

VectorStar™ MS4640A Series

Microwave Vector Network Analyzers

MS4642A, 10 MHz to 20 GHz, K Connectors

MS4644A, 10 MHz to 40 GHz, K Connectors

MS4645A, 10 MHz to 50 GHz, V Connectors

MS4647A, 10 MHz to 70 GHz, V Connectors



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Manufacturer's Name: ANRITSU COMPANY

Manufacturer's Address: Microwave Measurements Division
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

declares that the product specified below:

Product Name: VectorStar (Microwave Vector Network Analyzer)

Model Number: MS464XA

conforms to the requirement of:

EMC Directive: 2004/108/EC
Low Voltage Directive: 2006/95/EC

Electromagnetic Compatibility: EN61326:2006

Emissions: EN55011: 2007 Group 1 Class A

Immunity: EN 61000-4-2:1995 +A1:1998 +A2:2001 4kV CD, 8kV AD
EN 61000-4-3:2002 +A1:2008 3V/m
EN 61000-4-4:2004 0.5kV SL, 1kV PL
EN 61000-4-5:2006 0.5kV L-L, 1kV L-E
EN 61000-4-6: 2007 3V
EN 61000-4-11: 2004 100% @ 20msec

Electrical Safety Requirement:

Product Safety: EN 61010-1:2001

Morgan Hill, CA


Eric McLean, Corporate Quality Director

14 JAN 2009
Date

European Contact: For Anritsu product EMC & LVD information, contact Anritsu LTD, Rutherford Close, Stevenage Herts, SG1 2EF UK, (FAX 44-1438-740202)

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印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
LCD	×	×	×	×	○	○
其他(电缆、风扇、 连接器等) (Appended goods)	×	○	×	×	○	○

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Symbols Used in Manuals

Danger



This indicates a very dangerous procedure that could result in serious injury or death, and possible loss related to equipment malfunction, if not performed properly.

Warning



This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

Caution



This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

For Safety

Warning



Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Warning



or



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Warning



This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Warning



Use two or more people to lift and move this equipment, or use an equipment cart. There is a risk of back injury if this equipment is lifted by one person.

Caution



Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Chapter Descriptions

Chapter 1 — Overview

This manual provides a reference manual for the User Interface (UI) menus and dialog boxes in the VectorStar Series VNAs. In addition, this manual provides the context-sensitive portion of the instrument HELP system. The full documentation set for the VectorStar VNA includes the following documents. Many are included in the user documentation CD that came with the VNA. All except the maintenance manuals are available from the Anritsu Web Site. Maintenance manuals are available by contacting Anritsu Customer Service. Refer to the other documentation for the MS4640A Series VNA for more detailed explanations and procedures. Available documents are listed below.

Chapter 2 — Main Menu

This user interface (UI) reference chapter summary operational information about the UI and detailed overview of the primary controls on the top-of-screen Menu Bar and Icon Bar, and the right-side application Main Menu. The Main Menu is available for VectorStar VNAs. The Menu Bar provides drop-down menu interface to major instrument functions. The Icon Bar provides single-click access many instrument functions and is user-configurable to meet individual needs. The description of the Main Menu (MAIN) provides top level descriptions of each major function with links to detailed descriptions of menus and dialog boxes in subsequent chapters.

Chapter 3 — Channel Menus

This chapter provides information for setting the number of channels and how they are displayed on the instrument. If the instrument is in 25,000 point mode, up to 16 channels can be configured, each with up to 16 traces per channel. If the instrument is in 100,000 point mode, only one channel with up to 16 trace can be displayed.

Chapter 4 — Frequency Menus

This chapter provides information for configuring and displaying the frequency menus and their variants. The menus and associated field toolbars allow the user set various frequency start, stop, span, point, and CW mode parameters. The settings on the Frequency menu apply to the currently active channel. Settings on the SWEEP TYPES and other menus affect the frequency menu appearance, button availability, and available controls.

Chapter 5 — Power Menus - 2-Port VNAs

This chapter provides information per-port power and, if equipped, attenuator configurations for the VNA in 2-Port Mode. The Power menus and associated field toolbars allow the user to set various power mode parameters. The settings on the Power menus apply to the currently active channel. The power menus, their link structure, appearance, and related dialog boxes vary depending on the setting of the SWEEP TYPE menu as either: Frequency-Based Sweep (Linear or Log), Segmented-Based Sweep (Frequency- or Index-Based), or Power-Based Sweep (CW Frequency or Swept Frequency). Note that the menu appearance, button availability, and hierarchical links change if the VNA is in 4-Port Mode. For 4-Port Mode power menus, see [Chapter 6, “Power Menus - 4-Port VNAs”](#).

Chapter 6 — Power Menus - 4-Port VNAs

This chapter provides information on per-port power control and configuration, and, if equipped, attenuator configurations for the VNA in 4-Port Mode. The power menus and associated field toolbars allow the user to set various power mode parameters which apply to the currently active channel. The power menus, their link structure, appearance, and related dialog boxes vary depending on the setting of the SWEEP TYPE menu as either a Frequency-Based Sweep (Linear or Log), a Segment-Based Sweep (Frequency- or Index-Based), or a Power Sweep (CW Frequency or Swept Frequency). Note that the menu appearance, button availability, and hierarchical links change if the VNA is in 2-Port Mode. For 2-Port Mode power menus, see [Chapter 5, “Power Menus - 2-Port VNAs”](#).

Chapter 7 — Sweep Menus

This chapter provides information for controlling the instrument sweep types and their associated parameters. There are six (6) basic sweep types available: Frequency-based linear sweep, Frequency-based log sweep, Segmented frequency-based sweep, Segmented index-based sweep, Power sweep CW frequency, and Power sweep swept frequency. Configuration tableaus are provided for each segmented sweep allowing a specific set of frequencies or power levels to be assigned to an instrument setup. All sweep configurations can be saved or recalled individually and/or assigned to a user-defined preset setup configuration that can be recalled at any time. The sweep menus also configure the hold and trigger conditions available to each sweep type.

Chapter 8 — Averaging Menus

This chapter provides information for the AVERAGING menu and its functions. The menu controls the on/off status of averaging, the averaging factor, and whether the averaging type is per point or per sweep. Functions are also provided for IFBW and trace smoothing.

Chapter 9 — Calibration Menus - 2-Port VNAs

This chapter provides information for calibrating the 2-Port versions of the VectorStar MS4640A Series VNAs. This calibration chapter is organized in the sequence of the menus and dialog boxes that control the various types of calibrations. Due to the numerous permutations of instrument calibration ports, AutoCal, manual calibration, calibration methods, line types, and connectors, only a small subset of calibrations are shown.

Chapter 10 — Calibration Menus - 4-Port VNAs

This chapter provides information for calibrating the 4-Port versions of the VectorStar MS4640A Series VNAs. This calibration chapter is organized in the sequence of the menus and dialog boxes that control the various types of calibrations. Due to the numerous permutations of instrument calibration ports, AutoCal, manual calibration, calibration methods, line types, and connectors, only a small subset of calibrations are shown.

Chapter 11 — Measurement Menus

This chapter provides information for the measurement menu system which controls the embed/de-embed functions, the impedance transformations, reference plane location and the post-processing order functions along with their related configuration dialog boxes. The measurement system functions are available to VectorStar MS4640A Series VNAs.

Chapter 12 — Application Menus - Overview

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode. It provides links to the following five APPLICATION menu chapters, each of which focuses on a separate VNA application function and configuration control.

Chapter 13 — Application Menus - Multiple Source

This chapter provides information for the single APPLICATION menu with controls for instrument multiple source.

Chapter 14 — Application Menus - Broadband/Millimeter-Wave

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode, and whether broadband or multiple sources are used. The menu also provides access to NXN setup.

Chapter 15 — Application Menus - Noise Figure

This chapter provides information on the APPLICATION menu and Noise Figure Measurement configuration, when the VNA is equipped with Option 041. The configuration process starts when the VNA application mode is changed to Noise Figure, which enables the noise figure measurement configuration and operation menus and dialogs.

Chapter 16 — Application Menus - Mixer Setup

This chapter provides information for the APPLICATION menu and its configuration controls for NxN setup. Other Application Menu Chapters

Chapter 17 — Application Menus - NxN

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode, and whether broadband or multiple sources are used. The menu also provides access to NxN setup.

Chapter 18 — Trace Menus

This chapter provides information for the number of traces that appear for each channel and how those traces are arranged on the main display. Up to 16 traces can be defined for each channel. There are 22 available trace layouts.

Chapter 19 — Response Menus - 2-Port VNAs

This chapter provides information for the 2-Port VNA Response menus for configuration of the required S-Parameter or user-definition of a unique parameter. This menu also controls the rear panel **External Analog Input** port source. For information on the Response menus for 4-Port VNA, consult [Chapter 20, “Response Menus - 4-Port VNAs”](#)

Chapter 20 — Response Menus - 4-Port VNAs

This chapter provides information for the 4-Port VNA Response menus for configuration of the required S-Parameter or user-definition of a unique parameter. The MIXED-MODE dialog boxes described below allow mixed-mode response setup on a trace-by-trace basis with multiple response options for each trace. This menu also controls the rear panel External Analog Input port source. For information on the Response menus for 2-Port VNAs, consult [Chapter 19, “Response Menus - 2-Port VNAs”](#)

Chapter 21 — Display Menus

This chapter provides information for setup and configuration for the main instrument display. Selections provide control over the trace format with over 17 different major displays. Each display type can be further modified with parameters applicable to that format. The control also provides control for trace memory and trace math modifications. The trace limit functions allow maximum/minimum parameters to be set for each trace and provide visual and/or programmatic indications of pass/fail. Four major time domain settings are available for no time domain, frequency with time gate, time low pass, and time band pass. Gain compression configurations are available for CW Swept Frequency and Power Swept Frequency. Other menus and dialogs are available for range setup, DC term, extrapolation, gate setup, and window shape functions.

Chapter 22 — Scale Menus

This chapter provides information about the button controls for the SCALE menu variants. SCALE menus provide trace display control of settings such as resolution, reference value, and the scale of units. The number of buttons on a SCALE menu depends on the settings on the TRACE FORMAT menu. The bottom five (5) buttons on the SCALE menu, always the same, apply settings to the active trace, channel, or all channels and also control of the number of display vertical divisions.

Chapter 23 — Marker Menus

This chapter provides information for configuring and controlling the marker functions. The instrument provides up to 13 markers per trace of which 12 can be direct markers and one (1) a reference marker. Each marker can be individually controlled on/off and positioned as required. If the reference marker is off, each marker provides measurement data based on its display position. If the reference marker is on, each marker provides differential measurement data based on its position relative the reference. Other functions for display options and various types of single- and multi-peak search are available.

Chapter 24 — System Menus

This chapter provides information for various system and instrument management and configuration functions including initial setup, power-on options, preset options, remote interface management, network interface, self-test, and diagnostics.

Chapter 25 — File Management Menus

This chapter provides information for management of various system output and configuration files including Active channel TXT files, Active channel S2P files, Active channel CSV files, Active trace data (Formatted), and Active trace data (Unformatted).

Appendix A — File Specifications

This appendix defines the file directory structure used on the default-configuration MS4640A Series VNA and provides the general file extensions and specifications used in the instrument. The following is the standard directory structure:

Appendix B — Error Messages

This appendix lists, describes, and provides corrective action for the error messages that appear on the instrument display. Any error messages that require action by a qualified service representative are also listed. The tables below describe the name of the message, the typical reason for its occurrence, and recommended error correction methods. In many cases, the remedial action for the error message is described with applicable cross-references to documented procedures.

Table of Contents

Chapter 1 — Overview

1-1 Introduction	1-1
VNA System Documentation List	1-1
VectorStar MS4640A Series Vector Network Analyzer	1-1
VectorStar ME7838 Series 2-Port BB/mmW VNA Measurement System	1-1
VectorStar ME7828A Series Standard BB/mm-Wave VNA Measurement System	1-2
VectorStar MN4690B Series Multiport VNA Measurement System	1-2
Calibration Kits	1-2
Verification and Performance Verification Software (PVS) Kits	1-2
1-2 Updates to Manuals	1-3
1-3 Documentation Conventions.	1-3
Instrument Identification	1-3
Hard Keys or Front Panel Keys	1-3
1-4 VectorStar MS4640A Series VNA Models	1-4
1-5 MS4640A Series VNA Options.	1-5

Chapter 2 — Main Menu

2-1 Chapter Overview	2-1
2-2 MAIN Menu.	2-1

Chapter 3 — Channel Menus

3-1 Chapter Overview	3-1
3-2 Overview of Channel Menus.	3-1
3-3 Channel Menus.	3-2

Chapter 4 — Frequency Menus

4-1 Chapter Overview	4-1
4-2 Overview of Frequency Menus.	4-1
4-3 Frequency Menus	4-1
FREQUENCY Menu Changes	4-1
FREQUENCY Menu with Frequency-Based Sweep (Linear).	4-1
FREQUENCY Menu with Frequency-Based Sweep (Log).	4-1
FREQUENCY Menu with Segmented Sweep (Frequency-Based).	4-2
FREQUENCY Menu - INDEX. SEG. SWP Menu with Segmented Sweep (Index-Based).	4-2
FREQUENCY Menu with Power Sweep (CW Frequency)	4-2
FREQUENCY Menu with Power Sweep (Swept Frequency)	4-2

Chapter 5 — Power Menus - 2-Port VNAs

5-1 Chapter Overview	5-1
5-2 Overview of Power Menus	5-1
5-3 Appearance of Power Menus on 2-Port VNAs	5-2
Sweep Types	5-2
VNA Model, Option, and Mode	5-2

Table of Contents (Continued)

5-4 Maximum and Minimum Power Settings	5-3
5-5 Power Menus for Frequency-Based Sweeps (Linear and Log)	5-5
5-6 Power Menus for Segment-Based Sweeps (Frequency and Index)	5-7
5-7 Power Menus for Power-Based Sweeps (CW and Swept Frequency)	5-9
5-8 POWER Menu Variants - 2-Port VNAs	5-11
POWER Menu Name and Button Changes	5-11
POWER Menu Button Changes	5-11
POWER Menu with Frequency-Based Sweeps	5-11
POWER Menu with Segment-Based Sweeps	5-11
POWER Menu with Power-Based Sweeps	5-11
5-9 ATTENUATORS Menu Variants	5-20
ATTENUATOR Menu Button Availability	5-20
ATTENUATOR Menu Location	5-20
5-10 POWER SETUP Menu Variants	5-24
Sweep Type Frequency-Based	5-24
Sweep Type Segment-Based	5-24
Sweep Type Power-Based	5-24
5-11 POWER CAL Menu Variants	5-30
POWER CAL Non-Power Menus	5-30
POWER CAL Power-Based Menus	5-30
5-12 Receiver Setup and Calibration Menus - 2-Port VNAs	5-38
5-13 External Source Power Menu - 2-Port VNAs	5-45

Chapter 6 — Power Menus - 4-Port VNAs

6-1 Chapter Overview	6-1
6-2 Overview of Power Menus - 4-Port VNAs	6-1
6-3 Appearance of Power Menus on 4-Port VNAs	6-2
Sweep Types	6-2
VNA Model, Option, and Mode	6-2
6-4 Maximum and Minimum Power Settings	6-3
6-5 Power Menus for Frequency-Based Sweep (Linear and Log)	6-5
6-6 Power Menus for Segment-Based Sweep (Frequency and Index)	6-7
6-7 Power Menus for Power-Based Sweep (CW and Swept Frequency)	6-9
6-8 POWER Menu Variants - 4-Port VNAs	6-11
POWER Menu Name and Button Changes	6-11
POWER Menu Button Changes	6-12
POWER Menu with Frequency-Based Sweeps	6-12
POWER Menu with Segment-Based Sweeps	6-12
POWER Menu with Power-Based Sweeps	6-12
6-9 ATTENUATORS Menu Variants - 4-Port VNAs	6-20
ATTENUATOR Menu Button Availability	6-20
ATTENUATOR Menu Location	6-20

6-10 POWER SETUP Menu Variants - 4-Port VNAs	6-24
Sweep Type Frequency-Based	6-24
Sweep Type Segment-Based	6-24
Sweep Type Power-Based	6-24
6-11 Receiver Setup and Calibration Menus - 4-Port VNAs	6-30
6-12 External Source Power Menu	6-38

Chapter 7 — Sweep Menus

7-1 Chapter Overview	7-1
7-2 Overview of Sweep Menus	7-1
7-3 Sweep Setup and Sweep Type Menus	7-2
7-4 Segmented Frequency-Based Sweep Setup	7-6
7-5 Segmented Index-Based Sweep Setup	7-12
7-6 Sweep Hold and Trigger Functions	7-14
HOLD CONDITIONS Menu Variants	7-16
HOLD CONDITIONS Frequency-Based Sweep Menu	7-16
HOLD CONDITIONS Power-Based Sweep Menu	7-16
Related Menus	7-16

Chapter 8 — Averaging Menus

8-1 Chapter Overview	8-1
8-2 Overview of the Averaging Menu	8-1
8-3 Averaging Menu Functions	8-2

Chapter 9 — Calibration Menus - 2-Port VNAs

9-1 Chapter Overview	9-1
9-2 Overview of 2-Port Calibration Menus and Dialog Boxes	9-1
Primary Calibration Menus - 2-Port VNAs	9-1
Calibration Utility Functions - 2-Port VNAs	9-1
AutoCal Setup Menu - 2-Port VNAs	9-1
AutoCal 2-Port Calibration - 2-Port VNAs	9-1
AutoCal 1-Port Calibration - 2-Port VNAs	9-2
Manual Calibration Configuration - 2-Port VNAs	9-2
Manual 2-Port Calibration - 2-Port VNAs	9-2
Manual 1-Port Calibration - 2-Port VNAs	9-2
Manual Transmission Frequency Response Calibration - 2-Port VNAs	9-2
Manual Reflection Frequency Response Calibration - 2-Port VNAs	9-2
General Purpose Manual Calibration Dialog Boxes	9-3
9-3 Primary Menus for 2-Port VNA Calibration	9-4
9-4 Calibration Utility Functions	9-10
9-5 AutoCal Port Setup - 2-Port VNAs	9-43
9-6 AutoCal 2-Port Cal Setup - 2-Port VNAs	9-44
9-7 AutoCal 1-Port Cal Setup - 2-Port VNAs	9-49

Table of Contents (Continued)

9-8 Manual Calibration Menus and Dialog Boxes	9-53
Manual Calibration Types	9-54
Manual Calibration Methods	9-54
Calibration Line Types	9-54
Manual Calibration Dialog Box Settings	9-54
9-9 Manual 2-Port Cal Setup - 2-Port VNAs	9-60
Manual 2-Port Cal Setup Dialog Boxes - 2-Port VNAs	9-62
Manual 2-Port Cal Dialog Box Summary	9-75
9-10 Typical Calibration Sub-Menus	9-80
9-11 Manual 1-Port Cal Setup - 2-Port VNAs	9-86
Modify One-Port Cal Setup Dialog Boxes	9-88
Summary of 1-Port Calibration Setup Dialog Boxes	9-97
9-12 Manual Cal - Trans. Freq. Resp. Cal - 2-Port VNAs	9-100
Transmission Frequency Response Calibration Setup Dialog Boxes	9-104
9-13 Manual Cal - Refl. Freq. Resp. Cal - 2-Port VNAs	9-106
Refl. Freq. Resp. Calibration Setup Dialog Box Summary	9-114
9-14 Manual Calibration General Dialog Boxes - 2-Port VNAs	9-117
Chapter 10 — Calibration Menus - 4-Port VNAs	
10-1 Chapter Overview	10-1
10-2 Overview of 4-Port Calibration Menus	10-1
Primary Calibration Menus	10-1
Calibration Utility Functions	10-1
AutoCal Setup Menu	10-1
AutoCal 4-Port Calibration - 4-Port VNA	10-1
AutoCal 2-Port Calibration - 4-Port VNA	10-2
AutoCal 1-Port Calibration - 4-Port VNA	10-2
Manual Calibration Configuration - 4-Port VNA	10-2
Manual 4-Port Calibration - 4-Port VNA	10-2
Manual 3-Port Calibration - 4-Port VNA	10-3
Manual 2-Port Calibration - 4-Port VNA	10-3
Manual 1-Port Calibration - 4-Port VNA	10-3
Manual Transmission Frequency Response - 4-Port VNA	10-3
Manual Reflection Frequency Response Calibration - 4-Port VNA	10-4
Manual Calibration General Dialog Boxes - 4-Port VNA	10-5
10-3 Primary Menus for 4-Port VNA Calibration	10-6
10-4 Calibration Utility Functions	10-12
10-5 AutoCal Port Cal Setup - 4-Port VNAs	10-49
10-6 AutoCal 2-Port Cal Setup - 4-Port VNAs	10-54
10-7 AutoCal 1-Port Cal Setup - 4-Port VNAs	10-58
10-8 Manual Calibration Menus and Dialog Boxes - 4-Port VNAs	10-60
Manual Cal Combinations	10-61
Manual Cal Dialog Box Settings	10-61
10-9 Manual 4-Port Cal Setup - 4-Port VNAs	10-68
Manual 4-Port Cal Setup Dialog Boxes - 4-Port VNAs	10-71
Manual 4-Port Cal Dialog Box Summary	10-88

10-10 Typical Calibration Sub-Menus	10-93
10-11 Manual 3-Port Cal Setup - 4-Port VNAs	10-101
Summary of 3-Port Calibration Setup Dialog Boxes.	10-116
10-12 Manual 2-Port Cal Setup - 4-Port VNAs	10-121
Summary of 2-Port Calibration Setup Dialog Boxes.	10-133
10-13 Manual 1-Port Cal Setup	10-138
Summary of 1-Port Calibration Setup Dialog Boxes.	10-148
10-14 Manual Trans. Freq. Resp. Cal Menu and Dialog Boxes	10-151
Summary of Trans. Freq. Resp. Cal Setup Dialog Boxes	10-159
10-15 Manual Refl. Freq. Resp. Menu and Dialog Boxes.	10-161
Summary of Refl. Freq. Resp. Calibration Setup Dialog Boxes	10-169
10-16 Manual Calibration General Dialog Boxes	10-172
Chapter 11 — Measurement Menus	
11-1 Chapter Overview	11-1
11-2 Overview of Measurement Menus	11-1
Chapter 12 — Application Menus - Overview	
12-1 Chapter Overview	12-1
Other Application Menu Chapters.	12-1
12-2 APPLICATION Menu Variants	12-2
12-3 Typical APPLICATION Menus	12-4
12-4 APPLICATION Menu Instrument Mode Controls	12-6
12-5 APPLICATION Menu - Receiver Configuration Selection Control	12-7
12-6 APPLICATION Menu - Configuration Setup Control	12-7
Chapter 13 — Application Menus - Multiple Source	
13-1 Chapter Overview	13-1
Other Application Menu Chapters.	13-1
13-2 Application Menus and Dialog Boxes for Multiple Source	13-1
13-3 Application Menu Variants for Multiple Source.	13-2
13-4 Multiple and External Source Control.	13-5
Chapter 14 — Application Menus - Broadband/Millimeter-Wave	
14-1 Chapter Overview	14-1
Other Application Menu Chapters.	14-1
14-2 Application Menus and Dialog Boxes for BB/mm-Wave.	14-1
14-3 Application Menu Variants for BB/mm-Wave	14-2
14-4 Broadband/Millimeter-Wave Setup.	14-5
14-5 Broadband/Millimeter-Wave Control.	14-19
Chapter 15 — Application Menus - Noise Figure	
15-1 Chapter Overview	15-1
Other Application Menu Chapters.	15-1
15-2 Application Menus and Dialog Boxes for Noise Figure.	15-1

Table of Contents (Continued)

15-3 Noise Figure Overview	15-2
15-4 Noise Figure Procedure	15-2
15-5 Primary Application Menus and Noise Figure Dialogs and Menus	15-4
Transmission/Reflection Mode to Noise Figure Mode	15-5
Noise Figure Mode to Transmission/Reflection Mode	15-5
15-6 Noise Figure Menus and Dialogs	15-6

Chapter 16 — Application Menus - Mixer Setup

16-1 Chapter Overview	16-1
Other Application Menu Chapters	16-1
16-2 Application Menus and Mixer Dialog Boxes	16-1
16-3 Application Menu Variants for Mixer Setup	16-2
16-4 Mixer Setup Dialog Overview	16-5
Mixer Setup Procedure Variants	16-5
16-5 ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep	16-7
Mixer Setup – Active Channel – Linear/Log Frequency Sweep – Menu Set	16-7
Mixer Setup – Active Channel – Information Required	16-7
Mixer Setup – Active Channel – Frequency Sweep – Procedure	16-8
16-6 ACTIVE CHANNEL Dialog Box – Power-Based Sweep	16-16
Mixer Setup – Active Channel – Power Sweep – Menu Set	16-16
Mixer Setup – Active Channel – Power Sweep – Information Required	16-16
Mixer Setup – Active Channel – Power Sweep – Procedure	16-17
16-7 MULTI-CHANNEL – Frequency-Based Sweep	16-26
Mixer Setup – Multi-Channel – Frequency Sweep – Menu Set	16-26
Mixer Setup – Multi-Channel – Frequency Sweep – Available Measurements	16-29
Mixer Setup – Multi-Channel – Frequency Sweep – Channel Assignments	16-29
Mixer Setup – Multi-Channel – Frequency Sweep – Procedure	16-29
16-8 MULTI-CHANNEL – Power-Based Sweep	16-39
Mixer Setup – Multi-Channel – Power Sweep – Menu Set	16-40
Mixer Setup – Multi-Channel – Power Sweep – Available Measurements	16-40
Mixer Setup – Multi-Channel – Power Sweep – Channel Assignments	16-41
Mixer Setup – Multi-Channel – Power Sweep – Procedure	16-41

Chapter 17 — Application Menus - NxN

17-1 Chapter Overview	17-1
Other Application Menu Chapters	17-1
17-2 Application Menus and NxN Dialog Boxes	17-2
17-3 NXN S2P Configuration	17-3

Chapter 18 — Trace Menus

18-1 Chapter Overview	18-1
18-2 Overview of Trace Menus	18-1
18-3 Trace Configuration	18-2
18-4 Trace Display Layout	18-4

Chapter 19 — Response Menus - 2-Port VNAs

19-1 Chapter Overview	19-1
19-2 Primary Response Menus - 2-Port VNAs	19-1
19-3 User-Defined Parameter Menus - 2-Port VNAs	19-5
19-4 Mixed Mode Setup Menus - 2-Port VNAs	19-9
19-5 External Analog Input Menus	19-10
19-6 Noise Figure Response Menu	19-11

Chapter 20 — Response Menus - 4-Port VNAs

20-1 Chapter Overview	20-1
20-2 Overview of 4-Port Response Menus and Dialog Boxes	20-1
20-3 Display Response Mixed-Mode Control Menu	20-1
20-4 Response Menu Set - 4-Port VNAs	20-2
RESPONSE and SINGLE-MODE Menus	20-2
RESPONSE and USER-DEFINED Menus	20-3
RESPONSE Menu and MIXED MODE Dialog Box	20-4
RESPONSE Menu and NF RESPONSE Menu	20-5
20-5 Primary Response Menus - 4-Port VNAs	20-6
20-6 User-Defined Parameter Menus	20-11
20-7 Mixed Mode Setup Dialog Boxes	20-18
Dialog Boxes	20-18
Alternate Mixed Mode Configuration Control	20-18
20-8 External Analog Input Menus	20-28
20-9 Noise Figure Response Menu	20-30

Chapter 21 — Display Menus

21-1 Chapter Overview	21-1
21-2 Overview of Display Menus and Dialog Boxes	21-1
21-3 Display Main Menu	21-3
21-4 Trace Format and Parameter Menus	21-6
21-5 Trace Limit Line Control Menus and Dialog Boxes	21-22
Polar Chart Circular Limit Lines	21-23
Smith Chart Circular Limit Lines	21-25
21-6 DOMAIN Menu Appearance and Button Availability	21-34
DOMAIN Menu Button Selection Group	21-34
DOMAIN Menu Variants	21-34
DOMAIN Frequency with No Time Gate Menu	21-35
DOMAIN Frequency with Time Gate	21-35
DOMAIN Time Gate Low Pass Menu	21-35
DOMAIN Time Gate Band Pass Menu	21-36

Table of Contents (Continued)

21-7 Gain Compression Menus and Dialog Boxes	21-42
Types of Gain Compression	21-42
Gain Compression Button Not Available	21-42
Gain Compression Button Available	21-42
GAIN COMPRESS Self Normalization Menu	21-42
GAIN COMPRESS Compress Param Menu	21-43
Cross References to Related Menus	21-43
21-8 Domain Time Definition Menu	21-51
21-9 Range Setup Menus and Dialog Boxes	21-52
Range Setup Button Unavailable	21-52
RANGE SETUP Menu Availability	21-52
RANGE SETUP Menu Variants	21-52
RANGE SETUP 7-Button Menu - Frequency with Time Gate	21-52
RANGE SETUP 8-Button Menu - Time Band Pass	21-52
RANGE SETUP 9-Button Menu - Time Low Pass	21-52
RANGE SETUP Button Units	21-53
21-10 Time Domain Window Shape and Gate Setup Menus	21-63
21-11 Inter- and Intra-Trace Math and Operand Setup Menus	21-73
21-12 Conversion and Display Utility Menus and Dialog Boxes	21-76
Chapter 22 — Scale Menus	
22-1 Chapter Overview	22-1
22-2 Scale Menus Appearance, Common Buttons, and Units	22-1
Appearance	22-1
Common SCALE Menu Buttons	22-1
SCALE Menu Units	22-2
22-3 Overview of SCALE Menu Variants	22-4
22-4 SCALE Magnitude Menus	22-5
22-5 SCALE Phase Menu	22-8
22-6 SCALE Real or Imaginary Menus	22-9
22-7 SCALE SWR Menu	22-13
22-8 SCALE Smith Chart Menus	22-14
22-9 SCALE Polar Chart Menus	22-24
22-10 SCALE Dual-Trace Display Menus	22-26
22-11 SCALE Group Delay Menu	22-34
22-12 SCALE Power Menus	22-36
22-13 SCALE Menu Common Buttons	22-38
Chapter 23 — Marker Menus	
23-1 Chapter Overview	23-1
23-2 Overview of Marker Menus, Dialog Boxes, and Toolbars	23-1

23-3 Marker Menu Overview	23-2
Marker Button Label Changes	23-2
Marker Unit Changes	23-2
Reference Marker OFF or On.	23-2
Turning Individual Markers Off and On.	23-2
Turning All Markers On.	23-2
Turning All Markers Off.	23-3
Naming Conventions for Marker Buttons and Toolbars	23-3
23-4 Primary Marker Menus	23-4
Marker Labels	23-8
23-5 Marker Search Menus	23-9
23-6 Marker Value/Math Functions.	23-23

Chapter 24 — System Menus

24-1 Chapter Overview	24-1
24-2 System Menus and Dialog Boxes.	24-1
24-3 System Menus	24-2
24-4 Setup Menus.	24-4
24-5 Preset Menus and Dialog Boxes	24-6
24-6 Time and Color Setup Dialog Boxes.	24-12
24-7 Maximum Points and Options Control Menus	24-15
24-8 SNP Files Setup	24-23
24-9 System Utility Menus	24-27
24-10 Remote Interface Menus and Dialog Box.	24-36
24-11 Network Interface Menus and Dialog Boxes.	24-43

Chapter 25 — File Management Menus

25-1 Chapter Overview	25-1
25-2 Overview of File Management Menus and Dialog Boxes.	25-1
25-3 File Menus and Dialog Boxes.	25-2

Appendix A — File Specifications

A-1 Default File Directory Structure	A-1
A-2 File Extension Definitions.	A-1
A-3 Definitions for Specific Files.	A-6

Appendix B — Error Messages

B-1 Appendix Overview	B-1
B-2 System Messages	B-1
B-3 Operational Messages	B-2

Subject Index

Table of Contents (Continued)

Chapter 1 — Overview

1-1 Introduction

This manual provides a reference manual for the User Interface (UI) menus and dialog boxes in the VectorStar Series VNAs. In addition, this manual provides the context-sensitive portion of the instrument HELP system. The full documentation set for the VectorStar VNA includes the following documents. Many are included in the user documentation CD that came with the VNA. All except the maintenance manuals are available from the Anritsu Web Site. Maintenance manuals are available by contacting Anritsu Customer Service. Refer to the other documentation for the MS4640A Series VNA for more detailed explanations and procedures. Available documents are listed below.

VNA System Documentation List

The following documentation sets are available in support of the VectorStar VNA instruments and VNA Systems including the MS4640A Series VNAs, ME7828A Standard BB/mm-Wave System, ME7838A Modular BB/mm-Wave System, and the MN4690B Series Multiport VNA System. See the *VectorStar MS4640A Series VNA Operation Manual – 10410-00266* for longer descriptions of the primary MS4640A VNA documents as well as option and configuration information for each of the instruments and systems below. For more information on VNA systems, consult the system Technical Data Sheet (TDS). Most documents are available on the Anritsu Internet Web Site at www.anritsu.com. Maintenance manuals are available from Anritsu Customer Service. Printed copies of most manuals in 3-ring binders are available at nominal cost.

VectorStar MS4640A Series Vector Network Analyzer

- MS4640A Series VNA Technical Data Sheet (TDS) – 11410-00432
- MS4640A Series VNA Operation Manual (OM) – 10410-00266
- MS4640A Series VNA User Interface Reference (UI-RM) – 10410-00307
- MS4640A Series VNA Measurement Guide (MG) – 10410-00269
- MS4640A Series VNA Programming Manual (PM) – 10410-00267
- MS4640A Series VNA Programming Manual Supplement (PM-S) – 10410-00308
- MS4640A Series VNA Help System (HELP) – 10450-00008
 - Contains OM, UI-RM, PM, PM-S, and MG
- MS4640A Series VNA Maintenance Manual (MM) – 10410-00268
- MS4640A Series VNA User Documentation Compact Disc (CD) – 10920-00049
 - Contains MS4640A TDS, OM, UI-RM, PM, PM-S, MG, MM, and HELP above.

VectorStar ME7838 Series 2-Port BB/mmW VNA Measurement System

- ME7838A Modular BB/mm-Wave Technical Data Sheet (TDS) – 11410-00593
- ME7838D Modular BB/mm-Wave Technical Data Sheet (TDS) – 11410-00778
- ME7838A Modular BB/mm-Wave Quick Start Guide (QSG) – 10410-00292
- ME7838D Modular BB/mm-Wave Quick Start Guide (QSG) – 10410-00732
- ME7838 Series Modular BB/mm-Wave Installation Guide (IG) – 10410-00293
- VectorStar Broadband/Banded Millimeter-Wave Modules (RM) – 10410-00311
- ME7838 Series Modular BB/mm-Wave Maintenance Manual (MM) – 10410-00306

VectorStar ME7828A Series Standard BB/mm-Wave VNA Measurement System

- ME7828A Series BB/mm-Wave Technical Data Sheet – 11410-00452
- ME7828A Series BB/mm-Wave Quick Start Guide – 10410-00289
- ME7828A Series BB/mm-Wave Installation Guide – 10410-00287
- ME7828A Series BB/mm-Wave Maintenance Manual – 10410-00304
- ME7828A Series BB/mm-Wave User Documentation CD – 10920-00051
 - Contains TDS, QSG, IG, and MM above.

VectorStar MN4690B Series Multiport VNA Measurement System

- MN4690B Series Multiport VNA Measurement System Technical Data Sheet – 11410-00528
- MN4690B Series Multiport Test Set Quick Start Guide – 10410-00290
- MN4690B Series Multiport Test Set Installation Guide – 10410-00288
- MN4690B Series Multiport Test Set Maintenance Manual – 10410-00305
- MN4690B Series Multiport VNA Measurement System User Documentation CD – 10920-00053
 - Contains TDS, QSG, and IG above.

Calibration Kits

- 36585K and 36585V Precision Automatic Calibrator (AutoCal) Module Reference Manual – 10410-00279
 - 36585K-2F, Precision AutoCal Module, 70 kHz to 40 GHz, K (f) to K (f)
 - 36585K-2M, Precision AutoCal Module, 70 kHz to 40 GHz, K (m) to K (m)
 - 36585K-2MF, Precision AutoCal Module, 70 kHz to 40 GHz, K (m) to K (f)
 - 36585V-2F, Precision AutoCal Module, 70 kHz to 70 GHz, V (f) to V (f)
 - 36585V-2M, Precision AutoCal Module, 70 kHz to 70 GHz, V (m) to V (m)
 - 36585V-2MF, Precision AutoCal Module, 70 kHz to 70 GHz, V (m) to V (f)
- 3650A SMA/3.5 mm, 3651A GPC-7, 3652A K, 3653A Type N, and 3654D V Mechanical Calibration Kit Reference Manual – 10410-00278
 - 3650A Mechanical Calibration Kit, SMA/3.5 mm Connectors
 - 3650A-1 Mechanical Calibration Kit, SMA/3.5 mm Connectors with Sliding Loads
 - 3651A Mechanical Calibration Kit, GPC-7 Connectors
 - 3651A-1 Mechanical Calibration Kit, GPC-7 Connectors with a Single Sliding Load
 - 3652A Mechanical Calibration Kit, K Connectors
 - 3652A-1 Mechanical Calibration Kit, K Connectors with Sliding Loads
 - 3653A Mechanical Calibration Kit, Type N Connectors
 - 3654D Mechanical Calibration Kit, V Connectors
 - 3654D-1 Mechanical Calibration Kit, V Connectors with Sliding Loads

Verification and Performance Verification Software (PVS) Kits

- 3666-1 SMA/3.5 mm, 3663-1 Type N, 3668-1 K, and 3669B-1 V Verification Kits and 3-2300-527 PVS Quick Start Guide – 10410-00285
 - 3666-1 SMA/3.5 mm Connector Verification Kit
 - 3663-1 Type N Connector Verification Kit
 - 3668-1 K Connector Verification Kit
 - 3669B-1 V Connector Verification Kit
 - 3-2300-527 PVS
 - GPRG #67688

- 2300-531-R PVS for MS4640 Quick Start Guide – 10410-00291
- 3656B W1 (1 mm) Calibration/Verification Kit and 2300-496 PVS User Guide for VectorStar ME7838A and ME7828A and Lightning ME7808A/B/C Systems – 10410-00286
 - 3656B W1 Calibration Kit
 - 3656B W1 Verification Kit
 - 2300-496 System PVS
 - GPRG #76574
- 3659 - Cal-Verif- Kit-UG and 2300-558 System Performance Verification Software for BB-mmW ME7838D with 0.8 mm Connectors – 10410-00327
 - 3659 0.8 mm Calibration Kit
 - 3659 0.8 mm Verification Kit
 - 2300-558 System PVS
 - GPRG #76585

1-2 Updates to Manuals

For updates to any of the MS4640A Series VNA documentation, visit Anritsu's Web site at: <http://www.anritsu.com/VectorStar>

1-3 Documentation Conventions

The following conventions are used throughout the entire MS4640A Series documentation set:

Instrument Identification

Throughout this manual, the following term definitions are used:

- VectorStar VNA refers to any VectorStar VNA instrument or system.
- VNA refers to any VectorStar standalone VNA instrument.
- M4640A Series VNA refers to the MS4642A K, MS4644A K, MS4645A V, or the MS4647A V VNAs.

When required to identify a specific VNA model, the specific model number is used, such as MS4647A.

Note	Many of the images in this document are used as typical representations of the product, product features, or the user interface. Your instrument and instrument displays may vary slightly from these images.
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Hard Keys or Front Panel Keys

Front panel hard keys are denoted with a bold Sans Serif font such as “Press the front panel **Frequency** key.”

User Interface, Menus, and Soft Buttons

The MS4640A Series VNA user interface consists of menus, button lists, sub-menus, toolbars, and dialog boxes. All of these elements are denoted with a regular Sans Serif font, such as the CALIBRATION menu or the AutoCal button.

User Interface Navigation

- **Previous**

The prior object such as a menu or dialog box that was used to navigate to the current object is always identified with a “Previous” cross reference line. In some cases, multiple menus can link to the same sub-menu/dialog.

- **Navigation**

Elements in navigation shortcuts or paths (identified as “Navigation”) are separated with the pipe symbol (“|”). Menu and dialog box names are distinctive Sans Serif font in CAPITALS. Button names are in Title Case. For example, the path to the AUTOCAL menu is:

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL

User Input

User input such as entering values or other information is denoted in a mono-spaced font such as:

`This font denotes a string of user input.`

1-4 VectorStar MS4640A Series VNA Models

The VectorStar VNA is available in four basic models as shown in [Table 1-1](#) below.

Table 1-1. VectorStar MS4640A Series VNA Models

VNA Model Number	Name	Specifications	Connectors
MS4642A	Microwave Vector Network Analyzer	10 MHz to 20 GHz	K (m) Connector Test Ports
MS4644A	Microwave Vector Network Analyzer	10 MHz to 40 GHz	K (m) Connector Test Ports
MS4645A	Microwave Vector Network Analyzer	10 MHz to 50 GHz	V (m) Connector Test Ports
MS4647A	Microwave Vector Network Analyzer	10 MHz to 70 GHz	V (m) Connector Test Ports

For additional technical specifications and configuration data, see:

- **VectorStar MS4640A Series VNA Technical Data Sheet and Configuration Guide – 11410-00432**

1-5 MS4640A Series VNA Options

The available options for the MS4640A Series VNA are shown below.

Table 1-2. MS4640A Series VNA Options (1 of 2)

Option Name	Compatibility and Description	Option Part Numbers
Rack Mount Option – Adds 19" Rack Mounting Handles – Option 001	Optional for all VNA Models.	MS4640A-001
Time Domain Option – Option 002	Optional for all VNA Models.	MS4640A-002
Additional Hard Drive – Plug-In Serial ATA HDD with O/S – Option 004	Optional for all VNA Models.	MS4640A-004
Receiver Offset – Option 007	Optional for all VNA Models. • Provides Multiple Source, which includes mixer, IMD, and other measurements where the source and receiver operate at different frequencies. Required For: • The Receiver Offset option is required for Millimeter-Wave 3738x Systems (Options 082/083) and Broadband/Millimeter-Wave 3739x Systems (Options 080/081).	MS4640A-007
Noise Figure – Option 041	Optional for all VNA Models: • Requires front/rear panel access loops from Option 051, 061, or 062. • Adds VNA capability to measure degradation of the signal-to-noise ratio caused by components in a signal chain. • The Noise Figure measurement is based on a cold source technique for improved accuracy. • Various levels of match and fixture correction are available for additional enhancement. • For more information, see the VectorStar® MS4640A Series Microwave Vector Network Analyzers Calibration and Measurement Guide – 10410-00269 . • The supporting Noise Figure Uncertainty Calculator application available on VectorStar desktop and can be downloaded from the Anritsu web site.	MS4640A-041
Direct Access Loops – Option 051	Optional for all VNA Models: • If selected, do not use 061 or 062.	MS464xA-051
Active Measurements Suite with 2 Attenuators – Option 061	Optional for all VNA Models: • If selected, do not use 051 or 062	MS464xA-061
Active Measurements Suite with 4 Attenuators – Option 062	Optional for all VNA Models: • If selected, do not use 051 or 061.	MS464xA-062

Table 1-2. MS4640A Series VNA Options (2 of 2)

Option Name	Compatibility and Description	Option Part Numbers
70 kHz Low-End Frequency Extension – Option 070	Optional for all VNA Models.	MS464xA-070
Modular Broadband/Millimeter-Wave Option – Option 080	Optional: <ul style="list-style-type: none"> • For MS4647A VNAs without Option 051, 061, or 062. • If selected, do not use 082 or 083. 	MS4647A-080
Modular Broadband/Millimeter-Wave Option – Option 081	Optional: <ul style="list-style-type: none"> • For MS4647A VNAs with Option 051, 061, or 062. • If selected, do not use 082 or 083. 	MS4647A-081
Millimeter-Wave Option – Option 082	Optional: <ul style="list-style-type: none"> • For MS4644A, MS4645A, and MS4647A VNAs without Option 051, 061, or 062. • If selected, do not use 083. 	MS4644A-082 MS4645A-082 MS4647A-082
Millimeter-Wave Option – Option 083	Optional: <ul style="list-style-type: none"> • For MS4644A, MS4645A, and MS4647A VNAs with Option 051, 061, or 062. • If selected, do not use 082. 	MS4644A-083 MS4645A-083 MS4647A-083
VNA Hard Shell Transit Case	Optional for all VNA Models.	760-246
Extended Warranty and Service Options	Optional for all VNA Models.	MS464xA-ESxxx
Standard Calibration	Optional for all VNA Models.	MS464xA-098
Premium Calibration with Certification	Optional for all VNA Models.	MS464xA-099

Chapter 2 — Main Menu

2-1 Chapter Overview

This user interface (UI) reference chapter summary operational information about the UI and detailed overview of the primary controls on the top-of-screen **Menu Bar** and **Icon Bar**, and the right-side application **Main Menu**. The **Main Menu** is available for VectorStar VNAs. The **Menu Bar** provides drop-down menu interface to major instrument functions. The **Icon Bar** provides single-click access many instrument functions and is user-configurable to meet individual needs. The description of the **Main Menu (MAIN)** provides top level descriptions of each major function with links to detailed descriptions of menus and dialog boxes in subsequent chapters.

2-2 MAIN Menu

The **Main Menu** (or **MAIN**) provides 15 arrow buttons that link to lower-level submenus. The bulleted navigation paths presented in the sections below use the following conventions:

- Buttons are in initial capitals, such as **Channel** for the Channel button. For brevity, buttons are not named.
- Menus, toolbars, and dialog box names are in all capitals, such as **FREQUENCY** for the Frequency menu.
 - For brevity, menus are not labeled with the word “menu.”
 - Dialog boxes are labeled with the words “dialog box” such as the **SAVE FILE** dialog box.
 - Toolbars are labeled such as the **START FREQUENCY** field toolbar.

MAIN MENU

Navigation paths to all menus, toolbars, and dialog boxes start with the **MAIN MENU**.

- **MAIN MENU**

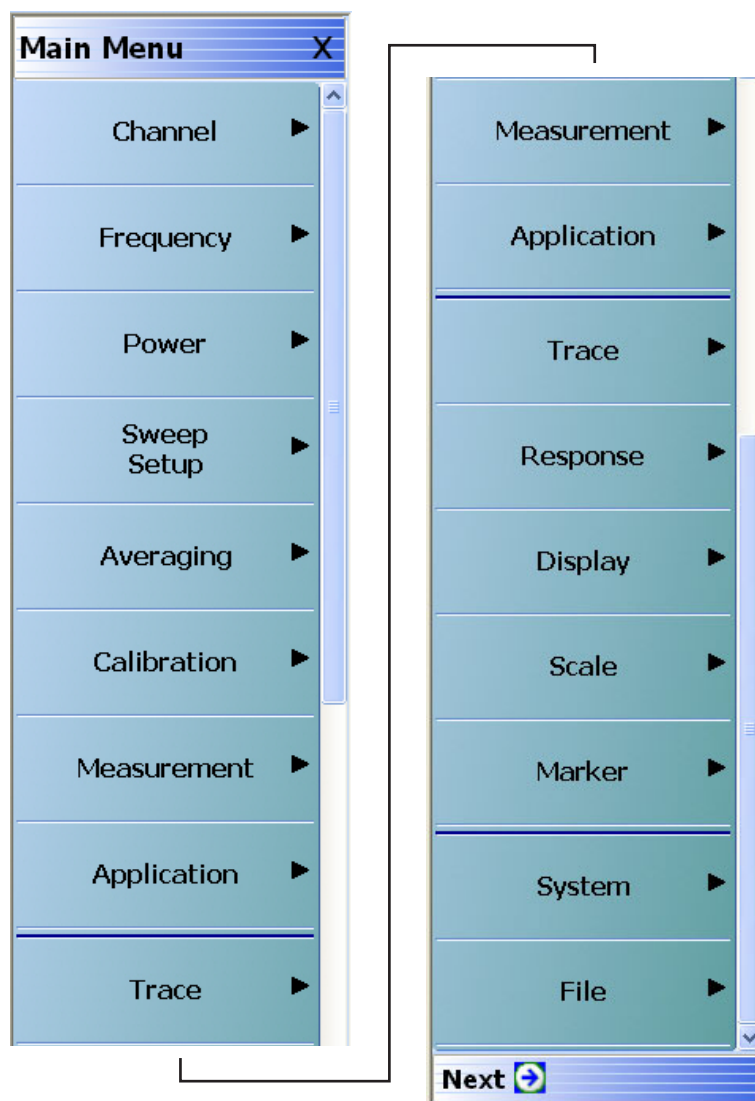


Figure 2-1. MAIN MENU

Channel

Select displays the CHANNEL menu.

- [“Channel Menus” on page 3-2](#)

Frequency

Select displays the FREQUENCY menu. The name, appearance, and available buttons on the FREQUENCY menu varies depending on the sweep type set and if CW frequency is selected.

- [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)

Power

Select displays the POWER menu which varies depending on 2-Port or 4-Port Mode, and the installed options.

- [“Power Menus - 2-Port VNAs” on page 5-1](#)
- [Chapter 6, “Power Menus - 4-Port VNAs”](#)

Sweep Setup

Select displays the SWEEP SETUP menu.

- [“Sweep Menus” on page 7-1](#)

Averaging

Select displays the AVERAGING menu.

- [“Averaging Menus” on page 8-1](#)

Calibration

Select displays the CALIBRATION menu.

- [“Calibration Menus - 2-Port VNAs” on page 9-1](#)
- [“Calibration Menus - 4-Port VNAs” on page 10-1](#)

Measurement

Select displays the MEASUREMENT menu.

- [“Measurement Menus” on page 11-1](#)

Application

Select displays the APPLICATION menu.

- [“Application Menus - Overview” on page 12-1](#)
- [“Application Menus - Multiple Source” on page 13-1](#)
- [“Application Menus - Broadband/Millimeter-Wave” on page 14-1](#)
- [“Application Menus - Noise Figure” on page 15-1](#)
- [“Application Menus - Mixer Setup” on page 16-1](#)
- [“Application Menus - NxN” on page 17-1](#)

Trace

Select displays the TRACE menu.

- [“Trace Menus” on page 18-1](#)

Response

Select displays the RESPONSE menu.

- [“Response Menus - 2-Port VNAs” on page 19-1](#)
- [“Response Menus - 4-Port VNAs” on page 20-1](#)

Display

Select displays the DISPLAY menu.

- [“Display Menus” on page 21-1](#)

Scale

Select displays the SCALE menu which allows the user to change the scaling and other attributes of a trace display.

- [“Scale Menus” on page 22-1](#)

The available SCALE menu buttons change based on the settings on the TRACE FORMAT menu.

- [“Trace Menus” on page 18-1](#)

Marker

Select displays the MARKER [1] menu.

- [“Marker Menus” on page 23-1](#)

System

Select displays the SYSTEM menu.

- [“System Menus” on page 24-1](#)

File

Select displays the FILE menu.

- [“File Management Menus” on page 25-1](#)

Chapter 3 — Channel Menus

3-1 Chapter Overview

This chapter provides information for setting the number of channels and how they are displayed on the instrument. If the instrument is in 25,000 point mode, up to 16 channels can be configured, each with up to 16 traces per channel. If the instrument is in 100,000 point mode, only one channel with up to 16 trace can be displayed.

3-2 Overview of Channel Menus

There are two channel menus:

- [“CHANNEL Menu” on page 3-2](#)
- [“CHAN. LAYOUT Menu” on page 3-3](#)

3-3 Channel Menus

The CHANNEL menu and the CHAN. LAYOUT menus are related in that the setting on one menu affects the setting on the other menu.

CHANNEL Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Channel | CHANNEL

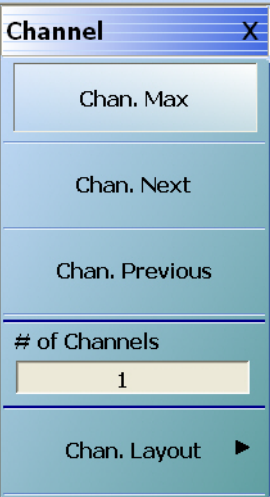

	<p>Chan. Max</p> <p>When multiple channels are displays, use the Channel Maximum button to maximize the active channel to fill the display area. Clicking a second time returns to the prior multi-channel view.</p> <p>Chan. Next</p> <p>When multiple channels are displayed, the Channel Next button activates the next higher channel number. When the highest channel number is reached, the next click activates channel 1 (one).</p> <p>Chan. Previous</p> <p>When multiple channels are displayed, the Channel Previous button activates the next lower channel number. When channel 1 (one) is reached, the next click activates the highest channel number.</p> <p># of Channels</p> <p>Select displays the Number of Channels field toolbar below the icon toolbar. The toolbar allows the user to set the number of displayed channels in discrete values of 1 (one), 2, 3, 4, 6, 8, 9, 10, 12, or 16 channels. If other channel settings are applied (5, 7, 11, 13, or 14), the instrument applies the next permitted channel setting. The Channel Layout (described below) is automatically set to the number of selected channels. If the instrument is in 100,000 point mode, only 1 (one) channel is available.</p>  <p>Chan. Layout</p> <p>The Channel Layout button displays the CHAN. LAYOUT menu which defines how multiple channels are displayed on the screen.</p> <ul style="list-style-type: none"> • “CHAN. LAYOUT Menu” on page 3-3
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Figure 3-1. CHANNEL Menu

CHAN. LAYOUT Menu

The CHANNEL LAYOUT menu allows the user to select from 22 selectable channel views. The channel view buttons are not labeled, but instead provide a representative icon of each view configuration. For example, the Single Channel View button provides a channel view where one channel is displayed in one display area. Once the desired view is selected, click the Back button at the bottom of the CHAN. LAYOUT menu to return to the CHANNEL menu. Note that CHAN. LAYOUT menu setting and the # of Channels setting on the CHANNEL menu are linked. Changing the number of channels selects an appropriate channel layout. Changing the channel layout where the number of displayed channels changes, changes the number of channels set on the CHANNEL menu.

Full Name

- CHANNEL LAYOUT Menu

Previous

- [“CHANNEL Menu” on page 3-2.](#)

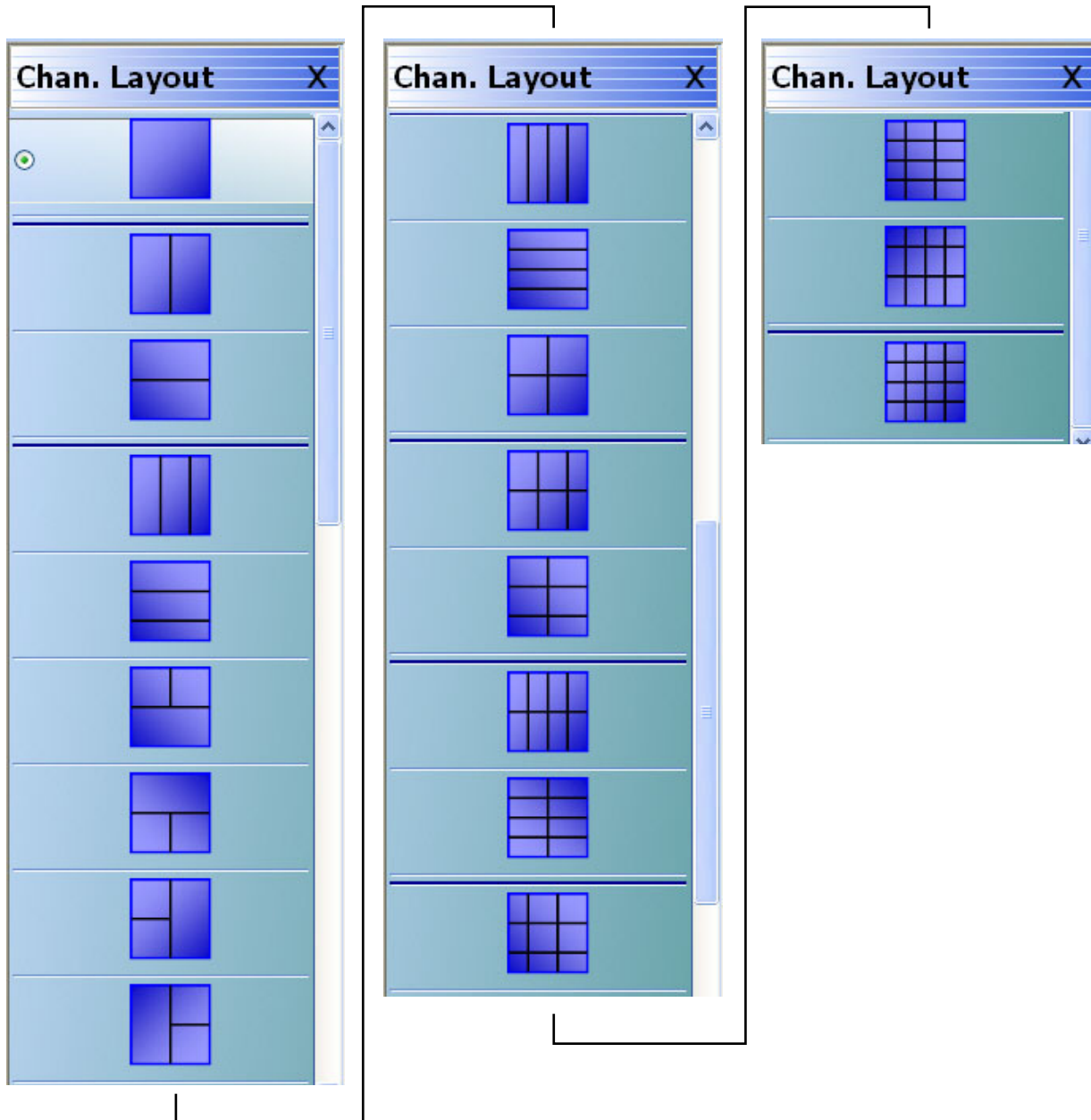
Navigation

- MAIN | Channel | CHANNEL | Chan. Layout | CHAN. LAYOUT

Note

The **Chan. Layout** buttons do not have labels, but do have tool tips that appear if the mouse pointer is hovered over the button. The selected channel layout view is indicated by the button selected icon. For VNA programmatic control, note also that each channel layout is described by the SCPI appropriate SCPI parameter. For example, to program a three across channel layout, use the R1C3 parameter.

The long CHAN LAYOUT menu is immediately below. The names of the different channel layout displays are shown in the [Table 3-1, “Channel Layout Options” on page 3-5](#) below.



The menu uses the right-side scroll bar to display the entire menu.

Figure 3-2. CHAN. LAYOUT (CHANNEL LAYOUT) Menu

The table below describes each Channel Layout option.

Table 3-1. Channel Layout Options (1 of 2)




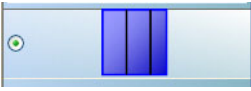


















Graphic	Description
	<p>Single Channel View Click Back to return to the CHANNEL menu. R1C1 for SCPI programs.</p>
	<p>Two Channel View - 2 Across x 1 Down Click Back to return to the CHANNEL menu. R1C2 for SCPI programs.</p>
	<p>Two Channel View - 1 Across x 2 Down Click Back to return to the CHANNEL menu. R2C1 for SCPI programs.</p>
	<p>Three Channel View - 3 Across Click Back to return to the CHANNEL menu. R1C3 for SCPI programs.</p>
	<p>Three Channel View - 3 Down Click Back to return to the CHANNEL menu. R3C1 for SCPI programs.</p>
	<p>Three Channel View - 2 on Top x 1 on Bottom Click Back to return to the CHANNEL menu. R2C2C1 for SCPI programs.</p>
	<p>Three Channel View - 1 on Top x 2 on Bottom Click Back to return to the CHANNEL menu. R2C1C2 for SCPI programs.</p>
	<p>Three Channel View - 2 on Left x 1 on Right Click Back to return to the CHANNEL menu. C2R2R1 for SCPI programs.</p>
	<p>Three Channel View - 1 on Left x 2 on Right Click Back to return to the CHANNEL menu. C2R1R2 for SCPI programs.</p>
	<p>Four Channel View - 4 Across Click Back to return to the CHANNEL menu. R1C4 for SCPI programs.</p>
	<p>Four Channel View - 4 Down Click Back to return to the CHANNEL menu. R4C1 for SCPI programs.</p>
	<p>Four Channel View - 2 Across x 2 Down Click Back to return to the CHANNEL menu. R2C2 for SCPI programs.</p>

Table 3-1. Channel Layout Options (2 of 2)

Graphic	Description
	Six Channel View - 3 Across x 2 Down Click Back to return to the CHANNEL menu. R2C3 for SCPI programs.
	Six Channel View - 2 Across x 3 Down Click Back to return to the CHANNEL menu. R3C2 for SCPI programs.
	Eight Channel View - 4 Across x 2 Down Click Back to return to the CHANNEL menu. R2C4 for SCPI programs.
	Eight Channel View - 2 Across x 4 Down Click Back to return to the CHANNEL menu. R4C2 for SCPI programs.
	Nine Channel View - 3 Across x 3 Down Click Back to return to the CHANNEL menu. R3C3 for SCPI programs.
	Ten Channel View - 5 Across x 2 Down Click Back to return to the CHANNEL menu. R5C2 for SCPI programs.
	Ten Channel View - 2 Across x 5 Down Click Back to return to the CHANNEL menu. R2C5 for SCPI programs.
	Twelve Channel View - 3 Across x 4 Down Click Back to return to the CHANNEL menu. R4C3 for SCPI programs.
	Twelve Channel View - 4 Across x 3 Down Click Back to return to the CHANNEL menu. R3C4 for SCPI programs.
	Sixteen Channel View - 4 Across x 4 Down Click Back to return to the CHANNEL menu. R4C4 for SCPI programs.

Chapter 4 — Frequency Menus

4-1 Chapter Overview

This chapter provides information for configuring and displaying the frequency menus and their variants. The menus and associated field toolbars allow the user set various frequency start, stop, span, point, and CW mode parameters. The settings on the Frequency menu apply to the currently active channel. Settings on the SWEEP TYPES and other menus affect the frequency menu appearance, button availability, and available controls.

4-2 Overview of Frequency Menus

There are six FREQUENCY menu variants:

- [“FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3](#)
- [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
- [“FREQUENCY Freq. Based Segmented Sweep Menu” on page 4-7](#)
- [“INDEX. SEG. SWP Index Based Segmented Sweep Menu” on page 4-8](#)
 - Note that this frequency menu has been renamed from its functional name of the [“FREQUENCY Index Based Segmented Sweep Menu” on page 4-8](#)
- [“FREQUENCY Power Sweep CW-Based Menu” on page 4-10](#)
- [“FREQUENCY Power Sweep Swept Freq Menu” on page 4-11](#)

4-3 Frequency Menus

The frequency menus and associated field toolbars allow the user set various frequency start, stop, span, point, and CW mode parameters. The settings on the Frequency menu apply to the currently active channel.

There is a single menu for frequency that appears in six (6) variants depending on the setting on the SWEEP TYPES menu.

FREQUENCY Menu Changes

The buttons present, button availability, and the menu name of the FREQUENCY menu change depending on the setting of the SWEEP TYPES menu. Detailed descriptions of each menu and the contained buttons are in the sections below. The six (6) different frequency menus are described below.

FREQUENCY Menu with Frequency-Based Sweep (Linear)

If Sweep Types is set to Frequency-Based Sweep (Linear), the full eight (8) button FREQUENCY menu (described in the sections below) is available.

- Available buttons are Start, Stop, Center, Span, # of Points, Step Size (read-only display), CW Mode, and CW Frequency.
- The availability of these buttons depends on whether CW Mode is on or off.
- [“FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3](#)

SWEEP Menu Information:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Frequency-Based Sweep (Log)

If Sweep Types is set to Frequency-Based Sweep (Linear), the full eight (8) button FREQUENCY menu (described in the sections below) is available.

- Available buttons are Start, Stop, Center, Span, # of Points, Step Size (read-only display), CW Mode, and CW Frequency.
- The availability of these buttons depends on whether CW Mode is on or off.
- [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Segmented Sweep (Frequency-Based)

If the SWEEP TYPE is set to Segmented Sweep (Frequency-Based), the FREQUENCY menu changes to six (6) button menu with three active buttons and three read-only displays.

- The three (3) active buttons are Start Range, Stop Range, and Maximize Range
- The three read-only buttons are Display Start, Display Stop, and Data Points.
- [“FREQUENCY Freq. Based Segmented Sweep Menu” on page 4-7](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu - INDEX. SEG. SWP Menu with Segmented Sweep (Index-Based)

When the SWEEP TYPE is set to Segmented Sweep (Index-Based), the FREQUENCY menu name changes to INDEX. SEG. SWP and the menu changes to a six (6) button menu with three active buttons and three read-only displays.

- The three (3) active buttons are Start (Index), Stop (Index), and Maximize Range
- The three read-only buttons are Display Start (Index), Display Stop (Index), and Data Points.
- Both links go to the same location.
- [“INDEX. SEG. SWP Index Based Segmented Sweep Menu” on page 4-8](#)
- [“FREQUENCY Index Based Segmented Sweep Menu” on page 4-8](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Power Sweep (CW Frequency)

When the SWEEP TYPE is set to Power Sweep (CW) Sweep, the FREQUENCY menu has only two buttons consisting of a read-only display button for CW Mode, and a CW Frequency field button.

- [“FREQUENCY Power Sweep CW-Based Menu” on page 4-10](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Power Sweep (Swept Frequency)

When the SWEEP TYPE is set to Power Sweep (Swept Frequency), the FREQUENCY menu changes to an eight (8) button menu with seven (7) active buttons and one read-only display.

- The three (3) buttons of Start Index, Stop Index, and Maximize Range are available.
- The three (3) read-only buttons of Display Start Index, Display Stop Index, and Data Points are displayed.
- The availability of these buttons depends on whether CW Mode is on or off.
- [“FREQUENCY Power Sweep Swept Freq Menu” on page 4-11](#)

SWEEP Menu Information:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Freq. Based Linear Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Prerequisites

- If the SWEEP TYPE is set to Frequency Sweep (Linear), the FREQUENCY menu changes to an eight (8) button menu with seven (7) active buttons and one read-only display.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Frequency | FREQUENCY

The screenshot shows a vertical menu titled 'Frequency' with a close button (X). The menu items and their values are:

- Start**: 1.000000000 GHz
- Stop**: 10.000000000 GHz
- Center**: 5.500000000 GHz
- Span**: 9.000000000 GHz
- # of Points**: 201
- StepSize**: 45.000000 MHz
- CW Mode**: OFF
- CW Frequency**: 10.000000000 GHz

Start (Frequency)

Displays the Start (Frequency) field toolbar and allows the user to enter a starting frequency on a per-channel basis.

Stop (Frequency)

Displays the Stop (Frequency) field toolbar and allows the user to enter a stop frequency on a per-channel basis.

Center (Frequency)

The Center (Frequency) button displays the Center (Frequency) field toolbar and allows the user to enter a center frequency on a per-channel basis.

Span (Frequency)

The Span (Frequency) button displays the Span (Frequency) field toolbar and allows the user to enter a span frequency on a per channel basis.

of Points

The Number of Points button displays the # of Points field toolbar and allows the user to enter the number of points for the frequency span, allowing separate parameter point settings for CW Mode ON and CW Mode OFF.

Step Size (Frequency)

A read-only field displays the calculated frequency step-size based on the requested frequency span and the number of points selected in the buttons above. If the CW Mode (below) is set to ON, the read-only field displays 0 (zero) Hz (shown at left).

CW Mode (Off/On)

The Continuous Wave (CW) toggle button, on a per-channel basis, toggles the CW function off and on. The default setting is off. If CW Mode is ON, the Step Size (Frequency) display (described above) is set to 0 (zero) Hz and the # of Points setting changes to what has been set for the CW Mode.

CW Frequency

The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. If a calibration is active, the VNA will choose the closest CW frequency point from the active calibration points. If the requested CW frequency is a calibrated point, the VNA will assign the entered value. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.

Figure 4-1. FREQUENCY Freq. Based Linear Sweep Menu

FREQUENCY Freq. Based Log Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Prerequisites

- If the SWEEP TYPE is set to Frequency Sweep (Linear), the FREQUENCY menu changes to an eight (8) button menu with seven (7) active buttons and one read-only display.

SWEEP TYPES Menu

- If the SWEEP TYPE is set to Frequency Sweep (Log), the FREQUENCY menu changes to an eight (8) button menu with seven (7) active buttons and one read-only display.
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Frequency | FREQUENCY

<p>Frequency X</p> <p>Start 70.000 kHz</p> <p>Stop 70.000000000 GHz</p> <p>Center 35.000035000 GHz</p> <p>Span 69.999930000 GHz</p> <p># of Points 201</p> <p>StepSize N/A in Log Sweep</p> <p>CW Mode OFF</p> <p>CW Frequency 70.000 kHz</p>	<p>Start (Frequency)</p> <p>Displays the Start (Frequency) field toolbar and allows the user to enter a starting frequency on a per-channel basis.</p> <p>Start : 70.000 kHz ^ v GHz MHz kHz Hz X</p> <p>Stop (Frequency)</p> <p>Displays the Stop (Frequency) field toolbar and allows the user to enter a stop frequency on a per-channel basis.</p> <p>Stop : 10.000000000 GHz ^ v GHz MHz kHz Hz X</p> <p>Center (Frequency)</p> <p>The Center (Frequency) button displays the Center (Frequency) field toolbar and allows the user to enter a center frequency on a per-channel basis.</p> <p>Center : 5.000035000 GHz ^ v GHz MHz kHz Hz X</p> <p>Span (Frequency)</p> <p>The Span (Frequency) button displays the Span (Frequency) field toolbar and allows the user to enter a span frequency on a per channel basis.</p> <p>Span : 9.999930000 GHz ^ v GHz MHz kHz Hz X</p>
--	--

Figure 4-2. FREQUENCY Freq. Based Log Sweep Menu (1 of 2)

of Points (Number)

The Number of Points button displays the # of Points field toolbar and allows the user to enter the number of points for the frequency span.

This button allows separate parameter point settings for CW Mode ON and CW Mode OFF.

**Step Size (Frequency)**

If the SWEEP TYPES menu is set to Freq Sweep (Log), the Step Size display defaults to N/A in Log Sweep.

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

CW Mode (Off/On)

The Continuous Wave (CW) toggle button, on a per-channel basis, toggles the CW function off and on. The default setting is off.

If CW Mode is ON, the Step Size (Frequency) display (described above) is set to 0 (zero) Hz and the # of Points setting changes to what has been set for the CW Mode.

CW Frequency

The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.



Figure 4-2. FREQUENCY Freq. Based Log Sweep Menu (2 of 2)

FREQUENCY Freq. Based Segmented Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Prerequisites

- If the SWEEP TYPE is set to Segmented Sweep (Frequency-Based), the FREQUENCY menu changes to six (6) button menu with three active buttons and three read-only displays.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Frequency | FREQUENCY

<p>The screenshot shows the FREQUENCY menu with the following items:</p> <ul style="list-style-type: none"> Start Range: 2.857192857 GHz Stop Range: 10.000000000 GHz Maximize Range Display Start: 2.857192857 GHz Display Stop: 10.000000000 GHz DataPoints: 11 	<p>Start Range (Frequency) Select displays the Start Range (Frequency) toolbar with frequency values and units of GHz, MHz, kHz, and Hz.</p> <p>Start Range : 2.857192857 GHz [^] [v] GHz MHz kHz Hz X</p> <p>Stop Range (Frequency) Select displays the Stop Range (Frequency) toolbar with frequency values and units of GHz, MHz, kHz, and Hz.</p> <p>Stop Range : 10.000000000 GHz [^] [v] GHz MHz kHz Hz X</p> <p>Maximize Range (Frequency) Select maximizes the start and stop value to the maximum of the instrument. Note that when clicked, any previously entered Start and Stop value are overwritten and cannot be recovered unless a preset save was done.</p> <p>Display Start (Frequency) A read-only display of the Start Range frequency.</p> <p>Display Stop (Frequency) A read-only display of the Stop Range frequency.</p> <p>Data Points (Number) A read-only display of the calculated number of data points in the set frequency range.</p>
---	--

Figure 4-3. FREQUENCY Freq. Based Segmented Sweep Menu

INDEX. SEG. SWP Index Based Segmented Sweep Menu**FREQUENCY Index Based Segmented Sweep Menu****INDEX-BASED SEGMENTED SWEEP Menu****FREQUENCY INDEX-BASED SEGMENTED SWEEP Menu****Full Name**

- Index-Based Frequency Segmented Sweep

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Prerequisites

- When the SWEEP TYPE is set to Segmented Sweep (Index-Based), the FREQUENCY menu name changes to INDEX. SEG. SWP and the menu changes to a six (6) button menu with three active buttons and three read-only displays.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Frequency | FREQUENCY

<p>Index. Seg.Swp X</p> <p>Start Index 0</p> <p>Stop Index 14</p> <p>Maximize Range</p> <p>Display Start Index 0</p> <p>Display Stop Index 14</p> <p>DataPoints 15</p>	<p>Start (Index Number) Select displays the Start (Index Number) toolbar allowing the selection of a starting index number for the sweep.</p> <p>Start Index : 0 [^] [v] Enter X</p> <p>Stop Index (Number) Select displays the Stop (Index Number) toolbar allowing the selection of an ending index number for the sweep.</p> <p>Stop Index : 14 [^] [v] Enter X</p> <p>Maximize Range (Index Number) Select maximizes the start and stop value to the maximum of the instrument. Note that when clicked, any previously entered Start and Stop value are overwritten and cannot be recovered unless a preset save was done.</p> <p>Display Start (Index Number) A read-only display of the Start Index number.</p> <p>Display Stop (Index Number) A read-only display of the Stop Index number.</p> <p>Data Points (Number) A read-only display of the calculated number of data points in the swept frequency range.</p>
---	--

Figure 4-4. INDEX. SEG. SWP (FREQUENCY) Index-Based Segmented Sweep Menu

FREQUENCY Power Sweep CW-Based Menu

Full Name

- Frequency Power Sweep CW-Based Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Prerequisites

- When the SWEEP TYPE is set to Power Sweep (CW Frequency), the FREQUENCY menu changes to a two (2) button menu with one active button and one read-only display.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Frequency | FREQUENCY

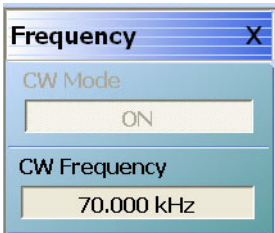
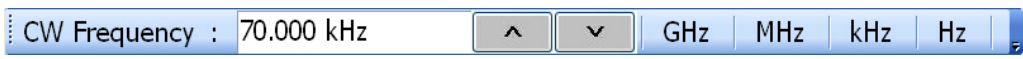
 <p>The screenshot shows a window titled 'Frequency' with a close button (X). It contains two sections: 'CW Mode' with a read-only field displaying 'ON', and 'CW Frequency' with a read-only field displaying '70.000 kHz'.</p>	<p>CW Mode (Off/On) The CW Mode toggle button is set to a read-only value of ON for a per-channel basis.</p> <p>CW Frequency The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.</p>  <p>The toolbar shows 'CW Frequency : 70.000 kHz' followed by up and down arrow buttons, and unit selection buttons for GHz, MHz, kHz, and Hz.</p>
---	--

Figure 4-5. FREQUENCY Power Sweep CW Freq. Menu

FREQUENCY Power Sweep Swept Freq Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Prerequisites

- If the SWEEP TYPE is set to Power Sweep (Swept Frequency), Frequency Sweep (Linear), the FREQUENCY menu changes to an eight (8) button menu with seven (7) active buttons and one read-only display.
- Power sweep (swept frequency) is a limited multi-dimensional sweep mode that allows the evaluation of gain compression across swept frequency.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

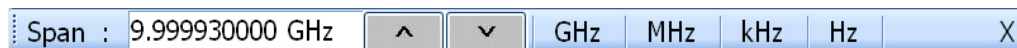
- MAIN | Frequency | FREQUENCY

<p>Frequency X</p> <p>Start 1.000000000 GHz</p> <p>Stop 45.000000000 GHz</p> <p>Center 23.000000000 GHz</p> <p>Span 44.000000000 GHz</p> <p># of Points 401</p> <p>StepSize 110.000000 MHz</p> <p>CW Mode OFF</p> <p>CW Frequency 45.000000000 GHz</p>	<p>Start (Frequency) Displays the Start (Frequency) field toolbar and allows the user to enter a starting frequency on a per-channel basis.</p> <p>Start : 70.000 kHz ^ v GHz MHz kHz Hz X</p> <p>Stop (Frequency) Displays the Stop (Frequency) field toolbar and allows the user to enter a stop frequency on a per-channel basis.</p> <p>Stop : 10.000000000 GHz ^ v GHz MHz kHz Hz X</p> <p>Center (Frequency) The Center (Frequency) button displays the Center (Frequency) field toolbar and allows the user to enter a center frequency on a per-channel basis.</p> <p>Center : 5.000035000 GHz ^ v GHz MHz kHz Hz X</p>
---	--

Figure 4-6. FREQUENCY Power Sweep Swept Frequency Menu (1 of 2)

Span (Frequency)

The Span (Frequency) button displays the Span (Frequency) field toolbar and allows the user to enter a span frequency on a per channel basis.

Span (Frequency) Field Toolbar**# of Points (Number)**

The Number (#) of Points button displays the # of Points field toolbar and allows the user to enter the number of points for the frequency span. When the sweep is set to Power Sweep (Swept Frequency) on the SWEEP TYPES menu, the number of points is limited to no more than 401, subject to the CW Mode setting below.

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

The # of Points setting depends on the CW Mode:

- If CW Mode is OFF, the range for the number of points is from 2 to 401.
- If CW Mode is ON, the number of points is 1 (one).

**Step Size (Frequency)**

Read-only display. If CW Mode is ON, the step size is set to 0 (zero) Hz.

CW Mode (Off/On)

The Continuous Wave (CW) toggle button, on a per-channel basis, toggles the CW function off and on. The default setting is off.

If CW Mode is ON:

- The Step Size (Frequency) display (described above) is set to 0 (zero) Hz
- The # of Points setting is set to 1 (one) point.

CW Frequency

The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.

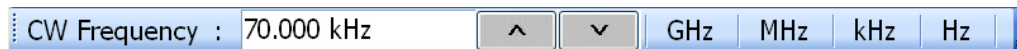


Figure 4-6. FREQUENCY Power Sweep Swept Frequency Menu (2 of 2)

Chapter 5 — Power Menus - 2-Port VNAs

5-1 Chapter Overview

This chapter provides information per-port power and, if equipped, attenuator configurations for the VNA in 2-Port Mode. The Power menus and associated field toolbars allow the user to set various power mode parameters. The settings on the Power menus apply to the currently active channel. The power menus, their link structure, appearance, and related dialog boxes vary depending on the setting of the SWEEP TYPE menu as either: Frequency-Based Sweep (Linear or Log), Segmented-Based Sweep (Frequency- or Index-Based), or Power-Based Sweep (CW Frequency or Swept Frequency). Note that the menu appearance, button availability, and hierarchical links change if the VNA is in 4-Port Mode. For 4-Port Mode power menus, see [Chapter 6, “Power Menus - 4-Port VNAs”](#).

5-2 Overview of Power Menus

The following power menus and dialog boxes are available:

- [“POWER Menu Variants - 2-Port VNAs” on page 5-11](#)
 - [“POWER Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-12](#)
 - [“POWER Menu - Segment-Based Sweeps - 2-Port VNAs” on page 5-15](#)
 - [“POWER Menu - Power-Based Sweeps - 2-Port VNAs” on page 5-17](#)
- [“ATTENUATORS Menu Variants” on page 5-20](#)
 - [“ATTENUATORS Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-21](#)
 - [“ATTENUATORS Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-22](#)
 - [“ATTENUATORS Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-23](#)
- [“POWER SETUP Menu Variants” on page 5-24](#)
 - [“POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-25](#)
 - [“POWER SETUP Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-27](#)
 - [“POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-27](#)
- [“POWER CAL Menu Variants” on page 5-30](#)
 - [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31](#)
 - [“POWER CAL Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-31](#)
 - [“POWER CAL Menu - Power-Based Sweep - 2-Port VNAs” on page 5-32](#)
 - [“POWER CALIBRATION \(PORT 1/PORT 2\) Dialog Box” on page 5-34](#)
 - [“OPEN \(POWER SWEEP POWER CAL PPC FILE\) Dialog Box” on page 5-35](#)
 - [“SAVE AS \(FREQ. SWEEP POWER CAL FPC FILE\) Dialog Box” on page 5-36](#)
 - [“SAVE AS \(POWER SWEEP POWER CAL PPC FILE\) Dialog Box” on page 5-37](#)
- [“Receiver Setup and Calibration Menus - 2-Port VNAs” on page 5-38](#)
 - [“RECEIVER SETUP Menu - 2-Port VNAs” on page 5-38](#)
 - [“RECEIVER CAL Menu - 2-Port VNAs” on page 5-39](#)
 - [“SAVE RCVR. CAL \(RECEIVER CALIBRATION RCVR FILE\) Dialog Box - 2-Port VNAs” on page 5-40](#)
 - [“RECALL RCVR. CAL \(RECEIVER CALIBRATION RCVR FILE\) Dialog Box - 2-Port VNAs” on page 5-41](#)
 - [“VIEW RECEIVER CAL Dialog Box - 2-Port VNAs” on page 5-43](#)
 - [“RCVR UTILITIES Menu - 2-Port VNAs” on page 5-42](#)
- [“External Source Power Menu - 2-Port VNAs” on page 5-45](#)
 - [“EXT. SRC POWER Menu - 2-Port VNAs” on page 5-45](#)

5-3 Appearance of Power Menus on 2-Port VNAs

As noted in the Power Menu Set descriptions below, the POWER menu and its related sub-menus vary in menu appearance, menu links, button presence, and button type (read/write vs. read-only) depending on a number of factors including:

- Type of sweep set
- Instrument model number
- Installed options
- Application receiver configuration mode
- Frequency range configured

Sweep Types

The instrument sweep type setting changes the POWER Menu Set depending on if the Sweep Type is set to

- Frequency-Based (Linear)
- Frequency-Based (Log)
- Segmented Sweep (either Frequency-Based or Index-Based)
- Power Sweep (either CW Freq or Swept Freq)

VNA Model, Option, and Mode

For MS4642A, MS4644A, and MS4645A VNAs, the POWER menu variants depend on the sweep type selected above and whether Multiple Source and mm-Wave are selected.

For MS4647A VNAs without Option 080/081, the POWER menu variants depend on the sweep type set above, and whether Multiple Source and BB/mm-Wave are selected.

For MS4647A VNAs, additional menu changes depend on the frequency range covered, the Receiver Configuration Mode if set to Modular Broadband or Modular Broadband with Multiple Source:

- Modular Broadband requires a MS4647A with Option 080/081 and an attached 3739x Test Set. Menus change depending the sweep type set above and the frequency range set, particularly depending on below, across, and above 54 GHz.
- Modular Broadband (a MS4647A with Option 081 and Option 061/062 providing attenuators) with Multiple Source can be configured. If at least one band is configured with a frequency greater than 54 GHz, an additional button is present.

5-4 Maximum and Minimum Power Settings

For all configurations, the maximum power setting is +15 dBm. For all configurations below 54 GHz, the minimum power setting is –30 dBm and for above 54 GHz, the minimum power setting is –60 dBm. These minimum power settings can be further lowered by application of internal attenuator, linear power calibration effects, and/or the connected presence of OEM millimeter-wave modules.

- The power settings are set by the appropriate Start, Stop, and/or Single Power buttons and their related field toolbars.
- Below 54 GHz, the user-defined start, stop, and/or single power settings are then modified by the effects of any applied attenuators (if equipped), and the relevant Linear Power Calibration and displayed as the appropriate read-only Effective Power button.
- Above 54 GHz, the user-defined start, stop, and/or single power settings are then modified by the effects of the relevant Linear Power Calibration (noting that internal attenuator effects are not applied above 54 GHz) and displayed as the appropriate read-only Effective Power button.
- Depending on the instrument model and equipped test sets where the frequency range as less than 54 GHz, greater than 54 GHz, or across 54 GHz, some of the following read-only Effective Power buttons appear:
 - Effective Start Power
 - Effective Start Power < 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Start Power button present.
 - Effective Start Power > 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Start Power button present.
 - Effective End Power
 - Effective Stop Power < 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective End Power button present.
 - Effective Stop Power > 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective End Power button present.
 - Effective Single Power
 - Effective Single Power < 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Single Power button present.
 - Effective Single Power > 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Single Power button present.
- For VNAs where frequencies either cross 54 GHz (MS4647A VNAs) or use frequencies above 54 GHz (MS4647A VNAs with Option 080/081 or MS4640A VNAs with Option 082/082 and E-Band or W-Band modules), additional buttons of Effective Start Power > 54 GHz, Effective Stop Power > 54 GHz, and Effective Single Power > 54 GHz are present.
- Where compatible with the various options above, the 4-Port VNA power maximum and power minimum are the same as for the 2-Port VNA less the loss of the Test Set and cables.

A summary of the power settings is in [Table 5-1](#) below.

Table 5-1. Summary of Maximum and Minimum Power Levels

VNA, Power Level, and Frequency Range	Power Sweep Type	Power Setting Max/Min ^a	Factors Affecting Effective Power	Resultant Effective Power
Any MS4640A VNA Maximum Power Above, Below, or Across 54 GHz	Any	+15 dBm maximum	<ul style="list-style-type: none"> Option 061/062 Attenuators^b Linear Power Calibration 	<ul style="list-style-type: none"> Effects at left can lower effective maximum power.
Any MS4640A VNA Minimum Power for Less Than 54 GHz	<ul style="list-style-type: none"> Power Sweep CW Single Power Mode Power Sweep Swept Frequency Power Sweep Swept Frequency Single Power 	-30 dBm minimum	<ul style="list-style-type: none"> Option 061/062 Attenuators Linear Power Calibration 	<ul style="list-style-type: none"> Effects at left can lower effective minimum power to less than -30 dBm.
MS4647A VNAs with BB/mm-Wave Option 080/081^c Minimum Power for Less Than 54 GHz to Greater Than 54 GHz	<ul style="list-style-type: none"> Power Sweep Swept Frequency Power Sweep Swept Frequency Single Power 	-60 dBm minimum	<div style="display: flex; flex-direction: column;"> <div style="margin-bottom: 10px;"> Below 54 GHz: <ul style="list-style-type: none"> Option 061/062 Attenuators Linear Power Calibration </div> <div> Above 54 GHz: <ul style="list-style-type: none"> Attenuators have no effect above 54 GHz. Linear Power Calibration </div> </div>	<ul style="list-style-type: none"> The default minimum power for frequencies less than 54 GHz is -30 dBm and for frequencies greater than 54 GHz is -60 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.
MS4640A VNAs with mm-Wave Option 082/083 and OML/VDI mm-Wave Modules^d	Any	-100 dBm minimum	<ul style="list-style-type: none"> VNA Attenuators have no effect on OML/VDI modules at any frequency. Linear Power Calibration 	<ul style="list-style-type: none"> The default minimum power for any frequency is always -100 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.

a.The default power setting applies to the user configurable Start, Stop, and Single Power buttons and their variants.

b.The Active Measurement Suite - Option 061 provides two attenuators; one if the Source 1 Path, and one in the Receive 2 Path. Option 062 provides four attenuators; One in each Source Path and one in each Receive Path.

c.Broadband/Millimeter-Wave System – ME7838A or ME7838D system with MS4647A VNA, Option 080/081, 3739x Test Set, 3743A, or MA25300A Modules to 145 GHz.

d.Millimeter-Wave System – Any MS4640A VNA, with Option 082/083, 3739x Test Set, and OML or VDI Millimeter-Wave Modules.

5-5 Power Menus for Frequency-Based Sweeps (Linear and Log)

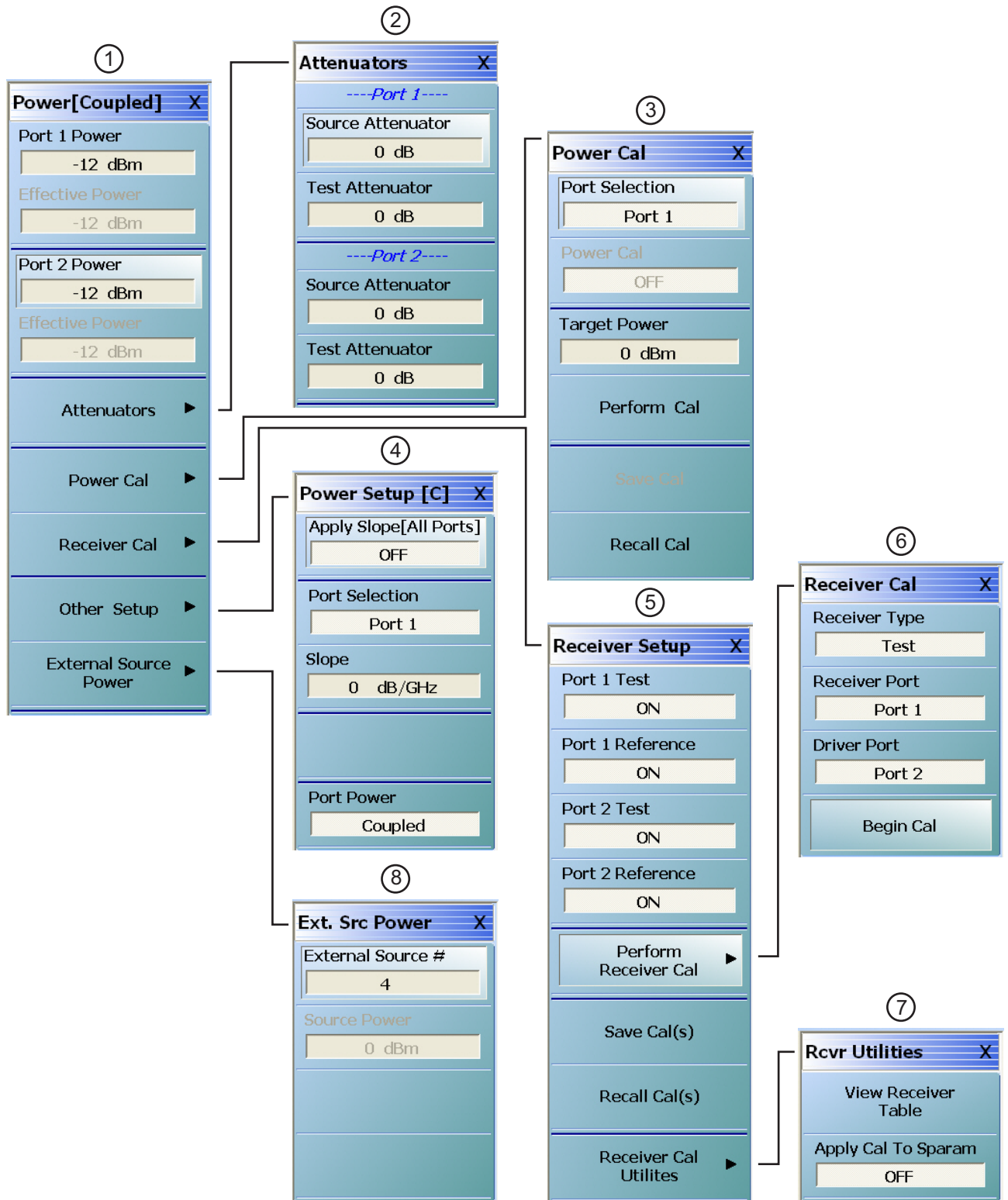


Figure 5-1. Power Menu Set - Frequency-Based Sweep (Linear or Log) (1 of 2)

This power menu set, including menu appearance and menu links, is available if Sweep Type is set to Frequency-Based (Linear) or Frequency-Based (Log). When Modular BB is enabled on the APPLICATION menu on MS4647A only when equipped with Options 007, 070, and 080/081, some power menus have either relabeled buttons or additional buttons. The button changes are related to power levels above and below 54 GHz.

1. "POWER Menu - Frequency-Based Sweep - 2-Port VNAs" on page 5-12
2. "ATTENUATORS Menu - Frequency-Based Sweep - 2-Port VNAs" on page 5-21

3. "POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs" on page 5-31
4. "POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs" on page 5-25
5. "RECEIVER SETUP Menu - 2-Port VNAs" on page 5-38
6. "RECEIVER CAL Menu - 2-Port VNAs" on page 5-39
7. "RCVR UTILITIES Menu - 2-Port VNAs" on page 5-42
8. "EXT. SRC POWER Menu - 2-Port VNAs" on page 5-45

Figure 5-1. Power Menu Set - Frequency-Based Sweep (Linear or Log) (2 of 2)

5-6 Power Menus for Segment-Based Sweeps (Frequency and Index)

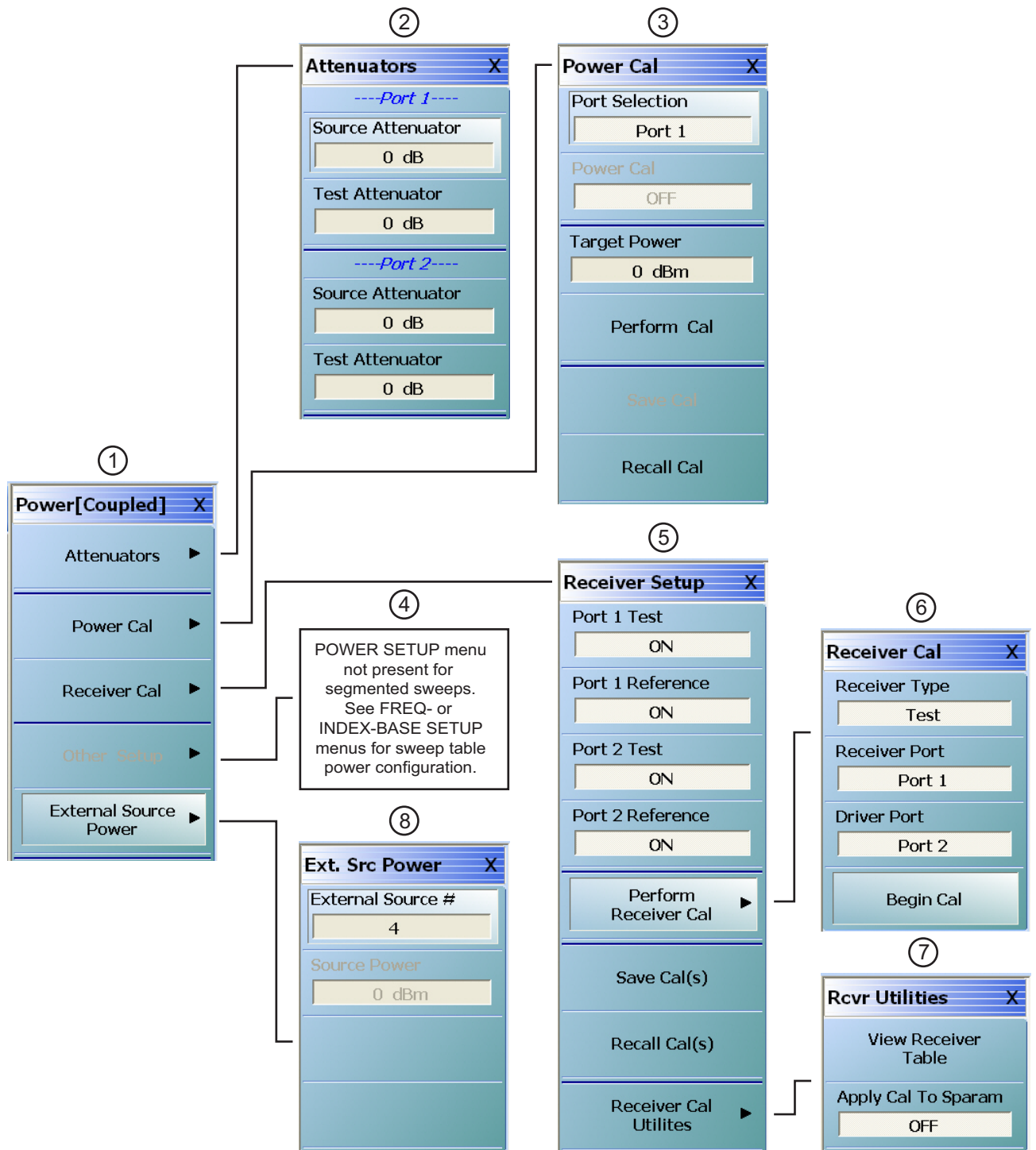


Figure 5-2. Power Menu Set - Segmented Sweeps (Frequency- or Index-Based) (1 of 2)

<p>This power menu set is available if Sweep Type is set to Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons. The power settings for segmented sweeps (frequency-based or index-based) are in the segmented-sweep input tables.</p> <ol style="list-style-type: none"> 1. "POWER Menu - Segment-Based Sweeps - 2-Port VNAs" on page 5-15. 2. "ATTENUATORS Menu - Segment-Based Sweep - 2-Port VNAs" on page 5-22. 3. "POWER CAL Menu - Segment-Based Sweep - 2-Port VNAs" on page 5-31. 	<ol style="list-style-type: none"> 4. The POWER SETUP Menu is not present with these sweep types. Power configuration is on a per-segment basis and is configured at the "FREQ BASE SETUP Menu" on page 7-6 or the "INDEX BASE SETUP Menu" on page 7-12. 5. "RECEIVER SETUP Menu - 2-Port VNAs" on page 5-38 6. "RECEIVER CAL Menu - 2-Port VNAs" on page 5-39 7. "RCVR UTILITIES Menu - 2-Port VNAs" on page 5-42 8. "EXT. SRC POWER Menu - 2-Port VNAs" on page 5-45
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Figure 5-2. Power Menu Set - Segmented Sweeps (Frequency- or Index-Based) (2 of 2)

5-7 Power Menus for Power-Based Sweeps (CW and Swept Frequency)

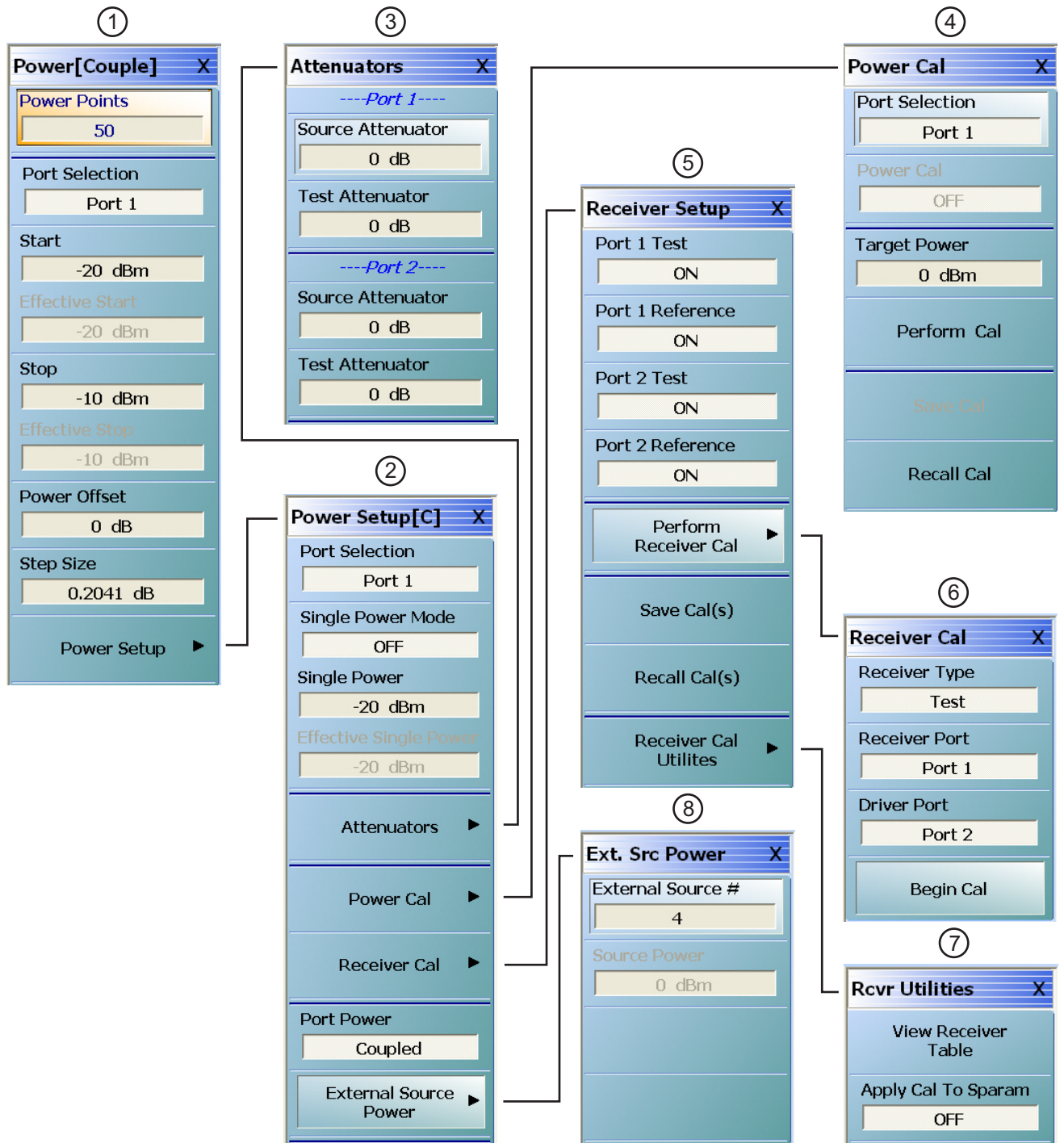


Figure 5-3. Power Menu Set - Power Sweeps (CW or Swept Frequency) (1 of 2)

<p>This power menu set is available if Sweep Type is set to Power Sweep (CW Freq) or Power Sweep (Swept Freq). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons. The power settings for power sweeps (frequency-based or index-based) are in the input tables. The button changes are related to power levels above and below 54 GHz.</p> <ol style="list-style-type: none"> 1. "POWER Menu - Power-Based Sweeps - 2-Port VNAs" on page 5-17 2. "POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs" on page 5-27. 	<ol style="list-style-type: none"> 3. "ATTENUATORS Menu - Power-Based Sweep Menu - 2-Port VNAs" on page 5-23. 4. "POWER CAL Menu - Power-Based Sweep - 2-Port VNAs" on page 5-32. 5. "RECEIVER SETUP Menu - 2-Port VNAs" on page 5-38. 6. "RECEIVER CAL Menu - 2-Port VNAs" on page 5-39. 7. "RCVR UTILITIES Menu - 2-Port VNAs" on page 5-42. 8. "EXT. SRC POWER Menu - 2-Port VNAs" on page 5-45.
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Figure 5-3. Power Menu Set - Power Sweeps (CW or Swept Frequency) (2 of 2)

5-8 POWER Menu Variants - 2-Port VNAs

POWER Menu Name and Button Changes

The name of the POWER menu can be POWER or POWER [COUPLED] depending on the settings on the POWER SETUP menu.

- POWER: On the POWER SETUP menu, the Port Power button is set to Not Coupled.
- POWER [COUPLED]: On the POWER SETUP menu, the Port Power button is set to Coupled.
- On POWER menus with frequency-based sweeps, the button to link to the POWER SETUP menu is labeled the Other Setup button. These sweeps are Freq Sweep (Linear), Freq Sweep (Log), Segmented Sweep (Freq-based), and Segmented Sweep (Index-based). Note that the Other Setup button is not available with segmented sweeps.
- On POWER menus with power-based sweeps, the button to link to the POWER SETUP menu is labeled the Power Setup button. These sweeps are Power Sweep (CW Freq) and Power Sweep (Swept Freq).

Navigation for Frequency-Based Sweeps

- MAIN | Power | POWER | Other Setup | POWER SETUP
- [“POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-25](#)

Navigation for Power-Based Sweeps

- MAIN | Power | POWER | Power Setup | POWER SETUP
- [“POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-27](#)

POWER Menu Button Changes

- The POWER menu can have 13, 5, or 9 buttons depending on the SWEEP TYPE settings.

POWER Menu with Frequency-Based Sweeps

If SWEEP TYPE is set to Frequency-Based Sweep (Linear or Log):

- The POWER menu has 13 buttons, one of which is the Attenuators button linking to the ATTENUATORS menu.
- The POWER SETUP menu has 5 buttons, including buttons for Port Selection, Apply Slope, Slope, and Port Power.

POWER Menu with Segment-Based Sweeps

If SWEEP TYPE is set to Segment-Based Sweep (Frequency or Index):

- The POWER menu has 5 buttons, one of which is the Attenuators button linking to the ATTENUATORS menu.
- The POWER SETUP menu is not available. Instead, per-port power and effective power is set on a per-segment basis in the Segmented Sweep Setup Tableau dialog area.
 - MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP
 - [“FREQ BASE SETUP Menu” on page 7-6](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Index-Based Seg Sweep Setup | INDEX BASE SETUP
 - [“INDEX BASE SETUP Menu” on page 7-12](#)

POWER Menu with Power-Based Sweeps

If SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency):

- The POWER menu has 9 buttons.
- The Attenuators button is not present on the POWER menu, but is moved to the POWER SETUP menu.
- The POWER SETUP menu has 9 buttons, including buttons for Attenuators, Power Cal, Receiver Cal, and External Source Power.

POWER Menu - Frequency-Based Sweep - 2-Port VNAs

Previous


- [“MAIN MENU” on page 2-1](#)

Navigation


- MAIN | Power | POWER

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log)
- Frequency-Based Sweep (Linear) Setup
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Linear)
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
- Frequency-Based Sweep (Log) Setup
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Log)
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)

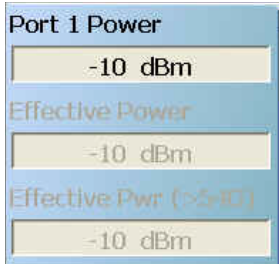


Port 1 Power
 Select displays the Port 1 Power field toolbar and allows setting the port 1 power level in dBm. If Port Power is set to coupled, changes to the Port 1 Power level affect the Port 2 Power level.




Effective (Port 1) Power (dBm)
 Read-only display. Shows the effective Port 1 power after any applied attenuator.

Effective Pwr (>54G) (dBm)
 This read-only button is only present if the instrument is an MS4647A VNA with Option 080/081 and, on the APPLICATION menu, the Modular BB is selected. The additional button is shown below.



Port 2 Power
 Select displays the Port 2 Power field toolbar and allows setting the port 2 power level in dBm. If Port Power is set to coupled, changes to the Port 2 Power level affect the Port 1 Power level.



Effective (Port 2) Power (dBm)
 Read-only display. Shows the effective Port 1 power after any applied attenuator.

Effective Pwr (>54G) (dBm)
 This read-only button is only present if the instrument is an MS4647A VNA with Option 080/081 and, on the APPLICATION menu, the Modular BB is selected. See example above.

Figure 5-4. POWER [COUPLED] Menu - Frequency-Based Sweeps - 2-Port VNAs (1 of 2)

Attenuators**Button Not Present**

If the Attenuators button is not present, the SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.

Button Not Available

If the Attenuators button is present but unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.

Button Available

If the Attenuators button is available, one of the attenuator options has been installed:

- Option 061: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
- Option 062: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-21](#)

Power Cal

Select displays the POWER CAL menu.

- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu - 2-Port VNAs” on page 5-39](#)

Other Setup (Power)

Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.

- [“POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-25](#)

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu - 2-Port VNAs” on page 5-45](#)

Figure 5-4. POWER [COUPLED] Menu - Frequency-Based Sweeps - 2-Port VNAs (2 of 2)

POWER Menu - Segment-Based Sweeps - 2-Port VNAs

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Frequency-Based Segmented Sweep or Index-Based Segmented Sweep
- Segmented Sweep Frequency-Based Setup
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Segmented Sweep (Freq-Based)
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
- Sweep Type - Segmented Sweep Index-Based Setup
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Segmented Sweep (Index-Based)
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)


	<h3>Segmented Sweep Power Control Functions</h3> <p>Controls for power configuration is moved to the frequency- or index-based segmented sweep setup functions on the SWEEP SETUP menu. There, the following parameters for each created segment can be defined:</p> <ul style="list-style-type: none"> • Basic controls add, delete, clear, save, and recall segments • Configuration controls for graph mode and ON/OFF display of IFBW, power, and averaging • Individual segment controls for: <ul style="list-style-type: none"> • Segment ON/OFF • Segment definition as either Start and Stop, Start and Step-Size, or CW • Number of points per segment • Calculated Step Size • IF Bandwidth (IFBW) • Port 1 Source Power • Port 2 Source Power • Averaging number of points • Navigation: <ul style="list-style-type: none"> • MAIN Sweep Setup SWEEP SETUP Freq-Based Seg. Sweep Setup FREQ BASE SETUP • MAIN Sweep Setup SWEEP SETUP Freq-Based Seg. Sweep Setup FREQ BASE SETUP • “FREQ BASE SETUP Menu” on page 7-6 • “INDEX BASE SETUP Menu” on page 7-12
--	--

Figure 5-5. POWER [COUPLED] Menu - Segment-Based Sweep - 2-Port VNAs (1 of 2)

Attenuators**Button Not Available**

If the Attenuators button is present but unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.

Button Available

If the Attenuators button is available, one of the attenuator options has been installed:

- Option 061: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
- Option 062: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-22](#)

Power Cal

Select displays the POWER CAL menu.

- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu - 2-Port VNAs” on page 5-39](#)

Other Setup (Power)

Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.

- [“POWER SETUP Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-27](#)

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu - 2-Port VNAs” on page 5-45](#)

Figure 5-5. POWER [COUPLED] Menu - Segment-Based Sweep - 2-Port VNAs (2 of 2)

POWER Menu - Power-Based Sweeps - 2-Port VNAs

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency)
- Power-Based Sweep (CW Frequency) Setup
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Power Sweep (CW Freq)
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
- Power-Based Sweep (Swept Frequency) Setup
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Power Sweep (Swept Freq)
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)

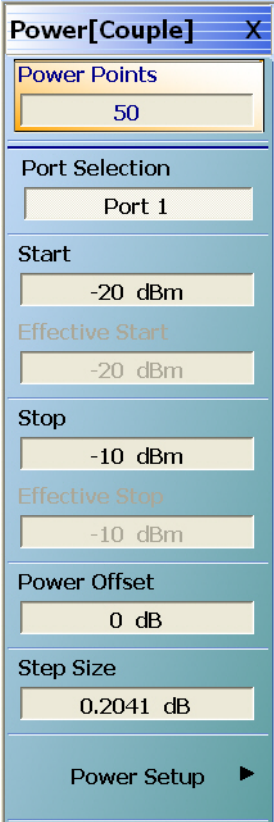
 <p>Power [Couple] X</p> <p>Power Points 50</p> <p>Port Selection Port 1</p> <p>Start -20 dBm</p> <p>Effective Start -20 dBm</p> <p>Stop -10 dBm</p> <p>Effective Stop -10 dBm</p> <p>Power Offset 0 dB</p> <p>Step Size 0.2041 dB</p> <p>Power Setup ▶</p>	<p>Power Points</p> <p>Select displays the Power Points field toolbar and allows selection of the total number of power points in the sweep.</p> <p>Power Points : 60 ^ v Enter X</p> <p>Power Points</p> <p>Select displays the Power Points field toolbar and allows selection of the total number of power points in the sweep.</p> <p>Power Points : 60 ^ v Enter X</p> <p>Port Selection</p> <p>The Port Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1 or Port 2. The selected port is shown in the button display field.</p>
--	--

Figure 5-6. POWER [COUPLED] Menu - Power-Based Sweep - 2-Port VNAs (1 of 3)

Start (Power) (dBm)

For the displayed port above, select displays the Start (dBm) field toolbar where the start power level is set.

**Effective Start (Power) (dBm)**

A read only display that shows the effective start power after the application of any attenuator effects. Stop (Power) (dBm)

Eff. Start (>54G) (dBm)

Effective Start Power >54 GHz Port 1. This read-only button is only present if the instrument is an MS4647A VNA with Option 080/081 and, on the APPLICATION menu, the Modular BB is selected. The additional button is shown below.

**Stop (Power) (dBm)**

For the displayed port, select displays the Stop (dBm) field toolbar where the stop power level is set.

**Effective Stop (Power) (dBm)**

A read only display that shows the effective stop power after the application of any attenuator effects.

Eff. Stop (>54G) (dBm)

Effective Stop Power >54 GHz Port 1. This read-only button is only present if the instrument is an MS4647A VNA with Option 080/081 and, on the APPLICATION menu, the Modular BB is selected. See example above.

Figure 5-6. POWER [COUPLED] Menu - Power-Based Sweep - 2-Port VNAs (2 of 3)

Power Offset (dB)

Select displays the Power Offset (dB) field toolbar where offsets can be applied.

**Step Size (dB)**

The button display field calculates the step size based on the start value, stop value, and the number of power points set in the field toolbars above or allows input of a required step size value. If a new value is input, the number of power points changes as required.

**Power Setup**

Select displays the POWER SETUP menu which contains the controls for Attenuators, Power Cal, Receiver Cal, and External Source Power. For a frequency-based sweep, these controls are located on the POWER menu.

- MAIN | Power | POWER | Other Setup | POWER SETUP
- [“POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-27](#)

Figure 5-6. POWER [COUPLED] Menu - Power-Based Sweep - 2-Port VNAs (3 of 3)

5-9 ATTENUATORS Menu Variants

ATTENUATOR Menu Button Availability

The available buttons in the ATTENUATORS menu depend on which attenuator option has been installed in the instrument and the sweep type setting.

Option 061 Installed - Port 1 Source Attenuator and Port 2 Test Attenuator

If Option 061 (Port 1 Source Attenuator and Port 2 Test Attenuator) is installed, only the first and fourth buttons are active. The other buttons are unavailable.

Option 062 Installed - Port 1 and Port 2 Source Attenuators, Port 1 and Port 2 Test Attenuators:

If Option 062 (Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuators) is installed, all buttons are available.

No Attenuator Options Installed

If neither attenuator option is installed, the Attenuators button (on the POWER or POWER SETUP menu) and the ATTENUATORS menu are unavailable. Contact Anritsu Customer Service for more information.

ATTENUATOR Menu Location

The location of the ATTENUATOR menu relative to the previous menu depends on the sweep type setting.

Sweep Type = Frequency-Based

If Sweep Type = Frequency Based (Linear) or Frequency-Based (Log):

- [“POWER Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-12](#)
- MAIN | Power | POWER | Attenuators | ATTENUATORS
- [“ATTENUATORS Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-21](#)

Sweep Type = Segment-Based

If Sweep Type = Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based):

- [“POWER Menu - Segment-Based Sweeps - 2-Port VNAs” on page 5-15](#)
- MAIN | Power | POWER | Attenuators | ATTENUATORS
- [“ATTENUATORS Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-22](#)

Sweep Type = Power-Based

If Sweep Type = Power Sweep (CW Frequency) or Power Sweep (Swept Frequency):

- [“POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-27](#)
- MAIN | Power | POWER | Other Setup | POWER SETUP | Attenuators | ATTENUATORS
- [“ATTENUATORS Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-23](#)

ATTENUATORS Menu - Frequency-Based Sweep - 2-Port VNAs

Previous

- [“POWER Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-12](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Linear) or Freq Sweep (Log)
- [“Sweep Setup and Sweep Type Menus” on page 7-2](#)

Attenuators X

---Port 1---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Port 2---

Source Attenuator
0 dB

Test Attenuator
0 dB

Source Attenuator (Port 1) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 1) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Port 2) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in dB.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Port 2 Test Attenuation in dB.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 5-7. ATTENUATORS Menu - Frequency-Based Sweep - 2-Port VNAs

ATTENUATORS Menu - Segment-Based Sweep - 2-Port VNAs

Previous

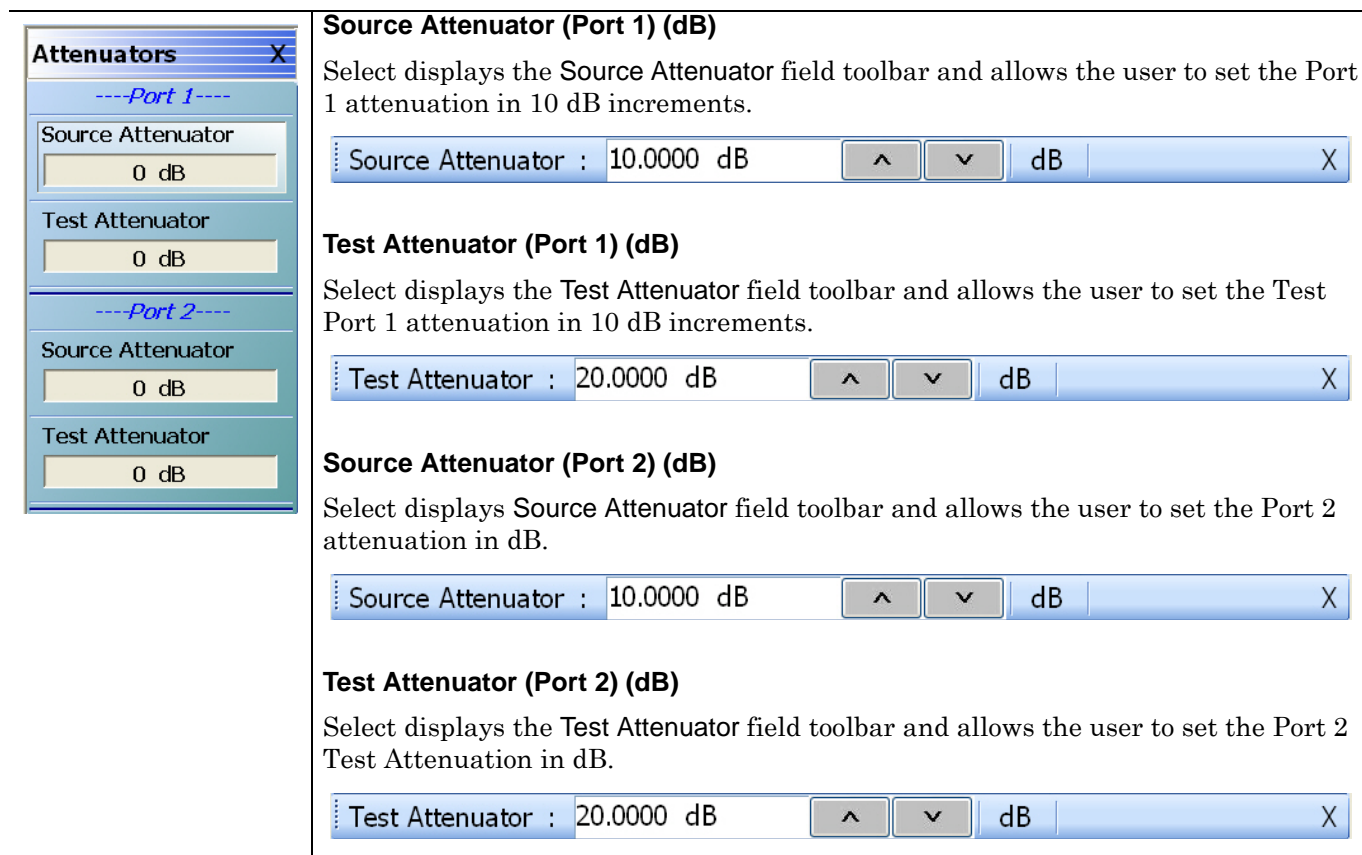
- [“POWER Menu - Segment-Based Sweeps - 2-Port VNAs” on page 5-15](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Segment-Based Sweep (Frequency or Index)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Segmented Sweep (Freq-Based) or Segmented Sweep (Index-Based)
- [“Sweep Setup and Sweep Type Menus” on page 7-2](#)



Attenuators X

---Port 1---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Port 2---

Source Attenuator
0 dB

Test Attenuator
0 dB

Source Attenuator (Port 1) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 1) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Port 2) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in dB.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Port 2 Test Attenuation in dB.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 5-8. ATTENUATORS Menu - Segment-Based Sweep - 2-Port VNAs

ATTENUATORS Menu - Power-Based Sweep Menu - 2-Port VNAs

Previous

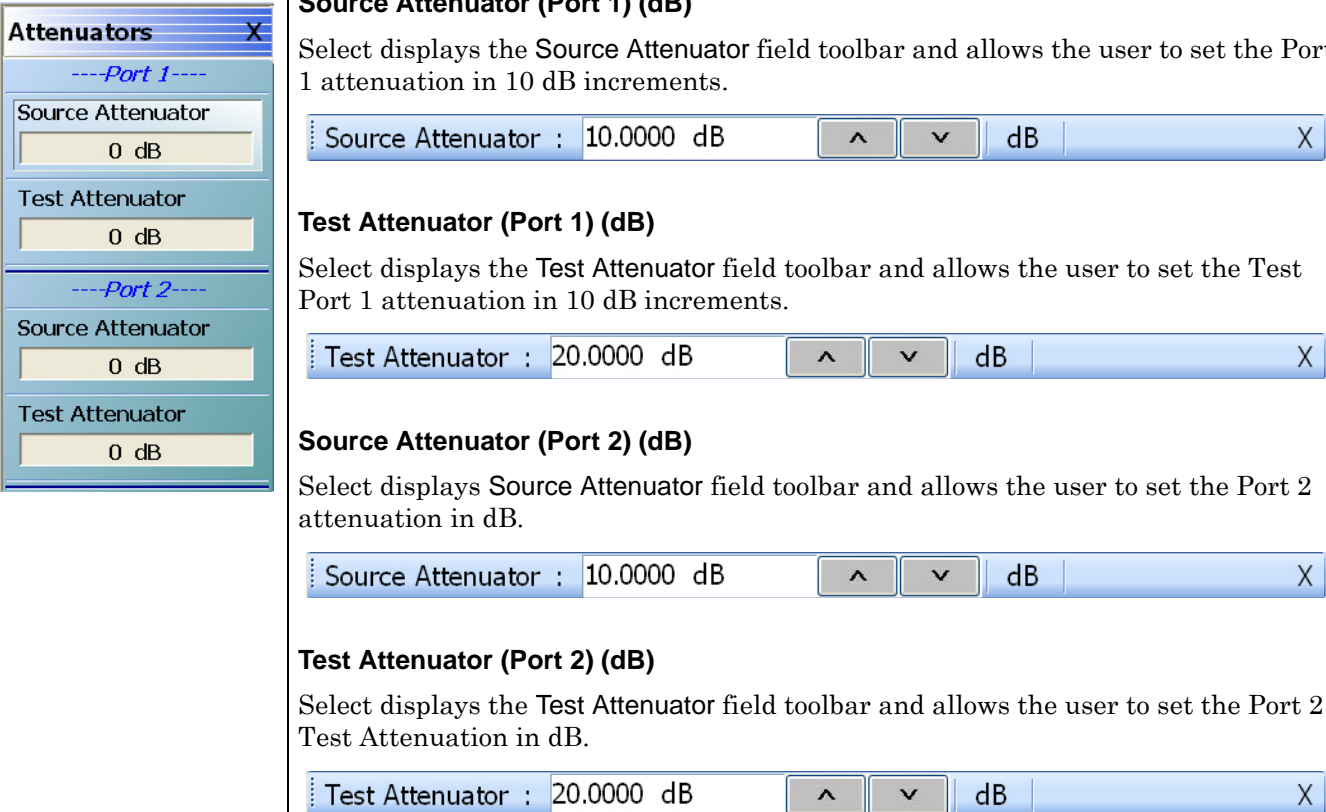
- [“POWER Menu - Power-Based Sweeps - 2-Port VNAs” on page 5-17](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Power Sweep (CW Freq) or Power Sweep (Swept Freq)
- [“Sweep Setup and Sweep Type Menus” on page 7-2](#)



Attenuators X

----Port 1----

Source Attenuator
0 dB

Test Attenuator
0 dB

----Port 2----

Source Attenuator
0 dB

Test Attenuator
0 dB

Source Attenuator (Port 1) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 1) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Port 2) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in dB.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Port 2 Test Attenuation in dB.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 5-9. ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs

5-10 POWER SETUP Menu Variants

The presence of the menu and the button availability on the menu depends on the sweep type setting.

Sweep Type Frequency-Based

If Sweep Type = Frequency Based (Linear) or Frequency-Based (Log):

- The POWER SETUP menu has four (4) buttons.
- Available buttons are: Port Selection, Apply Slope (All Ports), Slope (dB/GHz), and Port Power mode.
- [“POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-25](#)

Sweep Type Segment-Based

If Sweep Type = Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based):

- The POWER SETUP menu is not available.
- All power setup related configurations are completed in the segmented sweep setup FREQ BASE SETUP or INDEX BASE SETUP menus and tableau dialog boxes.
- Frequency-Based Segmented Sweep:
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented (Freq) | Freq-based Seg. Sweep Setup | FREQ BASE SETUP
- Index-Based Segmented Sweep:
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented (Index) | Index-based Seg. Sweep Setup | INDEX BASE SETUP
- [“POWER SETUP Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-27](#)

Sweep Type Power-Based

If Sweep Type = Power Sweep (CW Frequency) or Power Sweep (Swept Frequency):

- The POWER SETUP has nine (9) buttons.
- Available buttons are: Port Selection, Single Power Mode (ON/OFF), Single Power (dBm), Effective Single Power (dBm), Attenuators, Power Cal, Receiver Cal, Port Power (Coupled/Not Coupled), and External Source Power.
- Note that these buttons have moved from the POWER menu to the POWER SETUP Attenuators, Power Cal, Receiver Cal, Port Power (Coupled/Not Coupled), and External Source Power.
- Power-Based CW Frequency Sweep:
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Power Sweep (CW Freq)
- Power-Based Swept Frequency Sweep:
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Power Sweep (Swept Freq)
- [“POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-27](#)

POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs

Previous


- [“POWER Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-12](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Linear) or Freq Sweep (Log)
- [“Sweep Setup and Sweep Type Menus” on page 7-2](#)



Apply Slope [All Ports] (ON/OFF)
Select toggles the Apply Slope value set below between off and on.

Port Selection (Port 1/Port 2)
Select toggles the setup between Port 1 and Port 2.

- If Port Power is set to Not Coupled, when Port 1 is selected, the menu name changes to POWER SETUP [1].
- If Port Power is set to Not Coupled, when Port 2 is selected, the menu name changes to POWER SETUP [2].
- If Port Power is set to Coupled, the menu name changes to POWER SETUP [C]

Slope (dB/GHz)
Select displays the Single Power field toolbar and allows the user to select the single power level in dBm.

Slope [dB/GHz] : 0.00 ^ v Enter X

Port Power (Coupled/Not Coupled)
The Port Power button toggles the whether power adjustments to Ports 1-2 and Ports 3-4 are coupled or not coupled.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2 also changing the POWER SETUP menu name between POWER SETUP [1] and POWER SETUP [2].
- The POWER menu name also changes between POWER [1] and POWER [2].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].
- Coupling does not affect attenuator settings.

Figure 5-10. POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs

POWER SETUP Menu - Segment-Based Sweep - 2-Port VNAs

The POWER SETUP menu is not available if sweep is set to a frequency-based or index-based segment sweep. Instead, power configuration is on a per-segment basis and is configured at the FREQ BASE SETUP or the INDEX BASE SETUP menus.

Previous

- [“POWER Menu - Segment-Based Sweeps - 2-Port VNAs” on page 5-15](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Prerequisites

- Sweep = Frequency-Based Segment Sweep or Index-Based Segment Sweep
- Frequency-Based Segment Sweep Setup
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented Sweep (Freq-Based) | Freq-Based Seg. Sweep Setup | FREQ BASE SETUP
- Index-Based Segment Sweep Setup
 - [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented Sweep (Index-Based) | Index-Based Seg. Sweep Setup | INDEX BASE SETUP

POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs

Previous


- [“POWER Menu - Power-Based Sweeps - 2-Port VNAs” on page 5-17](#)

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP

Prerequisites

- Sweep = Power-Based Sweep (CW Frequency or Swept Frequency)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Power Sweep (CW Freq) or Power Sweep (Swept Freq)
- [“Sweep Setup and Sweep Type Menus” on page 7-2](#)



Port Selection (Port 1/Port 2)
 Select displays the SELECT PORT dialog box allowing touch screen selection of Port 1 or Port 2.
 The menu name suffix changes depending on the state of the Port Power (Couple/Not Coupled) button, and if Not Coupled, on the currently selected port.

Single Port Mode (ON/OFF)
 Select toggles single port mode ON and OFF.

Single Power (dBm)
 Select displays the Single Power (dBm) field toolbar and allows the user to select the single power level.

Single Power : -20.0000 dBm ^ v dBm X

Effective Single Power (dBm)
 The read-only button name depends on the receiver configuration selection made on the APPLICATION menu. If Single, Multiple Source, or BB/mm Wave is selected, the button name is Effective Single Power and displays the value of the effective single power level in dBm after the effects of any attenuators.

Eff. Single Pwr (>54G) (dBm)
 Effective Single Power >54 GHz. The button name depends on the receiver configuration selection made on the APPLICATION menu where Modular BB must be selected. In addition, the instrument must be an MS4647A with Option 080/081 installed. An example of the button name change is shown below.

Port Selection
Port 1

Single Power Mode
OFF

Single Power
-20 dBm

Eff. Single Pwr (>54G)
-20 dBm

Figure 5-11. POWER SETUP Menu - Power-Based Sweep - 2-Port VNAs (1 of 2)

Attenuators

The Attenuators button presence depends on instrument installed options:

- Button Not Available
 - If the Attenuators button is present but unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.
- Button Available
 - If the Attenuators button is available, one of the attenuator options has been installed.
 - Option 061: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
 - Option 062: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-21](#)
- [“ATTENUATORS Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-22](#)
- [“ATTENUATORS Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-23](#)

Power Cal

Select displays the POWER CAL menu.

- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu - 2-Port VNAs” on page 5-39](#)

Port Power (Coupled/Not Coupled)

The Port Power button toggles the whether power adjustments to Ports 1-2 and Ports 3-4 are coupled or not coupled.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2 also changing the POWER SETUP menu name between POWER SETUP [1] and POWER SETUP [2].
- The POWER menu name also changes between POWER [1] and POWER [2].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].
- Coupling does not affect attenuator settings.

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu - 2-Port VNAs” on page 5-45](#)

Figure 5-11. POWER SETUP Menu - Power-Based Sweep - 2-Port VNAs (2 of 2)

5-11 POWER CAL Menu Variants

The POWER CAL menu is available in two variants depending on the Sweep Type set in the SWEEP TYPE menu.

SWEEP TYPE Menu

- [“Sweep Setup and Sweep Type Menus” on page 7-2](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

POWER CAL Non-Power Menus

The POWER CAL Frequency-Based Sweep and the POWER CAL Segment-Based Sweep menus are the same. Both menus have six (6) buttons of: Port Selection, Port Cal, Target Power (dBm), Perform Cal, Save Cal, and Recall Cal. This menu is available if Sweep Type is set to:

- Freq Sweep (Linear)
- Freq Sweep (Log)
- Segmented Sweep (Freq-based)
- Segmented Sweep (Index-based)
- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31](#)

POWER CAL Power-Based Menus

The POWER CAL Power-Based Sweep menu is different with seven (7) buttons of: Port Selection, Port Cal, Target Start Power (dBm), Target Stop Power (dBm), Perform Cal, Save Cal, and Recall Cal. This menu is available if Sweep Type is set to:

- Power Sweep (CW Freq)
- Power Sweep (Swept Freq)
- [“POWER CAL Menu - Power-Based Sweep - 2-Port VNAs” on page 5-32](#)

POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs

POWER CAL Menu - Segment-Based Sweep - 2-Port VNAs

Previous

- [“POWER Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-12](#)
- [“POWER Menu - Segment-Based Sweeps - 2-Port VNAs” on page 5-15](#)

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL

Both menus are identical.

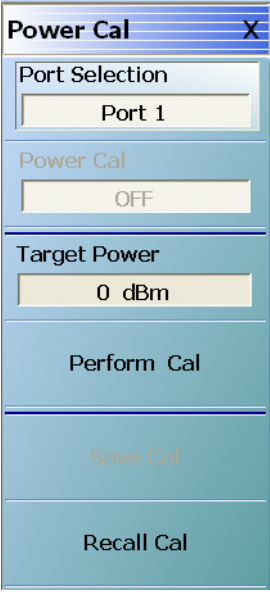

	<p>POWER CAL 6-Button Menu Available if a non-power sweep mode of Frequency-Based Sweep or Index-Based Sweep is selected.</p> <p>Port Selection (Port 1/Port 2) The Port Selection button toggles the port selection between Port 1 and Port 2.</p> <p>Power Cal (Off/On) If a successful power calibration has not been completed, the button is unavailable. If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.</p> <p>Target Power (dBm) Select displays the Target Power field toolbar and allows the user to enter power levels in dBm.</p>  <p>Perform Cal Starts the power calibration routine and displays the POWER CALIBRATION dialog box. When the calibration is successfully completed, the Save Cal button (below) and the Power Cal (Off/On) button (above) are available.</p> <ul style="list-style-type: none"> • “POWER CALIBRATION (PORT 1/PORT 2) Dialog Box” on page 5-34 <p>Save Cal If a successful power calibration has not been completed, the button is unavailable. The Save Cal button is available after a successful power calibration (above). If the sweep mode is set to a frequency sweep, select displays the SAVE AS (FREQUENCY SWEEP POWER CAL.fpc FILE) dialog box.</p> <ul style="list-style-type: none"> • “SAVE AS (FREQ. SWEEP POWER CAL FPC FILE) Dialog Box” on page 5-36 <p>Recall Cal The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled. As above, if the sweep mode is set to a frequency sweep, select displays the OPEN (FREQUENCY SWEEP POWER CAL.fpc FILE) dialog box. If the sweep mode is set to a power sweep, select displays the OPEN (POWER SWEEP POWER CAL.ppc FILE) dialog box.</p> <ul style="list-style-type: none"> • “OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 5-35
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Figure 5-12. POWER CAL Menu - Non-Power Sweep Modes - 6 Buttons

POWER CAL Menu - Power-Based Sweep - 2-Port VNAs

Previous

- [“POWER Menu - Power-Based Sweeps - 2-Port VNAs” on page 5-17](#)

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL

	<p>POWER CAL 7-Button Menu Available if Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is selected.</p> <p>Port Selection (Port 1/Port 2) The Port Selection button toggles the port selection between Port 1 and Port 2.</p> <p>Power Cal (Off/On) If a successful power calibration has not been completed, the button is unavailable. If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.</p> <p>Target Start Power (dBm) Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.</p> <p>Target Start Power : -30.0000 dBm [^] [v] dBm [X]</p> <p>Target Stop Power (dBm) Select displays the Target Stop Power field toolbar and allows the user to enter power levels in dBm.</p> <p>Target Stop Power : -20.0000 dBm [^] [v] dBm [X]</p>
--	--

Figure 5-13. POWER CAL Menu - Power Sweep Modes - 7 Buttons (1 of 2)

	<p>Perform Cal</p> <p>Starts the power calibration routine and displays the POWER CALIBRATION dialog box. When the calibration is successfully completed, the Save Cal button (below) and the Power Cal (Off/On) button (above) are available.</p> <ul style="list-style-type: none">• “POWER CALIBRATION (PORT 1/PORT 2) Dialog Box” on page 5-34 <p>Save Cal</p> <p>If a successful power calibration has not been completed, the button is unavailable. The Save Cal button is available after a successful power calibration (above). If the sweep mode is set to a power sweep, select displays the SAVE AS (POWER SWEEP POWER CAL.ppc FILE) dialog box.</p> <ul style="list-style-type: none">• “SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 5-37 <p>Recall Cal</p> <p>The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled.</p> <p>As above, if the sweep mode is set to a frequency sweep, select displays the OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. The dialog box is similar to the dialog box below:</p> <ul style="list-style-type: none">• “OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 5-35
--	---

Figure 5-13. POWER CAL Menu - Power Sweep Modes - 7 Buttons (2 of 2)

POWER CALIBRATION (PORT 1/PORT 2) Dialog Box

Previous

- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31](#)

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Perform Cal | POWER CALIBRATION (PORT 1/PORT 2) Dialog Box

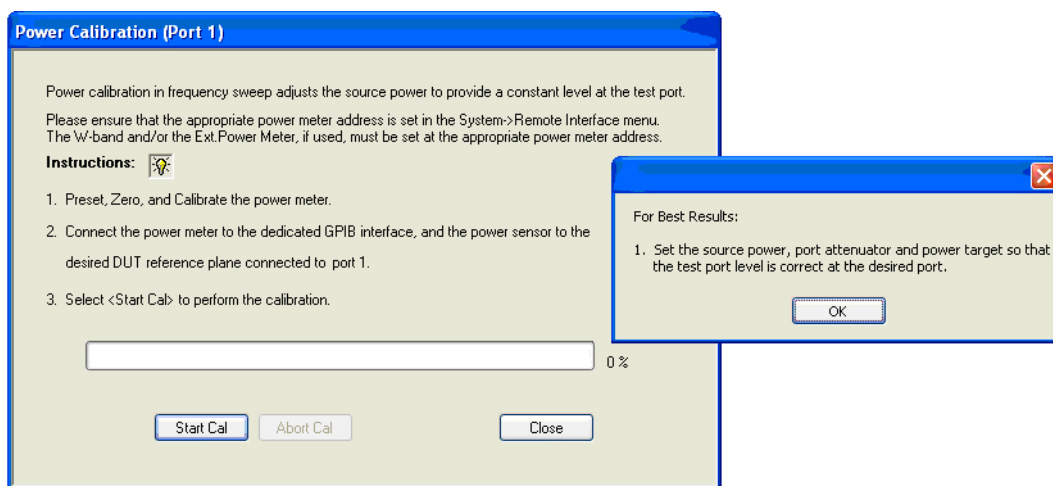


Figure 5-14. POWER CALIBRATION (PORT 1/PORT 2) Dialog Box

Overview

Power calibration in power sweep adjusts the source output power for the frequency specified over the power sweep range to provide a linear power level as the calibration plane.

Instructions

1. Preset, Zero, and Calibrate the power meter.
2. Connect the power meter to the dedicated GPIB interface, and the power sensor to Port 1.
3. Select Start Cal to perform the calibration.
4. Click Close to return. Click Abort Cal to end calibration session.

OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box

If a power sweep is set, recalling a prior calibration from the Power Cal menu displays this dialog box. If a frequency sweep is set, recalling a prior calibration displays the similar Open (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box.

Previous

- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31.](#)

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Recall Cal | OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box

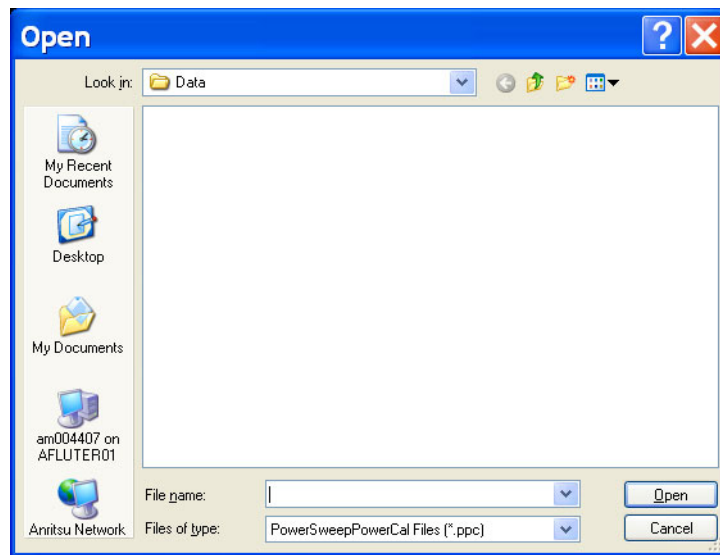


Figure 5-15. OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box

Overview

Allows the user to find, open, and recall a power sweep power calibration PPC file.

Instructions

1. Navigate to the location of a previously stored PPC file.
2. Click Open to recall the file.
3. Click Close to return or Cancel to end recall session.

SAVE AS (FREQ. SWEEP POWER CAL FPC FILE) Dialog Box

Full Name

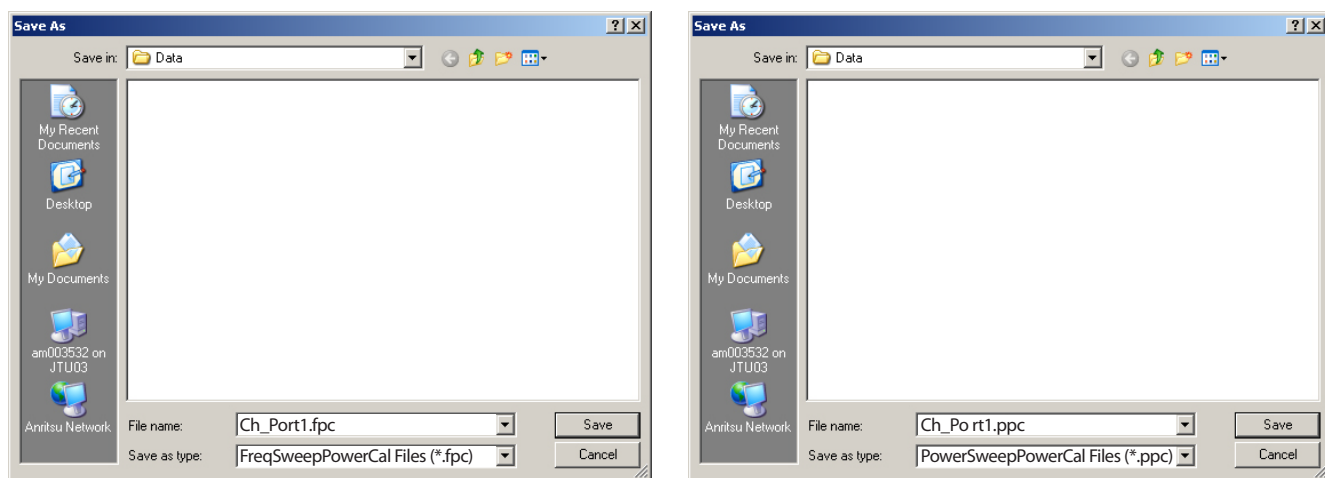
- SAVE AS (FREQUENCY SWEEP POWER CALIBRATION FPC FILE) Dialog Box

Previous

- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs”](#) on page 5-31

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Save Cal | SAVE AS (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box



At left, Save as Frequency Sweep Power Cal FPC Files | At right, Save As Power Sweep Power Cal (PPC) Files

Figure 5-16. SAVE AS (SWEEP POWER CAL FILE) Dialog Box

SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box

Previous

- [“POWER CAL Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-31](#)

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Save Cal | SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box

Figure

- [Figure 5-16, “SAVE AS \(SWEEP POWER CAL FILE\) Dialog Box” on page 5-36](#)

5-12 Receiver Setup and Calibration Menus - 2-Port VNAs

The receiver setup and calibration menus are available for all sweep types.

RECEIVER SETUP Menu - 2-Port VNAs

Previous

- [“POWER Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-12](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP

Menu Button Availability

- The top four (4) buttons are unavailable until a successful receiver calibration has been performed on the Receiver Cal menu. After a successful calibration, the buttons are available (shown below).

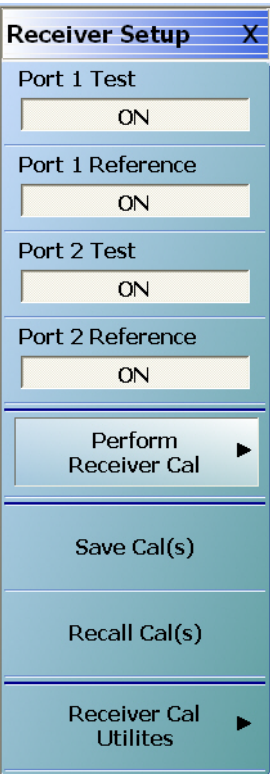
 <p>The screenshot shows the Receiver Setup menu with the following items from top to bottom: Port 1 Test (ON), Port 1 Reference (ON), Port 2 Test (ON), Port 2 Reference (ON), Perform Receiver Cal (with a right-pointing arrow), Save Cal(s), Recall Cal(s), and Receiver Cal Utilities (with a right-pointing arrow).</p>	<p>Port 1 Test (Off/On) Select toggles the Port 1 Test Off and On.</p> <p>Port 1 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 1 Reference between off and on.</p> <p>Port 2 Test (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 2 Test between off and on.</p> <p>Port 2 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 2 Reference between off and on.</p> <p>Perform Receiver Cal Select displays the RECEIVER CAL menu.</p> <ul style="list-style-type: none"> • “RECEIVER CAL Menu - 2-Port VNAs” on page 5-39 <p>Save Cal(s) Select displays the SAVE RCVR CAL dialog box.</p> <ul style="list-style-type: none"> • “SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box - 2-Port VNAs” on page 5-40 <p>Recall Cal(s) Select displays the RECALL RCVR CAL dialog box.</p> <ul style="list-style-type: none"> • “RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box - 2-Port VNAs” on page 5-41 <p>Receiver Cal Utilities Select displays the RCVR UTILITIES menu.</p> <ul style="list-style-type: none"> • “RCVR UTILITIES Menu - 2-Port VNAs” on page 5-42
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Figure 5-17. RECEIVER SETUP Menu

RECEIVER CAL Menu - 2-Port VNAs

Previous

- [“POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-27](#)
- [“RECEIVER SETUP Menu - 2-Port VNAs” on page 5-38](#)

Navigation Path for Power Sweep Mode

- MAIN | Power | POWER | Power Setup | POWER SETUP | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL

Navigation Path for Frequency Sweep Mode

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL

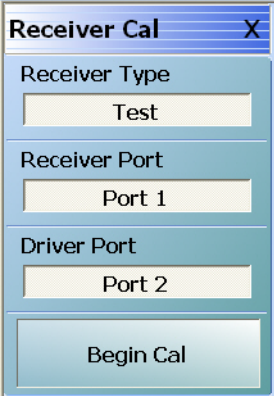
	<p>RECEIVER CAL Menu Message</p> <p>The menu displays a message: “Connect a through line between test ports.”</p> <p>Receiver Type (Test/Reference)</p> <p>After a successful receiver calibration, select toggles Receiver Type between Test (default) and Reference. Reference is used for additional test loop calibration.</p> <p>Receiver Port (Port 1/Port 2)</p> <p>The Receiver Port toggle button switches the receiver port between Port 1 and Port 2.</p> <p>Driver Port (Port 1/Port 2)</p> <p>The Driver Port toggle button switches the driving port between Port 1 and Port 2.</p> <p>Begin Cal</p> <p>The Begin Calibration button starts the receiver calibration. During the calibration process, the button dims and is unavailable. When the calibration is complete, the button returns to normal.</p> <p>At the end of successful calibration, the buttons on the RECEIVER SETUP menu are enabled.</p> <ul style="list-style-type: none"> • “RECEIVER SETUP Menu - 2-Port VNAs” on page 5-38
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Figure 5-18. RECEIVER CAL (RECEIVER CALIBRATION) Menu

SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box - 2-Port VNAs

Previous

- [“RECEIVER SETUP Menu - 2-Port VNAs”](#) on page 5-38

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Save Cal(s) | SAVE RCVR CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

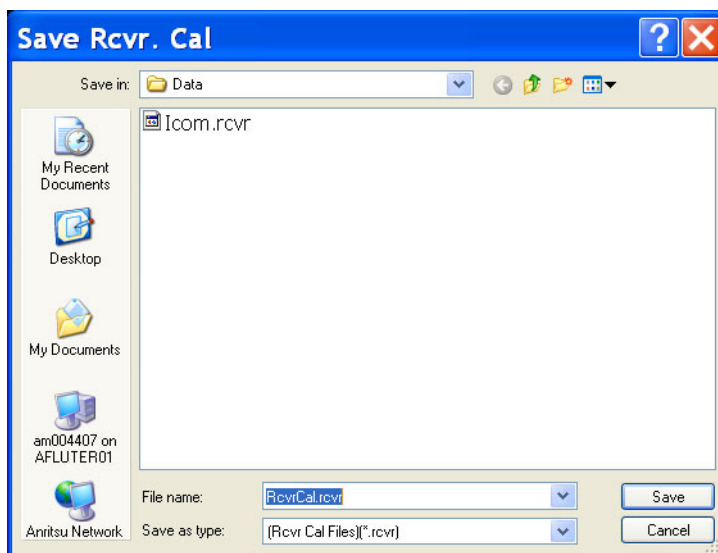


Figure 5-19. SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Overview

Use the dialog box to navigate to the desired location, enter a unique RCVR file name, and click **Save** to save. Click **Cancel** to exit the dialog box. Allows the user to save a receiver calibration (.rcvr) file.

Instructions

1. Navigate to the required location.
2. Click **Save**.
3. Click **Close** to return or **Cancel** to end recall session.

RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box - 2-Port VNAs

Previous

- “RECEIVER SETUP Menu - 2-Port VNAs” on page 5-38

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Recall Cal(s) | RECALL RCVR CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

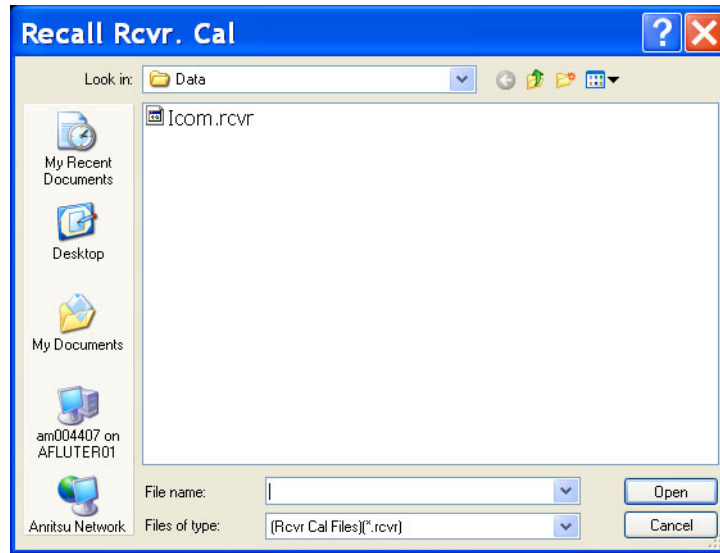


Figure 5-20. RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Instructions

Use the Open dialog box to navigate to required directory and select the required RCVR file. Click Open to recall the RCVR file. Click Cancel to exit the dialog box.

RCVR UTILITIES Menu - 2-Port VNAs

Previous

- [“RECEIVER CAL Menu - 2-Port VNAs” on page 5-39](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES

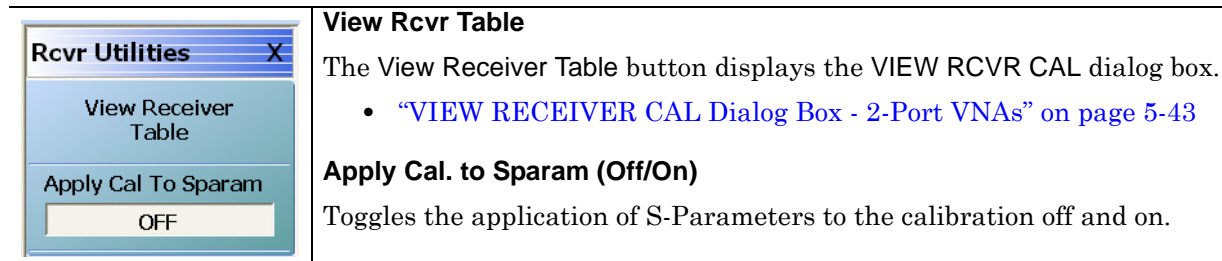


Figure 5-21. RCVR UTILITIES (RECEIVER UTILITIES) Menu

VIEW RECEIVER CAL Dialog Box - 2-Port VNAs

Full Name

- View Receiver Calibration Dialog Box

Previous

- [“RCVR UTILITIES Menu - 2-Port VNAs” on page 5-42](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES | View Receiver Table | VIEW RECEIVER CAL Dialog Box

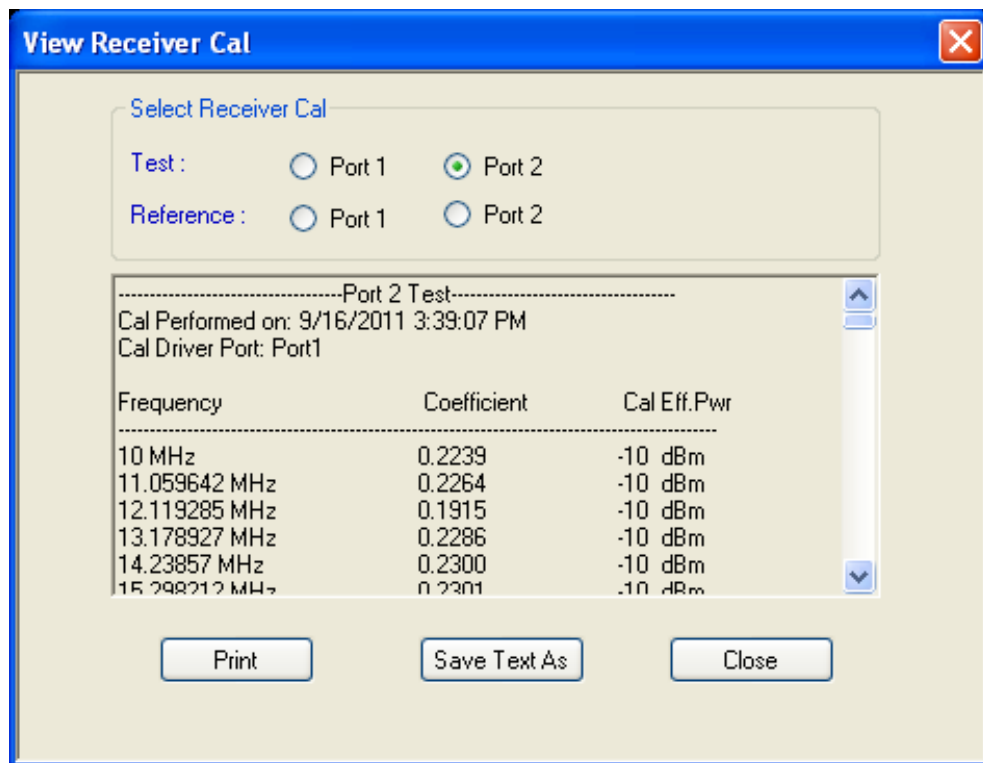


Figure 5-22. VIEW RCVR CAL (VIEW RECEIVER CALIBRATION) Dialog Box

Instructions

Use the View Rcvr Cal dialog box to view the applicable Receiver Calibration report. Radio buttons allow selection of following types of calibration data:

- Port 1 Test
- Port 1 Reference
- Port 2 Test
- Port 2 Reference

Click Print to print; Save Text As to save results as an ASCII TXT file to the desired directory or USB memory device; or click Close to close the dialog box.

Information Fields

The information fields provided are:

- Calibration date and time
- Port number
- Frequency
- Power in dB
- Cal.Eff.Pwr (Calculated Effective Power) in dBm

5-13 External Source Power Menu - 2-Port VNAs

EXT. SRC POWER Menu - 2-Port VNAs

Full Name

- External Source Power Menu

Previous for Frequency- and Segmented-Based Sweeps

- [“POWER SETUP Menu - Frequency-Based Sweep - 2-Port VNAs” on page 5-25](#)
- [“POWER SETUP Menu - Segment-Based Sweep - 2-Port VNAs” on page 5-27](#)

Navigation for Frequency- and Segmented-Based Sweeps

- MAIN | Power | POWER | External Source Power | EXT SRC POWER

Previous for Power-Based Sweeps

- [“POWER SETUP Menu - Power-Based Sweep Menu - 2-Port VNAs” on page 5-27](#)

Navigation for Power-Based Sweeps

- MAIN | Power | POWER | Power Setup | POWER SETUP | External Source Power | EXT SRC POWER

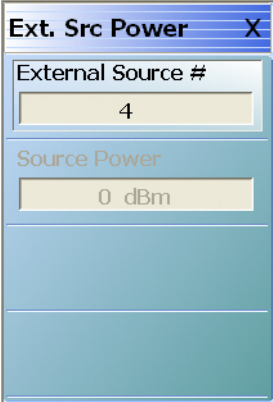
	<p>External Source #</p> <p>Selecting the External Source Number (External Source #) button displays the External Source # field toolbar. Use the toolbar to select the external power source port number.</p> <p>External Source # : 1 ^ v Enter</p> <p>Source Power (dBm)</p> <p>The button is enabled if an external source is connected to the instrument. If active, select displays the Source Power (dBm) field toolbar and allows setting the power level for all connected external sources. If unavailable, external sources are not connected.</p> <p>Source Power : 1.0000 dBm ^ v dBm X</p>
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Figure 5-23. EXT SRC POWER (EXTERNAL SOURCE POWER) Menu

Chapter 6 — Power Menus - 4-Port VNAs

6-1 Chapter Overview

This chapter provides information on per-port power control and configuration, and, if equipped, attenuator configurations for the VNA in 4-Port Mode. The power menus and associated field toolbars allow the user to set various power mode parameters which apply to the currently active channel. The power menus, their link structure, appearance, and related dialog boxes vary depending on the setting of the SWEEP TYPE menu as either a Frequency-Based Sweep (Linear or Log), a Segment-Based Sweep (Frequency- or Index-Based), or a Power Sweep (CW Frequency or Swept Frequency). Note that the menu appearance, button availability, and hierarchical links change if the VNA is in 2-Port Mode. For 2-Port Mode power menus, see [Chapter 5, “Power Menus - 2-Port VNAs”](#).

6-2 Overview of Power Menus - 4-Port VNAs

The following 4-Port VNA power menus and dialog boxes are available. Note that several menus have variants depending on the sweep type setting:

- [“POWER Menu Variants - 4-Port VNAs” on page 6-11](#)
 - [“POWER Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-13](#)
 - [“POWER Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-16](#)
 - [“POWER Menu - Power-Based Sweep - 4-Port VNAs” on page 6-18](#)
- [“ATTENUATORS Menu Variants - 4-Port VNAs” on page 6-20](#)
 - [“ATTENUATORS Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-21](#)
 - [“ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-22](#)
 - [“ATTENUATORS Menu - Power-Based Sweep - 4-Port VNAs” on page 6-23](#)
- [“POWER SETUP Menu Variants - 4-Port VNAs” on page 6-24](#)
 - [“POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-25](#)
 - [“POWER SETUP Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-27](#)
 - [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)
- [“Receiver Setup and Calibration Menus - 4-Port VNAs” on page 6-30](#)
 - [“RECEIVER SETUP Menu - 4-Port VNAs” on page 6-30](#)
 - [“RECEIVER CAL Menu - 4-Port VNAs” on page 6-32](#)
 - [“SAVE RCVR. CAL \(RECEIVER CALIBRATION RCVR FILE\) Dialog Box” on page 6-33](#)
 - [“RECALL RCVR. CAL \(RECEIVER CALIBRATION RCVR FILE\) Dialog Box” on page 6-34](#)
 - [“RCVR UTILITIES Menu - 4-Port VNAs” on page 6-35](#)
 - [“VIEW RCVR CAL Dialog Box” on page 6-36](#)
- [“External Source Power Menu” on page 6-38](#)
 - [“EXT. SRC POWER Menu - 4-Port VNA” on page 6-38](#)

6-3 Appearance of Power Menus on 4-Port VNAs

As noted in the Power Menu Set descriptions below, the POWER menu and its related sub-menus vary in menu appearance, menu links, button presence, and button type (read/write vs. read-only) depending on a number of factors including:

- Type of sweep set
- Instrument model number
- Installed options
- Application receiver configuration mode
- Frequency range configured

Sweep Types

The instrument sweep type setting changes the POWER Menu Set depending on if the Sweep Type is set to

- Frequency-Based (Linear)
- Frequency-Based (Log)
- Segmented Sweep (either Frequency-Based or Index-Based)
- Power Sweep (either CW Freq or Swept Freq)

VNA Model, Option, and Mode

For MS4642A, MS4644A, and MS4645A VNAs, the POWER menu variants depend on the sweep type selected above and whether Multiple Source and mm-Wave are selected.

For MS4647A VNAs without Option 080/081, the POWER menu variants depend on the sweep type set above, and whether Multiple Source and BB/mm-Wave are selected.

For MS4647A VNAs, additional menu changes depend on the frequency range covered, the Receiver Configuration Mode if set to Modular Broadband or Modular Broadband with Multiple Source:

- Modular Broadband requires a MS4647A with Option 080/081 and an attached 3739x Test Set. Menus change depending the sweep type set above and the frequency range set, particularly depending on below, across, and above 54 GHz.
- Modular Broadband (a MS4647A with Option 081 and Option 061/062 providing attenuators) with Multiple Source can be configured. If at least one band is configured with a frequency greater than 54 GHz, an additional button is present.

6-4 Maximum and Minimum Power Settings

For all configurations, the maximum power setting is +15 dBm. For all configurations below 54 GHz, the minimum power setting is –30 dBm and for above 54 GHz, the minimum power setting is –60 dBm. These minimum power settings can be further lowered by application of internal attenuators, linear power calibration effects, and/or the connected presence of OEM millimeter-wave modules.

- The power settings are set by the appropriate Start, Stop, and/or Single Power buttons and their related field toolbars.
- Below 54 GHz, the user defined start, stop, and/or single power settings are then modified by the effects of any applied attenuators (if equipped), and the relevant Linear Power Calibration and displayed as the appropriate read-only Effective Power button.
- Above 54 GHz, the user defined start, stop, and/or single power settings are then modified by the effects of the relevant Linear Power Calibration (noting that internal attenuator effects are not applied above 54 GHz) and displayed as the appropriate read-only Effective Power button.
- Depending the VNA model and the equipped test set, where the frequency range as less than 54 GHz, greater than 54 GHz, or across 54 GHz, some of the following read-only Effective Power buttons appear:
 - Effective Start Power
 - Effective Start Power < 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Start Power button present.
 - Effective Start Power > 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Start Power button present.
 - Effective End Power
 - Effective Stop Power < 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective End Power button present.
 - Effective Stop Power > 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective End Power button present.
 - Effective Single Power
 - Effective Single Power < 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Single Power button present.
 - Effective Single Power > 54 GHz – Button is only available when 3743A or MA25300A Modules are in use. If not present, only the Effective Single Power button present.
- For VNAs where frequencies either cross 54 GHz (MS4647A VNAs) or use frequencies above 54 GHz (MS4647A VNAs with Option 080/081 or MS4640A VNAs with Option 082/082 and E-Band or W-Band modules), additional buttons of Effective Start Power > 54 GHz, Effective Stop Power > 54 GHz, and Effective Single Power > 54 GHz are present.
- Where compatible with the various options above, the 4-Port VNA power maximum and power minimum are the same as for the 2-Port VNA less the loss of the Test Set and cables.

A summary of the power settings is in [Table 6-1 on page 6-4](#).

Table 6-1. Summary of Maximum and Minimum Power Levels

VNA, Power Level, and Frequency Range	Power Sweep Type	Power Setting Max/Min ^a	Factors Affecting Effective Power	Resultant Effective Power
Any MS4640A VNA Maximum Power Above, Below, or Across 54 GHz	Any	+15 dBm maximum	<ul style="list-style-type: none"> Option 061/062 Attenuators^b Linear Power Calibration 	<ul style="list-style-type: none"> Effects at left can lower effective maximum power.
Any MS4640A VNA Minimum Power for Less Than 54 GHz	<ul style="list-style-type: none"> Power Sweep CW Single Power Mode Power Sweep Swept Frequency Power Sweep Swept Frequency Single Power 	-30 dBm minimum	<ul style="list-style-type: none"> Option 061/062 Attenuators Linear Power Calibration 	<ul style="list-style-type: none"> Effects at left can lower effective minimum power to less than -30 dBm.
MS4647A VNAs with BB/mm-Wave Option 080/081 ^c Minimum Power for Less Than 54 GHz to Greater Than 54 GHz	<ul style="list-style-type: none"> Power Sweep Swept Frequency Power Sweep Swept Frequency Single Power 	-60 dBm minimum	<div style="display: flex; flex-direction: column;"> <div style="margin-bottom: 10px;">Below 54 GHz:</div> <ul style="list-style-type: none"> Option 061/062 Attenuators Linear Power Calibration <div style="margin-bottom: 10px;">Above 54 GHz:</div> <ul style="list-style-type: none"> Attenuators have no effect above 54 GHz. Linear Power Calibration </div>	<ul style="list-style-type: none"> The default minimum power for frequencies less than 54 GHz is -30 dBm and for frequencies greater than 54 GHz is -60 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.
MS4640A VNAs with mm-Wave Option 082/083 and OML/VDI mm-Wave Modules ^d	Any	-100 dBm minimum	<ul style="list-style-type: none"> VNA Attenuators have no effect on OML/VDI modules at any frequency. Linear Power Calibration 	<ul style="list-style-type: none"> The default minimum power for any frequency is always -100 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.

a. The default power setting applies to the user configurable Start, Stop, and Single Power buttons and their variants.

b. The Active Measurement Suite - Option 061 provides two attenuators; one in the Source 1 Path, and one in the Receive 2 Path. Option 062 provides four attenuators; One in each Source Path and one in each Receive Path.

c. Broadband/Millimeter-Wave System – ME7838A or ME7838D system with MS4647A VNA, Option 080/081, 3739x Test Set, and 3743A or MA25300A Modules to 145 GHz.

d. Millimeter-Wave System – Any MS4640A VNA, with Option 082/083, 3739x Test Set, and OML or VDI Millimeter-Wave Modules.

6-5 Power Menus for Frequency-Based Sweep (Linear and Log)

The power menu set for frequency-based sweep is shown in the figure below.

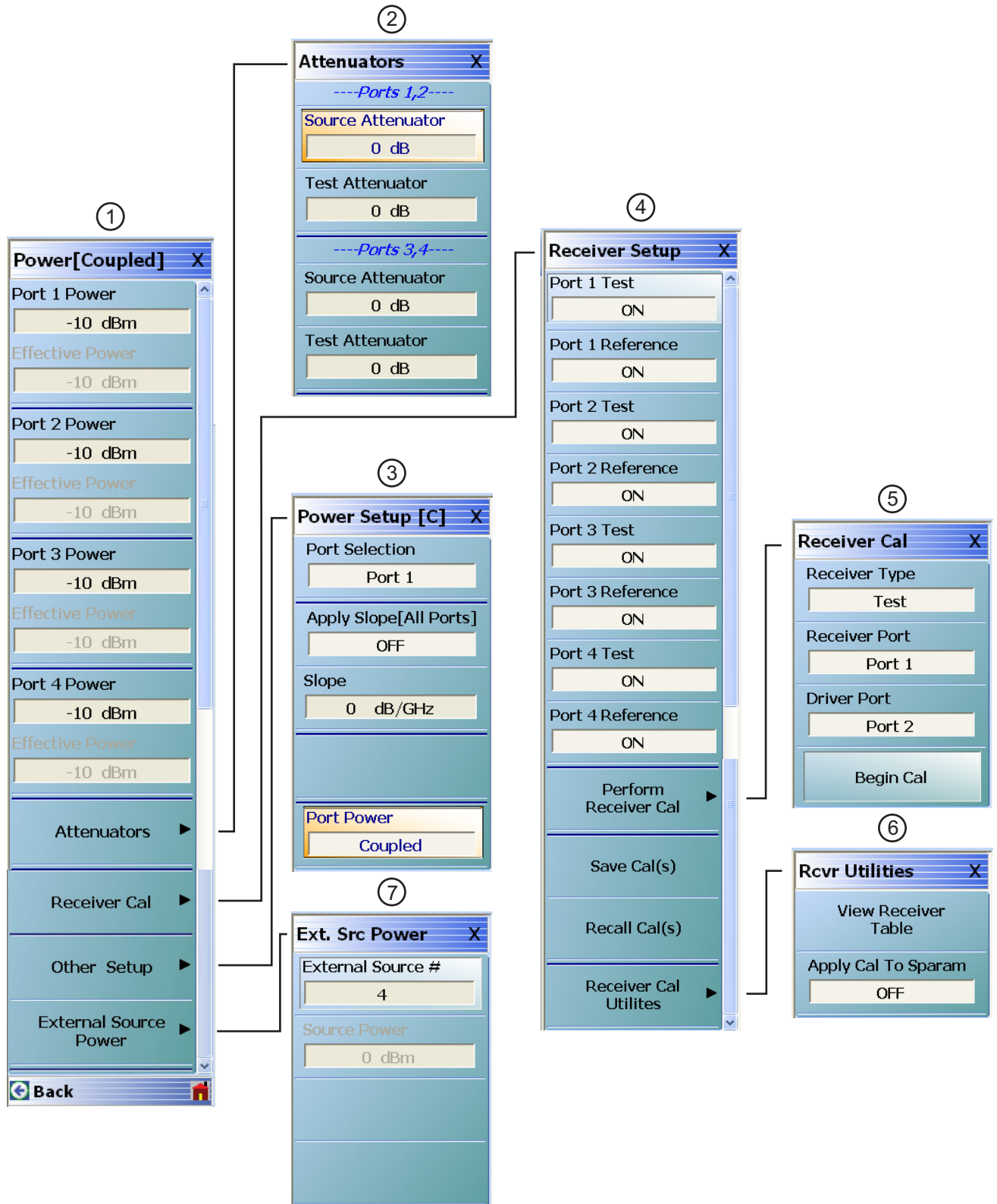


Figure 6-1. Power Menu Set - Frequency-Based Sweep (Linear or Log) (1 of 2)

This power menu set, including menu appearance and menu links, is available if Sweep Type is set to Frequency-Based (Linear) or Frequency-Based (Log). When Modular BB is enabled on the APPLICATION menu on MS4647A only when equipped with Options 007, 070, and 080/081, some power menus have either relabeled buttons or additional buttons. The button changes are related to power levels above and below 54 GHz.

1. "POWER Menu - Frequency-Based Sweep - 4-Port VNAs" on page 6-13.

2. "ATTENUATORS Menu - Frequency-Based Sweep - 4-Port VNAs" on page 6-21.
3. "POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs" on page 6-25.
4. "RECEIVER SETUP Menu - 4-Port VNAs" on page 6-30.
5. "RECEIVER CAL Menu - 4-Port VNAs" on page 6-32.
6. "RCVR UTILITIES Menu - 4-Port VNAs" on page 6-35.
7. "EXT. SRC POWER Menu - 4-Port VNA" on page 6-38.

Figure 6-1. Power Menu Set - Frequency-Based Sweep (Linear or Log) (2 of 2)

6-6 Power Menus for Segment-Based Sweep (Frequency and Index)

The power menu set for segment-based sweep is shown in the figure below.

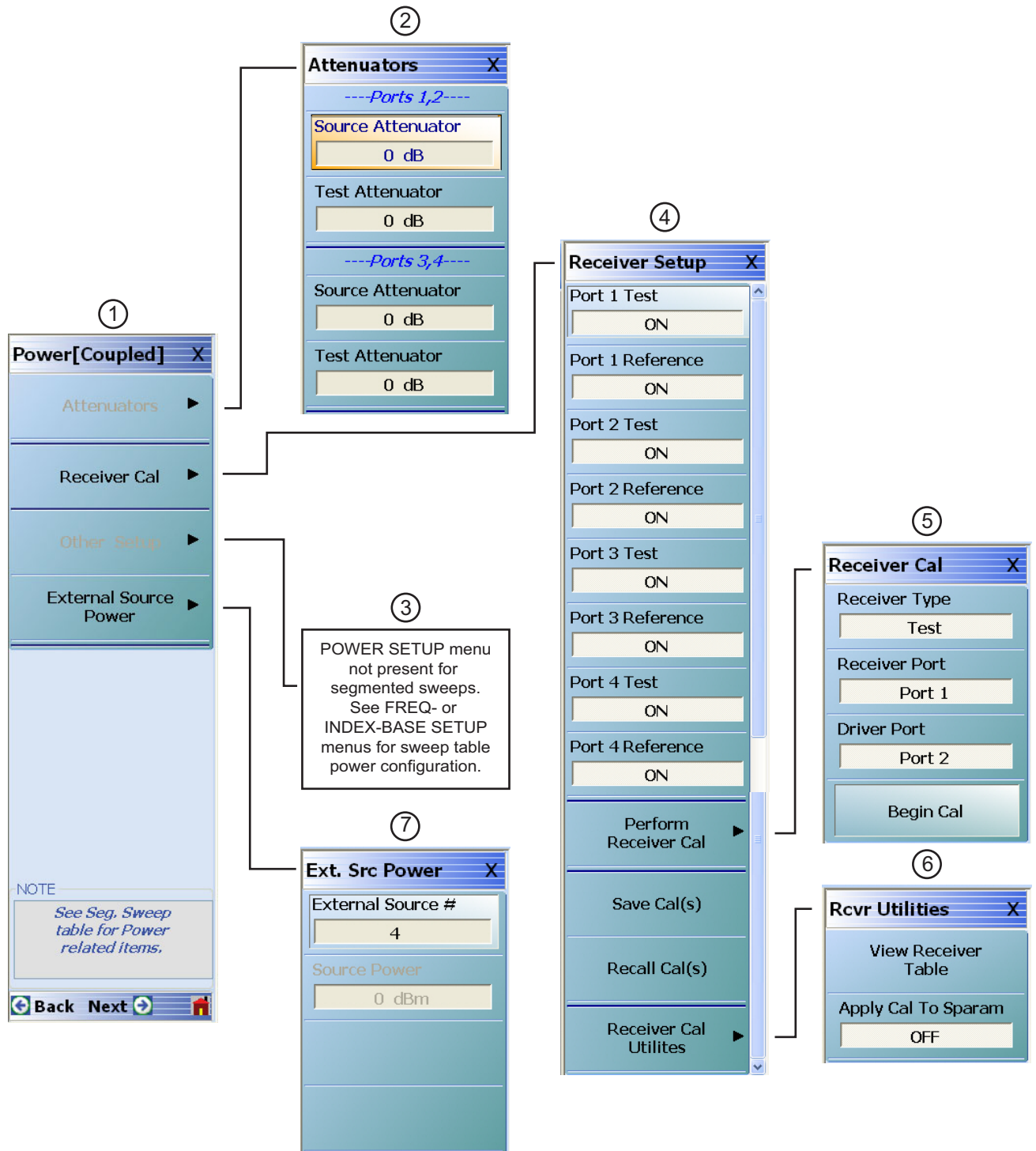


Figure 6-2. Power Menu Set - Segmented Sweeps (Frequency- or Index-Based) (1 of 2)

<p>This power menu set is available if Sweep Type is set to Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons. The power settings for segmented sweeps (frequency-based or index-based) are in the segmented-sweep input tables.</p> <ol style="list-style-type: none"> 1. “POWER Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-16. 2. “ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-22. 	<ol style="list-style-type: none"> 3. The POWER SETUP Menu is not present with these sweep types. Power configuration is on a per-segment basis and is configured at the “FREQ BASE SETUP Menu” on page 7-6 or the “INDEX BASE SETUP Menu” on page 7-12. 4. “RECEIVER SETUP Menu - 4-Port VNAs” on page 6-30. 5. “RECEIVER CAL Menu - 4-Port VNAs” on page 6-32. 6. “RCVR UTILITIES Menu - 4-Port VNAs” on page 6-35. 7. “EXT. SRC POWER Menu - 4-Port VNA” on page 6-38.
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Figure 6-2. Power Menu Set - Segmented Sweeps (Frequency- or Index-Based) (2 of 2)

6-7 Power Menus for Power-Based Sweep (CW and Swept Frequency)

The power menu set for power-based sweep is shown in the figure below.

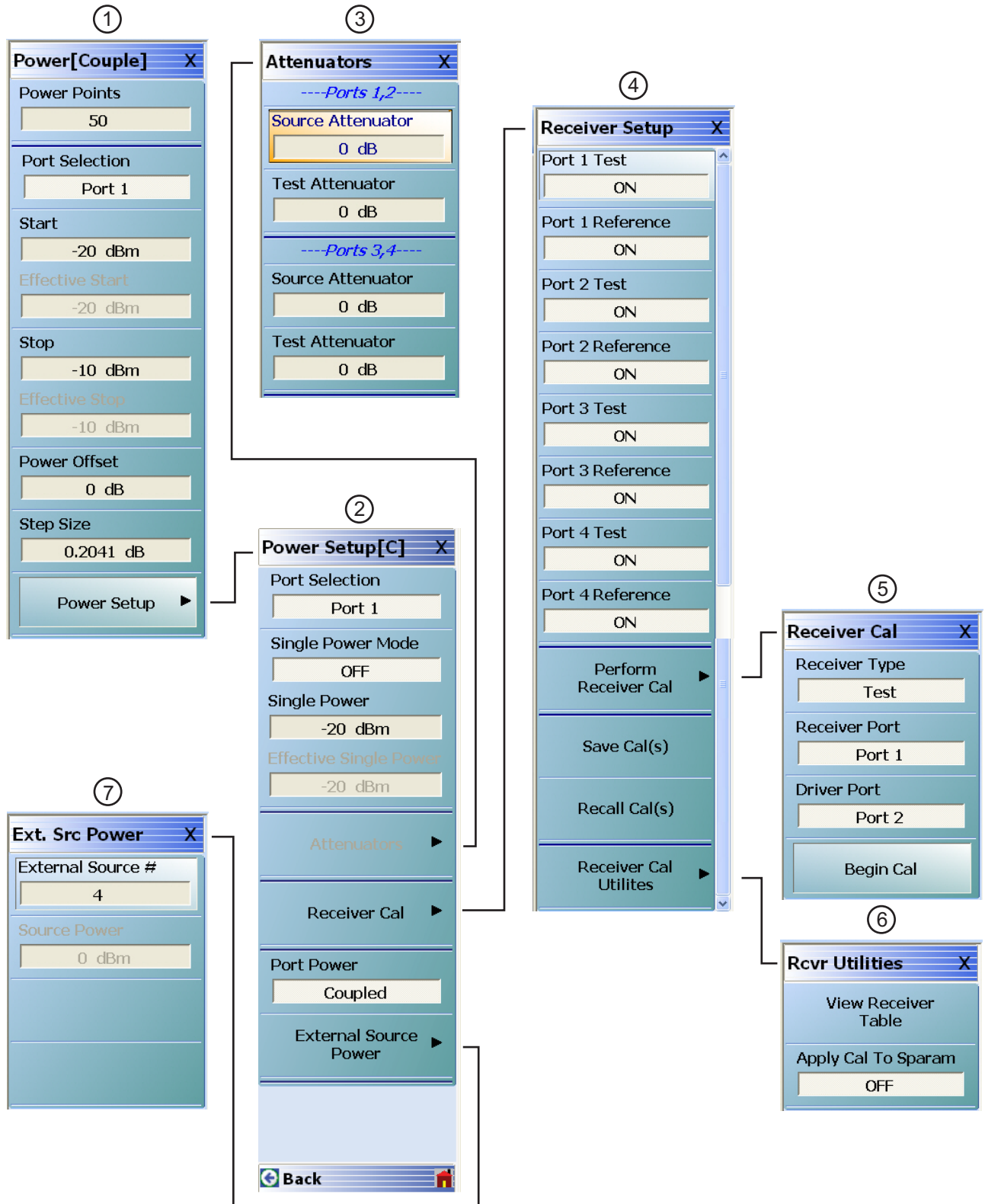


Figure 6-3. Power Menu Set - Power-Based Sweep (CW or Swept Frequency) (1 of 2)

<p>This power menu set is available if Sweep Type is set to Power Sweep (CW Freq) or Power Sweep (Swept Freq). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons. The power settings for power sweeps (frequency-based or index-based) are in the input tables. The button changes are related to power levels above and below 54 GHz.</p> <ol style="list-style-type: none">1. "POWER Menu - Power-Based Sweep - 4-Port VNAs" on page 6-18	<ol style="list-style-type: none">2. "POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs" on page 6-283. "ATTENUATORS Menu - Power-Based Sweep - 4-Port VNAs" on page 6-234. "RECEIVER SETUP Menu - 4-Port VNAs" on page 6-305. "RECEIVER CAL Menu - 4-Port VNAs" on page 6-326. "RCVR UTILITIES Menu - 4-Port VNAs" on page 6-357. "EXT. SRC POWER Menu - 4-Port VNA" on page 6-38
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Figure 6-3. Power Menu Set - Power-Based Sweep (CW or Swept Frequency) (2 of 2)

6-8 POWER Menu Variants - 4-Port VNAs

POWER Menu Name and Button Changes

The name of the POWER menu can be POWER or POWER [COUPLED] depending on the settings on the POWER SETUP menu.

- POWER: On the POWER SETUP menu, the Port Power button is set to Not Coupled.
- POWER [COUPLED]: On the POWER SETUP menu, the Port Power button is set to Coupled.
- On POWER menus with frequency-based sweeps, the button to link to the POWER SETUP menu is labeled the Other Setup button. These sweeps are Freq Sweep (Linear), Freq Sweep (Log), Segmented Sweep (Freq-based), and Segmented Sweep (Index-based). Note that the Other Setup button is not available with segmented sweeps.
- On POWER menus with power-based sweeps, the button to link to the POWER SETUP menu is labeled the Power Setup button. These sweeps are Power Sweep (CW Freq) and Power Sweep (Swept Freq).

Navigation for Frequency-Based Sweeps

- MAIN | Power | POWER | Other Setup | POWER SETUP
- [“POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-25](#)

Navigation for Power-Based Sweeps

- MAIN | Power | POWER | Power Setup | POWER SETUP
- [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)

Menu

- [“POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-25](#)
- [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)

Note

POWER: On the POWER SETUP menu, the Port Power button is set to Not Coupled.

POWER [COUPLED]: On the POWER SETUP menu, the Port Power button is set to Coupled.

POWER Menu Button Changes

- The POWER menu can have 13, 5, or 9 buttons depending on the SWEEP TYPE settings.

POWER Menu with Frequency-Based Sweeps

If SWEEP TYPE is set to Frequency-Based Sweep (Linear or Log):

- The POWER menu has 13 buttons, one of which is the Attenuators button linking to the ATTENUATORS menu.
- The POWER SETUP menu has 5 buttons, including buttons for Port Selection, Apply Slope, Slope, and Port Power.

POWER Menu with Segment-Based Sweeps

If SWEEP TYPE is set to Segment-Based Sweep (Frequency or Index):

- The POWER menu has 5 buttons, one of which is the Attenuators button linking to the ATTENUATORS menu.
- The POWER SETUP menu is not available. Instead, per-port power and effective power is set on a per-segment basis in the Segmented Sweep Setup Tableau dialog area.
 - MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP
 - [“FREQ BASE SETUP Menu” on page 7-6](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Index-Based Seg Sweep Setup | INDEX BASE SETUP
 - [“INDEX BASE SETUP Menu” on page 7-12](#)

POWER Menu with Power-Based Sweeps

If SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency):

- The POWER menu has 9 buttons.
- The Attenuators button is not present on the POWER menu, but is moved to the POWER SETUP menu.
- The POWER SETUP menu has 9 buttons, including buttons for Attenuators, Receiver Cal, and External Source Power.

POWER Menu - Frequency-Based Sweep - 4-Port VNAs

Previous

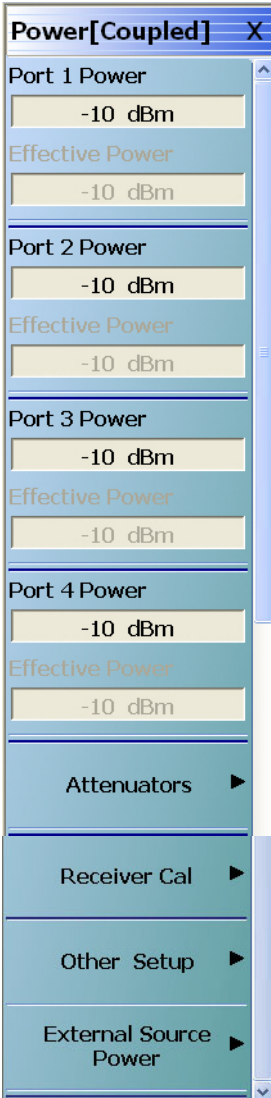
- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log)
- Frequency-Based Sweep (Linear)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Linear)
 - [“SWEEP TYPES Menu” on page 7-4](#)
- Frequency-Based Sweep (Log)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Log)
 - [“SWEEP TYPES Menu” on page 7-4](#)



Port 1 Power
Select displays the Port 1 Power field toolbar and allows setting the port 1 power level in dBm. If Port Power is set to coupled, changes to the Port 1 Power level affect all other port power levels.

Port 1 Power : -5.0000 dBm

Effective (Port 1) Power (dBm)
Read-only display. Shows the effective Port 1 power after any applied attenuator.

Port 2 Power
Select displays the Port 2 Power field toolbar and allows setting the port 2 power level in dBm. If Port Power is set to coupled, changes to the Port 2 Power level affect all other port power levels.

Port 2 Power : -10.0000 dBm

Effective (Port 2) Power (dBm)
Read-only display. Shows the effective Port 2 power after any applied attenuator.

Port 3 Power
Select displays the Port 3 Power field toolbar and allows setting the port 3 power level in dBm. If Port Power is set to coupled, changes to the Port 3 Power level affect all other port power levels. the toolbar is similar in appearance to the Port 2 Power (dBm) toolbar above.

Effective (Port 3) Power (dBm)
Read-only display. Shows the effective Port 3 power after any applied attenuator.

Port 4 Power
Select displays the Port 4 Power field toolbar and allows setting the port 4 power level in dBm. If Port Power is set to coupled, changes to the Port 4 Power level affect all other port power levels. The toolbar is similar in appearance to the Port 2 Power (dBm) toolbar above.

Effective (Port 4) Power (dBm)
Read-only display. Shows the effective Port 4 power after any applied attenuator.

Figure 6-4. POWER [COUPLED] Menu - Frequency-Based Sweep - 4-Port VNAs (1 of 2)

Attenuators

Button Not Present

If the Attenuators button is not present, the SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.

Button Not Available

If the Attenuators button is unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.

Button Available

If the Attenuators button is available, one of the attenuator options has been installed:

- Option 061: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
- Option 062: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.
- In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-21](#)
- [“ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-22](#)
- [“ATTENUATORS Menu - Power-Based Sweep - 4-Port VNAs” on page 6-23](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu - 4-Port VNAs” on page 6-32](#)

Other Setup (Power)

Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.

- [“POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-25](#)
- [“POWER SETUP Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-27](#)

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu - 4-Port VNA” on page 6-38](#)

Figure 6-4. POWER [COUPLED] Menu - Frequency-Based Sweep - 4-Port VNAs (2 of 2)

POWER Menu - Segment-Based Sweep - 4-Port VNAs

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Frequency-Based Segmented Sweep or Index-Based Segmented Sweep
- Frequency-Based Segmented Sweep
 - MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP
 - [“FREQ BASE SETUP Menu” on page 7-6](#)
- Index-Based Segmented Sweep
 - MAIN | Sweep Setup | SWEEP SETUP | Index-Based Seg Sweep Setup | INDEX BASE SETUP
 - [“INDEX BASE SETUP Menu” on page 7-12](#)

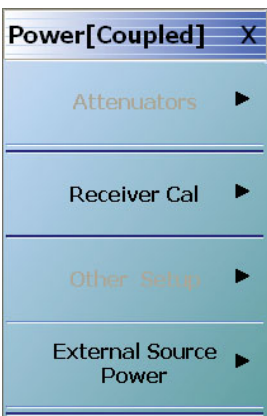
 <p>The screenshot shows the POWER [COUPLED] menu with four options: Attenuators, Receiver Cal, Other Setup, and External Source Power. The Attenuators option is highlighted in blue.</p>	<p>Attenuators Button</p> <p>Button Not Present</p> <p>If the Attenuators button is not present, the SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.</p> <p>Button Not Available</p> <p>If the Attenuators button is unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.</p> <p>Button Available</p> <p>If the Attenuators button is available, one of the attenuator options has been installed:</p> <ul style="list-style-type: none"> • Option 061: Includes Port 1 Source Attenuator and Port 2 Test Attenuator. • Option 062: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator. • In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4. <p>Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.</p> <ul style="list-style-type: none"> • “ATTENUATORS Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-21 • “ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-22 • “ATTENUATORS Menu - Power-Based Sweep - 4-Port VNAs” on page 6-23
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Figure 6-5. POWER [COUPLED] Menu - Segment-Based Sweep - 4-Port VNAs (1 of 2)

	<p>Receiver Cal</p> <p>Select displays the RECEIVER SETUP menu.</p> <ul style="list-style-type: none">• “RECEIVER CAL Menu - 4-Port VNAs” on page 6-32 <p>Other Setup (Power)</p> <p>Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.</p> <ul style="list-style-type: none">• “POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-25• “POWER SETUP Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-27• “POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28 <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none">• “EXT. SRC POWER Menu - 4-Port VNA” on page 6-38
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Figure 6-5. POWER [COUPLED] Menu - Segment-Based Sweep - 4-Port VNAs (2 of 2)

POWER Menu - Power-Based Sweep - 4-Port VNAs

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency)
- Power-Based Sweep (CW Frequency)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Power Sweep (CW Freq)
 - [“SWEEP TYPES Menu” on page 7-4](#)
- Power-Based Sweep (Swept Frequency)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Power Sweep (Swept Freq)
 - [“SWEEP TYPES Menu” on page 7-4](#)

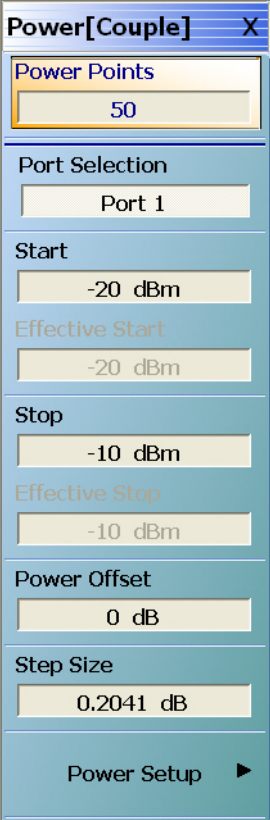
 <p>Power[Couple] X</p> <p>Power Points 50</p> <p>Port Selection Port 1</p> <p>Start -20 dBm</p> <p>Effective Start -20 dBm</p> <p>Stop -10 dBm</p> <p>Effective Stop -10 dBm</p> <p>Power Offset 0 dB</p> <p>Step Size 0.2041 dB</p> <p>Power Setup ▶</p>	<p>Power Points</p> <p>Select displays the Power Points field toolbar and allows selection of the total number of power points in the sweep.</p> <p>Power Points : 60 ^ v Enter X</p> <p>Port Selection</p> <p>The Port Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1, Port 2, Port 3, or Port 3. The selected port is shown in the button display field.</p> <p>Start (Power) (dBm)</p> <p>Select displays the Start (dBm) field toolbar where the start power level is set.</p> <p>Start : -20.0000 dBm ^ v dBm X</p> <p>Effective Start (Power) (dBm)</p> <p>A read only display that shows the effective start power after the application of any attenuator effects.</p>
--	--

Figure 6-6. POWER [COUPLED] Menu - Power-Based Sweep - 4-Port VNAs (1 of 2)

Stop (Power) (dBm)

Select displays the Stop (dBm) field toolbar where the stop power level is set.

Stop : -10.0000 dBm ^ v dBm X

Effective Stop (Power) (dBm)

A read only display that shows the effective stop power after the application of any attenuator effects.

Power Offset (dB)

Select displays the Power Offset (dB) field toolbar where offsets can be applied.

Power Offset : -10.0000 dB ^ v dB X

Step Size (dB)

The button display field calculates the step size based on the start value, stop value, and the number of power points set in the field toolbars above or allows input of a required step size value. If a new value is input, the number of power points changes as required.

Step Size : 0.2041 dB ^ v dB X

Power Setup

Select displays the POWER SETUP menu which contains the controls for Attenuators, Power Cal, Receiver Cal, and External Source Power. For a frequency-based sweep, these controls are located on the POWER menu.

- MAIN | Power | POWER | Other Setup | POWER SETUP
- [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)

Figure 6-6. POWER [COUPLED] Menu - Power-Based Sweep - 4-Port VNAs (2 of 2)

6-9 ATTENUATORS Menu Variants - 4-Port VNAs

ATTENUATOR Menu Button Availability

The available buttons in the ATTENUATORS menu depend on which attenuator option has been installed in the instrument and the sweep type setting.

- Option 061 Installed - Port 1 Source Attenuator and Port 2 Test Attenuator
 - If Option 061 (Port 1 Source Attenuator and Port 2 Test Attenuator) is installed, only the first and fourth buttons are active. The other buttons are unavailable.
- Option 062 Installed - Port 1 and Port 2 Source Attenuators, Port 1 and Port 2 Test Attenuators:
 - If Option 062 (Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuators) is installed, all buttons are available.
- No Attenuator Options Installed
 - If neither attenuator option is installed, the Attenuators button (on the POWER or POWER SETUP menu) and the ATTENUATORS menu are unavailable. Contact Anritsu Customer Service for more information.

ATTENUATOR Menu Location

The location of the ATTENUATOR menu relative to the previous menu depends on the sweep type setting.

Sweep Type Frequency-Based

If Sweep Type = Frequency Based (Linear) or Frequency-Based (Log):

- Previous
 - [“POWER Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-13](#)
- Navigation
 - MAIN | Power | POWER | Attenuators | ATTENUATORS

Sweep Type Segment-Based

If Sweep Type = Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based):

- Previous
 - [“POWER Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-16](#)
- Navigation
 - MAIN | Power | POWER | Attenuators | ATTENUATORS

Sweep Type Power-Based

If Sweep Type = Power Sweep (CW Frequency) or Power Sweep (Swept Frequency):

- Previous
 - [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)
- Navigation
 - MAIN | Power | POWER | Other Setup | Other Setup | Attenuators | ATTENUATORS

ATTENUATORS Menu - Frequency-Based Sweep - 4-Port VNAs

Previous

- [“POWER Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-13](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Linear) or Freq Sweep (Log)
- [“SWEEP TYPES Menu” on page 7-4](#)

Attenuators X

---Ports 1,2---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Ports 3,4---

Source Attenuator
0 dB

Test Attenuator
0 dB

Source Attenuator (Ports 1,2) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 1,2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Ports 3,4) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in dB.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 3,4) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Port 2 Test Attenuation in dB.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 6-7. ATTENUATORS Menu - Frequency-Based Sweep - 4-Port VNAs

ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs

Previous

- [“POWER Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-16](#)

Navigation

- MAIN | Power | POWER

Prerequisites

- Segment-Based Sweep (Frequency or Index)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Segmented Sweep (Freq-Based) or Segmented Sweep (Index-Based)
- [“SWEEP TYPES Menu” on page 7-4](#)

Attenuators X

---Ports 1,2---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Ports 3,4---

Source Attenuator
0 dB

Test Attenuator
0 dB

Source Attenuator (Ports 1,2) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 1,2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Ports 3,4) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in dB.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 3,4) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Port 2 Test Attenuation in dB.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 6-8. ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs

ATTENUATORS Menu - Power-Based Sweep - 4-Port VNAs

Previous

- [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Prerequisites

- Power-Based Sweep (CW Frequency or Swept Frequency)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Power Sweep (CW Freq) or Power Sweep (Swept Freq)
- [“SWEEP TYPES Menu” on page 7-4](#)

Attenuators X

---Ports 1,2---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Ports 3,4---

Source Attenuator
0 dB

Test Attenuator
0 dB

Source Attenuator (Ports 1,2) (dB)

Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 1,2) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Ports 3,4) (dB)

Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in dB.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 3,4) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Port 2 Test Attenuation in dB.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 6-9. ATTENUATORS Menu - Segment-Based Sweep - 4-Port VNAs

6-10 POWER SETUP Menu Variants - 4-Port VNAs

The presence of the menu and the button availability on the menu depends on the sweep type setting.

Sweep Type Frequency-Based

If Sweep Type = Frequency Based (Linear) or Frequency-Based (Log):

- The POWER SETUP menu has four (4) buttons.
- Available buttons are: Port Selection, Apply Slope (All Ports), Slope (dB/GHz), and Port Power mode.

Sweep Type Segment-Based

If Sweep Type = Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based):

- The POWER SETUP menu is not available.
- All power setup related configurations are completed in the segmented sweep setup FREQ BASE SETUP or INDEX BASE SETUP menus and tableau dialog boxes.
- Frequency-Based Segmented Sweep:
 - [“FREQ BASE SETUP Menu” on page 7-6](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented (Freq) | Freq-based Seg. Sweep Setup | FREQ BASE SETUP
- Index-Based Segmented Sweep:
 - [“INDEX BASE SETUP Menu” on page 7-12](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented (Index) | Index-based Seg. Sweep Setup | INDEX BASE SETUP

Sweep Type Power-Based

If Sweep Type = Power Sweep (CW Frequency) or Power Sweep (Swept Frequency):

- The POWER SETUP has nine (9) buttons.
- Available buttons are: Port Selection, Single Power Mode (ON/OFF), Single Power (dBm), Effective Single Power (dBm), Attenuators, Power Cal, Receiver Cal, Port Power (Coupled/Not Coupled), and External Source Power.
- Note that these buttons have moved from the POWER menu to the POWER SETUP Attenuators, Power Cal, Receiver Cal, Port Power (Coupled/Not Coupled), and External Source Power.
- Power-Based CW Frequency Sweep:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Power Sweep (CW Freq)
- Power-Based Swept Frequency Sweep:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Power Sweep (Swept Freq)

POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs

Previous

- [“POWER Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-13](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Prerequisites

- Frequency-Based Sweep (Linear or Log)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Freq Sweep (Linear) or Freq Sweep (Log)
- [“SWEEP TYPES Menu” on page 7-4](#)



Menu Name Change

If Port Power is set to Not Coupled, when Port 1 is selected, the menu name changes to POWER SETUP [1]. Similar menu name changes occur for the remaining Port selections.

If Port Power is set to Coupled, the menu name changed to POWER SETUP [C]

Port Selection (Port 1/Port 2/Port 3/Port 4)

Select displays the SELECT PORT dialog box allowing touch screen selection of Port 1, Port 2, Port 3, or Port 4.

Apply Slope [All Ports]

Select toggles the Apply Slope value set below between off and on.

Slope (dB/GHz)

Select displays the Single Power field toolbar and allows the user to select the single power level in dBm.



Port Power (Coupled/Not Coupled)

The Port Power button toggles whether power adjustments to Ports 1-2 and Ports 3-4 are coupled or not coupled.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2 also changing the POWER SETUP menu name between POWER SETUP [1] and POWER SETUP [2].
- The POWER menu name also changes between POWER [1] and POWER [2].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].
- Coupling does not affect attenuator settings.

Figure 6-10. POWER SETUP Menu - Frequency-Based Sweep - 4-Port VNAs

POWER SETUP Menu - Segment-Based Sweep - 4-Port VNAs

The POWER SETUP menu is not available if sweep is set to a frequency-based or index-based segment sweep. Instead, power configuration is on a per-segment basis and is configured at the **FREQ BASE SETUP** or the **INDEX BASE SETUP** menus.

Previous

- [“POWER Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-16](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Prerequisites

- Sweep = Frequency-Based Sweep or Index-Based Sweep
- Frequency-Based Segment Sweep Setup
 - [“FREQ BASE SETUP Menu” on page 7-6](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented Sweep (Freq-Based) | Freq-Based Seg. Sweep Setup | FREQ BASE SETUP
- Index-Based Segment Sweep Setup
 - [“INDEX BASE SETUP Menu” on page 7-12](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types = Segmented Sweep (Index-Based) | Index-Based Seg. Sweep Setup | INDEX BASE SETUP

POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs

Previous

- [“POWER Menu - Power-Based Sweep - 4-Port VNAs” on page 6-18](#)

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP

Prerequisites

- Sweep = Power-Based Sweep (CW Frequency or Swept Frequency)
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Power Sweep (CW Freq) or Power Sweep (Swept Freq)



 <p>The screenshot shows the 'Power Setup[C]' menu with the following options: Port Selection (Port 1), Single Power Mode (OFF), Single Power (-20 dBm), Effective Single Power (-20 dBm), Attenuators (with a right arrow), Receiver Cal (with a right arrow), Port Power (Coupled), and External Source Power (with a right arrow).</p>	<p>Port Selection (Port 1/Port 2/Port 3/Port 4) Select displays the SELECT PORT dialog box allowing touch screen selection of Port 1, Port 2, Port 3, or Port 4.</p> <p>The menu name suffix changes depending on the state of the Port Power (Couple/Not Coupled) button, and if Not Coupled, on the currently selected port.</p> <p>Single Port Mode (ON/OFF) Select toggles single port mode ON and OFF.</p> <p>Single Power (dBm) Select displays the Single Power (dBm) field toolbar and allows the user to select the single power level.</p>  <p>Effective Single Power (dBm) A read only display of the effective single power level after the effects of any attenuators.</p>
--	---

Figure 6-11. POWER SETUP Menu - Power-Based Sweep - 4-Port VNAs (1 of 2)

Attenuators – Button Not Present

If the Attenuators button is not present, the SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.

Attenuators – Button Not Available

If the Attenuators button is unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.

Attenuators – Button Available

If the Attenuators button is available, one of the attenuator options has been installed:

- Option 061: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
- Option 062: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.
- In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu - Power-Based Sweep - 4-Port VNAs” on page 6-23](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu - 4-Port VNAs” on page 6-32](#)

Port Power (Coupled/Not Coupled)

The Port Power button toggles the whether power adjustments to Ports 1-2 and Ports 3-4 are coupled or not coupled.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2 also changing the POWER SETUP menu name between POWER SETUP [1] and POWER SETUP [2].
- The POWER menu name also changes between POWER [1] and POWER [2].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].
- Coupling does not affect attenuator settings.

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu - 4-Port VNA” on page 6-38](#)

Figure 6-11. POWER SETUP Menu - Power-Based Sweep - 4-Port VNAs (2 of 2)

6-11 Receiver Setup and Calibration Menus - 4-Port VNAs

The receiver setup and calibration menus are available for all sweep types.

RECEIVER SETUP Menu - 4-Port VNAs

Sweep Types

- The RECEIVER SETUP menu is available for all sweep types.

Previous

- [“POWER Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-13.](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP

Menu Button Availability

- The top four (4) buttons (Port 1 Test and Reference, Port 2 Test and Reference) are unavailable until a successful receiver calibration has been performed on the RECEIVER CAL menu. After a successful calibration, the buttons are available (shown below).

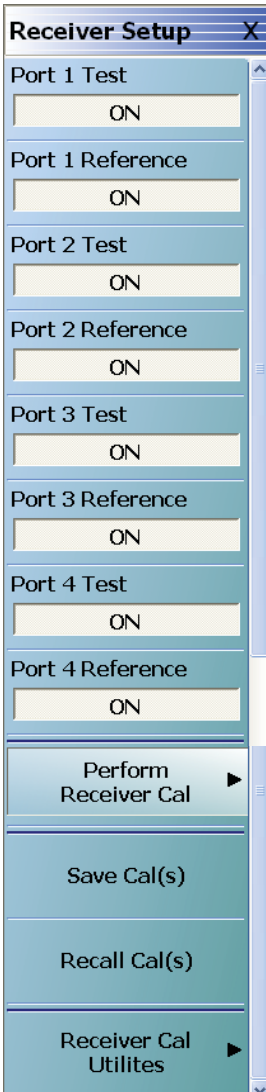
 <p>The screenshot shows the 'Receiver Setup' menu with the following items:</p> <ul style="list-style-type: none"> Port 1 Test: ON Port 1 Reference: ON Port 2 Test: ON Port 2 Reference: ON Port 3 Test: ON Port 3 Reference: ON Port 4 Test: ON Port 4 Reference: ON Perform Receiver Cal: (disabled) Save Cal(s): (disabled) Recall Cal(s): (disabled) Receiver Cal Utilites: (disabled) 	<p>Port 1 Test (Off/On) Select toggles the Port 1 Test Off and On.</p> <p>Port 1 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 1 Reference between off and on.</p> <p>Port 2 Test (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 2 Test between off and on.</p> <p>Port 2 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 2 Reference between off and on.</p> <p>Port 3 Test (Off/On) Select toggles the Port 3 Test Off and On.</p> <p>Port 3 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 3 Reference between off and on.</p> <p>Port 4 Test (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 4 Test between off and on.</p> <p>Port 4 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 4 Reference between off and on.</p>
---	---

Figure 6-12. RECEIVER SETUP Menu - 4-Port VNAs (1 of 2)

<p>Perform Receiver Cal</p> <p>Select displays the RECEIVER CAL menu.</p> <ul style="list-style-type: none">• “RECEIVER CAL Menu - 4-Port VNAs” on page 6-32 <p>Save Cal(s)</p> <p>Select displays the SAVE RCVR CAL dialog box.</p> <ul style="list-style-type: none">• “SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box” on page 6-33 <p>Recall Cal(s)</p> <p>Select displays the RECALL RCVR CAL dialog box.</p> <ul style="list-style-type: none">• “RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box” on page 6-34 <p>Receiver Cal Utilities</p> <p>Select displays the RCVR UTILITIES menu.</p> <ul style="list-style-type: none">• “RCVR UTILITIES Menu - 4-Port VNAs” on page 6-35

Figure 6-12. RECEIVER SETUP Menu - 4-Port VNAs (2 of 2)

RECEIVER CAL Menu - 4-Port VNAs

Full Name

- RECEIVER CALIBRATION Menu

Sweep Types

- The RECEIVER CAL menu is available for all sweep types.

Previous

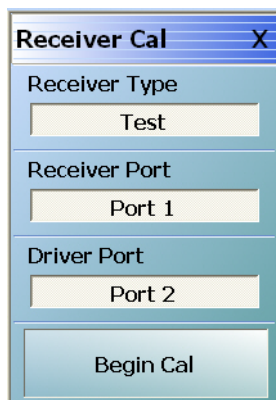
- [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)
- [“RECEIVER SETUP Menu - 4-Port VNAs” on page 6-30](#)

Navigation for Power Sweep Mode

- MAIN | Power | POWER | Power Setup | POWER SETUP | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL

Navigation for Frequency Sweep Mode

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL



RECEIVER CAL Menu Message

The menu displays a message: “Connect a through line between test ports.”

Receiver Type (Test/Reference)

After a successful receiver calibration, select toggles Receiver Type between Test (default) and Reference. Reference is used for additional test loop calibration.

Receiver Port (Port 1/Port 2/Port 3/Port 4)

The Receiver Port button displays the SELECT PORT touch screen dialog box and allows the user to select Port 1, Port 2, Port 3, or Port 4.

Driver Port (Port 1/Port 2/Port 3/Port 4)

The Driver Port button displays the SELECT PORT touch screen dialog box and allows the user to select Port 1, Port 2, Port 3, or Port 4.

Begin Cal

The Begin Calibration button starts the receiver calibration. During the calibration process, the button dims and is unavailable. When the calibration is complete, the button returns to normal.

At the end of successful calibration, the buttons on the RECEIVER SETUP menu are enabled.

- [“RECEIVER SETUP Menu - 4-Port VNAs” on page 6-30](#)

Figure 6-13. RECEIVER CAL (RECEIVER CALIBRATION) Menu - 4-Port VNAs

SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Full Name

- SAVE RECEIVER CALIBRATION .rcvr FILE Dialog Box

Previous

- [“RECEIVER SETUP Menu - 4-Port VNAs” on page 6-30](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Save Cal(s) | SAVE RCVR CAL (RECEIVER CALIBRATION .rcvr FILE) Dialog Box

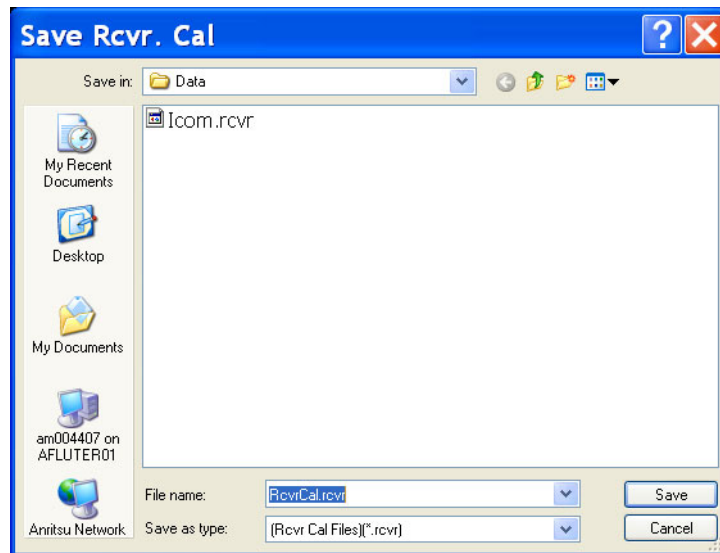


Figure 6-14. SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box - 4-Port VNAs

Overview

Use the dialog box to navigate to the desired location, enter a unique RCVR file name, and click **Save** to save. Click **Cancel** to exit the dialog box. Allows the user to save a receiver calibration (.rcvr) file.

Instructions

1. Navigate to the required location.
2. Click **Save**.
3. Click **Close** to return or **Cancel** to end recall session.

RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Full Name

- RECALL RECEIVER CALIBRATION .rcvr FILE Dialog Box

Previous

- [“RECEIVER SETUP Menu - 4-Port VNAs” on page 6-30](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Recall Cal(s) | RECALL RCVR CAL (RECEIVER CALIBRATION .rcvr FILE) Dialog Box

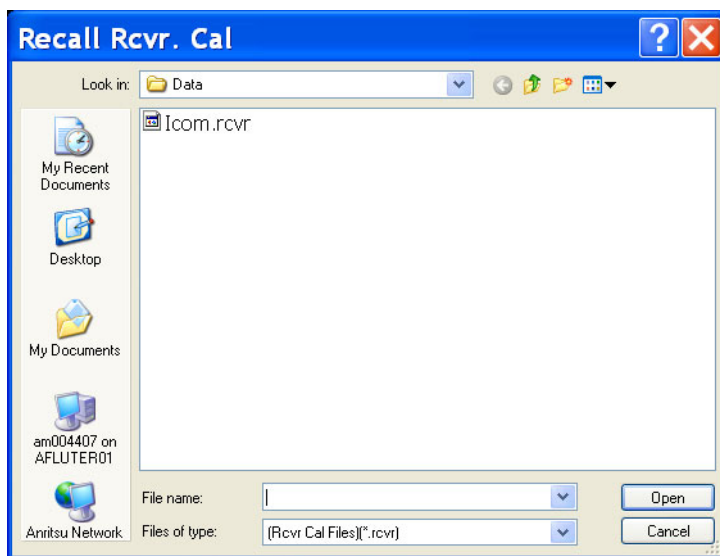


Figure 6-15. RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box - 4-Port VNAs

Instructions

Use the Open dialog box to navigate to required directory and select the required RCVR file. Click Open to recall the RCVR file. Click Cancel to exit the dialog box.

RCVR UTILITIES Menu - 4-Port VNAs

Full Name

- RECEIVER UTILITIES Menu

Previous

- [“RECEIVER CAL Menu - 4-Port VNAs” on page 6-32](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES

Prerequisites

- The RCVR UTILITIES menu is available for all sweep types.

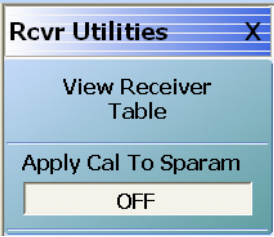
	<p>View Rcvr Table</p> <p>The View Receiver Table button displays the VIEW RCVR CAL dialog box.</p> <ul style="list-style-type: none">• “VIEW RCVR CAL Dialog Box” on page 6-36 <p>Apply Cal. to Sparam (Off/On)</p> <p>Toggles the application of S-Parameters to the calibration off and on.</p>
---	--

Figure 6-16. RCVR UTILITIES (RECEIVER UTILITIES) Menu - 4-Port VNAs

VIEW RCVR CAL Dialog Box

Full Name

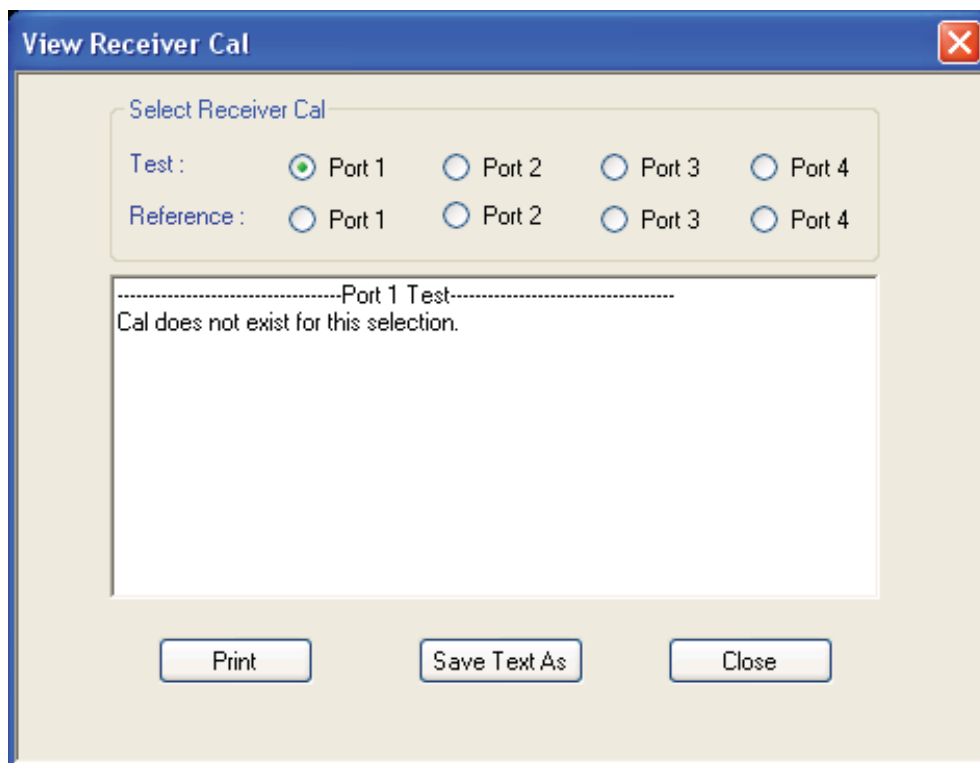
- VIEW RECEIVER CALIBRATION Dialog Box

Previous

- [“RCVR UTILITIES Menu - 4-Port VNAs” on page 6-35](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES | View Receiver Table | VIEW RECEIVER CAL Dialog Box



Receiver Cal Test

- Port 1 Test
- Port 2 Test
- Port 3 Test
- Port 4 Test

Receiver Cal Reference

- Port 1 Reference
- Port 2 Reference
- Port 3 Reference
- Port 4 Reference

Figure 6-17. VIEW RECEIVER CAL Dialog Box - 4-Port VNAs

Instructions

Use the VIEW RECEIVER CAL dialog box to view the applicable Receiver Calibration report. Radio buttons allow selection of following types of calibration data. Only one (1) report can be viewed at a time.

- Port 1 Test and Port 1 Reference
- Port 2 Test and Port 2 Reference
- Port 3 Test and Port 3 Reference
- Port 4 Test and Port 4 Reference

Click Print to print; Save Text As to save results as an ASCII TXT file to the desired directory or USB memory device; or click Close to close the dialog box.

Information Fields

The information fields provided are:

- Calibration date and time
- Port number
- Frequency
- Power in dB
- Cal.Eff.Pwr (Calculated Effective Power) in dBm

6-12 External Source Power Menu

EXT. SRC POWER Menu - 4-Port VNA

Full Name

- EXTERNAL SOURCE POWER Menu

Previous

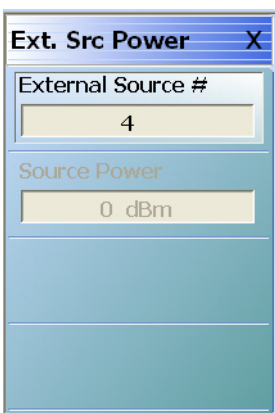
- The EXT. SRC POWER menu is available from multiple menus depending on the sweep type setting.
- [“POWER Menu - Frequency-Based Sweep - 4-Port VNAs” on page 6-13](#)
- [“POWER Menu - Segment-Based Sweep - 4-Port VNAs” on page 6-16](#)
- [“POWER SETUP Menu - Power-Based Sweep Menu - 4-Port VNAs” on page 6-28](#)

Navigation

- MAIN | Power | POWER | External Source Power | EXT SRC POWER

Prerequisites

- The EXT. SRC. POWER menu is available for all sweep types.



Ext. Src Power X

External Source #
4

Source Power
0 dBm

External Source #

Selecting the External Source Number (External Source #) button displays the External Source # field toolbar. Use the toolbar to select the external power source port number.

External Source # : 1 ^ v Enter

Source Power (dBm)

The button is enabled if an external source is connected to the instrument. If active, select displays the Source Power (dBm) field toolbar and allows setting the power level for all connected external sources. If unavailable, external sources are not connected.

Source Power : 1.0000 dBm ^ v dBm X

Figure 6-18. EXT SRC POWER (EXTERNAL SOURCE POWER) Menu - 4-Port VNAs

Chapter 7 — Sweep Menus

7-1 Chapter Overview

This chapter provides information for controlling the instrument sweep types and their associated parameters. There are six (6) basic sweep types available: Frequency-based linear sweep, Frequency-based log sweep, Segmented frequency-based sweep, Segmented index-based sweep, Power sweep CW frequency, and Power sweep swept frequency. Configuration tableaus are provided for each segmented sweep allowing a specific set of frequencies or power levels to be assigned to an instrument setup. All sweep configurations can be saved or recalled individually and/or assigned to a user-defined preset setup configuration that can be recalled at any time. The sweep menus also configure the hold and trigger conditions available to each sweep type.

7-2 Overview of Sweep Menus

There are 17 sweep control menus and dialog boxes:

- “SWEEP SETUP Menu” on page 7-2
- “SWEEP TYPES Menu” on page 7-4
- “FREQ BASE SETUP Menu” on page 7-6
 - “SEGMENTED SWEEP DEFINITION Table” on page 7-8
 - “SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box” on page 7-10
 - “RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box” on page 7-11
 - “SEGMENTED SWEEP DEFINITION Table” on page 7-8
- “INDEX BASE SETUP Menu” on page 7-12
- “HOLD FUNCTIONS Menu” on page 7-14
- “HOLD CONDITIONS Frequency-Based Sweep Menu” on page 7-17
- “HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18
- “TRIGGER Menu” on page 7-20
- “TRIGGER SOURCE Source Menu” on page 7-21
- “MANUAL TRIGGER Menu” on page 7-22
- “EXT. TRIGGER Menu” on page 7-23
- “GPIB TRIGGER Menu” on page 7-25
 - “IF CALIBRATION Dialog Box” on page 7-26

7-3 Sweep Setup and Sweep Type Menus

SWEEP SETUP Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP

	<p>Sweep Types</p> <p>Select displays the SWEEP TYPES menu for selection frequency sweep options. The display field in the Sweep Types button displays the instrument sweep setting for the active channel. The possible field display values and their meanings are:</p> <ul style="list-style-type: none"> • Freq Sweep (Linear) - Frequency-Based Sweep - Linear • Freq Sweep (Log) - Frequency-Based Sweep - Log • Segmented (Freq) - Frequency-Based Segmented Sweep • Segmented (Index) - Index-Based Segmented Sweep • Power (CW Freq) - Power Sweep CW-Frequency • Power (Swept Freq) - Power Sweep Swept-Frequency • “SWEEP TYPES Menu” on page 7-4 <p>Freq-Based Seg Sweep Setup</p> <p>The Frequency-Based Segmented Sweep Setup button displays the FREQ BASE SETUP menu and opens the FREQ DEF for F1 & F2 tableau area below the main display area.</p> <ul style="list-style-type: none"> • “FREQ BASE SETUP Menu” on page 7-6 <p>Index-Based Seg Sweep Setup</p> <p>The Index-Based Segmented Sweep Setup button displays the INDEX BASE SETUP menu and opens the FREQ DEF for F1 & F2 table area below the main display area.</p> <ul style="list-style-type: none"> • “INDEX BASE SETUP Menu” on page 7-12
--	--

Figure 7-1. SWEEP SETUP Menu

Hold Functions

Select displays the HOLD FUNCTIONS menu.

- [“HOLD FUNCTIONS Menu” on page 7-14](#)

Trigger

Select displays the TRIGGER menu.

- [“TRIGGER Menu” on page 7-20](#)

Enable Sweep Time (On/Off)

The toggle button enables or disables the sweep time configuration capability. If OFF, the Sweep Time Setup button below is unavailable. If ON, the Sweep Time Setup button is available.

Sweep Time Setup

Select displays the SWP TIME SETUP menu where sweep time functions of mode, time, display, and delay are configured.

- [“SWP TIME SETUP” on page 7-27](#)

RF Retrace (On/Off)

Select toggles the RF retrace function on and off.

Figure 7-1. SWEEP SETUP Menu

SWEEP TYPES Menu

Previous

- “SWEEP SETUP Menu” on page 7-2

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

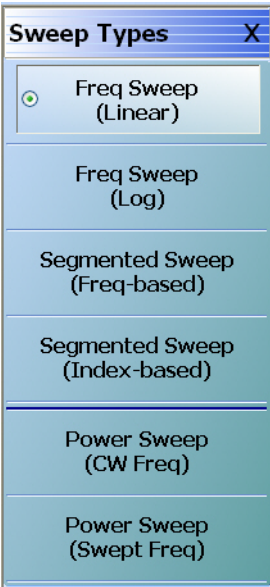
	<p>Sweep Types Button Selection Group</p> <p>The six (6) buttons of the SWEEP TYPES menu form a button selection group where the selection of any one button de-selects the other five (5) buttons.</p> <p>Freq Sweep (Linear)</p> <p>The Frequency Sweep (Linear) button sets the sweep type to a linear function. The displayed X-axis is linear.</p> <p>Freq Sweep (Log)</p> <p>The Frequency Sweep (Log) button sets the sweep type to a log function. Log sweeps have unequal step sizes and the number of points selected are spread equally between the decade divisions, and are displayed on a log scale X-axis.</p> <p>Segmented Sweep (Freq-Based)</p> <p>The Segmented Sweep (Frequency-Based) button allows selections of different frequency segments, monotonic in frequency, where each segment can have a different number of points, power level, and Averaging. The display could be in Frequency where you could have many points in a short segment and no points in a long segment, or the display could be index based, where all the points are plotted with equal spacing. The displayed x-axis is linear and the frequencies are plotted where those frequencies lie.</p> <p>Segmented Sweep (Index-Based)</p> <p>The Segmented Sweep (Index-Based) button sets the sweep type to an index-based segmented sweep and de-selects all other sweep types. An index-based segmented sweep sweeps over a custom list of frequency points. The indexed frequencies do not have to be in any order. Plotting on the X-axis is index-based and not frequency based and displayed at equal spacing. The frequencies in each segment and segments do not have to be monotonic. Index-based sweeps are often used when reverse sweeps and a particular frequency order is required. If index-based segmented sweep is selected, the display mode is always limited to index-based.</p>
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Figure 7-2. SWEEP TYPES Menu (1 of 2)

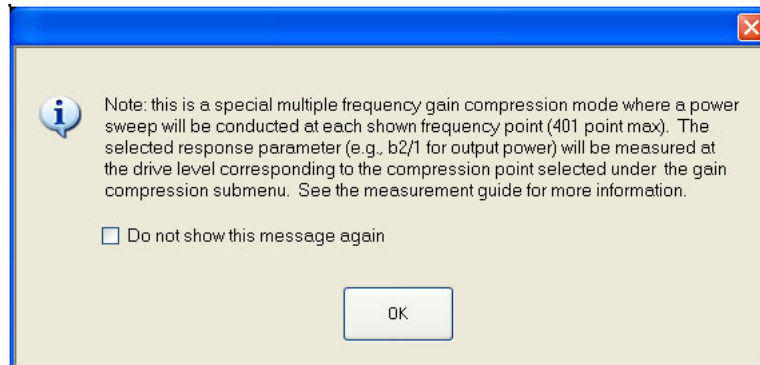
Power Sweep (CW Freq)

The Power Sweep (CW Freq) button selects the power sweep mode and de-selects all other sweep types. In this mode, a CW Frequency is set on the FREQUENCY menu and power is swept linearly on the X-axis, based on the number of points.

- [“FREQUENCY Power Sweep CW-Based Menu” on page 4-10](#)
- MAIN | Frequency | FREQUENCY

Power Sweep (Swept Freq)

The Power Sweep (Swept Freq) button sets the sweep to power sweep (swept frequencies) and de-selects all other sweep types. If selected, a notification dialog box appears.



Click OK to clear the dialog box. Select the Do Not Show Again check box and then click OK to prevent the dialog box from appearing again.

- [“FREQUENCY Power Sweep Swept Freq Menu” on page 4-11](#)
- MAIN | Frequency | FREQUENCY

Figure 7-2. SWEEP TYPES Menu (2 of 2)

7-4 Segmented Frequency-Based Sweep Setup

FREQ BASE SETUP Menu

Full Name

- FREQUENCY-BASED SEGMENTED SWEEP SETUP Menu

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP

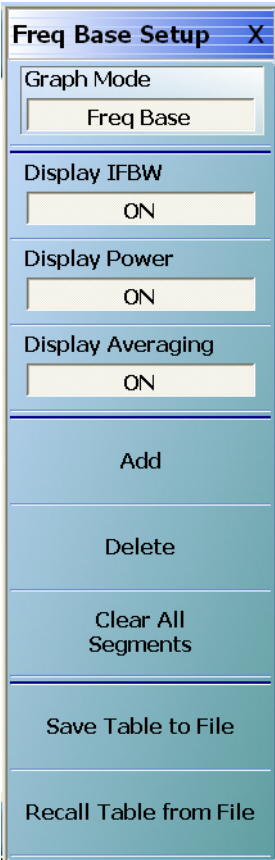
	<p>Segmented Frequency Table Display</p> <p>When the FREQ BASE SETUP menu appears, the SSEGMENTED SWEEP DEFINITION TABLE display dialog appears at the bottom of the main display area. The table display, described below, allows the configuration of frequency segments for sweep management.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Graph Mode (Freq Base/Index Base)</p> <p>The Graph Mode toggle button toggles the graph mode between Freq Base and Index Base. When Freq Base is selected, the display status bar shows Freq Base.</p> <p>Display IFBW (Off/On)</p> <p>Select toggles the IFBW column off and on. If on, the IFBW field is added to the Freq Def. for F1 & F2 table header in the SEGMENTED SWEEP DEFINITION table below.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Display Power (Off/On)</p> <p>Select toggles the Power column display off and on. If on, the P1 Src. Pwr (Src. Atten - 0 dB) and P2 Src. Pwr (Src. Atten - 0 dB) columns are added to the Freq Def. for F1 & F2 table header in the SEGMENTED SWEEP DEFINITION table below.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Display Averaging (Off/On)</p> <p>Select toggles the Averaging column display off and on. If on, the Averaging field is added to the Freq Def. for F1 & F2 table header in the SEGMENTED SWEEP DEFINITION table below.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8
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Figure 7-3. FREQ BASE SETUP (FREQUENCY-BASED SEGMENTED SWEEP SETUP) Menu (1 of 2)

	<p>Add (Freq-Based Segment)</p> <p>The Add button adds a row for a new segment to the Freq Def. for F1 & F2 table information below the currently selected segment.</p> <ul style="list-style-type: none">• “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Delete (Freq-Based Segment)</p> <p>The Delete button deletes the currently selected row/segment from the Freq Def. for F1 & F2 table information.</p> <ul style="list-style-type: none">• “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Clear All Segments (Freq-Based Segment)</p> <p>The Clear All Segments clears all rows except for Row 1 from the Freq Def. for F1 & F2 table information.</p> <ul style="list-style-type: none">• “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Save Table to File (Freq-Based Segment)</p> <p>The Save Table to File button saves the table data to a Segment Sweep .sgs file. Select displays the Save Segmented Sweep Table (SGS File) dialog box.</p> <ul style="list-style-type: none">• “SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box” on page 7-10 <p>Recall Table from File (Freq-Based Segment)</p> <p>The Recall Table from File button recalls table data from a Segment Sweep .sgs file. Select displays the Recall Segmented Sweep Table (Sweep SGS File) dialog box.</p> <ul style="list-style-type: none">• “RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box” on page 7-11
--	---

Figure 7-3. FREQ BASE SETUP (FREQUENCY-BASED SEGMENTED SWEEP SETUP) Menu (2 of 2)

SEGMENTED SWEEP DEFINITION Table

Previous

- “FREQ BASE SETUP Menu” on page 7-6

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP

Overview

The Freq Def. for F1 and F2 (Segmented Sweep Definition) table information appears below the display area. The number of rows and columns displayed depend on the button settings in the Freq Base Setup menu. The default settings display the following column fields: IFBW, P1 source power, P2 source power, and Averaging.

Default Appearance

This is table display with all fields showing.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	Averaging
▶ 1	<input checked="" type="checkbox"/>	Start & Stop	70 kHz	10 GHz	15	714.2807142...	100 kHz	-10	-10	1

Freq Def. for F1 & F2 Column, Sweep Segment Options Pull-Down Menu

The Freq Def. for F1 & F2 pull-down menu allows each segments to be set as either a Stop & Start, Start & Step Size, or CW (F2 not used).

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	Averaging
▶ 1	<input checked="" type="checkbox"/>	Start & Stop	70 kHz	10 GHz	15	714.2807142...	100 kHz	-10	-10	1
		Start & Stop Start & Step Size CW (F2 not used)								

Display IFBW Column, Toggle Off/On

The Display IFBW button on the Freq Base Setup menu causes the IFBW column to disappear and appear.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	Averaging
▶ 1	<input checked="" type="checkbox"/>	CW (F2 not used)	70 kHz		1	0		-10	-10	1

Display Power Column, Toggle Off/On

The Display Power button on the Freq Base Setup menu causes the Power columns to disappear and appear.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	Averaging
▶ 1	<input checked="" type="checkbox"/>	CW (F2 not used)	70 kHz		1	0	100 kHz	1

Display Averaging, Toggle Off/On

The Display Averaging button on the Freq Base Setup menu causes the Averaging column to disappear and appear.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	Averaging
▶ 1	<input checked="" type="checkbox"/>	Start & Stop	70 kHz	10 GHz	15	714.2807142...	100 kHz	-10	-10	1

Adding Rows

Selecting the Add button on the Freq Base Setup menu adds a row to the tableau so that another frequency segment can be added.

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
▶ 1	<input checked="" type="checkbox"/>	Start & Stop	70 kHz	10 GHz	15	714280714.2...
2	<input checked="" type="checkbox"/>	Start & Stop	10.00000000...	10.00000000...	2	1

To add additional rows, repeat selecting the Add button. Note that the currently selected and editable row is indicated by the left arrow, as shown in Row 3 below.

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
1	<input checked="" type="checkbox"/>	Start & Stop	70 kHz	10 GHz	15	714280714.2...
2	<input checked="" type="checkbox"/>	Start & StepSize	10.00000000...	1	2	10.00000000...
▶ 3	<input checked="" type="checkbox"/>	CW (F2 not used)	10000000003		1	0

Deleting Rows

Select a row to delete it. A selected row is indicated by the right-facing arrow icon as shown for Row 2 below:

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
1	<input checked="" type="checkbox"/>	Start & Stop	70 kHz	10 GHz	15	714280714.2...
▶ 2	<input checked="" type="checkbox"/>	Start & StepSize	10.00000000...	1	2	10.00000000...
3	<input checked="" type="checkbox"/>	CW (F2 not used)	10000000003		1	0

Click the Delete button on the Freq Base Setup menu to delete the row:

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
▶ 1	<input checked="" type="checkbox"/>	Start & Stop	70 kHz	10 GHz	15	714280714.2...
2	<input checked="" type="checkbox"/>	CW (F2 not used)	10000000003		1	0

Click the Clear All Seg. button on the Freq Base Setup menu to clear all rows.

SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box

Previous

- “FREQ BASE SETUP Menu” on page 7-6

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP | Save Table to File | SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box

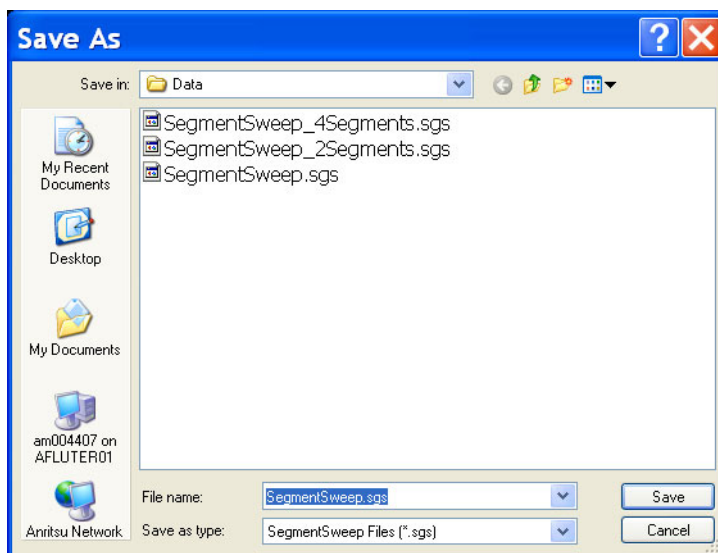


Figure 7-4. SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box

Instructions

Navigate to required location, enter unique file name, and click Save. Click Cancel to return to the Freq Base Setup menu.

RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box

Previous

- “FREQ BASE SETUP Menu” on page 7-6

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP | Save Table to File | RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box

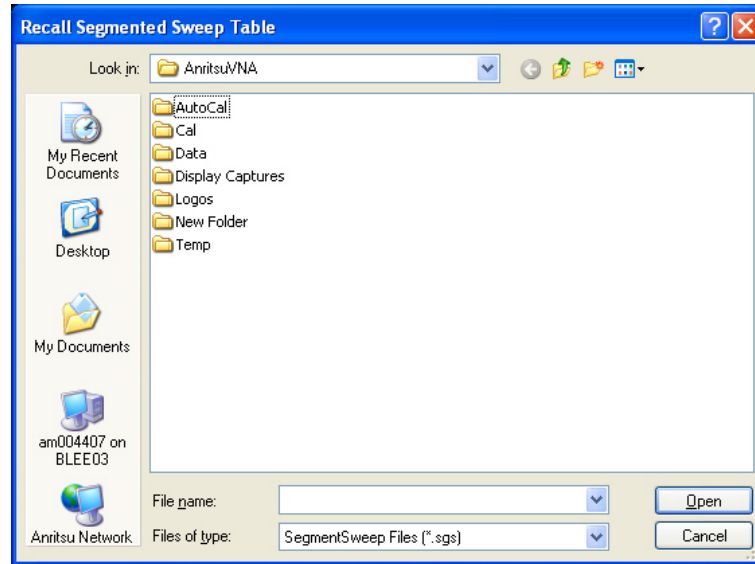


Figure 7-5. RECALL (SEGMENTED SWEEP TABLE SGS FILE) Dialog Box

Instructions

Navigate to required location, select the required SGS file, and click Open. Click Cancel to return to the Freq Base Setup menu.

7-5 Segmented Index-Based Sweep Setup

INDEX BASE SETUP Menu

Full Name

- Indexed-Based Sweep Setup Menu

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Index-Based Seg Sweep Setup | INDEX BASE SETUP


	<p>Segmented Frequency Table Display</p> <p>When the Index Base Setup menu appears, the Segmented Frequency Table Display tableau dialog appears at the bottom of the main display area. The tableau display allows the configuration of frequency segments for sweep management.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Display IFBW (Off/On)</p> <p>In the tableau display, select toggles the IFBW column display off and on. If on, the IFBW column field is added to the Freq Def. for F1 & F2 table header.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Display Power (Off/On)</p> <p>In the tableau display, select toggles the P1 Src. Pwr (Src. Atten = XX dB) and P2 Src. Pwr (Src. Atten = XX dB) column fields off and on.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Display Averaging (Off/On)</p> <p>In the tableau display, select toggles the Averaging column display off and on. If on, an Averaging column field is added to the Freq Def. for F1 & F2 table header.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8
---	---

Figure 7-6. INDEX BASE SETUP (INDEX-BASED SEGMENTED SWEEP SETUP) Menu (1 of 2)

Add (Index-Based Segment)

In the tableau area, select adds a row to the Freq Def. for F1 & F2 table information.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Delete (Index-Based Segment)

In the tableau area, select a row so the Right Arrow icon appears. Click Delete to remove the row from the Freq Def. for F1 & F2 table information.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Clear All Seg. (Index-Based Segment)

In the tableau area, select the Clear All Segments button to clear all rows except for Row 1 from the Freq Def. for F1 & F2 table information.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Save Table to File (Index-Based Segment)

Select displays the Save Segmented Sweep Table (SGS File) dialog box to save the segment table data as a Segment Sweep SGS file.

- [“SAVE AS \(SEGMENT SWEEP TABLE SGS FILE\) Dialog Box” on page 7-10](#)

Recall Table from File (Index-Based Segment)

Select displays the Recall Segmented Sweep Table (SGS) dialog box to recall table data from a previously stored Segment Sweep SGS file.

- [“RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box” on page 7-11](#)

Figure 7-6. INDEX BASE SETUP (INDEX-BASED SEGMENTED SWEEP SETUP) Menu (2 of 2)

7-6 Sweep Hold and Trigger Functions

HOLD FUNCTIONS Menu

Previous

- [SWEEP SETUP Menu](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Hold Functions | HOLD FUNCTIONS


	<p>HOLD FUNCTIONS Menu - Per-Channel Button Selection Group</p> <p>The top four (4) buttons of the HOLD FUNCTIONS menu provide hold control for the active trace.</p> <p>The Hold, Continue, Single Sweep & Hold, and Restart Sweep buttons form a four (4) button selection group where the selection of any one button de-selects the other three (3) buttons on a per channel basis.</p> <p>Hold</p> <p>For the active channel, the Hold button pauses the display and stops the channel signal processing. Also, if the Hold All Channels button (described below) is selected, this Hold button is selected.</p> <p>Continue</p> <p>For the active channel, the Continue button starts signal processing and resumes the active channel display. Also, if the Continuous All Channels button (described below) is selected, this Continue button is selected.</p> <p>Single Sweep & Hold</p> <p>For the active channel, the Single Sweep & Hold button performs a single sweep signal processing, and then holds the display, stops signal processing, and returns the button selection to the Hold button.</p> <p>Restart Sweep</p> <p>For the active channel only, the Restart Sweep button restarts signal processing, resumes the active channel display, and then selects the Continue button. To restart sweeps on all channels, use the Restart All Channels button described below.</p>
---	---

Figure 7-7. HOLD FUNCTIONS Menu (1 of 2)

HOLD FUNCTIONS Menu - Per-System Button Selection Group

The second set of four (4) buttons of the HOLD FUNCTIONS menu provide hold control for instrument on a per-system basis.

The Hold All Channels, Continuous All Channels, Single Sweep & Hold All Channels, and Restart All Channels buttons form a four (4) button selection group where the selection of any one button de-selects the other three (3) buttons on a per-system basis.

Hold All Channels

For all channels, the Hold All Channels button stops signal processing, holds the display, and then selects the Hold button (above).

Continuous All Channels

For all channels, the Continuous All Channels button starts signal processing, resumes the display on all channels, and then selects the Continue button (above).

Single Sweep & Hold All Channels

For all channels, the Single Sweep & Hold All Channels button performs a single sweep signal processing, and then stops signal processing, holds the display, momentarily selects the Single Sweep & Hold button, and then selects the Hold button (above).

Restart All Channels

For all channels, the Restart All Channels button restarts signal processing, resumes the active channel display, and then selects the Continue button. To restart only the active channel, use the Restart Sweep button described above.

Hold Conditions

Select displays the HOLD CONDITIONS menu where toggle settings for Bias Tee, RF, and DUT Protection are available.

- [“HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18](#)

Figure 7-7. HOLD FUNCTIONS Menu (2 of 2)

HOLD CONDITIONS Menu Variants

The HOLD CONDITIONS menu appearance varies as a 3- or 4-button version depending on the sweep type settings. The prerequisites for each variant is described below with a link to a full description of each menu.

HOLD CONDITIONS Frequency-Based Sweep Menu

If the HOLD CONDITIONS menu has three (3) buttons of Bias Tee, RF, and DUT Protection, Sweep Type is set to one of the following:

- Freq Sweep (Linear)
- Freq Sweep (Log)
- Segmented Sweep (Freq-based)
- Segmented Sweep (Index-based)

Menu Description

- [“HOLD CONDITIONS Frequency-Based Sweep Menu” on page 7-17](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

HOLD CONDITIONS Power-Based Sweep Menu

If the HOLD CONDITIONS menu has four (4) buttons of Bias Tee, RF, DUT Protection, and Hold Power, Sweep Type is set to one of the following:

- Power Sweep (CW Freq)
- Power Sweep (Swept Freq)

Menu Description:

- [“HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Related Menus

Use the links and navigation below to change the prerequisites for the HOLD CONDITIONS menus.

SWEEP SETUP Menu

- [“SWEEP SETUP Menu” on page 7-2](#)
- MAIN | Sweep Setup | SWEEP SETUP

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

DISPLAY Menu

- [“DISPLAY Menu” on page 21-3](#)
- MAIN | Display | DISPLAY

HOLD CONDITIONS Frequency-Based Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the HOLD CONDITIONS menu depends on settings on the SWEEP TYPE menu.
- Consult the section above for menu identification and prerequisites.
- [“HOLD CONDITIONS Menu Variants” on page 7-16](#)

Prerequisites

- The number of buttons on the HOLD CONDITIONS menu depends on the Sweep Type.
- If the HOLD CONDITIONS menu (described in the immediately below) has three (3) buttons, Sweep Type is set to one of the following:
 - Freq Sweep (Linear)
 - Freq Sweep (Log)
 - Segmented Sweep (Freq-based)
 - Segmented Sweep (Index-based)
- If the HOLD CONDITIONS menu has four (4) buttons, Sweep Type is set to:
 - Power Sweep (CW Freq)
 - Power Sweep (Swept Freq)
 - [“HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18](#)

SWEEP TYPES menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [HOLD FUNCTIONS Menu](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Hold Functions | HOLD FUNCTIONS | Hold Conditions | HOLD CONDITIONS Freq-Based Sweep

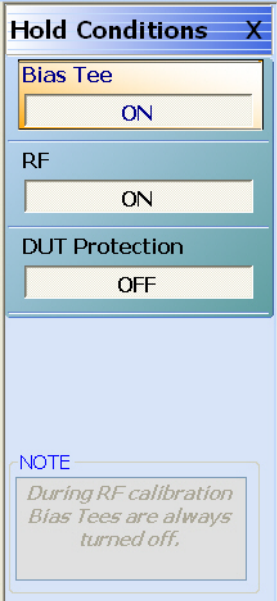
 <p>The screenshot shows a window titled 'Hold Conditions' with a close button (X). It contains three toggle buttons: 'Bias Tee' (ON), 'RF' (ON), and 'DUT Protection' (OFF). At the bottom, there is a 'NOTE' box with the text: 'During RF calibration Bias Tees are always turned off.'</p>	<p>Bias Tee (Off/On)</p> <p>Select toggles the Bias Tee option off and on during Hold mode. Note that during RF calibration, Bias Tees are turned off.</p> <p>RF (Off/On)</p> <p>Select toggles the Radio Frequency (RF) option off and on during Hold mode.</p> <p>DUT Protection (Off/On)</p> <p>Toggles the Device Under Test (DUT) protection off and on. The DUT Protection mode puts the instrument on hold with bias and RF turned off after powering up the instrument. This protects a device that is connected to the VNA. Note that DUT protection only applies after the software is fully loaded and operational. During the boot-up process, every effort has been taken to protect devices, but for full protection, sensitive devices should not be connected to the VNA during power-up.</p>
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Figure 7-8. HOLD CONDITIONS Frequency-Based Sweep Menu

HOLD CONDITIONS Power-Based Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the HOLD CONDITIONS menu depends on settings on the SWEEP TYPE menu.
- Consult the section above for menu identification and prerequisites.
- [HOLD CONDITIONS Menu Variants](#)

Prerequisites

- The number of buttons on the HOLD CONDITIONS menu depends on the Sweep Type.
- If the HOLD CONDITIONS menu (described below) has four (4) buttons, Sweep Type is set to:
 - Power Sweep (CW Freq)
 - Power Sweep (Swept Freq)
- If the HOLD CONDITIONS menu (described above) has three (3) buttons, Sweep Type is set to one of the following:
 - Freq Sweep (Linear)
 - Freq Sweep (Log)
 - Segmented Sweep (Freq-based)
 - Segmented Sweep (Index-based)

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“HOLD FUNCTIONS Menu” on page 7-14](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Hold Functions | HOLD FUNCTIONS | Hold Conditions | HOLD CONDITIONS Power-Based Sweep



	<p>Bias Tee (Off/On) Select toggles the Bias Tee option off and on during Hold mode. Note that during RF calibration, Bias Tees are turned off.</p> <p>RF (Off/On) Select toggles the Radio Frequency (RF) option off and on during Hold mode.</p> <p>DUT Protection (Off/On) Toggles the Device Under Test (DUT) protection off and on. The DUT Protection mode puts the instrument on hold with bias and RF turned off after powering up the instrument. This protects a device that is connected to the VNA. Note that DUT protection only applies after the software is fully loaded and operational. During the boot-up process, every effort has been taken to protect devices, but for full protection, sensitive devices should not be connected to the VNA during power-up.</p> <p>Hold Power On a per-system basis, sets the hold power level. Select displays the Hold Power field toolbar.</p> 
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Figure 7-9. HOLD CONDITIONS Power-Based Sweep Menu

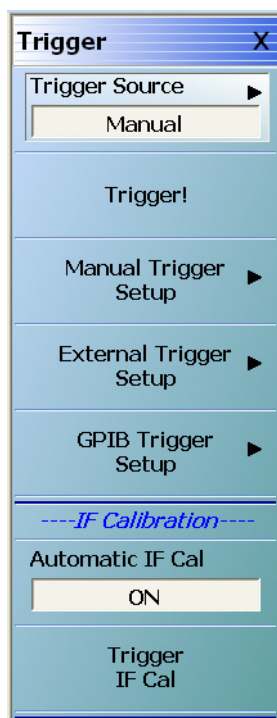
TRIGGER Menu

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER



TRIGGER Menu Button Availability

The availability of the Trigger! button depends on the setting of Trigger Source. If Trigger Source is set to Internal, External, or GPIB, the button is unavailable.

Trigger Source

Select displays the Trigger Source menu which allows trigger source choices of Internal, Manual, External, or GPIB. The configuration and settings for each trigger source type are defined by the buttons below.

- [“TRIGGER SOURCE Source Menu” on page 7-21](#)

Trigger!

The Trigger button manually triggers the measurement. Trigger Source (above) must be set to manual.

Manual Trigger Setup

Select displays the MANUAL TRIGGER menu and sets what measurement will be made when the trigger is manually selected. Measurement options can be based per-point, per-sweep (or per-port), per-channel, or for all channels.

- [“MANUAL TRIGGER Menu” on page 7-22](#)

External Trigger Setup

External trigger mode allows a rear panel input to start a measurement based per-point, per-sweep (or per-port), per-channel, or for all channels with configuration options between the external triggering device and the instrument. Select displays the EXT TRIGGER menu.

- [“EXT. TRIGGER Menu” on page 7-23](#)

GPIB Trigger Setup

The GPIB trigger mode allows a GPIB trigger command to start a measurement based per-point, per-sweep (or per-port), per-channel, or for all channels. Select displays the GPIB TRIGGER menu.

- [“GPIB TRIGGER Menu” on page 7-25](#)

Automatic IF Cal (Off/On)

Select toggles the Automatic Intermediate Frequency Calibration (Automatic IF Cal) calibration mode off and on.

Trigger IF Cal

The Trigger IF Cal button starts the IF calibration and displays the IF CALIBRATION dialog box with a completion progress bar.

- [“IF CALIBRATION Dialog Box” on page 7-26](#)

Figure 7-10. TRIGGER Menu

TRIGGER SOURCE Source Menu

Previous

- [“TRIGGER Menu” on page 7-20](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | Trigger Source | TRIGGER SOURCE

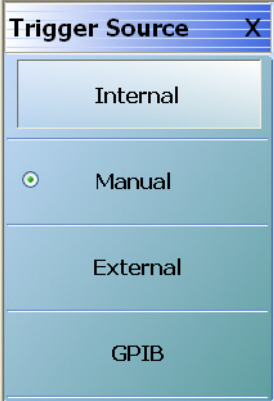
 <p>The screenshot shows a window titled 'Trigger Source' with a close button (X). It contains four buttons: 'Internal', 'Manual' (which has a radio button selected), 'External', and 'GPIB'.</p>	<p>TRIGGER SOURCE Menu Auto-Return Button Selection Group</p> <p>In the TRIGGER SOURCE menu, the Automatic Internal, Manual Internal, External, and GPIB buttons are members of a four (4) button selection group. Selection of any one button de-selects the other three buttons and automatically returns to the TRIGGER menu.</p> <p>Internal (Trigger Source)</p> <p>Select sets triggering to be automatically created within the instrument. Internal triggering mode is an automatically triggered point-by-point measurement that is controlled by the instrument internal software.</p> <p>Manual (Trigger Source)</p> <p>Select sets triggering to be manually triggered by the user. The default setting is on a per-channel basis. The maximum setting is for all channels.</p> <p>External (Trigger Source)</p> <p>Select sets triggering to be created externally by another instrument and sensed through the an external port/connector.</p> <p>GPIB (Trigger Source)</p> <p>Select sets triggering to be through an external General Purpose Interface Bus (GPIB) device and communicated to the instrument via a GPIB network.</p>
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Figure 7-11. TRIGGER SOURCE Menu

MANUAL TRIGGER Menu

Manual trigger mode is triggered by the user from the TRIGGER menu to start a measurement based per-point, per-sweep (or port), per-channel, or for all channels.

Previous

- [“TRIGGER Menu” on page 7-20](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | Manual Trigger Setup | MANUAL TRIGGER


	<p>MANUAL TRIGGER Menu Button Selection Group</p> <p>In the MANUAL TRIGGER menu, the Trig. All Chan., Trig. One Chan., Trig. One Port, and Trig. One Point buttons are members of a four (4) button selection group. Selection of any one button de-selects the other three buttons. After making a selection, click Back to return to the TRIGGER menu.</p> <p>Trig. All Chan. (Manual Trigger) The Trigger All Channels button sets the trigger to measure values for all channels.</p> <p>Trig. One Chan. (Manual Trigger) The Trigger One Channel button sets the trigger to measure value for the active channel only.</p> <p>Trig. One Sweep (Manual Trigger) The Trigger One Sweep button sets the trigger to measure values for one sweep only.</p> <p>Trig. One Point (Manual Trigger) The Trigger One Point button sets the trigger to measure values for one point only.</p>
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Figure 7-12. MANUAL TRIGGER Menu

EXT. TRIGGER Menu

External trigger mode allows a rear panel input to start a measurement based per-point, per-sweep (or per-port), per-channel, or for all channels. The EXT. TRIGGER menu configuration options allow for selection of either a positive or negative signal edge, a trigger delay, and signal handshaking between the external triggering device and the instrument.

Full Name

- EXTERNAL TRIGGER Menu

Previous

- [“TRIGGER Menu” on page 7-20](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | External Trigger Setup | EXT. TRIGGER

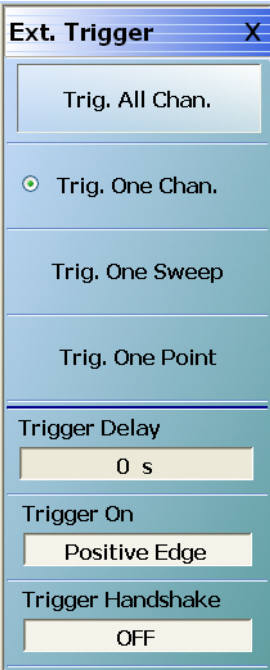

	<h3>EXT. TRIGGER Menu Button Selection Group</h3> <p>In the Ext. Trigger menu, the Trig. All Chan., Trig. One Chan., Trig. One Port, and Trig. One Point buttons are members of a four (4) button selection group where selection of any one button de-selects the other three.</p> <p>Trig. All Chan. (External Trigger) The Trigger All Channels button sets the external trigger to measure values for all channels.</p> <p>Trig. One Chan. (External Trigger) The Trigger One Channel button sets the external trigger to measure values for one channel only.</p> <p>Trig. One Sweep (External Trigger) The Trigger One Sweep button sets the external trigger to measure values for one sweep only.</p> <p>Trig. One Point (External Trigger) The Trigger One Point sets the external trigger to measure values for one point only.</p> <p>Trigger Delay (Time) (External Trigger) Trigger delay sets the time interval between when the instrument received the trigger signal and when the triggered measurement starts. Select displays the Trigger Delay field toolbar and allows the user to enter a trigger delay time in units of seconds (s), milliseconds (ms), microseconds (us), or nanoseconds (ns).</p> 
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Figure 7-13. EXT. TRIGGER (EXTERNAL TRIGGER) Menu (1 of 2)

Trigger On (Positive Edge/Negative Edge) (External Trigger)

Select toggles the triggering point to be on either the positive edge or negative edge of the triggering signal. The default value is positive edge.

Trigger Handshake (Off/On) (External Trigger)

If triggering handshaking is on, the instrument provides a Ready for Trigger and an Output Trigger signal from the rear panel.

- The instrument sends a Ready for Trigger signal to specify if the instrument is ready or not to receive a triggering signal.
- The instrument sends an Output Trigger signal when the triggered measurement is complete.

Select toggles whether the trigger handshake is off or on. The default value is OFF.

Figure 7-13. EXT. TRIGGER (EXTERNAL TRIGGER) Menu (2 of 2)

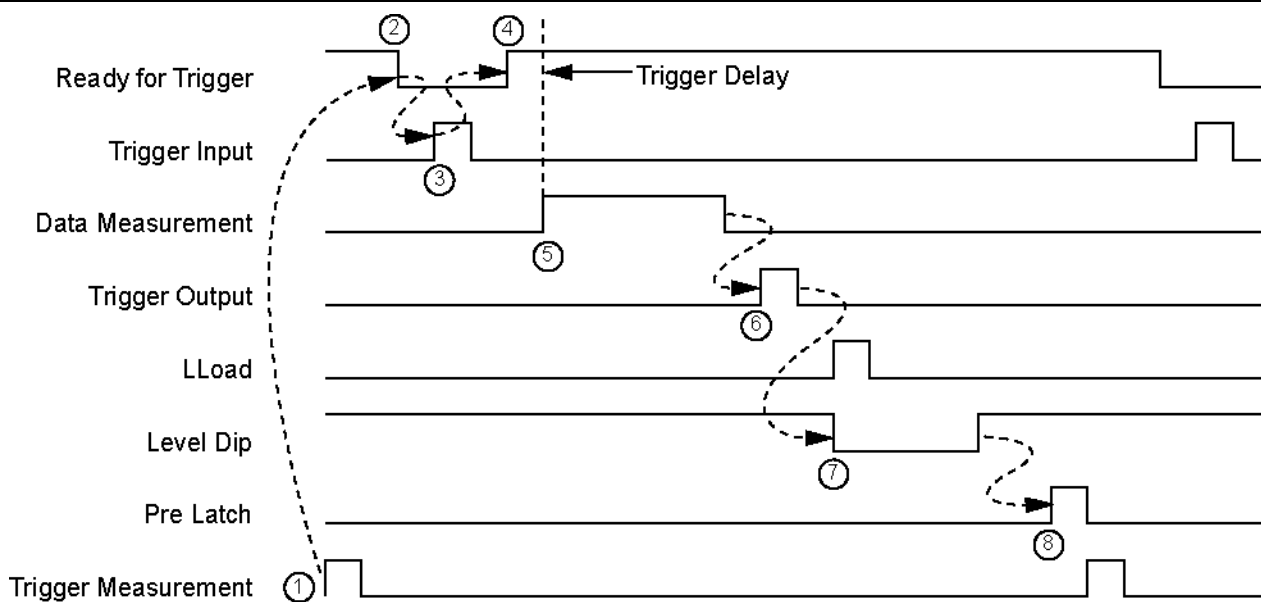


Figure 7-14. External Trigger Timing Diagram

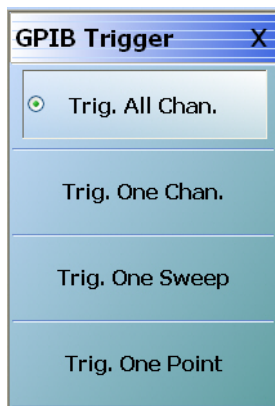
GPIB TRIGGER Menu

Previous

- [“TRIGGER Menu” on page 7-20](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | GPIB Trigger Setup | GPIB TRIGGER



GPIB TRIGGER Menu Button Group

The four (4) buttons below are members of a button selection group where the selection of any one button de-selects the other three buttons:

- Trig. All Chan.
- Trig. One Chan.
- Trig. One Port
- Trig. One Point

Trig. All Chan. (GPIB Trigger)

The Trig. All Chan. button triggers a measurement for all channels.

Trig. One Chan. (GPIB Trigger)

The Trig. One Chan. button triggers a measurement for the active channel only.

Trig. One Sweep (GPIB Trigger)

The Trig. One Sweep button triggers a measurement for one sweep only.

Trig. One Point (GPIB Trigger)

The Trig. One Point button triggers a measurement for one point only.

Figure 7-15. GPIB TRIGGER Menu

IF CALIBRATION Dialog Box

Previous

- [“TRIGGER Menu” on page 7-20](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | Trigger IF Cal | IF CALIBRATION Dialog Box

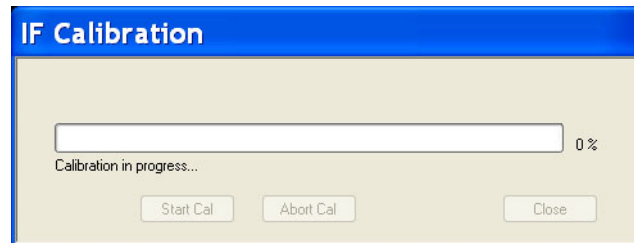


Figure 7-16. IF CALIBRATION Dialog Box

Instructions

Click **Start Cal** button to start; **Abort Cal** to end; **Close** to exit the dialog box.

SWP TIME SETUP

Full Name

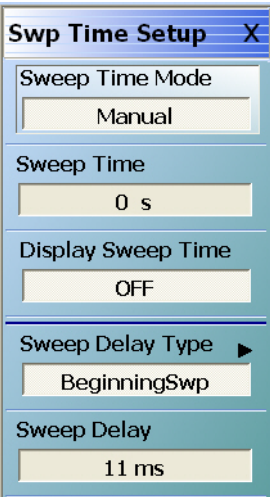
- SWEEP TIME SETUP Menu

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Sweep Time Setup | SWP TIME SETUP



Swp Time Setup X

Sweep Time Mode
Manual

Sweep Time
0 s

Display Sweep Time
OFF

Sweep Delay Type ▶
BeginningSwp

Sweep Delay
11 ms

Sweep Time Mode (Auto/Manual)
If toggled to Manual, the Sweep Time button is available. If toggled to Auto, the button is unavailable.

Sweep Time
The Sweep Time Mode must be set to Manual for the Sweep Time button to be available. Select displays the Sweep Time field toolbar. Note that the sweep delay time set here is also set on the SWEEP DELAY menu.

Sweep Time : 0.0000 s ^ v s ms us ns ps

Display Sweep Time (On/Off)
Select toggles the display of the sweep time ON and OFF.

Sweep Delay Type
Select displays the SWEEP DELAY menu where the delay can be set as OFF, or as begin sweep, phase locked, or load pulse. In addition, the sweep delay time value can be set.

- [“SWEEP DELAY Menu” on page 7-28](#)

Sweep Delay (Time)
Select displays the Sweep Delay field toolbar where the delay can be set as s, ms, us, or ns.

Sweep Delay : 12.0000 us ^ v s ms us ns X

Figure 7-17. SWP TIME SETUP (SWEEP TIME SETUP) Menu

SWEEP DELAY Menu

Previous

- “SWP TIME SETUP” on page 7-27

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Sweep Time Setup | SWP TIME SETUP | Sweep Delay Type | SWEEP DELAY



	<p>Auto-Return Button Group</p> <p>The top four (4) buttons on the SWEEP DELAY menu form an auto-return button selection group. Selecting the either the Off, Begin Swp, Phase Locked, or Load Pulse button de-selects the other three (3) buttons and auto-returns to the SWP TIME SETUP menu.</p> <p>The fifth button, Sweep Delay, displays the Sweep Delay field toolbar allowing input of sweep delays in units of seconds (s), milliseconds (ms), microseconds (us), and nanoseconds (ns).</p> <p>Off</p> <p>Select turns the sweep delay off and auto-returns to the SWP TIME SETUP menu. The sweep delay status of OFF is displayed in the Sweep Delay Type button.</p> <p>Begin Swp</p> <p>Select sets the sweep delay to Beginning Sweep and auto-returns to the SWP TIME SETUP menu. At the beginning of each sweep, the first point is phase locked, and then the user-defined delay time period occurs. After the delay time, the sweep is completed. On the SWP TIME SETUP menu, the Sweep Delay Type is shown as BeginningSwp.</p> <p>Phase Locked</p> <p>Select sets the sweep delay to Phase Locked and auto-returns to the SWP TIME SETUP menu. The sweep starts, the hardware phase locks at each frequency, and the user-defined delay time period occurs. The sweep continues until the sweep is completed. On the SWP TIME SETUP menu, the Sweep Delay Type is shown as PhaseLocked.</p>
	<p>Load Pulse</p> <p>Select sets the sweep to Load Pulse and auto-returns to the SWP TIME SETUP menu. The sweep starts, and while sweeping, the VNA digital signal processor sends a command to load the programming for the next frequency. At this point, the user-defined delay time period occurs. The sweep-load-delay cycle repeats for every point in the sweep.</p> <p>Sweep Delay</p> <p>Select displays the Sweep Delay field toolbar where the time delay can be set as s, ms, us, or ns. Note that the sweep delay time set here can also be set on the SWEEP DELAY menu.</p>  <p>After setting the sweep delay time, select the Back button to return to the SWP TIME SETUP menu.</p>

Figure 7-18. SWEEP DELAY Menu

Chapter 8 — Averaging Menus

8-1 Chapter Overview

This chapter provides information for the AVERAGING menu and its functions. The menu controls the on/off status of averaging, the averaging factor, and whether the averaging type is per point or per sweep. Functions are also provided for IFBW and trace smoothing.

8-2 Overview of the Averaging Menu

There is one (1) averaging menu:

- [“AVERAGING Menu” on page 8-2](#)

8-3 Averaging Menu Functions

AVERAGING Menu

Menu Variants

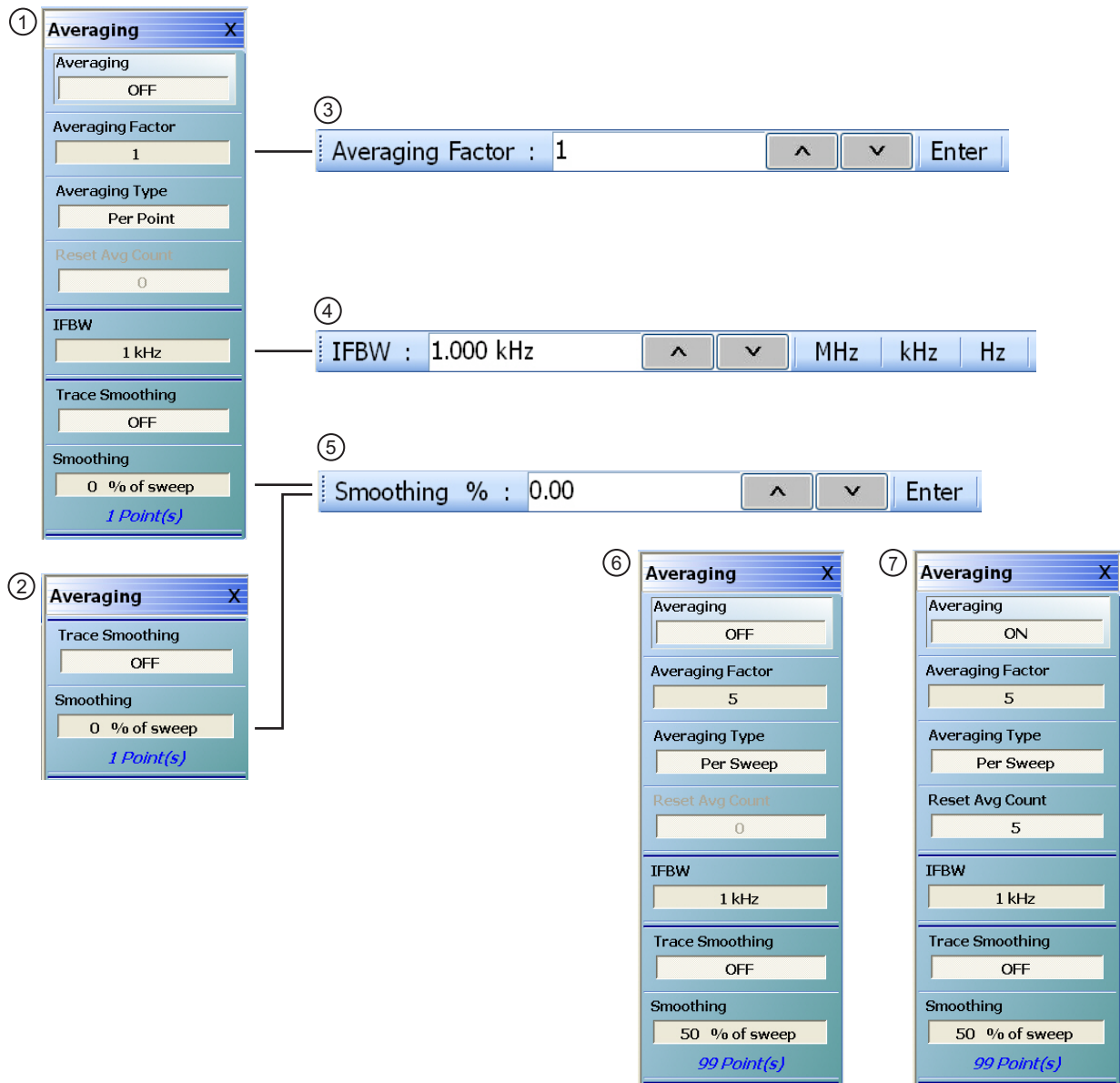
- Two variants of AVERAGING menus are available, determined by whether the sweep type is frequency- or power-based or is segment-based.
- If a frequency/power-based sweep is used, the menu has seven (7) buttons.
- If a segment-based sweep is used, the menu has two (2) buttons. For segment-based sweeps, Averaging, IFBW, and Power settings are made on a per-segment basis on the segment-based setup tableaus at the bottom of the screen.

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Averaging | AVERAGING



- | | |
|--|--|
| <ol style="list-style-type: none"> 1. AVERAGING Menu – Frequency-Based and Power-Based Sweeps 2. AVERAGING Menu – Segmented-Based Sweeps 3. Averaging Factor Field Toolbar 4. IFBW Frequency Field Toolbar | <ol style="list-style-type: none"> 5. Smoothing % (Smoothing Percentage) Field Toolbar 6. AVERAGING Menu – Example of frequency-/power-based sweeps menu with parameters set and Averaging OFF. 7. AVERAGING Menu – Example of frequency-/power-based sweeps menu with parameters set and results shown with Averaging ON. When set to ON, the Reset Avg Count and a similar display in the channel status bar counts up to the Averaging Factor value setting. |
|--|--|

Figure 8-1. AVERAGING Menu

Averaging (Off/On)

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select toggles trace averaging off and on.

Averaging Factor

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select displays the Averaging Factor field toolbar.

Averaging Type (Per Point/Per Sweep)

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select toggles between averaging per point and averaging per sweep.

Reset Average Count

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Read only display field. Counts up to the Averaging Factory value as the averaging session proceeds. Select resets the averaging count to 0 (zero), and the averaging session starts anew.

IFBW

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select displays the IFBW field toolbar for setting the Intermediate Frequency Bandwidth frequency. The toolbar allows discrete values of 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, or 300 kHz. Units of GHz, MHz, kHz, or Hz can be selected.

Trace Smoothing (Off/On)

On a per-trace basis, toggles trace smoothing OFF and ON.

Smoothing

On a per-trace basis, select displays the Smoothing % field toolbar. The toolbar allows the user to set the percentage of trace smoothing in use. A display below the button field shows the number of points that are smoothed.

Chapter 9 — Calibration Menus - 2-Port VNAs

9-1 Chapter Overview

This chapter provides information for calibrating the 2-Port versions of the VectorStar MS4640A Series VNAs. This calibration chapter is organized in the sequence of the menus and dialog boxes that control the various types of calibrations. Due to the numerous permutations of instrument calibration ports, AutoCal, manual calibration, calibration methods, line types, and connectors, only a small subset of calibrations are shown.

9-2 Overview of 2-Port Calibration Menus and Dialog Boxes

Primary Calibration Menus - 2-Port VNAs

The primary calibration menus are:

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)
- [“CALIBRATE Menu - 2-Port VNAs” on page 9-8](#)
- [“THRU UPDATE Menu - 2-Port VNAs” on page 9-9](#)

Calibration Utility Functions - 2-Port VNAs

The calibration utility function and management menus and dialog boxes are:

- [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)
 - [“RESTORE DEFAULT COEF. Dialog Box - 2-Port VNAs” on page 9-41](#)
 - [“FLEXIBLE CAL SETUP Dialog Box - 2-Port VNAs” on page 9-13](#)
 - [“MANUAL ADAPTER REMOVAL Dialog Box - 2-Port VNAs” on page 9-15](#)
 - [“CAL MERGE Dialog Box - 2-Port VNAs” on page 9-16](#)
 - [“NETWORK EXTRACTION Dialog Box - 2-Port VNAs” on page 9-21](#)
- [“CAL KIT/AUTOCAL Menu - 2-Port VNAs” on page 9-34](#)
 - [“INSTALL \(AUTOCAL CHARAC./CAL KIT\) Dialog Box - 2-Port VNAs” on page 9-35](#)
 - [“SAVE \(AUTOCAL CHARAC./CAL KIT\) Dialog Box - 2-Port VNAs” on page 9-36](#)
 - [“CAL KIT INFO Dialog Box - 2-Port VNAs” on page 9-38](#)
 - [“RESTORE DEFAULT COEF. Dialog Box - 2-Port VNAs” on page 9-41](#)

AutoCal Setup Menu - 2-Port VNAs

The main AutoCal setup menu is:

- [“AUTOCAL PORT Menu - 2-Port VNAs” on page 9-43](#)

AutoCal 2-Port Calibration - 2-Port VNAs

This set of menus and dialogs control the settings for a 2-port AutoCal calibration. These are followed by an example procedure for an AutoCal 2-Port Calibration.

- [“AUTOCAL SETUP Menu - 2-Port Cal - 2-Port VNAs” on page 9-44](#)
 - [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box” on page 9-45](#)
- AutoCal 1-Port Calibration Example - 2-Port VNAs
 - [“AutoCal 1-Port Cal Setup - 2-Port VNAs” on page 9-49](#)

AutoCal 1-Port Calibration - 2-Port VNAs

This set of menus and dialogs control the settings for a 1-port AutoCal calibration. These are followed by an example procedure for an AutoCal 1-Port Calibration.

- [“AUTOCAL SETUP Menu - 1-Port Cal - 2-Port VNAs” on page 9-49](#)
 - [“MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 2-Port VNAs” on page 9-50](#)

Manual Calibration Configuration - 2-Port VNAs

Once a calibration type is selected above in the MANUAL CALIBRATION menus, the following menus are used to set up the calibration method and line type. The settings in these menus define which dialog boxes will be available and the procedural menus that will appear for the specified calibration parameters:

- [“MANUAL CAL Menu - 2-Port VNAs” on page 9-55](#)
- [“CAL SETUP Menu” on page 9-56](#)
- [“CAL METHOD Menu” on page 9-58](#)
- [“LINE TYPE Menu” on page 9-59](#)

Manual 2-Port Calibration - 2-Port VNAs

This section provides information on 2-port manual calibration types on 2-port VNAs. A few of the possible configuration dialog boxes are shown. All of the controls and functions for the dialog boxes are listed in the summary table below that follows the dialog box examples. This section concludes with an example manual 2-port calibration procedure.

- [“TWO PORT CAL Menu - 2-Port VNAs” on page 9-60](#)
 - [“TWO PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 9-63](#)
 - [“TWO PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-66](#)
 - [“TWO PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box - 2-Port VNA” on page 9-69](#)
 - [“TWO PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box - 2-Port VNA” on page 9-72](#)
 - [“Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs” on page 9-75](#)
 - [“THRU/RECIP Menu - 2-Port VNAs” on page 9-84](#)

Manual 1-Port Calibration - 2-Port VNAs

- [“ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86](#)
 - [“ONE-PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-89](#)
 - [“ONE-PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-92](#)
 - [“ONE-PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-95](#)
 - [“Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 2-Port VNAs” on page 9-97](#)

Manual Transmission Frequency Response Calibration - 2-Port VNAs

- [“TRANS. RESPONSE Menu - 2-Port VNAs” on page 9-100](#)
 - [“TRANS. FREQ. RESP. CAL. SETUP \(SOLT/R - Coaxial\) Dialog Box” on page 9-102](#)
 - [“TRANS. FREQ. RESP. CAL. SETUP \(SOLT/R - Coaxial\) Dialog Box” on page 9-102](#)
 - [“Manual Calibration - Trans. Freq. Resp. Cal. Setup Dialog Box Contents - 2-Port VNAs” on page 9-104](#)
- [Manual Trans. Freq. Resp. Calibration Example - 2-Port VNAs](#)
 - [“Manual Cal - Trans. Freq. Resp. Cal - 2-Port VNAs” on page 9-100](#)

Manual Reflection Frequency Response Calibration - 2-Port VNAs

- [“REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106](#)
 - [“REFLECTION FREQ. RESPONSE CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 9-109](#)

- [“REFLECTION FREQ. RESPONSE CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 9-109](#)
- [“Manual Calibration - Reflection Frequency Response Cal Setup - 2-Port VNAs” on page 9-114](#)
- Manual Refl. Freq. Resp. Calibration Example
 - [“Manual Cal - Refl. Freq. Resp. Cal - 2-Port VNAs” on page 9-106](#)

General Purpose Manual Calibration Dialog Boxes

These dialog boxes are representative of those that can be linked-to from multiple locations. Not all possible dialog boxes are shown:

- [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)
- [“MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120](#)
- [“STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121](#)
- [“THRU INFO Dialog Box - 2-Port VNAs” on page 9-123](#)
- [“USER DEFINED MATCH DEVICES Dialog Box - 2-Port VNAs” on page 9-124](#)
- [“USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125](#)
- [“USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126](#)
- [“USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128](#)

9-3 Primary Menus for 2-Port VNA Calibration

The menus shown in the figure below provide the primary control for all 2-Port VNA calibration functions. From the AUTOCAL menu (below at #6), additional menus and dialog boxes provide configuration and setup for the 2-Port and 1-Port AutoCal calibration procedures. From the MANUAL CAL menu (below at #7), additional menus and dialog boxes provide configuration and setup for manual calibration 2-Port, 1-Port, Transmission Frequency Response, and Reflection Frequency Response procedures.

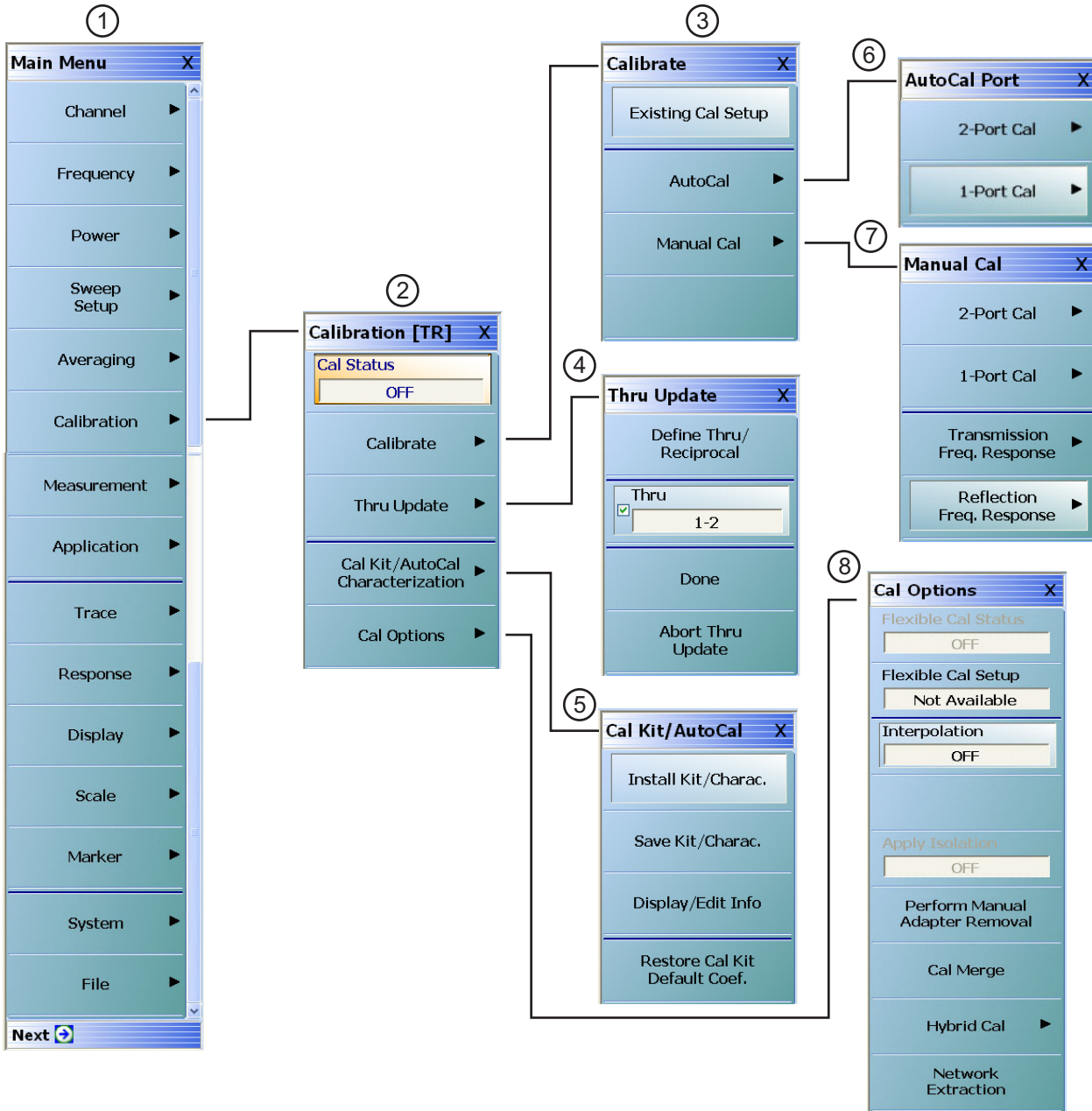


Figure 9-1. Primary Calibration Menus (1 of 2)

The primary calibration control and configuration menus for 2-port calibration VNAs.

1. MAIN menu
 2. CALIBRATION Menu
 3. CALIBRATE Menu
 4. THRU UPDATE Menu
 5. CAL KIT/AUTOCAL Characterization File Management Menu
 6. AUTOCAL PORTS Menu
 7. MANUAL CAL Menu
 8. CAL OPTIONS and calibration utilities menus and dialog boxes
-

Figure 9-1. Primary Calibration Menus (2 of 2)

CALIBRATION Menu - 2-Port VNAs

Use the Calibration menu to setup calibration options, configure AutoCal and cal kit characterization files, and to configure and run calibration routines.

Full Name

- CALIBRATION [TRANSMISSION-REFLECTION Menu
- The name of the Calibration menu is appended with [TR] for transmission/reflection operational mode. The instrument operation mode is set on the APPLICATION menu.

APPLICATION Menu

- [“Application Menus - Overview” on page 12-1](#)
- [“Application Menus - Multiple Source” on page 13-1](#)
- [“Application Menus - Broadband/Millimeter-Wave” on page 14-1](#)
- [“Application Menus - Noise Figure” on page 15-1](#)
- [“Application Menus - Mixer Setup” on page 16-1](#)
- [“Application Menus - NxN” on page 17-1](#)
- MAIN | Application | APPLICATION

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Calibration | CALIBRATION

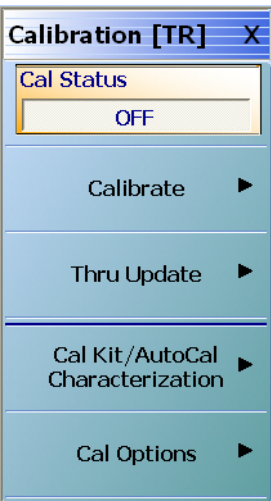
	<p>Cal Status (Off/On)</p> <p>The Cal Status toggle button displays the calibration status based on the last calibration run.</p> <p>If not calibrated, Cal Status cannot be changed from OFF and a calibration run must be successfully completed before the status can be changed.</p> <p>If calibrated, Cal Status status can be toggled between OFF and ON. If ON, the Channel Status bar at the bottom of the display area shows a status of CORR in green.</p> <p>Calibrate</p> <p>Use the Calibrate button to start the AutoCal or manual calibration process. Options on sub-menus allow for selection of automatic or manual calibration, calibration type, calibration method, line type and other calibration parameters. Select displays the CALIBRATE menu.</p> <ul style="list-style-type: none"> • “CALIBRATE Menu - 2-Port VNAs” on page 9-8 <p>Thru Update</p> <p>Thru update is a calibration refreshing technique where the user connects a thru line and quickly refreshes the transmission tracking and load match terms without the time and complexity of a full calibration run. The thru update is essentially a one-step refresh calibration for Full 2 Port and 1 Path-2 Port calibrations.</p> <p>Select displays the THRU UPDATE menu. If the Thru Update button is not available, a Full 2-Port or 1 Path-2 Port calibration is not active.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box - 2-Port VNAs” on page 9-123 <p>Cal Kit/AutoCal Characterization</p> <p>Use this menu to save, load, and recall characterization files for AutoCal and manual calibration kits. Select displays the CAL KIT/AUTOCAL menu.</p> <ul style="list-style-type: none"> • “CAL KIT/AUTOCAL Menu - 2-Port VNAs” on page 9-34. <p>Cal Options</p> <p>Select displays the CAL OPTIONS menu.</p> <ul style="list-style-type: none"> • “CAL OPTIONS Menu - 2-Port VNAs” on page 9-11
---	--

Figure 9-2. CALIBRATION Menu - 2-Port VNAs

CALIBRATE Menu - 2-Port VNAs

Use the CALIBRATE menu to start the AutoCal or manual calibration process. Sub-menus within each category allow selection of calibration parameters, calibration types, calibration methods, line types, and test port connectors.

Previous

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE

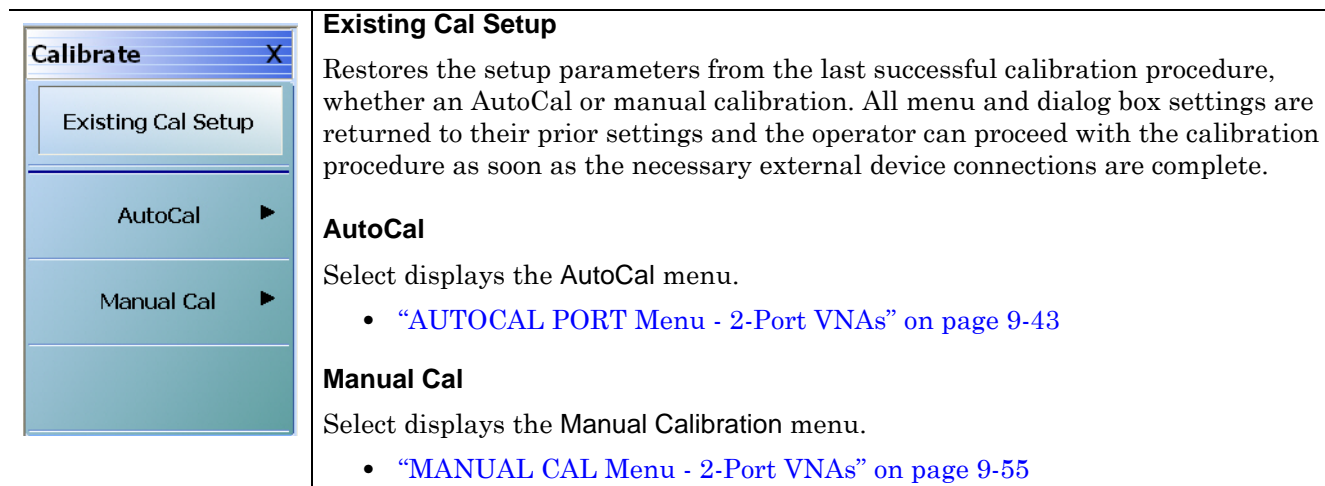


Figure 9-3. CALIBRATE Menu - 2-Port VNAs

THRU UPDATE Menu - 2-Port VNAs

The THRU UPDATE menu is a completion button menu. When the through update calibration procedure is complete, the button is annotated with a completion checkmark as shown in the figure below.

Prerequisites

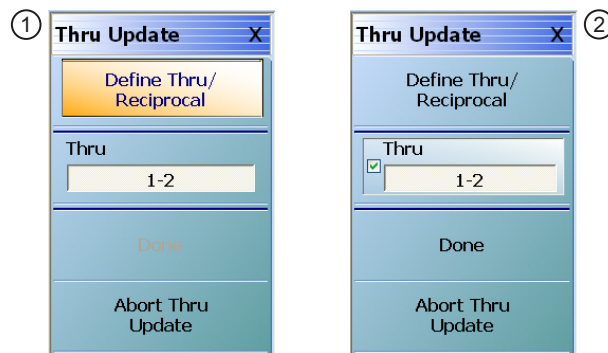
- The Thru Update button on the MANUAL CALIBRATION menu is not available unless a Full 2-Port, or a 1 Path-2 Port calibration (AutoCal or manual) has been successfully completed.

Previous

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Navigation

- MAIN | Calibration | CALIBRATION | Thru Update | THRU UPDATE



1. Starting THRU UPDATE calibration menu for 2-Port VNA system on left. The Done button is unavailable.

2. At right, the completed THRU UPDATE calibration menu for 2-Port VNA system on right with completion checkmark and Done button available.

Figure 9-4. THRU UPDATE Calibration Menu - 2-Port VNAs

Define Thru/Reciprocal

Displays the THRU INFO dialog box where the through parameters can be changed.

- [“THRU INFO Dialog Box - 2-Port VNAs” on page 9-123](#)

Done

When all calibrations are successfully completed, the Done button is available. Select returns to the CALIBRATION menu and the Cal Status button is set to ON.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Abort Thru Update

Abort Thru Update stops the current calibration procedure and returns to the CALIBRATION menu.

[“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

9-4 Calibration Utility Functions

The calibration utility function and management menus and dialog boxes are:

- “CAL OPTIONS Menu - 2-Port VNAs” on page 9-11
 - “RESTORE DEFAULT COEF. Dialog Box - 2-Port VNAs” on page 9-41
 - “FLEXIBLE CAL SETUP Dialog Box - 2-Port VNAs” on page 9-13
 - “MANUAL ADAPTER REMOVAL Dialog Box - 2-Port VNAs” on page 9-15
 - “CAL MERGE Dialog Box - 2-Port VNAs” on page 9-16
 - “NETWORK EXTRACTION Dialog Box - 2-Port VNAs” on page 9-21
- “CAL KIT/AUTOCAL Menu - 2-Port VNAs” on page 9-34
 - “INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box - 2-Port VNAs” on page 9-35
 - “SAVE (AUTOCAL CHARAC./CAL KIT) Dialog Box - 2-Port VNAs” on page 9-36
 - “CAL KIT INFO Dialog Box - 2-Port VNAs” on page 9-38
 - “RESTORE DEFAULT COEF. Dialog Box - 2-Port VNAs” on page 9-41

CAL OPTIONS Menu - 2-Port VNAs

The CAL OPTIONS menu and related sub-menus provide access to advanced calibration options either before or after a calibration procedure has been completed.

Previous

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS


	<p>Flexible Cal Status (Off/On)</p> <p>Read only display button. Flexible calibration is the ability to select a sub-set of a currently active calibration status. For example, if a Full 2 Port calibration has been completed, flexible calibration allows the calibration to be reduced to a Transmission Frequency Response calibration. Select toggles flexible calibration off and on.</p> <p>Flexible Cal Setup</p> <p>Use Flexible Cal Setup to change the parameters above. Select displays the FLEXIBLE CAL SETUP dialog box.</p> <ul style="list-style-type: none"> • “FLEXIBLE CAL SETUP Dialog Box - 2-Port VNAs” on page 9-13 <p>Interpolation (Off/On)</p> <p>Interpolation allows additional interpolated measurement points between calibrated measurement points. This is useful if the user wants to zoom into a specific area without having to recalibrate the instrument. The interpolated points must lie within the calibration frequency points. Select toggles interpolation OFF and ON with a default state of OFF.</p> <p>Apply Isolation (Off/On)</p> <p>If this button is unavailable, isolation calibration was not performed. The isolation calibration procedure is started by a button on the calibration type menu.</p> <ul style="list-style-type: none"> • “Manual 2-Port Cal Setup - 2-Port VNAs” on page 9-60 • “Manual 1-Port Cal Setup - 2-Port VNAs” on page 9-86 <p>If this button is available, isolation calibration was performed, and select toggles isolation calibration OFF and ON.</p>
--	--

Figure 9-5. CAL OPTIONS (CALIBRATION OPTIONS) Menu (1 of 2)

Perform Manual Adapter Removal

Adapter removal permits accurate measurement of non-insertable devices using an adapter of known electrical length and two full 12-term calibrations. Manual adapter removal extracts the behavior of the adapter from the setup after a successful calibration. Select displays the MANUAL ADAPTER REMOVAL dialog box.

- [“MANUAL ADAPTER REMOVAL Dialog Box - 2-Port VNAs” on page 9-15](#)

Cal Merge

Cal Merge allows merging two calibration files into a single file where the calibrations can use different methods at different frequencies. The calibrations must be of the same calibration type. Select displays the CAL MERGE dialog box.

- [“CAL MERGE Dialog Box - 2-Port VNAs” on page 9-16](#)

Hybrid Cal

Hybrid calibrations take two 1-port calibrations and hybridizes them into a 2-port calibration which allows a mixed-media calibration for a device that may have coaxial and waveguide connections. Select displays the HYBRID CAL menu where the hybrid calibration is configured.

- [“HYBRID CAL Menu - 2-Port VNAs” on page 9-18](#)

Network Extraction

Use network extraction to generate an S-Parameter (.s2p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the NETWORK EXTRACTION dialog box.

- [“NETWORK EXTRACTION Dialog Box - 2-Port VNAs” on page 9-21](#)

Figure 9-5. CAL OPTIONS (CALIBRATION OPTIONS) Menu (2 of 2)

FLEXIBLE CAL SETUP Dialog Box - 2-Port VNAs

Use the Flexible Cal Setup dialog box to define a calibration sub-set of the currently active calibration.

Previous

- [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup | FLEXIBLE CAL SETUP Dialog Box

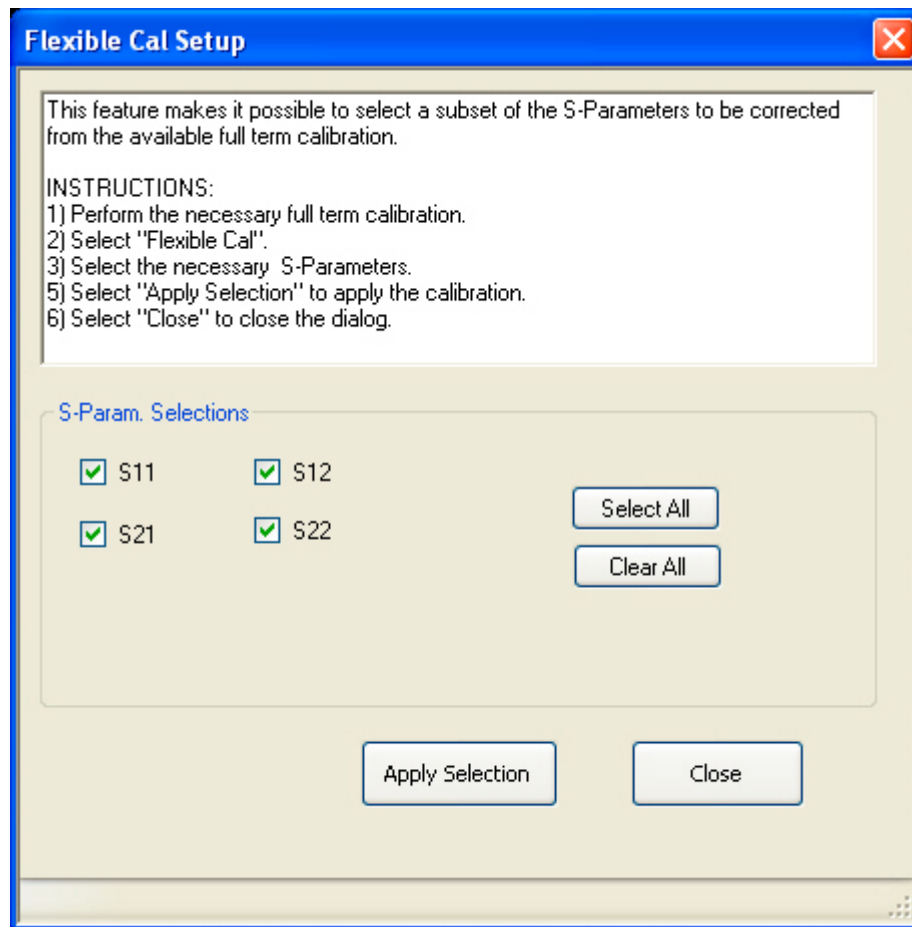


Figure 9-6. FLEXIBLE CAL SETUP (FLEXIBLE CALIBRATION SETUP) Dialog Box – 2-Port VNAs

Instructions

The flexible calibration setup feature makes it possible to select a subset of the S-Parameters to be corrected from the available full-term calibration.

Procedure

1. Perform the necessary full-term calibration.
2. On the CAL OPTIONS menu, select Flexible Cal Setup.
 - MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup
 - The FLEXIBLE CAL SETUP dialog box appears.

3. Select the necessary S-Parameters in any combination as long as one S-Parameter is selected:
 - S11
 - S12
 - S21
 - S22
4. Select the Apply Selection button to apply the calibration.
5. Select Close to close the dialog box and return to the CAL OPTIONS menu.
 - [“FLEXIBLE CAL SETUP Dialog Box - 2-Port VNAs” on page 9-13](#)
6. If Full Term Cal (By Port) is selected above, the area label is Port Selections (Full Term) with available options of:
 - Port 1 and/or
 - Port 2
7. If Reflection Only (By Port) is selected above, the area label is Port Selections (Reflection Only) with the available options of:
 - Port 1 and/or
 - Port 2
8. If Customize Cal (By S-Param) is selected, the S-Param Selections area appears with S-Parameter selection check boxes. Select any combination of:
 - S11
 - S21
 - S12
 - S22
9. Select Apply Selection to apply the selections.
10. Select Close to close the dialog without saving the selections.

MANUAL ADAPTER REMOVAL Dialog Box - 2-Port VNAs

Use manual adapter removal to extract the electrical behavior of an adapter after a successful calibration procedure. This is especially useful when the DUT configuration is not entirely compatible with common calibration procedures such as having different connectors at each end.

Previous

- [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Perform Manual Adapter Removal | MANUAL ADAPTER REMOVAL Dialog Box

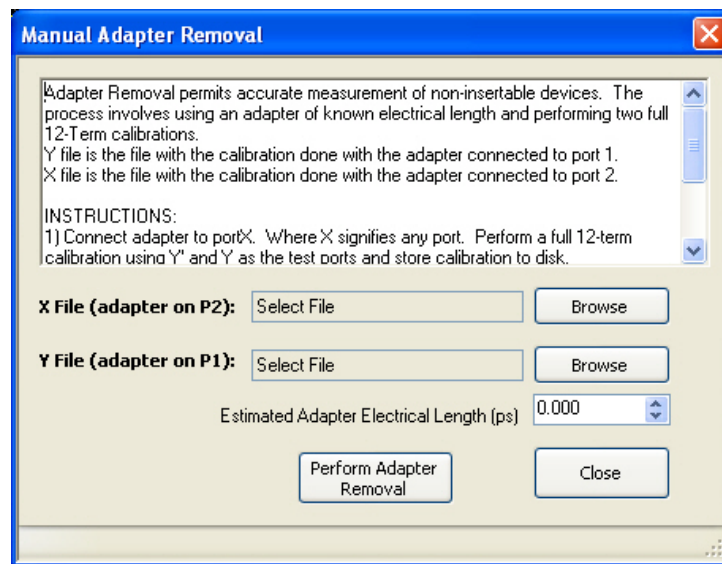


Figure 9-7. MANUAL ADAPTER REMOVAL Dialog Box

Instructions

Adapter removal permits accurate measurement of non-insertable devices. The process involves using an adapter of known electrical length and performing two full 12-term calibrations. In the procedure below, the Y file is the file with the calibration when the adapter connected to port 1 and the X file is the file with the calibration when the adapter connected to port 2.

Procedure

1. Connect the adapter to port X, where X signifies any port. Perform a full 12-term (Full 2 Port) calibration using Y' and Y as the test ports and store the calibration to disk.
2. Connect the adapter to port Y, where Y signifies any port that is not X. Perform a full 12-term calibration using X and X' as the test ports and store calibration to disk.
3. Call up the X and Y files.
4. Input the estimated adapter electrical length.
5. Select Perform Adapter Removal to remove adapter.

CAL MERGE Dialog Box - 2-Port VNAs

Calibration merge allows merging two calibration files into a single file where the prior calibrations can use different methods (such as SOLT and SSLT) at different frequencies. The calibrations must be the same calibration type (such as Full 1 Port) and be available on the instrument hard drive. Calibration merge has other requirements (described below) as to the number of points, start and stop frequencies, and front panel settings.

Previous

- [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

Navigation

- [MAIN](#) | [Calibration](#) | [CALIBRATION](#) | [Cal Options](#) | [CAL OPTIONS](#) | [Cal Merge](#) | [CAL MERGE Dialog Box](#)

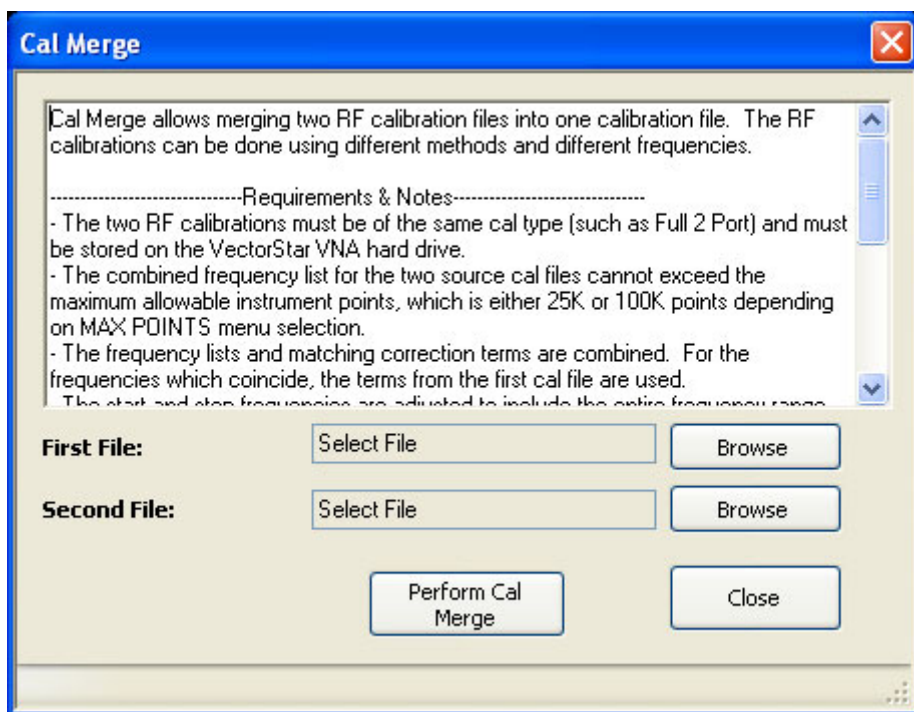


Figure 9-8. CAL MERGE Dialog Box

Instructions

Calibration merge (cal merge) allows the merging of two RF calibration files into a single file. The RF calibrations can use different methods and different frequencies.

Requirements and Notes

- The two RF calibrations must be of the same cal type (such as Full 2 Port) and must be stored on the VectorStar VNA hard drive.
- The combined frequency list for the two source cal files cannot exceed the maximum allowable instrument points, which is either 25,000 or 100,000 points depending on MAX POINTS menu selection.
- The frequency lists and matching correction terms are combined. For the frequencies which coincide, the terms from the first cal file are used.
- The start and stop frequencies are adjusted to include the entire frequency range provided by the two cal files.
- The first cal file provides all other front panel setup configuration information.
- Since Cal Merge can result in a non-discrete step size, the cal merge file sweep type is set to a frequency-based segmented sweep.

Procedure

1. In the dialog box, select **Browse** to select the appropriate cal files (e.g. calfile1.chx and calfile2.chx).
2. Click the **First File** or **Second File Browse** button to display an **OPEN (Setup.cal File)** dialog box.
3. Select **Perform Cal Merge** to perform the merge of the frequency lists and matching correction terms.
4. If required, enter the **Cutoff Frequency** in kHz.
5. Click **Perform Cal Merge** to merge the calibration files.
6. If the selected files are incorrect, a warning message is displayed.
7. Best practices recommend saving the resultant Cal Merge file, but a save is not required.
8. Click **Close** to exit the dialog box.

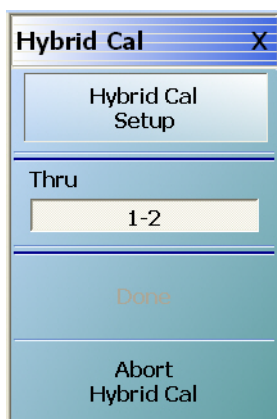
HYBRID CAL Menu - 2-Port VNAs

Previous

- [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Hybrid Cal | HYBRID CAL



Hybrid Cal Setup

Hybrid calibrations take two 1-port calibrations and hybridizes them into a 2-port calibration which allows a mixed-media calibration for a device that may have coaxial and waveguide connections. It also allows 2-port calibrations where the two 1-port calibrations are not restricted to be the same type. Select displays the HYBRID CAL SETUP dialog box where the hybrid calibration is configured.

- [“HYBRID CAL SETUP Dialog Box - 2-Port VNAs” on page 9-19](#)

Thru

After the hybridized calibration has been configured in the HYBRID CAL SETUP dialog box, make sure all through connections are complete. When ready to proceed, select the Thru button to start the hybridization. The display dims for a few seconds, and then reappears with a completion check box.

Done

If the Done button is unavailable, the hybrid calibration has not been successfully completed. After a successful completion, the Done button is available. Select returns to the CALIBRATION menu where the Cal Status button is set to ON.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Abort Hybrid Cal Setup

Selecting the Abort button stops the hybrid calibration and returns to the CALIBRATION menu.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Figure 9-9. CAL OPTIONS (CALIBRATION OPTIONS) Menu

HYBRID CAL SETUP Dialog Box - 2-Port VNAs

Previous

- “HYBRID CAL Menu - 2-Port VNAs” on page 9-18

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Hybrid Cal | HYBRID CAL | Hybrid Cal Setup | HYBRID CAL SETUP Dialog Box

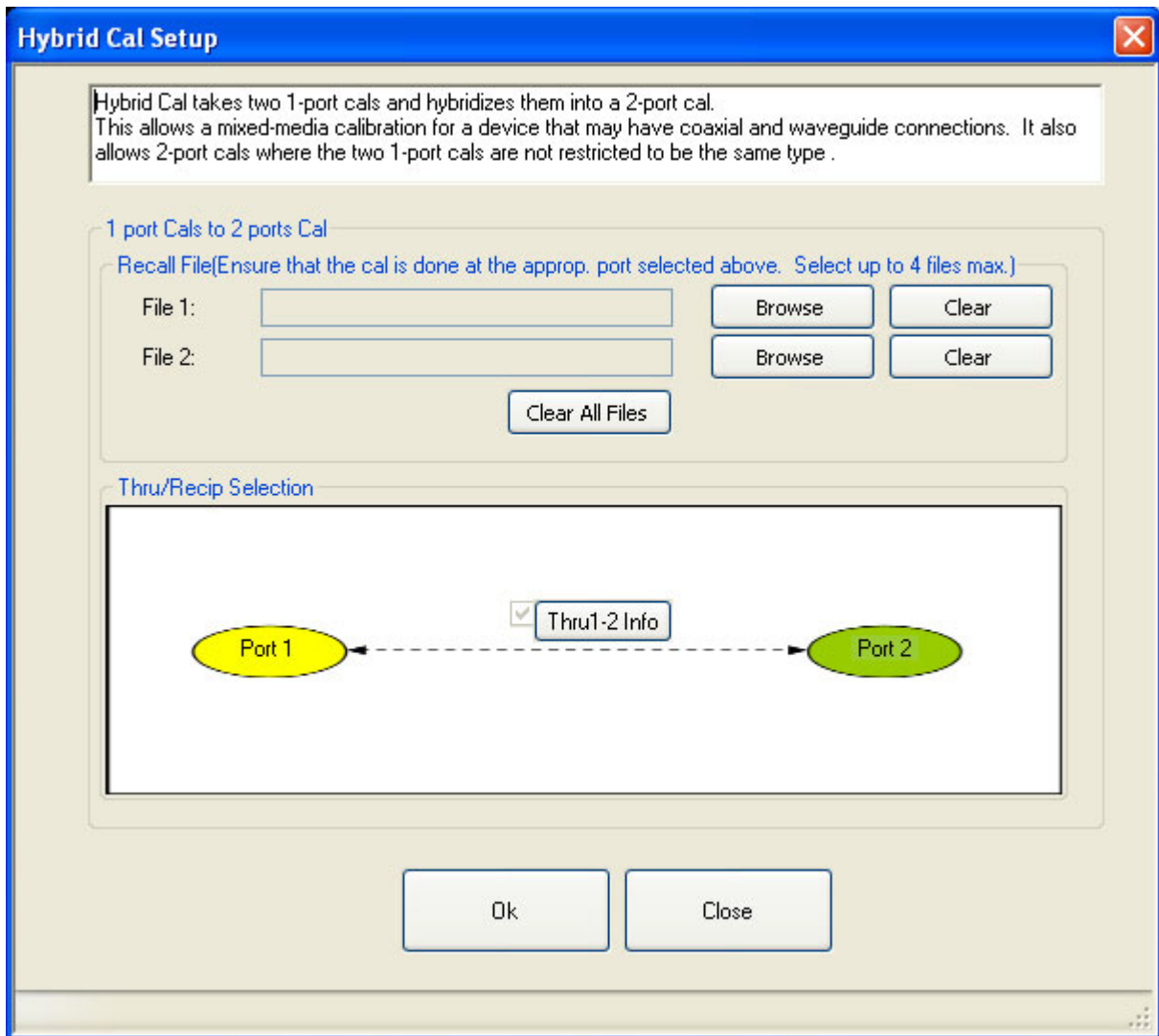


Figure 9-10. HYBRID CAL SETUP Dialog Box - 2-Port VNAs

Instructions

A hybrid calibration takes two 1-port calibrations and hybridizes them into a 2-port calibration. This allows a mixed-media calibration for a device that may have both coaxial and waveguide connections. It also allows 2-port calibrations where the two 1-port calibrations are not restricted to the same type such as.

Hybridizing Two 1-Port Cal's into a 2-Port Cal

In the File 1 field, select the Browse button to navigate to the appropriate Channel Setup and Calibration (CHX) file for the first calibration.

Repeat for the File 2 field.

Thru/Recip Selection

The figure shows the relationship between the two ports and the Thru 1-2 Info button is automatically selected.

OK

When both files have been identified, select OK to return to the HYBRID CAL menu.

NETWORK EXTRACTION Dialog Box - 2-Port VNAs

The network extraction features provides a method of generating an S-Parameter (.s2p) file for a set of networks. The.s2p file can then be embedded or de-embedded into the error coefficient of the VNA as required. Four extractable network configurations are provided:

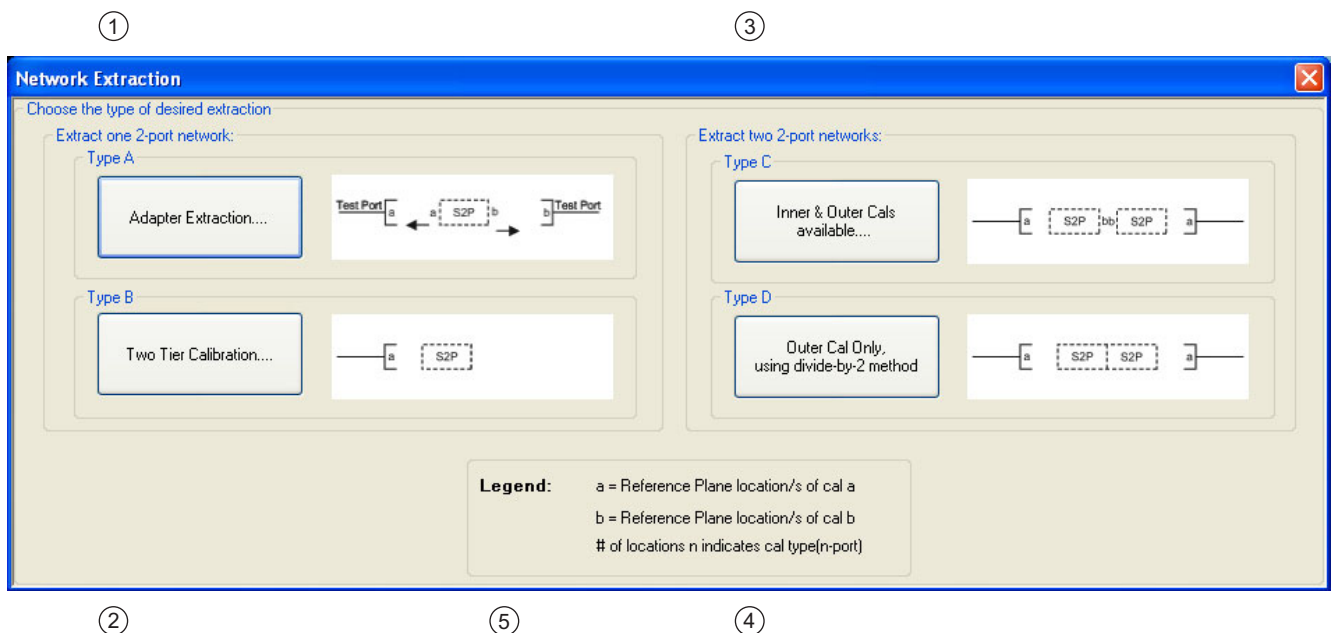
- Type A – Adapter Extraction – Extract one 2-port network
- Type B – Two Tier Calibration – Extract one 2-port network
- Type C – Inner and Outer Calibrations Available – Extract two 2-port networks
- Type D – Outer Cal Only – Extract two 2-port networks.

Previous

- [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box



NETWORK EXTRACTION Dialog Box – Choose the type of desired extraction from the four (4) buttons below:

1. Type A - Extract one (1) 2-Port Network - Adapter Extraction
2. Type B - Extract one (1) 2-Port Network - Two Tier Calibration
3. Type C - Extract two (2) 2-Port Networks - Inner and Outer Cals Available
4. Type D - Extract two (2) 2-Port Networks - Outer Cal Only using divided-by-2 method

5. Legend for Dialog Box Figures:

- a – Location of one or more Reference Planes for Cal A
- b – Location of one or more Reference Planes for Cal B
- # – Locations “n” indicated Cal Type for n-Port

Figure 9-11. NETWORK EXTRACTION Dialog Box

Instructions

The network extraction feature provides the method for generating the S-Parameter for a given set of networks. This generated.s2p file can then be embedded or de-embedded into the error coefficient for the VNA at a later stage. The dialog box provides four extraction choices accessible via large buttons. Each choice provides a separate configuration dialog box as described in the sections below.

- Extract One 2-Port Network - Type A - Adapter Extraction
 - [“NETWORK EXTRACTION – Type A – Extract One 2-Port Network Dialog Box”](#) on page 9-23
- Extract One 2-Port Network - Type B - Two Tier Calibration
 - [“NETWORK EXTRACTION – Type B – Extract One 2-Port Network”](#) on page 9-25
- Extract Two 2-Port Networks - Type C - Inner and Outer Cals Available
 - [“NETWORK EXTRACTION – Type C – Inner and Outer Cals Available”](#) on page 9-27
- Extract Two 2-Port Networks - Type D - Outer Cal Only Using
 - [“NETWORK EXTRACTION – Type D – Outer Cals Only Using Divide-By-Two”](#) on page 9-29

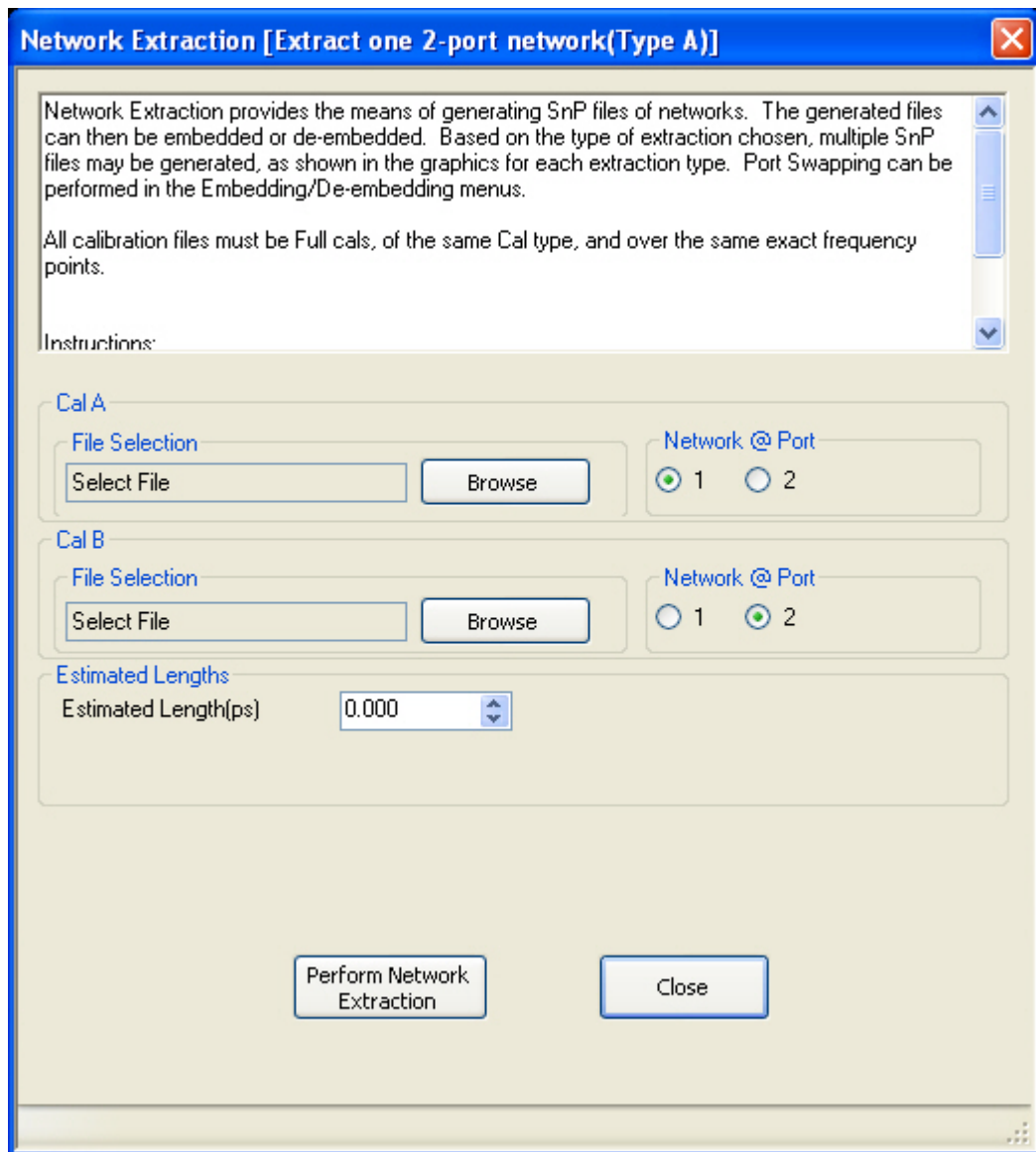
NETWORK EXTRACTION – Type A – Extract One 2-Port Network Dialog Box

Previous

- “NETWORK EXTRACTION Dialog Box - 2-Port VNAs” on page 9-21

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Two 2-Port Networks - Type A - Adapter Extraction



Use Type A Network Extraction to extract one (1) 2-Port network using adapter extraction.

Figure 9-12. NETWORK EXTRACTION Dialog Box - Type A - Adapter Extraction

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

Requirements

All calibration files must be:

- Full 12 term calibrations
- Of the same type (e.g. all SOLT/SOLR)
- Over the exact same frequency points

Instructions

1. Use the **Browse** button to select the Cal A file. Repeat to select the Cal B file. If necessary, estimate the Port 1 Length in ps.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP files/s.
4. After the extraction, the focus auto-returns to the CAL OPTIONS menu.
 - [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

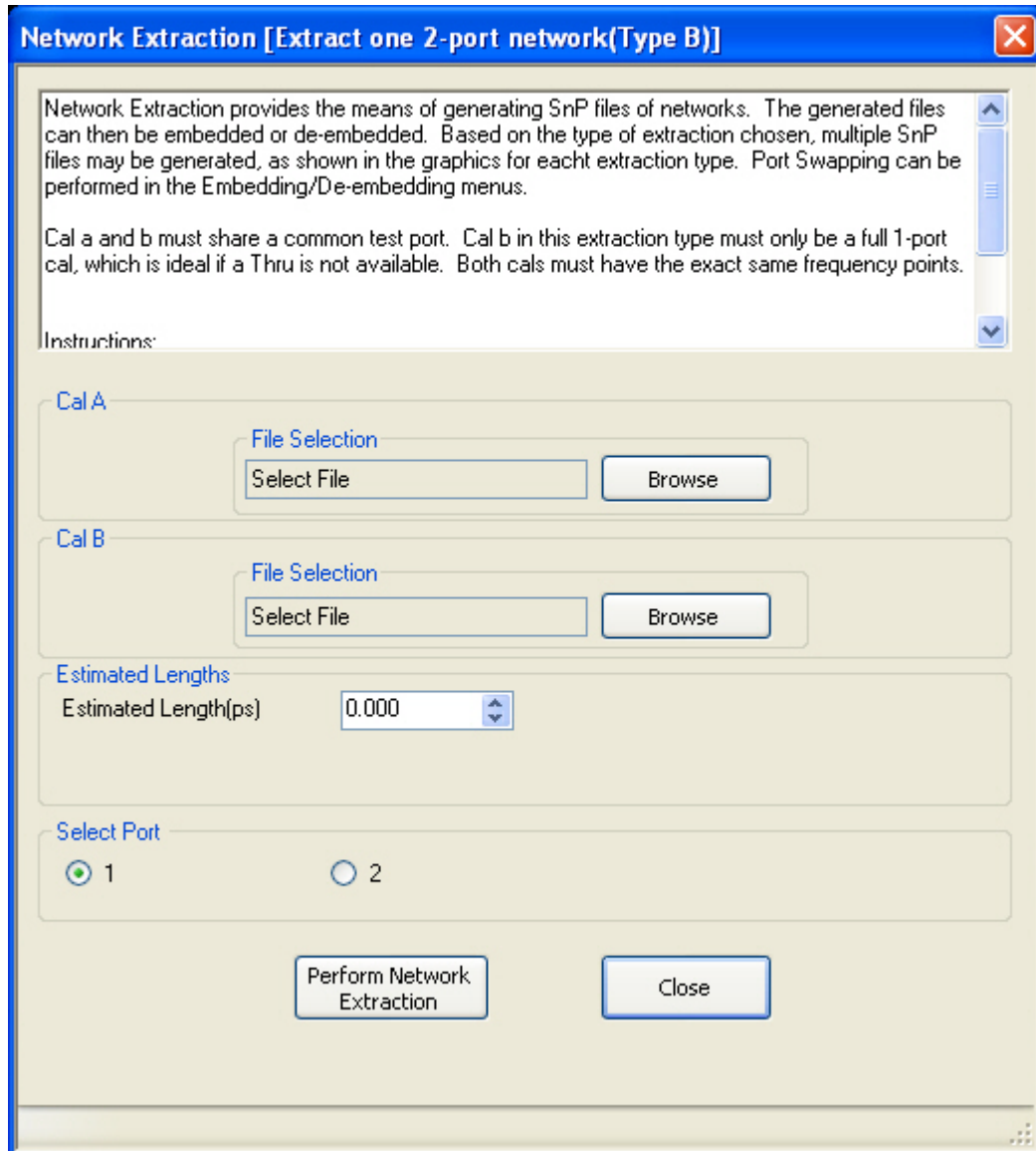
NETWORK EXTRACTION – Type B – Extract One 2-Port Network

Previous

- “NETWORK EXTRACTION Dialog Box - 2-Port VNAs” on page 9-21

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Two 2-Port Networks - Type B - Two Tier Calibration



Use Type B Network Extraction to extract one (1) 2-Port network using available two tier calibration.

Figure 9-13. NETWORK EXTRACTION Dialog Box - Type B - Two Tier Calibration

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

Requirements

- Calibration A must share a common test port.
- Calibration B in this extraction type must only be a full 1-port calibration, which is ideal if a Through is not available.
- Both calcs have to be of the same Cal Type and use the exact same frequency points.

Instructions

1. Use the **Browse** button to select the Cal A file. Repeat to select the Cal B file. If necessary, estimate the Port 1 Length in ps.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP files/s.
4. After the extraction, the focus auto-returns to the **CAL OPTIONS** menu.
 - [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

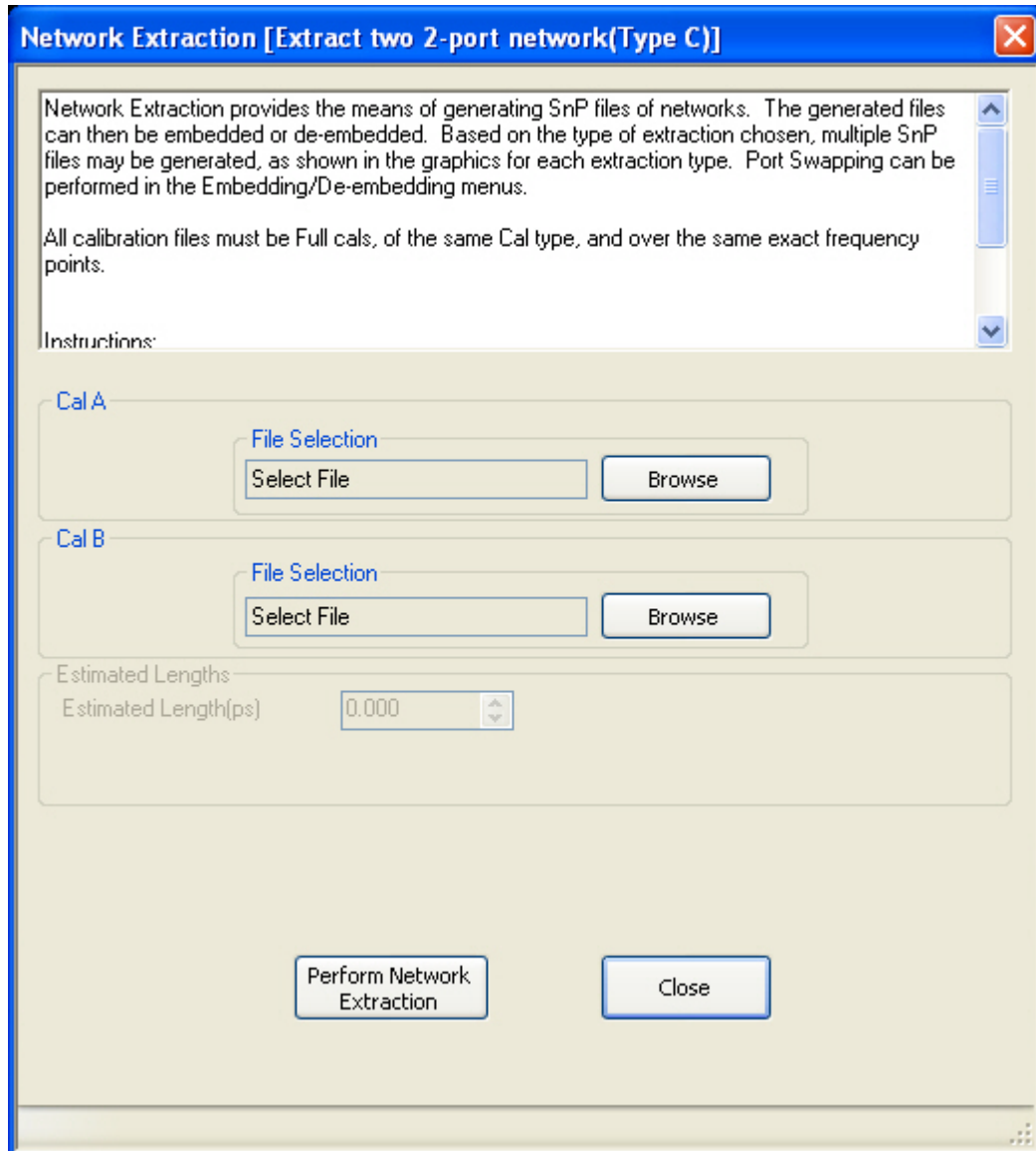
NETWORK EXTRACTION – Type C – Inner and Outer Cals Available

Previous

- “NETWORK EXTRACTION Dialog Box - 2-Port VNAs” on page 9-21

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Two 2-Port Networks - Type C - Outer Cal Only



Use Type C Network Extraction to extract two (2) 2-Port networks using available Inner and Outer calibrations.

Figure 9-14. NETWORK EXTRACTION Dialog Box - Type C - Inner and Outer Cals

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus. All calibration files must be:

- Full 12-term calibrations
- The same calibration type
- Over the exact same frequency points

Instructions:

1. Use the Browse button to select the Cal A file. Repeat to select the Cal B file.
2. Select Perform Network Extraction to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP files/s.
4. After the extraction, the focus auto-returns to the CAL OPTIONS menu.
 - [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

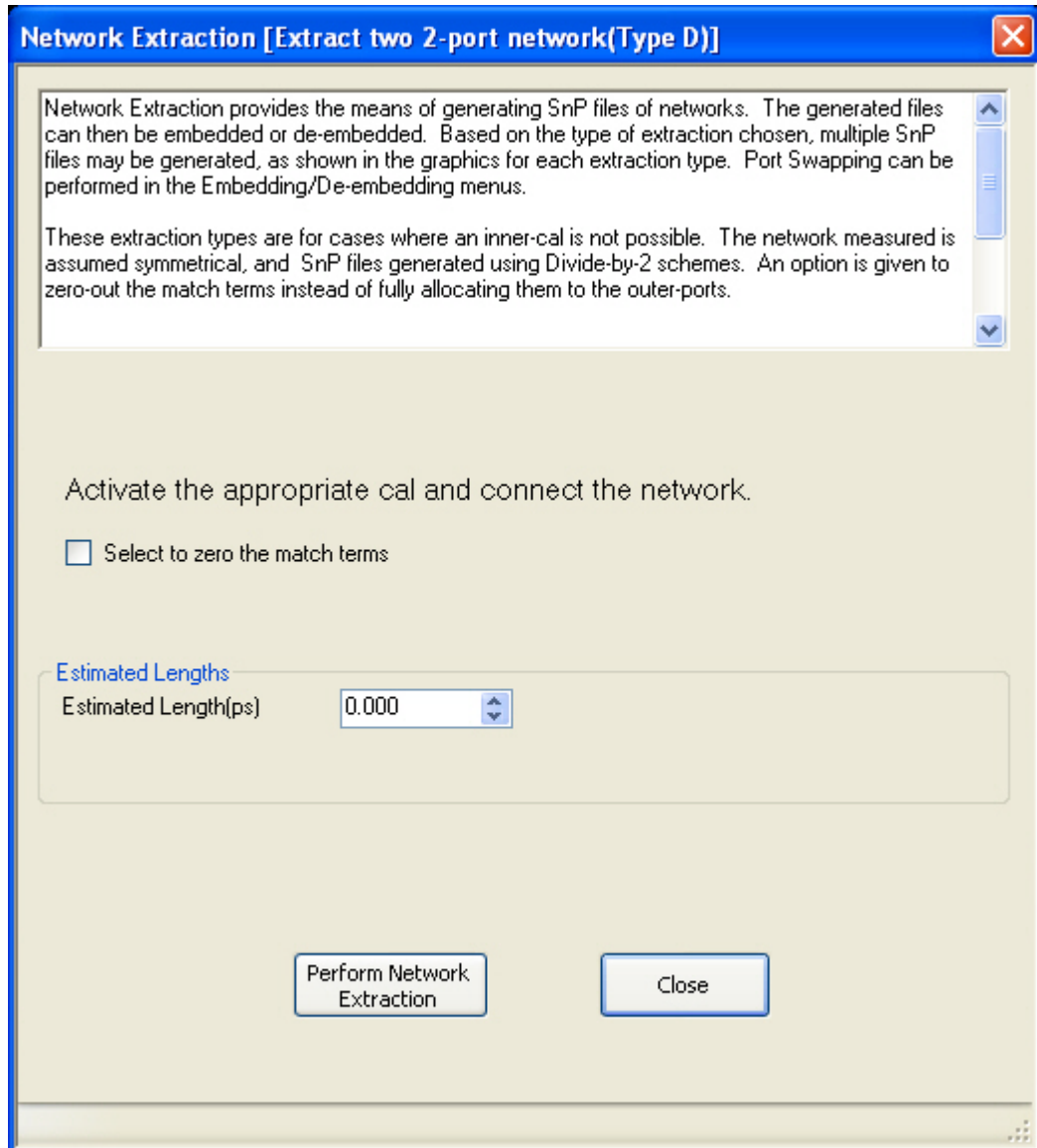
NETWORK EXTRACTION – Type D – Outer Cals Only Using Divide-By-Two

Previous

- “NETWORK EXTRACTION Dialog Box - 2-Port VNAs” on page 9-21

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Two 2-Port Networks - Type D - Outer Cal Only



Use Network Extraction to extract two (2) 2-Port networks using Outer calibrations and the divide-by-2 method.

Figure 9-15. NETWORK EXTRACTION Dialog Box - Type D - Outer Cal Only Divide-By-2 Method

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

Application

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide by 2 schemes. An option is given to zero-out the match terms instead of fully allocating them to the outer-ports.

Instructions

1. Make sure the appropriate calibration is active.
2. Zero-out the match terms if needed.
3. Connect the network and select Perform Network Extraction to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP files/s.
5. After the extraction, the focus auto-returns to the CAL OPTIONS menu.
 - [“CAL OPTIONS Menu - 2-Port VNAs” on page 9-11](#)

USER DEFINED MATCH DEVICES Dialog Box

The USER DEFINED MATCH DEVICES dialog box only appears if Device 2 or Device 4 is set to Match and the user clicks the Match Info button.

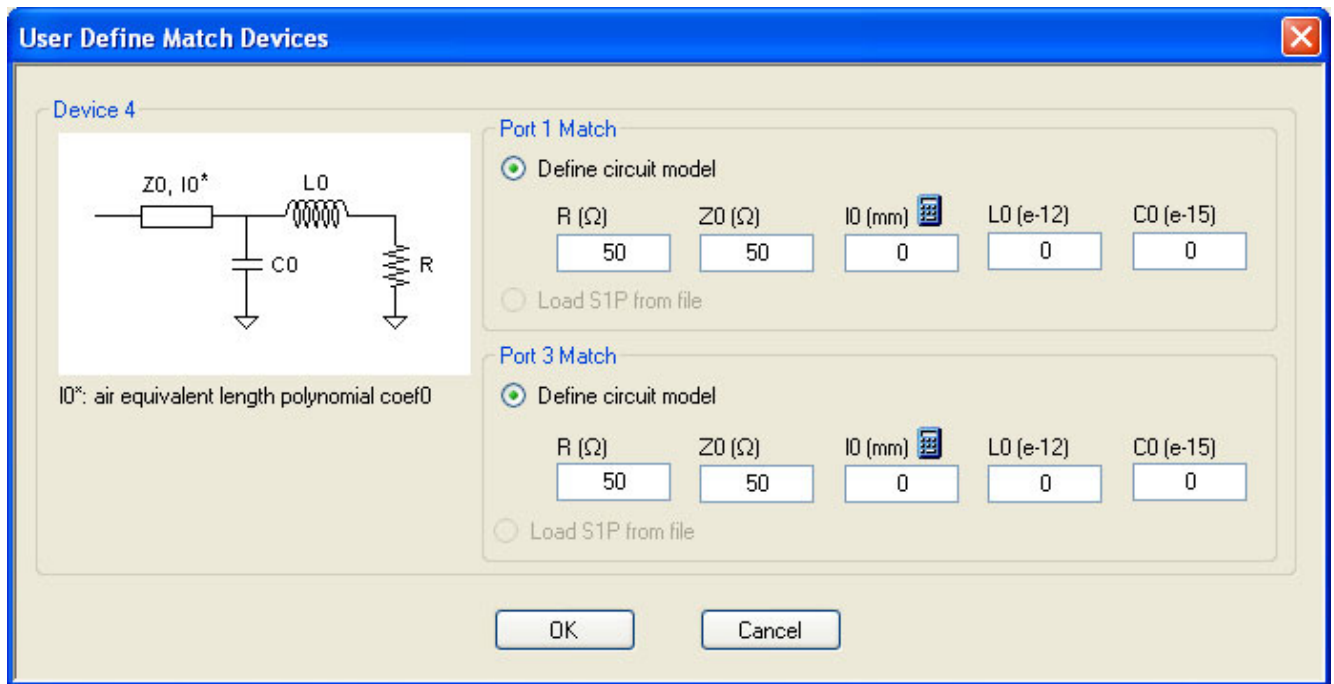


Figure 9-16. USER DEFINED MATCH DEVICES Dialog Box

Microstrip Info Button

Select displays the MICROSTRIP INFO Dialog Box shown below. In this example, the 25 Mil Kit was selected.

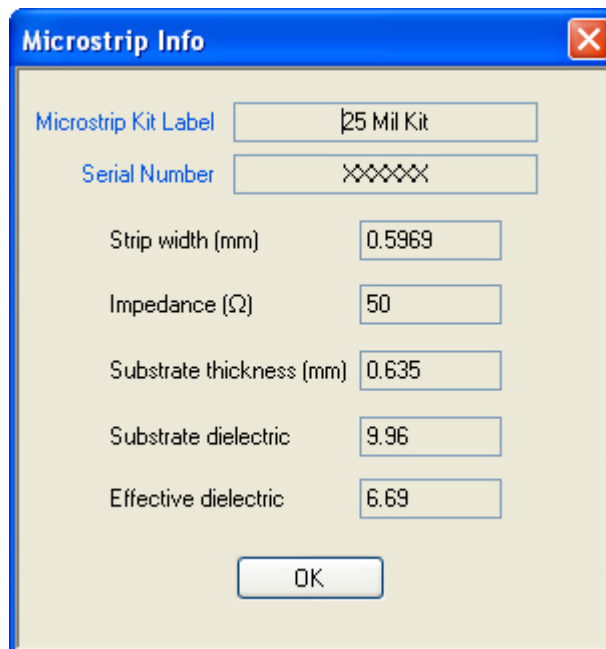


Figure 9-17. MICROSTRIP INFO Dialog Box for SSLT and 25 Mil Kit

Test Port 2 Connector Area - Standard Info Button

Select displays the Standard Info (SOLT/R) K-Conn (M) Dialog Box shown below. In the example below, K-Conn (M) was selected for a Test Port 1 DUT Connector.

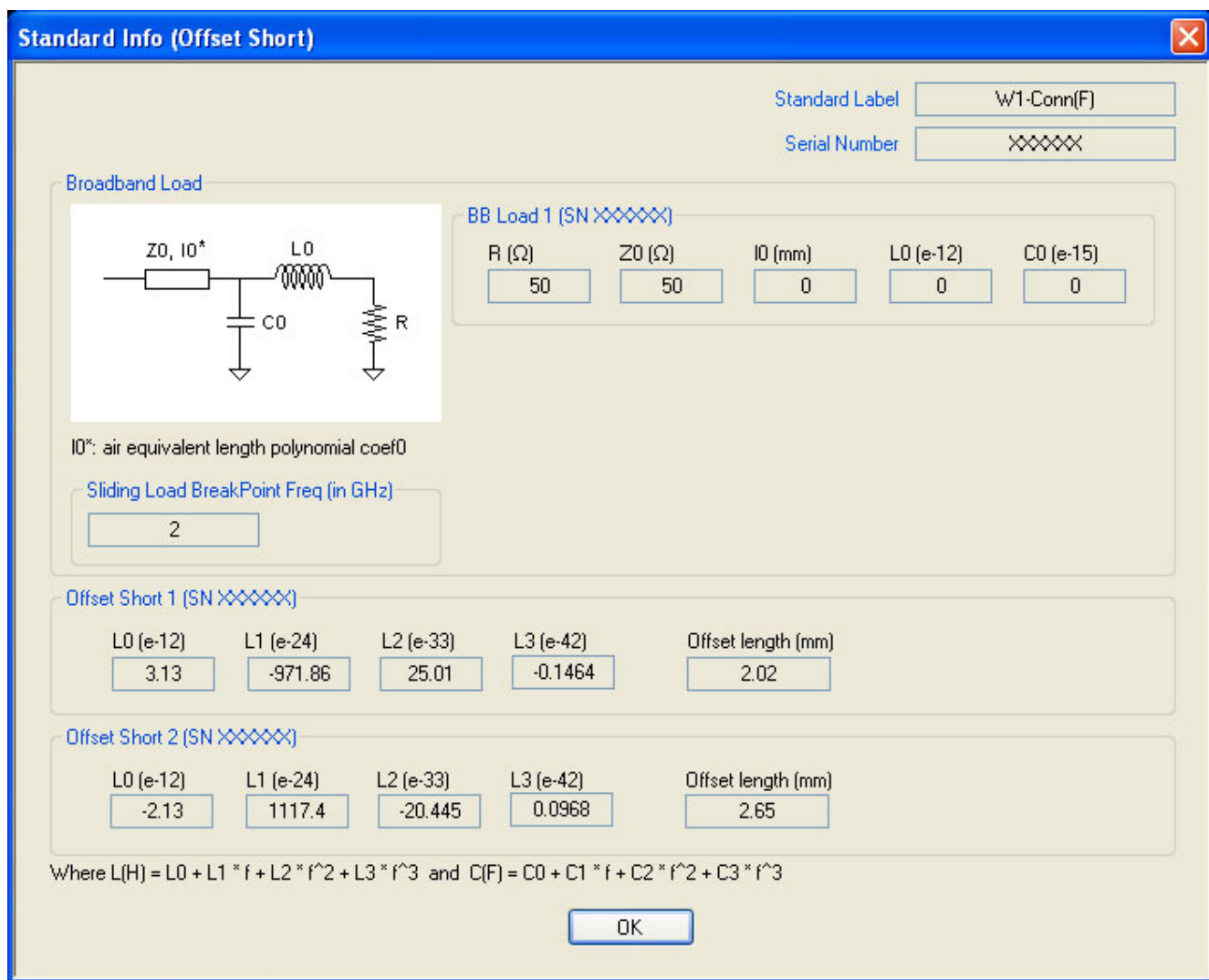


Figure 9-18. Test Port 2 Connector Standard Info Dialog Box for SOLT/R and K-Conn (M)

The Standard Info dialog shows the applicable calibration parameters for Test Port 2.

Test Port 1 Connector Area - Standard Info Button

Select displays the STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn M) Dialog Box shown below. Note that the name of this dialog changes depending on the selected Cal Method and DUT Connector. In the example below, V-Conn (M) was selected for a Test Port 1 DUT Connector.

Note The name of this dialog and the information presented is dependent on the user selections for **Calibration Type, Calibration Method, and Test Port Connectors.**

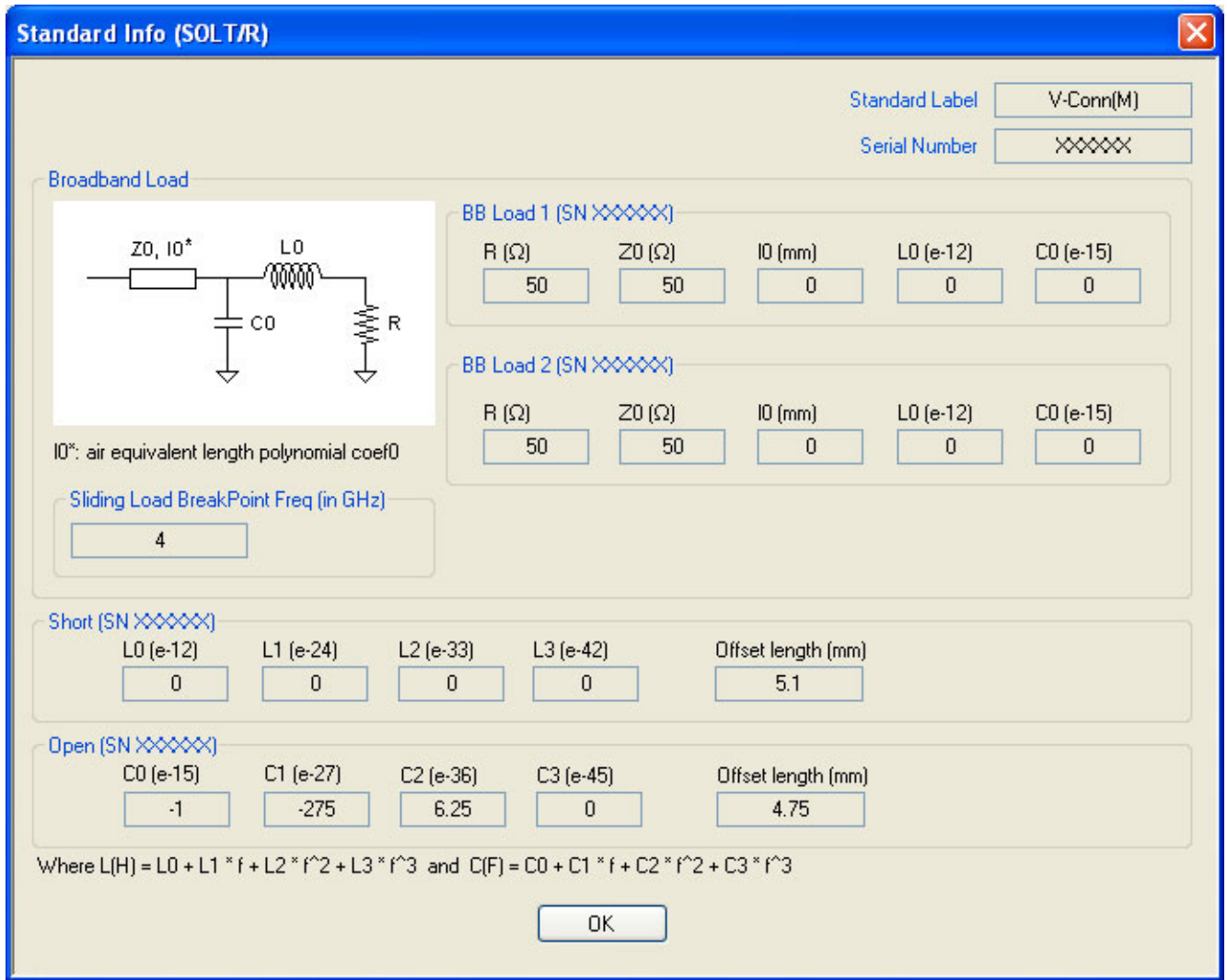


Figure 9-19. Test Port 1 Connector Standard Info Dialog Box for SOLT/R V-Conn (M)

The Standard Info dialog shows the applicable calibration parameters for Test Port 1.

CAL KIT/AUTOCAL Menu - 2-Port VNAs

Use the CAL KIT/AUTOCAL menu to install, save, and restore calibration kit characterization files between an external memory device, the instrument firmware, and a hard drive on the instrument or on a network.

Previous

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Navigation

- [MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL](#)

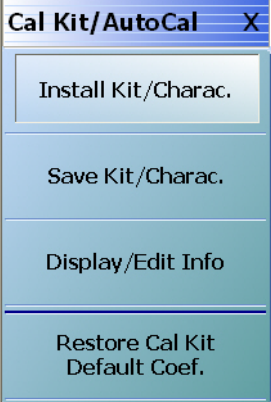
	<p>Install Kit/Charac.</p> <p>Select loads the Calibration Kit file or AutoCal Characterization file from the hard drive or external memory device into the VNA firmware through the INSTALL (AutoCal Characterization/Cal Kit File) dialog box.</p> <ul style="list-style-type: none"> • “INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box - 2-Port VNAs” on page 9-35 <p>Save Kit/Charac.</p> <p>Select saves the Cal Kit or AutoCal Characterization file from the firmware to the location of choice (typically the instrument hard drive) for later use through the SAVE (AutoCal Characterization/Cal Kit) File dialog box.</p> <ul style="list-style-type: none"> • “SAVE (AUTOCAL CHARAC./CAL KIT) Dialog Box - 2-Port VNAs” on page 9-36 <p>Display/Edit Info</p> <p>Select displays the CAL KIT INFO dialog box which shows parametric information about the calibration kit and allows user edits of the values.</p> <ul style="list-style-type: none"> • “CAL KIT INFO Dialog Box - 2-Port VNAs” on page 9-38 <p>Restore Cal Kit Default Cough.</p> <p>Select displays the RESTORE DEFAULT COEF dialog box.</p> <ul style="list-style-type: none"> • “RESTORE DEFAULT COEF. Dialog Box - 2-Port VNAs” on page 9-41
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Figure 9-20. CAL KIT/AUTOCAL Menu - 2-Port VNAs

INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box - 2-Port VNAs

Use the INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) dialog box to install the calibration kit coefficients file or AutoCal Characterization files in the instrument firmware for subsequent use. A recommended best practice is to keep the cal kit serial number as part of the file name.

Previous

- “CAL KIT/AUTOCAL Menu - 2-Port VNAs” on page 9-34

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Install Kit/Charac | INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box

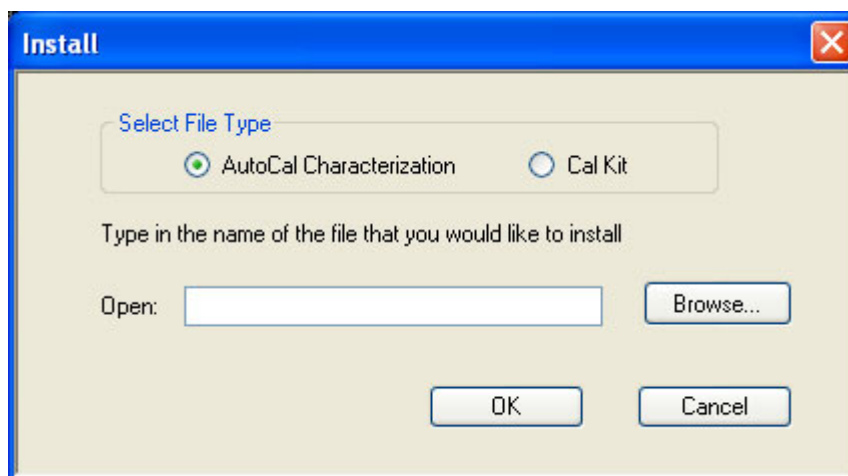


Figure 9-21. INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box

Instructions

1. In the Select File Type area, select either the AutoCal Characterization or the Cal Kit radio button.
2. In the Open field, either enter the file name or click Browse to navigate manually.
3. If AutoCal Characterization was selected, the file type will be an AutoCal Characterization ACD file.
4. If Cal Kit was selected, the file type will be a Cal Kit Coefficient.ccf file.
5. Click Open to load the file or Cancel to return to the menu.

SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT) Dialog Box - 2-Port VNAs

Use the SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT) dialog to save a Calibration Kit Coefficients file or an AutoCal Characterization file from the VNA firmware to external location such as the instrument hard drive, a network drive, or an external memory device. This is useful for storing in the instrument hard drive multiple files from available cal kits or AutoCal modules.

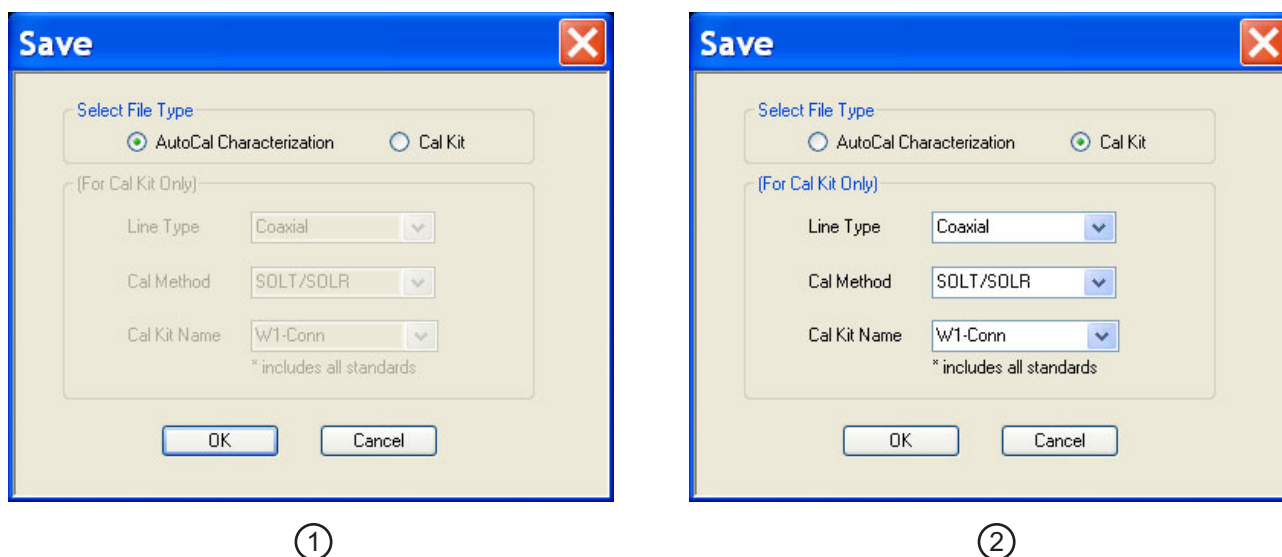
An alternate method is to use a Windows program such as File Manager to copy the file from the supplied USB memory device onto the hard drive. In that case, we recommend using the default locations mentioned later in this paragraph.

Previous

- “CAL KIT/AUTOLOCAL Menu - 2-Port VNAs” on page 9-34

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOLOCAL | Save Kit/Charac | SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT) Dialog Box



1. AutoCal Characterization radio button selected at left.
2. Cal Kit radio buttons selected at right.

Figure 9-22. SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT FILE) Dialog Box

Save Dialog Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available and instructions are immediately below.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Cal Kit Name. Instructions are in the next sub-section following.

Instructions for AutoCal Characterization File Type

1. Click OK to save the AutoCal Characterization file.
 - Click Cancel to stop the save.
2. The SAVE AS (AUTOLOCAL CHARACTERIZATION ACD FILE) dialog box appears.
3. Navigate to the required storage location:
 - C:\AnritsuVNA\AutoCal is recommended.
4. Click Save. The system auto-returns to the Cal Kit/AutoCal menu.

Instructions for Cal Kit File Types

If Cal Kit is selected, the fields of Line Type, Cal Method, and Cal Kit Name are available (shown at right in [“SAVE \(AUTOCAL CHARACTERIZATION/CAL KIT FILE Dialog Box”](#) on page 9-36 above) with the values in drop-down menus.

1. In the Line Type field, select a type value:
 - Coaxial
 - Non-Dispersive
 - Waveguide
2. In the Cal Method field, select a method value:
 - SOLT/SOLR
 - SSLT
 - SSST
3. In the Cal Kit Name field, select a calibration kit characterization file:
 - 0.8 mm Conn
 - W1-Conn
 - V-Conn
 - K-Conn
 - GPC-3.5
 - SMA
 - N-Conn
 - N-Conn (75)
 - GPC-7
 - 7/16
 - TNC
 - User-Defined1 through User-Defined32
4. Click OK to save the AutoCal Characterization file.
 - Click Cancel to stop the save.
5. The SAVE AS (CAL KIT COEFFICIENT CCF FILE) dialog box appears.
6. Navigate to the required storage location:
 - C:\AnritsuVNA\Data is recommended.
7. Click Save. The system auto-returns to the CAL KIT/AUTOCAL menu.
 - Click Cancel to abort the save and return to the CAL KIT/AUTOCAL menu.

CAL KIT INFO Dialog Box - 2-Port VNAs

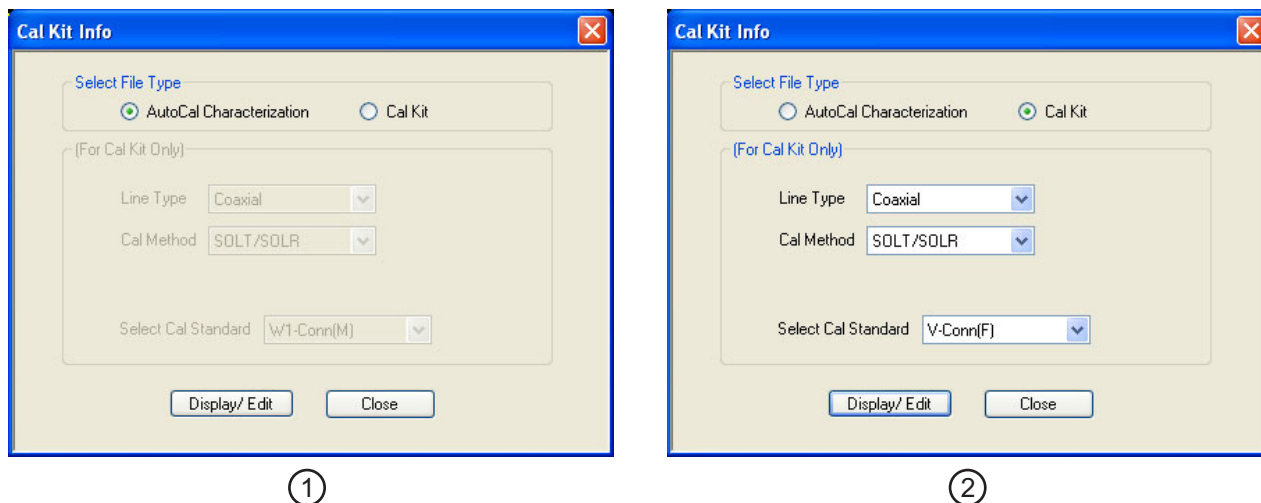
Use the CAL KIT INFO dialog box to review the available instrument calibration kit information.

Previous

- “CAL KIT/AUTOCAL Menu - 2-Port VNAs” on page 9-34

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Display/Edit Info | CAL KIT INFO Dialog Box



1. Controls for AutoCal Characterization files at left.
2. Controls for Cal Kit files at right.

Figure 9-23. CAL KIT INFO Dialog Box

Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Select Cal Standard.

Instructions

1. Select AutoCal Characterization or Cal Kit as required.
2. If Cal Kit was selected above, in the For Cal Kit Only area, select a Line Type value:
 - Coaxial
 - Non-Dispersive
 - Waveguide
3. Select a Cal Method value:
 - SOLT/SOLR
 - SSLT
 - SSST

4. Select a Cal Standard value:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

5. Click Display/Edit.

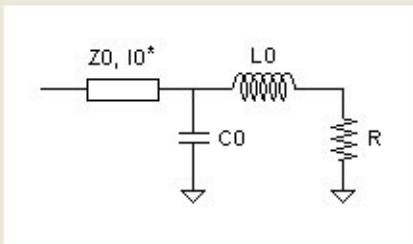
- The STANDARD INFO read-only dialog box appears.
- Note that the dialog box title and content fields are dependent on the selections made in the steps above for Cal Method, Line Type, and Connector Type.
- For example, if:
 - Calibration type is set to Full 2 Port (12 Term Cal)
 - Calibration method is set to SOLT/SOLR
 - Line type is set to Coaxial
 - Connector type is set to V-Conn (M).
- The read-only dialog box is titled:
 - STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn (M)) (shown below).

Standard Info (SOLT/R) ✖

Standard Label

Serial Number

Broadband Load



BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	l0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

BB Load 2 (SN XXXXXX)

R (Ω)	Z0 (Ω)	l0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

10*: air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz)

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)
0	0	0	0	5.1

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)
-1	-275	6.25	0	4.75

Where $L(H) = L_0 + L_1 * f + L_2 * f^2 + L_3 * f^3$ and $C(F) = C_0 + C_1 * f + C_2 * f^2 + C_3 * f^3$

Figure 9-24. Standard Info (SOLT/R) Standard Label (V-Conn (M)) Dialog Box

- Click OK to close the read-only dialog box.

RESTORE DEFAULT COEF. Dialog Box - 2-Port VNAs

Use the RESTORE DEFAULT COEF. dialog box to restore firmware-stored Cal Kit Coefficients fields back to their default coefficients. For best performance, either install the cal kit coefficients file supplied with your cal kit, or enter your user-defined coefficients before starting this procedure. The restore function is not available to AutoCal kits as they do not have restorable characterization data.

Previous

- [“CAL KIT/AUTOCAL Menu - 2-Port VNAs” on page 9-34](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Restore Cal Kit Default Coef. | RESTORE DEFAULT COEF. Dialog Box

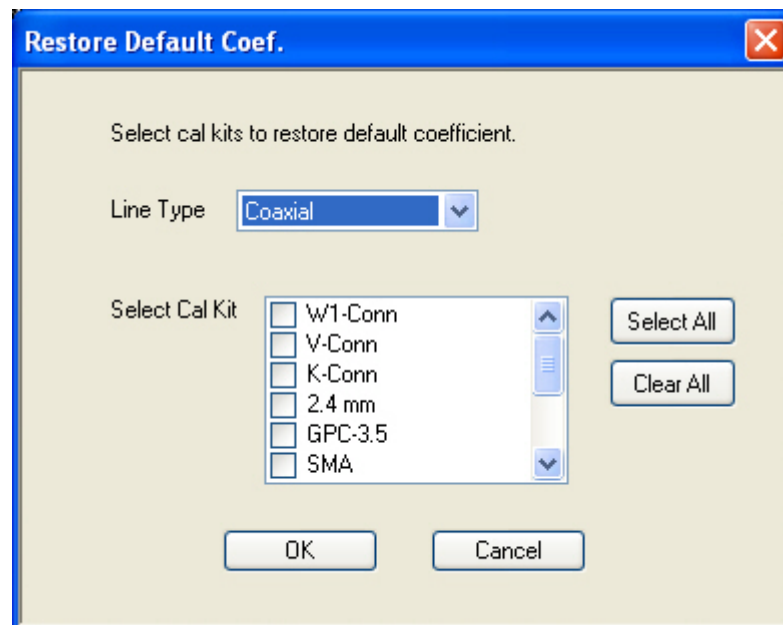


Figure 9-25. RESTORE DEFAULT COEF. (RESTORE DEFAULT COEFFICIENTS) Dialog Box

Instructions Restore Default Calibration Coefficients

Use this dialog to restore factory coefficients to available calibration kits.

1. Select the Line Type as required.
2. Select the Calibration Kits as required to be restored.
3. Click OK.

Available Selections

The table below shows the available calibration kits in the Select Cal Kit field of the RESTORE DEFAULT COEFFICIENTS dialog box. The available kits depend on the input combination selected for Line Type Media and Cal Method

Table 9-1. Calibration Kit Availability in the RESTORE DEFAULT COEF. Dialog Box

LINE TYPE Media Setting	CAL METHOD Setting	Available Calibration Kits
Coaxial	SOLT/SOLR	0.8 mm Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, 2.4 mm V, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm Conn, W1-Conn
	SSST	0.8 mm Conn, W1-Conn
Non-Dispersive	SOLT/SOLR	0.8 mm Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm Conn, W1-Conn
	SSST	0.8 mm Conn, W1-Conn
Microstrip	SOLT/SOLR	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSLT	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSST	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
Waveguide	SOLT/SOLR	No selections available
	SSLT	WR10, WR12, WR15
	SSST	No selections available

9-5 AutoCal Port Setup - 2-Port VNAs

AUTOCAL PORT Menu - 2-Port VNAs

Use the AUTOCAL PORT menu to define whether the AutoCal procedure will be for two-ports or only for one-port.

Previous

- [“CALIBRATE Menu - 2-Port VNAs” on page 9-8](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT


	<p>2-Port Cal (2-Port VNAs) Sets the AutoCal calibration function for 2-Port VNAs to a 2-port method and displays the AUTOCAL PROCEDURE (2-PORT CAL) menu.</p> <ul style="list-style-type: none"> • “AUTOCAL SETUP Menu - 2-Port Cal - 2-Port VNAs” on page 9-44 <p>1-Port Cal (2-Port VNAs) Sets the AutoCal calibration function for 2-Port VNAs to a 1-port method and displays the AUTOCAL SETUP (1-PORT CAL) menu.</p> <ul style="list-style-type: none"> • “AUTOCAL SETUP Menu - 1-Port Cal - 2-Port VNAs” on page 9-49
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Figure 9-26. AUTOCAL PORT Menu - 2-Port VNAs

9-6 AutoCal 2-Port Cal Setup - 2-Port VNAs

AUTOCAL SETUP Menu - 2-Port Cal - 2-Port VNAs

Instrument Mode

- 2-Port VNA Mode

Previous

- [“AUTOCAL PORT Menu - 2-Port VNAs” on page 9-43](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP

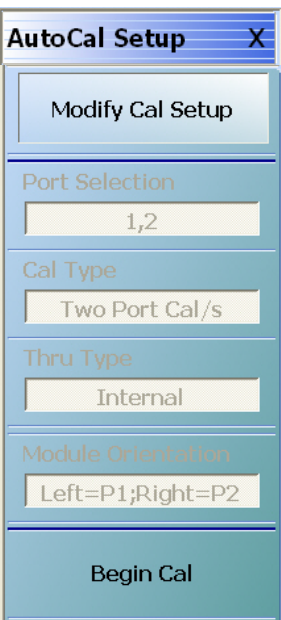
	<p>Modify Cal Setup</p> <p>Select displays the MODIFY 2-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for Auto Sense Module Orientation, Select Cal Type, Through Setup, Adapter Removal Port, and links to the THRU INFO and AIR EQUIVALENT LENGTH CALCULATOR dialog boxes.</p> <ul style="list-style-type: none"> • “MODIFY 2-PORT AUTOCAL SETUP Dialog Box” on page 9-45 <p>Port Selection (Read Only)</p> <p>Displays the Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Cal Type (Read Only)</p> <p>Displays the Cal Type selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Thru Type (Read Only)</p> <p>Displays the Thru Type selected for the AutoCal procedure as either Internal Thru or True Thru. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Module Orientation (Read Only)</p> <p>Displays the left/right VNA Port orientation and assignment for the AutoCal procedure. Options are either:</p> <ul style="list-style-type: none"> • Left=P1 Right =P1 • Left=P2 and Right=P1. <p>The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Begin Cal (AutoCal 2-Port Cal) (2-Port VNAs)</p> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu where the Cal Status button is enabled and set to ON.</p> <p>“CALIBRATION Menu - 2-Port VNAs” on page 9-6</p>
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Figure 9-27. AUTOCAL 2-PORT CAL SETUP Menu - 2-Port VNAs

MODIFY 2-PORT AUTOCAL SETUP Dialog Box

Use the MODIFY 2-PORT AUTOCAL SETUP dialog box to change the calibration parameters prior to an AutoCal calibration procedure. Options include the calibration and thru types to be used. If required, an adapter removal calibration can be configured. For production installations, the left/right port sense can be automatically or manually configured.

Previous

- [“AUTOCAL SETUP Menu - 2-Port Cal - 2-Port VNAs” on page 9-44](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY AUTOCAL SETUP Dialog Box

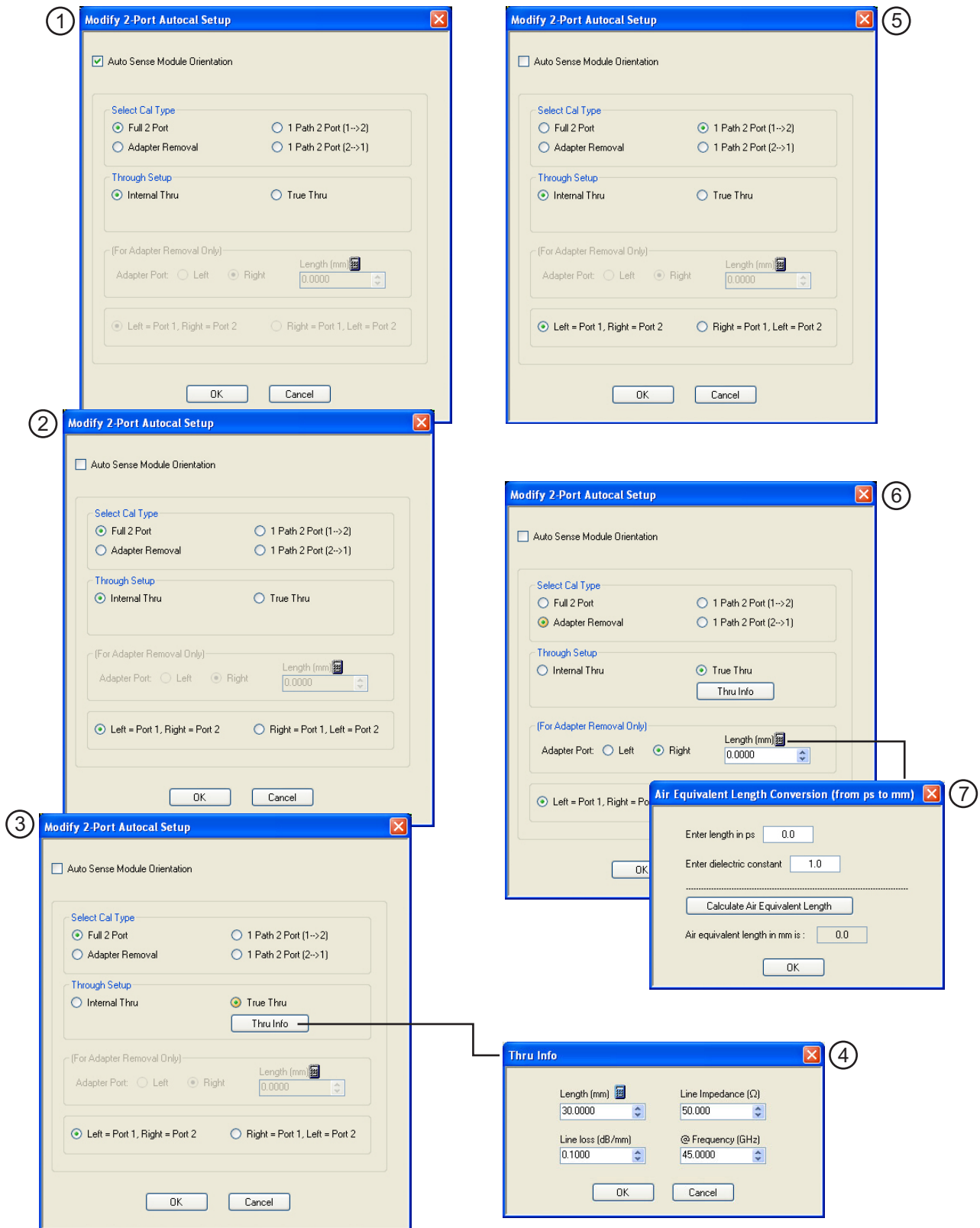


Figure 9-28. MODIFY 2-PORT AUTOCAL SETUP Dialog Box - 2-Port VNAs)

Auto Sense Module Orientation Check Box

See **Callout #1** in “[MODIFY 2-PORT AUTO CAL SETUP Dialog Box - 2-Port VNAs](#)” on page 9-46.

- If selected, the AutoCal Module determines the Port Left/Right assignments.
- If not selected, the Left/Right manual assignment area at the bottom of the dialog box is available. The user can select a radio button for either:
 - Left = Port 1, Right = Port 2
 - Right = Port 1, Left = Port 2.

Select Cal Type Area

Select one of the following using the provided radio buttons:

- Full 2 Port
 - When selected, the Thru Select area becomes available.
 - When selected, the For Adapter Removal Only area is unavailable.
 - See **Callout #2** in [Figure 9-28 on page 9-46](#).
- Adapter Removal
 - When selected, the Thru Select area becomes available and the Thru Info button appears.
 - Select the Thru Info button to display the THRU INFO dialog box.
 - When selected, the For Adapter Removal Only area becomes available.
 - Select the Calculator icon to display the AIR EQUIVALENT LENGTH CONVERSION dialog box. Use the calculator to convert length in ps to air equivalent length in mm.
 - See **Callout #4**, **Callout #6**, and **Callout #7** in [Figure 9-28, “MODIFY 2-PORT AUTO CAL SETUP Dialog Box - 2-Port VNAs” on page 9-46](#).
- 1 Path 2 Port (1-->2)
 - When selected, the Thru Select area becomes available.
 - When selected, the For Adapter Removal Only area is unavailable.
 - See **Callout #5** in [Figure 9-28 on page 9-46](#).
- 1 Path 2 Port (2-->1)
 - When selected, the Thru Select area becomes available.
 - When selected, the For Adapter Removal Only area is unavailable.

Through Setup Area

This area is available for all AutoCal Types. The button selection options are:

- Internal Thru
 - If selected, the AutoCal module uses internal circuitry to determine the through values.
 - The Thru Info button is unavailable.
 - See **Callout #5** in [Figure 9-28 on page 9-46](#).
- True Thru
 - If selected, the AutoCal module will prompt the user to remove the module and connect the ports with a through line.
 - If selected, the Thru Info button becomes available. When clicked, the THRU INFO dialog box appears and allows input of values for Thru Length, Thru Line Impedance, Thru Line Loss, and Thru Frequency Setting.
 - In the Thru Line Length field, enter the line length in mm. For example, enter a value of 30 mm.
 - In the Line Impedance field, enter the impedance in ohms. For example, use the default value of 50 ohms.
 - In the Line Loss field, enter the loss as dB per mm. For example, enter a value of 0.1 dB/mm.
 - In the @ Frequency field, enter the working frequency in GHz. For example, enter a value of 45 GHz.

- When all entries are complete, click OK to return to the Modify 2-Port AutoCal Setup dialog box.
- See **Callout #6** in [Figure 9-28 on page 9-46](#).
- [“THRU INFO Dialog Box - 2-Port VNAs” on page 9-123](#)

For Adapter Removal Only Area

This area is only available if Adapter Removal button was selected in the Select Cal Type area above. The adapter removal controls are:

Adapter Port Select Radio Buttons

- Left
- Right.

Adapter Length (mm) Field

Available as either a direct entry field or using the dialog box below to calculate the parameters.

- To use the calculator dialog, click the Calculator icon.
- The AIR EQUIVALENT LENGTH CONVERSION CALCULATOR dialog box appears. Entries can be typed in or incremented by clicking the field up/down arrows, or by pressing the keyboard up/down arrow keys.
 - Enter the adapter length in ps. For example, enter a length of 100 ps.
 - Enter the adapter dielectric constant. For example, enter a dielectric constant for polyethylene of 2.26.
 - Click the Calculate Air Equivalent Length button.
 - The air equivalent length in mm is: 9.9778515... or 9.9779.
 - Click OK and the result appears in the For Adapter Removal Only Length field.
 - See **Callout #7** in [Figure 9-28 on page 9-46](#).
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)

Manual Port Orientation Area

This area is only available if the Auto Sense Module Orientation check box at the top of the dialog box is deselected.

- If the Auto Sense check box is selected, the Left/Right buttons at the bottom of the dialog box are unavailable. The instrument identifies the left/right ports, and directs the user to the appropriate port.
 - See **Callout #1** in [Figure 9-28 on page 9-46](#).
- If the Auto Sense check box is deselected, the Left/Right buttons (Callout 8) at the bottom of the dialog box are available. The user defines which port is “Left” and which port is “Right”. This is especially useful if the instrument is oriented differently from the work environment. Options are:
 - Left = Port 1, Right = Port 2
 - Right = Port 1, Left = Port 2
 - See **Callout #2** in [Figure 9-28 on page 9-46](#).

Completing AutoCal Setup

When all AutoCal Setup functions are completed, click OK to return to the AutoCal menu. Click Cancel to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu - 2-Port Cal - 2-Port VNAs” on page 9-44](#)

9-7 AutoCal 1-Port Cal Setup - 2-Port VNAs

AUTOCAL SETUP Menu - 1-Port Cal - 2-Port VNAs

Previous

- [“AUTOCAL PORT Menu - 2-Port VNAs” on page 9-43](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 1-Port Cal | AUTOCAL SETUP

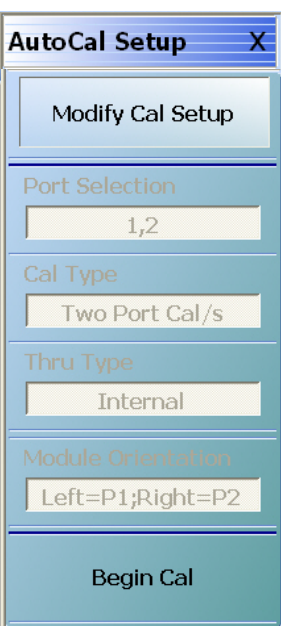
	<p>Modify Cal Setup</p> <p>Select displays the MODIFY 1-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for 1-Port Calibration Ports and Port Left/Right Identification.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 2-Port VNAs” on page 9-50 <p>Port Selection (Read Only)</p> <p>Displays the Port or Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 1-PORT AUTOCAL SETUP dialog box.</p> <p>Cal Type (Read Only)</p> <p>Displays the Cal Type selected for the AutoCal procedure. The setting is defined in the AUTOCAL PORTS menu.</p> <p>Port 1 Orientation (Read Only)</p> <p>This read-only button only appears if Port 1 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 1.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 2-Port VNAs” on page 9-50 <p>Port 2 Orientation (Read Only)</p> <p>This read-only button only appears if Port 2 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 2.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 2-Port VNAs” on page 9-50 <p>Begin Cal (AutoCal 1-Port Cal)</p> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu when the Cal Status button is enabled and set to ON.</p> <ul style="list-style-type: none"> • “CALIBRATION Menu - 2-Port VNAs” on page 9-6
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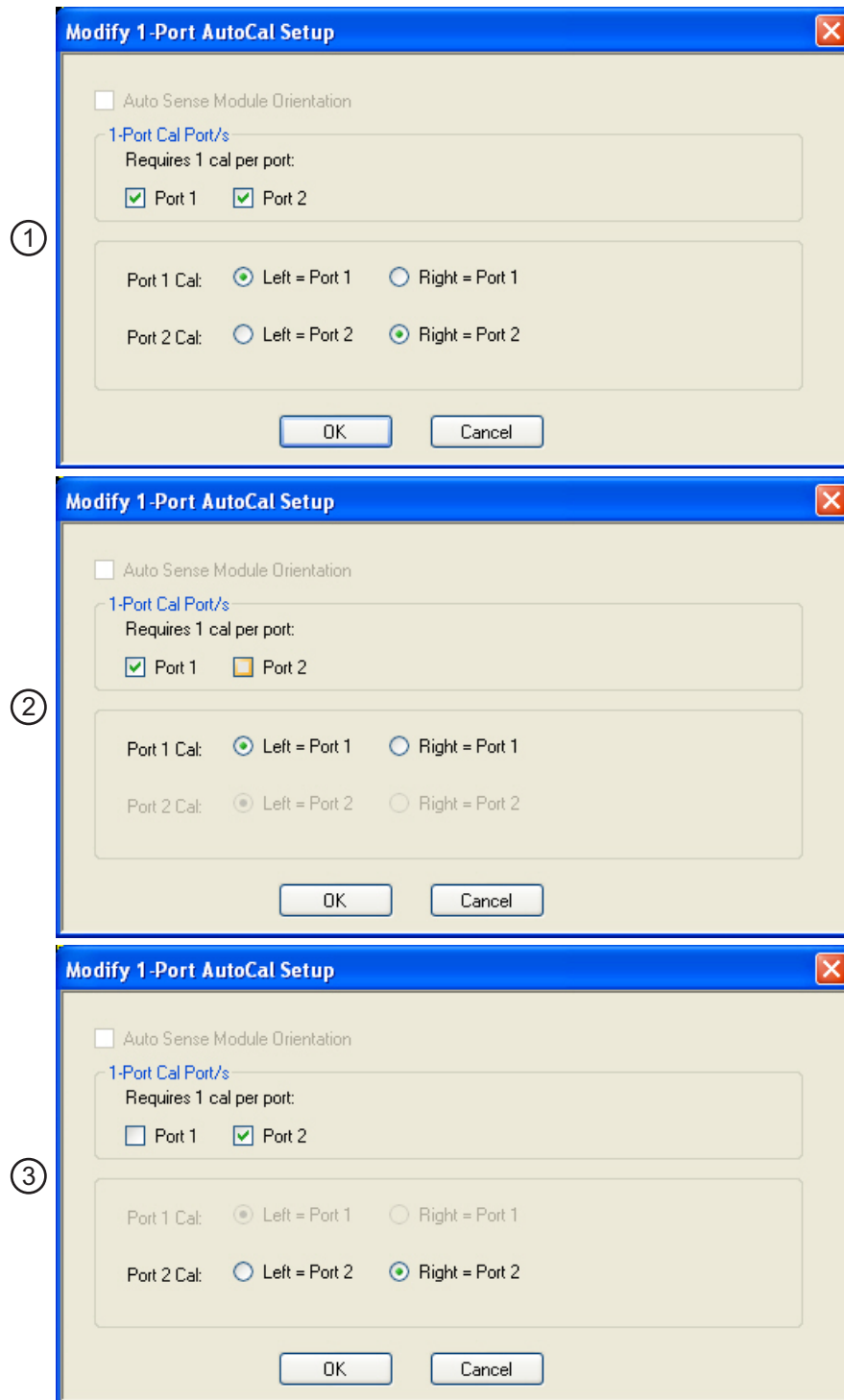
Figure 9-29. AUTOCAL SETUP Menu - One-Port Calibration - 2-Port VNAs

MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 2-Port VNAs**Previous**

- [“AUTOCAL SETUP Menu - 1-Port Cal - 2-Port VNAs” on page 9-49](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 1-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 1-PORT AUTOCAL SETUP Dialog Box



1. AutoSense not available. Port 1 and Port 2 selected for calibration. Port 1 = Left and Port 2 = Right.
2. Only Port 1 selected for calibration. Port 1 = Left.
3. Only Port 1 selected for calibration. Port 2 = Left.

Figure 9-30. MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 2-Port VNAs

Auto Sense Cal Port(s)

The Auto Sense selection check box is not available in AutoCal 1-Port.

1-Port Cal Port(s)

Select either one or both of the available ports.

- Port 1 Only
 - See **Callout #1** in [Figure 9-30 on page 9-51](#).
 - If selected, the Port 1 Cal Left/Right area is available.
- Port 1 and Port 2
 - See **Callout #2** in [Figure 9-30 on page 9-51](#).
 - If selected, the Port 1 Cal Left/Right area is available.
- Port 2 Only
 - See **Callout #3** in [Figure 9-30 on page 9-51](#)
 - If selected, the Port 2 Cal Left/Right area is available.

Port 1 Cal Left/Right Radio Buttons

Port 1 above must be selected to make the radio buttons available. If available, allows the following port left/right options:

- Left = Port 1
- Right = Port 1
- See **Callout #2** in [Figure 9-30 on page 9-51](#).

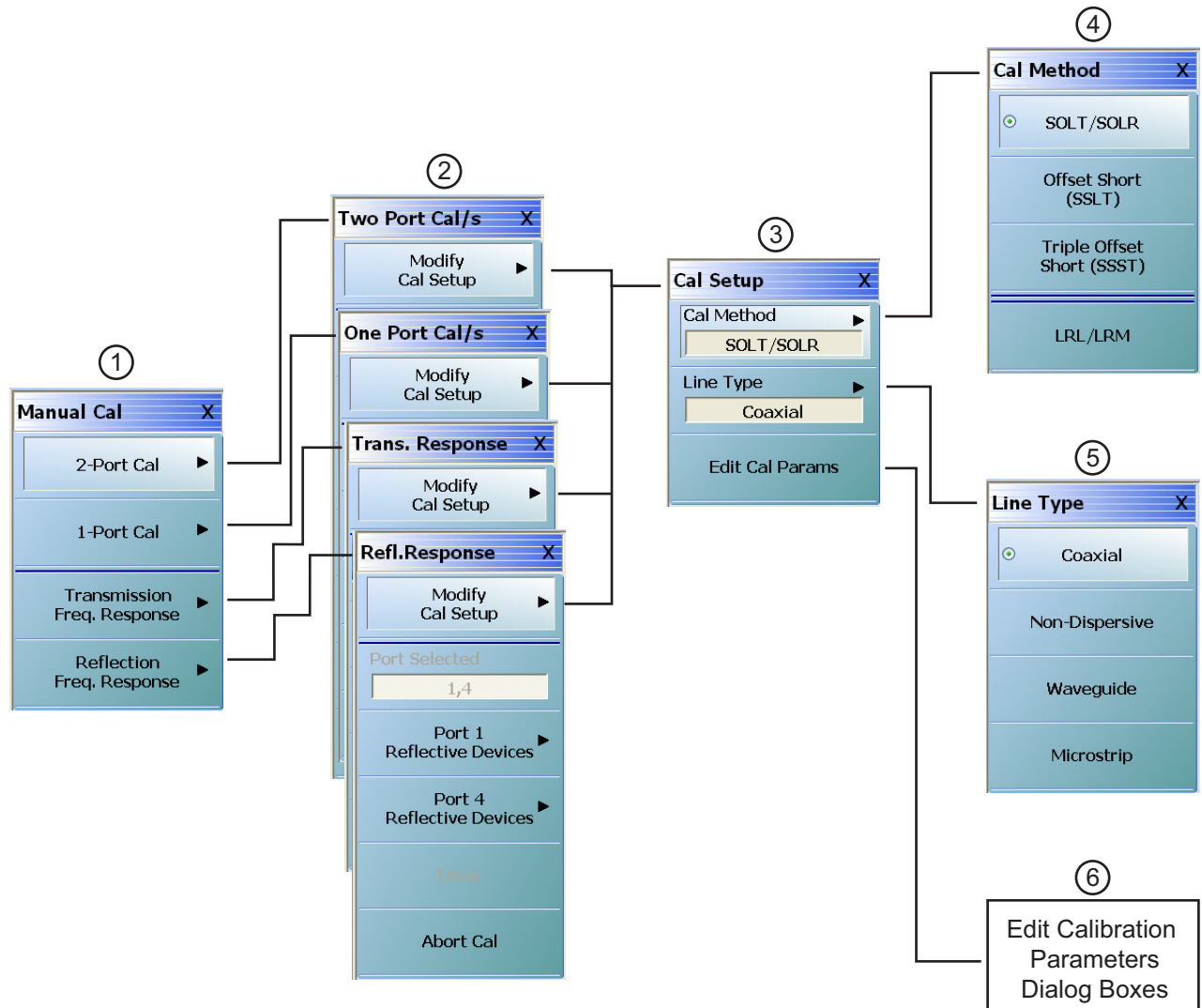
Port 2 Cal Left/Right Radio Buttons

Port 2 above must be selected to make the radio buttons available. If available, allows the following port left/right options:

- Left = Port 2
- Right = Port 2
- See **Callout #3** in [Figure 9-30 on page 9-51](#).

9-8 Manual Calibration Menus and Dialog Boxes

Once a manual calibration type such as 1-Port Cal has been selected, the main setup menu (which is named for the cal type such as ONE PORT CAL) appears. The Modify Cal Setup button provides access to the CAL SETUP, CAL METHOD, and LINE TYPE configuration menus with further access to the appropriate calibration parameter configuration dialog box. The manual calibration setup and procedure menus — TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, and REFL. RESPONSE and their supporting dialog boxes — change depending on the configuration made during the in the calibration setup. The figure below summarizes the configuration menus and dialogs,



1. MANUAL CAL port selection menu.
2. Calibration setup menus with titles of TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, or REFL. RESPONSE.
3. CAL SETUP selection menu.
4. CAL METHOD selection menu.
5. LINE TYPE selection menu.
6. Edit Cal Parameters button accesses calibration configuration dialog boxes. Dialog box titles vary depending on the calibration type, method, and line type selected.

Figure 9-31. Manual Calibration Setup Menus - 2-Port VNAs

Manual Calibration Types

- 2-Port Calibration
- 1-Port Calibration
- Transmission Frequency Response Calibration
- Reflection Frequency Response Calibration

Manual Calibration Methods

- SOLT/SOLR - Short-Open-Load-Thru / Short-Open-Load-Return
- SSLT - Offset Short or Short-Short-Load-Thru
- SSST - Triple Offset Short or Short-Short-Short-Thru
- LRL/LRM - Line-Reflect-Line / Line-Reflect-Match

Calibration Line Types

- Coaxial
- Non-Dispersive - Essentially the same as coaxial
- Waveguide
- Microstrip

Manual Calibration Dialog Box Settings

All permissible combinations of the calibration parameters above can be further modified through a series of dialog boxes that control DUT connectors, load types such as broadband or sliding loads, port selection, through types, reference plane location, number of bands, and similar settings. Many of these dialog boxes are shown in this document and all are summarized in tables.

MANUAL CAL Menu - 2-Port VNAs

Previous

- [“CALIBRATE Menu - 2-Port VNAs” on page 9-8](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL


 <p>The screenshot shows a menu titled 'Manual Cal' with a close button (X). Below the title are four menu items, each with a right-pointing arrow: '2-Port Cal', '1-Port Cal', 'Transmission Freq. Response', and 'Reflection Freq. Response'.</p>	<p>2-Port Cal</p> <p>Select displays the Two Port Cal menu where the calibration step-by-step procedure is carried out. Also called 12 Term Calibration. This is the most complete calibration, and fully corrects the four S-parameters (S11, S12, S21, and S22) parameters for both instrument ports.</p> <ul style="list-style-type: none"> • “TWO PORT CAL Menu - 2-Port VNAs” on page 9-60 <p>1-Port Cal</p> <p>Select displays the One Port Cal menu. A single reflection parameter, configured in the Edit Cal Params CAL SETUP dialog, is fully corrected (S11 or S22). Both ports can be covered but only reflection measurements are corrected. During the calibration configuration, you can select either Port 1 or Port 2.</p> <ul style="list-style-type: none"> • “ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86 <p>Transmission Freq. Response</p> <p>Selecting the Transmission Frequency Response button displays the Trans Freq menu. During the calibration configuration in the Edit Cal Params CAL SETUP dialog, select forward or reverse or both directions.</p> <ul style="list-style-type: none"> • “TRANS. RESPONSE Menu - 2-Port VNAs” on page 9-100 <p>Reflection Freq. Response</p> <p>Select displays the Refl. Response menu.</p> <ul style="list-style-type: none"> • “REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106
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Figure 9-32. MANUAL CAL (MANUAL CALIBRATION) Menu - 2-Port VNAs

CAL SETUP Menu

Use the CAL SETUP menu to set the calibration method (such as SOLT/R or SSLT), the calibration line type (such as coaxial or microwave), and more detailed parameters for ports and connectors through the Edit Cal Parameters button and the linked CAL SETUP dialogs.

Previous

- The CAL SETUP menu can be accessed from multiple menus depending on the manual calibration type selected on the MANUAL CAL menu.
 - [“TWO PORT CAL Menu - 2-Port VNAs” on page 9-60](#)
 - [“ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86](#)
 - [“TRANS. RESPONSE Menu - 2-Port VNAs” on page 9-100](#)
 - [“REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP
- The navigation path above assumes that Two Port Cal manual calibration type was selected on the MANUAL CAL menu.


	<p>Cal Method</p> <p>The field displays the currently selected calibration method such as SOLT/SOLR or LRL/LRM. Select displays the CAL METHOD menu where a calibration method is selected. Once a selection is made on the CAL METHOD menu, the system auto-returns to this CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL METHOD Menu” on page 9-58 <p>Line Type</p> <p>The field displays the currently selected line type such as Coaxial or Microstrip. Select displays the LINE TYPE menu where a line type is selected. Once a selection is made on the LINE TYPE menu, the system auto-returns to this CAL SETUP menu.</p> <ul style="list-style-type: none"> • “LINE TYPE Menu” on page 9-59
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Figure 9-33. CAL SETUP (CALIBRATION SETUP) Menu - 2-Port VNAs (1 of 2)

Edit Cal Params

Select displays the appropriate calibration setup dialog box. The exact name of the dialog box varies depending on the calibration type, calibration method, and line type selected.

- Dialog box name format: [Cal Type] [Cal Method] Cal Setup [Line Type]
- For example, if Full 2 Port, SOLT/SOLR, and Coaxial were selected, the dialog box name is:
 - Full Two Port Cal Setup (SOLT/R, Coaxial)
- Examples of Cal Setup dialog boxes using Coaxial line type are available in the links below:
 - [“TWO PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 9-63](#)
 - [“TWO PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-66](#)
 - [“TWO PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box - 2-Port VNA” on page 9-69](#)
 - [“TWO PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box - 2-Port VNA” on page 9-72](#)
- A summary table lists dialog box contents for all other combinations of method and line type:
 - [Table 9-2, “Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs” on page 9-75](#)

Figure 9-33. CAL SETUP (CALIBRATION SETUP) Menu - 2-Port VNAs (2 of 2)

CAL METHOD Menu

Use the CAL METHOD menu to select whether the method of SOLT/SOLR, SSLT, SSST, or LRL/LRM will be used during the calibration.

Previous

- [“CAL SETUP Menu” on page 9-56](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method | CAL METHOD
- The navigation path above assumes that Two Port Cal calibration type was selected on the Manual Cal menu.


 <p>The screenshot shows a menu titled 'Cal Method' with a close button (X). It contains four buttons: 'SOLT/SOLR' (selected with a radio button), 'Offset Short (SSLT)', 'Triple Offset Short (SSST)', and 'LRL/LRM'.</p>	<p>Auto-Return Button Selection Group:</p> <p>The four (4) buttons of the CAL METHOD menu form an auto-return button selection group. Selecting any one button marks the selection with the select icon, de-selects the other three (3) buttons, and auto-returns to the CAL SETUP menu.</p> <p>SOLT/SOLR</p> <p>Selecting the SOLT/SOLR button sets the calibration method to Short-Open-Load-Thru (or Short-Open-Load-Reciprocal) and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>Offset Short (SSLT)</p> <p>Selecting the Offset Short (SSLT) button sets the calibration method to Short-Short-Load-Thru and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>Triple Offset Short (SSST)</p> <p>Selecting the Triple Offset Short (SSST) button sets the calibration method to Short-Short-Short-Thru and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>LRL/LRM</p> <p>Selecting the LRL/LRM button sets the calibration method to Line-Reflect-Line or Line-Reflect-Match and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56
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Figure 9-34. CAL METHOD Menu - 2-Port VNAs

LINE TYPE Menu

Use the LINE TYPE menu to select from coaxial, non-dispersive, waveguide, or microstrip line types. Non-dispersive is for line types such as coplanar waveguide, stripline, or twin-lead and is treated the same as coaxial line.

Previous

- [“CAL SETUP Menu” on page 9-56.](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Line Type | LINE TYPE


 <p>The screenshot shows a menu titled 'Line Type' with a close button 'X'. There are four buttons: 'Coaxial' (with a select icon), 'Non-Dispersive', 'Waveguide', and 'Microstrip'.</p>	<p>Auto-Return Button Selection Group</p> <p>The four (4) buttons of the LINE TYPE menu form an auto-return button selection group. Selecting any one button marks the selection with the select icon, de-selects the other three (3) buttons, and auto-returns to the CAL SETUP menu.</p> <p>Coaxial (Line Type)</p> <p>Select sets the line type to coaxial, marks the button with the select icon, de-selects the Non-Dispersive, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>Non-Dispersive (Line Type)</p> <p>Non-dispersive line types, such as Coplanar Waveguide, Stripline, or twin-lead, are used on transmissions. The system treats non-dispersive lines the same as coaxial line types.</p> <p>Select sets the line type to non-dispersive, marks the button with the select icon, de-selects the Coaxial, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>Waveguide (Line Type)</p> <p>Waveguide is transmission media such as rectangular or circular waveguide.</p> <p>Select sets the line type to waveguide, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>Microstrip (Line Type)</p> <p>Microstrip line is typically used in on-wafer media.</p> <p>Select sets the line type to microstrip, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Waveguide buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56
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Figure 9-35. LINE TYPE Menu - 2-Port VNAs

9-9 Manual 2-Port Cal Setup - 2-Port VNAs

TWO PORT CAL Menu - 2-Port VNAs

Button Availability

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TWO PORT CAL SETUP dialog box.
- A representative menu is shown below.
- The example procedures at the end of this chapter show examples of various TWO PORT CAL menus.

Previous

- [“MANUAL CAL Menu - 2-Port VNAs” on page 9-55](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL


	<h4>Modify Cal Setup</h4> <p>Select displays the CAL SETUP menu where changes to the calibration method, line type, and associated parameters are made on the CAL METHOD and LINE TYPE submenus.</p> <ul style="list-style-type: none"> • Calibration method options are SOLT/SOLR, Offset Short (SSLT), Triple Offset Short (SSST), or LRL/LRM. • Line Type options are Coaxial, Non-Dispersive, Waveguide, or Microstrip. <p>A composite view of the CAL SETUP menu set is available in figure below:</p> <ul style="list-style-type: none"> • Figure 9-31, “Manual Calibration Setup Menus - 2-Port VNAs” on page 9-53 <p>Descriptions of the calibration configuration menus are available at:</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56. • “CAL METHOD Menu” on page 9-58. • “LINE TYPE Menu” on page 9-59. <p>A summary of 2-port calibration setup dialog box controls and functions is available in the table below:</p> <ul style="list-style-type: none"> • Table 9-2, “Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs” on page 9-75 <h4>Ports Selected (Read Only)</h4> <p>A display button showing the port numbers that are in the calibration.</p>
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Figure 9-36. TWO PORT CAL MENU - 2-Port VNAs - Typical Example (1 of 2)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the FOUR PORT CAL menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

When selected, provides the REFL. DEVICES PORT 1 menu. Each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the TWO PORT CAL menu.

Port 2 Reflective Devices

When selected, displays the REFL. DEVICES PORT 2 menu. When all tasks are completed, return to the TWO PORT CAL menu.

Thru/Recip

When selected, displays the THRU/RECIP menu. When all tasks are completed, return to the TWO PORT CAL menu.

Isolation (Optional)

When selected, displays the ISOLATION menu. When all tasks are completed, return to the TWO PORT CAL menu.

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Figure 9-36. TWO PORT CAL MENU - 2-Port VNAs - Typical Example (2 of 2)

Manual 2-Port Cal Setup Dialog Boxes - 2-Port VNAs

From the TWO PORT CAL menu, Modify Cal Setup button links to the CAL SETUP menu, where the Edit Cal Params button displays the appropriate configuration dialog box with that vary depending on the settings made in the MANUAL CAL, CAL SETUP, CAL METHOD, and LINE TYPE menus. Sample dialog boxes are described in the sections below for:

- [“TWO PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 9-63](#)
- [“TWO PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-66](#)
- [“TWO PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box - 2-Port VNA” on page 9-69](#)
- [“TWO PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box - 2-Port VNA” on page 9-72](#)

For all other calibration combinations, see the summary table of all dialog boxes and their controls:

- Table: [“Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs” on page 9-75.](#)

TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Prerequisites

- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Previous

- “CAL SETUP Menu” on page 9-56

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Two Port Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

Select Cal Type

Full 2 Port 1 Path 2 Port (1->2) 1 Path 2 Port (2->1)

Load Type

Broadband Load Sliding Load

Test Port 1 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: Load 1 Load 2

Test Port 2 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: Load 1 Load 2

Through/ Reciprocal

Select Line Through

Length (mm) 0.0000

Line Impedance (Ω) 50.000

Line Loss (dB/mm) 0.0000

@ Frequency (GHz) 0.0000

OK Cancel

Figure 9-37. Edit Cal Params - TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 --> 2)
- 1 Path 2 Port (2 --> 1)

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu and on the PORT 2 REFLECTIVE DEVICES menu.

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Select BB Load for Test Port 1 Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2 Area

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Through/Reciprocal Area

Located on the right side of the dialog box, these controls allow characterization of the through/reciprocal line settings.

- Select Line. Allows options of:
 - Reciprocal
 - Through
- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (SSLT, COAXIAL) Dialog Box - 2-Port VNAs

Prerequisites

- Cal Method = SSLT
- Line Type - Coaxial

Previous

- [“CAL SETUP Menu” on page 9-56](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

Two Port Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

Select Cal Type

Full 2 Port 1 Path 2 Port (1->2) 1 Path 2 Port (2->1)

Load Type

Broadband Load Sliding Load

Test Port 1 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: Load 1 Load 2

Test Port 2 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: Load 1 Load 2

Through/ Reciprocal

Select Line Through

Length (mm) 0.0000

Line Impedance (Ω) 50.000

Line Loss (dB/mm) 0.0000

@ Frequency (GHz) 0.0000

OK Cancel

Figure 9-38. TWO PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 --> 2)
- 1 Path 2 Port (2 --> 1)

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu and on the PORT 2 REFLECTIVE DEVICES menu.

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Select BB Load for Test Port 1 Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2 Area

Select BB Load number for Test Port 2:

- Load 1

- Load 2

Through/Reciprocal Area

Located on the right side of the dialog box, these controls allow characterization of the through/reciprocal line settings.

- Select Line. Allows options of:
 - Reciprocal
 - Through
- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (SSST, COAXIAL) Dialog Box - 2-Port VNA

Prerequisites

- Cal Method = SSST
- Line Type - Coaxial

Previous

- “CAL SETUP Menu” on page 9-56

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (SSST, COAXIAL) Dialog Box

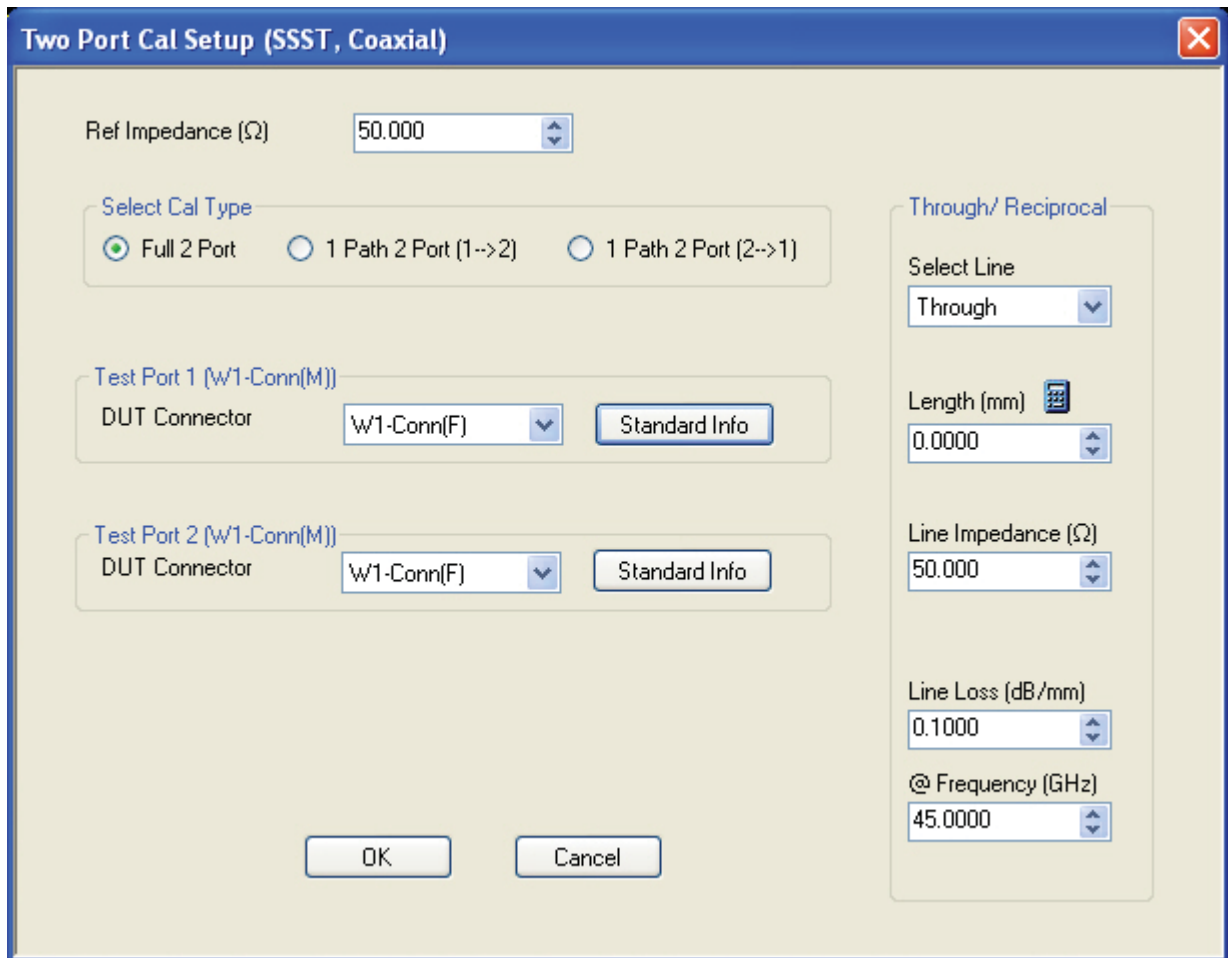


Figure 9-39. Edit Cal Params - TWO PORT CAL SETUP (SSST, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 --> 2)
- 1 Path 2 Port (2 --> 1)

Load Type

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu and on the PORT 2 REFLECTIVE DEVICES menu.

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Through/Reciprocal Area

Located on the right side of the dialog box, these controls allow characterization of the through/reciprocal line settings.

- Select Line. Allows options of:
 - Reciprocal
 - Through
- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box - 2-Port VNA

Prerequisites

- Cal Method = LRL/LRM
- Line Type - Coaxial

Previous

- [“CAL SETUP Menu” on page 9-56](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box

Two Port Cal Setup (LRL/LRM, Coaxial)

Ref Impedance (Ω)

Reference Plane Location

Ends of Line 1 Middle of Line 1

Band Definition

Number of Bands

Band 1 Device 1 Line Length (mm) Line Loss (dB/mm) @ Frequency (GHz)

Device 2 Type of Reflection Line Length (mm)

Band 2 Device 3

Device 4 Type of Reflection Line Length (mm)

Band Break Point

Use Recommended Frequency (GHz) Define New Frequency (GHz)

Reflection Component

Open-like Offset Length (mm)

Figure 9-40. Edit Cal Params - TWO PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Band Definition

Select one or two bands from the pull-down menu.

- Number of Bands = 1. Only the Band 1 Definition Area is present.
- Number of Bands = 2. The Band 1 Definition and the Band Break Point areas appear.

Band 1 Definition

Provides the following fields and controls for Band 1:

- Band 1 Device 1 = Defaulted to Line.
 - Line Length (mm) for Device 1. Allows input of the line length in mm.
 - Line Loss (dB/mm). Allows input of a line loss in dB per mm at the frequency specified in the field below.
 - @ Frequency (GHz). Allows input of a frequency setting for the Line Loss factor input above.
- Band 1 Device 2. Select from Line or Match in pull-down menu.
 - If Line is selected, Type of Reflection allows selection of Use Open-like component or Use Short-like component.
 - If Use Open-line component is selected, the Reflection Component area at bottom of dialog box displays the Open-like Offset Length (mm) field.
 - If Use Short-like component is selected, the Reflection Component area at bottom of dialog box displays Short-line Offset Length (mm) field.

Band 2 Definition

The Number of Bands field above must be set to “2” for this area and the Band Break Point area described below to be displayed. Provides the following fields and controls for Band 2.

Band 2 Device 3

A pull-down menu with selections of:

- Use device 1
- Use device 2
- Use new line. If selected, additional fields appear as Line Length (mm), Line Loss (dB/mm), and @ Frequency (GHz).

Band 2 Device 4

A pull-down menu with selections of:

- Line
- Match

If Line is selected for Device 4, the Type of Reflection and Line Length (mm) fields are available. The Type of Reflection field choices are limited to:

- Use Short-like component. If selected, the Reflection Component area below has one field of Short-like Offset Length (mm) field.
- Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

If Match is selected for Device 4, the Match Info button and the Type of Reflection fields are available. is available with choices of:

- The Match Info button appears. Select displays the USER DEFINED MATCH DEVICES dialog box appears which allows configuration of the match devices.
- The Type of Reflection field has the following choices:
 - Use Short-like component. If selected, the Reflection Component area below has one field of Short-like Offset Length (mm) field.
 - Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).
 - Use both. If selected, pair of radio button fields appear and allow selection of either Use Port 1 Match or Use Port 2 Match. Also, if selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

Band Break Point

This area only appears if the Number of Bands in the Band Definition area is set to “2”.

The Calculate Recommended Value button calculates the recommended break point value based on the input parameters in the fields above. Clicking the button calculates a break point frequency value and populates the Use Recommended Frequency (GHz) field.

A radio button set allows selection of either:

- Use Recommended Frequency (GHz) which was calculated by the button above.
- Define New Frequency (GHz) field which allows direct user input of a break frequency value.

Reflection Component

Depending on the settings in the fields above, this area provides up to two input fields.

- Open-like Offset Length (mm)
- Short-like Offset Length (mm)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Manual 2-Port Cal Dialog Box Summary

The table below summarizes the available fields in all 2-port calibration setup dialog boxes. If the dialog box is described above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named “Two Port Cal Setup (*Cal Method, Line Type*)”

Table 9-2. Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs (1 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Coaxial	<p>See full description above at “TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 9-63</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: Full 2 Port, 1 Path 2 Prt (1-->2), 1 Path 2 Port (2-->1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 <p>Test Port Select BB Load: Load 1, Load 2</p> <p>Through/Reciprocal Select Line: Through, Reciprocal</p> <p>Through/Reciprocal Length (mm): Input field</p> <p>Through/Reciprocal Line Impedance (Ohms): Input field</p> <p>Through/Reciprocal Line Loss (dB/mm): Input field</p> <p>Through/Reciprocal @ Frequency (GHz): Input field</p>
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coax above.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls and functions as SOLT/R Coax above with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128

Table 9-2. Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs (2 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coax above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125 <p>Test Port DUT Connector Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126
SSLT Coaxial	<p>See full description above at “TWO PORT CAL SETUP (SSLT, COAXIAL) Dialog Box - 2-Port VNAs” on page 9-66</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: Full 2 Port, 1 Path 2 Prt (1-->2), 1 Path 2 Port (2-->1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126 <p>Test Port Select BB Load: Load 1, Load 2</p> <p>Through/Reciprocal Select Line: Through, Reciprocal</p> <p>Through/Reciprocal Length (mm): Input field</p> <p>Through/Reciprocal Line Impedance (Ohms): Input field</p> <p>Through/Reciprocal Line Loss (dB/mm): Input field</p> <p>Through/Reciprocal @ Frequency (GHz): Input field</p>
SSLT Non-Dispersive	<p>Same controls and functions as SSLT Coax above.</p>
SSLT Waveguide	<p>Same controls and functions as SSLT Coax above with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128

Table 9-2. Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs (3 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SSLT Microstrip	<p>Same controls and functions as SSLT Coax above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125 <p>Test Port DUT Connector Type: User-Defined1 to User-Defined32</p> <p>Test Port DUT Connector Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126
SSST Coaxial	<p>See full description above at “TWO PORT CAL SETUP (SSST, COAXIAL) Dialog Box - 2-Port VNA” on page 9-69.</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: Full 2 Port, 1 Path 2 Prt (1-->2), 1 Path 2 Port (2-->1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126 <p>Through/Reciprocal Select Line: Through, Reciprocal</p> <p>Through/Reciprocal Length (mm): Input field</p> <p>Through/Reciprocal Line Impedance (Ohms): Input field</p> <p>Through/Reciprocal Line Loss (dB/mm): Input field</p> <p>Through/Reciprocal @ Frequency (GHz): Input field</p>
SSST Non-Dispersive	Same controls and functions as SSST Coaxial above.
SSST Waveguide	<p>Same controls and functions as SSLT Coax above with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128

Table 9-2. Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs (4 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SSST Microstrip	<p>Same controls and functions as SSST Coax above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125 <p>Test Port DUT Connector Type: User-Defined1 to User-Defined32</p> <p>Test Port DUT Connector Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126
LRL/LRM Coaxial	<p>See full description above display logic and controls at “TWO PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box - 2-Port VNA” on page 9-72.</p> <p>Reference Impedance (Ohms)</p> <p>Reference Plane Location: Ends of Line 1 or Middle of Line 1</p> <p>Number of Bands: 1 or 2</p> <p>Band 1 Device 1: Type defaults to Line, Line Length (mm), Line Loss (dB/mm), @ Frequency (GHz)</p> <p>Band 1 Device 2 Type: Line or Match</p> <ul style="list-style-type: none"> • If Device 2 = Match, Match Info button appears. Select displays USER DEFINED MATCH DEVICES dialog box for selected calibration method and kit. • Typical “USER DEFINED MATCH DEVICES Dialog Box - 2-Port VNAs” on page 9-124 <p>Band 1 Device 2 Type of Reflection: Use Short-like component, Use Open-like component, Use both</p> <ul style="list-style-type: none"> • If Use Short-like component selected: Reflection Component = Short-like Offset Length (mm) • If Use Open-like component selected: Reflection Component = Open-like Offset Length (mm) • If Use both selected: Reflection Component = Short-like Offset Length (mm) and Open-like Offset Length (mm) <p>If Number of Bands = 2, Band 2 Device 3 and Band 2 Device 4 areas appear:</p> <p>Band 2 Device 3: Use device 1, Use new line</p> <ul style="list-style-type: none"> • If Use new line selected: Line Length (mm), Line Loss (dB/mm), and @ Frequency (GHz) fields appear <p>Band 2 Device 4: Line or Match</p> <ul style="list-style-type: none"> • If Line selected: Line Length (mm) field appears. • If Match selected: Match Info button appears. Select displays USER DEFINED MATCH DEVICES dialog box for selected calibration method and kit. • Typical “USER DEFINED MATCH DEVICES Dialog Box - 2-Port VNAs” on page 9-124 <p>Band 2 Device 4 Type of Reflection: Use Short-like component, Use Open-like component</p> <p>Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz) or Define New Frequency (GHz).</p> <p>Reflection Component: Open-like Length (mm) and/or Short-like Offset Length (mm)</p>
LRL/LRM Non-Dispersive	Same controls and functions as LRL/LRM Coaxial above.

Table 9-2. Manual 2-Port Cal Setup Dialog Box Summary - 2-Port VNAs (5 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Waveguide	Same controls and functions as LRL/LRM Coaxial above with the following changes: Cutoff frequency (GHz) Dielectric
LRL/LRM Microstrip	Same controls and functions as LRL/LRM Coaxial above with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays a dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125

9-10 Typical Calibration Sub-Menus

The menus in this section are example menus for the calibration step procedures. The exact content and presence of each menu is dependent on the settings for each calibration run.

REFL. DEVICE(S) Menu - 2-Port VNAs

This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the REFL. DEVICE(S) menu.

Full Name

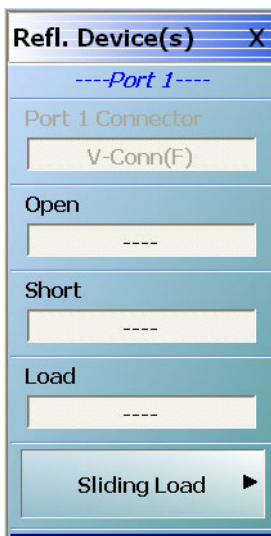
- REFLECTIVE DEVICE(S) Menu

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“TWO PORT CAL Menu - 2-Port VNAs” on page 9-60](#)
 - [“ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86](#)
 - [“TRANS. RESPONSE Menu - 2-Port VNAs” on page 9-100](#)
 - [“REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106](#)
- The REFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-56](#)
 - [“CAL METHOD Menu” on page 9-58](#)
 - [“LINE TYPE Menu” on page 9-59](#)

Similar Menus

- The REFL. DEVICE(S) Port 1 menu is nearly identical to the typical REFL. DEVICE(S) Port 2 menu.



A typical REFL. DEVICE(S) menu.

Each button is a completion task button and marked with a checkmark when the calibration task is complete.

Port 1 Connector

A read only button showing the configured connector for the indicated port.

Open

In general, prepare the indicated connections and components and then select the button. Starts the open calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.

Short

Starts the short calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.

Load

Starts the load calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.

Sliding Load

If present, selecting this button displays the SLIDING LOADS menu which is described in the section below.

- [“SLIDING LOADS Menu - 2-Port VNA” on page 9-82](#)

Figure 9-41. REFL. DEVICE(S) (REFLECTIVE DEVICES) Menu - 2-Port VNAs - Typical Example

SLIDING LOADS Menu - 2-Port VNA

This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the SLIDING LOADS menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“REFL. DEVICE\(S\) Menu - 2-Port VNAs” on page 9-80](#)
 - [“TWO PORT CAL Menu - 2-Port VNAs” on page 9-60](#)
 - [“ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86](#)
 - [“TRANS. RESPONSE Menu - 2-Port VNAs” on page 9-100](#)
 - [“REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106](#)
- The REFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-56](#)
 - [“CAL METHOD Menu” on page 9-58](#)
 - [“LINE TYPE Menu” on page 9-59](#)

	<p>A typical SLIDING LOADS menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete. The number of buttons appearing on the menu is dependent on the calibration settings.</p> <p>Connector Type A read only button showing the configured connector for the indicated port.</p> <p>Sliding Load (Position 1) In general, prepare the indicated connections and components and then select the button. Starts the sliding load calibration procedure at position 1 for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Sliding Load (Position 2) As above for sliding load calibration procedure at position 2.</p> <p>Sliding Load (Position 3) As above for sliding load calibration procedure at position 3.</p> <p>Sliding Load (Position 4) As above for sliding load calibration procedure at position 4.</p> <p>Sliding Load (Position 5) As above for sliding load calibration procedure at position 5.</p> <p>Sliding Load (Position 6) As above for sliding load calibration procedure at position 6.</p> <p>When all calibration procedures are complete, use the Back button to return to the REFL DEVICE menu.</p> <ul style="list-style-type: none"> • “REFL. DEVICE(S) Menu - 2-Port VNAs” on page 9-80
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Figure 9-42. SLIDING LOADS Menu - 2-Port VNAs - Typical Example

THRU/RECIP Menu - 2-Port VNAs

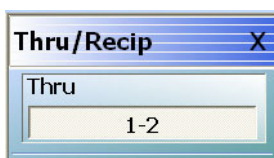
This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“TWO PORT CAL Menu - 2-Port VNAs” on page 9-60](#)
 - [“ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86](#)
 - [“TRANS. RESPONSE Menu - 2-Port VNAs” on page 9-100](#)
 - [“REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-56](#)
 - [“CAL METHOD Menu” on page 9-58](#)
 - [“LINE TYPE Menu” on page 9-59](#)



A typical THRU/RECIP menu.

Each button is a completion task button and marked with a checkmark when the calibration task is complete.

Thru (Port Pair 1-2)

In general, prepare the indicated connections and components and then select the button. Starts the through calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.

When all calibration procedures are complete, use the **Back** button to return to the REFL DEVICE menu.

- [“REFL. DEVICE\(S\) Menu - 2-Port VNAs” on page 9-80](#)

Figure 9-43. THRU/RECIP Menu - 2-Port VNAs - Typical Example

ISOLATION(S) Menu - 2-Port VNA

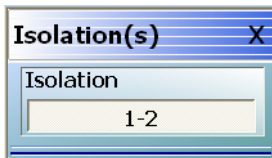
This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“TWO PORT CAL Menu - 2-Port VNAs” on page 9-60](#)
 - [“ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86](#)
 - [“TRANS. RESPONSE Menu - 2-Port VNAs” on page 9-100](#)
 - [“REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-56](#)
 - [“CAL METHOD Menu” on page 9-58](#)
 - [“LINE TYPE Menu” on page 9-59](#)



A typical ISOLATION(S) menu.

Each button is a completion task button and marked with a checkmark when the calibration task is complete.

Isolation (Port Pair 1-2)

In general, prepare the indicated connections and components and then select the button. Starts the optional isolation calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.

When all calibration procedures are complete, use the **Back** button to return to the REFL DEVICE menu.

- [“REFL. DEVICE\(S\) Menu - 2-Port VNAs” on page 9-80](#)

Figure 9-44. ISOLATION(S) Menu - 2-Port VNAs - Typical Example

9-11 Manual 1-Port Cal Setup - 2-Port VNAs

Note

The appearance and button availability of the calibration menus depends on the settings established in the CAL SETUP, CAL METHOD, LINE TYPE menus and in the associated dialog boxes that appear from the Edit Cal Params button.

ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs

Previous

- [“MANUAL CAL Menu - 2-Port VNAs” on page 9-55](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL


	Modify Cal Setup
	<p>Select displays the CAL SETUP menu where changes to the calibration method, line type, and associated parameters are made on the CAL METHOD and LINE TYPE submenus.</p>
	<ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56. • “CAL METHOD Menu” on page 9-58. <ul style="list-style-type: none"> • Calibration method options are SOLT/SOLR, Offset Short (SSLT), Triple Offset Short (SSST), or LRL/LRM. • “LINE TYPE Menu” on page 9-59. <ul style="list-style-type: none"> • Line Type options are Coaxial, Non-Dispersive, Waveguide, or Microstrip.
	<p>A composite view of the CAL SETUP menu set and is available in:</p>
	<ul style="list-style-type: none"> • Figure: Figure 9-31 on page 9-53
	Ports Selected (Read Only)
	<p>A display button showing the port numbers that are in the calibration.</p>

Figure 9-45. ONE PORT CAL MENU - 2-Port VNAs - Typical Example (1 of 2)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the FOUR PORT CAL menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

When selected, provides the PORT 1 REFLECTIVE DEVICES menu. Each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the ONE PORT CAL menu.

Thru/Recip

When selected, displays the THRU/RECIP menu. When all tasks are complete, return to the ONE PORT CAL menu.

Isolation (Optional)

When selected, displays the ISOLATION menu. When all tasks are completed, return to the ONE PORT CAL menu.

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Figure 9-45. ONE PORT CAL MENU - 2-Port VNAs - Typical Example (2 of 2)

Modify One-Port Cal Setup Dialog Boxes

The Edit Cal Params dialog boxes are populated with controls and fields that vary depending on the settings made in the MANUAL CAL, CAL SETUP, CAL METHOD, and LINE TYPE menus. Dialog box examples are:

- [“ONE-PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-89](#)
- [“ONE-PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-92](#)
- [“ONE-PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box - 2-Port VNAs” on page 9-95](#)

For all other combinations of calibration methods and line types, see the summary in [Table 9-3 on page 9-97](#) for a listing of dialog box controls and functions.

Note Note that the LRL/LRM calibration method is not available for One-Port Calibrations.
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ONE-PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box - 2-Port VNAs

Prerequisites

- Calibration Method = SOLT/SOLR
- Line Type = Coaxial

Previous

- “ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE-PORT CAL(S) | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE-PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

One Port Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

Test Port 1 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: Load 1 Load 2

Select Load Type: Broadband Load Sliding Load
* Still requires broadband loads below sliding load breakpoint frequency.

Test Port 2 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: Load 1 Load 2

Select Load Type: Broadband Load Sliding Load

* At least one port must be selected.

OK Cancel

Figure 9-46. ONE-PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box - 2-Port VNAs

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port 1

At least one test port (Test Port 1 or Test Port 2) must be selected. Both test ports may be selected.

Use the check box to select Test Port 1. If the check box is not selected, all Test Port 1 fields and controls are unavailable. If selected, the following controls are available:

DUT Connector Type Field

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 1

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Select Load Type for Test Port 1

Select the load type for Test Port 1:

- Broadband Load
- Sliding Load. If Sliding Load is selected:

- A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
- A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu.

Test Port 2 Area

Use the check box to select Test Port 2. If the check box is not selected, all Test Port 2 fields and controls are unavailable. If selected, the following controls are available:

DUT Connector Type Field:

Select the DUT Connector Type from a drop-down menu list with the same options as in Test Port 1 above.

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Select Load Type for Test Port 2

Select the load type for Test Port 2:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 2 REFLECTIVE DEVICES menu.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE-PORT CAL SETUP (SSLT, COAXIAL) Dialog Box - 2-Port VNAs

Prerequisites

- Calibration Method = SSLT
- Line Type = Coaxial

Previous

- [“ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE-PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

One Port Cal Setup (SSLT, Coaxial)

Ref Impedance (Ω) 50.000

Test Port 1 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Select BB Load: Load 1 Load 2

Select Load Type: Broadband Load Sliding Load

Test Port 2 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Select BB Load: Load 1 Load 2

Select Load Type: Broadband Load Sliding Load

* At least one port must be selected.

OK Cancel

Figure 9-47. ONE-PORT CAL SETUP (SSLT, COAXIAL) Dialog Box - 2-Port VNAs

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port 1

At least one test port (Test Port 1 or Test Port 2) must be selected. Both test ports may be selected.

Use the check box to select Test Port 1. If the check box is not selected, all Test Port 1 fields and controls are unavailable. If selected, the following controls are available:

Test Port 1 DUT Connector Type Field

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the selected connector and Cal Method selected.

Select BB Load for Test Port 1

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Select Load Type for Test Port 1

Select the load type for Test Port 1:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu.

Test Port 2 Area

Use the check box to select Test Port 2. If the check box is not selected, all Test Port 2 fields and controls are unavailable. If selected, the following controls are available:

Test Port 2 DUT Connector Type Field:

Select the DUT Connector Type from a drop-down menu list with the same options as in Test Port 1 above.

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Select Load Type for Test Port 2

Select the load type for Test Port 2:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 2 REFLECTIVE DEVICES menu.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE-PORT CAL SETUP (SSST, COAXIAL) Dialog Box - 2-Port VNAs

Prerequisites

- Calibration Method = SSST
- Line Type = Coaxial

Previous

- “ONE PORT CAL Menu - SOLT/R - Coaxial - 2-Port VNAs” on page 9-86

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE-PORT CAL(S) | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE-PORT CAL SETUP (SSST, COAXIAL) Dialog Box

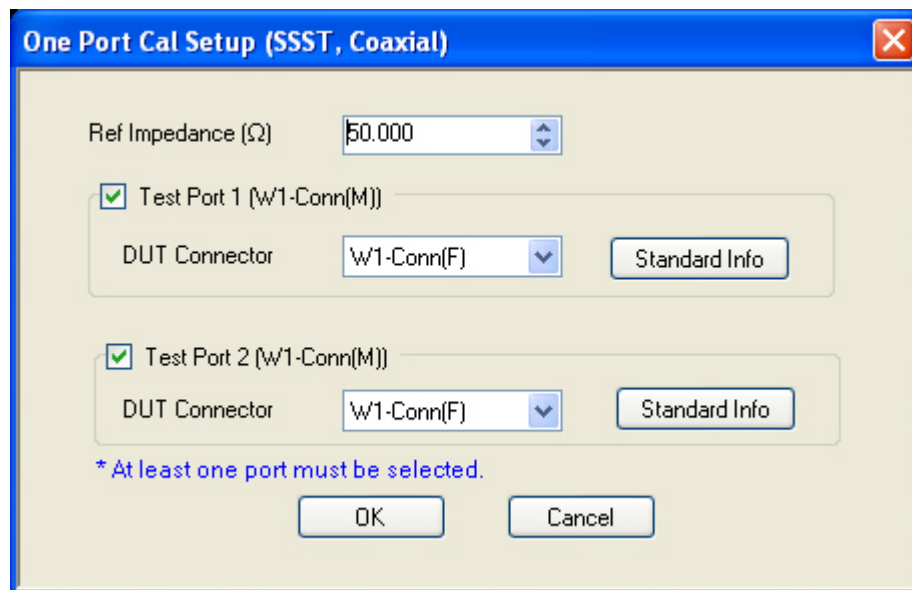


Figure 9-48. ONE-PORT CAL SETUP (SSST, COAXIAL) Dialog Box - 2-Port VNAs

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port 1

At least one test port (Test Port 1 or Test Port 2) must be selected. Both test ports may be selected.

Use the check box to select Test Port 1. If the check box is not selected, all Test Port 1 fields and controls are unavailable. If selected, the following controls are available:

Test Port 1 DUT Connector Type

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Area

Use the check box to select Test Port 2. If the check box is not selected, all Test Port 2 fields and controls are unavailable. If selected, the following controls are available:

Test Port 2 DUT Connector Type Field:

Select the DUT Connector Type from a drop-down menu list with the same options as in Test Port 1 above.

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 1-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in other one-port calibration setup dialog boxes. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named “One Port Cal Setup (*Cal Method, Line Type*)”.

Table 9-3. Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 2-Port VNAs (1 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See full description above at “ONE-PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box - 2-Port VNAs” on page 9-89.</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126 <p>Test Port BB Load: Load 1, Load 2</p> <p>Test Port Load Type: Broadband Load, Sliding Load</p>
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Reference Impedance (Ohms)</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125 <p>Test Port DUT Connector Type: User-Defined1 to User-Defined32</p> <p>Test Port Standard Info button: Displays info dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121

Table 9-3. Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 2-Port VNAs (2 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Coaxial	<p>See full description above at “ONE-PORT CAL SETUP (SSLT, COAXIAL) Dialog Box - 2-Port VNAs” on page 9-92.</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126 <p>Test Port BB Load: Load 1, Load 2</p> <p>Test Port Load Type: Broadband Load, Sliding Load</p>
SSLT Non-Dispersive	Same controls and functions as SSLT Coax.
SSLT Waveguide	<p>Same controls and functions as SSLT Coax with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays info dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128
SSLT Microstrip	<p>Same controls and functions as SSLT Coax with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays info dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125 <p>Test Port Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126

Table 9-3. Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 2-Port VNAs (3 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Coaxial	<p>See the full description above at “ONE-PORT CAL SETUP (SSST, COAXIAL) Dialog Box - 2-Port VNAs” on page 9-95.</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121
SSST Non-Dispersive	Same controls and functions as SSST Coaxial.
SSST Waveguide	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128
SSST Microstrip	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125
LRL/LRM Non-Dispersive	The LRL/LRM calibration method is not available for one-port calibrations.
LRL/LRM Waveguide	
LRL/LRM Microstrip	

9-12 Manual Cal - Trans. Freq. Resp. Cal - 2-Port VNAs

Note

The appearance and button availability of the calibration menus depends on the settings established in the CAL SETUP, CAL METHOD, LINE TYPE menus and in the associated dialog boxes that appear from the Edit Cal Params button.

Full Name

- Transmission Frequency Response Calibration

Menu Name

- TRANS. RESPONSE

Button Name

- Transmission Freq. Response

TRANS. RESPONSE Menu - 2-Port VNAs

Full Name

- TRANSMISSION FREQUENCY RESPONSE CALIBRATION SETUP Menu

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box. A representative menu is shown below. There is one example procedure of a TRANS. RESPONSE calibration in this chapter.

Previous

- [“MANUAL CAL Menu - 2-Port VNAs” on page 9-55](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE

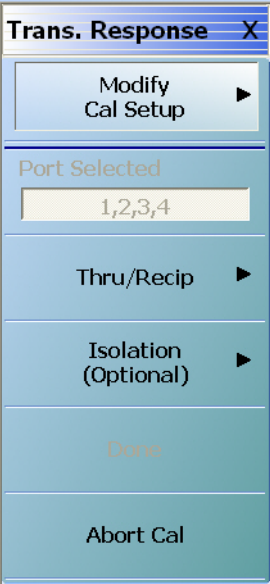
	<p>Modify Cal Setup</p> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>Example transmission frequency response calibration dialog boxes are available below:</p> <ul style="list-style-type: none"> • “TRANS. FREQ. RESP. CAL. SETUP (SOLT/R - Coaxial) Dialog Box” on page 9-102 <p>A summary table of all transmission frequency response calibration configuration dialog boxes is available here:</p> <ul style="list-style-type: none"> • Table 9-4, “Manual Calibration - Trans. Freq. Resp. Cal. Setup Dialog Box Contents - 2-Port VNAs” on page 9-104
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Figure 9-49. TRANS. RESPONSE Menu - Trans. Freq. Resp. Cal. - 2-Port VNAs - Typical example (1 of 2)

Port Selected

Read-only display of the ports selected for the pending calibration.

Completion Menu Buttons

For this example menu, the Thru/Recip and Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Thru/Recip button (shown below at #1) links to the THRU/RECIP submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the TRANS. RESPONSE menu.



The Thru/Recip button (shown above at #2) is now marked with a completion checkmark.

Thru/Recip

When selected, displays the THRU/RECIP menu. When all tasks are complete, return to the TRANS. RESPONSE menu.

Isolation (Optional)

When selected, displays the ISOLATION menu. When all tasks are completed, return to the TRANS. RESPONSE menu.

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Figure 9-49. TRANS. RESPONSE Menu - Trans. Freq. Resp. Cal. - 2-Port VNAs - Typical example (2 of 2)

TRANS. FREQ. RESP. CAL. SETUP (SOLT/R - Coaxial) Dialog Box**Full Name**

- Transmission Frequency Response Calibration Setup Dialog Box

Prerequisites

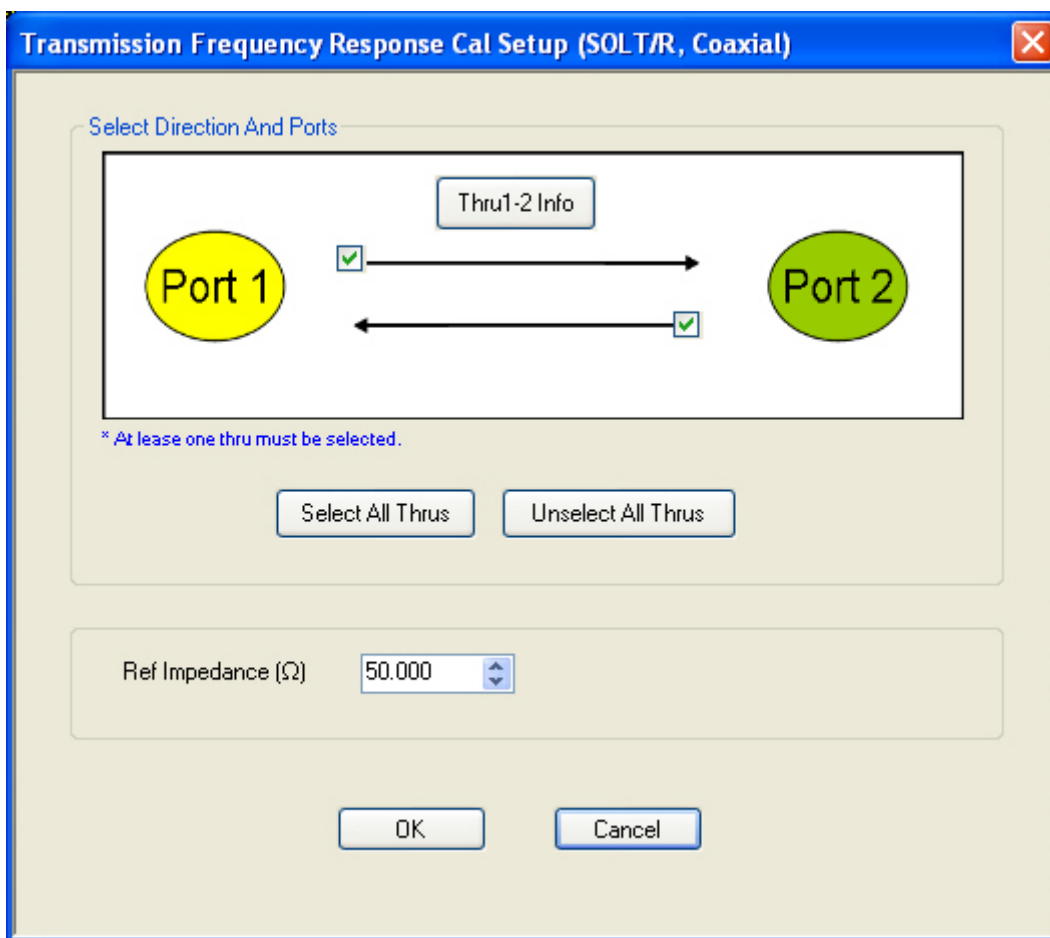
- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Previous

- [“TRANS. RESPONSE Menu - 2-Port VNAs”](#) on page 9-100
- [“CAL SETUP Menu”](#) on page 9-56

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq Response | TRANS FREQ (TRANSMISSION FREQUENCY RESPONSE) | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box



TRANSMISSION FREQUENCY RESPONSE CALIBRATION SETUP Dialog Box

Figure 9-50. TRANS. FREQ. RESP. CAL. SETUP (SOLT/R, COAXIAL) Dialog Box

Select Direction And Ports

Select any combination of the two available throughs. At least one thru must be selected. Both the Thru Port 1 to Port 2 and the Thru Port 2 to Port 1 may be selected.

Thru 1-2 Info Button

Select the Thru 1-2 to display the THRU INFO dialog box.

- The THRU INFO dialog box is described above in [“THRU INFO Dialog Box - 2-Port VNAs”](#) on page 9-123

The Calculator icon is available on the THRU INFO dialog box. Select displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.

- The AIR EQUIVALENT LENGTH CONVERSION dialog box is described above in [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs”](#) on page 9-118.

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Transmission Frequency Response Calibration Setup Dialog Boxes

The table below summarizes the available fields and controls in other transmission frequency response calibration setup dialog boxes (abbreviated in this section as Trans. Freq. Resp. Cal.). To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button.

Table 9-4. Manual Calibration - Trans. Freq. Resp. Cal. Setup Dialog Box Contents - 2-Port VNAs (1 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	See full description above at “TRANS. FREQ. RESP. CAL. SETUP (SOLT/R - Coaxial) Dialog Box” on page 9-102. Select Direction and Ports: Port 1, Port 2, Port 1 and Port 2 Reference Impedance (Ohms)
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial.
SOLT/R Waveguide	Same controls and functions as SOLT/R Coaxial with the following changes: Waveguide Kit: User-Defined1 to User-Defined32 Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box. • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128
SOLT/R Microstrip	Same controls and functions as SOLT/R Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays info dialog box for selected calibration method and kit. • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125
SSLT Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSLT Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SSLT Waveguide	Same controls and functions as SOLT/R Coaxial with the following changes: Waveguide Kit: User-Defined1 to User-Defined32 Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box. • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128
SSLT Microstrip	Same controls and functions as SOLT/R Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays info dialog box for selected calibration method and kit. • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125

Table 9-4. Manual Calibration - Trans. Freq. Resp. Cal. Setup Dialog Box Contents - 2-Port VNAs (2 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSST Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SSST Waveguide	Same controls and functions as SOLT/R Coaxial with the following changes: Waveguide Kit: User-Defined1 to User-Defined32 Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box. • Typical "USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs" on page 9-128
SSST Microstrip	Same controls and functions as SOLT/R Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays info dialog box for selected calibration method and kit. • Typical "MICROSTRIP INFO Dialog Box - 2-Port VNAs" on page 9-120 • Typical "USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs" on page 9-125
LRL/LRM Coaxial	The LRL/LRM calibration method is not available for transmission frequency response calibrations.
LRL/LRM Non-Dispersive	
LRL/LRM Waveguide	
LRL/LRM Microstrip	

9-13 Manual Cal - Refl. Freq. Resp. Cal - 2-Port VNAs

Full Name

- Manual Calibration - Reflection Frequency Response Calibration - 2-Port VNAs

Note

The appearance and button availability of the calibration menus depends on the settings established in the CAL SETUP, CAL METHOD, LINE TYPE menus and in the associated dialog boxes that appear from the Edit Cal Params button.

Full Name

- Reflection Frequency Response Calibration

Menu Name

- REFL. RESPONSE

Button Name

- Reflection Freq. Response

REFL. RESPONSE Menu - 2-Port VNAs

Full Name

- REFLECTION RESPONSE Menu

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant REFLECTION FREQUENCY RESPONSE CAL SETUP dialog box. A representative menu is shown below. There is one example procedure of a REFL. RESPONSE calibration in this chapter.

Previous

- [“MANUAL CAL Menu - 2-Port VNAs” on page 9-55](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE

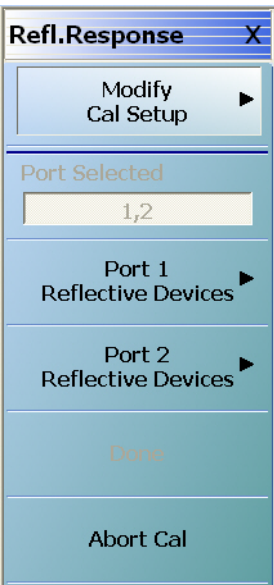
	<h3>Modify Cal Setup</h3> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the REFLECTION FREQ. RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-56 <p>A typical reflection frequency response calibration dialog box is available at:</p> <ul style="list-style-type: none"> • “REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 9-109 <p>A summary table of all reflection frequency response calibration configuration dialog boxes is available at:</p> <ul style="list-style-type: none"> • Table: “Manual Calibration - Reflection Frequency Response Cal Setup - 2-Port VNAs” on page 9-114
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Figure 9-51. REFL. RESPONSE Menu - Refl. Freq. Resp. Cal. - 2-Port VNAs - Typical example (1 of 2)

Port Selected

Read-only display of the ports selected for the pending calibration.

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices, Port 2 Reflective Devices, Thru/Recip, and Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the REFL. RESPONSE menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

When selected, the REFL. DEVICES PORT 1 menu appears where each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the REFL. RESPONSE menu.

Port 2 Reflective Devices

When selected, displays the REFL. DEVICES PORT 2 menu where each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the REFL. RESPONSE menu.

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Figure 9-51. REFL. RESPONSE Menu - Refl. Freq. Resp. Cal. - 2-Port VNAs - Typical example (2 of 2)

REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Prerequisites

- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Previous

- “REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106
- “CAL SETUP Menu” on page 9-56

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ REPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reflection Freq. Response Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

Test Port 1 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

Test Port 2 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

OK Cancel

REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP Dialog Box

Figure 9-52. REFL. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection

Select any combination:

- Test Port 1
- Test Port 2
- Test Port 1 and Test Port 2

Test Port 1 Select Cal Component

Select either:

- Open
- Short

Test Port 1 DUT Connector

Select the Test Port 1 Connector type from the pull down menu with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn M) Dialog Box. Note that the name of this dialog changes depending on the selected Cal Method and DUT Connector.

Test Port 2 Select Cal Component

Select either:

- Open
- Short

Test Port 2 DUT Connector

Select the Test Port 2 Connector type from the pull down menu. The options are the same as those for Test Port 1 above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn M) Dialog Box. Note that the name of this dialog changes depending on the selected Cal Method and DUT Connector.

REFLECTION FREQ. RESPONSE CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Prerequisites

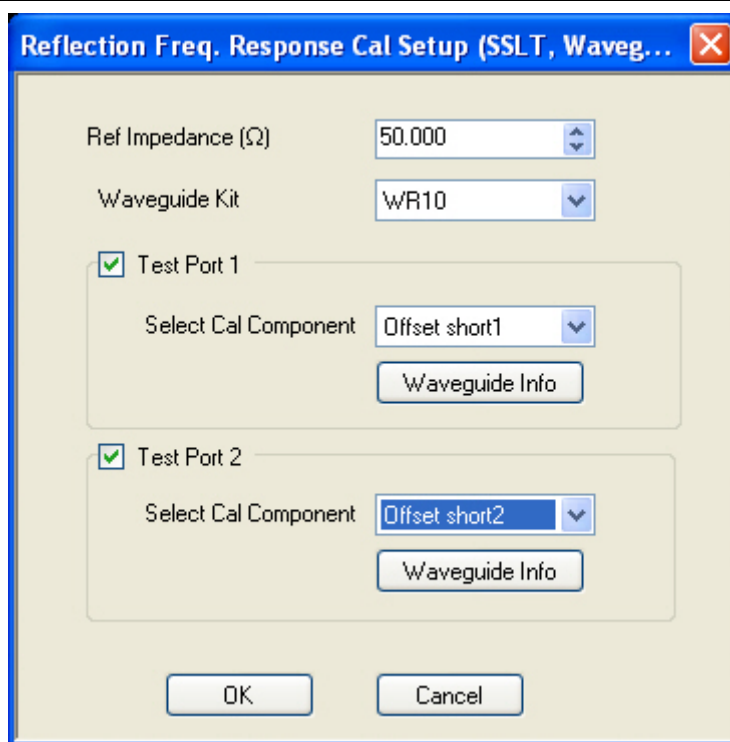
- Cal Method = SSLT
- Line Type = Waveguide

Previous

- “CAL SETUP Menu” on page 9-56
- “REFL. RESPONSE Menu - 2-Port VNAs” on page 9-106

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | REFLECTION FREQ RESPONSE CAL SETUP (SSLT, WAVEGUIDE) Dialog Box



REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP Dialog Box

Figure 9-53. REFL. FREQ. RESP. CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection

Select any combination:

- Test Port 1
- Test Port 2
- Test Port 1 and Test Port 2

Test Port 1 Select Cal Component

Select either:

- Offset Short 1
- Offset Short 2

Test Port 1 DUT Connector Waveguide Info Button

Select displays the WAVEGUIDE KIT or USER DEFINED WAVEGUIDE dialog box for the selected waveguide.

- Typical [“WAVEGUIDE INFO Dialog Box - 2-Port VNAs”](#) on page 9-131
- Typical [“USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs”](#) on page 9-128
- Typical [“USER DEFINED WAVEGUIDE SHORT Dialog Box - 2-Port VNAs”](#) on page 9-130

Test Port 2 Select Cal Component

Select either:

- Offset Short 1
- Offset Short 2

Test Port 2 DUT Connector Waveguide Info Button

Select displays the WAVEGUIDE KIT or USER DEFINED WAVEGUIDE dialog box for the selected waveguide as described above.

Refl. Freq. Resp. Calibration Setup Dialog Box Summary

The table below summarizes the available fields and controls in other reflection frequency response calibration setup dialog boxes. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button.

Table 9-5. Manual Calibration - Reflection Frequency Response Cal Setup - 2-Port VNAs (1 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See the full description above “REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 9-109</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port Cal Component: Open, Short</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays appropriate information dialog box for selected microstrip kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125

Table 9-5. Manual Calibration - Reflection Frequency Response Cal Setup - 2-Port VNAs (2 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Coaxial	<p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port Cal Component: Offset Short 1, Offset Short 2</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126
SSLT Non-Dispersive	Same controls and functions as SSLT Coaxial above.
SSLT Waveguide	<p>See the full description above “REFLECTION FREQ. RESPONSE CAL SETUP (SSLT, WAVEGUIDE) Dialog Box” on page 9-112</p> <p>Same controls and functions as SSLT Coaxial above with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Display the appropriate information dialog box for the selected waveguide.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128 • Typical “WAVEGUIDE INFO Dialog Box - 2-Port VNAs” on page 9-131
SSLT Microstrip	<p>Same controls and functions as SSLT Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays appropriate information dialog box for the selected microstrip.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125
SSST Coaxial	<p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port Cal Component: Offset Short 1, Offset Short 2, Offset Short 2</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the appropriate information dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121 • Typical “USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126
SSST Non-Dispersive	Same controls and functions as SSST Coaxial above.

Table 9-5. Manual Calibration - Reflection Frequency Response Cal Setup - 2-Port VNAs (3 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Waveguide	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Display the appropriate information dialog box for the selected waveguide.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128
SSST Microstrip	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays appropriate information dialog box for the selected microstrip.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120 • Typical “USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125
LRL/LRM Coaxial	The LRL/LRM calibration method is not available for reflection frequency response calibrations.
LRL/LRM Non-Dispersive	
LRL/LRM Waveguide	
LRL/LRM Microstrip	

9-14 Manual Calibration General Dialog Boxes - 2-Port VNAs

The dialog boxes displayed below are representative of standard and user-defined dialog boxes associated with the calibration function. Most of these dialog boxes can be called from multiple locations.

- [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)
- [“MICROSTRIP INFO Dialog Box - 2-Port VNAs” on page 9-120](#)
- [“STANDARD INFO Dialog Box - 2-Port VNAs” on page 9-121](#)
- [“THRU INFO Dialog Box - 2-Port VNAs” on page 9-123](#)
- [“USER DEFINED MATCH DEVICES Dialog Box - 2-Port VNAs” on page 9-124](#)
- [“USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs” on page 9-125](#)
- [“USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126](#)
- [“USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128](#)
- [“USER DEFINED WAVEGUIDE SHORT Dialog Box - 2-Port VNAs” on page 9-130](#)
- [“WAVEGUIDE INFO Dialog Box - 2-Port VNAs” on page 9-131](#)

AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs

Use the AIR EQUIVALENT LENGTH calculator dialog box to speed configuration of a thru line by entering its length in picoseconds (ps) and its dielectric constant. The calculator returns the air equivalent length in millimeters (mm).

Previous

- The AIR EQUIVALENT LENGTH dialog box can be accessed from multiple locations.
- [“TWO PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box”](#) on page 9-63
- [“TWO PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box - 2-Port VNAs”](#) on page 9-66
- [“TWO PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box - 2-Port VNA”](#) on page 9-69
- [“TWO PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box - 2-Port VNA”](#) on page 9-72
- [“ONE-PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box - 2-Port VNAs”](#) on page 9-89
- [“ONE-PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box - 2-Port VNAs”](#) on page 9-92
- [“ONE-PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box - 2-Port VNAs”](#) on page 9-95

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP dialog | Through/ Reciprocal Length Calculator Icon | AIR EQUIVALENT LENGTH Dialog Box

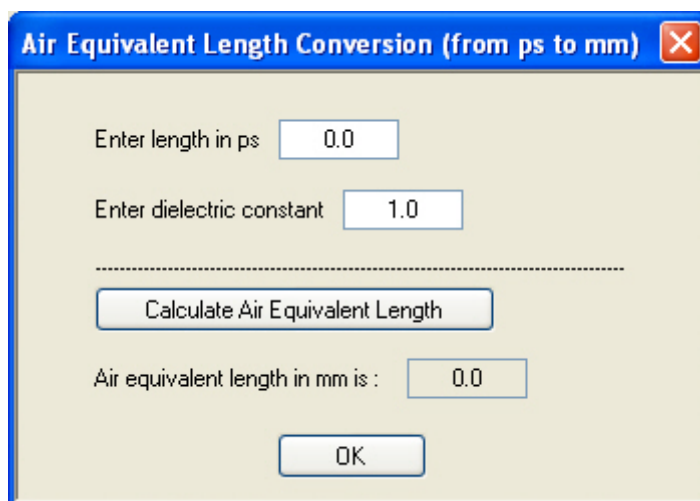


Figure 9-54. AIR EQUIVALENT LENGTH CONVERSION CALCULATOR Dialog Box

Using the Calculator

1. Use the Enter length in ps (picoseconds) to input a length.
 - For example, enter a value of 250 ps.
2. Use the Enter constant to change the dielectric constant as required.
 - For example, change the dielectric constant to 1.2.
3. Click the Calculate Air Equivalent Length button.
4. The required value appears in the Air Equivalent Length in mm field.
 - Using the examples above, an air equivalent length of 68.465319... appears in the field.
5. Click OK.
6. The Thru Info dialog box reappears with the calculated value in the Length (mm) field.

7. Using the examples above, the Length (mm) field displays 68.4653 mm.
 - [“THRU INFO Dialog Box - 2-Port VNAs” on page 9-123](#)
8. Click OK on the Thru Info dialog box.
9. The Modify AutoCal Setup dialog box reappears.
 - [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box” on page 9-45](#)

MICROSTRIP INFO Dialog Box - 2-Port VNAs

This dialog box displays read-only information for a standard microstrip. For the equivalent dialog box for user-defined microstrip, see “[USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs](#)” on page 9-125.

Prerequisites

- Line Type = Microstrip
- Microstrip Kit = 10 Mil Kit, 15 Mil Kit, or 25 Mil Kit

Previous

- The MICROSTRIP INFO dialog box can be accessed from multiple locations.
- “[TWO PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box - 2-Port VNA](#)” on page 9-72

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) | Microstrip Kit = 10 Mil Kit, 15, Mil Kit, or 25 Mil Kit | Microstrip Info button | MICROSTRIP INFO (*Selected Kit*) Dialog Box

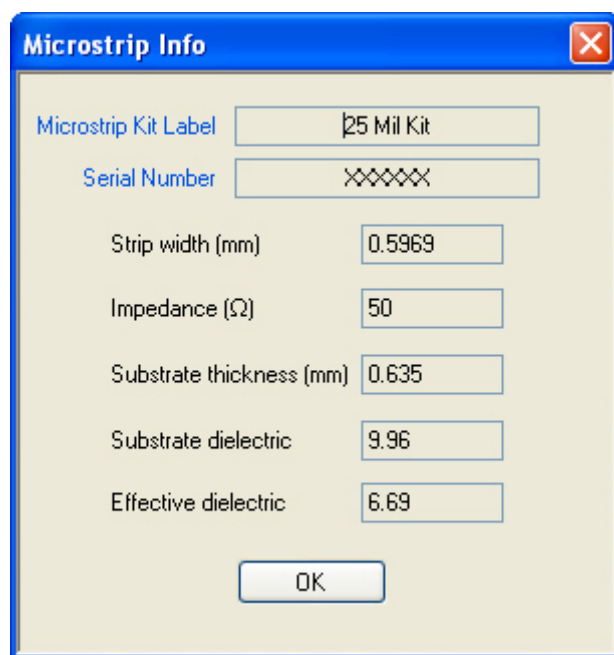


Figure 9-55. MICROSTRIP INFO (10 MIL KIT) Dialog Box

The read-only dialog box provides the calibration parameters for the selected microstrip kit. The displays for 10 Mil, 15 Mil, and 25 Mil Kits are identical.

The calibration parameters listed are:

- Microstrip Kit Label
- Microstrip Kit Serial Number
- Strip width (mm)
- Impedance (Ohms)
- Substrate thickness (mm)
- Substrate dielectric value
- Effective dielectric value

STANDARD INFO Dialog Box - 2-Port VNAs

The exact title and contents of the dialog box depend on the calibration method and connector types selected. This dialog box displays parametric information for a standard connector such as a V-connectors. For the equivalent dialog box for a user-defined connector, see [“USER DEFINED STANDARD Dialog Box - 2-Port VNAs” on page 9-126](#).

Prerequisites

- Line Type = Coaxial
- DUT Connector Type = V-Conn (M)

Previous

- The STANDARD INFO dialog box can be accessed from multiple locations.
- [“TWO PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 9-63](#)

Navigation

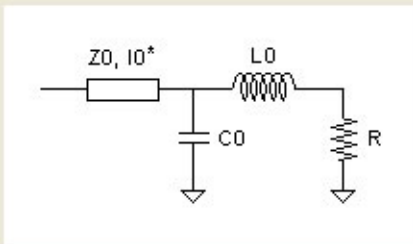
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, COAXIAL) | DUT Connector = V-Conn(M) | Standard Info button | STANDARD INFO (SOLT/R, V-CONN M) Dialog Box

Standard Info (SOLT/R) ✕

Standard Label

Serial Number

Broadband Load



BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	l0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

BB Load 2 (SN XXXXXX)

R (Ω)	Z0 (Ω)	l0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

l0*: air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz)

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)
0	0	0	0	5.1

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)
-1	-275	6.25	0	4.75

Where $L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3$ and $C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3$

Figure 9-56. STANDARD INFO (SOLT/R, V-CONN M) Dialog Box

The read-only dialog box provides the calibration parameters for the selected connector and calibration method.

THRU INFO Dialog Box - 2-Port VNAs

Use the THRU INFO dialog to update the thru information for most calibration types. The dialog includes access to the AIR EQUIVALENT LENGTH calculator function dialog box to speed configuration.

Previous

- The THRU INFO dialog box can be accessed from multiple locations.
- [“MODIFY 2-PORT AUTO CAL SETUP Dialog Box” on page 9-45](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTO CAL | Modify Cal Setup | MODIFY AUTO CAL SETUP Dialog Box | Thru Info | THRU INFO Dialog Box

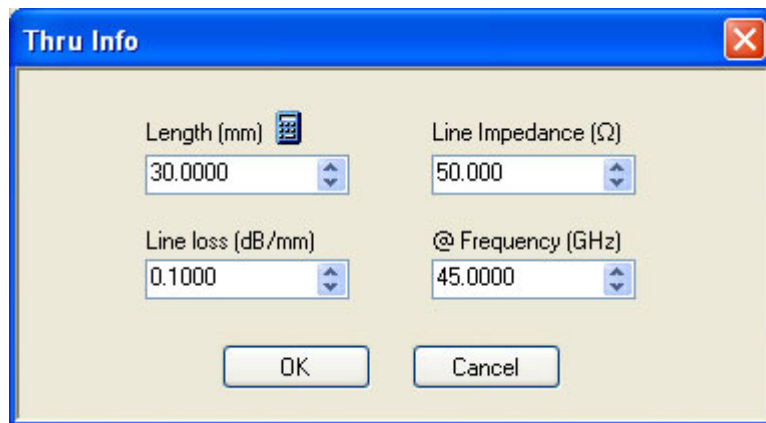


Figure 9-57. THRU INFO Dialog Box - AutoCal Two Port Calibration - 2-Port VNAs

Thru Information Parameters and Calculator

The Thru Info dialog box allows user input field for the thru connection parameters of:

- Length (mm). If needed, click the Calculator icon to display the Air Equivalent Length Conversion Calculator dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)
- Line Loss (dB/mm)
- Line Impedance (Ω or Ohms)
- @ Frequency (GHz)

USER DEFINED MATCH DEVICES Dialog Box - 2-Port VNAs

Prerequisites

- Calibration Method = LRL/LRM
- Line Type = Coaxial
- Band 1 Device 2 = Match

Previous

- The STANDARD INFO dialog box can be accessed from multiple locations.
- [“TWO PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box - 2-Port VNA”](#) on page 9-72

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Edit Cal Params | TWO PORT CAL SETUP (LRL/LRM, COAXIAL) | Band 1 Device 2 = Match | Match button | USER DEFINED MATCH DEVICES Dialog Box

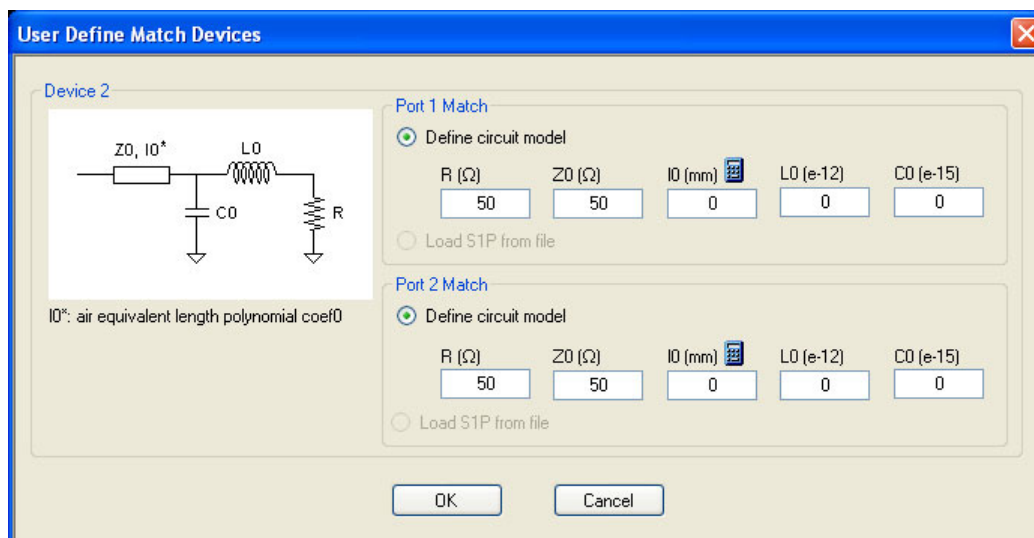


Figure 9-58. USER DEFINED MATCH DEVICES Dialog Box - 2-Port VNAs

Description

The dialog box allows the definition of a user-provided match device.

Port 1 Match

Define the Port 1 Match device by entering the following parameters:

- R (Ohms)
- Z0 (Ohms)
- l0 (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs”](#) on page 9-118
- L0 (e-12)
- C0(e-15)
- provides the calibration parameters for the selected connector and calibration method.

Port 2 Match

The Port 2 Match parameters and controls are the same as the Port 1 Match.

USER DEFINED MICROSTRIP Dialog Box - 2-Port VNAs

This dialog box displays parametric information for a user-defined microstrip. For the equivalent dialog box for a standard microstrip, see “[MICROSTRIP INFO Dialog Box - 2-Port VNAs](#)” on page 9-120.

Prerequisites

- Line Type = Microstrip
- Microstrip Kit = User-Defined1 to User-Defined32

Previous

- The USER DEFINED MICROSTRIP dialog box can be accessed from multiple locations.
- TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Line Type = Microstrip | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) | Microstrip Kit = User-Defined1 to User-Defined32 | Microstrip Info button | USER DEFINED MICROSTRIP Dialog Box

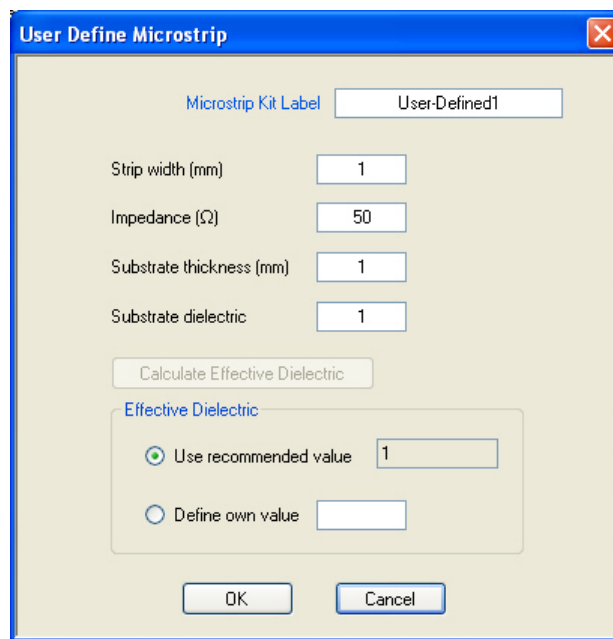


Figure 9-59. USER DEFINED MICROSTRIP Dialog Box - User-Defined1

The dialog box allows the definition of a user-provided microstrip device. The input fields for the calibration parameters are:

- Microstrip Kit Label
- Strip width (mm)
- Impedance (Ohms)
- Substrate thickness (mm)
- Substrate dielectric value
 - If this field is cleared, the Calculate Effective Dielectric button is enabled for the fields below.
- Effective dielectric value
 - Use a recommended value
 - Define a user value

USER DEFINED STANDARD Dialog Box - 2-Port VNAs

The exact title and contents of the dialog box depend on the calibration method and connector types selected. This dialog box displays parametric information for a user-defined connector. For the equivalent dialog box for a standard connector such as a V-connector, see “[STANDARD INFO Dialog Box - 2-Port VNAs](#)” on page 9-121

Prerequisites

- Line Type = Coaxial
- DUT Connector Type = User-Defined1 (M or F) to User-Defined32 (M or F)

Previous

- The STANDARD INFO dialog box can be accessed from multiple locations.
- “[TWO PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box](#)” on page 9-63

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, COAXIAL) | DUT Connector = User-Defined1 (M) | Standard Info button | USER DEFINED STANDARD Dialog Box

User Defined Standard (SOLT/R)

Standard Label: User-Defined1(M)

Broadband Load

$Z_0, 10^*$ L_0 C_0 R

10*: air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz): 2

BB Load 1

Define circuit model

R (Ω): 50 Z0 (Ω): 50 l0 (mm): 0 L0 (e-12): 0 C0 (e-15): 0

Load S1P from file

BB Load 2 (Optional)

Define circuit model

R (Ω): 50 Z0 (Ω): 50 l0 (mm): 0 L0 (e-12): 0 C0 (e-15): 0

Load S1P from file

Short

Define circuit model

L0 (e-12): 0 L1 (e-24): 0 L2 (e-33): 0 L3 (e-42): 0 Offset length (mm): 0

Load S1P from file

Open

Define circuit model

C0 (e-15): 0 C1 (e-27): 0 C2 (e-36): 0 C3 (e-45): 0 Offset length (mm): 0

Load S1P from file

Where L(H) = $L_0 + L_1 * f + L_2 * f^2 + L_3 * f^3$ and C(F) = $C_0 + C_1 * f + C_2 * f^2 + C_3 * f^3$

OK Cancel

Figure 9-60. USER DEFINED STANDARD Dialog Box

The USER DEFINED STANDARD dialog box allows the input of the calibration parameters for a user-defined device.

Standard Label

Either leave as the pre-defined label or input a new label for the device.

BB Load 1

Define the broadband load 1 circuit model with the following parameters:

- R (Ohms)
- Z0 (Ohms)
- I0 (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)
- L0 (e-12)
- C0 (e-15)

BB Load 2

Define the broadband load 2 circuit model with the same set of parameters as BB Load 1 above.

Sliding Load Break Point Frequency

Enter the Break Point Frequency in GHz.

Short Circuit Model

Define the Short Circuit Model with the following parameters:

- L0 (e-12)
- L1 (e-24)
- L2 (e-33)
- L3 (e-42)
- Offset length (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)

Open Circuit Model

Define the Open Circuit Model with the following parameters:

- C0 (e-15)
- C1 (e-27)
- C2 (e-36)
- C3 (e-45)
- Offset length (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)

USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs

This dialog box displays parametric information for a user-defined waveguide. For the equivalent dialog box for a standard waveguide kit, see [“WAVEGUIDE INFO Dialog Box - 2-Port VNAs”](#) on page 9-131.

Prerequisites

- Line Type = Waveguide
- DUT Connector Type = User-Defined1 to User-Defined32

Previous

- The USER DEFINED WAVEGUIDE dialog box can be accessed from multiple locations when Line Type is set to Waveguide.
- TWO PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | TWO PORT CAL SETUP (SSLT, WAVEGUIDE) | Waveguide Kit = User-Defined1 | Waveguide Info button | USER DEFINED WAVEGUIDE Dialog Box

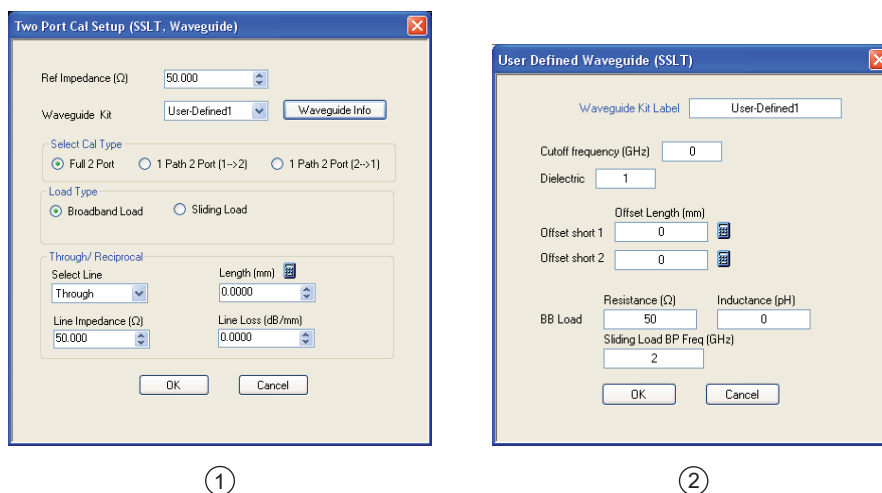


Figure 9-61. USER DEFINED WAVEGUIDE Dialog Box

Description

The USER DEFINED WAVEGUIDE dialog box allows the input of the calibration parameters for a user-defined device.

Standard Label

Either leave as the pre-defined label or input a new label for the device.

Cutoff Frequency and Dielectric

- Cutoff frequency (GHz)
- Dielectric value

Broadband Load Definition

Define the broadband load with the following parameters:

- Resistance (Ohms)
- Inductance (pH)
- Sliding Load Break Point Frequency (GHz)

Short Definition

- Offset length (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)

Open Circuit Model

Define the Open Circuit Model with the following parameters:

- C0 (e-15)
- C1 (e-27)
- C2 (e-36)
- C3 (e-45)
- Offset length (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#)

USER DEFINED WAVEGUIDE SHORT Dialog Box - 2-Port VNAs

This dialog box displays parametric information for a user-defined waveguide short. For the equivalent dialog box for a user-defined waveguide open, see [“USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs” on page 9-128](#). For the equivalent dialog box for a standard waveguide kit, see [“WAVEGUIDE INFO Dialog Box - 2-Port VNAs” on page 9-131](#).

Prerequisites

- Line Type = Waveguide
- DUT Connector Type = User-Defined1 to User-Defined32

Previous

- The USER DEFINED WAVEGUIDE dialog box can be accessed from multiple locations when Line Type = Waveguide.
- [“REFLECTION FREQ. RESPONSE CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 9-109](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Refl. Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Waveguide | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, WAVEGUIDE) | Select Cal Component = Short | Waveguide Info button | USER DEFINED WAVEGUIDE SHORT Dialog Box

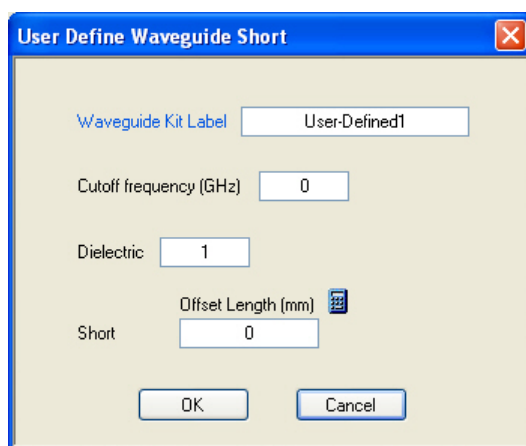


Figure 9-62. USER DEFINED WAVEGUIDE SHORT Dialog Box - 2-Port VNAs

Description

The USER DEFINED WAVEGUIDE SHORT dialog box provides for the following parameter definitions:

Waveguide Kit Label

- Either keep the default User-Defined label or enter a unique name.

Cutoff Frequency (GHz)

- Enter the cutoff frequency in GHz.

Dielectric Value

- Enter a dielectric value.

Short Offset Length (mm)

- Enter a short offset length in mm.
- If needed, select the Calculator icon to link to the AIR EQUIVALENT LENGTH dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box - 2-Port VNAs” on page 9-118](#).

WAVEGUIDE INFO Dialog Box - 2-Port VNAs

This read-only dialog box displays parametric information for a standard waveguide kit. For the equivalent dialog box for a user-defined waveguide, see [“USER DEFINED WAVEGUIDE Dialog Box - 2-Port VNAs”](#) on page 9-128.

Prerequisites

- Line Type = Waveguide
- DUT Connector Type = User-Defined1 to User-Defined32

Previous

- The WAVEGUIDE INFO dialog box can be accessed from multiple locations when Line Type is set to Waveguide.
- TWO PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | TWO PORT CAL SETUP (SSLT, WAVEGUIDE) | Waveguide Kit = WR10, WR12, or WR15 | Waveguide Info button | USER DEFINED WAVEGUIDE Dialog Box

Waveguide Info (SSLT)

Waveguide Kit Label

Serial Number

Cutoff frequency (GHz)

Dielectric

Offset Length (mm)

Offset short 1

Offset short 2

BB Load

Resistance (Ω) Inductance (pH)

Sliding Load BP Freq (GHz)

Figure 9-63. WAVEGUIDE INFO Dialog Box

Description

The read-only WAVEGUIDE INFO dialog box provides the calibration parameters for the WR10, WR12, and WR15 waveguide kits.

Instructions

The provides parameters are:

- Waveguide Kit Label
- Cutoff Frequency (GHz)
- Dielectric value
- and Dielectric
- Cutoff frequency (GHz)
- Dielectric value
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Broadband Load Resistance (Ohms)
- Broadband Load Resistance Inductance (pH)
- Sliding Load Break Point Frequency (GHz)

Chapter 10 — Calibration Menus - 4-Port VNAs

10-1 Chapter Overview

This chapter provides information for calibrating the 4-Port versions of the VectorStar MS4640A Series VNAs. This calibration chapter is organized in the sequence of the menus and dialog boxes that control the various types of calibrations. Due to the numerous permutations of instrument calibration ports, AutoCal, manual calibration, calibration methods, line types, and connectors, only a small subset of calibrations are shown.

10-2 Overview of 4-Port Calibration Menus

These links connect to the calibration menus organized by function and type of calibration:

Primary Calibration Menus

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)
- [“CALIBRATE Menu - 4-Port VNAs” on page 10-9](#)
- [“THRU UPDATE Menu - 4-Port VNAs” on page 10-10](#)

Calibration Utility Functions

The calibration utility function and management menus and dialog boxes are:

- [“CAL OPTIONS Menu - 4-Port VNAs” on page 10-13](#)
 - [“FLEXIBLE CAL SETUP Dialog Box - 4-Port VNAs” on page 10-15](#)
 - [“MANUAL ADAPTER REMOVAL Dialog Box - 4-Port VNAs” on page 10-17](#)
 - [“CAL MERGE Dialog Box - 4-Port VNAs” on page 10-19](#)
 - [“HYBRID CAL SETUP Dialog Box - 4-Port VNAs” on page 10-22](#)
 - [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)
- [“CAL KIT/AUTOCAL Menu - 4-Port VNAs” on page 10-40](#)
 - [“SAVE \(AUTOCAL CHARAC./CAL KIT\) Dialog Box - 4-Port VNAs” on page 10-42](#)
 - [“CAL KIT INFO Dialog Box - 4-Port VNAs” on page 10-44](#)
 - [“RESTORE DEFAULT COEF. Dialog Box - 4-Port VNAs” on page 10-47](#)

AutoCal Setup Menu

The main AutoCal setup menu is:

- [“AUTOCAL PORT Menu - 4-Port VNAs” on page 10-49](#)

AutoCal 4-Port Calibration - 4-Port VNA

- [“AUTOCAL SETUP Menu - 4-Port Cal - 4-Port VNAs” on page 10-50](#)
 - [“MODIFY 4-PORT AUTOCAL SETUP Dialog Box” on page 10-51](#)

AutoCal 2-Port Calibration - 4-Port VNA

- [“AUTO CAL SETUP Menu - 2-Port Cal - 4-Port VNAs” on page 10-54](#)
 - [“MODIFY 2-PORT AUTO CAL SETUP Dialog Box - 4-Port VNAs” on page 10-55](#)

AutoCal 1-Port Calibration - 4-Port VNA

- [“AUTO CAL SETUP Menu - 1-Port Cal - 4-Port VNAs” on page 10-58](#)
 - [“MODIFY 1-PORT AUTO CAL SETUP Dialog Box - 4-Port VNAs” on page 10-59](#)

Manual Calibration Configuration - 4-Port VNA

Once a calibration type is selected above in the MANUAL CALIBRATION menus, the following menus are used to set up the calibration method and line type. The settings in these menus define which dialog boxes will be available and the procedural menus that will appear for the specified calibration parameters:

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)
- [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)
- [“CAL METHOD Menu - 4-Port VNA” on page 10-66](#)
- [“LINE TYPE Menu - 4-Port VNA” on page 10-67](#)

Manual 4-Port Calibration - 4-Port VNA

- [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
 - [“FULL FOUR PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-72](#)
 - [“FULL FOUR PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box” on page 10-76](#)
 - [“FULL FOUR PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box” on page 10-79](#)
 - [“FULL FOUR PORT CAL SETUP \(SSST, WAVEGUIDE\) Dialog Box” on page 10-81](#)
 - [“FULL FOUR PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box” on page 10-83](#)
 - [“THRU/RECIP Menu - 4-Port VNAs” on page 10-97](#)
 - Summary Table:
 - [Table 10-3, “Manual 4-Port Cal Setup Dialog Box Summary” on page 10-88](#)

Manual 3-Port Calibration - 4-Port VNA

- “THREE PORT CAL Menu - 4-Port VNAs” on page 10-101
 - “THREE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-104
 - “THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box” on page 10-107
 - “THREE PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-110
 - “THREE PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box” on page 10-112
- Summary Table:
 - Table 10-4, “Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-116

Manual 2-Port Calibration - 4-Port VNA

- “TWO PORT CAL Menu - 4-Port VNAs” on page 10-121
 - “TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-123
 - “TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box” on page 10-126
 - “TWO PORT CAL SETUP (LRL/LRM, MICROSTRIP) Dialog Box” on page 10-129
- Summary Table:
 - Table 10-5, “Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-133

Manual 1-Port Calibration - 4-Port VNA

- “ONE PORT CAL Menu - 4-Port VNAs” on page 10-138
 - “ONE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-140
 - “ONE PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-144
 - “ONE PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box” on page 10-146
- Summary Table:
 - Table 10-6, “Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-148

Manual Transmission Frequency Response - 4-Port VNA

- “TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151
 - “TRANS. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-153
 - “TRANS. FREQ. RESP. CAL SETUP (SSLT, WAVEGUIDE) Dialog Box” on page 10-155
 - “TRANS. FREQ. RESP. CAL SETUP (SSST, MICROSTRIP) Dialog Box” on page 10-157
- Summary Table: “Trans. Freq. Resp. Manual Cal Setup Dialog Box Contents - 4-Port VNAs” on page 10-159

Manual Reflection Frequency Response Calibration - 4-Port VNA

- [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)
 - [“REFL. FREQ. RESP. CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-163](#)
 - [“REFL. FREQ. RESP. CAL SETUP \(SSLT, MICROSTRIP\) Dialog Box” on page 10-165](#)
 - [“REFL. FREQ. RESP. CAL SETUP \(SSST, WAVEGUIDE\) Dialog Box” on page 10-167](#)
 - Summary Table:
 - [Table 10-8, “Refl. Freq. Resp. Manual Cal. Setup Dialog Box Contents - 4-Port VNAs” on page 10-169](#)

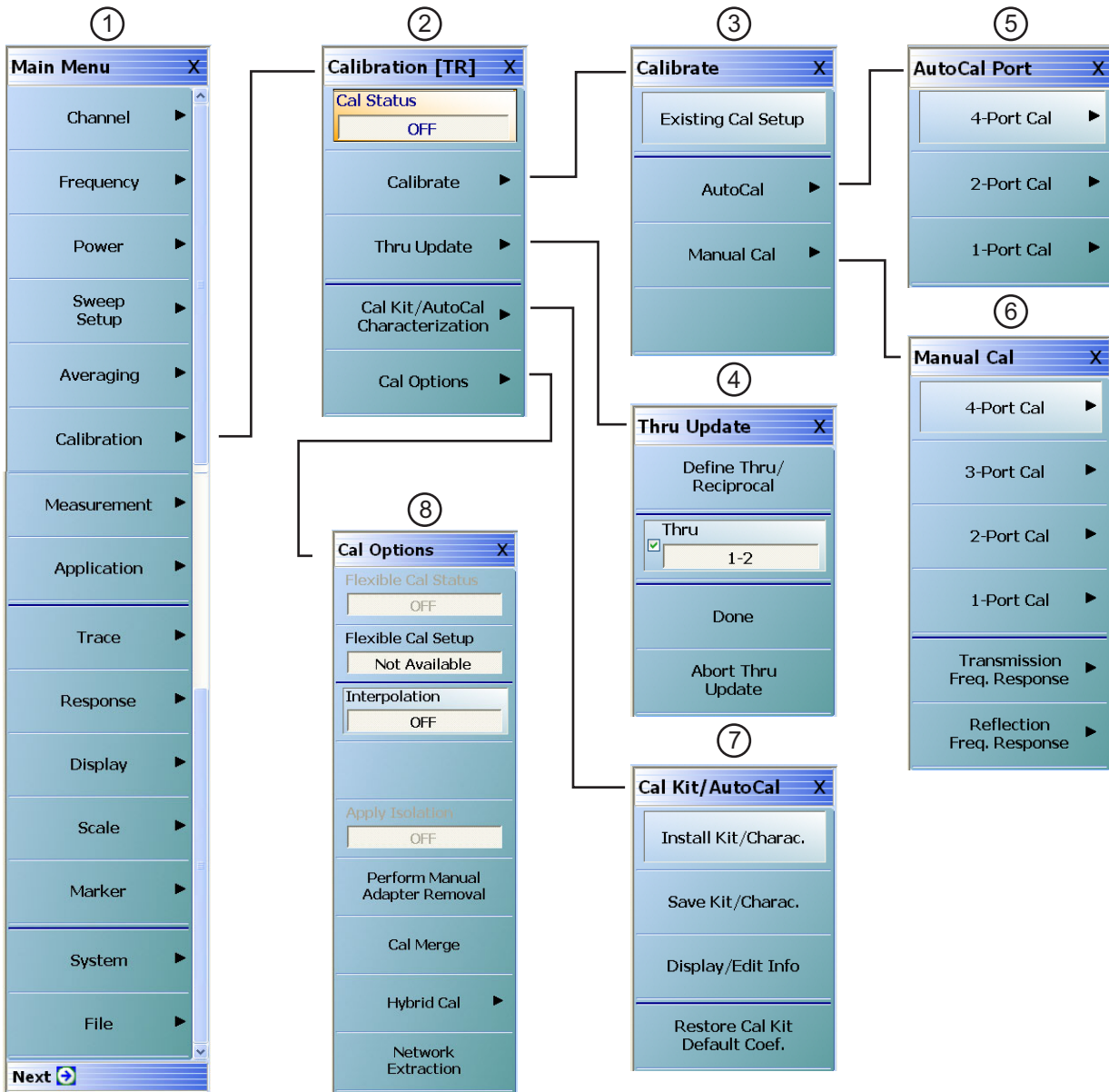
Manual Calibration General Dialog Boxes - 4-Port VNA

These dialog boxes are representative of those that can be linked to from multiple locations. Not all possible dialog boxes are shown:

- [“AIR EQUIVALENT LENGTH Calculator Dialog Box”](#) on page 10-173
- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box”](#) on page 10-177
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box”](#) on page 10-175
- [“THRU INFO Dialog Box - 4-Port VNAs”](#) on page 10-180
- [“USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM”](#) on page 10-181
- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes”](#) on page 10-182

10-3 Primary Menus for 4-Port VNA Calibration

The menus shown below provide the primary control for all 4-Port VNA calibration functions. From the AUTOCAL menu (below at #5), additional menus and dialog boxes provide configuration and setup for the 4-Port, 2-Port, and 1-Port AutoCal calibration procedures. From the MANUAL CAL menu (below at #6), additional menus and dialog boxes provide configuration and setup for the manual calibration 4-Port, 3-Port, 2-Port, 1-Port, Transmission Frequency Response, and Reflection Frequency Response procedures.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. MAIN menu 2. CALIBRATION Menu 3. CALIBRATE Menu 4. THRU UPDATE Menu | <ol style="list-style-type: none"> 5. AUTOCAL PORTS Menu 6. MANUAL CAL Menu 7. CAL KIT/AUTOCAL Menu for characterization file management. CAL OPTIONS Menu with links to calibration utilities menus and dialog boxes. |
|---|--|

Figure 10-1. Primary Calibration Menus for 4-Port VNAs

CALIBRATION [TR] Menu - 4-Port VNAs

Use the CALIBRATION menu to setup calibration options, configure AutoCal and cal kit characterization files, and to configure and run calibration routines.

Full Name

- CALIBRATION [TRANSMISSION-RESPONSE] Menu

Prerequisites

- The VNA is in 4-Port mode.
- The VNA is equipped with a Multiport Test Set.

Menu Name

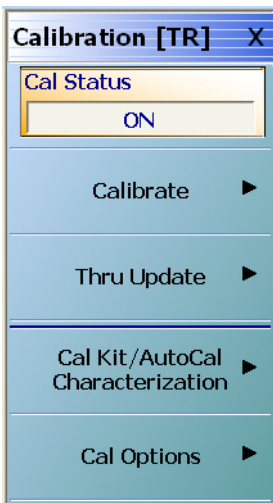
- The name of the CALIBRATION menu is appended with [TR] for transmission/reflection operational mode.
- The instrument operation mode is set on the APPLICATION menu.
 - MAIN | Application |APPLICATION
 - [“Application Menus - Overview” on page 12-1](#)
 - [“Application Menus - Multiple Source” on page 13-1](#)
 - [“Application Menus - Broadband/Millimeter-Wave” on page 14-1](#)
 - [“Application Menus - Noise Figure” on page 15-1](#)
 - [“Application Menus - Mixer Setup” on page 16-1](#)
 - [“Application Menus - NxN” on page 17-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Calibration | CALIBRATION



Cal Status (Off/On)

The Cal Status toggle button displays the calibration status based on the last calibration run.

If not calibrated, Cal Status cannot be changed from OFF and a calibration run must be successfully completed before the status can be changed.

If calibrated, Cal Status status can be toggled between OFF and ON. If ON, the Channel Status bar at the bottom of the display area shows a status of CORR in green.

Calibrate

Use the Calibrate button to start the AutoCal or manual calibration process. Options on sub-menus allow for selection of automatic or manual calibration, calibration type, calibration method, line type and other calibration parameters. Select displays the CALIBRATE menu.

- [“CALIBRATE Menu - 4-Port VNAs” on page 10-9](#)

Thru Update

Thru update is a calibration refreshing technique where the user connects a thru line and quickly refreshes the transmission tracking and load match terms without the time and complexity of a full calibration run. The thru update is essentially a one-step refresh calibration for Full 2 Port and 1 Path-2 Port calibrations.

Select displays the THRU UPDATE menu. If the Thru Update button is not available, a Full 4-Port, Full 3-Port, Full 2-Port, or 1 Path-2 Port calibration is not active. Complete one of the required calibrations to activate the Thru Update button.

- [“THRU UPDATE Menu - 4-Port VNAs” on page 10-10](#)

Cal Kit/AutoCal Characterization

Use this menu to save, load, and recall characterization files for AutoCal and manual calibration kits. Select displays the CAL KIT/AUTOCAL menu.

- [“CAL KIT/AUTOCAL Menu - 4-Port VNAs” on page 10-40](#)

Cal Options

Select displays the CAL OPTIONS menu.

- [“CAL OPTIONS Menu - 4-Port VNAs” on page 10-13](#)

Figure 10-2. CALIBRATION Menu - 4-Port VNAs

CALIBRATE Menu - 4-Port VNAs

Use the CALIBRATE menu to start the AutoCal or manual calibration process. Sub-menus within each category allow selection of calibration parameters, calibration types, calibration methods, line types, and test port connectors.

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE

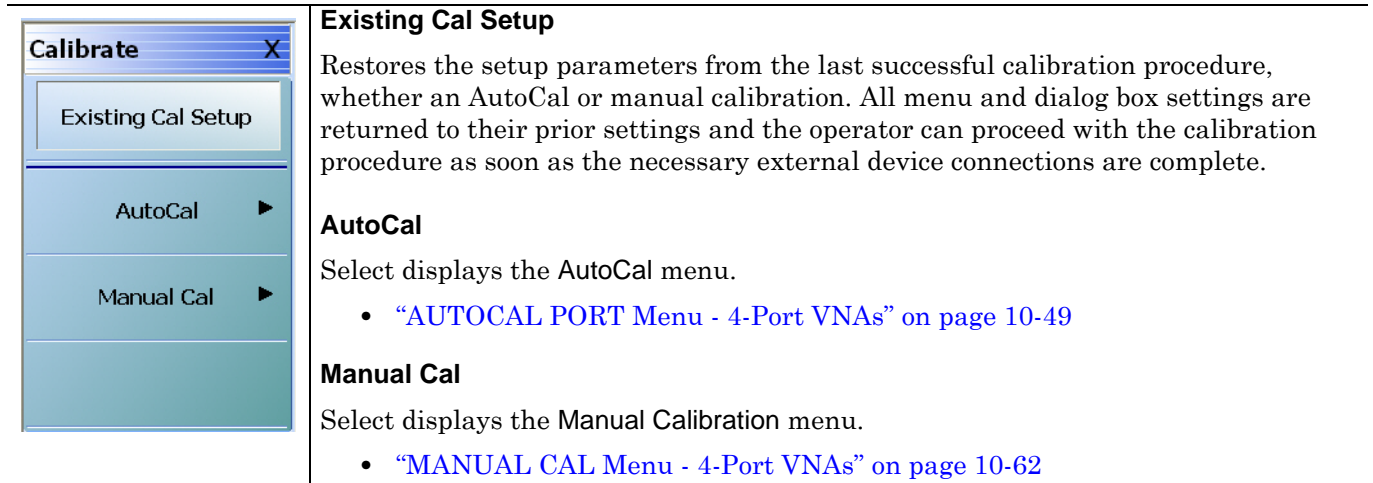


Figure 10-3. CALIBRATE Menu - 4-Port VNAs

THRU UPDATE Menu - 4-Port VNAs

The THRU UPDATE menu is a completion button menu. When the through update calibration procedure is complete, the button is annotated with a completion checkmark as shown in the figure below

Prerequisites

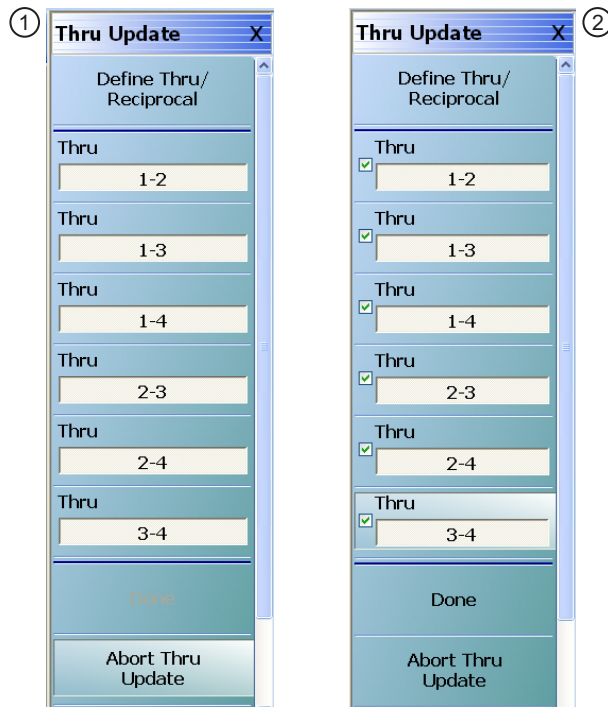
- The Thru Update button on the MANUAL CALIBRATION menu is not available unless a Full 4-Port, Full 3-Port, Full 2-Port, or a 1 Path-2 Port calibration has been successfully completed.
- The number of Thrus and the Thru pairs presented depends on the user-defined calibration configuration.

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Thru Update | THRU UPDATE



1. Starting THRU UPDATE calibration menu for 4-Port VNA system. The Done button is unavailable. The number of thrus and the thru pairs presented depends on the user configuration before the calibration and thru update.

2. At right, the completed THRU UPDATE calibration menu for 4-port VNA system on right with completion check marks and Done button available.

Figure 10-4. THRU UPDATE Calibration Menu – 4-Port VNAs

Define Thru/Reciprocal

Displays the THRU INFO dialog box where the through parameters can be changed.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)

Thru

The number of Thru buttons to appear depend on which were selected during the setup. The possible thru selections in a 4-Port system are 1-2, 1-3, 1-4, 2-3, 2-4, and 3-4. In the example menu above, all available 4-Port Thru measurements are required.

Done

When all calibrations are successfully completed, the Done button is available. Select returns to the CALIBRATION menu and the Cal Status button is set to ON.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Abort Thru Update

Abort Thru Update stops the current calibration procedure and returns to the CALIBRATION menu.

[“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

10-4 Calibration Utility Functions

The calibration utility functions and management menus and dialog boxes are:

- “CAL OPTIONS Menu - 4-Port VNAs” on page 10-13
 - “FLEXIBLE CAL SETUP Dialog Box - 4-Port VNAs” on page 10-15
 - “MANUAL ADAPTER REMOVAL Dialog Box - 4-Port VNAs” on page 10-17
 - “CAL MERGE Dialog Box - 4-Port VNAs” on page 10-19
 - “NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24
- “CAL KIT/AUTOCAL Menu - 4-Port VNAs” on page 10-40
 - “INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box - 4-Port VNAs” on page 10-41
 - “SAVE (AUTOCAL CHARAC./CAL KIT) Dialog Box - 4-Port VNAs” on page 10-42
 - “CAL KIT INFO Dialog Box - 4-Port VNAs” on page 10-44
 - “RESTORE DEFAULT COEF. Dialog Box - 4-Port VNAs” on page 10-47

CAL OPTIONS Menu - 4-Port VNAs

The CAL OPTIONS menu and related sub-menus provide access to advanced calibration options either before or after a calibration procedure has been completed.

Previous

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS

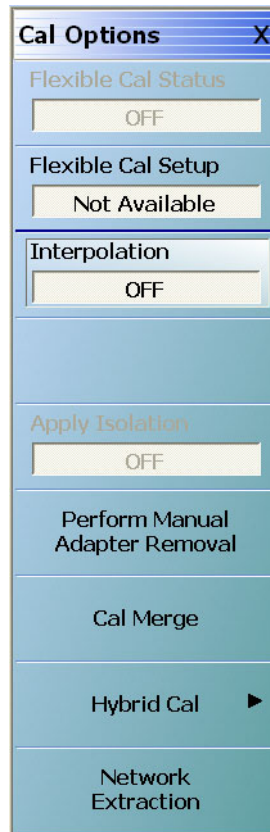


Figure 10-5. CAL OPTIONS (CALIBRATION OPTIONS) Menu

Flexible Cal Status (Off/On)

Flexible calibration is the ability to select a sub-set of a currently active calibration status. For example, if a Full 2 Port calibration has been completed, flexible calibration allows the calibration to be reduced to a Transmission Frequency Response calibration. Select toggles flexible calibration off and on.

Flexible Cal Setup

Use Flexible Cal Setup to change the parameters above. Select displays the FLEXIBLE CAL SETUP dialog box.

- [“FLEXIBLE CAL SETUP Dialog Box - 4-Port VNAs” on page 10-15](#)

Interpolation (Off/On)

Interpolation allows additional interpolated measurement points between calibrated measurement points. This is useful if the user wants to zoom into a specific area without having to recalibrate the instrument. The interpolated points must lie within the calibration frequency points. Select toggles interpolation OFF and ON with a default state of OFF.

Apply Isolation (Off/On)

If this button is unavailable, isolation calibration was not performed. The isolation calibration procedure is started by a button on the calibration type menu.

If this button is available, isolation calibration was performed, and select toggles isolation calibration OFF and ON.

Perform Manual Adapter Removal

Manual adapter removal extracts the behavior of the adapter from the setup after a successful calibration. Select displays the MANUAL ADAPTER REMOVAL dialog box.

- [“MANUAL ADAPTER REMOVAL Dialog Box - 4-Port VNAs” on page 10-17](#)

Hybrid

Hybrid calibration takes either up to four 1-port cals and hybridizes them into a 2-port, 3-port, or 4-port cal, or takes two 2-port cals and hybridizes them into 1 4-port cal.

- See [Chapter 9, “Calibration Menus - 2-Port VNAs”](#) and the section [“HYBRID CAL Menu - 2-Port VNAs” on page 9-18](#).

Cal Merge

Cal Merge allows merging two calibration files into a single file where the calibrations can use different methods at different frequencies. The calibrations must be of the same calibration type. Select displays the CAL MERGE dialog box.

- [“CAL MERGE Dialog Box - 4-Port VNAs” on page 10-19](#)

Network Extraction

Use network extraction to generate an S-Parameter (.s2p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the NETWORK EXTRACTION dialog box.

- [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)

FLEXIBLE CAL SETUP Dialog Box - 4-Port VNAs

Use the Flexible Cal Setup dialog box to define a calibration sub-set of the currently active calibration.

Previous

- [“CAL OPTIONS Menu - 4-Port VNAs” on page 10-13](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup | FLEXIBLE CAL SETUP Dialog Box

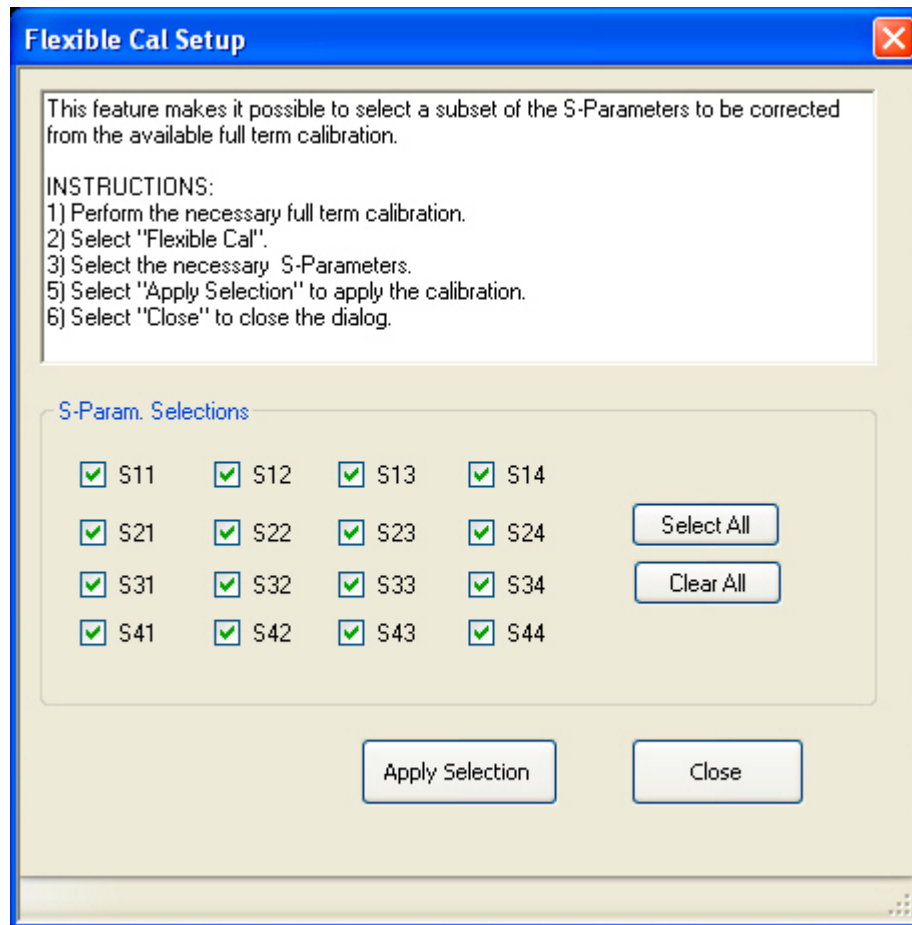


Figure 10-6. FLEXIBLE CAL SETUP (FLEXIBLE CALIBRATION SETUP) Dialog Box – 4-Port VNAs

Instructions

The flexible calibration setup feature makes it possible to select a subset of the S-Parameters to be corrected from the available full-term calibration.

Procedure

1. Perform the necessary full-term calibration.
2. Navigate to the FLEXIBLE CAL SETUP dialog box appears:
 - MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup | FLEXIBLE CAL SETUP

3. Select the input method (full term, reflection only, or customize). The default selection is full term calibration with all the ports turned on for the available calibration type. The following radio button options are available in the **Input Method** area:
 - Full Term Cal (By Port)
 - Reflection Only (By Port)
 - Customize Cal (By S-Param)
4. If **Full Term Cal (By Port)** is selected above, the area label is **Port Selections (Full Term)** with available options of:
 - Port 1 and/or
 - Port 2
5. If **Reflection Only (By Port)** is selected above, the area label is **Port Selections (Reflection Only)** with the available options of:
 - Port 1 and/or
 - Port 2
6. If **Customize Cal (By S-Param)** is selected, the **S-Param Selections** area appears with S-Parameter selection check boxes. Select any combination of:
 - S11
 - S21
 - S12
 - S22
7. Select **Apply Selection** to apply the selections.
8. Select **Close** to close the dialog without saving the selections.

MANUAL ADAPTER REMOVAL Dialog Box - 4-Port VNAs

Use manual adapter removal to extract the electrical behavior of an adapter after a successful calibration procedure. This is especially useful when the DUT configuration is not entirely compatible with common calibration procedures such as having different connectors at each end.

Previous

- [“CAL OPTIONS Menu - 4-Port VNAs” on page 10-13](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Perform Manual Adapter Removal | MANUAL ADAPTER REMOVAL Dialog Box

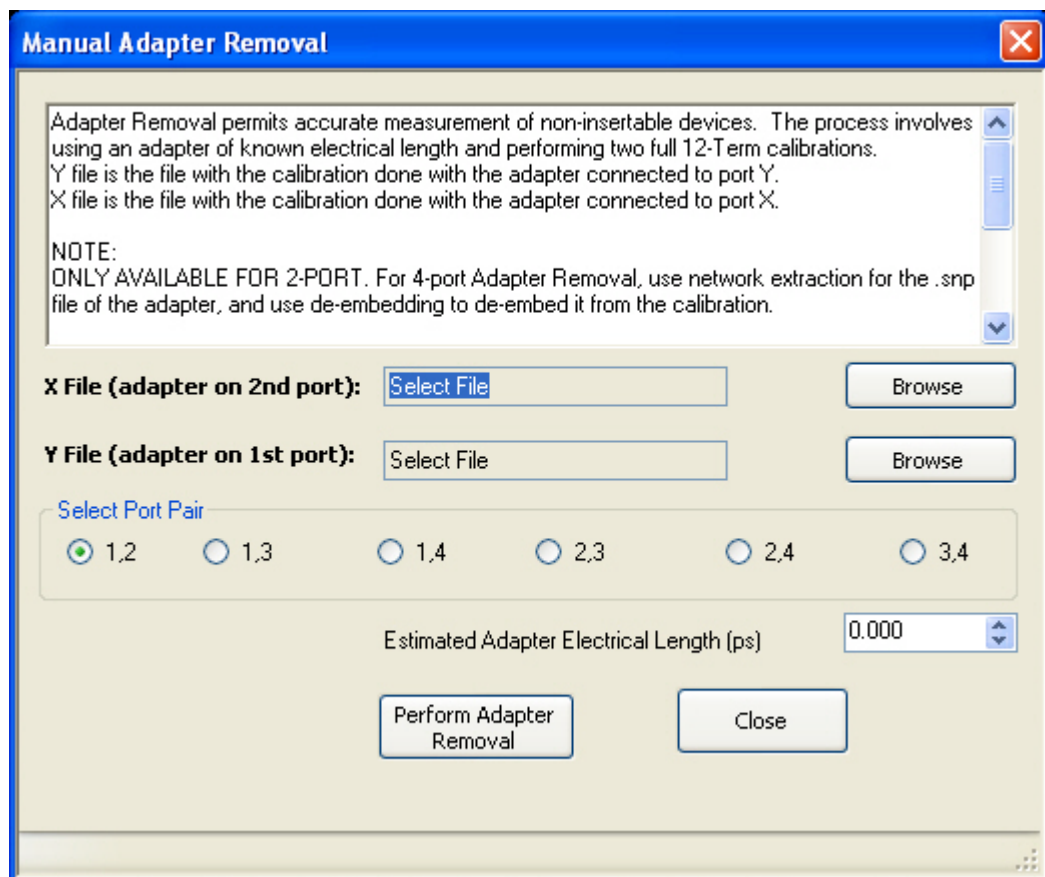


Figure 10-7. MANUAL ADAPTER REMOVAL Dialog Box

Instructions

Adapter removal permits accurate measurement of non-insertable devices. The process involves using an adapter of known electrical length and performing two full 12-term calibrations. In the procedure below:

- The Y file is the file with the calibration when the adapter connected to Port 1.
- The X file is the file with the calibration when the adapter connected to Port 2.

Note	ONLY AVAILABLE FOR 2-PORT. For 4-port Adapter Removal, use network extraction for the SNP file of the adapter, and use de-embedding to de-embed it from the calibration.
-------------	---

Procedure

Select the port pair to be used from the following port combinations: 1,2; 1,3; 1,4; 2,3; 2,4; or 3,4.

1. Connect the adapter to Port X where X signifies any port. Perform a full 12-term calibration using Y' and Y as the test ports and store calibration to disk.
2. Connect the adapter to Port Y where Y signifies any port that is not X. Perform a full 12-term calibration using X and X' as the test ports and store calibration to disk.
3. Call up the X and Y files.
4. Input the estimated adapter electrical length in picoseconds (ps).
5. Select Perform Adapter Removal to remove adapter.

CAL MERGE Dialog Box - 4-Port VNAs

Calibration merge allows merging two calibration files into a single file where the prior calibrations can use different methods (such as SOLT and SSLT) at different frequencies. The calibrations must be the same calibration type (such as Full 1 Port) and be available on the instrument hard drive. Calibration merge has other requirements (described below) as to the number of points, start and stop frequencies, and front panel settings.

Prerequisites

- 4-Port Mode

Previous

- [“CAL OPTIONS Menu - 4-Port VNAs” on page 10-13](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Cal Merge | CAL MERGE Dialog Box

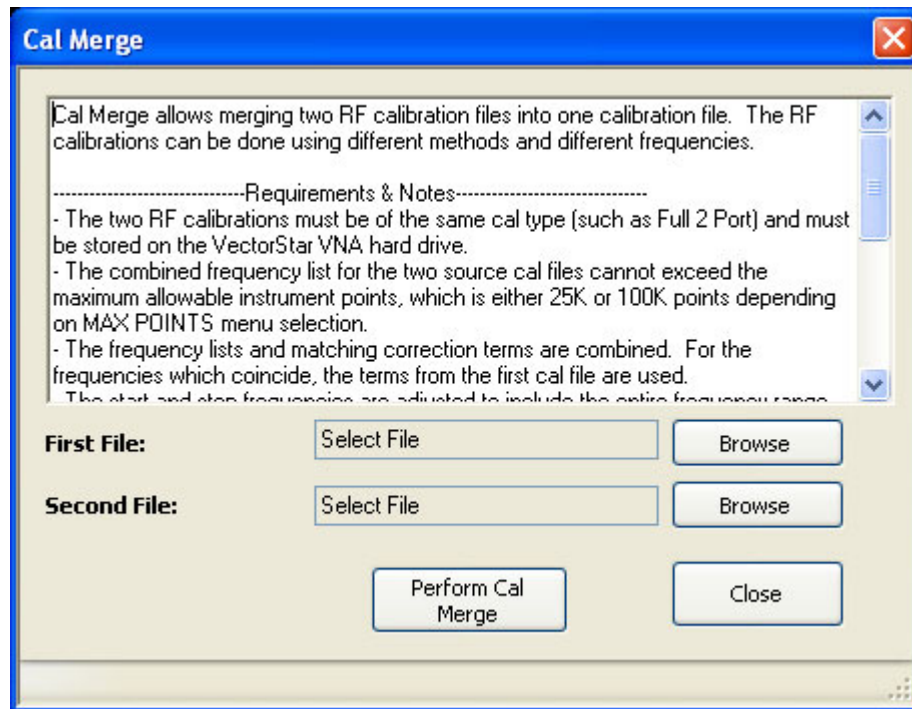


Figure 10-8. CAL MERGE Dialog Box

Instructions

Cal Merge allows merging two RF calibration files into one calibration file. The RF calibrations can be done using different methods and different frequencies.

Requirements and Notes

- The two RF calibrations must be of the same calibration type (such as Full 2 Port) and must be stored on the VectorStar VNA hard drive.
- The combined frequency list for the two source cal files cannot exceed the maximum allowable instrument points, which is either 25K or 100K points depending on MAX POINTS menu selection.
- The frequency lists and matching correction terms are combined. For the frequencies which coincide, the terms from the first cal file are used.
- The start and stop frequencies are adjusted to include the entire frequency range provided by the two cal files.
- The first cal file provides all other front panel setup configuration information.
- Since Calibration Merge can result in non-discrete step size, the cal merge file sweep type is set to Frequency-Based Segmented Sweep.

Procedure

1. Select **Browse** to select the appropriate cal files. For example, select a file such as `calfile1.chx` for the first file and `calfile2.chx` for the second file.
2. Select **Perform Cal Merge** to perform the merge of the frequency lists and matching correction terms.
3. For best practices it is recommend saving the resultant Cal Merge file, but a save is not required.

HYBRID CAL Menu - 4-Port VNAs

Prerequisites

- 4-Port Mode

Previous

- [“CAL OPTIONS Menu - 4-Port VNAs” on page 10-13](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Hybrid Cal | HYBRID CAL

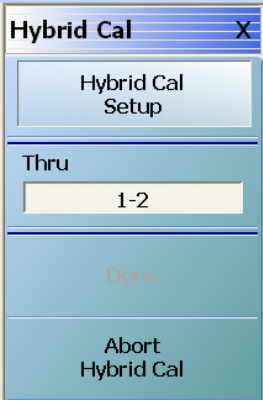
	<p>Hybrid Cal Setup</p> <p>Use Hybrid Cal Setup to change the hybrid calibration parameters. Select displays the HYBRID CAL SETUP dialog box.</p> <ul style="list-style-type: none"> • “HYBRID CAL SETUP Dialog Box - 4-Port VNAs” on page 10-22 <p>Thru</p> <p>Read-only display. Shows the thru port pair configured in the HYBRID CAL SETUP dialog box.</p> <p>Done</p> <p>The Done button is unavailable until a successful hybrid calibration has been completed. When available, select returns to the CAL OPTIONS menu.</p> <ul style="list-style-type: none"> • “CAL OPTIONS Menu - 4-Port VNAs” on page 10-13 <p>Abort Hybrid Cal</p> <p>The Abort button is unavailable until a hybrid calibration is started. Selection cancels the hybrid calibration, and returns to the CAL OPTIONS menu.</p> <ul style="list-style-type: none"> • “CAL OPTIONS Menu - 4-Port VNAs” on page 10-13
---	--

Figure 10-9. CAL OPTIONS (CALIBRATION OPTIONS) Menu

HYBRID CAL SETUP Dialog Box - 4-Port VNAs

Prerequisites

- 4-Port Mode

Previous

- [“HYBRID CAL Menu - 4-Port VNAs” on page 10-21](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Hybrid Cal | HYBRID CAL | Hybrid Cal Setup | HYBRID CAL SETUP Dialog Box

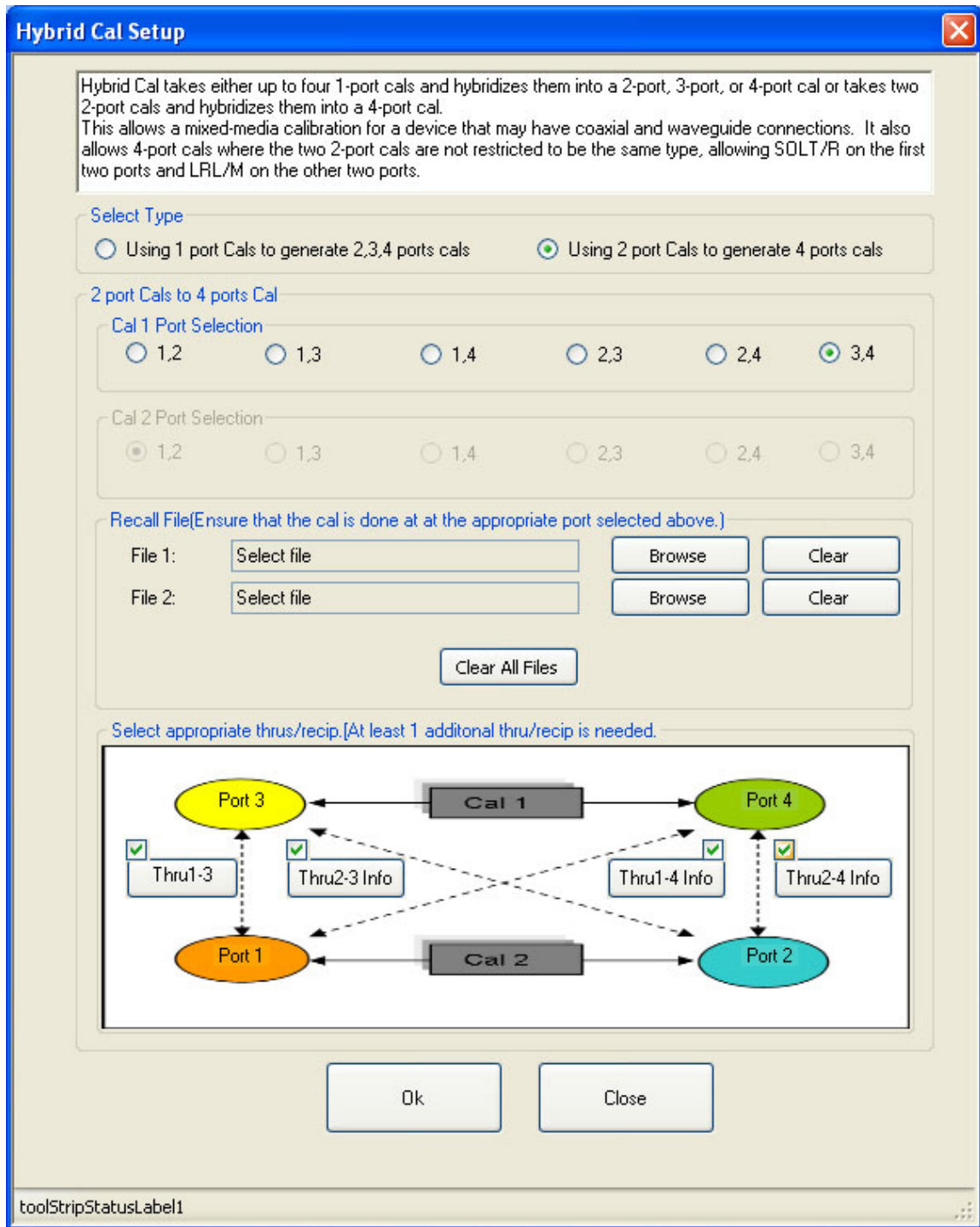


Figure 10-10. HYBRID CAL (CALIBRATION) Dialog Box – 4-Port VNAs

NETWORK EXTRACTION Dialog Box - 4-Port VNAs

The network extraction features provides a method of generating an S-Parameter (S2P) file for a set of networks. The S2P file can then be embedded or de-embedded into the VNA’s error coefficient as required. The first NETWORK EXTRACTION dialog box allow selection of one of the seven types of extraction available.

Prerequisites

- 4-Port Mode

Previous

- “CAL OPTIONS Menu - 4-Port VNAs” on page 10-13

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box

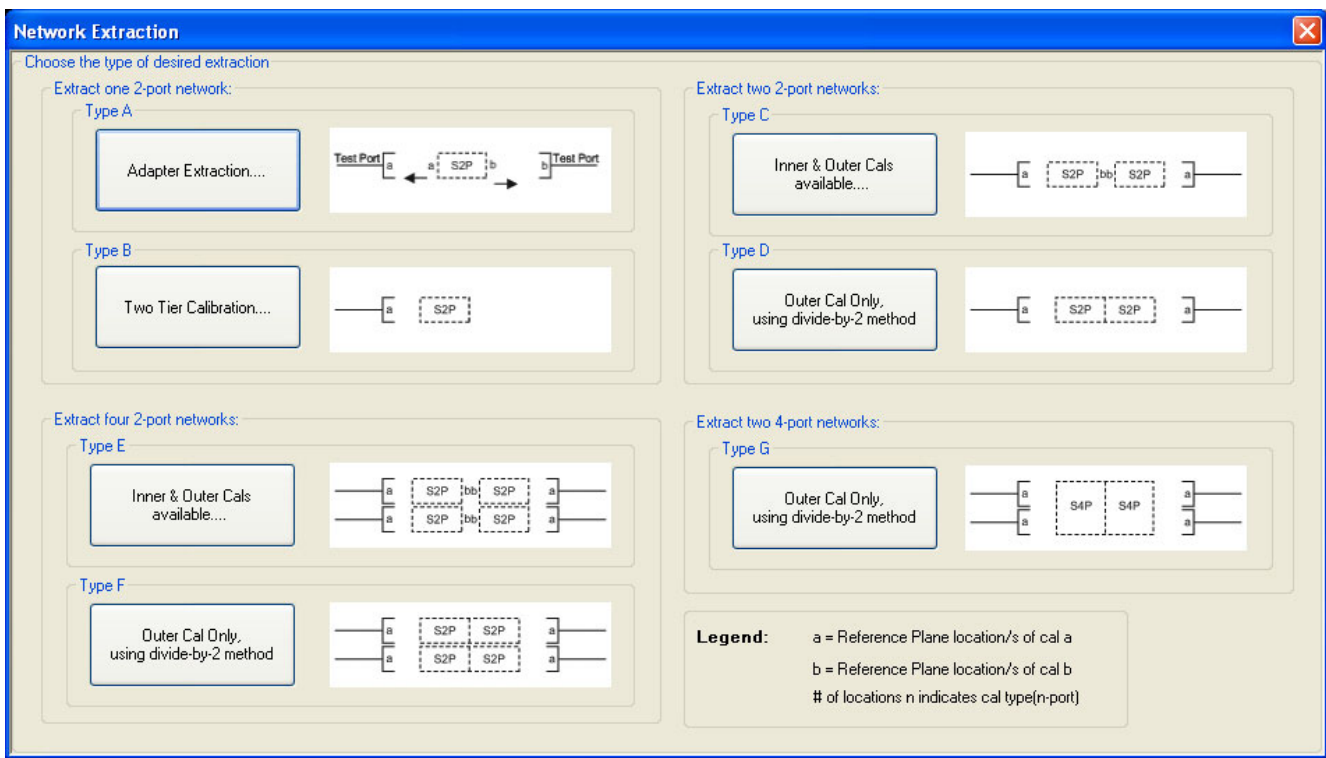


Figure 10-11. NETWORK EXTRACTION Dialog Box – 4-Port VNAs

Instructions

The network extraction feature provides the method for generating the S-Parameters for a given set of networks. This generated S2P file can then be embedded or de-embedded into the VNA error coefficient at a later stage. The table below summarizes the types of network extractions and their general attributes. Follow the cross references for additional information about each type of network extraction.

Table 10-1. Network Extraction Type Definitions

Network Extraction Type	Extract These Networks	Extraction Method	Cross Reference to Dialog Box Description
Type A	One 2-Port Networks	Adapter Extraction	"NETWORK EXTRACTION Dialog Box – Type A – 4-Port VNAs" on page 10-26
Type B		Two Tier Calibration	"NETWORK EXTRACTION Dialog Box – Type B – 4-Port VNAs" on page 10-28
Type C	Two 2-Port Networks	Inner and Outer Cals Available	"NETWORK EXTRACTION Dialog Box – Type C – 4-Port VNAs" on page 10-30
Type D		Outer Cal only using Divide-by-Two Method	"NETWORK EXTRACTION Dialog Box – Type D – 4-Port VNAs" on page 10-32
Type E	Four 2-Port Networks	Inner and Outer Cals Available	"NETWORK EXTRACTION Dialog Box – Type E – 4-Port VNAs" on page 10-34
Type F		Outer Cal only using Divide-by-Two Method	"NETWORK EXTRACTION Dialog Box – Type F – 4-Port VNAs" on page 10-36
Type G	Two 4-Port Networks	Outer Cal only using Divide-by-Two Method	"NETWORK EXTRACTION Dialog Box – Type G – 4-Port VNAs" on page 10-38

Requirements and Notes

The outer and inner files must meet the following requirements:

- Both files must be from a full term calibration such as a Full 12-Term (SOLT) calibration.
- Both files must be the same calibration type.
- Both files must have the same frequencies and number of points.

Procedure

1. Select **Browse** to display the **OPEN (SETUP CAL FILE)** dialog box and select the appropriate Outer File and Inner File.
2. Select the **Perform Ntwk. Extraction** button on the dialog box to perform the extraction.
3. If the extraction is successful, follow the prompt to save the appropriate S2P files. For a Full 12 Term Calibration, two (2) S2P files will be generated.
4. If either file is incorrect, a warning message is displayed.
5. Click **Close** to exit the dialog box.

NETWORK EXTRACTION Dialog Box – Type A – 4-Port VNAs

Full Name

- NETWORK EXTRACTION Dialog Box – Type A – One 2-Port Network - Adapter Extraction - 4-Port VNAs

Previous

- “NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract One 2-Port Network | Type A - Adapter Extraction | NETWORK EXTRACTION [EXTRACT ONE 2-PORT NETWORK (TYPE A)] Dialog Box

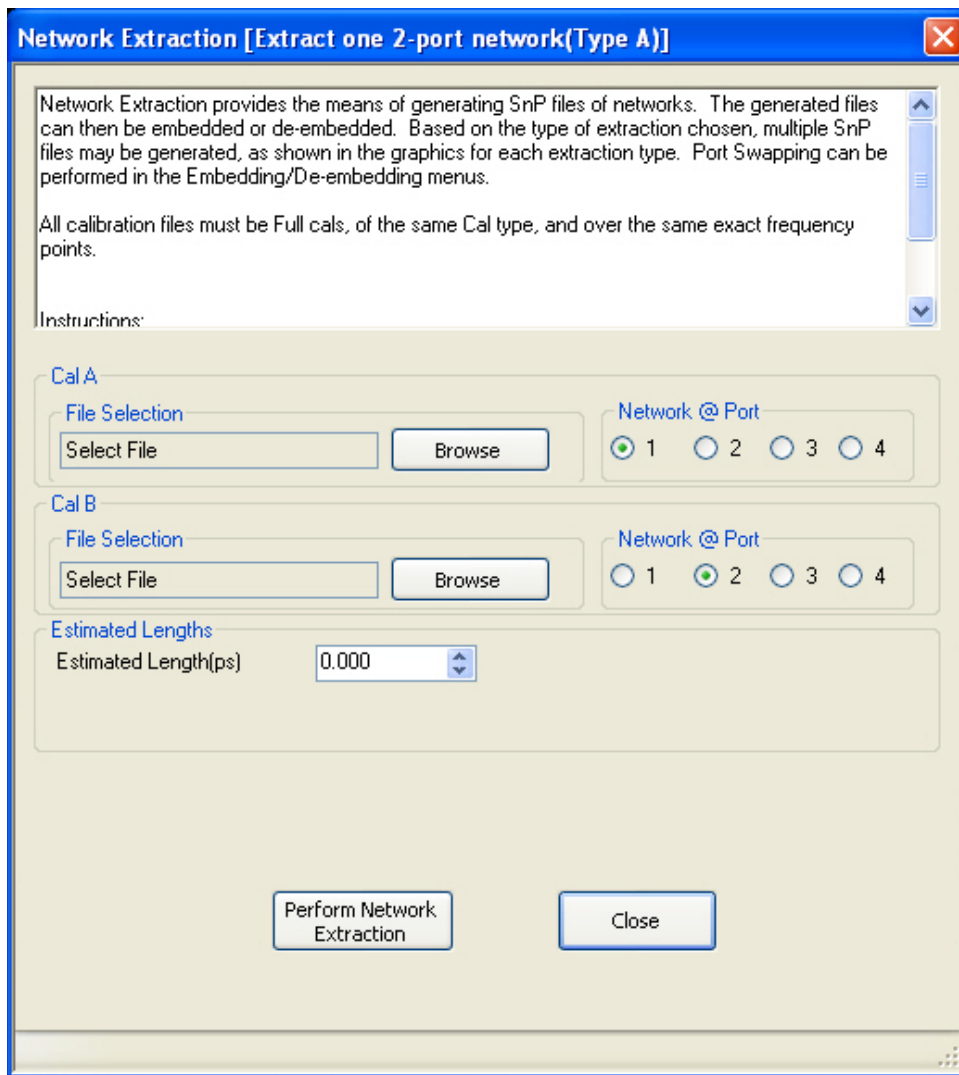


Figure 10-12.NETWORK EXTRACTION - EXTRACT ONE 2-PORT NETWORK - TYPE A - 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

All calibration files must be Full cals, of the same Cal type, and over the same exact frequency points.

Procedure

1. Select **Browse** to select the appropriate cal file or files.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP file or files.

NETWORK EXTRACTION Dialog Box – Type B – 4-Port VNAs

Full Name

- NETWORK EXTRACTION Dialog Box – Type B – Extract One 2-Port Network - Two Tier Calibration - 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract One 2-Port Network | Type B - Two Tier Calibration | NETWORK EXTRACTION [EXTRACT ONE 2-PORT NETWORK (TYPE B)] Dialog Box

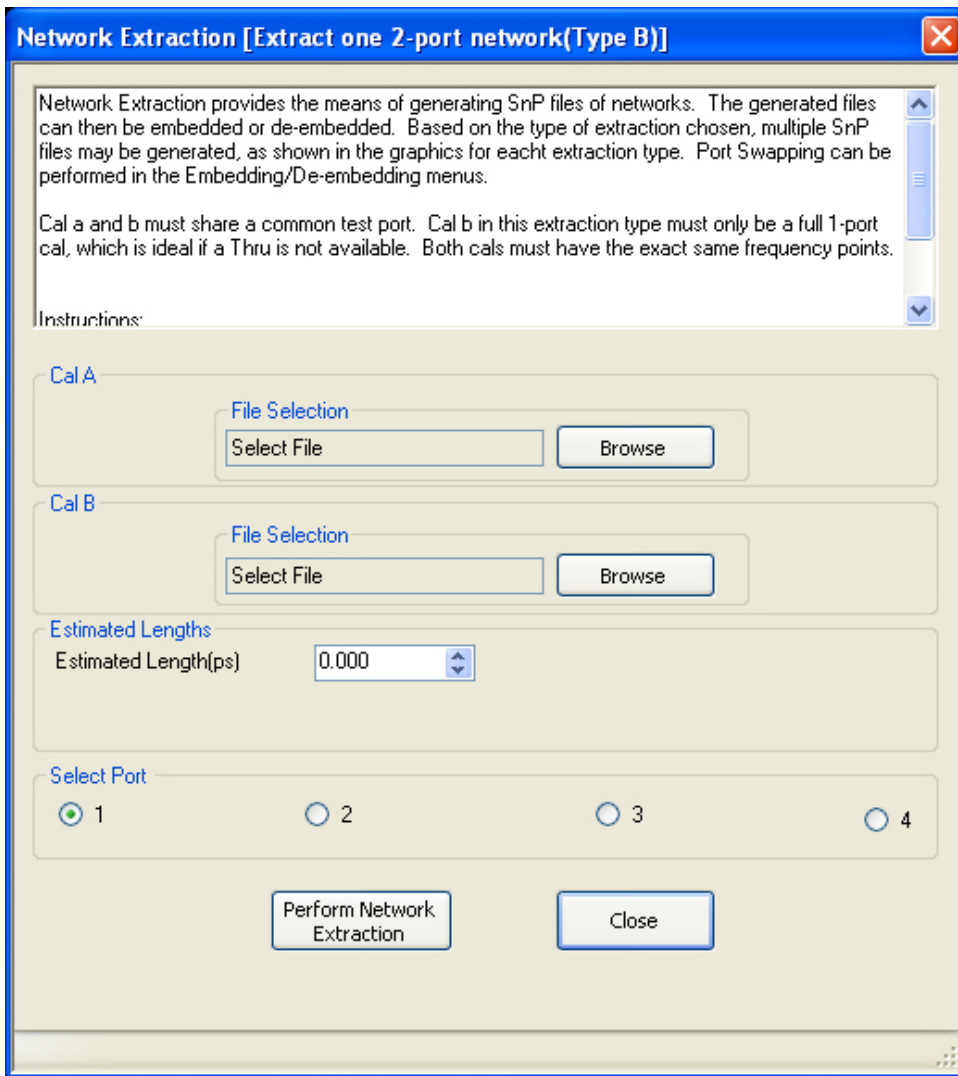


Figure 10-13. NETWORK EXTRACTION - EXTRACT ONE 2-PORT NETWORK - TYPE B - 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

Cal A and Cal B must share a common test port. Cal A in this extraction type must only be a full 1-port cal, which is ideal if a Thru is not available. Both cal's must have the exact same frequency points.

Procedure

1. Select **Browse** to select the appropriate cal file/s.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP file or files.

NETWORK EXTRACTION Dialog Box – Type C – 4-Port VNAs

Full Name

- NETWORK EXTRACTION Dialog Box – Type C – Extract Two 2-Port Networks - Inner and Outer Cals Available - 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Two 2-Port Networks | Type C - Inner and Outer Cals Available | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE C)] Dialog Box

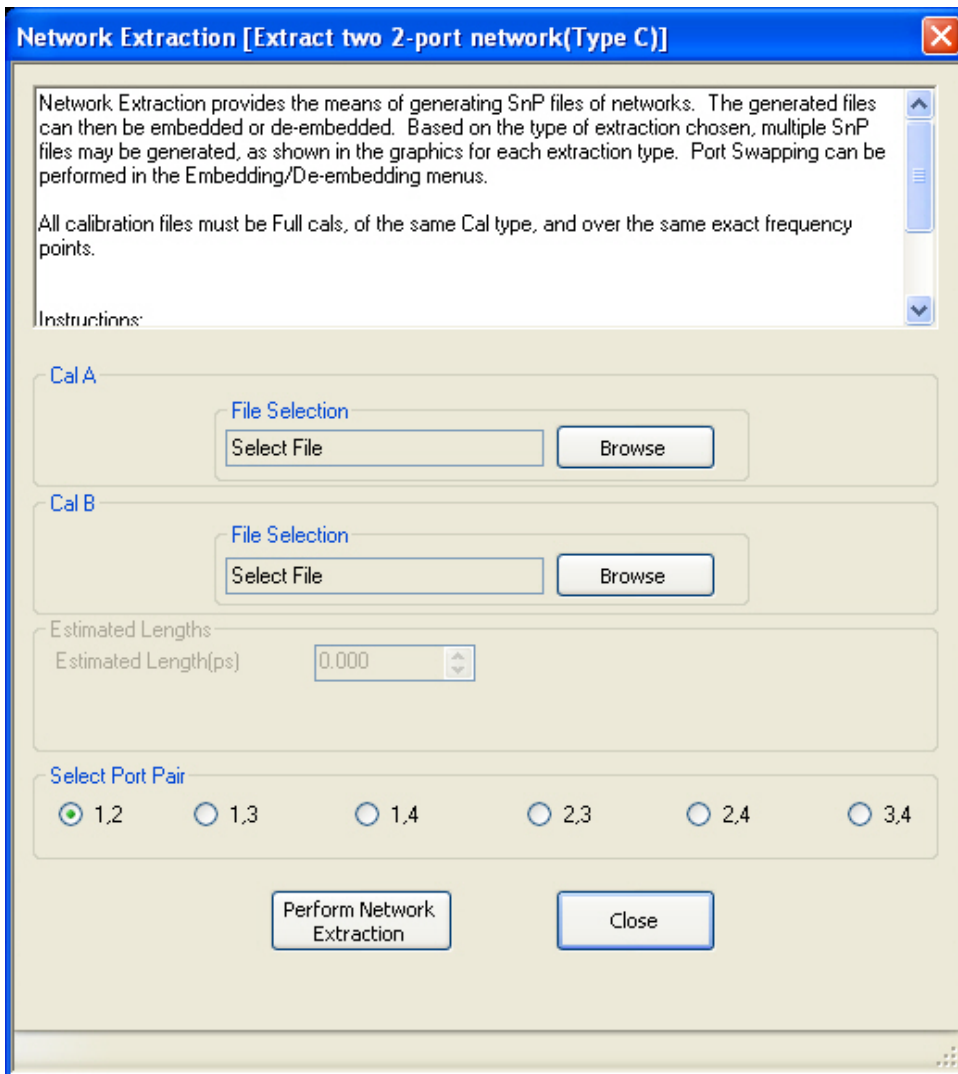


Figure 10-14. NETWORK EXTRACTION - EXTRACT TWO 2-PORT NETWORKS - TYPE C - 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding / De-embedding menus.

All calibration files must be Full cals, of the same Cal type, and over the same exact frequency points.

Procedure

1. Select **Browse** to select the appropriate cal file/s. Note CalA is the inner file and CalB is the outer file.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP file or files.

NETWORK EXTRACTION Dialog Box – Type D – 4-Port VNAs

Full Name

- NETWORK EXTRACTION Dialog Box – Type D – Extract Two 2-Port Networks - Outer Cal Only Using Divide-By-Two Method - 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Two 2-Port Networks | Type D - Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE D)] Dialog Box

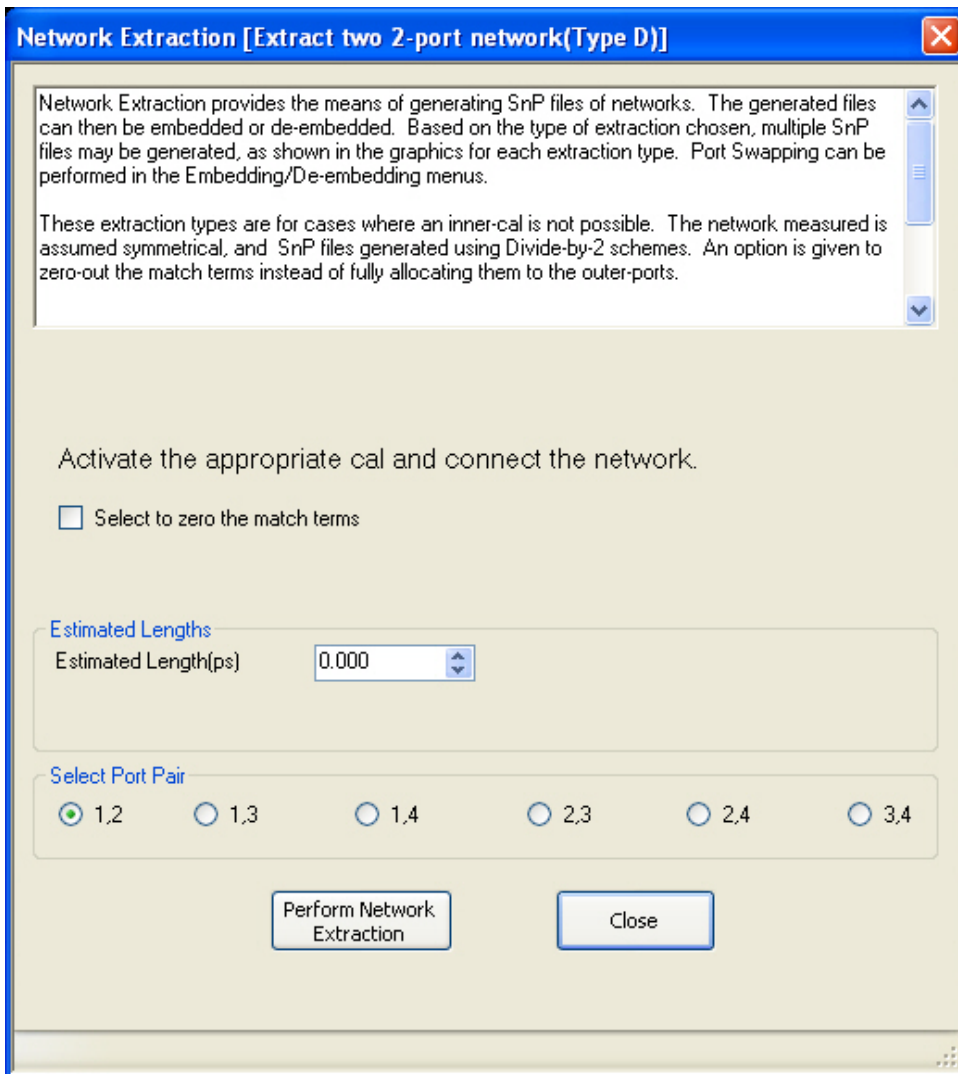


Figure 10-15.NETWORK EXTRACTION - EXTRACT TWO 2-PORT NETWORKS - TYPE D - 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-By-Two (2) schemes. An option is given to zero-out the match terms instead of fully allocating them to the outer-ports.

Procedure

1. Make sure the appropriate calibration is active.
2. Zero-out the match terms if needed.
3. Connect the network and select Perform Network Extraction to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP file or files.

NETWORK EXTRACTION Dialog Box – Type E – 4-Port VNAs

Full Name

- NETWORK EXTRACTION Dialog Box – Type E – Extract Four 2-Port Networks - Inner and Outer Cals Available - 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Four 2-Port Networks | Type E - Inner and Outer Cals Available | NETWORK EXTRACTION [EXTRACT FOUR 2-PORT NETWORKS (TYPE E)] Dialog Box

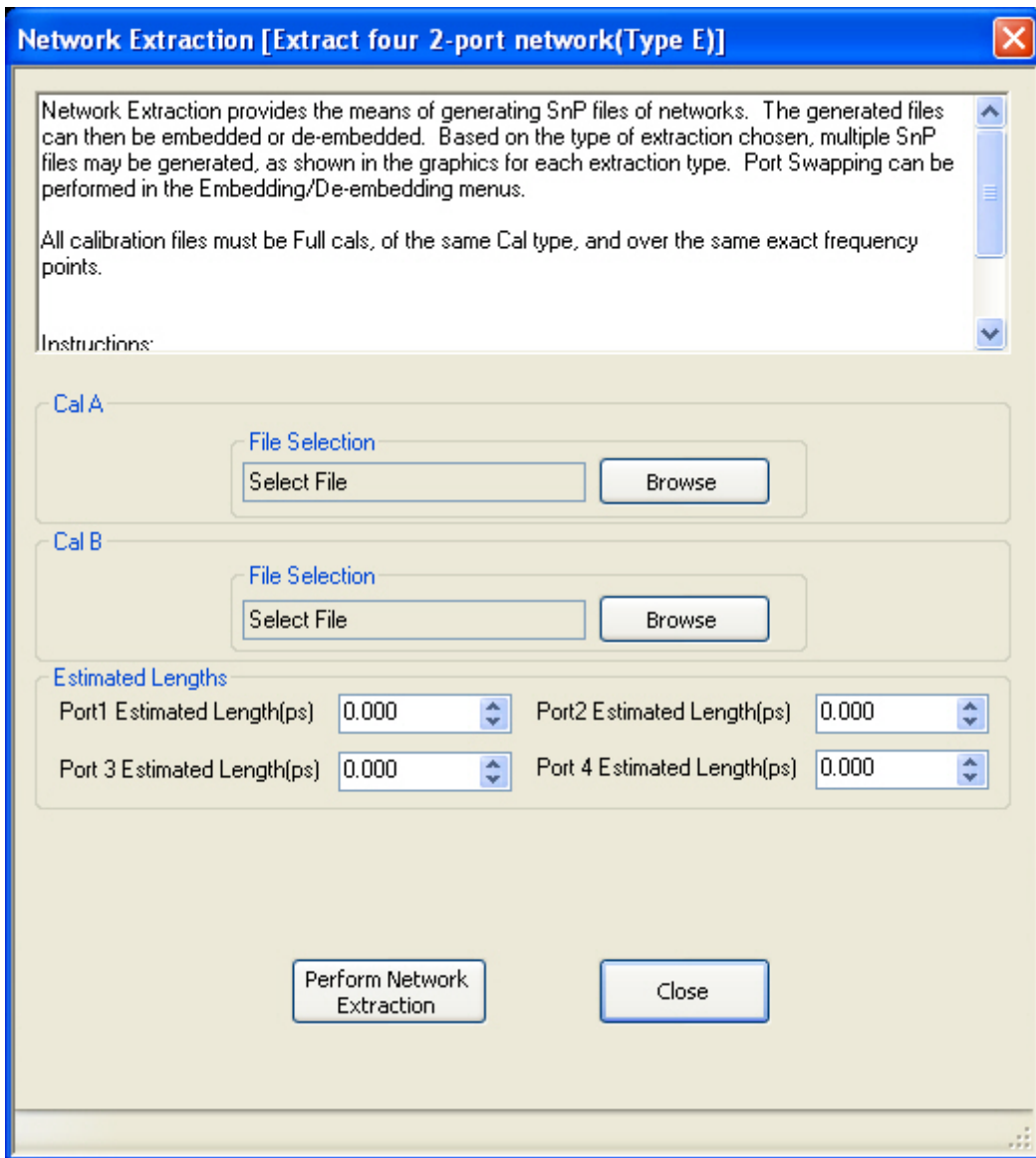


Figure 10-16.NETWORK EXTRACTION - EXTRACT TWO 2-PORT NETWORKS - TYPE E - 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

All calibration files must be Full cals, of the same Cal type, and over the same exact frequency points.

Procedure

1. Select **Browse** to select the appropriate cal file/s.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP file or files.

NETWORK EXTRACTION Dialog Box – Type F – 4-Port VNAs

Full Name

- NETWORK EXTRACTION Dialog Box – Type F – Extract Four 2-Port Networks - Outer Cal Only Using Divide-By-Two Method - 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Four 2-Port Networks | Type F - Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT FOUR 2-PORT NETWORKS (TYPE F)] Dialog Box

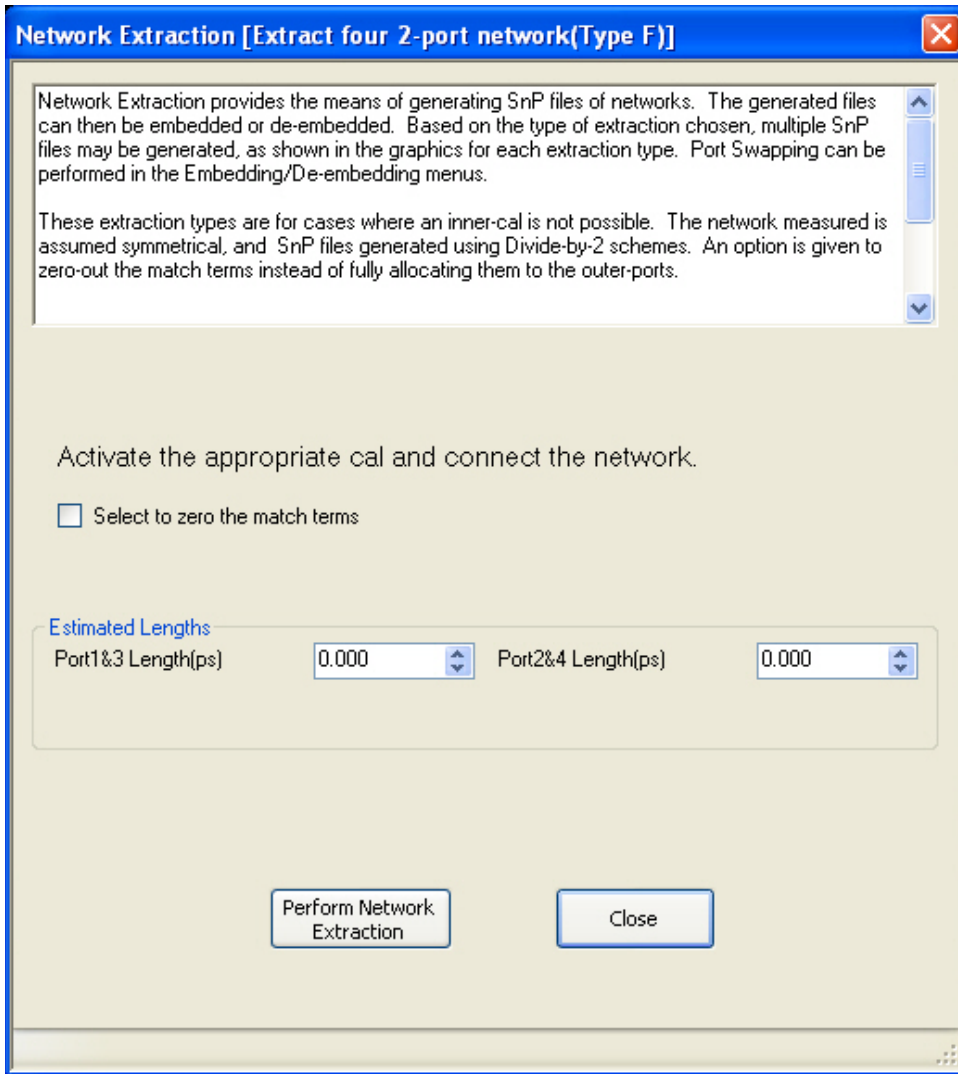


Figure 10-17.NETWORK EXTRACTION - EXTRACT TWO 2-PORT NETWORKS - TYPE F - 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-By-Two (2) schemes. An option is given to zero-out the match terms instead of fully allocating them to the outer-ports.

Procedure

1. Make sure the appropriate calibration is active.
2. Zero-out the match terms if needed.
3. Connect the network and select Perform Network Extraction to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP file or files.

NETWORK EXTRACTION Dialog Box – Type G – 4-Port VNAs

Full Name

- NETWORK EXTRACTION Dialog Box – Type G – Extract Two 4-Port Networks - Outer Cal Only Using Divide-By-Two Method - 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Dialog Box - 4-Port VNAs” on page 10-24](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Network Extraction | NETWORK EXTRACTION Dialog Box | Extract Two 4-Port Networks | Type G - Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT TWO 4-PORT NETWORKS (TYPE G)] Dialog Box

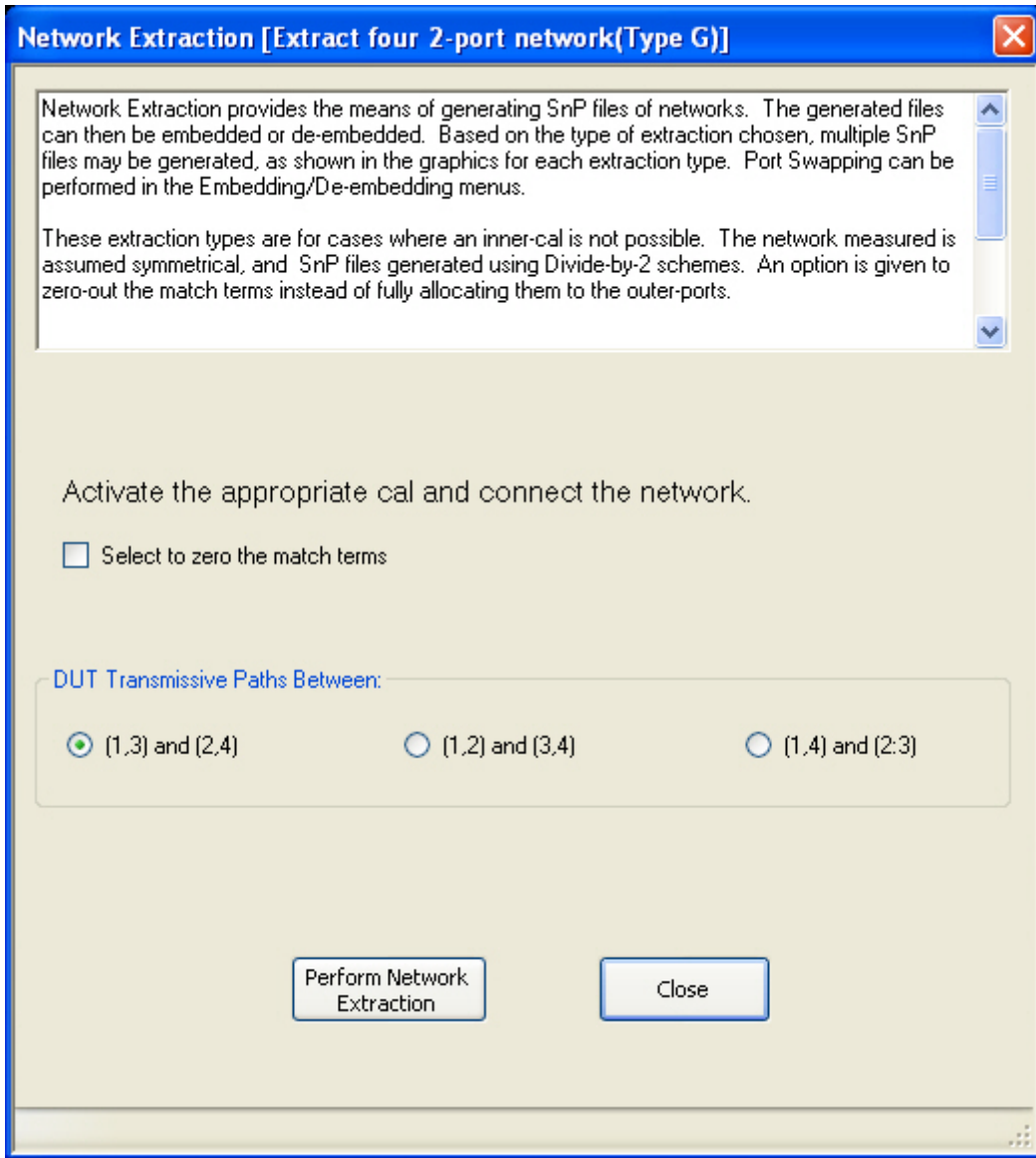


Figure 10-18. NETWORK EXTRACTION - EXTRACT FOUR 2-PORT NETWORKS - TYPE G - 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Based on the type of extraction chosen, multiple SnP files may be generated, as shown in the graphics for each extraction type. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide by 2 schemes. An option is given to zero-out the match terms instead of fully allocating them to the outer-ports.

Procedure

1. Make sure the appropriate calibration is active.
2. Zero-out the match terms if needed.
3. Connect the network and select Perform Network Extraction to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP file or files.

CAL KIT/AUTOCAL Menu - 4-Port VNAs

Use the CAL KIT/AUTOCAL menu to install, save, and restore calibration kit characterization files between an external memory device, the instrument firmware, and a hard drive on the instrument or on a network.

Full Name

- FULL MANUAL CALIBRATION KIT / AUTOMATIC CALIBRATOR (AUTOCAL) Menu

Previous

- [“CALIBRATION Menu - 2-Port VNAs” on page 9-6](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL

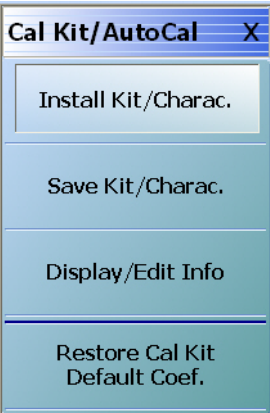
	<p>Install Kit/Charac. Select loads the Calibration Kit file or AutoCal Characterization file from the hard drive or external memory device into the VNA firmware through the INSTALL (AutoCal Characterization/Cal Kit File) dialog box.</p> <ul style="list-style-type: none"> • “INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box - 4-Port VNAs” on page 10-41 <p>Save Kit/Charac. Select saves the Cal Kit or AutoCal Characterization file from the firmware to the location of choice (typically the instrument hard drive) for later use through the SAVE (AutoCal Characterization/Cal Kit) File dialog box.</p> <ul style="list-style-type: none"> • “SAVE (AUTOCAL CHARAC./CAL KIT) Dialog Box - 4-Port VNAs” on page 10-42 <p>Display/Edit Info Select displays the CAL KIT INFO dialog box which shows parametric information about the calibration kit and allows user edits of the values.</p> <ul style="list-style-type: none"> • “CAL KIT INFO Dialog Box - 4-Port VNAs” on page 10-44 <p>Restore Cal Kit Default Coef. Select displays the RESTORE DEFAULT COEF dialog box.</p> <ul style="list-style-type: none"> • “RESTORE DEFAULT COEF. Dialog Box - 4-Port VNAs” on page 10-47
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Figure 10-19. CAL KIT/AUTOCAL Menu - 4-Port VNAs

INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box - 4-Port VNAs

Use the INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) dialog box to install the calibration kit coefficients file or AutoCal Characterization files in the instrument firmware for subsequent use. A recommended best practice is to keep the cal kit serial number as part of the file name.

Full Name

- INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT PARAMETERS FILES) Dialog Box

Previous

- [“CAL KIT/AUTOCAL Menu - 4-Port VNAs” on page 10-40](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Install Kit/Charac | INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box

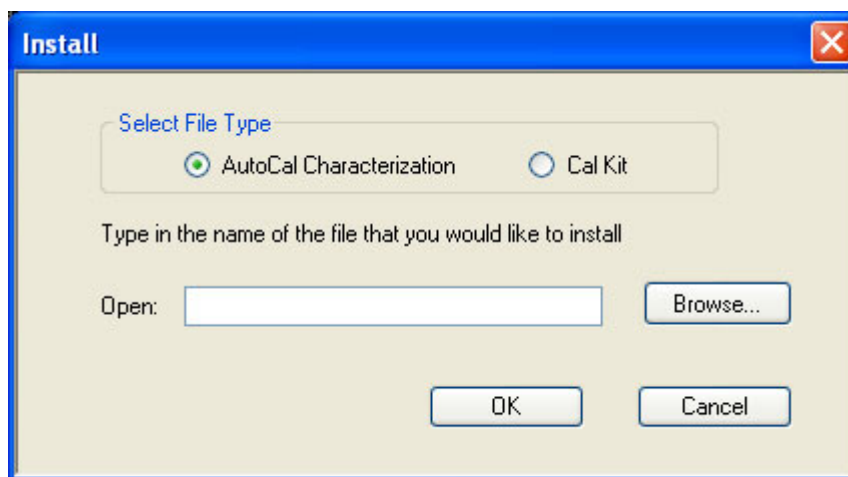


Figure 10-20.INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box

Instructions

1. In the Select File Type area, select either the AutoCal Characterization or the Cal Kit radio button.
2. In the Open field, either enter the file name or click Browse to navigate manually.
3. If AutoCal Characterization was selected, the file type will be an AutoCal Characterization ACD file.
4. If Cal Kit was selected, the file type will be a Cal Kit Coefficient CCF file.
5. Click Open to load the file or Cancel to return to the menu.

SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT) Dialog Box - 4-Port VNAs

Use the SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT) dialog to save a Calibration Kit Coefficients file or an AutoCal Characterization file from the VNA firmware to external location such as the instrument hard drive, a network drive, or an external memory device. This is useful for storing in the instrument hard drive multiple files from available cal kits or AutoCal modules.

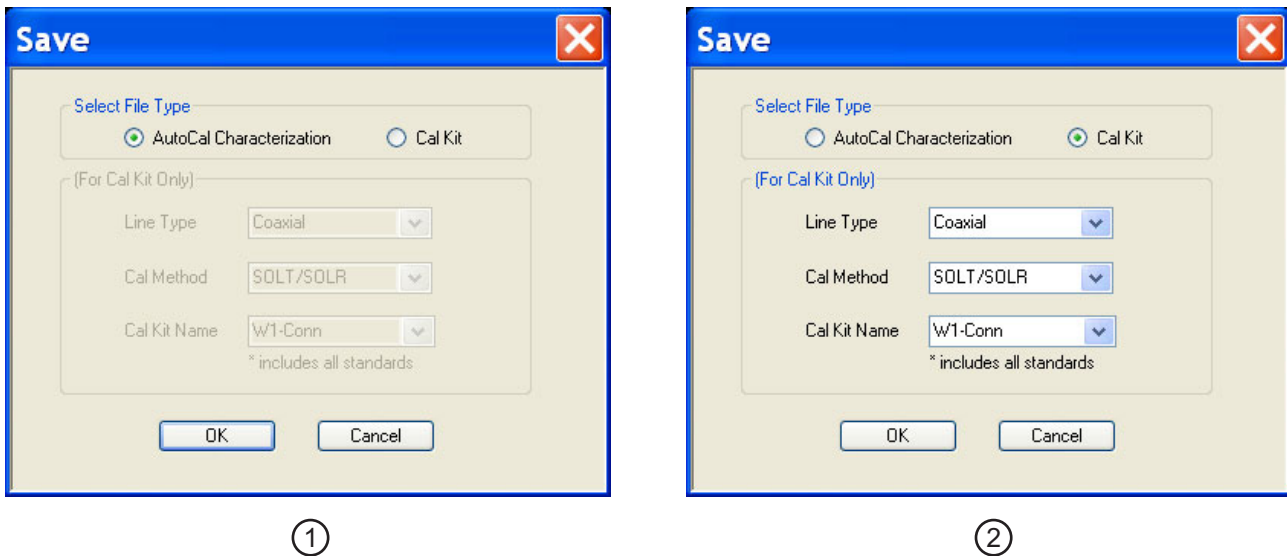
An alternate method is to use a Windows program such as File Manager to copy the file from the supplied USB memory device onto the hard drive. In that case, we recommend using the default locations mentioned later in this paragraph.

Previous

- “CAL KIT/AUTOLOCAL Menu - 4-Port VNAs” on page 10-40

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOLOCAL | Save Kit/Charac | SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT) Dialog Box



1. AutoCal Characterization radio button selected.
2. Cal Kit radio buttons selected.

Figure 10-21.SAVE (AUTOLOCAL CHARACTERIZATION/CAL KIT FILE Dialog Box

Save Dialog Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available and instructions are immediately below.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Cal Kit Name. Instructions are in the next sub-section following.

Instructions for AutoCal Characterization File Type

1. Click OK to save the AutoCal Characterization file.
 - Click Cancel to stop the save.
2. The SAVE AS (AUTOLOCAL CHARACTERIZATION ACD FILE) dialog box appears.
3. Navigate to the required storage location:
 - C:\AnritsuVNA\AutoCal is recommended.
4. Click Save. The system auto-returns to the Cal Kit/AutoCal menu.

Instructions for Cal Kit File Types

If Cal Kit is selected, the fields of Line Type, Cal Method, and Cal Kit Name are available (shown at right in [Figure 10-21 on page 10-42](#) above) with the values in drop-down menus.

1. In the Line Type field, select a type value:
 - Coaxial
 - Non-Dispersive
 - Waveguide
2. In the Cal Method field, select a method value:
 - SOLT/SOLR
 - SSLT
 - SSST
3. In the Cal Kit Name field, select a calibration kit characterization file:
 - 0.8 mm Conn
 - W1-Conn
 - V-Conn
 - K-Conn
 - GPC-3.5
 - SMA
 - N-Conn
 - N-Conn (75)
 - GPC-7
 - 7/16
 - TNC
 - User-Defined1 through User-Defined32
4. Click OK to save the AutoCal Characterization file.
 - Click Cancel to stop the save.
5. The SAVE AS (CAL KIT COEFFICIENT CCF FILE) dialog box appears.
6. Navigate to the required storage location:
 - C:\AnritsuVNA\Data is recommended.
7. Click Save. The system auto-returns to the CAL KIT/AUTOCAL menu.
 - Click Cancel to abort the save and return to the CAL KIT/AUTOCAL menu.

CAL KIT INFO Dialog Box - 4-Port VNAs

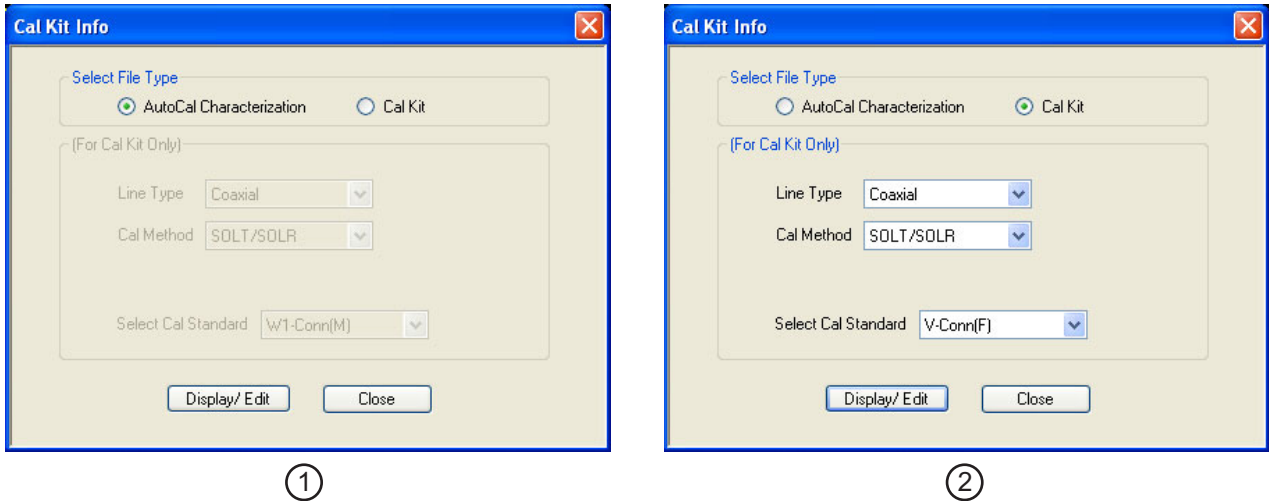
Use the CAL KIT INFO dialog box to review the available instrument calibration kit information.

Previous

- “CAL KIT/AUTOCAL Menu - 4-Port VNAs” on page 10-40

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Display/Edit Info | CAL KIT INFO Dialog Box



1. At left, controls for AutoCal Characterization files.
2. At right, controls for Cal Kit files.

Figure 10-22. CAL KIT INFO Dialog Box

Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Select Cal Standard.

Instructions

1. Select AutoCal Characterization or Cal Kit as required.
2. If Cal Kit was selected above, in the For Cal Kit Only area, select a Line Type value:
 - Coaxial
 - Non-Dispersive
 - Waveguide
3. Select a Cal Method value:
 - SOLT/SOLR
 - SSLT
 - SSST

4. Select a Cal Standard value:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1(M) through User-Defined32 (M)
- User-Defined1(F) through User-Defined32 (F)

5. Click Display/Edit.

- The STANDARD INFO read-only dialog box appears.
- Note that the dialog box title and content fields are dependent on the selections made in the steps above for Cal Method, Line Type, and Connector Type.
- For example, if:
 - Calibration type is set to Full 2 Port (12 Term Cal)
 - Calibration method is set to SOLT/SOLR
 - Line type is set to Coaxial
 - Connector type is set to V-Conn (M).
- The read-only dialog box is titled:
 - STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn (M)) (shown below).

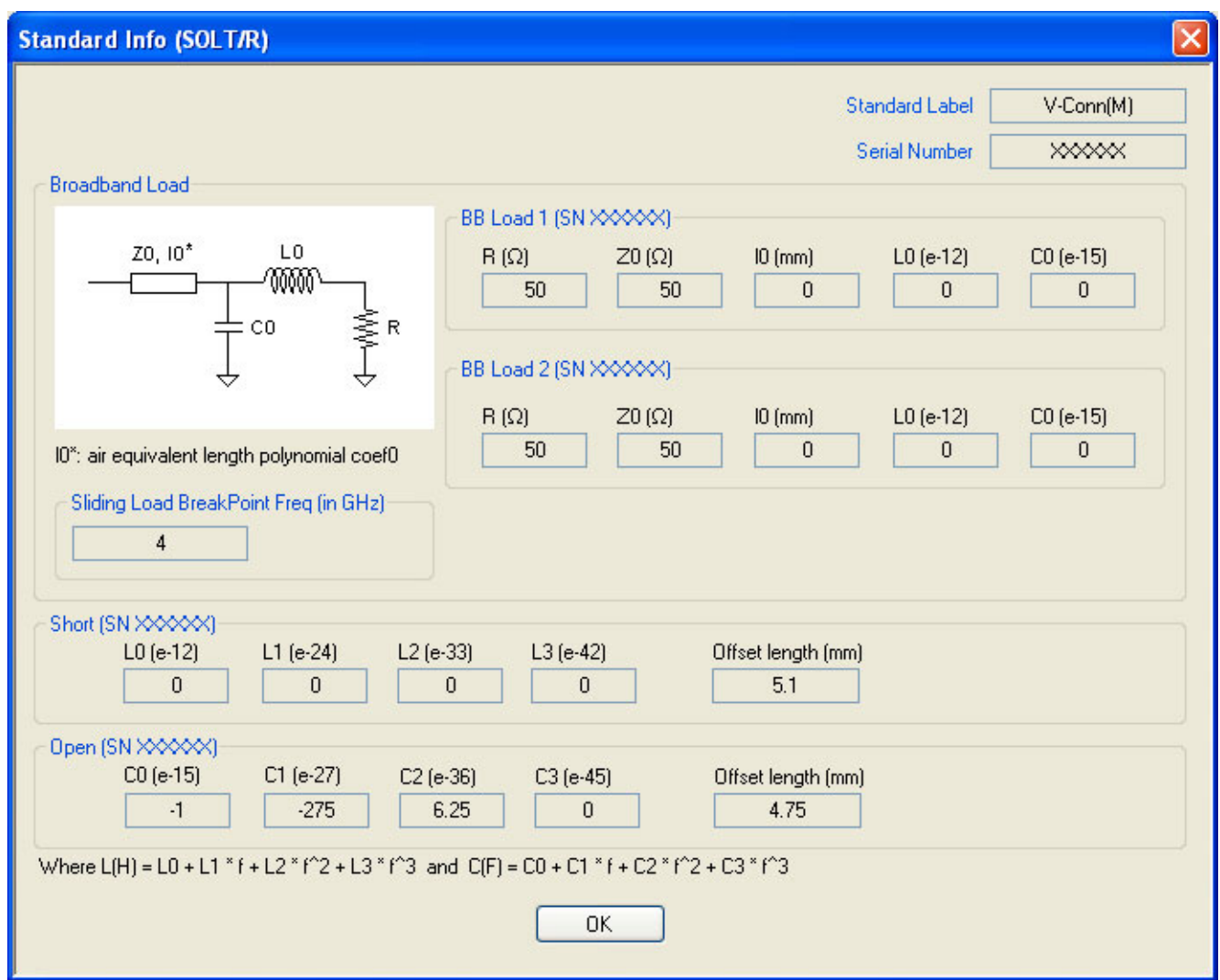


Figure 10-23. STANDARD INFO (SOLT/R) Standard Label (V-Conn (M)) Dialog Box

- Click OK to close the read-only dialog box.

RESTORE DEFAULT COEF. Dialog Box - 4-Port VNAs

Use the RESTORE DEFAULT COEF. dialog box to restore firmware-stored Cal Kit Coefficients fields back to their default coefficients. For best performance, either install the cal kit coefficients file supplied with your cal kit, or enter your user-defined coefficients before starting this procedure. The restore function is not available to AutoCal kits as they do not have restorable characterization data.

Full Name

- FULL RESTORE DEFAULT COEFFICIENTS Dialog Box

Previous

- [“CAL KIT/AUTOCAL Menu - 4-Port VNAs” on page 10-40](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Restore Cal Kit Default Coef | RESTORE DEFAULT COEF Dialog Box

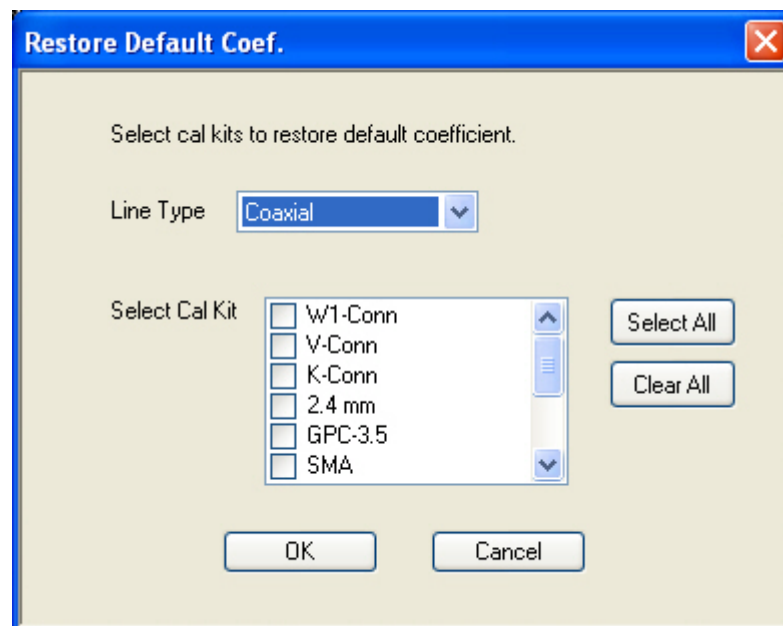


Figure 10-24. RESTORE DEFAULT COEF. (RESTORE DEFAULT COEFFICIENTS) Dialog Box

Instructions Restore Default Calibration Coefficients

Use this dialog to restore factory coefficients to available calibration kits.

1. Select the Line Type as required.
2. Select the Calibration Kits as required to be restored.
3. Click OK.

Available Selections

The table below shows the available calibration kits in the Select Cal Kit field of the RESTORE DEFAULT COEFFICIENTS dialog box. The available kits depend on the input combination selected for Line Type Media and Cal Method

Table 10-2. Calibration Kit Availability in the RESTORE DEFAULT COEF. Dialog Box

LINE TYPE Media Setting	CAL METHOD Setting	Available Calibration Kits
Coaxial	SOLT/SOLR	0.8 mm Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, 2.4 mm V, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm Conn, W1-Conn
	SSST	0.8 mm Conn, W1-Conn
Non-Dispersive	SOLT/SOLR	0.8 mm Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm Conn, W1-Conn
	SSST	0.8 mm Conn, W1-Conn
Microstrip	SOLT/SOLR	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSLT	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSST	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
Waveguide	SOLT/SOLR	No selections available
	SSLT	WR10, WR12, WR15
	SSST	No selections available

10-5 AutoCal Port Cal Setup - 4-Port VNAs

AUTOCAL PORT Menu - 4-Port VNAs

Use the AUTOCAL PORT menu to define whether the AutoCal procedure will be for 4-port, 2-port, or 1-port calibration.

Prerequisites

- 4-Port VNA Mode

Previous

- [“CALIBRATE Menu - 4-Port VNAs” on page 10-9](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT


 <p>The screenshot shows a menu titled 'AutoCal Port' with a close button (X) in the top right corner. Below the title are three menu items, each with a right-pointing arrow: '4-Port Cal', '2-Port Cal', and '1-Port Cal'.</p>	<p>4-Port Cal (4-Port VNAs) Sets the AutoCal calibration function for 2-Port VNAs to a 2-port method and displays the AUTOCAL PROCEDURE (2-PORT CAL) menu.</p> <ul style="list-style-type: none"> • “AUTOCAL SETUP Menu - 4-Port Cal - 4-Port VNAs” on page 10-50 <p>2-Port Cal (4-Port VNAs) Sets the AutoCal calibration function for 4-Port VNAs to a 2-port method and displays the AUTOCAL PROCEDURE (2-PORT CAL) menu.</p> <ul style="list-style-type: none"> • “AUTOCAL SETUP Menu - 2-Port Cal - 4-Port VNAs” on page 10-54 <p>1-Port Cal (4-Port VNAs) Sets the AutoCal calibration function for 4-Port VNAs to a 1-port method and displays the AUTOCAL PROCEDURE (1-PORT CAL) menu.</p> <ul style="list-style-type: none"> • “AUTOCAL SETUP Menu - 1-Port Cal - 4-Port VNAs” on page 10-58
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Figure 10-25. AUTOCAL PORT Menu - 4-Port VNAs

AUTOCAL SETUP Menu - 4-Port Cal - 4-Port VNAs

Prerequisites

- 4-Port Mode

Previous

- [“AUTOCAL PORT Menu - 4-Port VNAs” on page 10-49](#)

Navigation

MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 4-Port Cal | AUTOCAL SETUP

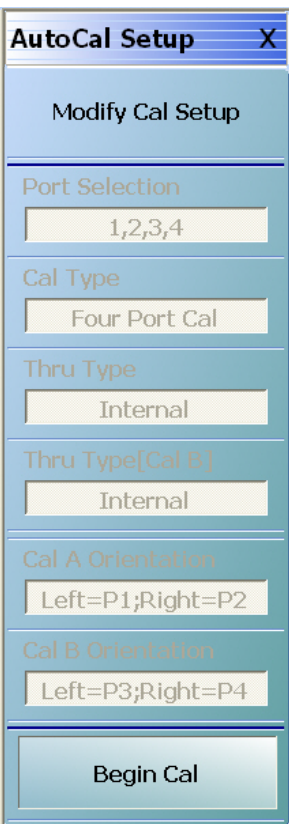
	<p>Modify Cal Setup</p> <p>Select displays the MODIFY 4-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for Auto Sense Module Orientation, Select Cal Type, Through Setup, Adapter Removal Port, and links to the THRU INFO and AIR EQUIVALENT LENGTH CALCULATOR dialog boxes.</p> <ul style="list-style-type: none"> • “MODIFY 4-PORT AUTOCAL SETUP Dialog Box” on page 10-51 <p>Port Selection (Read Only)</p> <p>Displays the Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</p> <p>Cal Type (Read Only)</p> <p>Displays the Cal Type selected for the AutoCal procedure. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</p> <p>Thru Type (Read Only)</p> <p>Displays the Thru Type selected for the AutoCal procedure as either Internal Thru or True Thru. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</p> <p>Module Orientation (Read Only)</p> <p>Displays the left/right VNA Port orientation and assignment for the AutoCal procedure. Options are either Left=P1 Right =P1 or Left=P2 and Right=P1. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</p> <p>Begin Cal (AutoCal 4-Port Cal)</p> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu where the Cal Status button is enabled and set to ON.</p> <ul style="list-style-type: none"> • “CALIBRATION [TR] Menu - 4-Port VNAs” on page 10-7
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Figure 10-26. AUTOCAL SETUP Menu - 4-Port Cal - 4-Port VNAs

MODIFY 4-PORT AUTOCAL SETUP Dialog Box

Use the MODIFY 4-PORT AUTOCAL SETUP dialog box to change the calibration parameters prior to an AutoCal calibration procedure. Options include the calibration and thru types to be used. The left/right port sense is manually configured.

Previous

- “AUTOCAL SETUP Menu - 4-Port Cal - 4-Port VNAs” on page 10-50

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 4-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 4-PORT AUTOCAL SETUP Dialog Box

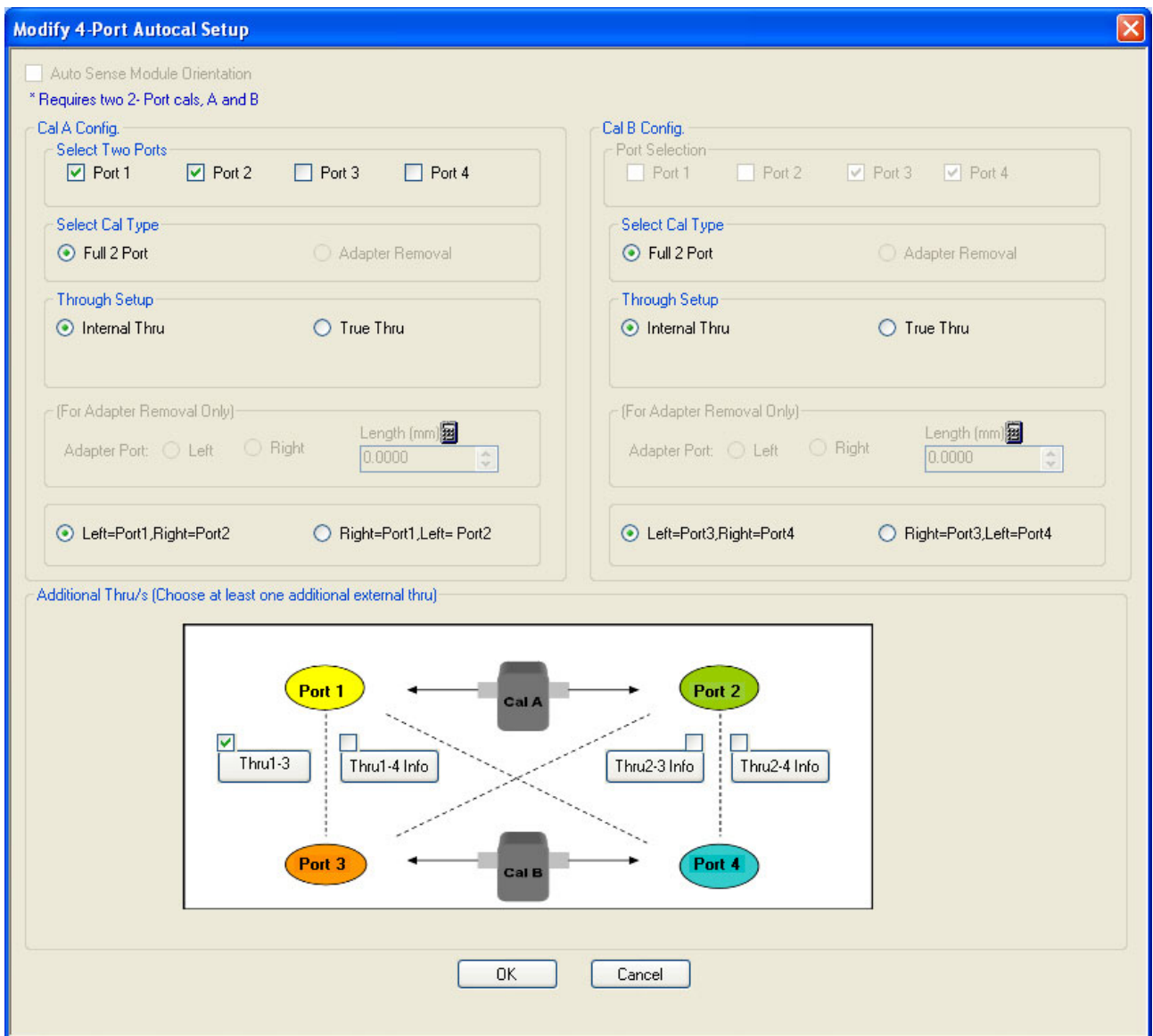


Figure 10-27. MODIFY 4-PORT AUTOCAL SETUP Dialog Box

General

The calibration requires two 2-Port calibrations: Cal A and Cal B.

Auto Sense Module Orientation

The Auto Sense Module Orientation is not available for 4-Port AutoCal calibrations.

Cal A Configuration

Select two ports for the Cal A configuration. choose from Port 1, Port 2, Port 3, or Port 4.

Cal A Configuration - Select Cal Type

Only the Full 2 Port selection is available.

Cal A Configuration - Through Setup

Select either Internal Through or True Thru.

If True Thru is selected, the Thru Info button is available. Select displays the THRU INFO dialog box.

For Adapter Removal

The For Adapter Removal area and its controls are not available in 4-Port AutoCal Setup.

Cal A Manual Port Sense Configuration

The selections available are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 2 were selected above, your choices are:
 - Left = Port 1 and Right = Port 2
 - Left = Port 2 and Right = Port 1
- If Port 1 and Port 3 were selected above, your choices are:
 - Left = Port 1 and Right = Port 3
 - Left = Port 3 and Right = Port 1

Cal B Configuration

Auto selects whichever ports were not selected in Cal A Configuration.

Cal B Configuration - Select Cal Type

Only the Full 2 Port selection is available.

Cal B Configuration - Through Setup

Select either Internal Through or True Thru.

If True Thru is selected, the Thru Info button is available. Select displays the THRU INFO dialog box.

Cal B Manual Port Sense Configuration

The selections available are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 2 were selected for Cal A above, your choices are:
 - Left = Port 3 and Right = Port 4
 - Left = Port 4 and Right = Port 3
- If Port 1 and Port 3 were selected for Cal A above, your choices are:
 - Left = Port 2 and Right = Port 4
 - Left = Port 4 and Right = Port 2

Additional Througths

Choose at least one additional external thru from the check boxes in the port diagrams. More than one selection may be made. Select from:

- Thru 1-2
- Thru 1-4
- Thru 2-3
- Thru 3-4

Completing AutoCal Setup

When all AutoCal Setup functions are completed, click **OK** to return to the AutoCal menu. Click **Cancel** to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu - 4-Port Cal - 4-Port VNAs” on page 10-50](#)

10-6 AutoCal 2-Port Cal Setup - 4-Port VNAs

AUTOCAL SETUP Menu - 2-Port Cal - 4-Port VNAs

Instrument Mode:

- 4-Port Mode

Previous

- [“AUTOCAL PORT Menu - 4-Port VNAs” on page 10-49](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP

	<p>Modify Cal Setup</p> <p>Select displays the MODIFY 2-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for Auto Sense Module Orientation, Select Cal Type, Through Setup, Adapter Removal Port, and links to the THRU INFO and AIR EQUIVALENT LENGTH CALCULATOR dialog boxes.</p> <ul style="list-style-type: none"> • “MODIFY 2-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs” on page 10-55 • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 • “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173 <p>Port Selection (Read Only)</p> <p>Displays the Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Cal Type (Read Only)</p> <p>Displays the Cal Type selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Thru Type (Read Only)</p> <p>Displays the Thru Type selected for the AutoCal procedure as either Internal Thru or True Thru. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Module Orientation (Read Only)</p> <p>Displays the left/right VNA Port orientation and assignment for the AutoCal procedure. Options are either Left=P1 Right =P1 or Left=P2 and Right=P1. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <p>Begin Cal (AutoCal 2-Port Cal) (2-Port VNAs)</p> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu when the Cal Status button is enabled and set to ON.</p> <ul style="list-style-type: none"> • “CALIBRATION [TR] Menu - 4-Port VNAs” on page 10-7
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Figure 10-28. AUTOCAL SETUP Menu - 2-Port Cal - 4-Port VNAs

MODIFY 2-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs

Use the MODIFY 2-PORT AUTOCAL SETUP dialog box to change the calibration parameters prior to an AutoCal calibration procedure. Options include the calibration and thru types to be used. If required, an adapter removal calibration can be configured. For production installations, the left/right port sense can be automatically or manually configured.

Previous

- [“AUTOCAL SETUP Menu - 2-Port Cal - 4-Port VNAs” on page 10-54](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 2-PORT AUTOCAL SETUP Dialog Box

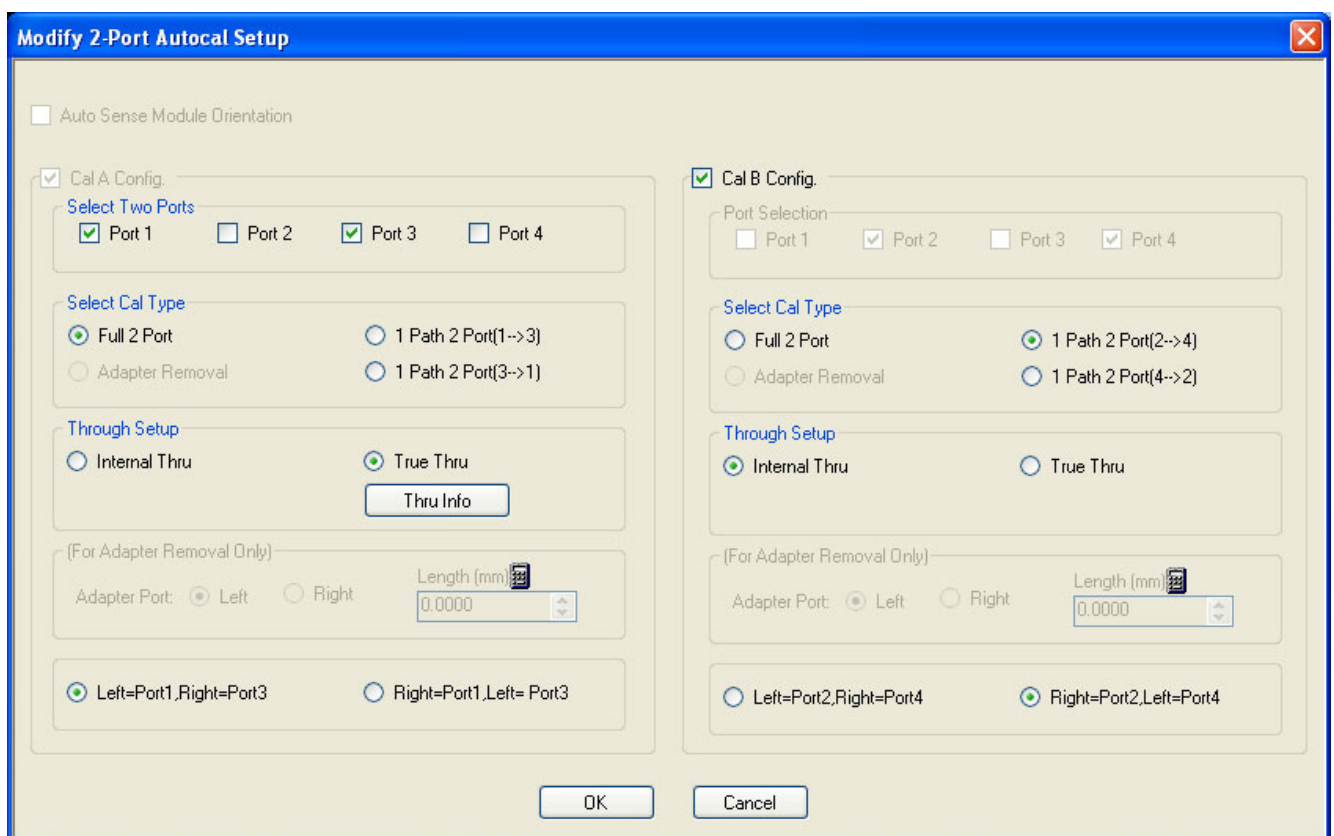


Figure 10-29.MODIFY 2-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs

Auto Sense Module Orientation

The Auto Sense Module Orientation is not available for 2-Port AutoCal calibrations.

Cal A Configuration

The Cal A Configuration is auto-selected.

Select two ports for the Cal A configuration from either:

- Port 1
- Port 2
- Port 3
- Port 4.

Whichever two ports are not selected are auto selected for Cal B Configuration.

Cal A Configuration - Select Cal Type

Select calibration types from the following choices. Note that the 1 Path 2 Port choices depend on the ports selected above in Cal A Configuration. The examples below assume that Port 1 and Port 3 were selected above.

- Full 2 Port
- 1 Path 2 Port (1-->3)
- 1 Path 2 Port (3-->1)

Cal A Configuration - Through Setup

Select either:

- Internal Through
- True Thru
 - If True Thru is selected, the Thru Info button is available. Select displays the THRU INFO dialog box which is described in the section above.
 - [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)

For Adapter Removal

The For Adapter Removal area and its controls are not available in 2-Port AutoCal Setup.

Cal A Manual Port Sense Configuration

The port sense configuration options are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 3 were selected above, your choices are:
 - Left = Port 1 and Right = Port 3
 - Left = Port 3 and Right = Port 1

Cal B Configuration

The configuration auto selects whichever ports were not selected in Cal A Configuration.

Cal B Configuration - Select Cal Type

Select calibration types from the following choices. Note that the 1 Path 2 Port choices depend on the ports selected above in Cal A Configuration. The examples below assume that Port 1 and Port 3 were selected above and that the Cal B ports are Port 2 and Port 4.

- Full 2 Port
- 1 Path 2 Port (2-->4)
- 1 Path 2 Port (4-->2)

Cal B Configuration - Through Setup

Select either:

- Internal Through
- True Thru
 - If True Thru is selected, the Thru Info button is available. Select displays the THRU INFO dialog box.
 - [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)

Cal B Manual Port Sense Configuration

The selections available are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 3 were selected for Cal A above, your choices are:
 - Left = Port 2 and Right = Port 4
 - Left = Port 4 and Right = Port 2

Completing AutoCal Setup

When all AutoCal Setup functions are completed, click OK to return to the AutoCal menu. Click Cancel to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu - 2-Port Cal - 4-Port VNAs” on page 10-54](#)

10-7 AutoCal 1-Port Cal Setup - 4-Port VNAs

AUTOCAL SETUP Menu - 1-Port Cal - 4-Port VNAs

Prerequisites

- 4-Port Mode

Previous

- [“AUTOCAL PORT Menu - 4-Port VNAs” on page 10-49](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 1-Port Cal | AUTOCAL SETUP

	<p>Modify Cal Setup</p> <p>Select displays the MODIFY 1-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for 1-Port Calibration Ports and Port Left/Right Identification.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs” on page 10-59 <p>Port Selection (Read Only)</p> <p>Displays the Port or Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 1-PORT AUTOCAL SETUP dialog box.</p> <p>Cal Type (Read Only)</p> <p>Displays the Cal Type selected for the AutoCal procedure. The setting is defined in the AUTOCAL PORT menu.</p> <ul style="list-style-type: none"> • “AUTOCAL PORT Menu - 4-Port VNAs” on page 10-49 <p>Port 1 Orientation (Read Only)</p> <p>This read-only button only appears if Port 1 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 1.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs” on page 10-59 <p>Port 2 Orientation (Read Only)</p> <p>This read-only button only appears if Port 2 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 2.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs” on page 10-59 <p>Begin Cal (AutoCal 1-Port Cal)</p> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu where the Cal Status button is now enabled and set to ON.</p> <ul style="list-style-type: none"> • “CALIBRATION [TR] Menu - 4-Port VNAs” on page 10-7
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Figure 10-30.AUTOCAL PROCEDURE Menu - 1-Port Calibration - 4-Port VNA

MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs

Previous

- [“AUTOCAL SETUP Menu - 1-Port Cal - 4-Port VNAs” on page 10-58](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 4-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 1-PORT AUTOCAL SETUP Dialog Box

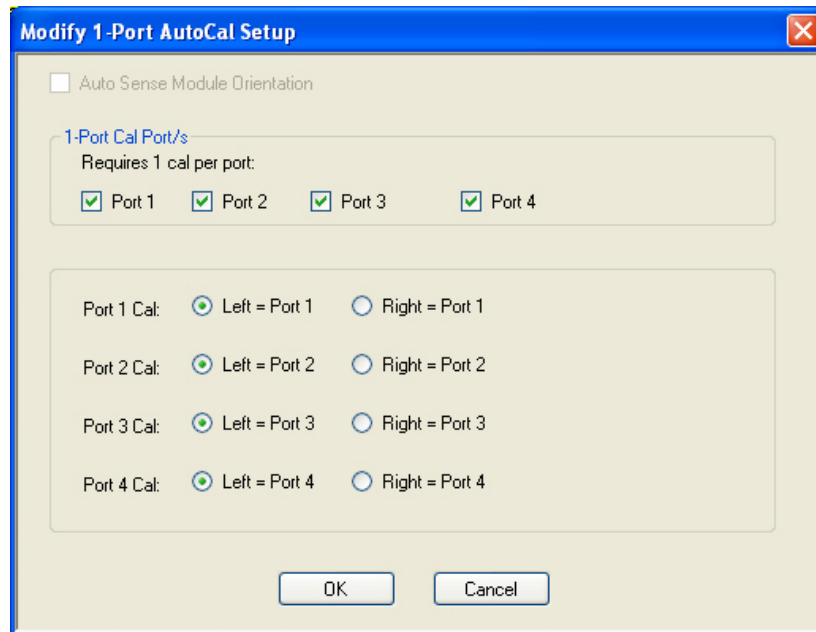


Figure 10-31.MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs

Auto Sense Module Orientation

The Auto Sense Module Orientation is not available for 2-Port AutoCal calibrations.

1-Port Cal Port(2)

Select any combination of ports from Port 1, Port 2, Port 3, or Port 4.

For each port selected above, a left/right configuration radio button becomes available below.

Port Sense Left/Right Configuration

For each selected port above, select the left/right assignment:

- Port 1 Cal: Left = Port 1 or Right = Port 1
- Port 2 Cal: Left = Port 2 or Right = Port 2
- Port 3 Cal: Left = Port 3 or Right = Port 3
- Port 4 Cal: Left = Port 4 or Right = Port 4

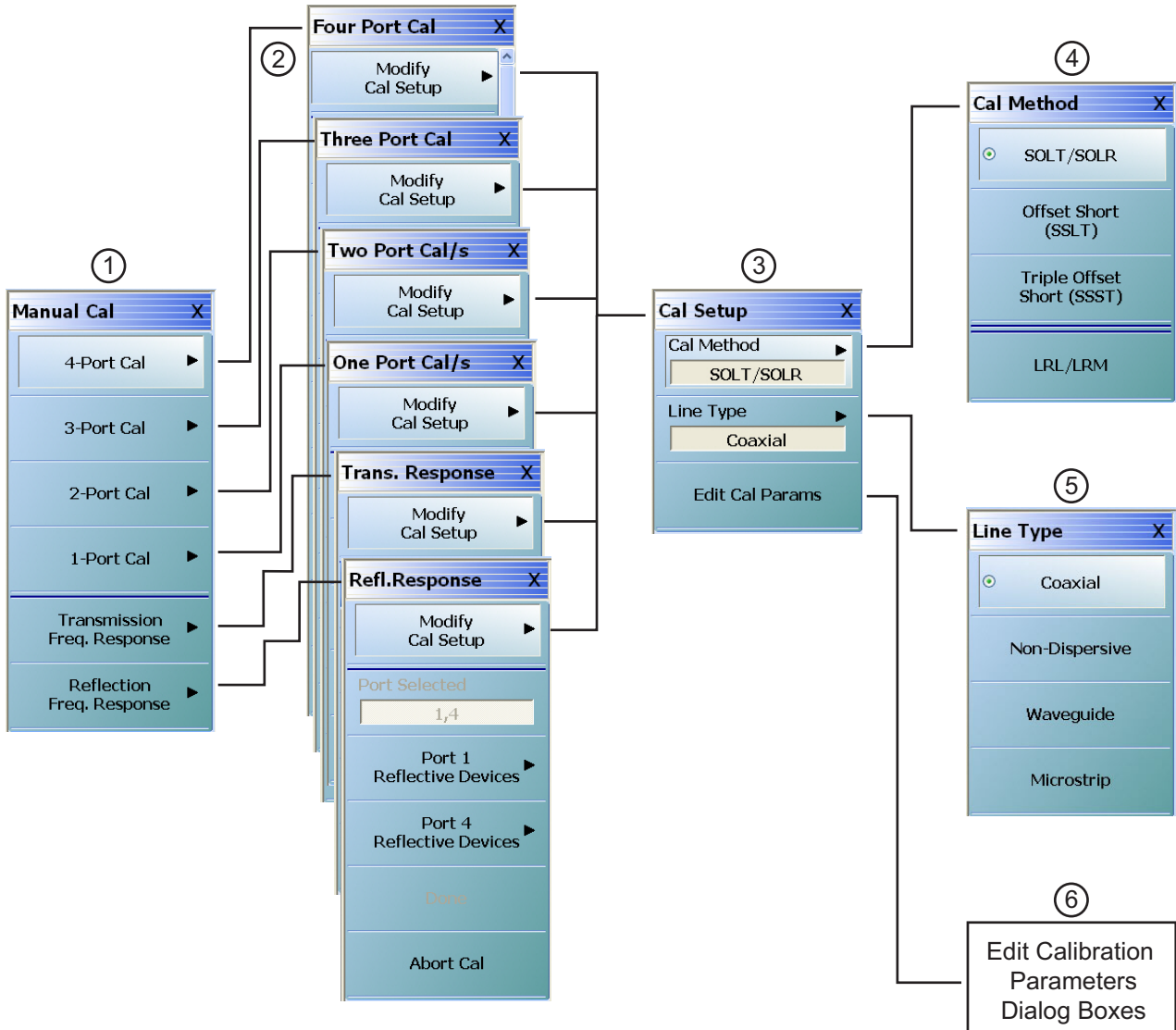
Completing AutoCal Setup

When all AutoCal Setup functions are completed, click OK to return to the AutoCal menu. Click Cancel to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu - 1-Port Cal - 4-Port VNAs” on page 10-58](#)

10-8 Manual Calibration Menus and Dialog Boxes - 4-Port VNAs

Once a manual calibration type such as 3-Port Cal has been selected, the main setup menu (which is named for the cal type such as THREE PORT CAL) appears. The Modify Cal Setup button provides access to the CAL SETUP, CAL METHOD, and LINE TYPE configuration menus with further access to the appropriate calibration parameter configuration dialog box. The manual calibration setup and procedure menus — FOUR PORT CAL, THREE PORT CAL, TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, and REFL. RESPONSE and their supporting dialog boxes — change depending on the configuration made during the in the calibration setup. The figure below summarizes the configuration menus and dialogs.



Primary menu for manual calibration setup.

1. MANUAL CAL port selection menu.
2. Calibration setup menus with titles of FOUR PORT CAL, THREE PORT CAL, TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, or REFL. RESPONSE.
3. CAL SETUP selection menu.
4. CAL METHOD selection menu.
5. LINE TYPE selection menu.
6. Edit Cal Params button accesses calibration configuration dialog boxes. Dialog box titles vary depending on the calibration type, method, and line type selected.

Figure 10-32. Manual Calibration Setup Menus - 4-Port VNAs

Manual Cal Combinations

The manual calibration setup menus and dialog boxes provide the following port configurations, calibration types, and calibration methods, and line types:

- Manual Calibration Types
 - 4-Port Calibration
 - 3-Port Calibration
 - 2-Port Calibration
 - 1-Port Calibration
 - Transmission Frequency Response Calibration
 - Reflection Frequency Response Calibration
- Calibration Methods
 - SOLT/SOLR - Short-Open-Load-Thru / Short-Open-Load-Return
 - SSLT - Offset Short or Short-Short-Load-Thru
 - SSST - Triple Offset Short or Short-Short-Short-Thru
 - LRL/LRM - Line-Reflect-Line / Line-Reflect-Match
- Line Types
 - Coaxial
 - Non-Dispersive - Essentially the same as coaxial
 - Waveguide
 - Microstrip

Manual Cal Dialog Box Settings

Most combinations of the calibration parameters above can be further modified through a series of dialog boxes that control DUT connectors, load types such as broadband or sliding loads, port selection, through types, reference plane location, number of bands, and similar settings. Many of these dialog boxes are shown in this document and all are summarized in tables.

MANUAL CAL Menu - 4-Port VNAs

Full Name

- Manual Calibration Menu

Prerequisites

- 4-Port Mode

Previous

- [“CALIBRATE Menu - 4-Port VNAs” on page 10-9](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL

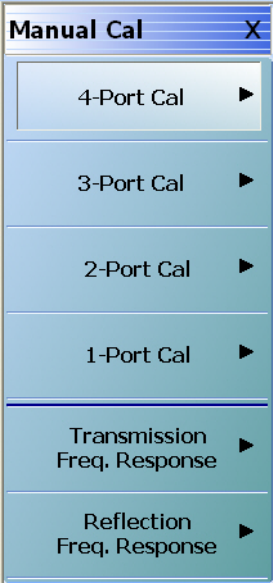
 <p>The screenshot shows a menu titled 'Manual Cal' with a close button (X) in the top right corner. Below the title are six menu items, each with a right-pointing arrow: '4-Port Cal', '3-Port Cal', '2-Port Cal', '1-Port Cal', 'Transmission Freq. Response', and 'Reflection Freq. Response'.</p>	<p>4-Port Cal</p> <p>Select displays the Four Port Cal menu where the calibration step-by-step procedure is carried out. The button composition of the menu depends on the settings established in the CAL SETUP, CAL METHOD, and LINE TYPE menus and in the related FULL FOUR PORT CAL SETUP dialog boxes. Generally this is the most complete calibration and fully corrects the available four-port S-parameters:</p> <ul style="list-style-type: none"> • S11, S12, S13, S14, S21, S22, S23, S24, S31, S32, S33, S34, S41, S42, S43, S44. <p>The menu shown below is representative of a typical 4-port calibration menu:</p> <ul style="list-style-type: none"> • “FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68 <p>3-Port Cal</p> <p>Select displays the THREE PORT CAL menu where the calibration step-by-step procedure is carried out. The menu shown below is representative of a typical 3-port calibration menu:</p> <ul style="list-style-type: none"> • “THREE PORT CAL Menu - 4-Port VNAs” on page 10-101
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Figure 10-33. MANUAL CALIBRATION Menu - 4-Port VNAs (1 of 2)

2-Port Cal

Select displays the TWO PORT CAL menu where the calibration step-by-step procedure is carried out.

The menu below is representative of a typical 2-port calibration menu:

- [“TWO PORT CAL Menu - 4-Port VNAs” on page 10-121](#)

The following 2-port calibration procedure examples are provided:

1-Port Cal

Select displays the One Port Cal menu.

The menu below is representative of a typical 1-port calibration.

- [“ONE PORT CAL Menu - 4-Port VNAs” on page 10-138](#)

The following 1-port calibration procedure examples are provided:

Transmission Freq. Response

Selecting the Transmission Frequency Response button displays the TRANS. RESPONSE menu. During the calibration configuration in the Edit Cal Params | CAL SETUP dialog, select forward or reverse or both directions. The menu below is representative of a typical trans. freq. resp. calibration menu:

- [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)

Reflection Freq. Response

Selecting the Reflection Frequency Response button displays the Refl. Response menu. During the calibration configuration in the Edit Cal Params | CAL SETUP dialog, select an Open or Short cal component. The menu below is representative of a typical refl. freq. resp. calibration menu:

- [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)

Figure 10-33. MANUAL CALIBRATION Menu - 4-Port VNAs (2 of 2)

CAL SETUP Menu - 4-Port VNAs

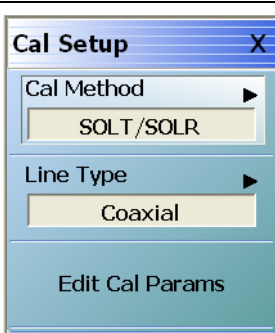
Use the CAL SETUP menu to set the calibration method (such as SOLT/R or SSLT), the calibration line type (such as coaxial or microwave), and more detailed parameters for ports and connectors through the Edit Cal Parameters button and the linked CAL SETUP dialogs.

Previous

- The CAL SETUP menu can be accessed from multiple menus depending on the manual calibration type selected on the MANUAL CAL menu.
- [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
- [“THREE PORT CAL Menu - 4-Port VNAs” on page 10-101](#)
- [“TWO PORT CAL Menu - 4-Port VNAs” on page 10-121](#)
- [“ONE PORT CAL Menu - 4-Port VNAs” on page 10-138](#)
- [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)
- [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)

Navigation

- The navigation path below assumes that 4-Port Cal manual calibration type was selected on the MANUAL CAL menu.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP
- The general navigation path is:
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Modify Cal Setup | CAL SETUP



Cal Method

The field displays the currently selected calibration method such as SOLT/SOLR or LRL/LRM. Select displays the CAL METHOD menu where a calibration method is selected. Once a selection is made on the CAL METHOD menu, the system auto-returns to this CAL SETUP menu.

- [“CAL METHOD Menu - 4-Port VNA” on page 10-66](#)

Line Type

The field displays the currently selected line type such as Coaxial or Microstrip. Select displays the LINE TYPE menu where a line type is selected. Once a selection is made on the LINE TYPE menu, the system auto-returns to this CAL SETUP menu.

- [“LINE TYPE Menu - 4-Port VNA” on page 10-67](#)

Figure 10-34. CAL SETUP (CALIBRATION SETUP) Menu (1 of 2)

Edit Cal Params

Select displays the appropriate calibration setup dialog box. The exact name of the dialog box varies depending on the calibration type, calibration method, and line type selected.

Dialog box name format: [Cal Type] [Cal Method] Cal Setup [Line Type]

- For example, if Full 2 Port, SOLT/SOLR, and Coaxial were selected, the dialog box name is:
- Full Two Port Cal Setup (SOLT/R, Coaxial)

Examples of Cal Setup dialog boxes using Coaxial line type are available in the links below:

- [“FULL FOUR PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-72](#)
- [“THREE PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-104](#)
- [“TWO PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-123](#)
- [“ONE PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-140](#)
- [“TRANS. FREQ. RESP. CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-153](#)
- [“REFL. FREQ. RESP. CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box” on page 10-163](#)

The summary tables below list the contents of all calibration setup dialog boxes based on the number of ports involved in the calibration:

- Table: [“Manual 4-Port Cal Setup Dialog Box Summary” on page 10-88](#)
- Table: [“Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-116](#)
- Table: [“Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-133](#)
- Table: [“Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-133](#)
- Table: [“Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-148](#)
- Table: [“Trans. Freq. Resp. Manual Cal Setup Dialog Box Contents - 4-Port VNAs” on page 10-159](#)
- Table: [“Refl. Freq. Resp. Manual Cal. Setup Dialog Box Contents - 4-Port VNAs” on page 10-169](#)

Figure 10-34. CAL SETUP (CALIBRATION SETUP) Menu (2 of 2)

CAL METHOD Menu - 4-Port VNA

Use the CAL METHOD menu to select whether the method of SOLT/SOLR, SSLT, SSST, or LRL/LRM will be used during the calibration.

Procedure Reference

- [Figure 10-35, “CAL METHOD Menu” on page 10-66](#) Callout #3

Auto-Return Button Selection Group

- The four (4) buttons of the CAL METHOD menu form an auto-return button selection group. Selecting any one button marks the selection with the select icon, de-selects the other three (3) buttons, and auto-returns to the CAL SETUP menu.

Previous

- [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)

Navigation

- The navigation path below assumes that Full 2 Port calibration type was selected on the Manual Cal menu.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method | CAL METHOD

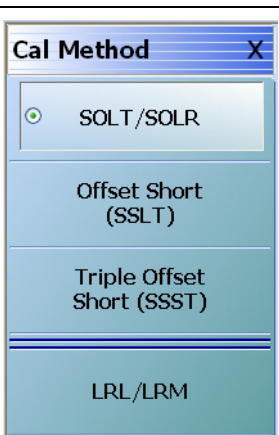
 <p>The screenshot shows a menu titled 'Cal Method' with a close button 'X'. It contains four buttons: 'SOLT/SOLR' (selected with a green circle), 'Offset Short (SSLT)', 'Triple Offset Short (SSST)', and 'LRL/LRM'.</p>	<p>SOLT/SOLR</p> <p>Selecting the SOLT/SOLR button sets the calibration method to Short-Open-Load-Thru (or Short-Open-Load-Reciprocal) and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Offset Short (SSLT)</p> <p>Selecting the Offset Short (SSLT) button sets the calibration method to Short-Short-Load-Thru and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Triple Offset Short (SSST)</p> <p>Selecting the Triple Offset Short (SSST) button sets the calibration method to Short-Short-Short-Thru and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>LRL/LRM</p> <p>Selecting the LRL/LRM button sets the calibration method to Line-Reflect-Line or Line-Reflect-Match and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64
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Figure 10-35. CAL METHOD Menu

LINE TYPE Menu - 4-Port VNA

Use the LINE TYPE menu to select from coaxial, non-dispersive, waveguide, or microstrip line types. Non-dispersive is for line types such as coplanar waveguide, stripline, or twin-lead and is treated the same as coaxial line.

Procedure Reference

- [Figure 10-36, “LINE TYPE Menu” on page 10-67](#) Callout #4

Auto-Return Button Selection Group

- The four (4) buttons of the LINE TYPE menu form an auto-return button selection group.
- Selecting any one button marks the selection with the select icon, de-selects the other three (3) buttons, and auto-returns to the CAL SETUP menu.

Previous

- [“CAL SETUP Menu - 4-Port VNAs” on page 10-64.](#)

Navigation

- The navigation path below assumes that Full 2 Port calibration type was selected on the Manual Cal menu.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Line Type | LINE TYPE


 <p>The screenshot shows a menu titled 'Line Type' with a close button (X). There are four buttons: 'Coaxial' (selected with a radio button), 'Non-Dispersive', 'Waveguide', and 'Microstrip'.</p>	<p>Coaxial (Line Type)</p> <p>Select sets the line type to coaxial, marks the button with the select icon, de-selects the Non-Dispersive, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Non-Dispersive (Line Type)</p> <p>Non-dispersive line types, such as Coplanar Waveguide, Stripline, or twin-lead, are used on transmissions. The system treats non-dispersive lines the same as coaxial line types. Select sets the line type to non-dispersive, marks the button with the select icon, de-selects the Coaxial, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Waveguide (Line Type)</p> <p>Waveguide is transmission media such as rectangular or circular waveguide. Select sets the line type to waveguide, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Microstrip (Line Type)</p> <p>Microstrip line is typically used in on-wafer media. Select sets the line type to microstrip, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Waveguide buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64
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Figure 10-36.LINE TYPE Menu

10-9 Manual 4-Port Cal Setup - 4-Port VNAs

The FOUR PORT CAL Setup menu and its related dialog boxes is used to set the calibration parameters for the four port calibration.

FOUR PORT CAL Menu - 4-Port VNAs

Button Availability

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant FULL FOUR PORT CAL SETUP dialog box.
- A representative menu is shown below.
- The example procedures at the end of this chapter show examples of various FOUR PORT CAL menus.

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL

	<h4>Modify Cal Setup</h4> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the FULL FOUR PORT CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>The following Cal Method/Line Type combinations are represented with a figure and complete description:</p> <ul style="list-style-type: none"> • “FULL FOUR PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-72 • “FULL FOUR PORT CAL SETUP (SSLT, COAXIAL) Dialog Box” on page 10-76 • “FULL FOUR PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-79 • “FULL FOUR PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box” on page 10-83 <p>Dialog boxes for all Cal Method/Line Type combinations are summarized in the table below:</p> <ul style="list-style-type: none"> • Table: “Manual 4-Port Cal Dialog Box Summary” on page 10-88 <h4>Port Selected</h4> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 10-37.FOUR PORT CAL Menu - 4-Port VNAs - Typical Example (1 of 3)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the FOUR PORT CAL menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

Select displays the REFL. DEVICES PORT 1 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Port 2 Reflective Devices

Select displays the REFL. DEVICES PORT 2 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Port 3 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Port 4 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Thru/Recip

Select displays the THRU/RECIP submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Isolation (Optional)

If required, select displays the ISOLATION submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Figure 10-37. FOUR PORT CAL Menu - 4-Port VNAs - Typical Example (2 of 3)

Done

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the CALIBRATION menu where the Cal Status button is set to ON.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Abort Cal

This button stops the current calibration procedure and returns to the CALIBRATION menu.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Figure 10-37. FOUR PORT CAL Menu - 4-Port VNAs - Typical Example (3 of 3)

Manual 4-Port Cal Setup Dialog Boxes - 4-Port VNAs

The instrument supports all combinations of 4-port calibration method and line types with configuration dialog boxes. In the interest of document length, not all combinations are described in detail. However, all combinations are summarized in the table at the end of this section.

- [“FULL FOUR PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box”](#) on page 10-72
- [“FULL FOUR PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box”](#) on page 10-76
- [“FULL FOUR PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box”](#) on page 10-79
- [“FULL FOUR PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box”](#) on page 10-83
- Table: [“Manual 4-Port Cal Setup Dialog Box Summary”](#) on page 10-88

FULL FOUR PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Previous

- “FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68
- “CAL SETUP Menu - 4-Port VNAs” on page 10-64

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

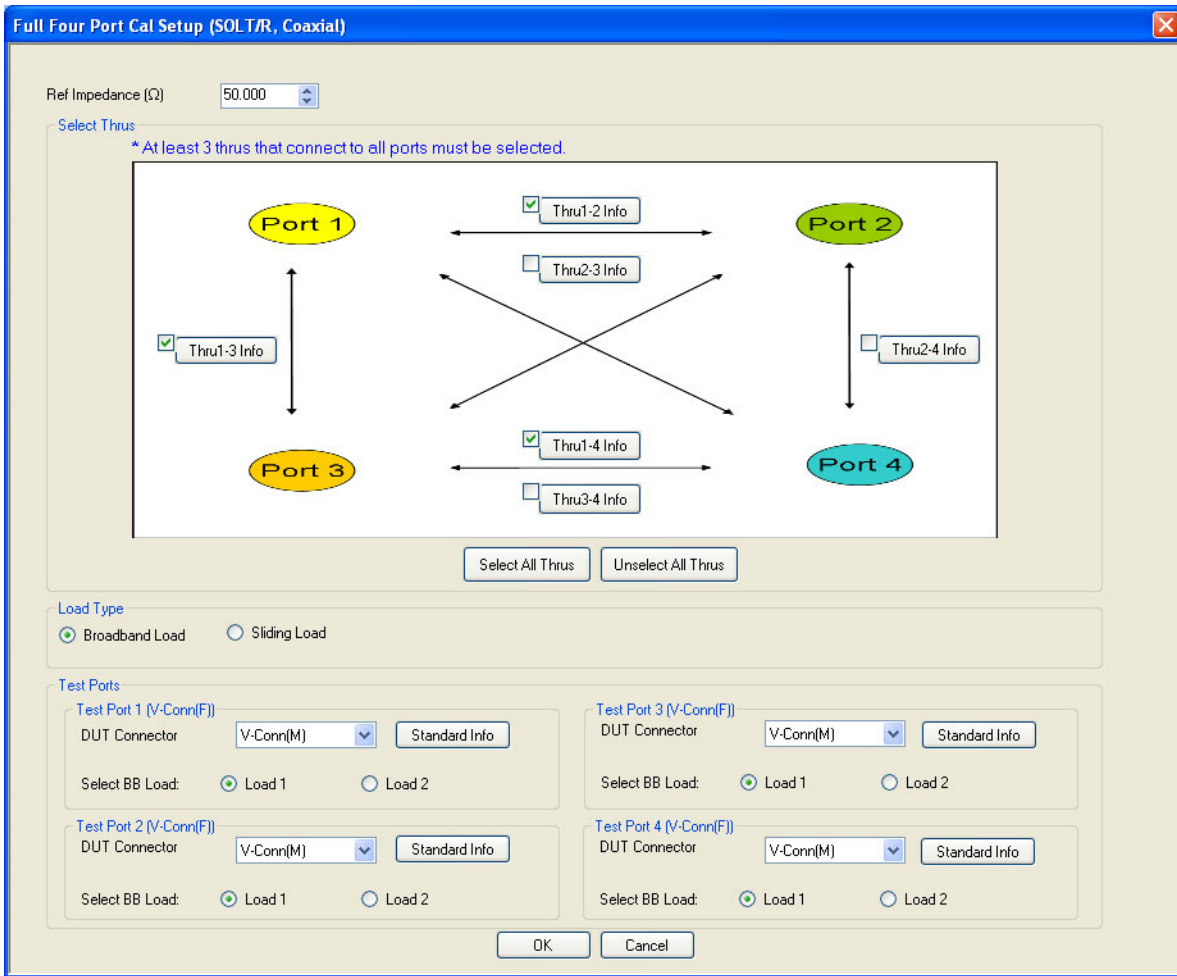


Figure 10-38. FULL FOUR PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Select Through Area

Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3.4

Thru Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected, a message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”

Test Port 1 Connector Type Area

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)

Test Port 1 Select BB Load Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2, Test Port 3, and Test Port 4 Connector Type Area

Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the Standard Info dialog box for the selected DUT Connector.

Test Port 2, Test Port 3, and Test Port 4 Select BB Load Area

Identical function as with the Test Port 1 Select BB Load Area above. Select between Load 1 and Load 2.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSLT
- Line Type = Coaxial

Previous

- [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
- [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

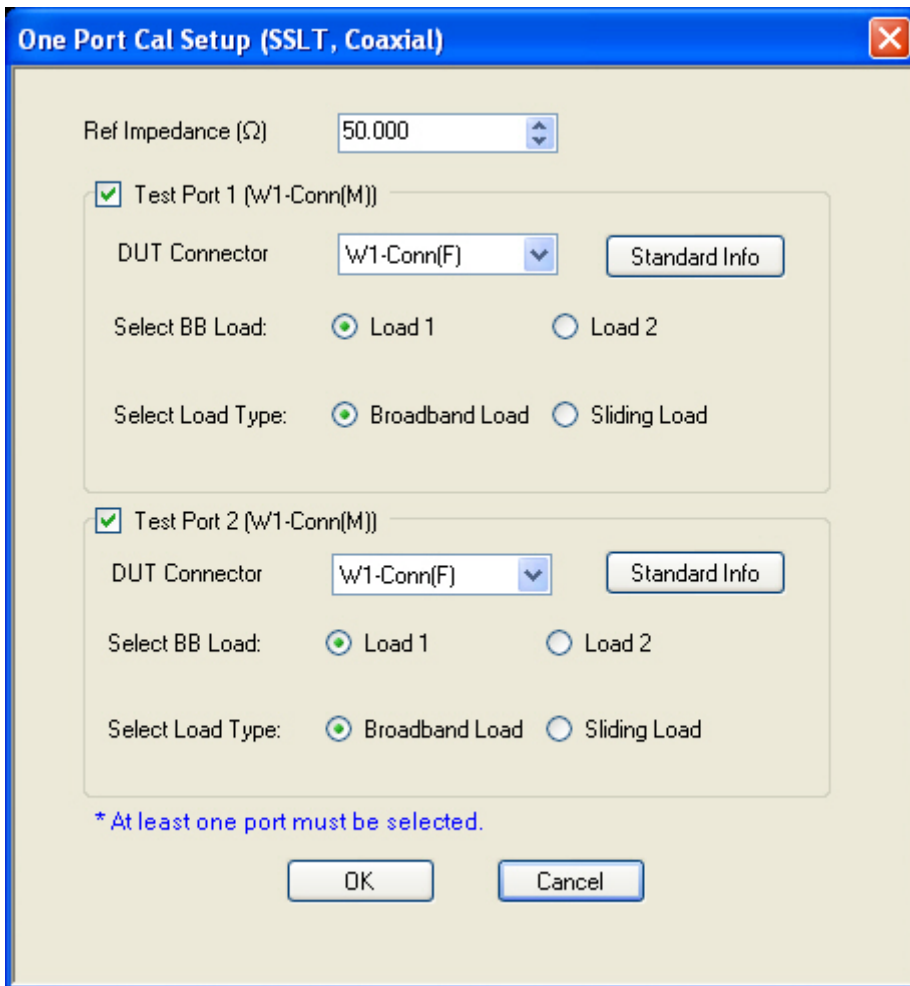


Figure 10-39. FULL FOUR PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Select Throughs

Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3.4

Thru Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

Load Type

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected, a message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”

Test Port 1 Connector Type

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)

Test Port 1 Select BB Load

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2, Test Port 3, and Test Port 4 Connector Type

Identical function as with the Test Port 1 Connector above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the Standard Info dialog box for the selected DUT Connector.

Test Port 2, Test Port 3, and Test Port 4 Select BB Load

Identical function as with the Test Port 1 Select BB Load above. Select between Load 1 and Load 2.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (SSST, COAXIAL) Dialog Box

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSST
- Line Type = Coaxial

Previous

- [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
- [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)

Navigation

- This dialog box is available from multiple menus.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, COAXIAL) Dialog Box

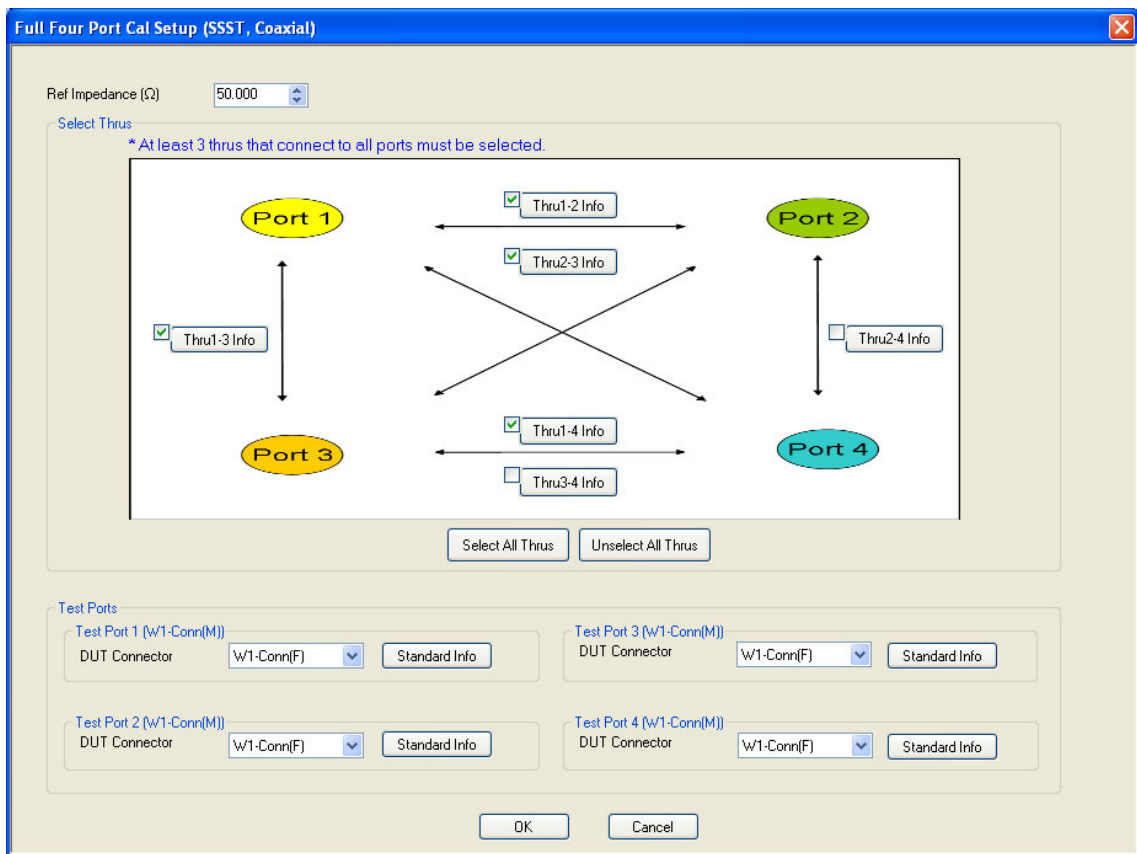


Figure 10-40. FULL FOUR PORT CAL SETUP (SSST, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Select Throughs

Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3,4

Thru Info Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

Test Port 1 Connector Type

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)

Test Port 2, Test Port 3, and Test Port 4 Connector Type

Identical function as with the Test Port 1 Connector above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the Standard Info dialog box for the selected DUT Connector.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (SSST, WAVEGUIDE) Dialog Box

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSST
- Line Type = Waveguide

Previous

- “FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68
- “CAL SETUP Menu - 4-Port VNAs” on page 10-64

Navigation

- This dialog box is available from multiple menus.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Waveguide | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, WAVEGUIDE) Dialog Box

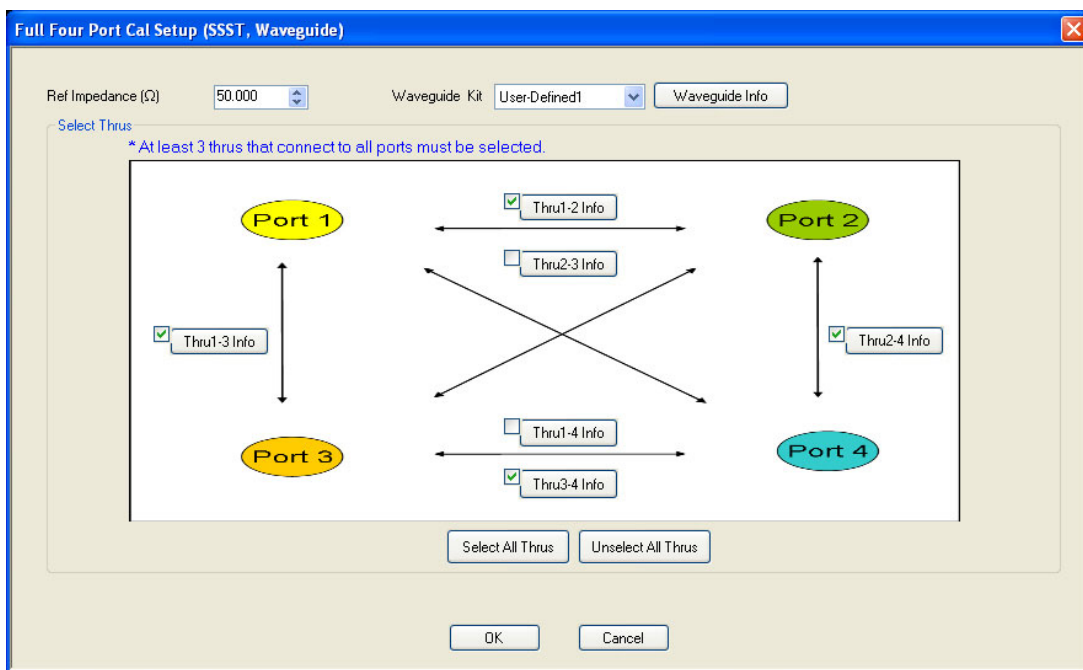


Figure 10-41. FULL FOUR PORT CAL SETUP (SSST, WAVEGUIDE) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit

Select the **Waveguide Kit** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Select Throughs

Select any combination of throughs as long as three are selected that connect to all ports. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3.4

Thru Buttons

As each through is selected, it enables a Thru Info button that displays the THRU INFO configuration dialog box for the selected port pair. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = LRL/LRM
- Line Type = Coaxial

Previous

- [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
- [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box

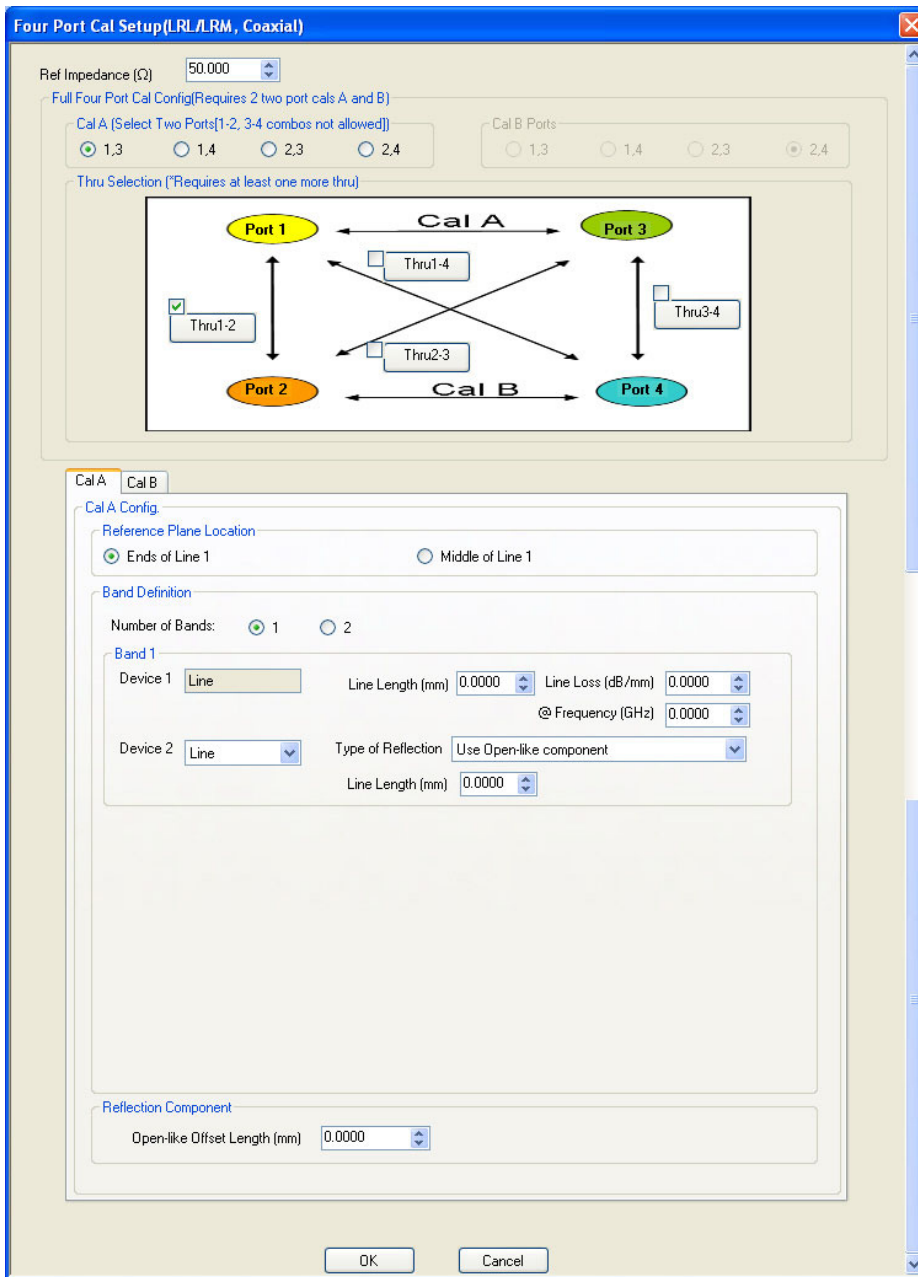


Figure 10-42.FOUR PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box

Overview

The dialog box provides common areas for Reference Impedance, Full Four Port Calibration Configuration, and Thru Selection. Below this common section are two tabbed dialog areas for Cal A and Cal B.

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Full Four Port Cal Configuration

Requires two 2-port calibrations as Cal A and Cal B, configured below.

Cal A Ports

Allows selection of the calibration A port pair. Combinations of ports 1-2 and ports 3-4 are not allowed. Select from:

- Port 1, 3
- Port 1, 4
- Port 2, 3
- Port 2, 4

Cal B Ports

This area is read-only and defined by the port pair choice for Cal A.

- If Cal A = Ports 1, 3, then Cal B = Ports 2, 4
- If Cal A = Ports 1, 4, then Cal B = Ports 2, 3
- If Cal A = Ports 2, 3, then Cal B = Ports 1, 4
- If Cal A = Ports 2, 4, then Cal B = Ports 1, 3

Thru Selection

Any combination of throughs may be selected as long as least one additional through is selected from:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 3-4

Cal A Tab

Access the Cal A functions and controls by selecting the Cal A tab.

Cal A - Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Cal A - Band Definition

Select one or two bands from the pull-down menu.

- Number of Bands = 1. Only the Band 1 Definition area is present.
- Number of Bands = 2. The Band 1 Definition area remains, and the Band 2 Definition and the Band Break Point areas appear.

Cal A - Band 1 Device 1 Definition

Provides the following fields and controls for Band 1:

- Band 1 Device 1 = Defaulted to Line.
- Line Length (mm) for Device 1. Allows input of the line length in mm.
- Line Loss (dB/mm). Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz). Allows input of a frequency setting for the Line Loss factor input above.

Cal A - Band 1 Device 2 Definition

- Band 1 Device 2. Select from Line or Match in pull-down menu.
- If Line is selected, the Type of Reflection allows selection of Use Open-like component or Use Short-like component.
 - If Use Open-line component is selected, the Reflection Component area at bottom of dialog box displays the Open-like Offset Length (mm) field.
 - If Use Short-like component is selected, the Reflection Component area at bottom of dialog box displays Short-line Offset Length (mm) field.

Cal A - Band 2 Definition

The Number of Bands field above must be set to “2” for this area and the Band Break Point area described below to be displayed. Provides the following fields and controls for Band 2.

Cal A - Band 2 Device 3 Definition

A pull-down menu with selections of:

- Use device 1
- Use device 2
- Use new line. If selected, additional fields appear as Line Length (mm), Line Loss (dB/mm), and @ Frequency (GHz).

Cal A - Band 2 Device 4 Definition

A pull-down menu with selections of:

- Line
- Match

If Line is selected for Band 2 Device 4, the Type of Reflection and Line Length (mm) fields are available.

The Type of Reflection field choices are limited to:

- Use Short-like component. If selected, the Reflection Component area below has one field for Short-like Offset Length (mm).
- Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

If Match is selected for Band 2 Device 4, the Match Info button and the Type of Reflection fields appear with choices of:

- The Match Info button appears. Select displays the USER DEFINED MATCH DEVICES dialog box appears which allows configuration of the match devices.
 - [“USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181](#)
- The Type of Reflection field has the following choices:
 - Use Short-like component. If selected, the Reflection Component area below has one field of Short-like Offset Length (mm) field.
 - Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).
 - Use both. If selected, pair of radio button fields appear and allow selection of either Use Port 1 Match or Use Port 2 Match. Also, if selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

Cal A - Band Break Point

This area only appears if the Number of Bands in the Band Definition area is set to “2”.

The Calculate Recommended Value button calculates the recommended break point value based on the input parameters in the fields above. Clicking the button calculates a break point frequency value and populates the Use Recommended Frequency (GHz) field.

A radio button set allows selection of either:

- Use Recommended Frequency (GHz) which was calculated by the button above.
- Define New Frequency (GHz) field which allows direct user input of a break frequency value.

Cal A - Reflection Component

Depending on the settings in the fields above, this area one or two input fields from:

- Open-like Offset Length (mm)
- Short-like Offset Length (mm)

Cal B Tab and Controls

Access the Cal B functions and controls by selecting the Cal B tab.

Cal B - Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Cal B - Band Definition

Select one or two bands from the pull-down menu. The function is the same as the Cal A - Band Definition described above.

Cal B - Band 1 Device 1 Definition

Provides fields and controls for Cal B - Band 1 Device 1. The functions are the same as the Cal B - Band 1 Device 1 Definition area described above.

Cal B - Band 1 Device 2 Definition

Provides fields and controls for Cal B - Band 1 Device 2. The functions are the same as the Cal A - Band 1 Device 2 Definition area described above.

Cal B - Band 2 Definition

The Number of Bands field above must be set to “2” for this area and the Band Break Point area described below to be displayed. The functions are the same as the Cal B - Band 2 Definition area described above.

Cal B - Band 2 Device 3 Definition

A pull-down menu with selections of Use device 1, Use device 2, or Use new line. The functions and controls are the same as the Cal A - Band 2 Device 3 Definition area described above.

Cal B - Band 2 Device 4 Definition

A pull-down menu with selections of Line or Match. The functions and controls are the same as the Cal A - Band 2 Device 4 Definition area described above.

Cal B - Band Break Point

This area only appears if the Number of Bands in the Band Definition area is set to “2”. The functions and controls are the same as the Cal A - Band Break Point area described above.

Cal B - Reflection Component

Depending on the settings in the fields above, this area has one or two input fields. The functions and controls are the same as the Cal A - Reflection Component area described above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Manual 4-Port Cal Dialog Box Summary

The table below summarizes the available fields in all available 4-port calibration setup dialog boxes. If the dialog box is described above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named either “Full Four Port Cal Setup (*Cal Method, Line Type*)” or “Four Port Cal Setup (*Cal Method, Line Type*)”

Table 10-3. Manual 4-Port Cal Setup Dialog Box Summary (1 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Coaxial	See full description at “FULL FOUR PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-72 0.8 mm Conn (M) 0.8 mm Conn (F) Reference Impedance (Ohms) Select Throughs: At least 3 throughs that connect to all ports must be selected. Select from Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4. Thru Info buttons: Displays the THRU INFO dialog box for the selected through. <ul style="list-style-type: none"> • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 Load Type: Select from Broadband Load or Sliding Load Test Ports: Port 1, Port 2, Port 3, Port 4. Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F) Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector. <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 Test Port Select BB Load: Load 1, Load 2. Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	SOLT/R is not recommended for Waveguide calibrations. Same controls as SOLT/R Coaxial with the following changes: Waveguide Kit: User-Defined1 to User-Defined32 Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above. <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182

Table 10-3. Manual 4-Port Cal Setup Dialog Box Summary (2 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Microstrip	<p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port DUT Connector: User-Defined1 through User Defined32.</p> <p>Test Port DUT Connector Standard Info Button: For each port, displays the USER DEFINED STANDARD dialog box for the selected connector:</p>
SSLT Coaxial	<p>See full description at “FULL FOUR PORT CAL SETUP (SSLT, COAXIAL) Dialog Box” on page 10-76</p> <p>Reference Impedance (Ohms)</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 3 throughs that connect to all ports must be selected. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons:</p> <ul style="list-style-type: none"> • Displays the THRU INFO dialog box for the selected through. • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Ports: Port 1, Port 2, Port 3, Port 4</p> <p>Test Port 1 DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button:</p> <ul style="list-style-type: none"> • Displays the STANDARD INFORMATION dialog box for the selected connector. • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port 1 BB Load: Load 1, Load 2.</p> <p>Test Port 2, Test Port 3, and Test Port 4 controls are the same as Test Port 1.</p>
SSLT Non-Dispersive	<p>Same controls and functions as SSLT Coax above.</p>
SSLT Waveguide	<p>Same controls as SSLT Coaxial with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined1 to User-Defined32</p> <p>Waveguide Info button:</p> <ul style="list-style-type: none"> • Displays WAVEGUIDE INFO dialog box for selected calibration method and kit. • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182

Table 10-3. Manual 4-Port Cal Setup Dialog Box Summary (3 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SSLT Microstrip	Same controls as SSLT Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: <ul style="list-style-type: none"> • Displays MICROSTRIP INFO dialog box for selected calibration method and kit. • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 Test Port DUT Connector: User-Defined1 through User Defined32. Test Port DUT Connector Standard Info Button: <ul style="list-style-type: none"> • Select displays the USER DEFINED STANDARD dialog box for the selected connector.
SSST Coaxial	See full description at “FULL FOUR PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-79 Reference Impedance (Ohms) Select Throughs: At least 3 throughs that connect to all ports must be selected. Select from Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 Thru Info buttons: Displays the THRU INFO dialog box for the selected through. <ul style="list-style-type: none"> • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 Test Ports: Port 1, Port 2, Port 3, Port 4 Test Port DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F) Test Port Connector Standard Info Button: Displays the STANDARD INFORMATION dialog box for the selected connector. <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175 Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.
SSST Non-Dispersive	Same controls as SSST Coaxial above.
SSST Waveguide	See full description at “FULL FOUR PORT CAL SETUP (SSST, WAVEGUIDE) Dialog Box” on page 10-81 Same controls as SSST Coaxial with the following changes: Waveguide Kit: User-Defined1 to User-Defined32 Waveguide Info button: <ul style="list-style-type: none"> • Displays WAVEGUIDE INFO dialog box for selected calibration method and kit. • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182

Table 10-3. Manual 4-Port Cal Setup Dialog Box Summary (4 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SSST Microstrip	<p>Same controls as SSST Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button:</p> <ul style="list-style-type: none"> • Displays MICROSTRIP INFO dialog box for selected calibration method and kit. • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port DUT Connector: User-Defined1 through User Defined32.</p> <p>Test Port DUT Connector Standard Info Button:</p> <ul style="list-style-type: none"> • Select displays the USER DEFINED STANDARD dialog box for the selected connector.
LRL/LRM Coaxial	<p>See full description of controls and display logic at “FULL FOUR PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box” on page 10-83.</p> <p>Reference Impedance (Ohms)</p> <p>Cal A Ports - Select two from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports - Auto-selected non-Cal A Ports of 1-3, 1-4, 2-3, 2-4</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • Requires at least one additional through. • Four through combinations of Cal A and Cal B Ports are displayed. • Only four of Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 are shown • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Number of Bands: 1, 2</p> <ul style="list-style-type: none"> • If 1, only Band 1 Device 1 and Band 1 Device 2 controls appear. • If 2, the above plus Band 2 Device 3 and Band 2 Device 4 controls appear. <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Cal A Reference Plane Location: Ends of Line, Middle of Line 1 • Cal A Number of Bands: 1 or 2 • Cal A Band 1 Device 1 Line: Line Length (mm), Line Loss (dB/mm), @ Frequency (GHz) • Cal A Band 1 Device 2 Type: Line, Match; Use Short-like component, Use Open-like component, Use both; If Device 2 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. • “USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181 • Cal A Band 2 Device 3: Use device 1, Use new line • Cal A Band 2 Device 4: Line, Match, Type of Reflection (Use Open-like component, Use Short-like component), Line Length (mm) • Cal A Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.

Table 10-3. Manual 4-Port Cal Setup Dialog Box Summary (5 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Non-Dispersive	Same controls as LRL/LRM Coaxial.
LRL/LRM Waveguide	<p>See full description for the “FULL FOUR PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box” on page 10-83 above.</p> <p>Same controls as LRL/LRM Coaxial with the following changes:</p> <p>Cutoff Frequency (GHz)</p> <p>Dielectric Value</p>
LRL/LRM Microstrip	<p>Same controls as LRL/LRM Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174

10-10 Typical Calibration Sub-Menus

The menus in this section are example menus for the calibration step procedures. The exact content and presence of each menu is dependent on the settings for each calibration run.

REFL. DEVICE(S) Menu - 4-Port VNAs

Full Name

- REFLECTIVE DEVICE(S) Menu

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

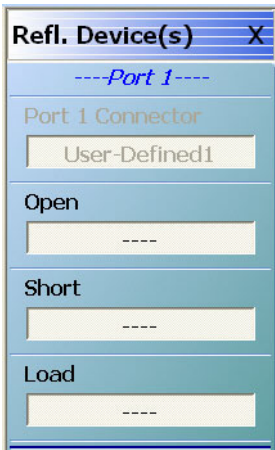
Using a different configuration set can change the appearance of the REFL. DEVICE(S) menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
 - [“THREE PORT CAL Menu - 4-Port VNAs” on page 10-101](#)
 - [“TWO PORT CAL Menu - 4-Port VNAs” on page 10-121](#)
 - [“ONE PORT CAL Menu - 4-Port VNAs” on page 10-138](#)
 - [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)
 - [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)
- The REFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)
 - [“CAL METHOD Menu - 4-Port VNA” on page 10-66](#)
 - [“LINE TYPE Menu - 4-Port VNA” on page 10-67](#)
 - [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)

Similar Menus

- The REFL. DEVICE(S) Port 1 menu is nearly identical to typical REFL. DEVICE(S) Port 2, REFL. DEVICE(S) Port 3, and REFL. DEVICE(S) Port 4 menus.



A typical REFL. DEVICE(S) menu.

REFLECTIVE DEVICE(S) Menu. Each button is a completion task button and marked with a checkmark when the calibration task is complete.

Port 1 Connector

A read only button showing the configured connector for the indicated port.

Open

In general, prepare the indicated connections and components and then select the button. Starts the open calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.

Short

Starts the short calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.

Load

Starts the load calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.

Sliding Load

If present, selecting this button displays the SLIDING LOADS menu which is described in the section below.

- [“SLIDING LOADS Menu - 4-Port VNAs” on page 10-95](#)

Figure 10-43. REFL. DEVICE(S) Menu - 4-Port VNAs - Typical Example

SLIDING LOADS Menu - 4-Port VNAs

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the SLIDING LOADS menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“REFL. DEVICE\(S\) Menu - 4-Port VNAs” on page 10-93](#)
 - [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
 - [“THREE PORT CAL Menu - 4-Port VNAs” on page 10-101](#)
 - [“TWO PORT CAL Menu - 4-Port VNAs” on page 10-121](#)
 - [“ONE PORT CAL Menu - 4-Port VNAs” on page 10-138](#)
 - [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)
 - [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)
- The SLIDING LOADREFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)
 - [“CAL METHOD Menu - 4-Port VNA” on page 10-66](#)
 - [“LINE TYPE Menu - 4-Port VNA” on page 10-67](#)

	<p>A typical SLIDING LOADS menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete. The number of buttons appearing on the menu is dependent on the calibration settings.</p> <p>Connector Type</p> <p>A read only button showing the configured connector for the indicated port.</p> <p>Sliding Load (Position 1)</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the sliding load calibration procedure at position 1 for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Sliding Load (Position 2)</p> <p>As above for sliding load calibration procedure at position 2.</p> <p>Sliding Load (Position 3)</p> <p>As above for sliding load calibration procedure at position 3.</p> <p>Sliding Load (Position 4)</p> <p>As above for sliding load calibration procedure at position 4.</p> <p>Sliding Load (Position 5)</p> <p>As above for sliding load calibration procedure at position 5.</p> <p>Sliding Load (Position 6)</p> <p>As above for sliding load calibration procedure at position 6.</p> <p>When all calibration procedures are complete, use the Back button to return to the REFL DEVICE menu.</p> <ul style="list-style-type: none"> • “REFL. DEVICE(S) Menu - 4-Port VNAs” on page 10-93
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Figure 10-44. SLIDING LOADS Menu - 4-Port VNAs - Typical Example

THRU/RECIP Menu - 4-Port VNAs

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
 - [“THREE PORT CAL Menu - 4-Port VNAs” on page 10-101](#)
 - [“TWO PORT CAL Menu - 4-Port VNAs” on page 10-121](#)
 - [“ONE PORT CAL Menu - 4-Port VNAs” on page 10-138](#)
 - [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)
 - [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)
 - [“CAL METHOD Menu - 4-Port VNA” on page 10-66](#)
 - [“LINE TYPE Menu - 4-Port VNA” on page 10-67](#)



A typical THRU/RECIP menu.

Each button is a completion task button and marked with a checkmark when the calibration task is complete.

Thru (Port Pair 1-2)

In general, prepare the indicated connections and components and then select the button. Starts the through calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.

Thru (Port Pair 1-3)

As above for through calibration at port pair 1-3.

Reciprocal (Port Pair 1-4)

As above for reciprocal calibration at port pair 1-4.

Thru (Port Pair 2-3)

As above for through calibration at port pair 2-3.

Thru (Port Pair 2-4)

As above for through calibration at port pair 2-4.

Thru (Port Pair 3-4)

As above for through calibration at port pair 3-4.

When all calibration procedures are complete, use the **Back** button to return to the REFL DEVICE menu.

- [“REFL. DEVICE\(S\) Menu - 4-Port VNAs” on page 10-93](#)

Figure 10-45. THRU/RECIP Menu - 4-Port VNAs - Typical Example

ISOLATION (OPTIONAL) Menu

Typical Configuration

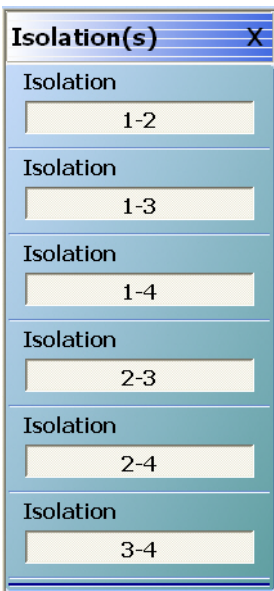
This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“FOUR PORT CAL Menu - 4-Port VNAs” on page 10-68](#)
 - [“THREE PORT CAL Menu - 4-Port VNAs” on page 10-101](#)
 - [“TWO PORT CAL Menu - 4-Port VNAs” on page 10-121](#)
 - [“ONE PORT CAL Menu - 4-Port VNAs” on page 10-138](#)
 - [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)
 - [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)
 - [“CAL METHOD Menu - 4-Port VNA” on page 10-66](#)
 - [“LINE TYPE Menu - 4-Port VNA” on page 10-67](#)



A typical ISOLATION(S) menu.

Each button is a completion task button and marked with a checkmark when the calibration task is complete.

Isolation (Port Pair 1-2)

In general, prepare the indicated connections and components and then select the button. Starts the optional isolation calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.

Isolation (Port Pair 1-3)

As above for isolation calibration at port pair 1-3.

Isolation (Port Pair 1-4)

As above for isolation calibration at port pair 1-4.

Isolation (Port Pair 2-3)

As above for isolation calibration at port pair 2-3.

Isolation (Port Pair 2-4)

As above for isolation calibration at port pair 2-4.

Isolation (Port Pair 3-4)

As above for isolation calibration at port pair 3-4.

When all calibration procedures are complete, use the **Back** button to return to the REFL DEVICE menu.

- [“REFL. DEVICE\(S\) Menu - 4-Port VNAs” on page 10-93](#)

Figure 10-46. ISOLATION(S) Menu - 4-Port VNAs - Typical Example

10-11 Manual 3-Port Cal Setup - 4-Port VNAs

This sections described the menus and dialog boxes uses for manual 3-port calibration on a VectorStar 4-Port VNA.

THREE PORT CAL Menu - 4-Port VNAs

Button Availability

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant THREE PORT CAL SETUP dialog box.
- A representative menu is shown below.
- The example procedures at the end of this chapter show examples of various THREE PORT CAL menus.

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL

	<h4>Modify Cal Setup</h4> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the THREE PORT CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>The following Cal Method/Line Type combinations and their dialog boxes are represented with a figure and complete description:</p> <ul style="list-style-type: none"> • “THREE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-104 • “THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box” on page 10-107 • “THREE PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-110 • “THREE PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box” on page 10-112 <p>This table summarizes the dialog boxes for all Cal Method/Line Type combinations:</p> <ul style="list-style-type: none"> • Table 10-4, “Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-116 <h4>Port Selected</h4> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 10-47.THREE PORT CAL Menu - 4-Port VNAs - Typical example (1 of 3)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the THREE PORT CAL menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

Select displays the REFL. DEVICES PORT 1 submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

- Example: [“REFL. DEVICE\(S\) Menu - 4-Port VNAs” on page 10-93](#)

Port 2 Reflective Devices

Select displays the REFL. DEVICES PORT 2 submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

Port 3 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

Port 4 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

Figure 10-47. THREE PORT CAL Menu - 4-Port VNAs - Typical example (2 of 3)

Thru/Recip

Select displays the THRU/RECIP submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

- [“THRU/RECIP Menu - 4-Port VNAs” on page 10-97](#)

Isolation (Optional)

If required, select displays the ISOLATION submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

- [“ISOLATION \(OPTIONAL\) Menu” on page 10-99](#)

Done

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the CALIBRATION menu where the Cal Status button is set to ON.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Abort Cal

This button stops the current calibration procedure and returns to the CALIBRATION menu.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Figure 10-47. THREE PORT CAL Menu - 4-Port VNAs - Typical example (3 of 3)

THREE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “THREE PORT CAL Menu - 4-Port VNAs” on page 10-101

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

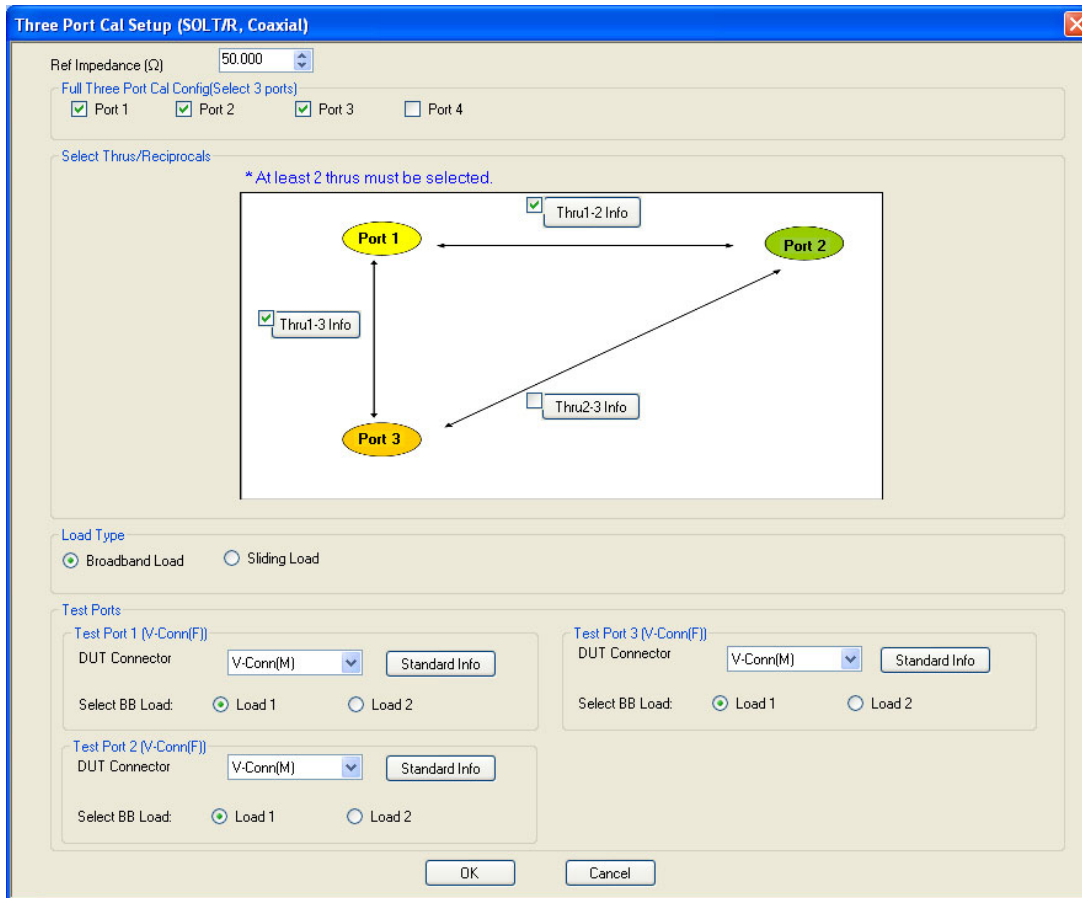


Figure 10-48. THREE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Full Three Port Calibration Configuration

Select three (3) ports from the list below. If a fourth port selection is attempted, an earlier port is discarded:

- Port 1
- Port 2
- Port 3
- Port 4

Select Throughs

Select any combination of three possible throughs as long as two (2) are selected. The available port pair throughs are based on the ports selected above. For a 3-port calibration, only three of the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3.4

Thru Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

Load Type

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected, a message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”

Only three of the Test Port configuration area are available based on the port selection above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)

- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 DUT Connector Standard Info Button

If Port 1 was selected above, select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)

Test Port 1 Select BB Load

If Port 1 was selected above, select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

If Port 2 was selected above, provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

If Port 3 was selected above, provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

If Port 4 was selected above, provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSLT
- Line Type = Microstrip

Previous

- [“CAL SETUP Menu - 4-Port VNAs” on page 10-64](#)
- [“THREE PORT CAL Menu - 4-Port VNAs” on page 10-101](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Microstrip | Edit Cal Params | THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box

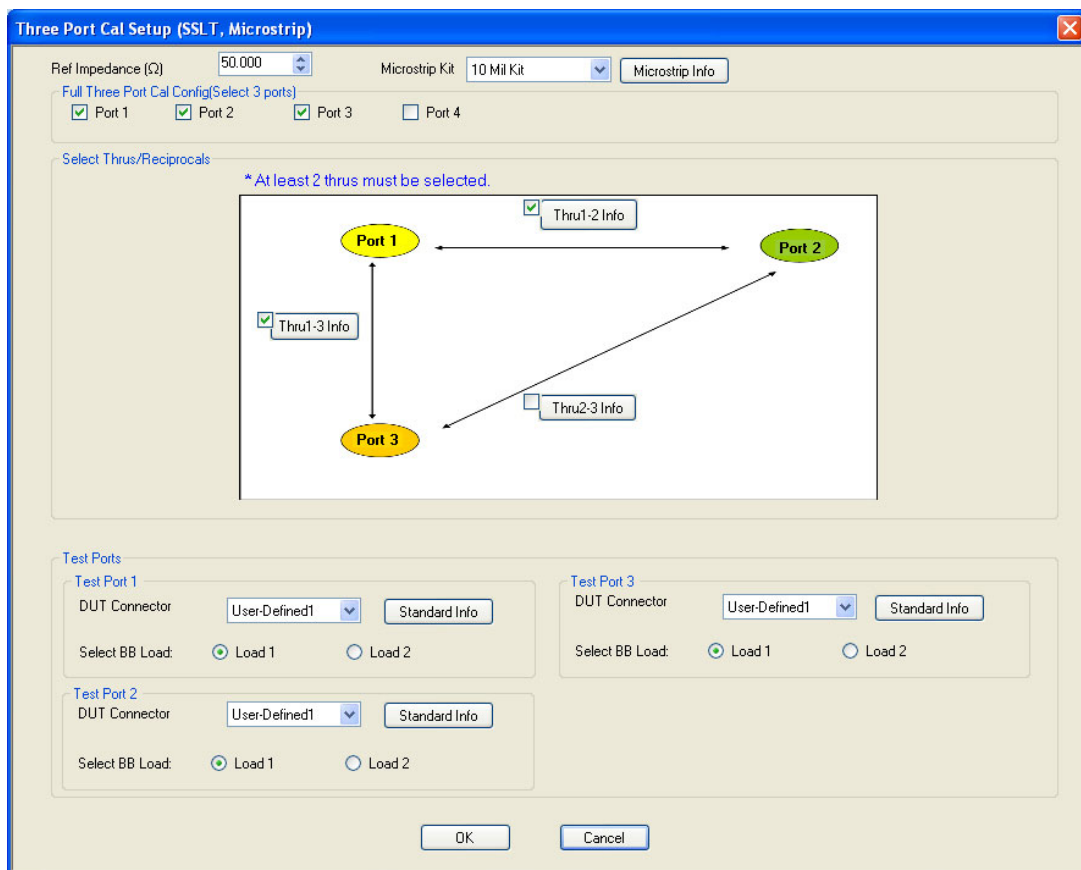


Figure 10-49. THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Full Three Port Calibration Configuration

Select three (3) ports from the list below. If a fourth port selection is attempted, an earlier port is discarded:

- Port 1
- Port 2
- Port 3
- Port 4

Select Throughs

Select any combination of three possible throughs as long as two (2) are selected. The available port pair throughs are based on the ports selected above. For a 3-port calibration, only three of the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3,4

Thru Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

Only three of the Test Port configuration areas are available based on the port selection above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 DUT Connector Standard Info Button

If Port 1 was selected above, select displays the Standard Info dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174](#)

Test Port 1 Select BB Load

If Port 1 was selected above, select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

If Port 2 was selected above, provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

If Port 3 was selected above, provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

If Port 4 was selected above, provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

THREE PORT CAL SETUP (SSST, COAXIAL) Dialog Box

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSST
- Line Type = Coaxial

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “THREE PORT CAL Menu - 4-Port VNAs” on page 10-101

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (SSST, COAXIAL) Dialog Box

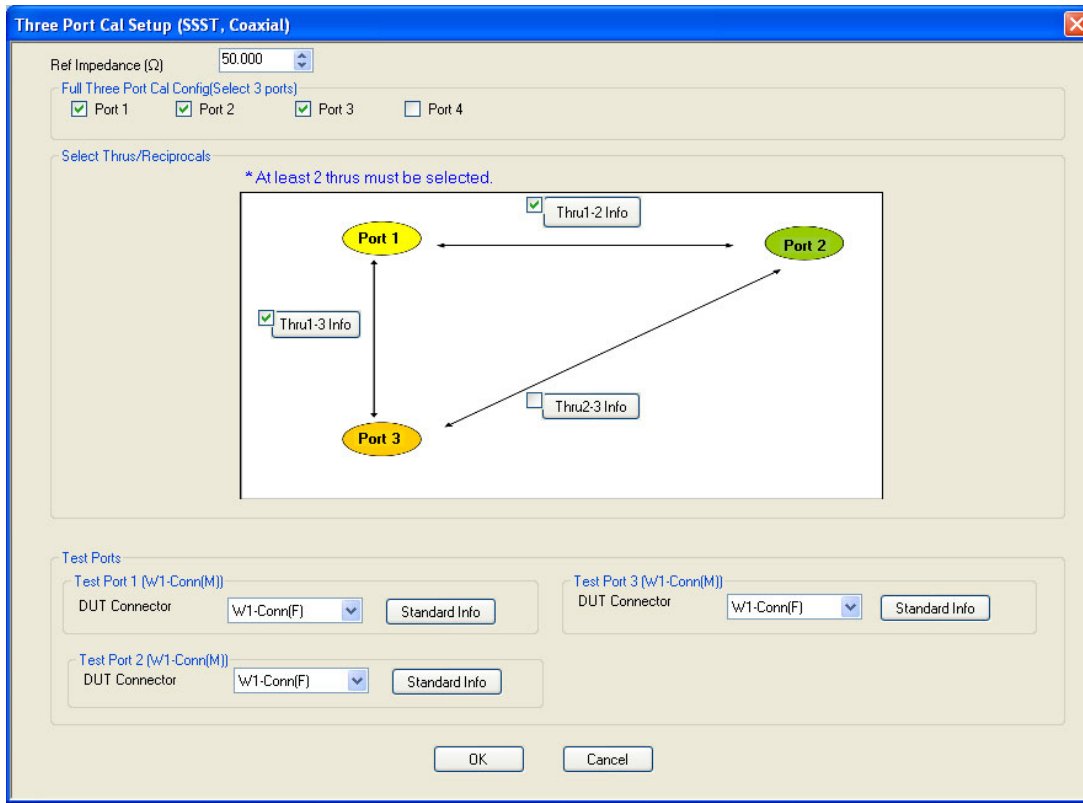


Figure 10-50.THREE PORT CAL SETUP (SSST, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Full Three Port Calibration Configuration

Select three (3) ports from the list below. If a fourth port selection is attempted, an earlier port is discarded:

- Port 1
- Port 2

- Port 3
- Port 4

Select Throughs/Reciprocals

Select any combination of three possible throughs as long as two (2) are selected. The available port pair throughs are based on the ports selected above. For a 3-port calibration, only three of the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3.4

Thru Info Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box accesses the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

Only three of the Test Port Configuration areas are available based on the port selection above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 DUT Connector Standard Info Button

If Port 1 was selected above, select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)

Test Port 2 Configuration

If Port 2 was selected above, provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

If Port 3 was selected above, provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

If Port 4 was selected above, provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

THREE PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “THREE PORT CAL Menu - 4-Port VNAs” on page 10-101

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (LRL/LRM, COAXIAL)

The screenshot displays the 'Three Port Cal Setup (LRL/LRM, Coaxial)' dialog box with the 'Cal A' tab selected. The interface includes the following elements:

- Ref Impedance (Ω):** 50.000
- Select Cal Type:** Radio buttons for 'LRL/M + Singleton' and 'Two LRL/Ms' (selected).
- Two LRL/Ms:** A note stating 'Full Three Port Cal Config(1-2,3-4 combos are not allowed)'. Below are two groups of radio buttons for 'Cal A (Select Port Pair)' (1,3 selected; 1,4; 2,3; 2,4) and 'Cal B Ports(Select Port Pair, One port must be shared with Cal A)' (1,3; 1,4; 2,3 selected; 2,4).
- Cal A Config:**
 - Reference Plane Location:** Radio buttons for 'Ends of Line 1' (selected) and 'Middle of Line 1'.
 - Band Definition:**
 - Number of Bands:** Radio buttons for '1' (selected) and '2'.
 - Band 1:**
 - Device 1:** 'Line' dropdown, 'Line Length (mm):' 0.0000, 'Line Loss (dB/mm):' 0.0000, '@ Frequency (GHz):' 0.0000.
 - Device 2:** 'Line' dropdown, 'Type of Reflection:' 'Use Open-like component' dropdown, 'Line Length (mm):' 0.0000.
 - Reflection Component:** 'Open-like Offset Length (mm):' 0.0000.
- Buttons:** 'OK' and 'Cancel' at the bottom.

Figure 10-51. THREE PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box - Cal A Tab

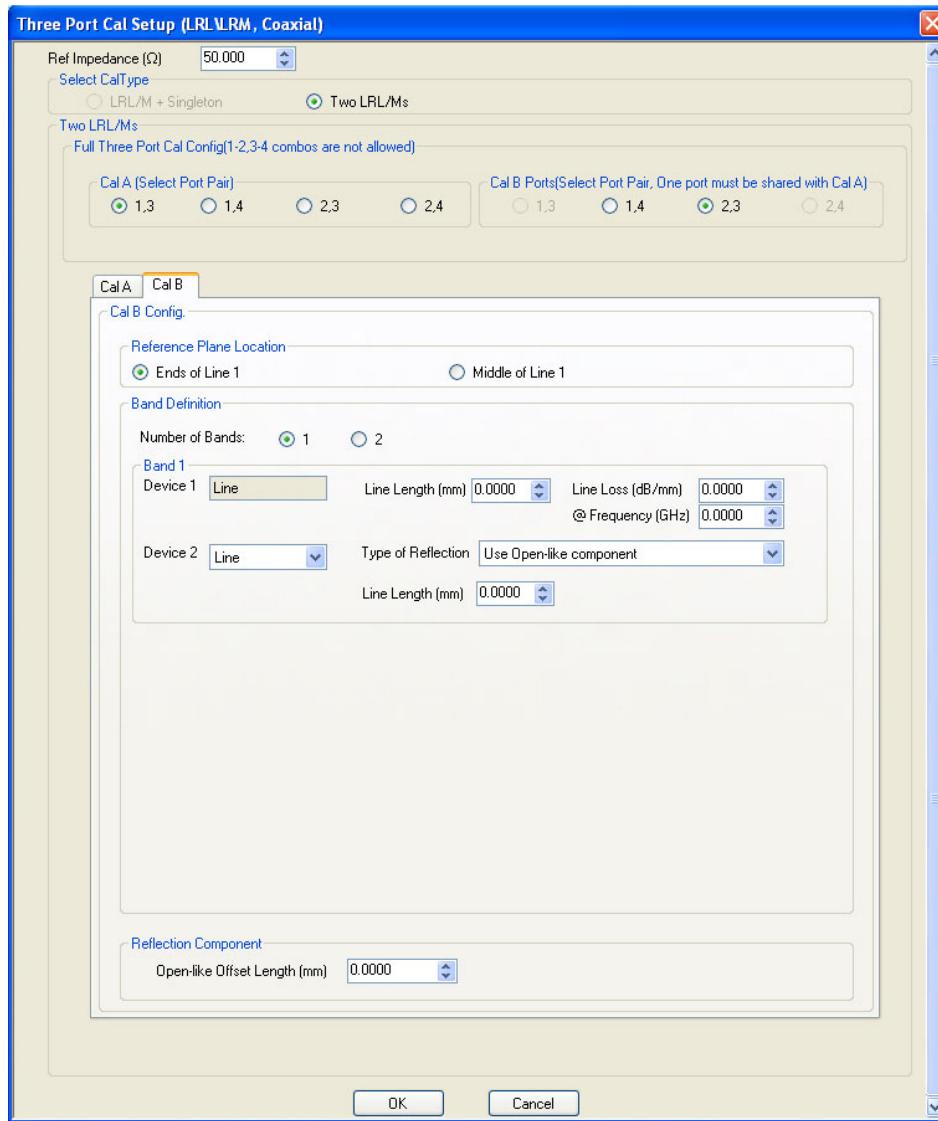


Figure 10-52. THREE PORT CAL SETUP (LRL/VRM, COAXIAL) Dialog Box - Cal B Tab

Overview

The dialog box provides common areas at the top for Reference Impedance, Three Port Calibration Configuration, and Thru Selection. Below these common sections are two tabbed dialog areas for Cal A and Cal B.

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select one of the calibration options from:

- LRL/M + Singleton
- Two LRL/Ms

Cal A Ports

Select one (1) Calibration A Port Pair noting that combinations of **Port Pair 1-2** and **Port Pair 3-4** are not allowed. Select from:

- Port 1-3
- Port 1-4
- Port 2-3
- Port 2-4

Cal B Ports

Select one (1) Calibration B Port Pair from the remaining unused port pairs from the Cal A Ports:

- If Cal A = Ports 1-3, then select Cal B from Ports 1-4 or 2-3
- If Cal A = Ports 1-4, then select Cal B from Ports 1-3 or 2-4.
- If Cal A = Ports 2-3, then select Cal B from Ports 1-3 or 2-4.
- If Cal A = Ports 2-4, then select Cal B from Ports 1-4 or 2-3.

Access the **Cal A** functions and controls by selecting the Cal A tab.

Cal A - Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Cal A - Band Definition

Select one or two bands from the pull-down menu.

- Number of Bands = 1. Only the Band 1 Definition area is present.
- Number of Bands = 2. The Band 1 Definition area remains, and the Band 2 Definition and the Band Break Point areas appear.

Cal A - Band 1 Device 1 Definition

Provides the following fields and controls for Band 1:

- Band 1 Device 1 = Defaulted to Line.
- Line Length (mm) for Device 1. Allows input of the line length in mm.
- Line Loss (dB/mm). Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz). Allows input of a frequency setting for the Line Loss factor input above.

Cal A - Band 1 Device 2 Definition

- Band 1 Device 2. Select from Line or Match in pull-down menu.
- If Line is selected, the Type of Reflection allows selection of Use Open-like component or Use Short-like component.
 - If Use Open-line component is selected, the Reflection Component area at bottom of dialog box displays the Open-like Offset Length (mm) field.
 - If Use Short-like component is selected, the Reflection Component area at bottom of dialog box displays Short-line Offset Length (mm) field.

Cal A - Band 2 Definition

The Number of Bands field above must be set to “2” for this area and the Band Break Point area described below to be displayed. Provides the following fields and controls for Band 2.

Cal A - Band 2 Device 3 Definition

A pull-down menu with selections of:

- Use device 1

- Use device 2
- Use new line. If selected, additional fields appear as Line Length (mm), Line Loss (dB/mm), and @ Frequency (GHz).

Cal A - Band 2 Device 4 Definition

A pull-down menu with selections of:

- Line
- Match

If Line is selected for Band 2 Device 4, the Type of Reflection and Line Length (mm) fields are available.

The Type of Reflection field choices are limited to:

- Use Short-like component. If selected, the Reflection Component area below has one field for Short-like Offset Length (mm).
- Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

If Match is selected for Band 2 Device 4, the Match Info button and the Type of Reflection fields appear with choices of:

- The Match Info button appears. Select displays the USER DEFINED MATCH DEVICES dialog box appears which allows configuration of the match devices.
 - [“USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181](#)
- The Type of Reflection field has the following choices:
 - Use Short-like component. If selected, the Reflection Component area below has one field of Short-like Offset Length (mm) field.
 - Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).
 - Use both. If selected, pair of radio button fields appear and allow selection of either Use Port 1 Match or Use Port 2 Match. Also, if selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

Cal A - Band Break Point

This area only appears if the Number of Bands in the Band Definition area is set to “2”.

The Calculate Recommended Value button calculates the recommended break point value based on the input parameters in the fields above. Clicking the button calculates a break point frequency value and populates the Use Recommended Frequency (GHz) field.

A radio button set allows selection of either:

- Use Recommended Frequency (GHz) which was calculated by the button above.
- Define New Frequency (GHz) field which allows direct user input of a break frequency value.

Cal A - Reflection Component

Depending on the settings in the fields above, this area has one or two input fields as:

- Open-like Offset Length (mm)
- Short-like Offset Length (mm)

Access the **Cal B** functions and controls by selecting the Cal B tab where the controls and functions are the same as the Cal A tab above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 3-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in all available 3-port calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All three-port dialog boxes are named “Three Port Cal Setup (*Cal Method, Line Type*)”

Table 10-4. Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (1 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Coaxial	<p>See full description at “THREE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-104</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select 3 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 2 throughs that connect to all ports must be selected. Only three throughs are available from the ports selected above. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 <p>Load Type: Broadband Load, Sliding Load</p> <p>The Test Port Configuration areas below are only available if the port was selected above.</p> <p>Test Port 1 DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 <p>Test Port 1 Select BB Load: Load 1, Load 2.</p> <p>Test Port 2, Test Port 3, and Test Port 4 controls are the same as Test Port 1, but only available if that test port was selected.</p>
SOLT/R Non-Dispersive	<p>Same controls and functions as SOLT/R Coaxial above.</p>
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182

Table 10-4. Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (2 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Microstrip	<p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p> <p>Test Port 1 Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p>
SSLT Coaxial	<p>See full description at “THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box” on page 10-107 above.</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select 3 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 2 throughs that connect to all ports must be selected. Only three throughs are available from the ports selected above. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 <p>Load Type: Broadband Load, Sliding Load</p> <p>The Test Port Configuration areas below are only available if the port was selected above.</p> <p>Test Port DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 <p>Test Port Select BB Load: Load 1, Load 2.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
SSLT Non-Dispersive	<p>Same controls SSLT Coaxial above.</p>
SSLT Waveguide	<p>Warning: Not recommended to perform waveguide cal with SOLT/R method.</p> <p>Same controls as SSLT Coaxial with the following changes:</p> <p>Waveguide Kit: Select from WR10, WR12, WR15, User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182

Table 10-4. Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (3 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SSLT Microstrip	See full description at “THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box” on page 10-107 Same controls as SSLT Coaxial with the following changes: Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 Test Port DUT Connector: User-Defined1 to User-Defined32 Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.
SSST Coaxial	See full description at “THREE PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-110 above. Reference Impedance (Ohms) Test Ports: Select 3 ports from Port 1, Port 2, Port 3, Port 4. Select Throughs: <ul style="list-style-type: none"> • At least 2 throughs that connect to all ports must be selected. Only three throughs are available from the ports selected above. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 Thru Info buttons: Displays the THRU INFO dialog box for the selected through. <ul style="list-style-type: none"> • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 The Test Port Configuration areas below are only available if the port was selected above. Test Port DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F) Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector. <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.
SSST Non-Dispersive	Same controls as SSST Coaxial.
SSST Waveguide	Same controls as SSST Coaxial with the following changes: Waveguide Kit: User-Defined1 to User-Defined32 Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182

Table 10-4. Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (4 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
SSST Microstrip	Same controls as SSST Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 Test Port DUT Connector: User-Defined1 to User-Defined32 Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.
LRL/LRM Coaxial	See full description of controls and display logic at “THREE PORT CAL SETUP (LRL/LRM, COAXIAL) Dialog Box” on page 10-112. Reference Impedance (Ohms) Select Cal Type: LRL/M + Singleton, Two LRL/Ms Cal A Ports: Select two port pairs from 1-3, 1-4, 2-3, 2-4 Cal B Ports: Auto-selected non-Cal A Port Pairs: 1-3, 1-4, 2-3, 2-4 Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box. Reference Plane Location: Ends of Line 1, Middle of Line 1 Number of Bands: 1, 2 <ul style="list-style-type: none"> • If 1, only Band 1 Device 1 and Band 1 Device 2 controls appear. • If 2, the above plus Band 2 Device 3 and Band 2 Device 4 controls appear. Cal A Configuration Parameters: <ul style="list-style-type: none"> • Cal A Reference Plane Location: Ends of Line, Middle of Line 1 • Cal A Number of Bands: 1 or 2 • Cal A Band 1 Device 1 Line: Line Length (mm), Line Loss (dB/mm), @ Frequency (GHz) • Cal A Band 1 Device 2 Type: Line, Match; Use Short-like component, Use Open-like component, Use both; If Device 2 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. • “USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181 • Cal A Band 2 Device 3: Use device 1, Use new line • Cal A Band 2 Device 4: Line, Match, Type of Reflection (Use Open-like component, Use Short-like component), Line Length (mm) • Cal A Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) Cal B Configuration Parameters <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
LRL/LRM Non-Dispersive	Same controls as LRL/LRM Coaxial above.

Table 10-4. Manual Calibration - 3-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (5 of 5)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Waveguide	Same controls as LRL/LRM Coaxial above with the following changes: Cutoff Frequency (GHz) Dielectric Value
LRL/LRM Microstrip	Same controls as LRL/LRM Coaxial above with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration kit. • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174

10-12 Manual 2-Port Cal Setup - 4-Port VNAs

TWO PORT CAL Menu - 4-Port VNAs

Button Availability:

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TWO PORT CAL SETUP dialog box.
- A representative menu is shown below.
- The example procedures at the end of this chapter show examples of various TWO PORT CAL menus.

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL

	<p>Modify Cal Setup</p> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the THREE PORT CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Example two-port dialog boxes are available at the following links:</p> <ul style="list-style-type: none"> • “TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-123 • “TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box” on page 10-126 • “TWO PORT CAL SETUP (LRL/LRM, MICROSTRIP) Dialog Box” on page 10-129 <p>A summary of all 2-Port Cal Method and Line Type combinations is available at:</p> <ul style="list-style-type: none"> • Table 10-5, “Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs” on page 10-133 <p>Port Selected</p> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 10-53. TWO PORT CAL Menu - 4-Port VNAs - Typical example (1 of 2)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the TWO PORT CAL menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

Select displays the REFL. DEVICES PORT 1 submenu. When all procedures are complete, select the Back button to return to the TWO PORT CAL menu where this button is now marked with a completion checkmark.

- [“REFL. DEVICE\(S\) Menu - 4-Port VNAs” on page 10-93](#)

Port 2 Reflective Devices

Select displays the REFL. DEVICES PORT 2 submenu. When all procedures are complete, select the Back button to return to the TWO PORT CAL menu where this button is now marked with a completion checkmark.

Thru/Recip

Select displays the THRU/RECIP submenu. When all procedures are complete, select the Back button to return to the TWO PORT CAL menu where this button is now marked with a completion checkmark.

- [“THRU/RECIP Menu - 4-Port VNAs” on page 10-97](#)

Isolation (Optional)

If required, select displays the ISOLATION submenu. When all procedures are complete, select the Back button to return to the TWO PORT CAL menu where this button is now marked with a completion checkmark.

- [“ISOLATION \(OPTIONAL\) Menu” on page 10-99](#)

Done

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the CALIBRATION menu where the Cal Status button is set to ON.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Abort Cal

This button stops the current calibration procedure and returns to the CALIBRATION menu.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Figure 10-53.TWO PORT CAL Menu - 4-Port VNAs - Typical example (2 of 2)

TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “TWO PORT CAL Menu - 4-Port VNAs” on page 10-121

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, COAXIAL)

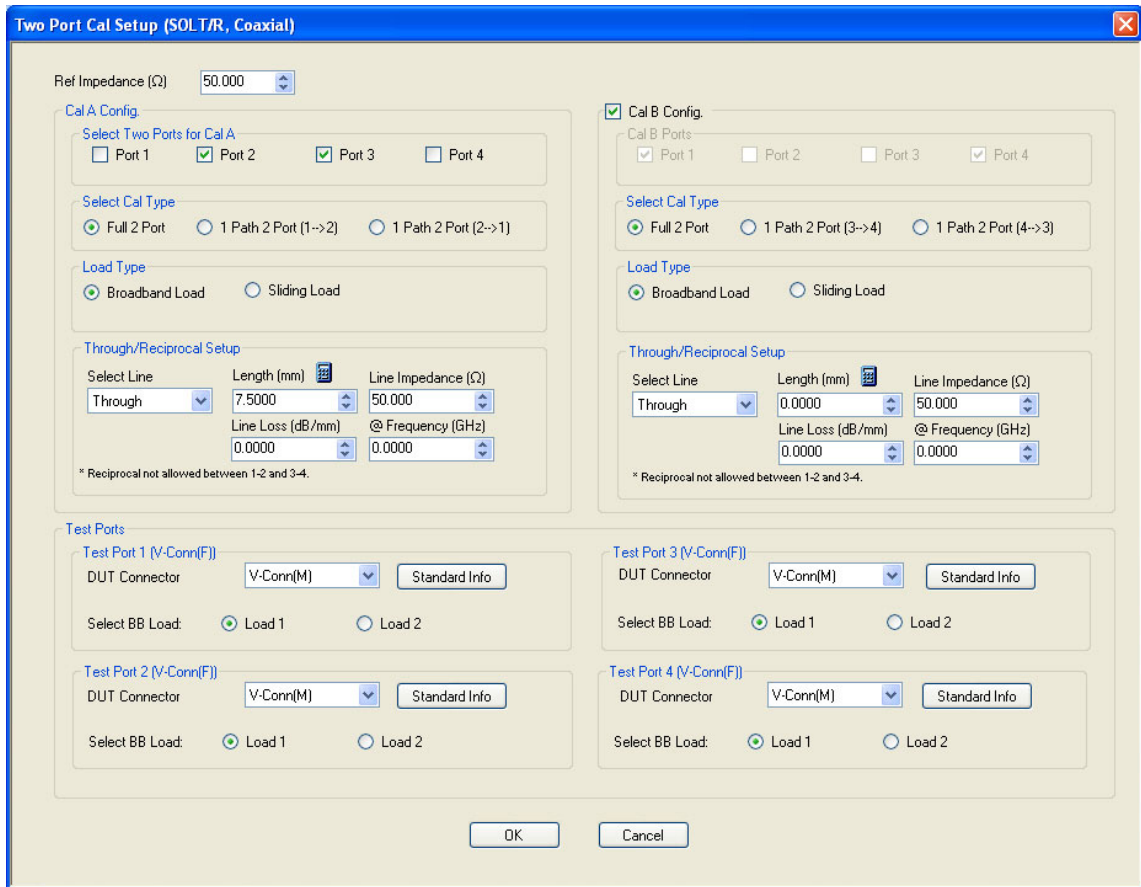


Figure 10-54. TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Cal A and Cal B Configuration

The dialog box is divided into two calibration areas for Calibration A and Calibration B. Of the four test ports, the user selects two ports for the Cal A procedure. The instrument autoselects the remaining two test ports for the Cal B procedure.

Cal A Test Ports

Select any two test ports from Port 1, Port 2, Port 3, and Port 4. The non-selected ports are autoselected for Cal B.

Cal A Cal Type

Select the calibration type from the following options:

- Full 2 Port
- 1 Path 2 Port forward. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (1-->2).
- 1 Path 2 Port reverse. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (2-->1).

Cal A Load Type

Select from:

- Broadband Load
- Sliding Load. If selected, a message appears: "Still required broadband loads below sliding load breakpoint frequency."

Cal A Through/Reciprocal Setup

- Select Line:
 - Through
 - Reciprocal. Reciprocal is not allowed between 1-2 and 3-4.
- Length (mm).
 - Select the Calculator icon to convert time to length:
 - ["AIR EQUIVALENT LENGTH Calculator Dialog Box" on page 10-173](#)
- Line Impedance (Ohms)
- Line Loss (dB/mm)
- @ Frequency (GHz)

Cal B Setup Areas

The Cal B functions and controls are the same as Cal A above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)

- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 DUT Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector with its calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182](#)

Test Port 1 Select BB Load

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

Provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

Provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

Provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “TWO PORT CAL Menu - 4-Port VNAs” on page 10-121

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box

Two Port Cal Setup (SOLT/R, Microstrip)

Ref Impedance (Ω)

Microstrip Kit

Cal A Config.

Select Two Ports for Cal A
 Port 1 Port 2 Port 3 Port 4

Select Cal Type
 Full 2 Port 1 Path 2 Port (1->2) 1 Path 2 Port (2->1)

Through/Reciprocal Setup
 Select Line:
 Length (mm)
 Line Impedance (Ω)
 Line Loss (dB/mm)
 @ Frequency (GHz)
 * Reciprocal not allowed between 1-2 and 3-4.

Cal B Config.

Cal B Ports
 Port 1 Port 2 Port 3 Port 4

Select Cal Type
 Full 2 Port 1 Path 2 Port (3->4) 1 Path 2 Port (4->3)

Through/Reciprocal Setup
 Select Line:
 Length (mm)
 Line Impedance (Ω)
 Line Loss (dB/mm)
 @ Frequency (GHz)
 * Reciprocal not allowed between 1-2 and 3-4.

Test Ports

Test Port 1
 DUT Connector:
 Select BB Load: Load 1 Load 2

Test Port 2
 DUT Connector:
 Select BB Load: Load 1 Load 2

Test Port 3
 DUT Connector:
 Select BB Load: Load 1 Load 2

Test Port 4
 DUT Connector:
 Select BB Load: Load 1 Load 2

Figure 10-55. TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted.

Cal A and Cal B Configuration

The dialog box is divided into two calibration areas for Calibration A and Calibration B. Of the four test ports, the user selects two ports for the Cal A procedure. The instrument autoselects the remaining two test ports for the Cal B procedure.

Cal A Test Ports

Select any two test ports from Port 1, Port 2, Port 3, and Port 4. The non-selected ports are autoselected for Cal B.

Cal A Cal Type

Select the calibration type from the following options:

- Full 2 Port
- 1 Path 2 Port forward. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (1-->2).
- 1 Path 2 Port reverse. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (2-->1).

Cal A Load Type

Select from:

- Broadband Load
- Sliding Load. If selected, a message appears: "Still required broadband loads below sliding load breakpoint frequency."

Cal A Through/Reciprocal Setup

- Select Line:
 - Through
 - Reciprocal. Reciprocal is not allowed between 1-2 and 3-4.
- Length (mm).
 - Select the Calculator icon to convert time to length:
 - ["AIR EQUIVALENT LENGTH Calculator Dialog Box" on page 10-173](#)
- Line Impedance (Ohms)
- Line Loss (dB/mm)
- @ Frequency (GHz)

Cal B Setup Areas

The functions of the Cal B areas is the same as the Cal A above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 DUT Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector with its calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- ["MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes" on page 10-174](#)

Test Port 1 Select BB Load

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

Provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

Provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

Provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (LRL/LRM, MICROSTRIP) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “TWO PORT CAL Menu - 4-Port VNAs” on page 10-121

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (LRL/LRM) | Line Type (MICROSTRIP) | Edit Cal Parameters | TWO PORT CAL SETUP (LRL/M, Coaxial) Dialog Box

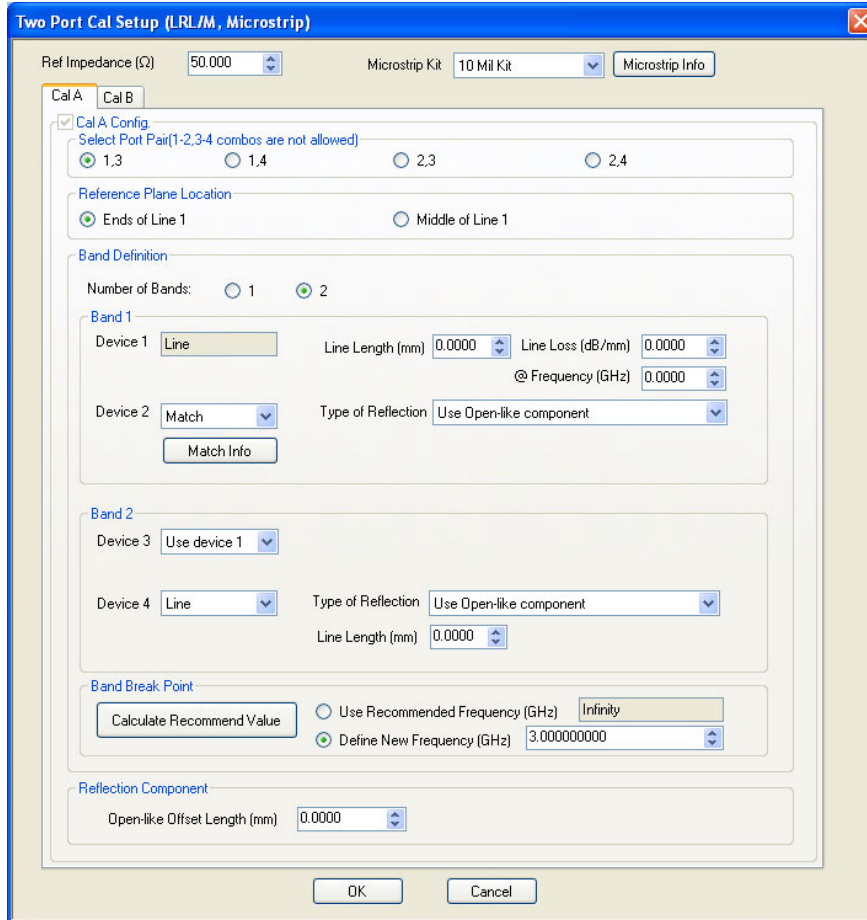


Figure 10-56. TWO PORT CAL SETUP (LRL/M, MICROSTRIP) Dialog Box - Cal A Tab

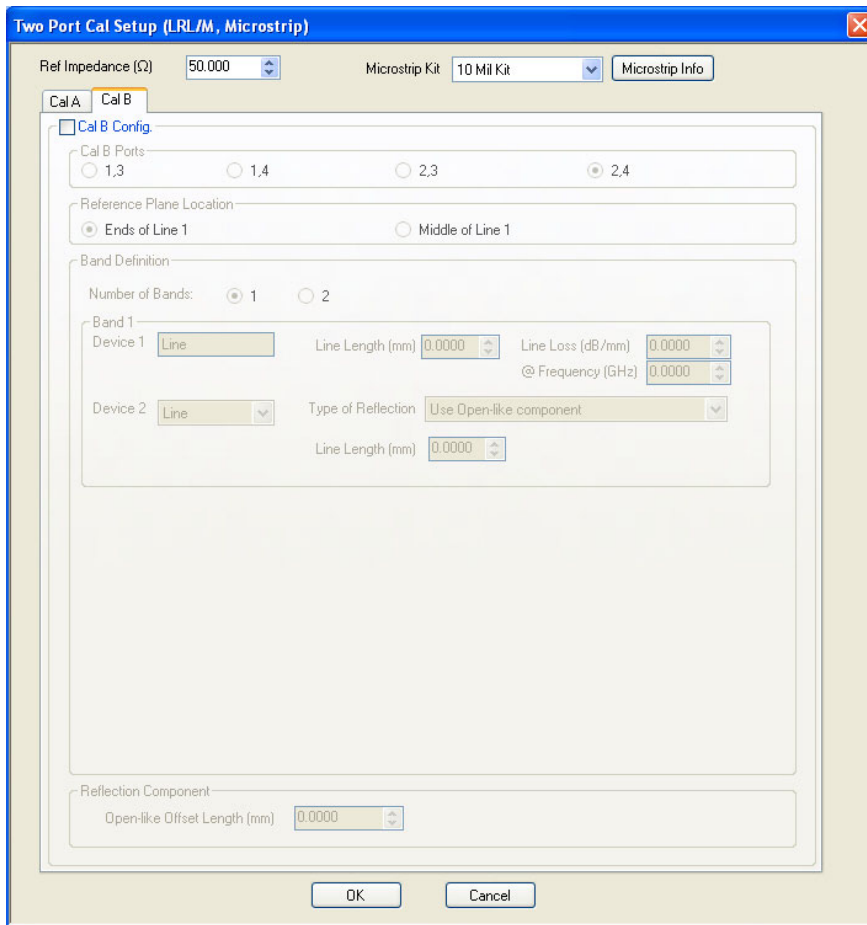


Figure 10-57. TWO PORT CAL SETUP (LRL/M, MICROSTRIP) Dialog Box - Cal B Tab

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted.

Microstrip Kit

Select from:

- 10 Mil Kit
- 15 Mil Kit
- 25 Mil Kit
- User-Defined1 to User-Defined32

Microstrip Info Button

Select the Microstrip Info button to display the parameter information dialog box for the selected kit. The contents of the box vary depending on the selected Cal Method, Line Type, and connector type.

- [“MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes”](#) on page 10-174

Cal A Ports

Select one (1) Calibration A Port Pair noting that combinations of **Port Pair 1-2** and **Port Pair 3-4** are not allowed.

- Select one (1) from: Port 1-3, Port 1-4, Port 2-3, Port 2-4

Access the **Cal A** functions and controls by selecting the Cal A tab.

Cal A - Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Cal A - Band Definition

Select one or two bands from the pull-down menu.

- Number of Bands = 1. Only the **Band 1 Definition** area is present.
- Number of Bands = 2. The **Band 1 Definition** area remains, and the **Band 2 Definition** and the **Band Break Point** areas appear.

Cal A - Band 1 Device 1 Definition

Provides the following fields and controls for Band 1:

- Band 1 Device 1 = Defaulted to Line.
- Line Length (mm) for Device 1. Allows input of the line length in mm.
- Line Loss (dB/mm). Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz). Allows input of a frequency setting for the Line Loss factor input above.

Cal A - Band 1 Device 2 Definition

- Band 1 Device 2. Select from Line or Match in pull-down menu.
- If Line is selected, the Type of Reflection allows selection of Use Open-like component or Use Short-like component.
 - If Use Open-line component is selected, the Reflection Component area at bottom of dialog box displays the Open-like Offset Length (mm) field.
 - If Use Short-like component is selected, the Reflection Component area at bottom of dialog box displays Short-line Offset Length (mm) field.

Cal A - Band 2 Definition

The Number of Bands field above must be set to “2” for this area and the **Band Break Point** area described below to be displayed. Provides the following fields and controls for Band 2.

Cal A - Band 2 Device 3 Definition

A pull-down menu with selections of:

- Use device 1
- Use device 2
- Use new line. If selected, additional fields appear as Line Length (mm), Line Loss (dB/mm), and @ Frequency (GHz).

Cal A - Band 2 Device 4 Definition

A pull-down menu with selections of:

- Line
- Match

If Line is selected for Band 2 Device 4, the **Type of Reflection** and **Line Length (mm)** fields are available.

The **Type of Reflection** field choices are limited to:

- Use Short-like component. If selected, the Reflection Component area below has one field for **Short-like Offset Length (mm)**.

- Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

If Match is selected for Band 2 Device 4, the Match Info button and the Type of Reflection fields appear with choices of:

- The Match Info button appears. Select displays the USER DEFINED MATCH DEVICES dialog box appears which allows configuration of the match devices.
 - [“USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181](#)
- The Type of Reflection field has the following choices:
 - Use Short-like component. If selected, the Reflection Component area below has one field of Short-like Offset Length (mm) field.
 - Use Open-like component. If selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).
 - Use both. If selected, pair of radio button fields appear and allow selection of either Use Port 1 Match or Use Port 2 Match. Also, if selected, the Reflection Component area below has two fields of Open-like Offset Length (mm) and Short-like Offset Length (mm).

Cal A - Band Break Point

This area only appears if the Number of Bands in the Band Definition area is set to “2”.

The Calculate Recommended Value button calculates the recommended break point value based on the input parameters in the fields above. Clicking the button calculates a break point frequency value and populates the Use Recommended Frequency (GHz) field.

A radio button set allows selection of either:

- Use Recommended Frequency (GHz) which was calculated by the button above.
- Define New Frequency (GHz) field which allows direct user input of a break frequency value.

Cal A - Reflection Component

Depending on the settings in the fields above, this area has one or two input fields as:

- Open-like Offset Length (mm)
- Short-like Offset Length (mm)

Access the **Cal B** functions and controls by selecting the Cal B tab where the controls and functions are the same as the Cal A tab above.

Cal B Ports

The Calibration B Port Pair is autoselected from the remaining unused port pairs:

- If Cal A = Ports 1-3, then Cal B = Ports 2-4
- If Cal A = Ports 1-4, then Cal B = Ports 2-3
- If Cal A = Ports 2-3, then Cal B = Ports 1-4
- If Cal A = Ports 2-4, then Cal B = Ports 1-3

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 2-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in all available 3-port calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All three-port dialog boxes are named “Three Port Cal Setup (*Cal Method, Line Type*)”

Table 10-5. Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (1 of 5)

Cal Method Line Type	Input Selections
SOLT/R Coaxial	<p>See full description at “TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-123</p> <p>Reference Impedance (Ohms)</p> <p>Cal A Test Ports: Select 2 ports from Port 1, Port 2, Port 3, Port 4. Ports not selected are assigned to Cal B</p> <p>Cal A Cal Type: Select Full 2 Port, 1 Path 2 Port Forward, or 1 Path 2 Port Reverse</p> <p>Cal A Load Type: Select Broadband Load or Sliding Load</p> <p>Cal A Through/Reciprocal: Select Through or Reciprocal</p> <ul style="list-style-type: none"> • Length (mm). Use the Calculator icon to display the AIR EQUIVALENT LENGTH dialog box at “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173. • Line Impedance (Ohms) • Line Loss (dB/mm) • @ Frequency (GHz) <p>Cal B Test Ports: Test Ports are autoselected the remaining non-Cal A Ports</p> <ul style="list-style-type: none"> • All other controls and functions are the same as Cal A. <p>Test Port DUT Connector: Select from 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 <p>Test Port Select BB Load: Select Load 1 or Load 2.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
SOLT/R Non-Dispersive	Same controls as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182

Table 10-5. Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (2 of 5)

Cal Method Line Type	Input Selections
SOLT/R Microstrip	See full description at “TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box” on page 10-126 Same controls as SOLT/R Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above. <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 Test Port 1, 2, 3, and 4 Connector Standard Info Button: Select displays the USER DEFINED STANDARD dialog box for the selected connector.
SSLT Coaxial	See full description at “TWO PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-123 Same controls as SOLT/R Coaxial with the following exception: Test Port DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn(F), User-Defined1(M) to User-Defined32 (M), User-Defined1(F) to User-Defined32 (F) Test Port Connector Standard Info Button: Select displays either the STANDARD INFORMATION or the USER DEFINED dialog box for the selected connector. <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175
SSLT Non-Dispersive	Same controls as SSLT Coaxial.
SSLT Waveguide	Same controls as SSLT Coaxial with the following changes: Waveguide Kit: WR10, WR12, WR15, User-Defined1 to User-Defined32 Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SSLT Microstrip	Same controls as SSLT Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174

Table 10-5. Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (3 of 5)

Cal Method Line Type	Input Selections
<p>SSST Coaxial</p>	<p>See full description at above.</p> <p>Reference Impedance (Ohms)</p> <p>Cal A Test Ports: Select 2 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Cal A Cal Type: Select from Full 2 Port, 1 Path 2 Port Forward, or 1 Path 2 Port Reverse</p> <p>Cal A Through/Reciprocal: Through, Reciprocal</p> <ul style="list-style-type: none"> • Length (mm). Use the Calculator icon to display the AIR EQUIVALENT LENGTH dialog box at “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173. • Line Impedance (Ohms) • Line Loss (dB/mm) • @ Frequency (GHz) <p>Cal B Configuration</p> <ul style="list-style-type: none"> • Cal B can be included or not in the calibration. • If included, Test Ports are autoselected from the remaining non-Cal A Ports • All other controls and functions are the same <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 Controls are the same.</p> <p>Test Port DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn(F), User-Defined1(M) to User-Defined32 (M), User-Defined1(F) to User-Defined32 (F)</p> <p>Test Port DUT Connector Standard Info Button: Select displays the USER DEFINED STANDARD dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-179
<p>SSST Non-Dispersive</p>	<p>Same controls as SSST Coaxial.</p>
<p>SSST Waveguide</p>	<p>Same controls as SSST Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182 <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p>
<p>SSST Microstrip</p>	<p>Same controls as SSST Coaxial with the following exception:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port DUT Connector Standard Info Button: Select displays the USER DEFINED STANDARD dialog box for the selected connector.</p>

Table 10-5. Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (4 of 5)

Cal Method Line Type	Input Selections
LRL/LRM Coaxial	<p>See full description at “TWO PORT CAL SETUP (LRL/LRM, MICROSTRIP) Dialog Box” on page 10-129 above.</p> <p>Reference Impedance (Ohms)</p> <p>Cal A Ports - Select two port pairs from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports - Autoselected non-Cal A Port Pairs: 1-3, 1-4, 2-3, 2-4</p> <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Reference Plane Location: Ends of Line 1, Middle of Line 1</p> <p>Number of Bands: 1, 2</p> <ul style="list-style-type: none"> • If 1, only Band 1 Device 1 and Band 1 Device 2 controls appear. • If 2, the above plus Band 2 Device 3 and Band 2 Device 4 controls appear. <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Cal A Reference Plane Location: Ends of Line, Middle of Line 1 • Cal A Number of Bands: 1 or 2 • Cal A Band 1 Device 1 Line: Line Length (mm), Line Loss (dB/mm), @ Frequency (GHz) • Cal A Band 1 Device 2 Type: Line, Match; Use Short-like component, Use Open-like component, Use both; If Device 2 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. • “USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181 • Cal A Band 2 Device 3: Use device 1, Use new line • Cal A Band 2 Device 4: Line, Match, Type of Reflection (Use Open-like component, Use Short-like component), Line Length (mm) • Cal A Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
LRL/LRM Non-Dispersive	<p>Same controls as LRL/LRM Coaxial.</p>

Table 10-5. Manual Calibration - 2-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (5 of 5)

Cal Method Line Type	Input Selections
LRL/LRM Waveguide	Same controls as LRL/LRM Coaxial above with the following changes: Cutoff Frequency (GHz) Dielectric Value
LRL/LRM Microstrip	See full description at "TWO PORT CAL SETUP (LRL/LRM, MICROSTRIP) Dialog Box" on page 10-129 above. Same controls as LRL/LRM Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • "MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes" on page 10-174

10-13 Manual 1-Port Cal Setup

ONE PORT CAL Menu - 4-Port VNAs

Button Availability:

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant ONE PORT CAL SETUP dialog box.
- A representative menu is shown below.
- The example procedures at the end of this chapter show examples of various TWO PORT CAL menus.

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL

	<p>Modify Cal Setup</p> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the FULL ONE PORT CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Example one-port dialog boxes are available at the following links:</p> <ul style="list-style-type: none"> • “ONE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-140 • “ONE PORT CAL SETUP (SSLT, COAXIAL) Dialog Box” on page 10-142 • “ONE PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-144 • “ONE PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box” on page 10-146 <p>Port Selected</p> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 10-58. ONE PORT CAL Menu - 4-Port VNAs - Typical example (1 of 2)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the TWO PORT CAL menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

Select displays the REFL. DEVICES PORT 1 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.

- [“REFL. DEVICE\(S\) Menu - 4-Port VNAs” on page 10-93](#)

Port 2 Reflective Devices

Select displays the REFL. DEVICES PORT 2 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.

Port 3 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.

Port 3 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.

Done

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the CALIBRATION menu where the Cal Status button is set to ON.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Abort Cal

This button stops the current calibration procedure and returns to the CALIBRATION menu.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Figure 10-58. ONE PORT CAL Menu - 4-Port VNAs - Typical example (2 of 2)

ONE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “ONE PORT CAL Menu - 4-Port VNAs” on page 10-138

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

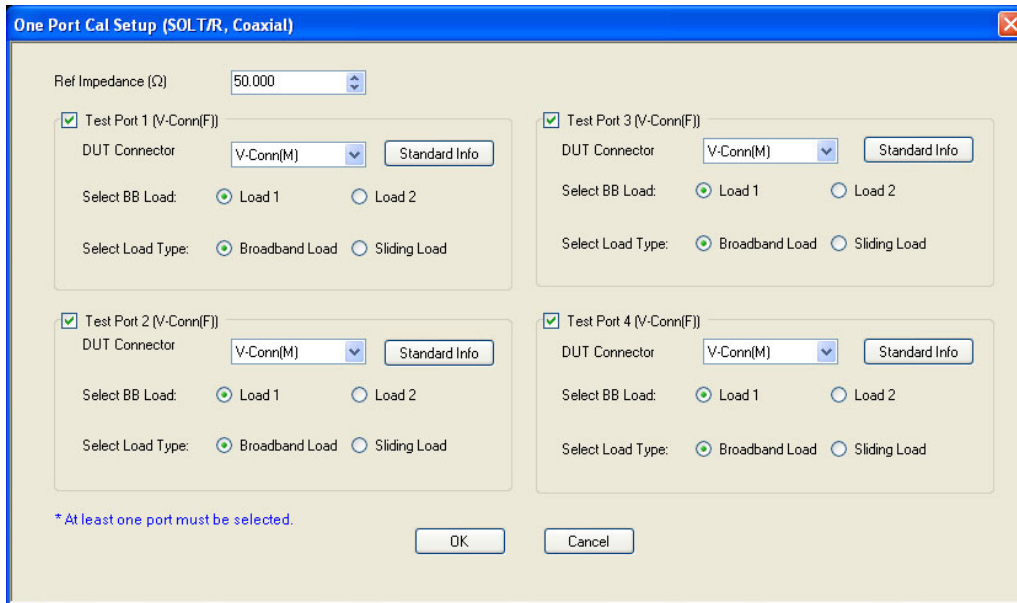


Figure 10-59. ONE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)

- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)

Test Port 1 Load Type

Select the load for Test Port 1:

- Broadband Load
- Sidling Load
 - If sliding load is selected, a message appears: “Still required broadband loads below sliding load breakpoint frequency.”

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Load Type

Select the load as either Broadband Load or Sidling Load as describe above in Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “ONE PORT CAL Menu - 4-Port VNAs” on page 10-138

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

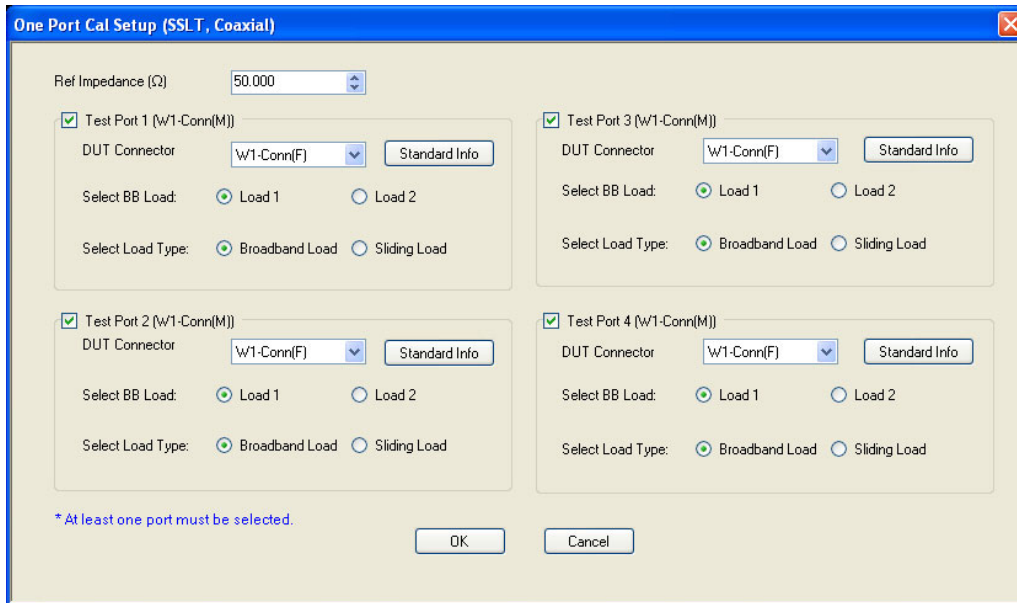


Figure 10-60. ONE PORT CAL SETUP (SSLT, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. The examples in the link below shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box”](#) on page 10-177
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box”](#) on page 10-175

Test Port 1 BB Load

Select the broadband load for Test Port 1:

- Load 1
- Load 2

Test Port 1 Load Type

Select the load for Test Port 1:

- Broadband Load
- Sliding Load
 - If sliding load is selected, a message appears: “Still required broadband loads below sliding load breakpoint frequency.”

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 BB Load

Select the broadband load as either Load 1 or Load 2 as describe above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Load Type

Select the load as either Broadband Load or Sliding Load as describe above in Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (SSST, COAXIAL) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “ONE PORT CAL Menu - 4-Port VNAs” on page 10-138

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (SSST, COAXIAL) Dialog Box

The dialog box is titled "One Port Cal Setup (SSST, Coaxial)". It features a "Ref Impedance (Ω)" field with a value of 50.000. Below this, there are four sections for Test Port 1, 2, 3, and 4. Each section includes a checked checkbox, a "DUT Connector" dropdown menu set to "W1-Conn(F)", and a "Standard Info" button. At the bottom, there is a note: "* At least one port must be selected." and "OK" and "Cancel" buttons.

Figure 10-61. ONE PORT CAL SETUP (SSST, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. The examples in the link below shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box” on page 10-175](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Previous

- “CAL SETUP Menu - 4-Port VNAs” on page 10-64
- “ONE PORT CAL Menu - 4-Port VNAs” on page 10-138

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL (SSLT, WAVEGUIDE) Dialog Box

Full One Port Cal (SSLT, Waveguide)

Ref Impedance (Ω) 50.000

Waveguide Kit WR10 Waveguide Info

Test Port 1
Select Load Type: Broadband Load Sliding Load

Test Port 2
Select Load Type: Broadband Load Sliding Load

Test Port 3
Select Load Type: Broadband Load Sliding Load

Test Port 4
Select Load Type: Broadband Load Sliding Load

* At least one port must be selected.

OK Cancel

Figure 10-62. ONE PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit Selection

Select the **Waveguide Kit Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Waveguide Info Button

Select displays the USER DEFINED WAVEGUIDE (SSST) parameters dialog box. The dialog box allows user input of waveguide calibration parameters of:

- Waveguide kit label. A user-defined kit label can be input here.
- Cutoff frequency (GHz)
- Dielectric
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Offset short 3 length (mm)
- A calculator icon provides access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box described in the AutoCal sections above.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 1-Port Calibration Setup Dialog Boxes

The table below summarizes the fields and controls in all 1-port calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All three-port dialog boxes are named “Three Port Cal Setup (*Cal Method, Line Type*)”

Table 10-6. Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (1 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See full description above at “ONE PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-140</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, and/or Test Port 4 as long as one port is selected.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors from a drop-down list: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port DUT Connector Standard Info Button: Select displays the STANDARD INFO dialog box for the selected connector above.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175 <p>Test Port BB Load: For each Test Port selected above, select either Load 1 or Load 2</p> <p>Test Port Load Type: For each Test Port selected above, select either Broadband Load, Sidling Load</p>
SOLT/R Non-Dispersive	<p>Same controls as SOLT/R Coaxial.</p>
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>The same controls as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SOLT/R Microstrip	<p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, or User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174

Table 10-6. Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (2 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
<p>SSLT Coaxial</p>	<p>See full description above at “ONE PORT CAL SETUP (SSLT, COAXIAL) Dialog Box” on page 10-142</p> <p>Reference Impedance (Ohms).</p> <p>Select Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, and/or Test Port 4 as long as one port is selected.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors from a drop-down list: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port DUT Connector Standard Info Button: Select displays the STANDARD INFO dialog box for the selected connector above.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175 <p>Test Port BB Load: For each Test Port selected above, select either Load 1 or Load 2</p> <p>Test Port Load Type: For each Test Port selected above, select either Broadband Load, Sidling Load</p>
<p>SSLT Non-Dispersive</p>	<p>Same controls and functions options as SSLT Coax.</p>
<p>SSLT Waveguide</p>	<p>See full description above at “ONE PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box” on page 10-146</p> <p>Same controls and functions as SSLT Coaxial with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182 • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
<p>SSLT Microstrip</p>	<p>Same controls and functions as SSLT Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays the MICROSTRIP INFO or USER DEFIND dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port Connector Standard Info Button: For each port selected, displays the USER DEFINED STANDARD dialog box for the selected calibration method and connector. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175

Table 10-6. Manual Calibration - 1-Port Calibration Setup Dialog Box Contents - 4-Port VNAs (3 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Coaxial	<p>See full description above at “ONE PORT CAL SETUP (SSST, COAXIAL) Dialog Box” on page 10-144</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, Test Port 3 as long a one port is selected.</p> <p>Test Port DUT Connector: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F)</p> <p>Test Port DUT Connector Standard Info button: Displays the STANDARD INFO (Triple Offset Short) dialog box for selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-179
SSST Non-Dispersive	Same controls and functions as SSST Coaxial.
SSST Waveguide	<p>Same controls and functions as SSST Coaxial with the following changes</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SSST Microstrip	<p>Same controls and functions as SSST Coaxial with the following changes</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174
LRL/LRM	LRL/LRM calibration method is not available for 1-port calibrations.

10-14 Manual Trans. Freq. Resp. Cal Menus and Dialog Boxes

Full Name

- Transmission Frequency Response Calibration

Menu Name

- TRANS. RESPONSE

Button Name

- Transmission Freq. Response

TRANS. RESPONSE Menu - 4-Port VNAs

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box. A representative menu is shown below. There is one example procedure of a TRANS. RESPONSE calibration in this chapter.

Full Name

- Transmission Frequency Response Menu

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE

	<h3>Modify Cal Setup</h3> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Example transmission frequency response calibration dialog boxes are available below:</p> <ul style="list-style-type: none"> • “TRANS. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-153 • “TRANS. FREQ. RESP. CAL SETUP (SSLT, WAVEGUIDE) Dialog Box” on page 10-155 • “TRANS. FREQ. RESP. CAL SETUP (SSST, MICROSTRIP) Dialog Box” on page 10-157 <p>A summary table of all transmission frequency response calibration configuration dialog boxes is available here:</p> <ul style="list-style-type: none"> • Table 10-7, “Trans. Freq. Resp. Manual Cal Setup Dialog Box Contents - 4-Port VNAs” on page 10-159
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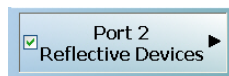
Figure 10-63. TRANS. RESPONSE Menu - 4-Port VNAs - Typical example (1 of 2)

Port Selected

Read-only display of the ports selected for the pending calibration.

Other Menu Buttons

For this example menu, the buttons below **Port Selected** to the **Isolation (Optional)** button each display calibration completion submenus. Once the calibration steps on each submenu are complete, these menu buttons are marked as completed.

**Done**

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the **CALIBRATION** menu where the **Cal Status** button is set to **ON**.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Abort Cal

This button stops the current calibration procedure and returns to the **CALIBRATION** menu.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Figure 10-63. TRANS. RESPONSE Menu - 4-Port VNAs - Typical example (2 of 2)

TRANS. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Full Name

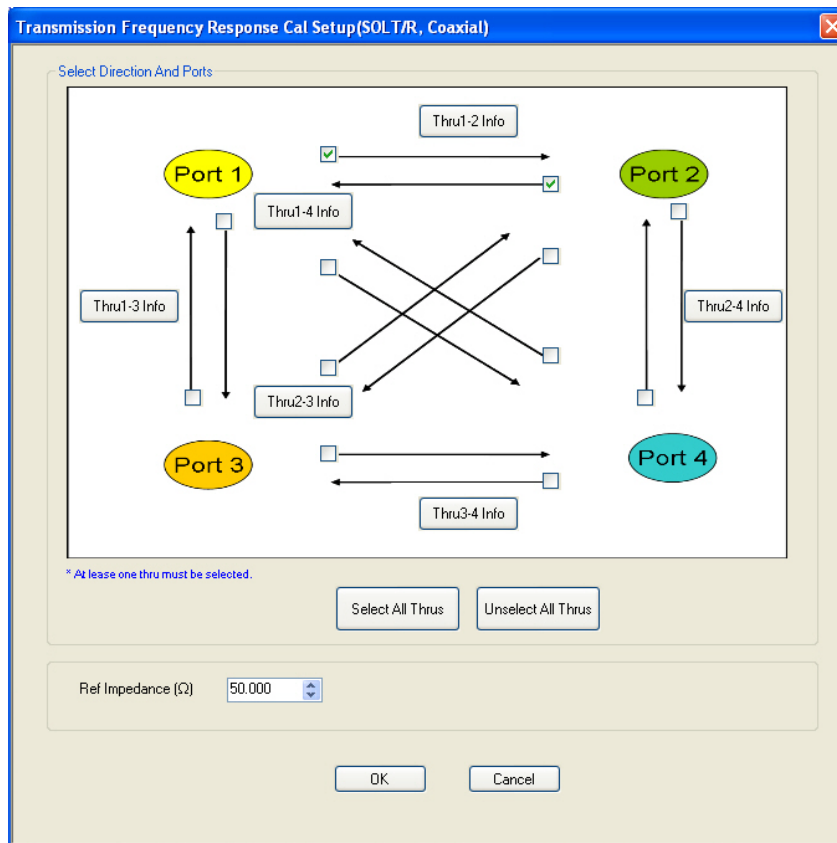
- Transmission Frequency Response Calibration Setup

Previous

- [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box
- CAL SETUP must be set to Cal Method = SOLT/SOLR and Line Type = Coaxial.



TRANSMISSION FREQUENCY RESPONSE CALIBRATION SETUP Dialog Box

Figure 10-64. TRANS. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Test Port Thru Selection Boxes

Allows selection of any combination of the test port throughs for the available port pairs:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Test Port Pair Thru Info Buttons

A Thru Info button becomes available for each port pair through selected above. Select displays the THRU INFO configuration dialog box for the selected port pair. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- Both dialog boxes are described in the AutoCal sections above.
- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TRANS. FREQ. RESP. CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Full Name

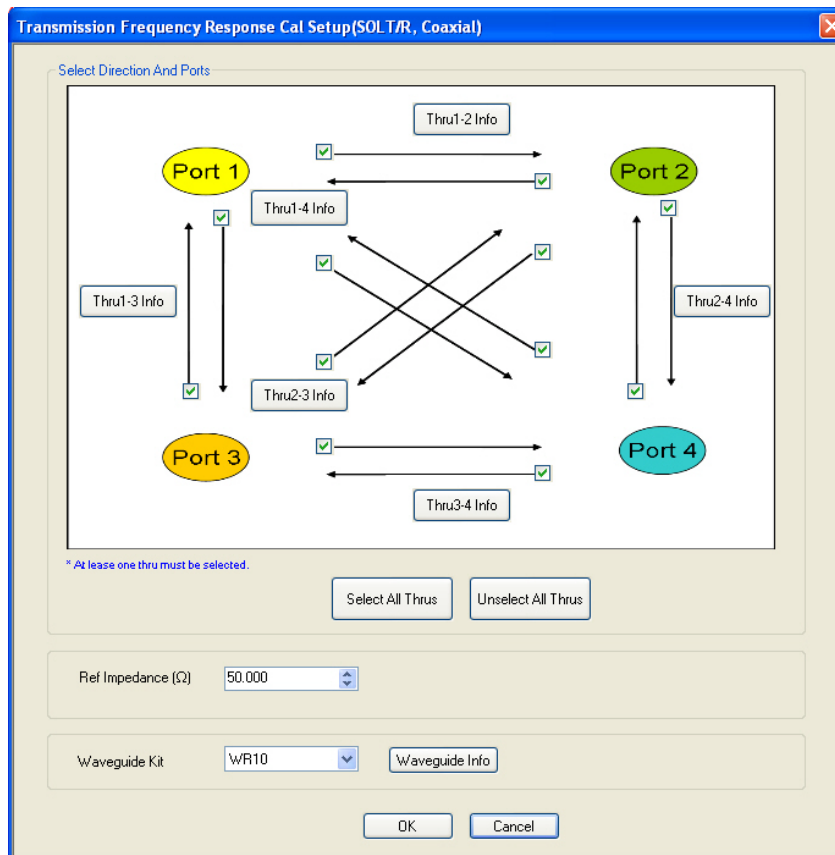
- Transmission Frequency Response Calibration Setup

Previous

- “TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box
- CAL SETUP must be set to Cal Method = SSLT and Line Type = Waveguide.



TRANSMISSION FREQUENCY RESPONSE CALIBRATION SETUP

Figure 10-65. TRANS. FREQ. RESP. CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit Selection

Select the **Waveguide Kit Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Waveguide Info Button

Select displays the USER DEFINED WAVEGUIDE (SSST) parameters dialog box. The dialog box allows user input of waveguide calibration parameters of:

- Waveguide kit label. A user-defined kit label can be input here.
- Cutoff frequency (GHz)
- Dielectric
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Offset short 3 length (mm)
- A calculator icon provides access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box described in the AutoCal sections above.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TRANS. FREQ. RESP. CAL SETUP (SSST, MICROSTRIP) Dialog Box

Full Name

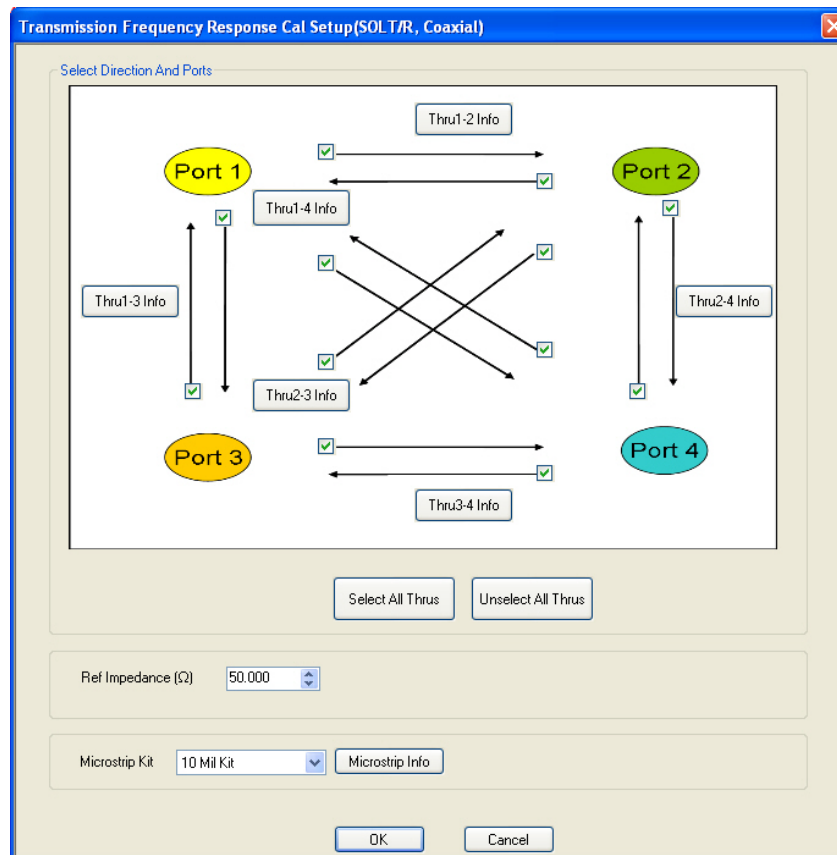
- Transmission Frequency Response Calibration Setup

Previous

- [“TRANS. RESPONSE Menu - 4-Port VNAs” on page 10-151](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SSST, COAXIAL) Dialog Box
- CAL SETUP must be set to Cal Method = SSST and Line Type = Microstrip.



TRANSMISSION FREQUENCY RESPONSE CALIBRATION SETUP

Figure 10-66. TRANS. FREQ. RESP. CAL SETUP (SSST, MICROSTRIP) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 Select Cal Component

Select from Offset Short 1, Offset Short 2, or Offset Short 3

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 Connector Standard Info Button

Select displays the USER DEFINED OFFSET SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. See the following links for typical examples:

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182](#)
- [“USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181](#)

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the USER DEFINED SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of Trans. Freq. Resp. Cal Setup Dialog Boxes

The table below summarizes the fields and controls in all transmission frequency response calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All transmission frequency response dialog boxes are named “Transmission Frequency Response Cal Setup (*Cal Method, Line Type*)”

Table 10-7. Trans. Freq. Resp. Manual Cal Setup Dialog Box Contents - 4-Port VNAs (1 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See full description above at “TRANS. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-153</p> <p>Select Test Port Throughs: Select any combination of port pair throughs from Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, and/or Thru 1-3. At least one through must be selected.</p> <p>Thru Info Button: For each through selected above, the Thru Info [Port Pair] button is enabled. Select the Thru Info button to display the THRU INFO dialog box.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box - 4-Port VNAs” on page 10-180 • In the Thru Info dialog box, select the Calculator icon to display the AIR EQUIVALENT LENGTH CONVERSION dialog box to change units. • “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173 <p>Reference Impedance (Ohms)</p>
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: Select from User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays the USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above. Define the waveguide by entering values for: Cutoff frequency (GHz), Dielectric constant</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, or User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SSLT Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSLT Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.

Table 10-7. Trans. Freq. Resp. Manual Cal Setup Dialog Box Contents - 4-Port VNAs (2 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Waveguide	<p>See full description above “TRANS. FREQ. RESP. CAL SETUP (SSLT, WAVEGUIDE) Dialog Box” on page 10-155</p> <p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: Select from Wr10, WR15, WR20, and User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Select displays either the WAVEGUIDE INFO (SSLT) or the USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above. Define the user waveguide by entering values for: Cutoff frequency (GHz), Dielectric constant</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SSLT Microstrip	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. Typical dialog boxes on the links below.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174
SSST Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSST Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SSST Waveguide	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SSST Microstrip	<p>See full description above at “TRANS. FREQ. RESP. CAL SETUP (SSST, MICROSTRIP) Dialog Box” on page 10-157</p> <p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174
LRL/LRM	LRL/LRM calibration method is not available for the Transmission Frequency Response calibration type.

10-15 Manual Refl. Freq. Resp. Menus and Dialog Boxes

Calibration Full Name

- Reflection Frequency Response Calibration

Menu Full Name

- REFLECTION FREQUENCY REPONSEA Menu

Button Name

- Reflection Freq. Response

REFL. RESPONSE Menu - 4-Port VNAs

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TRANSMISSION FREQUENCY REPONSE CAL SETUP dialog box. A representative menu is shown below. The example procedures in this chapter show one example of a TRANS. RESPONSE menu.

Previous

- [“MANUAL CAL Menu - 4-Port VNAs” on page 10-62](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE

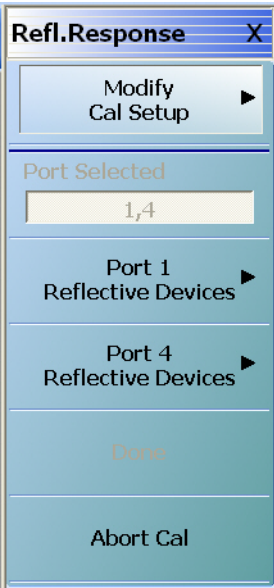
	<h3>Modify Cal Setup</h3> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the REFLECTION FREQ. RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu - 4-Port VNAs” on page 10-64 <p>Example reflection frequency response calibration dialog boxes are available at the following links:</p> <ul style="list-style-type: none"> • “REFL. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-163 • “REFL. FREQ. RESP. CAL SETUP (SSLT, MICROSTRIP) Dialog Box” on page 10-165 • “REFL. FREQ. RESP. CAL SETUP (SSST, WAVEGUIDE) Dialog Box” on page 10-167 <p>A summary table of all reflection frequency response calibration dialog boxes is available here:</p> <ul style="list-style-type: none"> • Table 10-8, “Refl. Freq. Resp. Manual Cal. Setup Dialog Box Contents - 4-Port VNAs” on page 10-169
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Figure 10-67. REFL. RESPONSE Menu - 4-Port VNAs - Typical example (1 of 2)

Port Selected

Read-only display of the ports selected for the pending calibration.

Other Menu Buttons

For this example menu, the buttons below **Port Selected** to the **Isolation (Optional)** button each display calibration completion submenus. Once the calibration steps on each submenu are complete, these menu buttons are marked as completed.

**Done**

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the **CALIBRATION** menu where the **Cal Status** button is set to **ON**.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Abort Cal

This button stops the current calibration procedure and returns to the **CALIBRATION** menu.

- [“CALIBRATION \[TR\] Menu - 4-Port VNAs” on page 10-7](#)

Figure 10-67.REFL. RESPONSE Menu - 4-Port VNAs - Typical example (2 of 2)

REFL. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Full Name

- REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP (SOLT/R, COAXIAL) Dialog Box

Previous

- [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, COAXIAL) Dialog Box
- CAL SETUP must be set to Cal Method = SOLT/R and Line Type = Coaxial.

REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP

Figure 10-68. REFL. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 Select Cal Component

Select from Open or Short

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm Conn (M)
- 0.8 mm Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M)
- TNC (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. See the following links for typical examples:

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-177](#)
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box” on page 10-175](#)

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

OK / Cancel

- Click **OK** to accept the changes and return to the **CAL SETUP** menu.
- Click **Cancel** to abandon any changes and return to the **CAL SETUP** menu.

REFL. FREQ. RESP. CAL SETUP (SSLT, MICROSTRIP) Dialog Box

Full Name

- REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP (SSLT, MICROSTRIP) Dialog Box

Previous

- [“REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP (SSLT, MICROSTRIP) Dialog Box
- CAL SETUP must be set to Cal Method = SSLT and Line Type = Microstrip.

REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP

Figure 10-69.REFL. FREQ. RESP. CAL SETUP (SSLT, MICROSTRIP) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 Select Cal Component

Select from Offset Short 1 or Offset Short 2

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 Connector Standard Info Button

Select displays the USER DEFINED SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. See the following links for typical examples:

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182](#)
- [“USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM” on page 10-181](#)

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the USER DEFINED SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

OK / Cancel

Click **OK** to accept the changes and return to the **CAL SETUP** menu.

Click **Cancel** to abandon any changes and return to the **CAL SETUP** menu.

REFL. FREQ. RESP. CAL SETUP (SSST, WAVEGUIDE) Dialog Box

Full Name

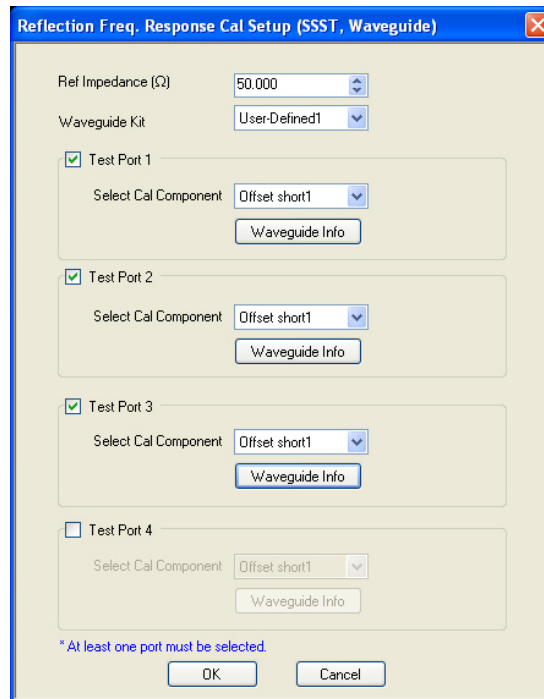
- REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP (SSST, WAVEGUIDE) Dialog Box

Previous

- “REFL. RESPONSE Menu - 4-Port VNAs” on page 10-161

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP (SSST, WAVEGUIDE) Dialog Box
- CAL SETUP must be set to Cal Method = SSST and Line Type = Waveguide.



REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP

Figure 10-70.REFL. FREQ. RESP. CAL SETUP (SSST, WAVEGUIDE) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted although input values <0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit Selection

Select the **Waveguide Kit Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Select Test Port 1 Cal Component

Select a cal component from:

- Offset short 1
- Offset short 2
- Offset short 3

Test Port 1 Waveguide Info Button

Select displays the USER DEFINED WAVEGUIDE (SSST) parameters dialog box. The dialog box allows user input of waveguide calibration parameters of:

- Waveguide kit label. A user-defined kit label can be input here.
- Cutoff frequency (GHz)
- Dielectric
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Offset short 3 length (mm)
- A calculator icon provides access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box described in the AutoCal sections above.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-173](#)

The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182](#)

Test Port 2, Test Port 3, and Test Port 4 Controls

The controls for these test ports are the same as those for Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of Refl. Freq. Resp. Calibration Setup Dialog Boxes

The table below summarizes the fields and controls in all Reflection Frequency Response calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All reflection frequency response dialog boxes are named “Reflection Freq. Response Cal Setup (Cal Method, Line Type)”

Table 10-8. Refl. Freq. Resp. Manual Cal. Setup Dialog Box Contents - 4-Port VNAs (1 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	See full description above at “REFL. FREQ. RESP. CAL SETUP (SOLT/R, COAXIAL) Dialog Box” on page 10-163 Reference Impedance (Ohms) Select Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, and/or Test Port 4 as long as one port is selected. Select Test Port Cal Component: For each selected test port, select Open or Short. Test Port DUT Connector: For each selected test port, select one of the following connectors from a drop-down list: 0.8 mm Conn (M), 0.8 mm Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F) DUT Connector Standard Info Button: Select displays the STANDARD INFO dialog box for the selected connector above. <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-177 • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial
SOLT/R Waveguide	Same controls and functions as SOLT/R Coaxial with the following changes: Waveguide Kit: Select User-Defined1 to User-Defined32 Waveguide Info button: Depending on the Open/Short component selection above, displays either the USER DEFINED WAVEGUIDE PARAMS or the USER DEFINED WAVEGUIDE SHORT dialog box for the waveguide kit selected above. <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SOLT/R Microstrip	Same controls and functions as SOLT/R Coaxial with the following changes: Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, or User-Defined1 to User-Defined32 Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above. <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 Test Port DUT Connector: Select User-Defined1 to User-Defined32 Test Port DUT Connector Standard Info Button: Depending on the Cal Component selected above, displays either the USER DEFINED OPEN or the USER DEFINED SHORT dialog box. See the following links for typical examples:

Table 10-8. Refl. Freq. Resp. Manual Cal. Setup Dialog Box Contents - 4-Port VNAs (2 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Coaxial	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Select Cal Component: Offset short 1 or Offset short 2</p> <p>Test Port DUT Connector: Select 0.8 mm Conn (M), 0.8 mm Conn (F), W1 Conn (F), W1 Conn (M), User-Defined1 (F) to User-Defined32 (F), User-Defined1 (M) to User Defined32 (M)</p> <p>Test Port DUT Connector Standard Info Button: Depending on the Cal Component selected above, displays either the STANDARD INFO or the USER DEFINED OFFSET SHORT dialog box. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175
SSLT Non-Dispersive	<p>Same controls and functions as SSLT Coaxial</p>
SSLT Waveguide	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined1 to User-Defined32</p> <p>Select Cal Component: Offset short 1 or Offset short 2</p> <p>Test Port Waveguide Info Button: Depending on the Cal Component selected above, displays either the STANDARD INFO or the USER DEFINED OFFSET SHORT dialog box. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SSLT Microstrip	<p>See full description above at “REFL. FREQ. RESP. CAL SETUP (SSLT, MICROSTRIP) Dialog Box” on page 10-165</p> <p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port Cal Component: Offset short 1 or Offset short 2.</p> <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p> <p>Test Port Connector Standard Info Button: For each port selected above, displays the USER DEFINED STANDARD dialog box for the selected calibration method and connector. See the following links for typical examples:</p>

Table 10-8. Refl. Freq. Resp. Manual Cal. Setup Dialog Box Contents - 4-Port VNAs (3 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Coaxial	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Test Port Cal Component: Offset short 1 or Offset short 2.</p> <p>Test Port DUT Connector: Select 0.8 mm Conn (M), 0.8 mm Conn (F), W1 Conn (F), W1 Conn (M), User-Defined1 (F) to User-Defined32 (F), User-Defined1 (M) to User Defined32 (M)</p> <p>Test Port Connector Standard Info Button: For each port selected above, displays the STANDARD INFO dialog box for the selected calibration method and connector. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-175 • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-179
SSST Non-Dispersive	<p>Same controls and functions as SSST Coaxial above.</p>
SSST Waveguide	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined1 to User-Defined32</p> <p>Test Port Cal Component: Offset short 1, Offset short, Offset short 3.</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE INFO dialog box for selected calibration method and kit. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-182
SSST Microstrip	<p>See full description above at “REFL. FREQ. RESP. CAL SETUP (SSST, WAVEGUIDE) Dialog Box” on page 10-167</p> <p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined1 to User-Defined32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-174 <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p> <p>Test Port Connector Standard Info Button: For each port, displays the USER DEFINED OFFSET SHORT dialog box for the selected calibration method and connector. See the following links for typical examples:</p>
LRL/LRM	<p>LRL/LRM calibration method is not available for the Reflection Frequency Response calibration type.</p>

10-16 Manual Calibration General Dialog Boxes

These are general information dialog boxes that can be linked to from most manual calibration procedures. A representative typical of dialog box contents are shown below:

- [“AIR EQUIVALENT LENGTH Calculator Dialog Box”](#) on page 10-173
- [“MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes”](#) on page 10-174
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box”](#) on page 10-175
- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box”](#) on page 10-177
- [“STANDARD INFO \(TRIPLE OFFSET SHORT\) W1-Connector \(M\) Dialog Box”](#) on page 10-179
- [“THRU INFO Dialog Box - 4-Port VNAs”](#) on page 10-180
- [“USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM”](#) on page 10-181
- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes”](#) on page 10-182

AIR EQUIVALENT LENGTH Calculator Dialog Box

Use the AIR EQUIVALENT LENGTH calculator dialog box to speed configuration of a through line by entering its length in picoseconds (ps) and its dielectric constant. The calculator returns the air equivalent length in millimeters (mm).

Previous

- The AIR EQUIVALENT LENGTH dialog box can be accessed from multiple locations.
- [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL | Modify Cal Setup | MODIFY AUTOCAL SETUP Dialog Box | Thru Info | THRU INFO Dialog Box | Calculator Icon | AIR EQUIVALENT LENGTH Dialog Box

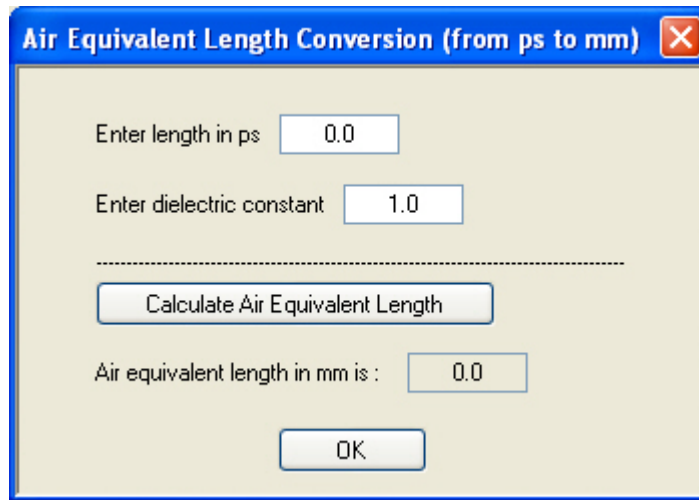


Figure 10-71. AIR EQUIVALENT LENGTH CONVERSION CALCULATOR Dialog Box

Using the Calculator

1. Use the Enter length in ps (picoseconds) to input a length.
 - For example, enter a value of 250 ps.
2. Use the Enter constant to change the dielectric constant as required.
 - For example, change the dielectric constant to 1.2.
3. Click the Calculate Air Equivalent Length button.
4. The required value appears in the Air Equivalent Length in mm field.
 - Using the examples above, an air equivalent length of 68.465319... appears in the field.
5. Click OK.
6. The Thru Info dialog box reappears with the calculated value in the Length (mm) field.
7. Using the examples above, the Length (mm) field displays 68.4653 mm.
 - [“THRU INFO Dialog Box - 4-Port VNAs” on page 10-180](#)
8. Click OK on the Thru Info dialog box.
9. The Modify AutoCal Setup dialog box reappears.
 - [“MODIFY 4-PORT AUTOCAL SETUP Dialog Box” on page 10-51](#)
 - [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs” on page 10-55](#)
 - [“MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs” on page 10-59](#)

MICROSTRIP KIT INFO and USER DEFINED MICROSTRIP Dialog Boxes

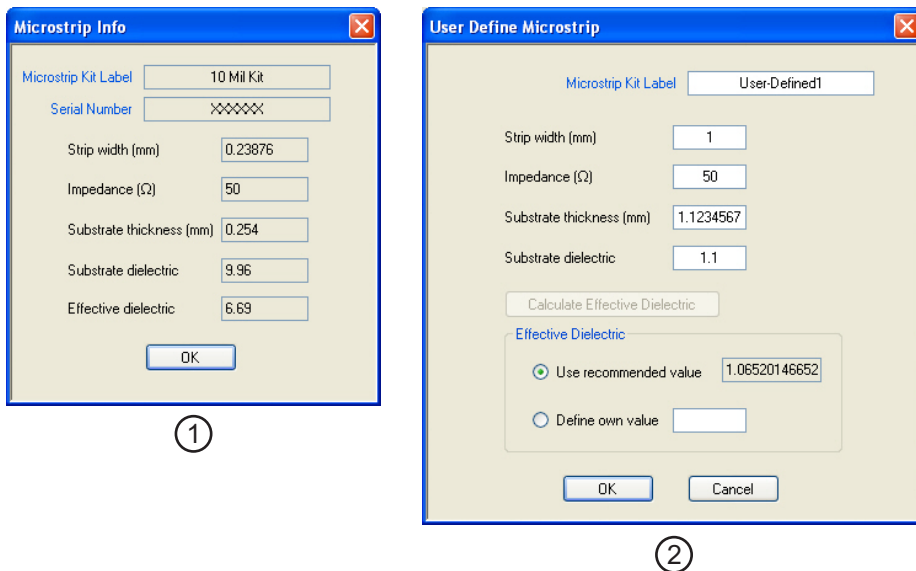
Dialog Box Name Changes

The exact names of these dialog boxes change depending on the calibration method and connector type selected.

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“TWO PORT CAL SETUP \(SOLT/R, MICROSTRIP\) Dialog Box”](#) on page 10-126.
- [“TWO PORT CAL SETUP \(LRL/LRM, MICROSTRIP\) Dialog Box”](#) on page 10-129.
- [“TRANS. FREQ. RESP. CAL SETUP \(SSST, MICROSTRIP\) Dialog Box”](#) on page 10-157.
- [“REFL. FREQ. RESP. CAL SETUP \(SSLT, MICROSTRIP\) Dialog Box”](#) on page 10-165.

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Microstrip | Edit Cal Params | THREE PORT CAL SETUP (SSLT, MICROSTRIP) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/R | Line Type = Microstrip | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, MICROSTRIP) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Microstrip | Edit Cal Params | TWO PORT CAL SETUP (LRL/LRM, MICROSTRIP) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Trans. Freq. Resp. | TRANS. RESP. | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Microstrip | Edit Cal Params | TRANSMISSION REFLECTION RESPONSE SETUP (SSST, MICROSTRIP) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Refl. Freq. Resp. | REFL. RESP. | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Microstrip | Edit Cal Params | REFLECTION RESPONSE SETUP (SSLT, MICROSTRIP) Dialog Box



1. At right MICROSTRIP INFO for 10 Mil Kit.
2. At right USER DEFINED MICROSTRIP Input Dialog Box

Figure 10-72. MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes

STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box

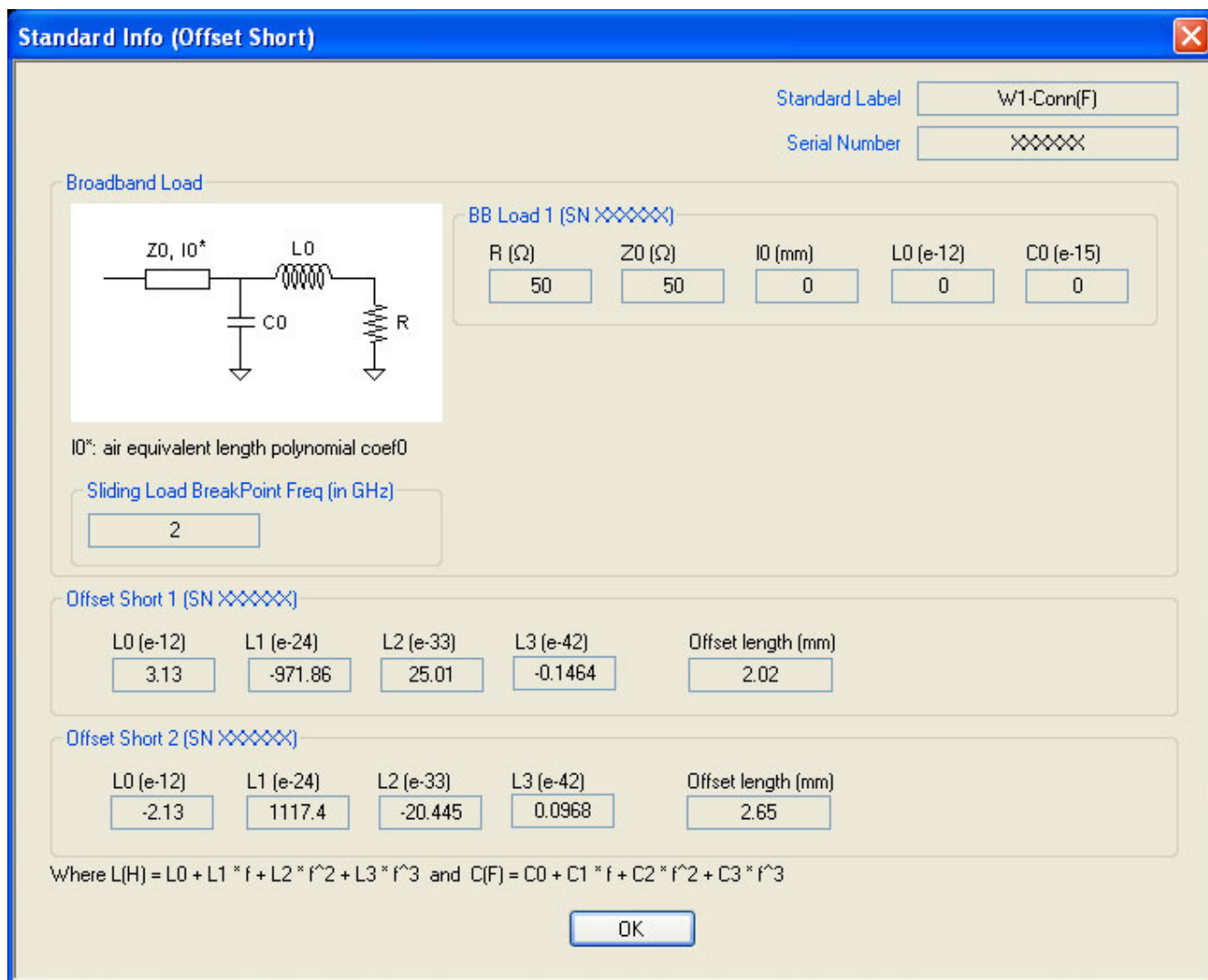
The figure below shows a typical connector standard information dialog box. The box format and contents depending on the calibration method, the calibration line type, and the calibration connectors and genders used. Anritsu-provided dialogs provide read-only information. User-defined dialogs allow user input of parameters and names.

Previous

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box”](#) on page 10-76.
- [“FULL FOUR PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box”](#) on page 10-79.
- [“FULL FOUR PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box”](#) on page 10-83.

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box | DUT Connector = W1-Conn \(F\) | Standard Info | STANDARD INFO \(OFFSET SHORT, W1-CONN \(F\)\) Dialog Box](#)



Representative Standard Information Dialog Box

Figure 10-73. STANDARD INFO (OFFSET SHORT) W-1Conn (F)

STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box

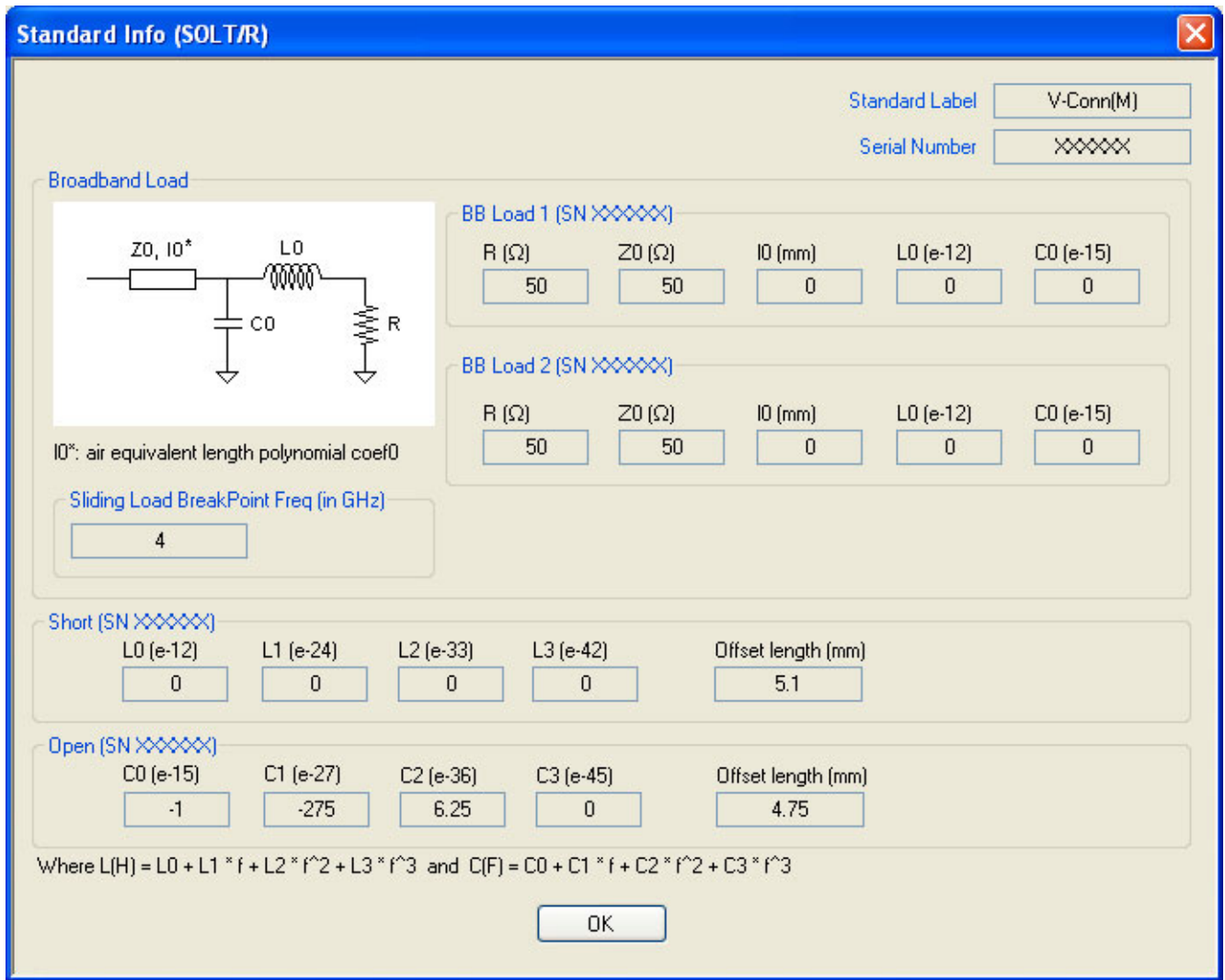
The figure below shows a typical connector standard information dialog box. The box format and contents depending on the calibration method, the calibration line type, and the calibration connectors and genders used. Anritsu-provided dialogs provide read-only information. User-defined dialogs allow user input of parameters and names.

Previous

- This dialog box can be linked from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(SOLT/R, COAXIAL\) Dialog Box”](#) on page 10-72.
- [“FULL FOUR PORT CAL SETUP \(SSLT, COAXIAL\) Dialog Box”](#) on page 10-76.
- [“FULL FOUR PORT CAL SETUP \(SSST, COAXIAL\) Dialog Box”](#) on page 10-79.
- [“FULL FOUR PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box”](#) on page 10-83.

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SOLT/R, COAXIAL) Dialog Box | DUT Connector = V-Conn (M) | Standard Info | STANDARD INFO (SOLT/R, V-CONN(M))



Representative Standard Information Dialog Box

Figure 10-74. STANDARD INFO (SOLT/R) V-Conn (M)

STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box

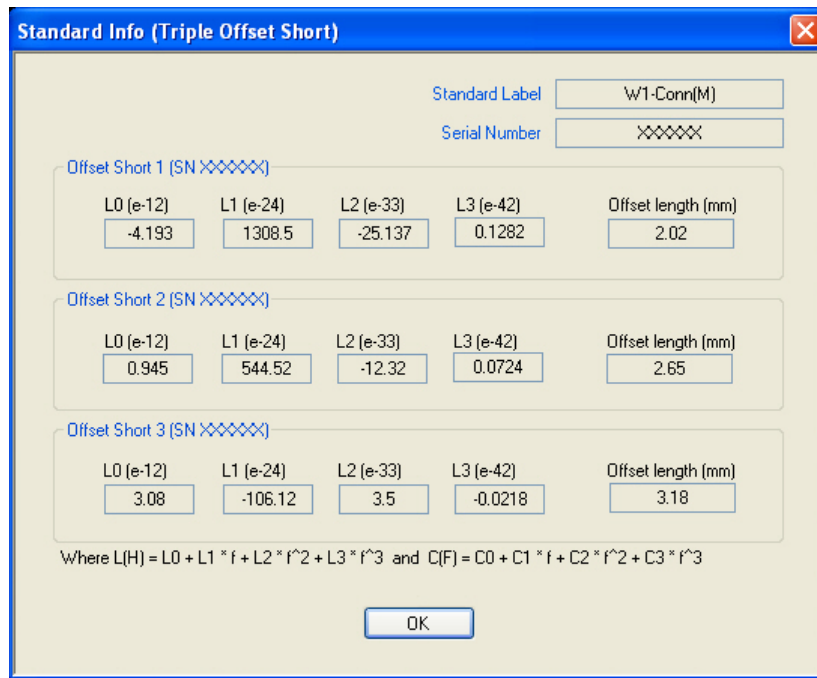
The figure below shows a typical connector standard information dialog box. The box format and contents depending on the calibration method, the calibration line type, and the calibration connectors and genders used. Anritsu-provided dialogs provide read-only information. User-defined dialogs allow user input of parameters and names.

Previous

- This dialog box can be linked from multiple dialog sources. The links below are for dialogs that appear in this chapter.

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, COAXIAL) Dialog Box | DUT Connector = W1-Conn (M) | Standard Info | STANDARD INFO (TRIPLE OFFSET SHORT, W1-CONN(M))



Representative Standard Information Dialog Box

Figure 10-75. STANDARD INFO (TRIPLE OFFSET SHORT) W1-Conn (M)

THRU INFO Dialog Box - 4-Port VNAs

Use the THRU INFO dialog to update the thru information for most calibration types. The dialog includes access to the AIR EQUIVALENT LENGTH calculator function dialog box to speed configuration.

The dialog box name includes the port-pair being configured.

Previous

- The THRU INFO dialog box can be accessed from multiple locations.
- [“MODIFY 4-PORT AUTOCAL SETUP Dialog Box”](#) on page 10-51
- [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs”](#) on page 10-55
- [“MODIFY 1-PORT AUTOCAL SETUP Dialog Box - 4-Port VNAs”](#) on page 10-59

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL | Modify Cal Setup | MODIFY AUTOCAL SETUP Dialog Box | Thru Info | THRU INFO Dialog Box

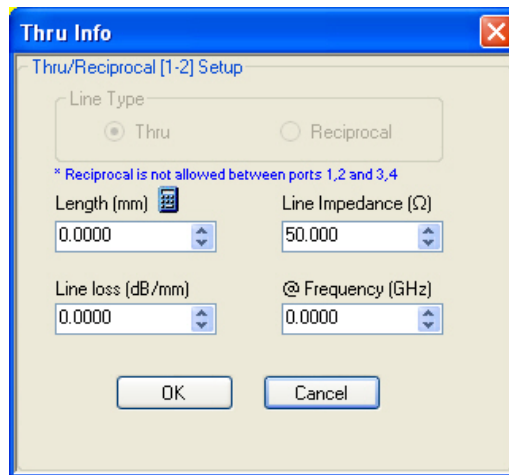


Figure 10-76. THRU INFO (Thru/Reciprocal Ports 1-2 Setup) Dialog Box

Overview

The THRU INFO dialog box is available for all possible through combinations for all 4-port, 3-port, and 2-port calibrations. Each box is labeled with the port pair it represents.

Thru Information Parameters and Calculator

The Thru Info dialog box allows user input field for the thru connection parameters of:

- Length (mm). If needed, click the Calculator icon to display the Air Equivalent Length Conversion Calculator dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box”](#) on page 10-173
- Line Loss (dB/mm)
- Line Impedance (Ω or Ohms)
- @ Frequency (GHz)

USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM

Previous

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box”](#) on page 10-83.
- [“THREE PORT CAL SETUP \(LRL/LRM, COAXIAL\) Dialog Box”](#) on page 10-112.
- [“TWO PORT CAL SETUP \(LRL/LRM, MICROSTRIP\) Dialog Box”](#) on page 10-129.

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (LRL/LRM, COAXIAL) | Band 1, Device 2 (Match) | Match Info | USER DEFINE MATCH DEVICES Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (LRL/LRM, COAXIAL) | Band 1, Device 2 (Match) | Match Info | USER DEFINE MATCH DEVICES Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (LRL/LRM, COAXIAL) | Band 1, Device 2 (Match) | Match Info | USER DEFINE MATCH DEVICES Dialog Box

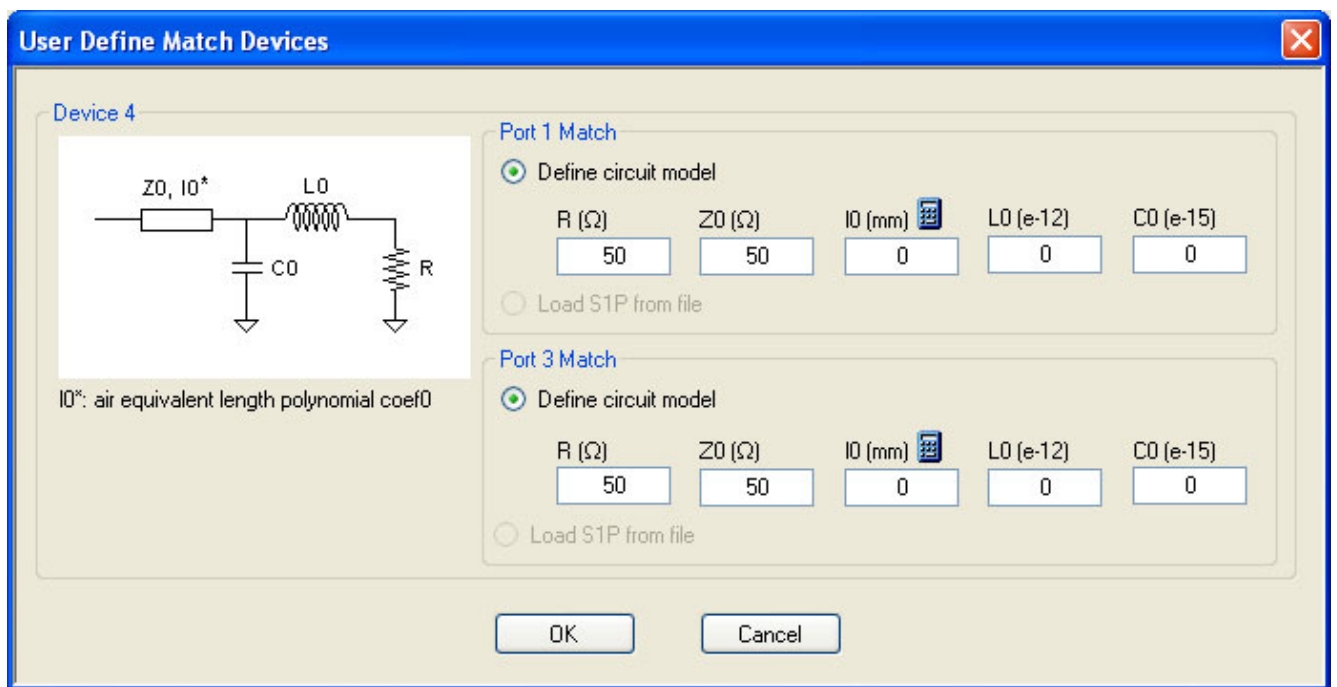


Figure 10-77. USER DEFINED MATCH DEVICES Dialog Box - LRL/LRM

WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes

Dialog Box Name Changes

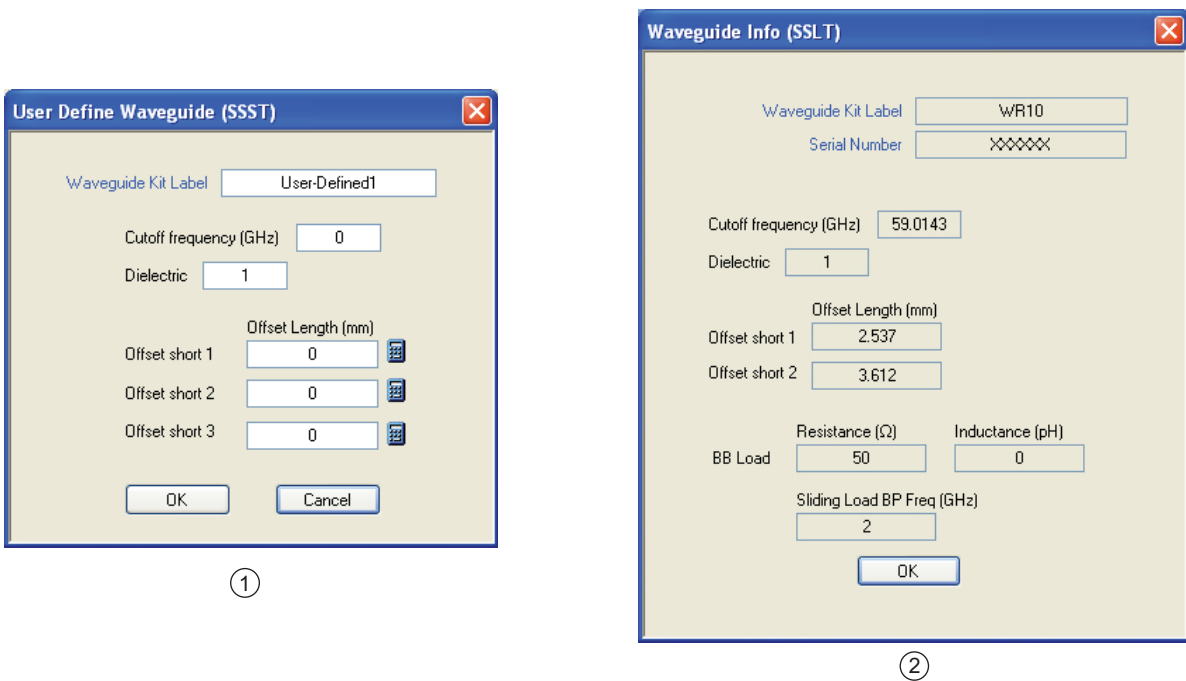
- The exact title of this dialog box varies depending on the selected calibration method and waveguide kit. See section immediately below.

Previous

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(SSST, WAVEGUIDE\) Dialog Box”](#) on page 10-81.
- [“ONE PORT CAL SETUP \(SSLT, WAVEGUIDE\) Dialog Box”](#) on page 10-146.

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Waveguide | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, WAVEGUIDE) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | FULL ONE PORT CAL (SSLT, WAVEGUIDE) | Waveguide Info Button | WAVEGUIDE INFO (SSLT) Dialog Box



1. At left, USER DEFINED WAVEGUIDE Input Dialog Box.

2. At right WAVEGUIDE INFO for WR10 Connector.

Figure 10-78. WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes

Chapter 11 — Measurement Menus

11-1 Chapter Overview

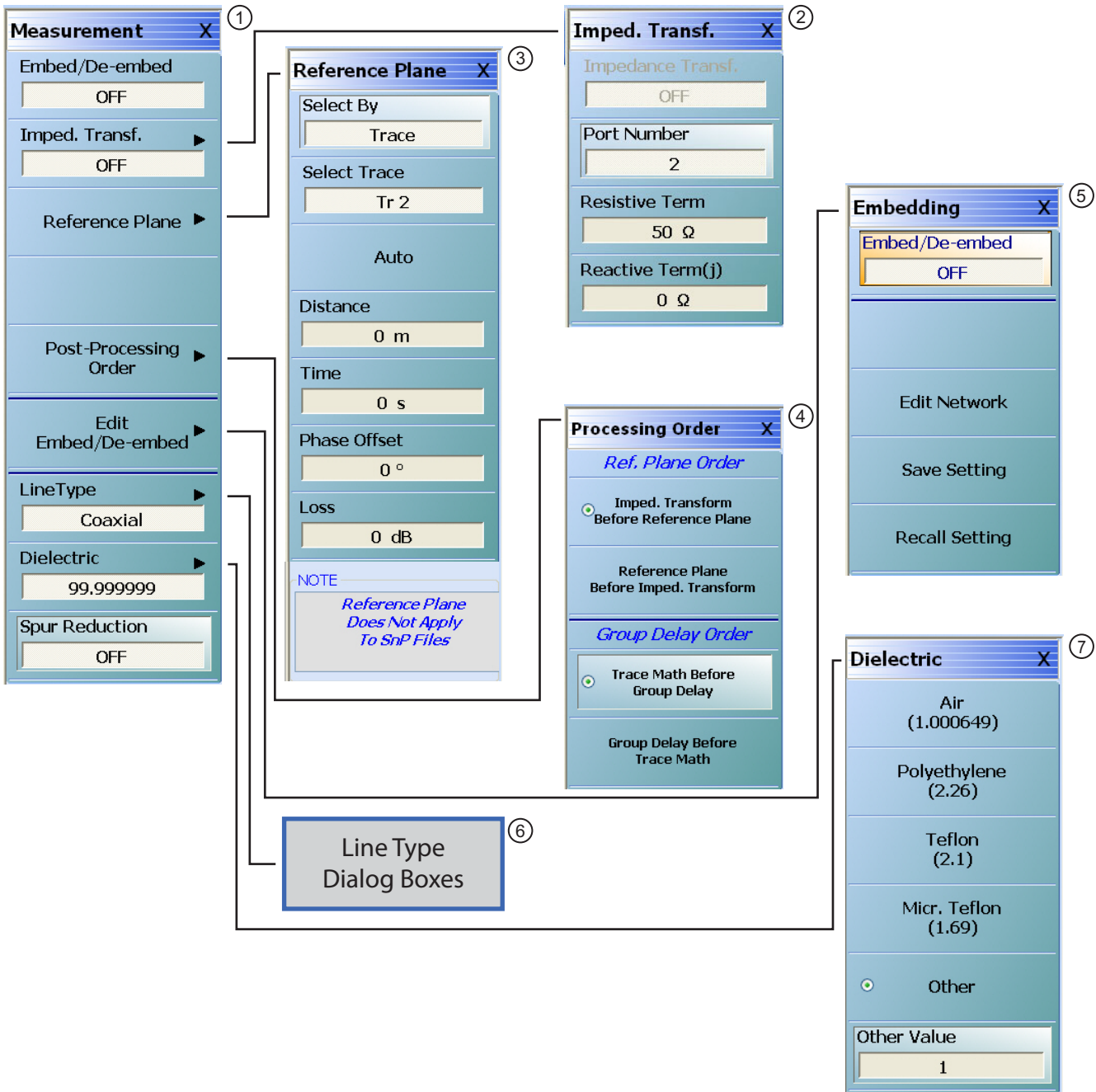
This chapter provides information for the measurement menu system which controls the embed/de-embed functions, the impedance transformations, reference plane location and the post-processing order functions along with their related configuration dialog boxes. The measurement system functions are available to VectorStar MS4640A Series VNAs.

11-2 Overview of Measurement Menus

There are 10 menus and dialog boxes in the measurement menus:

- “MEASUREMENT Menu” on page 11-3
- “IMPED. TRANSF. Menu” on page 11-5
- “REFERENCE PLANE Menu” on page 11-6
- “PROCESSING ORDER Menu” on page 11-8
- “EMBEDDING Menu” on page 11-10
 - “EDIT EMBEDDING/DE-EMBEDDING (2 Port DUT) Dialog Box” on page 11-11
 - “SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box” on page 11-14
 - “OPEN (EMBED/DE-EMBED EDL File) Dialog Box” on page 11-15
 - “LINE TYPE Dialog Box” on page 11-16
- “DIELECTRIC Menu” on page 11-20

The Measurement Menu Set is shown in the figure below.



- | | |
|---|--|
| 1. MEASUREMENT Menu | 5. EMBEDDING/De-Embedding Menu |
| 2. IMPED. TRANSF. (Impedance Transformation) Menu | 6. Line Type Dialog Boxes – Not shown here. |
| 3. REFERENCE PLANE Adjustment Menu | 7. DIELECTRIC Selection Menu – If Other is selected, Other Value field is available for input. |
| 4. PROCESSING ORDER Menu – Select Reference Plane Order at top and Group Delay Order at bottom. | |

Figure 11-1. MEASUREMENT Menu and Related Submenus

MEASUREMENT Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Measurement | MEASUREMENT

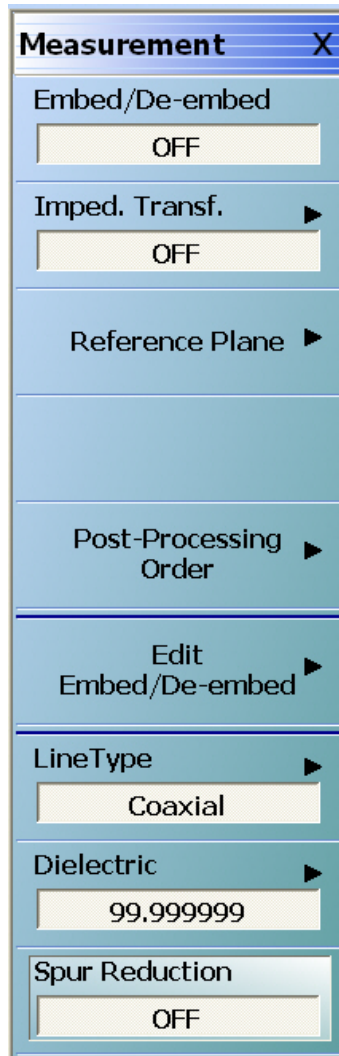


Figure 11-2. MEASUREMENT Menu

Embed/De-embed (Off/On)

Select toggles the embedding/de-embedding function off and on.

If a successful calibration has not been previously performed, select displays a warning message. Click OK to clear.

Imped Transf (Impedance Transformation)

Select impedance transfer displays the IMPED TRANSF menu.

- [“IMPED. TRANSF. Menu” on page 11-5](#)

Reference Plane

Select displays the REFERENCE PLANE menu.

- [“REFERENCE PLANE Menu” on page 11-6](#)

Post-Processing Order

Select displays the PROCESSING ORDER menu.

- [“PROCESSING ORDER Menu” on page 11-8](#)

Edit Embed/De-embed

Select displays the EMBEDDING menu.

- [“EMBEDDING Menu” on page 11-10](#)

Line Type

Select displays the LINE TYPE dialog box.

- [“LINE TYPE Dialog Box” on page 11-16](#)

Dielectric

Select displays the DIELECTRIC menu and allows the user to select from pre-defined dielectric materials or create the value for a user-defined material.

- [“DIELECTRIC Menu” on page 11-20](#)

Spur Reduction (Off/On)

Select toggles Spur Reduction off and on. Turning Spur Reduction ON eliminates the effect of spurious signals being reflected back from DUTs such as deep stop-band filters, which will cause a decrease in dynamic range. Spur Reduction ON turns off the unused test receiver during each S-parameter measurement, thus requiring 4 sweeps to measure all 4 S-parameters.

IMPED. TRANSF. Menu

Full Name

- IMPEDANCE TRANSFORMATION Menu

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Imped Transf | IMPED TRANSF (IMPEDANCE TRANSFORMATION)

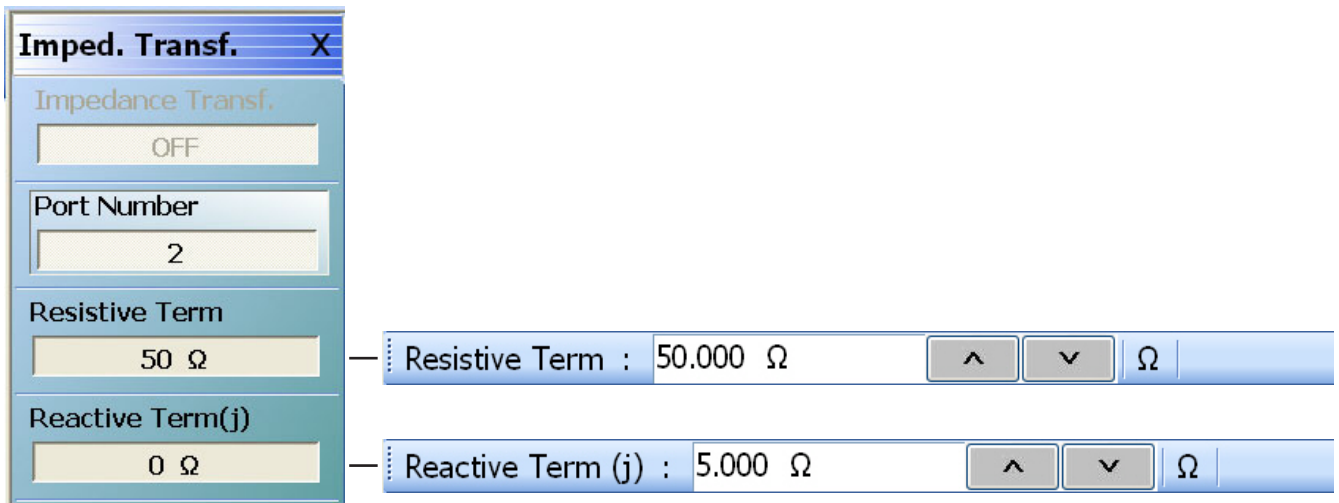


Figure 11-3. IMPED. TRANSF. (IMPEDANCE TRANSFORMATION) Menu

Impedance Trans (Off/On)

Select toggles impedance transformation off and on.

Port Number (Port 1/Port 2)

When the VNA is in 2-Port Mode, select toggles between Port 1 or Port 2.

When the VNA is in 4-Port Mode, select displays the SELECT PORT dialog box with large easy-to-select buttons. Selecting a port auto-returns to the IMPED. TRANSF. menu.

Resistive Term (Ohms)

Select displays the Resistive Term field toolbar and allows the user to define the resistive term in Ohms. The default value is 50.000 ohms.

Reactive Term (j) (Ohms)

Select displays the Reactive Term field toolbar and allows the user to define the reactive (j) term in Ohms.

REFERENCE PLANE Menu

Previous

- “MEASUREMENT Menu” on page 11-3

Navigation

- MAIN | Measurement | MEASUREMENT | Reference Plane | REFERENCE PLANE

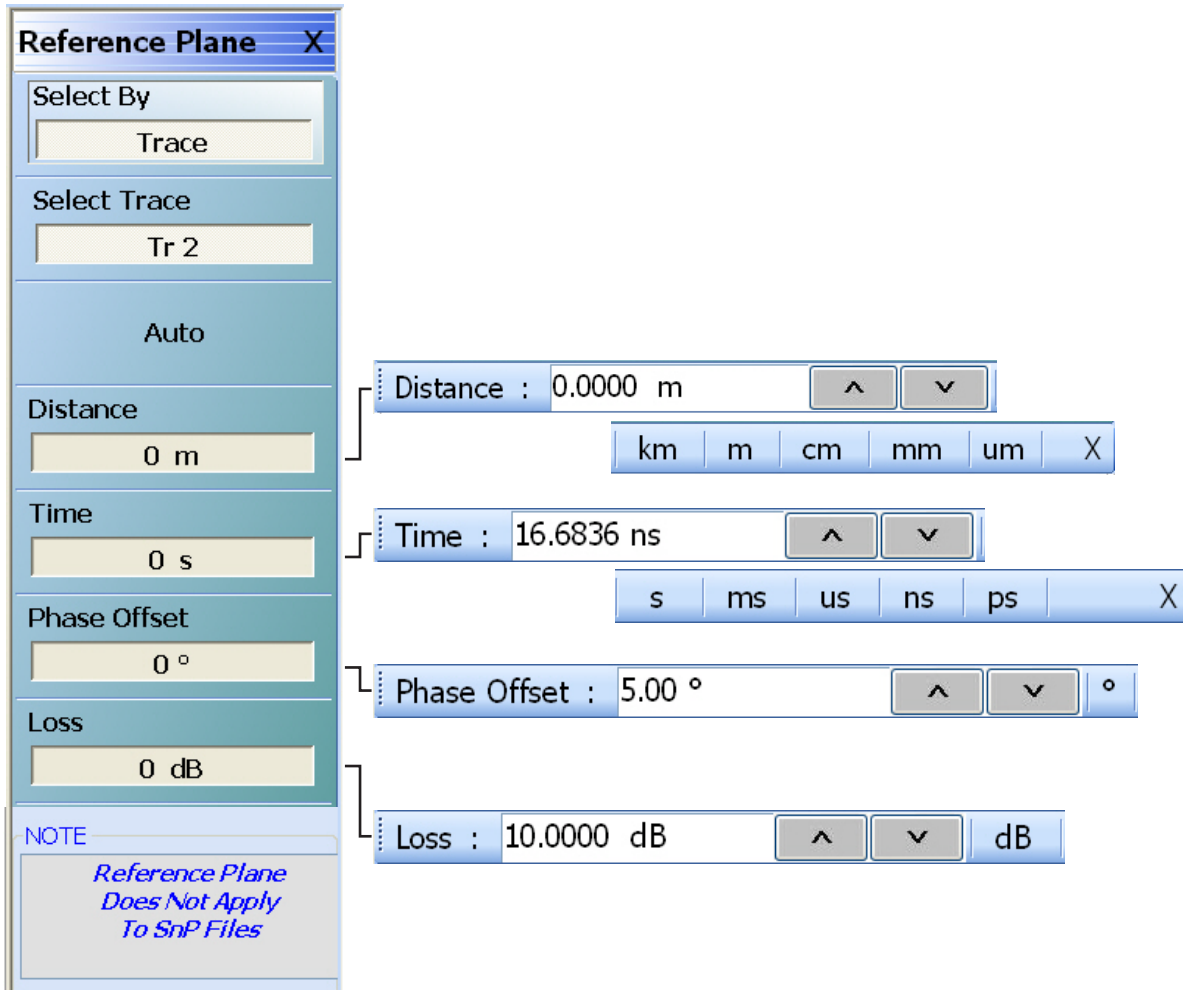


Figure 11-4. REFERENCE PLANE Menu

Select By (Port/Trace)

The Select By toggle button changes between Select Reference Plane By Port and Select Reference Plane By Trace. When the selection is changed, the name of the next button changes as:

- Select By = Port: The button below is set to Select Port. If Port is selected, reference plane adjustments are on a per-port basis.
- Select By = Trace: The button below is set to Select Trace. If Trace is selected, reference plane adjustments are on a per-trace basis.

Select Port (Port 1/Port 2)

This button is only present when the **Select By** button above is set to **Port**. If present, when the VNA is in 2-Port Mode, select toggles between Port 1 or Port 2. If present, when the VNA is in 4-Port Mode, select displays the **SELECT PORT (REFERENCE PLANE)** dialog box with large easy-to-select buttons. Selecting a port auto-returns to the **REFERENCE PLANE** menu.

Select Trace

This button is only present when the **Select By** button above is set to **Trace**. If present, the reference plane adjustments available in the buttons and toolbars following can be modified on a per-trace basis. Selecting the button displays the large **SELECT TRACE** Dialog Box (below) where the trace number can be selected. After a trace is selected, the focus auto-returns to the **REFERENCE PLANE** menu.



Auto (Reference Plane)

The **Auto** button automatically extends the test port location by removing the effects of the electrical delay of a device. If selected, the button dims until the calibration step is complete, when the button returns to normal appearance.

Distance (Reference Plane)

Select displays the **Distance** field toolbar. Allows the user to enter a distance in units of km (kilometers), m (meters), cm (centimeters), mm (millimeters), or um (micrometers).

Time (Reference Plane)

Select displays the **Time** field toolbar. Allows the user to enter a reference time in units of s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds), or ps (picoseconds).

Phase Offset (Degrees) (Reference Plane)

Select displays the **Phase Offset** field toolbar. Allows the user to enter a phase offset in degrees from -360° (degrees) to $+360^\circ$ in 0.01° increments.

Loss (dB) (Reference Plane)

Displays the **Loss (dB)** field toolbar. Allows the user to enter a loss factor in dB.

PROCESSING ORDER Menu

Previous

- “MEASUREMENT Menu” on page 11-3

Navigation

- MAIN | Measurement | MEASUREMENT | Post-Processing Order | PROCESSING ORDER

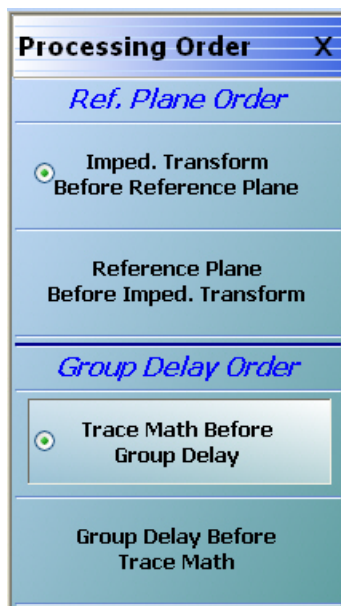


Figure 11-5. PROCESSING ORDER Menu

Reference Plane Order Button Selection Group

The two buttons in the Reference Plane area of the PROCESSING ORDER menu form a button group where selection of one button de-selects the other button.

Imped. Transform Before Reference Plane

Select sets the processing order to first process the impedance transformation and then process the reference plane data. Click Back to return to the MEASUREMENT menu.

Reference Plane Before Imped. Transform

Select sets the processing order to first process the reference plane data and then process the impedance transformation. Click Back to return to the MEASUREMENT menu.

Group Delay Order Button Selection Group

The two buttons in the Group Delay area of the PROCESSING ORDER menu form a button group where selection of one button de-selects the other button.

Trace Math Before Group Delay

Select sets the processing order to first process the trace math data and then process the group delay data. Click Back to return to the MEASUREMENT menu.

Group Delay Before Trace Math

Select sets the processing order to first process the group delay data and then process the trace math data. Click **Back** to return to the MEASUREMENT menu.

EMBEDDING Menu

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING

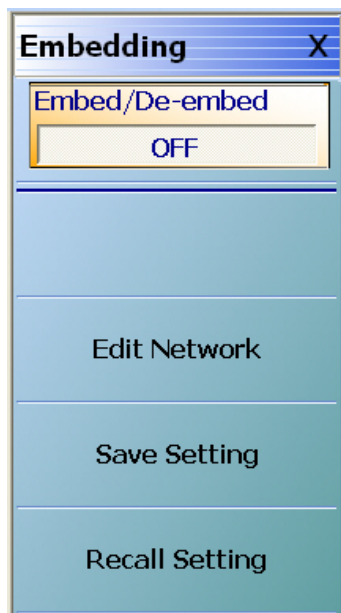


Figure 11-6. EMBEDDING Menu

Embed/De-Embed (Off/On)

Toggles embedding/de-embedding off and on.

If calibration has not been applied, and a toggle to ON is attempted, a Not Allowed warning message is displayed.

Edit Network (Embedding)

Select displays the EDIT EMBEDDING/DE-EMBEDDING (2 Port DUT) dialog box.

- [“EDIT EMBEDDING/DE-EMBEDDING \(2 Port DUT\) Dialog Box” on page 11-11](#)

Save Setting (Embedding)

Select displays the SAVE AS (Embed/De-Embed EDL File) dialog box.

- [“SAVE AS \(EMBED/DE-EMBED EDL FILE\) Dialog Box” on page 11-14](#)

Recall Setting (Embedding)

Select displays the OPEN (Embed/De-Embed EDL File) dialog box.

- [“OPEN \(EMBED/DE-EMBED EDL File\) Dialog Box” on page 11-15](#)

EDIT EMBEDDING/DE-EMBEDDING (2 Port DUT) Dialog Box

Previous

- “EMBEDDING Menu” on page 11-10

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING | Edit Network | EDIT EMBEDDING/DE-EMBEDDING (DUT TYPE) Dialog Box

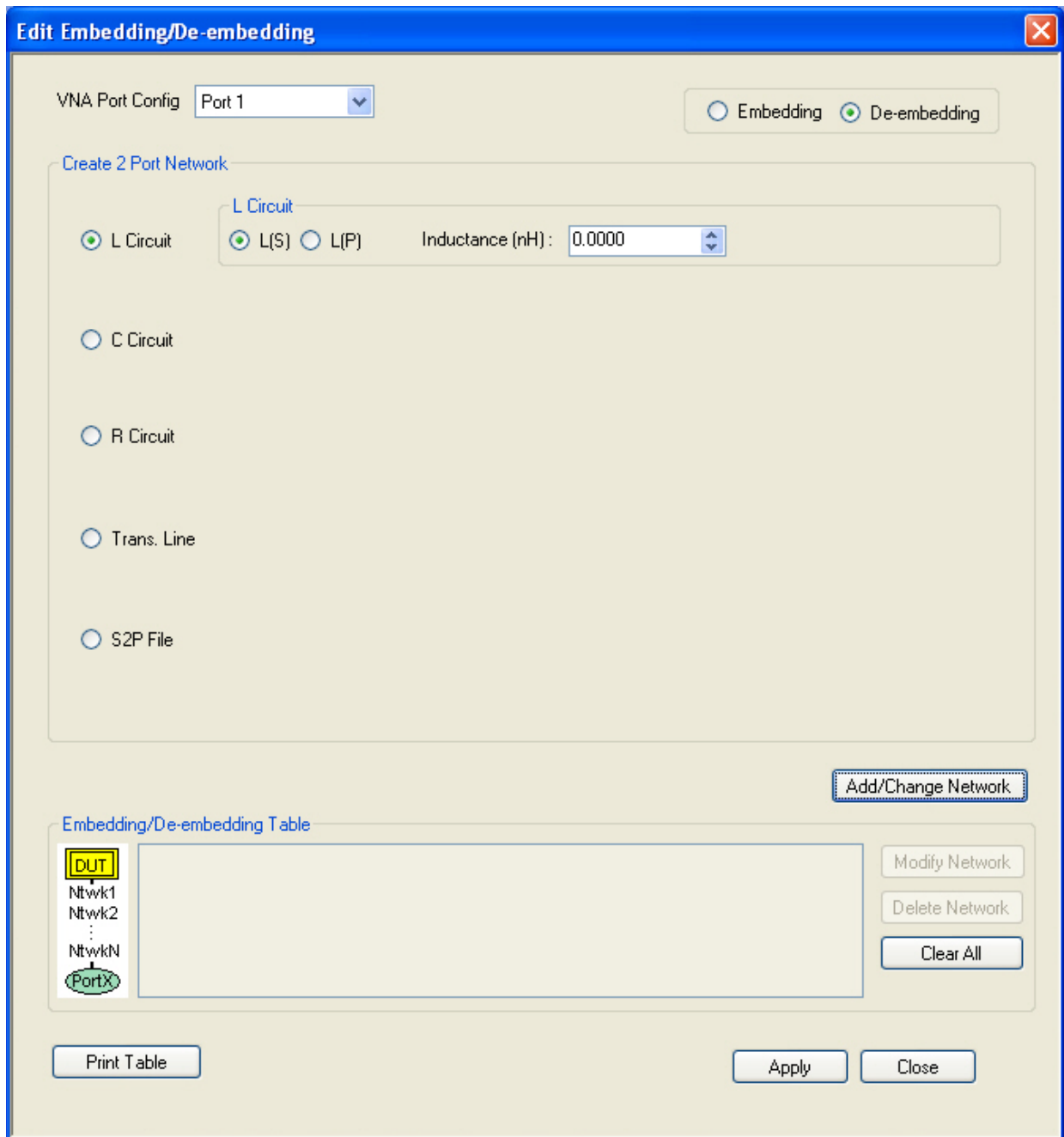


Figure 11-7. EDIT EMBEDDING/DE-EMBEDDING (DUT Type) Dialog Box

Overview

The dialog box allows user setup of the embedding/de-embedding for the DUT. The available parameters for each dialog box area are described below.

VNA Port Configuration

The available port list depends if the VNA is in 2-Port Mode or in 4-Port Mode. Port 3 and/or Port 4 are only available if the VNA is in 4-Port Mode:

- Port 1
- Port 2
- Port 3
- Port 4
- Ports 1,2
- Ports 1,3
- Ports 1,4
- Ports 2,3
- Ports 3,4

Embedding/De-embedding Radio Buttons

The configuration can be set to either embedding or de-embedding.

- Embedding
- De-embedding

Create 2 Port Network

Allows user selection of one of four types 2-Port Networks:

- L Circuit
- C Circuit
- R Circuit
- Trans. (Transmission) Line
- S2P File

Once an option above has been selected, other sub-options, described in the sections below, are available.

L Circuit Selected in Create 2 Port Network

If L Circuit is selected above in Create 2 Port Network, the L Circuit area appears with the following options:

- Radio button selections for L(S) or L(P)
- Input field for Inductance (nH)

C Circuit Selected in Create 2 Port Network

If C Circuit is selected above in Create 2 Port Network, the C Circuit area appears with the following options:

- Radio button selections for C(S) or C(P)
- Input field for Capacitance (pF)

R Circuit Selected in Create 2 Port Network

If R Circuit is selected above in Create 2 Port Network, the R Circuit area appears with the following options:

- Radio button selections for R(S) or R(P)
- Input field for Resistance (Ohms)

Trans. Line Circuit Selected in Create 2 Port Network

If Trans. Line is selected above in Create 2 Port Network, the Transmission Line area appears with the following options:

- Input field for Impedance (Ohms)
- Input field for Length (mm) or Calculator icon
 - The transmission line length can be directly input in millimeters.
 - If the Calculator icon is selected, the AIR EQUIVALENT LENGTH CONVERSION (from ps to mm) dialog appears. Enter the length in ps, enter dielectric constant, calculate equivalent air equivalent length, obtain the air equivalent length in millimeters. Click OK. The calculated value is entered into the Length field.
- Input field for Loss (dB/mm)
- Input field for @ Frequency (GHz)
- Input field for Dielectric constant:
 - Provides menu selections for Air (1.000649), Polyethylene (2.26), Teflon (2.10), Microporous Teflon (1.69), Other.
 - If other is selected, an Other input field is provided for a user-defined dielectric constant.

S2P File Selected in Create 2 Port Network

If S2P File is selected above in Create 2 Port Network, the following options are available:

- The Load S2P file button appears. Select displays the OPEN (Display S2P File) dialog box to allow the user to navigate to a previously saved S2P file. Once a file is selected, its path and file names appears in the field next to the button.
- Swap Port Assignment Check Box. Normally, the network's Port 2 will be nearer the DUT. If the Swap Port check box is selected, the port assignments are swapped.

Add/Change Network

As each network is configured, select the Add/Change Network button to add it to the Embedding/De-embedding Table. The newest configured networks are entered closest to the Test Port.

To modify or delete a network, delete the network in the Embedding/De-embedding Table. The Modify Network and Delete Network buttons become available. Use the Clear All button to clear all entries. Use the Print Table button to output a network table to a connected printer.

When all network changes are made, select Apply and then Close. On the EMBEDDING menu, select Save Setting to store the network configuration.

SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box

Previous

- “[EMBEDDING Menu](#)” on page 11-10

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING | Save Setting | SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box

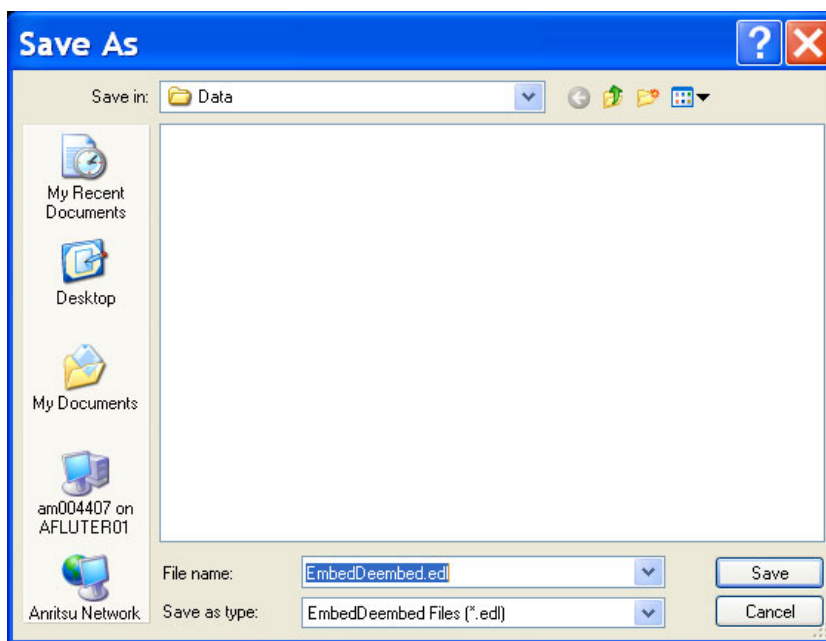


Figure 11-8. SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box

OPEN (EMBED/DE-EMBED EDL File) Dialog Box

Previous

- “[EMBEDDING Menu](#)” on page 11-10

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING | Recall Setting | OPEN (EMBED/DE-EMBED EDL FILE) Dialog Box

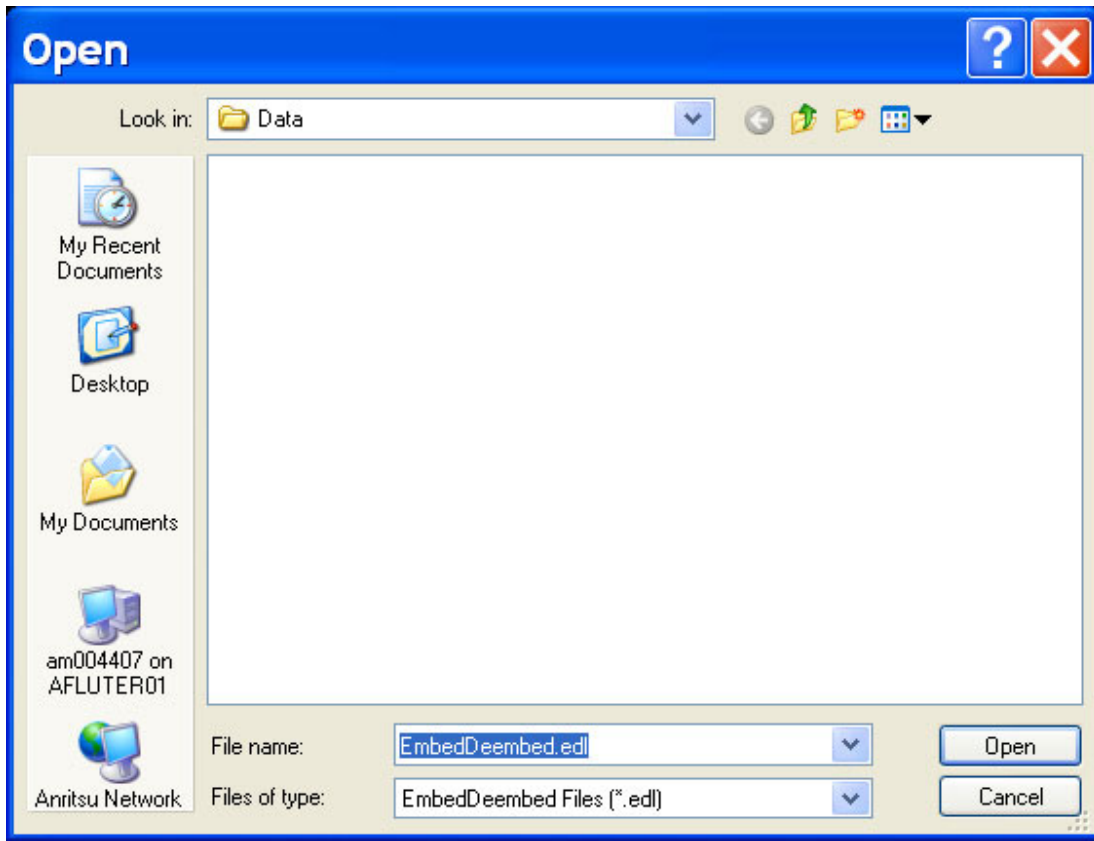


Figure 11-9. OPEN (EMBED/DE-EMBED EDL FILE) Dialog Box

LINE TYPE Dialog Box

Previous

- “MEASUREMENT Menu” on page 11-3

Navigation

- MAIN | Measurement | MEASUREMENT | Line Type | LINE TYPE Dialog Box

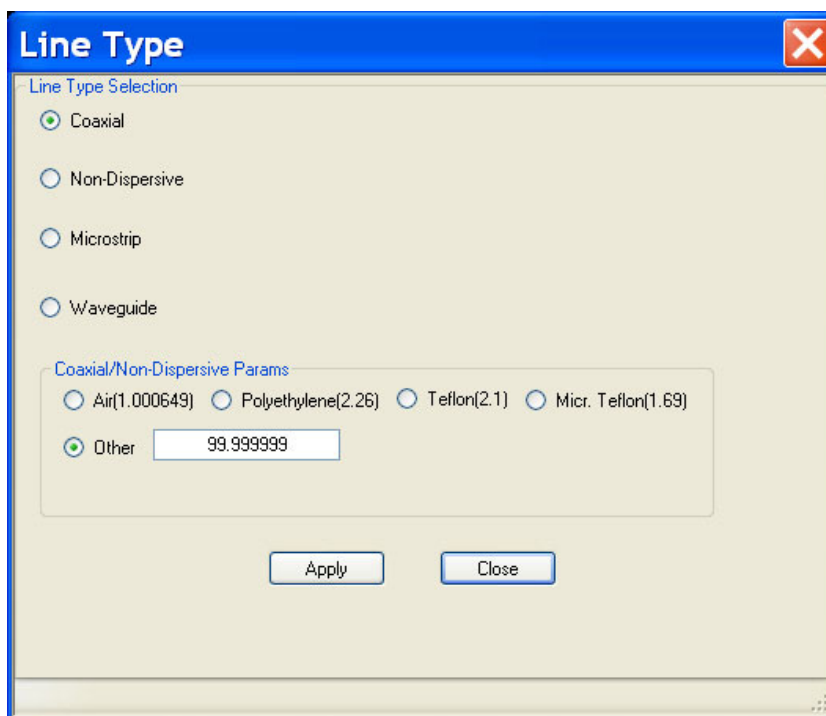


Figure 11-10. LINE TYPE Dialog Box - Coaxial, Non-Dispersive, Microstrip, or Waveguide

Line Type Selection Area

The Line Type Selection area allows user choice of four (4) different line types:

- Coaxial
 - Select causes the Coaxial/Non-Dispersive Line Type Area (described below) to appear.
- Non-Dispersive
 - Select causes the Coaxial/Non-Dispersive Line Type Area to appear.
- Microstrip
 - Select causes the Microstrip Parameters Area (described below) to appear.
- Waveguide
 - Select causes the Waveguide Line Type Area (described below) to appear.

The options and selectable parameters for each option are described in the sections below.

Coaxial or Non-Dispersive Line Types Area

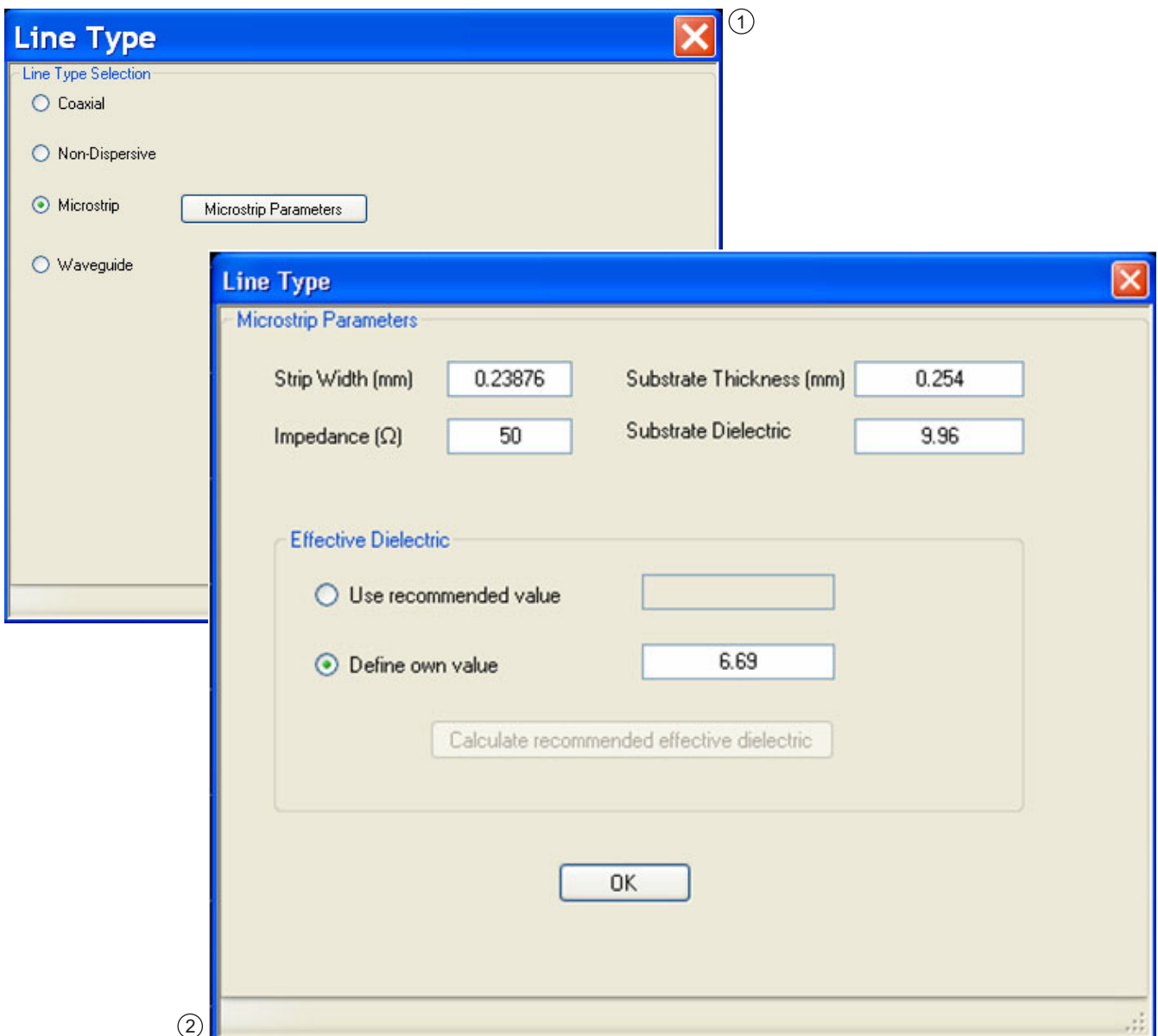
If Coaxial or Non-Dispersive line type is selected, the Coaxial/Non-Dispersive Parameters area appears with a button selection group and selections of:

- Air (1.000649)

- Polyethylene (2.26)
- Teflon (2.1)
- Micr. Teflon (Microporous Teflon) (1.69)
- Other.
 - If other is selected, a field appears allowing user entry of a line type dielectric parameter between 0 (zero) and 99.

Microstrip Parameters Area

If Microstrip line type is selected, the Microstrip Parameters button appears (shown below at left). Clicking Microstrip Parameters displays an additional dialog with areas for Microstrip Parameters and Effective Dielectric (shown below at right).



1. Line Type Selector Area – Microstrip Selected

2. Microstrip Parameters Area – Microstrip Parameters for User-Defined Values

Figure 11-11. LINE TYPE Dialog Box - Microstrip Selected

Microstrip Params Area

The system default microstrip parameters are displayed:

- Strip width (mm): 0.23876
- Impedance (Ω): 50
- Substrate thickness (mm): 0.254
- Substrate dielectric: 9.96

To change a value, click in the field, and then enter the required parameter value.

Effective Dielectric Area

In the Effective Dielectric Area of the dialog box, select one of the two options:

- Use recommended value
- Define own value. If Define own value was selected, click in the field and enter the required dielectric value.

Click OK to close the Microstrip Parameters Area.

Waveguide Line Type Area

If Waveguide line type is selected, the Waveguide Parameters Area appears.

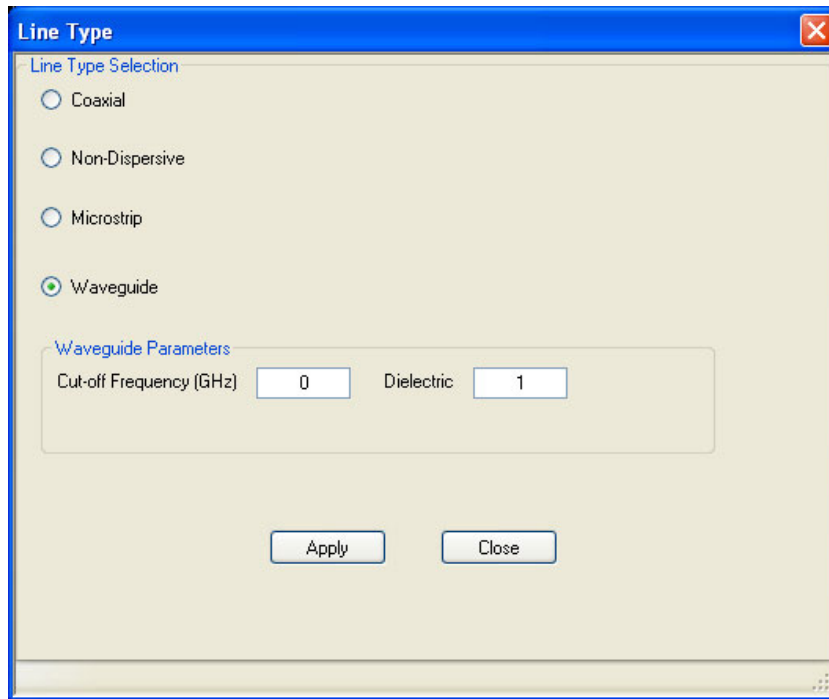


Figure 11-12. LINE TYPE Dialog Box -Waveguide Selected - Waveguide Parameters Area

Waveguide Parameters Area

Cut-off Frequency (GHz):

- User entry field

Dielectric value:

- User entry field

Applying Line Type Changes

1. After making a selection, you must click the Apply button to apply the changes made and then click Close.
2. On the MEASUREMENT menu, the read-only Line Type and Dielectric buttons show the entered values.
3. Clicking Close without clicking Apply abandons any changes and returns to the MEASUREMENT menu with the prior current instrument setting.

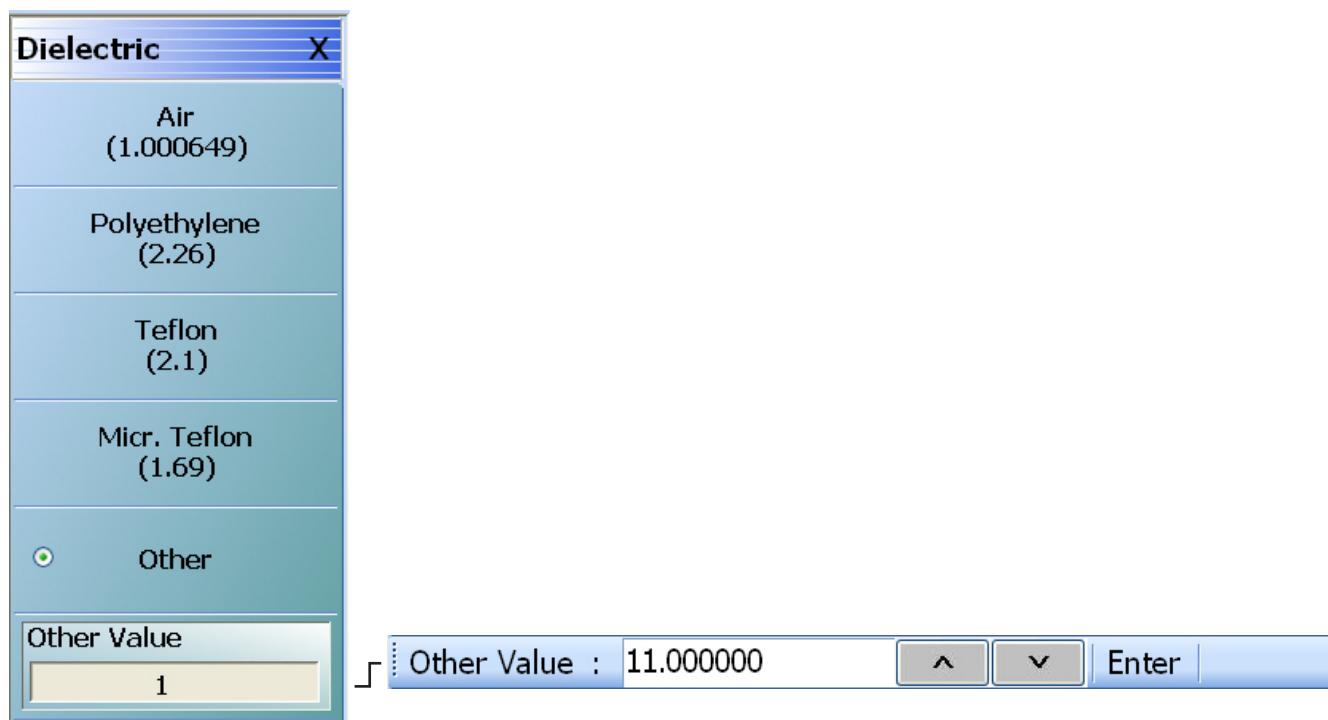
DIELECTRIC Menu

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Dielectric | DIELECTRIC



The **Other** button must be selected to make the **Other Value** button and its related Field Toolbar available.

Figure 11-13. DIELECTRIC Menu

DIELECTRIC Menu Button Selection Group

The DIELECTRIC menu variably displays five (5) or six (6) buttons that are all members of a button selection group. If any single button is selected, the other buttons are deselected.

If the Other (Dielectric) button is selected, a sixth button, Other Value (Dielectric) appears at the bottom of the menu and allows the user to enter a user-defined dielectric constant.

The dielectric material selected here is displayed in the MEASUREMENT menu in the read-only Dielectric button field.

- [“MEASUREMENT Menu” on page 11-3](#)
- MAIN | Measurement | MEASUREMENT

After selecting a dielectric value, click **Back** to return to the MEASUREMENT menu.

Air (1.000649) (Dielectric)

Select sets the dielectric as air (1.000649) and de-selects Polyethylene, Teflon, Micr. Teflon, and Other.

Polyethylene (2.26) (Dielectric)

Select sets the dielectric as polyethylene (2.26) and de-selects Air, Teflon, Micr. Teflon, and Other.

Teflon (2.1) (Dielectric)

Select sets the dielectric as Teflon (2.1) and de-selects Air, Polyethylene, Micr. Teflon, and Other.

Micr. Teflon (1.69) (Dielectric)

Select sets the dielectric as Microporous Teflon (1.69) and de-selects Air, Polyethylene, Teflon, and Other.

Other (Dielectric)

Select sets the dielectric as Other (Dielectric) and de-selects Air, Polyethylene, Teflon, and Micr. Teflon. Select also displays the Other Value (Dielectric) button at the bottom of the menu.

Other Value (Dielectric)

The Other Value (Dielectric) button only appears if the Other button (above) has been selected. Once the Other Value (Dielectric) button is available, select displays the Other Value (Dielectric) field toolbar for entry of a user-defined dielectric constant.

Chapter 12 — Application Menus - Overview

12-1 Chapter Overview

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode. It provides links to the following five APPLICATION menu chapters, each of which focuses on a separate VNA application function and configuration control.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 13, “Application Menus - Multiple Source”](#)
- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)
- [Chapter 15, “Application Menus - Noise Figure”](#)
- [Chapter 16, “Application Menus - Mixer Setup”](#)
- [Chapter 17, “Application Menus - NxN”](#)

12-2 APPLICATION Menu Variants

The number of buttons present and their names depends on the VNA instrument model and the equipped options.

APPLICATION Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Application | APPLICATION

Button Availability and Naming

- The buttons present and their names vary depending on the VNA model number and the installed options as shown in the table below.

Table 12-1. APPLICATION Menu Variants – VNA Models – Equipped Options (1 of 2)

VNA Model	All MS4640A VNAs	MS4642A, MS4644A, MS4645A VNAs		MS4647A VNA		
Equipped Options	No 007 ^a	007 ^b , 041 ^c	007, 041, 082/083 ^d	007, 041	007, 041, 082/083	007, 041, 080/081 ^e
Instrument Mode Buttons	T/R ^f	T/R	T/R	T/R	T/R	T/R
	–	Noise Figure ^g	Noise Figure	Noise Figure	Noise Figure	Noise Figure
Receiver Configuration Buttons	Standard	Standard	Standard	Standard	Standard	Standard
	–	Multiple Source	Multiple Source	Multiple Source	Multiple Source	Multiple Source
	–	mmWave (3738 Test Set)	mmWave (3738 Test Set)	–	–	–
	–	–	–	BB/mmWave (3738 Test Set)	BB/mmWave (3738 Test Set)	BB/mmWave (3738 Test Set)
	–	–	mmWave (3739 Test Set)	–	mmWave (3739 Test Set)	–
	–	–	–	–	–	BB/mmWave (3739 Test Set)

Table 12-1. APPLICATION Menu Variants – VNA Models – Equipped Options (2 of 2)

VNA Model	All MS4640A VNAs	MS4642A, MS4644A, MS4645A VNAs		MS4647A VNA		
Equipped Options	No 007 ^a	007 ^b , 041 ^c	007, 041, 082/083 ^d	007, 041	007, 041, 082/083	007, 041, 080/081 ^e
Setup Buttons	–	Multiple Source Setup	Multiple Source Setup	Multiple Source Setup	Multiple Source Setup	Multiple Source Setup
	–	mmWave (3738 Setup)	mmWave (3738 Setup)	–	–	–
	–	–	–	BB/mmWave (3738 Setup)	BB/mmWave (3738 Setup)	BB/mmWave (3738 Setup)
	–	Noise Figure Setup ^h	Noise Figure Setup	Noise Figure Setup	Noise Figure Setup	Noise Figure Setup
	–	–	mmWave (3739 Setup)	–	mmWave (3739 Setup)	–
	–	–	–	–	–	BB/mmWave (3739 Setup)
	–	Mixer Setup (Active Channel) ⁱ	Mixer Setup (Active Channel)	Mixer Setup (Active Channel)	Mixer Setup (Active Channel)	Mixer Setup (Active Channel)
	–	Mixer Setup (Multi-Channel)	Mixer Setup (Multi-Channel)	Mixer Setup (Multi-Channel)	Mixer Setup (Multi-Channel)	Mixer Setup (Multi-Channel)
		NxN	NxN	NxN	NxN	NxN

a.Option 007 – Receiver Offset is not installed.

b.Option 007 is installed.

c.Option 041 – Noise Figure. Requires front/rear panel access loops from Option 051, 061, or 062.

d.Option 082/083 – Millimeter-Wave connectivity. Use 082 for VNAs without 051, 061, or 062. Use 083 for VNAs with 051, 061, or 062. For MS4647A VNAs only, if 082/083 is equipped, Option 080/081 cannot be equipped.

e.Option 080/081 – Broadband/Millimeter-Wave connectivity. For MS4647A VNAs only. Use 080 for 47A VNAs without 051, 061, or 062. Use 081 for 47A VNAs with 051, 061, or 062. If 080/081 is equipped, Option 082/083 cannot be equipped.

f.Transmission/Reflection

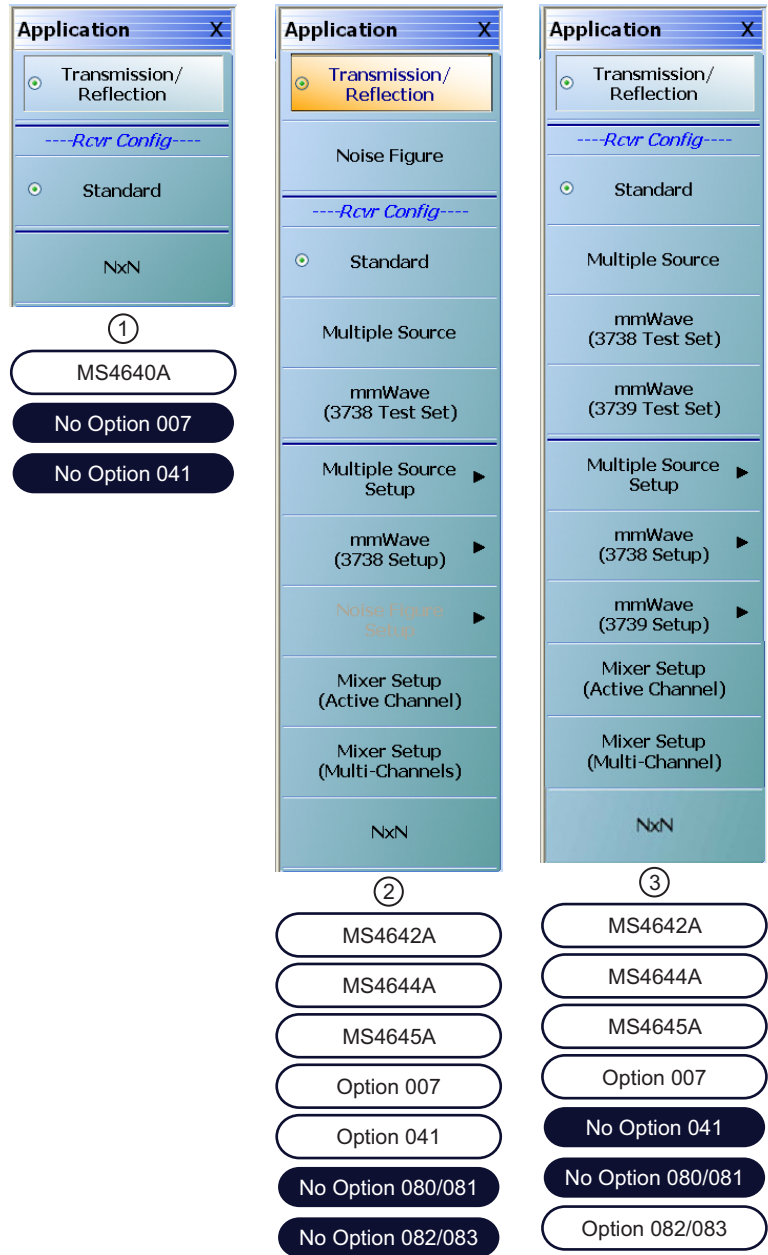
g.Requires Option 041 and Option 051, 061, or 062. If not equipped, Noise Figure and Noise Figure Setup buttons are not present.

h.Noise Figure Setup button is only available if Noise Figure mode button (above) is selected.

i.The Mixer Setup (Active Channel) and Mixer Setup (Multi-Channels) buttons are not present if the instrument is in 4-Port Mode.

12-3 Typical APPLICATION Menus

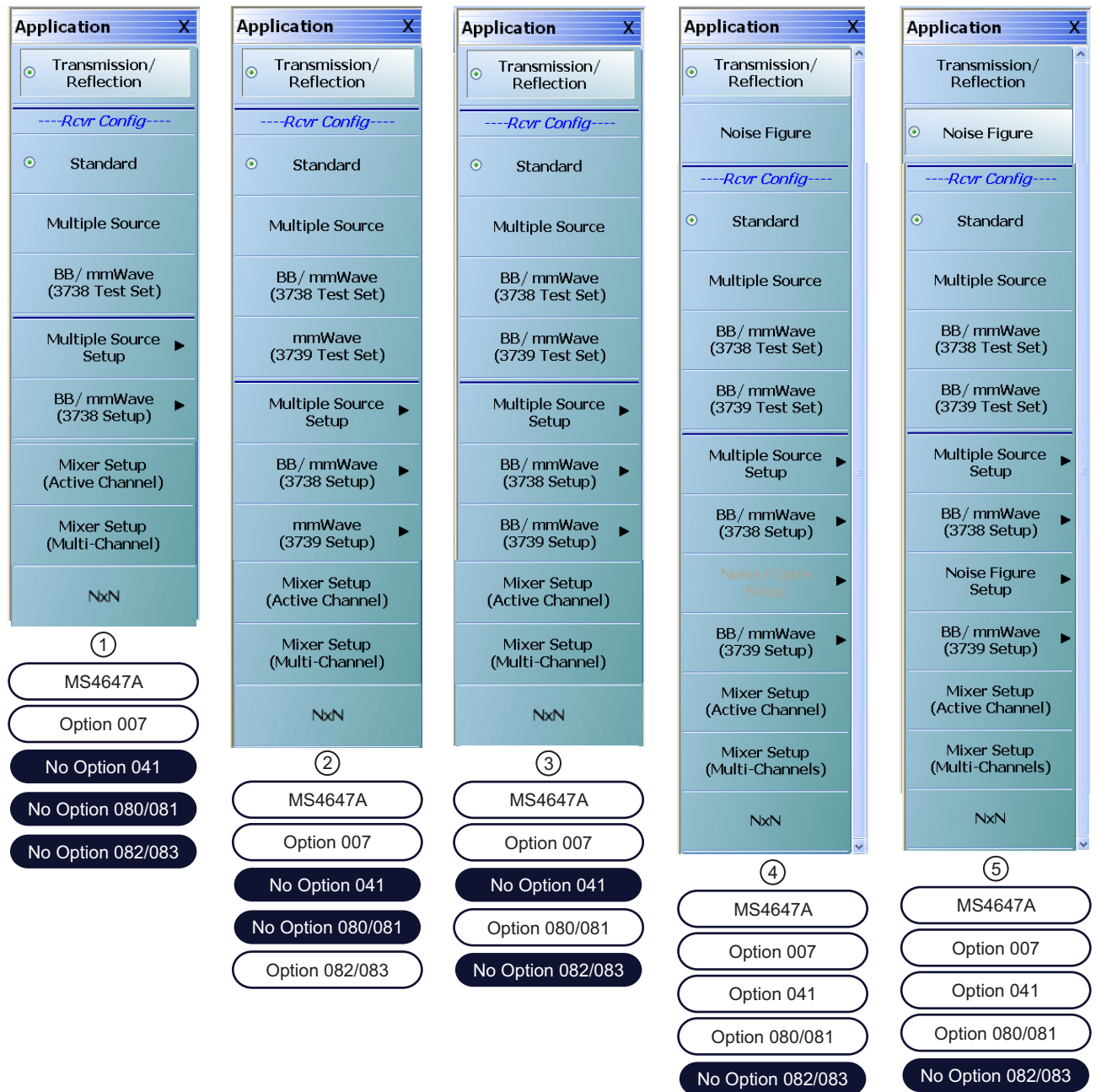
Typical APPLICATION menus are shown in the figures below.



1. For any MS4640A Series VNA without Option 007 – Receiver Offset.
2. For MS4642A, MS4644A, and MS4645A VNAs with Option 007 and Option 041 – Noise Figure.

3. For MS4642A, MS4644A, and MS4645A VNA with Option 007 and Option 082/083 Millimeter-Wave.

Figure 12-1. APPLICATION Menu – Variants – For MS4642A, MS4644A, and MS4645A VNAs



1. APPLICATION Menu – MS4647A – with Option 007 Receiver Offset.
2. APPLICATION Menu – MS4647A – with Option 007 and Option 082/083 Millimeter-Wave.
3. APPLICATION Menu – MS4647A – with Option 007 and Option 080/081 Broadband/Millimeter-Wave.
4. APPLICATION Menu – MS4647A – with Option 007, 080/081, and Option 041 – Noise Figure Measurement. Option 041 is turned off.
5. APPLICATION Menu – MS4647A – with Option 007, 080/081, and 041. Option 041 is turned on.

Figure 12-2. APPLICATION Menu – Variants – For MS4647A VNAs

Button Availability, Button Naming, and Menu Appearance

As shown above in the table and figures, the number of buttons, the button names, and the menu appearance varies depending in the instrument model number and the installed options.

The APPLICATION menu can be conveniently divided into the following the following groups:

- Instrument mode selection
- Receiver configuration
- Receiver and VNA configuration setup.

In general, the receiver configuration is selected first, and then the setup for that configuration completed. Each is briefly described in the sections below followed by a cross reference to a full chapter description of each mode and control group.

As mentioned in the chapter introduction, due to length, the APPLICATION menu mode and configuration selections are described by major function in the next five chapters:

- [Chapter 13, “Application Menus - Multiple Source”](#)
- [Chapter 12, “Application Menus - Overview”](#)
- [Chapter 12, “Application Menus - Overview”](#)
- [Chapter 16, “Application Menus - Mixer Setup”](#)
- [Chapter 17, “Application Menus - NxN”](#)

A summary of the button selections for each menu variant is in the section below with a cross reference to the chapter with the detailed description.

12-4 APPLICATION Menu Instrument Mode Controls

The instrument mode button selection group consists of the Transmission/Reflection and Noise Figure modes and their respective buttons.

- Transmission/Reflection mode is available for all instruments with any combination of options.
- Noise Figure mode requires Option 041 – Noise Figure to be equipped on the VNA. Option 041 requires front and rear panel access loops provided by Option 051, 061, or 062.

Transmission/Reflection

All instrument models. Read-only display if Option 041 is not equipped. This shows the instrument mode set to Transmission/Reflection measurement. This setting changes the CALIBRATION menu name to CALIBRATION [TR].

- [“Calibration Menus - 2-Port VNAs” on page 9-1](#)
- [“Calibration Menus - 4-Port VNAs” on page 10-1](#)

If Option 041 is equipped, selection of the Noise Figure mode de-selects the Transmission/Reflection button, and enables the Noise Figure Setup button lower on the menu. Also, when Noise Figure mode is selected, the normal calibration menus are not available.

- [Chapter 15, “Application Menus - Noise Figure”](#)

Noise Figure

Available on all VNA instruments equipped with Option 041 – Noise Figure Measurement. If the instrument is in Transmission/Reflection mode and the Noise Figure button is selected, an entry dialog provides the opportunity to save the current Transmission/Reflection configuration before proceeding. Similarly, if the VNA is in Noise Figure mode, and the Transmission/Reflection mode is selected, an exit dialog provides the opportunity to save the current Noise Figure configuration before exiting. For detailed information, see:

- [Chapter 15, “Application Menus - Noise Figure”](#)

12-5 APPLICATION Menu - Receiver Configuration Selection Control

The buttons in this group are mutually exclusive and selecting one button de-selects all others. Also note that the button appearance and naming varies with the instrument model and equipped options.

Standard

Part of the Receiver Configuration button selection group. Select sets the Standard receiver configuration and de-selects all other receiver configurations and their respective selection buttons.

Multiple Source

Part of the Receiver Configuration button selection group. Requires the installation of Option 007 – Receiver Offset. Select sets the Multiple Source receiver configuration and de-selects all other receiver configurations and their respective selection buttons.

If selected, use the Multiple Source Setup button described below to configure the multiple sources including external sources. For detailed information, see:

- [Chapter 13, “Application Menus - Multiple Source”](#)

mmWave (3738 Test Set)

Part of the Receiver Configuration button selection group. Only for MS4642A, MS4644A, and MS4645A VNAs. Select sets the receiver configuration as mmWave (3738 Test Set). Use the mmWave (3738 Setup) button below to configure this receiver configuration.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

BB/mmWave (3738 Test Set)

Part of the Receiver Configuration button selection group. Only available on MS4647A VNAs. Select set the receiver configuration as BB/mmWave (3738 Test Set). Use the BB/mmWave (3738 Setup) button below to configure this receiver configuration.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

mmWave (3739 Test Set)

Part of the Receiver Configuration button selection group. Only for MS4642A, MS4644A, and MS4645A VNAs. Select sets the receiver configuration as mmWave (3739 Test Set). Use the mmWave (3739 Setup) button below to configure this receiver configuration.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

BB/mmWave (3739 Test Set)

Part of the Receiver Configuration button selection group. Only available on MS4647A VNAs. Select set the receiver configuration as BB/mmWave (3739 Test Set). Use the BB/mmWave (3739 Setup) button below to configure this receiver configuration.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

12-6 APPLICATION Menu - Configuration Setup Control

Use these buttons to setup the configurations above, as well as the mixer setup configurations.

Multiple Source Setup

Present on all VNAs. Select displays the MULTIPLE SOURCE SETUP menu. Use this button if the Multiple Source Receiver Configuration was selected above.

- [Chapter 13, “Application Menus - Multiple Source”](#)

mmWave (3738 Setup)

Select displays the 3738 SETUP menu. Use this button for configuration if the mmWave (3738 Test Set) was selected above.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

BB/mmWave (3738 Setup)

Select displays the 3738 SETUP menu. Use this button for configuration if the BB/mmWave (3738 Test Set) was selected above.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

mmWave (3739 Setup)

Select displays the 3739 SETUP menu. Use this button for configuration if the mmWave (3739 Test Set) was selected above.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

BB/mmWave (3739 Setup)

Select displays the 3739 SETUP menu. Use this button for configuration if the BB/mmWave (3739 Test Set) was selected above.

- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)

Mixer Setup (Active Channel Mixer Setup)

Select displays the single channel version of the mixer setup, the MIXER SETUP [SWEEP TYPE] dialog boxes. The setup allows setting the sweep type, the port correspondence to RF and IF, and the signal source for the LO. There are separate setup configurations for frequency-based sweep and power-based sweep.

- [“Application Menus - Mixer Setup” on page 16-1](#)

Mixer Setup (Multi-Channel Mixer Setup)

Select displays the MIXER SETUP CONFIGURATION dialog boxes. The mixer setup dialogs provide setup guidance for different mixer types, and supports measurement of various parameters on different channels. Once the mixer configuration and measurement requirements are input, the system responds with the necessary calibrations required. The mixer measurement configuration can be saved and recalled.

- [“Application Menus - Mixer Setup” on page 16-1](#)

NxN

Select displays the NXN SOLUTION USING S2P Files dialog box.

- [Chapter 17, “Application Menus - NxN”](#)

Chapter 13 — Application Menus - Multiple Source

13-1 Chapter Overview

This chapter provides information for the single APPLICATION menu with controls for instrument multiple source.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

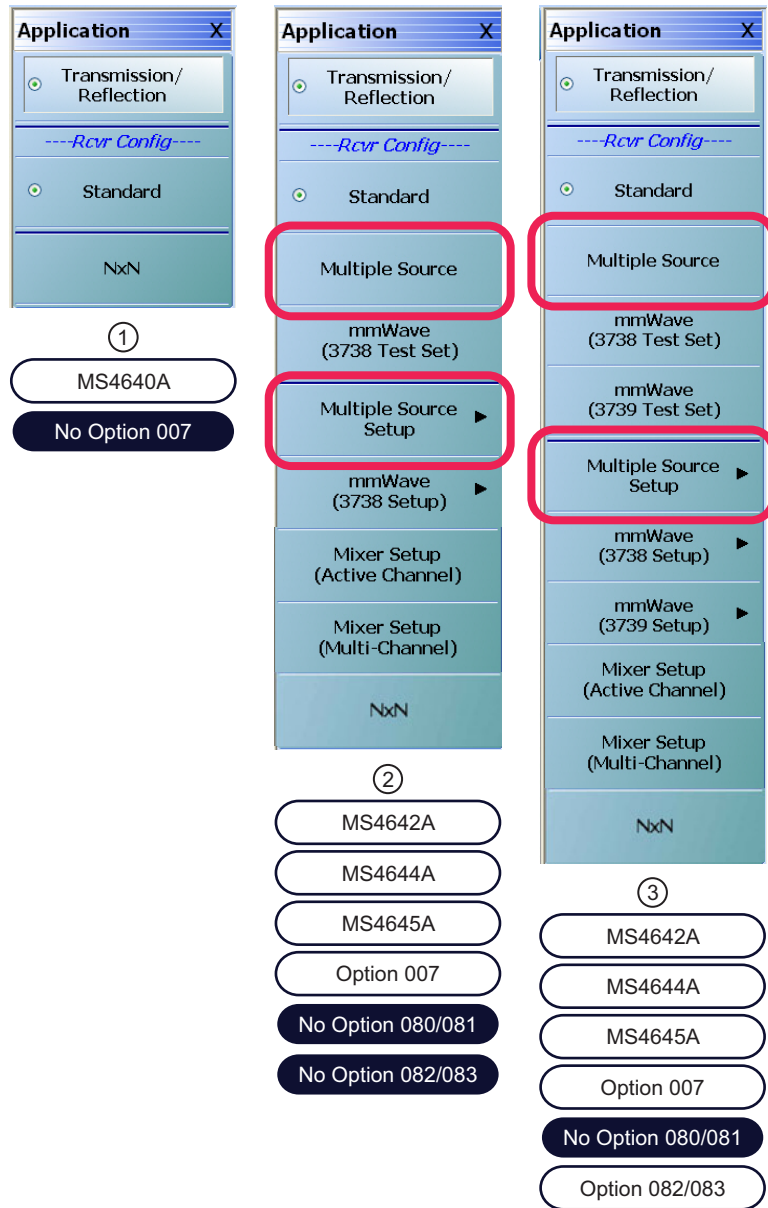
- [Chapter 12, “Application Menus - Overview”](#)
- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)
- [Chapter 15, “Application Menus - Noise Figure”](#)
- [Chapter 16, “Application Menus - Mixer Setup”](#)
- [Chapter 17, “Application Menus - NxN”](#)

13-2 Application Menus and Dialog Boxes for Multiple Source

The APPLICATION menu set for configuration and control of multiple source contains the following menus and dialogs:

- [“Application Menu Variants for Multiple Source” on page 13-2](#)
 - [Figure 13-1, “APPLICATION Menu – Variants – For MS4642A, MS4644A, and MS4645A VNAs” on page 13-2](#)
 - [Figure 13-2, “APPLICATION Menu – Variants – For MS4647A VNAs” on page 13-3](#)
- [“Multiple and External Source Control” on page 13-5](#)
 - [“MULTIPLE SOURCE Menu” on page 13-5](#)
 - [“Multiple Source Tableau Dialog” on page 13-7](#)
 - [“EXT. SRC CONTROL Menu” on page 13-10](#)
 - [“EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box” on page 13-13](#)
 - [“EXTERNAL MODULE CTRL Dialog Box Overview” on page 14-19](#)

13-3 Application Menu Variants for Multiple Source

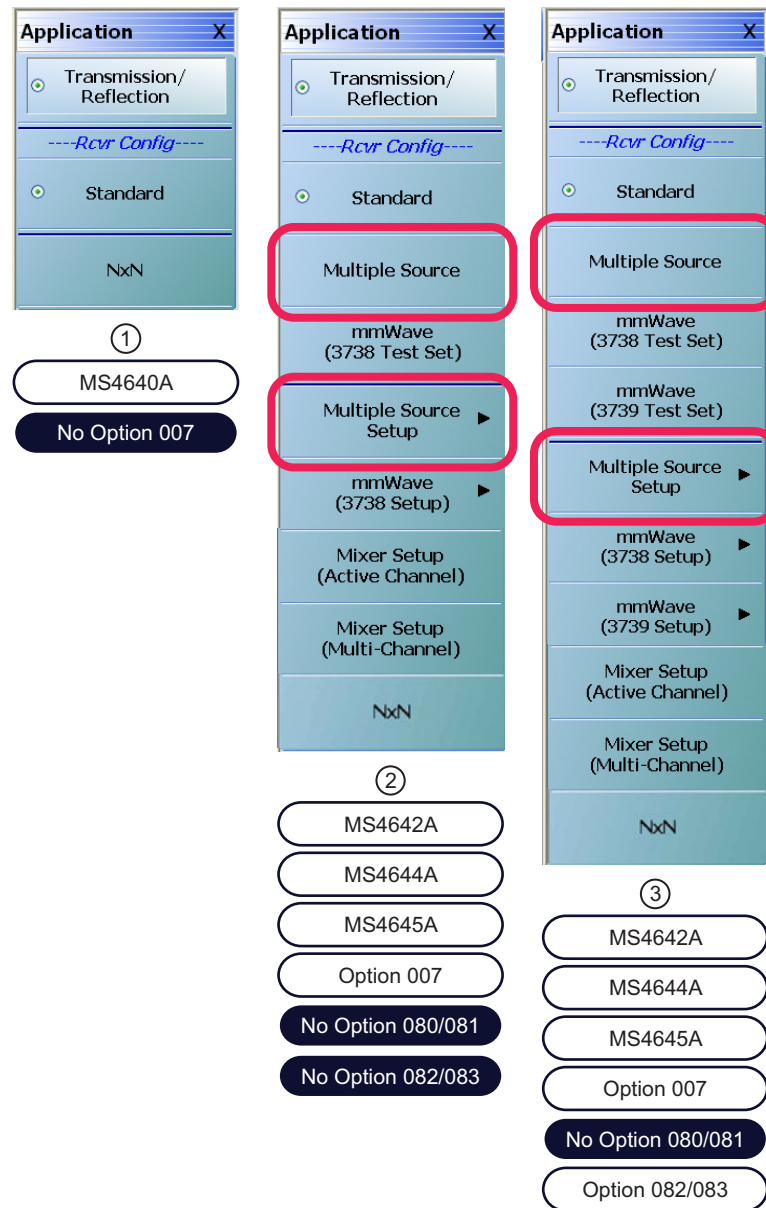


Multiple Source control buttons on the APPLICATION Menu.

1. For any MS4640A Series VNA without Option 007 – Receiver Offset.
2. For MS4642A, MS4644A, and MS4645A VNA with Option 007.

3. For MS4642A, MS4644A, and MS4645A VNA with Option 007 and Option 082/083 Millimeter-Wave.

Figure 13-1. APPLICATION Menu – Variants – For MS4642A, MS4644A, and MS4645A VNAs



<p>Multiple Source control buttons on the APPLICATION Menu.</p> <ol style="list-style-type: none"> 1. APPLICATION Menu – MS4647A – with Option 007 Receiver Offset. 2. APPLICATION Menu – MS4647A – with Option 007 and Option 082/083 Millimeter-Wave. 	<ol style="list-style-type: none"> 3. APPLICATION Menu – MS4647A – with Option 007 and Option 080/081 Broadband/Millimeter-Wave.
---	---

Figure 13-2. APPLICATION Menu – Variants – For MS4647A VNAs

See the other APPLICATION menu chapters for descriptions of other menu button selections.

Multiple Source

Part of the Receiver Configuration button selection group. Requires the installation of Option 007 – Receiver Offset. Select sets the **Multiple Source** receiver configuration and de-selects all other receiver configurations and their respective selection buttons.

If selected, use the Multiple Source Setup button described below to configure the multiple sources including external sources. For detailed information, see:

- [Chapter 13, “Application Menus - Multiple Source”](#)

Multiple Source Setup

Present on all VNAs. Select displays the MULTIPLE SOURCE SETUP menu. Use this button if the Multiple Source Receiver Configuration was selected above.

- [“MULTIPLE SOURCE Menu” on page 13-5](#) below.

13-4 Multiple and External Source Control

MULTIPLE SOURCE Menu

Prerequisites

-

Previous

- [“APPLICATION Menu” on page 12-2](#)

Navigation

- MAIN | Application | APPLICATION | Multiple Source Setup | MULTIPLE SOURCE

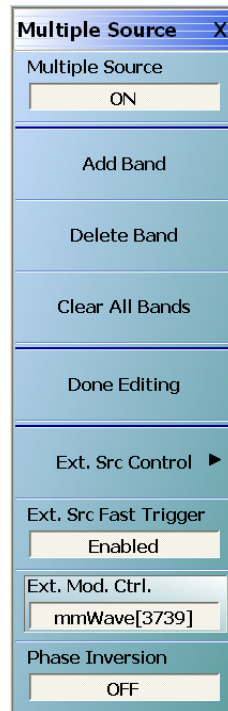


Figure 13-3. MULTIPLE SOURCE Menu

MULTIPLE SOURCE Menu Source Tableau

When the MULTIPLE SOURCE menu is selected, the MULTIPLE SOURCE Tableau Area appears at the bottom of the main display area.

Multiple Source (Off/Off)

Select toggles multiple source capability off or on.

Add Band

Select adds a frequency band to the multiple source tableau at the bottom of the display.

- [“Multiple Source Tableau Dialog” on page 13-7](#)

Delete Band

Select a row in the frequency band tableau at the bottom of the display. Click the Delete Band button to permanently delete it.

- [“Multiple Source Tableau Dialog” on page 13-7](#)

Clear All Bands

Select deletes all band entries in the tableau.

- [“Multiple Source Tableau Dialog” on page 13-7](#)

Done Editing

If no changes have been made to the frequency band settings, this button is unavailable.

Once changes are made, the button becomes available.

When all changes are complete, select the Done Editing button to apply the frequency band changes (additions, edits, and deletions) to the current running measurement and its attached test sets and modules.

After the change have been applied, the button again becomes unavailable.

If the button is not selected, the changes are not applied to the instrument.

Ext. Src Control

Select displays the EXT. SRC CONTROL menu.

- [“EXT. SRC CONTROL Menu” on page 13-10](#)

Ext. Src Fast Trigger (Enabled/Disabled)

Select displays the EXT SRC FAST TRIGGER dialog box where the trigger mode can be enabled or disabled. The button shows the current fast trigger mode.

- [“EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box” on page 13-13](#)

Ext. Mod. Ctrl.

The button displays the currently broadband setting as either OFF, mmWave [3738], mmWave [3739], Broadband to 125 GHz, E-Band 56 GHz to 96 GHz, or W-Band 65 GHz to 110 GHz.

Select displays the EXTERNAL MODULE CTRL dialog box. The dialog box allows the module type to be set as OFF, mmWave [3738], mmWave [3739], Broadband to 125 GHz, Broadband to 145 GHz, E-Band 56 GHz to 96 GHz, or W-Band 65 GHz to 110 GHz which also depends on the connected equipment and installed options. If any configuration other than OFF is selected, additional configuration parameters are available for each defined band. The dialog box content depends on the broadband mode and the number of bands selected. Sample dialogs for some configurations are shown below.

- [“EXTERNAL MODULE CTRL Dialog Box Overview” on page 14-19](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = OFF” on page 14-22](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mm-Wave \(3738\)” on page 14-23](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mm-Wave \(3739\)” on page 14-24](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = BB/mm-Wave \(3739\)” on page 14-26](#)

Phase Inversion (Off/On)

Select toggles the phase inversion function off and on.

Multiple Source Tableau Dialog

The multiple source tableau is available at the bottom of the screen when the MULTIPLE SOURCE menu is selected. typical example is shown below.

Ch1	TR	Start 70 kHz	Stop 70 GHz	IFBW 1 kHz	Avg OFF	Measuring State UNCORR			
Stop Freq :		70.001 kHz		<input type="button" value="^"/> <input type="button" value="v"/>		GHz	MHz	kHz	Hz
Band #	Start Freq	Stop Freq	Src = (M/D) * (F + OS); Src CW = (M/D) * OS	CW ON	Multiplier (M)	Divisor (D)	Offset Freq (OS)		
1	70 kHz	70.001 kHz	Internal Source 1 (Auto)	<input type="checkbox"/>	1	1	0 Hz		
			Internal Source 2 (Auto)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 1 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 2 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 3 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 4 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			Receiver	<input type="checkbox"/>	1	1	0 Hz		
			Receiver Source	<input type="checkbox"/>	1	1	0 Hz		
2	70.002 kHz	70.003 kHz	Internal Source 1 (Auto)	<input type="checkbox"/>	1	1	0 Hz		
			Internal Source 2 (Auto)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 1 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 2 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 3 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 4 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			Receiver	<input type="checkbox"/>	1	1	0 Hz		
			Receiver Source	<input type="checkbox"/>	1	1	0 Hz		
3	70.004 kHz	70.005 kHz	Internal Source 1 (Auto)	<input type="checkbox"/>	1	1	0 Hz		
			Internal Source 2 (Auto)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 1 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 2 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 3 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			External Source 4 (Inactive)	<input type="checkbox"/>	1	1	0 Hz		
			Receiver	<input type="checkbox"/>	1	1	0 Hz		
			Receiver Source	<input type="checkbox"/>	1	1	0 Hz		

Internal Int. 10 MHz Local Ch1 Port 1 2

Figure 13-4. MULTIPLE SOURCE TABLEAU Dialog - Sample

Band Tableau Controls

Bands are added by selecting the Add Band button on the MULTIPLE SOURCE menu. Up to 50 Bands can be added. Each band can be defined for any combination of the following sources:

- Internal Source
- External Source 1
- External Source 2
- External Source 3
- External Source 4
- External Source 1
- Receiver
- Receiver Source

General Operation

The following general operation notes and requirements apply:

- Tabular field data can be entered in any sequence.
- If invalid data is entered, a warning icon appears in the left margin of the table. Selecting the Done Editing button with invalid data results in a warning dialog.
- Read-only tabular elements are distinguished from editable contents.
- Table focus remains on the last added/ deleted band.
- Data is not applied to the instrument and its attached equipment until the Done Editing button is selected. When successful, the button again becomes unavailable.

CW OFF

Each source is defaulted as CW off. A check box can be selected to enable CW for each source. If CW is not selected, the source equation is:

$$\text{Source (Src)} = \left(\frac{M}{D}\right) \times (F + OS)$$

Where:

- M = Multiplier
- D = Divisor
- F = Frequency in user-defined units of Hz, kHz, MHz, or GHz. This is the current instrument frequency within the band being defined.
- OS = Offset frequency in Hertz

CW ON

If CW is selected, the source equation is:

$$\text{Source (Src)} = \left(\frac{M}{D}\right) \times (OS)$$

Where:

- M = Multiplier
- D = Divisor
- OS = Offset frequency in Hertz

Band Management

Band management is done by using the Add Band, Delete Band, and Clear All Bands button. After all bands are configured, select Done Editing button to apply the setting to the instrument and its attached equipment.

Saving/Recalling Band Configurations

A multiple source band configuration can be saved by using MENU BAR | File | Save Setup. On the SAVE SETUP dialog box, the setup can be saved as a:

- Active Channel Setup and Calibration CHX file
- Active Channel Setup STX file
- All Channel Setup and Calibration CHA file
- All Channel Setup STA file

Recall previously saved setups by using MENU BAR | File | Recall Setup.

File operations are duplicated on the FILE menu at MAIN | File | FILE.

EXT. SRC CONTROL Menu

Full Name

- EXTERNAL SOURCE CONTROL Menu

Previous

- [“MULTIPLE SOURCE Menu” on page 13-5](#)

Navigation

- MAIN | Application | APPLICATION | Multiple Source Setup | MULTIPLE SOURCE | Ext. Src Control | EXT. SRC CONTROL

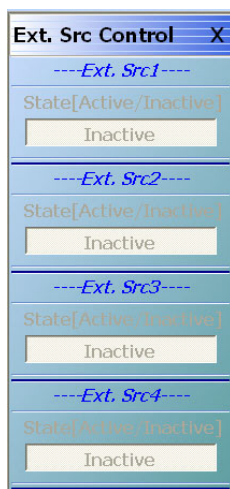


Figure 13-5. EXT. SRC CONTROL (EXTERNAL SOURCE CONTROL) Menu

EXT. SRC CONTROL Menu Note

The RF of External Sources is not automatically turned on. See the installation and configuration procedure below this figure.

Ext. Src1 State [Inactive/Active]

For External Source 1, select toggles the State from active to inactive.

- If the State is Inactive and Unavailable, either:
 - No external source is connected, or
 - The GPIB address set by the VNA instrument for External Source 1 differs from the GPIB address set on the external source instrument.
- If the State is Inactive and Available, an external source is connected with a GPIB address that matches that set in the external source instrument.
 - Select toggles the Ext. Src1 State button between states of Inactive and Active.
 - When the State is Active, the external source is controlled by the VNA instrument via the GPIB connection.

See the procedure section below this figure a more detailed description.

If in Modular BB mode, each external source is turned on/off manually from this menu.

If in BB/MM Wave mode, and external source is set to ON, Source 1 and Source 2 are automatically set to Active.

Ext. Src2 State [Inactive/Active]

For External Source 2, select toggles the State from active to inactive.

- See the description above in the Ext. Src1 State button.

Ext. Src3 State [Inactive/Active]

For External Source 3, select toggles the State from inactive to active.

- See the description above in the Ext. Src1 State button.

Ext. Src4 State [Inactive/Active]

For External Source 4, select toggles the State from inactive to active.

- See the description above in the Ext. Src1 State button.

External Source State Buttons

This description applies to these buttons described in the figure above:

- (Ext. Src1) State [Inactive/Active] button
- (Ext. Src2) State [Inactive/Active] button
- (Ext. Src3) State [Inactive/Active] button
- (Ext. Src4) State [Inactive/Active] button

In this section, these buttons are referred to as the External Source State buttons.

External Source State Buttons Inactive and Unavailable

If the External Source State buttons are Inactive and Unavailable (grayed out), either no external sources are connected to the instrument, or the external sources have different GPIB addresses from those set on the VNA instrument. Once one or more external sources are connected with matching GPIB addresses, the buttons change to Inactive and Available (not grayed out).

Connecting an External Source

Connect from one (1) to four (4) external sources via the rear panel **Dedicated GPIB Port D-24 (f) Connector**.

This GPIB port is used when the VNA instrument controls external instruments such as power meters, frequency counters, and in this case, external sources.

- Up to four (4) external sources can be connected to the instrument.
- Note that each external instrument and the VNA must have a unique GPIB address with no duplicates. The factory-default GPIB addresses for the four external sources and other likely external instruments are:
 - External Source 1 = GPIB Address 4
 - External Source 2 = GPIB Address 5
 - External Source 3 = GPIB Address 2
 - External Source 4 = GPIB Address 3
 - Power Meter = GPIB Address 13
 - W-Band Power Meter = GPIB Address 15
 - Frequency Counter = GPIB Address 7
 - MN4690B Series Multiport Test Set = GPIB Address 16
 - Frequency Counter = GPIB Address 7

- The VNA Instrument itself = GPIB Address 6

The default addresses for external sources can be changed at the EXT. SRC. ADDR. (EXTERNAL SOURCE ADDRESS) menu

- [“EXT. SRC ADDR. Menu” on page 24-41](#)
- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Ext. Sources | EXT. SRC. ADDR.

The default addresses for the instrument itself, the external power meter, and the external frequency counter can be changed at the REMOTE INTER. menu.

- [“REMOTE INTER. Menu” on page 24-36](#)
- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
- Only Anritsu external sources such as the **MG3696A Signal Generator** or the **MS3695B Signal Generator** can be connected.
- The external sources must be off during the connection process. The VNA instrument can be running.
- Connect the GPIB cables between the instrument and the external sources.

Note	Best practices recommend no more than two (2) GPIB cable connectors be connected to any one GPIB port. Once connected, do not bend the connectors as this might damage the instrument Dedicated GPIB Port Connector.
-------------	--

Matching GPIB Addresses Between the VNA and the External Source

The GPIB addresses set on the VNA instrument must match those set on each external source.

If the GPIB addresses set on the VNA match those on the external source, the appropriate External Source State button should change from unavailable (grayed out) to available. Once an External Source State button is available, it can be used to toggle the external source between Inactive and Active.

Manual Refresh Required for the EXT. SRC. CONTROL Menu

Note that the EXT. SRC. CONTROL menu does not refresh itself if address changes are made in any of the external sources. If in doubt about the state of connected external sources, click the Back button at the bottom of the display, and then re-enter the menu.

- For example, if a single external source with a GPIB address of 4 is connected to the VNA, the (Ext. Src1) State [Inactive/Active] button is available and can toggle the source as Active or Inactive.
- The user changes the GPIB address of the external source from 4 to 5.
- The current EXT. SRC. CONTROL menu will still show the (Ext. Src1) State [Inactive/Active] button as available.
- To verify the currently connected external sources, select Back to exit the EXT. SRC ADDR. menu to the REMOTE INTER. menu and then select again the Ext. Sources button to re-enter the EXT. SRC. CONTROL menu.
- In this example, the EXT. SRC. CONTROL menu will now show:
 - The (Ext. Src1) State [Inactive/Active] button as unavailable
 - The (Ext. Src2) State [Inactive/Active] button as available
 - All external source control buttons follow this behavior.

EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box

Previous

This menu can be accessed from multiple locations.

- “[MULTIPLE SOURCE Menu](#)” on page 13-5
- “[3738 SETUP Menu](#)” on page 14-5

Navigation

- MAIN | Application | APPLICATION | Multiple Source Setup | MULTIPLE SOURCE | Ext. Src Fast Trigger | EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box
- MAIN | Application | APPLICATION | mmWave (3738 Setup) | 3738 SETUP | Ext. Src Fast Trigger | EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box
- MAIN | Application | APPLICATION | BB/mm Wave (3738 Setup) | 3738 SETUP | Ext. Src Fast Trigger | EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box

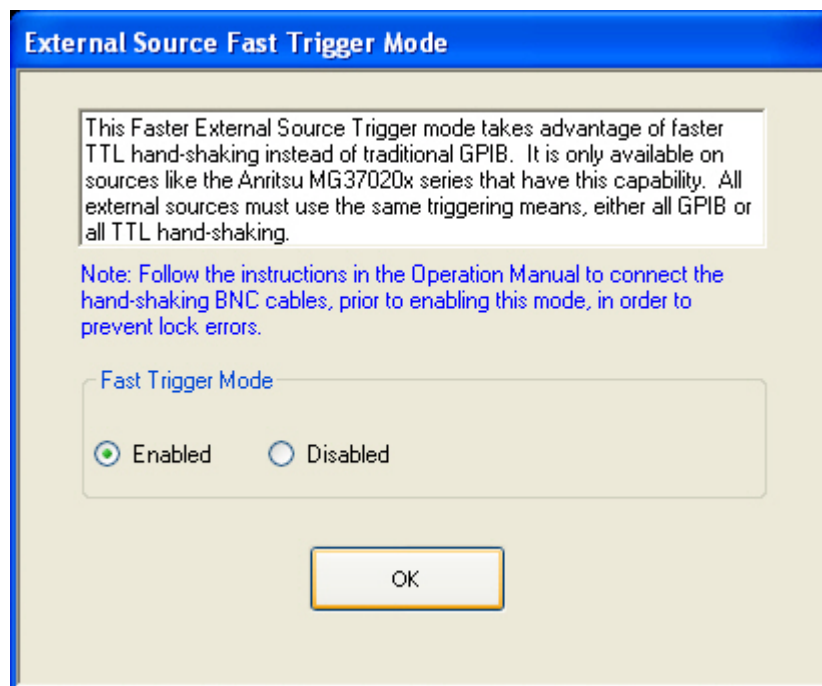


Figure 13-6. EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box

Instructions

This Fast External Source Trigger mode takes advantage of faster TTL hand-shaking instead of traditional GPIB. It is only available on sources such as the Anritsu MG37020x Series Signal Generators that have this capability. All external sources must use the same triggering means, either all GPIB or all TTL hand-shaking.

Note Ensure that the BNC cable is connected properly before enabling this mode to prevent source lock errors. The length of the BNC cables can vary, while the BNC T-Connectors should all be the same type from the same manufacturer. Select OK when done.

In the Fast Trigger Mode area, select Enabled or Disabled, and then select OK. The general configuration is shown in the figure below.

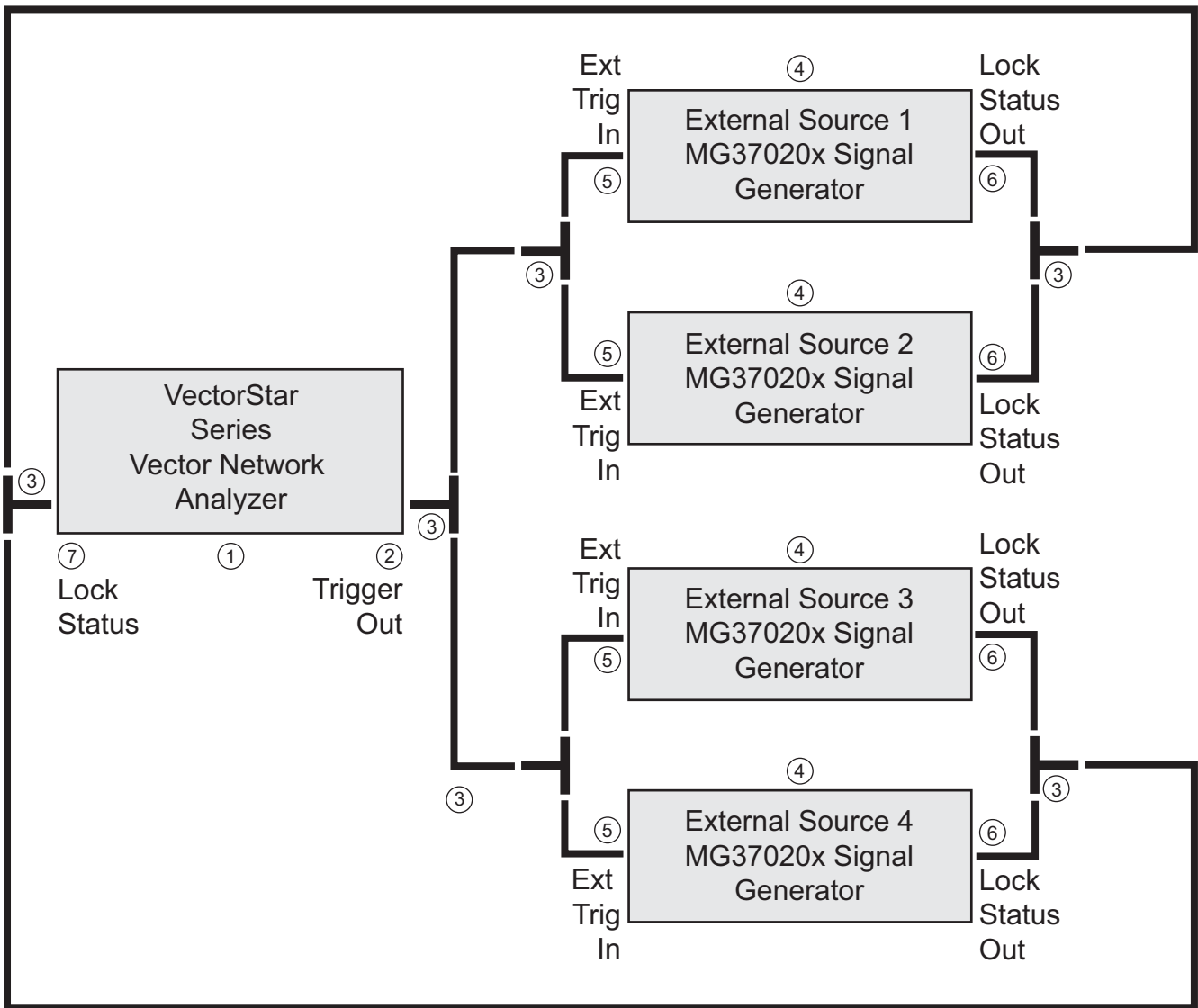


Figure 13-7. External Source Fast Trigger BNC Cable Connections (1 of 2)

<ol style="list-style-type: none">1. VectorStar MS4640A Series VNA.2. VNA Trigger Out – Rear Panel External Trigger Output (Ext Trig Out) Port.3. BNC T-Connectors – For this application, the best practice recommendation is to use the same model number BNC T-connectors from the same manufacturer. The BNC cables do not need to be identical length nor do they need to be from the same manufacturer.	<ol style="list-style-type: none">4. Anritsu MG3702xX Signal Generators – Up to four (4) signal generators can be connected.5. MS37020x Rear Panel External Trigger (External Trigger In) Port.6. MS37020x Rear Panel Lock Status (Lock Status Output) Port.7. VNA Lock Status – Rear Panel Lock Status (Lock Status In) Port.
---	---

Figure 13-7. External Source Fast Trigger BNC Cable Connections (2 of 2)

Chapter 14 — Application Menus - Broadband/Millimeter-Wave

14-1 Chapter Overview

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode, and whether broadband or multiple sources are used. The menu also provides access to NXN setup.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

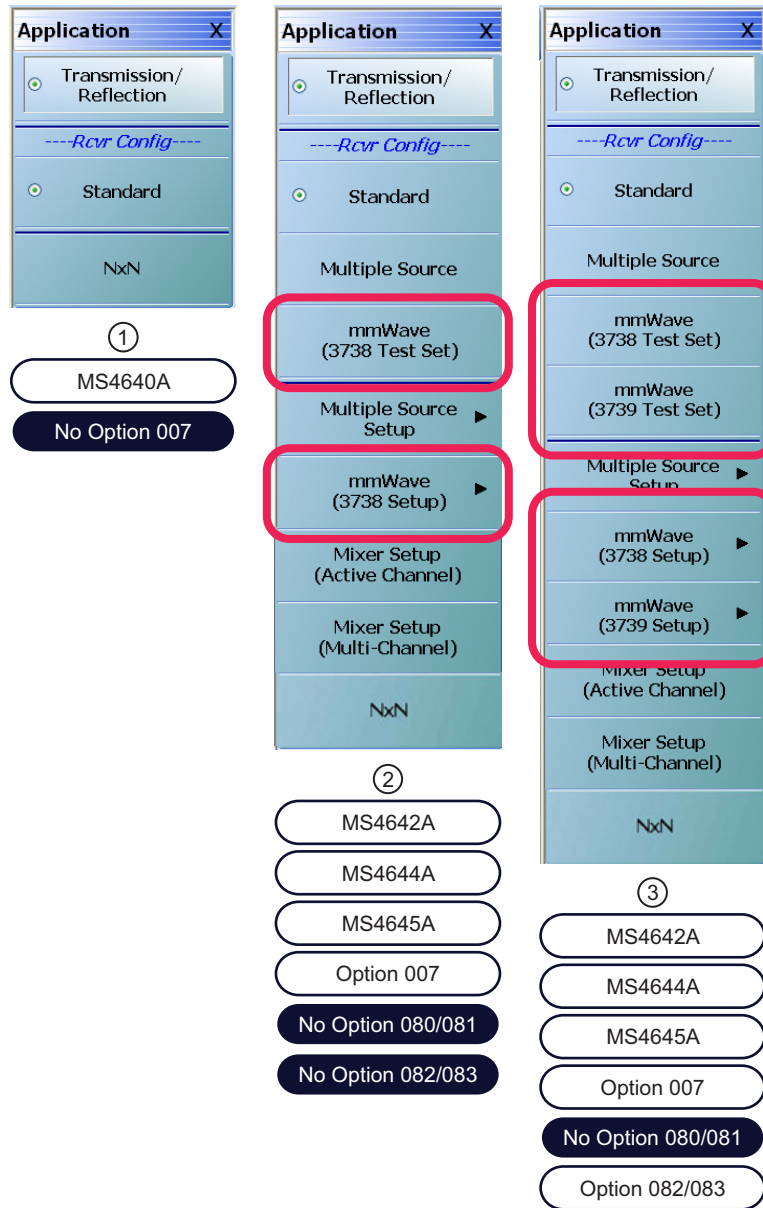
- [Chapter 12, “Application Menus - Overview”](#)
- [Chapter 13, “Application Menus - Multiple Source”](#)
- [Chapter 15, “Application Menus - Noise Figure”](#)
- [Chapter 16, “Application Menus - Mixer Setup”](#)
- [Chapter 17, “Application Menus - NxN”](#)

14-2 Application Menus and Dialog Boxes for BB/mm-Wave

The APPLICATION menu set contains the following menus and dialogs:

- [“Application Menu Variants for BB/mm-Wave” on page 14-2](#)
 - [Figure 14-1, “APPLICATION Menu – Variants – For MS4642A, MS4644A, and MS4645A VNAs” on page 14-2](#)
 - [Figure 14-2, “APPLICATION Menu – Variants – For MS4647A VNAs” on page 14-3](#)
- [“Broadband/Millimeter-Wave Setup” on page 14-5](#)
 - [“3738 SETUP Menu” on page 14-5](#)
 - [“3739 SETUP Menu” on page 14-7](#)
 - [“mmWAVE ALC CAL Menu” on page 14-12](#)
 - [“mmWAVE ALC CAL \(MM MODULE NAME\) Dialog Box” on page 14-14](#)
 - [“EXTERNAL MODULE SELECTION Dialog Box” on page 14-16](#)
- [“Broadband/Millimeter-Wave Control” on page 14-19](#)
 - [“EXTERNAL MODULE CTRL Dialog Box Overview” on page 14-19](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = OFF” on page 14-22](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mm-Wave \(3738\)” on page 14-23](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mm-Wave \(3739\)” on page 14-24](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = BB/mm-Wave \(3739\)” on page 14-26](#)

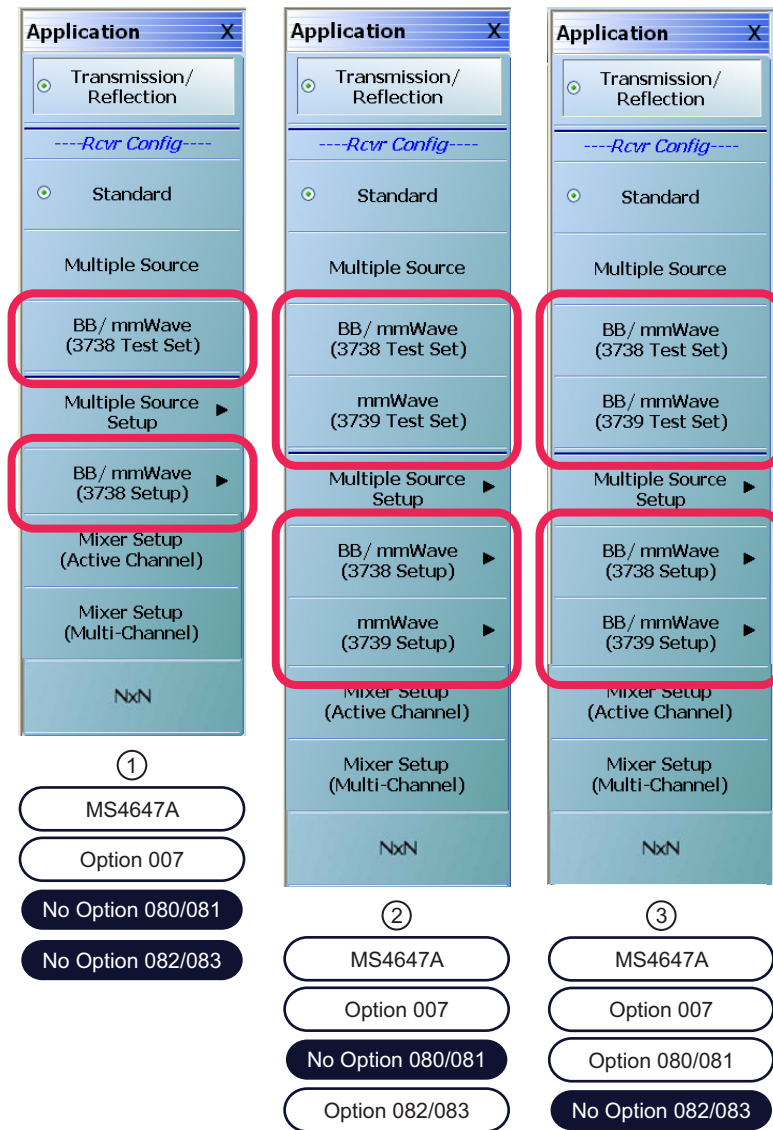
14-3 Application Menu Variants for BB/mm-Wave



Broadband/Millimeter-Wave (BB/mm-Wave) control buttons on the APPLICATION Menu.

<p>1. For any MS4640A Series VNA without Option 007 – Receiver Offset.</p> <p>2. For MS4642A, MS4644A, and MS4645A VNA with Option 007.</p>	<p>3. For MS4642A, MS4644A, and MS4645A VNA with Option 007 and Option 082/083 Millimeter-Wave.</p>
---	---

Figure 14-1. APPLICATION Menu – Variants – For MS4642A, MS4644A, and MS4645A VNAs



Broadband/Millimeter-Wave (BB/mm-Wave) control buttons on the APPLICATION Menu.

1. APPLICATION Menu – MS4647A – with Option 007 Receiver Offset.
2. APPLICATION Menu – MS4647A – with Option 007 and Option 082/083 Millimeter-Wave.

3. APPLICATION Menu – MS4647A – with Option 007 and Option 080/081 Broadband/Millimeter-Wave.

Figure 14-2. APPLICATION Menu – Variants – For MS4647A VNAs

See the other APPLICATION menu chapters for descriptions of other menu button selections.

APPLICATION Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Application | APPLICATION

Button Availability and Naming

- The buttons present and their names vary depending on the VNA model number and the installed options. Typical menu variants are shown in the figures above.

mmWave (3738 Test Set)

Part of the Receiver Configuration button selection group. Only for MS4642A, MS4644A, and MS4645A VNAs. The Rcvr Config area on the menu provides a button selection group that allows control of the receiver configuration mode. Depending on the instrument model and the installed options, this button selection group can consist of from one to multiple receiver configuration options.

BB/mmWave (3738 Test Set)

Part of the Receiver Configuration button selection group. Only for MS4647A VNAs. The Rcvr Config area on the menu provides a button selection group that allows control of the receiver configuration mode. Depending on the instrument model and the installed options, this button selection group can consist of from one to multiple receiver configuration options.

mmWave (3739 Test Set)

Part of the Receiver Configuration button selection group. This button is only available on MS4642A, MS4644A, or MS4645A VNAs. If the instrument is an MS4647A, the BB/mmWave button appears (described below). Select sets the mmWave receiver configuration and de-selects other receiver configuration buttons.

BB/mmWave (3739 Test Set)

Part of the Receiver Configuration button selection group. This button is only available on MS4642A, MS4644A, or MS4645A VNAs. If the instrument is an MS4647A, the BB/mmWave button appears (described below). Select sets the mmWave receiver configuration and de-selects other receiver configuration buttons.

mmWave (3738 Setup)

Select displays the 3738 SETUP menu. Use this button for configuration if the mmWave (3738 Test Set) was selected above.

- [“3738 SETUP Menu” on page 14-5](#)

BB/mmWave (3738 Setup)

Select displays the 3738 SETUP menu. Use this button for configuration if the BB/mmWave (3738 Test Set) was selected above.

- [“3738 SETUP Menu” on page 14-5](#)

mmWave (3739 Setup)

Select displays the 3739 SETUP menu. Use this button for configuration if the mmWave (3738 Test Set) was selected above.

- [“3739 SETUP Menu” on page 14-7](#)

BB/mmWave (3739 Setup)

Select displays the 3739 SETUP menu. Use this button for configuration if the BB/mmWave (3738 Test Set) was selected above.

- [“3739 SETUP Menu” on page 14-7](#)

14-4 Broadband/Millimeter-Wave Setup

3738 SETUP Menu

Previous

- “APPLICATION Menu” on page 14-4

Navigation

The navigation path changes depending on the instrument model and the equipped options. For MS4642A, 44A, and 45A with Option 007 and Option 082/083:

- MAIN | Application | APPLICATION | mmWave (3738 Setup) | 3738 SETUP

For MS4647A with Options 007 and 082/083 or Options 007 and 080/081.

- MAIN | Application | APPLICATION | BB/mmWave (3738 Setup) | 3738 SETUP

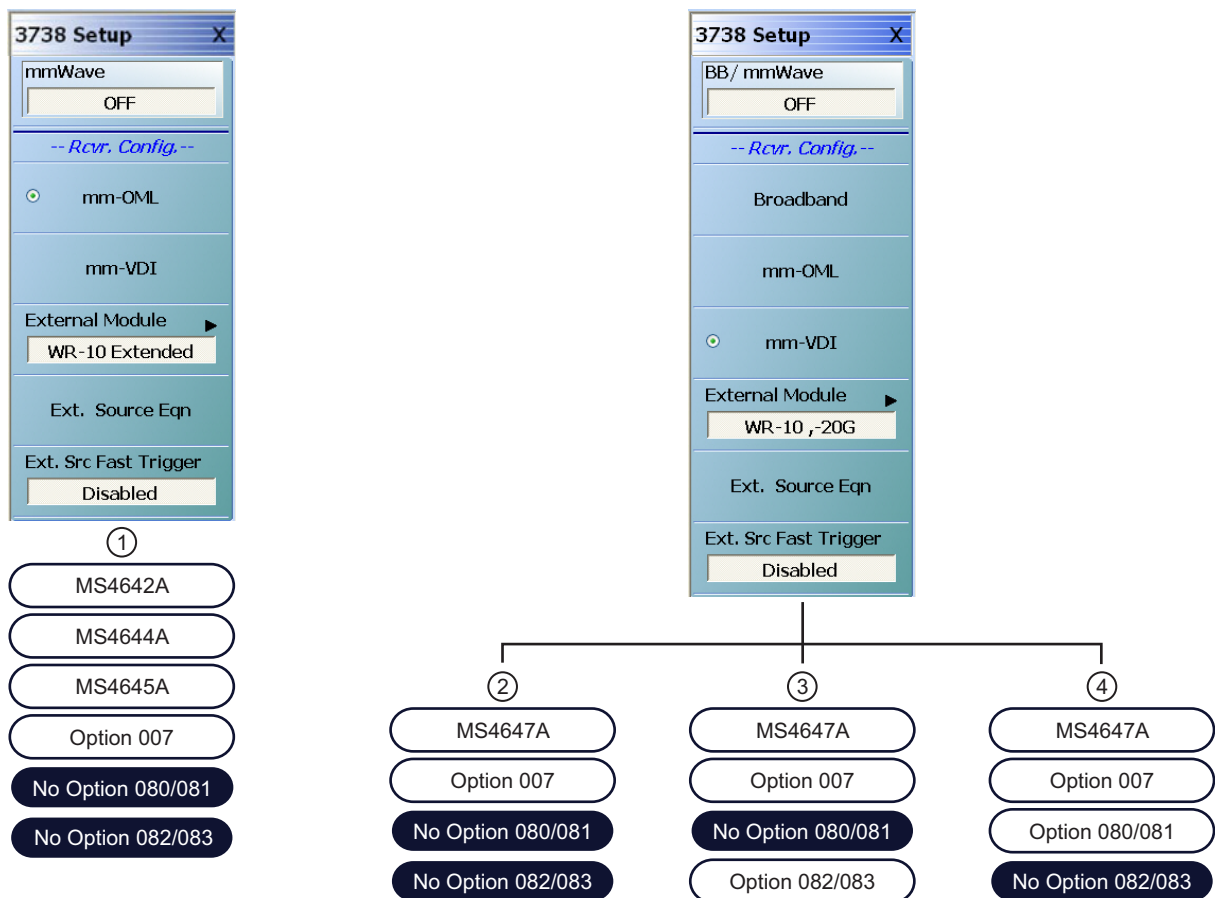


Figure 14-3. 3738 SETUP Menu Variants

<ol style="list-style-type: none"> 1. 3738 SETUP menu for MS4642A, 44A, and 45A VNAs equipped with Receiver Offset Option 007 only. <ul style="list-style-type: none"> • This is six (6) button menu variant. • Option 080/081 is not compatible with 42A, 44A, and 47A VNAs. 2. 3738 SETUP menu for MS4647A VNA. <ul style="list-style-type: none"> • VNA equipped with Option 007 only. • This is the seven (7) button menu variant as in #3 and #4. 	<ol style="list-style-type: none"> 3. 3738A SETUP menu for MS4647A VNA <ul style="list-style-type: none"> • VNA equipped with Option 007 and Option 082/083 – 3738A Test Set with Millimeter-Wave Modules. • This is the same seven (7) button menu variant as in #2 and #4. 4. 3738A SETUP menu for MS4647A VNA <ul style="list-style-type: none"> • VNA equipped with Option 007 and Option 080/081 3739x Test Set with Broadband/Millimeter-Wave Modules. • This is the same seven (7) button menu variant as in #2 and #3.
--	--

Figure 14-3. 3738 SETUP Menu Variants

BB/mmWave

Select toggles broadband/millimeter-wave capability on and off. The broadband state is shown in the button field.

Receiver Configuration Button Group Start

Depending on the instrument model and equipped options, the receiver configuration button group allows only one type to be selected.

Broadband

Select sets the receiver configuration as Broadband.

mm-OML

Select sets the receiver configuration as mm-OML using OML brand millimeter-wave modules.

mm-VDI

Select sets the receiver configuration as mm-VDI using VDI brand millimeter-wave modules.

Receiver Configuration Button Group End

The mm-VDI button is the last button in the receiver configuration button group.

External Module

Select displays the EXTERNAL MODULE SELECTION dialog box.

- [“EXTERNAL MODULE SELECTION Dialog Box” on page 14-16](#)

Ext. Source Eqn

Select displays the MODIFY EXTERNAL SOURCE EQUATIONS dialog box.

- [“MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box” on page 14-10](#)

Ext. Src Fast Trigger

Select displays the EXTERNAL SOURCE FAST TRIGGER MODE dialog box.

- [“EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box” on page 13-13](#)

3739 SETUP Menu

Previous

- “APPLICATION Menu” on page 14-4

Navigation

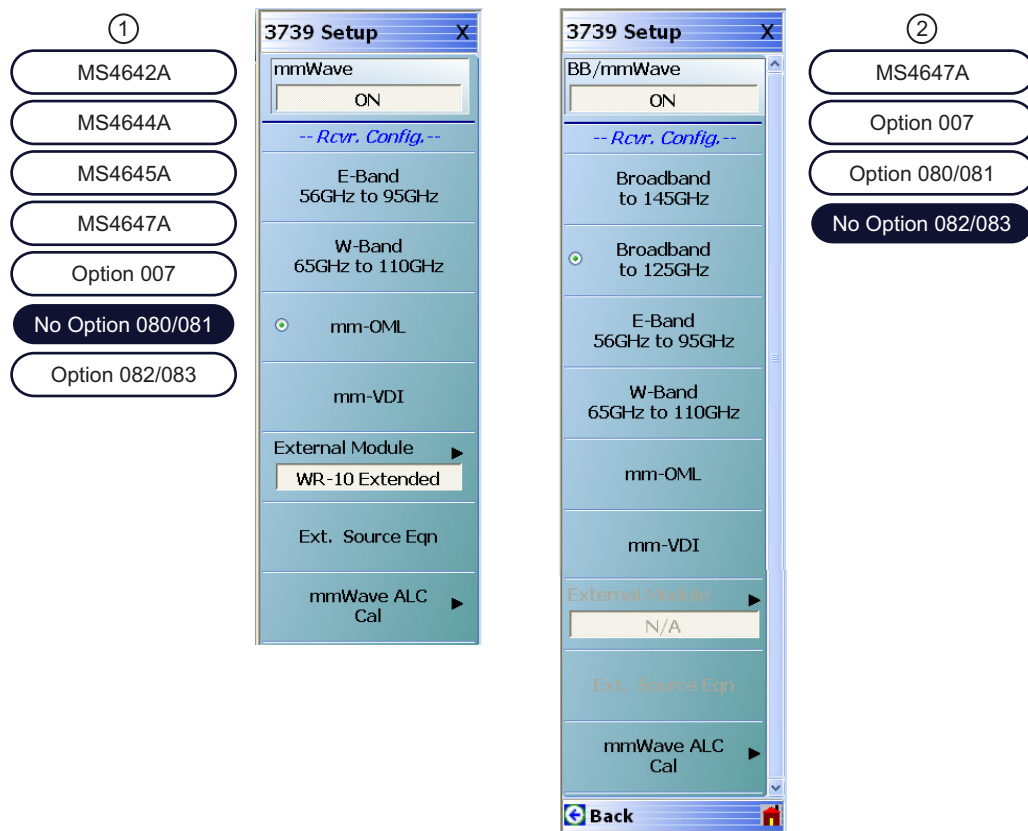
The navigation path changes depending on the instrument model and the equipped options.

For MS4642A, 44A, and 45A with Option 007 and Option 082/083:

- MAIN | Application | APPLICATION | mmWave (3739 Setup) | 3739 SETUP

For MS4647A with Options 007 and 082/083 or Options 007 and 080/081:

- MAIN | Application | APPLICATION | BB/mmWave (3739 Setup) | 3739 SETUP



- | | |
|---|--|
| <p>1. The 3739 SETUP Menu for MS4642A, 44A, 45A, and 47A VNAs with Option 007 – Receiver Offset and Option 082/083 – Millimeter-Wave Module Connectivity Capability.</p> <ul style="list-style-type: none"> • The menu has eight (8) buttons. • The first button is mmWave (ON/OFF). • Option 082/083 and Option 081/082 are mutually exclusive and only one can be installed on 47A VNAs. | <p>2. The 3739 SETUP Menu for MS4647A VNAs with Option 007 and Option 080/081 Broadband/Millimeter-Wave Modules Connectivity Capability.</p> <ul style="list-style-type: none"> • The menu has ten (10) buttons. • The first button name is changed to BB/mmWave (ON/OFF). • Note that Option 080/081 is only available for MS4647A VNAs. |
|---|--|

Figure 14-4. 3739 SETUP Menu – Variants

Receiver Configuration Button Group

The receiver configuration button group changes depending on the VNA model and the equipped options:

- For MS4642A, 44A, 45A, and 47A45A VNAs with Option 082/083, E-Band 56 GHz to 95 GHz, W-Band 65 GHz to 110 GHz, mm-OML, and mm-VDI buttons are members of a button selection group where only one button can be selected.
- For MS4647A VNAs with Option 082/083, the Broadband to 125 GHz, E-Band 56 GHz to 95 GHz, W-Band 65 GHz to 110 GHz, mm-OML, and mm-VDI buttons are members of a button selection group where only one button can be selected.

mmWave

Part of the Receiver Configuration button selection group. Only on MS4642A, MS4644A, MS4745A, and MS4647A VNAs equipped with Option 082/083. Toggles the millimeter-wave capabilities on and off.

BB/mmWave

Part of the Receiver Configuration button selection group. Only on MS4647A VNAs equipped with Option 080/081. Toggles the broadband/millimeter-wave capabilities on and off.

Broadband to 145 GHz

Part of the Receiver Configuration button selection group. Only on MS4647A VNAs equipped with Option 080/081. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

Broadband to 125 GHz

Part of the Receiver Configuration button selection group. Only on MS4647A VNAs equipped with Option 080/081. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

E-Band 56 GHz to 95 GHz

Part of the Receiver Configuration button selection group. Only on MS4640A Series VNAs equipped with Option 082/083 or 081/082. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

W-Band 65 GHz to 110 GHz

Part of the Receiver Configuration button selection group. Only on MS4640A Series VNAs equipped with Option 082/083. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

mm-OML

Part of the Receiver Configuration button selection group. Only on MS4640A Series VNAs equipped with Option 082/083 or 081/082. Select enables the External Module and the Ext. Source Eqn buttons. The External Module button links to a module selection dialog and configures the VNA to use OML millimeter-wave modules. The module selection is done using the External Module button described below to access the EXTERNAL MODULE SELECTION dialog box. The Ext. Source Eqn (External Source Equation) button links to the MODIFY EXTERNAL SOURCE EQUATIONS dialog box.

mm-VDI

Part of the Receiver Configuration button selection group. Only on MS4640A Series VNAs equipped with Option 082/083 or 081/082. Select enables the External Module button which links to a module selection dialog and configures the VNA to use VDI millimeter-wave modules. The module selection is done using the External Module button below to access the EXTERNAL MODULE SELECTION dialog box.

Receiver Configuration Button Selection End

The mm-VDI button is the end of the Receiver Configuration button selection group.

External Module

Select displays the EXTERNAL MODULE SELECTION dialog box where separate control tabs allow configuration of either OML or VDI millimeter-wave modules. Once a module has been selected, the module name appears in the button field.

- [“EXTERNAL MODULE SELECTION Dialog Box” on page 14-16.](#)

Ext. Source Eqn

Select displays the MODIFY EXTERNAL SOURCE EQUATIONS dialog box for OML or VDI module selected.

- [“MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box” on page 14-10.](#)

mmWave ALC Cal

Select displays the MMWAVE ALC CAL (Millimeter-Wave Automatic Level Control Calibration) menu.

- [“mmWAVE ALC CAL Menu” on page 14-12.](#)

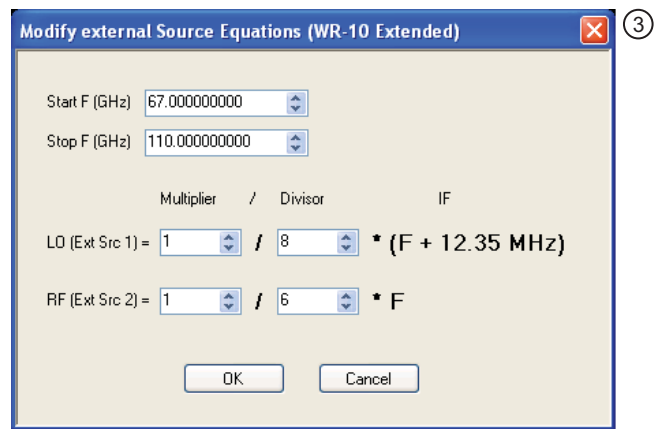
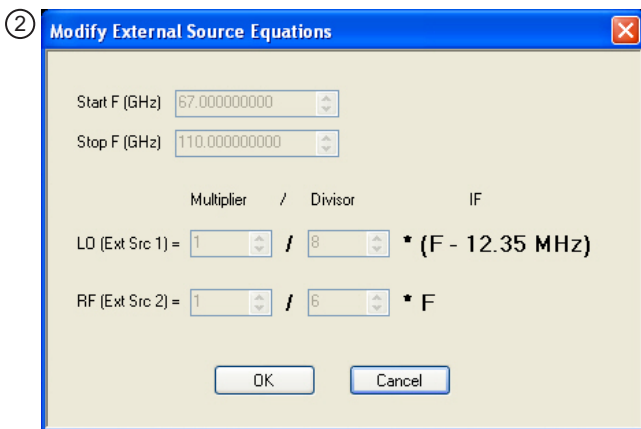
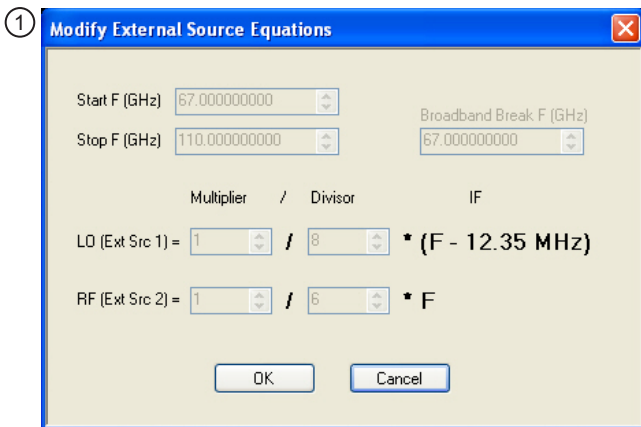
MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box

Previous

- The previous menu varies depending on the instrument model.
- MS4642A or MS4644A VNAs: “3738 SETUP Menu” on page 14-5
- MS4645A or MS4647A VNAs: “3739 SETUP Menu” on page 14-7

Navigation

- MAIN | Application | APPLICATION | mmWave (3738 Setup) | 3738 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box
- MAIN | Application | APPLICATION | BB/mm Wave (3738 Setup | 3738 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box
- MAIN | Application | APPLICATION | mmWave (3739 Setup) | 3739 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box
- MAIN | Application | APPLICATION | BB/mm Wave (3739 Setup | 3739 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box



1. 3738 SETUP Menu and setup dialog for Broadband External Source Equations at top left.
 - Note the minus sign (“-”) in the frequency portion of the equation.
2. 3738 SETUP Menus and setup dialog for Millimeter-Wave External Source Equations at bottom left.
 - Note the minus sign (“-”) in the frequency portion of the equation.

3. 3739 SETUP Menu and setup dialog for Millimeter-Wave External Source Equations at bottom right.
 - Note the plus sign (“+”) in the frequency portion of the equation.
 - Also, there is no corresponding dialog with a breakpoint frequency as shown above left at #1.

Figure 14-5. MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box

Broadband Source Equation

For broadband source equations, enter the following parameters:

- Start Frequency (GHz)
- Stop Frequency (GHz)
- Broadband Break Frequency (GHz)
- LO External Source 1 Multiplier (Integer)
- LO External Source 1 Divisor (Integer)
- RF External Source 2 Multiplier (Integer)
- RF External Source 2 Divisor (Integer)

Millimeter Wave Source Equation

For the millimeter wave source equations, the same parameters above are entered omitting the Broadband Break Frequency.

mmWAVE ALC CAL Menu

Full Name

- Millimeter-Wave Automatic Level Control Calibration Menu

Previous

- [“3739 SETUP Menu” on page 14-7](#)

Navigation

- There are multiple navigation paths to this menu.
- MAIN | Application | APPLICATION | mmWave (3739 Setup) | 3739 SETUP | mmWave ALC Cal | mmWAVE ALC CAL
- MAIN | Application | APPLICATION | BB/mmWave (3739 Setup) | 3739 SETUP | mmWave ALC Cal | mmWAVE ALC CAL

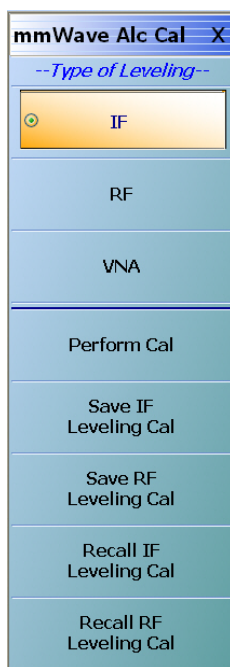


Figure 14-6. mmWAVE ALC CAL Menu – Millimeter-Wave Automatic Level Control Calibration

Type of Leveling Button Group Start

The IF, RF, and VNA buttons at the top of the menu form a button selection group where only one type of leveling can be selected.

IF

If the IF type of leveling is selected, it provides the advantages of RF leveling described below plus the benefit of greater power control range and a lower minimum leveled power (at least 20 dB lower typically). As one approaches a 100 MHz difference between source and receiver frequencies, the power control range will start to decrease as will power control accuracy. The use of IF leveling is not recommended for source-receiver frequency differences greater than 100 MHz.

RF

If the RF type of leveling is selected, it provides a leveled RF output power with improved source match, protection against over powering the DUT, and insuring that the DUT is operating in its designated power range.

VNA

If the VNA type of leveling is selected, it turns the RF or IF ALC off and the ALC accuracy is set as that for the standalone VNA instrument.

Type of Leveling Button Group End

The VNA button is the end of the Type of Leveling button group.

Perform Cal

Select starts the calibration type selected above (IF, RF, or VNA) and displays the mmWAVE ALC CAL dialog box. A suffix is added to the dialog name denoting the selected mm-Wave module.

- [“mmWAVE ALC CAL \(MM MODULE NAME\) Dialog Box” on page 14-14](#)

Save IF Leveling Cal

Select displays a SAVE IF LEVELING dialog box. Navigate to the required folder to save the calibration.

Save RF Leveling Cal

Select displays a SAVE RF LEVELING dialog box. Navigate to the required folder to save the calibration.

Recall IF Leveling Cal

Select displays a RECALL IF LEVELING dialog box. Navigate to the required folder to recall the calibration.

Recall RF Leveling Cal

Select displays a RECALL RF LEVELING dialog box. Navigate to the required folder to recall the calibration.

mmWAVE ALC CAL (MM MODULE NAME) Dialog Box

Full Name

- Millimeter-Wave Automatic Level Control (Typical module name such as WR-10 Extended) Dialog Box

Previous

- “mmWAVE ALC CAL Menu” on page 14-12.

Navigation

- There are multiple navigation paths to this menu.
- MAIN | Application | APPLICATION | mmWave (3739 Setup) | 3739 SETUP | mmWave ALC Cal | mmWAVE ALC CAL | mmWAVE ALC CAL | Perform Cal | mmWAVE ALC CAL dialog box
- MAIN | Application | APPLICATION | BB/mmWave (3739 Setup) | 3739 SETUP | mmWave ALC Cal | mmWAVE ALC CAL | mmWAVE ALC CAL | Perform Cal | mmWAVE ALC CAL dialog box

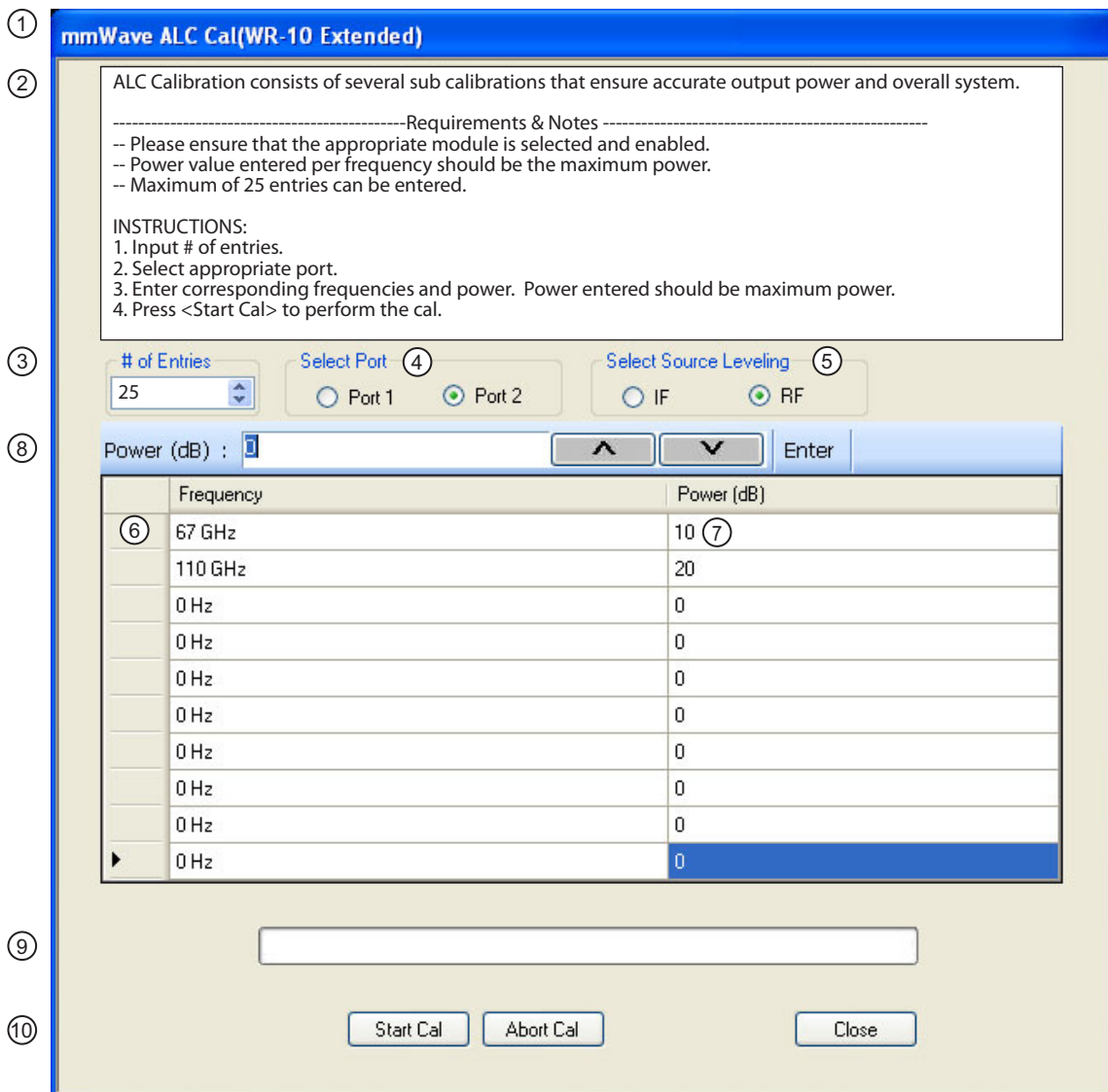


Figure 14-7. mmWAVE ALC CAL (MODULE NAME) Dialog Box (1 of 2)

1. mmWAVE ALC CAL (MODULE NAME) Dialog Box	6. Frequency Input. When this has the focus, the Frequency Field Toolbar (not shown here) appears to allow value and units input for each entry row.
2. General instructions. See below.	7. Power (dB) level for each frequency. When it has the focus, the Power (dB) field toolbar appears to allow value input for each entry row.
3. # of Entries (Number of Entries) input field. Up to 25 frequency/power combinations can be entered.	8. Power (dB) Field Toolbar
4. Select Port Radio Buttons – Select either Port 1 or Port 2.	9. Calibration Progress Bar
5. Select Source Leveling as either IF or RF.	10. Dialog box control buttons

Figure 14-7. mmWAVE ALC CAL (MODULE NAME) Dialog Box (2 of 2)

Instructions

ALC Calibration consists of several sub calibrations that ensure accurate output power and overall system.

Requirements and Notes

The following requirements and notes apply:

- Please ensure that the appropriate module is selected and enabled.
- Power value entered per frequency should be the maximum power.
- Maximum of 25 entries can be entered.

Instructions

1. Input the # of entries (Number of Entries).
2. Select appropriate port.
3. Enter corresponding frequencies and power. Power entered should be maximum power.
4. Select Start Cal to perform the calibration.
5. Select Abort Cal to stop the calibration.
6. Select Close to exit the dialog box to the mmWAVE ALC CAL menu.

EXTERNAL MODULE SELECTION Dialog Box

Previous

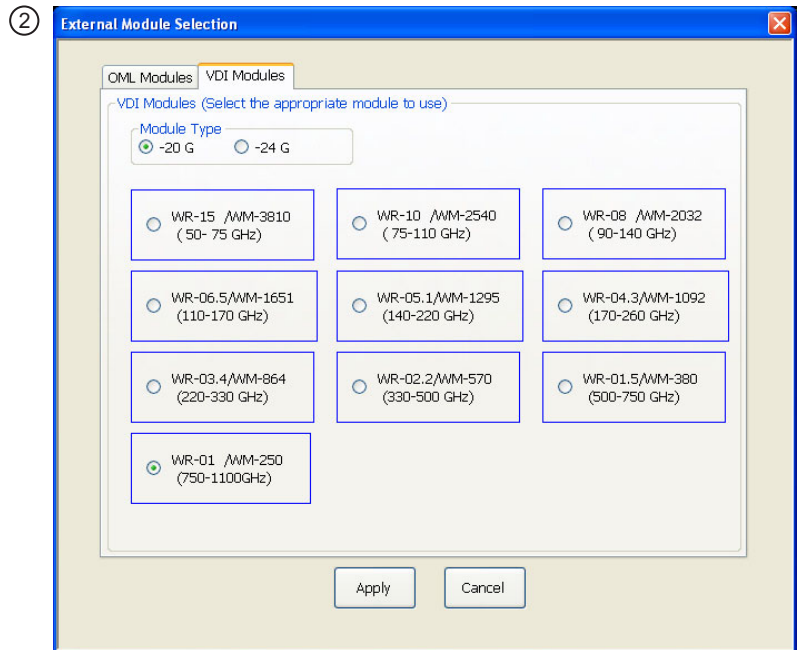
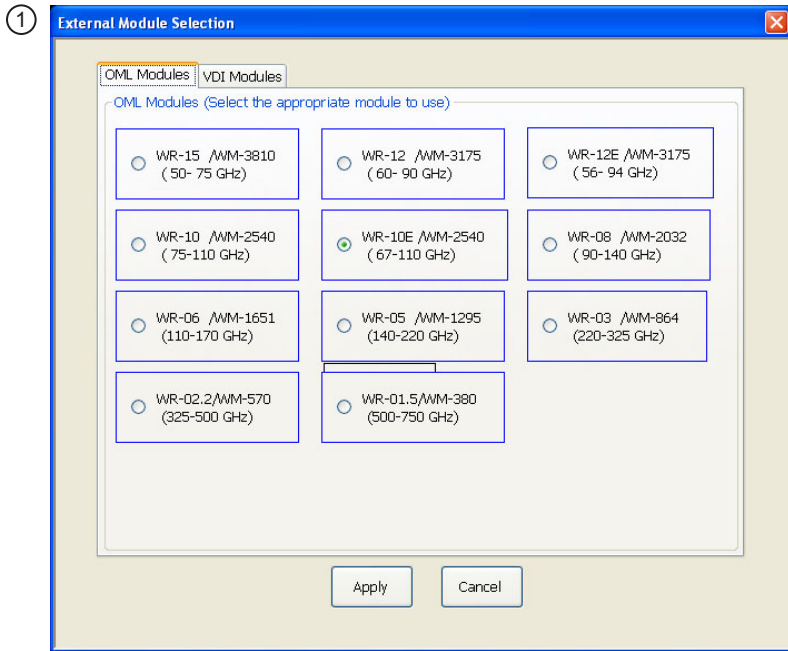
There are multiple paths to this dialog box:

- [“3738 SETUP Menu” on page 14-5](#)
- [“3739 SETUP Menu” on page 14-7](#)

Navigation

There are multiple paths to this dialog box depending on the instrument model number and the equipped options:

- MAIN | Application | APPLICATION | mmWave (3738 Setup) | 3738 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box
- MAIN | Application | APPLICATION | mmWave (3739 Setup) | 3739 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box
- MAIN | Application | APPLICATION | BB/mmWave (3738 Setup) | 3738 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box
- MAIN | Application | APPLICATION | BB/mmWave (3739 Setup) | 3739 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box



1. At top, the OML tab is selected and the available OML Modules are shown. Select a module radio button to configure that module.

2. At bottom, the VDI tab is selected and the available VDI Modules are shown. Select a module radio button to configure that module. Note that VDI modules have two basic types at -20 G and -40G. The module type selected here must match the module being used as the two types have slightly different frequency plans.

Figure 14-8. EXTERNAL MODULE SELECTION Dialog Box

External Module Summary Notes**• WR Numbers**

The WR number abbreviation is for “rectangular waveguide” using English measurement units. The interior dimensions of waveguides have an aspect ratio of 2:1, where the broadwall is twice the dimension of the narrow wall. The number following is approximately the broadwall length in mils (0.001 in) divided by 10. For example, the WR-62 waveguide has a broadwall dimension of 620 mils (0.620 in) divided by 10 which yields 62. The larger the WR Number, the lower the operating frequency range. Both OML Modules and VDI Modules reference WR and the equivalent WM Numbers.

• WM Numbers

WM numbers are an emerging metric specification for equivalent and new waveguides using metric measurements. The interior opening aspect ratio follows the same 2:1 ratio. The number is derived from the broadwall dimension in micrometers (μm or 0.0001 m). For example, the WM-570 has a broadwall dimension of 570 μm . The larger the WM Number, the lower the operating frequency range. Both OML Modules and VDI Modules reference both WR and the equivalent WM Numbers.

• Anritsu Numbers

Anritsu has the following five Broadband/Millimeter-Wave module numbers:

- MA25300A Millimeter-Wave Module, 54 to 145 GHz – Requires a MS4647A VNA with Broadband/Millimeter-Wave Option 08x and a 3739C Test Set. Two MA25300A modules are required.
- 3743A Millimeter-Wave Module, 54 to 125 GHz – Requires a MS4647A VNA with Broadband/Millimeter-Wave Option 08x and a 3739x Test Set. Two 3743A modules are required.
- 3744A-EW/SM6597 Millimeter-Wave Module, W-Band, 65 to 110 GHz – Requires any MS464xA Series VNA equipped with Millimeter-Wave Option 08x and a Millimeter-Wave Test Set.
- 3744A-EE/SM6499 Millimeter-Wave Module, E-Band, 56 to 95 GHz – Requires any MS464xA Series VNA equipped with Millimeter-Wave Option 08x and a Millimeter-Wave Test Set.
- 3743A-Rx; This module is typically ordered as an accessory to the ME7838 system. When ordering this module, the base VectorStar VNA must have Noise Figure Option 041.

Note When using MA25300A BB/mm-Wave modules, the 3739C Test Set is required.

14-5 Broadband/Millimeter-Wave Control

EXTERNAL MODULE CTRL Dialog Box Overview

Full Name

- EXTERNAL Module Control Dialog Box

Previous

- [“MULTIPLE SOURCE Menu” on page 13-5](#)

Navigation

- MAIN | Application | APPLICATION | Multiple Source Setup | MULTIPLE SOURCE | Ext. Mod. Ctrl. | EXTERNAL MODULE CTRL Dialog Box

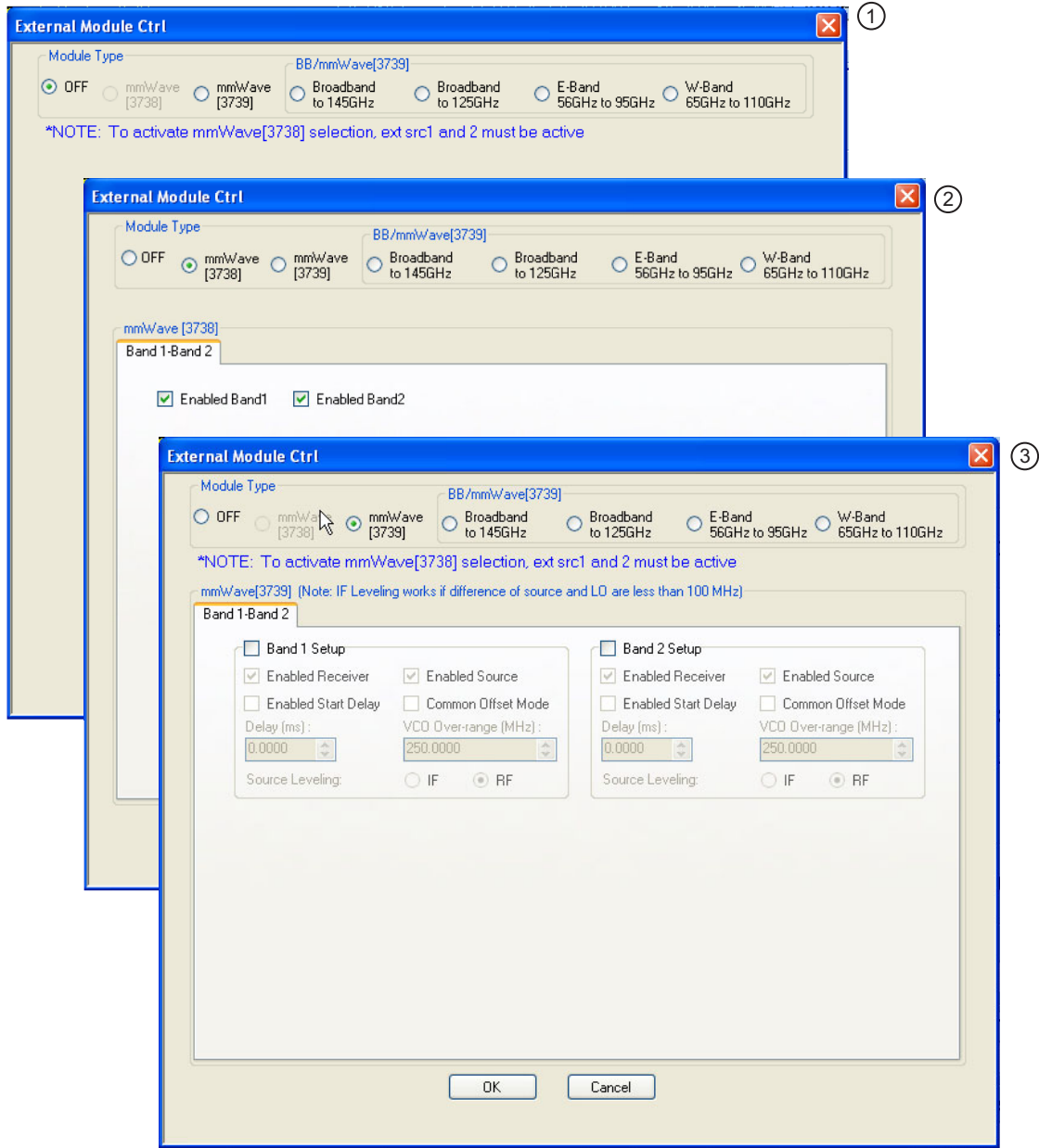
Description

The EXTERNAL MODULE CTRL dialog box controls the configuration of attached broadband modules and systems.

For Modular Broadband (Modular BB), an MS4647A VNA with Option 080/081 is required with a connected 3739x Broadband/Millimeter-Wave Test Set and MA25300A or 3743A Millimeter-Wave Modules.

For Standard BB, an MS464xA Series VNA is required with a connected 3738A Broadband/Millimeter-Wave Test Set and related modules and signal generators.

Figure 14-9 below shows the EXTERNAL MODULE CTRL dialog box variants for OFF, mm-Wave 3738, and mm-Wave 3739. Figure 14-10 shows the variants for Broadband to 145 GHz, 125 GHz, E-Band 56 GHz to 95 GHz, and W-Band 65 GHz to 110 GHz.



- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Dialog box with Module Type OFF selected. 2. Dialog box with Module Type mmWave (3739) selected. Selection boxes enable Band 1 and/or Band 2. | <ol style="list-style-type: none"> 3. Dialog box with Module Type mmWave (3739) selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. |
|---|---|

Figure 14-9. EXTERNAL MODULE CTRL Dialog Box Variants – OFF, mm-Wave 3738, and mm-Wave 3739

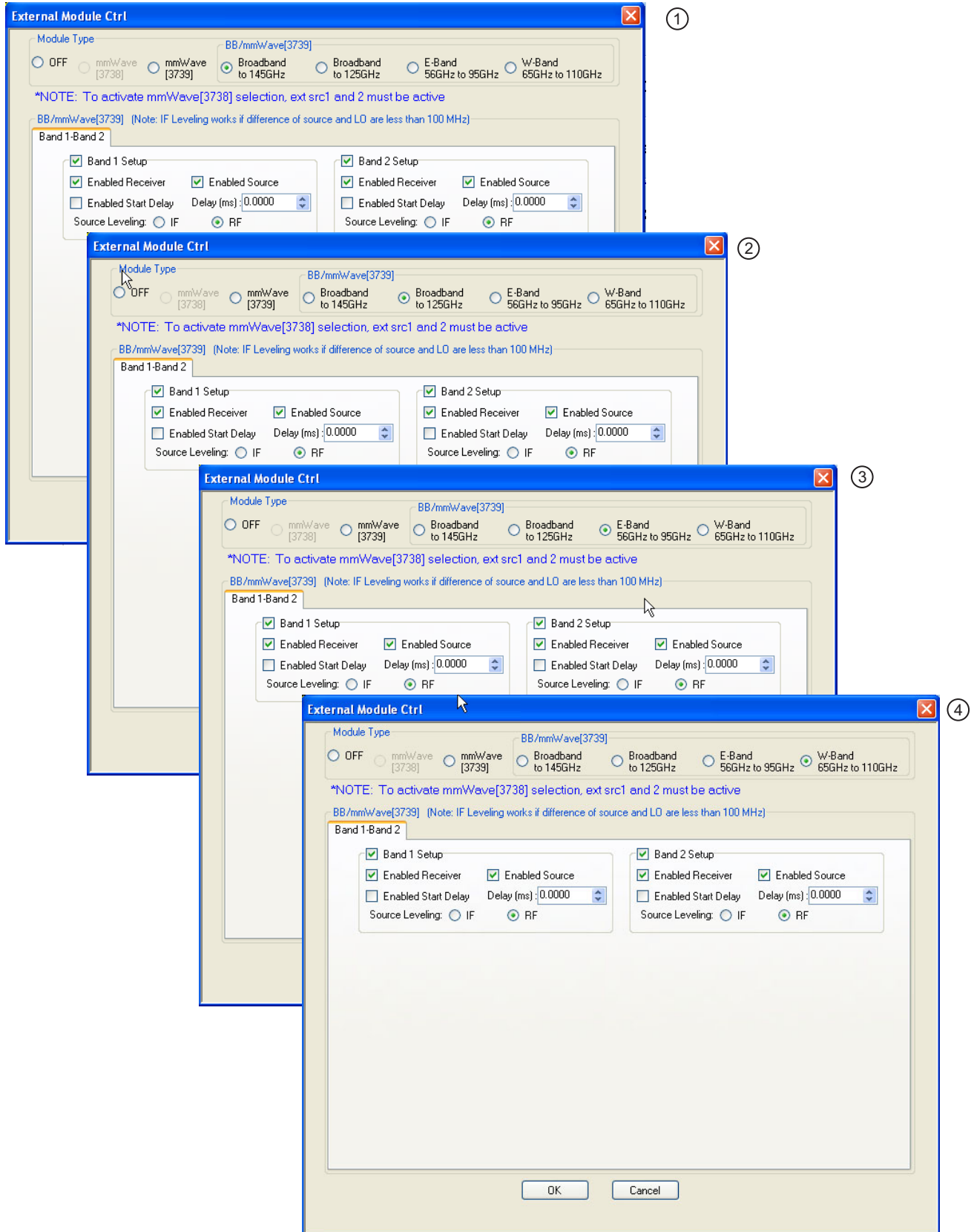


Figure 14-10. EXTERNAL MODULE CTRL Dialog Box – Broadband, E-Band, and W-Band

- | | |
|---|---|
| <p>1. Dialog box with Module Type Broadband to 145 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4647A VNAs equipped with Option 08x.</p> <p>2. Dialog box with Module Type Broadband to 125 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4647A VNAs equipped with Option 080/081.</p> | <p>3. Dialog box with Module Type E-Band 56 GHz to 95 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4644A, MS4645A, or MS4647A VNAs equipped with Options 080/081 (47A only) or 082/083.</p> <p>4. Dialog box with Module Type W-Band 65 GHz to 110 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4644A, MS4645A, or MS4647A VNAs equipped with Option 080/081 (47A only) or 082/083.</p> |
|---|---|

Figure 14-10.EXTERNAL MODULE CTRL Dialog Box – Broadband, E-Band, and W-Band

EXTERNAL MODULE CTRL Dialog Box – Module Type = OFF

External mm-Wave or broadband test sets are not being used. The dialog in this state is shown in [Figure 14-11](#) below. The 3739 test set does not require external synthesizers so these non-OFF choices will always be available assuming option 08x is present. The 3738 test set does not require additional options but does require the presence of external synthesizers 1 and 2 on the GPIB bus.

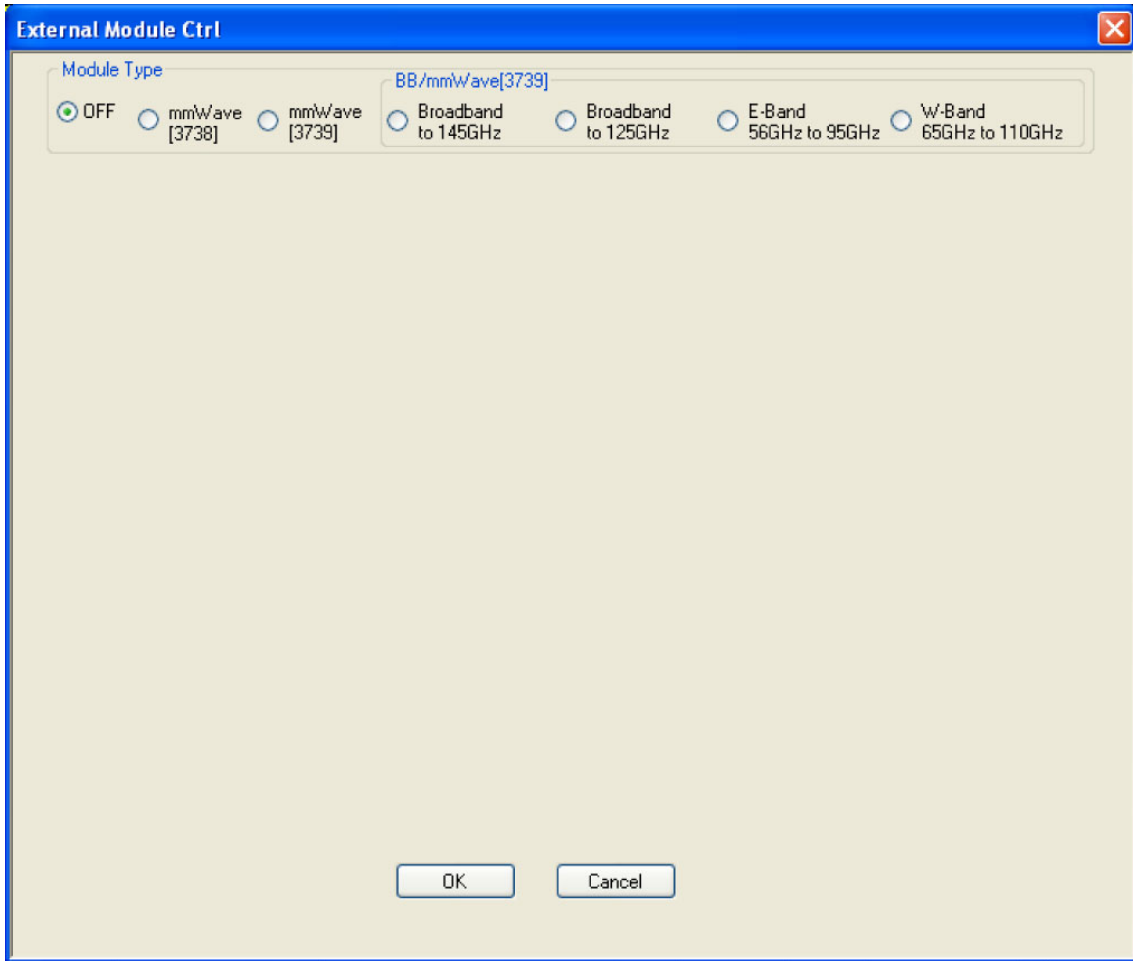


Figure 14-11.EXTERNAL MODULE CTRL Dialog Box – Set for OFF

EXTERNAL MODULE CTRL Dialog Box – Module Type = mm-Wave (3738)

The 3738x Test set is being used with conventional OEM mm-Wave modules (the ME7828 family of systems). In this case, a check box will be available per-defined band to allow activation of the test set in that band. This option is only available if External Sources 1 and 2 are connected and active. There are no other parameters to select other than to activate or de-activate on a band-by-band basis.

As an example to show how this selection might be used, consider a DUT that is a downconverter taking 250 to 300 GHz down to a fixed IF of 1 GHz. The LO is sub-harmonically driven with an effective multiplier of 18 and will be driven from External Source 3 (EXT. SRC 3). The RF is supplied by an external mm-Wave module (WR-03 waveguide in this case) which also has an effective source multiplier of 18 and this will be driven from EXT. SRC. 1. This external module also has an LO input (x20 effective multiplier) that will be driven from EXT SRC 2. It is desired to measure both return loss (at the RF) of the DUT as well as its conversion loss. This will require two different multiple source setups since the conversion paths in the VNA are different.

Return Loss Measurement

Connect all external synthesizers and make sure the GPIB addresses match and 10 MHz clocks are synchronized (or higher frequency references if those are being used). It is desired that the DUT LO port be driven since that can affect return loss. Since the IF outputs of the mm-Wave module will be used (and routed to the VNA rear panel), the Ext Module Ctrl for BB/mm-Wave must be enabled.

- Band 1: 250-300 GHz
- Int Src (Internal Source) = $1/1(\text{CW } 3 \text{ GHz})$
 - We are not using the internal source so it is just parked.
- Ext Src1 (External Source) = $1/18(f+0)$
- Ext Src2 = $1/20(f+12.35 \text{ MHz})$
 - The system IF (rear panel) is 12.35 MHz.
- Ext Src3 = $1/18(f+ 1 \text{ GHz})$
- Rcvr (Receiver) = $1/1(\text{CW } 2 \text{ GHz})$
 - We are not using the internal LO so this is just parked.

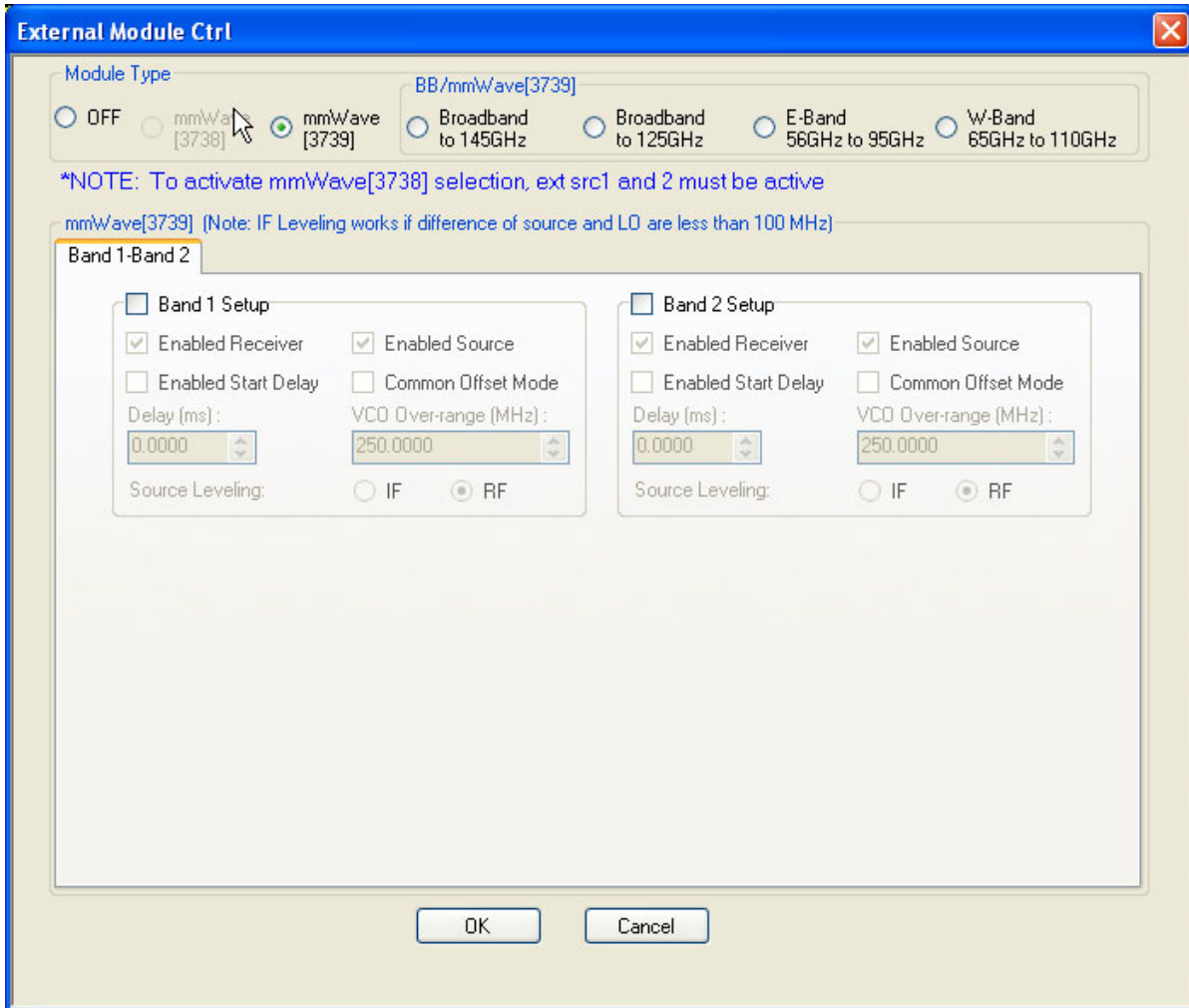
Conversion Loss Measurement

In this case, Ext Module Ctrl must be OFF since we will not be using the rear panel IFs. Note that this also disables the test set so some care is required with RF signal cabling.

- Band 1: 250 to 300 GHz
- Int Src = $1/1(\text{CW } 3 \text{ GHz})$
 - We are not using the internal source so it is just parked.
- Ext Src1 = $1/18(f+0)$
- Ext Src2 = $1/1(\text{CW } 2 \text{ GHz})$
 - The external mm-Wave module LO is not being used.
- Ext Src3 = $1/18(f+ 1 \text{ GHz})$
- Rcvr = $1/1(\text{CW } 1 \text{ GHz})$
 - The DUT IF is routed to a port or receiver loop so it can be converted.

EXTERNAL MODULE CTRL Dialog Box – Module Type = mm-Wave (3739)

The mm-Wave (3739) selection also assumes the use of OEM mm-Wave modules but with the 3739 Test Set. Details on some applicable modules, from a hardware perspective, are discussed below and in [Chapter 13, “Application Menus - Multiple Source”](#). Any multiplied transceivers can be used here as long as the frequency and power plans are consistent with the VectorStar system with the 3739x test set. The Test Set offers additional power control options and assumes the use of the internal VNA sources so there are some additional selection options as suggested by [Figure 14-12](#).



The external module control dialog is shown as configured for a single active band of mm-Wave (3739).

Figure 14-12.EXTERNAL MODULE CTRL Dialog Box – Set for mm-Wave (3739)

The selection choices per band are described below

- **Enabled Receiver**

Use the receiver in the remote modules. Above this breakpoint, the VNA system LO will be set appropriately in terms of frequency and power, the test set configured, and the VNA rear panel IFs will be activated.

- **Enabled Source**

Use the source multipliers in the remote modules. When enabled the VNA synthesizers will be set appropriately, the test set configured as needed, and ALC leveling prepared (see below).

- **Enabled Start Delay**

This enables a fixed delay at the beginning of the band. This could be useful for certain slow settling DUT measurements or for very low power levels.

- **Common Offset mode**

At higher multiples (generally for modules running over 300 GHz), it may be desired to improve source correlation to reduce trace noise. This can be done with the Common Offset mode bit (and it automatically done in the 3739 mm-Wave modes discussed in chapter 16). If the source and receiver frequencies (when reduced to the 2.5-5 GHz range by division) differ by more than about 50 MHz with this bit selected, phase lock errors may occur so this selection is not appropriate for mm-Wave mixer measurements but is useful for IMD and other related measurements.

- **VCO Overrange**

Normally, the internal VNA multipliers switch at 5, 10, 20, and 40 GHz. In some mm-Wave modules operating with high multipliers, it may be desirable to push those switch points out further (up to 5.5, 11, 22, and 44 GHz typical but not guaranteed). This overrange (expressed in MHz relative to the 5 GHz breakpoint) sets the new breakpoints.

- **Source Leveling**

The leveling choice determines which detection path is used (RF implies the VNA detection on the RF drive path, IF uses the test set detection on a reference IFs). Additional calcs using the mm-Wave ALC subsystem may be required. Generally IF leveling is only valid if the IF coming from the mm-Wave modules is under 100 MHz.

EXTERNAL MODULE CTRL Dialog Box – Module Type = BB/mm-Wave (3739)

This right side of the radio button array is for the broadband operation (with the 3739x test set and the 3743A or MA25300A modules) and for banded operation (using the 3739x test set and the 3743x or 3744x modules). The selection for BB/mm-Wave is straightforward. When checked in a given band, the test set will be activated, the VNA internal transfer switch will be shut down, and the rear panel IF ports on the VNA will be activated.

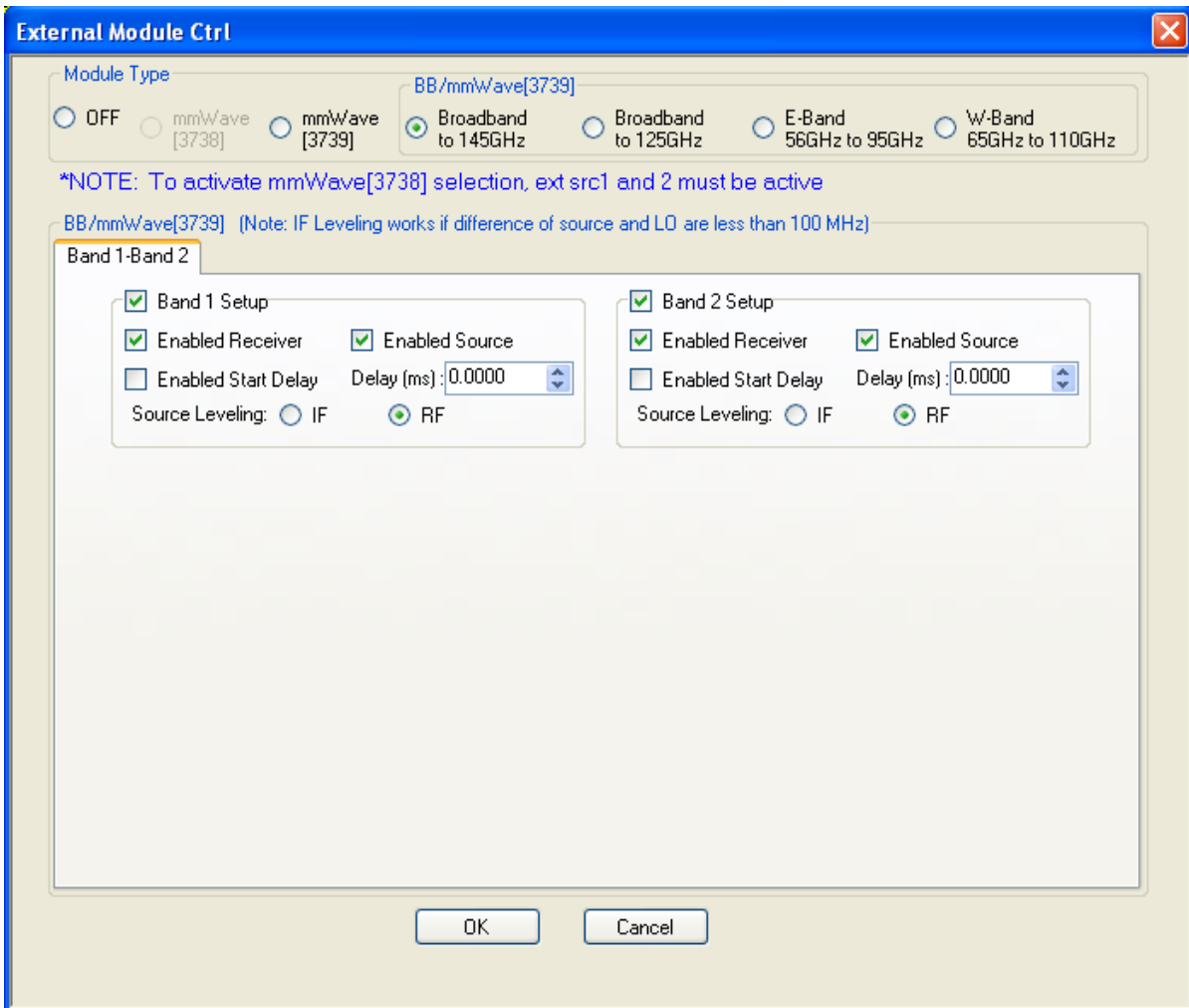
There are four choices for use with the MA25300A, 3743x, and 3744x modular heads:

- Broadband to 145 GHz
- Broadband to 125 GHz
- E-Band
- W-Band

The distinction between these selections is based on the imposed frequency range limits when activated.

- Broadband allows from the lower instrument limit up to 145 GHz.
- E-Band allows 56-95 GHz (under range to 54.000000001 GHz allowed).
- W-Band allows 65-110 GHz.

Otherwise the selections and instrument operation are the same. The dialog in the case of broadband set for 2 bands is shown in [Figure 14-13](#) below.



The external module control set for broadband (3739x-based) mode is shown here with 2 bands configured for that mode.

Figure 14-13.EXTERNAL MODULE CTRL Dialog Box – Set for Broadband to 145 GHz

The MA25300A, 3743x, and 3744x modules have independent source and receiver paths that can be selected from the above dialog. The selections can be interpreted as follows:

Enabled Receiver

Use the receiver in the remote modules above the receiver breakpoint (30 GHz). Above this breakpoint, the VNA system LO will be set appropriately in terms of frequency and power, the test set configured, and the VNA rear panel IFs will be activated.

Enabled Source

Use the source multipliers in the remote modules above the source breakpoints (54 GHz, 80GHz, and 120 GHz for x2, x3, and x4 respectively for 3743A modules; 54 GHz, 80 GHz, and 110 GHz for x2, x3, and x6, respectively for MA25300A modules). Above the first breakpoint, the VNA synthesizers will be set appropriately, the test set configured as needed, and ALC leveling prepared (see below). Note that the above and below 54 GHz power control setting apply when this source feature is enabled (more details in Chapter 16)

Enabled Start Delay

This enables a fixed delay at the beginning of the band. This could be useful for certain slow settling DUT measurements or for very low power levels.

Source Leveling

The default operation of the 3739-based modes (when not in multiple source) is to use IF leveling in order to get wide power ranges but if the source and receiver frequencies are not close enough (or the receiver is not enabled), then an IF is not available for leveling. The leveling defaults to RF in multiple source 3739-based modes with broadband/millimeter-wave and this is recommended unless one knows the IF will be available (up to about 100 MHz) in the module for leveling. Separate ALC calibrations are available for RF and IF leveling and the system will automatically index the correct calibration table.

Chapter 15 — Application Menus - Noise Figure

15-1 Chapter Overview

This chapter provides information on the APPLICATION menu and Noise Figure Measurement configuration, when the VNA is equipped with Option 041. The configuration process starts when the VNA application mode is changed to Noise Figure, which enables the noise figure measurement configuration and operation menus and dialogs.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 12, “Application Menus - Overview”](#)
- [Chapter 13, “Application Menus - Multiple Source”](#)
- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)
- [Chapter 16, “Application Menus - Mixer Setup”](#)
- [Chapter 17, “Application Menus - NxN”](#)

15-2 Application Menus and Dialog Boxes for Noise Figure

The NF SETUP menu set for configuration and control of noise figure contains the following menus and dialogs:

- [“Primary Application Menus and Noise Figure Dialogs and Menus” on page 15-4](#)
 - [Figure 15-1, “APPLICATION Menu and NF SETUP Menu and Dialog Set” on page 15-4](#)
- [“Noise Figure Menus and Dialogs” on page 15-6](#)
 - [Figure 15-2, “Noise Figure Measurement Menu Set” on page 15-6](#)
- [“NF SETUP Menu” on page 15-7](#)
 - [Figure 15-3, “NF SETUP Menu” on page 15-8](#)
- [“NF CONFIG Menu” on page 15-10](#)
 - [Figure 15-4, “NF CONFIG Menu and Related Field Toolbars” on page 15-11](#)
- [“NF ADVANCED Menu - Receiver Cal Offset” on page 15-13](#)
 - [Figure 15-5, “NF ADVANCED Menu” on page 15-13](#)

15-3 Noise Figure Overview

Noise Figure Measurement is a Option 041 for the MS4640A Series VNAs which requires front panel access loops from Option 051, 061, or 062. The option is compatible with the ME78x8A Broadband/Millimeter-Wave Systems. Option 041 is also compatible with the MN4690B Multiport System as long as the noise figure measurements are limited to Port 1 and Port b2.

Noise figure is a fundamental indicator of performance for non-frequency converting devices, such as amplifiers, during the design stage and production compliance testing. Option 041 uses the cold source method of noise figure measurements.

If Option 041 is not installed, the Noise Figure button and menu controls are not present in the UI display.

If Option 041 is installed, the primary instrument mode can be quickly changed to Noise Figure mode from the default Transmission/Reflection mode to access the menu and dialog box controls.

15-4 Noise Figure Procedure

The typical procedure for a noise figure measurement is listed below.

1. It is assumed that the user has already acquired non-compressed DUT gain data and has it available in an S2P file.
2. It is assumed the user has performed a composite receiver calibration.
 - See the **VectorStar MS4640A Measurement and Calibration Guide – 10410-00269** for more information about a noise figure measurement composite receiver.

Change the Instrument Mode to Noise Figure

3. On the APPLICATION menu, select the Noise Figure button.
 - A notice dialog box advises about saving the current instrument setup so it can be recalled at a later time.
 - When Continue is selected, the instrument changes application modes to Noise Figure.
 - The NF Setup (Noise Figure Setup) menu appears.
 - The instrument resets the default settings for noise figure trace condition to a single trace and Noise Figure (LogMag) response.
4. On the NF SETUP menu, select Noise Figure Configuration.
 - The NF CONFIG (Noise Figure Configuration) menu appears.

Set the Noise Figure Measurement Configuration

5. On the NF CONFIG menu, select the configuration parameters for the noise figure measurement:
 - Frequency Start
 - Frequency Stop
 - Number of Sweep Points
 - CW ON/OFF
 - CW Frequency
 - Number of RMS Points
 - Intermediate Frequency Bandwidth

Get the DUT S-Parameter Data

6. Go back and get the DUT S-Parameter data.
7. Return to the NF SETUP menu by selecting the back icon at the bottom of the menu.
 - The NF SETUP menu appears.
8. On the NF SETUP menu, select Get DUT S-Param Data.
 - The DUT S-PARAM DATA dialog box appears.

- Navigate to the stored data and open the file.

Get the Receiver Calibration Data

9. Go back and recall the Receiver Calibration file.
10. On the NF SETUP menu, select Recall Receiver Calibration.
 - The RECALL RECEIVER CALIBRATION dialog box appears.
 - Navigate to the stored data and open the file.

Perform the Noise Calibration.

11. Insert the DUT with the cold source on input.
12. The trace display shows Log magnitude noise figure versus frequency.
13. When all noise figure measurements are complete, on the APPLICATION menu, select the Transmission/Reflection button.
 - A notice dialog box advises about saving the current instrument setup so it can be recalled at a later time.
 - When Continue is selected, the instrument changes application modes to Transmission/Reflection and the Noise Figure Setup button becomes unavailable.
 - The instrument resets the factory as-shipped default settings for transmission/reflection which are four traces as:
 - S11 response on a Smith Chart trace display
 - S12 response on dual LogMag + Phase trace display
 - S21 response on dual LogMag + Phase trace display
 - S22 response on a Smith Chart trace display
14. If a prior preset was in effect, it can be recalled using the RECALL SETUP dialog box located at MENU BAR | File | Recall Setup | RECALL SETUP Dialog Box.

15-5 Primary Application Menus and Noise Figure Dialogs and Menus

The primary menu and dialog set for noise figure measurement on the APPLICATION menu, the NF SETUP menu, the NF SETUP menu, and the related dialog boxes is shown below. After clearing the entry T/R to NF dialog box, the NF SETUP menu appears. When changing from NF to T/R, a similar exit dialog box appears, and when cleared, resolves into the APPLICATION menu in Transmission/Reflection mode.

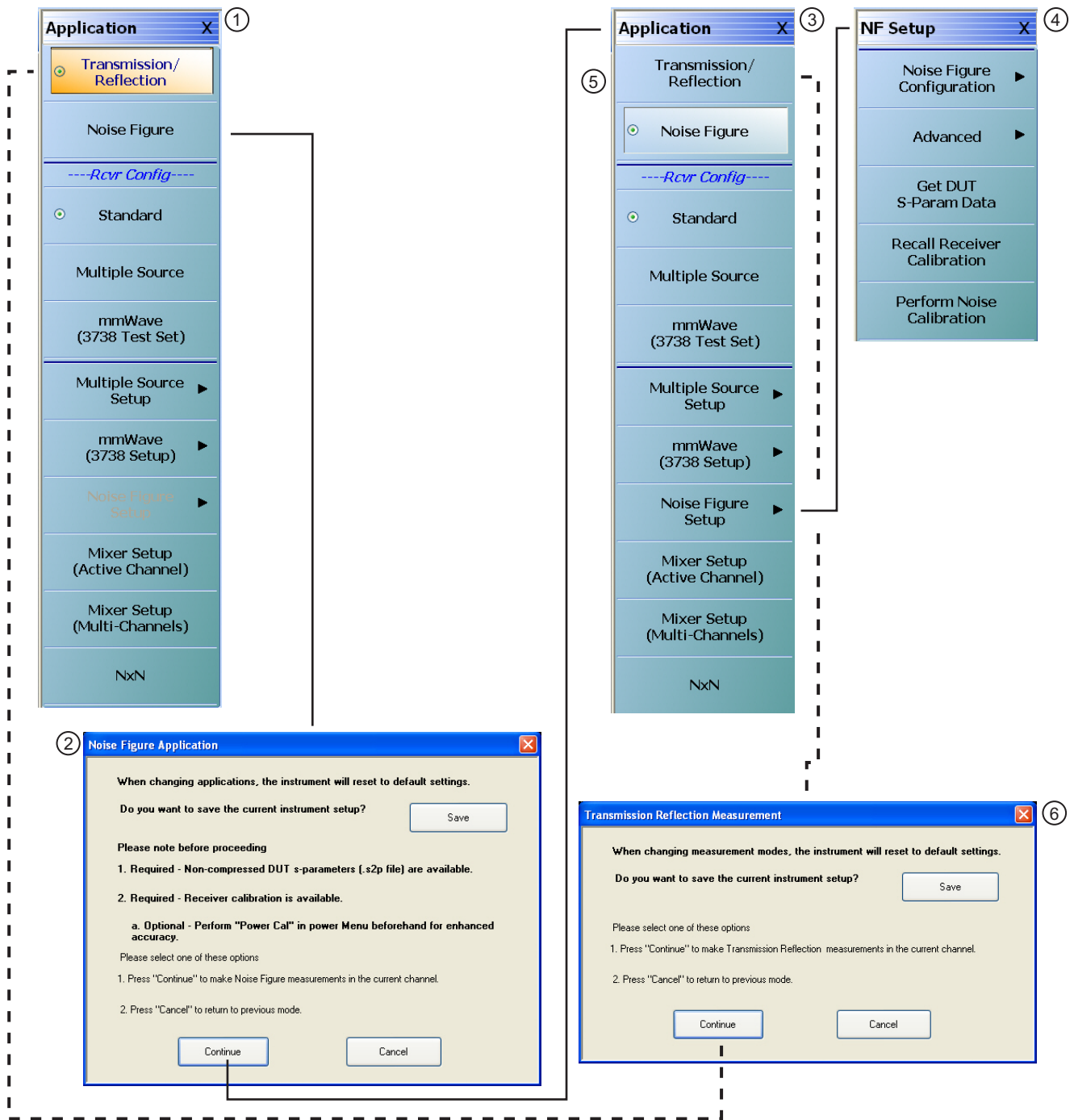


Figure 15-1. APPLICATION Menu and NF SETUP Menu and Dialog Set (1 of 2)

1. APPLICATION Menu – Transmission/Reflection Mode – Typical APPLICATION menu variant with Option 041 equipped on VNA.	4. NF SETUP Menu – After APPLICATION menu Noise Figure Setup button is selected.
2. NOISE FIGURE MEASUREMENT Mode Change Dialog Box – Provides options for canceling or saving setup and proceeding by selecting Continue.	5. To exit Noise Figure Mode, select the Transmission/Reflection button on the APPLICATION menu.
3. APPLICATION Menu – Noise Figure mode selected on typical menu variant.	6. TRANSMISSION REFLECTION MEASUREMENT Dialog Box.
	7. APPLICATION Menu – Transmission/Reflection Mode.

Figure 15-1. APPLICATION Menu and NF SETUP Menu and Dialog Set (2 of 2)

Transmission/Reflection Mode to Noise Figure Mode

When the APPLICATION menu is set to Transmission/Reflection application mode and Noise Figure mode is selected, the NOISE FIGURE MEASUREMENT dialog box appears. The dialog provides opportunities to:

- Cancel out of the change to Noise Figure application mode, and remain in Transmission/Reflection application mode.
- Save the current instrument setup as an Active Channel Setup and Calibration CHX file and then either Cancel (above) or proceed (below).
- Continue into Noise Figure application mode.

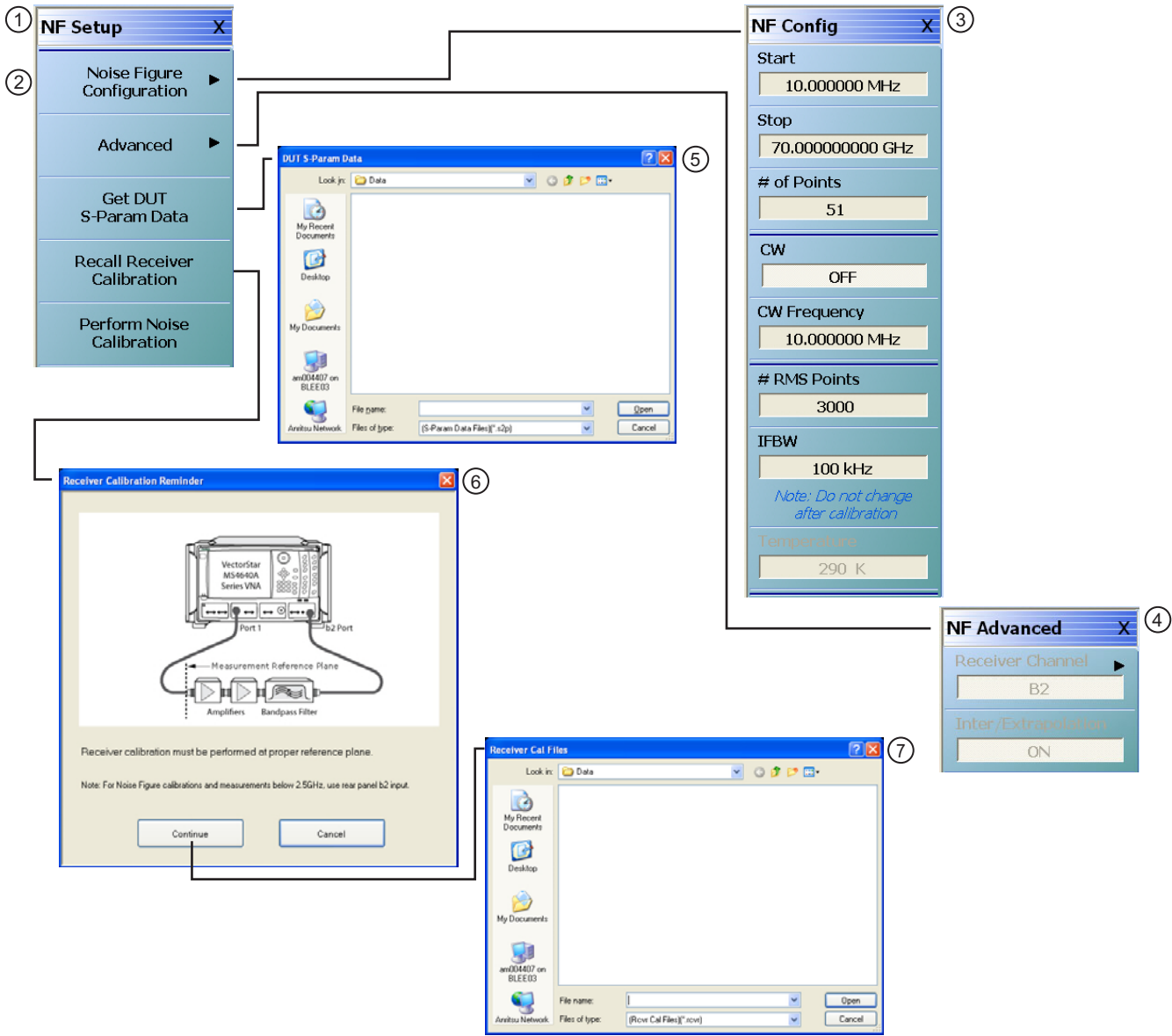
Noise Figure Mode to Transmission/Reflection Mode

Similarly, when the APPLICATION menu is set Noise Figure application mode, and Transmission/Reflection application mode is selected, the TRANSMISSION REFLECTION MEASUREMENT dialog box appears. The dialog provides the opportunities to:

- Cancel out of the change to Transmission/Reflection application mode and remain in Noise Figure application mode.
- Save the current instrument setup as an Active Channel Setup and Calibration CHX file and then either Cancel (above) or proceed (below).
- Continue into Transmission/Reflection application mode.

15-6 Noise Figure Menus and Dialogs

The Noise Figure Measurement menu set and related dialogs is shown in the figure below.



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. NF SETUP menu. 2. Noise Figure Configuration button selected. 3. NF CONFIG (NF Configuration) menu. 4. NF ADVANCED menu. | <ol style="list-style-type: none"> 5. DUT S-PARAM (S-Parameter) dialog box. 6. RECEIVER CALIBRATION REMINDER dialog box. 7. RECALL RECEIVER CAL FILES dialog box. Provides access to previously saved receiver calibration RCVR files. |
|--|---|

Figure 15-2. Noise Figure Measurement Menu Set

NF SETUP Menu

Full Name

- Noise Figure Setup Menu

Prerequisites

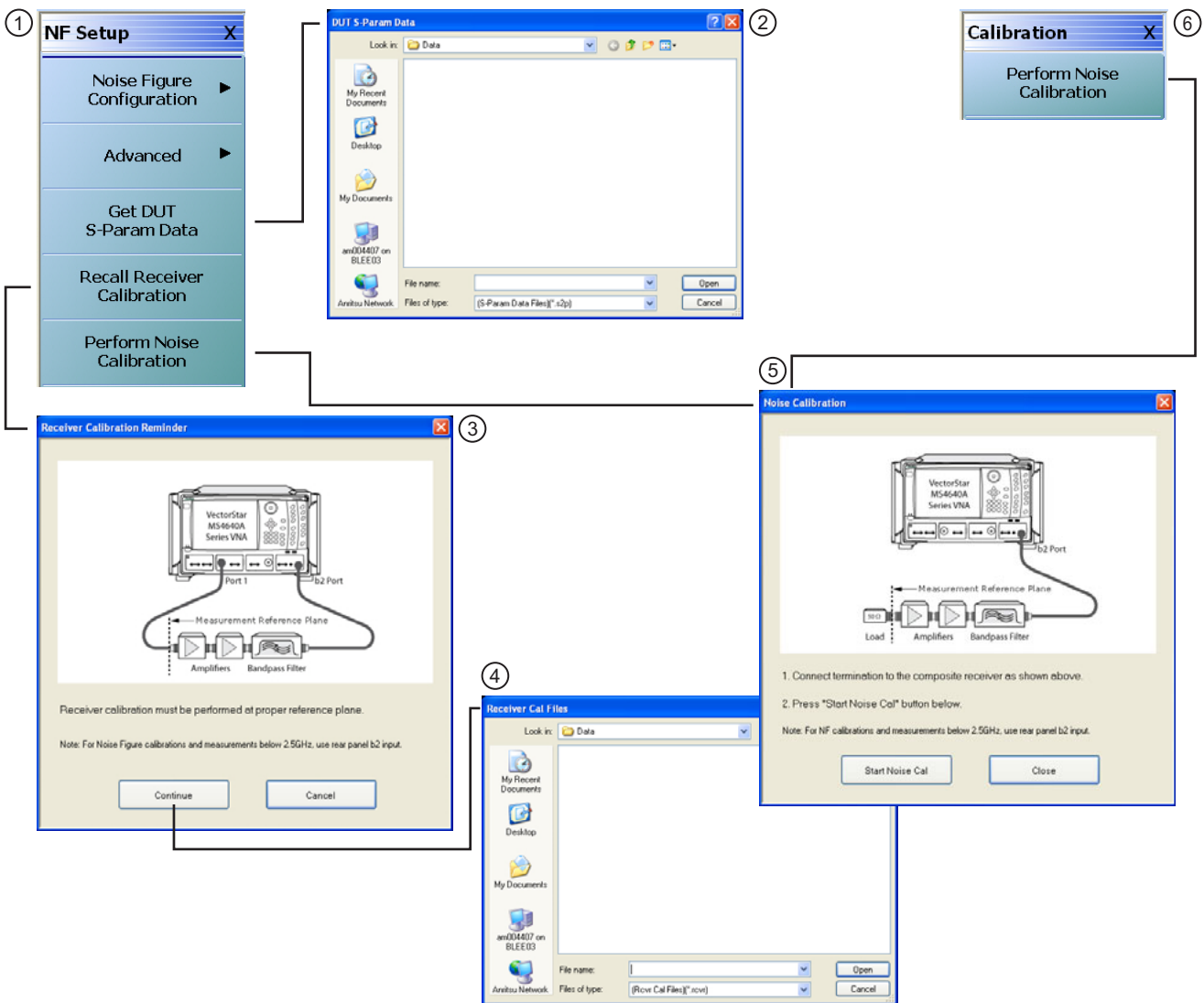
- Option 041 is installed on the VNA.
- The DUT S-Parameter Data S2P file has been stored and is available on the VNA as an S2P file.
- The Receiver Calibration for the composite noise receiver has been performed and is available on the VNA as a RCVR file.
- The APPLICATION menu mode is set to Noise Figure mode.

Previous

- [“APPLICATION Menu” on page 12-2](#)

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP



1. NF SETUP Menu
2. DUT S-PARAM DATA Dialog Box
3. RECEIVER CALIBRATION REMINDER Dialog Box
4. RECALL RECEIVER CAL FILES Dialog Box
5. NOISE CALIBRATION Dialog Box

6. CALIBRATION Menu – Appearance and button availability changes for Noise Figure operation. Button provides direct access to the NOISE CALIBRATION Dialog Box described above. When in Noise Figure mode, path via CALIBRATION menu is: **MAIN | Calibration | CALIBRATION | Perform Noise Calibration.**

Figure 15-3. NF SETUP Menu

Noise Figure Configuration

Select displays the NF CONFIG menu.

- “NF CONFIG Menu” on page 15-10
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Noise Figure Configuration | NF CONFIG

Advanced

Select displays the NF ADVANCED menu.

- [“NF ADVANCED Menu” on page 15-13](#)
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED

Get DUT S-Param Data

Select displays the DUT S-PARAM DATA dialog box. Once opened, navigate to the location of the stored DUT S-Parameter Data S2P file type. Once found, select the Open button to retrieve the file. The S-Parameter data file must be stored and available before starting noise figure measurements.

Recall Receiver Calibration

Select displays the RECEIVER CALIBRATION REMINDER dialog box with the reminders below. Select Continue to proceed. Select Cancel to return to the NF SETUP menu.

- Receiver calibration must be performed at proper reference plane.
 - For noise figure calibrations and measurement below 2.5 GHz, use the rear panel b2 input.
1. Select Continue to proceed.
 2. The RECEIVER CAL FILES recall dialog box appears.
 3. Navigate to the location of the previously stored receiver calibration RCVR file.
 4. Select Open.
 5. Return to the NF SETUP menu.

Perform Noise Calibration

Select displays the NOISE CALIBRATION dialog box. Once open, follow the procedure below to calibrate the noise:

1. Connect the termination to the preamplifier at the reference plane of the noise figure measurement. The dialog box figure shows the placement of the required components.
2. Select the Start Noise Cal button on the dialog box to start the calibration.

NF CONFIG Menu

Full Name

- Noise Figure Configuration

Prerequisites

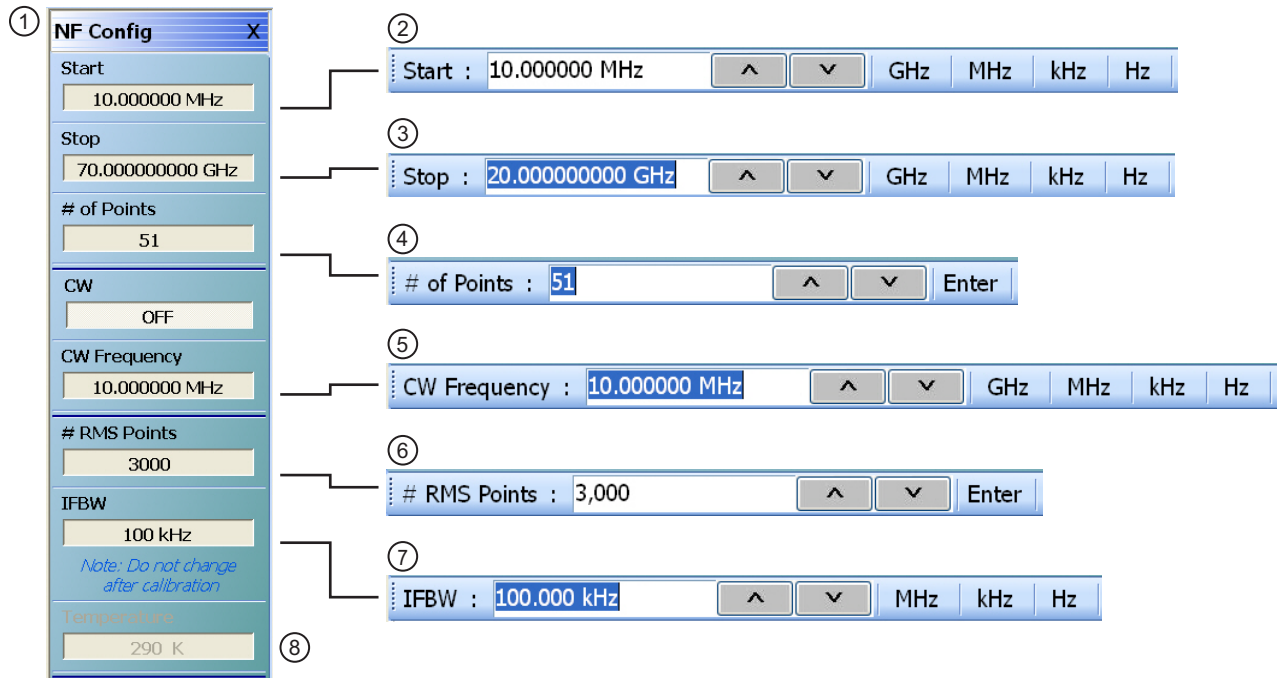
- Option 041 is installed on the VNA.
- The non-compressed DUT S-Parameter Data S2P file has been stored and is available on the VNA as an S2P file.
- The Receiver Calibration for the composite noise receiver has been performed and is available on the VNA as a RCVR file.
- The APPLICATION menu mode is set to Noise Figure mode.

Previous

- [“NF SETUP Menu” on page 15-7](#)

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Noise Figure Configuration | NF CONFIG



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. NF CONFIG menu – Related button field toolbars shown to the right. 2. Start Frequency field toolbar. 3. Stop Frequency field toolbar. 4. # (Number) of Points field toolbar. 5. CW Frequency field toolbar. | <ol style="list-style-type: none"> 6. # of RMS Points field toolbar. 7. IFBW (Intermediate Frequency Bandwidth) Frequency field toolbar – Do not change the IFBW setting after calibration. 8. Temperature K – Read-only display field button. |
|--|---|

Figure 15-4. NF CONFIG Menu and Related Field Toolbars

Start

Select displays the **Start** frequency field toolbar to provide input for the start frequency in GHz, MHz, kHz, or Hz.

Stop

Select displays the **Stop** frequency field toolbar to provide input for the stop frequency in GHz, MHz, kHz, or Hz.

of Points

Number of Points. Select displays the **# of Points** field toolbar to provide input for the number of sweep points.

CW

Continuous Wave Frequency. Select displays the **CW** field toolbar to provide input for the CW frequency in GHz, MHz, kHz, or Hz.

RMS Points

Number of Root Mean Square Points. Select displays the **# RMS Points** field toolbar to provide input for the number of RMS measurement points per sweep point set above. For example, if the sweep points are set to 51,

and the RMS points are set to 3,000, the total measurement points are $51 \times 3,000 = 153,000$.

IFBW

Intermediate Frequency Bandwidth. Select displays the IFBW field toolbar to provide input for the IFBW frequency in MHz, kHz, or Hz.

Note Do not change the IFBW setting after calibration.

Temperature K

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

NF ADVANCED Menu - Receiver Cal Offset

Full Name

- Noise Figure Advanced Configuration Menu.

Prerequisites

- Option 041 is installed on the VNA.
- The non-compressed DUT S-Parameter Data S2P file has been stored and is available on the VNA with the filename extension **.rco**.
- The Receiver Calibration for the composite noise receiver has been performed and is available on the VNA as a RCVR file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED

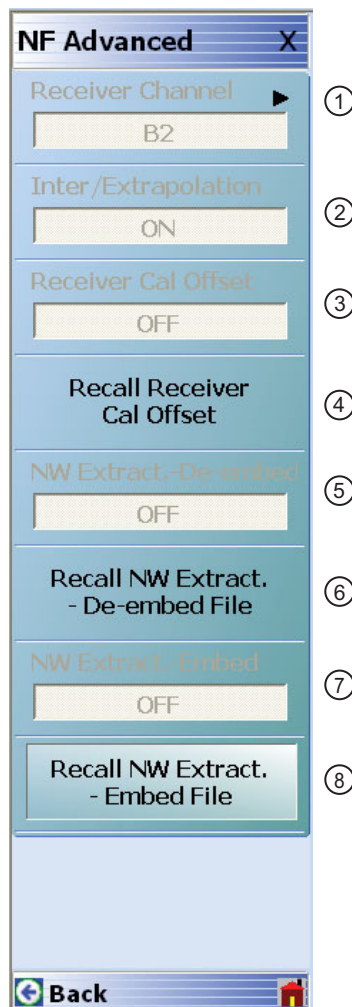
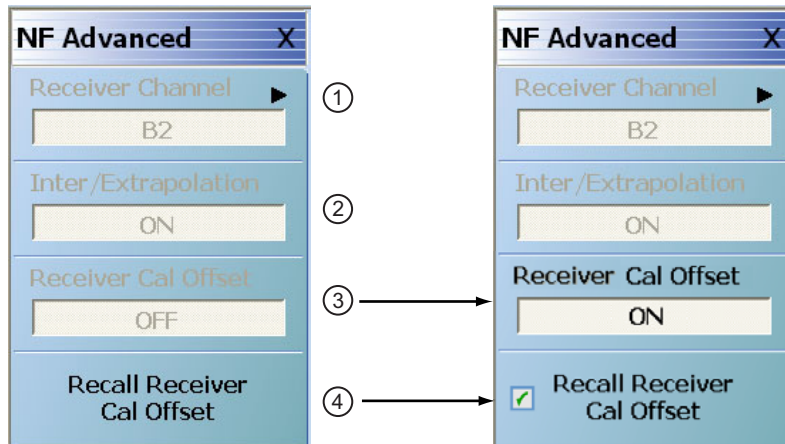


Figure 15-5. NF ADVANCED Menu (1 of 2)

1. **Receiver Channel:** Read-only field display. Shows the receiver channel as B2.
2. **Inter/Extrapolation:** Calibration Interpolation and Extrapolation Mode. Read-only display. This display indicates that the VNA calibration interpolation and extrapolation mode is ON.
3. **Receiver Cal Offset:** Read-only field display and toggle. Shows the Receiver Cal Offset status. After loading the receiver cal offset file (.txt), this field becomes an ON/OFF toggle for the Receiver Cal Offset function.
4. **Recall Receiver Cal Offset:** Opens Receiver Calibration Offset Data dialog box. After loading the receiver cal offset file (.txt), A CheckBox (as checked) will be shown to indicate the successful file load. Also, the menu item "Receiver Cal Offset" toggle will be enabled and the status will be changed to ON.
5. **NW Extract.–De-embed:** Read-only field display. Shows the NW Extract–De-embed status.
6. **Recall NW Extract.–De-embed File:** Opens Select S2P File for Network DeEmbedding dialog box, which is used to select an s2p file.
7. **NW Extract.–Embed:** Shows the NW Extract–Embed status. When ON, the user is able to toggle the Network Extraction status to ON/OFF by clicking this menu item.
8. **Recall NW Extract.–Embed File:** Opens Select S2P File for Network Embedding dialog box, which is used to select an s2p file. The selected s2p file is validated and if found valid, the Embedding operation will be performed with respect to the selected s2p file. A CheckBox (as checked) will be shown to indicate the file loaded successfully. Also the menu item "NW Extraction. Embed" will be enabled and the status will be changed to ON.

Figure 15-5. NF ADVANCED Menu (2 of 2)



1. **Receiver Channel:** Read-only field display.
2. **Inter/Extrapolation:** Calibration Interpolation and Extrapolation Mode. Read-only display. This display indicates that the VNA calibration interpolation and extrapolation mode is ON.
3. **Receiver Cal Offset:** Read-only field display and toggle. Shows the Receiver Cal Offset status. After loading the receiver cal offset file (.txt), this field becomes an ON/OFF toggle for the Receiver Cal Offset function.
4. **Recall Receiver Cal Offset:** Opens Receiver Calibration Offset Data dialog box. After loading the receiver cal offset file (.txt), A CheckBox (as checked) will be shown to indicate the successful file load. Also, the menu item "Receiver Cal Offset" will be enabled and the status will be changed to ON.

Figure 15-6. NF ADVANCED Menu

Chapter 16 — Application Menus - Mixer Setup

16-1 Chapter Overview

This chapter provides information for the APPLICATION menu and its configuration controls for NxN setup. Other Application Menu Chapters

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

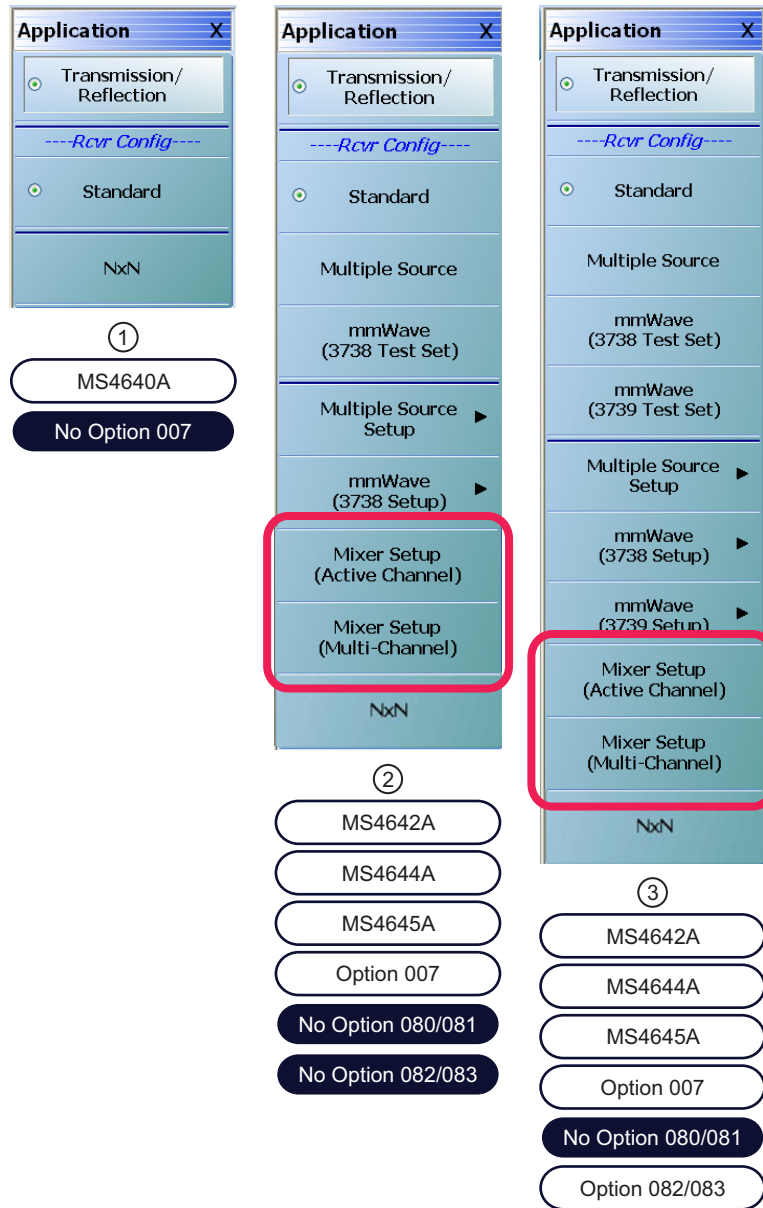
- [Chapter 12, “Application Menus - Overview”](#)
- [Chapter 13, “Application Menus - Multiple Source”](#)
- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)
- [Chapter 15, “Application Menus - Noise Figure”](#)
- [Chapter 17, “Application Menus - NxN”](#)

16-2 Application Menus and Mixer Dialog Boxes

Note The Mixer Setup buttons are not present when the VNA is in 4-Port mode.

- [“Application Menu Variants for Mixer Setup” on page 16-2](#)
 - [Figure 16-1, “APPLICATION Menu – Variants – For MS4642A, MS4644A, and MS4645A VNAs” on page 16-2](#)
 - [Figure 16-2, “APPLICATION Menu – Variants – For MS4647A VNAs” on page 16-3](#)
- [“Mixer Setup Dialog Overview” on page 16-5](#)
 - [“MIXER SETUP – ACTIVE CHANNEL Dialog Box Variants” on page 16-6](#)
 - [“ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep” on page 16-7](#)
 - [“ACTIVE CHANNEL Dialog Box – Power-Based Sweep” on page 16-16](#)
 - [“MIXER SETUP – MULTI-CHANNEL Dialog Box Variants” on page 16-25](#)
 - [“MULTI-CHANNEL – Frequency-Based Sweep” on page 16-26](#)
 - [“MULTI-CHANNEL – Power-Based Sweep” on page 16-39](#)

16-3 Application Menu Variants for Mixer Setup

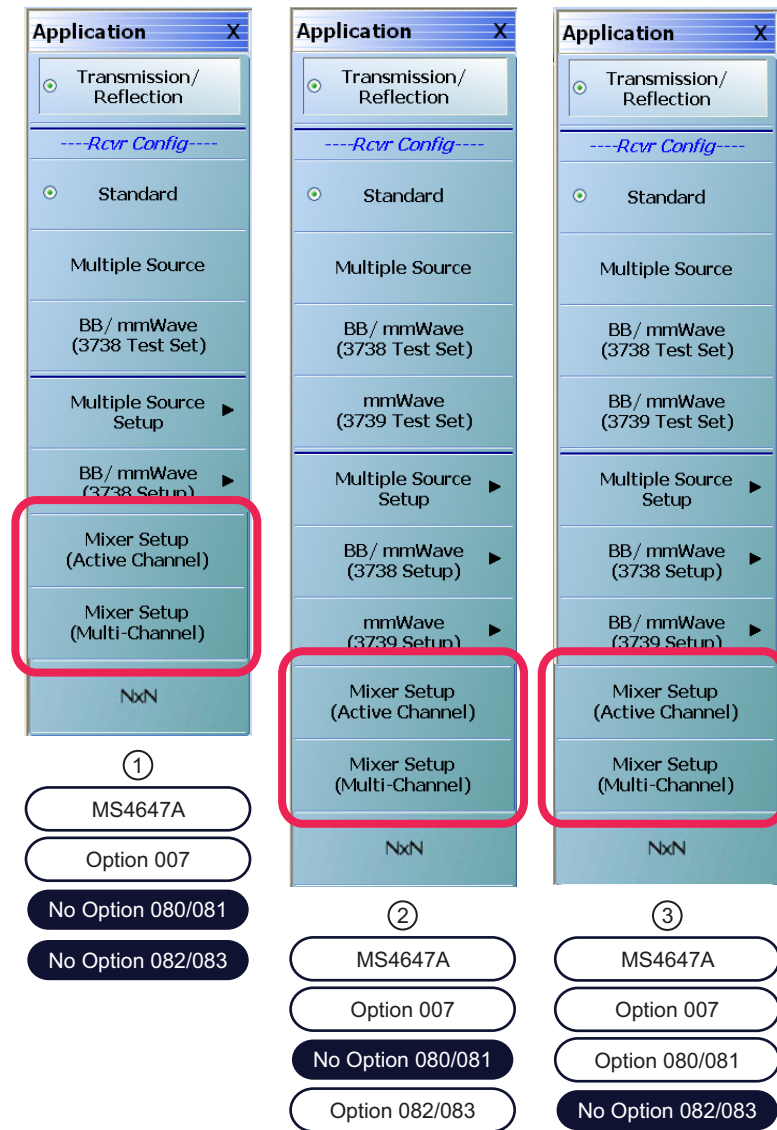


Mixer Setup buttons on the APPLICATION Menu.

1. For any MS4640A Series VNA without Option 007 – Receiver Offset.
2. For MS4642A, MS4644A, and MS4645A VNA with Option 007.

3. For MS4642A, MS4644A, and MS4645A VNA with Option 007 and Option 082/083 Millimeter-Wave.

Figure 16-1. APPLICATION Menu – Variants – For MS4642A, MS4644A, and MS4645A VNAs



<p>Mixer Setup buttons on the APPLICATION Menu.</p> <ol style="list-style-type: none"> 1. APPLICATION Menu – MS4647A – with Option 007 Receiver Offset. 2. APPLICATION Menu – MS4647A – with Option 007 and Option 082/083 Millimeter-Wave. 	<ol style="list-style-type: none"> 3. APPLICATION Menu – MS4647A – with Option 007 and Option 080/081 Broadband/Millimeter-Wave.
---	---

Figure 16-2. APPLICATION Menu – Variants – For MS4647A VNAs

See the other APPLICATION menu chapters for descriptions of other menu button selections.

Mixer Setup (Active Channel Mixer Setup)

Select displays the single channel version of the mixer setup, the MIXER SETUP [SWEEP TYPE] dialog boxes. The setup allows setting the sweep type, the port correspondence to RF and IF, and the signal source for the LO. There are separate setup configurations for frequency-based sweep and power-based sweep.

- [“MIXER SETUP – ACTIVE CHANNEL Dialog Box Variants” on page 16-6](#)

Mixer Setup (Multi-Channel Mixer Setup)

Select displays the MIXER SETUP CONFIGURATION dialog boxes. The mixer setup dialogs provide setup guidance for different mixer types, and supports measurement of various parameters on different channels. Once the mixer configuration and measurement requirements are input, the system responds with the necessary calibrations required. The mixer measurement configuration can be saved and recalled.

- [“MIXER SETUP – MULTI-CHANNEL Dialog Box Variants” on page 16-25](#)

16-4 Mixer Setup Dialog Overview

There are two different mixer setup dialog sets available on the APPLICATION menu shown as two buttons near the bottom of the menu. The first button, provides support for configuring the active channel. The second button provides support for configuring multiple channels as required for the measurements selected. The mixer setup dialog box controls and basic operation are the same on both dialog sets.

Mixer Setup Procedure Variants

The mixer setup dialogs are available on the APPLICATION menu. From a procedure point of view, it is convenient to divide the configuration procedures into four types:

- Single channel mixer setup for linear frequency or log frequency sweep.
 - [“ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep” on page 16-7](#)
- Single channel mixer setup for power sweep with CW frequency.
 - [“ACTIVE CHANNEL Dialog Box – Power-Based Sweep” on page 16-16](#)
- Multi-channel mixer setup for frequency-based sweep.
 - [“ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep” on page 16-7](#)
- Multi-channel mixer setup for power sweep.
 - [“MULTI-CHANNEL – Power-Based Sweep” on page 16-39](#)

MIXER SETUP – ACTIVE CHANNEL Dialog Box Variants

Full Name

The full name of the mixer setup dialog box varies depending on the type of sweep and active channel. The channel number is taken from the currently active channel. See [Figure 16-3](#) for comparison examples. The frequency sweep version is the same as the log sweep version.

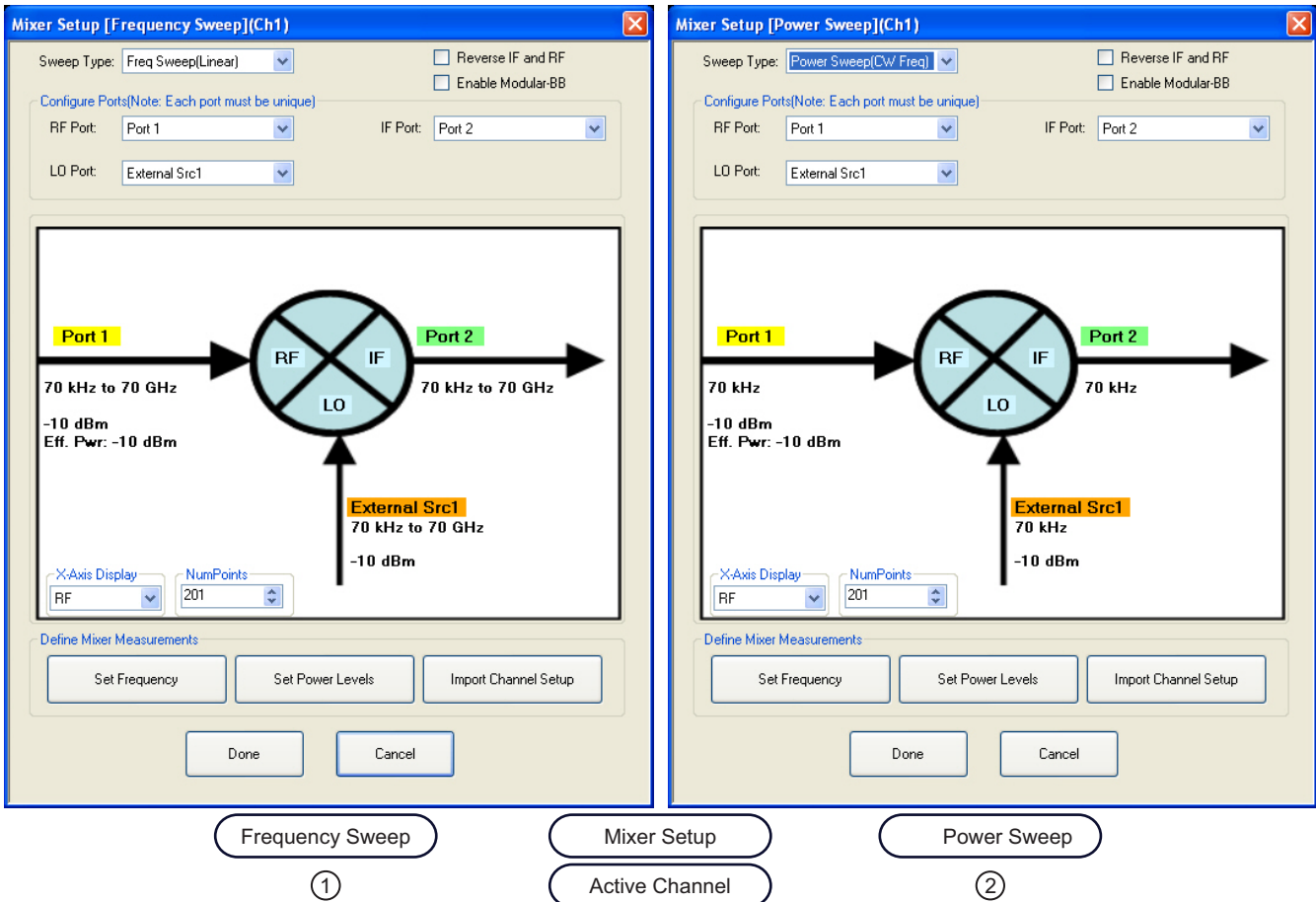
- MIXER SETUP [FREQUENCY SWEEP] (Ch1) Dialog Box
- MIXER SETUP [LOG SWEEP] (Ch1) Dialog Box
- MIXER SETUP [POWER SWEEP] (Ch1) Dialog Box

Previous

- “Application Menu Variants for Mixer Setup” on page 16-2

Navigation

- MAIN | Application | APPLICATION | Mixer Setup (Active Channel) | MIXER SETUP Dialog Box



1. On left, MIXER SETUP (FREQUENCY SWEEP). 2. On right, MIXER SETUP (POWER SWEEP).

Figure 16-3. MIXER SETUP – ACTIVE CHANNEL Main Dialog Variants

16-5 ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep

Previous

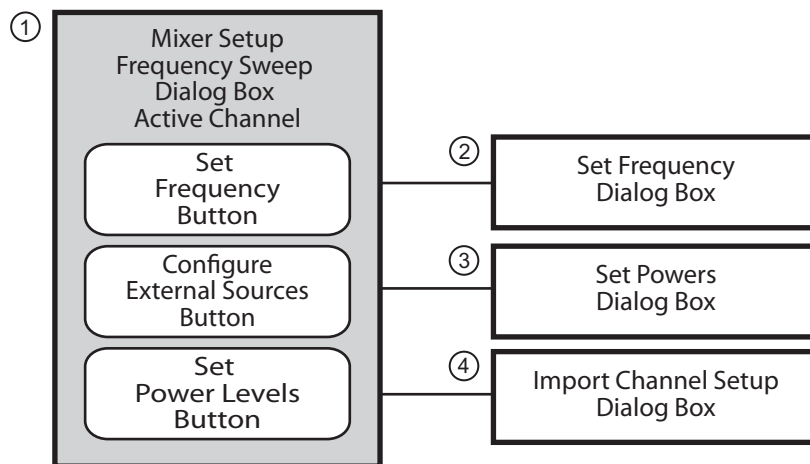
- “Application Menu Variants for Mixer Setup” on page 16-2.

Navigation

- MAIN | Application | APPLICATION | Mixer Setup (Active Channel) | MIXER SETUP dialog box | Sweep Type = Freq Sweep (Linear) or Freq Sweep (Log)

Mixer Setup – Active Channel – Linear/Log Frequency Sweep – Menu Set

The flowchart below shows the dialogs that are completed using the active channel.



1. MIXER SETUP FREQUENCY SWEEP Dialog	3. SET POWERS (FREQUENCY SWEEP) Dialog
2. SET FREQUENCY (FREQUENCY SWEEP) Dialog	4. ACTIVE CHANNEL SETUP IMPORTED Dialog

Figure 16-4. Mixer Setup Dialog Set – Active Channel – Frequency Sweep

Mixer Setup – Active Channel – Information Required

Before starting the mixer setup dialogs, have the following information available:

- Channel number of the active channel
- Type of sweep
- Port and external source assignments for RF, IF, and LO.
- RF as input or RF as output.
- Frequency range or CW setting for RF, IF, and LO.
- If RF is input, conversion to be used for IF:
 - $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
- If RF is output, conversion to be used for IF:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF - RF$ which is down conversion with Upper SideBand (USB).

- If RF is input, power setting for:
 - Power for Port 1 RF in dBm.
 - Power for External Source LO in dBm.
- If RF is output, power setting for:
 - Power for Port 1 IF in dBm.
 - Power for External Source LO in dBm.

Mixer Setup – Active Channel – Frequency Sweep – Procedure

1. Navigate to the APPLICATION menu and select the Mixer Setup (Single-Channel) button.
 - MAIN | Application | APPLICATION | Mixer Setup (Single Channel)

2. The MIXER SETUP dialog appears as shown below.

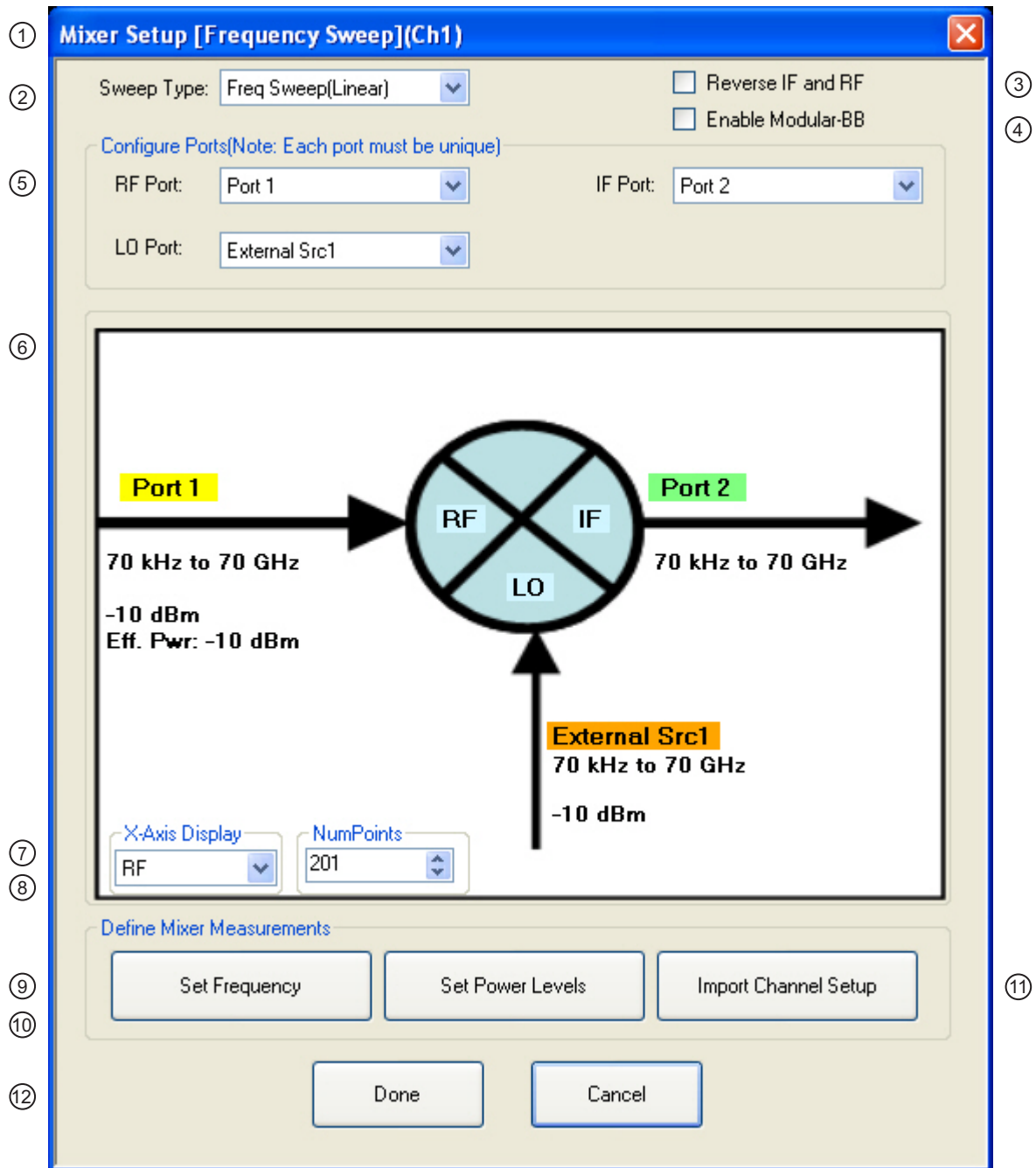


Figure 16-5. MIXER SETUP ACTIVE CHANNEL Dialog Box – Frequency Sweep – Control Locations (1 of 2)

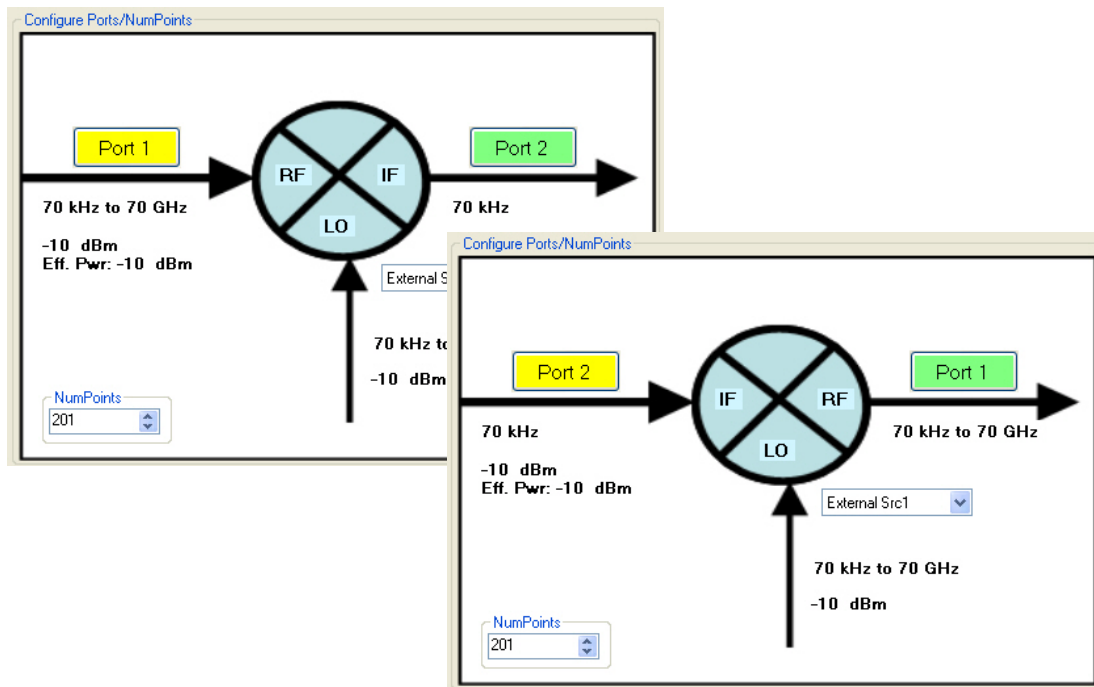
1. MIXER SETUP ACTIVE CHANNEL (FREQUENCY SWEEP) Dialog Box.	7. X-Axis Display Options – Select from RF, IF, or LO.
2. Sweep Type Setting – Freq Sweep (Linear), Freq (Log), or Power Sweep (CW Freq).	8. Num Point (Number of Sweep Points) – Sets the number of sweep points. Shows this setting on the FREQUENCY menu.
3. Reverse IF and RF – Default is RF as input, and IF as output. Reverse sets IF as input and RF as output.	9. Set Frequency Button – Select displays the SET FREQUENCY (FREQUENCY SWEEP) dialog.
4. Enable Modular BB – Only for MS4647A VNAs with Option 080/081 and ME7838A peripheral equipment.	10. Set Power Levels Button – Select displays the SET POWERS (FREQUENCY SWEEP dialog).
5. Configure Port Assignments – Each must be unique selecting from None, Port 1, Port 2, or External Sources 1 through 4.	11. Import Channel Setup Button – Select imports the active channel settings into the dialogs.
6. Mixer Schematic – Updates automatically with port assignments, frequency settings, and power levels.	12. Dialog Completion Buttons

Figure 16-5. MIXER SETUP ACTIVE CHANNEL Dialog Box – Frequency Sweep – Control Locations (2 of 2)

Active Channel – Frequency Sweep – Initial Configuration

3. In the Sweep Type area at the left top of the dialog, set the sweep type for Freq Sweep (Linear) or Freq Sweep (Log).
 - If the Sweep Type is set to Power Sweep (CW Freq), the dialog changes.
 - See [“ACTIVE CHANNEL Dialog Box – Power-Based Sweep”](#) on page 16-16.
4. At the right top of the dialog, select Reverse IF and RF and Enable Modular BB check boxes as required.
 - Enable Modular BB: Select enables using the VectorStar ME7838A Broadband/Millimeter-Wave system with the 3739x BB/mm-Wave Test Set and the 3743A or MA25300A mm-Wave Modules. This is only used on MS4647A VNAs equipped with Option 080/081.
5. The Reverse IF and RF check box changes the input/output assignments for the RF and IF mixer ports.
 - The default non-selected check box is RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.

- In [Figure 16-6](#) below, the standard and reversed RF/IF port assignments are shown.



At top left, the standard port assignments of RF on Port 1 as input and IF on Port 2 as output.

At bottom right, reversed port assignments of IF on Port 2 and input and RF on Port 1 as output.

Figure 16-6. Standard and Reversed IF and RF Ports

Active Channel – Frequency Sweep – Configure Ports

6. In the Configure Ports area, set the port assignment for the RF, IF, and LO.
 - The default assignments are Port 1 = RF, Port 2 = IF, and an External Source 1 = LO.
 - The port and external source assignments must be unique.
 - The assignment options for RF, IF, and LO are:
 - Port 1
 - Port 2
 - External Source (Src) 1
 - External Src 2
 - External Src 3
 - External Src 4
 - None
 - The changes above are shown in the mixer schematic in the center of the dialog.

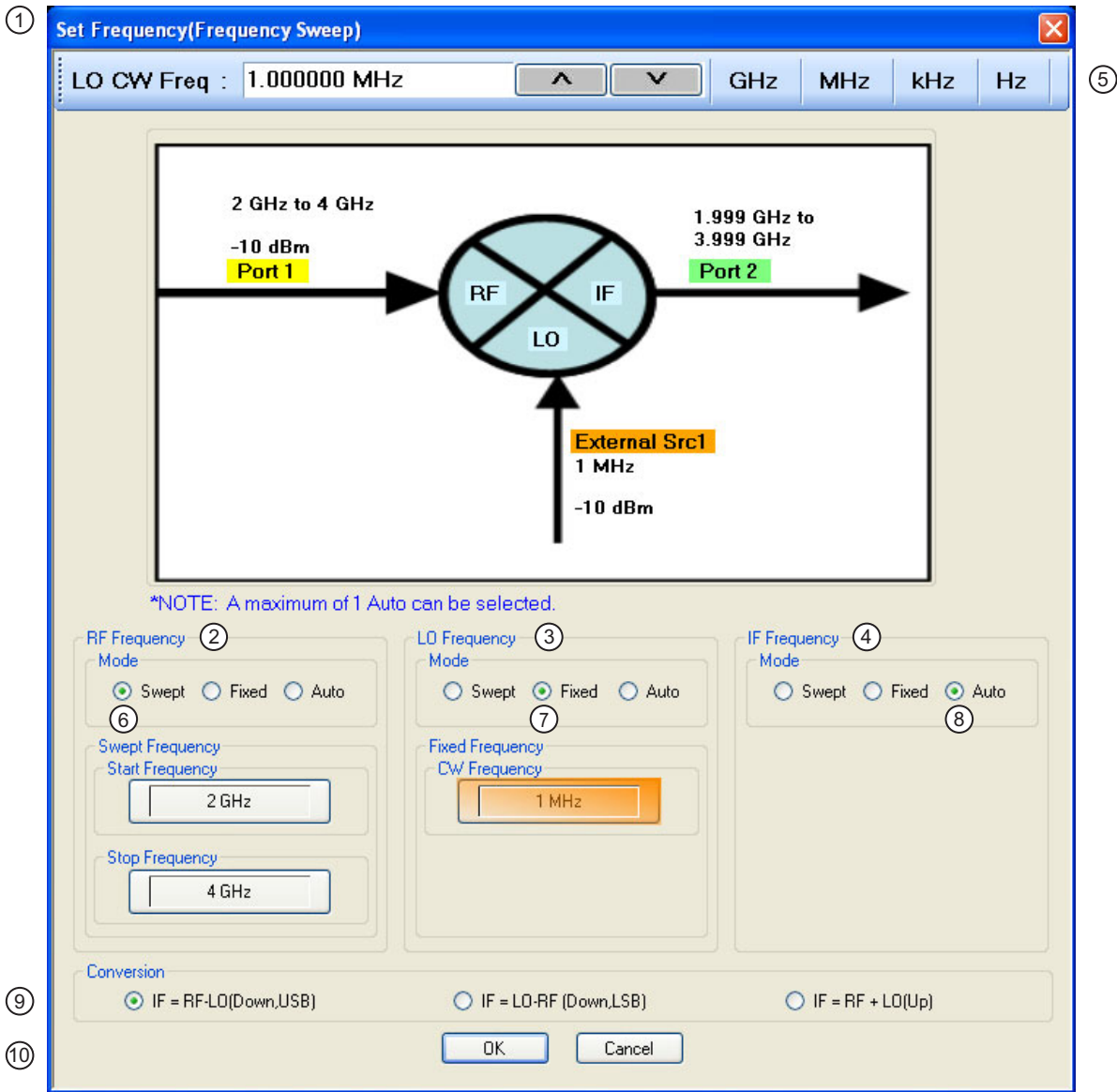
Active Channel – Frequency Sweep – Configure X-Axis Display and Number of Points

7. Set the X-Axis display to the required parameter as required. The default is RF.
 - Options are RF, IF, or LO.
8. Set the Number of Points (Num Points) for the X-Axis display.
 - The initial value is taken from the setting on the FREQUENCY menu and the # of Points button.
 - The FREQUENCY menu and MIXER dialog settings are coupled. A change on one affects the other.

Active Channel – Frequency Sweep – Set Frequency for RF, IF, and LO

9. In the Define Mixer Measurements area at the bottom of the dialog box, select the Set Frequency button.

- The SET FREQUENCY (FREQUENCY SWEEP) or (LOG FREQUENCY SWEEP) dialog appears as shown below in Figure 16-7.



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. SET FREQUENCY (FREQUENCY SWEEP) Dialog Box. 2. RF Frequency mode and value area. 3. LO Frequency mode and value area. 4. IF Frequency mode and value area. 5. Frequency input field toolbar. The label changes depending whether RF, IF, or LO are selected. 6. Mode set as Swept. Any combination of the RF, IF, and LO ports can be set as Swept. When selected, Start and Stop Frequency fields appear. | <ol style="list-style-type: none"> 7. Mode set as Fixed. Any combination of the RF, IF, and LO ports can be set as Fixed. When selected, a CW Frequency field appears. 8. Mode set as Auto. Only one of the three ports can be set as Auto. If selected, the instrument determines the frequency settings based on the other two values and the Conversion type setting. 9. Conversion setting. Changes based on whether RF is input or output. 10. Dialog box control buttons. |
|--|---|

Figure 16-7. SET FREQUENCY (FREQUENCY SWEEP) Dialog Box – Control Areas

10. The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

Active Channel – Frequency Sweep – Set RF, LO, and IF Frequency Mode and Value

11. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency.
12. For each control area, set the frequency mode.
 - The frequency options are Swept, Fixed, or Auto.
 - Any combination of Swept or Fixed can be assigned to the RF, IF, and LO ports.
 - Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected in the Conversion area at the bottom of the dialog box and the settings on the other two ports.
 - Each Frequency Mode selection provides different control immediately below in the next area.
 - In the figure above, RF Frequency is set as Swept, LO Frequency is set as Fixed, and IF Frequency is set as Auto.
13. If the RF, IF, and/or LO Frequency Mode is set as Swept:
 - The Swept Frequency area appears with controls for Start Frequency and Stop Frequency.
 - Select the Start Frequency field, and at the top of the dialog in the field toolbar, enter the required starting frequency and required units from GHz, MHz, kHz, or Hz.
 - Note that the field toolbar name changes depending on whether RF, IF, or LO is selected.
14. If the RF, IF, and/or LO Frequency Mode is set as Fixed:
 - The Fixed Frequency area appears with a single control for CW Frequency.
 - Select the CW field and enter the required CW frequency and required units.
15. If the RF, IF, or LO Frequency Mode is set as Auto:
 - No frequency assignment fields are available.
 - The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.
 - Only one mixer port can be assigned as Auto.

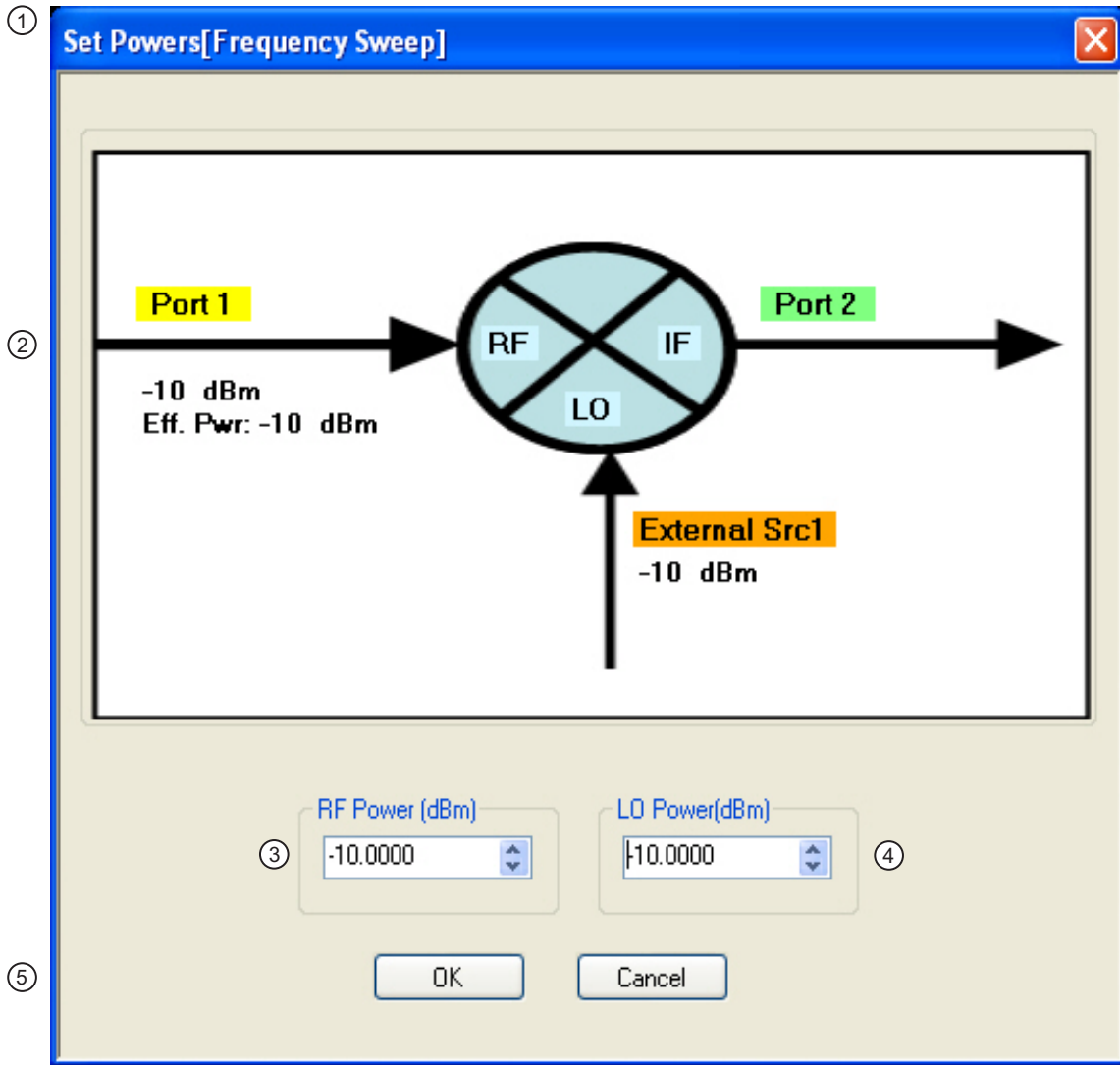
Active Channel – Frequency Sweep – Set the Conversion Required

16. Near the bottom of the dialog is the Conversion area.
17. Select button for the conversion type required from available options:
 - If RF is input:
 - $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
 - If RF is output:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF - LO$ which is down conversion with Upper Side Band (USB).
18. When all settings are complete, select the OK button to return to the mixer setup central control dialog.
 - The MIXER SETUP [FREQUENCY SWEEP] OR [LOG SWEEP] dialog reappears as shown in [Figure 16-5, “MIXER SETUP ACTIVE CHANNEL Dialog Box – Frequency Sweep – Control Locations”](#) on page 16-9.
 - If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Active Channel – Frequency Sweep – Set the Power Levels

19. Select the Set Power Levels button in the bottom center of the dialog box.

- The SET POWERS [FREQUENCY SWEEP] or [LOG SWEEP] dialog appears as shown below in Figure 16-8.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. SET POWERS (FREQUENCY SWEEP) Dialog Box – The LOG SWEEP version is identical. 2. Mixer Schematic – Port assignments and power levels are updated automatically. | <ol style="list-style-type: none"> 3. RF Power (dBm) input field. 4. LO Power (dBm) input field. 5. Dialog box control buttons. |
|---|--|

Figure 16-8. SET POWERS (FREQUENCY SWEEP) Dialog Box - Control Areas

20. Enter the required RF Power level in dBm in the provided field.
 - Note that the power setting appears on the Mixer Schematic and also in the VNA POWER menu.
21. Enter the required LO Power level in dBm.
22. When all settings are complete, select the OK button to return to the main mixer control dialog box.
 - The MIXER SETUP (FREQUENCY SWEEP) or (LOG SWEEP) dialog reappears.

Active Channel – Frequency Sweep – Import Channel Setup

23. The final single channel setup is to import the current channel settings.

24. Select the Import Channel Setup button as shown above in [Figure 16-5](#), “MIXER SETUP ACTIVE CHANNEL Dialog Box – Frequency Sweep – Control Locations” on page 16-9. The ACTIVE CHANNEL SETUP IMPORTED dialog appears and confirms in configuration import as shown below in [Figure 16-9](#).



Figure 16-9. ACTIVE CHANNEL SETUP IMPORTED Dialog Box

25. With all settings correct and as required, select the Done button.
26. A dialog report appears with a listing of the required calibrations to support the input mixer configuration. A typical example is shown below.

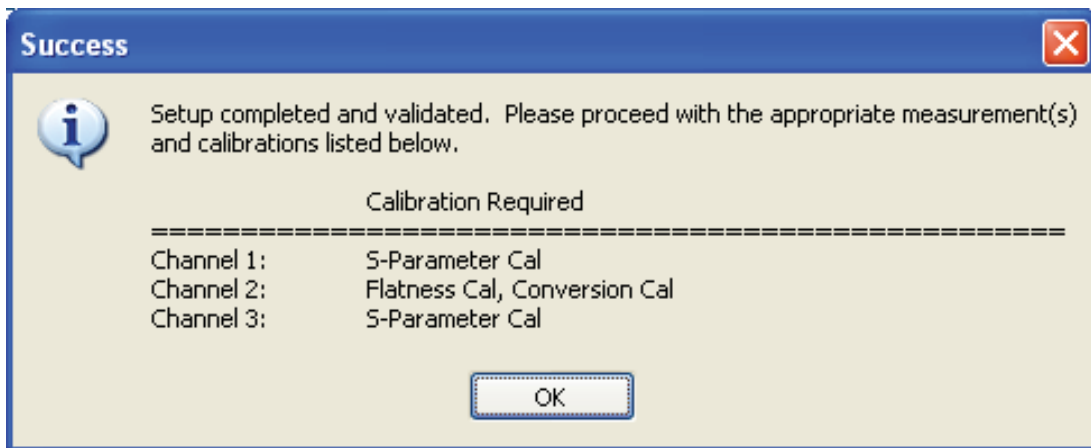


Figure 16-10. SUCESS Dialog with Required Calibrations

27. The mixer configuration process is complete.

16-6 ACTIVE CHANNEL Dialog Box – Power-Based Sweep

Previous

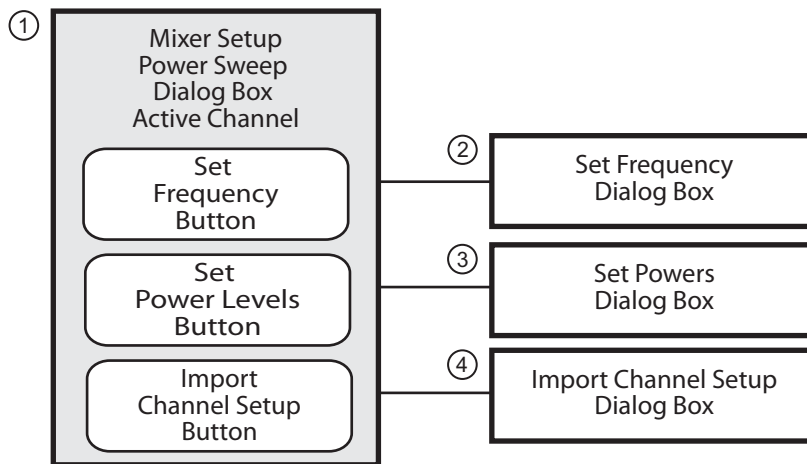
- “Application Menu Variants for Mixer Setup” on page 16-2.

Navigation

- MAIN | Application | APPLICATION | Mixer Setup (Active Channel) | MIXER SETUP dialog box | Sweep Type = Power Sweep (CW Frequency)

Mixer Setup – Active Channel – Power Sweep – Menu Set

The chart below shows the dialogs that are completed using an active channel. The numbered procedure below follows the steps in the diagram.



1. MIXER SETUP POWER SWEEP Dialog	3. SET POWERS (POWER SWEEP) Dialog
2. SET FREQUENCY (POWER SWEEP) Dialog	4. ACTIVE CHANNEL SETUP IMPORTED Dialog

Figure 16-11. Mixer Setup Dialog – Active Channel – Power Sweep

Mixer Setup – Active Channel – Power Sweep – Information Required

Before starting the mixer, have the following information available:

- Channel number of the active channel
- Type of sweep
- Port and external source assignments for RF, IF, and LO.
- RF as input or RF as output.
- Frequency range or CW setting for RF, IF, and LO.
- If RF is input, conversion to be used for IF:
 - $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
- If RF is output, conversion to be used for IF:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF - RF$ which is down conversion with Upper SideBand (USB).

- If RF is input, power setting for:
 - Power for Port 1 RF in dBm.
 - Power for External Source LO in dBm.
- If RF is output, power setting for:
 - Power for Port 1 IF in dBm.
 - Power for External Source LO in dBm.

Mixer Setup – Active Channel – Power Sweep – Procedure

The procedure here is very similar to the operation of the frequency sweep mixer dialogs described in the section above.

1. Navigate to the APPLICATION menu and select the Mixer Setup (Single-Channel) button.
 - MAIN | Application | APPLICATION | Mixer Setup (Single Channel)
2. The MIXER SETUP dialog appears.
3. In the Sweep Type area at the left top of the dialog, set the sweep type for Power Sweep (CW Freq).
 - If the Sweep Type is set to Freq Sweep (Linear) or Freq Sweep (Log), the dialog appearance changes.
 - The dialog appearance changes to the MIXER SETUP (POWER SWEEP) shown in the figure below.

- If a frequency-based sweep is required, see “ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep” on page 16-7 above.

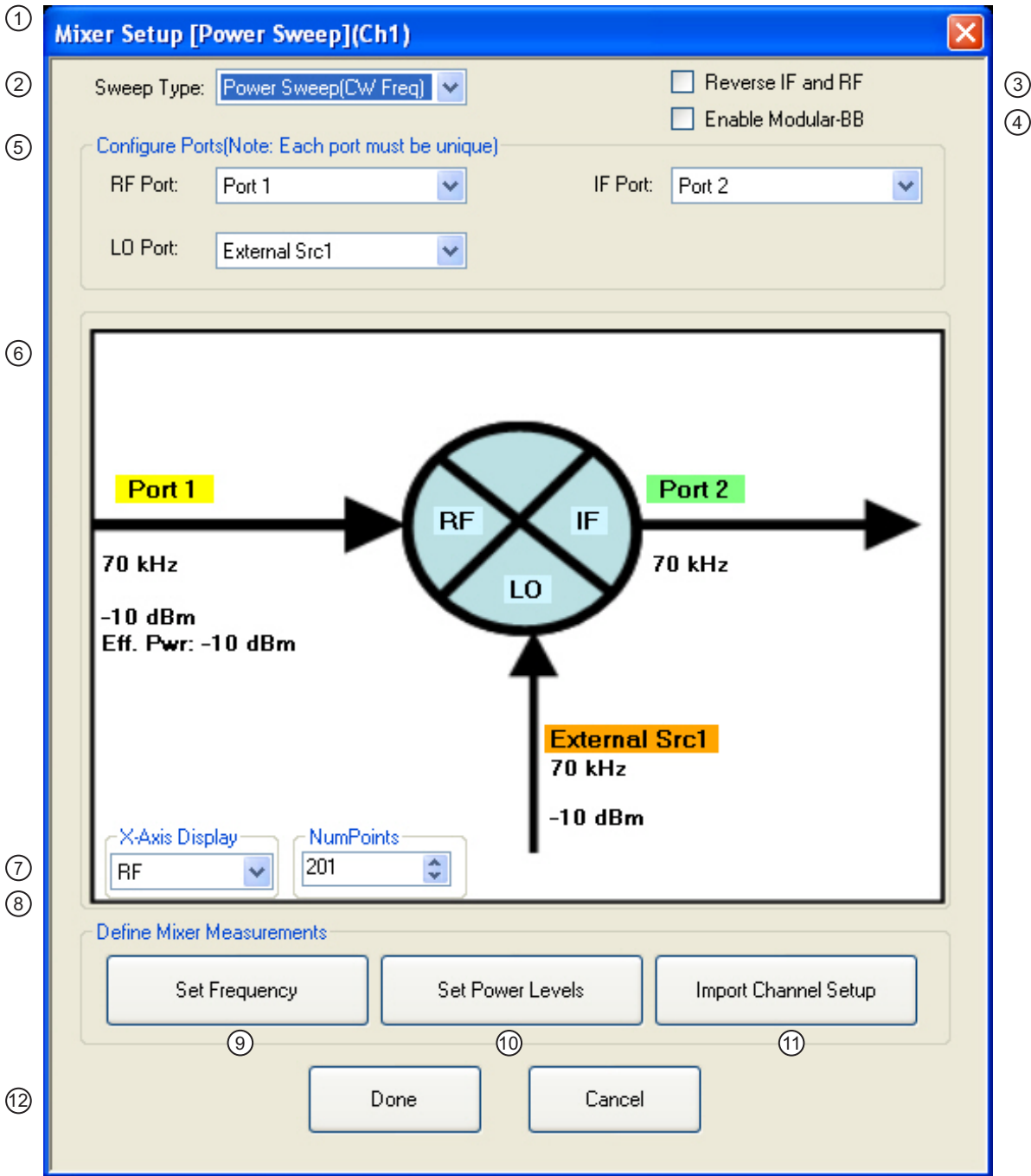


Figure 16-12.MIXER SETUP Dialog Box – Power Sweep – Control Locations (1 of 2)

1. MIXER SETUP ACTIVE CHANNEL (POWER SWEEP) Dialog Box.	7. X-Axis Display Options – Select from RF, IF, or LO.
2. Sweep Type Setting – Power Sweep (CW Freq) is set. Options are Freq Sweep (Linear) or Freq (Log).	8. Num Points (Number of Sweep Points) – Sets the number of sweep points. Shows this setting on the FREQUENCY menu.
3. Reverse IF and RF – Default is RF as input, and IF as output. Reverse sets IF as input and RF as output.	9. Set Frequency Button – Select displays the SET FREQUENCY (POWER SWEEP) dialog.
4. Enable Modular BB – Only for MS4647A VNAs with Option 080/081 and ME7838A peripheral equipment.	10. Set Power Levels Button – Select displays the SET POWERS (POWER SWEEP dialog).
5. Configure Port Assignments – Each must be unique selecting from None, Port 1, Port 2, or External Sources 1 through 4.	11. Import Channel Setup Button – Select imports the active channel settings into the dialogs.
6. Mixer Schematic – Updates automatically with port assignments, frequency settings, and power levels.	12. Dialog Completion Buttons

Figure 16-12. MIXER SETUP Dialog Box – Power Sweep – Control Locations (2 of 2)

Mixer Setup – Active Channel – Power Sweep – Initial Configuration

4. At the top right of the dialog, select the Reverse IF and RF and Enable Modular BB check boxes as required.
5. The Reverse IF and RF check box changes the input/output assignments for the RF and IF mixer ports.
 - The default non-selected check box is RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.
 - See [Figure 16-6, “Standard and Reversed IF and RF Ports”](#) on page 16-11 above for examples of standard and reversed RF/IF mixer port assignments.
6. The Enable Modular BB check box enables using the VectorStar ME7838 Broadband/Millimeter-Wave system with the 3739x BB/mm-Wave Test Set and the 3743A or MA25300A mm-Wave Modules. This is only used on MS4647A VNAs equipped with Option 080/081.

Mixer Setup – Active Channel – Power Sweep – Configure Ports

7. In the Configure Ports area, set the port assignments for the RF, IF, and LO.
 - The default assignments are Port 1 = RF, Port 2 = IF, and External Source 1 = LO.
 - The port and external source assignments must be unique.
 - The assignment options for RF, IF, and LO are:
 - Port 1
 - Port 2
 - External Source (Src) 1
 - External Src 2
 - External Src 3
 - External Src 4
 - None
 - The changes above are shown in the mixer schematic in the center of the dialog.

Mixer Setup – Active Channel – Power Sweep – Configure X-Axis Display and Number of Points

8. Set the X-Axis display to the required parameter as required. The default is RF.
 - Options are RF, IF, or LO.
9. Set the Number of Points (Num Points) for the X-Axis display.
 - The initial value is taken from the setting on the FREQUENCY menu and the # of Points button.

- A change on the FREQUENCY menu also changes the setting on the MIXER dialog and a MIXER change changes the FREQUENCY menu setting.

Mixer Setup – Active Channel – Power Sweep – Set RF, LO, and IF Frequency Mode and Value

10. In the Define Mixer Measurements area at the bottom of the dialog box, select the Set Frequency button.

11. The SET FREQUENCY (POWER SWEEP) dialog appears as shown below in Figure 16-7.

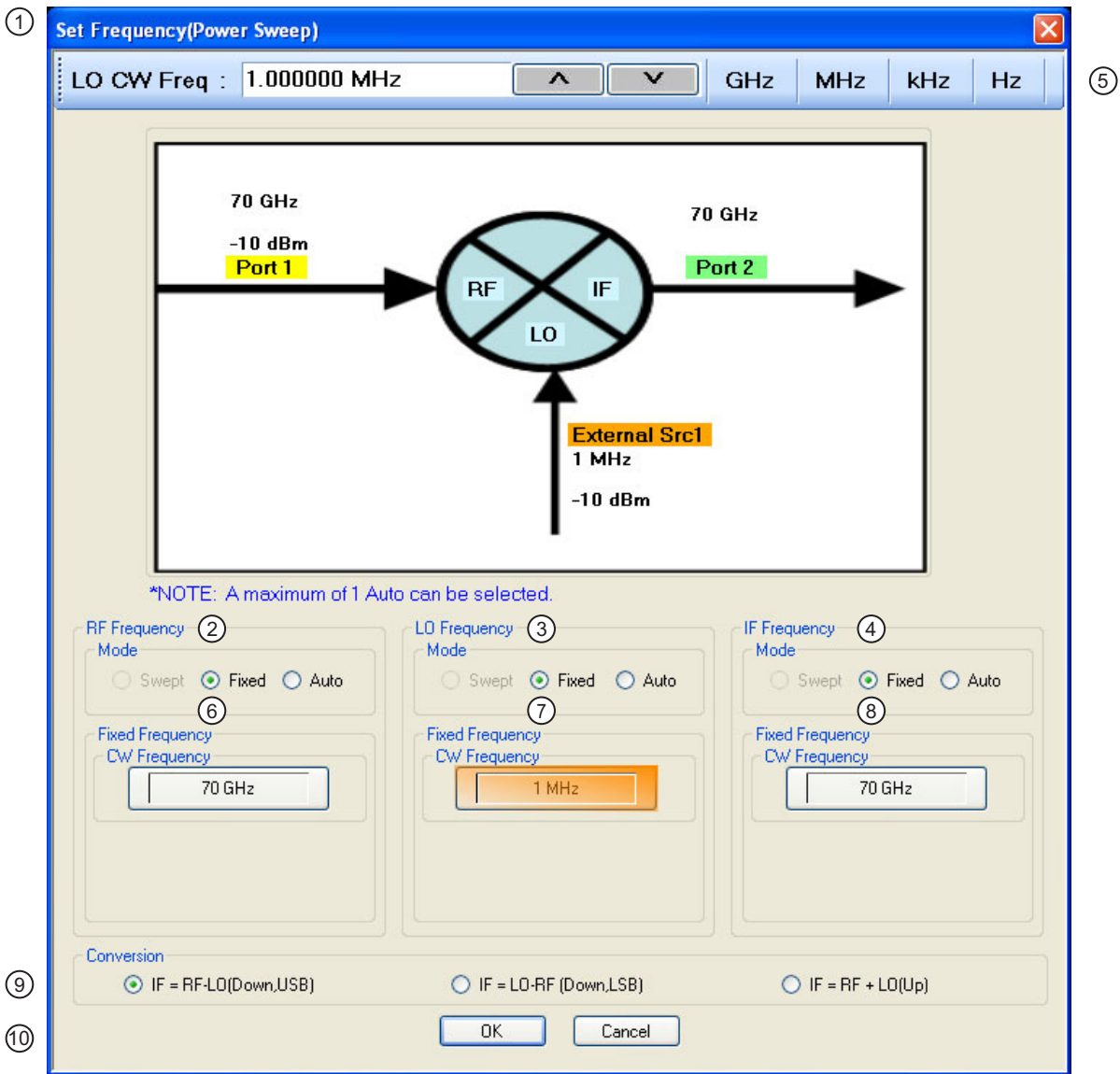


Figure 16-13.SET FREQUENCY (POWER SWEEP) Dialog Box – Control Areas

<ol style="list-style-type: none"> 1. SET FREQUENCY (POWER SWEEP) Dialog Box. 2. RF Frequency mode and value area. 3. LO Frequency mode and value area. 4. IF Frequency mode and value area. 5. Frequency input field toolbar. The label changes depending whether RF, IF, or LO are selected. 6. RF Mode setting can only be Fixed or Auto. Only one mixer port can be Auto. If fixed, RF CW frequency is input in field below. 	<ol style="list-style-type: none"> 7. LO Mode setting can only be Fixed or Auto. Only one mixer port can be Auto. LO CW frequency is input in field below. 8. IF Mode setting can only be Fixed or Auto. Only one mixer port can be Auto. IF CW frequency is input in field below. 9. Conversion setting. Changes based on whether RF is input or output. If RF is input, equations show conversion calculations for IF. If IF is input, equations show conversion calculations for RF. 10. Dialog box control buttons.
--	---

Figure 16-13. SET FREQUENCY (POWER SWEEP) Dialog Box – Control Areas

12. The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

Mixer Setup – Active Channel – Power Sweep – RF, LO, and IF Frequency Mode and Value Area

13. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency. Depending on the settings, there is a Mode area and a Frequency area for each port.

14. For each control area, set the frequency mode.

- The frequency options are Fixed or Auto. Swept is not available for Power Sweeps.
- Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected in the Conversion area at the bottom of the dialog box and the settings on the other two ports.
- Each Frequency Mode selection provides different input field control immediately below in the next area.
- In the figure above, RF Frequency is set as Swept, LO Frequency is set as Fixed, and IF Frequency is set as Auto.

15. If the RF, IF, and/or LO Frequency Mode is set as Fixed:

- The Fixed Frequency area appears with a single control for CW Frequency.
- Select the CW field and enter the required CW frequency and required units in the field toolbar at the top of the dialog box.

16. If the RF, IF, or LO Frequency Mode is set as Auto:

- No frequency assignment fields are available.
- The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.

Mixer Setup – Active Channel – Power Sweep – Set the Conversion Required

17. Near the bottom of the dialog is the Conversion area.

18. Select the button for the conversion type required from options of:

- If RF is input and IF is output (the default):
 - $IF = RF - LO$ which is down conversion with Upper Side Band (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
- If RF is output and IF is input (optional):
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF - LO$ which is down conversion with Upper Side Band (USB).

19. When all settings are complete, select the OK button to return to the central control dialog.

- The MIXER SETUP (POWER SWEEP) dialog reappears.
- See [Figure 16-12, “MIXER SETUP Dialog Box – Power Sweep – Control Locations”](#) on page 16-18 above.
- If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Mixer Setup – Active Channel – Power Sweep – Set the Power Levels

20. Select the Set Power Levels button in the bottom center of the dialog box.

- The SET POWERS (POWER SWEEP) dialog appears as shown below in [Figure 16-8](#).

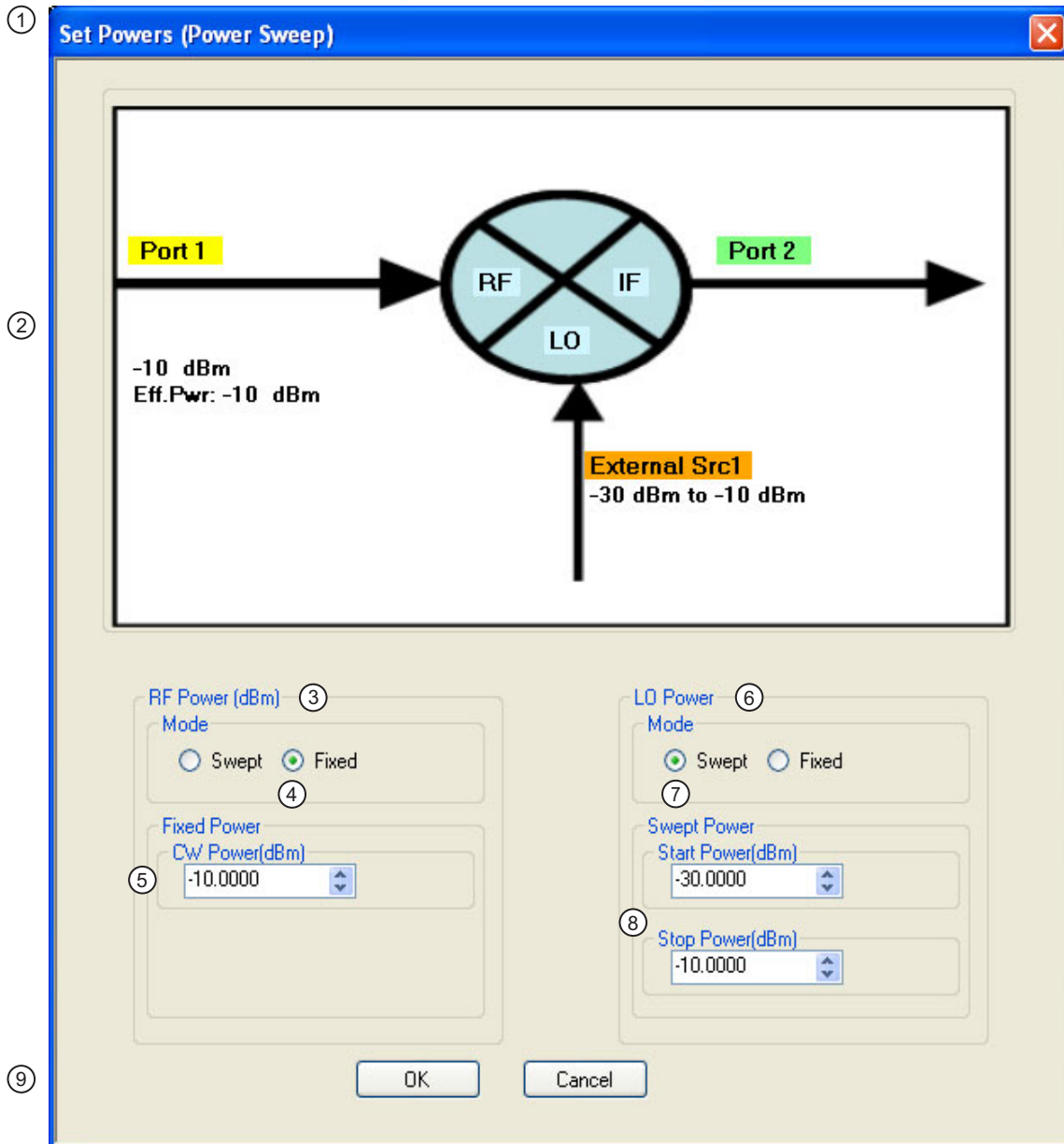


Figure 16-14. SET POWERS (POWER SWEEP) Dialog Box - Control Areas

1. SET POWERS (POWER SWEEP) Dialog Box	6. LO Power controls
2. Mixer Schematic – Port assignments and power levels are updated automatically.	7. Mode set as Swept with option of Fixed.
3. RF Power (dBm) controls.	8. Swept start and stop power input fields.
4. RF Power Mode set as Fixed with option of Swept.	9. Dialog box control buttons.
5. RF Power CW Power input field	

Figure 16-14. SET POWERS (POWER SWEEP) Dialog Box - Control Areas

Mixer Setup – Active Channel – Power Sweep – Configuring the RF, IF, and LO Power Settings

21. Separate control areas for Mode and Power are provided for RF Power, IF Power, and LO Power.
 - If RF is input and IF is output (the default), power level controls are available for RF and LO Power:
 - RF Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.
 - LO Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.
 - If RF is output and IF is input (optional by selecting the Reverse IF and RF check box):
 - IF Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.
 - LO Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.
22. For each displayed mixer port, select the mode as Swept or Fixed.
23. If Swept is set, enter the Start and Stop Power levels.
24. If Fixed is set, enter the CW Power level.
25. Repeat the two steps above for the remaining mixer port.
26. When all settings are complete, select the OK button to return to the main control dialog box.
 - The MIXER SETUP (POWER SWEEP) setup dialog reappears.
 - See [Figure 16-12, “MIXER SETUP Dialog Box – Power Sweep – Control Locations”](#) on page 16-18 above.

Mixer Setup – Active Channel – Power Sweep – Import Channel Setup

27. The final single channel setup is to import the current channel settings.
28. Select the Import Channel Setup button. The ACTIVE CHANNEL SETUP IMPORTED dialog appears and confirms in configuration import as shown below in [Figure 16-9](#).

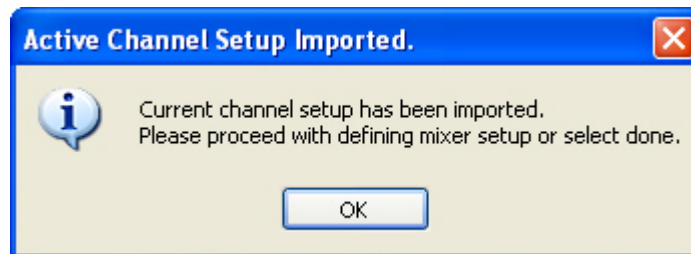


Figure 16-15. ACTIVE CHANNEL SETUP IMPORTED Dialog Box

29. With all settings correct and as required, select the Done button.

30. A dialog report appears with a listing of the required calibrations to support the input mixer configuration. A typical example is shown below.

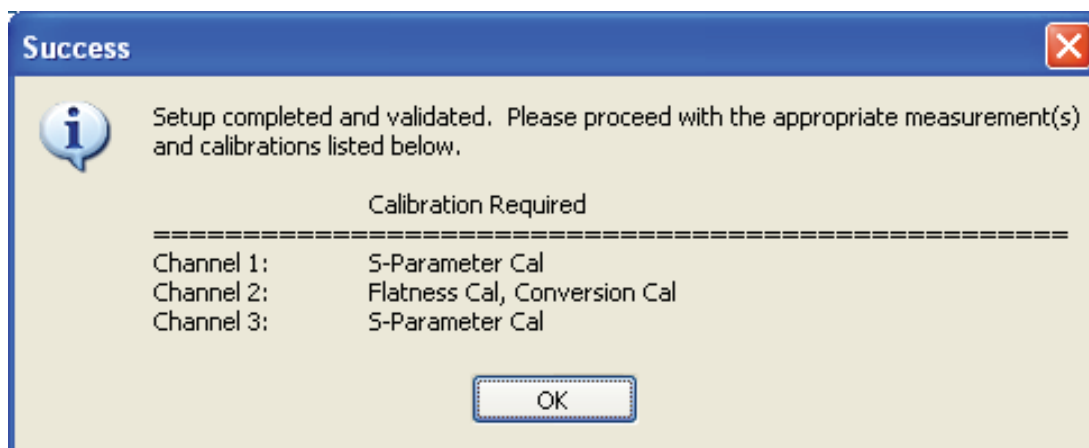


Figure 16-16. SUCESS Dialog with Required Calibrations

31. The mixer configuration process is complete.

MIXER SETUP – MULTI-CHANNEL Dialog Box Variants

Full Name

The full name of the mixer setup dialog box varies depending on the type of sweep. See Figure 16-17 for comparison examples. In the procedure sections following, two multi-channel mixer setup example procedures are shown:

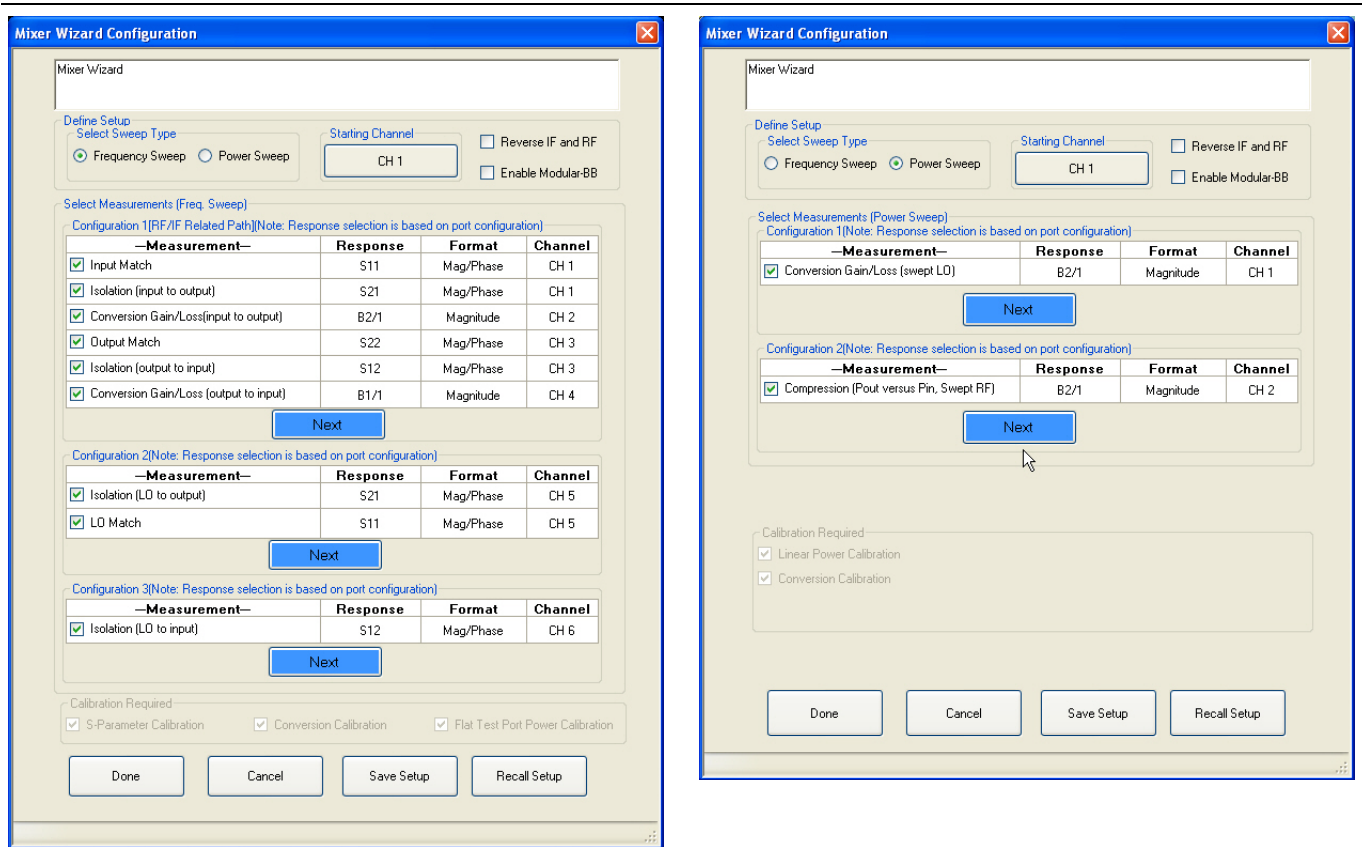
- “MULTI-CHANNEL – Frequency-Based Sweep” on page 16-26
- “MULTI-CHANNEL – Power-Based Sweep” on page 16-39

Previous

- “Application Menu Variants for Mixer Setup” on page 16-2.

Navigation

- MAIN | Application | APPLICATION | Mixer Setup (Multi-Channel) | MIXER SETUP CONFIGURATION Dialog Box



At left, the multi-channel mixer setup dialog for frequency-based sweeps.

At right, the multi-channel mixer setup dialog for power-based sweeps.

Figure 16-17. MULTI-CHANNEL MIXER SETUP Dialog Box

16-7 MULTI-CHANNEL – Frequency-Based Sweep

Mixer Setup – Multi-Channel – Frequency Sweep – Menu Set

The multi-channel mixer setup provides additional measurement capability over multiple channels and consists of one central control dialog box with multiple supporting dialog boxes. The multi-channel mixer setup for frequency-based sweeps is similar to the controls for the active channel version described above. Additional parameters can be measured, requiring addition dialogs to configure the mixer. In [Figure 16-18, “MULTI-CHANNEL MIXER SETUP Dialog Boxes – Frequency-Based Sweep”](#) on page 16-27 below, the illustration

shows the relationship between the main and supporting dialog boxes.

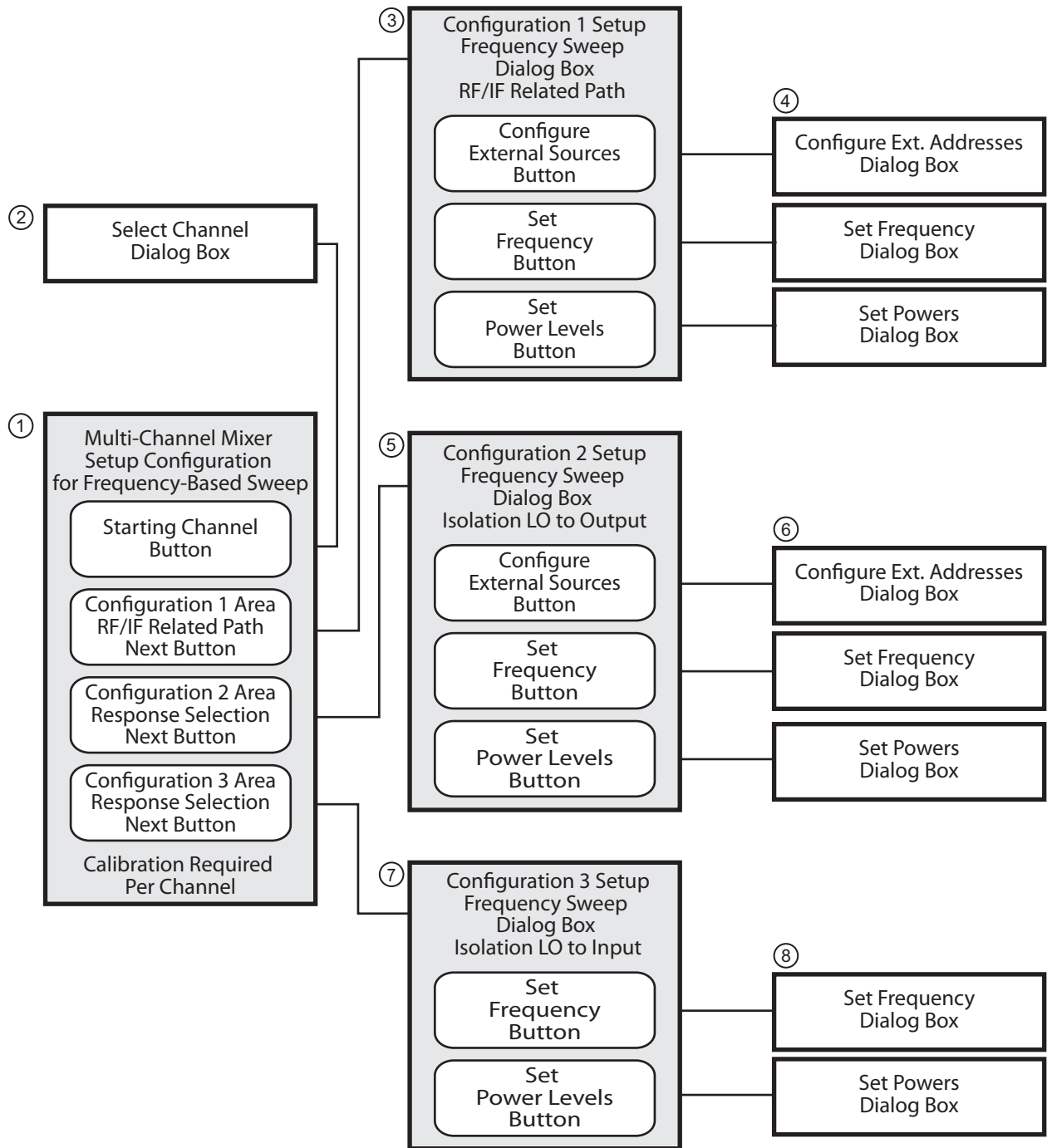


Figure 16-18. MULTI-CHANNEL MIXER SETUP Dialog Boxes – Frequency-Based Sweep (1 of 2)

1. MIXER SETUP CONFIGURATION [Frequency-Based Sweep] Dialog Box	5. CONFIGURATON 2 SETUP Dialog Box for Isolation LO to Output
2. SELECT CHANNEL Dialog Box	6. Configuration 2 Dialog Boxes for External Source Address, Frequency, and Power.
3. CONFIGURATON 1 SETUP Dialog Box for RF/IF Related Paths	7. CONFIGURATON 3 SETUP Dialog Box for Isolation LO to Input
4. Configuration 1 Dialog Boxes for External Source Address, Frequency, and Power.	8. Configuration 3 Dialog Boxes for Frequency and Power.

Figure 16-18.MULTI-CHANNEL MIXER SETUP Dialog Boxes – Frequency-Based Sweep (2 of 2)

Mixer Setup – Multi-Channel – Frequency Sweep – Available Measurements

The table below lists the available frequency-based mixer measurements. On the main dialog box, check boxes allow individual measurement selections. Within each of the three configuration areas (Configuration 1, Configuration 2, and Configuration 3), selection of any one measurement within a configuration area enables the Next button for that area. Selecting the Next button displays the multiple support dialogs for that configuration area.

Table 16-1. Available Measurements for Frequency-Based Sweep

Measurement	Response	Display Format	Channel
Configuration 1 – RF/IF Related Path – Response selection is based on port configuration.			
Input match	S22	Mag/Phase	Channel 1
Isolation, input to output	S12	Mag/Phase	Channel 1
Conversion gain/loss, input to output	B1/1	Magnitude	Channel 2
Output match	S11	Mag/Phase	Channel 3
Isolation, output to input	S21	Mag/Phase	Channel 3
Conversion gain/loss, output to input	B2/1	Magnitude	Channel 4
Next button – Links to the CONFIGURATION 1 SETUP Dialog Box for RF/IF Related Paths.			
Configuration 2 – Isolation LO to Output – Response selection is based on port configuration.			
Isolation, LO to output	S21	Mag/Phase	Channel 5
LO Match	S11	Mag/Phase	Channel 5
Next button – Links to the CONFIGURATION 2 SETUP dialog box for Isolation LP to Output.			
Configuration 3 – Isolation LO to Input – Response selection is based on port configuration.			
Isolation, LO to Input	S12	Mag/Phase	Channel 6
Next button – Links to the CONFIGURATION 3 SETUP dialog box for Isolation LO to Input.			

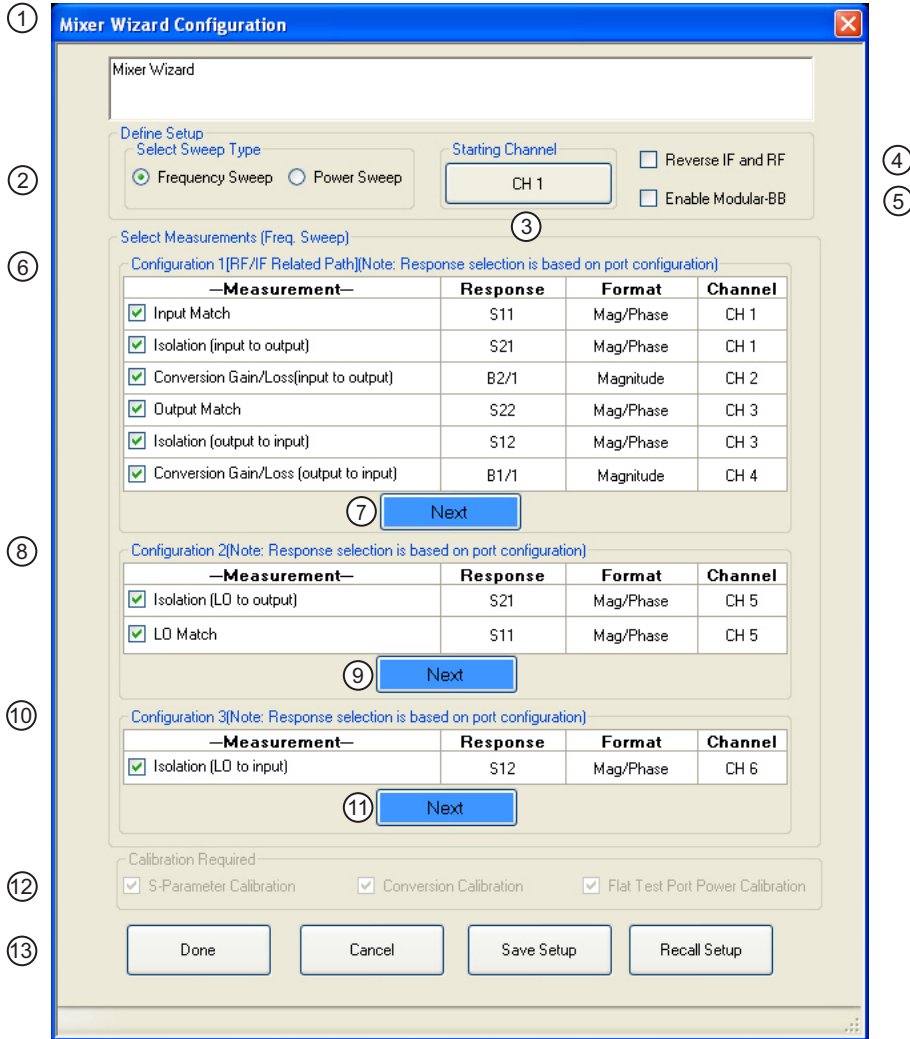
Mixer Setup – Multi-Channel – Frequency Sweep – Channel Assignments

Six channels are required to support all measurements. See [Table 16-1, “Available Measurements for Frequency-Based Sweep” on page 16-29](#) above for the default channel assignments. Skipped measurements do not change the channel assignment. For example, if Input Match and Output Match are required in Configuration 1, the default channel assignment will be Channel 1 and Channel 3. The starting channel can be changed to any of the 16 channels. If Channel 16 is assigned, and another channel is required, the Channel assignment rolls over to Channel 1.

Mixer Setup – Multi-Channel – Frequency Sweep – Procedure

1. Navigate to the APPLICATION menu and select the Mixer Setup (Multi-Channel) button.
 - MAIN | Application | APPLICATION | Mixer Setup (Multi-Channel)

2. The MIXER SETUP CONFIGURATION dialog appears. See Figure 16-19 below for the initial appearance and its control areas.



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. MIXER SETUP CONFIGURATION (FREQUENCY SWEEP) Dialog Box 2. Select Sweep Type as Frequency Sweep or Power Sweep. 3. Channel Start Selection 4. Reverse IF and RF – Default is RF as input and IF as output. Toggles to RF as output and IF as input. 5. Enable Modular-BB – Only for MS4647A VNAs with Option 080/081 BB/m-Wave System. 6. Configuration 1 – Conversion Gain/Loss Swept LO – RF/IF Related Path – Select any combination of measurements. Channels are automatically assigned based on Starting Channel. 7. Next Button – Links to Configuration 1 Dialogs to configure mixer and VNA ports, external sources, frequency, and power levels. | <ol style="list-style-type: none"> 8. Configuration 2 – Compression Pout versus Pin Swept RF – Select any combination of measurements. Channels are automatically assigned. 9. Next Button – Links to Configuration 2 Dialogs to configure mixer and VNA ports, external sources, frequency, and power levels. 10. Configuration 3 – Isolation – LO to Input Available Measurement 11. Next Button – Links to Configuration 3 Dialogs to configure mixer and VNA ports, frequency, and power. 12. Calibration Required Area 13. Dialog Controls |
|--|---|

Figure 16-19. MIXER SETUP CONFIGURATION (FREQUENCY SWEEP) Dialog Box – Control Areas

Mixer Setup – Multi-Channel – Frequency Sweep – Define the Mixer Setup

3. Use the steps below to set the sweep type, the starting channel, reverse ports, and enable modular broadband.
4. In the Define Setup Select Sweep Type area at the top of the dialog, set the Sweep Type as Frequency Sweep.
 - If Power Sweep is selected, the dialog box appearance changes.
 - See “[MULTI-CHANNEL – Power-Based Sweep](#)” on page 16-39 below for the setup procedure for power-based sweeps.

Mixer Setup – Multi-Channel – Frequency Sweep – Set the Starting Channel

5. The default starting channel is Channel 1. To change the default, select the Starting Channel button.
 - The SELECT CHANNEL dialog box appears as shown below in [Figure 16-5](#).



The SELECT CHANNEL dialog box. Select any starting channel.

If necessary, Channel Number rolls over from Channel 16 to Channel 1.

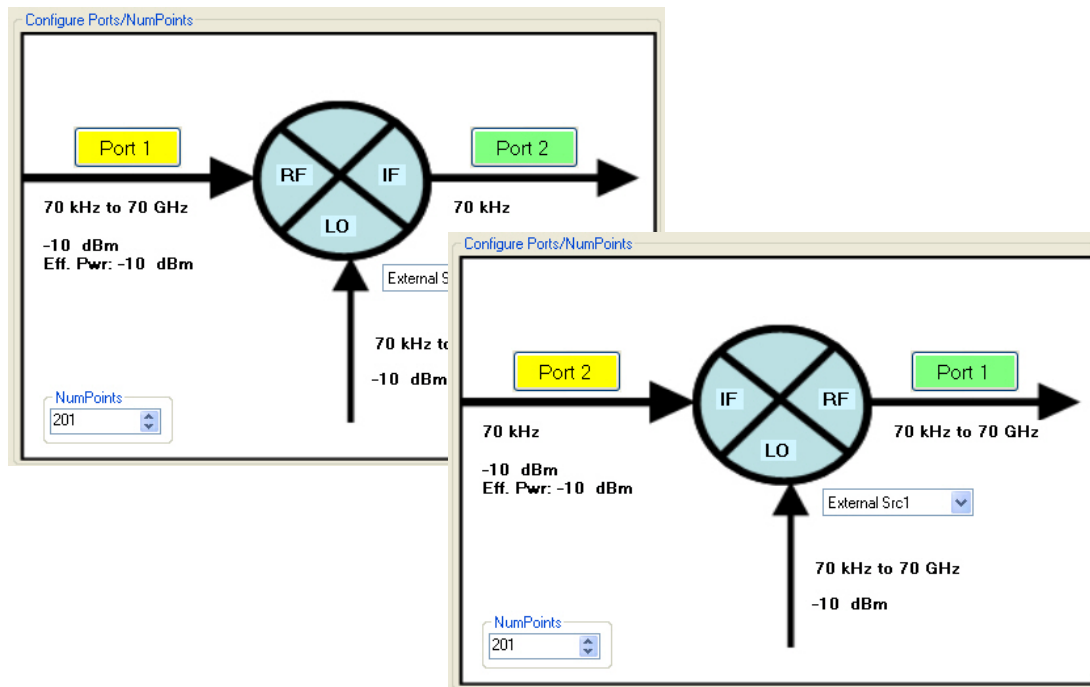
Figure 16-20. SELECT CHANNEL Dialog Box

6. Select the required starting channel. The focus autoreturns to the MIXER SETUP CONFIGURATION (FREQUENCY SWEEP) dialog box.

Mixer Setup – Multi-Channel – Frequency Sweep – Reverse IF and RF

7. If required, on the right side of the dialog box, select the check box for Reverse the IF and RF.
 - The default non-selected check box provides RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.

- The figure below shows the standard and reversed RF/IF port assignments.



At top, the standard port assignments of RF on Port 1 as input and IF on Port 2 as output.

At bottom, reversed port assignments of IF on Port 2 and input and RF on Port 1 as output.

Figure 16-21. Standard and Reversed IF and RF Ports

Mixer Setup – Multi-Channel – Frequency Sweep – Enable Modular BB

- If required, also on the right, select the check box for Enable Modular-BB (Broadband).
 - This is only available for MS4647A VNAs equipped with Option 080/081 Modular Broadband/Millimeter-Wave (mm-Wave).
 - This installation also requires the ME7838 configuration with the 3739x Test Set and two 3743A or MA25300A mm-Wave Modules.

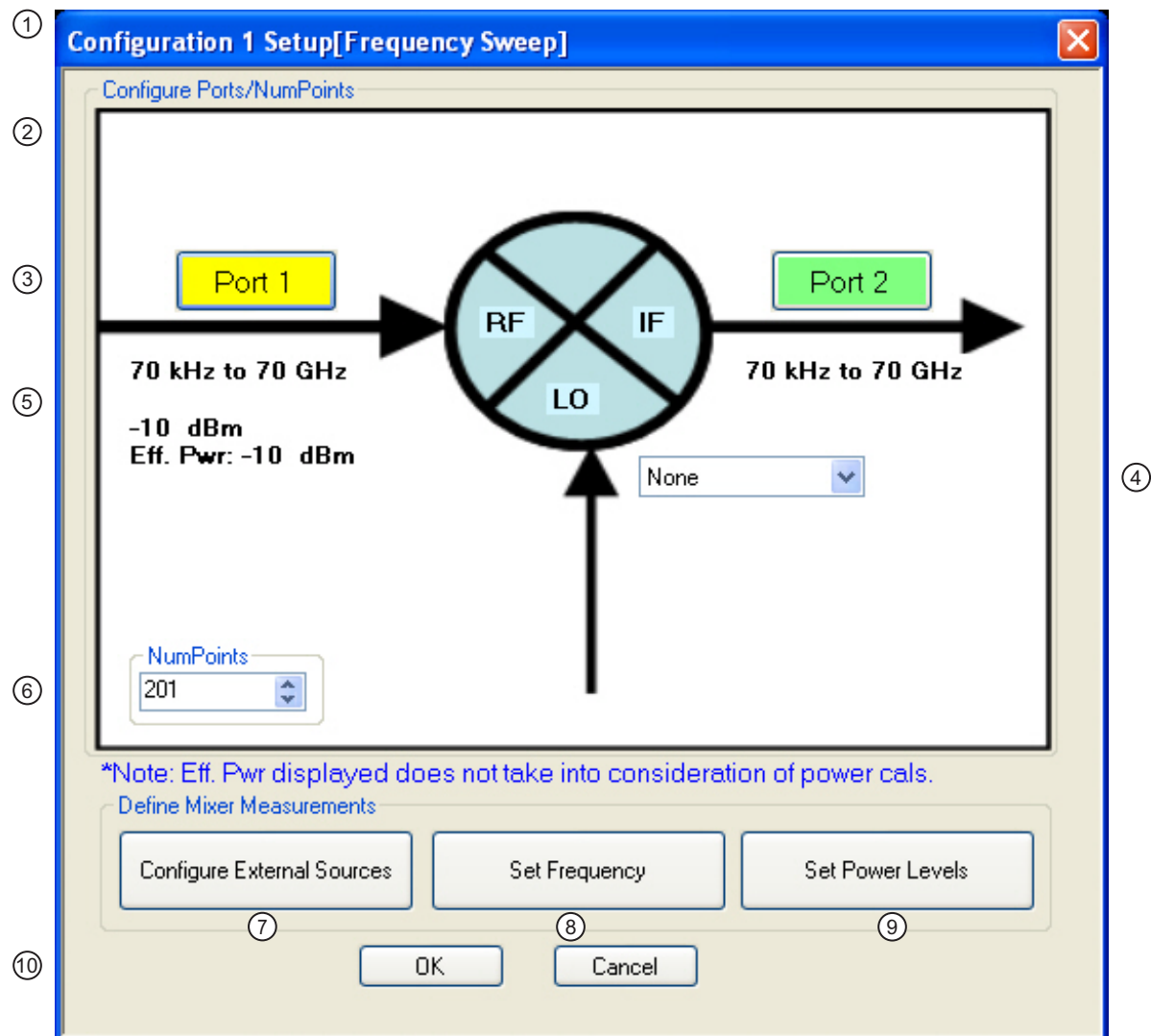
Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Initial Settings

- Select the required measurements in the Configuration 1 RF/IF Related Path area.
 - The available measurements are:
 - Input match
 - Isolation, input to output
 - Conversion gain/loss, input to output
 - Output match
 - Isolation, output to input
 - Conversion gain/loss, output to input
 - See [Table 16-1, “Available Measurements for Frequency-Based Sweep”](#) on page 16-29 above for more information on measurements.
 - At least one measurement must be selected to make the Next button available.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency

10. When all selections have been made, select the Next button.

- The CONFIGURATION 1 SETUP (FREQUENCY SWEEP) dialog box appears.



- | | |
|---|--|
| 1. CONFIGURATION 1 SETUP (FREQUENCY SWEEP) Setup Dialog Box. | 7. Configure External Sources – Links to CONFIGURE EXT. SOURCE ADDRESSES dialog box to configure GPIB addresses. |
| 2. Mixer Schematic with port, frequency, and power assignments. | 8. Set Frequency Button – Links to the SET FREQUENCY (FREQUENCY SWEEP) setup dialog to set frequency mode and value for IRF, IF, and LO. |
| 3. Port Assignments – Each must be unique selecting from None, Port 1, Port 2, or External Sources 1 through 4. | 9. Set Power Levels Button – Links to the SET POWERS (FREQUENCY SWEEP) setup dialog. |
| 4. Port Assignment pull down field | 10. Dialog Completion Buttons |
| 5. Power Assignments | |
| 6. NumPoints – Number of measurement points. | |

Figure 16-22. CONFIGURATION 1 SETUP (FREQUENCY SWEEP) – Controls

11. Use the controls on the dialog box to set the following parameters:

- Select the Port 1 or Port 2 button to change port assignments.
- Select the LO field to select the source for LO as External Src (Source) 1, External Src 2, External Src 3, External Src 4, or None.
- Change the NumPoints (Number of Points) field to the required measurement points. The initial value is taken from the setting on the FREQUENCY menu.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set External Source Addresses

12. When ready, select the Configure External Sources button. The CONFIGURE EXT. SOURCE ADDRESSES dialog box appears.

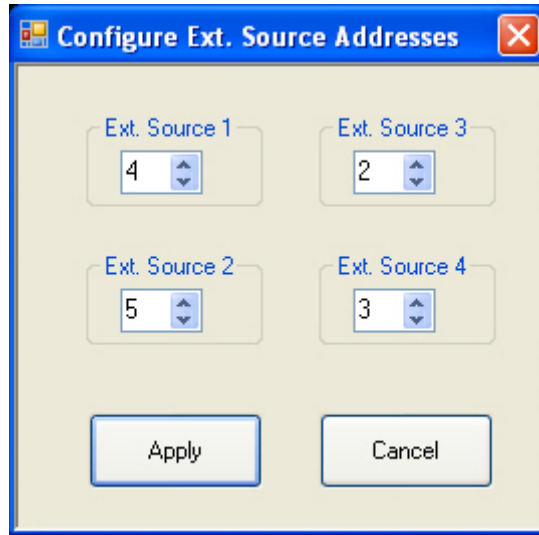
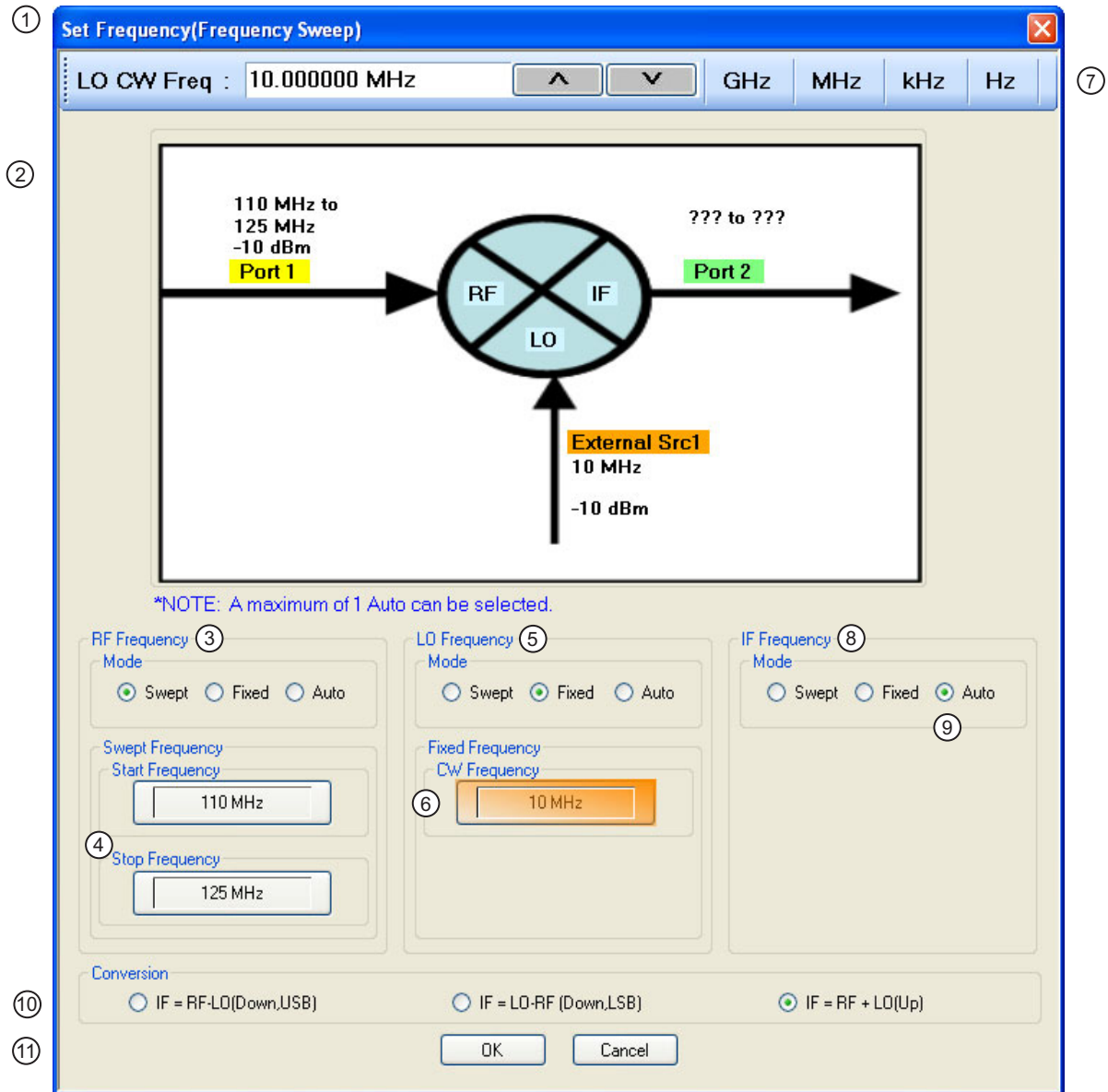


Figure 16-23. CONFIGURE EXT. SOURCE ADDRESSES Dialog Box

13. Change the address settings as required.
 - The mixer dialog uses the settings made on the REMOTE INTER. menu.
 - MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
 - Changes made in the mixer dialog are applied to the REMOTE INTER. men.
14. When all changes are complete, select the Apply button. The CONFIGURATION 1 SETUP dialog box reappears.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency

15. When ready, select the Set Frequency button. The SET FREQUENCY (FREQUENCY SWEEP) dialog box appears as shown in Figure 16-24 below.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Multi-Channel – SET FREQUENCY (FREQUENCY SWEEP) Setup Dialog Box 2. Mixer schematic showing mixer and VNA port assignments, frequency values, and power values. 3. RF Frequency Mode and Value Settings 4. RF Mode set as Swept with Swept Frequency Start and Stop input field. For all ports, mode can be any combination of Swept and Fixed. Only one port can be set as Auto. 5. LO Frequency Mode and Value Setting | <ol style="list-style-type: none"> 6. LO Mode set as Fixed with CW Frequency input field. 7. LO CW Frequency field tool bar with vale and units. Appears for RF, IF, and LO input as required. 8. IF Frequency Model and Value Settings 9. IF Mode set as Auto. Value is calculated based on the settings for the other two ports and the Conversion setting below. 10. Conversion setting radio buttons. If default RF as input and LO as output, calculates IF. If R as output and IF and input, calculates RF. |
|---|--|

Figure 16-24. Multi-Channel – SET FREQUENCY (FREQUENCY SWEEP) Setup Dialog Box

16. The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency – Set RF, LO, and IF Mode and Values

17. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency.

18. For each control area, set the frequency mode.

- The frequency options are Swept, Fixed, or Auto.
- Any combination of Swept or Fixed can be assigned to the RF, IF, and LO ports.
- Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected (described below) in the Conversion area at the bottom of the dialog box and the settings on the other two ports.
- Each Frequency Mode selection provides different control immediately below in the next area.
- In the figure above, RF Frequency is set as Swept, LO Frequency is set as Swept, and IF Frequency is set as Fixed.

19. If the RF, IF, and/or LO Frequency Mode is set as Swept:

- The Swept Frequency area appears with controls for Start Frequency and Stop Frequency.
- Select the Start Frequency field, and at the top of the dialog in the field toolbar, enter the required starting frequency and required units from GHz, MHz, kHz, or Hz.
- Note that the field toolbar name changes depending on whether RF, IF, or LO is selected.

20. If the RF, IF, and/or LO Frequency Mode is set as Fixed:

- The Fixed Frequency area appears with a single control for CW Frequency.
- Select the CW field and enter the required CW frequency and required units.

21. If the RF, IF, or LO Frequency Mode is set as Auto:

- No frequency assignment fields are available.
- The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency – Set the Conversion Required

22. Near the bottom of the dialog is the Conversion area.

23. Select button for the conversion type required from options of:

- $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
- $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
- $IF = RF + LO$ which is up conversion.

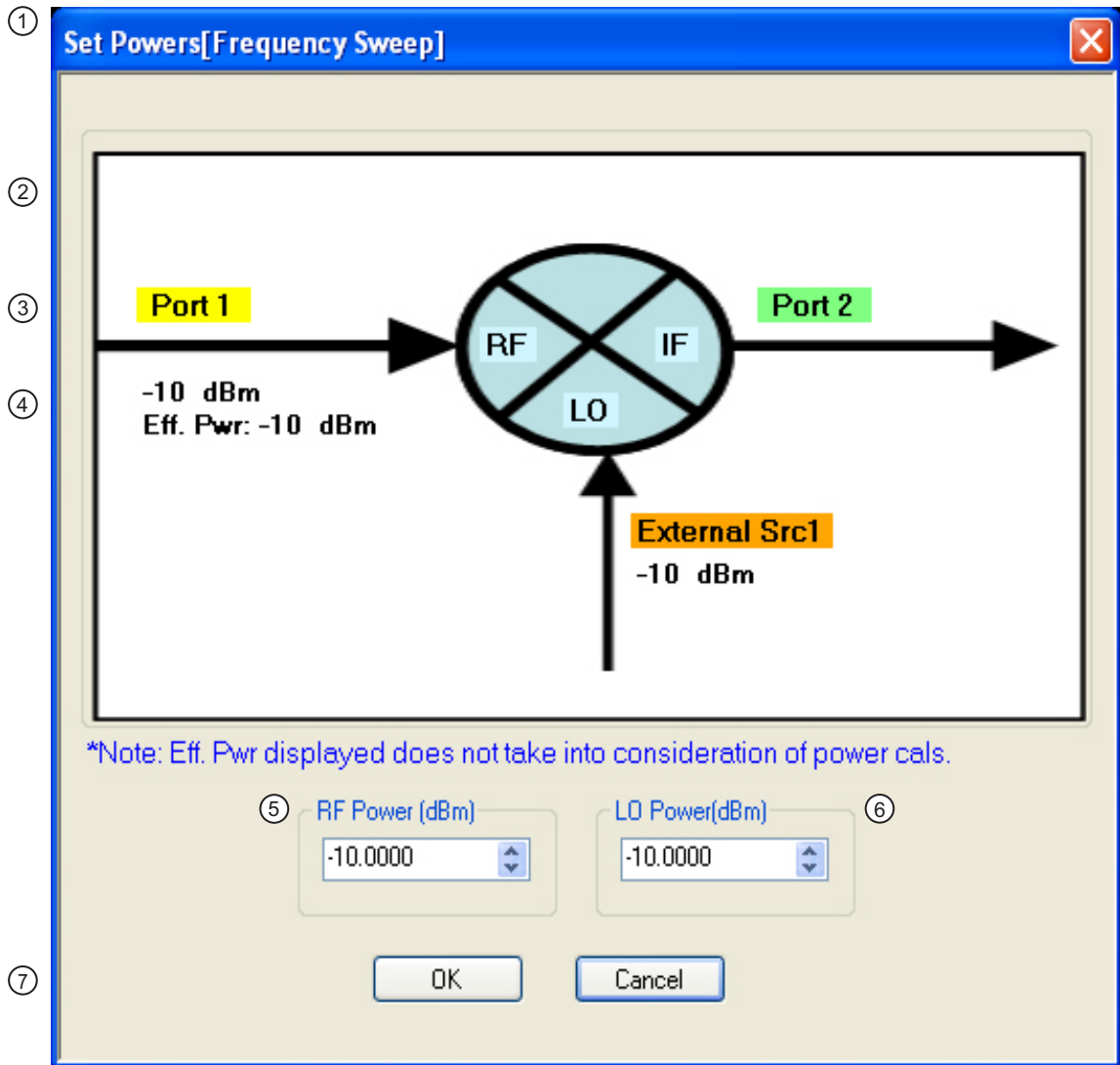
24. When all settings are complete, select the OK button to return to the setup central control dialog.

- The CONFIGURATION 1 SETUP [FREQUENCY SWEEP] setup dialog reappears.
- See [Figure 16-22, “CONFIGURATION 1 SETUP \(FREQUENCY SWEEP\) – Controls” on page 16-33](#) above.
- If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Power Levels

25. On the CONFIGURATION 1 SETUP [FREQUENCY SWEEP] setup dialog box, select the Set Power Levels button.

- The SET POWERS (FREQUENCY SWEEP) setup dialog box appears as shown below in Figure 16-13.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Multi-Channel – Configuration 1 – SET POWERS (FREQUENCY SWEEP) Dialog Box 2. Mixer Schematic with mixer and VNA port assignments and power settings. 3. Port Assignments | <ol style="list-style-type: none"> 4. Power Settings – Note that only the driving ports have assigned power settings. The port and naming assignments depend on the user configuration. 5. RF Power (dBm) input field. 6. LO Power (dBm) input field. 7. Dialog Control buttons. |
|---|--|

Figure 16-25. Multi-Channel – Configuration 1 – SET POWERS (FREQUENCY SWEEP) Dialog Box

26. Enter the required RF Power level in dBm in the provided field.
 - Note that the power setting appears on the Mixer Schematic and also in the POWER menu.
27. Enter the required LO POWER level in dBm.
28. When all settings are complete, select the OK button to return to the main setup control dialog box.
 - See [Figure 16-19, “MIXER SETUP CONFIGURATION \(FREQUENCY SWEEP\) Dialog Box – Control Areas”](#) on page 16-30] setup dialog reappears.

29. A dialog report appears with a listing of the required calibrations to support the input mixer configuration. A typical example is shown below.

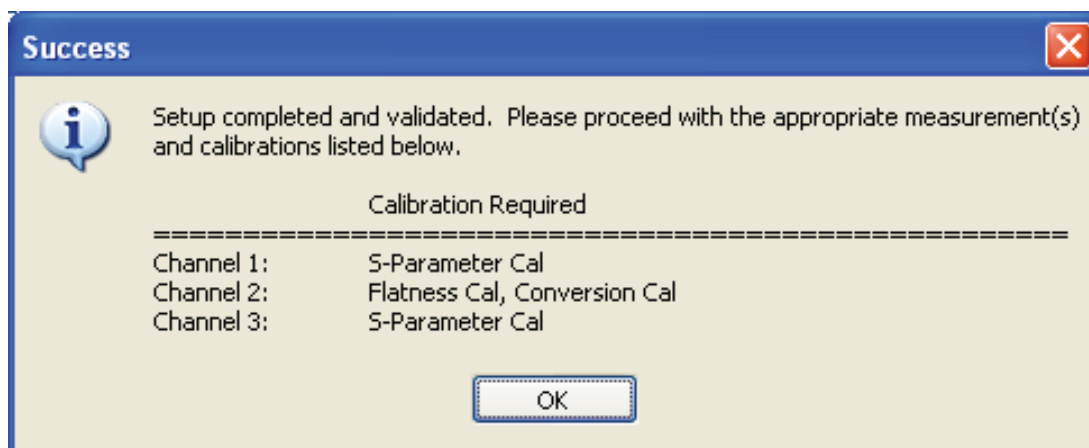


Figure 16-26. SUCESS Dialog with Required Calibrations

30. The mixer configuration process is complete.

16-8 MULTI-CHANNEL – Power-Based Sweep

Previous

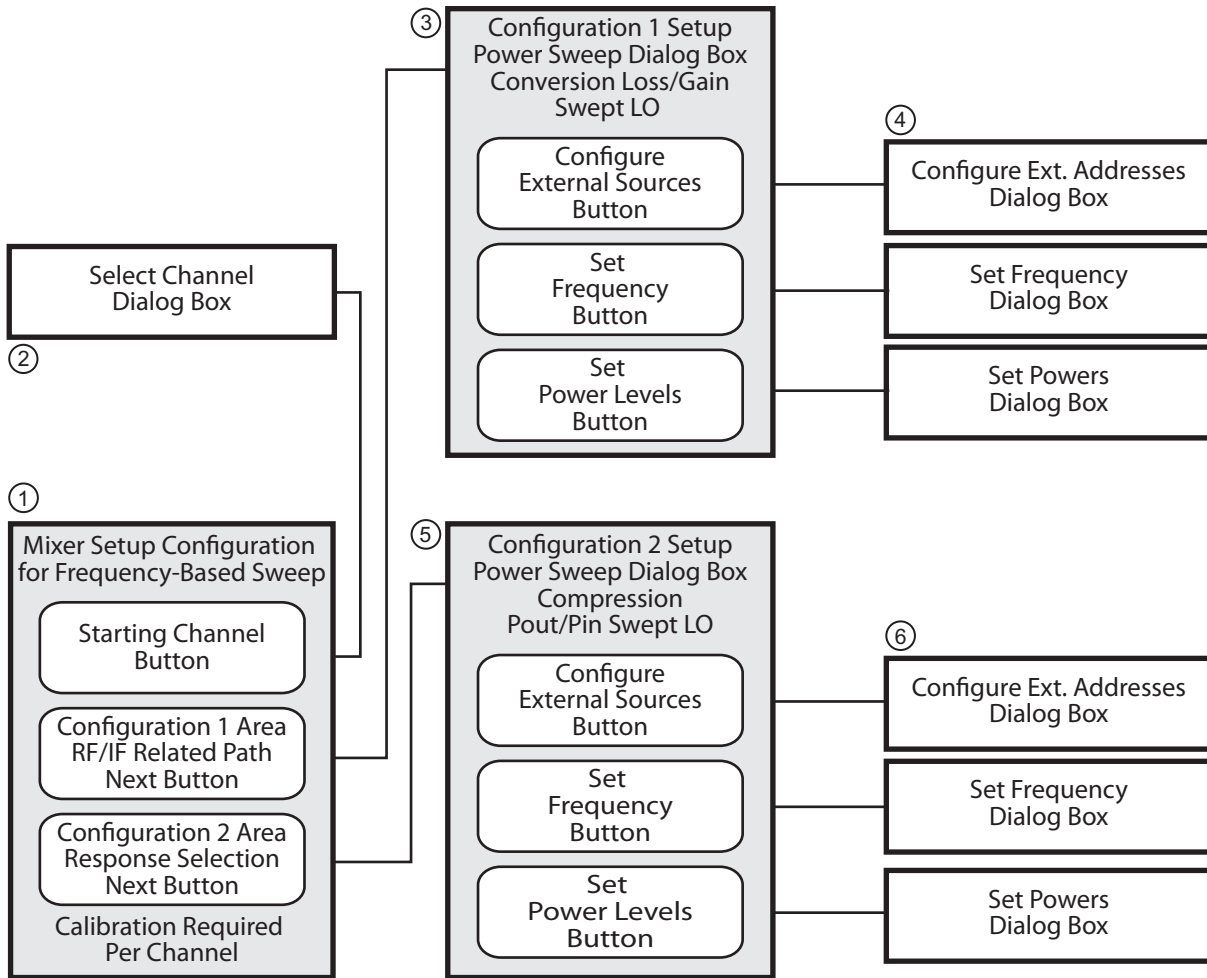
- [“Application Menu Variants for Mixer Setup” on page 16-2.](#)

Navigation

- MAIN | Application | APPLICATION | Mixer Setup (Active Channel) | MIXER SETUP Dialog Box | MIXER SETUP CONFIGURATION Dialog Box | Sweep Type = Power Sweep

Mixer Setup – Multi-Channel – Power Sweep – Menu Set

The multi-channel mixer setup provides additional measurement capability over multiple channels and consists of one central control dialog box with multiple supporting dialog boxes. The multi-channel mixer setup dialog for power-based sweeps is similar to the controls for the active channel version described above. Additional parameters can be measured, which require addition dialogs to configure the mixer. The relationships between the main and supporting dialog boxes in shown in [Figure 16-27](#) below.



- | | |
|---|---|
| <ol style="list-style-type: none"> 1. MIXER SETUP CONFIGURATION [Frequency-Based Sweep] Dialog Box 2. SELECT CHANNEL Dialog Box 3. CONFIGURATON 1 SETUP Dialog Box for RF/IF related Paths 4. Configuration 1 Dialog Boxes for External Source Address, Frequency, and Power. | <ol style="list-style-type: none"> 5. CONFIGURATON 2 SETUP Dialog Box for Isolation LO to Output 6. Configuration 2 Dialog Boxes for External Source Address, Frequency, and Power. 7. CONFIGURATON 3 SETUP Dialog Box for Isolation LO to Input 8. Configuration 3 Dialog Boxes for Frequency and Power. |
|---|---|

Figure 16-27.MULTI-CHANNEL MIXER SETUP Dialog Boxes – Power-Based Sweep

Mixer Setup – Multi-Channel – Power Sweep – Available Measurements

The table below lists the available power-based mixer measurements. On the main dialog box, check boxes

allow individual measurement selections. Within each of the two configuration areas (Configuration 1 and Configuration 2), selection of any one measurement within a configuration area enables the Next button for that area. Selecting the Next button displays the multiple support dialogs for that configuration area.

Table 16-2. Available Measurements for Power-Based Sweep

Measurement	Response	Display Format	Channel
Configuration 1 – Conversion Gain/Loss – Swept LO Response selection is based on port configuration.			
Conversion Gain/Loss, Swept LO	B2/1	Magnitude	Channel 1
Next button – Links to the CONFIGURATION 1 SETUP Dialog Box for Conversion Gain/Loss, Swept LO.			
Configuration 2 – Pout versus Pin – Swept RF – Response selection is based on port configuration.			
Compression, Pout versus Pin, Swept RF	B2/1	Magnitude	Channel 2
Next button – Links to the CONFIGURATION 2 SETUP dialog box for Isolation LP to Output.			

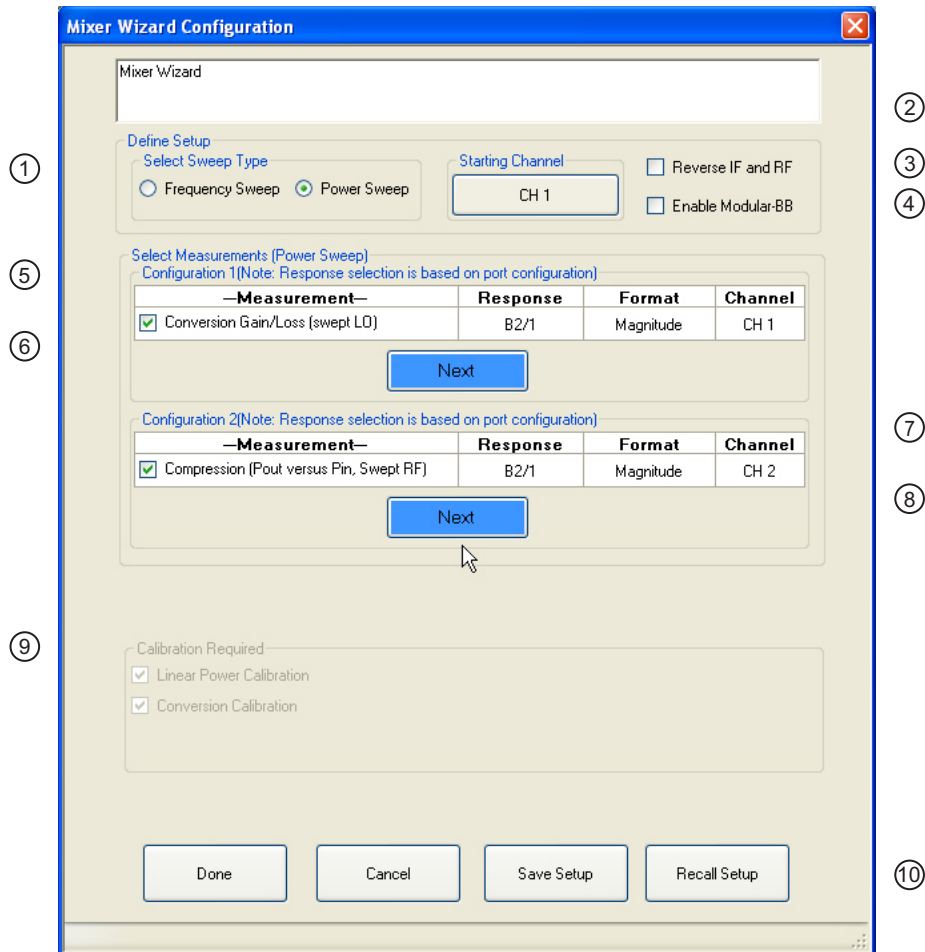
Mixer Setup – Multi-Channel – Power Sweep – Channel Assignments

Two channels are required to support all measurements. See [Table 16-2, “Available Measurements for Power-Based Sweep” on page 16-41](#) above for the default channel assignments. Skipped measurements do not change the channel assignment. For example, if the default channel settings are used and the Conversion Gain/Loss, Swept LO measurement is not used, the remaining Compression, Pout versus Pin, Swept RF measurement is set to Channel 2. The starting channel can be changed to any of the 16 channels. If Channel 16 is assigned, and another channel is required, the Channel assignment rolls over to Channel 1.

Mixer Setup – Multi-Channel – Power Sweep – Procedure

1. On the APPLICATION menu, select the Mixer Setup (Multi-Channel) button. The MIXER SETUP CONFIGURATION dialog box appears.

2. In the Define Setup area at the top of the box, select the Power Sweep radio button. The appearance and controls change for power sweep as shown in the figure below. The control areas are shown in the figure below.



- | | |
|--|---|
| 1. Select Sweep Type | 6. Next button to Configuration 1 dialogs |
| 2. Select Starting Channel | 7. Configuration 2 Measurements for Compression Pout versus Pin Swept RF. |
| 3. Reverse RF and IF – Standard is RF is input and IF output. Reverse is RF as output and IF as input. | 8. Next button to Configuration 2 dialogs. |
| 4. Enable Modular Broadband. | 9. Calibration Required Area display. |
| 5. Configuration 1 Measurements for Conversion Gain/ Loss Swept LO. | 10. Dialog control buttons. |

Figure 16-28. MIXER SETUP CONFIGURATION Dialog Box – Power Sweep

3. For Frequency Sweeps, see “[Previous](#)” on page 16-25 above.
4. If a power-based mixer setup has been previously saved, select the Recall Setup button near the bottom of the dialog box. A RECALL MIXER CONFIGURATION SETUP dialog box appears. Navigate as required and select the appropriate MWZD file. Once open, proceed with the procedure below to modify it as required.

Mixer Setup – Multi-Channel – Power Sweep – Set the Starting Channel

5. The default starting channel is Channel 1. To change the default, select the Starting Channel button.

- The SELECT CHANNEL dialog box appears (see [Figure 16-5, “MIXER SETUP ACTIVE CHANNEL Dialog Box – Frequency Sweep – Control Locations”](#) on page 16-9 above).
 - If Channel 16 is selected, and another channel is required, the setup automatically rolls over to assign Channel 1 to the next channel.
6. Select the required starting channel. The focus autoreturns to the MIXER SETUP CONFIGURATION (POWER SWEEP) dialog box.

Mixer Setup – Multi-Channel – Power Sweep – Reverse IF and RF

7. If required, on the right side of the dialog box, select the check box for Reverse the IF and RF.
- The default non-selected check box provides RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.
 - See [Figure 16-6, “Standard and Reversed IF and RF Ports”](#) on page 16-11 above for examples of default and reversed RF/IF port assignments.

Mixer Setup – Multi-Channel – Power Sweep – Enable Modular BB

8. If required, also on the right, select the check box for Enable Modular-BB (Broadband).
- This is only available for MS4647A VNAs equipped with Option 080/081 Modular Broadband/Millimeter-Wave (mm-Wave).
 - This installation also requires the ME7838A configuration with the 3739x Test Set and two 3743A or MA25300A mm-Wave Modules.

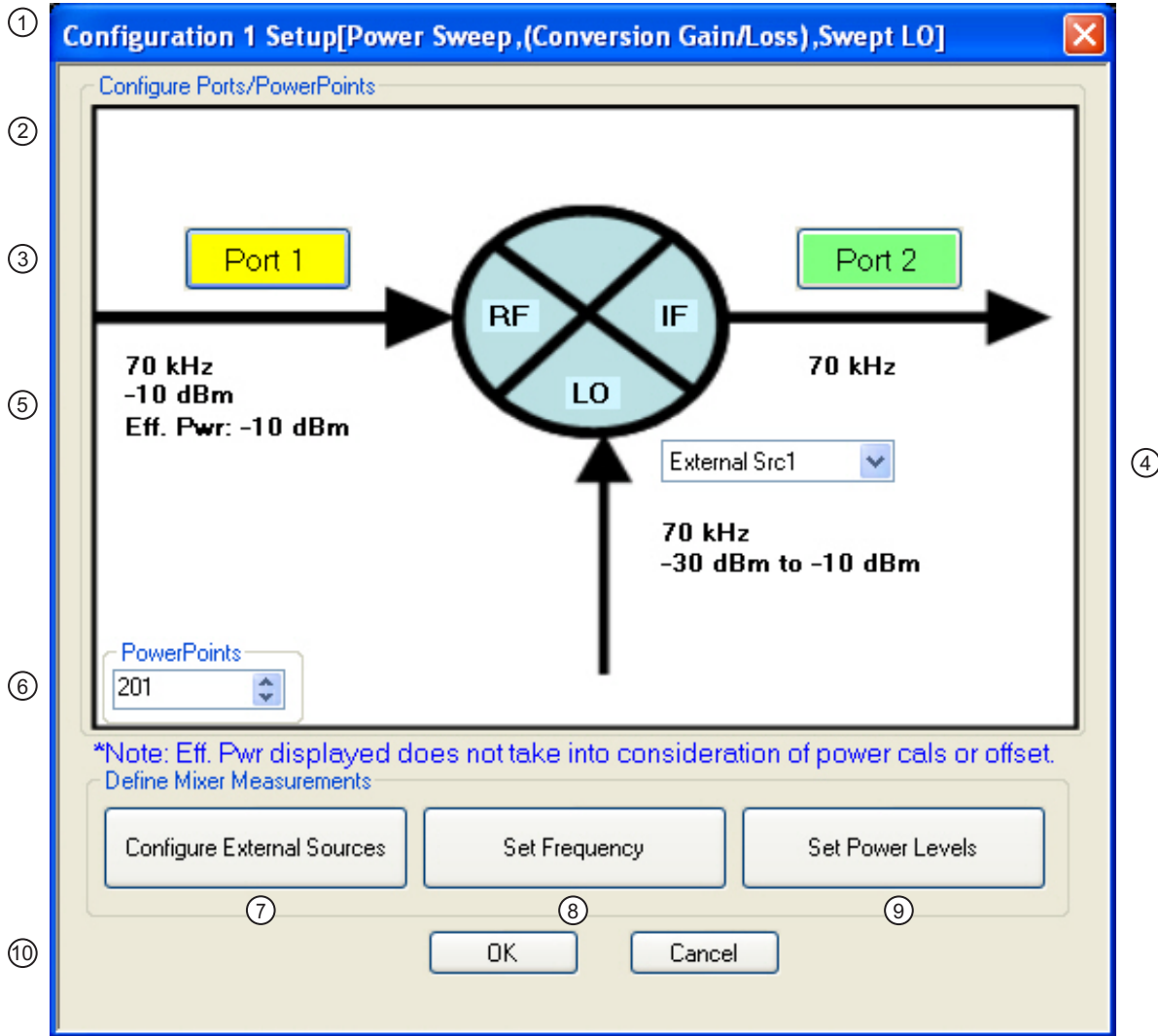
Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Initial Settings

9. Select the required measurements in the Configuration 1 Conversion Gain/Loss area.
- The available measurement is Conversion Gain/Loss (Swept LO).
 - See [Table 16-2, “Available Measurements for Power-Based Sweep”](#) on page 16-41 above for more information on measurements.
 - At least one measurement must be selected to make the Next button available.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency

10. When all selections have been made, select the Next button.

- The CONFIGURATION 1 SETUP (FREQUENCY SWEEP) dialog box appears.



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. CONFIGURATION 1 SETUP (POWER SWEEP) Setup Dialog Box. 2. Mixer Schematic with port, frequency, and power assignments. 3. Port Assignments – Each must be unique selecting from None, Port 1, Port 2, or External Sources 1 through 4. 4. Port Assignment pull down field 5. Power Assignments 6. PowerPoints – Number of power measurement points. | <ol style="list-style-type: none"> 7. Configure External Sources – Links to CONFIGURE EXT. SOURCE ADDRESSES dialog box to configure GPIB addresses. 8. Set Frequency Button – Links to the SET FREQUENCY (POWER SWEEP) setup dialog to set frequency mode and value for IRF, IF, and LO. 9. Set Power Levels Button – Links to the SET POWERS (POWER SWEEP) setup dialog. 10. Dialog Completion Buttons |
|--|---|

Figure 16-29. CONFIGURATION 1 SETUP (POWER SWEEP) – Controls

11. Use the controls on the dialog box to set the following parameters:

- Select the Port 1 or Port 2 button to change port assignments.
- Select the LO field to select the source for LO as External Src (Source) 1, External Src 2, External Src 3, External Src 4, or None.
- Change the PowerPoints (Number of Power Points) field to the required measurement points. The initial value is taken from the setting on the FREQUENCY menu.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set External Source Addresses

12. When ready, select the Configure External Sources button. The CONFIGURE EXT. SOURCE ADDRESSES dialog box appears.

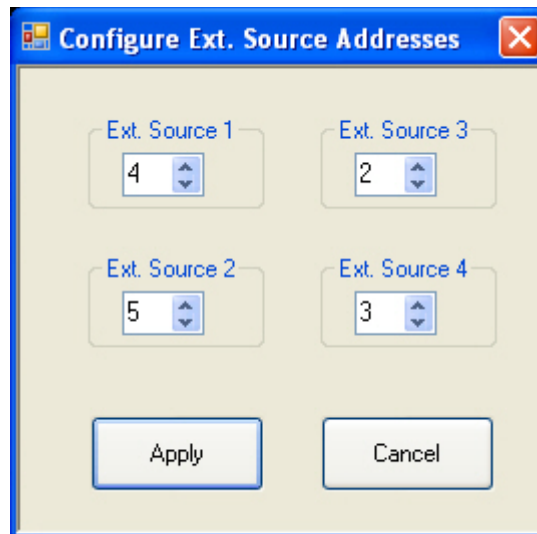


Figure 16-30. Configuration 1 – CONFIGURE EXT. SOURCE ADDRESSES Dialog Box

13. Change the address settings as required.

- The mixer dialog uses the settings made on the REMOTE INTER. menu.
 - MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
- Changes made in the mixer dialog are applied to the REMOTE INTER. men.

14. When all changes are complete, select the Apply button. The CONFIGURATION 1 SETUP dialog box reappears.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency

15. When ready, select the Set Frequency button. The SET FREQUENCY (POWER SWEEP) dialog box appears as shown in Figure 16-31 below.

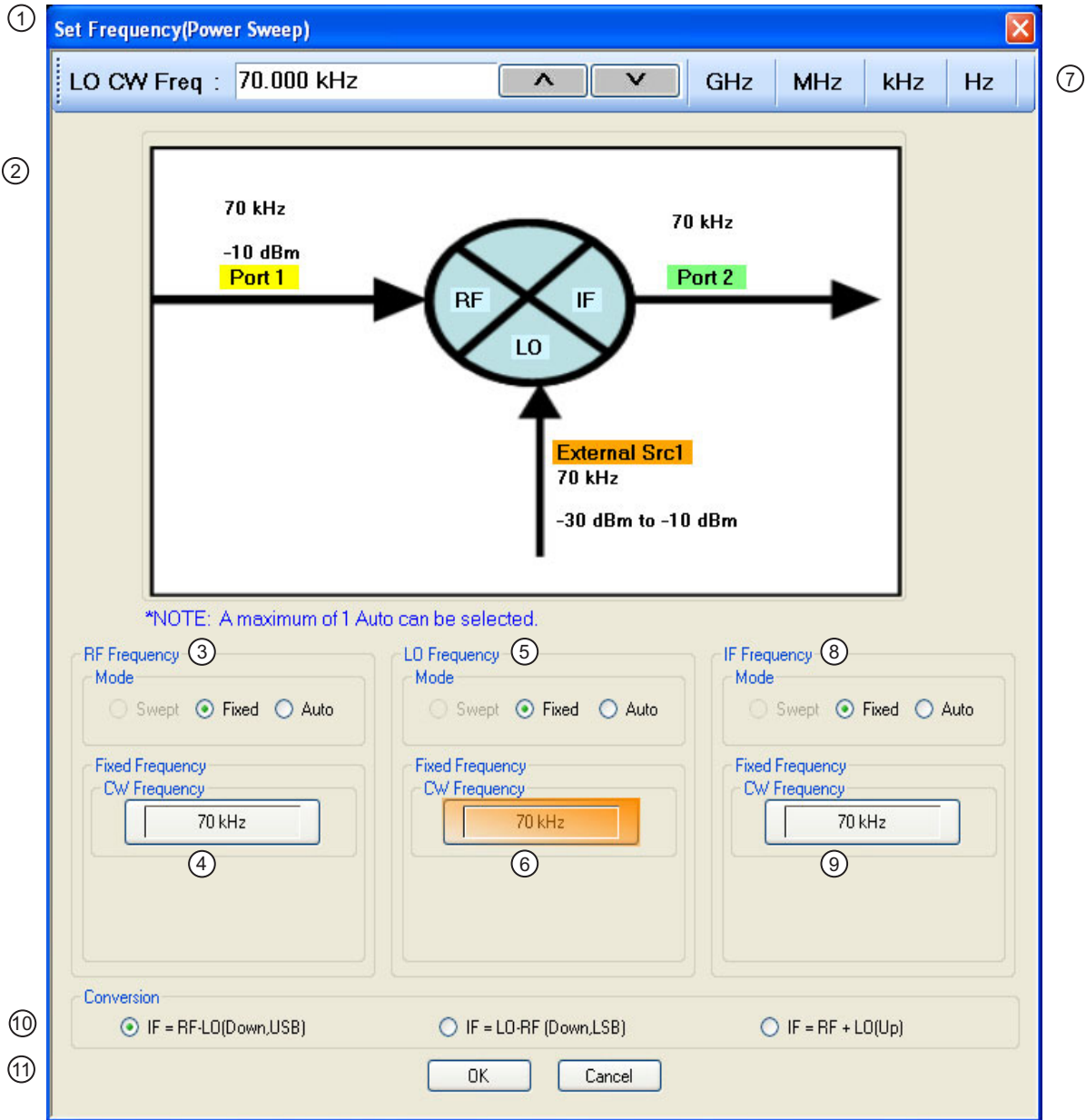


Figure 16-31. Configuration 1 – SET FREQUENCY (POWER SWEEP) Setup Dialog Box (1 of 2)

1. Multi-Channel – SET FREQUENCY (POWER SWEEP) Setup Dialog Box	6. LO Mode set as Fixed with Fixed CW Frequency input field.
2. Mixer schematic showing mixer and VNA port assignments, frequency values, and power values.	7. LO CW Frequency field tool bar with value and units. Appears for RF, IF, and LO input as required.
3. RF Frequency Mode and Value Settings	8. IF Frequency Mode and Value Settings
4. RF Mode set as Fixed with Fixed CW Frequency field. For all ports, only one port can be set as Auto. If a port is set as Auto, its value is calculated based on the two other ports and the conversion setting.	9. IF Mode set as Fixed with Fixed CW Frequency field.
5. LO Frequency Mode and Value Setting	10. Conversion setting radio buttons. If default RF as input and LO as output, calculates IF. If RF as output and IF as input is set, calculates RF.

Figure 16-31. Configuration 1 – SET FREQUENCY (POWER SWEEP) Setup Dialog Box (2 of 2)

16. The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency – Set RF, LO, and IF Mode and Values

17. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency.

18. For each control area, set the frequency mode.

- The frequency options are Fixed or Auto. Swept is unavailable.
- Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected (described below) in the Conversion area at the bottom of the dialog box and the settings on the other two ports.

19. If the RF, IF, and/or LO Frequency Mode is set as Fixed:

- The Fixed Frequency area appears with a single control for CW Frequency.
- Select the CW field and enter the required CW frequency and required units.
- At the top of the dialog in the field toolbar, enter the required starting frequency and required units from GHz, MHz, kHz, or Hz.
- Note that the field toolbar name changes depending on whether RF, IF, or LO is selected.

20. If the RF, IF, or LO Frequency Mode is set as Auto:

- No frequency assignment fields are available.
- The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency – Set the Conversion Required

21. Near the bottom of the dialog is the Conversion area.

22. Select button for the conversion type required from options provided which depend on whether IF and RF were reversed.

- If the default RF as input and IF as output was selected above:
 - $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
- If reverse was selected above with IF as input and RF as output:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF + LO$ which is down conversion with Upper Side Band (USB).

23. When all settings are complete, select the OK button to return to the setup central control dialog.

- The CONFIGURATION 1 SETUP (POWER SWEEP) setup dialog reappears.
- See Figure 16-29, “CONFIGURATION 1 SETUP (POWER SWEEP) – Controls” on page 16-44 above.
- If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Power Levels

24. On the CONFIGURATION 1 SETUP (POWER SWEEP) setup dialog box, select the Set Power Levels button.

- The SET POWERS (FREQUENCY SWEEP) dialog box appears as shown below in Figure 16-13.

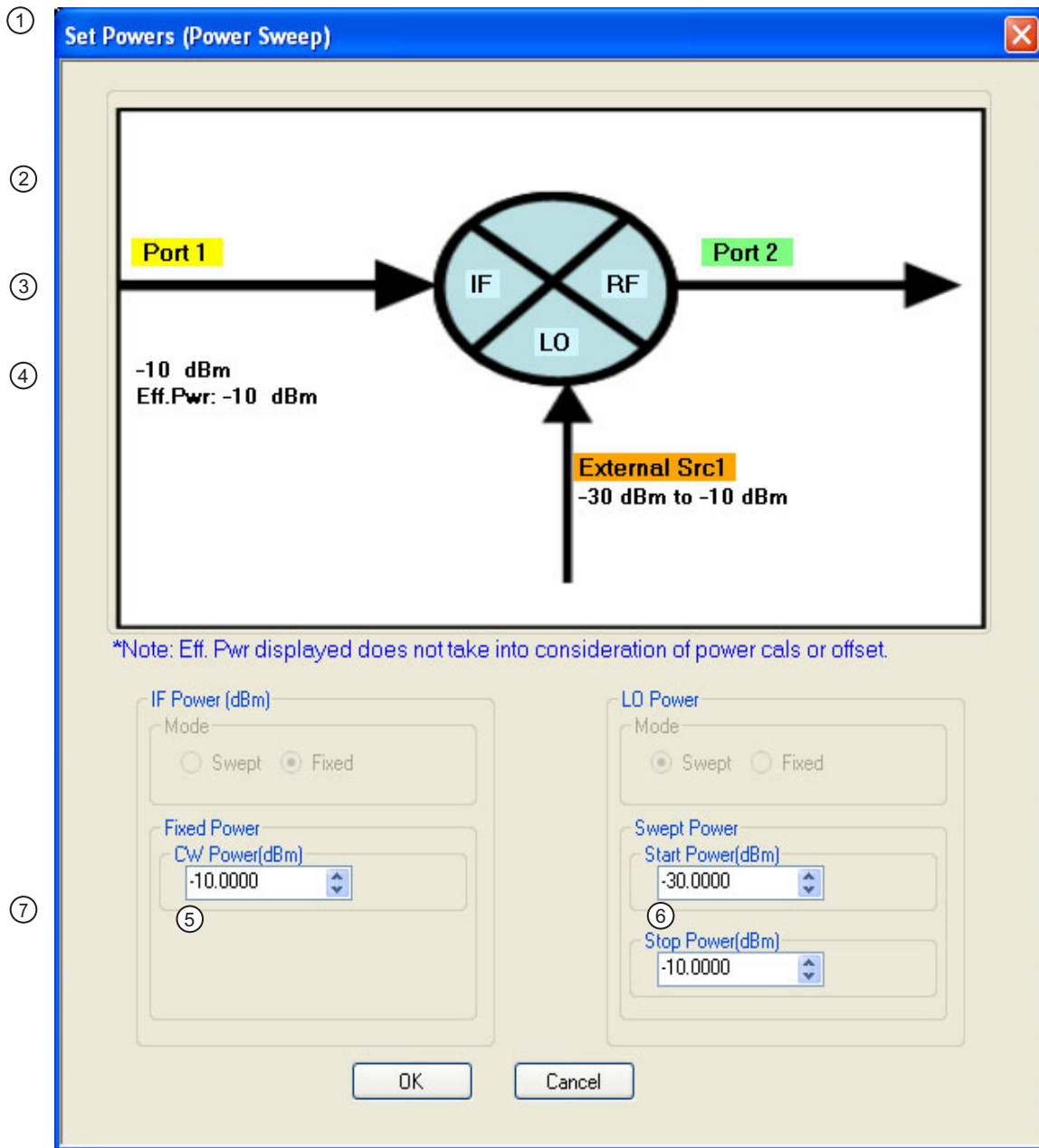


Figure 16-32. Configuration 1 – SET POWERS (POWER SWEEP) Setup Dialog Box (1 of 2)

<ol style="list-style-type: none"> 1. Multi-Channel – Configuration 1 – SET POWERS (POWER SWEEP) Dialog Box 2. Mixer Schematic with mixer and VNA port assignments and power settings. 3. Port Assignments 	<ol style="list-style-type: none"> 4. Power Settings – Note that only the driving ports have assigned power settings. The port and naming assignments depend on the user configuration. 5. RF Power (dBm) input field for CW Power. 6. LO Power (dBm) input fields for Swept Power. 7. Dialog Control buttons.
---	--

Figure 16-32. Configuration 1 – SET POWERS (POWER SWEEP) Setup Dialog Box (2 of 2)

25. Depending on the configuration enter the required power levels for RF, LO and/or IF in the provided fields.
 - Note that the power setting appears on the Mixer Schematic and also in the POWER menu.
26. When all settings are complete, select the OK button to return to the Configuration 1 setup control dialog box.
 - The CONFIGURATION 1 SETUP (POWER SWEEP, CONVERSION GAIN/LOSS, Swept LO) setup dialog box reappears.
 - See [Figure 16-29, “CONFIGURATION 1 SETUP \(POWER SWEEP\) – Controls”](#) on page 16-44 above.
27. Inspect all settings in Configuration 1 and make any final changes as required.
28. When all settings are complete, select the OK button to return to the MIXER SETUP CONFIGURATION (POWER SWEEP) main control dialog box.
 - The MIXER SETUP CONFIGURATION (POWER SWEEP) reappears.
 - See [Figure 16-28, “MIXER SETUP CONFIGURATION Dialog Box – Power Sweep”](#) on page 16-42 above.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Initial Settings

29. If required, in the Configuration 2 area, select the Compression (Pout versus Pin) measurement.
 - At least one measurement must be selected to make the Next button available.
 - See [Table 16-2, “Available Measurements for Power-Based Sweep”](#) on page 16-41 above for more information on measurements.
30. Select the Next button in the Configuration 2 area.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency

31. When all selections have been made, select the Next button.
 - The CONFIGURATION 2 SETUP (FREQUENCY SWEEP) dialog box appears.
 - See [Figure 16-29, “CONFIGURATION 1 SETUP \(POWER SWEEP\) – Controls”](#) on page 16-44 above for a dialog box example.
32. Set parameters as required:
 - VNA Port Assignment
 - External Source Assignment
 - Number of Power Measurement Points
33. When all selections have been made, select the Configure External Sources button.
 - The CONFIGURE EXT. SOURCE ADDRESSES dialog box appears.
 - See [Figure 16-30, “Configuration 1 – CONFIGURE EXT. SOURCE ADDRESSES Dialog Box”](#) on page 16-45 above for a dialog box example.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Set External Source Addresses

34. Use the controls on the dialog box to set the GPIB addresses for External Source 1 through External Source 2.

- The mixer dialog uses the settings made on the REMOTE INTER. menu.
 - MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
 - Changes made in the mixer dialog are applied to the REMOTE INTER. men.
35. When all changes are complete, select the Apply button. The CONFIGURATION 2 SETUP mixer setup dialog box reappears.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Set Frequency

36. When ready, select the Set Frequency button. The SET FREQUENCY (POWER SWEEP) dialog box appears.
- See [Figure 16-31, “Configuration 1 – SET FREQUENCY \(POWER SWEEP\) Setup Dialog Box” on page 16-46](#) above for a dialog box example.
37. The available mixer ports to configure for frequency depend on the settings.
38. For each mixer port, set the mode as Swept or Fixed as required. In some cases, some options may be unavailable.
39. For each mixer port, set the Start/Stop Frequency or CW Frequency as required. All settings are presented in the mixer schematic.
40. When all changes are complete, select the OK button. The CONFIGURATION 2 SETUP mixer setup dialog box reappears.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Set Power Levels

41. When ready, select the Set Power Levels button. The SET POWERS (POWER SWEEP) dialog box appears.
- See [Figure 16-32, “Configuration 1 – SET POWERS \(POWER SWEEP\) Setup Dialog Box” on page 16-48](#) above for a dialog box example.
42. The available mixer ports to configure for power depend on the settings. Some settings and/or some ports may be unavailable.
43. For each mixer port, set the mode as required.
44. If Swept is set, enter the Swept Power Start and Swept Power Stop power settings.
45. If CW is set, enter the CW Power setting.
46. When ready, select the OK button. The CONFIGURATION 2 SETUP mixer setup dialog box reappears.
- See [Figure 16-32, “Configuration 1 – SET POWERS \(POWER SWEEP\) Setup Dialog Box” on page 16-48](#) above for a dialog box example.
47. Check all settings and when ready, select the OK button. The MIXER SETUP CONFIGURATION (POWER SWEEP) dialog box appears.
- See [Figure 16-28, “MIXER SETUP CONFIGURATION Dialog Box – Power Sweep” on page 16-42](#) above.

Mixer Setup – Multi-Channel – Power Sweep – Completing the Configuration

48. The Calibration Required area on the dialog box becomes available. Make a note of the required calibrations. A dialog report appears with a listing of the required calibrations to support the input mixer configuration. A typical example is shown below.

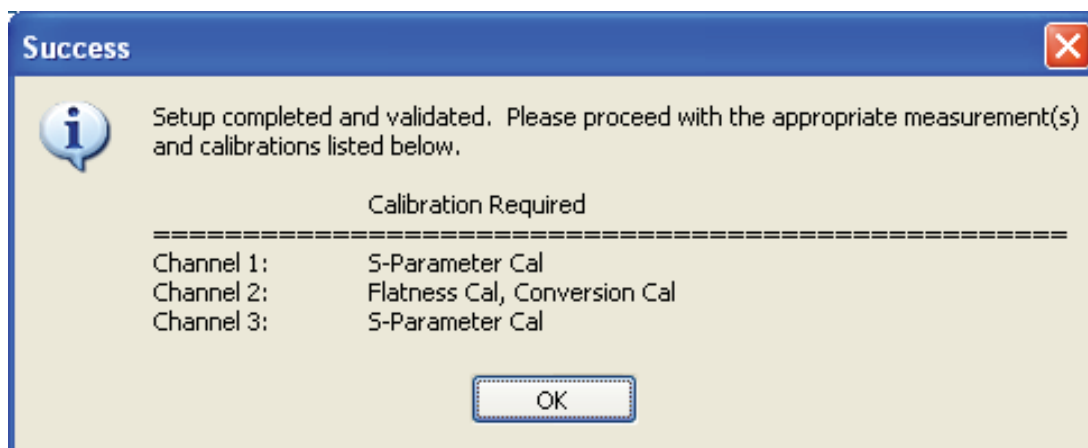


Figure 16-33. SUCCESS Dialog with Required Calibrations

49. The mixer configuration process is complete.

50. To save the setup, select the **Save Setup** button.

- A standard Windows Save dialog box appears to save the setup as a MWZD file.
- Navigate to the required folder, and select **Save**.

Chapter 17 — Application Menus - NxN

17-1 Chapter Overview

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode, and whether broadband or multiple sources are used. The menu also provides access to NxN setup.

Other Application Menu Chapters

Other APPLICATION menu chapters with specific application feature focus are:

- [Chapter 12, “Application Menus - Overview”](#)
- [Chapter 13, “Application Menus - Multiple Source”](#)
- [Chapter 14, “Application Menus - Broadband/Millimeter-Wave”](#)
- [Chapter 15, “Application Menus - Noise Figure”](#)
- [Chapter 16, “Application Menus - Mixer Setup”](#)

17-2 Application Menus and NxN Dialog Boxes

The APPLICATION menu set for NxN contains the following one menu and one dialog box:

- APPLICATION Menu (see Figure 17-1, “APPLICATION Menu and NxN Function – Typical Variant Examples” on page 17-2 below.)
- “NXN SOLUTION USING S2P FILES Dialog Box” on page 17-3
- Typical APPLICATION menus with related NxN buttons are shown in the figure below.



Typical APPLICATION menu variants showing NxN function location. All VNAs have Option 007 – Receiver Offset and Option 041 – Noise Figure equipped.

1. MS4642A VNA – Transmission/Reflection selected.

2. MS4642A VNA – Noise Figure selected.

3. MS4647A VNA – Noise Figure selected.

4. MS4647A VNA – Transmission/Reflection selected. Equipped with Option 080/081 – Broadband/ Millimeter-Wave.

Figure 17-1. APPLICATION Menu and NxN Function – Typical Variant Examples

NxN

Selecting the NxN button displays the NXN SOLUTION USING S2P Files dialog box.

- “NXN SOLUTION USING S2P FILES Dialog Box” on page 17-3

17-3 NXN S2P Configuration

NXN SOLUTION USING S2P FILES Dialog Box

Previous

- “APPLICATION Menu” on page 12-2

Navigation

- MAIN | Application | APPLICATION | NxN | NXN SOLUTION USING S2P FILES Dialog Box

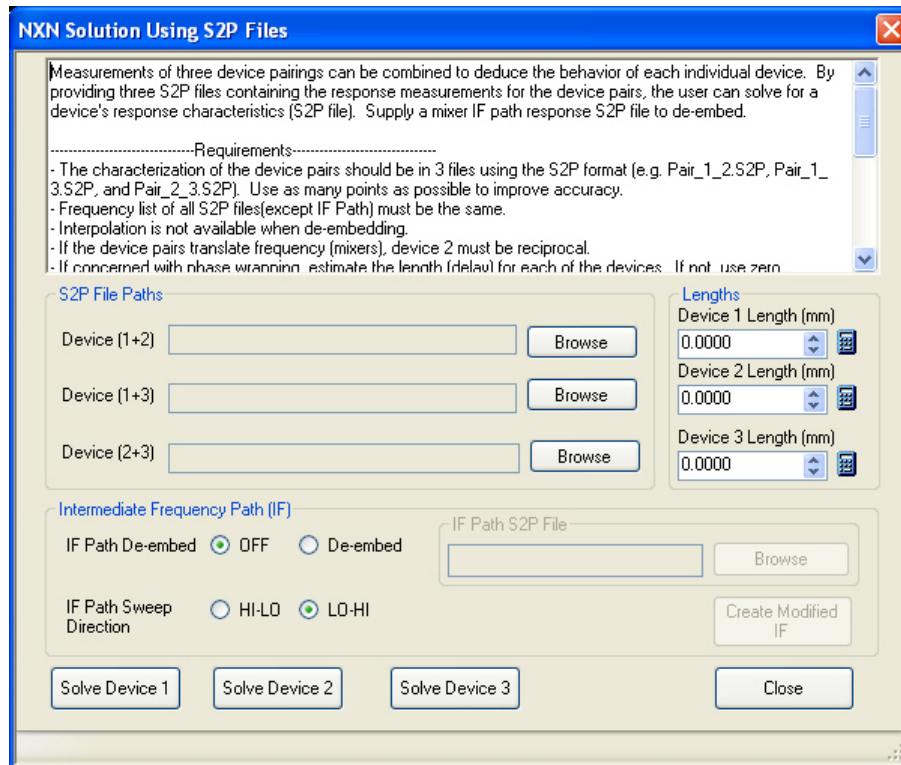


Figure 17-2. NXN SOLUTION USING S2P FILES Dialog Box

Description

Measurements of three device pairings can be combined to deduce the behavior of each individual device. By providing three S2P files containing the response measurements for the device pairs, the user can solve for a device's response characteristics (S2P file). Supply a mixer IF path response S2P file to de-embed.

Requirements

The characterization of the device pairs should be in three (3) files using the S2P format, such as:

- Pair_1_2.s2p
- Pair_1_3.s2p
- Pair_2_3.s2p

Use as many points as possible to improve accuracy. The following requirements apply:

- The frequency list of all.s2p files (except the IF Path) must be the same. Interpolation is not available in the NxN extraction process but it is available when de-embedding the resultant file.
- If the device pairs translate frequency (mixers), device 2 must be reciprocal.

- If concerned with phase wrapping, estimate the length (delay) for each of the devices. If not, use zero (0).

Instructions

1. Select the location and filenames of the input device pairs by selecting the **Browse** button.
 - Each button displays a separate file open dialog box named **Select S2P File for Device (###)** where **###** is either **1+2**, **1+3**, or **2+3**.
2. Input the estimated length (delay) for each device.
 - Use the **Calculator** icon to convert from time to distance.
3. Select the appropriate IF Path.
 - Note that if the **IF Path De-embed** selection is **De-embed**, an IF Path S2P file is needed.
 - IF path de-embedding is used when it is desired to remove the effects of any pad/filter assembly that might be used between devices (particularly when they are mixers). Note that the frequency list in the file must be the VNA frequency range (even if physically it is not) so some S2P editing may be needed.
4. Select the appropriate IF Path Sweep Direction as either **HI-LO** or **LO-HI**.
 - If the devices are frequency converting and the IF is sweeping the opposite direction from the VNA (that is, if the port 1 frequency increases, the IF decreases because of the LO frequency being used), then select the IF Path Sweep Direction as **LO-HI**.
 - If using **LO-HI**, an internally swapped list for the IF S2P file will be created. If desired, this can be saved to a file using the **Create Modified IF** button.
 - Otherwise, select **HI-LO**.
5. Select the **Solve** button to solve for the desired device, saving as a S2P file. This will prompt for a location of where to save the S2P files.

Chapter 18 — Trace Menus

18-1 Chapter Overview

This chapter provides information for the number of traces that appear for each channel and how those traces are arranged on the main display. Up to 16 traces can be defined for each channel. There are 22 available trace layouts.

18-2 Overview of Trace Menus

There are two (2) trace menus:

- [“TRACE Menu” on page 18-2](#)
- [“TRACE LAYOUT Menu” on page 18-4](#)

18-3 Trace Configuration

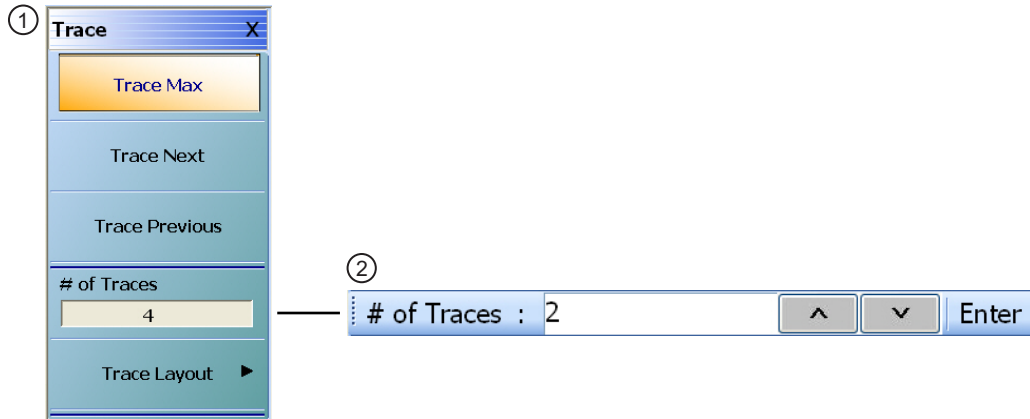
TRACE Menu

Previous

- “MAIN MENU” on page 2-1

Navigation

- MAIN | Trace | TRACE



1. TRACE Menu

2. # of Traces (Number of Traces) Field Toolbar

Figure 18-1. TRACE Menu

Trace Max

Select displays the currently active trace and maximizes the display to fill the screen. Select again to return to the normal trace display.

Trace Next

Select activates the next higher trace number. If the highest trace was previously selected, trace 1 (one) is activated.

Trace Previous

Select activates the next lower trace number. If trace 1 (one) is was previously selected, the highest numbered trace is selected.

of Traces

Selecting the # of Traces (Number of Traces) button allows the user to define the number of traces that appear on the screen and displays the # of Traces field toolbar. On the toolbar, from 1 (one) to 16 traces per channel can be selected.

- If the number of traces is greater than the current trace display layout (described below), traces will be overlaid as required. For example, if the # of Traces selection is set to 6 (six) traces, and the trace layout is set to 4 (four) traces, 2 (two) of the trace displays will be overlaid with an additional trace.
- If the number of traces is less than the current trace display layout, trace display positions will be empty. For example, if the trace layout is for 16 traces (4 rows of 4 displays), and the # of Traces selection is set for 12 traces, the last row of three trace displays will be empty.

Trace Layout

Select displays the TRACE LAYOUT menu to change how the traces are displays on the screen.

- [“TRACE LAYOUT Menu” on page 18-4](#)

18-4 Trace Display Layout

TRACE LAYOUT Menu

The trace view buttons are not labeled but instead provide a representation icon of the available view. Click the required view to select it. Click the **Back** button at the bottom of the TRACE LAYOUT menu to return to the TRACE menu. If more traces than trace layouts are specified, some or all of the trace layouts will show multiple overlaid trace displays. If more trace layouts than trace are specified, some trace layout positions will be empty.

Previous

- [“TRACE Menu” on page 18-2](#)

Navigation

- MAIN | Trace | TRACE | Trace Layout | TRACE LAYOUT

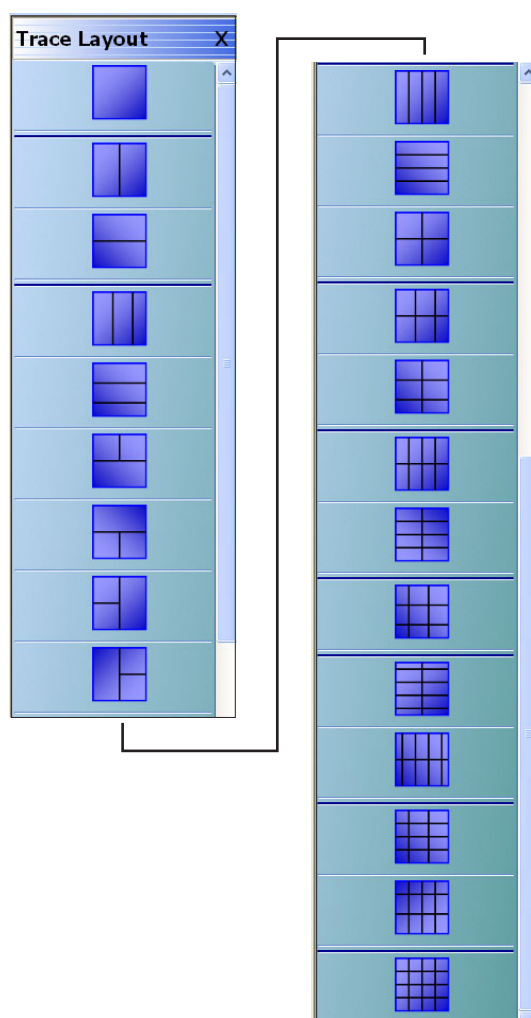


Figure 18-2. TRACE LAYOUT Menu (1 of 3)

	<p>Single Trace View</p> <p>Click Back to return to the Trace menu.</p> <p>If SCPI programming is used to control the VNA, the command parameter for this trace view is R1C1. The command parameters for the other trace layout views are listed with each trace view type below.</p>
	<p>Two Trace View - 2 Across x 1 Down</p> <p>Click Back to return to the Trace menu.</p> <p>R1C2 for SCPI programs.</p>
	<p>Two Trace View - 1 Across x 2 Down</p> <p>Click Back to return to the Trace menu.</p> <p>R2C1 for SCPI programs.</p>
	<p>Three Trace View - 3 Across</p> <p>Click Back to return to the Trace menu.</p> <p>R1C3 for SCPI programs.</p>
	<p>Three Trace View - 3 Down</p> <p>Click Back to return to the Trace menu.</p> <p>R3C1 for SCPI programs.</p>
	<p>Three Trace View - 2 on Top x 1 on Bottom</p> <p>Click Back to return to the Trace menu.</p> <p>R2C2C1 for SCPI programs.</p>
	<p>Three Trace View - 1 on Top x 2 on Bottom</p> <p>Click Back to return to the Trace menu.</p> <p>R2C1C2 for SCPI programs.</p>
	<p>Three Trace View - 2 on Left x 1 on Right</p> <p>Click Back to return to the Trace menu.</p> <p>C2R2R1 for SCPI programs.</p>
	<p>Three Trace View - 1 on Left x 2 on Right</p> <p>Click Back to return to the Trace menu.</p> <p>C2R1R2 for SCPI programs.</p>
	<p>Four Trace View - 4 Across</p> <p>Click Back to return to the Trace menu.</p> <p>R1C4 for SCPI programs.</p>
	<p>Four Trace View - 4 Down</p> <p>Click Back to return to the Trace menu.</p> <p>R4C1 for SCPI programs.</p>
	<p>Four Trace View - 2 Across x 2 Down</p> <p>Click Back to return to the Trace menu.</p> <p>R2C2 for SCPI programs.</p>
	<p>Six Trace View - 3 Across x 2 Down</p> <p>Click Back to return to the Trace menu.</p> <p>R2C3 for SCPI programs.</p>

Figure 18-2. TRACE LAYOUT Menu (2 of 3)

	<p>Six Trace View - 2 Across x 3 Down</p> <p>Click Back to return to the Trace menu. R3C2 for SCPI programs.</p>
	<p>Eight Trace View - 4 Across x 2 Down</p> <p>Click Back to return to the Trace menu. R2C4 for SCPI programs.</p>
	<p>Eight Trace View - 2 Across x 4 Down</p> <p>Click Back to return to the Trace menu. R4C2 for SCPI programs.</p>
	<p>Nine Trace View - 3 Across x 3 Down</p> <p>Click Back to return to the Trace menu. R3C3 for SCPI programs.</p>
	<p>Ten Trace View - 5 Across x 2 Down</p> <p>Click Back to return to the Trace menu. R5C2 for SCPI programs.</p>
	<p>Ten Trace View - 2 Across x 5 Down</p> <p>Click Back to return to the Trace menu. R2C5 for SCPI programs.</p>
	<p>Twelve Trace View - 3 Across x 4 Down</p> <p>Click Back to return to the Trace menu. R4C3 for SCPI programs.</p>
	<p>Twelve Trace View - 4 Across x 3 Down</p> <p>Click Back to return to the Trace menu. R3C4 for SCPI programs.</p>
	<p>Sixteen Trace View - 4 Across x 4 Down</p> <p>Click Back to return to the Trace menu. R4C4 for SCPI programs.</p>

Figure 18-2. TRACE LAYOUT Menu (3 of 3)

Chapter 19 — Response Menus - 2-Port VNAs

19-1 Chapter Overview

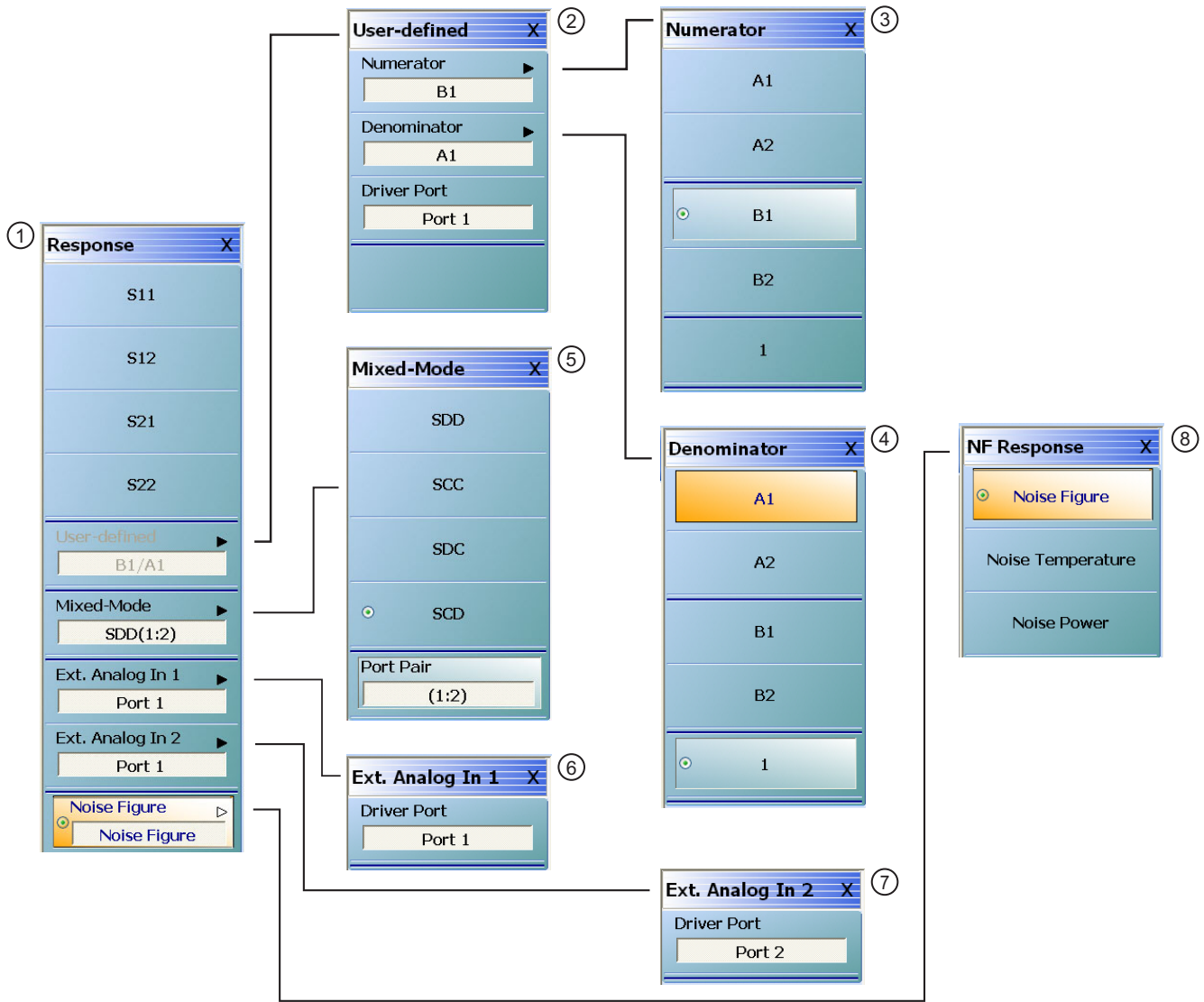
This chapter provides information for the 2-Port VNA Response menus for configuration of the required S-Parameter or user-definition of a unique parameter. This menu also controls the rear panel **External Analog Input** port source. For information on the Response menus for 4-Port VNA, consult [Chapter 20, “Response Menus - 4-Port VNAs”](#)

19-2 Primary Response Menu - 2-Port VNAs

The available 2-port Response menus are:

- [“RESPONSE Menu - 2-Port VNAs” on page 19-3](#)
- [“USER-DEFINED Menu - 2-Port VNAs” on page 19-5](#)
- [“DENOMINATOR Menu - 2-Port VNAs” on page 19-8](#)
- [“MIXED MODE Menu - 2-Port VNAs” on page 19-9](#)
- [“EXT. ANALOG IN 1 Menu - 2-Port VNAs” on page 19-10](#)
- [“EXT. ANALOG IN 2 Menu - 2-Port VNAs” on page 19-10](#)
- [“NF RESPONSE Menu - 2-Port VNAs” on page 19-11](#)

The figure below shows Response 2-Port Menu Set when Option 041 – Noise Figure Measurement is installed.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. RESPONSE Menu <ul style="list-style-type: none"> • The Noise Figure button is not present if Noise Figure Option 041 is not installed. • The button is present but not available if Option 041 is installed and the instrument mode on the APPLICATION menu is set as Transmission/Reflection. 2. USER-DEFINED Menu 3. NUMERATOR Menu | <ol style="list-style-type: none"> 4. DENOMINATOR Menu 5. MIXED-MODE Menu 6. If Noise Figure mode has been set on the APPLICATION menu, this button is unavailable and grayed out.EXT. ANALOG IN 1 Menu 7. EXT.ANALOG IN 2 Menu 8. NF RESPONSE (Noise Figure Response) Menu |
|---|--|

Figure 19-1. Response Menu Set - 2-Port VNAs

RESPONSE Menu - 2-Port VNAs

Previous

- “MAIN MENU” on page 2-1

Navigation

- MAIN | Response | RESPONSE

Button Selection Group

- All the buttons of the RESPONSE menu form a button selection group where the selection of any one button de-selects the other buttons.



1. RESPONSE Menu – 2-Port VNA
 - Option 041 – Noise Figure is not equipped.
2. RESPONSE Menu – 2-Port VNA
 - Option 041 – Noise Figure is equipped.
 - The VNA measurement mode at the APPLICATION menu is set to Transmission/Reflection.

3. RESPONSE Menu – 2-Port VNA
 - Option 041 – Noise Figure is equipped.
 - The VNA measurement mode at the APPLICATION menu is set to Noise Figure.
 - The User-Defined button is unavailable.
 - The Mixed-Mode button is unavailable.

Figure 19-2. RESPONSE Menu - 2-Port VNAs

S11 (Response)

Select sets the response to the input reflection coefficient (or S11 Forward Reflection) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

S12 (Response)

Select sets the response to the reverse transmission coefficient (or S12 Reverse Transmission) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

S21 (Response)

Select sets the response to the forward transmission coefficient (or S21 Forward Transmission) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

S22 (Response)

Select sets the response to the output reflection coefficient (or S22 Reverse Reflection) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

User-defined (Response)

Select displays the USER-DEFINED menu and sets the response to a user-defined mathematical fraction by using the USER DEFINED menu to select S11, S12, S21, S22, or 1 (one) as a numerator over S11, S12, S21, S22, or 1 as the denominator. Select also de-selects S12, S21, S22, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2. This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 041 must be equipped for Noise Figure.

- [“USER-DEFINED Menu - 2-Port VNAs” on page 19-5](#)

Mixed-Mode (Response 2-Port)

Select displays the MIXED-MODE menu where mixed-mode response options of SDD, SCC, SDC, and SCD are available with a Port Pair assignment of either 1:2 or 2:1. Select also de-selects S12, S21, S22, User-Defined, Ext. Analog In 1, and Ext. Analog In 2. This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 041 must be equipped for Noise Figure.

- [“MIXED MODE Menu - 2-Port VNAs” on page 19-9](#)

Ext. Analog In 1 (Response)

Select displays the EXT ANALOG 1 menu and de-selects S12, S21, S22, User-defined, and Ext. Analog In 2.

- [“EXT. ANALOG IN 1 Menu - 2-Port VNAs” on page 19-10](#)

Ext. Analog In 2 (Response)

Select displays the EXT ANALOG 2 menu and de-selects S12, S21, S22, User-defined, and Ext. Analog In 1.

- [“EXT. ANALOG IN 2 Menu - 2-Port VNAs” on page 19-10](#)

Noise Figure

This button is only present if Option 041 – Noise Figure is equipped on the VNA. If present, it is only available if the VNA application mode is set to Noise Figure. The application mode is set on the APPLICATION menu at:

- MAIN | Application | APPLICATION | Mode = Noise Figure
- [Chapter 15, “Application Menus - Noise Figure”](#)

If present and available, select displays the NF RESPONSE menu where the where the noise figure response type is selected.

- [“NF RESPONSE Menu - 2-Port VNAs” on page 19-11](#)

If the Noise Figure button is available, the User-Defined and Mixed-Mode buttons are unavailable.

19-3 User-Defined Parameter Menus - 2-Port VNAs

USER-DEFINED Menu - 2-Port VNAs

The USER DEFINED menu is used to establish various mathematical combinations of incident and reflected power values. See [Table 19-1, “User-Defined Numerator/Denominator Combinations” on page 19-6](#) below for all possible combinations and definitions of the more common parameters.

Previous

- [“RESPONSE Menu - 2-Port VNAs” on page 19-3](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED

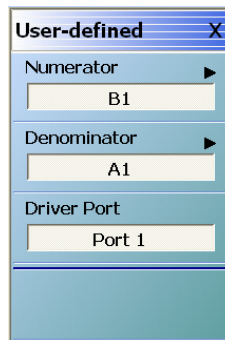


Figure 19-3. USER DEFINED Menu - 2-Port VNAs

Numerator

Select displays the NUMERATOR menu. Once a numerator value is selected, the menu auto-returns to the USER DEFINED menu.

- [“NUMERATOR Menu - 2-Port VNAs” on page 19-7](#)

Denominator

Select displays the DENOMINATOR menu. Once a denominator value is selected, the menu auto-returns to the USER DEFINED menu.

- [“DENOMINATOR Menu - 2-Port VNAs” on page 19-8](#)

Driver Port (Port 1/Port 2)

Select toggles the driving port between Port 1 and Port 2.

Table 19-1. User-Defined Numerator/Denominator Combinations

Denominator	Numerator				
	A1	A2	B1	B2	1
A1	$\frac{A1}{A1} = 1$	$\frac{A2}{A1}$	$\frac{B1}{A1}$ S11 Forward Reflection	$\frac{B2}{A1}$ S21 Forward Transmission	$\frac{1}{A1}$
A2	$\frac{A1}{A2}$	$\frac{A2}{A2} = 1$	$\frac{B1}{A2}$ S12 Reverse Transmission	$\frac{B2}{A2}$ S22 Reverse Reflection	$\frac{1}{A2}$
B1	$\frac{A1}{B1}$	$\frac{A2}{B1}$	$\frac{B1}{B1} = 1$	$\frac{B2}{B1}$	$\frac{1}{B1}$
B2	$\frac{A1}{B2}$	$\frac{A2}{B2}$	$\frac{B1}{B2}$	$\frac{B2}{B2} = 1$	$\frac{1}{B2}$
1	$\frac{A1}{1} = A1$	$\frac{A2}{1} = A2$	$\frac{B1}{1} = B1$	$\frac{B2}{1} = B2$	$\frac{1}{1} = 1$

NUMERATOR Menu - 2-Port VNAs

Previous

- [“USER-DEFINED Menu - 2-Port VNAs” on page 19-5](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED | Numerator | NUMERATOR

Numerator Auto-Return Button Selection Group

- The buttons of the NUMERATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER-DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized above in [Table 19-1, “User-Defined Numerator/Denominator Combinations” on page 19-6.](#)

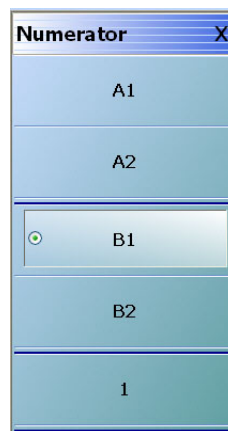


Figure 19-4. NUMERATOR Menu - 2-Port VNAs

A1 (Numerator)

Select specifies that A1, incident power on port 1, will be the numerator value.

A2 (Numerator)

Select specifies that A2 will be the numerator value.

B1 (Numerator)

Select specifies that B1, received power on port 1, will be the numerator value.

B2 (Numerator)

Select specifies that B2 will be the numerator value.

1 (One) (Numerator)

Select specifies that 1 (one) will be the numerator value.

DENOMINATOR Menu - 2-Port VNAs

Previous

- [“USER-DEFINED Menu - 2-Port VNAs” on page 19-5](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED | Denominator | DENOMINATOR

Denominator Auto-Return Button Selection Group

- The buttons of the DENOMINATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized in [Table 19-1, “User-Defined Numerator/Denominator Combinations” on page 19-6](#) above.

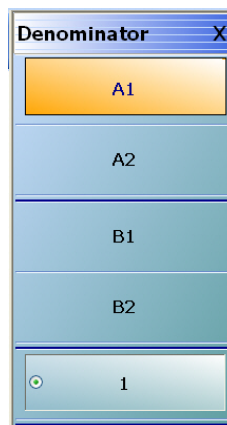


Figure 19-5. DENOMINATOR Menu - 2-Port VNAs

A1 (Denominator)

Select sets A1 as the denominator value.

A2 (Denominator)

Select sets A2 as the denominator value.

B1 (Denominator)

Select sets B1 as the denominator value.

B2 (Denominator)

Select sets B2 as the denominator value.

1 (One) (Denominator)

Select sets 1 (one) as the denominator value.

19-4 Mixed Mode Setup Menus - 2-Port VNAs

MIXED MODE Menu - 2-Port VNAs

Previous

- [“RESPONSE Menu - 2-Port VNAs” on page 19-3](#)

Navigation

- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE

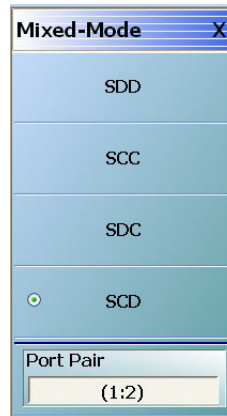


Figure 19-6. MIXED MODE Menu - 2-Port VNAs

SDD

Select sets the S-Parameter to differential reception with differential drive where the reception/driver ports are determined by the Port Pair button below.

SCC

Select sets the S-Parameter to common-mode reception with common-mode drive where the reception/driver ports are determined by the Port Pair button below.

SDC

Select sets the S-Parameter to differential reception with common-mode drive where the reception/driver ports are determined by the Port Pair button below.

SCD

Select sets the S-Parameter to common-mode reception with differential drive where the reception/driver ports are determined by the Port Pair button below.

Port Pair

Toggles the reception/driver port pair between 1:2 and 2:1.

19-5 External Analog Input Menus

EXT. ANALOG IN 1 Menu - 2-Port VNAs

Full Name

- EXTERNAL ANALOG INPUT 1 Menu

Previous

- [“RESPONSE Menu - 2-Port VNAs” on page 19-3](#)

Navigation

- MAIN | Response | RESPONSE | Ext Analog In 1 | EXT ANALOG IN 1

Figure

- See [Figure 19-7](#) below.

Port 1 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 1.

Port 2 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 2.



EXT. ANALOG IN 1 menu on left and EXT. ANALOG IN 2 menu on right.

Figure 19-7. EXT. ANALOG IN (External Analog Input) Menus - 2-Port VNAs

EXT. ANALOG IN 2 Menu - 2-Port VNAs

Full Name

- EXTERNAL ANALOG INPUT 2 Menu

Previous

- [“RESPONSE Menu - 2-Port VNAs” on page 19-3](#)

Navigation

- MAIN | Response | RESPONSE | Ext. Analog In 2 | EXT.ANALOG IN 2

Figure

- See [Figure 19-7](#) above.

Port 1 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 1.

Port 2 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 2.

19-6 Noise Figure Response Menu

NF RESPONSE Menu - 2-Port VNAs

Full Name

- NOISE FIGURE RESPONSE Menu

Prerequisites

- The VNA must be equipped with Option 041 – Noise Figure Measurement
- The application mode must be set to Noise Figure on the APPLICATION menu.
 - MAIN | Application | APPLICATION
 - [Chapter 15, “Application Menus - Noise Figure”](#)
 - [Chapter 15, “Application Menus - Noise Figure”](#)

Button Selection Group

- The buttons on the NF RESPONSE menu form a button selection group where selection of any one button de-selects all other buttons.

Previous

- [“RESPONSE Menu - 2-Port VNAs” on page 19-3](#)

Navigation

- MAIN | Response | RESPONSE | Noise Figure | NF RESPONSE

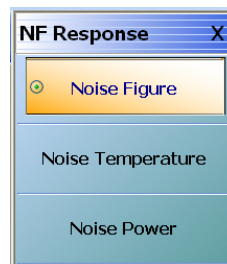


Figure 19-8. NF RESPONSE (Noise Figure Response) Menu

Note

All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.

Noise Figure

Select sets the noise figure measurement to Noise Figure. The noise figure is measured on a cold source basis. The units are set by the graph type.

Noise Temperature

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. The noise temperature is calculated from the noise figure. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

Noise Power

Select sets the noise figure measurement to Noise Power trace response. The measurement units are set by the graph type. The units will be in absolute power when a receiver calibration is applied.

Chapter 20 — Response Menus - 4-Port VNAs

20-1 Chapter Overview

This chapter provides information for the 4-Port VNA Response menus for configuration of the required S-Parameter or user-definition of a unique parameter. The MIXED-MODE dialog boxes described below allow mixed-mode response setup on a trace-by-trace basis with multiple response options for each trace. This menu also controls the rear panel External Analog Input port source. For information on the Response menus for 2-Port VNAs, consult [Chapter 19, “Response Menus - 2-Port VNAs”](#)

20-2 Overview of 4-Port Response Menus and Dialog Boxes

The available 4-port Response menus and dialog boxes are:

- [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)
 - [“MIXED MODE Setup Dialog Box - Two Diff. Pairs - 4-Port VNAs” on page 20-19](#)
 - [“MIXED MODE Setup Dialog Box - One Diff. Pair - One Singleton - 4-Port VNAs” on page 20-22](#)
 - [“MIXED MODE Setup Dialog Box - One Diff. Pair - Two Singletons - 4-Port VNAs” on page 20-24](#)
 - [“SELECT TRACE Dialog Box - 4-Port VNAs” on page 20-27](#)
- [“SINGLE-MODE Menu - 4-Port VNAs” on page 20-9](#)
- [“USER-DEFINED Menu - 4-Port VNAs” on page 20-11](#)
- [“NUMERATOR Menu - 4-Port VNAs” on page 20-14](#)
- [“DENOMINATOR Menu - 4-Port VNAs” on page 20-16](#)
- [“EXT. ANALOG IN 1 Menu - 4-Port VNAs” on page 20-28](#)
- [“EXT. ANALOG IN 2 Menu - 4-Port VNAs” on page 20-29](#)
- [“NF RESPONSE Menu - 4-Port VNAs” on page 20-30](#)

20-3 Display Response Mixed-Mode Control Menu

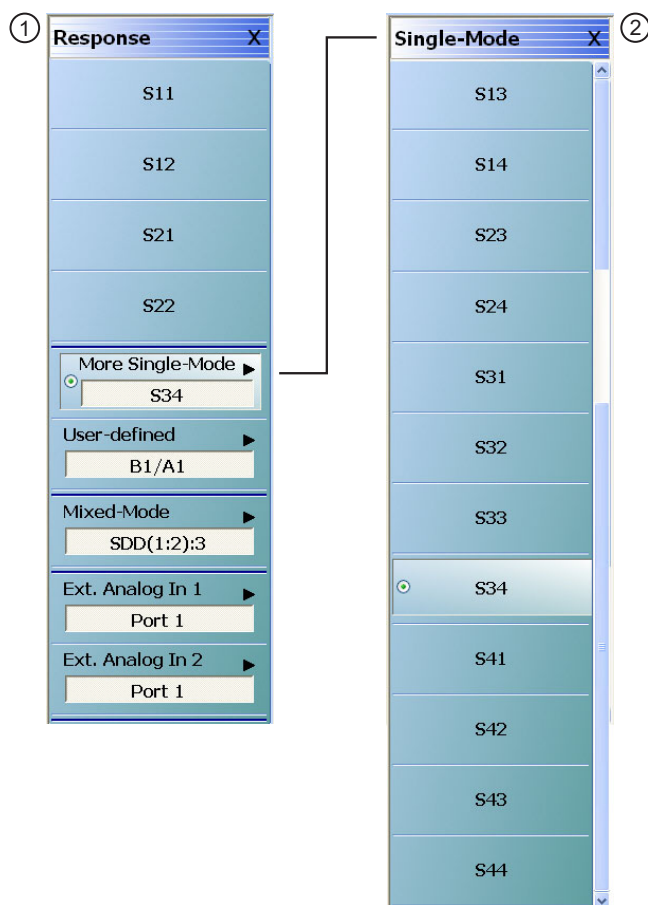
A related 4-port response mixed-mode control menu is available in the DISPLAY menus. The menu provides a faster change between the mixed-mode types of two differential pairs, one differential pair and one singleton, or one differential pair and two singletons but the change can only be applied to all traces with no selection of the response type.

- [Chapter 21, “Display Menus”](#)
- [“RESPONSES SETUP Menu - 4-Port VNAs” on page 21-79](#)
- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Responses Setup | RESPONSES SETUP

20-4 Response Menu Set - 4-Port VNAs

RESPONSE and SINGLE-MODE Menus

The primary RESPONSE menu provides direct access to S-Parameters from S11 to S22 and via the More Single-Mode button to additional parameters on the SINGLE-MODE selection menu which provides access to other S-Parameters from S13 to S44. Both menus are shown below in [Figure 20-1](#).



1. RESPONSE Menu - 4-Port VNAs

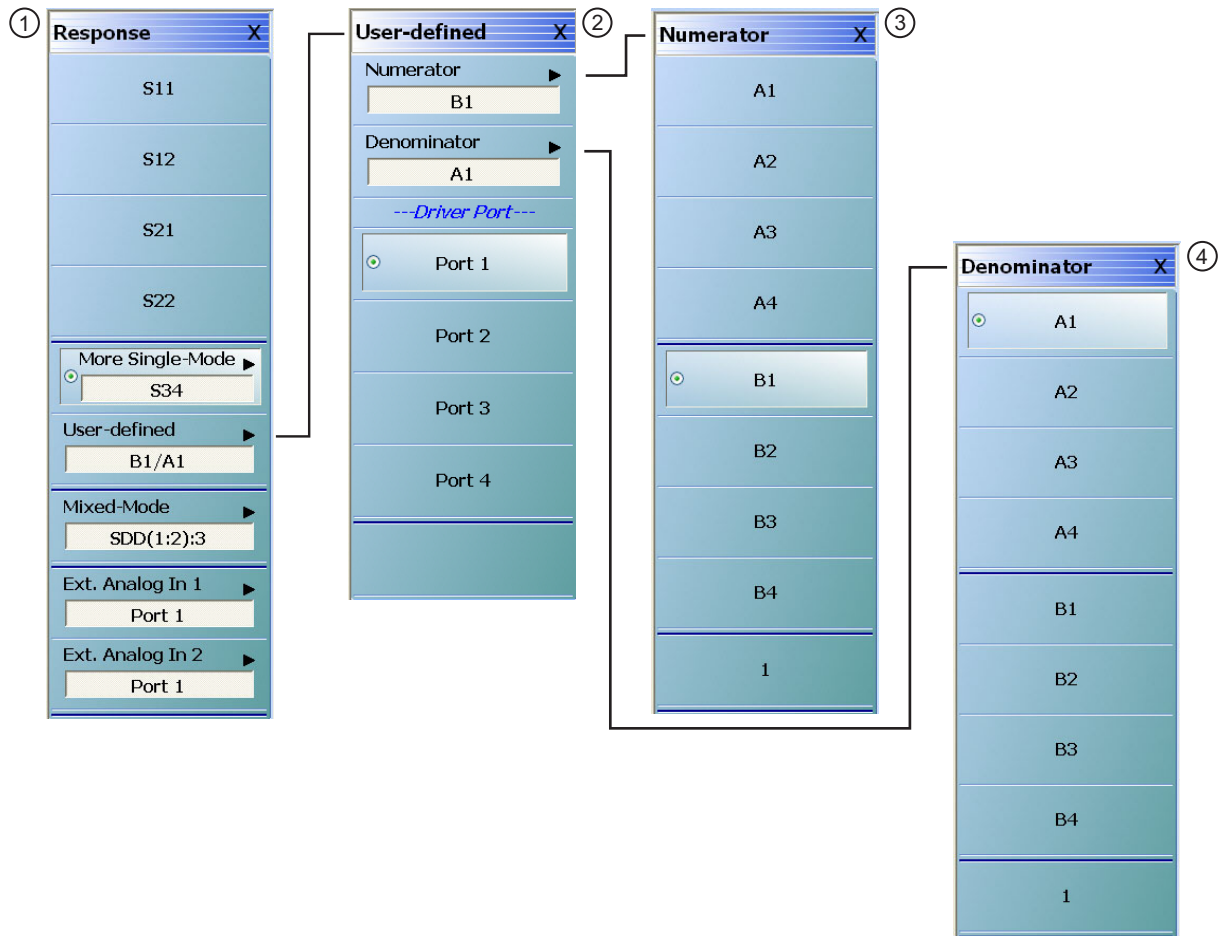
2. SINGLE-MODE Menu - 4-Port VNAs

Figure 20-1. RESPONSE and SINGLE-MODE Menus - 4-Port VNAs

The top-level four-port version of the **RESPONSE** menu is shown above in [Figure 20-1](#) where single purpose buttons provide access to S-Parameters for S11, S12, S21, and S33. The **More Single-Mode** button displays the **SINGLE-MODE** sublevel menu which provides S-Parameter selection from S13 to S44. The menu representation here is elongated; on an actual system there will be a scroll bar and not all parameters will be visible at once

RESPONSE and USER-DEFINED Menu

The 4-Port VNA provides for expanded user-defined parameters as shown below in parameters are shown in [Figure 20-2](#). All of the parameters are available regardless the calibration in place so that some parameters may be uncorrected.



1. RESPONSE Menu - 4-Port VNAs

2. USER-DEFINED Menu - 4-Port VNAs

3. NUMERATOR Menu - 4-Port VNAs

4. DENOMINATOR Menu - 4-Port VNAs

Figure 20-2. Response Menu Set - 4-Port VNAs

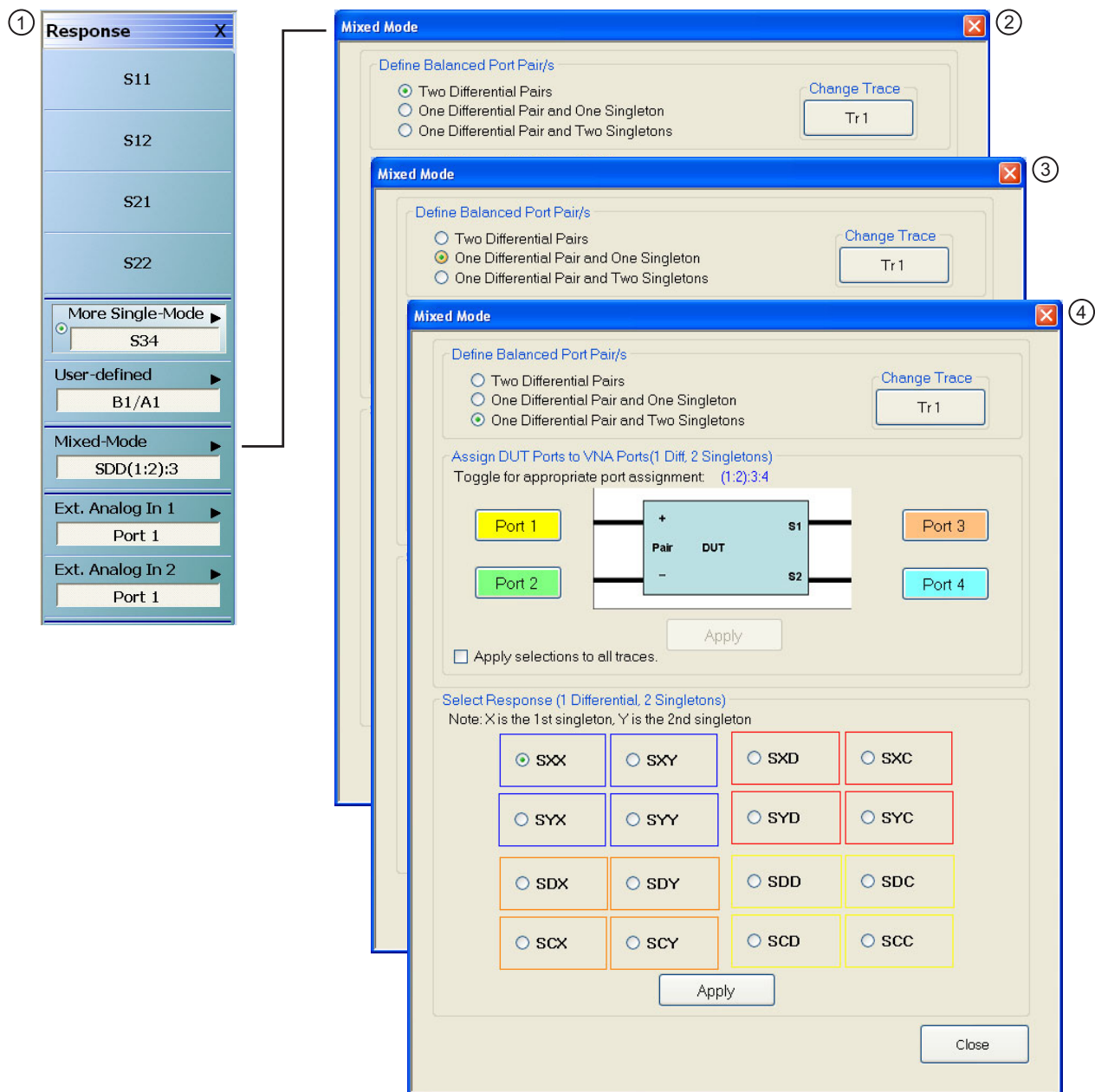
The four-port version of the **RESPONSE** menu and the submenus linking from the **User-Defined** button are shown above in [Figure 20-2](#). On the lower level of the **USER-DEFINED** response submenu, any one of the four ports may be sourcing RF power as the “driver” port. On the upper level of the **USER-DEFINED** menu, selections are made for the numerator and denominator values of user-defined parameter. The **NUMERATOR** and **DENOMINATOR** menus provide user-defined parameters. After a selection is made, both menus autoreturn to the **USER-DEFINED** menu.

RESPONSE Menu and MIXED MODE Dialog Box

The MIXED MODE dialog box provides configuration for three major types of mixed-mode configurations:

- Two differential pairs
- One differential pair and one singleton
- One differential pair and two singletons

Each mixed-mode configuration dialog box provides control of all response measurement parameters.



1. RESPONSE Menu and Mixed Mode button.
2. MIXED MODE Dialog Box for Two Differential Pairs.

3. MIXED MODE Dialog Box for One Differential Pair and One Singleton.
4. MIXED MODE Dialog Box for One Differential Pair and Two Singletons.

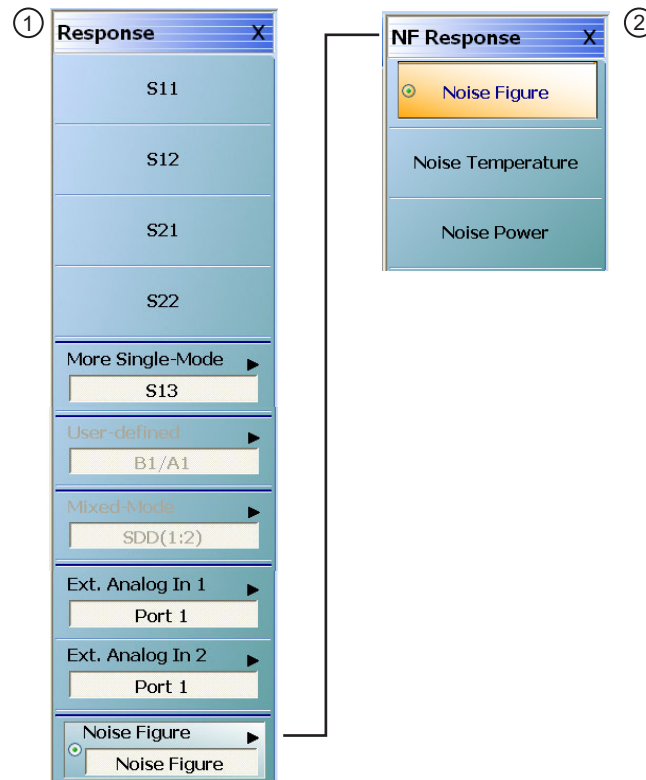
Figure 20-3. RESPONSE Menu and MIXED MODE Dialog Box Variants – 4-Port VNA

RESPONSE Menu and NF RESPONSE Menu

The NF RESPONSE menu provides configuration for available noise figure response measurement types:

- Noise Figure
- Noise Temperature
- Noise Power

The instrument must be equipped with Option 041 – Noise Figure Measurement and the application mode must be set to Noise Figure at MAIN | Application | APPLICATION.



1. RESPONSE Menu – 4-Port VNAs

- Option 041 – Noise Figure is equipped.
- Noise Figure measurement mode is set on the APPLICATION menu.
- User-Defined button is unavailable.
- Mixed-Mode button is unavailable.

2. NF RESPONSE Menu – Available measurements:

- Noise Figure
- Noise Temperature
- Noise Power

Figure 20-4. RESPONSE and NF RESPONSE Menus – Option 041 on 4-Port VNAs

Note

All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.

20-5 Primary Response Menu - 4-Port VNAs

RESPONSE Menu - 4-Port VNAs

Prerequisites

- The VNA must be in 4-Port Mode

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Response | RESPONSE

Button Selection Group

- All the buttons of the RESPONSE menu form a button selection group where the selection of any one button de-selects the other buttons.



1. RESPONSE Menu – 4-Port VNA

- Option 041 – Noise Figure is not equipped.

2. RESPONSE Menu – 4-Port VNA

- Option 041 – Noise Figure is equipped.
- The VNA measurement mode at the APPLICATION menu is set to Transmission/Reflection.

3. RESPONSE Menu – 4-Port VNA

- Option 041 – Noise Figure is equipped.
- The VNA measurement mode at the APPLICATION menu is set to Noise Figure.
- The User-Defined button is unavailable.
- The Mixed-Mode button is unavailable.

Figure 20-5. RESPONSE Menu - 4-Port VNAs – Menu Variants

S11

Select sets the response to the input reflection coefficient (or S11 Forward Reflection) and de-selects all other buttons.

S12

Select sets the response to the reverse transmission coefficient (or S12 Reverse Transmission) and de-selects all other buttons.

S21

Select sets the response to the forward transmission coefficient (or S21 Forward Transmission) and de-selects all other buttons.

S22

Select sets the response to the output reflection coefficient (or S22 Reverse Reflection) and de-selects all other buttons.

More Single-Mode

Select de-selects other buttons and displays the SINGLE-MODE menu where 4-Port S-Parameters are selected from the following selections: S13, S14, S23, S24, S31, S32, S33, S34, S41, S42, S43, S44.

- [“SINGLE-MODE Menu - 4-Port VNAs” on page 20-9](#)

User-Defined

Select sets the response to a user-defined mathematical fraction, and displays the USER DEFINED menu to select S11, S12, S21, S22, or 1 (one) as a numerator over S11, S12, S21, S22, or 1 as the denominator. Select also de-selects all other buttons. This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 041 must be equipped for Noise Figure.

- [“User-Defined Parameter Menus” on page 20-11](#)

Mixed-Mode

Select de-selects all other menu buttons and displays the MIXED MODE dialog box for three general mixed-mode configurations of:

- Two differential pairs
- One differential pair and one singleton
- One differential pair and two singletons

The button field displays the currently selected mixed-mode settings where the SXXXX is the selected response type and numbers are the assigned port number.

- [“MIXED MODE Setup Dialog Box - Two Diff. Pairs - 4-Port VNAs” on page 20-19](#)
- [“MIXED MODE Setup Dialog Box - One Diff. Pair - One Singleton - 4-Port VNAs” on page 20-22](#)
- [“MIXED MODE Setup Dialog Box - One Diff. Pair - Two Singletons - 4-Port VNAs” on page 20-24](#)

This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 041 must be equipped for Noise Figure.

Ext. Analog In 1

Select displays the EXT ANALOG 1 menu and de-selects all other buttons.

- [“EXT. ANALOG IN 1 Menu - 4-Port VNAs” on page 20-28](#)

Ext. Analog In 2

Select displays the EXT ANALOG 2 menu and de-selects all other buttons.

- [“EXT. ANALOG IN 2 Menu - 4-Port VNAs” on page 20-29](#)

Noise Figure

This button is only present if Option 041 – Noise Figure is equipped on the VNA. If present, it is only available if the VNA application mode is set to Noise Figure. The application mode is set on the APPLICATION menu at:

- MAIN | Application | APPLICATION
- [Chapter 15 — Application Menus - Noise Figure](#)

If present and available, select de-selected all other response types and displays the NF RESPONSE menu, where the where the noise figure response type is selected.

- [“NF RESPONSE Menu - 4-Port VNAs” on page 20-30](#)

If the Noise Figure button is available, the User-Defined and Mixed-Mode buttons are unavailable.

SINGLE-MODE Menu - 4-Port VNAs

Prerequisites

- The VNA must be in 4-Port Mode

Previous

- [“RESPONSE Menu - 4-Port VNAs”](#) on page 20-6

Navigation

- MAIN | Response | RESPONSE | Single-Mode | SINGLE-MODE

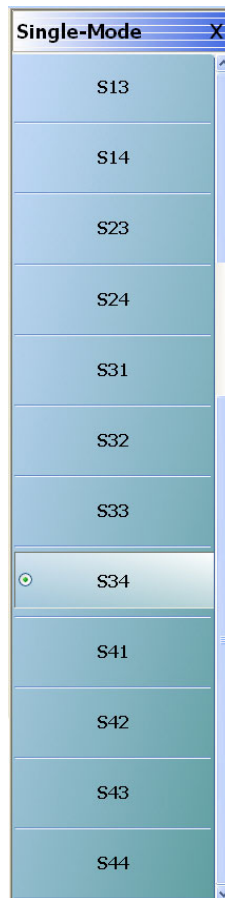


Figure 20-6. SINGLE-MODE Menu - 4-Port VNAs

S13

Select sets S-Parameter to S13.

S14

Select sets S-Parameter to S14.

S23

Select sets S-Parameter to S23.

S24

Select sets S-Parameter to S24.

S31

Select sets S-Parameter to S31.

S32

Select sets S-Parameter to S32.

S33

Select sets S-Parameter to S33.

S34

Select sets S-Parameter to S34.

S41

Select sets S-Parameter to S41.

S42

Select sets S-Parameter to S42.

S43

Select sets S-Parameter to S43.

S44

Select sets S-Parameter to S44.

20-6 User-Defined Parameter Menus

USER-DEFINED Menu - 4-Port VNAs

The USER DEFINED menu is used to establish various mathematical combinations of incident and reflected power values. See [Table 20-1, “User-Defined 4-Port Mathematical Combinations” on page 20-13](#) below for a listing of all possible parameter combinations.

Prerequisites

- The VNA must be in 4-Port Mode

Previous

- [“Primary Response Menus - 4-Port VNAs” on page 20-6](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED

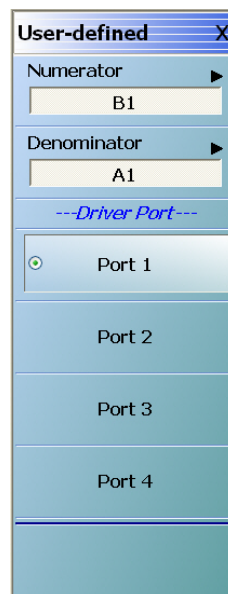


Figure 20-7. USER DEFINED Menu - 4-Port VNAs

Numerator

Select displays the NUMERATOR menu. Once a numerator value is selected, the menu auto-returns to the USER DEFINED menu.

- [“NUMERATOR Menu - 4-Port VNAs” on page 20-14](#)

Denominator

Select displays the DENOMINATOR menu. Once a denominator value is selected, the menu auto-returns to the USER DEFINED menu.

- [“DENOMINATOR Menu - 4-Port VNAs” on page 20-16](#)

Driver Port Button Selection Group

The four Driver Port buttons form a selection group where the selection of any button de-selects the other buttons.

Port 1 (Driver Port)

Select sets the driving port to Port 1.

Port 2 (Driver Port)

Select sets the driving port to Port 2.

Port 3 (Driver Port)

Select sets the driving port to Port 3.

Port 4 (Driver Port)

Select sets the driving port to Port 4.

Table 20-1. User-Defined 4-Port Mathematical Combinations

Denominator	Numerator								
	A1	A2	A3	A4	B1	B2	B3	B4	1
A1	$\frac{A1}{A1} = 1$ Unity	$\frac{A2}{A1}$	$\frac{A3}{A1}$	$\frac{A4}{A1}$	$\frac{B1}{A1}$ S11	$\frac{B2}{A1}$ S21	$\frac{B3}{A1}$ S31	$\frac{B4}{A1}$ S41	$\frac{1}{A1}$
A2	$\frac{A1}{A2}$	$\frac{A2}{A2} = 1$ Unity	$\frac{A3}{A2}$	$\frac{A4}{A2}$	$\frac{B1}{A2}$ S12	$\frac{B2}{A2}$ S22	$\frac{B3}{A2}$ S32	$\frac{B4}{A2}$ S42	$\frac{1}{A2}$
A3	$\frac{A1}{A3}$	$\frac{A2}{A3}$	$\frac{A3}{A3} = 1$ Unity	$\frac{A4}{A3}$	$\frac{B1}{A3}$ S13	$\frac{B2}{A3}$ S23	$\frac{B3}{A3}$ S33	$\frac{B4}{A3}$ S43	$\frac{1}{A3}$
A4	$\frac{A1}{A4}$	$\frac{A2}{A4}$	$\frac{A3}{A4}$	$\frac{A4}{A4} = 1$ Unity	$\frac{B1}{A4}$ S14	$\frac{B2}{A4}$ S24	$\frac{B3}{A4}$ S34	$\frac{B4}{A4}$ S44	$\frac{1}{A4}$
B1	$\frac{A1}{B1}$	$\frac{A2}{B1}$	$\frac{A3}{B1}$	$\frac{A4}{B1}$	$\frac{B1}{B1} = 1$ Unity	$\frac{B2}{B1}$	$\frac{B3}{B1}$	$\frac{B4}{B1}$	$\frac{1}{B1}$
B2	$\frac{A1}{B2}$	$\frac{A2}{B2}$	$\frac{A3}{B2}$	$\frac{A4}{B2}$	$\frac{B1}{B2}$	$\frac{B2}{B2} = 1$ Unity	$\frac{B3}{B2}$	$\frac{B4}{B2}$	$\frac{1}{B2}$
B3	$\frac{A1}{B3}$	$\frac{A2}{B3}$	$\frac{A3}{B3}$	$\frac{A4}{B3}$	$\frac{B1}{B3}$	$\frac{B2}{B3}$	$\frac{B3}{B3} = 1$ Unity	$\frac{B4}{B3}$	$\frac{1}{B3}$
B4	$\frac{A1}{B4}$	$\frac{A2}{B4}$	$\frac{A3}{B4}$	$\frac{A4}{B4}$	$\frac{B1}{B4}$	$\frac{B2}{B4}$	$\frac{B3}{B4}$	$\frac{B4}{B4} = 1$ Unity	$\frac{1}{B4}$
1	$\frac{A1}{1} = A1$ A1	$\frac{A2}{1} = A2$ A2	$\frac{A3}{1} = A3$ A3	$\frac{A4}{1} = A4$ A4	$\frac{B1}{1} = B1$ B1	$\frac{B2}{1} = B2$ B2	$\frac{B3}{1} = B3$ B3	$\frac{B4}{1} = B4$ B4	$\frac{1}{1} = 1$ Unity

NUMERATOR Menu - 4-Port VNAs

Prerequisites

- The VNA must be in 4-Port Mode

Previous

- [“User-Defined Parameter Menus” on page 20-11](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED | Numerator | NUMERATOR

Numerator Auto-Return Button Selection Group

- The buttons of the NUMERATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized above in [Table 20-1, “User-Defined 4-Port Mathematical Combinations” on page 20-13.](#)

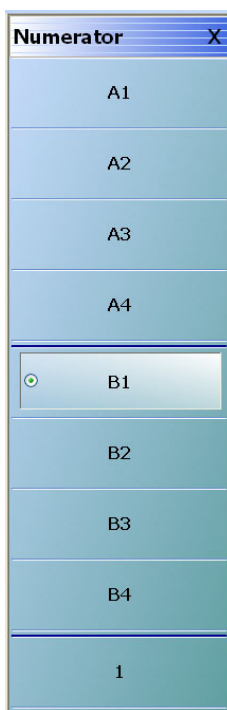


Figure 20-8. NUMERATOR Menu - 4-Port VNAs

A1 (Numerator)

Select specifies that A1, incident power on port 1, will be the numerator value.

A2 (Numerator)

Select specifies that A2 will be the numerator value.

A3 (Numerator)

Select specifies that A3, incident power on port 1, will be the numerator value.

A4 (Numerator)

Select specifies that A4 will be the numerator value.

B1 (Numerator)

Select specifies that B1, received power on port 1, will be the numerator value.

B2 (Numerator)

Select specifies that B2 will be the numerator value.

B3 (Numerator)

Select specifies that B3, incident power on port 1, will be the numerator value.

B4 (Numerator)

Select specifies that B4 will be the numerator value.

1 (One) (Numerator)

Select specifies that 1 (one) will be the numerator value.

DENOMINATOR Menu - 4-Port VNAs

Prerequisites

- The VNA must be in 4-Port Mode

Previous

- [“User-Defined Parameter Menus” on page 20-11](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED | Denominator | DENOMINATOR

Denominator Auto-Return Button Selection Group

- The buttons of the DENOMINATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized in [Table 20-1, “User-Defined 4-Port Mathematical Combinations” on page 20-13](#) above.

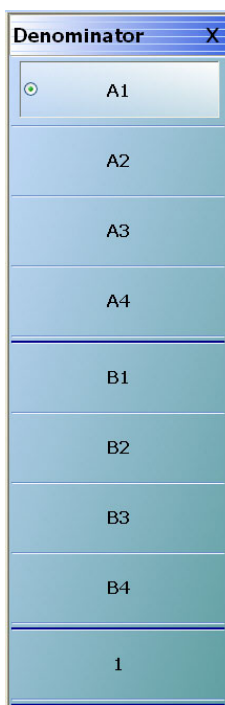


Figure 20-9. DENOMINATOR Menu - 4-Port VNAs

A1 (Denominator)

Select sets A1 as the denominator value.

A2 (Denominator)

Select sets A2 as the denominator value.

A3 (Denominator)

Select sets A3 as the denominator value.

A4 (Denominator)

Select sets A4 as the denominator value.

B1 (Denominator)

Select sets B1 as the denominator value.

B2 (Denominator)

Select sets B2 as the denominator value.

B3 (Denominator)

Select sets B3 as the denominator value.

B4 (Denominator)

Select sets B4 as the denominator value.

1 (One) (Denominator)

Select sets 1 (one) as the denominator value.

20-7 Mixed Mode Setup Dialog Boxes

Dialog Boxes

The contents and controls in the dialog box change depending how the user-defined balanced port is selected as:

- Two differential pairs
- One differential pair and one singleton
- One differential pair and two singletons

Each balanced port selection is described in the sections below.

Alternate Mixed Mode Configuration Control

There is a separate mixed-mode response control located on the RESPONSES SETUP menu located within the DISPLAY menus that provides a rapid assignment of one of the three options above. The response type assignment is limited to all traces on the active channel. The menu is described in:

- [Chapter 21, “Display Menus”](#)
- [“RESPONSES SETUP Menu - 4-Port VNAs” on page 21-79](#)
- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Responses Setup | RESPONSES SETUP

MIXED MODE Setup Dialog Box - Two Diff. Pairs - 4-Port VNAs

Prerequisites

- Balanced Port Pair Setting = Two Differential Pairs

Previous

- [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | Two Differential Pairs

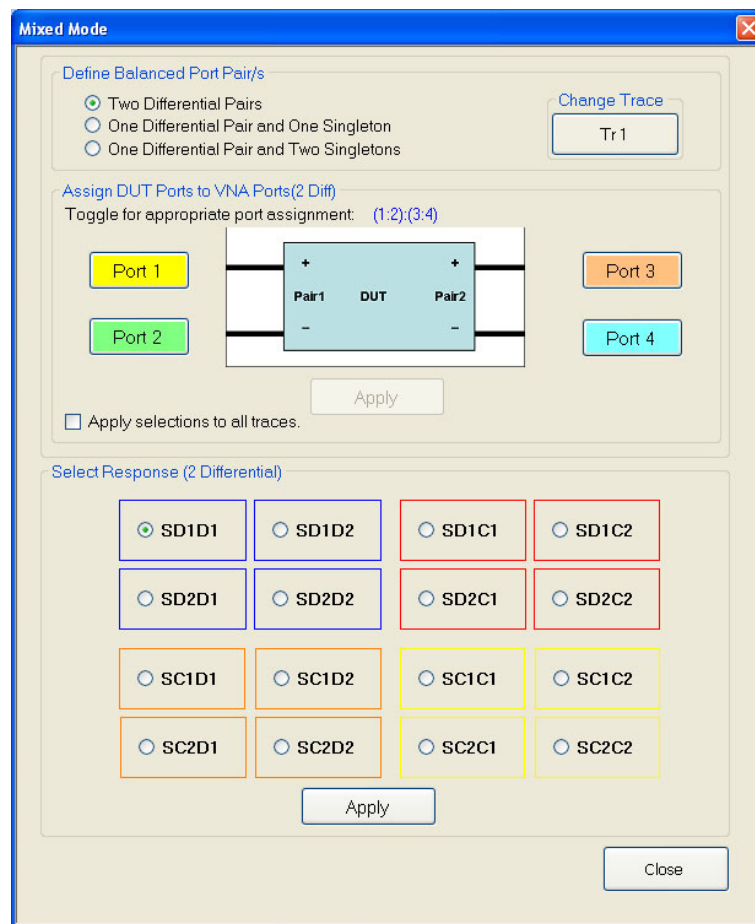


Figure 20-10. MIXED MODE Dialog Box - Two Differential Pairs - 4-Port VNAs

Define Balanced Port Pair(s)

Select the option required:

- Two Differential Pairs

The DUT Ports diagram appears with a four-port DUT and is ready for port assignment.

Change Trace

The Change Trace button displays the currently active trace number. Select displays the SELECT TRACE dialog box where another trace can be selected.

- [“SELECT TRACE Dialog Box - 4-Port VNAs” on page 20-27](#)

Assign DUT Ports to VNA Ports (2 Diff)

For each DUT connection, toggle the Port button to select the appropriate VNA Port Number.

- DUT Port Pair 1
 - Pair 1 +: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has positive polarity.
 - Pair 1 -: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has negative polarity.
- DUT Port Pair 2:
 - Pair +: Select from VNA Port 1, Port 2, Port 3, or Port 4
 - Pair -: Select from VNA Port 1, Port 2, Port 3, or Port 4

Note that all port assignments must be unique and have different color coding. When all port assignments are completed, select the Apply button. If the assignment is invalid, a warning dialog appears. If the port assignments are valid, the title of the DUT Ports diagram is annotated with the port assignment in the format (A:B):(C:D). For example:

- (1:2):(3:4) = The first port pair is measured from 1 to 2 and the second port pair is measured from 3 to 4.
- (4:1):(2:3) = The first port pair is measured from 4 to 1 and the second port pair is measured from 2 to 3.

Assign Port Assignments to All Traces

The actions above only apply to the active trace on the active channel. If required, select the Apply Selections check box to apply the port pair selections to all traces on the active channel.

Select Response

Select the required 2-differential response characteristic from the available 16 combinations of pure differential (D) and common-mode (C) parameters. Only one response may be selected:

- Differential Reception with Differential Drive S-Parameters
 - SD1D1 - S-parameter for differential reception at Pair 1 and differential drive at Pair 2.
 - SD1D2 - S-parameter for differential reception at Pair 1 and differential drive at Pair 2.
 - SD2D1 - S-parameter for differential reception at Pair 2 and differential drive at Pair 1.
 - SD2D2 - S-parameter for differential reception at Pair 2 and differential drive at Pair 2.
- Common-Mode Reception with Differential Drive S-Parameters
 - SC1D1 - S-parameter for common-mode reception at Pair 1 and differential drive at Pair 1.
 - SC1D2 - S-parameter for common-mode reception at Pair 1 and differential drive at Pair 2.
 - SC2D1 - S-parameter for common-mode reception at Pair 2 and differential drive at Pair 1.
 - SC2D2 - S-parameter for common-mode reception at Pair 2 and differential drive at Pair 2.
- Differential Reception with Common-Mode Drive S-Parameters
 - SD1C1 - S-parameter for differential reception at Pair 1 and common-mode drive at Pair 2.
 - SD1C2 - S-parameter for differential reception at Pair 1 and common-mode drive at Pair 2.
 - SD2C1 - S-parameter for differential reception at Pair 2 and common-mode drive at Pair 1.
 - SD2C2 - S-parameter for differential reception at Pair 2 and common-mode drive at Pair 2.

- Common-Mode Reception with Common-Mode Drive S-Parameters
 - SC1C1 - S-parameter for common-mode reception at Pair 1 and common-mode drive at Pair 1.
 - SC1C2 - S-parameter for common-mode reception at Pair 1 and common-mode drive at Pair 2.
 - SC2C1 - S-parameter for common-mode reception at Pair 2 and common-mode drive at Pair 1.
 - SC2C2 - S-parameter for common-mode reception at Pair 2 and common-mode drive at Pair 2.

Apply

When the selection is complete, select the **Apply** button to apply the setting to the active trace.

MIXED MODE Setup Dialog Box - One Diff. Pair - One Singleton - 4-Port VNAs

Prerequisites

- Balanced Port Pair Setting = One Differential Pair and One Singleton

Previous

- [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | One Differential Pair and One Singleton

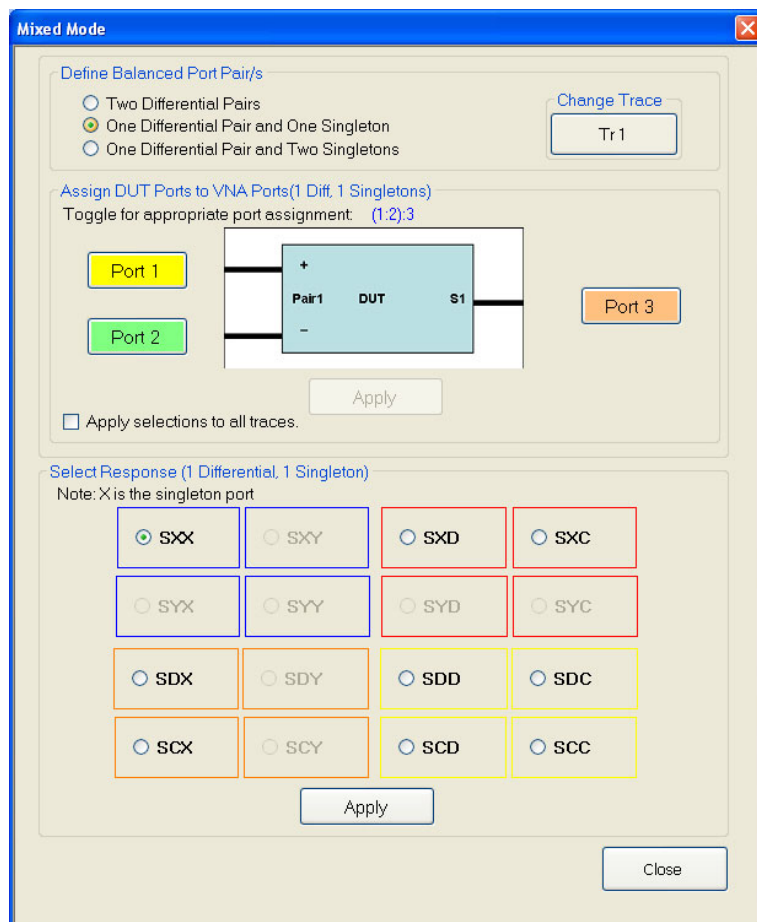


Figure 20-11. MIXED MODE Dialog Box - One Differential Pair and One Singleton - 4-Port VNAs

Define Balanced Port Pair(s)

Select the option required:

- One Differential Pair and One Singleton

The DUT Ports diagram appears with a DUT having one port pair and one singleton connection.

Change Trace

Displays the currently active trace number. Select displays the SELECT TRACE dialog box where another trace can be selected.

- [“SELECT TRACE Dialog Box - 4-Port VNAs” on page 20-27](#)

Assign DUT Ports to VNA Ports (1 Diff, 1 Singleton)

For each DUT connection, toggle the Port button to select the appropriate VNA Port Number.

- DUT Port Pair 1
 - Pair 1 +: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has positive polarity.
 - Pair 1 -: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has negative polarity.
- DUT S1 Singleton:
 - S1: Select from VNA Port 1, Port 2, Port 3, or Port 4

Note that all port assignments must be unique and have different color coding. When all port assignments are completed, select the Apply button. If the assignment is invalid, a warning dialog appears. If the port assignments are valid, the title of the DUT Ports diagram is annotated with the port assignment in the format (A:B):C. For example:

- (1:2):3 = The DUT port differential is measured from 1 to 2 and 3 is the singleton.
- (4:2):1 = The DUT port differential is measured from 4 to 2 and 1 is the singleton.

Assign Port Assignments to All Traces

The actions above only apply to the active trace on the active channel. If required, select the Apply Selections check box to apply the port pair selections to all traces on the active channel.

Select Response

Select the required differential or common-mode response characteristic from the available 9 combinations of pure differential (D), common-mode (C), or singleton (X) parameters. Only one response may be selected:

- Reception at Singleton and Drive at Singleton
 - SXX - S-Parameter for singleton reception and singleton drive.
- Reception at Singleton and Drive at Pair 1
 - SXD - S-Parameter for singleton reception and differential drive at Pair 1
 - SXC - S-Parameter for singleton reception and common-mode drive at Pair 1
- Reception at Pair 1 and Drive at Singleton
 - SDX - S-Parameter for differential reception at Pair 1 and singleton drive
 - SCX - S-Parameter for common-mode reception at Pair 1 and singleton drive
- Reception at Pair 1 and Drive at Pair 1
 - SDD - S-Parameter for differential reception at the Pair 1 and differential drive at the port pair.
 - SDC - S-Parameter for differential reception at Pair 1 and common-mode drive at the port pair
 - SCD - S-Parameter for common-mode reception at Pair 1 and differential drive at the port pair.
 - SCC - S-Parameter for common-mode reception at Pair 1 and common-mode drive at the port pair.

Apply

When the selection is complete, select the Apply button to apply the setting to the active trace.

MIXED MODE Setup Dialog Box - One Diff. Pair - Two Singletons - 4-Port VNAs

Prerequisites

- Balanced Port Pair Setting = One Differential Pair and Two Singletons

Previous

- [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | One Differential Pair and Two Singletons

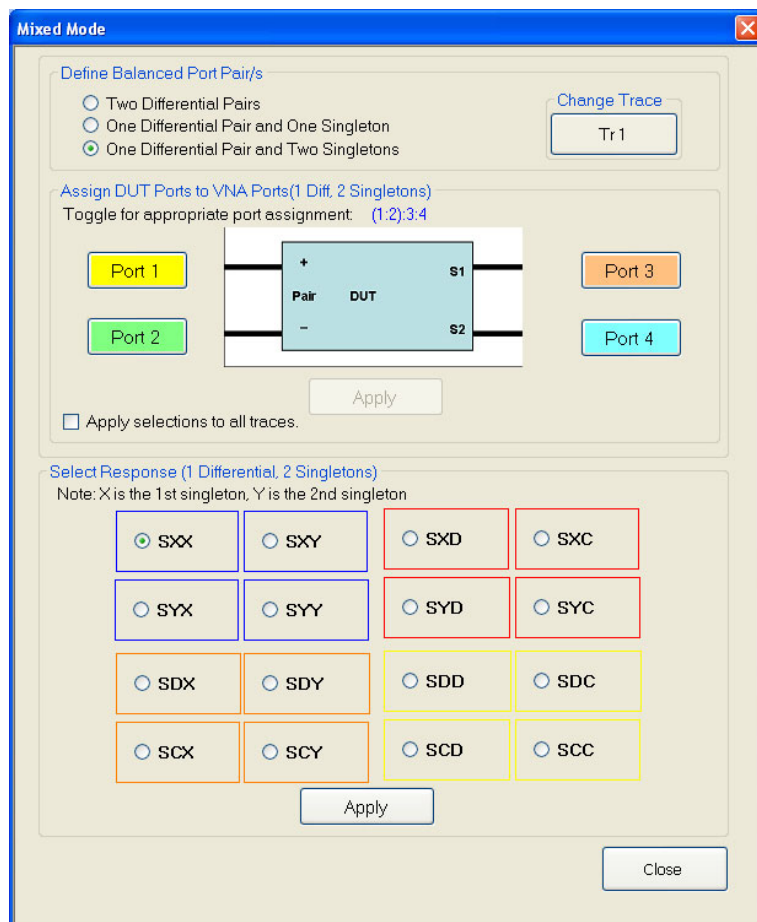


Figure 20-12.MIXED MODE Dialog Box - One Differential Pair and Two Singletons - 4-Port VNAs

Define Balanced Port Pair(s)

Select the option required:

- One Differential Pair and Two Singletons

The DUT Ports diagram appears with a DUT having one port pair and two singletons connection.

Change Trace

Displays the currently active trace number. Select displays the SELECT TRACE dialog box where another trace can be selected.

- [“SELECT TRACE Dialog Box - 4-Port VNAs” on page 20-27](#)

Assign DUT Ports to VNA Ports (1 Diff, 1 Singleton)

For each DUT connection, toggle the Port button to select the appropriate VNA Port Number.

- DUT Port Pair 1
 - Pair 1 +: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has positive polarity.
 - Pair 1 -: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has negative polarity.
- DUT S1 Singleton:
 - S1: Select from VNA Port 1, Port 2, Port 3, or Port 4
- DUT S2 Singleton:
 - S2: Select from VNA Port 1, Port 2, Port 3, or Port 4

Note that all port assignments must be unique and have different color coding. When all port assignments are completed, select the Apply button. If the assignment is invalid, a warning dialog appears. If the port assignments are valid, the title of the DUT Ports diagram is annotated with the port assignment in the format (A:B):C). For example:

- (1:2):3:4 = The DUT port differential is measured from 1 to 2 while 3 and 4 are the singletons.
- (4:2):1:3 = The DUT port differential is measured from 4 to 2 while 1 and 3 are the singletons.

Assign Port Assignments to All Traces

The actions above only apply to the active trace on the active channel. If required, select the Apply Selections check box to apply the port pair selections to all traces on the active channel.

Select Response

Select the required differential or common-mode response characteristic from the available 16 combinations of pure differential (D), common-mode (C), first singleton (X), or second singleton (Y) parameters. Only one response may be selected:

- Reception at Singleton and Drive at Singleton
 - SXX - S-Parameter for first singleton reception and first singleton drive
 - SXY - S-Parameter for first singleton reception and second singleton drive
 - SYX - S-Parameter for second singleton reception and first singleton drive
 - SYY - S-Parameter for second singleton reception and second singleton drive
- Reception at Singleton and Drive at Pair 1
 - SXD - S-Parameter for first singleton reception and differential drive at Pair 1
 - SXC - S-Parameter for first singleton reception and common-mode drive at Pair 1
 - SYD - S-Parameter for second singleton reception and differential drive at Pair 1
 - SYC - S-Parameter for second singleton reception and common-mode drive at Pair 1
- Reception at Pair 1 and Drive at Singleton
 - SDX - S-Parameter for differential reception at Pair 1 and first singleton drive
 - SDY - S-Parameter for differential reception at Pair 1 and second singleton drive
 - SCX - S-Parameter for common-mode reception at Pair 1 and first singleton drive
 - SCY - S-Parameter for common-mode reception at Pair 1 and second singleton drive

- Reception at Pair 1 and Drive at Pair 1
 - SDD - S-Parameter for differential reception at Pair 1 and differential drive at the port pair.
 - SDC - S-Parameter for differential reception at Pair 1 and common-mode drive at the port pair.
 - SCD - S-Parameter for common-mode reception at Pair 1 and differential drive at the port pair.
 - SCC - S-Parameter for common-mode reception at Pair 1 and common-mode drive at the port pair.

Apply

When the selection is complete, select the **Apply** button to apply the setting to the active trace.

SELECT TRACE Dialog Box - 4-Port VNAs

Prerequisites

- One of the three available configurations on the MIXED MODE dialog box must be selected.

Previous

- “MIXED MODE Setup Dialog Box - Two Diff. Pairs - 4-Port VNAs” on page 20-19
 - Figure 20-10, “MIXED MODE Dialog Box - Two Differential Pairs - 4-Port VNAs” on page 20-19
- “MIXED MODE Setup Dialog Box - One Diff. Pair - One Singleton - 4-Port VNAs” on page 20-22
 - Figure 20-11, “MIXED MODE Dialog Box - One Differential Pair and One Singleton - 4-Port VNAs” on page 20-22
- “MIXED MODE Setup Dialog Box - One Diff. Pair - Two Singletons - 4-Port VNAs” on page 20-24
 - Figure 20-12, “MIXED MODE Dialog Box - One Differential Pair and Two Singletons - 4-Port VNAs” on page 20-24

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | Change Trace | SELECT TRACE Dialog Box



Figure 20-13. SELECT TRACE Dialog Box - For Mixed-Mode Trace Assignment - 4-Port VNAs

Instructions

Select the trace number button to apply the current mixed-mode settings. After a Trace Number button is selected, the focus autoreturns to the MIXED MODE dialog box.

20-8 External Analog Input Menus

EXT. ANALOG IN 1 Menu - 4-Port VNAs

Full Name

- EXTERNAL ANALOG INPUT 1 Menu

Previous

- [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)

Navigation

- MAIN | Response | RESPONSE | Ext Analog In 1 | EXT ANALOG IN 1

Button Selection Group

- The Port 1, Port 2, Port 3, and Port 4 buttons form a button selection group where the selection of any one button de-selects the other buttons.

Port 1 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 1.

Port 2 (Ext Analog In 1 Driver Port)

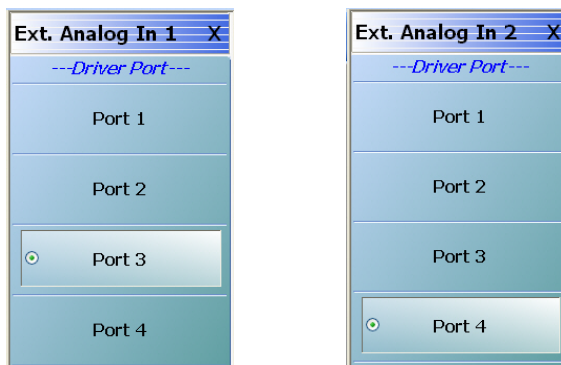
Select sets the External Analog Input 1 source to Port 2.

Port 3 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 3.

Port 4 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 4



EXT. ANALOG IN 1 menu on left and EXT. ANALOG IN 2 menu on right.

Figure 20-14. EXT. ANALOG IN (External Analog Input) Menus - 4-Port VNAs

EXT. ANALOG IN 2 Menu - 4-Port VNAs

Full Name

- EXTERNAL ANALOG INPUT 2 Menu

Previous

- [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)

Navigation

- MAIN | Response | RESPONSE | Ext. Analog In 2 | EXT.ANALOG IN 2

Figure

- See [Figure 20-14](#) above.

Button Selection Group

- The Port 1, Port 2, Port 3, and Port 4 buttons form a button selection group where the selection of any one button de-selects the other buttons.

Port 1 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 1.

Port 2 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 2.

Port 3 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 3.

Port 4 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 4.

20-9 Noise Figure Response Menu

NF RESPONSE Menu - 4-Port VNAs

Full Name

- NOISE FIGURE RESPONSE Menu

Prerequisites

- The VNA must be equipped with Option 041 – Noise Figure.
- The application mode must be set to Noise Figure on the APPLICATION menu.
 - MAIN | Application | APPLICATION
 - [Chapter 15 — Application Menus - Noise Figure](#)

Button Selection Group

- The buttons on the NF RESPONSE menu form a button selection group where selection of any one button de-selects all other buttons.

Previous

- [“Primary Response Menus - 4-Port VNAs” on page 20-6](#)

Navigation

- MAIN | Response | RESPONSE | Noise Figure | NF RESPONSE

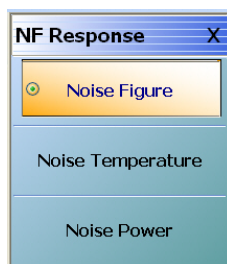


Figure 20-15. NF RESPONSE (Noise Figure Response) Menu

Note

All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.

Noise Figure

Select sets the noise figure measurement to Noise Figure. Noise figure is measured using the “cold source” technique. The units are set by the graph type.

Noise Temperature

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. The noise temperature is calculated from the noise figure. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

Noise Power

Select sets the noise figure measurement to Noise Power trace response. The measurement units are set by the display graph type. The units will be in absolute power when a receiver calibration is applied.

Chapter 21 — Display Menus

21-1 Chapter Overview

This chapter provides information for setup and configuration for the main instrument display. Selections provide control over the trace format with over 17 different major displays. Each display type can be further modified with parameters applicable to that format. The control also provides control for trace memory and trace math modifications. The trace limit functions allow maximum/minimum parameters to be set for each trace and provide visual and/or programmatic indications of pass/fail. Four major time domain settings are available for no time domain, frequency with time gate, time low pass, and time band pass. Gain compression configurations are available for CW Swept Frequency and Power Swept Frequency. Other menus and dialogs are available for range setup, DC term, extrapolation, gate setup, and window shape functions.

21-2 Overview of Display Menus and Dialog Boxes

The available display menus and dialog boxes are:

- “DISPLAY Menu” on page 21-3
- “TRACE FORMAT Menu” on page 21-6
- “IMPEDANCE Menu” on page 21-9
- “SMITH (IMPEDANCE) Menu” on page 21-11
- “SMITH (ADMITTANCE) Menu” on page 21-13
- “LINEAR POLAR Menu” on page 21-15
- “LOG POLAR Menu” on page 21-16
- “VIEW TRACE Menu” on page 21-18
- “DATA-MEM. OP. Menu” on page 21-21
- “EDIT LIMIT LINE Menu” on page 21-26
 - “LIMIT LINE TYPE SETUP Tableau Dialog” on page 21-28
 - “SAVE AS (LIMIT LINE LMT FILE) Dialog Box” on page 21-32
 - “OPEN (LIMIT LINE LMT FILE) Dialog Box” on page 21-33
- “DOMAIN Frequency with No Time Gate Menu” on page 21-37
- “DOMAIN Frequency with Time Gate Menu” on page 21-38
- “DOMAIN Time Low Pass Menu” on page 21-39
- “DOMAIN Time Band Pass Menu” on page 21-41
- “GAIN COMPRESS. Self Normalization Menu” on page 21-44
- “GAIN COMPRESS. Compression Param Menu” on page 21-47
- “COMP. PARAM Menu” on page 21-49
 - “VIEW COMPRESSION RESULT Dialog Box” on page 21-50
- “TIME DEFINITION Menu” on page 21-51
- “RANGE SETUP Frequency with Time Gate Menu” on page 21-54
- “RANGE SETUP Time Band Pass Menu” on page 21-56
- “RANGE SETUP Time Low Pass Menu” on page 21-58
- “DC TERM Menu” on page 21-60
- “EXTRAPOLATION Menu” on page 21-62
- “WINDOW SHAPE Menu” on page 21-63
 - “ADVANCED WINDOW SHAPE SETUP Dialog Box” on page 21-65
- “GATE SETUP Menu” on page 21-67

- “GATE FUNCTION Menu” on page 21-69
 - “ADVANCED GATE SHAPE SETUP Dialog Box” on page 21-71
- “INTER-TRACE MATH Menu” on page 21-73
- “INTRA TRACE OP. Menu” on page 21-75
- “CONVERSION Menu” on page 21-76
- “DISPLAY SETUP Menu” on page 21-77
- “RESPONSES SETUP Menu - 4-Port VNAs” on page 21-79
 - “EDIT CHANNEL TITLE Dialog Box” on page 21-81

21-3 Display Main Menu

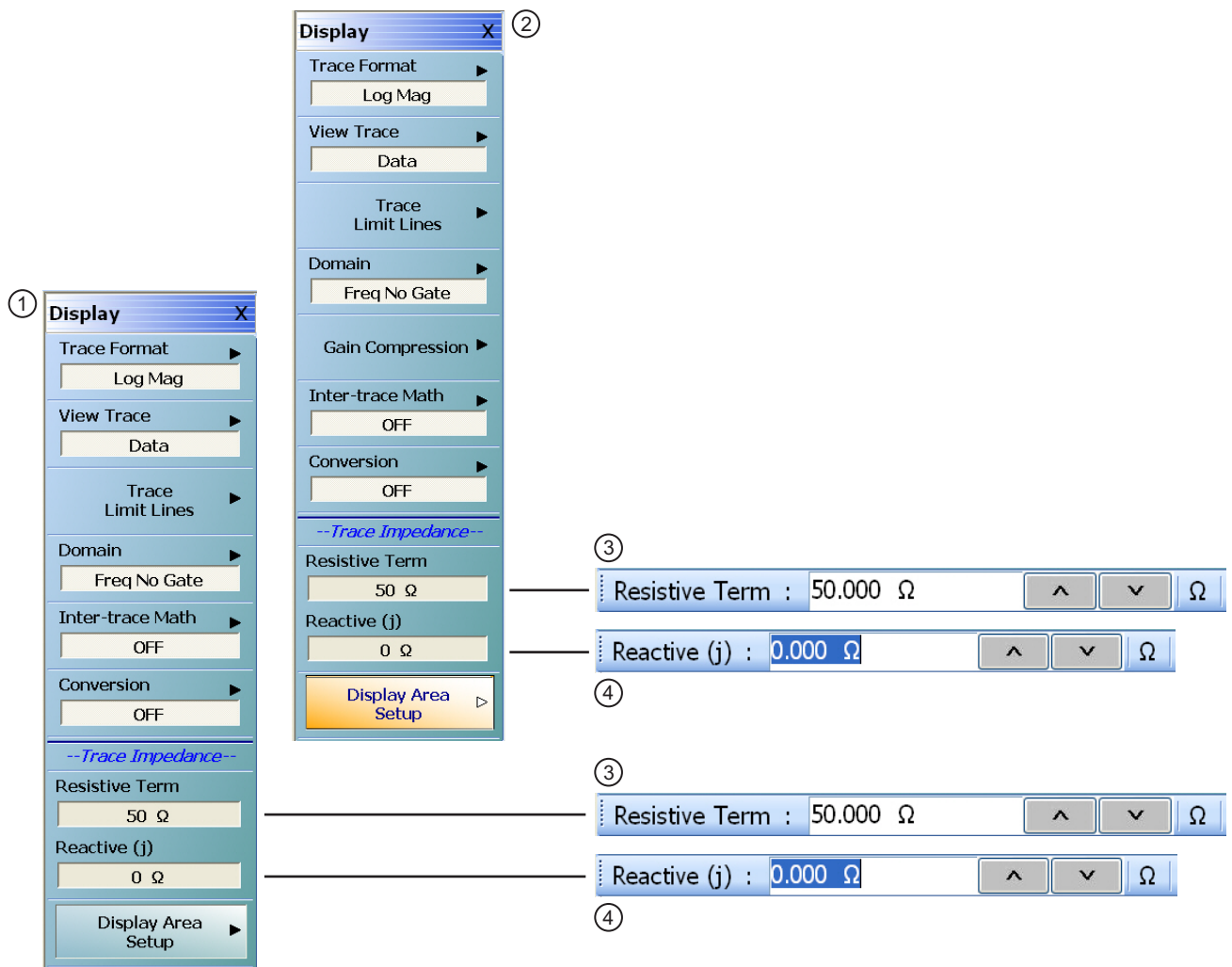
DISPLAY Menu

Previous

- “MAIN MENU” on page 2-1

Navigation

- MAIN | Display | DISPLAY



1. DISPLAY menu with frequency-based sweeps at left.
2. DISPLAY menu with power-based sweeps at right.

3. Resistive Term Field Toolbar in Ohms.
4. Reactive Term (j) Field Toolbar in Ohms.

Figure 21-1. DISPLAY Menu

Trace Format

Displays the current trace format setting. Select displays the TRACE FORMAT menu.

- “TRACE FORMAT Menu” on page 21-6

View Trace

Select displays the VIEW TRACE menu.

- [“VIEW TRACE Menu” on page 21-18](#)

Trace Limit Lines

Select displays the LIMIT menu.

- [“LIMIT Menu” on page 21-22](#)

Domain

Select displays the DOMAIN menu. The appearance and button availability of the DOMAIN menu depends on settings on other menus.

- [“DOMAIN Menu Appearance and Button Availability” on page 21-34](#)
- [“DOMAIN Frequency with No Time Gate Menu” on page 21-37](#)
- [“DOMAIN Frequency with Time Gate Menu” on page 21-38](#)
- [“DOMAIN Time Low Pass Menu” on page 21-39](#)
- [“DOMAIN Time Band Pass Menu” on page 21-41](#)

Gain Compression

The Gain Compression button is available if the SWEEP TYPES menu is set to Power (CW Freq) or Power (Swept Freq). Different menus are presented depending on which power sweep mode is used. If available, select displays the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Self Normalization Menu” on page 21-44](#)
- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

The Gain Compression button is unavailable if the SWEEP TYPES menu is set to:

- Freq Sweep (Linear)
- Freq Sweep (Log)
- Segmented Sweep (Freq-Based)
- Segmented Sweep (Index-based)
 - [“SWEEP SETUP Menu” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Inter-trace Math

Select displays the INTERTRACE MATH menu.

- [“INTER-TRACE MATH Menu” on page 21-73](#)

Conversion

Select displays the CONVERSION menu.

- [“CONVERSION Menu” on page 21-76](#)

Resistive Term (Ohms)

Select allows the user to enter the trace impedance in Ohms and displays the Resistive Term toolbar. Use the toolbar to enter the required impedance for the currently active trace. The default value is 50.000 Ohms.

Reactive (j) (Ohms)

Select allows the user to enter trace reactive term in Ohms and displays the Reactive (j) toolbar.

Display Area Setup

Select displays the menu.

- [“DISPLAY SETUP Menu” on page 21-77](#)

21-4 Trace Format and Parameter Menus

TRACE FORMAT Menu

Active Trace on Active Channel

- The trace format selections below only apply to the currently active trace on the active channel.

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT

Button Selection Group

- The buttons on the TRACE FORMAT menu form a button selection group, where the selection of any one button de-selects the other 16 buttons.

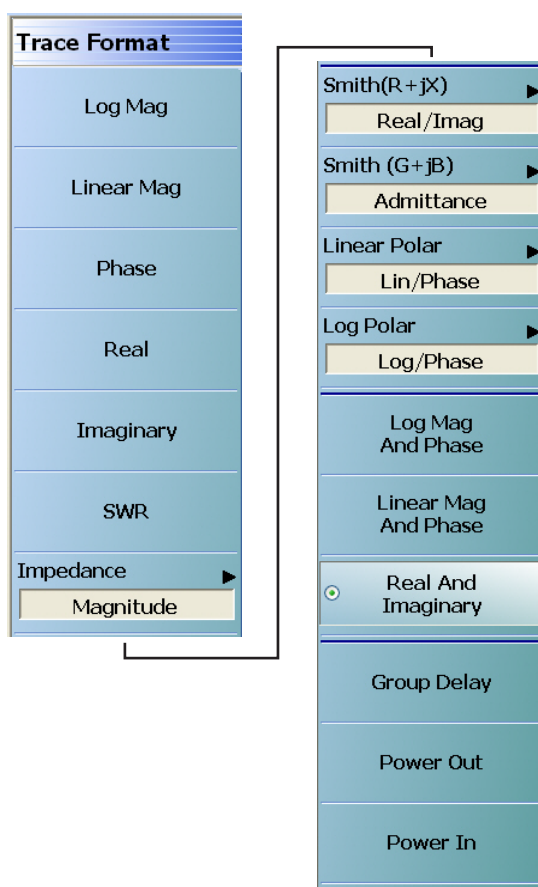


Figure 21-2. TRACE FORMAT Menu

Log Mag (Trace Format)

Select sets a single rectilinear display. All other trace display graph types are deselected.

Linear Mag (Trace Format)

Select sets a single rectilinear display.

Phase (Trace Format)

Select sets a single rectilinear display.

Real (Trace Format)

Select sets a single rectilinear display.

Imaginary (Trace Format)

Select sets a single rectilinear display.

SWR (Trace Format)

Select sets a single rectilinear display.

Impedance (Trace Format)

Select displays the Impedance submenu.

- [“IMPEDANCE Menu” on page 21-9](#)

Smith (R+jX) (Impedance)

Select displays the SMITH (with Impedance) submenu to configure the display of Smith Impedance charts.

- [“SMITH \(IMPEDANCE\) Menu” on page 21-11](#)

Smith (G+jB) (Admittance)

Select displays the SMITH (with Admittance) menu to configure the display of Smith Admittance charts.

- [“SMITH \(ADMITTANCE\) Menu” on page 21-13](#)

Linear Polar (Trace Format)

Select displays the LINEAR POLAR menu to configure the display of polar graphs.

- [“LINEAR POLAR Menu” on page 21-15](#)

Log Polar (Trace Format)

Select displays the Log Polar menu to configure the display of polar graphs.

- [“LOG POLAR Menu” on page 21-16](#)

Log Mag and Phase (Trace Format)

Select sets a dual rectilinear display with Log Magnitude data in the upper graph and Phase data in the lower graph.

Linear Mag and Phase (Trace Format)

Select sets a dual rectilinear display with Linear Magnitude data in the upper graph and Phase data in the lower graph.

Real and Imaginary (Trace Format)

Select sets a dual rectilinear display with Real data in the upper graph and Imaginary data in the lower graph.

Group Delay (Trace Format)

Group delay graphs display phase-related distortion as a function of frequency such as for the flatness of the group delay of a filter over its passband. Select sets a single rectilinear display.

Power Out (Trace Format)

Select sets a single rectilinear display measuring power output of the DUT.

Power In (Trace Format)

Select sets a single rectilinear display measuring power input to the DUT.

IMPEDANCE Menu

Previous

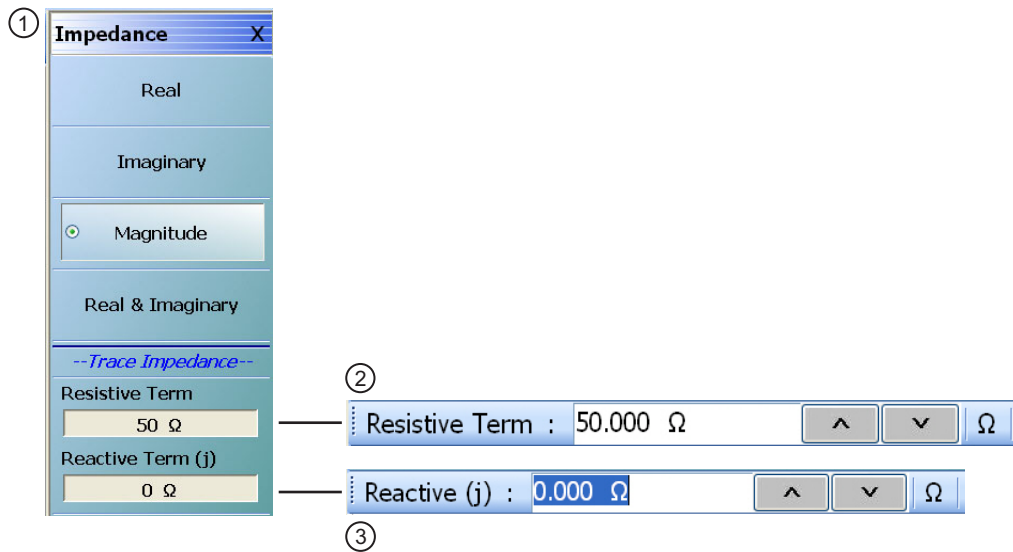
- “TRACE FORMAT Menu” on page 21-6

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Impedance | IMPEDANCE

Auto-Return Button Selection Group

- The first four (4) buttons (Real, Imaginary, Magnitude, and Real & Imaginary) on the IMPEDANCE menu are configured as a button selection group with an auto-return function, where selection of any one button de-selects the other three (3) buttons, and then auto-returns to the TRACE FORMAT menu.



- | | |
|-------------------|---|
| 1. IMPEDANCE Menu | 2. Resistive Term Field Toolbar in Ohms. |
| | 3. Reactive (j) Term Field Toolbar in Ohms. |

Figure 21-3. IMPEDANCE Menu

Real (Impedance)

Select sets a rectilinear display, and de-selects Imaginary, Magnitude, and Real & Imaginary and auto-returns to TRACE FORMAT menu.

Imaginary (Impedance)

Select sets a rectilinear display, and de-selects Real, Magnitude, and Real & Imaginary and auto-returns to TRACE FORMAT menu.

Magnitude (Impedance)

Select sets a rectilinear display, and de-selects Real, Imaginary, and Real & Imaginary and auto-returns to TRACE FORMAT menu.

Real & Imaginary (Impedance)

Select sets a dual rectilinear display with Real data in the upper graph and Imaginary data in the lower graph. Select also de-selects Real, Imaginary, and Magnitude and auto-returns to TRACE FORMAT menu.

Resistive Term (Ohms)

Select allows the user to enter the trace impedance in Ohms and displays the **Resistive Term** toolbar. Use the toolbar to enter the required impedance for the currently active trace. The default value is 50.000 Ohms.

Reactive (j) (Ohms)

Select allows the user to enter trace reactive term in Ohms and displays the **Reactive (j)** toolbar.

SMITH (IMPEDANCE) Menu

Previous

- “TRACE FORMAT Menu” on page 21-6

Navigation

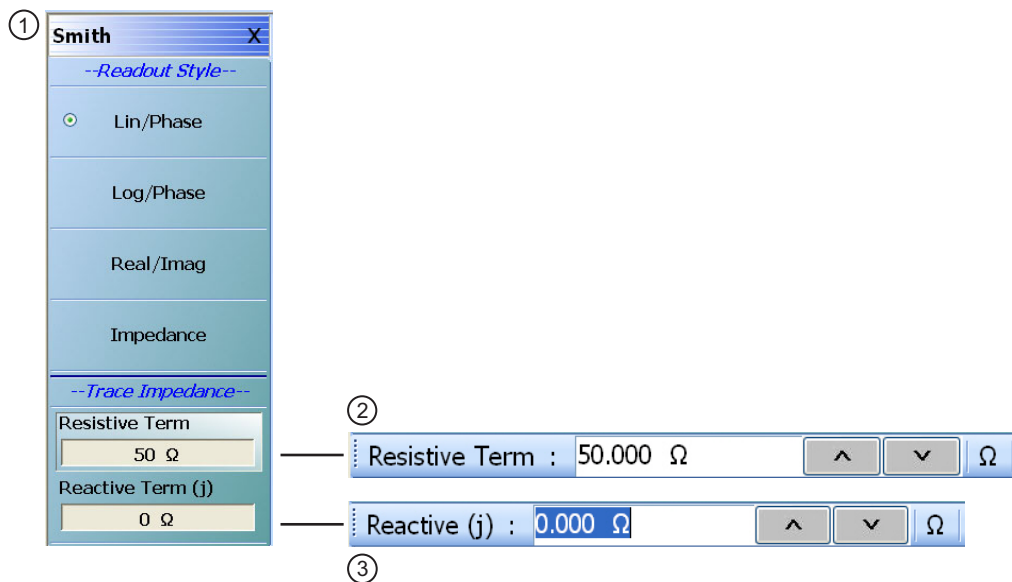
- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (R+jX) | SMITH (IMPEDANCE)

Scaling

- Once the Smith Impedance or Smith Admittance display is selected, the scale of the display can be adjusted by using the SCALE menu.
- “SCALE Smith Chart Impedance Menu” on page 22-14
- MAIN | Scale | SCALE | Scale Selection | SMITH SCALING

Auto-Return Button Selection Group

- The Lin/Phase, Log/Phase, Real/Imag, and Impedance buttons form a button selection group with an auto-return function, where the selection of any one button de-selects the other three buttons and auto-returns to the TRACE FORMAT menu.



1. SMITH (IMPEDANCE) Menu

2. Resistive Term Field Toolbar in Ohms.

3. Reactive (j) Term Field Toolbar in Ohms.

Figure 21-4. SMITH (IMPEDANCE) Menu

Lin/Phase (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots with linear values and phase.

Log/Phase (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots with log values and phase.

Real/Imag (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots with real and imaginary values.

Impedance (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots only impedance.

Resistive Term (Smith Impedance)

Select displays the Resistive Term (Ohms) toolbar and allows the user to select the impedance for the selected active trace.

Reactive Term (j) (Smith Impedance)

Select displays the Reactive Term (j) Field Toolbar (Smith Impedance). The appearance and operation is the same as the Resistive Term field toolbar above.

SMITH (ADMITTANCE) Menu

SMITH (ADMITTANCE) Menu Auto-Return Button Selection Group

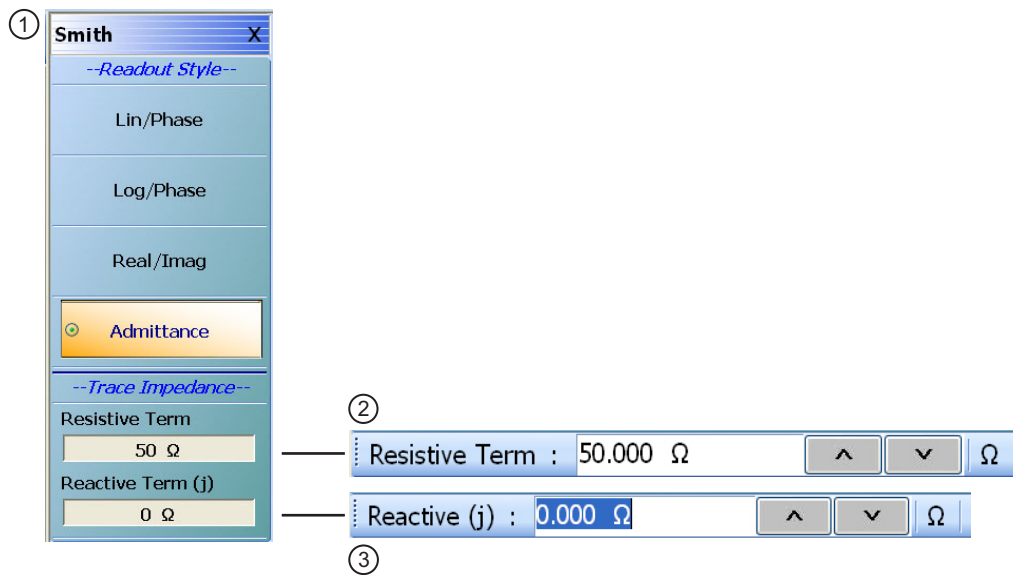
- The Lin/Phase, Log/Phase, Real/Imag, and Admittance buttons form an auto-return button selection group where the selection of any one button de-selects the other three buttons and auto-returns to the TRACE FORMAT menu.

Previous

- “TRACE FORMAT Menu” on page 21-6

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (G+jB) | SMITH (ADMITTANCE)



1. SMITH (ADMITTANCE) Menu

2. Resistive Term Field Toolbar in Ohms.

3. Reactive (j) Term Field Toolbar in Ohms.

Figure 21-5. SMITH (ADMITTANCE) Menu

Lin/Phase (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots with linear values and phase.

Log/Phase (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots with log values and phase.

Real/Imag (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots with real and imaginary values.

Admittance (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots only admittance.

Resistive Term (Smith Admittance)

Select displays the Resistive Term (Ohms) toolbar and allows the user to select the impedance for the selected active trace.

Reactive Term (j) (Smith Admittance)

Select displays the Reactive Term (j) Field Toolbar (Smith Impedance). The appearance and operation is the same as the Resistive Term field toolbar above.

LINEAR POLAR Menu

LINEAR POLAR Menu Button Selection Group

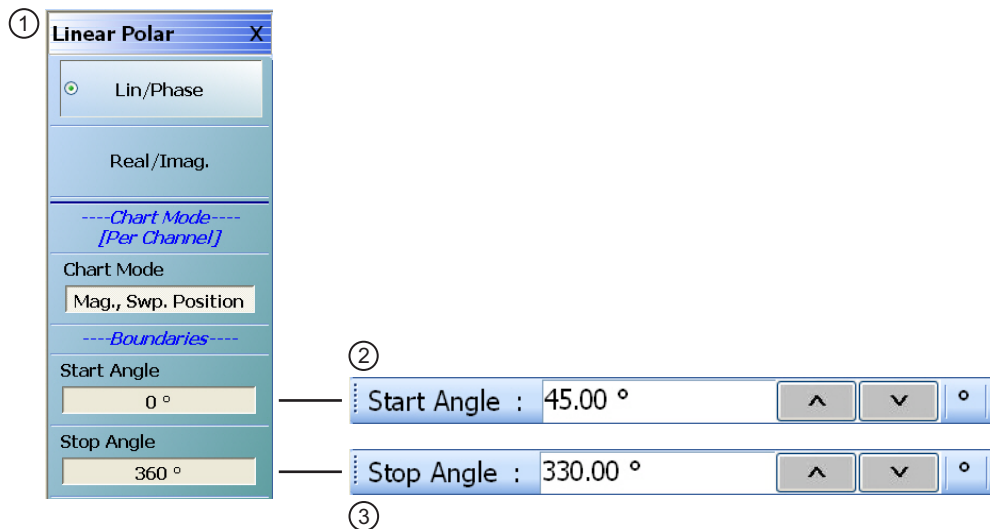
- The Lin/Phase and Real/Imag. buttons form a button selection group where the selection of one button de-selects the other button.

Previous

- “TRACE FORMAT Menu” on page 21-6

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Linear Polar | LINEAR POLAR



1. LINEAR POLAR Menu	2. Start Angle Field Toolbar in Degrees. 3. Stop Angle Field Toolbar in Degrees.
----------------------	---

Figure 21-6. LINEAR POLAR Menu

Lin/Phase (Linear Polar)

Sets the linear polar display graph to linear and phase.

Real/Imag (Linear Polar)

Sets the linear polar display graph to real and imaginary.

Chart Mode (Mag/Phase & Mag/Swp. Position) (Linear Polar)

On a per-channel basis, select toggles between values of Mag/Phase and Mag/Swp. Position. If Mag/Phase is selected, the Start Angle and Stop Angle buttons below are unavailable. If Mag/Swp. Position is selected, the Start Angle and Stop Angle buttons are become available.

Start Angle (Linear Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Start Angle (Degrees) toolbar. Enter a starting angle between 0.00 degrees and 360 degrees.

Stop Angle (Linear Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Stop Angle (Degrees) toolbar. Enter a stop angle from between 0.00 degrees and 360 degrees.

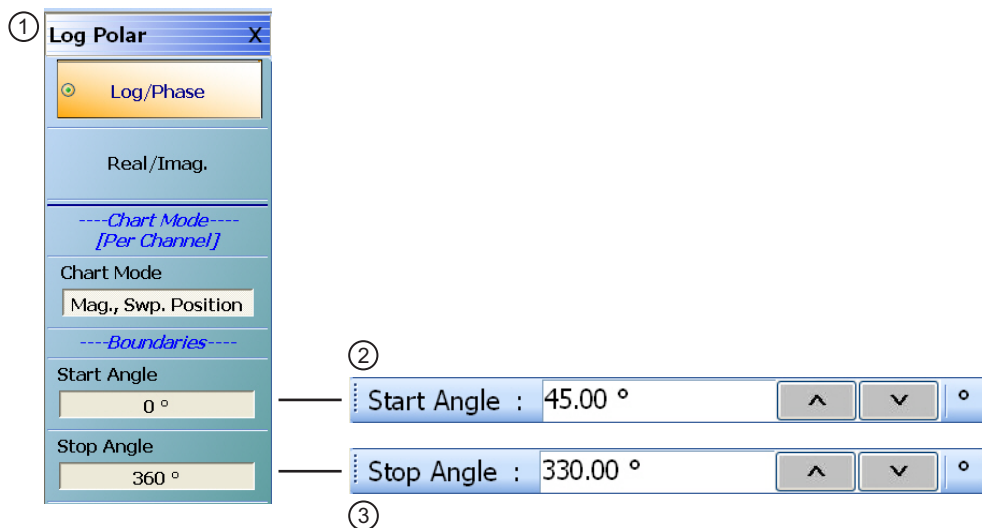
LOG POLAR Menu

Previous

- “TRACE FORMAT Menu” on page 21-6

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Log Polar | LOG POLAR



1. LOG POLAR Menu

2. Start Angle Field Toolbar in Degrees.

3. Stop Angle Field Toolbar in Degrees.

Figure 21-7. LOG POLAR Menu

Log Polar Button Selection Group

The Lin/Phase and Real/Imag. buttons form a button selection group where the selection of one button de-selects the other button.

Lin/Phase (Log Polar)

Sets the log polar display graph to linear and phase.

Real/Imag. (Log Polar)

Sets the log polar display graph to real and imaginary.

Chart Mode (Mag., Phase & Mag., Swp. Position) (Log Polar)

On a per-channel basis, select toggles between values of Mag/Phase and Mag/Swp. Position. If Mag/Phase is selected, the Start Angle and Stop Angle buttons below are unavailable. If Mag/Swp. Position is selected, the Start Angle and Stop Angle buttons are become available.

Start Angle (Deg) (Log Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Start Angle (Degrees) toolbar. Enter a starting angle between 0.00 degrees and 360 degrees.

Stop Angle (Log Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Stop Angle (Degrees) toolbar. Enter a stop angle from between 0.00 degrees and 360 degrees.

VIEW TRACE Menu

Previous

- “TRACE FORMAT Menu” on page 21-6

Navigation

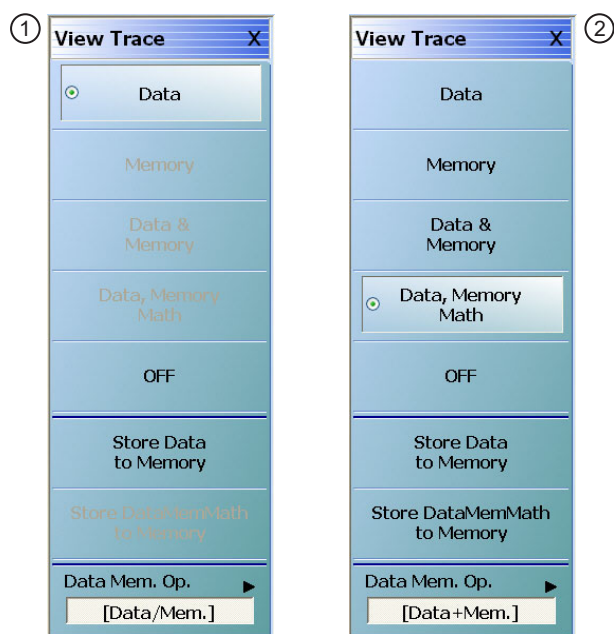
- MAIN | Display | DISPLAY | View Trace | VIEW TRACE

Button Availability

- If trace data has not previously been stored to memory, only the Data, Off, Store Data to Memory, and Data Mem Op buttons (all described below) are available as shown left side of [Figure 21-8](#) below.
- The Memory, Data & Memory, Data Memory Math, and Store Data Mem Math to Memory buttons are unavailable.
- After one or more sweeps, select the Store Data to Memory button to enable the Memory, Data & Memory, Data Memory Math buttons.
- See the section below for availability of the Store Data Mem Math to Memory button functions.

Button Selection Group

- If trace data has been stored to memory, the Data, Memory, Data and Memory, Data Mem. Math, and OFF buttons become available and form a button selection group where selection of any one button de-selects the other four buttons as shown in the right side of [Figure 21-8](#) below.



1. VIEW TRACE menu button availability with no data stored to memory.

2. VIEW TRACE menu after one or more sweeps and Store Data to Memory has been selected.

Figure 21-8. VIEW TRACE Menu

View Trace Button Availability

If trace data has not previously been stored to memory, only the Data, Off, Store Data to Memory, and Data Mem Op buttons are available.

Data

The button is available but has no function until data has been stored as described below.

OFF (View Trace)

If OFF (View Trace) is selected, the active trace on the active channel is removed from the trace graph display.

Store Data to Memory

Select causes data to be stored to memory and the Store Data MemMath to Memory button is (below) becomes available.

Data Mem. Op.

Select displays the Data Mem Op menu.

- [“DATA-MEM. OP. Menu” on page 21-21](#)

After one or more sweeps, select the Store Data to Memory button to enable the Memory, Data & Memory, Data Memory Math buttons described below.

View Trace Menu Button Selection Group

If data has been saved to memory, the Data, Memory, Data and Memory, Data Mem. Math, and OFF buttons become available and form a button selection group where selection of any one button de-selects the other four buttons.

Data

Select records data to memory where it can be stored or further manipulated. The Store Data MemMath to Memory button (below) is unavailable.

Memory

Memory recalls data from memory where it is displayed or further manipulated. The Store Data MemMath to Memory button (below) is unavailable.

Data & Memory

Data & Memory recalls data and uses the active memory for display and/or further manipulation. The Store Data MemMath to Memory button (below) is unavailable.

Data Memory Math

The Data Memory Math button enabled the Store Data MemMath to Memory button (below) is available where the selected math operation is applied to the stored data.

OFF (View Trace)

If OFF (View Trace) is selected, the active trace on the active channel is removed from the trace graph display. The Store Data MemMath to Memory button (below) is unavailable.

Store Data to Memory

Select causes data to be stored to memory and the Store Data MemMath to Memory button is (below) is available.

Store Data MemMath to Memory

The Data Memory Math button (above) must be selected to make this button available. If selected, this stored the active trace data/math information to a file.

Data Mem. Op.

Select displays the Data Mem Op menu.

- [“DATA-MEM. OP. Menu” on page 21-21](#)

DATA-MEM. OP. Menu

Full Name

- DATA-MEMORY OPERATIONS Setup Menu

Previous

- [“VIEW TRACE Menu” on page 21-18](#)

Navigation

- MAIN | Display | DISPLAY | View Trace | VIEW TRACE | Data Mem Op | DATA MEM OP

Button Selection Group

- The menu buttons form button selection group where the selection of any one button deselect the other three buttons.

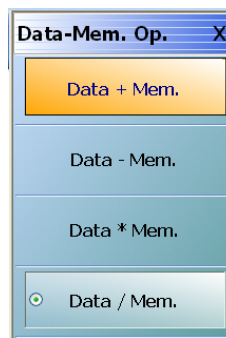


Figure 21-9. DATA-MEM. OP. (DATA-MEMORY OPERATIONS) Menu

Data + Mem. (Plus)

Selecting Data + Mem button de-selects the Data – Mem, Data Mem, and Data / Mem buttons. The data value is added to the memory value. Click **Back** to return to the View Trace menu.

Data – Mem. (Minus)

Selecting the Data – Mem button de-selects the Data + Mem, Data Mem, and Data / Mem buttons. The memory value is subtracted from the data value. Click **Back** to return to the View Trace menu.

Data * Mem. (Multiplication)

Selecting Data * Mem button de-selects the Data + Mem, Data – Mem, and Data / Mem buttons. The data value is multiplied times the memory value. Click **Back** to return to the View Trace menu.

Data / Mem. (Division)

Selecting Data / Mem button de-selects the Data + Mem, Data – Mem, and Data Mem buttons. The data value is divided by the memory value. Click **Back** to return to the View Trace menu.

21-5 Trace Limit Line Control Menus and Dialog Boxes

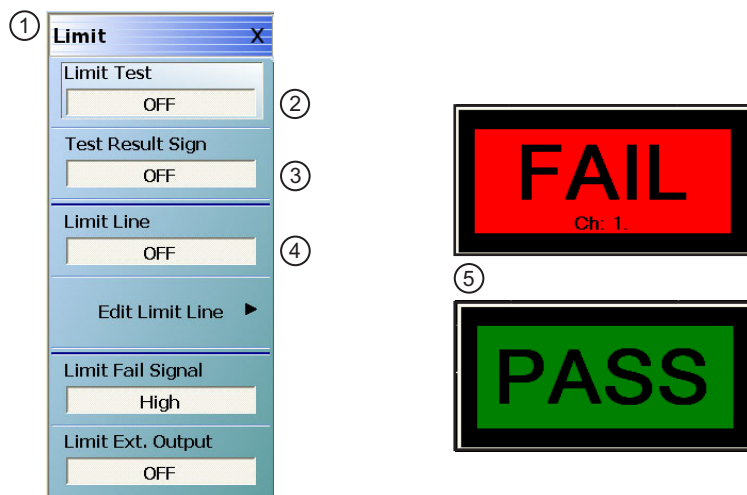
LIMIT Menu

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT



- | | |
|--|--|
| <ol style="list-style-type: none"> 1. LIMIT Menu 2. Limit Test Toggle Button – Toggles limit tests ON or OFF. 3. Limit Test Results Sign Button – Toggles limit test results as screen message as shown in #5 ON and OFF. | <ol style="list-style-type: none"> 4. Limit Line Toggle Button – Toggles existing limit lines ON or OFF. 5. Pass/Fail screen dialogs showing results of test.button function descriptions. |
|--|--|

Figure 21-10. LIMIT Menu

Limit Test (Off/On)

On a per-system basis, select toggles Limit Test on and off.

Test Result Sign (Off/On)

On a per-system basis, toggles the Test Result Sign on and off. If the Test Result Sign is enabled, a failed test icon appears. If the Test Result Sign is enabled, a passed test icon appears.

Limit Line

On a per-trace basis, toggles Limit Lines off and on.

Edit Limit Line

On a per-trace basis, displays the Edit Limit Line menu.

- [“EDIT LIMIT LINE Menu” on page 21-26](#)

Limit Fail Signal (High/Low)

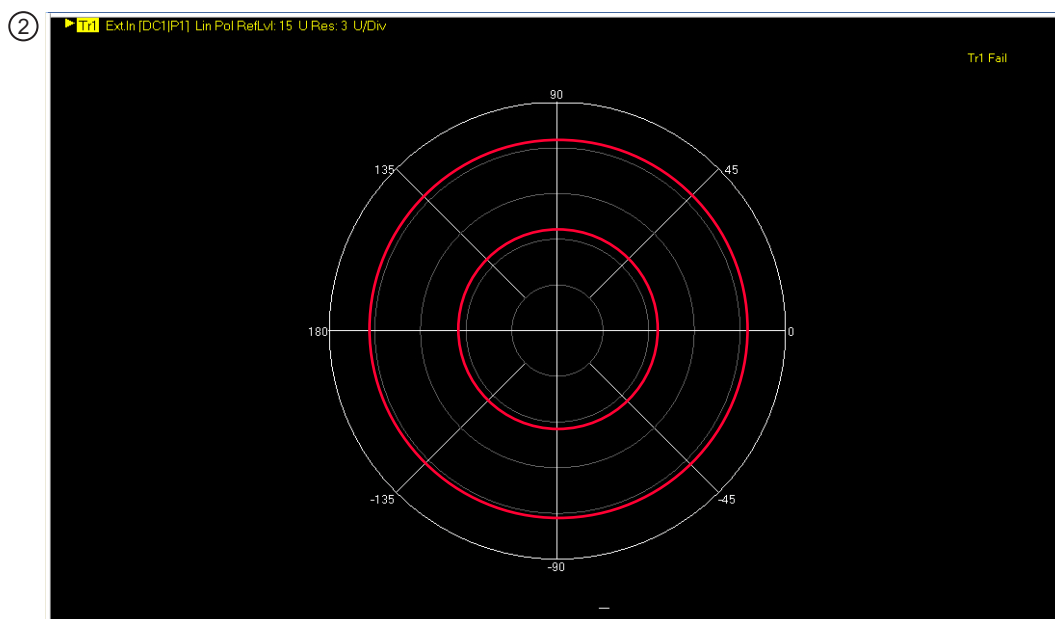
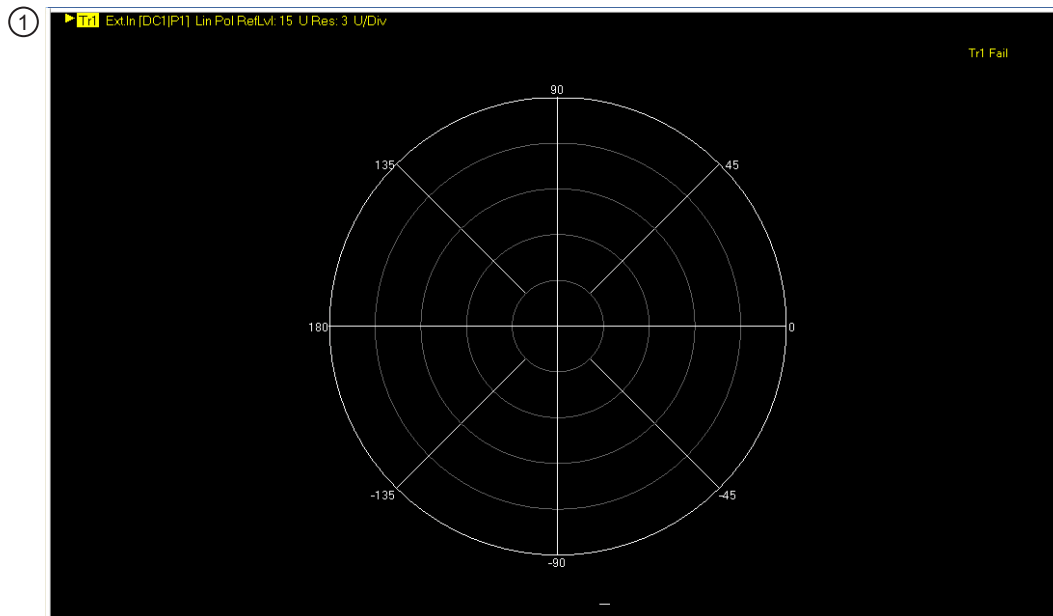
On a per-trace basis, toggles the Limit Fail Signal between high and low.

Limit Ext. Output (Off/On)

Select toggles the Limit Ext. Output between off and on.

Polar Chart Circular Limit Lines

For Linear Polar Chart displays and Log Polar Chart displays, only upper and lower limit lines are supported. For example, in [Figure 21-11](#), a Linear Polar display at left has the limit lines turned off, and at right, the limit lines are turned on.



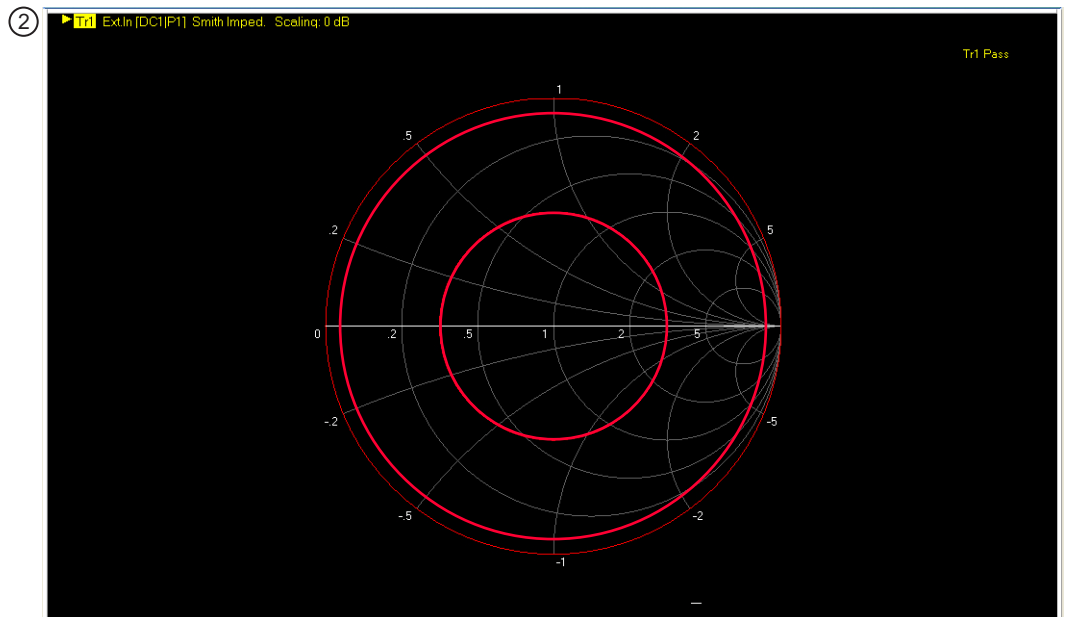
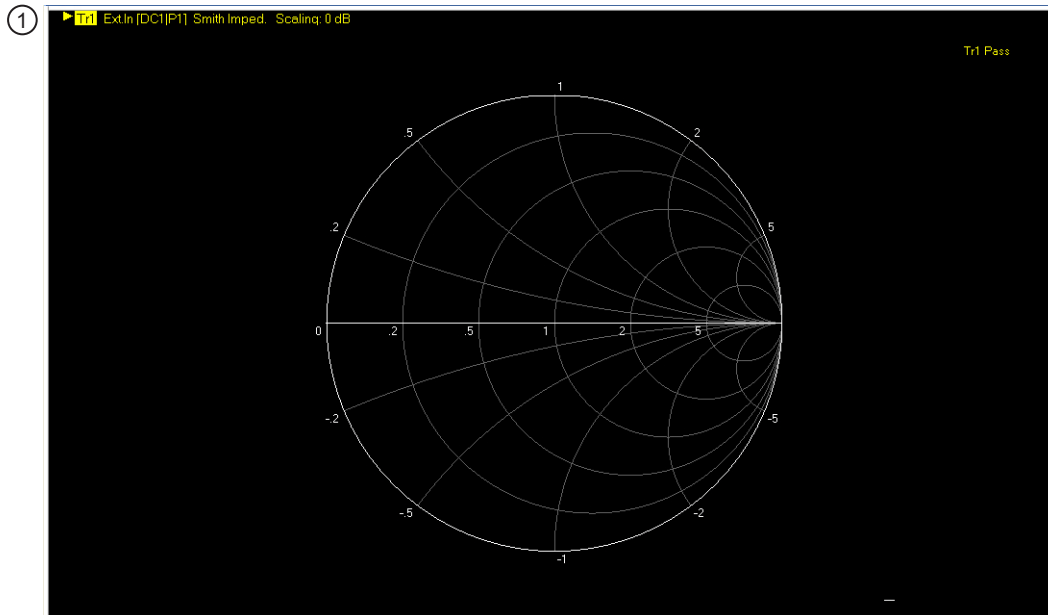
1. Linear Polar Display – Limit Lines Off

2. Linear Polar Display – Limit Lines On.

Figure 21-11. Linear Polar Display – Limit Lines – Off/On

Smith Chart Circular Limit Lines

For Smith Charts, again only upper and lower limits are supported. In [Figure 21-12](#), a Smith Chart with the limit lines turned off is shown on the left, and with the limit lines turned on at the left.



1. Smith Chart Limit Lines - Limit Lines OFF

2. Smith Chart Limit Lines – Upper and Lower Limit Lines ON.

Figure 21-12. Smith Chart Limit Lines – Off at left – On at right

EDIT LIMIT LINE Menu

When this menu is selected, the bottom of the display moves up and the “LIMIT LINE TYPE SETUP Tableau Dialog” is displayed. The number of limit lines that can be added depend on the type of display:

- Single rectangular trace displays can have up to 50 limit line segments per trace.
- Dual rectangular trace displays can have up to 50 limit line segments where each segment is the same on both trace displays.
- Smith Chart and Polar Graph circular displays are can only have an upper and lower limit.

Previous

- [“LIMIT Menu” on page 21-22](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE

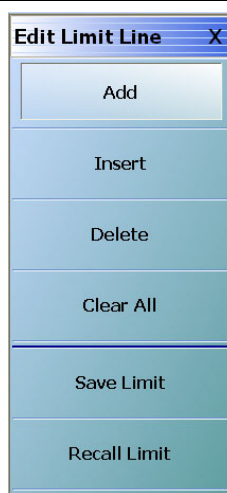


Figure 21-13. EDIT LIMIT LINE Menu

EDIT LIMIT LINE Menu Button Availability

The six (6) buttons of the EDIT LIMIT LINE menu are available to all rectangular, Smith Chart, and Polar Graph Chart displays.

Rectangular displays can have up to 50 limit line segments per trace. Smith Chart and Polar Graph circular displays can have an upper and lower limit only.

Add (Limit Line)

Select adds a new row of limit line information to the “LIMIT LINE TYPE SETUP Tableau Dialog” at the bottom of the display. For example, if four (4) limit lines are displayed, selecting Add creates a new limit line at position five (5).

- [“LIMIT LINE TYPE SETUP Tableau Dialog” on page 21-28](#)

Insert (Limit Line)

Inserts a new limit line ABOVE the currently selected limit line.

- If no limit lines are currently defined, the button does not function.
- If one (1) or more limit lines are defined, select and highlight the limit line where you want to insert a new line. A selected line is indicated by the right-facing triangle will all line fields in a reversed display.

- For example, if four (4) lines are currently defined, and a fifth line is required between Limit Line 1 and Limit Line 2, select Limit Line 2 so that the right arrow selection triangle appears to the left of the line number.
- Click the **Insert** button and a new limit line appears at position two with the default values from the active trace display. The cursor moves to the row above the inserted line. The previous line 2 and its values are moved to the row 3 position; the previous line 3 and its values are moved to the row 4 position.
- See the detailed tableau operations description in the sections below.
- [“LIMIT LINE TYPE SETUP Tableau Dialog” on page 21-28](#)

Delete (Limit Line)

After selecting a limit line row in the EDIT LIMIT LINE TABLEAU dialog, selecting the **Delete** button removes the limit line.

- [“LIMIT LINE TYPE SETUP Tableau Dialog” on page 21-28](#)

Clear All (Limit Lines)

Select deletes all recorded limit lint rows in the EDIT LIMIT LINE TABLEAU dialog.

- [“LIMIT LINE TYPE SETUP Tableau Dialog” on page 21-28](#)

Save Limit

Select displays the SAVE AS (LIMIT LINE LMT FILE) dialog box.

- [“SAVE AS \(LIMIT LINE LMT FILE\) Dialog Box” on page 21-32](#)

Recall Limit

Select displays the OPEN (LIMIT LINE LMT FILE) dialog box.

- [“OPEN \(LIMIT LINE LMT FILE\) Dialog Box” on page 21-33](#)

LIMIT LINE TYPE SETUP Tableau Dialog

When the EDIT LIMIT LINE menu is selected, the “LIMIT LINE TYPE SETUP Tableau Dialog” appears at the bottom of the display allowing creation of limit lines for each trace display. Both upper- and lower-segmented limits can be created by using the buttons in the EDIT LIMIT LINE menu and the segment controls in the tableau dialog.

Previous

- “EDIT LIMIT LINE Menu” on page 21-26

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE

Limit Line Parameters

The following eight parameters are used to define each limit line:

- Limit line segment number
- Limit line type. Each segment can be defined as an Upper limit, a Lower limit, or turned off.
- X1 = The X-axis segment start frequency.
- X2 = The X-axis segment stop frequency.
- Y1 = The Y-axis starting constraint for the segment. The units for Y1 change depending on the trace display type. For example, if the display is set Log Magnitude, the Y1 units are in dB. If the display is set to Power Out, the Y1 units are in dBm.
- Y2 = The Y-axis stopping constraint for the segment. As above, the Y2 units change depending on the trace display type.
- X Offset = The offset from the X1 value. This is useful if copying existing limit line segments where an incremental offset can be applied to a fundamental X1 value. Any offset is applied to both the X1 and X2 values.
- Y Offset = The offset from the Y1 value. As above, the offset is applied to both the Y1 and Y2 values.

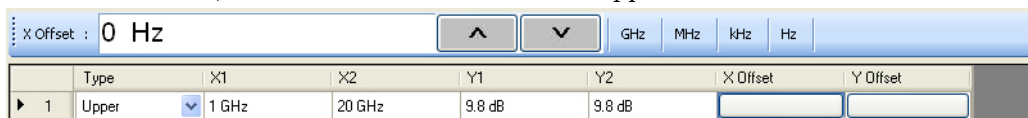
Adding the First Limit Line

Assuming that no limit lines have been added during the current session, the dialog area appears as just a title bar. If unwanted limit lines from a previous configuration appear, on the EDIT LIMIT LINE menu, click the Clear All button.



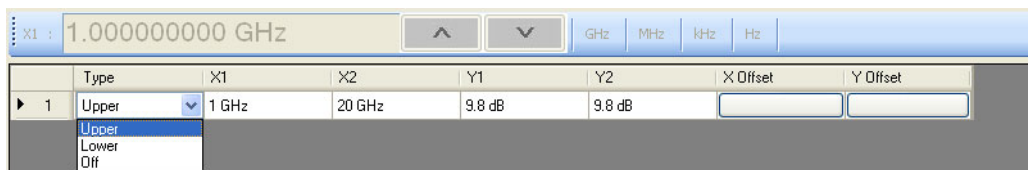
Adding a Limit Line Row

On the EDIT LIMIT LINE menu, click Add. A default limit line appears in the tableau at row 1.



Type Selection Field

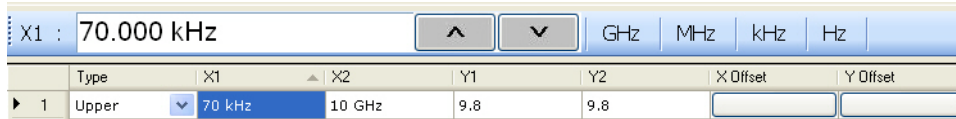
In the Type field, click the down button icon to select whether the limit will be an Upper or Lower limit line or if it will be OFF.



The OFF function is useful if you use a saved limit line file and want to temporarily disable some limits.

X1 Field

In X1 column, click the X1 field which constrains the start point for the X-axis segment. Usually this will be frequency for linear, log, or segmented frequency-based sweeps. Alternatively, the units can be time (time domain) or power (CW power sweeps).

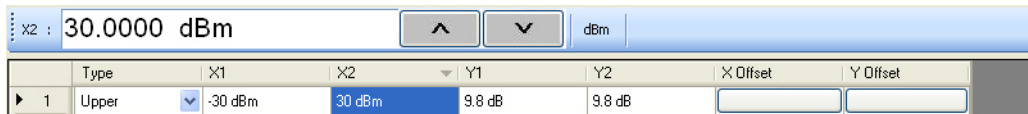


X1 Field Toolbar

As shown above, the X1 field toolbar appears immediately above the tableau header row. If the units are frequency, enter the required X1 frequency, using the field toolbar buttons to select the required units of GHz, MHz, kHz, or Hz. If the units are time or power, the general operation is the same.

X2 Field

In the X2 column, click the X2 field which constrains the end point for the X-axis segment. As above, the X2 field toolbar appears immediately above the tableau header row with units of frequency, time, or power.

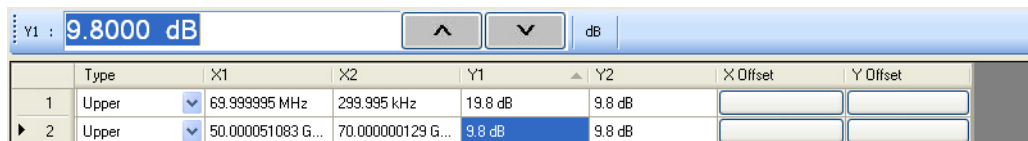


X2 Field Toolbar

As shown above, use the toolbar to enter the required X2 value and units.

Y1 Field

The Y1 and Y2 fields constrain the limit segment in the trace display Y-axis. The units used will match those of the selected trace display. In the Y1 column, click the Y1 field. The Y1 field toolbar appears immediately above the header row.

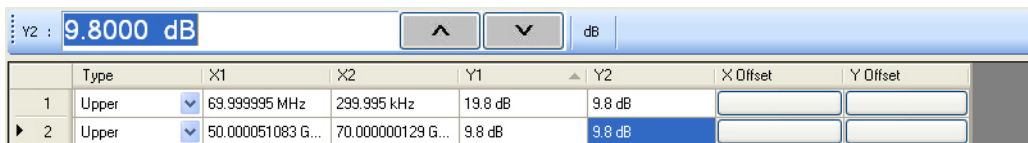


Y1 Field Toolbar

As shown above, use the toolbar to enter the Y1 value and units.

Y2 Field

In the Y2 column, click the Y2 field. As above in the Y1 field, the Y2 field toolbar appears immediately above the header row.



Y2 Field Toolbar

As shown above, use the field toolbar to enter the required Y2 value and units.

X Offset Button

On a per-row basis, the X Offset and Y Offset buttons allow the user to offset indices by a constant amount. This is useful for copying multiple rows and incrementing by a fixed frequency offset. In the X Offset column, click the X Offset button for the appropriate row. The X Offset field toolbar appears immediately above the tableau header row. Use the toolbar to enter the required value and units. When the units button is selected, the offset is applied to the X1 and X2 values. In the example in row 2 below, a lower limit line has already been established for X1 = 2.0 GHz and X2 = 2.99 GHz. To offset these by the same amount, select row 2, and then click the X Offset button. In the example, the offset required is -0.5 GHz. With row 2 selected, click the X Offset button and the X Offset field toolbar appears. Enter the required value and units.

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2	Lower	2 GHz	2.99 GHz	-12 dB	-13 dB		

X Offset Field Toolbar

As shown above, use the field toolbar to enter the required X Offset value and units. Once the toolbar units button has been selected, the new X values in row 2 are X1 = 1.5 GHz and X2 = 2.99 GHz as shown below.

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2	Upper	1.5 GHz	2.99 GHz	-12 dB	-13 dB		

Y Offset Button

The Y Offset button and field toolbar function the same as the X Offset button described above. Under the Y Offset column heading, click the Y Offset button. The Y Offset field toolbar appears immediately above the tableau header row. In the example below, in the example in row 1 below, a lower limit line has already been established with Y1 = -10 dB and Y2 = -11 dB. To offset these by the same amount, select row 1, and then click the Y Offset button. In the example below, the offset required is -0.75 dB. With row 1 selected, click the Y Offset button and the Y Offset field toolbar appears. Enter the required value and units.

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2	Lower	2.49 GHz	2.49 GHz	-12 dB	-13 dB		

Y Offset Field Toolbar

As shown above, use the field toolbar to enter the required Y Offset value and units. Once the units button has been selected, the Y1 and Y2 fields for row 1 are changed as shown below.

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10.75 dB	-11.75 dB		
2	Lower	2.49 GHz	2.49 GHz	-12 dB	-13 dB		

Adding a Limit Line Row

To add more rows to the bottom of the "LIMIT LINE TYPE SETUP Tableau Dialog" area, use the Add button on the EDIT LIMIT LINE menu and then complete the X1, X2, Y1, Y2, and offset parameters as described above.

If no rows are present, Add creates a new row 1 at the top of the tableau using the trace settings for X1 start and X2 stop values.

- If one or more rows are present, the Add button places each new row at the bottom of the tableau.
- If no rows are present or the field of an existing row is selected, the Insert does not function.
- If one or more rows are present and the entire row is selected by selecting the row number, Insert adds a row at the cursor position and pushes the current row and all those below down.

Inserting a Limit Line Row

To insert a limit line row, at least two limit lines must be present. If multiple limit lines are present, select the limit line row number where the new limit line is to be inserted. In the example below, a new limit line is needed above row 2. Row 2 is selected indicated by the highlighting and the right arrow.

Y2 : -15.0000 dB

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
▶ 2	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
3	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

On the EDIT LIMIT LINE menu, click the Insert button. A new row is added as row 2 and the previous rows are pushed down as shown below.

X1 : 1.000000000 GHz

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
▶ 2	Upper	1 GHz	20 GHz	9.8 dB	9.8 dB		
3	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
4	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

After the row is inserted, use the procedures above to complete the X1, X2, Y1, Y2, and offset parameters.

Deleting a Limit Line

To delete a limit line, select it as above, and then on the EDIT LIMIT LINE menu, select the Delete button. on the EDIT LIMIT LINE menu. In the example below, row 1 is selected and ready to be deleted.

X1 : 1.000000000 GHz

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
▶ 1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2	Upper	1 GHz	20 GHz	9.8 dB	9.8 dB		
3	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
4	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

After the Delete button is selected, the row is removed and all rows below move up as shown below.

X Offset : 0 Hz

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	20 GHz	9.8 dB	9.8 dB		
2	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
▶ 3	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

SAVE AS (LIMIT LINE LMT FILE) Dialog Box

Previous

- “EDIT LIMIT LINE Menu” on page 21-26

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE | Save Limit | SAVE AS (LIMIT LINE LMT FILE) Dialog Box

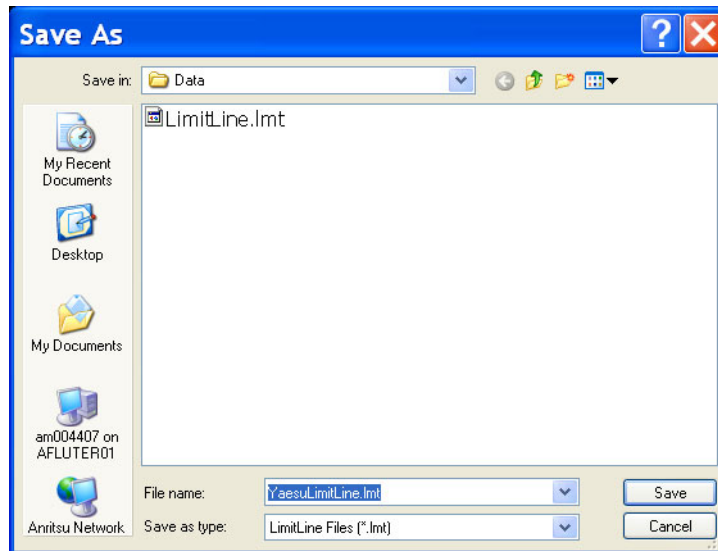


Figure 21-14. SAVE AS (LIMIT LINE LMT FILE) Dialog Box

Instructions

Use the Save As dialog box to save the limit line settings as a Limit Line (LMT) file.

OPEN (LIMIT LINE LMT FILE) Dialog Box

Previous

- [“EDIT LIMIT LINE Menu” on page 21-26](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE | Recall Limit | OPEN (LIMIT LINE LMT FILE) Dialog Box

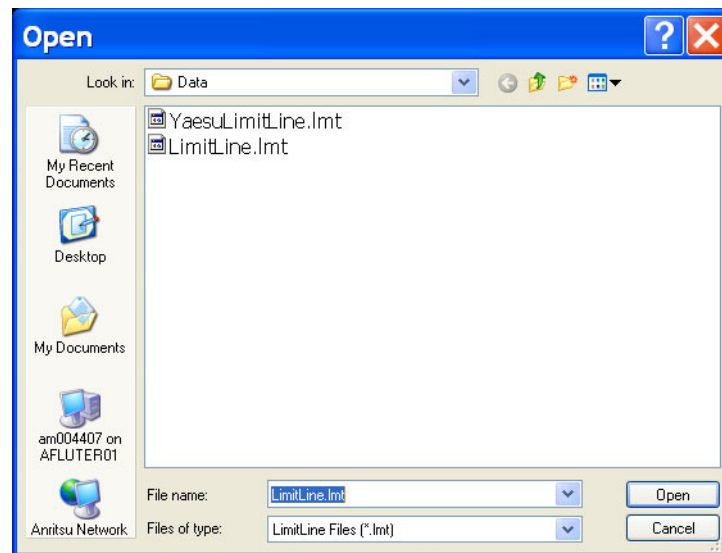


Figure 21-15. OPEN (LIMIT LINE LMT FILE) Dialog Box

Instructions

Select the required LMT file and then click Open.

21-6 DOMAIN Menu Appearance and Button Availability

The presence and availability of the DOMAIN menu buttons depends on the selections made on the SWEEP TYPES and FREQUENCY menus. Use the descriptions below to determine which menu is currently present and then use the link to navigate to the correct menu description.

DOMAIN Menu Button Selection Group

The top four (4) buttons on the DOMAIN menu form a button selection group where the selection of one (1) button de-selects the other three (3) buttons.

- Frequency, with No Time Gate
- Frequency, with Time Gate
- Time, Low Pass
- Time, Band Pass

DOMAIN Menu Variants

Each DOMAIN menu variant is shown in the sections below.

- Time Domain, Frequency with No Time Gate
- Time Domain, Frequency with Time Gate
- Time Domain, Time Gate Low Pass
- Time Domain, Time Gate Band Pass

DOMAIN Frequency with No Time Gate Menu

The DOMAIN Frequency with No Time Gate menu has only the Frequency with No Time Gate button available. No other menu options are available.

Menu Description

- [“DOMAIN Frequency with No Time Gate Menu” on page 21-37](#)

Prerequisites

- SWEEP TYPES = Power (Swept Freq) or Power (CW Freq).
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Power (Swept Freq)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Power (CW Freq)

DOMAIN Frequency with Time Gate

The DOMAIN Frequency with Time Gate menu has the Frequency with Time Gate button available.

Menu Description

- [“DOMAIN Frequency with Time Gate Menu” on page 21-38](#)

Prerequisites

- SWEEP TYPES = Freq Sweep (Linear), Freq Sweep (Log), or Segmented Sweep (Freq-based)
- [SWEEP TYPES Menu](#) on page 7-4
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Freq Sweep (Linear)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Freq Sweep (Log)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Segmented Sweep (Freq-based)

DOMAIN Time Gate Low Pass Menu

The DOMAIN Time Gate Low Pass menu and the Time, Low Pass button is only available as a selection under certain conditions when a harmonic sweep condition is established. Sweep must be set to a frequency-based sweep: Frequency Sweep (Linear), Frequency Sweep (Log) or Segmented sweep (Frequency-based).

Menu Unavailable

- The Time, Low Pass button is unavailable if:
 - A power-based sweep of Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is set.
 - A Segmented Sweep (Index-Based) is set.

Menu Description

- [“DOMAIN Time Low Pass Menu” on page 21-39](#)

Prerequisites

- SWEEP TYPES Menu = Freq Sweep (Linear), Freq Sweep (Log), or Segmented Sweep (Freq-based)
 - [SWEEP TYPES Menu](#) on page 7-4
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Freq Sweep (Linear)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Freq Sweep (Log)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Segmented Sweep (Freq-based)
- For example, at the FREQUENCY menu, set the following:
 - Start point of 1 GHz
 - Stop point of 10 GHz
 - # of Points set to 10

- The Time, Low Pass button available.
- [“FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3](#)
- [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
- [“FREQUENCY Freq. Based Segmented Sweep Menu” on page 4-7](#)
- MAIN | Frequency | FREQUENCY

DOMAIN Time Gate Band Pass Menu

The DOMAIN Time Gate Band Pass menu and the Time, Band Pass button is only available as a selection when a frequency-based sweep: Frequency Sweep (Linear), Frequency Sweep (Log) or Segmented sweep (Frequency-based).

Menu Unavailable

- The Time, Band Pass button is unavailable if:
 - A power-based sweep of Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is set.
 - A Segmented Sweep (Index-Based) is set.

Menu Description

- [“DOMAIN Time Band Pass Menu” on page 21-41](#)

Prerequisites

- SWEEP TYPES Menu = Freq Sweep (Linear), Freq Sweep (Log), or Segmented Sweep (Freq-based)
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

DOMAIN Frequency with No Time Gate Menu

Menu Identification and Variants

- The appearance and button availability of the DOMAIN menu depends on settings on the SWEEP menu.
- Consult the section above for menu identification and prerequisites.
- [“DOMAIN Menu Appearance and Button Availability” on page 21-34](#)

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with No Time Gate


	<h3>Frequency, with No Time Gate</h3> <p>If the Frequency, with No Time Gate button is selected:</p> <ul style="list-style-type: none"> • The following time domain options are deselected and unavailable: <ul style="list-style-type: none"> • Frequency, with Time Gate • Time, Low Pass • Time, Band Pass • No other menu buttons are available.
--	--

Figure 21-16. DOMAIN Frequency with No Time Gate Menu

DOMAIN Frequency with Time Gate Menu

Menu Identification and Variants

- The appearance and button availability of the DOMAIN menu depends on settings on the SWEEP menu.
- Consult the section above for menu identification and prerequisites.
- [“DOMAIN Menu Appearance and Button Availability” on page 21-34](#)

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN

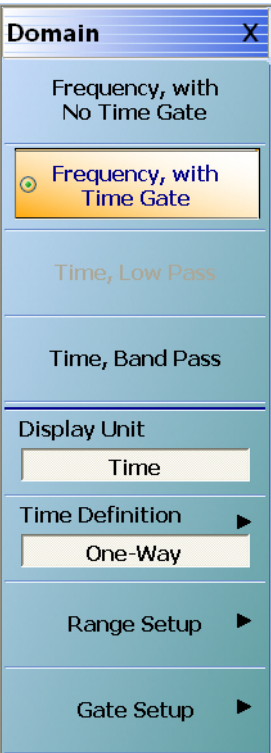
 <p>The screenshot shows a vertical menu titled 'Domain' with a close button (X). The menu items are: 'Frequency, with No Time Gate', 'Frequency, with Time Gate' (highlighted in yellow with a green circle), 'Time, Low Pass', 'Time, Band Pass', 'Display Unit' (with a dropdown menu showing 'Time'), 'Time Definition' (with a dropdown menu showing 'One-Way'), 'Range Setup', and 'Gate Setup'.</p>	<h3>Frequency with Time Gate</h3> <p>If the Frequency, with Time Gate button is selected:</p> <ul style="list-style-type: none"> • The following time domain options are deselected and unavailable: <ul style="list-style-type: none"> • Frequency, with No Time Gate • Time, Low Pass • Time, Band Pass • The following time domain options are available below: <ul style="list-style-type: none"> • The Display Unit, Time Definition, Range Setup, and Gate Setup buttons are available. <h3>Display Unit (Time/Distance)</h3> <p>This button is available if the Frequency, with Time Gate button (above) has been selected. Select toggles the display units between time and distance.</p> <h3>Time Definition</h3> <p>This button is available if the Frequency, with Time Gate button (above) has been selected. Select displays the TIME DEFINITION menu.</p> <ul style="list-style-type: none"> • “TIME DEFINITION Menu” on page 21-51 <h3>Range Setup</h3> <p>This button is available if the Frequency, with Time Gate button (above) has been selected. Select displays the RANGE SETUP menu.</p> <ul style="list-style-type: none"> • “RANGE SETUP Frequency with Time Gate Menu” on page 21-54 <h3>Gate Setup</h3> <p>This button is available if the Frequency, with Time Gate button (above) has been selected. Select displays the GATE SETUP menu.</p> <ul style="list-style-type: none"> • “GATE SETUP Menu” on page 21-67
---	---

Figure 21-17. DOMAIN Frequency with Time Gate Menu

DOMAIN Time Low Pass Menu

The appearance and button availability of the DOMAIN menu depends on settings on the SWEEP and FREQUENCY menus. Consult the section above at [“DOMAIN Menu Appearance and Button Availability” on page 21-34](#) for menu identification and prerequisites.

Prerequisites

- The Time, Low Pass button is only available as a selection under certain conditions when a harmonic sweep condition is established.
- For example, at the FREQUENCY menu, a Start point of 1 GHz, a Stop point of 10 GHz, and the # of Points set to 10 makes the Time, Low Pass button available.
 - [“FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3](#)
 - [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
 - MAIN | Frequency | FREQUENCY

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass


	<h3>Time, Low Pass</h3> <p>If the Time, Low Pass button is selected:</p> <ul style="list-style-type: none"> • The following time domain options are deselected and unavailable: <ul style="list-style-type: none"> • Frequency, with No Time Gate • Frequency, with Time Gate • Time, Band Pass • If the Time Band Pass button is selected: <ul style="list-style-type: none"> • The read-only Impulse Width [3dB] display button appears. • The Display Unit, Time Definition, Range Setup, and Gate Setup buttons are available. <h3>Impulse Width [3dB] Display Button</h3> <p>The read-only display button is only available if the Time, Low Pass button (above) has been selected. The units in the Impulse Width display change to match the setting on the Display Units button.</p> <h3>Display Unit (Time/Distance)</h3> <p>This button is available if the Time, Low Pass button (above) has been selected. Select toggles the display units between time and distance.</p> <h3>Time Definition</h3> <p>This button is available if the Time, Low Pass button (above) has been selected. Select displays the TIME DEFINITION menu.</p> <ul style="list-style-type: none"> • “TIME DEFINITION Menu” on page 21-51
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Figure 21-18. DOMAIN Time Low Pass Menu (1 of 2)

Range Setup

This button is available if the Time, Low Pass button (above) has been selected. Select displays the RANGE SETUP menu.

- [“RANGE SETUP Time Low Pass Menu” on page 21-58](#)

Gate Setup

This button is available if the Time, Low Pass button (above) has been selected. Select displays the GATE SETUP menu.

- [“GATE SETUP Menu” on page 21-67](#)
-

Figure 21-18. DOMAIN Time Low Pass Menu (2 of 2)

DOMAIN Time Band Pass Menu

Menu Identification and Variants

- The appearance and button availability of the DOMAIN menu depends on settings on the SWEEP menu.
- Consult the section above for menu identification and prerequisites.
- [“DOMAIN Menu Appearance and Button Availability” on page 21-34](#)

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass

	<h3>Time, Band Pass</h3> <p>If the Time, Band Pass button is selected:</p> <ul style="list-style-type: none"> • The following time domain options are deselected and unavailable: <ul style="list-style-type: none"> • Frequency, with No Time Gate • Frequency, with Time Gate • Time, Low Pass • These options are available: <ul style="list-style-type: none"> • The read-only Impulse Width [3dB] display button appears. • The Display Unit, Time Definition, Range Setup, and Gate Setup buttons are available. <h3>Impulse Width [3dB] Display Button</h3> <p>This display button is only available if the Time Band Pass button (above) has been selected. The units in the Impulse Width display changes to match the setting on the Display Units button.</p> <h3>Display Unit (Time/Distance)</h3> <p>This button is available if the Time Band Pass button (above) has been selected. Select toggles the display units between time and distance.</p> <h3>Time Definition</h3> <p>This button is available if the Time Band Pass button (above) has been selected. Select displays the TIME DEFINITION menu.</p> <ul style="list-style-type: none"> • “TIME DEFINITION Menu” on page 21-51 <h3>Range Setup</h3> <p>This button is available if the Time Band Pass button (above) has been selected. Select displays the RANGE SETUP menu.</p> <ul style="list-style-type: none"> • “RANGE SETUP Frequency with Time Gate Menu” on page 21-54 <h3>Gate Setup</h3> <p>This button is available if the Time Band Pass button (above) has been selected. Select displays the GATE SETUP menu.</p> <ul style="list-style-type: none"> • “GATE SETUP Menu” on page 21-67
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Figure 21-19. DOMAIN Time Band Pass Menu

21-7 Gain Compression Menus and Dialog Boxes

The Gain Compression button availability and access to the underlying GAIN COMPRESS menu depends on the Sweep Type set as described below. In addition, there are two GAIN COMPRESS menu variants described here as the GAIN COMPRESS Self Normalization menu and the GAIN COMPRESS Compress Param menu. The conditions for each is described immediately below.

Types of Gain Compression

The GAIN COMPRESS. (GAIN COMPRESSION) menu provides control of all gain compression parameters. Two menu variants are available depending on the power sweep type selected.

- **CW Frequency Gain Compression** – The CW Frequency gain compression is a trace function in power sweep CW mode and separate compression points can be set for each trace display. The trace labels are changed with an @CP notation after the measured S-Parameter. Typical trace labels are shown below:
 - Without Gain Compression: Tr1 S21 Trans LogM
 - With Gain Compression: Tr1 S21@CP Trans LogM
- **Swept Frequency Gain Compression** – The Swept Frequency gain compression is also a trace function in power sweep swept-frequency mode, and by default, the displays shows the output power verses frequency at the gain compression point. The compression parameter is set to S21 and the plotting parameter set to B2/1 (B2 divided by 1). The trace labels also change with the @CP notation as described above

Gain Compression Button Not Available

If the Gain Compression button on the DISPLAY menu is not available, Sweep Types is set to one of the following:

- Freq Sweep (Linear)
- Freq Sweep (Log)
- Segmented Sweep (Freq-based)
- Segmented Sweep (Index-based)

The sweep type is set on the SWEEP TYPES menu:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Gain Compression Button Available

To make the Gain Compression button on the DISPLAY menu and GAIN COMPRESS menu available, Sweep Types on the SWEEP SETUP menu must be set to Power (CW Freq) or Power (Swept Freq). Each setting enables a different menu variant which are described in the sections below.

GAIN COMPRESS Self Normalization Menu

If Sweep Type is set to Power (CW Freq), the GAIN COMPRESS. menu is termed the GAIN COMPRESS. Self Normalization) menu, has six (6) buttons, and the top button is Self Normalization.

Menu Description

- [“GAIN COMPRESS. Self Normalization Menu” on page 21-44](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

GAIN COMPRESS Compress Param Menu

If Sweep Type is set to Power (Swept Freq), the GAIN COMPRESS. menu is termed the GAIN COMPRESS. Compress Param menu, has six (6) buttons, and the top button is Compression Param.

Menu Description

- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Cross References to Related Menus

Use the links and navigation below to change the prerequisites for the GAIN COMPRESS menus.

Sweep Setup References:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP

Sweep Types References:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Display References:

- [“DISPLAY Menu” on page 21-3](#)
- MAIN | Display | DISPLAY

GAIN COMPRESS. Self Normalization Menu

Full Name

- GAIN COMPRESSION Self Normalization Menu

The appearance and button availability of the GAIN COMPRESS menu depends on settings on the SWEEP TYPES menu. Consult the [Gain Compression Menus and Dialog Boxes](#) on page 21-42 section above for menu identification and prerequisites.

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (CW Freq).
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. Self Normalization



Compression Indicator Example

For an example display, see [Figure 21-22 on page 21-48](#) below.

Self Normalization (Off/On)

Select toggles the self normalization function OFF and ON. If ON, self normalization normalizes the trace display reference to the first data point of each sweep.

Compression Indicator (Off/On)

Select toggles the screen trace display compression indicators between OFF and ON. If the Compression Indicator is toggled ON, and the instrument finds the compression points, the general display is R and C where:

- The reference point indicator is labeled R
- The gain compression indicator is labeled C with parametric data displayed at the top of the trace window
- The Trace Label is identified with the @CP label after the Measurement Type such as Tr3 S21@CP Trans LogM.

Reference (R) Indicator

If the instrument cannot find the reference points, the R and C labels will not be displayed and will instead display the following messages:

- C: Not Found in the graph display area
- Invalid Reference Value in the display status bar

Compression Reference Point

If the compression reference is set to maximum gain, the instrument will always find the reference point. The instrument may not be able to find the reference point if:

- The compression points are outside the range setting
- The Hold Power setting is outside of the X-axis range on the trace display graph
- The P-in setting is outside of the X-axis range on the trace display graph

Compression (C) Indicator

If the instrument cannot find the compression points, the C label will not be displayed and will instead display the message C: Not Found in the graph display area.

DUT or Compression Point Value

The instrument may not be able to find the compression point because of the characteristics of the DUT or because of compression point value.

Figure 21-20. GAIN COMPRESS. Self Normalization Menu (1 of 2)

Compression Reference Button Selection Group

The Max P Out, Hold Power, and P in buttons of the Compression Reference area form a three-button selection group where the selection of one button de-selects the other two (2) buttons.

Max P Out

Select sets the maximum power output available to the instrument.

Hold Power (-XX dBm)

Read-only display. Shows the hold power level on a per-system basis. It defaults to the lowest port source power of -20 dBm. The Hold Power Level is set on the HOLD CONDITIONS menu.

- [“HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18](#)
- MAIN | Sweep Setup | SWEEP SETUP | Hold Functions | HOLD FUNCTIONS | Hold Conditions | HOLD CONDITIONS

P in

Select displays the P In field toolbar and sets the power in level in dBm as a function of frequency.

P in : 1.0000 dBm [^] [v] dBm [X]

Compression Point

Select displays the Compression Point (dB) field toolbar and allows the user to enter a compression point in dB.

Compression Point : 1.0000 dB [^] [v] dB [X]

View Result

Select displays the VIEW COMPRESSION RESULT dialog box. The data can be printed and/or saved as a text file.

- [“VIEW COMPRESSION RESULT Dialog Box” on page 21-50](#)

Figure 21-20. GAIN COMPRESS. Self Normalization Menu (2 of 2)

GAIN COMPRESS. Compression Param Menu

Full Name

- GAIN COMPRESS. Compression Parameters Menu

Menu Appearance and Availability

- The appearance and button availability of the GAIN COMPRESS menu depends on settings on the SWEEP TYPES menu. Consult the section above for menu identification and prerequisites.
- [“Gain Compression Menus and Dialog Boxes” on page 21-42](#)

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (Swept Freq).
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. Compression Param.

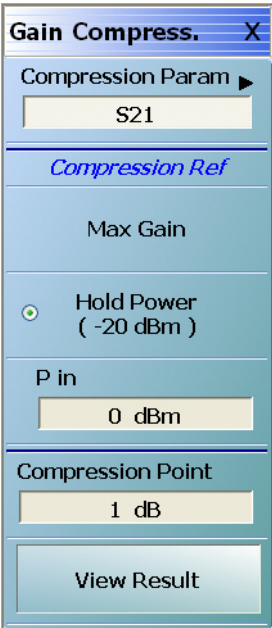
	<p>Display Example</p> <p>For a sample display, see Figure 21-22 below. When Gain Compression is on, the Trace Label is identified with the @CP label after the Measurement Type such as Tr3 S21@CP Trans LogM.</p> <p>Compression Param</p> <p>Select displays the COMP PARAM (Compression Parameter) menu which allows the user to select which S-Parameter (S11, S12, S21, S22) is to be used.</p> <ul style="list-style-type: none"> • “COMP. PARAM Menu” on page 21-49 <p>Compression Reference Button Selection Group</p> <p>The three (3) buttons of the Compression Reference area form a button selection group where the selection of any one button de-selects the other two (2) buttons.</p> <p>Max Gain</p> <p>Select sets the maximum gain output available to the instrument.</p> <p>Hold Power (-XX dBm)</p> <p>Read-only display. Shows the hold power level on a per-system basis. It defaults to the lowest port source power of -20 dBm. The hold power level is set on the Hold Conditions menu.</p> <ul style="list-style-type: none"> • “HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18 • MAIN Sweep Setup SWEEP SETUP Hold Functions HOLD FUNCTIONS Hold Conditions HOLD CONDITIONS
--	---

Figure 21-21. GAIN COMPRESS. Compression Param. Menu (1 of 2)

P in

Select displays the P in (dBm) field toolbar. Allows the user to set the power-in level in dBm as a function of frequency.

**Compression Point**

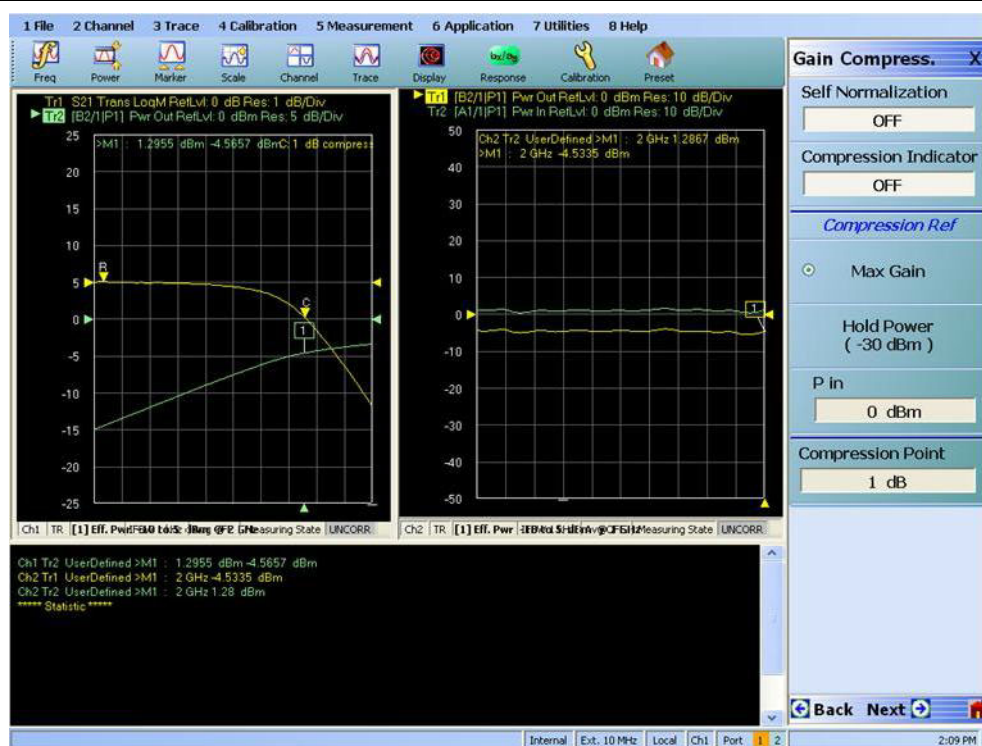
Select displays the Compression Point (dB) field toolbar and allows the user to enter a compression point in dB.

**View Result**

Select displays the VIEW COMPRESSION RESULT dialog box. The data can be printed and/or saved as a text file.

- [“VIEW COMPRESSION RESULT Dialog Box” on page 21-50](#)

Figure 21-21. GAIN COMPRESS. Compression Param. Menu (2 of 2)



1. CW Freq (at left) and Power Sweep.
2. Swept Freq (at right).

Figure 21-22. Gain Compression Display with Power Sweep

COMP. PARAM Menu

The COMPRESSION PARAMETER menu allows selection of an S-parameter for the compression reference.

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (Swept Freq).
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP

Previous

- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. Compression Param | Compression Param | COMP. PARAM

Auto-Return Button Selection Group

The COMP. PARAM menu buttons form an auto-return button selection group where selection of one button de-selects all other buttons and then auto-returns to the GAIN COMPRESS menu.



Figure 21-23. COMP. PARAM (COMPRESSION PARAMETER) Menu

S11 (Comp Param)

Select sets the compression parameter to S11 - Forward Reflection and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

S12 (Comp Param)

Select sets the compression parameter to S12 - Reverse Transmission and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

S21 (Comp Param)

Select sets the compression parameter to S21 - Forward Transmission and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

S22 (Comp Param)

Select sets the compression parameter to S22 - Reverse Reflection and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

VIEW COMPRESSION RESULT Dialog Box

The VIEW COMPRESSION RESULT dialog box allows review of the compression results.

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (Swept Freq).
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Previous

- [“GAIN COMPRESS. Compression Param Menu” on page 21-47](#)

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. | View Result | VIEW COMPRESSION RESULT Dialog Box

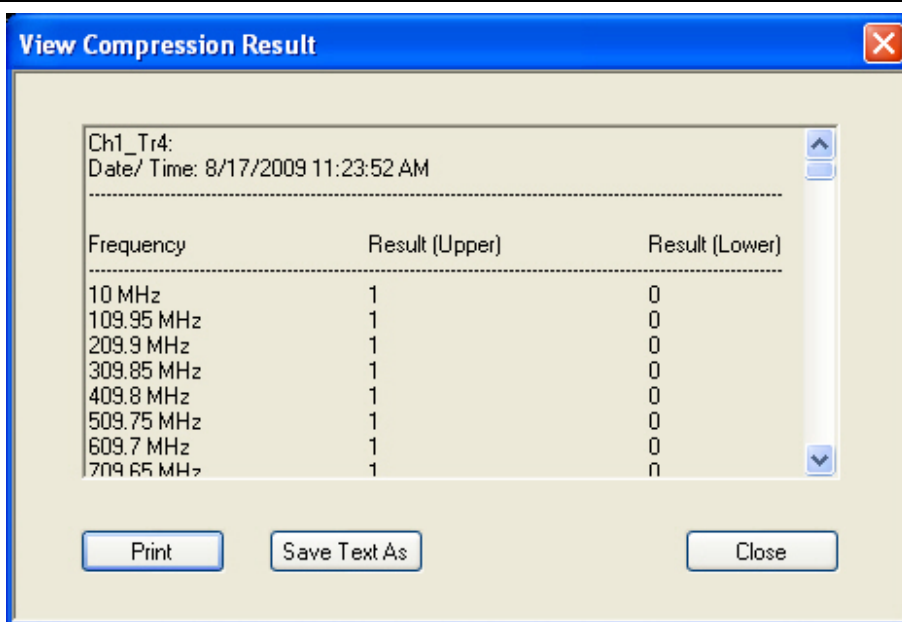


Figure 21-24. VIEW COMPRESSION RESULT Dialog Box

Instructions

1. Use the right-side slider bar to scroll through the results.
2. Click Print to print to the local attached printer.
3. Click Save Text As to save the data to a user-defined location.
4. Click Close to return to the GAIN COMPRESS menu.

21-8 Domain Time Definition Menu

TIME DEFINITION Menu

Prerequisites

- The DOMAIN menu must be set to one of the following: Frequency, with Time Gate; Time, Low Pass; Time, Band Pass.

Previous

- [“DOMAIN Frequency with Time Gate Menu” on page 21-38](#)
- [“DOMAIN Time Low Pass Menu” on page 21-39](#)
- [“DOMAIN Time Band Pass Menu” on page 21-41](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Time Definition | TIME DEFINITION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Time Definition | TIME DEFINITION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Time Definition | TIME DEFINITION

Menu Button Selection Auto-Return Group

The three (3) buttons of the TIME DEFINITION menu form an auto-return button selection group. Selection of any one button de-selects the other two buttons, and auto-returns to the prior DOMAIN menu variant.

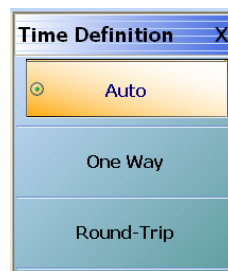


Figure 21-25. TIME DEFINITION Menu

Auto (Time Definition)

Selecting the Auto (Time Definition) button de-selects the One Way and the Round-Trip buttons and auto-returns to the DOMAIN menu.

One Way (Time Definition)

Selecting the One Way button de-selects the Auto and the Round-Trip buttons and auto-returns to the DOMAIN menu.

Round-Trip (Time Definition)

Selecting the Round-Trip button de-selects the Auto and the One Way buttons and auto-returns to the DOMAIN menu.

21-9 Range Setup Menus and Dialog Boxes

Range Setup Button Unavailable

If the Domain Type on the DOMAIN menu is set to Frequency, with No Time Gate, the Range Setup button and the underlying RANGE SETUP menu are unavailable.

- [“DOMAIN Frequency with No Time Gate Menu” on page 21-37](#)
- MAIN | Display | DISPLAY | Domain | DOMAIN

RANGE SETUP Menu Availability

In order to view the RANGE SETUP menu, the Domain Type on the DOMAIN menu must be set to one of the following: Frequency, with Time Gate; Time, Low Pass; Time, Band Pass.

The Time, Low Pass button on the DOMAIN menu is only available if a harmonic sweep is set on the FREQUENCY menu such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points.

- [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
- [“FREQUENCY Freq. Based Segmented Sweep Menu” on page 4-7](#)
- MAIN | Frequency | FREQUENCY

RANGE SETUP Menu Variants

The RANGE SETUP menu has seven (7), eight (8), or nine (9) buttons depending on the Time Domain type set in the DOMAIN menu.

RANGE SETUP 7-Button Menu - Frequency with Time Gate

If the Domain Type is set to Frequency, with Time Gate, the RANGE SETUP menu has seven (7) buttons as: Display Unit, Start, Stop, Center, Span, Window Shape, and Alias Free Range.

Menu Description

- [“RANGE SETUP Frequency with Time Gate Menu” on page 21-54](#)

Prerequisites

- Domain Type = Frequency with Time Gate

RANGE SETUP 8-Button Menu - Time Band Pass

If the Domain Type is set to Time, Band Pass, the RANGE SETUP menu has eight (8) buttons as Display Unit, Start, Stop, Center, Span, Phasor Impulse, Window Shape, and Alias Free Range.

Menu Description

- [“RANGE SETUP Time Band Pass Menu” on page 21-56](#)

Prerequisites

- Domain Type = Time Band Pass

RANGE SETUP 9-Button Menu - Time Low Pass

If the Domain Type is set to Time, Low Pass, the RANGE SETUP menu has nine (9) buttons as Display Unit, Start, Stop, Center, Span, Response, DC Term, Window Shape, and Alias Free Range...

Menu Description

- [“RANGE SETUP Time Low Pass Menu” on page 21-58](#)

Prerequisites

- Domain Type = Time Low Pass

RANGE SETUP Button Units

The units of the RANGE SETUP menu and its Start, Stop, Center, and Span buttons change between Distance or Time, depending on the setting of the Display Unit toggle button on each RANGE SETUP menu. The RANGE SETUP (DISTANCE) menu is shown in the next section below.

- See the GATE SETUP menu below for an example of time setup values in a menu.
- [“GATE SETUP Menu” on page 21-67](#)
- MAIN | Display | DISPLAY | Domain | DOMAIN | Gate Setup | GATE SETUP

RANGE SETUP Frequency with Time Gate Menu

Menu Identification and Variants

- The appearance and button availability of the RANGE SETUP (Frequency with Time Gate) menu depends on settings on DOMAIN menu.
- The RANGE SETUP Frequency with Time Gate menu has seven (7) buttons.
- [“Range Setup Menus and Dialog Boxes” on page 21-52](#)

Prerequisites

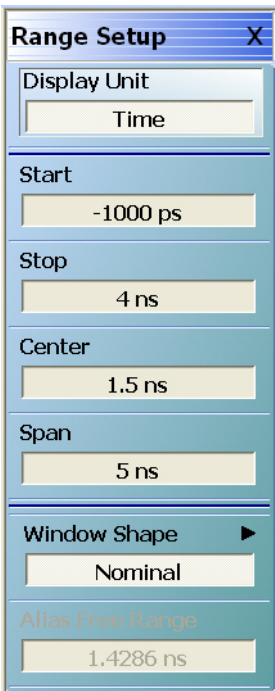
- On the DOMAIN menu, Domain Type is set to Frequency, with Time Gate

Previous

- [“DOMAIN Frequency with Time Gate Menu” on page 21-38](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Range Setup | RANGE SETUP Frequency with Time Gate



Display Unit (Distance/Time) (Range)

The RANGE SETUP and the GATE SETUP menus use the same Display Unit toggle button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.

Select toggles between distance and time.

- When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below.
- When toggled to Time, the Start, Stop, Center, and Span button fields show time values as described in the buttons below.

Start (Distance/Time) (Range)

If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.

Start :

 ^ v
 km m cm mm um
 X

If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.

Start :

 ^ v
 s ms us ns ps
 X

Stop (Distance/Time) (Range)

As above, select either displays the Stop (Distance) or Stop (Time) toolbar.

Stop :

 ^ v
 km m cm mm um
 X

Stop :

 ^ v
 s ms us ns ps
 X

Figure 21-26. RANGE SETUP Frequency with Time Gate Menu (1 of 2)

Center (Distance/Time) (Range)

As above, select either displays the Center (Distance) or Center (Time) toolbar.

Center : 44.9543 cm ^ v km m cm mm um X

Center : 1.5000 ns ^ v s ms us ns ps X

Span (Distance/Time) (Range)

As above, select either displays the Span (Distance) or Span (Time) toolbar.

Span : 84.0391 um ^ v km m cm mm um X

Span : 5.0000 ns ^ v s ms us ns ps X

Window Shape

Select displays the WINDOW SHAPE menu where four (4) standard shapes of Rectangular, Nominal, Low Side Lobe, and Min Side Lobe can be selected. A fifth advanced selection provides an additional menu where configurable Kaiser-Bessel or Dolph-Chebyshev window types are available.

- [“WINDOW SHAPE Menu” on page 21-63](#)

Alias Free Range

Read-only display button. The units are the same as those set by the Display Unit button above. Displays the length or time period that can be measured without repeating a discontinuity response. This is a function of the inverse of the frequency sweep step size.

Figure 21-26. RANGE SETUP Frequency with Time Gate Menu (2 of 2)

RANGE SETUP Time Band Pass Menu

Menu Identification and Variants

- The appearance and button availability of the RANGE SETUP (Time Band Pass) menu depends on settings on DOMAIN menu.
- This RANGE SETUP (Time Band Pass) menu has eight (8) buttons.
- [“Range Setup Menus and Dialog Boxes” on page 21-52](#)

Prerequisites

- On the DOMAIN menu, Domain Type is set to Time, Band Pass

Previous

- [“DOMAIN Time Band Pass Menu” on page 21-41](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Band Pass | Range Setup | RANGE SETUP Time Band Pass

	<p>Display Unit (Distance/Time) (Range)</p> <p>The RANGE SETUP and the GATE SETUP menus use the same Display Unit toggle button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.</p> <p>Select toggles between distance and time.</p> <ul style="list-style-type: none"> • When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below. • When toggled to Time, the Start, Stop, Center, and Span button fields show time values as described in the buttons below. <p>Start (Distance/Time) (Range)</p> <p>If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.</p> <p>Start : 9.0391 cm ^ v km m cm mm um X</p> <p>If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.</p> <p>Start : 1.0000 ns ^ v s ms us ns ps X</p>
--	---

Figure 21-27. RANGE SETUP Time Band Pass Menu - 8 Buttons (1 of 2)

Stop (Distance/Time) (Range)

As above, select either displays the Stop (Distance) or Stop (Time) toolbar.

Stop : 1.1988 m ^ v km m cm mm um X

Stop : 4.0000 ns ^ v s ms us ns ps X

Center (Distance/Time) (Range)

As above, select either displays the Center (Distance) or Center (Time) toolbar.

Center : 44.9543 cm ^ v km m cm mm um X

Center : 1.5000 ns ^ v s ms us ns ps X

Span (Distance/Time) (Range)

As above, select either displays the Span (Distance) or Span (Time) toolbar.

Span : 84.0391 um ^ v km m cm mm um X

Span : 5.0000 ns ^ v s ms us ns ps X

Phasor Impulse (Off/On) (Range)

Select toggles the phasor impulse off or on.

Window Shape

Select displays the WINDOW SHAPE menu to allow changing the window shape between rectangular, nominal, low side lobe, minimum side load, or addition advanced selections.

- [“WINDOW SHAPE Menu” on page 21-63](#)

Alias Free Range

Read-only display button. The units are the same as those set by the Display Unit button above. Displays the length or time period that can be measured without repeating a discontinuity response. This is a function of the inverse of the frequency sweep step size

Figure 21-27. RANGE SETUP Time Band Pass Menu - 8 Buttons (2 of 2)

RANGE SETUP Time Low Pass Menu

Menu Identification and Variants

- The appearance and button availability of the RANGE SETUP (Time Band Pass) menu depends on settings on DOMAIN menu.
- This RANGE SETUP (Time Low Pass) menu has nine (9) buttons.
- [“Range Setup Menus and Dialog Boxes” on page 21-52](#)

Prerequisites

- On the FREQUENCY menu, a harmonic sweep must be set such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
 - [“FREQUENCY Freq. Based Segmented Sweep Menu” on page 4-7](#)
 - MAIN | Frequency | FREQUENCY
- On the DOMAIN menu, Domain Type is set to Time, Low Pass

Previous

- [“DOMAIN Time Low Pass Menu” on page 21-39](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Low Pass | Range Setup | RANGE SETUP Time Low Pass

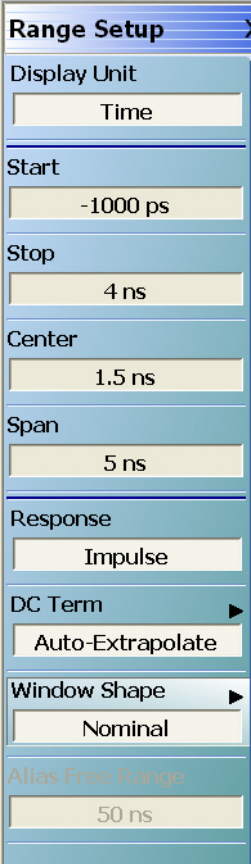


	<p>Display Unit (Distance/Time) (Range)</p> <p>The RANGE SETUP and the GATE SETUP menus use the same Display Unit toggle button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.</p> <p>Select toggles between distance and time.</p> <ul style="list-style-type: none"> • When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below. • When toggled to Time, the Start, Stop, Center, and Span button fields show time values as described in the buttons below. <p>Start (Distance/Time) (Range)</p> <p>If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.</p>  <p>If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.</p> 
--	---

Figure 21-28. RANGE SETUP Time Gate Low Pass Menu - Nine Buttons - (1 of 2)

Stop (Distance/Time) (Range)

As above, select either displays the Stop (Distance) or Stop (Time) toolbar.

Stop : 1.1988 m ^ v km m cm mm um X

Stop : 4.0000 ns ^ v s ms us ns ps X

Center (Distance/Time) (Range)

As above, select either displays the Center (Distance) or Center (Time) toolbar.

Center : 44.9543 cm ^ v km m cm mm um X

Center : 1.5000 ns ^ v s ms us ns ps X

Span (Distance/Time) (Range)

As above, select either displays the Span (Distance) or Span (Time) toolbar.

Span : 84.0391 um ^ v km m cm mm um X

Span : 5.0000 ns ^ v s ms us ns ps X

Response (Impulse/Step) (Range)

Select toggles the response between impulse and step.

DC Term

Select displays the DC TERM menu where Auto-Extrapolate or other extrapolation methods can be selected.

- [“DC TERM Menu” on page 21-60](#)

Window Shape

Select displays the WINDOW SHAPE menu to allow changing the window shape between rectangular, nominal, low side lobe, minimum side load, or addition advanced selections.

- [“WINDOW SHAPE Menu” on page 21-63](#)

Alias Free Range

Read-only display button. The units are the same as those set by the Display Unit button above. Displays the length or time period that can be measured without repeating a discontinuity response. This is a function of the inverse of the frequency sweep step size.

Figure 21-28. RANGE SETUP Time Gate Low Pass Menu - Nine Buttons - (2 of 2)

DC TERM Menu

Prerequisites

- On the FREQUENCY menu, a harmonic sweep must be set such as:
 - Start Frequency = 10 MHz
 - Stop Frequency = 50 MHz
 - # of Points = 5 points
- FREQUENCY Menus
 - “FREQUENCY Freq. Based Log Sweep Menu” on page 4-5
 - “FREQUENCY Freq. Based Segmented Sweep Menu” on page 4-7
 - MAIN | Frequency | FREQUENCY
- On the DOMAIN menu, Domain Type is set to Time, Low Pass

Previous

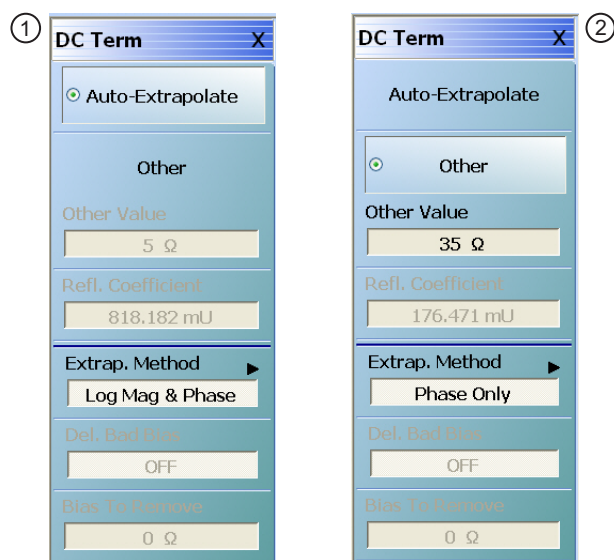
- “RANGE SETUP Time Low Pass Menu” on page 21-58

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Low Pass | Range Setup | RANGE SETUP Time Low Pass | DC Term | DC TERM

Menu Button Availability

The availability of buttons on the DC TERM menu change based on the setting on the Auto-Extrapolate and Other buttons. These two buttons also form a button selection group where the selection of one button de-selects the other button.



1. DC TERM menu with Auto-Extrapolate option selected. See below for button function descriptions.

2. DC TERM menu with Other option selected and Other Value field button now available. See below for button function descriptions.

Figure 21-29. DC TERM Menu

Auto-Extrapolate (DC Term)

Selection of the Auto-Extrapolate button de-selects the Other button (below) and sets the DC Term extrapolation to the method currently set in the Extrap Method button (described below).

Other (DC Term)

Selection of the Other button de-selects the Auto-Extrapolate button and enables the Other Value button below for input of a user-defined DC Term.

Other Value (DC Term)

This button is only available if the Other (DC Term) button above is selected. Displays the currently user-defined Other Value DC Term in Ohms. Select displays the Other Value (Ohms) field toolbar which allows user input of a custom user-defined DC Term in Ohms.

**Refl. Coefficient**

Reflection Coefficient button. Read-only display. The Reflection Coefficient display shows the calculated coefficient in Units.

Extrap Method

Extrapolation Method button. The Extrapolation Method button displays the currently selection DC term extrapolation method. Available options on the displayed EXTRAPOLATION menu are Log Mag & Phase, Phase Only, and User Defined.

- [“EXTRAPOLATION Menu” on page 21-62](#)

Del. Bad Bias (Off/On)

The Delete Bad Bias toggle button is not available.

Bias To Remove (Ohms)

The Bias to Remove button and the related Bias to Remove (Ohms) field toolbar are not available.

EXTRAPOLATION Menu

Prerequisites

- On the FREQUENCY menu, a harmonic sweep must be set such as:
 - Start Frequency = 10 MHz
 - Stop Frequency = 50 MHz
 - # of Points = 5 points
- FREQUENCY Menus
 - “FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3
 - “FREQUENCY Freq. Based Log Sweep Menu” on page 4-5
 - MAIN | Frequency | FREQUENCY
- On the DOMAIN menu, Domain Type is set to Time, Low Pass

Previous

- “DC TERM Menu” on page 21-60

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Low Pass | Range Setup | RANGE SETUP Time Low Pass | DC Term | DC TERM | Extrap Method | EXTRAPOLATION

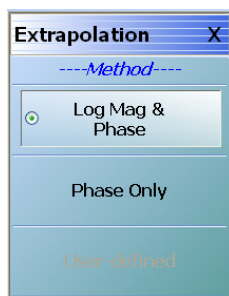


Figure 21-30. EXTRAPOLATION Menu

EXTRAPOLATION Menu Auto-Return Button Selection Group

The three buttons of the EXTRAPOLATION menu form an auto-return button selection group where the selection of any button de-selects the other two buttons and auto-returns to the DC TERM menu.

Log Mag & Phase (Extrapolation)

Sets the DC term extrapolation method to log magnitude and phase. Selection sets the method as Log Mag & Phase and auto-returns to the DC TERM menu.

Phase Only (Extrapolation)

Sets the DC term extrapolation method to Phase Only. Selection sets the method as phase and auto-returns to the DC TERM menu.

User Defined (Extrapolation)

The option is unavailable.

21-10 Time Domain Window Shape and Gate Setup Menus

WINDOW SHAPE Menu

Prerequisites

- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass.
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - [“FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3](#)
 - [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
 - MAIN | Frequency | FREQUENCY

Previous

- [“RANGE SETUP Frequency with Time Gate Menu” on page 21-54](#)
- [“RANGE SETUP Time Band Pass Menu” on page 21-56](#)
- [“RANGE SETUP Time Low Pass Menu” on page 21-58](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Range Setup | RANGE SETUP Frequency with Time Gate | Window Shape | WINDOW SHAPE
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Range Setup | RANGE SETUP Time Band Pass | Window Shape | WINDOW SHAPE
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Range Setup | RANGE SETUP Time Low Pass



WINDOW SHAPE Menu Button Selection Group

The Rectangular, Nominal, Low Side Lobe, Min Side Lobe, and Advanced Selection buttons form a five (5) button selection group where selection of any one button de-selects the other three buttons.

Rectangular (Window)

Sets the window shape to rectangular.

Nominal (Window)

Sets the window shape to nominal.

Low Side Lobe (Window)

Sets the window shape to low side lobe.

Min Side Lobe (Window)

Sets the window shape to the minimum side lobe.

Advanced Selection

Selects displays the ADVANCED WINDOW SETUP dialog box that allows selection of configurable Kaiser-Bessel or Dolph-Chebyshev window types.

- [“ADVANCED WINDOW SHAPE SETUP Dialog Box” on page 21-65](#)

Impulse Width [3dB]

Read-only display. Shows the calculated width of the window at **3 dB**.

Figure 21-31. WINDOW SHAPE Menu

ADVANCED WINDOW SHAPE SETUP Dialog Box

Prerequisites

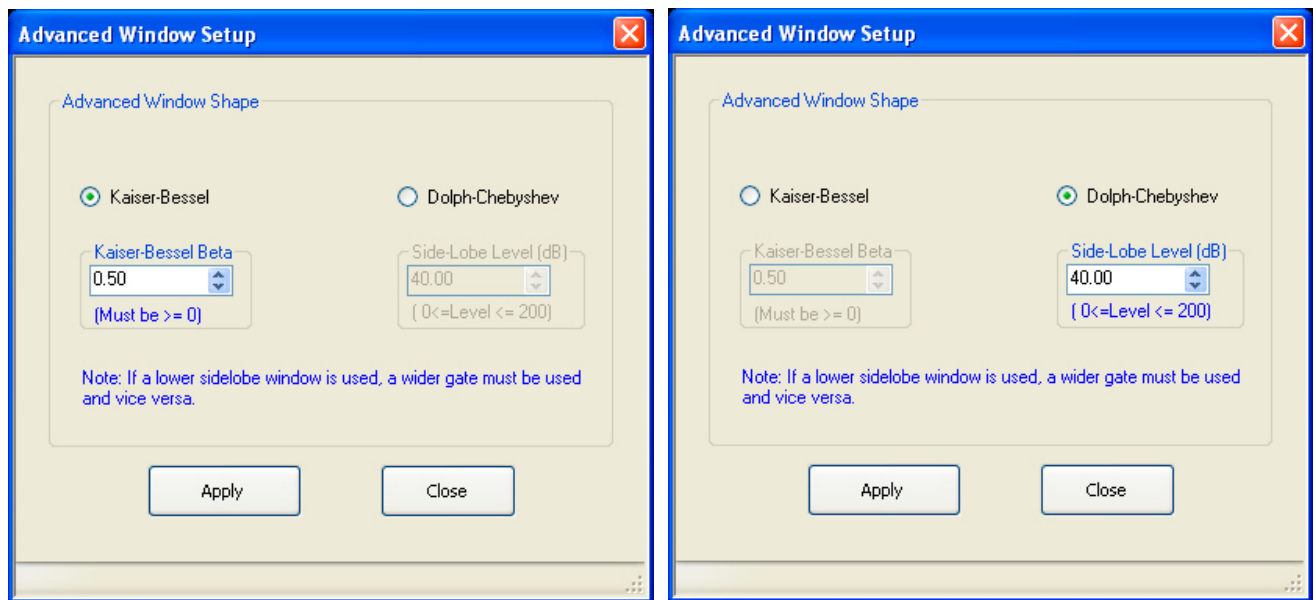
- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep set such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - “FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3
 - “FREQUENCY Freq. Based Log Sweep Menu” on page 4-5
- MAIN | Frequency | FREQUENCY

Previous

- “WINDOW SHAPE Menu” on page 21-63

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Range Setup | RANGE SETUP Frequency with Time Gate | Window Shape | WINDOW SHAPE | Advanced Selection | ADVANCED WINDOW SHAPE SETUP Dialog Box
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Range Setup | RANGE SETUP Time Band Pass | Window Shape | WINDOW SHAPE | Advanced Selection | ADVANCED WINDOW SHAPE SETUP Dialog Box
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Range Setup | RANGE SETUP Time Low Pass | Window Shape | WINDOW SHAPE | Advanced Selection | ADVANCED WINDOW SHAPE SETUP Dialog Box



①

②

1. ADVANCED WINDOW SETUP – Advanced Window Shape dialog box for Kaiser-Bessel at left.

2. ADVANCED WINDOW SETUP – Advanced Window Shape dialog box for Dolph-Chebyshev at right.

Figure 21-32. ADVANCED WINDOW SHAPE SETUP Dialog Box

Instructions

The Advanced Window Shape area provides a two-button selection group (Kaiser-Bessel or Dolph-Chebyshev) where the selection of one button deselects the other button. If selected, each button provides an additional configuration parameter.

Note If a lower side-lobe window is used, a wider gate must be used. If a higher side-lobe window is used, a narrower gate must be used.

1. Make a selection of one of the two available choices.
 - Kaiser-Bessel
 - Dolph-Chebyshev
2. If Kaiser-Bessel is selected, the Kaiser-Bessel Beta area below the button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be ≥ 0 (greater than or equal to zero).
3. If Dolph-Chebyshev is selected, the Side-Lobe Level (dB) area button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be $0 \geq \text{Level} \geq 200$ (greater than or equal to zero and less than or equal to 200).
4. Click Apply to set the changes.
 - If you click Close without clicking the Apply button, any dialog box changes are discarded and the prior window shape state is retained.
5. Click Close to close the dialog box and return to the ADVANCED WINDOW SHAPE SETUP dialog box.
 - [“ADVANCED WINDOW SHAPE SETUP Dialog Box” on page 21-65](#)

GATE SETUP Menu

Prerequisites

- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass.
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep set such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - [“FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3](#)
 - [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
- MAIN | Frequency | FREQUENCY

Previous

- [“DOMAIN Frequency with Time Gate Menu” on page 21-38](#)
- [“DOMAIN Time Low Pass Menu” on page 21-39](#)
- [“DOMAIN Time Band Pass Menu” on page 21-41](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Gate Setup | GATE SETUP
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Gate Setup | GATE SETUP
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Gate Setup | GATE SETUP

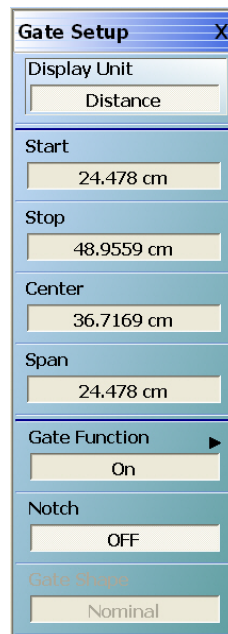


Figure 21-33. GATE SETUP Menu

GATE SETUP Menu Button Units

The units of the GATE SETUP menu and its Start, Stop, Center, and Span buttons change between Distance or Time, depending on the setting of the Display Unit toggle button. This button is shared by the GATE SETUP and the RANGE SETUP menus. The GATE SETUP (Distance) menu is shown at left.

- See the RANGE SETUP menu above for an example of time setup values in a menu.
- [“RANGE SETUP Frequency with Time Gate Menu” on page 21-54](#)

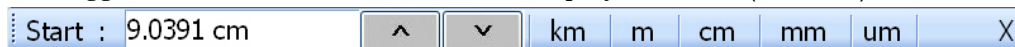
Display Unit (Distance/Time) (Gate)

The RANGE SETUP and the GATE SETUP menus use the same Display Unit button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.

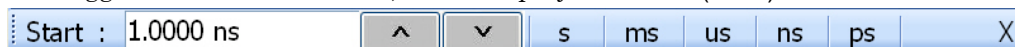
Select toggles between distance and time. When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below.

Start (Distance/Time) (Gate)

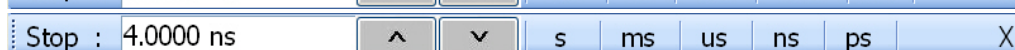
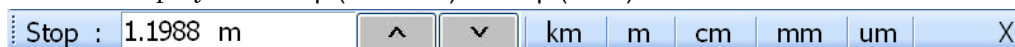
If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.



If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.

**Stop (Distance/Time) (Gate)**

As above, select either displays the Stop (Distance) or Stop (Time) toolbar.

**Center (Time or Distance) (Gate)**

As above, select either displays the Center (Distance) or Center (Time) toolbar.

**Span (Time or Distance) (Gate)**

As above, select either the Span (Distance) or Span (Time) toolbar.

**Gate Function (Off/On)**

Select displays the Gate Function menu.

- [“GATE FUNCTION Menu” on page 21-69](#)

Notch (Off/On)

Select toggles notch between off and on.

Gate Slope

Read-only display of the Gate Slope setting.

GATE FUNCTION Menu

Prerequisites

- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass.
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep set such as:
 - Start Frequency = 10 MHz
 - Stop Frequency = 50 MHz
 - # of Points = 5 points
- FREQUENCY Menus
 - [“FREQUENCY Freq. Based Linear Sweep Menu” on page 4-3](#)
 - [“FREQUENCY Freq. Based Log Sweep Menu” on page 4-5](#)
 - MAIN | Frequency | FREQUENCY

Previous

- [“GATE SETUP Menu” on page 21-67](#)

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION



Figure 21-34. GATE FUNCTION Menu

GATE Function Area Button Selection Group

The three (3) Gate Function Area buttons (Off, Display, and On) form a button selection group where the selection of any one button de-selects the other two buttons.

Off (Gate Function)

Select turns OFF the gate function on the active trace.

Display (Gate Function)

Select displays the gate function on the active trace

On (Gate Function)

Select turns ON the gate function on the active trace.

Gate Shape Area Button Selection Group

The four (4) Gate Shape Area buttons (Minimum, Nominal, Wide, Maximum, and Advanced Selection) form a button selection group where the selection of any one button de-selects the other four buttons.

Minimum (Gate Function)

Select sets the gate function to its minimum setting.

Nominal (Gate Function)

Select sets the gate function to its nominal setting.

Wide (Gate Function)

Select sets the gate function to its widest setting.

Maximum (Gate Function)

Select sets the gate function to its maximum setting.

Advanced Selection (Gate Function)

Select displays the Advanced Gate (Shape) Setup dialog box which allows selection either of a Kaiser-Bessel or Dolph-Chebyshev shaped gate. Each gate option allows selectable parameters.

- [“ADVANCED GATE SHAPE SETUP Dialog Box” on page 21-71](#)

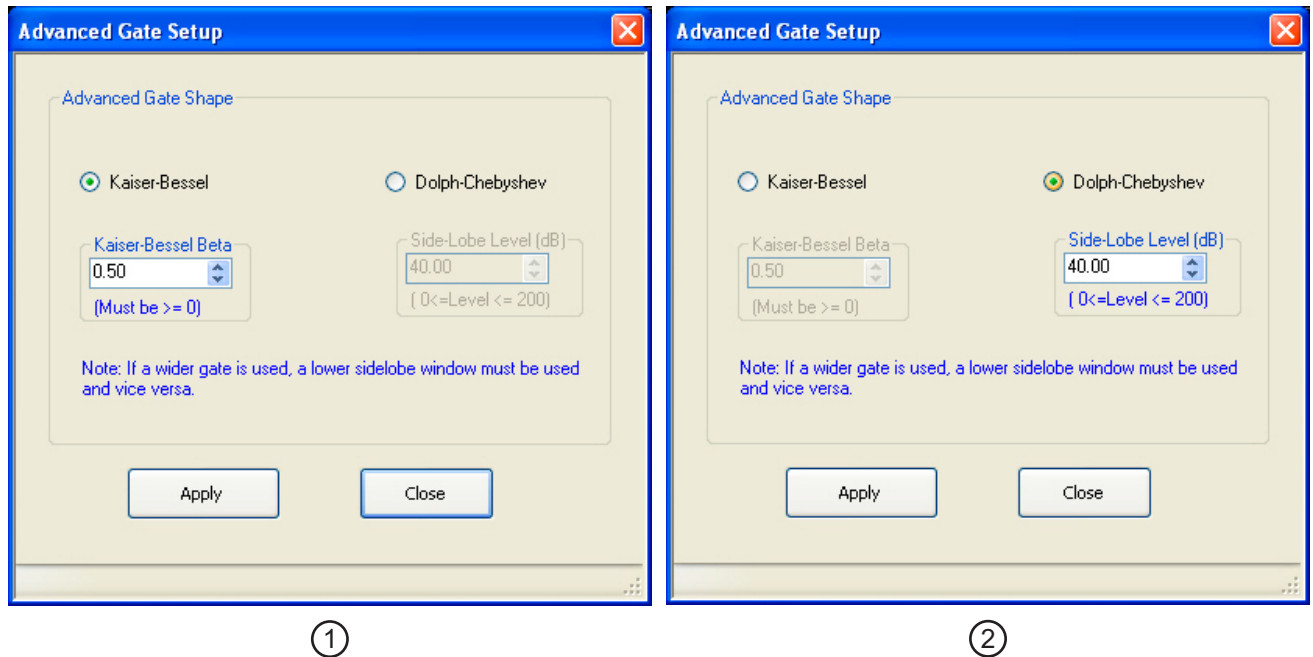
ADVANCED GATE SHAPE SETUP Dialog Box

Previous

- “GATE FUNCTION Menu” on page 21-69

Navigation

- MAIN | Display | DISPLAY | Domain | TIME DOMAIN | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION | Advanced Selection | ADVANCED GATE (SHAPE) SETUP Dialog Box



1. ADVANCED WINDOW SETUP – Advanced Gate Shape dialog box for Kaiser-Bessel at left.

2. ADVANCED WINDOW SETUP – Advanced Gate Shape dialog box for Dolph-Chebyshev at right.

Figure 21-35. ADVANCED GATE SHAPE SETUP Dialog Box

Instructions

The Advanced Gate Shape area provides a two-button selection group (Kaiser-Bessel or Dolph-Chebyshev) where the selection of one button deselects the other button. If selected, each button provides an additional configuration parameter.

Note

If a lower side-lobe window is used, a wider gate must be used. If a higher side-lobe window is used, a narrower gate must be used.

1. Make a selection of one of the two available choices.
 - Kaiser-Bessel, shown at left at #1 in [Figure 21-35](#) above.
 - Dolph-Chebyshev, shown at right at #2 in [Figure 21-35](#) above.
2. If Kaiser-Bessel is selected, the Kaiser-Bessel Beta area below the button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be ≥ 0 (greater than or equal to zero).

3. If Dolph-Chebyshev is selected, the Side-Lobe Level (dB) area button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be $0 \geq \text{Level} \geq 200$ (greater than or equal to zero and less than or equal to 200).
4. Click Apply to set the changes.
 - If you click Close without clicking the Apply button, any dialog box changes are discarded and the prior window shape state is retained.
5. Click Close to close the dialog box and return to the ADVANCED GATE (SHAPE) SETUP dialog box.

21-11 Inter- and Intra-Trace Math and Operand Setup Menus

INTER-TRACE MATH Menu

This menu allows operand setting and then mathematical comparisons between a user-defined trace 1 (one) and trace 2 (two). The two traces values can be added together, subtracted from each other, multiplied, or divided.

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Inter-Trace Math | INTER-TRACE MATH

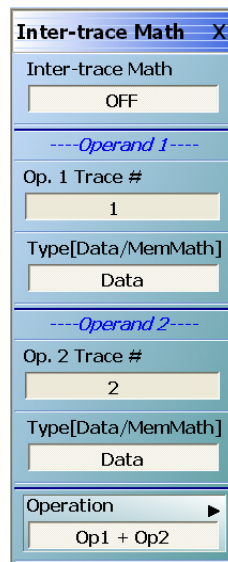


Figure 21-36. INTER-TRACE MATH Menu

Inter-Trace Math (Off/On)

Toggles Inter-Trace Math off and on.

Operand 1 Area

Op. 1 Trace

Operand One Trace Number. Select displays the Op 1 Trace # field toolbar which allows selection of the trace number of trace math operand 1 (one).



(Op. 1) Type (Data/MemMath)

The Operand 1 Type toggle button switches between DataMemMath and Data for Operand 1.

Operand 2 Area

Op. 2 Trace

Operand Two Trace Number. Select displays the Op 2 Trace # field toolbar which allows selection of the trace number of trace math operand 2 (two).



(Op. 2) Type (Data/MemMath)

The Operand 2 Type toggle button switches between DataMemMath and Data for Operand 2.

Operation Area**Operation**

Select displays the INTRA TRACE OP. menu.

- [“INTRA TRACE OP. Menu” on page 21-75](#)

INTRA TRACE OP. Menu

Full Name

- INTRA-TRACE OPERAND Menu

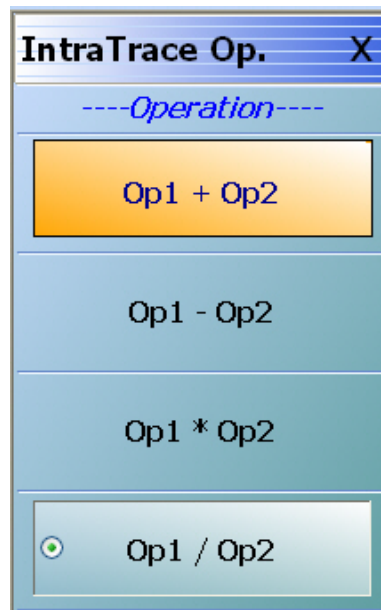
The menu provides mathematical operations between the values on two separate traces.

Previous

- [“INTER-TRACE MATH Menu” on page 21-73](#)

Navigation

- MAIN | Display | DISPLAY | Inter-trace Math | INTER-TRACE MATH | Operation | INTRA-TRACE OP



See below for button function descriptions.

Figure 21-37. INTRA-TRACE OP. (INTRA TRACE OPERAND) Menu

INTRA TRACE OP. Menu Button Selection Group

The four (4) buttons of the INTRA TRACE OPERATIONS menu form a button selection group where the selection of any one (1) button de-selects the other three (3) buttons.

Operation Area

Op1 + Op2 (Operand Plus)

The trace value assigned to Operand 1 is added to the trace value assigned to Operand 2.

Op1 – Op2 (Operand Subtraction)

The trace value assigned to Operand 2 is subtracted from the trace value assigned to Operand 1.

Op1 * Op2 (Operand Multiplication)

The trace value assigned to Operand 1 is multiplied times the trace value assigned to Operand 2.

Op1 / Op2 (Operand Division)

The trace value assigned to Operand 1 is divided by the trace value assigned to Operand 2.

21-12 Conversion and Display Utility Menus and Dialog Boxes

CONVERSION Menu

Previous

- “DISPLAY Menu” on page 21-3

Navigation

- MAIN | Display | DISPLAY | Conversion | CONVERSION

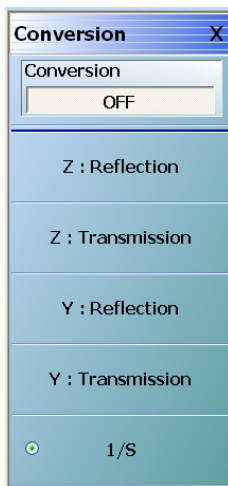


Figure 21-38. CONVERSION Menu

Conversion (Off/On)

Select toggles conversion OFF and ON.

CONVERSION Menu Reflection/Transmission Button Selection Group

The five (5) reflection, transmission, and 1/S buttons form a button selection group where the selection of any one button de-selects the other four buttons.

Z:Reflection

Select Z:Reflection de-selects the Z:Transmission, Y:Reflection, and 1/S buttons.

Z:Transmission

Select de-selects the Z:Reflection, Y:Reflection, and 1/S buttons.

Y:Reflection

Select Y:Reflection de-selects the Z:Reflection, Z:Transmission, and 1/S buttons.

Y:Transmission

Select Y:Transmission de-selects the Z:Reflection, Z:Transmission, and 1/S buttons.

1/S (One Divided By S)

Select 1/S (One/S) de-selects the Z:Reflection, Z:Transmission, Y:Reflection, and the Z:Transmission buttons.

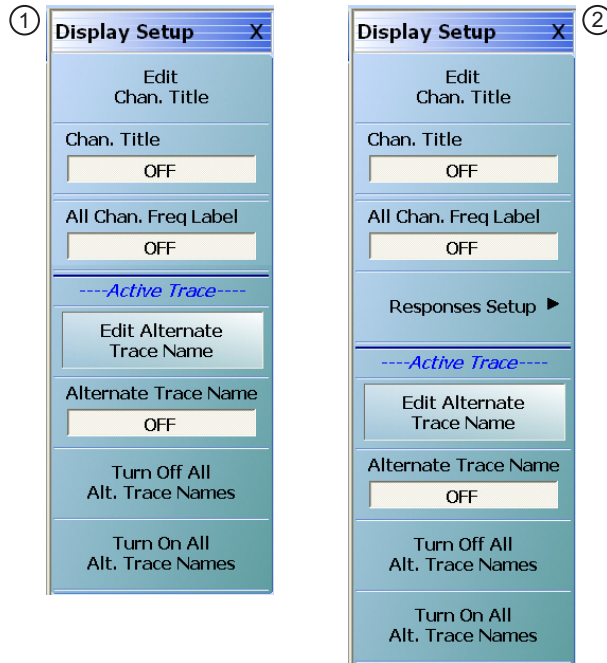
DISPLAY SETUP Menu

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP



1. DISPLAY SETUP Menu for 2-Port VNAs at left. See button descriptions below.	2. DISPLAY SETUP Menu for 4-Port VNAs at right. See button descriptions below.
---	--

Figure 21-39. DISPLAY SETUP Menu

Edit Chan. Title

Edit Channel Title button. Select displays the EDIT CHANNEL TITLE dialog box to create a user-defined title for the active channel.

- [“EDIT CHANNEL TITLE Dialog Box” on page 21-81](#)

Chan. Title (Off/On)

Channel Title toggle button. Select toggles the channel title created by the EDIT CHANNEL TITLE dialog box OFF and ON. If ON, the user-defined channel title appears at the top of the channel display.

All Chan. Freq Label

All Channel Frequency Label button. Select toggles the frequency labels for all channels OFF and ON. The frequency labels appear at the bottom of each channel display. When ON, the labels typically show starting and stopping frequencies and IFBW settings. When OFF, the frequency labels are removed.

Responses Setup

This button is only available if the VNA is in 4-Port Mode.

If available, the button displays the RESPONSE SETUP menu where the user can perform a quick-set of the single-ended or mixed-mode response by choosing setting to:

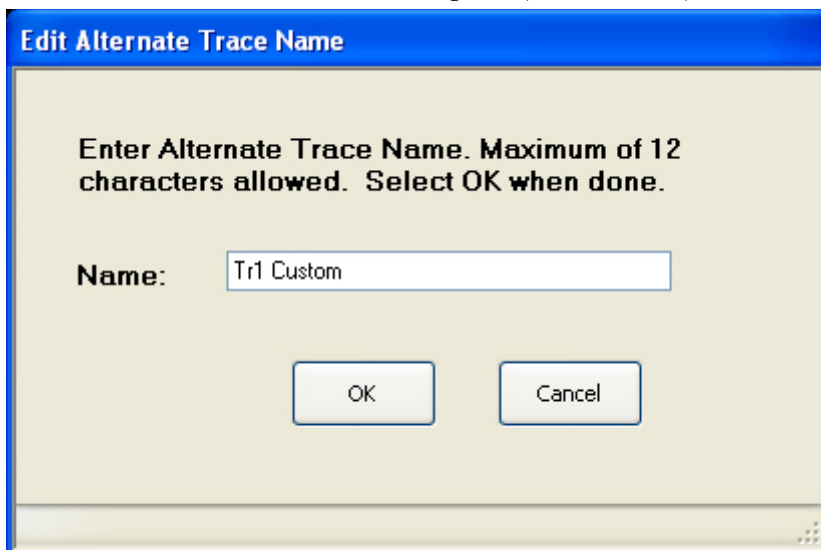
- Single-ended
- 2 differential pairs
- 1 differential pair and 2 singletons
- 1 differential pair and 1 singleton

Select displays the RESPONSE SETUP - 4-Port VNAs menu.

- [“RESPONSES SETUP Menu - 4-Port VNAs” on page 21-79](#)

Edit Alternate Trace Name

Select displays the EDIT ALTERNATE TRACE NAME dialog box (shown below) for the active trace.



If the default Tr# label is replaced, up to 12 alphanumeric characters can be input to identify the trace. If the Tr# label is kept, up to 9 characters can be added for Traces 1 to 9, and up to 8 characters added for Traces 10 to 16. Alternate trace names can be duplicated or unique as required. The user defined trace name replaces the instrument default trace number abbreviation. For example, with Alternative Trace Name = OFF, Trace 1 is default labeled as:

- Tr1 S11 Refl LogM RefLvl: 0 dB Res: 10 dB/Div

With Alternate Trace Name = ON, and a user-input Alternate Trace Name set as “DUT SN 12345”, the Trace 1 label becomes:

- DUT SN12345 S11 Refl LogM RefLvl: 0 dB Res: 10 dB/Div

Once setup, a user-defined alternate trace name configuration can be saved as a setup and then recalled as a preset using:

- MENU BAR | File | Save Setup | SAVE SETUP Dialog Box
- MAIN | File | FILE | Save Setup |SAVE SETUP Dialog Box

Alternate Trace Name (On/Off)

For the selected trace, toggles the alternate trace name ON and OFF.

Turn Off All Alt. Trace Names

For all traces on the active channel, turns off all alternate trace names and restores the default trace names.

Turn On All Alt. Trace Names

For all traces on the active channel, turns ON all alternate trace names.

RESPONSES SETUP Menu - 4-Port VNAs

Prerequisites

- The RESPONSES SETUP menu is only available if the VNA is in 4-Port mode and allows selection between four different modes.

Alternate Mixed Mode Control

- The RESPONSES SETUP menu duplicates the functions available in the menu and dialog boxes below available in the RESPONSE 4-Port VNA menus:
 - [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)
 - [“MIXED MODE Setup Dialog Box - Two Diff. Pairs - 4-Port VNAs” on page 20-19](#)
 - [“MIXED MODE Setup Dialog Box - One Diff. Pair - One Singleton - 4-Port VNAs” on page 20-22](#)
 - [“MIXED MODE Setup Dialog Box - One Diff. Pair - Two Singletons - 4-Port VNAs” on page 20-24](#)

Previous

- [“DISPLAY Menu” on page 21-3](#)

Navigation

- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Responses Setup | RESPONSES SETUP



Figure 21-40. RESPONSES SETUP SETUP Menu

Single-Ended

Select sets the response mode to single-ended mode where any S-Parameter can be selected in the RESPONSE menu group.

- S11, S12, S21, and S22 can be selected on the RESPONSE menu.
 - [“RESPONSE Menu - 4-Port VNAs” on page 20-6](#)
 - MAIN | Response | RESPONSE
- S13, S23, S32, S33, S14, S24, S34, S41, S42, S43, S44 can be selected on the SINGLE-MODE menu
 - [“SINGLE-MODE Menu - 4-Port VNAs” on page 20-9](#)
 - MAIN | Response | RESPONSE | More Single-Mode | SINGLE-MODE

2 Diff. Pair

Two Differential Pairs button. Select sets all traces on the 4-Port VNA to mixed-mode with two differential pairs. When the warning dialog appears, select OK to continue. This is the same mixed-mode as set by the MIXED-MODE dialog box.

- [“MIXED MODE Setup Dialog Box - Two Diff. Pairs - 4-Port VNAs” on page 20-19](#)
- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE Dialog Box - Two Differential Pairs

1 Pair, 2 Singletons

Select sets all traces on the 4-Port VNA to mixed-mode with one differential pair and two singletons. When the warning dialog appears, select OK to continue. This is the same mixed-mode as set by the MIXED-MODE dialog box.

- [“MIXED MODE Setup Dialog Box - One Diff. Pair - Two Singletons - 4-Port VNAs” on page 20-24](#)
- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE Dialog Box - One Differential Pair and Two Singletons

1 Pair, 1 Singletons

Select sets all traces on the 4-Port VNA to mixed-mode with one differential pair and one singleton. When the warning dialog appears, select OK to continue. This is the same mixed-mode as set by the MIXED-MODE dialog box.

- [“MIXED MODE Setup Dialog Box - One Diff. Pair - One Singleton - 4-Port VNAs” on page 20-22](#)
- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE Dialog Box - One Differential Pair and One Singleton

EDIT CHANNEL TITLE Dialog Box

Previous

- “DISPLAY SETUP Menu” on page 21-77

Navigation

- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Edit Chan Title | EDIT CHANNEL TITLE Dialog Box

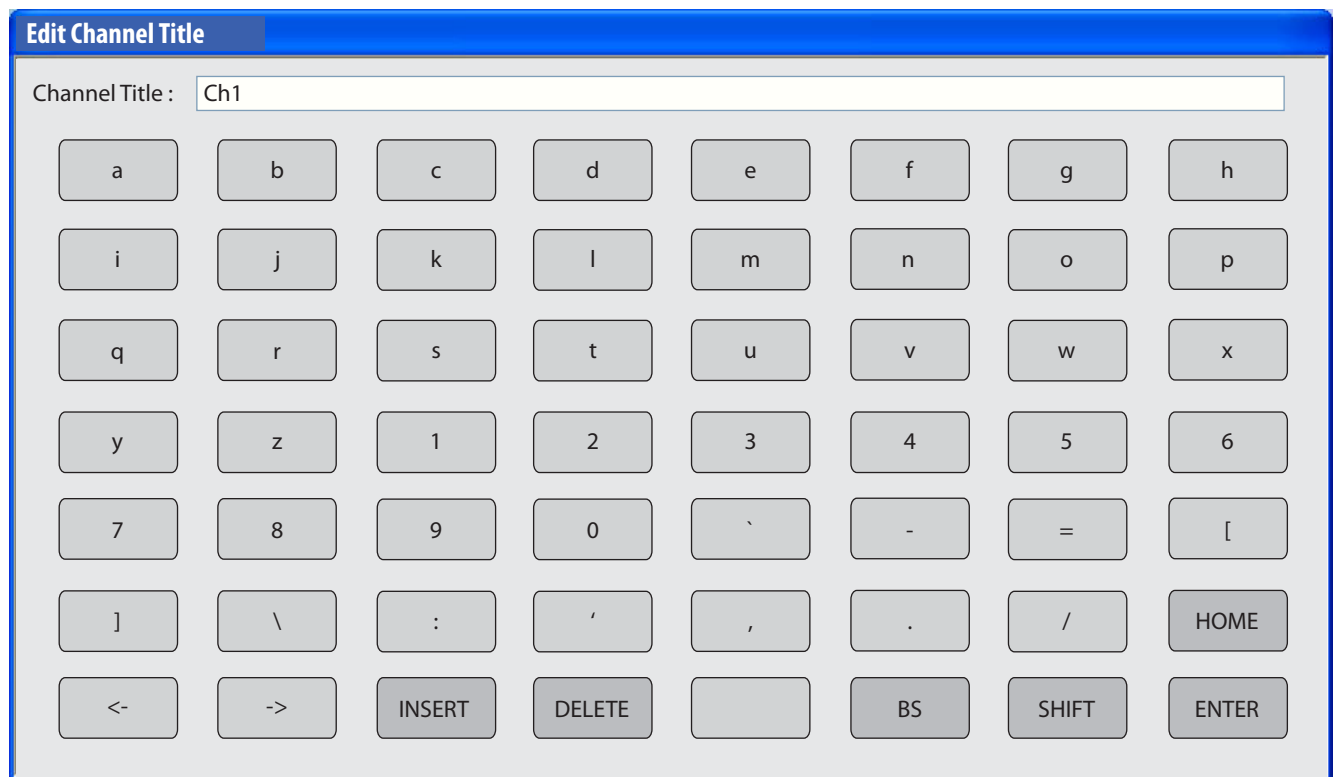


Figure 21-41. EDIT CHANNEL TITLE Dialog Box

Use an Input Device

To enter a channel title label, use any of the following devices:

- **Attached Keyboard:** Use an attached USB keyboard by typing directly into the Channel Table name field name.
- **Attached Mouse:** If a keyboard is not attached, use a mouse to click the required alphanumeric symbols.
- **QWERTY Keyboard:** The available characters are those from a full QWERTY keyboard.

Enter a Channel Title Label

Use the buttons on the EDIT CHANNEL TITLE dialog box to enter the required text string into the Channel Title field:

- **Uppercase Characters:** For UPPERCASE characters, click SHIFT. Click again to change to lowercase.
- **Cursor Up:** To move the cursor to the start of the Channel Title field, click HOME.
- **Cursor Left:** To move the cursor one character to the LEFT, click the <- arrow button.
- **Cursor Up:** To move the cursor one character to the RIGHT, click the -> arrow button.
- **Delete to Left:** To delete characters to the LEFT of the cursor position, click the BS (Backspace) button.
- **Delete to Right:** To delete characters to the RIGHT of the cursor position, click DELETE.

- **Insert Character String:** To insert the character string into the Channel Title field, click INSERT.

Save the Channel Label

To save the Channel Table character string, and return to the DISPLAY SETUP menu, click ENTER.

Chapter 22 — Scale Menus

22-1 Chapter Overview

This chapter provides information about the button controls for the SCALE menu variants. SCALE menus provide trace display control of settings such as resolution, reference value, and the scale of units. The number of buttons on a SCALE menu depends on the settings on the TRACE FORMAT menu. The bottom five (5) buttons on the SCALE menu, always the same, apply settings to the active trace, channel, or all channels and also control of the number of display vertical divisions.

22-2 Scale Menus Appearance, Common Buttons, and Units

Appearance

The appearance of the SCALE menu label buttons, their units, and the menu area names change depending on the trace type selected in the TRACE FORMAT menu.

- [“TRACE LAYOUT Menu” on page 18-4](#)
- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT

Common SCALE Menu Buttons

In all SCALE menus, the bottom five (5) buttons on the SCALE menu are always the same and described at the end of this section. The five common buttons are:

- Auto Scale Active Trace
- Auto Scale Active Channel
- Auto Scale All Channels
- # of Vert. Divisions
- Apply # of Div. to All Channels

The description of these buttons is found at:

- [Section 22-13 “SCALE Menu Common Buttons” on page 22-38](#)

SCALE Menu Units

The table below summarizes the displayed fields and units available in the SCALE menu variants.

Table 22-1. SCALE Menu Parameter Buttons (1 of 2)

Scale Menu	Resolution Button and Field Toolbar	Reference Value Button and Field Toolbar	Reference Position Button and Field Toolbar	Scale Selection Button	Wrap Offset Button and Field Toolbar	Aperture Button and Field Toolbar	Auto Scale Active Trace Button	Auto Scale Active Channel Button	Auto Scale All Channel Button	# of Vert Div Button and Field Toolbar	Apply # of Div. to All Channels Buttons
Notes	<p>YES – The button or link to submenu APPEARS on the menu. NO – The button DOES NOT APPEAR on the menu # – A number without units is entered. NA – The button appears on the menu but is not available (is grayed out). Time Units – The available time units are s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds, and ps (picoseconds). Dual Entries – Table cells with dual entries are for SCALE menus that have separate controls for dual displays with upper and lower traces. For example, the SCALE menu for Log Mag and Phase, a dual display, has an upper menu area titled Log Mag with these buttons: Resolution (dB/Division), Reference Value (dB), and Reference Position (Number). The lower menu area is titled Phase with these buttons: Resolution (Deg/Division), Reference Value (dB), Reference Position (Number), and Wrap Offset (Deg)</p>										
Log Mag	dB/Division	# dB	#	NO	NO	NO	YES	YES	YES	#	YES
Lin Mag	Units/Division	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Phase	Deg/Division	# Deg	#	NO	Deg	NO	YES	YES	YES	#	YES
Real	Units/Division	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Imaginary	Units/Division	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
SWR	Units/Division	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Real	Ohms/Division	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Imaginary	Ohms/Division	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Magnitude	Ohms/Division	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Real & Imaginary (dual display)	Ohms/Division	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
	Ohms/Division	# Ohms	#	NO	NO	NO					
Smith Chart Impedance: Lin/Phase, Log Phase, Real/Imaginary, & Impedance	NA	NA	NA	Yes to Submenu	Deg on Submenu Also Wrap Setup button with link to WRAP SETUP menu.	NO	YES	YES	YES	#	YES
Smith Chart Admittance: Lin/Phase, Log/Phase, Real/Imaginary, & Admittance	NA	NA	NA	Yes to Submenu	Deg on Submenu Also Wrap Setup button with link to WRAP SETUP	NO	YES	YES	YES	#	YES
Linear Polar: Lin/Phase, Real/Imag	Units/Division	# Units	NA	NO	Deg	NO	YES	YES	YES	#	YES

Table 22-1. SCALE Menu Parameter Buttons (2 of 2)

Scale Menu	Resolution Button and Field Toolbar	Reference Value Button and Field Toolbar	Reference Position Button and Field Toolbar	Scale Selection Button	Wrap Offset Button and Field Toolbar	Aperture Button and Field Toolbar	Auto Scale Active Trace Button	Auto Scale Active Channel Button	Auto Scale All Channel Button	# of Vert Div Button and Field Toolbar	Apply # of Div. to All Channels Buttons
Notes	<p>YES – The button or link to submenu APPEARS on the menu. NO – The button DOES NOT APPEAR on the menu # – A number without units is entered. NA – The button appears on the menu but is not available (is grayed out). Time Units – The available time units are s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds), and ps (picoseconds). Dual Entries – Table cells with dual entries are for SCALE menus that have separate controls for dual displays with upper and lower traces. For example, the SCALE menu for Log Mag and Phase, a dual display, has an upper menu area titled Log Mag with these buttons: Resolution (dB/Division), Reference Value (dB), and Reference Position (Number). The lower menu area is titled Phase with these buttons: Resolution (Deg/Division), Reference Value (dB), Reference Position (Number), and Wrap Offset (Deg)</p>										
Log Polar: Log/Phase and Real/Imag	Units/Division	# Units	NA	NO	Deg	NO	YES	YES	YES	#	YES
Log Mag and Phase (dual display)	dB/Division	# dB	#	NO	NO	NO	YES	YES	YES	#	YES
	Deg/Division	# Deg	#	NO	# Deg	NO	YES	YES	YES	#	YES
Linear Mag and Phase (dual display)	dB/Division	# dB	#	NO	NO	NO	YES	YES	YES	#	YES
	Deg/Division	# Deg	#	NO	# Deg	NO	YES	YES	YES	#	YES
Real and Imaginary (dual display)	Units/Division	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
	Units/Division	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Group Delay	Time/Division	Time Units	#	NO	NO	% of Sweep	YES	YES	YES	#	YES
Power Out	dB/Division	# dBm	#	NO	NO	NO	YES	YES	YES	#	YES
Power In	dB/Division	# dBm	#	NO	NO	NO	YES	YES	YES	#	YES

22-3 Overview of SCALE Menu Variants

All SCALE menu variants are shown in the sections and links below:

- [“SCALE Magnitude Menus” on page 22-5](#)
 - [“SCALE Log Magnitude Menu” on page 22-5](#)
 - [“SCALE Linear Magnitude Menu” on page 22-6](#)
 - [“SCALE Impedance Magnitude Menu” on page 22-7](#)
- [“SCALE Phase Menu” on page 22-8](#)
 - [“SCALE Phase Menu” on page 22-8](#)
- [“SCALE Real or Imaginary Menus” on page 22-9](#)
 - [“SCALE Real Magnitude Menu” on page 22-9](#)
 - [“SCALE Imaginary Menu” on page 22-10](#)
 - [“SCALE Impedance Real Menu” on page 22-11](#)
 - [“SCALE Impedance Imaginary Menu” on page 22-12](#)
- [“SCALE SWR Menu” on page 22-13](#)
 - [“SCALE Standing Wave Ratio Menu” on page 22-13](#)
- [“SCALE Smith Chart Menus” on page 22-14](#)
 - [“SCALE Smith Chart Impedance Menu” on page 22-14](#)
 - [“SCALE Smith Chart Admittance Menu” on page 22-23](#)
- [“SCALE Polar Chart Menus” on page 22-24](#)
 - [“SCALE Linear Polar Chart Menu” on page 22-24](#)
 - [“SCALE Log Polar Chart Menu” on page 22-25](#)
- [“SCALE Dual-Trace Display Menus” on page 22-26](#)
 - [“SCALE Impedance Real and Imaginary Menu” on page 22-26](#)
 - [“SCALE Log Magnitude and Phase Menu” on page 22-28](#)
 - [“SCALE Linear Magnitude and Phase Menu” on page 22-30](#)
 - [“SCALE Real and Imaginary Menu” on page 22-32](#)
- [“SCALE Group Delay Menu” on page 22-34](#)
 - [“SCALE Group Delay Menu” on page 22-34](#)
- [“SCALE Power Menus” on page 22-36](#)
 - [“SCALE Power Out Menu” on page 22-36](#)
 - [“SCALE Power In Menu” on page 22-37](#)
- [“SCALE Menu Common Buttons” on page 22-38](#)

22-4 SCALE Magnitude Menus

SCALE Log Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu.
- Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

<p>The screenshot shows the SCALE menu with the following settings:</p> <ul style="list-style-type: none"> Resolution: 10 dB/Div Reference Value: 0 dB Reference Position: 5 Auto Scale Active Trace (selected) Auto Scale Active Channel Auto Scale All Channels # of Vert. Divisions: 10 Apply # of Div. to All Channels 	<p>SCALE (Log Magnitude) Menu</p> <p>This menu is available when TRACE FORMAT is set to Log Magnitude. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: dB <p>Resolution (dB/Div)</p> <p>Select displays the Resolution (dB) toolbar with units in dB per division.</p> <p>Resolution (dB/Div) Field Toolbar</p> <p>Reference Value (dB)</p> <p>Select displays the Reference Value (dB) toolbar.</p> <p>Reference Value (dB) Field Toolbar</p> <p>Reference Position (Number)</p> <p>Select displays the Reference Position toolbar.</p> <p>Reference Position (Number) Field Toolbar</p> <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
--	---

Figure 22-1. SCALE Log Magnitude Menu

SCALE Linear Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

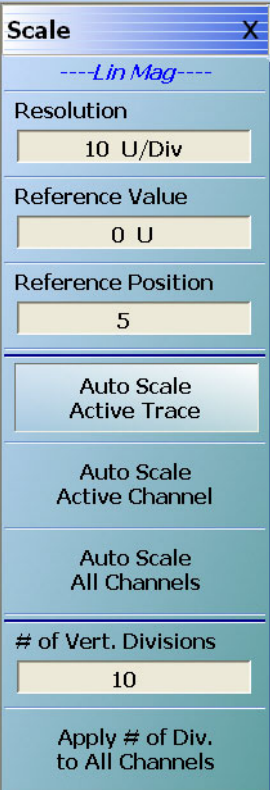



	<p>SCALE (Linear Magnitude) Menu</p> <p>This menu is available when TRACE FORMAT is set to Linear Magnitude. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: U (Units) <p>Resolution (Units/Div)</p> <p>Select displays the Resolution (Units/Division) toolbar with units of units per division.</p> <p>Resolution (Units/Div) Field Toolbar</p>  <p>Reference Value (Units)</p> <p>Select displays the Reference Value (Units) toolbar.</p> <p>Reference Value (Units) Field Toolbar</p>  <p>Reference Position (Number)</p> <p>Select displays the Reference Position toolbar.</p> <p>Reference Position (Number) Field Toolbar</p>  <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
---	---

Figure 22-2. SCALE Linear Magnitude Menu

SCALE Impedance Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

	<h3>SCALE (Impedance Magnitude) Menu</h3> <p>This menu is available when TRACE FORMAT is set to Impedance - Magnitude. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: Ω (Ohms) <h3>Resolution (Ohms/Div)</h3> <p>Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.</p> <h3>Resolution (Ohms/Div) Field Toolbar</h3> <h3>Reference Value (Ohms)</h3> <p>Select displays the Reference Value (Ohms) toolbar with units in Ohms.</p> <h3>Reference Value (Ohms) Field Toolbar</h3> <h3>Reference Position (Number)</h3> <p>Select allows the user to define a reference position and displays the Reference Position field toolbar.</p> <h3>Reference Position (Number) Field Toolbar</h3> <h3>Additional Common Buttons</h3> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38.
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Figure 22-3. SCALE Impedance Magnitude Menu

22-5 SCALE Phase Menu

SCALE Phase Menu

Menu Identification

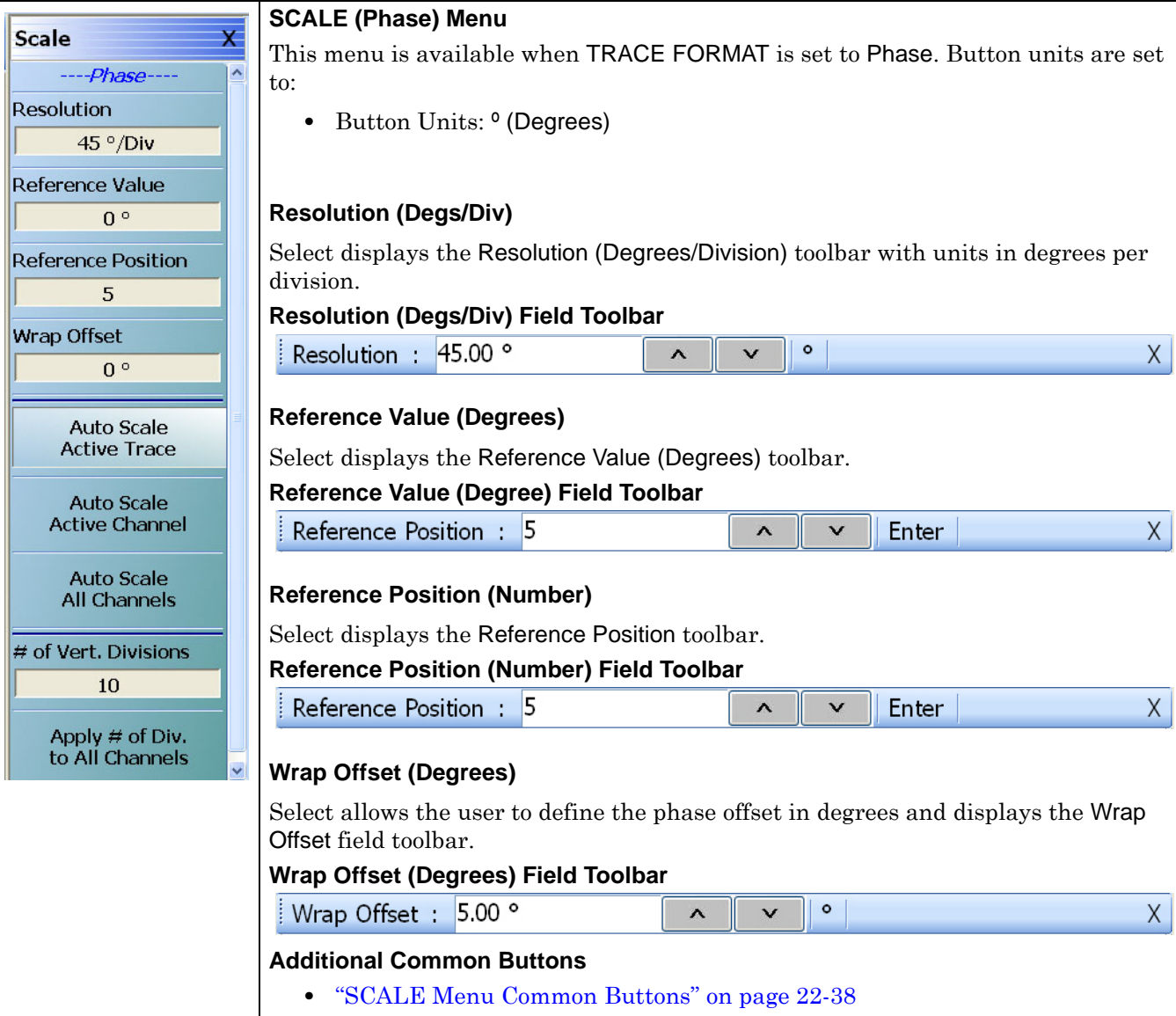
- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE



SCALE (Phase) Menu
 This menu is available when TRACE FORMAT is set to Phase. Button units are set to:

- Button Units: ° (Degrees)

Resolution (Degs/Div)
 Select displays the Resolution (Degrees/Division) toolbar with units in degrees per division.

Resolution (Degs/Div) Field Toolbar
 Resolution : 45.00 °

Reference Value (Degrees)
 Select displays the Reference Value (Degrees) toolbar.

Reference Value (Degree) Field Toolbar
 Reference Position : 5

Reference Position (Number)
 Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar
 Reference Position : 5

Wrap Offset (Degrees)
 Select allows the user to define the phase offset in degrees and displays the Wrap Offset field toolbar.

Wrap Offset (Degrees) Field Toolbar
 Wrap Offset : 5.00 °

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-4. SCALE Phase Menu

22-6 SCALE Real or Imaginary Menus

SCALE Real Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

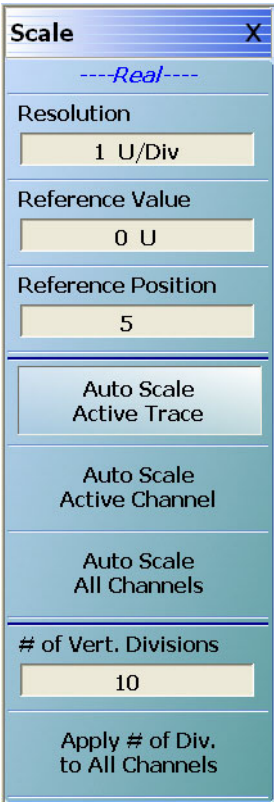



	<p>SCALE (Real) Menu</p> <p>This menu is available when TRACE FORMAT is set to Real. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: U (Units) <p>Resolution (Units/Div)</p> <p>Select displays the Resolution (Units/Division) toolbar with units of units per division.</p> <p>Resolution (Units/Div) Field Toolbar</p>  <p>Reference Value (Units)</p> <p>Select displays the Reference Value (Units) toolbar.</p> <p>Reference Value (Units) Field Toolbar</p>  <p>Reference Position (Number)</p> <p>Select displays the Reference Position toolbar.</p> <p>Reference Position (Number) Field Toolbar</p>  <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
--	--

Figure 22-5. SCALE Real Menu

SCALE Imaginary Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

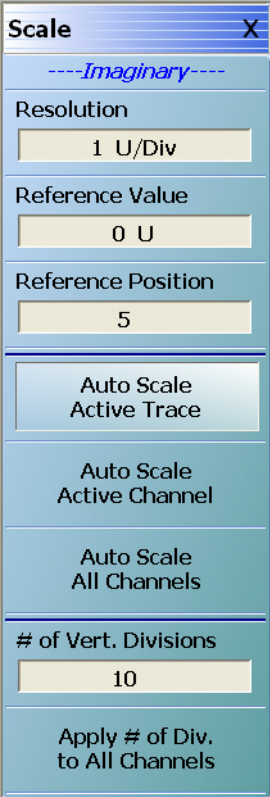



	<p>SCALE (Imaginary) Menu</p> <p>This menu is available when TRACE FORMAT is set to Imaginary. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: U (Units) <p>Resolution (Units/Div)</p> <p>Select displays the Resolution (Units/Division) toolbar with units of units per division.</p> <p>Resolution (Units/Division) Field Toolbar</p>  <p>Reference Value (Units)</p> <p>Select displays the Reference Value (Units) toolbar.</p> <p>Reference Value (Units) Field Toolbar</p>  <p>Reference Position (Number)</p> <p>Select displays the Reference Position toolbar.</p> <p>Reference Position (Number) Field Toolbar</p>  <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
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Figure 22-6. SCALE Imaginary Menu

SCALE Impedance Real Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

<p>The screenshot shows the SCALE menu with the following settings:</p> <ul style="list-style-type: none"> Resolution: 10 Ω/Div Reference Value: 50 Ω Reference Position: 5 Auto Scale Active Trace (button) Auto Scale Active Channel (button) Auto Scale All Channels (button) # of Vert. Divisions: 10 Apply # of Div. to All Channels (button) 	<h3>SCALE (Impedance Real) Menu</h3> <p>This menu is available when TRACE FORMAT is set to Impedance - Magnitude. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: Ω (Ohms) <h3>Resolution (Ohms/Div)</h3> <p>Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.</p> <h3>Resolution (Ohms/Div) Field Toolbar</h3> <p>Resolution : 10.000 Ω</p> <h3>Reference Value (Ohms)</h3> <p>Select displays the Reference Value (Ohms) toolbar with units in Ohms.</p> <h3>Reference Value (Ohms) Field Toolbar</h3> <p>Reference Value : 10.000 Ω</p> <h3>Reference Position (Number)</h3> <p>Select allows the user to define a reference position and displays the Reference Position field toolbar.</p> <h3>Reference Position (Number) Field Toolbar</h3> <p>Reference Position : 5</p> <h3>Additional Common Buttons</h3> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
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Figure 22-7. SCALE Impedance Real Menu

SCALE Impedance Imaginary Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu.
- Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

	<p>SCALE (Impedance Imaginary) Menu</p> <p>This menu is available when TRACE FORMAT is set to Impedance - Imaginary. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: Ω (Ohms) <p>Resolution (Ohms/Div)</p> <p>Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.</p> <p>Resolution (Ohms/Div) Field Toolbar</p> <p>Reference Value (Ohms)</p> <p>Select displays the Reference Value (Ohms) toolbar with units in Ohms.</p> <p>Reference Value (Ohms) Field Toolbar</p> <p>Reference Position (Number)</p> <p>Select allows the user to define a reference position and displays the Reference Position field toolbar.</p> <p>Reference Position (Number) Field Toolbar</p> <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
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Figure 22-8. SCALE Impedance Imaginary Menu

22-7 SCALE SWR Menu

SCALE Standing Wave Ratio Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

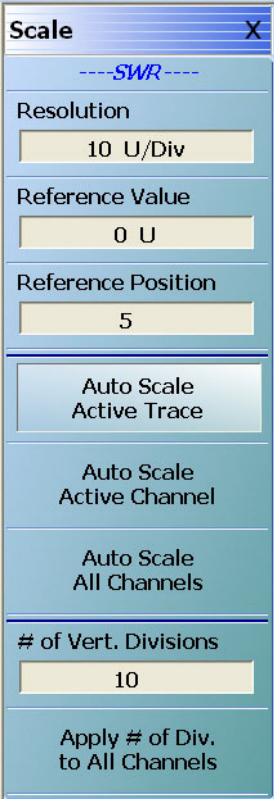



 <p>Scale X</p> <p>---SWR---</p> <p>Resolution 10 U/Div</p> <p>Reference Value 0 U</p> <p>Reference Position 5</p> <p>Auto Scale Active Trace</p> <p>Auto Scale Active Channel</p> <p>Auto Scale All Channels</p> <p># of Vert. Divisions 10</p> <p>Apply # of Div. to All Channels</p>	<h4>SCALE (Standing Wave Ratio SWR) Menu</h4> <p>This menu is available when TRACE FORMAT is set to SWR. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: U (Units) <p>Resolution (Units/Div) Select displays the Resolution (Units/Division) toolbar with units of units per division.</p> <p>Resolution (Units/Division) Field Toolbar</p>  <p>Reference Value (Units) Select displays the Reference Value (Units) toolbar.</p> <p>Reference Value (Unit) Field Toolbar</p>  <p>Reference Position (Number) Select displays the Reference Position toolbar.</p> <p>Reference Position (Number) Field Toolbar</p>  <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
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Figure 22-9. SCALE SWR (Standing Wave Ratio) Menu

22-8 SCALE Smith Chart Menus

The SCALE menu for Smith Charts contain two unique buttons to control the display scale (Scale Selection) and control of the phase wrapping (Wrap Setup). Both are described in the sections below.

SCALE Smith Chart Impedance Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Prerequisites

- The TRACE FORMAT is set to Smith (R+jX Impedance).
 - [“DISPLAY Menu” on page 21-3](#)
 - MAIN | Trace | TRACE | Smith (R+jX)
- The SMITH readout style is set to Linear/Phase, Log/Phase, Real/Imaginary, or Impedance.
 - [“SMITH \(IMPEDANCE\) Menu” on page 21-11](#)
 - MAIN | Trace | TRACE | Smith (R+jX) | SMITH Readout Style

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

	<p>SCALE (Smith Impedance) Menu</p> <p>This menu is available when TRACE FORMAT is set to:</p> <ul style="list-style-type: none"> • Smith (R+jX Impedance) and either • Linear/Phase, Log/Phase, Real/Imaginary, or Impedance is selected. <p>Resolution (Units/Div)</p> <p>The Resolution button is unavailable.</p> <p>Reference Value (Units)</p> <p>The Reference Value button is unavailable.</p> <p>Reference Position (Number)</p> <p>The Reference Position button is unavailable.</p> <p>Scale Selection</p> <p>The button displays the Smith Chart scale in dB. Select displays the SMITH SCALING menu.</p> <ul style="list-style-type: none"> • “SMITH SCALING Impedance Menu” on page 22-16 <p>Wrap Setup</p> <p>Select displays the WRAP SETUP menu which allows the user to define if wrapping of on or off, and if on, the wrap offset in degrees. Additional Common Buttons</p> <ul style="list-style-type: none"> • “WRAP Setup Menu” on page 22-22 <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
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Figure 22-10. SCALE Smith Impedance Menu

SMITH SCALING Impedance Menu

SMITH SCALING Admittance Menu

The SMITH SCALING Impedance and the SMITH SCALING Admittance menus provide discrete Smith Chart scaling options from the default 0 dB display. Both the impedance and admittance menus provide the same functions. The user can zoom in to areas of interest by expanding the display at selectable levels of -10 dB, -20 dB, or -30 dB. Alternatively, the Smith Chart display can be compressed to a level of 3 dB. No incremental levels are provided. An example of Smith Chart scaling follows the menu description below.

Prerequisites

- The TRACE FORMAT is set to Smith (R+jX Impedance).
 - “DISPLAY Menu” on page 21-3
 - MAIN | Trace | TRACE | Smith (R+jX)
- The SMITH readout style is set to Linear/Phase, Log/Phase, Real/Imaginary, or Impedance.
 - “SMITH (IMPEDANCE) Menu” on page 21-11
 - MAIN | Trace | TRACE | Smith (R+jX) | SMITH Readout Style

Previous

- “TRACE FORMAT Menu” on page 21-6

Navigation

- MAIN | Scale | SCALE Smith Impedance | SCALE SMITH IMPED. | SMITH SCALING IMPEDANCE

Button Selection Group

- The five buttons of the SMITH SCALING IMPEDANCE menu form a button selection group where the selection of any one button de-selects the other four buttons.


	<p>0 dB (Refl 1.0) The default Smith Chart Impedance scale is 0 dB with a reflection coefficient of 1.0.</p> <p>-10 dB (Refl 0.3162278) Expands the Smith Chart Impedance trace display and sets the scale to -10 dB with a reflection coefficient of 0.3162278.</p> <p>-20 dB (Refl 0.10) Expands the Smith Chart Impedance trace display and sets the scale to -20 dB with a reflection coefficient of 0.10.</p> <p>-30 dB (Refl 0.0316228) Expands the Smith Chart Impedance trace display and sets the scale to -30 dB with a reflection coefficient of 0.03162278.</p> <p>+3 dB (Refl 1.4125375) Compresses the Smith Chart Impedance trace display and sets the scale to $+3$ dB with a reflection coefficient of 1.4125375.</p>
--	---

Figure 22-11. SCALE Smith Impedance Menu

Smith Chart Scaling Operations

A typical Smith Chart display is shown below at the default 0 dB setting.

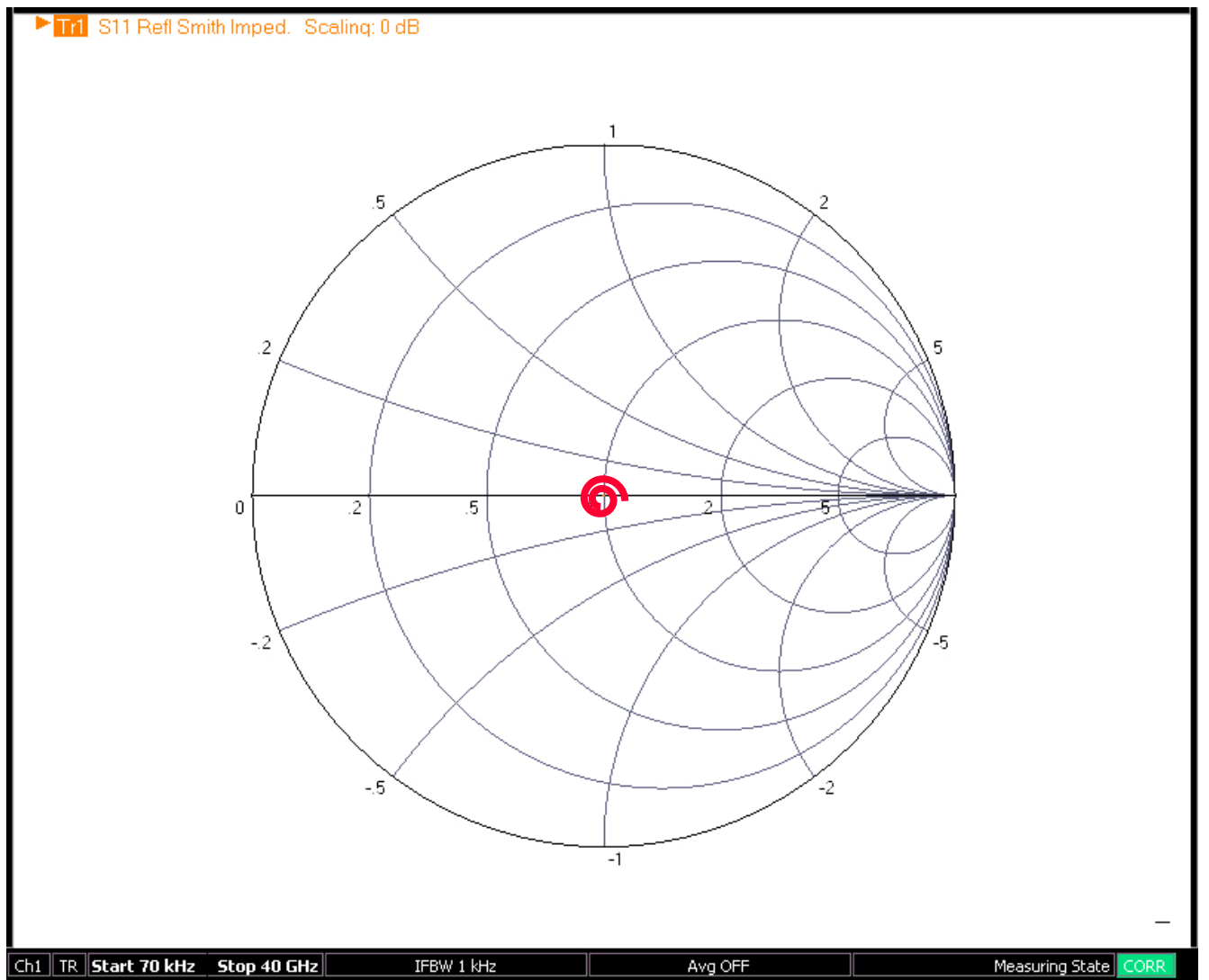


Figure 22-12. Smith Chart Impedance Display – Typical Results at 0 dB

Expanded Smith Chart Displays

The user can zoom into the display by expanding the Smith Chart as shown in the figures below:

- -10 dB in [Figure 22-13](#), “Smith Chart Impedance Display – Expanded to -10 dB” on page 22-18
- -20 dB in [Figure 22-14](#), “Smith Chart Impedance Display – Expanded to -20 dB” on page 22-19
- -30 dB in [Figure 22-15](#), “Smith Chart Impedance Display – Expanded to -30 dB” on page 22-20

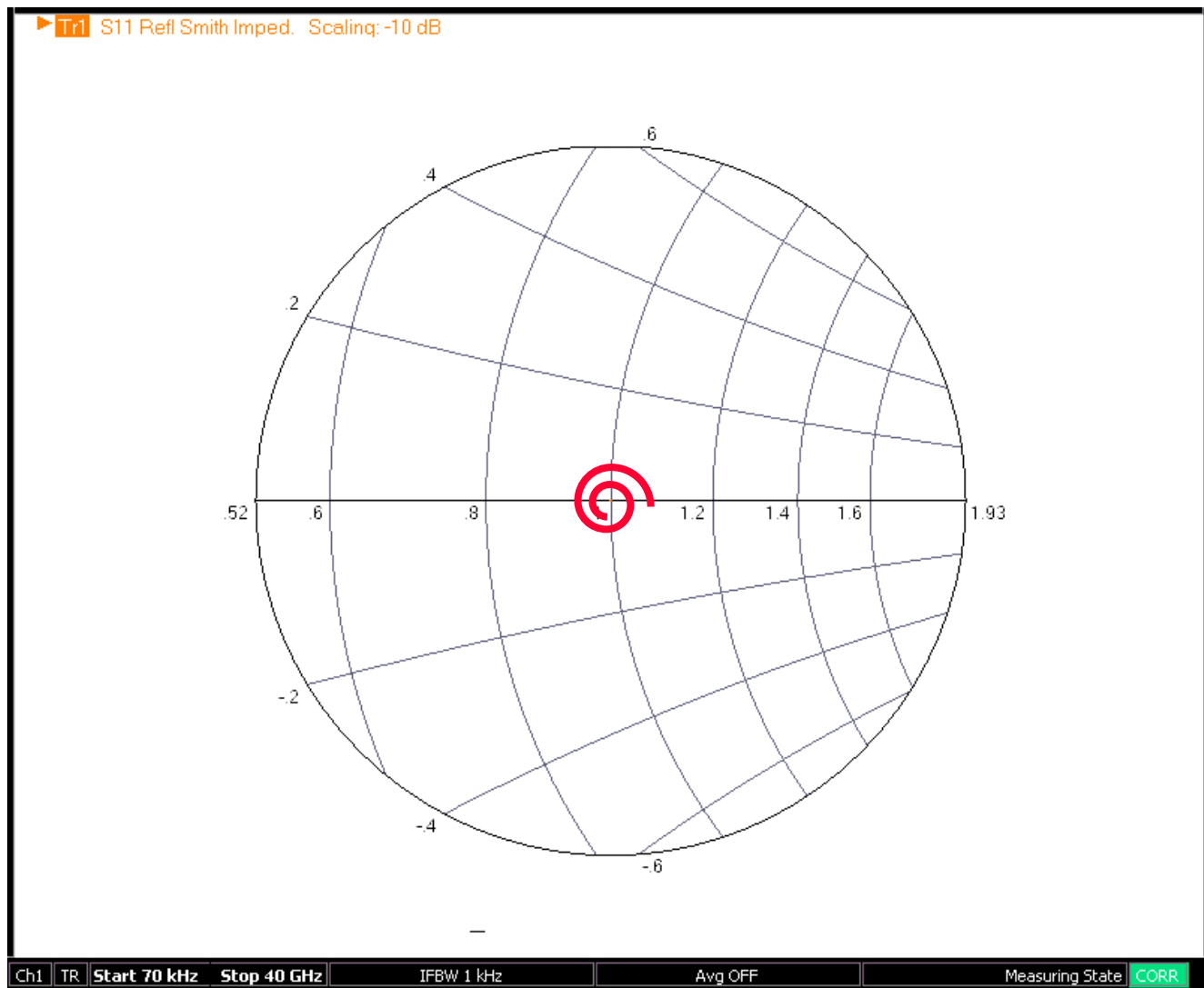


Figure 22-13. Smith Chart Impedance Display – Expanded to -10 dB

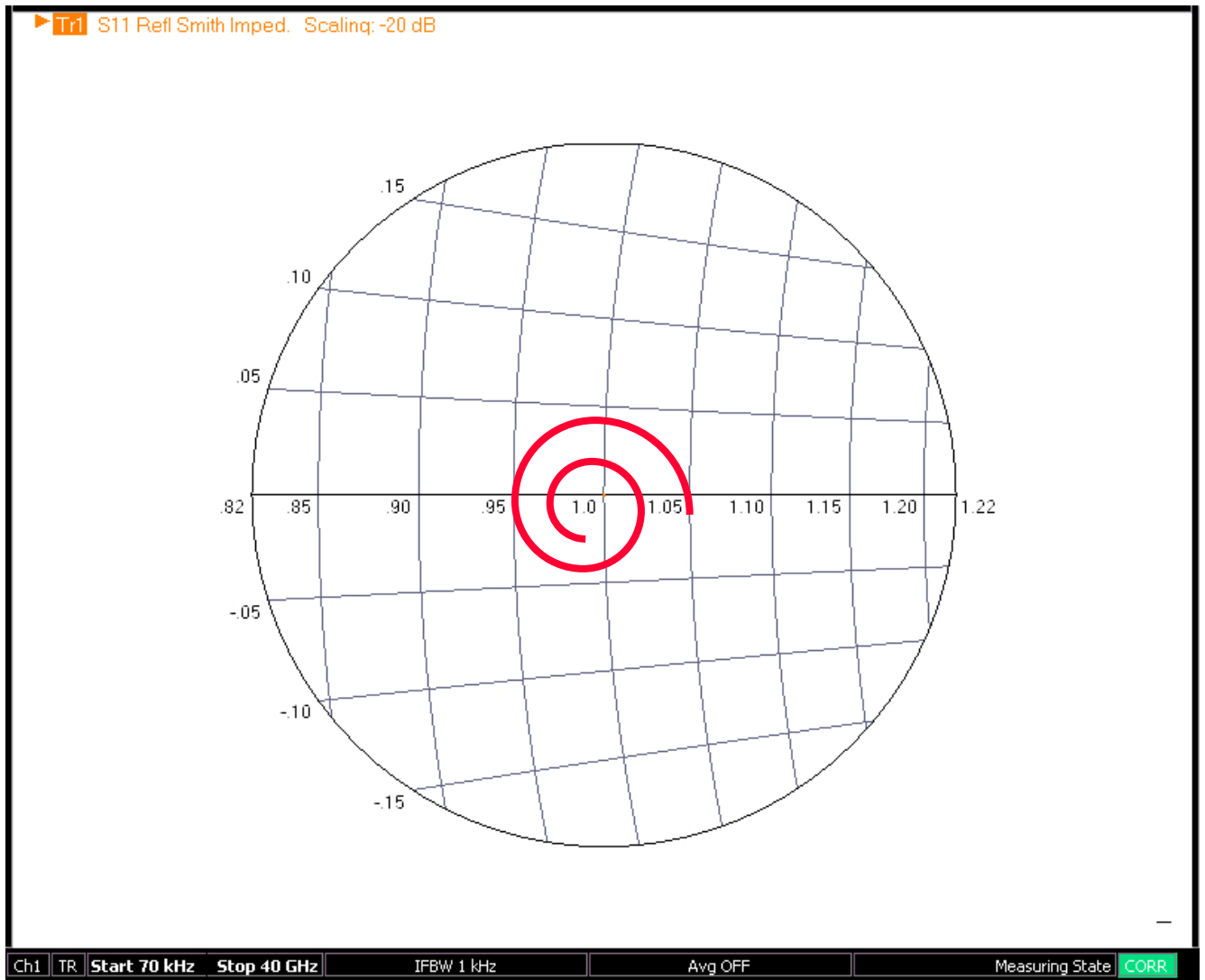


Figure 22-14. Smith Chart Impedance Display – Expanded to -20 dB

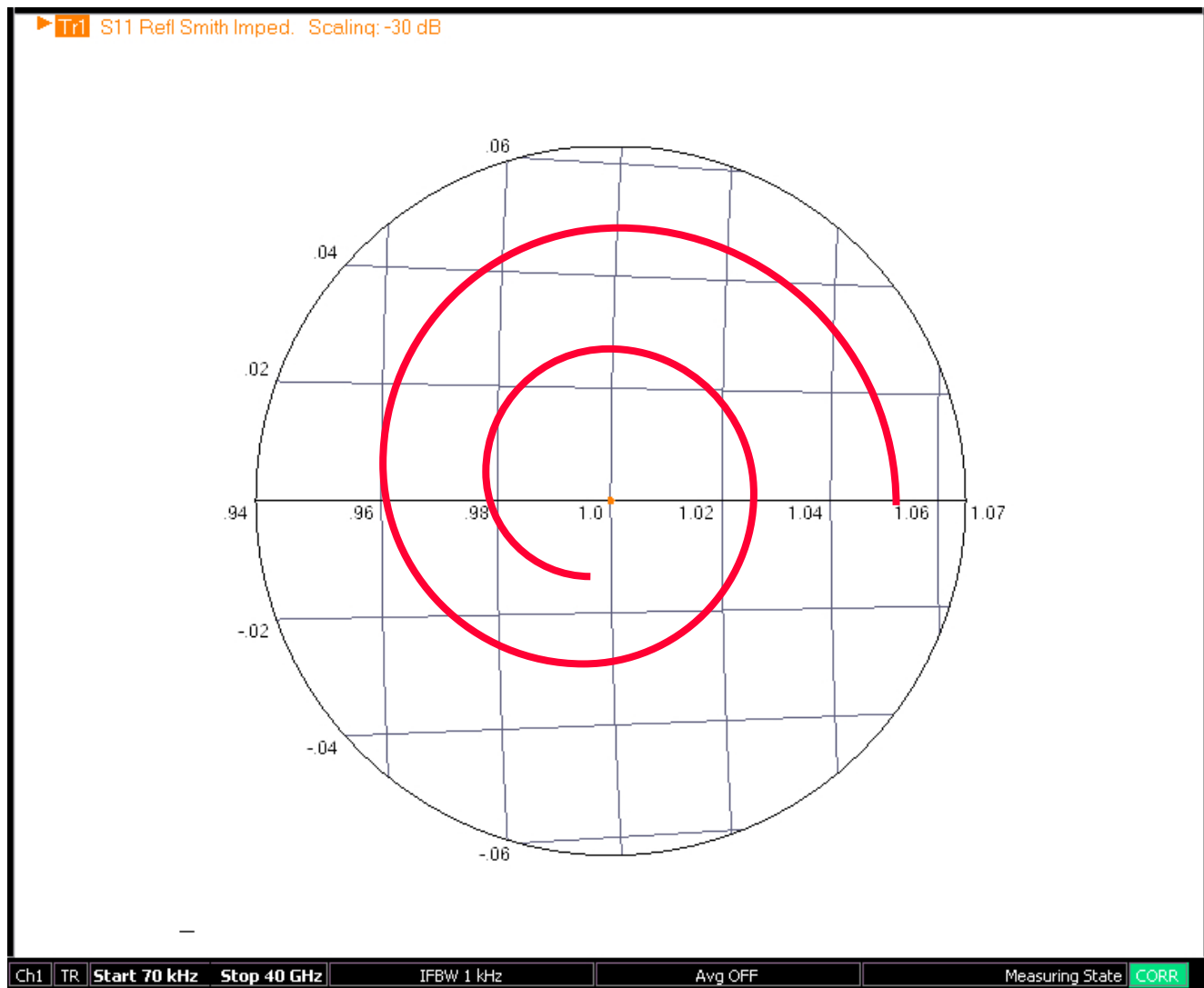
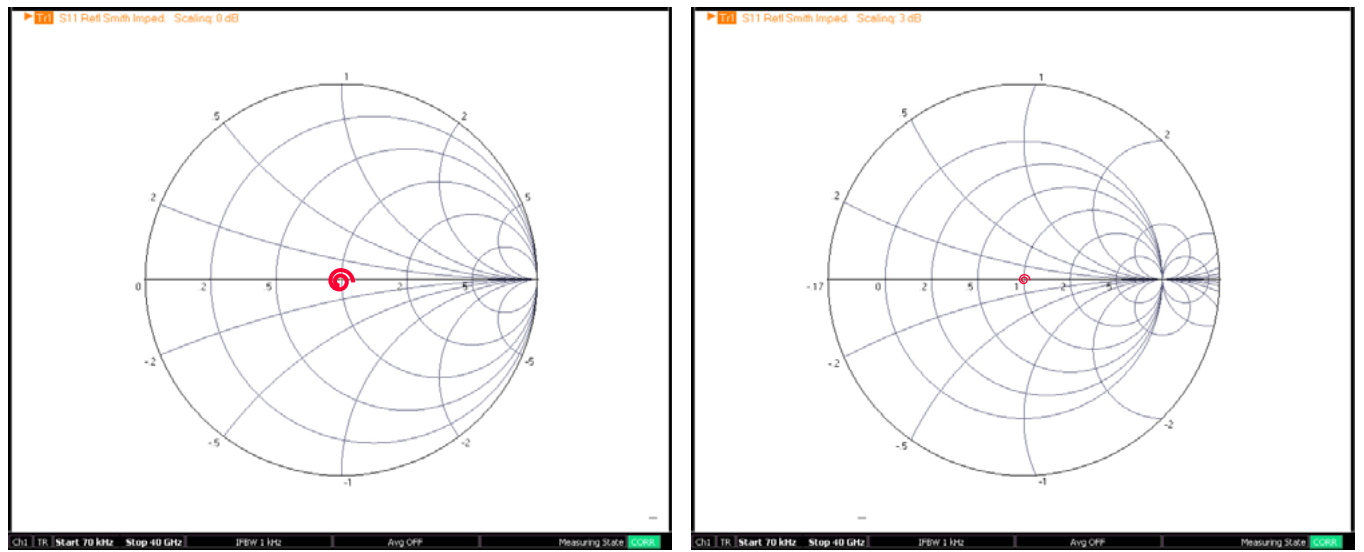


Figure 22-15. Smith Chart Impedance Display – Expanded to -30 dB

Smith Chart Compressed Display

The 3 dB selection compresses the Smith Chart display so that the outer edges can be easily examined. The figure below shows an example of the original 0 dB display on the left, and the compressed 3 dB display on the right.



- Original Smith Chart Impedance display at 0 dB on left.
- Compresses Smith Chart Impedance display at 3 dB at right.

Figure 22-16. Compressed Smith Chart Example – 0 dB and 3 dB

WRAP Setup Menu

Prerequisites

- The WRAP SETUP submenu is linked to the SCALE Smith Impedance or the SCALE Smith Admittance menus and is only available if the DISPLAY menu is set to a Smith Impedance (R+jX) or Smith Admittance (G+jB) trace display.
- “DISPLAY Menu” on page 21-3

Previous

- “SCALE Smith Chart Impedance Menu” on page 22-14
- “SCALE Smith Chart Admittance Menu” on page 22-23

Navigation

- MAIN | Scale | SCALE Smith Impedance | Wrap Setup | WRAP SETUP
- MAIN | Scale | SCALE Smith Admittance | Wrap Setup | WRAP SETUP

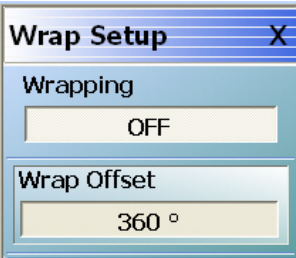

	<p>Wrapping (On/Off) Select toggles Smith chart phase wrapping on and off, with the current state displayed in the button field.</p> <p>Wrap Offset (Degrees) Select displays the Wrap Offset field toolbar where the user can define the phase offset in degrees from 0 degrees to 360 degrees.</p> <p>Wrap Offset (Degrees) Field Toolbar</p> 
--	--

Figure 22-17. SCALE Smith Impedance Menu

SCALE Smith Chart Admittance Menu

Menu Appearance

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Prerequisites

- The TRACE FORMAT is set to Smith (G+jB Impedance).
 - [“DISPLAY Menu” on page 21-3](#)
 - MAIN | Trace | TRACE | Smith (G+jB)
- The SMITH readout style is set to Linear/Phase, Log/Phase, Real/Imaginary, or Impedance.
 - [“SMITH \(IMPEDANCE\) Menu” on page 21-11](#)
 - MAIN | Trace | TRACE | Smith (G+jB) | SMITH Readout Style

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

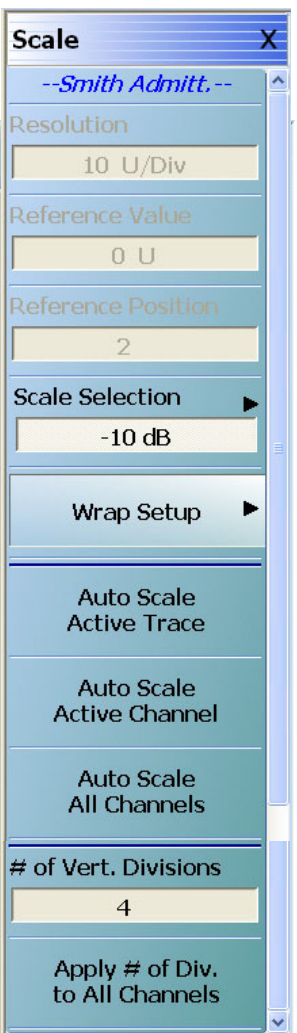
	<h3>SCALE (Smith Admittance) Menu</h3> <p>This menu is available when TRACE FORMAT is set to Smith (G+jB Admittance) and either Linear/Phase, Log/Phase, Real/Imaginary, or Impedance is selected. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: ° (Degrees) <p>Resolution (Units/Div) The Resolution button is unavailable.</p> <p>Reference Value (Units) The Reference Value button is unavailable.</p> <p>Reference Position (Number) The Reference Position button is unavailable.</p> <p>Scale Selection The button displays the Smith Chart scale in dB. Select displays the SMITH SCALING menu.</p> <ul style="list-style-type: none"> • “SMITH SCALING Impedance Menu” on page 22-16 <p>Wrap Setup Select displays the WRAP SETUP menu which allows the user to define if wrapping of on or off, and if on, the wrap offset in degrees. Additional Common Buttons</p> <ul style="list-style-type: none"> • “WRAP Setup Menu” on page 22-22 <p>Additional Common Buttons</p> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
--	---

Figure 22-18. SCALE Smith Admittance Menu

22-9 SCALE Polar Chart Menus

SCALE Linear Polar Chart Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Prerequisites

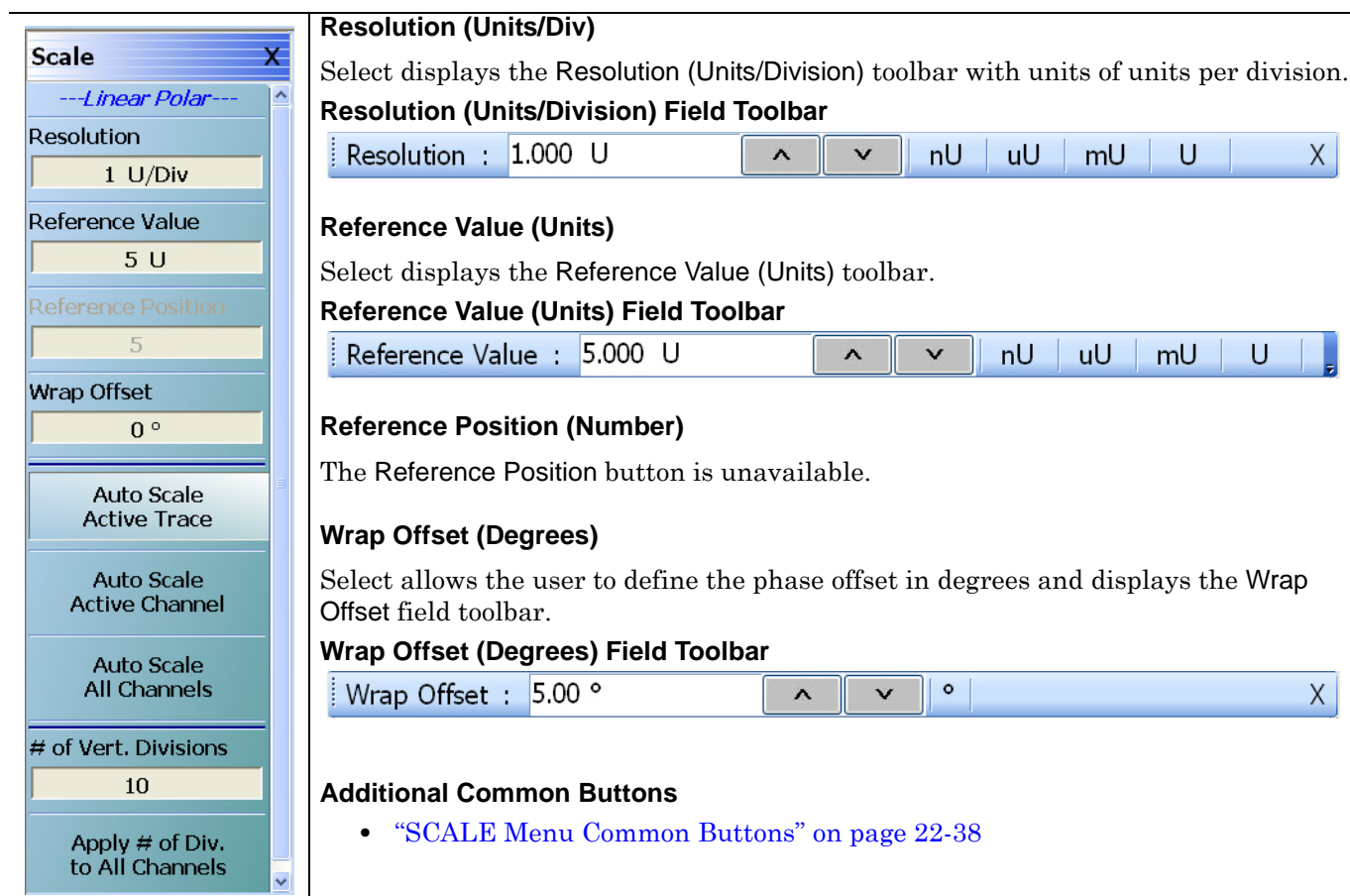
- The SCALE (Linear Polar) menu is available when TRACE FORMAT is set to either Linear Polar (Linear/Phase) or Linear Polar (Real/Imaginary).
- Button Units: U (Units)
- Button Units: ° (Degrees)
- The Reference Position button is unavailable.

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE



The screenshot shows the SCALE Linear Polar Chart Menu on the left and its corresponding field toolbars on the right. The menu items and their values are:

- Resolution: 1 U/Div
- Reference Value: 5 U
- Reference Position: 5
- Wrap Offset: 0 °
- Auto Scale Active Trace
- Auto Scale Active Channel
- Auto Scale All Channels
- # of Vert. Divisions: 10
- Apply # of Div. to All Channels

The field toolbars on the right are:

- Resolution (Units/Div)**: Select displays the Resolution (Units/Division) toolbar with units of units per division. Resolution (Units/Division) Field Toolbar: Resolution : 1.000 U
- Reference Value (Units)**: Select displays the Reference Value (Units) toolbar. Reference Value (Units) Field Toolbar: Reference Value : 5.000 U
- Reference Position (Number)**: The Reference Position button is unavailable.
- Wrap Offset (Degrees)**: Select allows the user to define the phase offset in degrees and displays the Wrap Offset field toolbar. Wrap Offset (Degrees) Field Toolbar: Wrap Offset : 5.00 °
- Additional Common Buttons**:
 - [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-19. SCALE Linear Polar Menu

SCALE Log Polar Chart Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Prerequisites

- The SCALE (Log Polar) menu is available when TRACE FORMAT is set to either Log Polar (Linear/Phase) or Log Polar (Real/Imaginary).
- Button Units: dB
- Button Units: ° (Degrees)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Log Polar---

Resolution
10 dB/Div

Reference Value
0 dB

Reference Position
5

Wrap Offset
0 °

Auto Scale
Active Trace

Auto Scale
Active Channel

Auto Scale
All Channels

of Vert. Divisions
10

Apply # of Div.
to All Channels

Resolution (dB/Div)
Select displays the Resolution (dB) toolbar with units in dB per division.

Resolution (dB/Division) Field Toolbar
Resolution : 10.0000 dB ^ v dB X

Reference Value (dB)
Select displays the Reference Value (dB) toolbar.

Reference Value (dB) Field Toolbar
Reference Value : 10.0000 dB ^ v dB X

Reference Position (Number)
The Reference Position button is unavailable.

Wrap Offset (Degrees)
Select allows the user to define the phase offset in degrees and displays the Wrap Offset field toolbar.

Wrap Offset (Degrees) Field Toolbar
Wrap Offset : 5.00 ° ^ v ° X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-20. SCALE Log Polar Menu

22-10 SCALE Dual-Trace Display Menus

SCALE Impedance Real and Imaginary Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- “Scale Menus Appearance, Common Buttons, and Units” on page 22-1

Previous

- “MAIN MENU” on page 2-1

Navigation

- MAIN | Scale | SCALE

SCALE (Impedance Real & Impedance Imaginary) Menu

This menu is available when TRACE FORMAT is set to Impedance - Real & Impedance - Imaginary. There are separate button sets for Impedance-Real and Impedance-Imaginary. Button units are set to:

- Button Units: Ω (Ohms)

Impedance Real Button Set

Resolution (Ohms/Div)

Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.

Resolution (Ohms/Div) Field Toolbar

Resolution : 10.000 Ω [Up] [Down] Ω [X]

Reference Value (Ohms)

Select displays the Reference Value (Ohms) toolbar with units in Ohms.

Reference Value (Ohms) Field Toolbar

Reference Value : 10.000 Ω [Up] [Down] Ω [X]

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 [Up] [Down] Enter [X]

The screenshot shows the SCALE menu with two sections: Impedance Real and Impedance Imag. Each section has fields for Resolution (10 Ω /Div), Reference Value (0 Ω), and Reference Position (5). Below these are buttons for Auto Scale (Active Trace, Active Channel, All Channels) and # of Vert. Divisions (10). At the bottom is a button for Apply # of Div. to All Channels.

Figure 22-21. SCALE Impedance Real and Impedance Imaginary Menu (1 of 2)

Impedance Imaginary Button Set**Resolution (Ohms/Div)**

Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.

Resolution (Ohms/Div) Field Toolbar

A field toolbar for Resolution (Ohms/Div). It features a text input field containing '10.000 Ω', followed by an up arrow button, a down arrow button, a unit selector button with the Greek letter Ω, and a close button with an 'X'.

Reference Value (Ohms)

Select displays the Reference Value (Ohms) toolbar with units in Ohms.

Reference Value (Ohms) Field Toolbar

A field toolbar for Reference Value (Ohms). It features a text input field containing '10.000 Ω', followed by an up arrow button, a down arrow button, a unit selector button with the Greek letter Ω, and a close button with an 'X'.

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

A field toolbar for Reference Position (Number). It features a text input field containing '5', followed by an up arrow button, a down arrow button, an 'Enter' button, and a close button with an 'X'.

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-21. SCALE Impedance Real and Impedance Imaginary Menu (2 of 2)

SCALE Log Magnitude and Phase Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Log Mag---

Resolution
10 dB/Div

Reference Value
0 dB

Reference Position
5

---Phase---

Resolution
45 °/Div

Reference Value
0 °

Reference Position
5

Wrap Offset
0 °

Auto Scale
Active Trace

Auto Scale
Active Channel

Auto Scale
All Channels

of Vert. Divisions
10

Apply # of Div.
to All Channels

SCALE (Log Magnitude & Phase) Menu

This menu is available when TRACE FORMAT is set to Log Magnitude and Phase. There are separate button sets for Log Magnitude and Phase. Button units are set to:

- Button Units: dB
- Button Units: ° (Degrees)

Log Magnitude Area Button Set

Resolution (dB/Div)

Select displays the Resolution (dB) toolbar with units in dB per division.

Resolution (dB/Division) Field Toolbar

Resolution : 10.0000 dB ^ v dB X

Reference Value (dB)

Select displays the Reference Value (dB) toolbar.

Reference Value (dB) Field Toolbar

Reference Value : 10.0000 dB ^ v dB X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Figure 22-22. SCALE Log Magnitude and Phase Menu (1 of 2)

Phase Area Button Set**Resolution (Degs/Div)**

Select displays the Resolution (Degrees/Division) toolbar with units in degrees per division.

Resolution (Degs/Div) Field Toolbar

Resolution : 45.00 °

The toolbar consists of a text input field containing '45.00 °', followed by an up arrow button, a down arrow button, a degree symbol button, and a close button (X).

Reference Value (Degrees)

Select displays the Reference Value (Degrees) toolbar.

Reference Value (Degrees) Field Toolbar

Reference Value : 5.00 °

The toolbar consists of a text input field containing '5.00 °', followed by an up arrow button, a down arrow button, a degree symbol button, and a close button (X).

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5

The toolbar consists of a text input field containing '5', followed by an up arrow button, a down arrow button, an 'Enter' button, and a close button (X).

Wrap Offset (Degrees)

Select allows the user to define the phase offset in degrees and displays the Wrap Offset field toolbar.

Wrap Offset (Deg) Field Toolbar

Wrap Offset : 5.00 °

The toolbar consists of a text input field containing '5.00 °', followed by an up arrow button, a down arrow button, a degree symbol button, and a close button (X).

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-22. SCALE Log Magnitude and Phase Menu (2 of 2)

SCALE Linear Magnitude and Phase Menu

Menu Identification

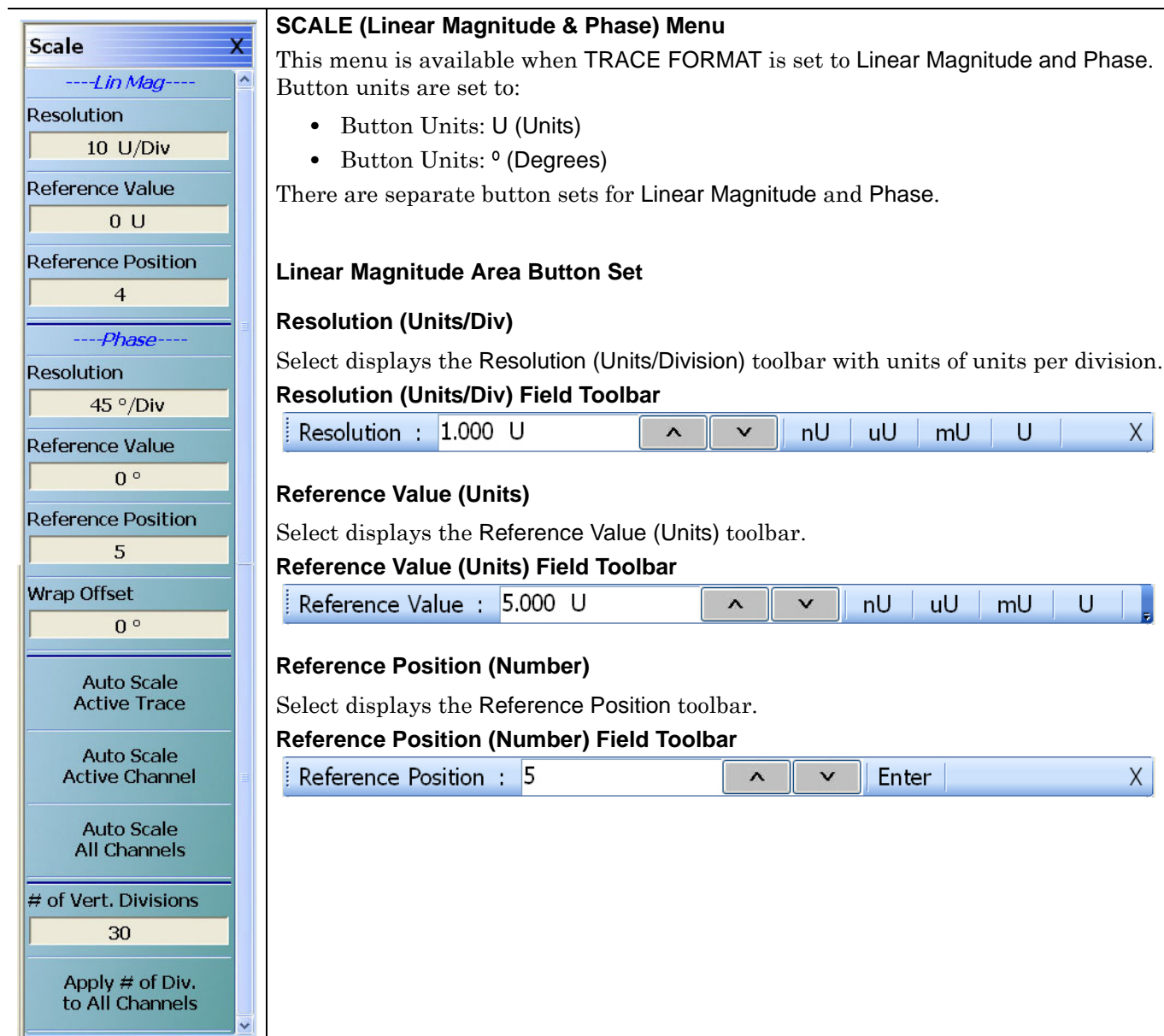
- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE



SCALE (Linear Magnitude & Phase) Menu

This menu is available when TRACE FORMAT is set to Linear Magnitude and Phase. Button units are set to:

- Button Units: U (Units)
- Button Units: ° (Degrees)

There are separate button sets for Linear Magnitude and Phase.

Linear Magnitude Area Button Set

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar

Resolution : 1.000 U ^ v nU uU mU U X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U ^ v nU uU mU U X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Scale Menu Settings:

- Resolution: 10 U/Div
- Reference Value: 0 U
- Reference Position: 4
- Resolution: 45 °/Div
- Reference Value: 0 °
- Reference Position: 5
- Wrap Offset: 0 °
- Auto Scale Active Trace
- Auto Scale Active Channel
- Auto Scale All Channels
- # of Vert. Divisions: 30
- Apply # of Div. to All Channels

Figure 22-23. SCALE Linear Magnitude and Phase Menu (1 of 2)

Phase Area Button Set**Resolution (Degs/Div)**

Select displays the Resolution (Degrees/Division) toolbar with units in degrees per division.

Resolution (Degs/Div) Field Toolbar

Resolution : 45.00 ° [^] [v] [°] [X]

Reference Value (Degs)

Select displays the Reference Value (Degrees) toolbar.

Reference Value (Degrees) Field Toolbar

Reference Value : 5.00 ° [^] [v] [°] [X]

Reference Position (Number)


Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 [^] [v] [Enter] [X]

Wrap Offset (Degrees)

Select allows the user to define the phase offset in degrees and displays the Wrap Offset field toolbar.

Wrap Offset (Degrees) Field Toolbar

Wrap Offset : 5.00 ° [^] [v] [°] [X]

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-23. SCALE Linear Magnitude and Phase Menu (2 of 2)

SCALE Real and Imaginary Menu

Menu Identification

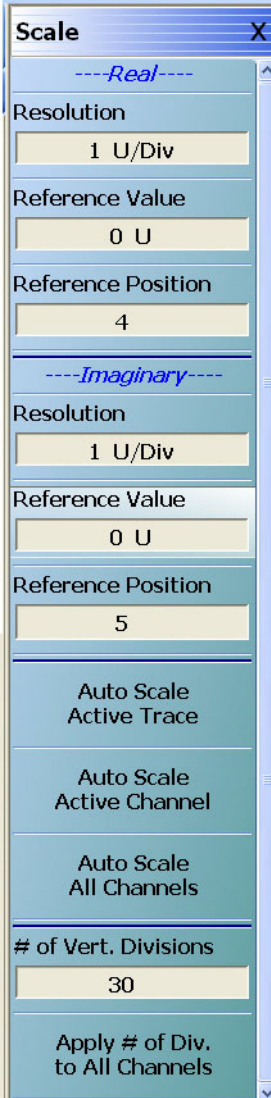
- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE



SCALE (Real & Imaginary) Menu

This menu is available when TRACE FORMAT is set to Real and Imaginary. Button units are set to:

- Button Units: U (Units)

There are separate button sets for Real and Imaginary.

Real Area Button Set

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar

Resolution : 1.000 U ^ v nU uU mU U X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U ^ v nU uU mU U X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Scale Menu Settings:

- Real Mode:** Resolution: 1 U/Div, Reference Value: 0 U, Reference Position: 4
- Imaginary Mode:** Resolution: 1 U/Div, Reference Value: 0 U, Reference Position: 5
- Auto Scale:** Active Trace, Active Channel, All Channels
- # of Vert. Divisions:** 30
- Apply # of Div. to All Channels:** (button)

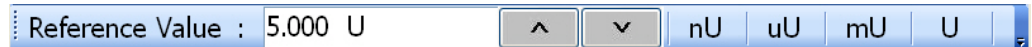
Figure 22-24. SCALE Real and Imaginary Menu (1 of 2)

Imaginary Area Button Set**Resolution (Units/Div)**

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar**Reference Value (Units)**

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar**Reference Position (Number)**

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar**Additional Common Buttons**

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-24. SCALE Real and Imaginary Menu (2 of 2)

22-11 SCALE Group Delay Menu

SCALE Group Delay Menu

Menu Identification

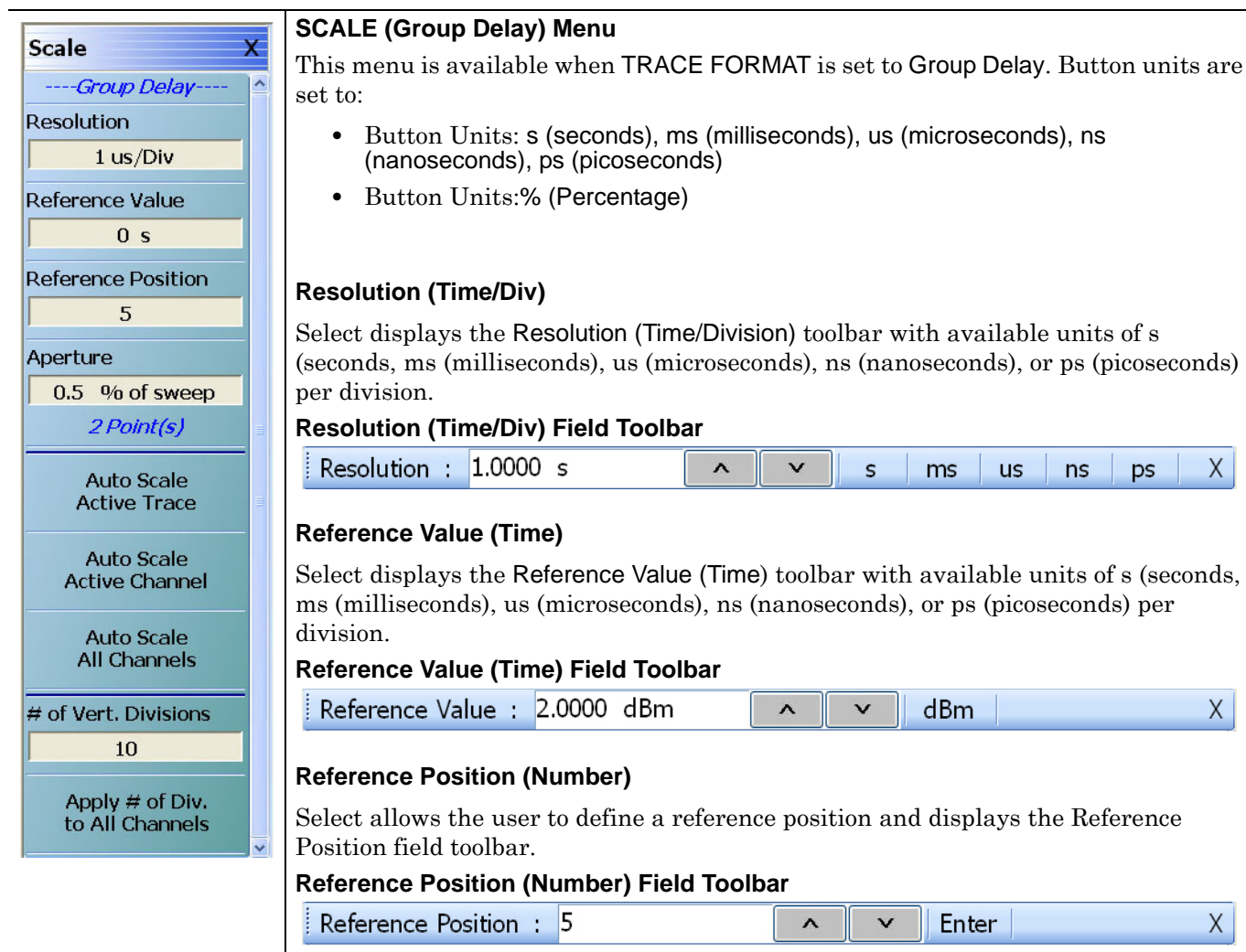
- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE



Scale X

---Group Delay---

Resolution
1 us/Div

Reference Value
0 s

Reference Position
5

Aperture
0.5 % of sweep
2 Point(s)

Auto Scale
Active Trace

Auto Scale
Active Channel

Auto Scale
All Channels

of Vert. Divisions
10

Apply # of Div.
to All Channels

SCALE (Group Delay) Menu

This menu is available when TRACE FORMAT is set to Group Delay. Button units are set to:

- Button Units: s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds), ps (picoseconds)
- Button Units:% (Percentage)

Resolution (Time/Div)

Select displays the Resolution (Time/Division) toolbar with available units of s (seconds, ms (milliseconds), us (microseconds), ns (nanoseconds), or ps (picoseconds) per division.

Resolution (Time/Div) Field Toolbar

Resolution : 1.0000 s ^ v s ms us ns ps X

Reference Value (Time)

Select displays the Reference Value (Time) toolbar with available units of s (seconds, ms (milliseconds), us (microseconds), ns (nanoseconds), or ps (picoseconds) per division.

Reference Value (Time) Field Toolbar

Reference Value : 2.0000 dBm ^ v dBm X

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Figure 22-25. SCALE Group Delay Menu (1 of 2)

Aperture %

The Aperture Percentage is the width of the sweep frequency that is used in the group delay calculation where group delay is the integrated slope of the signal measurement.

Aperture % (Percentage) Field Toolbar**Additional Common Buttons**

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-25. SCALE Group Delay Menu (2 of 2)

22-12 SCALE Power Menus

SCALE Power Out Menu

Menu Identification

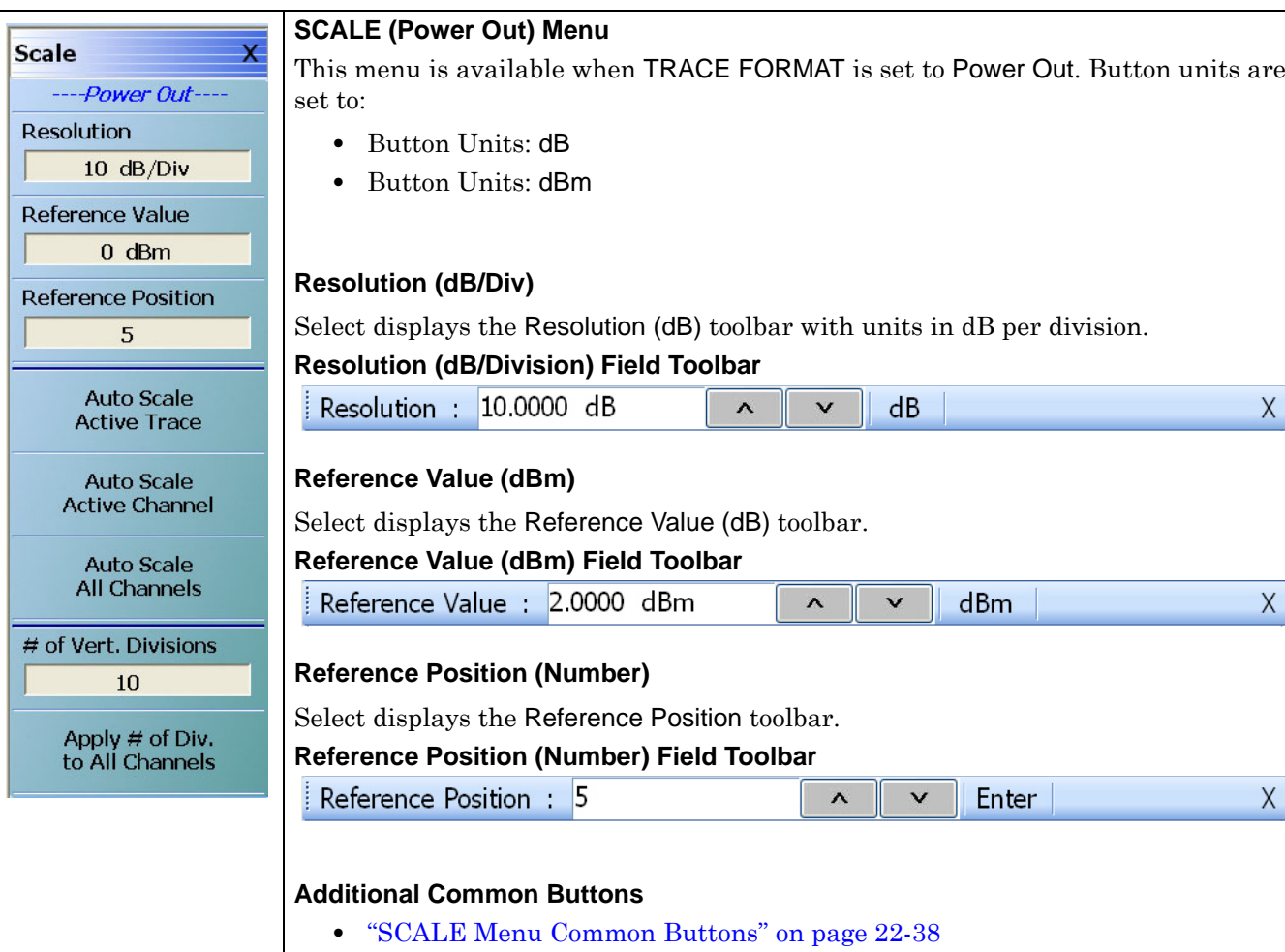
- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE



The figure shows the SCALE (Power Out) menu on the left and its corresponding field toolbars on the right. The menu includes options for Resolution (10 dB/Div), Reference Value (0 dBm), Reference Position (5), and Auto Scale settings. The field toolbars show the current values and units for Resolution (10.0000 dB), Reference Value (2.0000 dBm), and Reference Position (5).

SCALE (Power Out) Menu

This menu is available when TRACE FORMAT is set to Power Out. Button units are set to:

- Button Units: dB
- Button Units: dBm

Resolution (dB/Div)

Select displays the Resolution (dB) toolbar with units in dB per division.

Resolution (dB/Division) Field Toolbar

Resolution : 10.0000 dB [^] [v] dB [X]

Reference Value (dBm)

Select displays the Reference Value (dB) toolbar.

Reference Value (dBm) Field Toolbar

Reference Value : 2.0000 dBm [^] [v] dBm [X]

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 [^] [v] Enter [X]

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 22-38](#)

Figure 22-26. SCALE Power Out Menu

SCALE Power In Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

<p>Scale X</p> <p>----Power In----</p> <p>Resolution 10 dB/Div</p> <p>Reference Value 0 dBm</p> <p>Reference Position 5</p> <p>Auto Scale Active Trace</p> <p>Auto Scale Active Channel</p> <p>Auto Scale All Channels</p> <p># of Vert. Divisions 10</p> <p>Apply # of Div. to All Channels</p>	<h3>SCALE (Power In) Menu</h3> <p>This menu is available when TRACE FORMAT is set to Power In. Button units are set to:</p> <ul style="list-style-type: none"> • Button Units: dB • Button Units: dBm <h4>Resolution (dB/Div)</h4> <p>Select displays the Resolution (dB) toolbar with units in dB per division.</p> <h4>Resolution (dB/Div) Field Toolbar</h4> <p>Resolution : 10.0000 dB ^ v dB X</p> <h4>Reference Value (dBm)</h4> <p>Select displays the Reference Value (dB) toolbar.</p> <h4>Reference Value (dBm) Field Toolbar</h4> <p>Reference Value : 2.0000 dBm ^ v dBm X</p> <h4>Reference Position (Number)</h4> <p>Select displays the Reference Position toolbar.</p> <h4>Reference Position (Number) Field Toolbar</h4> <p>Reference Position : 5 ^ v Enter X</p> <h4>Additional Common Buttons</h4> <ul style="list-style-type: none"> • “SCALE Menu Common Buttons” on page 22-38
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Figure 22-27. SCALE Power In Menu

22-13 SCALE Menu Common Buttons

The button descriptions below apply to all SCALE menus.

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult the section above for SCALE menu identification and prerequisites.
- [“Scale Menus Appearance, Common Buttons, and Units” on page 22-1](#)

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Scale | SCALE

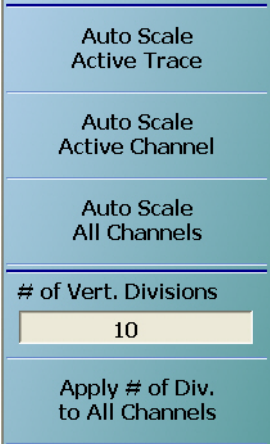
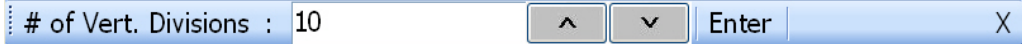
	<p>SCALE Menu Common Buttons</p> <p>These buttons appear on all SCALE menus.</p> <p>Auto Scale Active Trace</p> <p>Select applies the auto scale function to the active trace only and de-selects the Auto Scale Active Channel and Auto Scale Active Channel buttons.</p> <p>Auto Scale Active Channel</p> <p>Select applies the auto scale function to all traces on the active channel only and de-selects the Auto Scale Active Trace and Auto Scale Active Channel buttons.</p> <p>Auto Scale All Channels</p> <p>Select applies the auto scale function to all traces on all channels and de-selects the Auto Scale Active Trace and Auto Scale Active Channel buttons.</p> <p># of Vert. Divisions (Number)</p> <p>Select displays the Number of Vertical Divisions field toolbar.</p> <p># of Vert. Divisions (Number) Field Toolbar</p>  <p>Apply # of Div. to All Channels</p> <p>The Apply Number of Divisions to All Channels button applies the division selection made by the button above to all channels.</p>
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Figure 22-28.SCALE Menu - Common Buttons

Chapter 23 — Marker Menus

23-1 Chapter Overview

This chapter provides information for configuring and controlling the marker functions. The instrument provides up to 13 markers per trace of which 12 can be direct markers and one (1) a reference marker. Each marker can be individually controlled on/off and positioned as required. If the reference marker is off, each marker provides measurement data based on its display position. If the reference marker is on, each marker provides differential measurement data based on its position relative the reference. Other functions for display options and various types of single- and multi-peak search are available.

23-2 Overview of Marker Menus, Dialog Boxes, and Toolbars

The available menus and dialog boxes are:

- “MARKERS [1] Menu” on page 23-4
- “MARKERS [2] Menu” on page 23-6
- “MARKER SETUP Menu” on page 23-7
 - “MARKER TABLE DISPLAY Tableau” on page 23-8
- “MARKER SEARCH Menu” on page 23-9
- “PEAK (Marker) Menu” on page 23-10
- “TARGET (Marker) Menu” on page 23-12
- “MULTI PEAK Marker Search Menu” on page 23-15
- “SEARCH RANGE Marker Menu” on page 23-18
- “BANDWIDTH Marker Search Menu” on page 23-21
- “NOTCH Marker Search Menu” on page 23-22
- “MKR FUNCTIONS Menu” on page 23-23

23-3 Marker Menu Overview

Marker Button Label Changes

The labels for marker buttons 1 through 12 change depending on whether they are on or off and whether the Ref. Mkr function (described below) is on or off.

Marker Unit Changes

The marker units change depending on the selected instrument sweep setting on the SWEEP TYPES menu and settings on the DOMAIN and RANGE menus:

- Frequency Sweep (Linear):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)
- Frequency Sweep (Log):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)
- Segmented Sweep (Frequency-Based):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)
- Segmented Sweep (Index-Based):
 - Marker units set to Index number.
- Power Sweep (CW Frequency):
 - Marker units set to power (dBm)
- Power Sweep (Swept Frequency):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)

Reference Marker OFF or On

If Ref. Mkr is set to OFF, the label is formatted as:

- Mkr # [OFF] if the marker is off (where # is the marker number).
- Mkr # [ON] if the marker is on.
- For example, Marker 1 would be labeled either Mkr #1 [OFF] or Mkr #1 [ON].

If Ref. Mkr. is set to ON, the label is formatted as:

- Mkr#-Ref [OFF] if the marker is off.
- Mkr#-Ref [ON] if the marker is on.
- For example, Marker 1 would be labeled either Mkr#1-Ref [OFF] or Mkr#1-Ref [ON].

Turning Individual Markers Off and On

The MARKERS [1] menu described below is shown with Marker 1 (Mkr 1) through Marker 4 (Mkr 4) turned off. Individual markers can be turned off manually by clicking their buttons.

Turning All Markers On

All markers can be turned on either manually one-by-one (as above) or at the MARKERS [2] menu, by clicking the All Markers On button.

Navigation

- MAIN | Markers | MARKERS | More Markers | MARKERS [2] | All Markers On

Turning All Markers Off

All markers can be turned off either manually one-by-one or at the MARKERS [2] menu, by clicking the All Markers Off button.

Navigation

- MAIN | Markers | MARKERS [1] | More Markers | MARKERS [2] | All Markers Off

Naming Conventions for Marker Buttons and Toolbars

The following conventions are used to label the marker buttons and toolbars in this section.

Marker Buttons

- Mkr # [Ref] [OFF/ON] is used for all button names (where # is the number of the marker).
- For example, Mkr1 [Ref] [OFF/ON] is used for the Marker 1 button when it is labeled Mkr 1 [OFF], Mkr 1 [ON], Mkr1-Ref [OFF], or Mkr1-Ref [ON].

Marker Toolbars

- Mkr # [Ref] [ON] is used for all marker toolbars (where # is the number of the marker).
- For example, Mkr1-[Ref] [ON] is used for the Marker 1 toolbar when it is labeled Mkr 1 [ON] or Mkr1-Ref [ON].
- Note the marker must be on for the toolbar to be available.

23-4 Primary Marker Menus

MARKERS [1] Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | Marker | MARKERS [1]

<p>The screenshot shows the MARKERS [1] menu with the following items:</p> <ul style="list-style-type: none"> Mkr 1 [ON] with a frequency of 70.000 kHz Mkr 2 [ON] with a frequency of 2.100067900 GHz Mkr 3 [ON] with a frequency of 3.150066850 GHz Mkr 4 [ON] with a frequency of 4.200065800 GHz Ref. Mkr [OFF] More Markers ▶ Marker Setup ▶ Marker Search ▶ Marker Functions ▶ 	<h4>Mkr 1 [Ref] [OFF/ON]</h4>
	<p>The Marker 1 Button appearance depends on instrument settings:</p>
	<ul style="list-style-type: none"> • If the label reads Mkr 1 [OFF], Marker 1 is set to off. • If the label reads Mkr 1 [ON], Marker 1 is set to on. • If the label reads Mkr1-Ref [OFF], the Ref. Mkr button (described below) is set to on, and Marker 1 is set to off. • If the label reads Mkr1-Ref [ON], the Ref. Mkr button is set to on, and Marker 1 is set to on. • If the marker button reads Mkr1-Ref1[ON], the Mkr1-Ref [ON] Toolbar is available. Allows input of frequency value and selection of GHz, MHz, kHz, or Hz units.
	<h4>Mkr 2 [Ref] [OFF/ON]</h4>
	<p>Used to control Marker 2.</p>
	<ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4
	<h4>Mkr 3 [Ref] [OFF/ON]</h4>
	<p>Used to control Marker 3.</p>
	<ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4
	<h4>Mkr 4 [Ref] [OFF/ON]</h4>
	<p>Used to control Marker 4.</p>
	<ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4

Figure 23-1. MARKERS [1] Menu (1 of 2)

Ref. Mkr [OFF/ON]

Select toggles the reference marker off and on.

Ref. Mkr ON

If toggled to ON, a user-defined reference value can be entered and:

- The labels for the Mkr 1, Mkr 2, Mkr 3, and Mkr 4 buttons (described above) change to Mkr1-Ref, Mkr2-Ref, Mkr3-Ref, and Mkr4-Ref.
- The labels for Mkr 5 through Mkr 12 on the Markers [2] menu (described below) are changed to Mkr5-Ref through Mkr12-Ref.
- The Ref. Mkr [ON] toolbar appears below the icon toolbar.
- The units in the reference marker toolbar depend on the sweep, domain, and time/distance settings.

Ref. Mkr OFF

If toggled to OFF:

- The labels for the Mkr1-Ref, Mkr2-Ref, Mkr3-Ref, and Mkr4-Ref buttons change to Mkr 1, Mkr 2, Mkr 3, and Mkr 4.
- The labels for Mkr5-Ref through Mkr12-Ref. on the Markers [2] menu change to Mkr 5 through Mkr 12.
- The menu changes automatically from the Markers [1] menu to the Markers [2] menu.

More Markers

Select displays the MARKERS [2] menu and the controls for Marker 5 through Marker 12. The button labels for these markers are the same as Marker 1 through Marker 4.

- [“MARKERS \[2\] Menu” on page 23-6](#)

Markers Setup

Select displays the MARKER SETUP menu.

- [“MARKER SETUP Menu” on page 23-7](#)

Markers Search

Select displays the MARKER SEARCH button.

- [“MARKER SEARCH Menu” on page 23-9](#)

Marker Functions

Select displays the MKR FUNCTIONS menu.

- [“MKR FUNCTIONS Menu” on page 23-23](#)

Figure 23-1. MARKERS [1] Menu (2 of 2)

MARKERS [2] Menu

Previous

- [“MARKERS \[1\] Menu” on page 23-4](#)

Navigation

- MAIN | Marker | MARKERS [1] | More Markers | MARKERS [2]

	<p>All Markers Off Select toggles all 12 regular markers off. If on, Reference Marker is turned off.</p> <p>All Markers On Select toggles all 12 regular markers on. If OFF, the Reference Marker is not turned on. If ON, the Reference Marker is not affected.</p> <p>Mkr 5 [Ref] [OFF/ON] Used to control Marker 5.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4 <p>Mkr 6 [Ref] [OFF/ON] Used to control Marker 6.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4 <p>Mkr 7 [Ref] [OFF/ON] Used to control Marker 7.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4 <p>Mkr 8 [Ref] [OFF/ON] Used to control Marker 8.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4 <p>Mkr 9 [Ref] [OFF/ON] Used to control Marker 9.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4 <p>Mkr 10 [Ref] [OFF/ON] Used to control Marker 10.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4 <p>Mkr 11 [Ref] [OFF/ON] Used to control Marker 11.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4 <p>Mkr 12 [Ref] [OFF/ON] Used to control Marker 12.</p> <ul style="list-style-type: none"> • “Mkr 1 [Ref] [OFF/ON]” on page 23-4
--	--

Figure 23-2. MARKERS [2] Menu

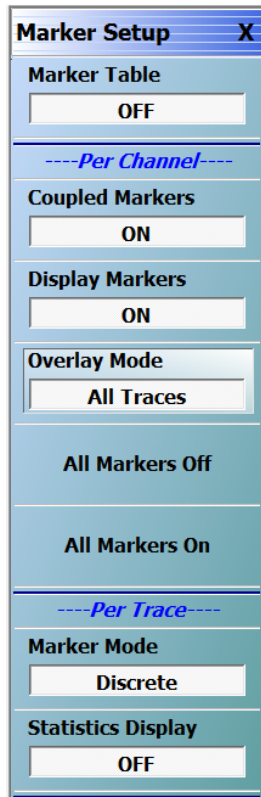
MARKER SETUP Menu

Previous

- “[MARKERS \[1\] Menu](#)” on page 23-4

Navigation

- MAIN | Marker | MARKERS [1] | Marker Setup | MARKER SETUP



Marker Table

Select toggles the marker table off and on. When OFF is selected, the Marker Table display area is not visible. When ON is selected, the display area is shortened, and the marker table appears below the main display.

- “[MARKER TABLE DISPLAY Tableau](#)” on page 23-8

Coupled Markers (Off/On)

Select toggles the marker coupling off and on for a per channel basis.

- In Coupled Markers ON mode, moving a specific marker in one trace display moves the same numbered marker in all other trace displays in that channel.
- In Coupled Markers OFF mode, markers can be moved independently in each trace without affecting the position of other markers in other traces.

Display Markers (Off/On)

Select toggles the markers display off and on. The number and position of displayed markers is not changed when the display is turned back on.

Overlay Mode

Select toggles the overlay mode between Active Trace and All Traces. When Active Trace is selected, only the markers for the active trace are displayed when in overlay trace format. When All Traces is selected, the markers that are turned on for all traces are displayed in overlay trace format.

All Markers Off

Select toggles all markers OFF. If on, the Reference Marker is also turned OFF.

All Markers On

Select toggles all 12 regular markers ON. If OFF, the Reference Marker is not turned on. If ON, the Reference Marker is not affected.

Marker Mode

On a per-trace basis, select toggles between Discrete Marker Mode and Continuous Marker Mode.

- In Discrete Mode, markers can only be moved from measured point to measured point and cannot be set between measured points.
- In Continuous Mode, markers can be moved between measured points. If a non-measured position is selected, the instrument interpolates the measurement value.

Statistics Display

On a per-trace basis, select toggles the statistics display off and on.

Figure 23-3. MARKER SETUP Menu

MARKER TABLE DISPLAY Tableau

Previous

- “MARKER SETUP Menu” on page 23-7

Navigation

- MAIN | Marker | MARKERS [1] | Marker Setup | MARKER SETUP | Marker Table Display

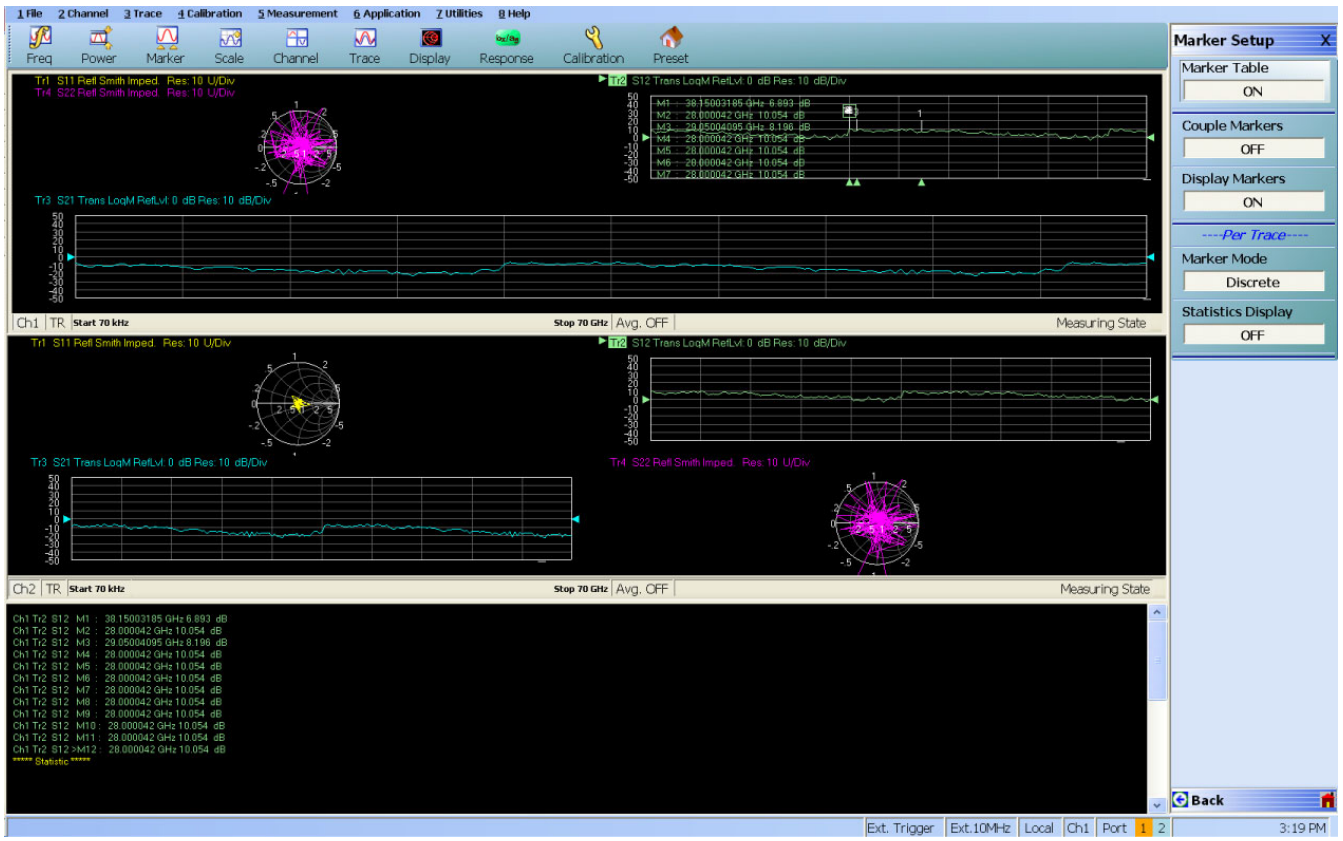


Figure 23-4. MARKER TABLE DISPLAY Tableau

Marker Labels

Marker labels in the Marker Table Display show the response type set for the Trace. For example, if Noise Temperature is selected in the Response Menus, the Marker Table listing starts with “Noise Temperature”.

23-5 Marker Search Menus

MARKER SEARCH Menu

Previous

- [“MARKERS \[1\] Menu” on page 23-4](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH


	<p>MARKER SEARCH Menu Button Selection Group</p> <p>The Max, Min, Peak, and Target buttons form a four (4) button selection group where the selection of any one button de-selects the other three (3) buttons.</p> <p>Max (Marker) Select sets marker search to Maximum values and de-selects Min, Peak, and Target.</p> <p>Min (Marker) Select sets marker search to Minimum values and de-selects Max, Peak, and Target.</p> <p>Peak (Marker) Select sets marker search to Peak values, de-selects Max, Min, and Target, and then displays the PEAK menu.</p> <ul style="list-style-type: none"> • “PEAK (Marker) Menu” on page 23-10 <p>Target (Marker) Select sets marker search to Target values, de-selects Max, Min, and Peak, and then displays the TARGET menu.</p> <ul style="list-style-type: none"> • “TARGET (Marker) Menu” on page 23-12 <p>Tracking (Off/On) (Marker) Select toggles marker tracking off and on.</p> <p>Advanced Search (Marker) Select displays the ADVANCED SEARCH menu.</p> <ul style="list-style-type: none"> • “ADVANCED SEARCH Markers Menu” on page 23-14
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Figure 23-5. MARKER SEARCH Menu

PEAK (Marker) Menu

Previous

- “MARKER SEARCH Menu” on page 23-9

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Peak | PEAK

	<p>PEAK (Marker) Menu Search Button Selection Group The Search Peak, Search Left, and the Search Right buttons form a button selection group where selection of any one button de-selects the other two (2) buttons.</p> <p>Search Peak (Marker Peak) Select moves the active marker to the peak with the highest absolute value that matches the selected Peak Excursion, Threshold, and Polarity values.</p> <p>Search Left (Marker Peak) Select moves the active marker to the target that is nearest on its left to the peak value that matches the selected Peak Excursion, Threshold, and Polarity values.</p> <p>Search Right (Marker Peak) Select moves the active marker to the target that is nearest on its right to the peak value that matches the selected Peak Excursion, Threshold, and Polarity values.</p> <p>Peak Excursion (Marker Peak) Select displays the Peak Excursion field toolbar and allows the user to enter the peak excursion value in dB, dBm, or Units (U) depending on instrument settings.</p> <p>Peak Excursion (dB) Field Toolbar Peak Excursion : 0.0000 dB [^] [v] dB [X]</p> <p>Peak Excursion (dBm) Field Toolbar Peak Excursion : 0.0000 dBm [^] [v] dBm [X]</p> <p>Peak Excursion (Degs) Field Toolbar Peak Excursion : 0.00 ° [^] [v] ° [X]</p> <p>Peak Excursion (Units) Field Toolbar Peak Excursion : 0.000 U [^] [v] nU uU mU U [X]</p>
--	---

Figure 23-6. PEAK (Marker) Menu (1 of 2)

Threshold (Marker Peak)

Select displays the Threshold field toolbar and allows the user to enter the peak threshold value in dB, dBm, Index, or Units (U) depending on instrument settings.

Threshold (dB) Field Toolbar

Threshold : 0.0000 dB [^] [v] [dB] [X]

Threshold (dBm) Field Toolbar

Threshold : 0.0000 dBm [^] [v] [dBm] [X]

Threshold (Index) Field Toolbar

Threshold : 0.000 U [^] [v] [nU] [uU] [mU] [U] [X]

Threshold (Degs) Field Toolbar

Threshold : 0.00 ° [^] [v] [°] [X]

Threshold (Units) Field Toolbar

Threshold : 0.000 U [^] [v] [nU] [uU] [mU] [U] [X]

Peak Polarity Button Selection Group

The Positive, Negative, and Both buttons form a button selection group where the selection of any one button de-selects the other two (2) buttons.

Positive (Marker Peak)

Sets the peak search object polarity to positive.

Negative (Marker Peak)

Sets the peak search object polarity to negative.

Both (Marker Peak)

Sets the peak search object polarity to either positive or negative.

Figure 23-6. PEAK (Marker) Menu (2 of 2)

TARGET (Marker) Menu

Previous

- “MARKER SEARCH Menu” on page 23-9

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Target | TARGET

	<p>TARGET Search Button Selection Group The Search Target, Search Left, and the Search Right buttons form a button selection group where selection of any one button de-selects the other two (2) buttons.</p> <p>Search Target (Marker) Select moves the active marker to the marker that matches the target value and polarity.</p> <p>Search Left (Marker) Select moves the active marker to the marker that is nearest on its left that matches the target value and polarity.</p> <p>Search Right (Marker) Select moves the active marker to the marker that is nearest on its right that matches the target value and polarity.</p> <p>Target Value (Marker) Select displays the Target Value field toolbar and allows the user to enter the target value in dB, dBm, Index, or Units (U) depending on instrument settings.</p> <p>Target Value (dB) Field Toolbar Target Value : 0.0000 dB [^] [v] dB [X]</p> <p>Target Value (dBm) Field Toolbar Target Value : 0.0000 dBm [^] [v] dBm [X]</p> <p>Target Value (Degs) Field Toolbar Target Value : 0.00 ° [^] [v] ° [X]</p> <p>Target Value (Units) Field Toolbar Target Value : 0.000 U [^] [v] nU uU mU U [X]</p>
--	--

Figure 23-7. TARGET (Marker) Menu (1 of 2)

Target Transition Button Selection Group

The Positive, Negative, and Both buttons form a button selection group where the selection of any one button de-selects the other two (2) buttons.

Positive (Marker Target)

Sets the target transition to search for a positive transition.

Negative (Marker Target)

Sets the target transition to search for a negative transition.

Both (Marker Target)

Sets the target transition to search for either a positive or negative transition.

Figure 23-7. TARGET (Marker) Menu (2 of 2)

ADVANCED SEARCH Markers Menu

Previous

- [MARKER SEARCH Menu](#) on page 23-9

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH

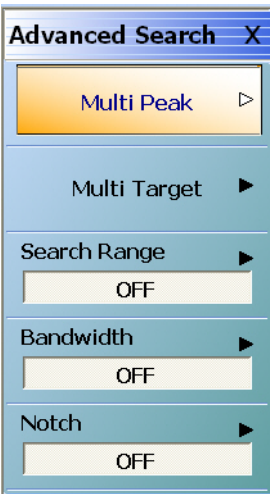
	<p>Multi Peak (Marker) Select displays the Multi Peak (Marker) menu.</p> <ul style="list-style-type: none"> • “MULTI PEAK Marker Search Menu” on page 23-15 <p>Multi Target (Marker) Select displays the Multi Target (Marker) menu.</p> <ul style="list-style-type: none"> • “MULTI TARGET Marker Search Menu” on page 23-17 <p>Search Range (Off/On) (Marker) Select displays the Search Range (Marker) menu.</p> <ul style="list-style-type: none"> • “SEARCH RANGE Marker Menu” on page 23-18 <p>Bandwidth (Marker) Select displays the Bandwidth (Marker) menu.</p> <ul style="list-style-type: none"> • “BANDWIDTH Marker Search Menu” on page 23-21 <p>Notch (Marker) Select displays the Notch (Marker) menu.</p> <ul style="list-style-type: none"> • “NOTCH Marker Search Menu” on page 23-22
--	---

Figure 23-8. ADVANCED SEARCH (Marker) Menu

MULTI PEAK Marker Search Menu

Previous

- “ADVANCED SEARCH Markers Menu” on page 23-14

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Multi Peak | MULTI PEAK

<div style="border: 1px solid black; padding: 5px;"> <p>Multi Peak X</p> <hr/> <p>All Markers Off</p> <hr/> <p>Search Multi Peak</p> <hr/> <p>Peak Excursion 0 dB</p> <hr/> <p>Threshold 0 dB</p> <hr/> <p>---Peak Polarity---</p> <p><input checked="" type="radio"/> Positive</p> <hr/> <p>Negative</p> <hr/> <p>Both</p> </div>	<p>All Markers Off (Multi Peak) Select turns all markers off.</p> <p>Search Multi Peak Select starts the defined multi peak marker search.</p> <p>Peak Excursion (Multi Peak) Select displays the Peak Excursion (Multi Peak) toolbar and allows entry of the peak excursion value in dB, dBm, Index, or Units (U) depending on instrument settings.</p> <p>Peak Excursion (dB) (Multi Peak) Field Toolbar Peak Excursion : 0.0000 dB ^ v dB X</p> <p>Peak Excursion (dBm) (Multi Peak) Field Toolbar Peak Excursion : 0.0000 dBm ^ v dBm X</p> <p>Peak Excursion (Degs) (Multi Peak) Field Toolbar Peak Excursion : 0.000 U ^ v nU uU mU U X</p> <p>Peak Excursion (Index) (Multi Peak) Field Toolbar Peak Excursion : 0.000 U ^ v nU uU mU U X</p> <p>Peak Excursion (Units) (Multi Peak) Field Toolbar Peak Excursion : 0.000 U ^ v nU uU mU U X</p> <p>Threshold (Multi Peak) Select displays the Threshold field toolbar and allows the user to enter the peak excursion value in dB, dBm, Degrees, Index, or Units (U) depending on instrument settings.</p> <p>Threshold (dB) (Multi Peak) Field Toolbar Threshold : 0.0000 dB ^ v dB X</p> <p>Threshold (dBm) (Multi Peak) Field Toolbar Threshold : 0.0000 dBm ^ v dBm X</p> <p>Threshold (Degs) (Multi Peak) Field Toolbar Threshold : 0.00 ° ^ v ° X</p> <p>Threshold (Index) (Multi Peak) Field Toolbar Threshold : 0.000 U ^ v nU uU mU U X</p> <p>Threshold (Units) (Multi Peak) Field Toolbar Threshold : 0.000 U ^ v nU uU mU U X</p>
---	---

Figure 23-9. MULTI PEAK (Marker) Menu (1 of 2)

Multi Peak Polarity Button Selection Group

The Positive, Negative, and Both buttons form a button selection group where the selection of any one button de-selects the other two (2) buttons.

Positive Polarity (Multi Peak)

Sets the peak search object polarity to positive.

Negative Polarity (Multi Peak)

Sets the peak search object polarity to negative.

Both Polarity (Multi Peak)

Sets the peak search object polarity to either positive or negative.

Figure 23-9. MULTI PEAK (Marker) Menu (2 of 2)

MULTI TARGET Marker Search Menu

Previous

- “ADVANCED SEARCH Markers Menu” on page 23-14

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Multi Target | MULTI TARGET

<div style="border: 1px solid black; padding: 5px;"> <p>Multi Target X</p> <p>All Markers Off</p> <p>Search Multi Target</p> <p>Target Value 0 dB</p> <p>--Target Transition--</p> <p>Positive</p> <p>Negative</p> <p><input checked="" type="radio"/> Both</p> </div>	<p>All Markers Off (Multi Target) Select turns all markers off.</p> <p>Search Multi Target (Multi Target) Select starts the defined multi peak marker search with search units in dB, dBm, Degrees, or Units depending on the instrument settings.</p> <p>Target Value (dB) Field Toolbar Target Value : 0.0000 dB [up] [down] dB X</p> <p>Target Value (dBm) Field Toolbar Target Value : 0.0000 dBm [up] [down] dBm X</p> <p>Target Value (Degs) Field Toolbar Target Value : 0.00 ° [up] [down] ° X</p> <p>Target Value (Units) Field Toolbar Target Value : 0.000 U [up] [down] nU uU mU U X</p> <p>Multi Target Transition Button Selection Group The Positive, Negative, and Both buttons form a button selection group where the selection of any one button de-selects the other two (2) buttons.</p> <p>Positive (Multi Target) Sets the target transition to search for a positive transition.</p> <p>Negative (Multi Target) Sets the target transition to search for a negative transition.</p> <p>Both (Multi Target) Sets the target transition to search for either a positive or negative transition.</p>
---	---

Figure 23-10. MULTI TARGET (Marker) Menu

SEARCH RANGE Marker Menu

Previous

- [“ADVANCED SEARCH Markers Menu” on page 23-14](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Search Range | SEARCH RANGE


	<p>Search Range (Marker) (Off/On)</p> <p>Select toggles the search range off and on.</p> <p>Marker Search Range Units</p> <p>The marker search range units can vary depending on the settings in the SWEEP TYPES menu and in the DOMAIN menu. The button descriptions below and their related field toolbars reflect a marker units setting of frequency in Hertz. Alternatively, marker units can be:</p> <ul style="list-style-type: none"> • dBm • Distance (km to um) • Frequency (GHz to Hz) • Number (Index Number) • Time (s to ps)
--	---

Figure 23-11. SEARCH RANGE (Marker) Menu (1 of 3)

Start Range Buttons and Field Toolbars

Only one of the following Start Range button/toolbar pairs appears depending on the instrument settings.

Start Range (dBm) (Marker)

Select displays the Start Range (dBm) field toolbar and allows entry of a starting search point in units of dBm.

Start Range (dBm) Field Toolbar



Start Range (Distance) (Marker)

Select displays the Start Range (Distance) field toolbar and allows entry of a starting search point in Distance units.

Start Range (Distance) Field Toolbar



Start Range (Frequency) (Marker)

Select displays the Start Range (Frequency) field toolbar and allows entry of a starting search point units of Hertz.

Start Range (Frequency) Field Toolbar



Start Range (Number) (Marker)

Select displays the Start Range (Number) field toolbar and allows entry of a starting search point of Index Number.

Start Range (Number) Field Toolbar



Start Range (Time) (Marker)

Select displays the Start Range (Time) field toolbar and allows entry of a starting search point in units of Time.

Start Range (Time) Field Toolbar



Figure 23-11. SEARCH RANGE (Marker) Menu (2 of 3)

Stop Range Buttons and Field Toolbars

Only one of the following Stop Range button/toolbar pairs appears depending on the instrument settings.

Stop Range (dBm) (Marker)

Select displays the Stop Range (dBm) field toolbar and allows entry of a stop search point in units of dBm.

Stop Range (dBm) Field Toolbar**Stop Range (Distance) (Marker)**

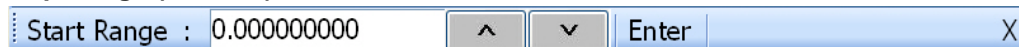
Select displays the Stop Range (Distance) field toolbar and allows entry of a stop search point units of Distance.

Stop Range (Distance) Field Toolbar**Stop Range (Frequency) (Marker)**

Select displays the Stop Range (Frequency) field toolbar and allows entry of stop search point in units of Hertz.

Stop Range (Frequency) Field Toolbar**Stop Range (Number) (Marker)**

Select displays the Stop Range (Number) field toolbar and allows entry of a stop search point as an Index Number.

Stop Range (Number) Field Toolbar**Stop Range (Time) (Marker)**

Select displays the Stop Range (Time) field toolbar and allows entry of a stop search point in units of Time.

Stop Range (Time) Field Toolbar**Apply to All Traces? (No/Yes) (Marker)**

Select toggles the Apply to All Traces between off and on.

- If on, the search range set above is applied to all traces in the active channel.
- If off, the search range only applies to the active trace in the active channel.

Figure 23-11. SEARCH RANGE (Marker) Menu (3 of 3)

BANDWIDTH Marker Search Menu

Previous

- “ADVANCED SEARCH Markers Menu” on page 23-14

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Bandwidth | BANDWIDTH

<div style="border: 1px solid black; padding: 5px;"> <p>Bandwidth X</p> <p>Bandwidth OFF</p> <p>Bandwidth Loss Value 0 dB</p> <p>---Shape Factor---</p> <p>Include In Search? NO</p> <p>High(Rel. To Loss) 0 dB</p> <p>Low(Rel. To Loss) 0 dB</p> </div>	<p>Bandwidth (Off/On) (Marker) Select toggles the bandwidth marker search off and on.</p> <p>Bandwidth Loss Value (Marker) Select displays the Bandwidth Loss Value field toolbar and allows entry of a loss value in dB (shown below), dBm, or Units (U).</p> <p>Bandwidth Loss Value (dB) Field Toolbar Bandwidth Loss Value : 0.0000 dB [^] [v] dB [X]</p> <p>Include in Search? (Yes/No) (Marker) Select toggles whether the shape factor will be included in the marker search (Yes) or not included in the search (No).</p> <p>High (Rel. To Loss) (dB) (Marker) Select displays the High (Relative to Loss) field toolbar and allows entry of a high loss value in dB. Depending on instrument settings, this search function can be in units of dB, dBm (not shown), or Units.</p> <p>High (Rel. To Loss) (dB) Field Toolbar High(Rel. To Loss) : 20.0000 dB [^] [v] dB [X]</p> <p>High (Rel. To Loss) (Degs) Field Toolbar High(Rel. To Loss) : 0.00 ° [^] [v] ° [X]</p> <p>High (Rel. To Loss) (Units) Field Toolbar High(Rel. To Loss) : 10.000 U [^] [v] nU uU mU [v]</p> <p>Low (Rel. To Loss) (dB) (Marker) Select displays the Low (Relative to Loss) field toolbar and allows entry of a low loss value in dB. Depending on instrument settings, this search function can be in units of dB, dBm (not shown), or Units.</p> <p>Low (Rel. To Loss) (dB) Field Toolbar Low(Rel. To Loss) : 30.0000 dB [^] [v] dB [X]</p> <p>Low (Rel. To Loss) (Degs) Field Toolbar Low(Rel. To Loss) : 0.00 ° [^] [v] ° [X]</p> <p>Low (Rel. To Loss) (Units) Field Toolbar Low(Rel. To Loss) : 0.000 U [^] [v] nU uU mU U [v]</p>
---	---

Figure 23-12. BANDWIDTH (Marker) Menu

NOTCH Marker Search Menu

Previous

- [“ADVANCED SEARCH Markers Menu” on page 23-14](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Notch | NOTCH

	<p>Notch (Off/On) (Marker) Select toggles the bandwidth marker search off and on.</p> <p>Notch Loss Value (Marker) Select displays the Notch Loss Value field toolbar and allows entry of a loss value in dB, Degrees, or Units.</p> <p>Notch Loss Value (dB) Field Toolbar Notch Loss Value : 0.0000 dB [^] [v] dB [X]</p> <p>Notch Loss Value (Degs) Field Toolbar Notch Loss Value : 0.00 ° [^] [v] ° [X]</p> <p>Notch Loss Value (Units) Field Toolbar Notch Loss Value : 0.000 U [^] [v] nU uU mU U [X]</p> <p>Include in Search (No/Yes) (Marker) Select toggles whether the notch factor is or is not included in the search.</p> <p>High (Rel. To Loss) (dB) (Marker) Select displays the High (Relative to Loss) (Notch) field toolbar and allows entry of a high loss value in dB, dBm (not shown), Degrees, or Units.</p> <p>High (Rel. To Loss) (dB) Field Toolbar High(Rel. To Loss) : 20.0000 dB [^] [v] dB [X]</p> <p>High (Rel. To Loss) (Degs) Field Toolbar High(Rel. To Loss) : 0.00 ° [^] [v] ° [X]</p> <p>High (Rel. To Loss) (Units) Field Toolbar High(Rel. To Loss) : 10.000 U [^] [v] nU uU mU [X]</p> <p>Low (Rel. To Loss) (dB) (Marker) Select displays the Low (Relative to Loss) (Notch) field toolbar and allows entry of a high loss value in dB, dBm (not shown), Degrees, or Units.</p> <p>Low (Rel. To Loss) (dB) Field Toolbar Low(Rel. To Loss) : 10.0000 dB [^] [v] dB [X]</p> <p>Low (Rel. To Loss) (Degs) Field Toolbar Low(Rel. To Loss) : 0.00 ° [^] [v] ° [X]</p> <p>Low (Rel. To Loss) (Units) Field Toolbar Low(Rel. To Loss) : 0.000 U [^] [v] nU uU mU U [X]</p>
--	---

Figure 23-13. NOTCH (Marker) Menu

23-6 Marker Value/Math Functions

MKR FUNCTIONS Menu

Full Name

- MARKER FUNCTIONS Menu

Previous

- [“MARKERS \[1\] Menu” on page 23-4](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Functions | MKR FUNCTIONS

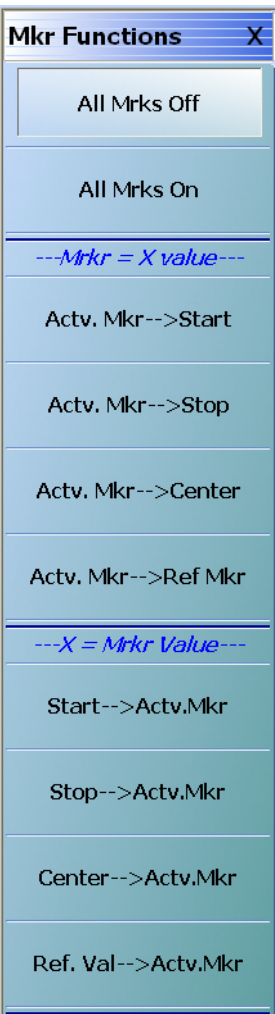
 <p>The screenshot shows a vertical menu titled "Mkr Functions" with a close button (X). The menu items are: "All Mrks Off", "All Mrks On", a separator line with "<i>---Mkr = X value---</i>", "Actv. Mkr-->Start", "Actv. Mkr-->Stop", "Actv. Mkr-->Center", "Actv. Mkr-->Ref Mkr", another separator line with "<i>---X = Mkr Value---</i>", "Start-->Actv.Mkr", "Stop-->Actv.Mkr", "Center-->Actv.Mkr", and "Ref. Val-->Actv.Mkr".</p>	<p>All Markers Off/On Button Selection Group The All Markers Off and All Markers On buttons form a two (2) button selection group where the selection of one button de-selects the other button.</p> <p>All Markers Off On a per-channel basis, if the All Markers Off button is selected, all markers (Marker 1 through Marker 12) are turned off including the Reference Marker (Ref. Mkr [OFF]).</p> <p>All Markers On On a per-channel basis, if the All Markers On button is selected, all markers (Marker 1 through Marker 12) are turned on. If off, the Reference Marker (Ref. Mkr [OFF]) is left off. If on, Ref. Mkr [ON]) is left on.</p> <p>Marker = X Value Area The buttons in this area set the value of the currently selected marker to that of the specified start, stop, center, or reference marker.</p> <p>Actv. Mkr-->Start Sets the value of the active marker on the active trace to that of the start range. If All Markers Off is set, the button is unavailable.</p> <p>Actv. Mkr-->Stop Sets the value of the active marker on the active trace to that of the stop range. If All Markers Off is set, the button is unavailable.</p> <p>Actv. Mkr-->Center Sets the value of the active marker on the active trace to that of the center range. If All Markers Off is set, the button is unavailable.</p> <p>Actv. Mkr-->Ref. Mkr Sets the value of the active marker on the active trace to that of the Reference Marker. If All Markers Off is set, the button is unavailable.</p>
--	--

Figure 23-14. MKR FUNCTIONS (MARKER FUNCTIONS) Menu (1 of 2)

X Value Area = Mkr Value

The buttons in this area set the value of the currently specified start, stop, center, or reference marker to the selected marker.

Start-->Actv. Mkr

Sets the value of the start frequency to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.

Stop-->Actv. Mkr

Sets the value of the stop frequency to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.

Center-->Actv. Mkr

Sets the value of the center frequency to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.

Ref. Val-->Actv. Mkr

Sets the value of the reference line to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.

Figure 23-14. MKR FUNCTIONS (MARKER FUNCTIONS) Menu (2 of 2)

Chapter 24 — System Menus

24-1 Chapter Overview

This chapter provides information for various system and instrument management and configuration functions including initial setup, power-on options, preset options, remote interface management, network interface, self-test, and diagnostics.

24-2 System Menus and Dialog Boxes

- “SYSTEM Menu” on page 24-2
- “SETUP Menu” on page 24-4
- “PRESET SETUP Menu” on page 24-6
 - “SELECT PRESET SETUP Dialog Box” on page 24-8
- “POWER-ON SETUP Menu” on page 24-9
 - “SELECT USER SETUP FILE (CHA) Dialog Box” on page 24-11
 - “DATE AND TIME PROPERTIES Dialog Box” on page 24-12
 - “COLOR SETUP Dialog Box” on page 24-13
 - “COLOR Picker Dialog Box” on page 24-14
- “MAX. POINTS Menu” on page 24-15
- “MISC. SETUP Menu” on page 24-16
 - “MANAGE OPTIONS Dialog Box” on page 24-20
 - “INSTRUMENT SETTINGS Dialog Box” on page 24-21
 - “OPTION STATUS Dialog Box” on page 24-22
- “SNP FILES SETUP Menu - 2-Port VNAs” on page 24-23
 - “SNP SETUP Dialog Box - 4-Port VNAs” on page 24-25
- “UTILITY Menu” on page 24-27
 - “HAMPSHIRE TSHARC (TOUCHSCREEN) CONTROL PANEL Dialog Box” on page 24-33
- “AUTOCAL CHARAC. Menu” on page 24-29
 - “OPEN (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box” on page 24-31
 - “SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box” on page 24-32
- “REMOTE INTER. Menu” on page 24-36
 - “MULTIPOINT TEST SET CONFIGURATION Dialog Box - 4-Port VNAs” on page 24-38
- “REMOTE LANG. Menu” on page 24-40
- “EXT. SRC ADDR. Menu” on page 24-41
- “NETWORK INTERF. Menu” on page 24-43
 - “NETWORK CONNECTIONS Dialog Box” on page 24-45
 - “SELF TEST Dialog Box” on page 24-46
 - “EVENT VIEWER Dialog Box” on page 24-47
- “REAR PANEL OUT. Menu” on page 24-48
 - “EDIT REAR PANEL OUTPUT MODE Dialog Box” on page 24-50
 - “DIAGNOSTICS ACCESS Dialog Box” on page 24-52

24-3 System Menus

SYSTEM Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | System | SYSTEM

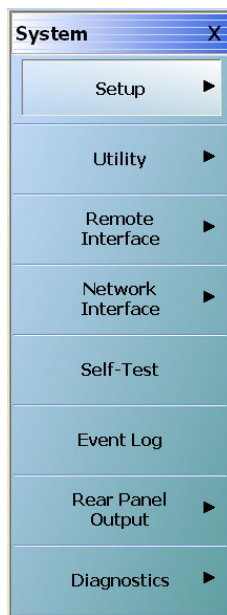


Figure 24-1. SYSTEM Menu

Setup

Select displays the SETUP menu.

- [“SETUP Menu” on page 24-4](#)

Utility

Select displays the UTILITY menu.

- [“UTILITY Menu” on page 24-27](#)

Remote Interface

Select displays the REMOTE INTERFACE menu where GPIB addresses for remote instruments are assigned.

- [“REMOTE INTER. Menu” on page 24-36](#)

Network Interface

Select displays the NETWORK INTERFACE menu.

- [“NETWORK INTERF. Menu” on page 24-43](#)

Self-Test

Select displays the SELF TEST dialog box.

- [“SELF TEST Dialog Box” on page 24-46](#)

Event Log

Select displays the EVENT VIEWER dialog box.

- [“EVENT VIEWER Dialog Box” on page 24-47](#)

Rear Panel Output

Select displays the REAR PANEL OUTPUT menu.

- [“REAR PANEL OUT. Menu” on page 24-48](#)

Diagnostics

Select displays the DIAGNOSTICS ACCESS dialog box.

- [“DIAGNOSTICS ACCESS Dialog Box” on page 24-52](#)

24-4 Setup Menus

SETUP Menu

Previous

- [“SYSTEM Menu” on page 24-2](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP



Figure 24-2. SETUP Menu

Preset Setup

Select displays the PRESET SETUP menu.

- [“PRESET SETUP Menu” on page 24-6](#)

Power On Setup

Select displays the POWER-ON SETUP menu.

- [“POWER-ON SETUP Menu” on page 24-9](#)

Clock Setup

Displays the DATA AND TIME PROPERTIES dialog box.

- [“DATE AND TIME PROPERTIES Dialog Box” on page 24-12](#)

Invert Color

Select toggles the main display from the system default off and on. From the default state, the first click inverts background color from black to white. A second click changes the background to the factory default setting of black background.

Colors Setup

Select displays the COLOR SETUP dialog box used to change the display colors.

- [“COLOR SETUP Dialog Box” on page 24-13](#)

Reset Colors

Select displays the RESET Colors dialog box to confirm the reset. Click **Cancel** leave the colors as is. Click **OK** to reset the all colors to the factory default setting.

Max Points Setup

Select display the MAX POINTS menu.

- [“MAX. POINTS Menu” on page 24-15](#)

Misc. Setup

The MISC. SETUP menu varies depending on whether the VNA is in 2-Port or 4-Port Mode. Select displays the MISC SETUP menu.

- [“MISC. SETUP Menu” on page 24-16](#)

24-5 Preset Menus and Dialog Boxes

PRESET SETUP Menu

Use the PRESET SETUP menu to define which previously saved preset configuration file will be applied to the instrument.

PRESET SETUP Menu Button Selection Group

The Default, Default 0, and Saved Setup buttons form a three-button selection group where selecting one button deselects the other two buttons.

Previous

- [“SETUP Menu” on page 24-4](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Preset Setup | PRESET SETUP

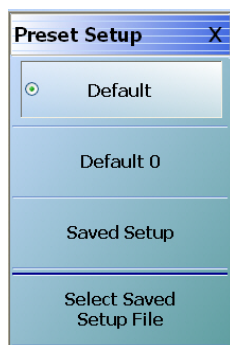


Figure 24-3. PRESET SETUP Menu

Preset Actions

The selected Default or Saved Setup presets (described below) are invoked by any of the following:

- **Preset Key**
- MENU BAR | Utilities | Preset

Default

If selected, Default selection loads the factory as-shipped preset configuration which is one channel with four traces displayed on a two-row and two-column trace display. This preset option is always available. Once this option is selected, if the user presses the front panel **Preset Key** or selects MENU BAR | Utilities | Preset, the instrument returns to the factory as-shipped configuration.

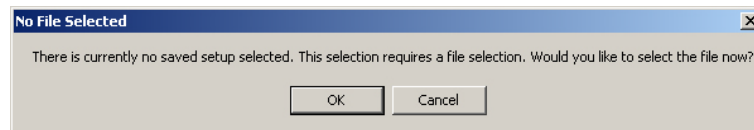
Default 0

The Default 0 button operates identical to the Default button (above) with the addition removing any Cal Kits and/or Characterization Coefficient files from instrument memory. Once used, all connector coefficients are then returned to the factory as-shipped default values. Note that any Cal Kit and/or Characterization Coefficient files resident on the instrument hard drive are not deleted and remain in place. If this command is used, the user must re-load into memory all required Cal Kit and other Characterization Coefficient files.

Saved Setup

If selected, the **Saved Setup** selection loads the setup file selected in the dialog box below. Once selected, if either of the preset actions (described above) occur, the preset file returns the instrument to the user-defined configuration.

If the **Saved Setup** button is clicked when no prior **Setup File** has been saved, a **NO FILE SELECTED** dialog box appears with the message: “There is currently no saved setup selected. This selection requires a file selection. Would you like to select the file now?”



- Click **OK** to open the **SELECT PRESET SETUP** dialog box described below.
- Click **CANCEL** to close the dialog box.

Select Saved Setup File

Select displays the **SELECT PRESET SETUP** dialog box where a previously saved setup configuration file is be selected. Once a file is selected, the **Saved Setup** button must be selected to implement the configuration from the:

- **Preset Key**
- **MENU BAR | Utilities | Preset**
- [“SELECT PRESET SETUP Dialog Box” on page 24-8](#)

SELECT PRESET SETUP Dialog Box

Previous

- “PRESET SETUP Menu” on page 24-6

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Preset Setup | PRESET SETUP | Saved Setup | SELECT PRESET SETUP Dialog Box

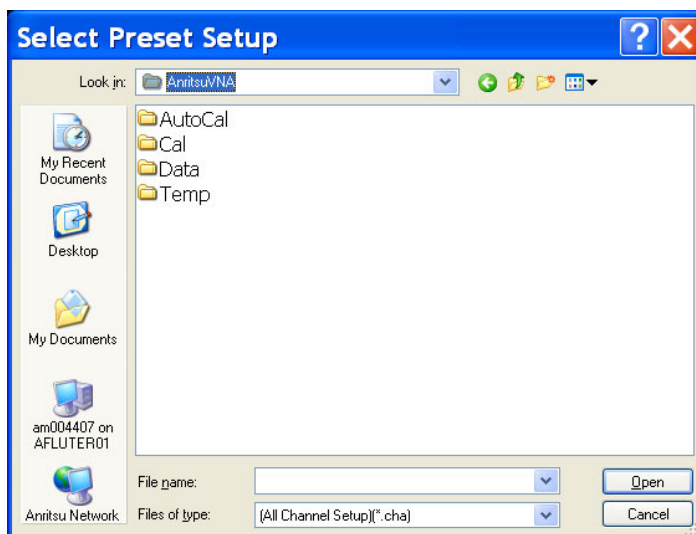


Figure 24-4. SELECT PRESET SETUP Dialog Box

Allows the user to select a previously saved All Channel Setup CHA file. Navigate to the saved CHA file, select it, and then click Open to use the file. Click Cancel to cancel the operation.

POWER-ON SETUP Menu

The POWER-ON SETUP menu defines in which configuration the instrument will restore to after a cold start and full power-up. In order to use the **Saved Setup** option, a previously stored power-up setup file must have been saved using the menu bar **Save Setup** command.

Menu Bar

- MENU BAR | File Drop-Down Menu

Previous

- [“SETUP Menu” on page 24-4](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Power-On Setup | POWER-ON SETUP

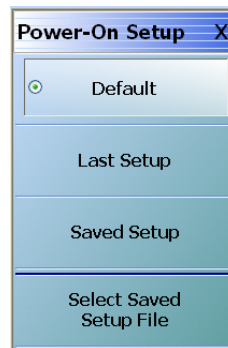


Figure 24-5. POWER-ON SETUP Menu

POWER-ON SETUP Menu Button Selection Group

The **Default**, **Last Setup**, and **Select Saved Setup File** buttons form a button selection group where only one (1) of the three buttons may be selected. Once selected, the power-on setting remains until changed.

Default

Select sets the factory default as-shipped power-on setup settings. This setting is always available.

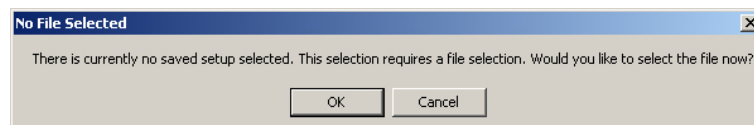
Last Setup

For many users in general purpose work, this setting is the user-selected default. Select sets the power-on setup to be from the last operational state including frequencies, channels, traces, markers, and limit lines.

Saved Setup

Select sets the power-on settings to a previously saved user-defined setup file, useful for repeated identical settings in a line production mode. Using the button described below, a previously-saved setting file can be recalled and will remain active until changed. The system can store multiple setup files but only one can be active at any time.

If the **Saved Setup** button is clicked when no prior Setup File has been saved, a **NO FILE SELECTED** dialog box appears with the message: “There is currently no saved setup selected. This selection requires a file selection. Would you like to select the file now?”



- Click OK to open the **SELECT USER SETUP FILE (CHA FILE)** dialog box described below.

- Click CANCEL to close the dialog box.

Select Saved Setup File

Use this button to display a dialog to recall a previously saved setup file. Once recalled, the file settings can be implemented by selecting the Saved Setup button above. Select displays the SELECT USER SETUP FILE dialog box.

- [“SELECT USER SETUP FILE \(CHA\) Dialog Box” on page 24-11](#)

SELECT USER SETUP FILE (CHA) Dialog Box

Use the SELECT USER SETUP FILE dialog to select a previously saved power-on setup file for use on the POWER-ON SETUP menu.

Previous

- [“POWER-ON SETUP Menu” on page 24-9](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Power-On Setup | POWER-ON SETUP | Saved Setup | SELECT USER SETUP FILE (CHA) Dialog Box

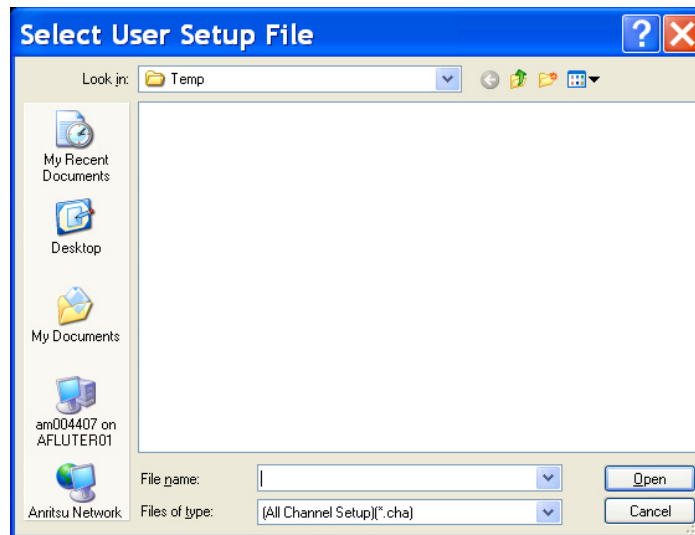


Figure 24-6. SELECT USER SETUP FILE (CHA) Dialog Box

Instructions

Use this dialog to select a previously stored power-on setup configuration file.

1. Navigate to the POWER-ON SETUP menu.
 - MAIN | System | SYSTEM | Setup | SETUP | Power-On Setup | POWER-ON SETUP | Select Saved Setup File
2. The Select User Setup File dialog box appears.
3. Navigate to the required folder and locate the required All Channel Setup (.CHA) file.
 - Best practices recommend the C:\AnritsuVNA folder.
4. Once the appropriate file is selected, click Open.
5. The selected power-on setup file is now available for use on the POWER-ON SETUP menu if the Saved Setup button is selected.
 - [“POWER-ON SETUP Menu” on page 24-9](#)

24-6 Time and Color Setup Dialog Boxes

DATE AND TIME PROPERTIES Dialog Box

Previous

- “SETUP Menu” on page 24-4

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Clock Setup | DATE AND TIME PROPERTIES Dialog Box

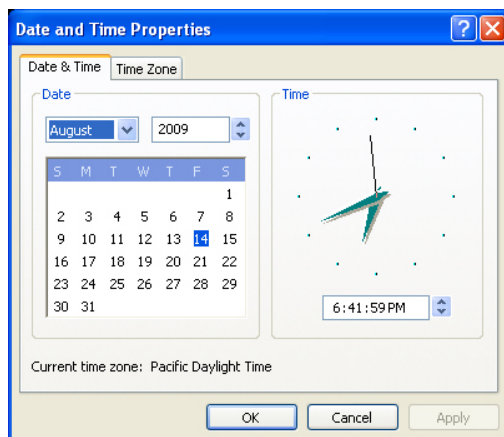


Figure 24-7. DATE AND TIME PROPERTIES Dialog Box

Instructions

Click OK to close the box. Click Cancel to close without changes. Click Apply to apply changes and leave box.

COLOR SETUP Dialog Box

Previous

- “SETUP Menu” on page 24-4

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Color Setup | COLOR SETUP Dialog Box

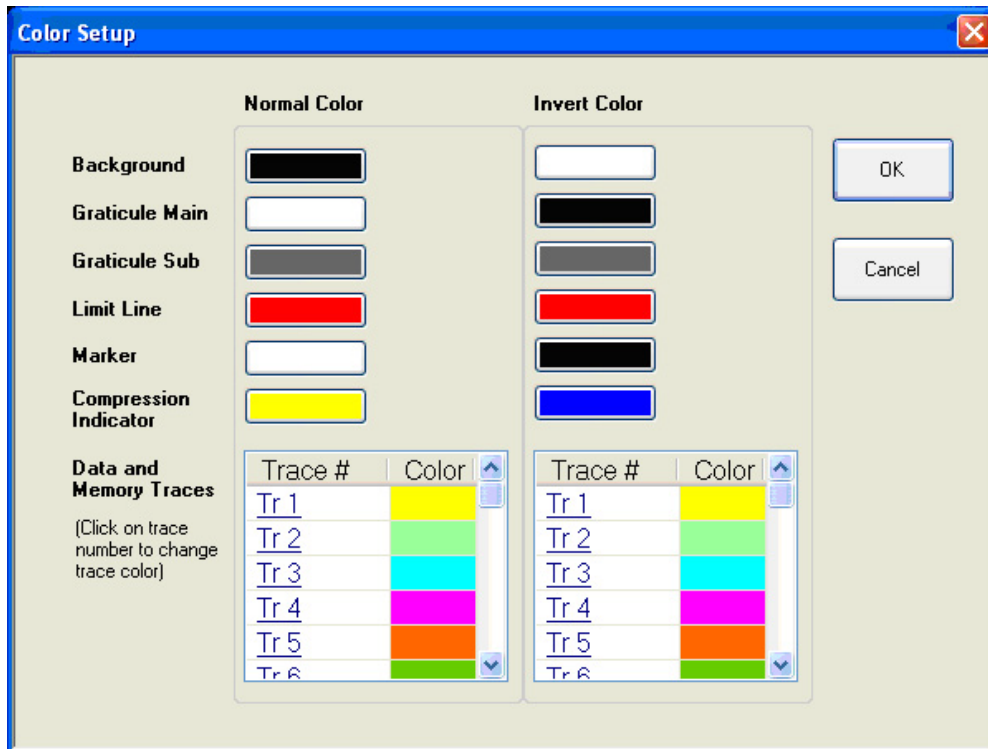


Figure 24-8. COLOR SETUP Dialog Box

Modifying Default Colors

Use the Color Setup dialog box to assign colors in:

- Normal Mode for Background, Graticule Main, Graticule Sub, Limit Lines, and each trace.
- Invert Color Mode for the same elements.

Color Setup

To change Background, Graticule Main, Graticule Sub, and Limit Line colors, click on the color block to display the Color Pallet dialog box. To change the trace color, click on the trace number such as Tr1. To save a color assignment, click OK or click Cancel to exit.

COLOR Picker Dialog Box

Previous

- “COLOR SETUP Dialog Box” on page 24-13

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Color Setup | COLOR SETUP Dialog Box | Color Block | COLOR Picker Dialog Box

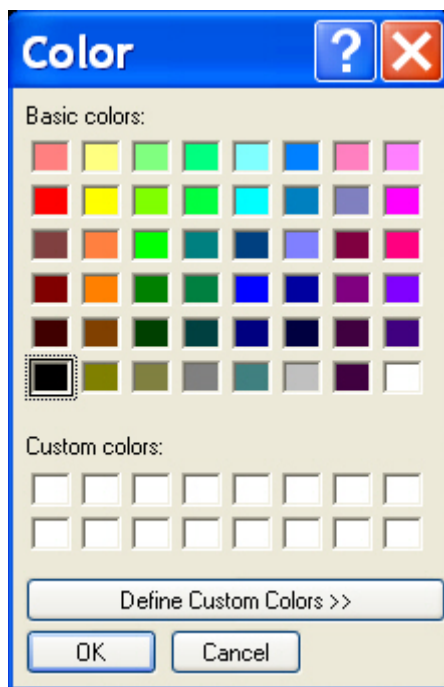


Figure 24-9. COLOR PALLET Dialog Box

Color Reset

To reset all colors to the factory-default setting, click the Reset Colors button.

- MAIN | System | SYSTEM | Setup | SETUP | Reset Colors

24-7 Maximum Points and Options Control Menus

MAX. POINTS Menu

Full Name

- MAXIMUM POINTS Menu

Previous

- [“SETUP Menu” on page 24-4](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Max Points Setup | MAX POINTS

MAX. POINTS Menu Button Selection Group

- The two buttons of the MAX POINTS menu form a button selection group where the selection of one button de-selects the other button.
- Note that if the Maximum Points setting is changed, the instrument requires a complete re-start to implement the change.

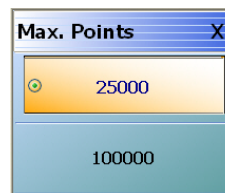


Figure 24-10. MAX. POINTS (MAXIMUM POINTS) Menu

25000

Select de-selects the 100000 (100,000) points button, and sets the instrument to:

- 25,000 maximum system measurement points
- Up to a maximum of 16 channels
- Up to a maximum of 16 traces per channel.

Once selected, the system displays a **Context Switch Message** dialog box and requires a complete instrument re-start to implement the change.

- Click to **Yes** to proceed and restart the instrument
- Click **No** to abandon the change

100000

Select de-selects the 25000 (25,000) points button, and sets the instrument to:

- 100,000 maximum system measurement points
- Provides only one (1) channel
- The channel can have up to a maximum of 16 traces

Once selected, the system displays a **Context Switch Message** dialog box and requires a complete instrument re-start to implement the change.

- Click to **Yes** to proceed and restart the instrument.
- Click **No** to abandon the change.

MISC. SETUP Menu

Full Name

- MISCELLANEOUS SETUP Menu

Prerequisites and Menu Variants

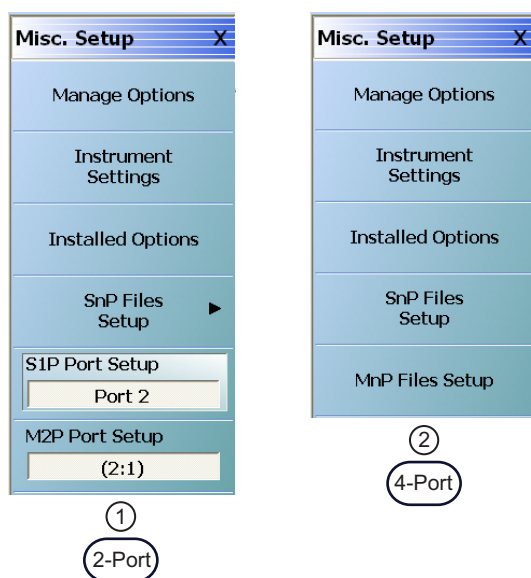
- If the VNA is in 2-Port Mode, the MISC. SETUP menu has eight (8) buttons.
- If the VNA is in 4-Port Mode, the MISC. SETUP menu has seven (7) buttons.

Previous

- [“SETUP Menu” on page 24-4](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP



1. MISC. SETUP Menu – 2-Port VNA Mode

2. MISC. SETUP Menu – 4-Port VNA Mode

Figure 24-11. MISC. SETUP (MISCELLANEOUS SETUP) Menu

Manage Options

Available in 2-Port and 4-Port VNAs. For Anritsu Customer Service personnel. Provides access to option management menus. A password is required to enter the dialog box. Select displays the MANAGE OPTIONS dialog box.

- [“MANAGE OPTIONS Dialog Box” on page 24-20](#)

Instrument Settings

Available in 2-Port and 4-Port VNAs. For Anritsu Customer Service personnel. Provides access to the internal instrument setting menus. A password is required to enter the dialog box. Select displays the INSTRUMENTS SETTINGS dialog box.

- [“INSTRUMENT SETTINGS Dialog Box” on page 24-21](#)

Installed Options

Available in 2-Port and 4-Port VNAs. Select displays the OPTION STATUS dialog box which is a read-only listing of all installed, included, and not installed options.

- [“OPTION STATUS Dialog Box” on page 24-22](#)

SnP Files Setup

Available in 2-Port and 4-Port VNAs. The linked-to destination varies depending on the 2-Port/4-Port Mode.

- If the VNA is in 2-Port Mode, select displays the SNP FILES SETUP Menu where the frequency units and output format of the SnP files is set.
 - [“SNP FILES SETUP Menu - 2-Port VNAs” on page 24-23](#)
- If the VNA is in 4-Port Mode, select displays the SNP FILES SETUP Dialog Box where the frequency units and output format of the SnP files is set.
 - [“SNP SETUP Dialog Box - 4-Port VNAs” on page 24-25](#)

S1P Port Setup

Available in 2-Port VNAs. Select toggles the S1P port between Port 1 and Port 2.

M2P Port Setup

Available in 2-Port VNAs. Select toggles the M2P port between 1:2 and 2:1.

MnP Files Setup

Available in 4-Port VNAs. Select displays the MXP SETUP dialog box. The dialog box allows mixed-mode DUT configuration as:

- M4P DUT with two differential pairs and no singletons
- M4P DUT with one differential pair and two singletons
- M3P DUT with one differential pair and one singleton
- M2P DUT with one differential pair and no singletons

Each configuration allows any VNA port to be assigned to any DUT port.

- [“MXP SETUP Dialog Box - 4-Port VNAs” on page 24-18](#)

MXP SETUP Dialog Box - 4-Port VNAs

Full Name

- MIXED-MODE DUT SETUP Dialog Box - 4-Port VNAs

Prerequisites

- VNA is in 4-Port Mode

Previous

- [“MISC. SETUP Menu” on page 24-16](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | MnP Files Setup | MXP SETUP Dialog Box

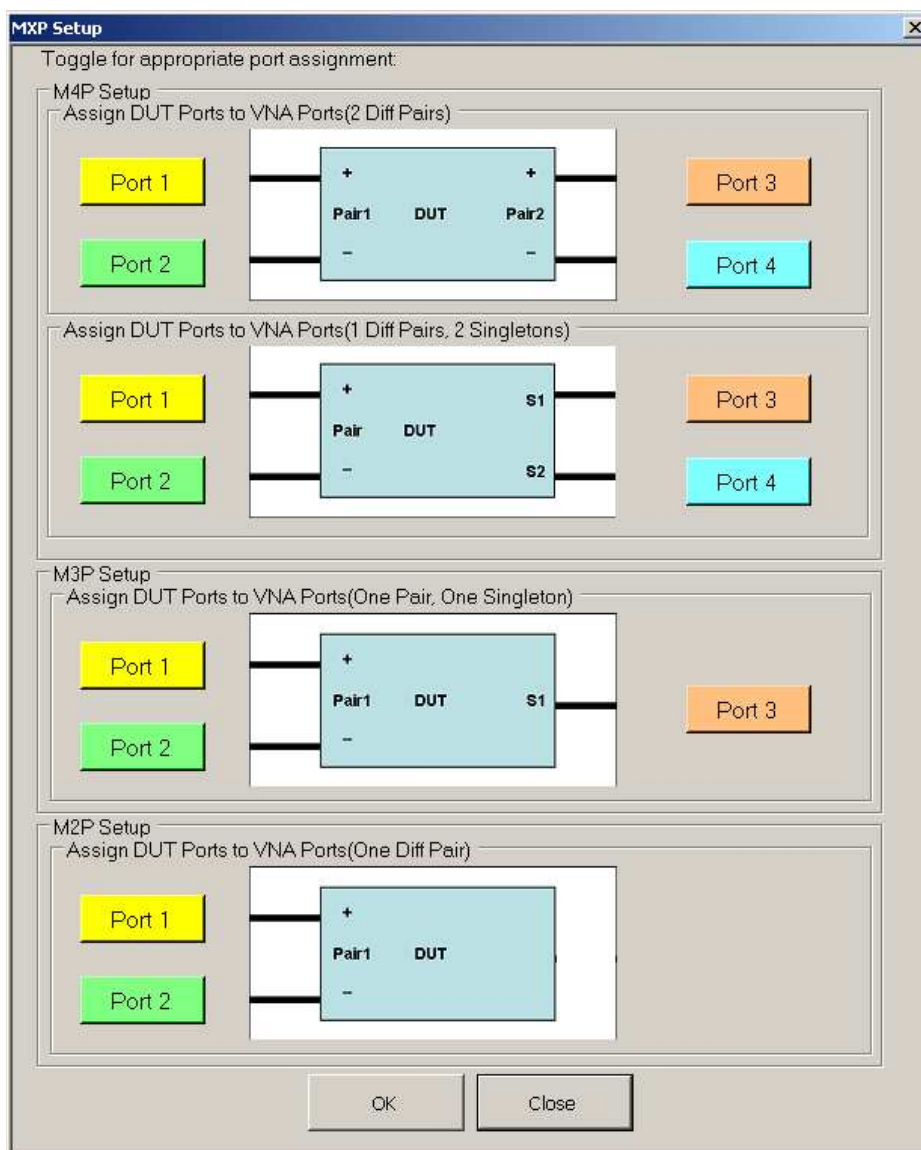


Figure 24-12.MXP (MIXED-MODE DUT) SETUP Dialog Box

Instructions

Select displays the MXP SETUP dialog box. The dialog box provides VNA-port to DUT-port configuration for output files for four mixed-mode DUT types:

- M4P Setup - Assign DUT ports with two differential pairs. For remote GPIB control, this is defined as D2S0.
- M4P Setup - Assign DUT ports with one differential pair and two singletons. For remote GPIB control, this is defined as D1S2
- M3P Setup - Assign DUT ports with one differential pair and one singleton. For remote GPIB control, this is defined as D2S1.
- M2P Setup - Assign DUT ports with one differential pair and no singletons. For remote GPIB control, this is defined as D1S0.

MANAGE OPTIONS Dialog Box

Previous

- “MISC. SETUP Menu” on page 24-16

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | Manage Options | MANAGE OPTIONS Dialog Box

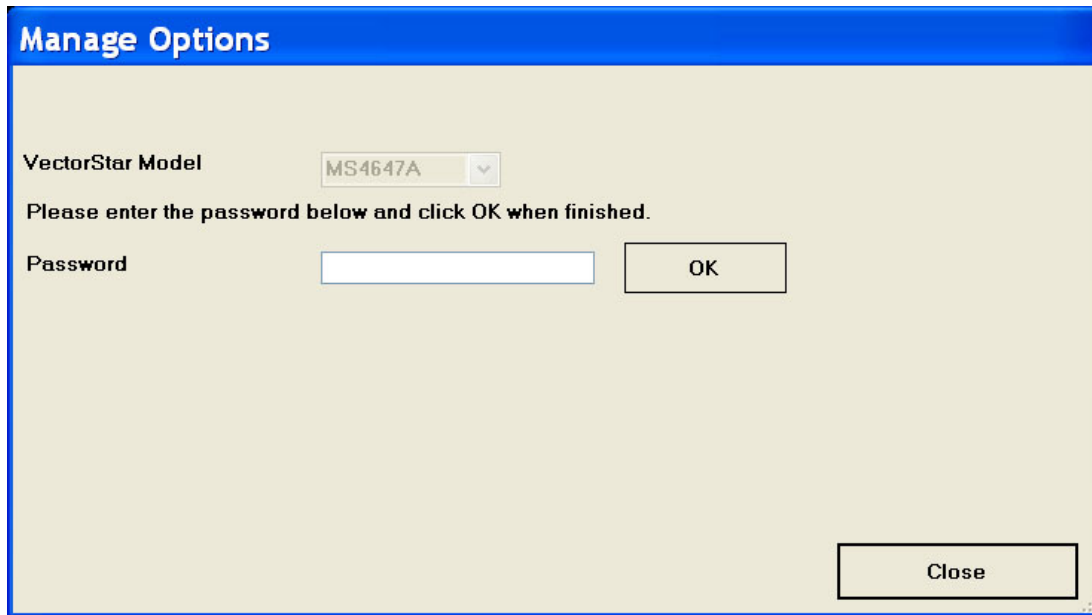


Figure 24-13. MANAGE OPTIONS Dialog Box

Instructions

An instrument-specific password is required to enter the MANAGE OPTIONS dialog box. The MANAGE OPTIONS dialog box is for use by Anritsu Customer Service only.

INSTRUMENT SETTINGS Dialog Box

Previous

- “MISC. SETUP Menu” on page 24-16

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | Instrument Settings | INSTRUMENT SETTINGS Dialog Box

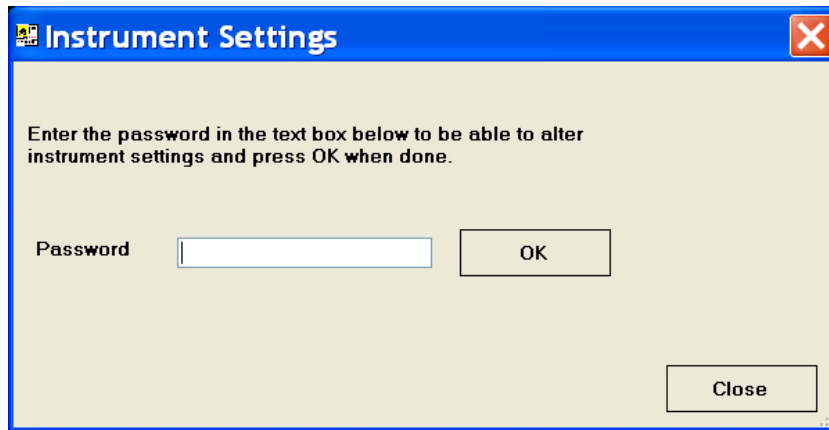


Figure 24-14. INSTRUMENT SETTINGS Dialog Box

Instructions

An instrument-specific password is required to enter the INSTRUMENT SETTINGS dialog box. The INSTRUMENT SETTINGS dialog box is for use by Anritsu Customer Service only.

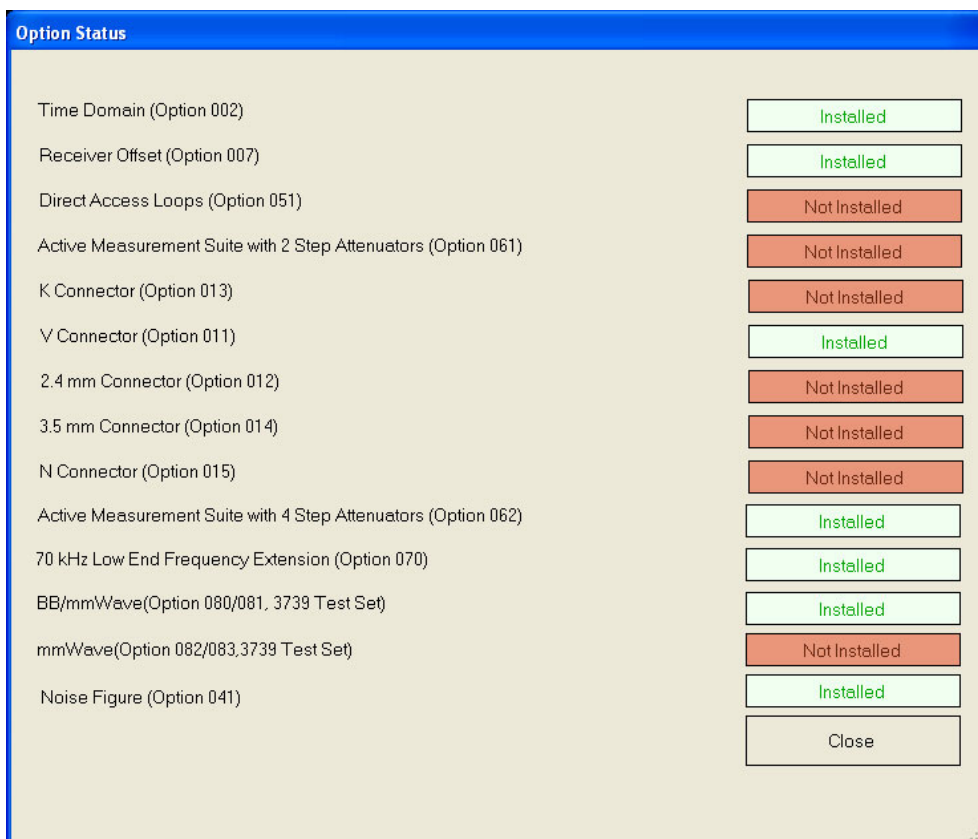
OPTION STATUS Dialog Box

Previous

- “MISC. SETUP Menu” on page 24-16

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | Installed Options | OPTION STATUS Dialog Box



This example dialog shows the following options installed:

- Time Domain – Option 002
- Receiver Offset – Option 007
- V Connectors – Option 011 (Standard for MS4647A)
- Active Measurement Suite with Four Step Attenuators and Front/Rear Panel Access Loops – Option 062

- 70 kHz Low End Frequency Extension – Option 070
- Broadband/Millimeter-Wave Capability – Option 080/081 – For the 3739x Test Set – For this VNA, the Option 081 is installed to match the installation of Option 062 above.
- Noise Figure – Option 041 – Adds Noise Figure measurement functions to the APPLICATION menu.

Figure 24-15. OPTION STATUS Dialog Box – Typical Option Set for the MS4647A VNA

Instructions

The OPTION STATUS dialog box provides a list of the VectorStar MS4640A Series VNA options and the installation status of each option. Click **Close** to close the dialog box.

24-8 SnP Files Setup

The SnP files setup configuration user interface varies depending on the VA port mode and can be either a menu (2-Port) or a dialog box (4-Port).

- For 2-Port VNAs, see “[SNP FILES SETUP Menu - 2-Port VNAs](#)” on page 24-23 immediately below.
- For 4-Port VNAs, see “[SNP SETUP Dialog Box - 4-Port VNAs](#)” on page 24-25 in the section following.

SNP FILES SETUP Menu - 2-Port VNAs

Frequency Units Area Button Selection Group

In the Freq Units area, the four (4) frequency units buttons (GHz, MHz, kHz, and Hz) form a button selection group where the selection of one button de-selects the other three (3) buttons.

Prerequisites

- The VNA is in 2-Port Mode

Previous

- “[MISC. SETUP Menu](#)” on page 24-16

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | SnP Files Setup | SNP FILES SETUP

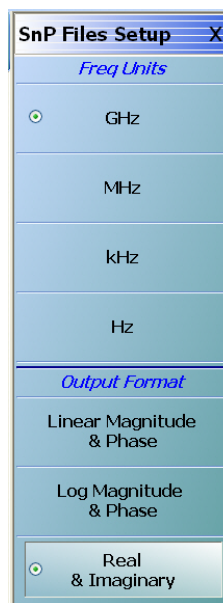


Figure 24-16. SNP FILES SETUP Menu

GHz

Select sets the units for the SnP file output to GHz.

MHz

Select sets the units for the SnP file output to MHz.

kHz

Select sets the units for the SnP file output to kHz.

Hz

Select sets the units for the SnP file output to Hz.

Output Format Area Button Selection Group

In the Output Format area of the menu, the three (3) buttons form a button selection group where the selection of one button de-selects the other two (2) buttons.

Linear Magnitude & Phase

Select sets the data file output format to record linear magnitude and phase information.

Log Magnitude & Phase

Select sets the data file output format to record log magnitude and phase information.

Real & Imaginary

Select sets the data file output format to real and imaginary information.

SNP SETUP Dialog Box - 4-Port VNAs

Prerequisites

- The VNA is in 4-Port Mode

Previous

- [“MISC. SETUP Menu” on page 24-16](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | SnP Files Setup | SNP SETUP Dialog Box

SnP Setup

Per System

Freq. Units

GHz MHz kHz Hz

Output Format

Linear Mag & Phase Log Mag & Phase Real & Imaginary

Per Channel

S1P Port Selection

Port 1 Port 2 Port 3 Port 4

S2P Port Selection

Port 1-2 Port 1-3 Port 1-4

Port 2-3 Port 2-4 Port 3-4

S3P Port Selection

Port 1-2-3 Port 1-2-4 Port 1-3-4

Port 2-3-4

OK Close

Figure 24-17. SNP SETUP Dialog Box - 4-Port VNAs

Instructions

The controls in the SNP SETUP dialog box allow for configuration of file output for all SnP file types.

Per System - Frequency Units

On a per-system basis, allows the frequency units to be set as:

- GHz
- MHz
- kHz
- Hz

Per System - Output Format

On a per-system basis, allows the output format to be set as:

- Linear magnitude and phase
- Log magnitude and phase
- Real and imaginary numbers

Per Channel - S1P Port Selection

On a per-channel basis, allows the S1P single port to be selected as:

- Port 1
- Port 2
- Port 3
- Port 4

Per Channel - S2P Port Selection

On a per-channel basis, allows the S2P port pair to be selected as:

- Port 1-2
- Port 1-3
- Port 1-4
- Port 2-3
- Port 2-4
- Port 3-4

Per Channel - S3P Port Selection

On a per-channel basis, allows the S2P port triad to be selected as:

- Port 1-2-3
- Port 1-2-4
- Port 1-3-4
- Port 2-3-4

24-9 System Utility Menus

UTILITY Menu

Previous

- “SYSTEM Menu” on page 24-2

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY

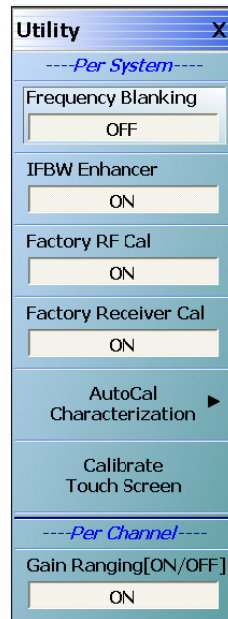


Figure 24-18. TILITY Menu

Per-System Utility Options

These settings are on a per-system basis.

Frequency Blanking (Off/On)

The default state is OFF where frequency values are displayed on the main display and on all menus, buttons, and dialogs. Select changes the button state to ON, and replaces all frequency displays with “Xs” as “XXXX” which includes all frequency displays on all buttons, menus, and dialogs such as all MARKER [1] menu frequency displays. To return all frequency displays, do one of the following:

- MENU BAR | Utilities | Preset
- **Preset Key**

IFBW Enhancer (Off/On)

Select toggles the IFBW enhancer function OFF and ON.

If the IFBW enhancer function is ON:

- The system automatically reduces the IFBW below 3 MHz to compensate for the lower system frequency.
- The system limits the maximum IFBW allowed so that it is less than or equal to the received frequency divided by 300.

- For example, if the received frequency is set to 300 kHz, the IFBW is equal to 300 kHz divided by 300 or 1 kHz.

Factory RF Cal (Off/On)

Select toggles the factory RF calibration OFF and ON.

Factory Receiver Cal

Select toggles the factory receiver calibration OFF and ON.

AutoCal Characterization

Select displays the AutoCal Characterization menu.

- [“AUTO CAL CHARAC. Menu” on page 24-29](#)

Calibrate Touch Screen

Select displays the Touch Screen Control Panel dialog box.

- [“HAMPSHIRE TSHARC \(TOUCHSCREEN\) CONTROL PANEL Dialog Box” on page 24-33](#)

Per-Channel Utility Options

This setting is on a per-channel basis.

Gain Ranging (Off/On)

Select toggles gain ranging OFF and ON.

AUTOCAL CHARAC. Menu

The best practice recommendation is to return the AutoCal module to Anritsu annually for an in-factory characterization. If a factory re-characterization is not possible, you can use this menu to re-characterize the module. Note that the re-characterization will be only as good as the prior instrument manual full calibration procedure. The recommended manual calibration is a Full Two Port calibration (12 Term Cal). For more information, contact Anritsu Customer Service.

Full Name

- AUTOMATIC CALIBRATOR (AUTOCAL) CHARACTERIZATION Menu

AUTOCAL CHARAC. Menu Button Availability

The availability of the Module Orientation button depends on the setting of the Auto Sense (Off/On) button.

- If Auto Sense is off (shown at left), the Module Orientation button is available.
- If Auto Sense is on, the Module Orientation button is unavailable.

Previous

- [“UTILITY Menu” on page 24-27](#)

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | AutoCal Characterization | AUTOCAL CHARAC.

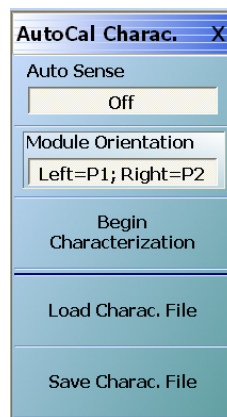


Figure 24-19. AUTOCAL CHARAC. (AUTOCAL CHARACTERIZATION) Menu

Auto Sense (Off/On)

If Auto Sense is on, the Module Orientation toggle button below is unavailable and during an auto-calibration run, the instrument will automatically detect the left and right port assignments.

If Auto Sense is off, the Module Orientation toggle button below is available allowing user definition of left/right port assignments. This is useful for test setups where the ports are reversed from the perspective of the user.

Module Orientation

This button is unavailable if the Auto Sense button above is ON and available if the Auto Sense button is OFF.

If available, use the orientation selection to define left/right port assignments from the point of view of the operator.

Select toggles between Left=P1;Right=P2 or Right=P1;Left=P2.

Begin Characterization

Select starts the characterization process. Note that the instrument must have completed a Full Two Port calibration (12 Term Cal) before starting this calibration step. During the characterization run, dialogs appear instructing the user for the each configuration action.

If a 12 Term Calibration is not applied, a warning message appears. Click OK to clear the warning message and apply the 12 Term Calibration before proceeding.

Load Charac. File

Selecting the Load Characterization File button displays the OPEN (AUTOCAL CHARACTERIZATION ACD FILE) dialog box.

- [“OPEN \(AUTOCAL CHARACTERIZATION ACD FILE\) Dialog Box” on page 24-31](#)

Save Charac. File

Select displays the SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) dialog box.

- [“SAVE AS \(AUTOCAL CHARACTERIZATION ACD FILE\) Dialog Box” on page 24-32](#)

OPEN (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Previous

- [“AUTOCAL CHARAC. Menu” on page 24-29](#)

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | AutoCal Characterization | AUTOCAL CHARAC. | Load Charac. File | OPEN (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

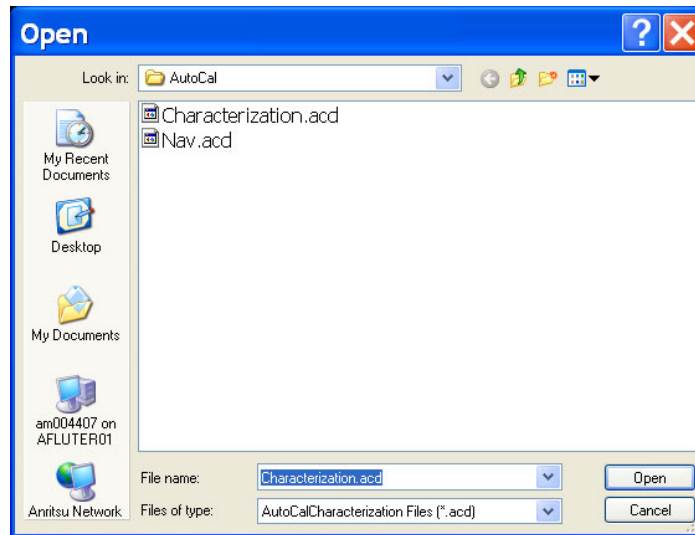


Figure 24-20. OPEN (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Instructions

The OPEN (AUTOCAL CHARACTERIZATION ACD FILE) dialog box displays available ACD files. Navigate to and select the required ACD file and click **Open** to apply. Click **Cancel** to abort.

SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Previous

- “AUTOCAL CHARAC. Menu” on page 24-29

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | AutoCal Characterization | AUTOCAL CHARAC. | Save Charac. File | SAVE AS (AUTO CAL CHARACTERIZATION ACD FILE) Dialog Box

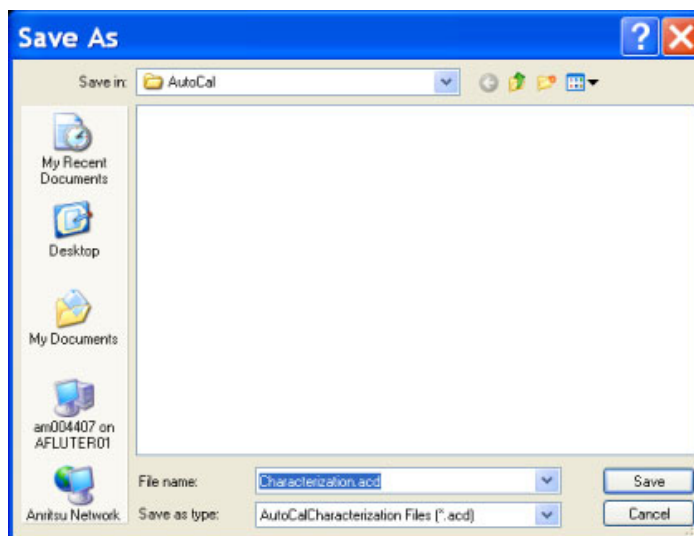


Figure 24-21.SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Instructions

Displays the Save As (AUTO CAL CHARACTERIZATION ACD FILE) dialog box. Navigate to the required folder and click Save to save the file. Click Cancel to abort.

HAMPSHIRE TSHARC (TOUCHSCREEN) CONTROL PANEL Dialog Box

The HAMPSHIRE™ TSHARC™ (TOUCH SCREEN) CONTROL PANEL dialog box has five (5) tabs for control of Screen Selection, Calibration, Click, Touch, and Capacitive settings. Each screen and its recommended parameters are defined below.

When using the touch screen, a recommended best practice is to use a positive hard press to make sure the required setting is input into the system. A light touch may not change the instrument setting as required.

Note

To recalibrate the touch screen, navigate to the CALIBRATE TOUCH SCREEN dialog box located at **MAIN | System | SYSTEM | Utility | UTILITY | Calibrate Touch Screen | TOUCH SCREEN CONTROL PANEL dialog box**. The procedure is described in [Chapter 24, “System Menus”](#) in [“HAMPSHIRE TSHARC \(TOUCHSCREEN\) CONTROL PANEL Dialog Box”](#) on page 24-33 below.

A more detailed touch screen calibration and adjustment procedure is described in the **VectorStar MS4640A Series VNA Maintenance Manual – 10410-00268**.

Previous

- [“UTILITY Menu”](#) on page 24-27

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | Calibrate Touch Screen | HAMPSHIRE TSHARC (TOUCHSCREEN) CONTROL PANEL Dialog Box

Operation

- The TOUCH SCREEN CONTROL PANEL dialog box shown above provides five tabbed sections for touch screen control as:
 - Screen Selection Control Tab at 1
 - Calibration Tab at 2
 - Click Settings Tab at 3
 - Touch Settings Tab at 4
 - Capacitive Tab at 5.

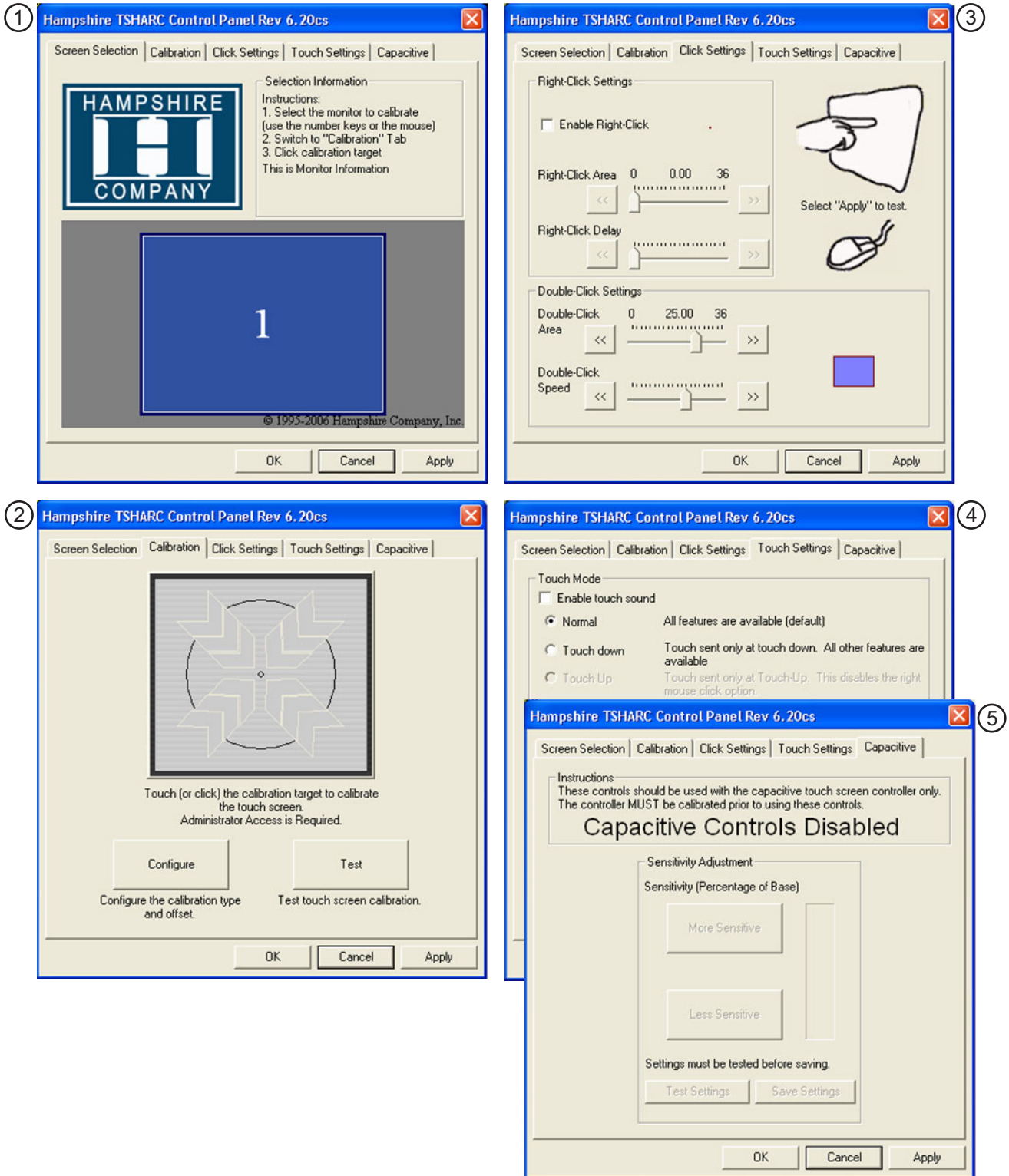


Figure 24-22. TOUCH SCREEN CONTROL PANEL Dialog Box (1 of 2)

1. Touch Screen Control Panel Dialog Box – Screen Selection Tab	4. Touch Screen Control Panel Dialog Box – Touch Settings Tab
2. Touch Screen Control Panel Dialog Box – Calibration Tab	5. Touch Screen Control Panel Dialog Box – Capacitive Tab – Use after calibration of the controller.
3. Touch Screen Control Panel Dialog Box – Click Settings Tab	

Figure 24-22. TOUCH SCREEN CONTROL PANEL Dialog Box (2 of 2)

24-10 Remote Interface Menus and Dialog Box

REMOTE INTER. Menu

Full Name

- REMOTE INTERFACE Menu

Previous

- [“SYSTEM Menu” on page 24-2](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.

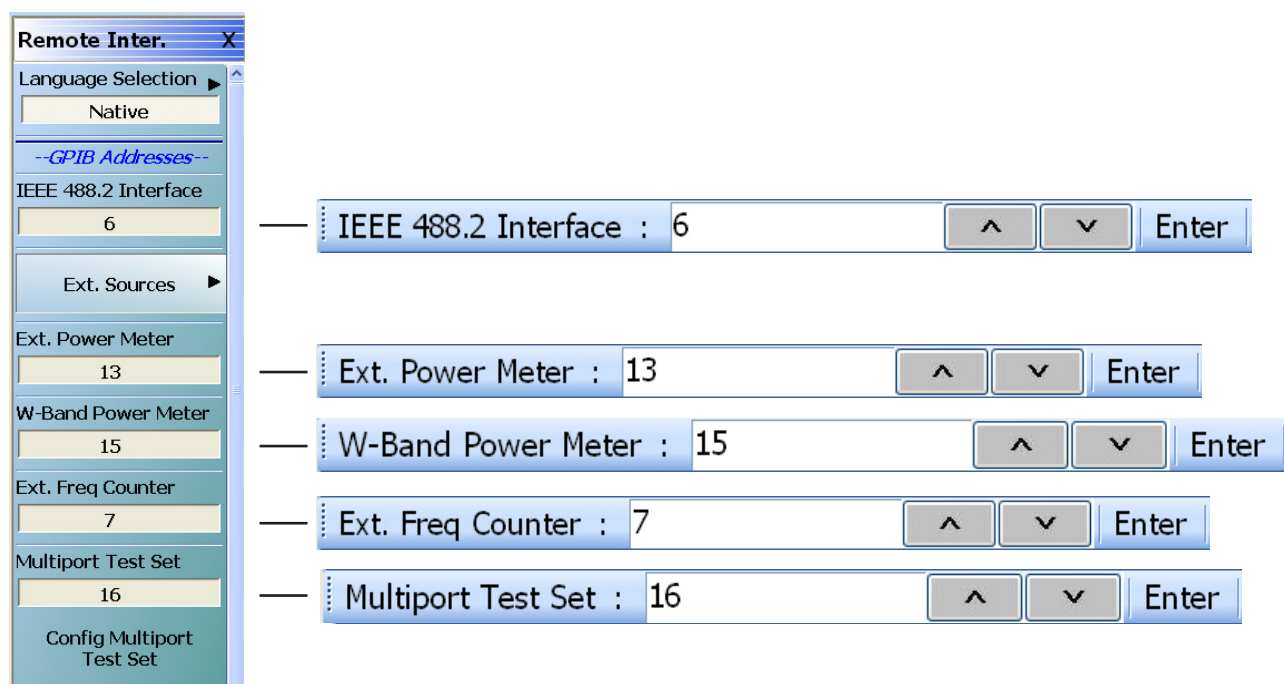


Figure 24-23. REMOTE INTER. (REMOTE INTERFACE) Menu

Language Selection

The Language Selection button displays currently set language as Native, Lightning, or HP8510. Select displays the REMOTE LANG menu.

- [“REMOTE LANG. Menu” on page 24-40](#)

IEEE 488.2 Interface

Displays the currently selected GPIB address for the VNA instrument. Select displays the IEEE GPIB field toolbar, used to establish the GPIB device number of the instrument.

- The default GPIB instrument address is 6.
- The allowable range is from 1 to 30 but must be unique for the power meter and not duplicate any other peripheral or instrument address.

Ext. Sources

The External Sources button select displays the EXT SRC ADDR (EXTERNAL SOURCE ADDRESS) menu.

- [“EXT. SRC ADDR. Menu” on page 24-41](#)

Ext. Power Meter

Select displays the External Power Meter field toolbar. Use the External Power Meter field toolbar to enter the GPIB device number for an optional attached power meter.

- The default GPIB device address is 13.
- The allowable range is from 1 to 30 but must be unique for the power meter and not duplicate any other address.

W-Band Power Meter

Select displays the W-Band Power Meter field toolbar. Use the W-Band Power Meter field toolbar to enter the GPIB device number for an optional Wide Band Power Meter device used in Modular Broadband applications. For modular broadband operations, use this GPIB address to connect an HP 437B-compatible power meter with a W-band (75 to 110 GHz) power sensor.

- The default GPIB device is 15.
- The allowable range is from 1 to 30 but must be unique for the wide band power meter and not duplicate any other address.

Ext. Freq Counter

Select displays the External Frequency Counter field toolbar. Use the External Frequency Counter field toolbar to enter the GPIB device number for an optional attached frequency counter.

- The default GPIB device address is 7.
- The allowable range is from 1 to 30 but must be unique for the frequency counter and not duplicate any other address.

Multiport Test Set

Select displays the Multiport Test Set field toolbar. Use the toolbar to enter the GPIB device number for the optional Multiport Test Set.

- The default GPIB address is 16.
- The allowable range is from 1 to 20 but must be unique for the test set and not duplicate another address.

Config Multiport Test Set

Select displays the Multiport Test Set Configuration dialog box to optionally configure an attached **MN4690B Series Multiport Test Set**.

- [“MULTIPOINT TEST SET CONFIGURATION Dialog Box - 4-Port VNAs” on page 24-38](#)

MULTIPOINT TEST SET CONFIGURATION Dialog Box - 4-Port VNAs

Previous

- “REMOTE INTER. Menu” on page 24-36

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Configure Multipoint Test Set | MULTIPOINT TEST SET CONFIGURATION Dialog Box

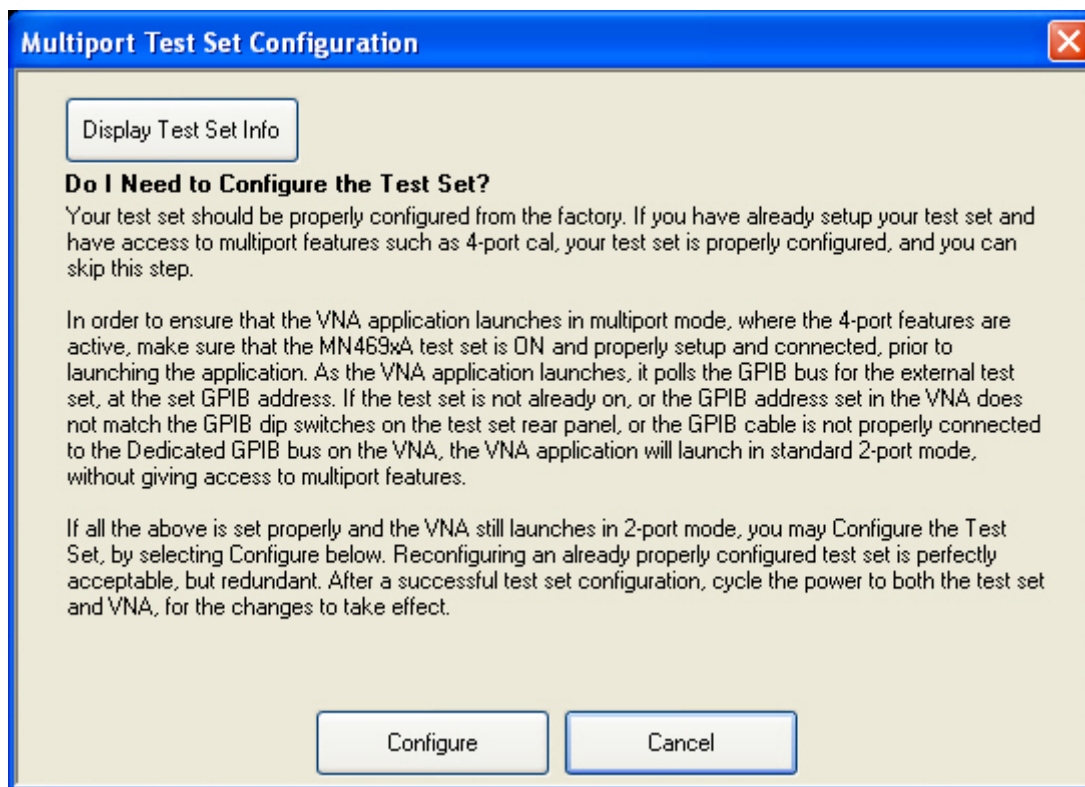


Figure 24-24. MULTIPOINT TEST SET CONFIGURATION Dialog Box

Display Test Set Info Button

Select displays a dialog box with the current attached multipoint test set configuration information.

Advisory Configuration Information

Your test set should be properly configured from the factory. If you have already setup your test set and have access to multipoint features such as 4-port cal, your test set is properly configured, and you can skip this step.

In order to ensure that the VNA application launches in multipoint mode, where the 4-port features are active, make sure that the MN4690B Series test set is ON and properly setup and connected, prior to launching the application. As the VNA application launches, it polls the GPIB bus for the external test set, at the set GPIB address. If the test set is not already on, or the GPIB address set in the VNA does not match the GPIB dip switches on the test set rear panel, or the GPIB cable is not properly connected to the Dedicated GPIB bus on the VNA, the VNA application will launch in standard 2-port mode, without giving access to multipoint features.

If all the above is set properly and the VNA still launches in 2-port mode, you may Configure the Test Set, by selecting Configure below. Re-configuring an already properly configured test set is perfectly acceptable, but redundant. After a successful test set configuration, cycle the power to both the test set and VNA, for the changes to take effect.

Controls

The **Configure** button starts the configuration process. **Cancel** closes the dialog box and returns to the REMOTE INTER. menu.

REMOTE LANG. Menu

Full Name

- REMOVE LANGUAGE Menu

REMOTE LANG. Menu Button Selection Group

The three (3) buttons of the REMOTE LANG. menu form an auto-return button selection group where the selection of one button de-selects the other two (2) buttons and returns to the REMOTE INTER. menu.

Previous

- [“REMOTE INTER. Menu” on page 24-36](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Language Selection | REMOTE LANG.



Figure 24-25. REMOTE LANG. (REMOTE LANGUAGE) Menu

Native

Select sets the remote language to Native, de-selects the Lightning and HP8510 buttons, and auto-returns to the REMOTE INTER menu.

Lightning

Select sets the remote language to Lightning, de-selects the Native and HP8510 buttons, and auto-returns to the REMOTE INTER menu.

HP8510

Select sets the remote language to HP8510ng, de-selects the Native and Lightning buttons, and auto-returns to the REMOTE INTER menu.

EXT. SRC ADDR. Menu

Full Name

- EXTERNAL SOURCE ADDRESS Menu

Previous

- [“REMOTE INTER. Menu” on page 24-36](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Ext. Sources | EXT. SRC ADDR.

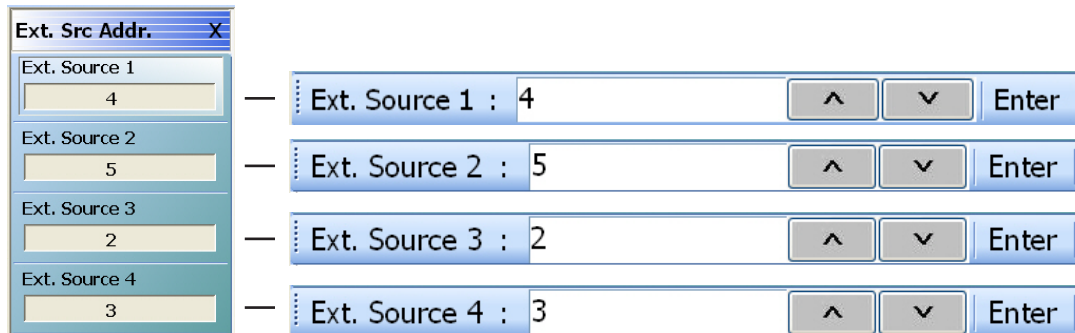


Figure 24-26. EXT. SRC ADDR. (EXTERNAL SOURCE ADDRESS) Menu

Ext. Source 1

Select displays the Ext. Source 1 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 1 is 4.
- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

Ext. Source 2

Select displays the Ext. Source 2 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 2 is 5.
- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

Ext. Source 3

Select displays the Ext. Source 3 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 3 is 2.
- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

Ext. Source 4

Select displays the Ext. Source 4 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 4 is 3.

- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

24-11 Network Interface Menus and Dialog Boxes

NETWORK INTERF. Menu

Full Name

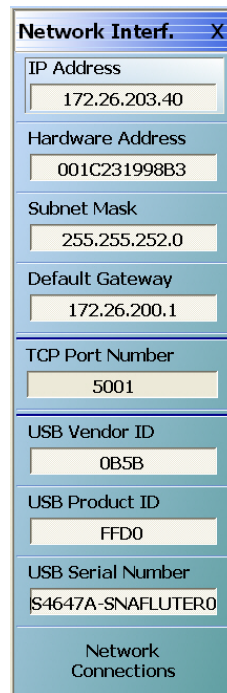
- NETWORK INTERFACE Menu

Previous

- [“SYSTEM Menu” on page 24-2](#)

Navigation

- MAIN | System | SYSTEM | Network Interface | NETWORK INTERF.



The screenshot shows a dialog box titled "Network Interf." with a close button (X). It contains several fields for network and USB settings:

IP Address	172.26.203.40
Hardware Address	001C231998B3
Subnet Mask	255.255.252.0
Default Gateway	172.26.200.1
TCP Port Number	5001
USB Vendor ID	0B5B
USB Product ID	FFD0
USB Serial Number	S4647A-SNAFLUTER0
Network Connections	

Figure 24-27. NETWORK INTERF. (NETWORK INTERFACE) Menu

IP Address

A read-only display. Shows the IP address of the instrument.

Hardware Address

A read-only display. Shows the internal network interface card hardware address.

Subnet Mask

A read-only display. Shows the network subnet mask value.

Default Gateway

A read-only display. Shows the network default gateway address.

TCP Port Number

A read-only display. Shows the network TCP port number.

USB Vendor ID

A read-only display. Shows the USB Port vendor identification number.

USB Product ID

A read-only display. Shows the USB product identification number.

USB Serial Number

A read-only display. Shows the USB serial number.

Network Connections

Select displays the Network Connections dialog box which is part of the Microsoft Operating System.

- [“NETWORK CONNECTIONS Dialog Box” on page 24-45](#)

NETWORK CONNECTIONS Dialog Box

Previous

- “NETWORK INTERF. Menu” on page 24-43

Navigation

- MAIN | System | SYSTEM | Network Interface | NETWORK INTERF. | Network Connections | NETWORK CONNECTIONS Dialog Box

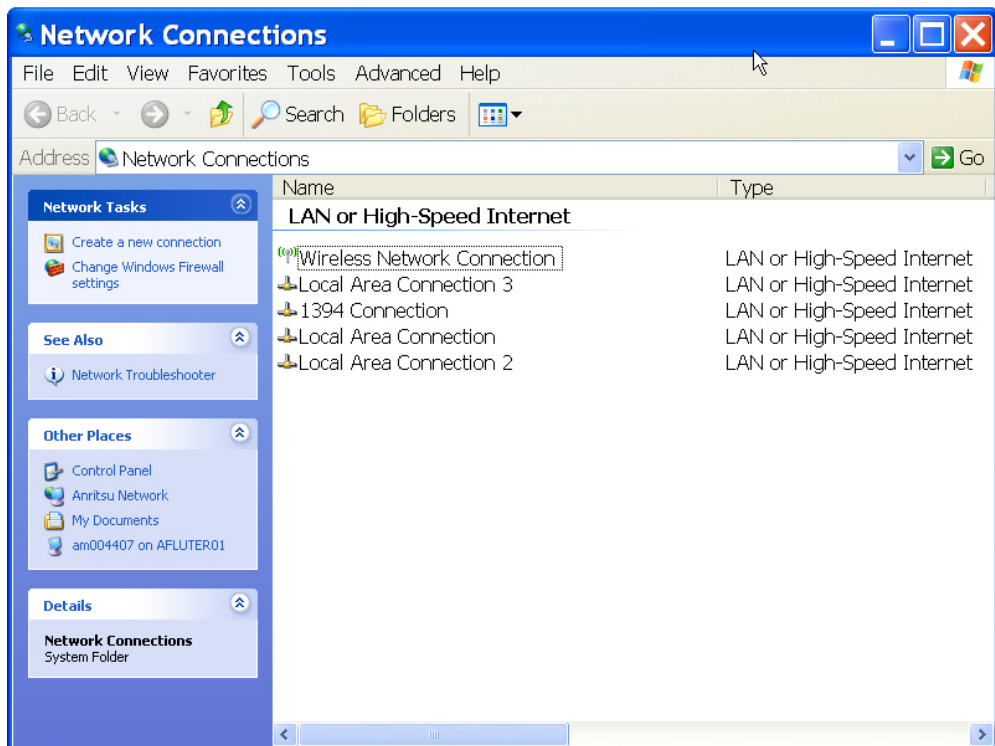


Figure 24-28. NETWORK CONNECTIONS Dialog Box

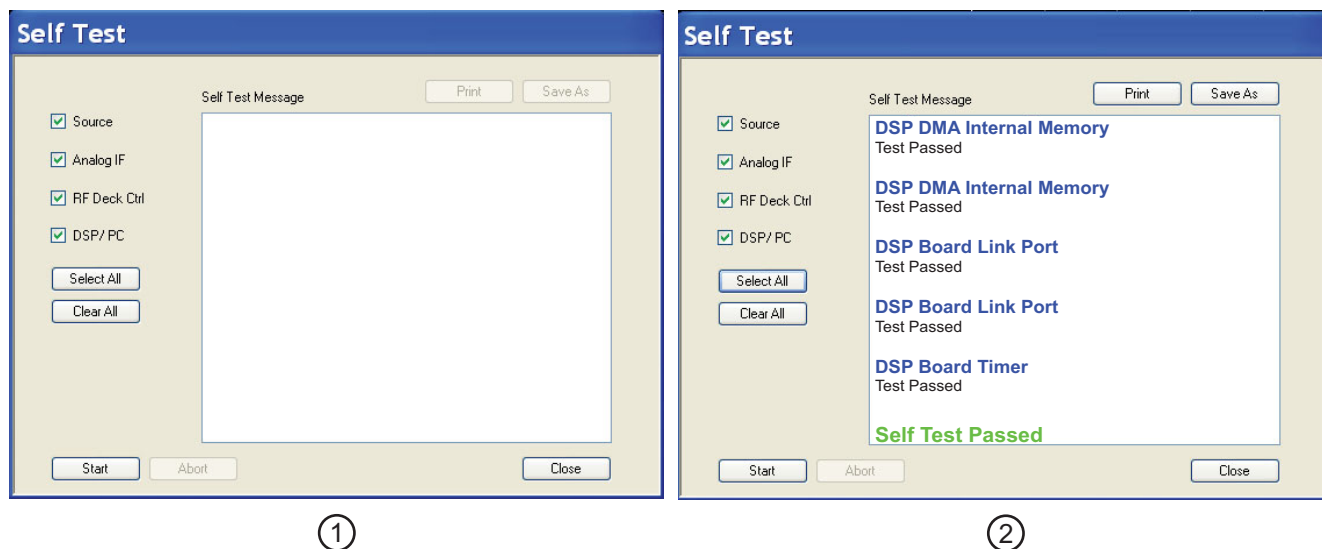
SELF TEST Dialog Box

Previous

- “SYSTEM Menu” on page 24-2

Navigation

- MAIN | System | SYSTEM | Diagnostics | DIAGNOSTICS | Self-Test | SELF TEST Dialog Box



1. SELF TEST Dialog Box – Test Not Started at left.

2. SELF TEST Dialog Box – Test Passed at right.

Figure 24-29.SELF TEST Dialog Box

Instructions

1. Select any combination of tests from the available check boxes:
 - Source
 - Analog IF
 - RF Deck Ctrl
 - DSP/PV
2. The **Select All** button selects all tests. The **Clear All** button de-selects all tests.
3. Once selections are made, click **Start** to run the tests. Click **Abort** to cancel in-process tests.
4. Test results are displayed in the **Self Test Message** area.
5. A normal message is **Self Test Passed**.
6. Click **Print** to print to the local printer through an open **Print** dialog box. Click **Save As** to save as a **Self Test Result TXT** file typically located in `C:\AnritsuVNA\Data`. Click **Close** to close the dialog box.

EVENT VIEWER Dialog Box

Previous

- “SYSTEM Menu” on page 24-2

Navigation

- MAIN | System | SYSTEM | Event Log | EVENT VIEWER Dialog Box

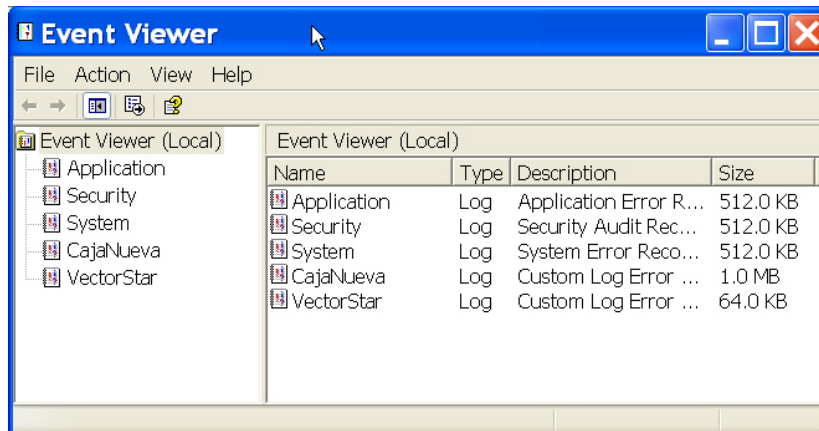


Figure 24-30. EVENT VIEWER Dialog Box

Instructions

Options on the menu bar are:

- File
 - Options: Displays the Options dialog box with additional system functions.
 - Exit: Closes the dialog box and returns to the Diagnostics menu
- Action
 - Connect to another computer
 - Open log file
 - Export list
 - Help
- View
 - Add/Remove columns
 - Customize
- Help
 - Help Topics
 - About Microsoft Management Console
 - About Event Viewer

REAR PANEL OUT. Menu

Full Name

- REAR PANEL OUTPUT Menu

Previous

- [“SYSTEM Menu” on page 24-2](#)

Navigation

- MAIN | System | SYSTEM | Rear Panel Output | REAR PANEL OUT.

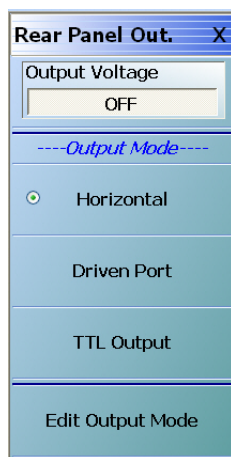


Figure 24-31. REAR PANEL OUT. (REAR PANEL OUTPUT) Menu

Output Voltage

Select toggles rear panel output voltage off and on.

Output Mode Button Selection Group

The Horizontal, Driven Port, and TTL Output buttons form a three (3) button selection group where the selection of any one button de-selects the other two buttons.

Horizontal Output Mode

The horizontal output mode sets the condition of the sweep independent of the port sweep voltage that corresponds to the start and stop sweep limits. The values are edited in the dialog box available from the Edit Output Mode button below.

Selecting the Horizontal button de-selects Driven Port and TTL Port.

Driven Port Output Mode

The driven port output mode assigns the voltage setting to whichever port is set as the driven port. The values are edited in the dialog box available from the Edit Output Mode button below.

Selecting the Driven Port button de-selects Horizontal and TTL Port.

TTL Output Mode

The TTL (Transistor-Transistor-Logic) button sets the voltage output to either pulse or level TTL. The values are edited in the dialog box available from the Edit Output Mode button below.

Selecting the TTL Output Mode button de-selects Horizontal and Driven Port Output.

Edit Output Mode

Select displays the Edit Rear Panel Output Mode dialog box.

- [“EDIT REAR PANEL OUTPUT MODE Dialog Box” on page 24-50](#)

EDIT REAR PANEL OUTPUT MODE Dialog Box

Previous

- “REAR PANEL OUT. Menu” on page 24-48

Navigation

- MAIN | System | SYSTEM | Rear Panel Output | REAR PANEL OUT. | Edit Output Mode | EDIT REAR PANEL OUTPUT MODE Dialog Box

Edit Rear Panel Output Mode

Horizontal

Start (V) 0.000

Stop (V) 1.000

Driven Port

Set Output Voltage: Port 1 (V) 0.000

Port 2 (V) 0.000

TTL Output

Set Output Level: Port 1: High

Port 2: High

Pulse Width (ms) 0.000

OK Cancel

Figure 24-32.EDIT REAR PANEL OUTPUT MODE Dialog Box

Instructions

Use the dialog box for settings of horizontal voltage, driven port voltage, and TTL output voltage levels.

Horizontal Voltage

- Start (V). Selectable range from –10.000 to 0.000 to +10.000 V.
- Stop (V). Selectable range from –10.000 to 0.000 to +10.000 V.

Driven Port

- Set Output Voltage
- Port 1 (V). Selectable range from –10.000 to 0.000 to +10.000 V.
- Port 2 (V). Selectable range from –10.000 to 0.000 to +10.000 V.

TTL Output

- Set Output Level
- Port 1. Selectable options of High, Low, High Pulse, or Low Pulse.
- Port 2. Selectable options of High, Low, High Pulse, or Low Pulse.
- If High or Low Pulse selected, Pulse Width (ms) becomes available.

DIAGNOSTICS ACCESS Dialog Box

Previous

- [“SYSTEM Menu” on page 24-2](#)

Navigation

- MAIN | System | SYSTEM | Diagnostics | DIAGNOSTICS ACCESS Dialog Box

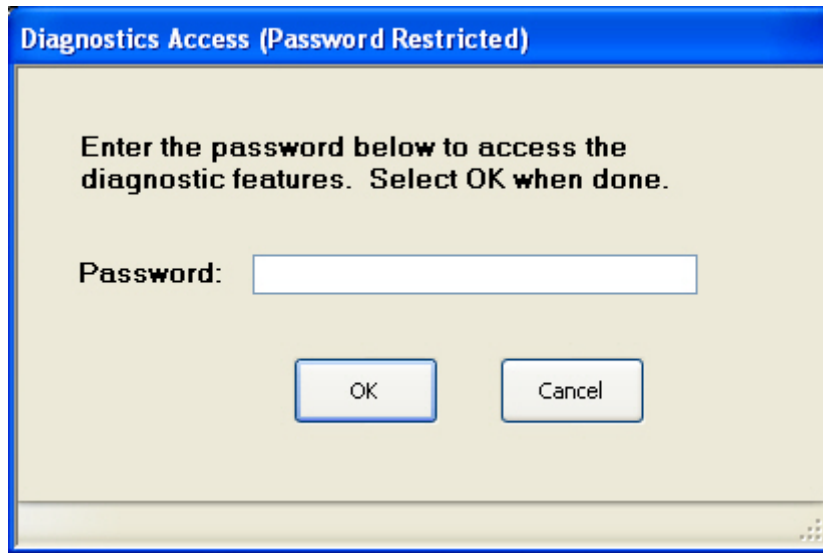


Figure 24-33.DIAGNOSTICS ACCESS Dialog Box

Instructions

An instrument-specific password is required to enter the DIAGNOSTICS ACCESS dialog box. Contact Anritsu Customer Service before using this dialog box.

Chapter 25 — File Management Menus

25-1 Chapter Overview

This chapter provides information for management of various system output and configuration files including Active channel TXT files, Active channel S2P files, Active channel CSV files, Active trace data (Formatted), and Active trace data (Unformatted).

25-2 Overview of File Management Menus and Dialog Boxes

There is one available menu with multiple related dialog boxes:

- [“FILE Menu” on page 25-2](#)
 - [“RECALL SETUP Dialog Box” on page 25-4](#)
 - [“RECALL DATA Dialog Box” on page 25-6](#)
 - [“SAVE SETUP Dialog Box” on page 25-7](#)
 - [“SAVE DATA Dialog Box” on page 25-8](#)
 - PRINT Dialog Box: See [“Print” on page 25-3](#)
 - [“PAGE SETUP Dialog Box” on page 25-9](#)
 - [“PRINT SETUP Dialog Box” on page 25-11](#)
 - EXIT Dialog Box: See [“Exit” on page 25-3](#)

25-3 File Menus and Dialog Boxes

FILE Menu

Previous

- [“MAIN MENU” on page 2-1](#)

Navigation

- MAIN | File | FILE

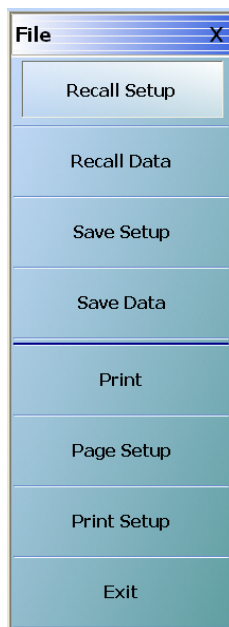


Figure 25-1. FILE Menu – Data Save/Recall Functions – Print Functions

Recall Setup

Select displays the Recall Setup dialog box which allows recalling of previously saved setup files.

- [“RECALL SETUP Dialog Box” on page 25-4](#)

Recall Data

Select displays the Recall Data dialog box.

- [“RECALL DATA Dialog Box” on page 25-6](#)

Save Setup

Use the **Save Setup** button to save variations of the current instrument setup. The configurations that can be saved are of the following types:

- Active Channel Setup and Calibration CHX files
- Active Channel Setup STX files
- All Channel Setup and Calibration CHA files
- All Channel Setup STA files

Select displays the Save Setup dialog box.

- [“SAVE SETUP Dialog Box” on page 25-7](#)

Save Data

Use the Save Data button to save the active channel data in several different formats and different purposes. For example, save data as a TXT file for use in another application such as a spreadsheet or word processor. Note the TXT data cannot be imported back into the instrument. Available formats are:

- Active Channel TXT files
- Active Channel S1P files
- Active Channel S2P files
- Active Channel M2P files
- Active Channel CSV files
- Active Channel BMP files
- Active Channel PNG files
- Active Channel JPEG files
- Active Trace Data (Formatted) TDF files
- Active Trace Data (Unformatted) TDU files

Select displays the Save Data dialog box.

- [“SAVE DATA Dialog Box” on page 25-8](#)

Print

Select prints the current main display to the default printer using a standard Windows PRINT dialog box. Print confirmation dialogs appear as the print job is spooled to the default printer. Note that the default printer and its configuration is set from the Windows Desktop using the PRINTERS AND FAX dialog box. If the VNA is standalone and not on a network, the attached printer is used. If the VNA is networked, any network printer can be used.

Page Setup

Select displays the PAGE SETUP dialog box where the paper size, margins, paper orientation, and other printer parameters can be set.

- [“PAGE SETUP Dialog Box” on page 25-9](#)

Print Setup

Select displays the PRINT SETUP dialog box where various print output parameters can be configured and set.

- [“PRINT SETUP Dialog Box” on page 25-11](#)

Exit

Select displays an exit warning, and if confirmed, ends all MS4640A processes, and exits the VNA application to the Windows operating system desktop.

RECALL SETUP Dialog Box

Use the Recall Setup dialog to recall one of several types of previously saved setup for general instrument configuration.

Power-On Configuration Setup

- Note that this dialog does not set the power-on configuration setting.
- Power-on settings are configured in the POWER-ON SETUP menu located within the SYSTEM menus.
- [“POWER-ON SETUP Menu” on page 24-9](#)
- MAIN | System | SYSTEM | Power-On Setup | POWER-ON SETUP

Previous

- [“FILE Menu” on page 25-2](#)

Navigation

- MAIN | File | FILE | Recall Setup | RECALL SETUP Dialog Box

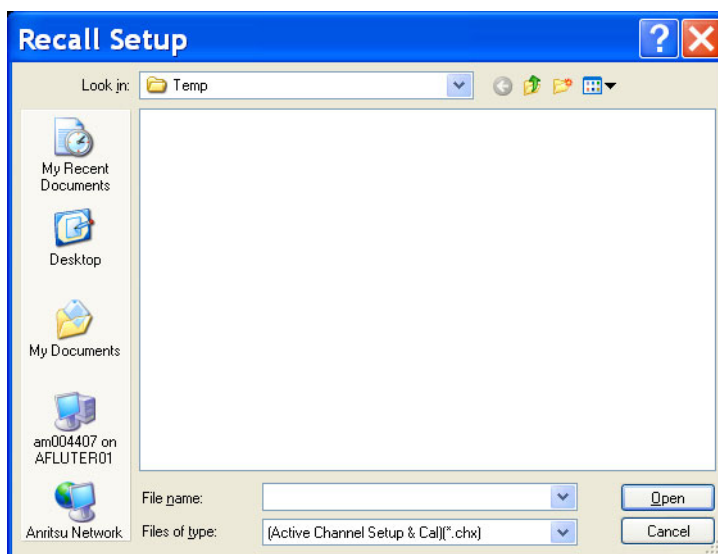


Figure 25-2. RECALL SETUP Dialog Box

Instructions

Use this dialog to select a previously stored setup configuration file.

1. Navigate to the File menu and the Power-On Setup dialog box.
 - MAIN | File | FILE | Recall Setup | RECALL SETUP Dialog Box
2. The Recall Setup dialog box appears.
3. Navigate to the required folder (recommend C:\AnritsuVNA folder) and locate the required setup file:
 - Active Channel Setup and Calibration CHX files
 - Active Channel Setup STX files
 - All Channel Setup and Calibration CHA files
 - All Channel Setup STA files
4. Once the appropriate file is selected, click Open.

5. The selected setup file is now available for use on the PRESET SETUP menu if the Saved Setup button is selected.
- MAIN | System | SYSTEM | Preset Setup | PRESET SETUP
 - [“PRESET SETUP Menu” on page 24-6](#)

RECALL DATA Dialog Box

Previous

- “FILE Menu” on page 25-2

Navigation

- MAIN | File | FILE | Recall Data | RECALL DATA Dialog Box

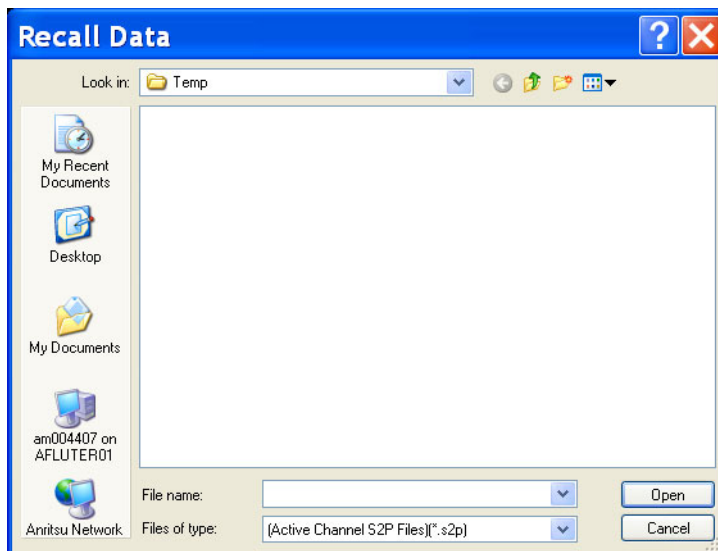


Figure 25-3. RECALL DATA Dialog Box

Instructions

Use this dialog to select a previously stored data configuration file. If the system is on hold, recall a TBF formatted file to overwrite the active trace memory. If system is not on hold, recall a TBF or TBU formatted file to overwrite the active trace memory. Note that the Active Channel TXT file cannot be imported back into the instrument.

Procedure

1. Navigate to the required folder and locate the required data file:

- Active Channel S1P files
- Active Channel S2P files
- Active Channel M2P files
- Active Channel CSV files
- Active Channel BMP files
- Active Channel PNG files
- Active Channel JPEG files
- Active Trace Data (Formatted) TDF files
- Active Trace Data (Unformatted) TDU files

2. Best practices recommend the C:\AnritsuVNA folder.

3. Once the appropriate file is selected, click Open.

4. The selected data file is applied depending on the file type.

SAVE SETUP Dialog Box

Previous

- [“FILE Menu” on page 25-2](#)

Navigation

- MAIN | File | FILE | Save Setup | SAVE SETUP Dialog Box

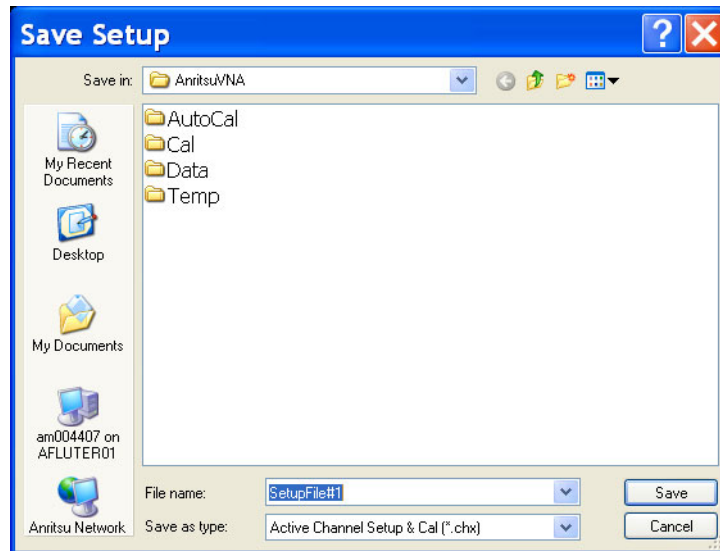


Figure 25-4. SAVE SETUP Dialog Box

Instructions

Use this dialog to select a previously stored setup configuration file.

1. Navigate to the required folder to save the setup file.
 - Best practices recommend the C:\AnritsuVNA folder.
2. Select the file type from the pull-down menu in the dialog box:
 - Active Channel Setup and Calibration CHX files
 - Active Channel Setup STX files
 - All Channel Setup and Calibration CHA files
 - All Channel Setup STA files
3. Once the appropriate file type and location is selected, click **Save**.
4. The selected setup file is saved and available for use on the PRESET SETUP menu if the Saved Setup button is selected.
 - MAIN | System | SYSTEM | Preset Setup | PRESET SETUP
 - [“PRESET SETUP Menu” on page 24-6](#)

SAVE DATA Dialog Box

Previous

- “FILE Menu” on page 25-2

Navigation

- MAIN | File | FILE | Save Data | SAVE DATA Dialog Box

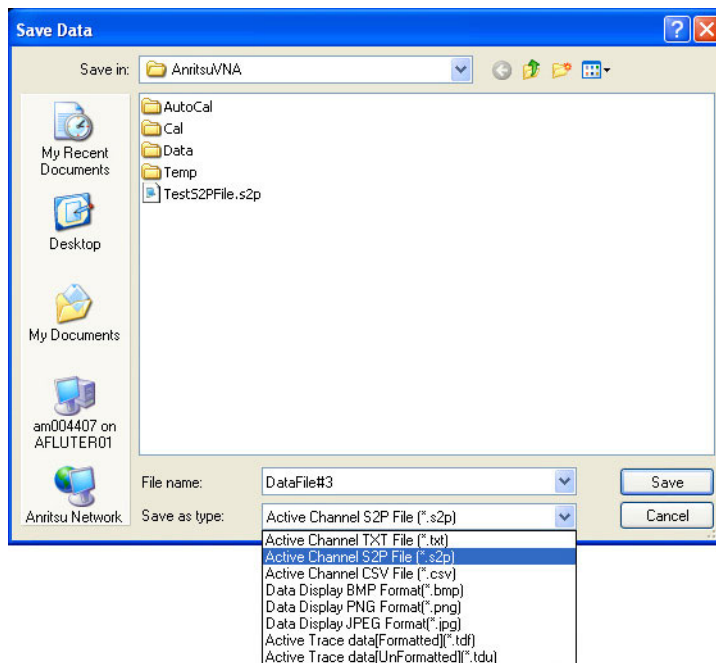


Figure 25-5. SAVE DATA Dialog Box

Instructions

Use this dialog to save a data configuration file.

1. Navigate to the required folder.
 - Best practices recommend the C:\AnritsuVNA folder.
2. Select the data file type from the pull-down menu:
 - Active Channel TXT files
 - Active Channel S1P files
 - Active Channel S2P files
 - Active Channel M2P files
 - Active Channel CSV files
 - Active Channel BMP files
 - Active Channel PNG files
 - Active Channel JPEG files
 - Active Trace Data (Formatted) TDF files
 - Active Trace Data (Unformatted) TDU files
3. Once the appropriate file type is selected, click **Save**.
4. The selected data file is saved.

PAGE SETUP Dialog Box

Menu Bar

- MENU BAR | File | Print

Previous

- “FILE Menu” on page 25-2

Navigation

- MAIN | File | FILE | Page Setup | PAGE SETUP Dialog Box

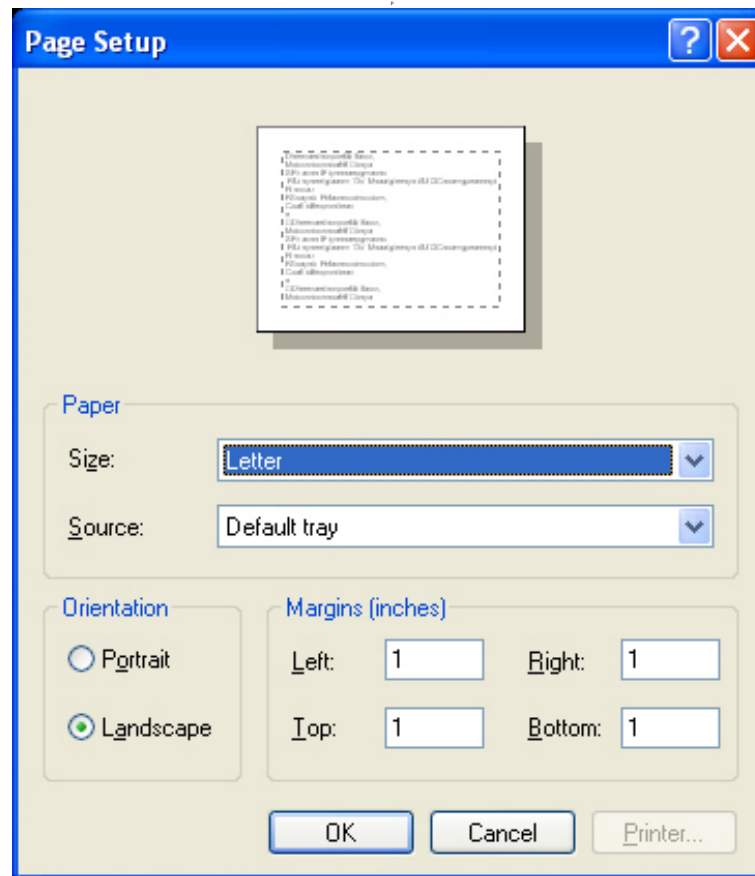


Figure 25-6. PRINT Dialog Boxes

Instructions

Select displays the standard Windows Print dialog box to print the current main display.

- If the VNA is networked, allows printing to any compatible networked printer. If a USB printer is attached, allows printing to any compatible USB printer.
- If the Graphics Header information is configured, selecting PRINT outputs the display data along with any user-defined parameters. The graphics header setup outputs data when the Remote Interface Language is set to Lightning AND the Graphics Header is set to ON.
- If the header is set to OFF, no header is printed, and the standard PAGE SETUP and then the PRINT dialog are displayed.
- If the Remote Interface Language is set to Native or HP8510, no header is output, regardless of the header setting and the same PAGE SETUP and PRINT dialogs are displayed

For additional information, see:

- [“MISC. SETUP Menu” on page 24-16](#)
- [“REMOTE LANG. Menu” on page 24-40](#)
- [“PAGE SETUP Dialog Box” on page 25-9](#)
- [“PRINT SETUP Dialog Box” on page 25-11](#)

PRINT SETUP Dialog Box

Menu Bar

- MENU BAR | File | Print Setup

Previous

- “FILE Menu” on page 25-2

Navigation

- MAIN | File | FILE | Print Setup | PRINT SETUP Dialog Box

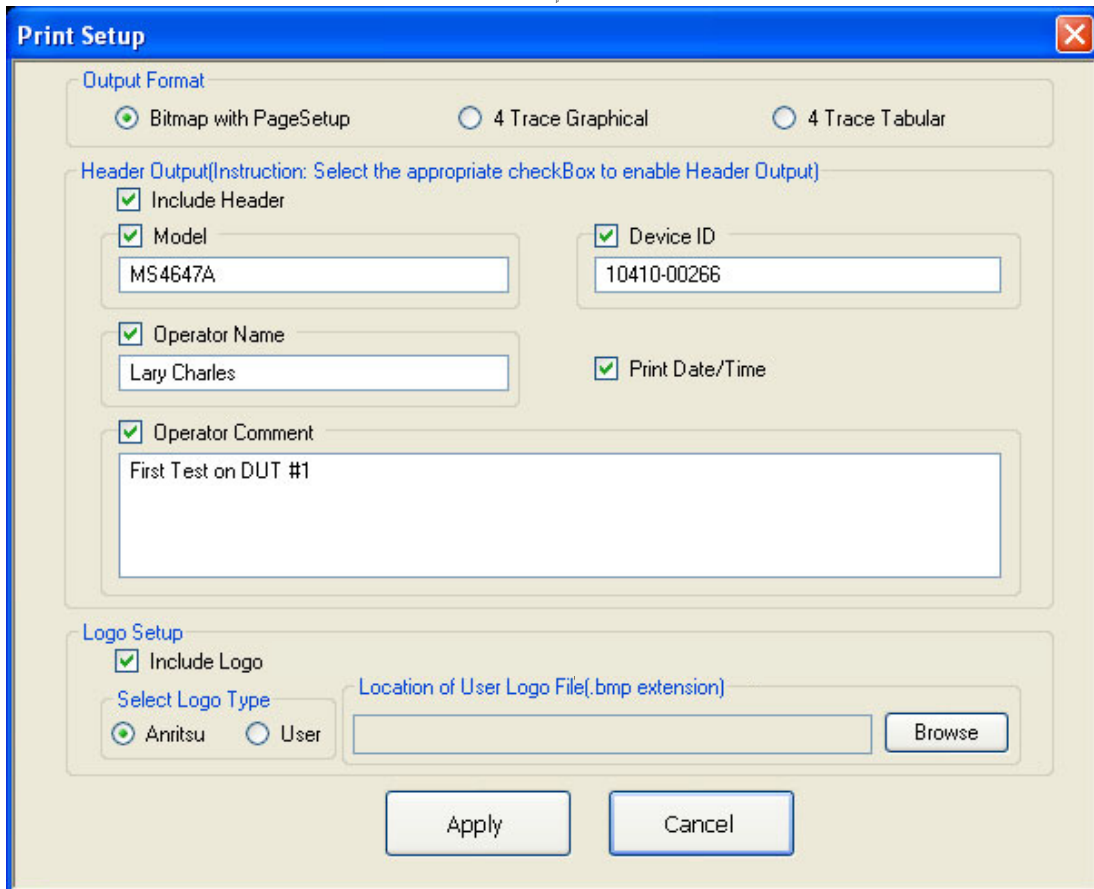


Figure 25-7. PRINT Dialog Boxes

The PRINT SETUP dialog box allows user configuration of various print output options described below.

Output Format

This button selection group allows three choices of print output:

- Bitmap (BMP) with Page Setup information
- 4 Trace Graphical Display
- 4 Trace Tabular Listing

Header Output

The header output area provides control of which display elements are to appear on the output, and the contents of each.

Include Header

- When the check box is selected, all selected header elements below are included in the output type above. When the check box is not selected, no header fields are included in the output.

Model

- Typically the VNA Model Number, but it can be any alphanumeric string. It may be selected for inclusion in the output or not selected.

Device ID

- Typically the identification of the DUT, but it can be any alphanumeric string. It may be selected for inclusion in the output or not selected.

Operator Name

- Typically the identification of the test operator, but it can be any alphanumeric string. It may be selected for inclusion in the output or not selected.

Operator Comment

- Any free form comment from the test operator as alphanumeric strings. It may be selected for inclusion in the output or not selected.

Logo Setup

This area allows the inclusion of a logo on the output report. If not selected, the logo does not appear in the output.

Select Logo Type

- The output can be configured to output the Anritsu Logo or a user defined logo. If the user defined logo is selected, it must be added to the VNA system as a BMP (Bit Mapped Graphic) File to a known location on the VectorStar Solid State Drive (SSD).
- To load a user defined logo, copy the logo to a known SSD location. Then select the User radio button, and then browse to the logo location.
- The logo will remain until changed.
- If necessary, multiple logos can be added to the system and changed as needed.

Appendix A — File Specifications

A-1 Default File Directory Structure

This appendix defines the file directory structure used on the default-configuration MS4640A Series VNA and provides the general file extensions and specifications used in the instrument. The following is the standard directory structure:

```
C:\AnritsuVNA
    \AutoCal
    \Cal
    \Data
    \Temp
```

A-2 File Extension Definitions

The following file types are used to support the instrument. The typical location provided is the default installation location.

Table A-1. File Extension Definitions (1 of 5)

Extension	Name	Definition
.acd	Precision Automatic Calibrator (AutoCal) Module Characterization File AutoCal Characterization File	Each AutoCal module has an associated characterization file that contains parametric data about the module. When AutoCal starts up, it looks for any files in the current directory with the extension .acd. If more than one file is found, the user is prompted for which file to use.
.ahc	All Hardware Calibration File	Saves all hardware calibration data on a per-system basis.
.aic	AIC Analog-In Calibration File	Saves analog-in calibration data on a per-system basis.
.alc	ALC Calibration File	Saves all available ALC calibration for all ports, per system.
.bmp	Bit-mapped Graphics File	A Windows-compatible graphic file. In the MS4640A-Series VNA, the graphic capture of the main display results in a .bmp file that includes the running graphics display,
.ccf	Calibration Kit Coefficients File	For VectorStar MS4640A Series VNA. A calibration kit coefficients file comes with each calibration kit, usually on a USB memory device. These files can be loaded onto the VNA hard disk and then recalled to active memory as required. See also .kit files.
.cha	All Channels Setup and Calibrations File	For saving and recalling all channel setup parameters and calibration data. Upon recall, restores all configuration settings to all channels. Similar to the .sta file. The .sta file does not save calibration data.

Table A-1. File Extension Definitions (2 of 5)

Extension	Name	Definition
.chx	Active Channel Setup and Calibration File	<p>For the active channel, saves the active channel setup and calibration parameters.</p> <p>Upon recall, restores the channel configuration settings and calibration data to the active channel.</p> <p>The .chx and .stx file formats are very convenient for copying the setup of one channel into another channel. Save the setup from the active channel, open an additional channel, and recall the saved .chx or .stx file into the new channel.</p> <p>Similar to the .stx file. The .stx file type does not save calibration data.</p>
.csv	Active Channel Information CSV File	<p>An exportable trace data file in a spreadsheet compatible comma-separated-value (CSV) format.</p> <p>Includes an optional descriptive heading in which the data for every trace is saved to a defined location folder.</p> <p>The data for each trace is saved as an X and a Y column to accommodate multiple parameters such as mixed frequency and time domain.</p> <p>Subsequent traces are added as additional columns.</p> <p>Instrument data can be saved to the .csv but the .csv file cannot be recalled into the VNA memory.</p> <p>Similar to the .txt file format.</p>
.edl	Embedding/De-embedding Configuration File	Default file name is EmbedDeembed.edl.
.fpc	Frequency Sweep Power Calibration File	<p>On a per-channel, per-port basis, saves the active channel and port data.</p> <p>Upon recall, restores the saved port data to the active channel.</p> <p>File extension for frequency sweep calibrations using Frequency Sweep (Linear), Frequency Sweep (Log), Segmented Sweep (Frequency-based), and Segmented Sweep (Index-based).</p> <p>Compare with .ppc file types below for power sweeps.</p>
.ini	AutoCal Default Setup File	<p>The default setup file for AutoCal. The default file name is auto_cal.ini.</p> <p>If another file is required, another AutoCal setup file should be loaded by selecting File Open Setup File.</p>
.ini	Source Initialization Table	For troubleshooting only. Saves the source initialization table data. Upon recall, restores the source initialization table data.
.ini	Frequency Initialization Table file	Default name is FreqIniTable.ini
.jpg .jpeg	Joint Photographic Experts Group Image File	User-initiated capture of the data display area of the VNA.

Table A-1. File Extension Definitions (3 of 5)

Extension	Name	Definition
.kit	Calibration Kit Coefficients File	From Anritsu Lightning 37000D Series VNA. VectorStar VNAs will read .kit files but not save them. The VectorStar VNA will convert a .kit file to a .ccf file format.
.lmt	Limit Line Configuration File	For the active trace on the active channel, saves all limit line data including number of segments, frequency range or CW, test result signs, limit fail signals, and limit external output. Upon recall, restores the limit line configuration to the active trace on the active channel
.log	Microsoft Windows Event Viewer Log File	These are operating system files logging events for the Application, Security, System, and Vector. The files are viewable by navigating to: MAIN System SYSTEM Event Log EVENT VIEWER Dialog Box
.mft	Multiple Frequency Table configuration file.	Provides the entire frequency table and is used for troubleshooting. Default file name is FreqTable.mft.
.ppc	Power Sweep Power Calibration File	On a per-channel basis, saved the active channel and port. Upon recall, restores the saved port data to the active channel. File extension for power sweep calibration files using Power Sweep (CW Frequency) or Power Sweep (Swept Frequency). Compare with .fpc file types above for frequency-based sweeps.
.ptc	Pretune Calibration File	Per system
.rcvr	Receiver Calibration File	On a per-channel basis, saves all available user receiver calibration data. Upon recall, restored the user receiver calibration data to the active channel.

Table A-1. File Extension Definitions (4 of 5)

Extension	Name	Definition
.s1p .s2p	Active Channel S1P file Active Channel S2P file	<p>Generically, an .sNp file is in standard microwave simulator text format and is similar to the .txt file described below.</p> <p>Includes a controlled header and only one or four S-parameters are saved.</p> <p>An .s1p file type holds the characteristics of a reflective calibration components. These files are loaded as needed during calibration if the calibration components is characterized by this file type.</p> <p>An .s2p file type holds the characteristics of a 2-port microwave device.</p> <p>If a full two-port calibration is applied, all of the S-parameters are always measured, even if they do not need to be displayed. The resultant .s2p file is complete with all S-parameter information.</p> <p>Upon recall, the .sNp file can be recalled and displayed as trace memory when they are loaded into the active channel.</p>
.sft	Single Frequency Table File	<p>For troubleshooting, saves the frequency table for a single frequency.</p> <p>Upon recall, restores the saved single frequency table.</p>
.sgs	Segmented Sweep File	<p>On a per-channel basis, saves the segmented sweep definition configuration data. UseSegmented sweep definition file.</p> <p>Used for frequency-based sweep and index-based sweep.</p>
.slc	Source Low Level Calibration (Src LO) calibration file	<p>On a per-system basis, saves the hardware calibration file for each VNA internal source.</p> <p>There is a separate .slc file for each internal source.</p> <p>Upon recall, restores the internal source settings.</p>
.sqm	Source Quadrupler hardware calibration file	
.sta	All Channels Setup File	<p>Same as .cha file but without calibration information.</p> <p>The file can be saved and recalled.</p>
.stx	Active Channel Setup File	<p>For saving and recalling active channel setup parameters.</p> <p>Includes all setup details for the active channel without any calibration data.</p> <p>Upon recall, restores the channel configuration settings to the active channel.</p> <p>The .chx and .stx file formats are very convenient for copying the setup of one channel into another channel. Save the setup from the active channel, open an additional channel, and recall the saved .chx or .stx file into the new channel.</p> <p>Similar to the .chx file. The .chx file includes channel calibration data.</p>

Table A-1. File Extension Definitions (5 of 5)

Extension	Name	Definition
.tdf	Active Trace Data Memory Formatted File - After Post Processing	<p>The .tdf file stores trace data or trace memory data after all post processing using an XML format.</p> <p>This is useful for comparing a DUT against a “golden device” or seeing if the performance of a DUT has changed over time.</p> <p>The file can be saved and recalled. The file will recalled into the same part of the chain that it was saved from and after any post-processing steps.</p>
.tdu	Active Trace Data Memory Unformatted File - Before Post Processing	<p>The .tdf file stores trace data or trace memory data using an XML format.</p> <p>The file saves the active trace’s memory before most post processing such as time domain, smoothing, and group delay calculations.</p> <p>The file can save data from the current trace or from the trace memory.</p> <p>A previously saved file can be recalled and loaded, and then either displayed on the current trace or displayed on the trace memory.</p> <p>This file can be recalled into either the active trace (normally in hold or sweeping very slowly) or into the active trace’s memory.</p> <p>The file will recalled into the same part of the chain that it was saved from and before any post-processing steps.</p>
.tmz	Ten (10) MHz Calibration File	Per system
.txt	Active channel trace data text file	<p>An exportable trace data file in a spreadsheet or word processor compatible format that uses tabs to delimit the output fields.</p> <p>Includes an optional descriptive heading in which the data for every trace is saved to a defined location folder.</p> <p>The data for each trace is saved as an X and Y column to accomodate multiple parameters such as mixed frequency and time domain.</p> <p>Subsequent traces are added as additional columns.</p> <p>Instrument data can be saved to the .txt file but the .txt file cannot be recalled into the VNA memory.</p> <p>Similar to the .csv file format.</p>
.xml	VNA configuration file in XML	<p>XML or eXtensible Markup Language file</p> <p>Used for the VNA configuration state when the instrument is shut down and subsequently powered back up.</p>
KIT_INFO.xyz	Calibration kit file for an Anritsu Lightning 37xxD/37xxE Series VNA.	<p>The .xyz file extension varies with the connector geometry and gender.</p> <p>The MS4640A Series VNA can read Lightning calibration kit files and convert them to a .ccf format.</p>

A-3 Definitions for Specific Files

The table below describes specific files in terms of function and use.

Table A-2. File Definitions

File	Name	Definition
auto_cal.ini	Default setup for AutoCal.	If another file is required, another AutoCal setup file should be loaded by selecting File Open Setup File.
EmbedDeembed.edl		
FreqIniTable.ini	Frequency Initialization Table file	
FreqIniTable.ini	Frequency Initialization Table files.	
FreqTable.mft	Multiple Frequency Table configuration file	
FreqTable.sft.	Single Frequency Table configuration files	

Appendix B — Error Messages

B-1 Appendix Overview

This appendix lists, describes, and provides corrective action for the error messages that appear on the instrument display. Any error messages that require action by a qualified service representative are also listed. The tables below describe the name of the message, the typical reason for its occurrence, and recommended error correction methods. In many cases, the remedial action for the error message is described with applicable cross-references to documented procedures.

B-2 System Messages

System messages are displayed in the status bar or a pop-up dialog box. They indicate that the system may be malfunctioning. System messages are recorded into the event log. Contact Anritsu Customer service if problems are not resolved with instrument re-boot.

Table B-1. Status Bar Messages

Message	Description	Display Location
Lock Error “A”	Direct Digital Synthesis Reference Unlocked	Status Bar
Lock Error “B”	Local Oscillator 1 Heterodyne Unlocked	Status Bar
Lock Error “C”	Local Oscillator 1 Offset Unlocked	Status Bar
Lock Error “D”	Source 1 Offset Unlocked	Status Bar
Lock Error “E”	Local Oscillator 1 Main Unlocked	Status Bar
Lock Error “F”	Source 1 Main Unlocked	Status Bar
Lock Error “H”	Source 1 Heterodyne Unlocked	Status Bar
RF Power Unlevel	Automatic Level Control Loop Failed	Status Bar
Auto IF Cal Failed	Intermediate Frequency Power Level Failed	Status Bar
Trigger IF Cal Failed	Intermediate Frequency Power Level Failed	Dialog Box
Power Up Self Test Failed	Self Test Failed	Status Bar
Trigger Self Test Failed	Self Test Failed	Dialog Box
Source Pretune Cal Failed	Source Pretune Calibration Failed to Complete	Dialog Box
LO Level Cal Failed	Local Oscillator Calibration Failed to Complete	Dialog Box
ALC Cal Failed	Automatic Level Control Calibration Failed to Complete	Dialog Box
Memory Location Corrupted		Status Bar/ Dialog Box
System Out of Memory		Status Bar/dialog Box

B-3 Operational Messages

Operational messages are displayed in the status bar, a pop-up dialog box, or in a table. They indicate an operation error. A system malfunction does not typically cause operational messages. Operational messages are not recorded to the event log unless specified below.

Table B-2. Multiple Source Operational Messages

Message	Display Location	Corrective Action
Equation out of range	Table, Dialog Box	Enter values for the source equation that are within the operational range of the instrument.
Start must be less than stop	Table, Dialog Box	Enter a correct start or stop frequency for the current band.
Frequency range overlaps between bands	Table, Dialog Box	Enter a correct start or stop frequency for the current band.
Undefined divide by zero	Table, Dialog Box	Enter a correct divisor value.
Invalid data entries in band x	Table, Dialog Box	Enter an in band x value

Table B-3. LO Level Cal/ALC Cal Operational Messages

Message	Display Location	Corrective Action
Incorrect sensor detected	Dialog Box	Reconnect the sensors or change the port configuration.
Power cal in frequency sweep	Dialog Box	Change the sweep to a power sweep.
Power cal in power sweep	Dialog Box	Change the sweep to a frequency sweep
Power meter not detected	Dialog Box	Verify that the power meter is properly connected and communicating with the instrument.
Power sensor out of range	Dialog Box	Change the power range.
Wrong power meter detected	Dialog Box	Restart the calibration with the connected power meter or change the power meter.

Table B-4. AutoCal/AutoCal Characterization Operational Messages

Message	Display Location	Corrective Action
Characterization file not found	Dialog Box	Load the AutoCal module characterization file.
AutoCal module not detected	Dialog Box	Check the serial cable connection.
AutoCal module orientation not detected	Dialog Box	Select the module orientation on the next dialog.
AutoCal assurance failed	Dialog Box, Event Log	Rerun AutoCal. If the problem reoccurs, there might be a problem with the AutoCal Module.
12 term cal not applied	Dialog Box	Apply the 12-term calibration.

Table B-5. RF Calibration Operational Messages

Message	Display Location	Corrective Action
Label name already exist	Dialog Box	Enter a new label name.
Blank label name not allowed	Dialog Box	Enter a valid label name.

Table B-6. Operational Messages

Message	Display Location	Corrective Action
File read error		
File write error		
External drive has no room		Delete unneeded files from the external drive.
External drive unavailable		
Hard disk has no room		Delete unneeded files from the internal drive.
Hard disk unavailable		

Subject Index

A

- Anritsu Part Numbers
 - MS4642A VNA 1-4
 - MS4644A VNA 1-4
 - MS4645A VNA 1-4
 - MS4647A VNA 1-4
- ATTENUATOR Menu Button Availability 5-20, 5-30, 6-20
- Auto-Return Button Selection Groups
 - EXTRAPOLATION menu 21-62
- Averaging Menus 8-1

C

- Calibration Guide 1-1
- Calibration Menus - 2-Port VNAs 9-1
- Calibration Menus - 4-Port VNAs 10-1
- Channel Menus 3-1
- Common-Mode Reception with Common-Mode Drive S-Parameters 20-21
- Common-Mode Reception with Differential Drive S-Parameters 20-20
- CW Mode (Off/On) 4-10

D

- Data sheets 1-1
- Differential Reception with Common-Mode Drive S-Parameters 20-20
- Differential Reception with Differential Drive S-Parameters 20-20
- Display Field
 - Step Size - Frequency Menu 4-4, 4-6, 4-12
- Documentation 1-1

E

- External Source Power Setup Menus ... 5-45, 6-38

F

- File Management Menus 25-1
- FREQUENCY Menu Changes 4-1
- Frequency Menus 4-1

I

- Impedance Transf. toggle button 11-5
- INDEX. SEG. SWP Menu 4-2
- Installation guide 1-1

M

- Maintenance Manual (MM) 1-1
- Marker Menus 23-1
- Measurement Guide (MG) 1-1

- Measurement Menus 11-1
- Models 1-4

N

- Navigation 1-3

O

- Operation Manual (OM) 1-1
- Options 1-4

P

- Power and Attenuator Menus 5-11, 6-11
- Power Calibration Menus 5-30
- Power Menus 6-1
- Previous 1-3
- Programming Manual (PM) 1-1

R

- Receiver Setup and Calibration 5-38, 6-30
- Response Menus - 2-Port VNAs 19-1
- Response Menus - 4-Port VNAs 20-1

S

- Safety Symbols
 - For Safety 1-2
 - In Manuals 1-1
 - On Equipment 1-1
- SCALE Menu Links 22-4
- SCALE Menu Units 22-2
- Scale Menus 22-1
- Segmented Sweep (Index-Based) 4-2
- Sweep Hold and Trigger Functions 7-14
- Sweep Menus 7-1
- Sweep Setup and Type 7-2
- System Menu 24-1

T

- Technical publications 1-1
- Thru Update - Calibration 9-7, 10-8
- Trace Menus 18-1
- Trigger Functions 7-14

U


- Updates to Manuals 1-3
- User Input 1-4
- User Interface Navigation 1-3

V

- VNA models 1-4

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Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA
<http://www.anritsu.com>