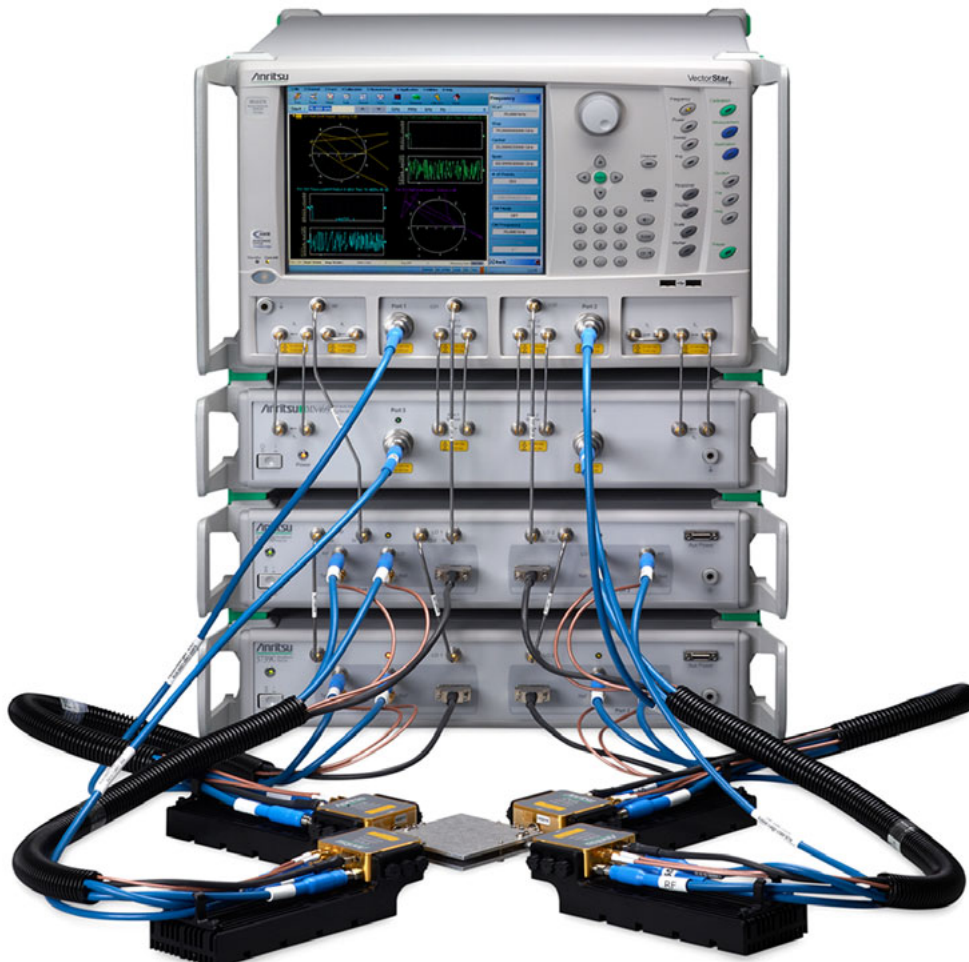


Installation Guide

VectorStar™ ME7838A4 Series Multiport Broadband Vector Network Analyzers

High Performance Modular Broadband/Banded Millimeter-Wave
Vector Network Analyzer (VNA) Multiport Measurement System

ME7838A4, 70 kHz to 110 (125) GHz



Anritsu

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DECLARATION OF CONFORMITY

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 4-Port Broadband VNA

Model Number: ME7838A4

conforms to the requirement of:

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

Electromagnetic Compatibility: EN61326-1:2006

Emissions: EN55011:2009 +A1:2010 Group 1 Class A

Immunity:	EN 61000-4-2:2009	4 kV CD, 8 kV AD
	EN 61000-4-3:2006 +A2:2010	3 V/m
	EN 61000-4-4:2004	0.5 kV S-L, 1 kV P-L
	EN 61000-4-5:2006	0.5 kV L-L, 1 kV L-E
	EN 61000-4-6: 2009	3 V
	EN 61000-4-11: 2004	100% @ 20 ms

Electrical Safety Requirement:

Product Safety: EN 61010-1:2010



Eric McLean, Corporate Quality Director

Morgan Hill, CA

28 Oct 2014
Date

European Contact: For Anritsu product CE information, contact Anritsu EMEA Limited, 200 Capability Green, Luton, Bedfordshire, LU1 3LU, England. (Telephone: +44 (0)1582 433200; Email: bert.francis@anritsu.com)

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For Chinese Customers Only YLNB

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 [Cr(VI)]	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
LCD	×	×	×	×	○	○
其他(电缆、风扇、 连接器等) (Appended goods)	×	○	×	×	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。
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Symbols Used in Manuals

Danger



This indicates a risk from a very dangerous condition or procedure that could result in serious injury or death and possible loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

Warning



This indicates a risk from a hazardous condition or procedure that could result in light-to-severe injury or loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

Caution



This indicates a risk from a hazardous procedure that could result in loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

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



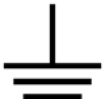
Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

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.

Table of Contents

Chapter 1 — System Overview

1-1	Introduction	1-1
1-2	ME7838A4 Series Multiport System Main Components	1-1
	ME7838A4 Broadband Systems	1-1
	ME7838A4 Banded Systems	1-1
1-3	System Component Identification	1-2
	System Component and Front Panel Connector Identification	1-3
	System Rear Panel Connector Identification (MS464xA VNA)	1-5
	System Rear Panel Connector Identification (MS464xB VNA)	1-7
	Millimeter-Wave Modules	1-9
1-4	ME7838A4 Series Configuration Part Numbers	1-10
1-5	Calibration/Verification Kits	1-12
	3656B W1 1 mm Calibration/Verification Kit with 2300-496 PVS	1-12
1-6	Performance Specifications	1-12
1-7	VNA System Documentation List	1-13
	VectorStar™ ME7838A4 Series Multiport BB/mm Wave VNA Measurement System	1-13
	VectorStar™ MS464xA Series Vector Network Analyzer	1-13
	VectorStar™ MS464xB Series Vector Network Analyzer	1-13
	VectorStar™ MN469xC Series Multiport VNA Measurement System	1-13
	Calibration, Verification, and System Performance Verification	1-13
	Additional Documentation	1-14
1-8	Contacting Anritsu	1-14

Chapter 2 — System Assembly

2-1	Introduction	2-1
2-2	Assembly Notes	2-1
2-3	Required Tools	2-2
2-4	Unpacking the Instruments	2-2
2-5	Rear Panel VNA GPIB Connection	2-3
2-6	Rear Panel Connections Between System Components (MS464xA VNA)	2-4
2-7	Rear Panel Connections Between System Components (MS464xB VNA)	2-7
	Cable Connections (Systems without Option 031)	2-8
2-8	Semi-rigid Cable Connections Between System Components	2-11
2-9	Front Panel Cable Connections	2-15
2-10	Front Panel to Millimeter-Wave Module Connections	2-18
2-11	Front Panel to OML/VDI Module Connections	2-20

Chapter 3 — ME7838A4 Initial System Checkout

3-1	Introduction	3-1
3-2	Power Up Procedure	3-1
3-3	VNA Preset Procedure	3-2

Table of Contents (Continued)

3-4	MS464xA VNA Broadband/Banded Configuration	3-3
	Receiver Configuration for Broadband	3-3
	3739 Setup for Broadband.	3-4
	Frequency Setup	3-5
	Receiver Configuration for Multiple Source	3-6
	3739 Setup for Banded Modules	3-7
	3739 Setup for OML/VDI Selection	3-8
	OML Band Selection	3-9
	VDI Band Selection	3-10
3-5	MS464xB VNA Broadband/Banded Configuration	3-11
	Receiver Configuration for Broadband	3-11
	3739 Setup for Broadband.	3-12
	Frequency Setup	3-13
	Receiver Configuration for Multiple Source	3-14
	3739 Setup for Banded Modules	3-16
	3739 Setup for OML/VDI Selection	3-17
	OML Band Selection	3-18
	VDI Band Selection	3-19
3-6	ME7838A4 Configuration Verification – BB/mmW Modules	3-20

Appendix A — ME7838A4 Series Multiport Specifications

A-1	ME7838A4 Multiport Broadband/Banded VNA System Specifications.	A-1
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Chapter 1 — System Overview

1-1 Introduction

This manual provides instructions for setup and initial test of the VectorStar™ ME7838A4 Multiport Broadband/Banded Millimeter Wave Vector Network Analyzer (VNA) System. The chapters are:

- [Chapter 1 — System Overview](#)
Provides an overview of the system, its major part numbers, options, and components.
- [Chapter 2 — System Assembly](#)
Describes the general assembly instructions and cabling procedures for the system.
- [Chapter 3 — ME7838A4 Initial System Checkout](#)
Provides an initial system checkout for a completely assembled system. Also provides a quick checkout of the PC control system via the IEEE-488 GPIB interface. Once this procedure is complete, the system is ready for full calibration and system performance verification.
- [Appendix A — ME7838A4 Series Multiport Specifications](#)
Provides a binder tab for the VectorStar™ ME7838A4 Modular Broadband/Millimeter-Wave Technical Data Sheet – 11410-00593 and other documents as required.

See [Table 1-4, “ME7838A4 Multiport Broadband/Millimeter-Wave VNA System Components,”](#) on page 1-10 for a listing of each standard and optional configuration.

1-2 ME7838A4 Series Multiport System Main Components

ME7838A4 Broadband Systems

The ME7838A4 Broadband Multiport system consists of the following components:

- MS4647A or MS4647B VNA with Option 007 (Receiver Offset), Option 070 (70 kHz Low End Frequency Extension), Option 08x (Modular Broadband Connection Capability)
- MN4697C Multiport Test Set
- 3736B Broadband Test Set
- 3739C Broadband Test Set
- Four 3743A Millimeter-Wave Modules
- Front and rear panel cables

ME7838A4 Banded Systems

The ME7838A4 Banded Multiport system consists of the following components:

- MS4644A or MS4644B – or – MS4645A or MS4645B VNA with Option 082/083
- MN4694C Multiport Test Set
- 3736B Broadband Test Set
- 3739C Broadband Test Set
- Four 3744A-EE, 3744A-EW, or four OML/VDI Millimeter-Wave Modules
- Front and rear panel cables

1-3 System Component Identification

Figure 1-1 shows the ME7838A4 Multiport System major components.

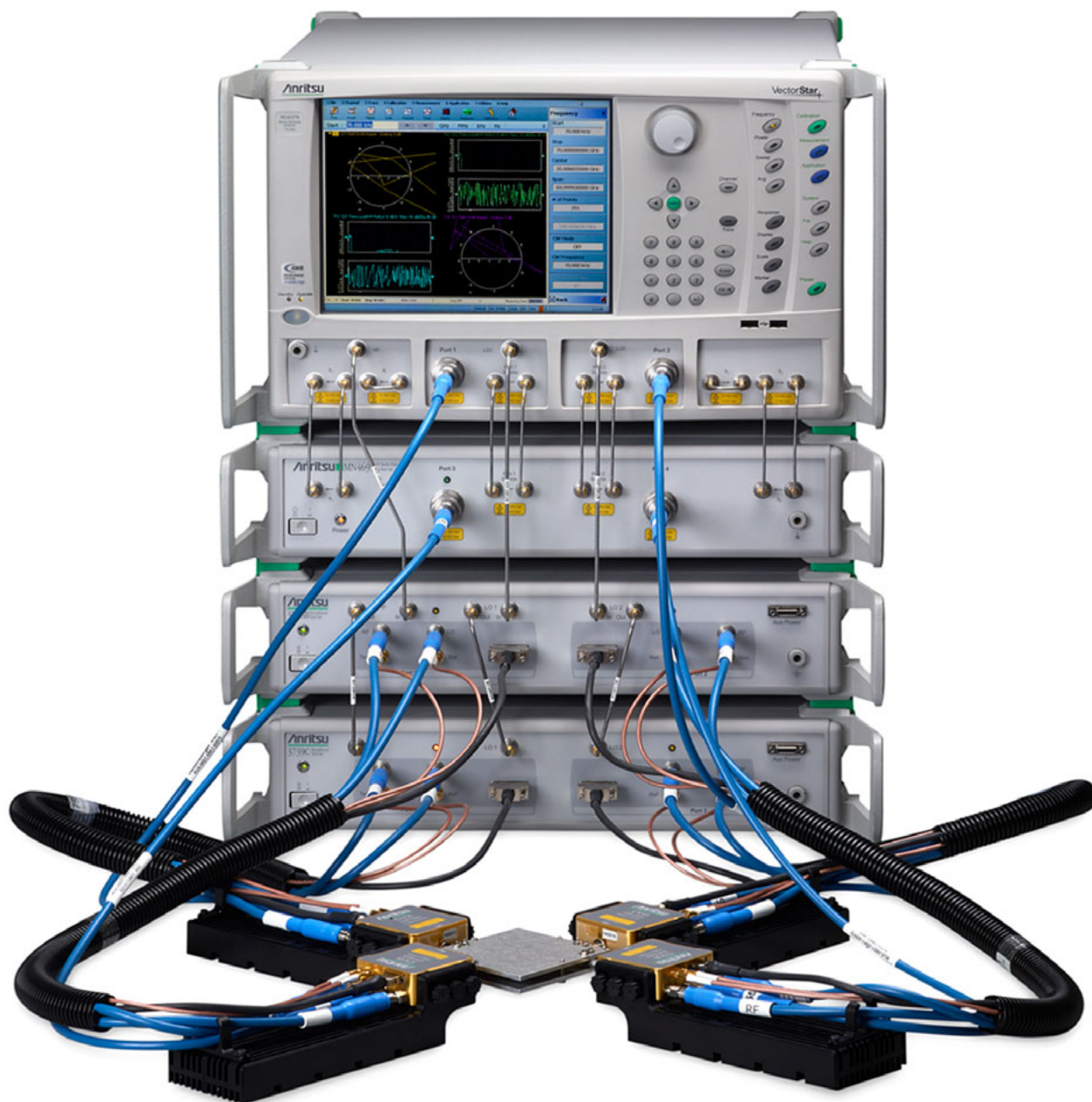


Figure 1-1. ME7838A4 Multiport System, with 3743A Millimeter-Wave Modules

System Component and Front Panel Connector Identification

The ME7838A4 Series Multiport System components and connectors are identified in [Figure 1-2](#) and [Table 1-1](#).

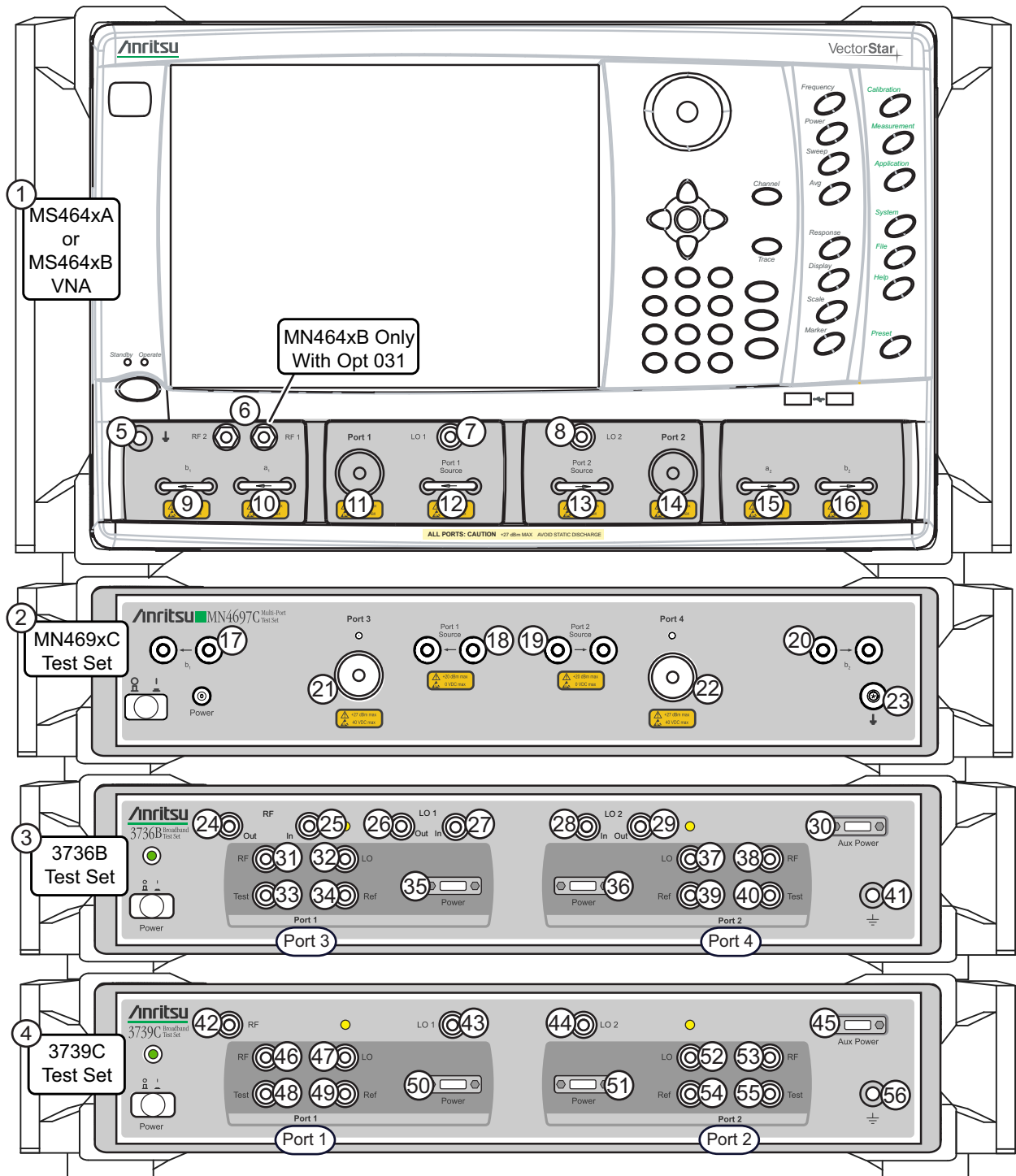


Figure 1-2. ME7838A4 Series Multiport Components and Front Panel Connectors

Table 1-1. ME7838A4 Series Multiport Components and Front Panel Connectors

Index	Description	Index	Description
System Components		3736B Broadband Test Set (Continued)	
1	VectorStar™ MS464xA or MS464xB VNA	28	LO 2 Input
2	MN469xC – 4 Port Test Set	29	LO 2 Output
3	3736B Test Set	30	Aux Power Source
4	3739C Test Set	31	Port 3 RF
MS464xA/B VNA		32	Port 3 LO
5	Ground	33	Port 3 Test IF
6	RF Output <ul style="list-style-type: none"> • Single source port designated “RF” on MS464xA/B • Dual source ports designated “RF” 1 and “RF 2” on MS464xB only (with Option 031 Dual Source Architecture) 	34	Port 3 Ref IF
7	LO 1 Output	35	Port 3 Power
8	LO 2 Output	36	Port 4 Power
9	b1 Direct Access Loop	37	Port 4 LO
10	a1 Direct Access Loop	38	Port 4 RF
11	Test Port 1	39	Port 4 Ref IF
12	Port 1 Source Direct Access Loop	40	Port 4 Test IF
13	Port 2 Source Direct Access Loop	41	Ground Port
14	Test Port 2	3739C Broadband Test Set	
15	a2 Direct Access Loop	42	RF Input
16	b2 Direct Access Loop	43	LO 1 Input
MN469xC Multiport Test Set		44	LO 2 Input
17	b1 Input/Output to VNA	45	Aux Power Source
18	Port 1 Source Input/Output to VNA	46	Port 1 RF
19	Port 2 Source Input/Output to VNA	47	Port 1 LO
20	b2 Input/Output to VNA	48	Port 1 Test IF
21	Test Port 3	49	Port 1 Ref IF
22	Test Port 4	50	Port 1 Power
23	Ground	51	Port 2 Power
3736B Broadband Test Set		52	Port 2 LO
24	RF Output	53	Port 2 RF
25	RF Input	54	Port 2 Ref IF
26	LO 1 Output	55	Port 2 Test IF
27	LO 1 Input	56	Ground

System Rear Panel Connector Identification (MS464xA VNA)

The ME7838A4 Series Multiport System rear panel connectors are identified in [Figure 1-3](#) and [Table 1-2](#).

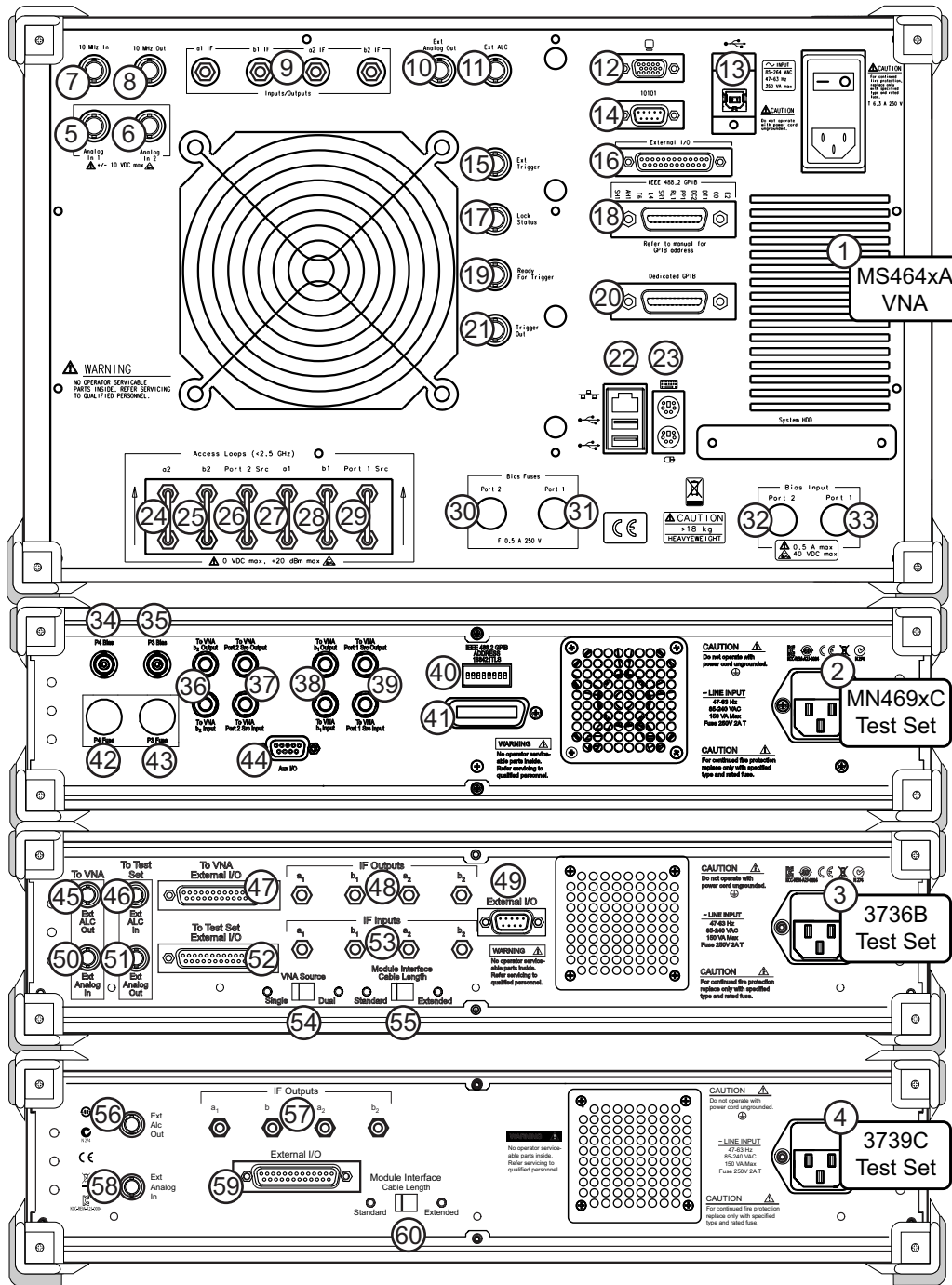


Figure 1-3. ME7838A4 Multiport System Rear Panel Connector Identification (using MS464xA VNA)

Table 1-2. ME7838A4 Series Multiport Components and Rear Panel Connectors (MS464xA VNA)

Index	Description	Index	Description
System		32	Bias Input - Port 2
1	VectorStar™ MS464xA VNA	33	Bias Input - Port 1
2	MN469xC 4 Port Test Set	MN469xC Multiport Test Set	
3	3736B Test Set	34	P4 Bias
4	3739C Test Set	35	P3 Bias
MS464xA VNA		36	b2 Input/Output to VNA
5	Analog In 1	37	Port 2 Src Input/Output to VNA
6	Analog In 2	38	b1 Input/Output to VNA
7	10 MHz In	39	Port 1 Src Input/Output to VNA
8	10 MHz Out	40	IEEE 488.2 GPIB Address
9	IF Inputs/Outputs a1, b1, a2, b2	41	IEEE 488.2 GPIB
10	External Analog Out	42	P4 Fuse
11	External ALC	43	P3 Fuse
12	External Monitor	44	Aux I/O Port
13	USB 2.0 Type B Port	3736B Broadband Test Set	
14	RS-232 Serial Port	45	External ALC Out - To VNA
15	Ext Trigger	46	External ALC In - To Test Set
16	External I/O Port	47	External I/O Port - To VNA
17	Lock Status	48	IF Outputs a1, b1, a2, b2
18	IEEE 488.2 GPIB Port	49	External I/O Port
19	Ready For Trigger	50	External Analog In - To VNA
20	Dedicated GPIB Port	51	External Analog Out - To Test Set
21	Trigger Out	52	External I/O Port - To Test Set
22	USB 2.0 Type A and Ethernet Ports	53	IF Inputs a1, b1 a2, b2
23	Keyboard and Mouse PS/2	54	VNA Single/Dual Source Switch
24	Access Port - a2	55	Module Interface Cable Length Switch
25	Access Port - b2	3739C Broadband Test Set	
26	Access Port - Port 2 Src	56	External ALC Out
27	Access Port - a1	57	IF Outputs a1, b1, a2, b2
28	Access Port - b1	58	External Analog In
29	Access Port - Port 1 Src	59	External I/O Port
30	Bias Fuse - Port 2	60	Module Interface Cable Length Switch
31	Bias Fuse - Port 1		

System Rear Panel Connector Identification (MS464xB VNA)

The ME7838A4 Series Multiport System rear panel connectors are identified in [Figure 1-4](#) and [Table 1-3](#).

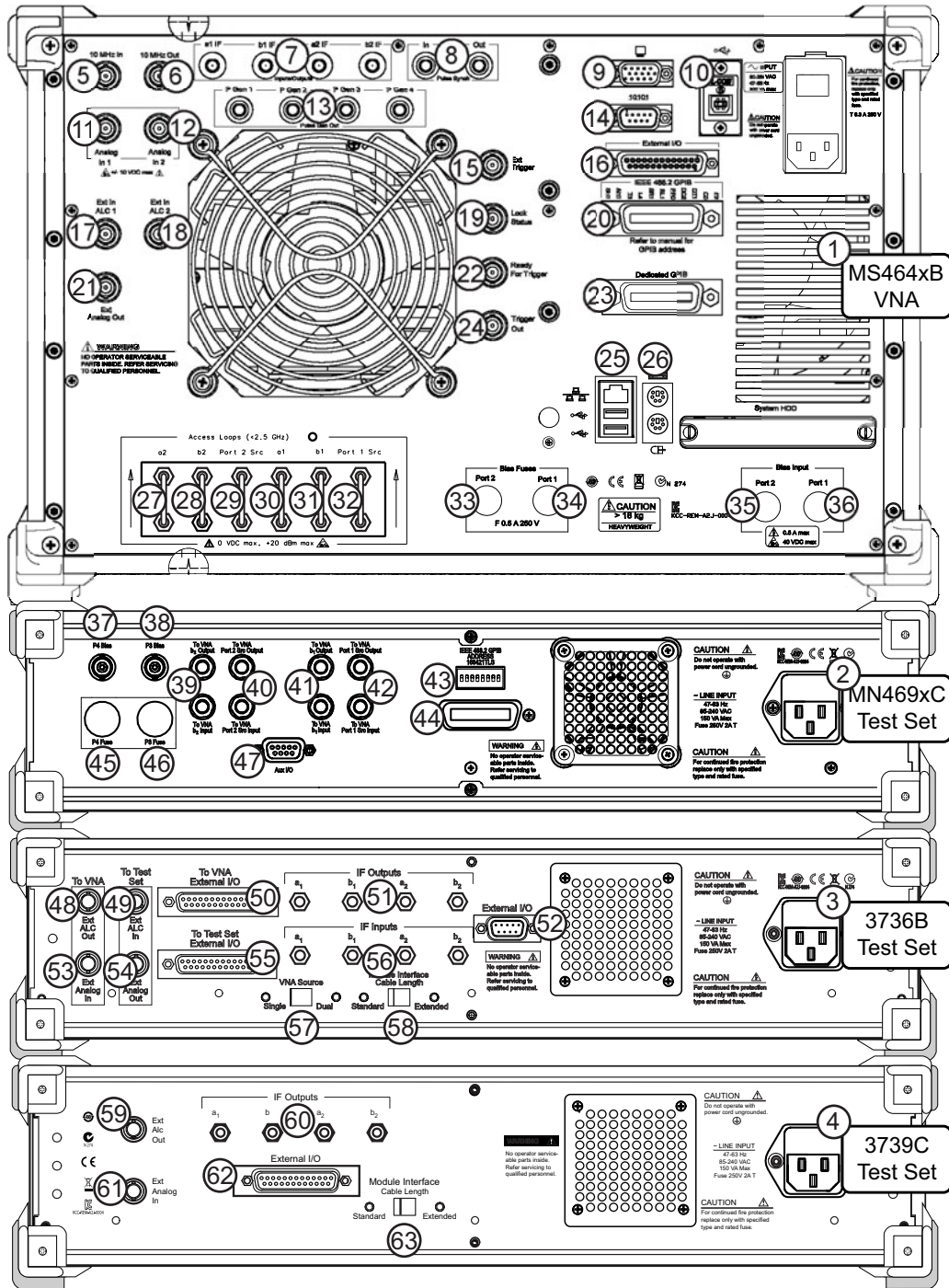


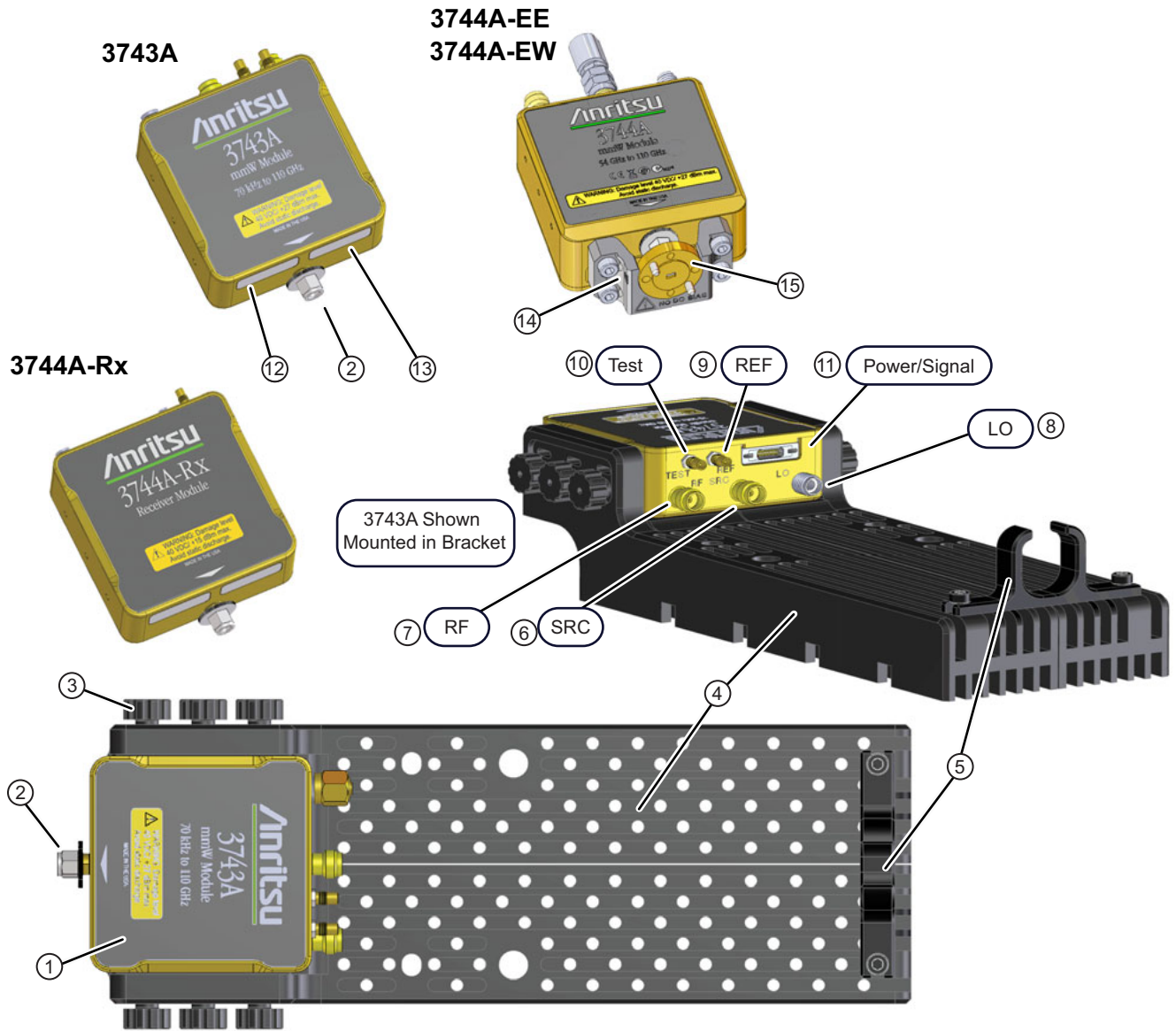
Figure 1-4. ME7838A4 Multiport System Rear Panel Connector Identification (using MS464xB VNA)

Table 1-3. ME7838A4 Series Multiport Components and Rear Panel Connectors (MS464xB VNA)

Index	Description	Index	Description
System		33	Bias Fuse - Port 2
1	VectorStar™ MS464xB VNA	34	Bias Fuse - Port 1
2	MN469xC – MultiPort Test Set	35	Bias Input - Port 2
3	3736B Test Set	36	Bias Input - Port 1
4	3739C Test Set	MN469xC Multiport Test Set	
MS464xB VNA		37	P4 Bias
5	10 MHz In	38	P3 Bias
6	10 MHz Out	39	Lowband b2 Input/Output to VNA
7	IF Inputs/Outputs a1, b1, a2, b2	40	Lowband Port 2 Src Input/Output to VNA
8	Pulse Synch In/Out	41	Lowband b1 Input/Output to VNA
9	External Monitor	42	Lowband Port 1 Src Input/Output to VNA
10	USB 2.0 Type B Port	43	IEEE 488.2 GPIB Address
11	Analog In 1	44	IEEE 488.2 GPIB
12	Analog In 2	45	P4 Fuse
13	Pulse Gen Out – P Gen1/2/3/4	46	P3 Fuse
14	RS-232 Serial Port	47	Aux I/O Port
15	Ext Trigger	3736B Broadband Test Set	
16	External I/O Port	48	External ALC Out - To VNA
17	External In – ALC 1	49	External ALC In - To Test Set
18	External In – ALC 2	50	External I/O Port - To VNA
19	Lock Status	51	IF Outputs a1, b1, a2, b2
20	IEEE 488.2 GPIB Port	52	External I/O Port
21	External Analog Out	53	External Analog In - To VNA
22	Ready For Trigger	54	External Analog Out - To Test Set
23	Dedicated GPIB Port	55	External I/O Port - To Test Set
24	Trigger Out	56	IF Inputs a1, b1, a2, b2
25	USB 2.0 Type A and Ethernet Ports	57	VNA Single/Dual Source Switch
26	Keyboard and Mouse PS/2	58	Module Interface Cable Length Switch
27	Access Port - a2	3739C Broadband Test Set	
28	Access Port - b2	59	External ALC Out
29	Access Port - Port 2 Src	60	IF Outputs a1, b1, a2, b2
30	Access Port - a1	61	External Analog In
31	Access Port - b1	62	External I/O Port
32	Access Port - Port 1 Src	63	Module Interface Cable Length Switch

Millimeter-Wave Modules

The 3743A connects to the 3736B and 3739C Test Set ports and to Test Port 1 through Test Port 4 on the MN4697C. The 3744A-xx Millimeter-Wave Modules connect only to the ports on the 3736B and 3739C Test Sets.



1 – 3743A Millimeter-Wave Module in Bracket	9 – REF SSMC connector
2 – W1 Connector	10 – TEST SSMC connector
3 – Knurled M3 x 8 mm Mounting Screws	11 – Power/Signal latching Bi-Lobe™ connector
4 – Module Mounting Bracket	12 – Factory Calibrated Port Assignment Label
5 – Module Power/Signal Cable Restraint	13 – Module Serial Number Label
6 – SRC V connector	14 – Waveguide Adapter Bracket
7 – RF V connector	15 – WR-10 or WR-12 Waveguide to 1 mm Adapter
8 – LO K connector	

Figure 1-5. Millimeter-Wave Module in Bracket

Note

The left-side and right-side mmW modules are identical. The modules have the same connector orientation and sequence and can be used on either port. There is no module right-hand or left-hand orientation.

However, in the as-shipped configuration (except for the 3744A-Rx Module) each module is calibrated for a specific VNA serial number and a specific VNA Test Port. The module labels indicate the calibrated port assignment.

1-4 ME7838A4 Series Configuration Part Numbers

The ME7838A4 Series Multiport VNA system configuration uses different combinations of the components listed in the table below. Additional configuration information is available in the relevant technical data sheet. Refer to [Appendix A — ME7838A4 Series Multiport Specifications](#) for the TDS part number.

Table 1-4. ME7838A4 Multiport Broadband/Millimeter-Wave VNA System Components (1 of 3)

Applicable ME7838x4 System	Part Number	Description	Specifications
VNA Configuration			
ME7838A4	MS4647A MS4647B	VectorStar™ MS4647A/B Vector Network Analyzer (VNA)	10 MHz to 70 GHz V (m) Test Ports
ME7838A4	MS4640A-007 MS4640B-007	Receiver Offset Option	–
ME7838A4	MS4640A-002 MS4640B-002	Time Domain Option	–
ME7838A4	MS4640A-070 MS4640B-070	70 kHz Low End Frequency Extension Option	70 kHz to 10 MHz <ul style="list-style-type: none"> • 70 kHz low end is specified for the option. • 40 kHz is allowed for the option.
ME7838A4	MS4647A-08x MS4647B-08x	VectorStar™ MS4647A/B-081 VNA Broadband System Option	Use Option 051, 061, or 062
ME7838A4	MS464xA-08x MS464xB-08x	VectorStar™ MS4644A/B-083 VNA <i>Banded System Option</i>	Use Option 051, 061, or 062
ME7838A4	MN4697C	Multiport Test Set (Broadband)	With front/rear panel interface cables
ME7838A4	MN4694C	Multiport Test Set (Banded)	With front/rear panel interface cables
ME7838A4	3736B	Broadband Test Set	With front/rear panel interface cables
ME7838A4	3739C	Broadband Test Set	With front/rear panel interface cables
Millimeter-Wave Modules			
ME7838A4	3743A	Broadband Millimeter-Wave Module	70 kHz to 110+ GHz
ME7838A4	3744A-EE	Banded Millimeter-Wave Module	56 GHz to 95 GHz
ME7838A4	3744A-EW	Banded Millimeter-Wave Module	65 GHz to 110 GHz
ME7838A4	3744A-Rx	Receiver Module	30 GHz to 110 GHz

Table 1-4. ME7838A4 Multiport Broadband/Millimeter-Wave VNA System Components (2 of 3)

Applicable ME7838x4 System	Part Number	Description	Specifications
OML/VDI Millimeter-Wave Frequency Extension Modules			
ME7838A4	VxxVNA2-xx	OML	50 GHz to 500 GHz
ME7838A4	WRxxxx	VDI	50 GHz to 750 GHz (1.1 THz)
Waveguide Adapter Kits			
ME7838A4	74394-1 ^a	Waveguide Accessory Kit, 3744A-EE and 3744A-EW	–
ME7838A4	SM6540	WG Adapter Kit, V Band	WR-15
ME7838A4	35WR12WF-EE	WG Adapter Kit, E Band	WR-12
ME7838A4	35WR10WF-EW	WG Adapter Kit, W Band	WR-10
ME7838A4	ME7838A4-SS020	On-Site System Assembly and Verification	–
Interconnect Cable Part Numbers			
ME7838A4	67357-18	K male-male semi-rigid cables	–
ME7838A4	67357-19	K male-male semi-rigid cables	–
ME7838A4	3-67357-38	K male-male semi-rigid cables	–
ME7838A4	67357-230	K male-male semi-rigid cables	–
ME7838A4	67357-231	K male-male semi-rigid cables	–
ME7838A4	67357-232	K male-male semi-rigid cables	–
ME7838A4	3-62109-142	V male-male semi-rigid cables	–
ME7838A4	62112-80	SMA male-male semi-rigid cables	–
ME7838A4	62112-81	SMA male-male semi-rigid cables	–
ME7838A4	73598-1	SMA male-male flexible cables	–
ME7838A4	3-80734	SMA male-male flexible cables	–
ME7838A4	75685-1	mm-Wave Module Interface Cables (for 3743A, 3744A-EE, 3744A-EW modules) Group of 5 cables for each port	–
ME7838A4	75685-2	OML Module Interface Cables Group of 4 cables for each port	–
ME7838A4		VDI Module Interface Cables Group of 4 cables for each port	–
ME7838A4	75685-3	mm-Wave Module Interface Cables (for 3744A-Rx modules) Group of 3 cables for each port	–
Phase Stable Cable Option			
ME7838A4	806-206	1.85 mm Phase Stable Interconnect Cable	70 cm (24 inches) • V (m) to V (f) • 2 cables
ME7838A4	806-209	1.85 mm Phase Stable Interconnect Cable	91 cm (36 inches) • V (m) to V (f) • 2 cables

Table 1-4. ME7838A4 Multiport Broadband/Millimeter-Wave VNA System Components (3 of 3)

Applicable ME7838x4 System	Part Number	Description	Specifications
MS464xA or MS464xB VNA Front Panel Options			
ME7838A4	MS4647A/B-051 MS4645A/B-051 MS4644A/B-051	Front Panel Loops	6 Front Panel Loops • Provides front and rear panel loops for b1, a1, Port 1 Source, Port 2 Source, a2, and b2
ME7838A4	MS4647A/B-061 MS4645A/B-061 MS4644A/B-061	Active Measurement Suite	2 Attenuators • Includes front and rear panel loops above with two (2) attenuators, bias tees in test set, gain compression, and efficiency measurement software.
ME7838A4	MS4647A/B-062 MS4645A/B-062 MS4644A/B-062	Active Measurement Suite	4 Attenuators • Includes front and rear panel loops above with four (4) attenuators, bias tees in test set, gain compression, and efficiency measurement software.

a. The 74394-1 Waveguide Accessory Kit comes without the adapter bracket, the waveguide to coax adapter, and the V210 termination. These items come already attached to the 3744A-EE and 3744A-EW mmW modules.

1-5 Calibration/Verification Kits

3656B W1 1 mm Calibration/Verification Kit with 2300-496 PVS

The 3656B W1 (1 mm) Calibration and Verification Kit with 2300-496 Performance Verification Software is recommended in applications using 1 mm coaxial cable. The kit comes with the calibration/verification hardware and the system performance verification software (PVS). For additional information, see:

- **VectorStar™ 3656B W1 Calibration/Verification Kit and 2300-496 PVS User Guide – 10410-00270**
- **VectorStar™ 3656B W1 Calibration/Verification Kit and 2300-496 PVS Quick Start Guide – 10410-00285**

1-6 Performance Specifications

System performance specifications for the VectorStar™ ME7838A4 Broadband/Millimeter Wave VNA System are located in the **VectorStar™ ME7838A4 Series Broadband/Millimeter-Wave VNA System Technical Data Sheet – 11410-00704**, available on the CD-ROM that came with the shipment, or at <http://www.anritsu.com>.

1-7 VNA System Documentation List

The following documentation sets are available in support of the ME7838A4 Series systems. All documents listed in this section (except for the MS464xA VNA) are available on the VectorStar™ User Documentation Disc – 10920-00067. (The documents for VectorStar MS4640A Series VNA documents are available on 10920-00049). Calibration, Verification, and System Performance Verification documents are included on a separate disc included with each calibration kit.

VectorStar™ ME7838A4 Series Multiport BB/mm Wave VNA Measurement System

- ME7838A4 4-Port Broadband VNA Technical Data Sheet (TDS) – 11410-00704
- ME7838A4 Series Multiport BB/mm-Wave Quick Start Guide (QSG) – 10410-00735
- ME7838A4 Series Multiport BB/mm-Wave Installation Guide (IG) – 10410-00734
- ME7838A4 Series Multiport BB/mm-Wave Maintenance Manual (MM) – 10410-00736
- Broadband/Banded Millimeter-Wave Module Reference Manual (RM) – 10410-00311

VectorStar™ MS464xA Series Vector Network Analyzer

- MS464xA Series VNA Technical Data Sheet – 11410-00432
- MS464xA Series VNA Operation Manual (OM) – 10410-00266
- MS464xA Series VNA Measurement Guide (MG) – 10410-00269
- MS464xA Series VNA Programming Manual (PM) – 10410-00267
- MS464xA Series VNA Help System (OM, PM, and MG) – 10450-00008
- MS464xA Series VNA Maintenance Manual (MM) – 10410-00268
- MS464xA Series VNA User Documentation Disc – 10920-00049

VectorStar™ MS464xB Series Vector Network Analyzer

- MS464xB Series VNA Technical Data Sheet – 11410-00611
- MS464xB Series VNA Operation Manual – 10410-00317
- MS464xB Series VNA Measurement Guide – 10410-00318
- MS464xB Series VNA User Interface Reference Manual – 10410-00319
- MS464xB Series VNA Maintenance Manual – 10410-00320
- MS464xB Series VNA Programming Manual – 10410-00322
- MS464xB Series VNA Programming Manual Supplement – 10410-00323
- MS464xB Series VNA User Help System – 10450-00040

VectorStar™ MN469xC Series Multiport VNA Measurement System

- MN469xC Series Multiport VNA Measurement System Technical Data Sheet – 11410-00777
- MN4690C Series Multiport Test Set Installation Guide – 10410-00737
- MN469xC Series Multiport Test Set Quick Start Guide – 10410-00738
- MN469xC Series Multiport Test Set Maintenance Manual – 10410-00730

Calibration, Verification, and System Performance Verification

- 36585K and 36585V Precision Auto Calibrator (AutoCal) Module Reference Manual – 10410-00279
- 3650A, 3652A, and 3654D Mechanical Calibration Kit Reference Manual – 10410-00278
- 3666-1, 3668-1, 3669B-1 Verification Kits and 3-2300-527 Performance Verification Software (PVS) User Guide – 10410-00270
- 3666-1, 3668-1, 3669B-1 Verification Kits and 3-2300-527 PVS Quick Start Guide – 10410-00285

- VectorStar 3656B W1 Calibration/Verification Kit and 2300-496 PVS User Guide – 10410-00286

Additional Documentation

For additional literature related to the Anritsu VectorStar™ family of products, refer to:
<http://www.anritsu.com/VectorStar>

1-8 Contacting Anritsu

To contact Anritsu, please visit:

<http://www.anritsu.com/contact.asp>

From here, you can select the latest sales, select service and support contact information in your country or region, provide online feedback, complete a "Talk to Anritsu" form to have your questions answered, or obtain other services offered by Anritsu.

Updated product information can be found on the Anritsu web site:

<http://www.anritsu.com/>

Search for the product model number. The latest documentation is on the product page under the Library tab.

Example URL for MS464xB:

<http://www.anritsu.com/en-us/products-solutions/products/MS464xB-series.aspx>

Chapter 2 — System Assembly

2-1 Introduction

This chapter describes unpacking, assembly, and cabling procedures for the VectorStar™ ME7838A4 Multiport Broadband/Millimeter-Wave VNA Measurement Multiport System. The major system components are:

- VectorStar™ MS4647A or MS4647B VNA System, 70 kHz to 70 GHz, V Connectors (Broadband)
- VectorStar™ MS464xA or MS464xB VNA System, 70 kHz to 50 GHz, K Connectors (Banded)
- MN4697C Multiport Test Set (Broadband)
- MN4694C Multiport Test Set (Banded)
- 3736B Broadband Test Set
- 3739C Broadband Test Set
- Front and rear panel cables.
- 3743A Broadband Millimeter-Wave Modules (4 each)
- 3744A-xx Banded Millimeter-Wave Modules (4 each)
- Optional OML or VDI Frequency Extension Modules (4 each)
- Test Set to Module Connection Cables (4 sets)
- Phase Stable RF Connection Cables (4 each) - (used with 3743A modules only).

2-2 Assembly Notes

The following general assembly notes apply to the unpacking, installation, and assembly procedures:

- **Heavy**
The VectorStar™ VNA instrument is heavy. Use at least two people to lift the VNA and set it on top of the test sets.
- **Fragile RF Cables and Cable Loops**
The VNA instrument has fragile RF cables (such as the **Cable Loops**) connected to both the front and rear panels. Be careful not to bend these cables when handling the instrument.
- **V, K, SMA, and 3.5 mm Connectors**
Best practices recommend using an **Anritsu 01-201 Torque End Wrench** to tighten the 8 mm (5/16") ME7838A4 V, K, and SMA/3.5 mm connectors. The correct torque setting is 0.9 N·m (8 lbf·in).
Use the torque wrench with an open end backing wrench. Best practices recommend using an **Anritsu 01-204 8 mm (5/16") End Wrench**.
- **W1 Connectors**
Best practices recommend using an **Anritsu 1-504 Torque End Wrench** to tighten the 6 mm nut on W1 connectors. The correct torque setting is 0.45 N·m (4 lbf·in).
Use a 6 mm end wrench with the torque wrench above. Best practices recommend using an **Anritsu 01-505 6 mm/7mm Open End Wrench**.
- **SSMC Connectors**
For the 3743A Modules, the **TEST** and **REF** connectors are SSMC-type connectors. Best practices recommend using an **Anritsu 01-511 4 mm (5/32") Torque End Wrench** set to 0.22 N·m (2 lbf·in).
Alternatively, use a 4 mm (5/32") end wrench and carefully hand tighten to less than 0.22 N·m (2 lbf·in).

- **Knurled-Head Thumbscrews on Module Mounting Brackets**

In the as-shipped module bracket configuration, each module is held into its bracket by six (6) knurled head M3 × 8 mm thumbscrews, with three (3) on each side. Only use hand tightening for these screws. If the module is installed in a user-provided bracket, use hand tightening, make sure that between 5 and 6 mm of screw threads are engaged in the module body. Do not bottom out screws. Do not over torque.

- **GPIB and DB Connectors**

Tighten the connector screws with a flat blade screwdriver.

Note	For instructions on waveguide alignment on the 3744A-xx series millimeter-Wave modules, refer to 10410-00311, <i>VectorStar™@ Broadband/Banded Millimeter-Wave Modules Reference Manual</i> .
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Caution	To avoid connector damage or inaccurate measurements, before making any connections, review the 10100-00060-Connector Care Instruction Sheet. Observe connector torque requirements where indicated in this installation guide.
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Caution	Do not plug any ME7838A4 power cords into main AC power source until all ME3838A4 components are in place, interconnected, and ready for power-up.
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2-3 Required Tools

- **Anritsu 01-201 8mm (5/16") Torque Wrench** or equivalent rated at 0.9 N·m (8 lbf·in) for SMA, K, and V connectors
- **Anritsu 01-204 8 mm (5/16") End Wrench** or equivalent
- **Anritsu 01-511 4 mm Torque Wrench** or equivalent rated at 0.22 N·m (2 lbf·in) for 3743A Module SSMC connectors
- **4 mm (5/32") End Wrench** for Millimeter-Wave Module SSMC connectors
- Small flat-blade **screwdriver**
- Phillips screwdriver

2-4 Unpacking the Instruments

Caution



A MS4647A/B VNA unit is heavy. To avoid personal injury, it must be lifted and maneuvered by at least two people during installation.

If mounting on a workbench surface, first position the 3739C Broadband Test Set with access to its front and rear panels. Stack the remaining test sets on top of one another, then finally the VNA.

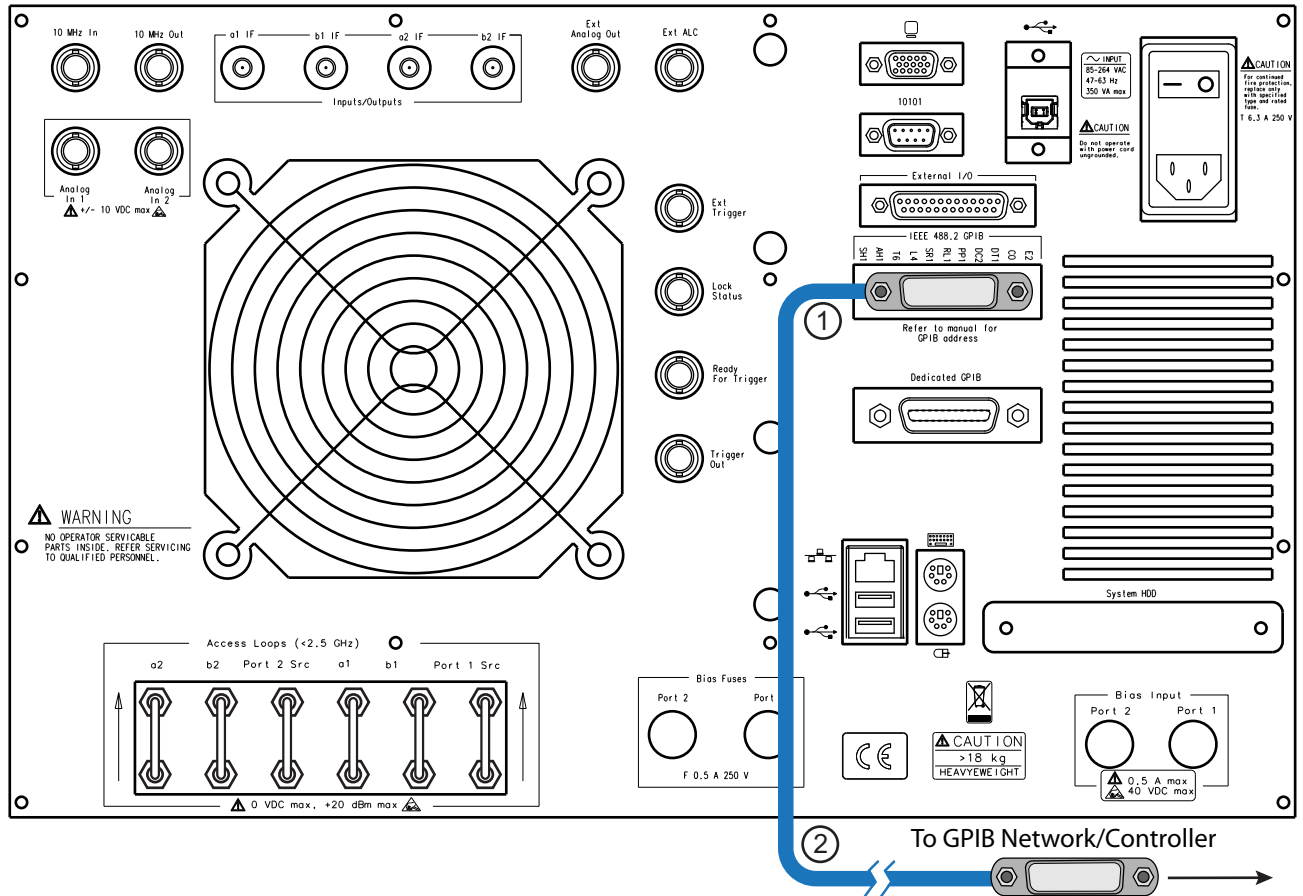
If mounting into rack or console, make sure the Test Sets have been installed, and that the rack/console is carefully positioned on a flat and level surface. If equipped, make sure any casters are locked. Use two people to lift the VNA unit and two to guide it into its shelf rails.

The test loops on the front and rear panels of the VNA are delicate. Be careful not to bump or bend the test loops.

Unpack the various components and set aside in a clean static-free environment. Note that the millimeter-Wave Modules come in separate shipping containers.

2-5 Rear Panel VNA GPIB Connection

If the VNA is to be controlled over a GPIB network by a PC or other GPIB controller, install the GPIB cable to the **IEEE 488.2 GPIB** rear panel connector. **Figure 2-1** shows an MS464xA rear panel. The connection is the same on both the MS464xA and MS464xB VNA.



- 1 – VNA Rear Panel – IEEE 488.2 GPIB Port – For operational control of VNA by external GPIB Controller.
- 2 – GPIB Connector and Cable – To GPIB network and GPIB Controller.

Figure 2-1. Optional – MS464x/A/B Rear Panel – IEEE 488.2 GPIB Port – Cable Connection

2-6 Rear Panel Connections Between System Components (MS464xA VNA)

In this section, connect the cables between the VNA and the Test Sets as shown in [Figure 2-2](#) and [Table 2-1](#).

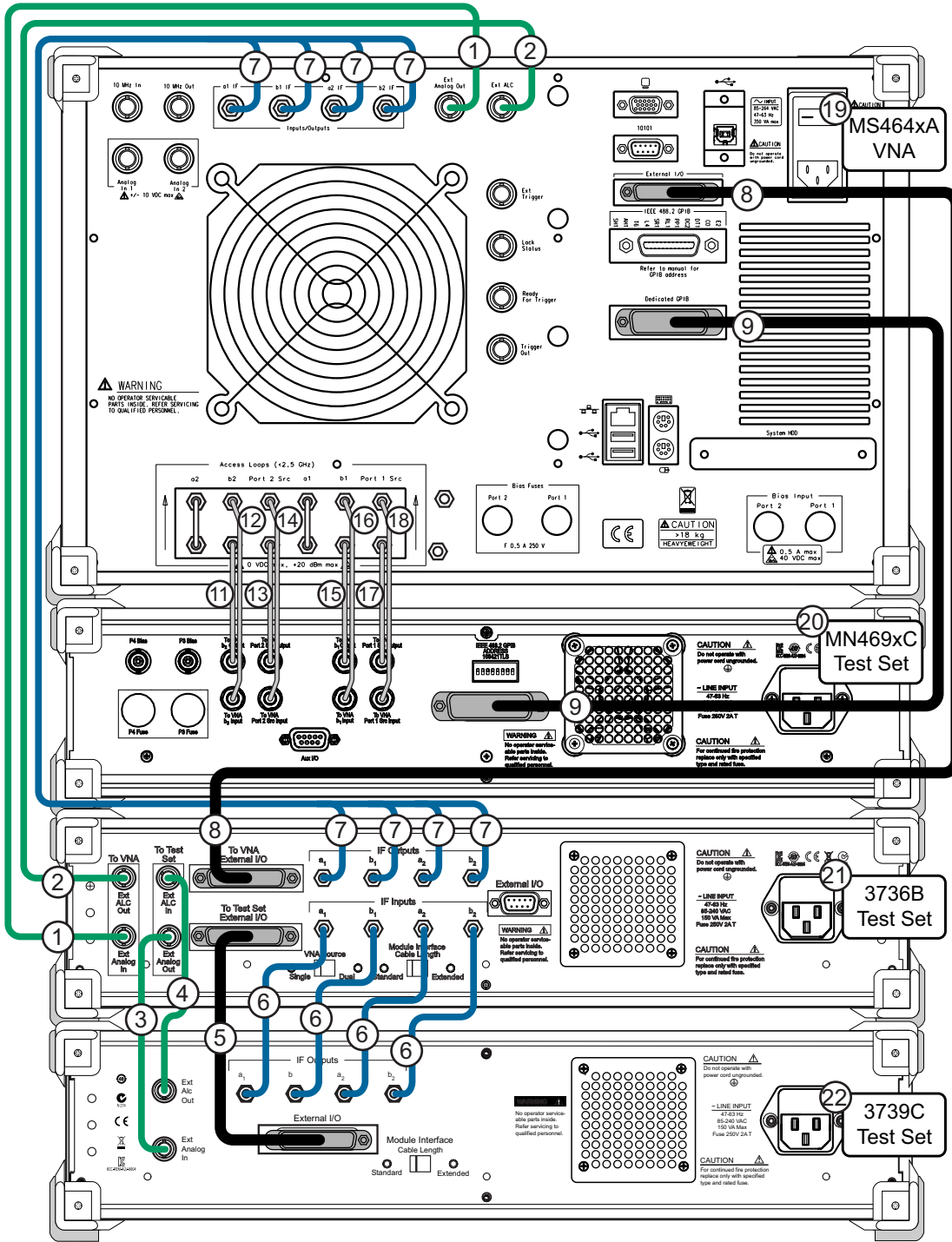


Figure 2-2. ME7838A4 – Rear Panel Cable Connections (MS464xA VNA)

Table 2-1. ME7838A4 Multiport Rear Panel Cable Connections (MS464xA) (1 of 2)

Index	Part Number	Cable Description	Connection From	Connection To
1	3-806-225	BNC (male-male), 24 in	MS464xA port labeled: Ext Analog Out	3736B port labeled: EXT ANALOG IN
2	3-806-225	BNC (male-male), 24 in	MS464xA port labeled: Ext ALC	3736B port labeled: EXT ALC OUT
3	3-806-225	BNC (male-male), 24 in	3736B port labeled: (To Test Set) EXT ANALOG OUT	3739C port labeled: EXT ANALOG IN
4	3-806-225	BNC (male-male), 24 in	3736B port labeled: (To Test Set) EXT ALC IN	3739C port labeled: EXT ALC OUT
5		DB-25	3736B port labeled: TO TEST SET EXTERNAL I/O	3739C port labeled: EXTERNAL I/O
6	73598-1 ^a (5 cable bundle)	SMA male-male flexible: 3-72243-1 3-72243-2 3-72243-3 3-72243-4	3736B ports labeled: (IF INPUTS) a1 b1 a2 b2	3739C ports labeled: (IF OUTPUTS) a1 b1 a2 b2
7	3-80734 ^a (5 cable bundle)	SMA male-male flexible: 3-72243-21 3-72243-22 3-72243-23 3-72243-24	MS464xA ports labeled: (Inputs/Outputs) a1 IF b1 IF a2 IF b2 IF	3736B ports labeled: (IF OUTPUTS) a1 IF b1 IF a2 IF b2 IF
8		DB-25	MS464xA port labeled: External I/O	3736B port labeled: TO VNA EXTERNAL I/O
9	2100-1	GPIB, 1 m	MS464xA port labeled: Dedicated GPIB	MN469xC port labeled: IEEE 488.2 GPIB
11	62112-81 ^a	SMA male-male semi-rigid	MS464xA port labeled: b2 loop out	MN469xC port labeled: TO VNA b2 OUTPUT
12	62112-80 ^a	SMA male-male semi-rigid	MS464xA port labeled: b2 loop in	MN469xC port labeled: TO VNA b2 INPUT
13	62112-81 ^a	SMA male-male semi-rigid	MS464xA port labeled: P2 source loop out	MN469xC port labeled: TO VNA Port 2 Src OUTPUT
14	62112-80 ^a	SMA male-male semi-rigid	MS464xA port labeled: P2 source loop in	MN469xC port labeled: TO VNA Port 2 Src INPUT
15	62112-81 ^a	SMA male-male semi-rigid	MS464xA port labeled: b1 loop out	MN469xC port labeled: TO VNA b1 OUTPUT
16	62112-80 ^a	SMA male-male semi-rigid	MS464xA port labeled: b1 loop in	MN469xC port labeled: TO VNA b1 INPUT
17	62112-81 ^a	SMA male-male semi-rigid	MS464xA port labeled: P1 source loop out	MN469xC port labeled: TO VNA Port 1 Src OUTPUT

Table 2-1. ME7838A4 Multiport Rear Panel Cable Connections (MS464xA) (2 of 2)

Index	Part Number	Cable Description	Connection From	Connection To
18	62112-80 ^a	SMA male-male semi-rigid	MS464xA port labeled: P1 source loop in	MN469xC port labeled: TO VNA Port 1 Src INPUT
19	MS464xA VNA			
20	MN469xC Test Set			
21	3736B Test Set			
22	3739C Test Set			

a. Tighten each cable in this group using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).

2-7 Rear Panel Connections Between System Components (MS464xB VNA)

In this section, connect the cables between the VNA and the Test Sets as shown in [Figure 2-3](#) or [Figure 2-4](#), and [Table 2-2](#).

Cable Connections (Systems with Option 031 Dual Source Architecture)

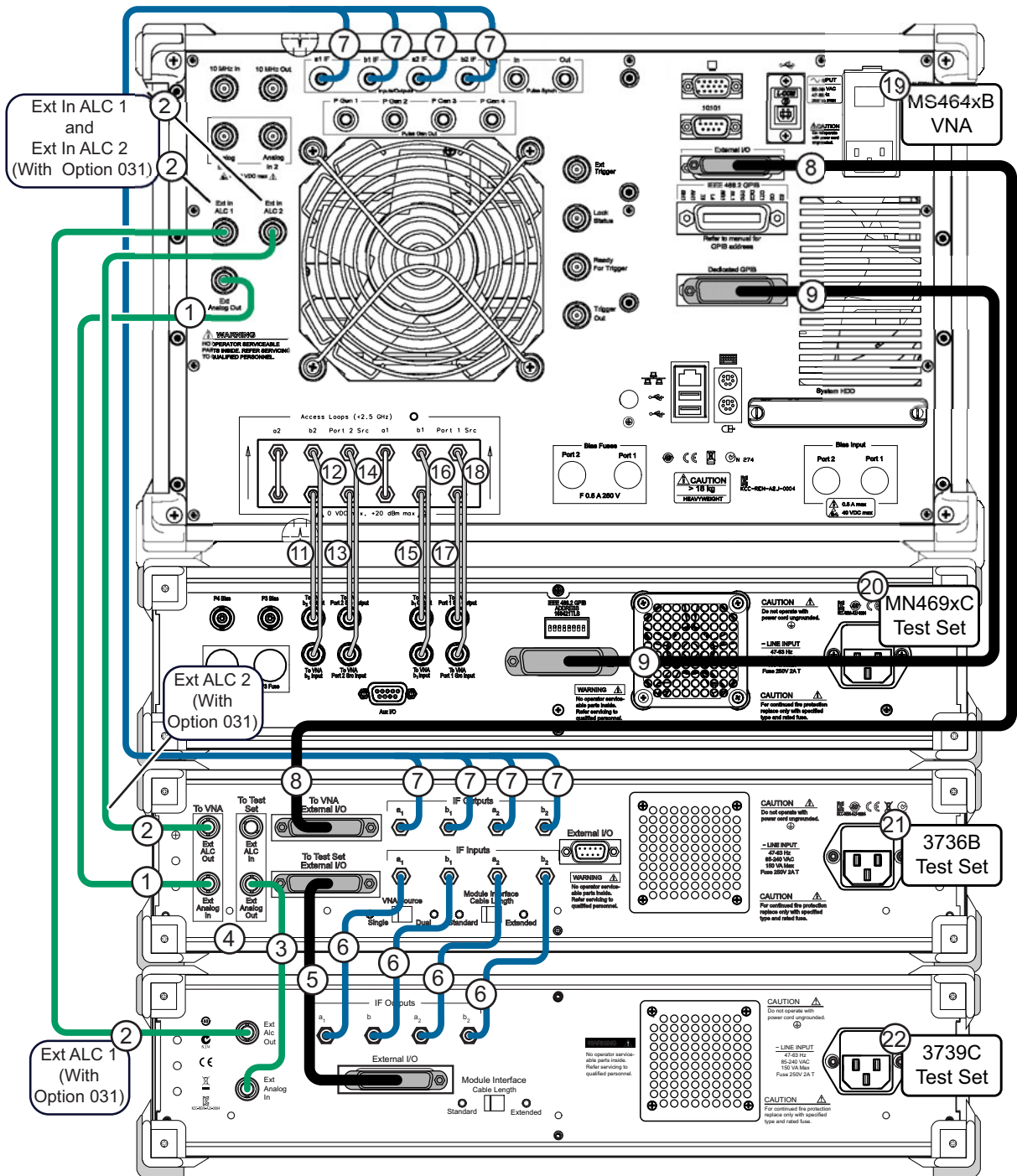


Figure 2-3. ME7838A4 Multiport BB/mmW VNA System – Rear Panel Cables (With Option 031)

Cable Connections (Systems without Option 031)

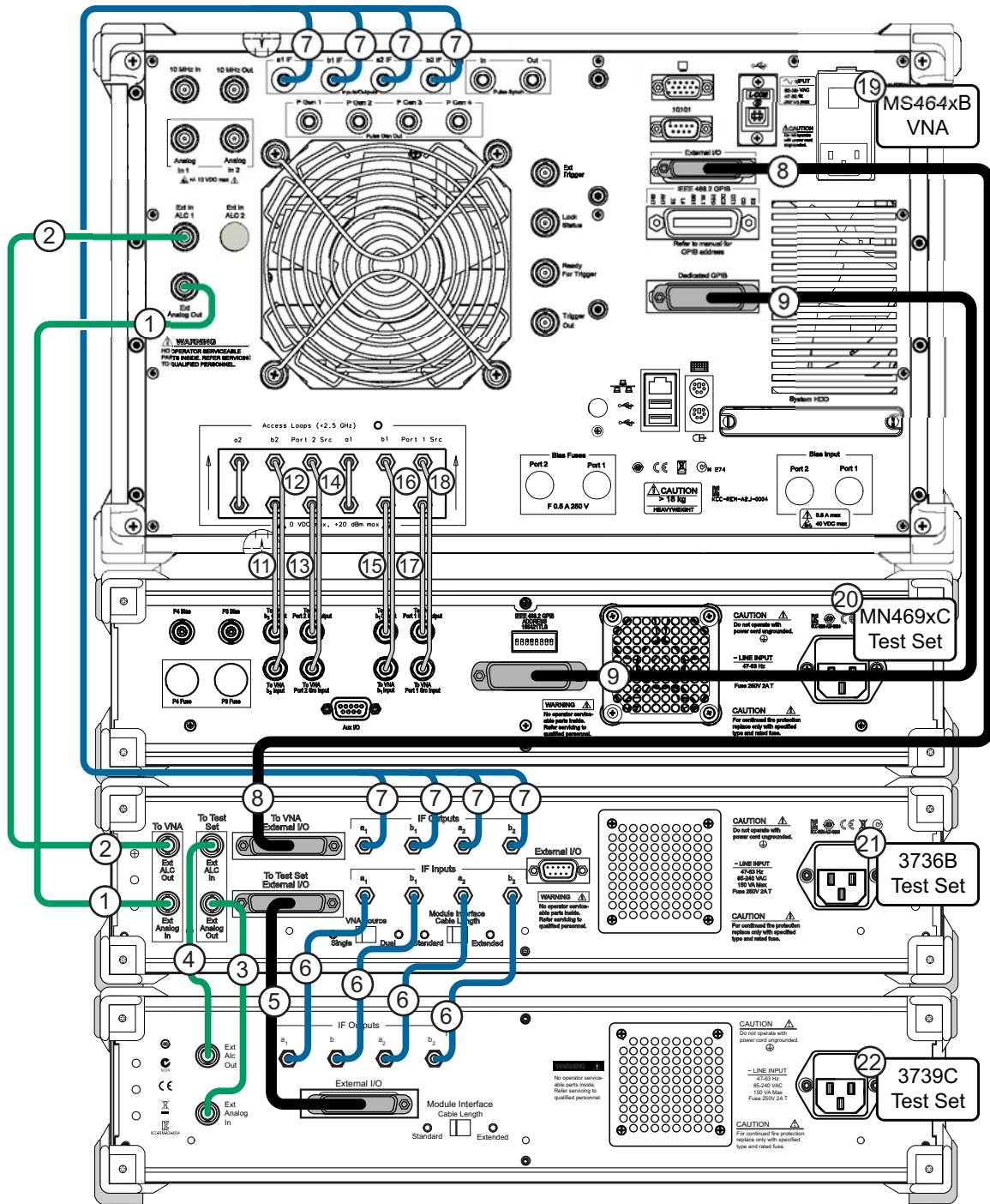


Figure 2-4. ME7838A4 Multiport BB/mmW VNA System – Rear Panel Cables (No Option 031)

Table 2-2. ME7838A4 Multiport Rear Panel Cable Connections (MS464xB) (1 of 2)

Index	Part Number	Cable Description	Connection From	Connection To
1	3-806-225	BNC (male-male), 24 in	MS464xB port labeled: Ext Analog Out	3736B port labeled: EXT ANALOG IN
2	3-806-225	BNC (male-male), 24 in	VNA port labeled: Ext In ALC 1 <i>(No Option 031)</i> (Figure 2-4)	3736B port labeled: EXT ALC OUT
		BNC (male-male), 24 in	VNA port labeled: Ext In ALC 1 <i>(With Option 031)</i> (Figure 2-3)	3739C port labeled: EXT ALC OUT
		BNC (male-male), 24 in	VNA port labeled: Ext In ALC 2 <i>(With Option 031)</i> (Figure 2-3)	3736B port labeled: EXT ALC OUT
3	3-806-225	BNC (male-male), 24 in	3736B port labeled: (To Test Set) EXT ANALOG OUT	3739C port labeled: EXT ANALOG IN
4	3-806-225	BNC (male-male), 24 in	3736B port labeled: (To Test Set) EXT ALC IN (Figure 2-4) <i>(Not used with Option 031)</i>	3739C port labeled: EXT ALC OUT
5	73598-1 ^a (5 cable bundle)	DB-25	3736B port labeled: TO TEST SET EXTERNAL I/O	3739C port labeled: EXTERNAL I/O
6		SMA male-male flexible: 3-72243-1 3-72243-2 3-72243-3 3-72243-4	3736B ports labeled: (IF INPUTS) a1 b1 a2 b2	3739C ports labeled: (IF OUTPUTS) a1 b1 a2 b2
7	3-80734 ^a (5 cable bundle)	SMA male-male flexible: 3-72243-21 3-72243-22 3-72243-23 3-72243-24	MS464xB ports labeled: (Inputs/Outputs) a1 IF b1 IF a2 IF b2 IF	3736B ports labeled: (IF OUTPUTS) a1 IF b1 IF a2 IF b2 IF
8		DB-25	MS464xB port labeled: External I/O	3736B port labeled: TO VNA EXTERNAL I/O
9	2100-1	GPIB, 1 m	MS464xB port labeled: Dedicated GPIB	MN469xC port labeled: IEEE 488.2 GPIB
11	62112-81 ^a	SMA male-male semi-rigid	MS464xB port labeled: b2 loop out	MN469xC port labeled: TO VNA b2 OUTPUT
12	62112-80 ^a	SMA male-male semi-rigid	MS464xB port labeled: b2 loop in	MN469xC port labeled: TO VNA b2 INPUT
13	62112-81 ^a	SMA male-male semi-rigid	MS464xB port labeled: P2 source loop out	MN469xC port labeled: TO VNA Port 2 Src OUTPUT

Table 2-2. ME7838A4 Multiport Rear Panel Cable Connections (MS464xB) (2 of 2)

Index	Part Number	Cable Description	Connection From	Connection To
14	62112-80 ^a	SMA male-male semi-rigid	MS464xB port labeled: P2 source loop in	MN469xC port labeled: TO VNA Port 2 Src INPUT
15	62112-81 ^a	SMA male-male semi-rigid	MS464xB port labeled: b1 loop out	MN469xC port labeled: TO VNA b1 OUTPUT
16	62112-80 ^a	SMA male-male semi-rigid	MS464xB port labeled: b1 loop in	MN469xC port labeled: TO VNA b1 INPUT
17	62112-81 ^a	SMA male-male semi-rigid	MS464xB port labeled: P1 source loop out	MN469xC port labeled: TO VNA Port 1 Src OUTPUT
18	62112-80 ^a	SMA male-male semi-rigid	MS464xB port labeled: P1 source loop in	MN469xC port labeled: TO VNA Port 1 Src INPUT
19	MS464xB VNA			
20	MN469xC Test Set			
21	3736B Test Set			
22	3739C Test Set			

a. Tighten each cable in this group using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).

2-8 Semi-rigid Cable Connections Between System Components

Make the semi-rigid cable connections as shown in [Figure 2-5](#) or [Figure 2-6](#), and in [Table 2-3](#).

If your system has Option 031 Dual Source Architecture (MS464xB only), use [Figure 2-5](#). If your system does not have Option 031, use [Figure 2-6](#).

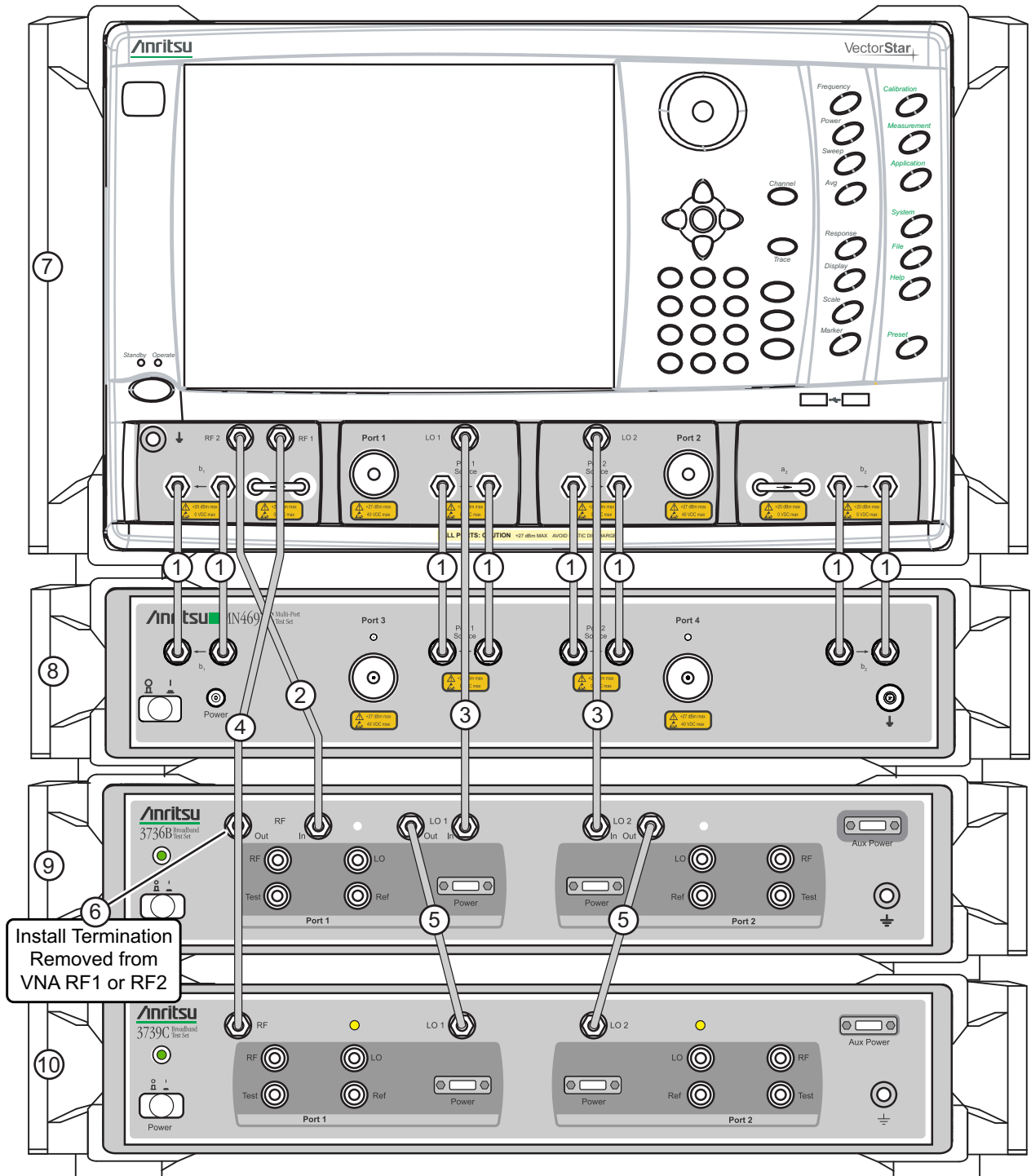


Figure 2-5. ME7838A4 Multiport Semi-rigid Cable Connections (with Option 031 Dual Source Architecture)

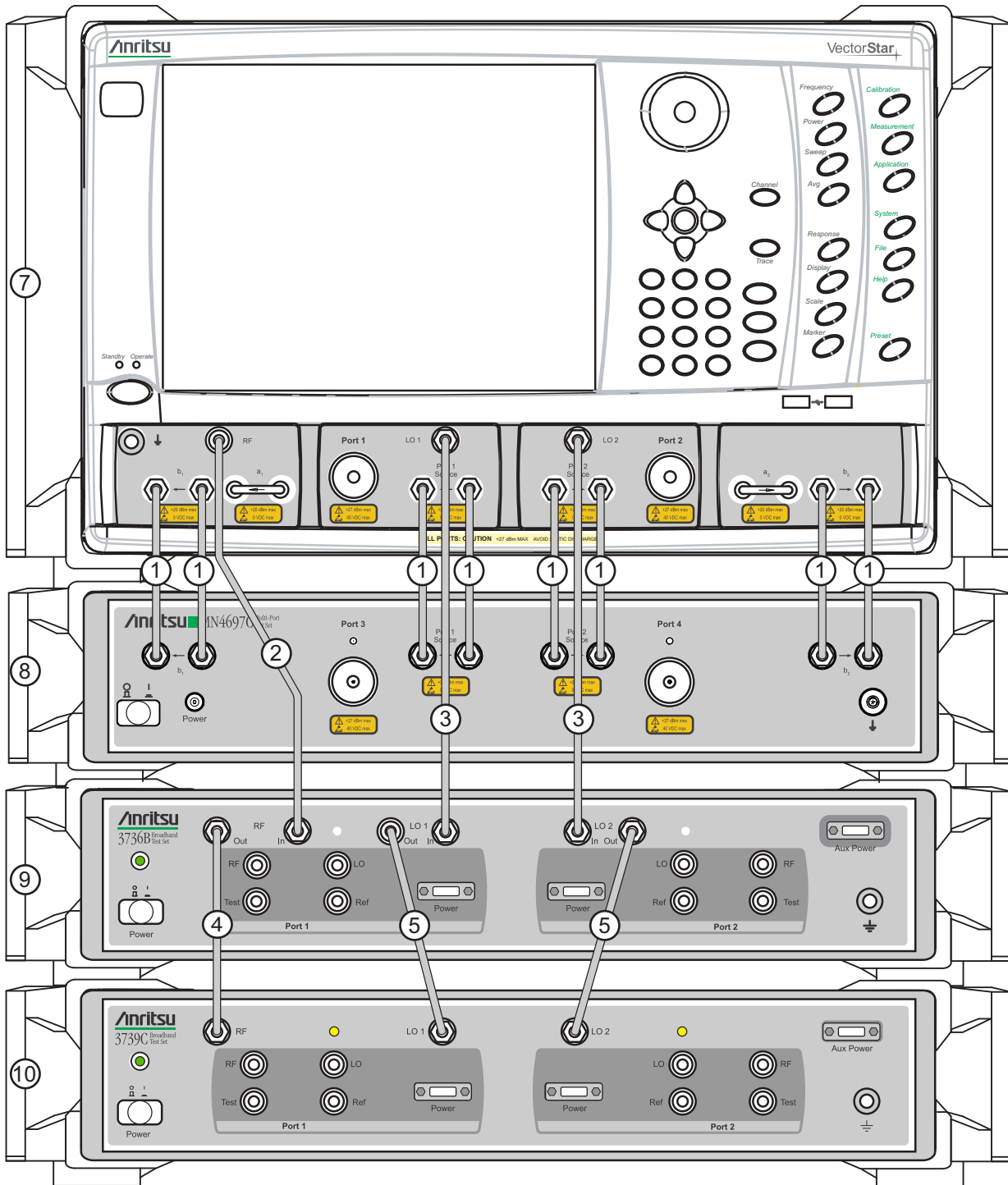


Figure 2-6. ME7838A4 Multiport Semi-rigid Cable Connections (without Option 031 Dual Source Architecture)

Table 2-3. ME7838A4 Multiport semi-rigid Cable Interconnect Part Numbers and Locations (1 of 2)

Index	Part Numbers	Description/Torque	Connection From	Connection To
1	3-62109-42 V (m-m) (MN4697C) 3-67357-38 K (m-m) (MN4694C)	Front Panel RF Cable (4 each) V or K male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	VNA port labeled: b1 (In)	MN469xC port labeled: b1 (In)
			VNA port labeled: b1 (Out)	MN469xC port labeled: b1 (Out)
			VNA port labeled: Port 1 Source (In)	MN469xC port labeled: Port 1 Source (In)
			VNA port labeled: Port 1 Source (Out)	MN469xC port labeled: Port 1 Source (Out)
			VNA port labeled: Port 2 Source (In)	MN469xC port labeled: Port 2 Source (In)
			VNA port labeled: Port 2 Source (Out)	MN469xC port labeled: Port 2 Source (Out)
			VNA port labeled: b2 (In)	MN469xC port labeled: b2 (In)
2	67357-230	Front Panel RF Cable K male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	VNA port labeled: RF 2 (Figure 2-5) <i>(With Option 031)</i>	3736B Test Set port labeled: RF In
			VNA port labeled: RF (Figure 2-6) <i>(No Option 031)</i>	3736B Test Set port labeled: RF In
3	67357-231	Front Panel LO Cable (2 each) K male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	VNA port labeled: LO 1	3736B Test Set port labeled: LO 1 In
			VNA port labeled: LO 2	3736B Test Set port labeled: LO 2 In
4	67357-232 <i>(With Option 031)</i>	Front Panel RF Cable K male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	VNA port labeled: RF 1 (Figure 2-5) <i>(With Option 031)</i>	3739C Test Set port labeled: RF
	67357-18 <i>(No Option 031)</i>		3736B Test Set port labeled: RF Out (Figure 2-6) <i>(No Option 031)</i>	3739C Test Set port labeled: RF
5	67357-19	Front Panel LO Cable (2 each) K male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	3736B Test Set port labeled: LO 1 Out	3739C Test Set port labeled: LO 1
			3736B Test Set port labeled: LO 2 Out	3739C Test Set port labeled: LO 2
6	V210	Termination (With Option 031) Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	Remove from VNA port labeled: RF 1 or RF 2	Add to 3736B Test Set port labeled: RF Out

Table 2-3. ME7838A4 Multiport semi-rigid Cable Interconnect Part Numbers and Locations (2 of 2)

Index	Part Numbers	Description/Torque	Connection From	Connection To
7	MS464xA VNA	Option 051, 061, or 062, and 08x (Banded)		
	MS464xB VNA	Option 051, 061, or 062, and 08x (Banded)		
	MS4647A VNA	Option 051, 061, or 062, and 08x (Broadband)		
	MS4647B VNA	Option 051, 061, or 062, and 08x (Broadband)		
8	MN4694C Test Set	(Banded)		
	MN4697C Test Set	(Broadband)		
9	3736B Test Set			
10	3739C Test Set			

2-9 Front Panel Cable Connections

Make the cable connections as shown in [Figure 2-7](#) and in [Table 2-4](#).

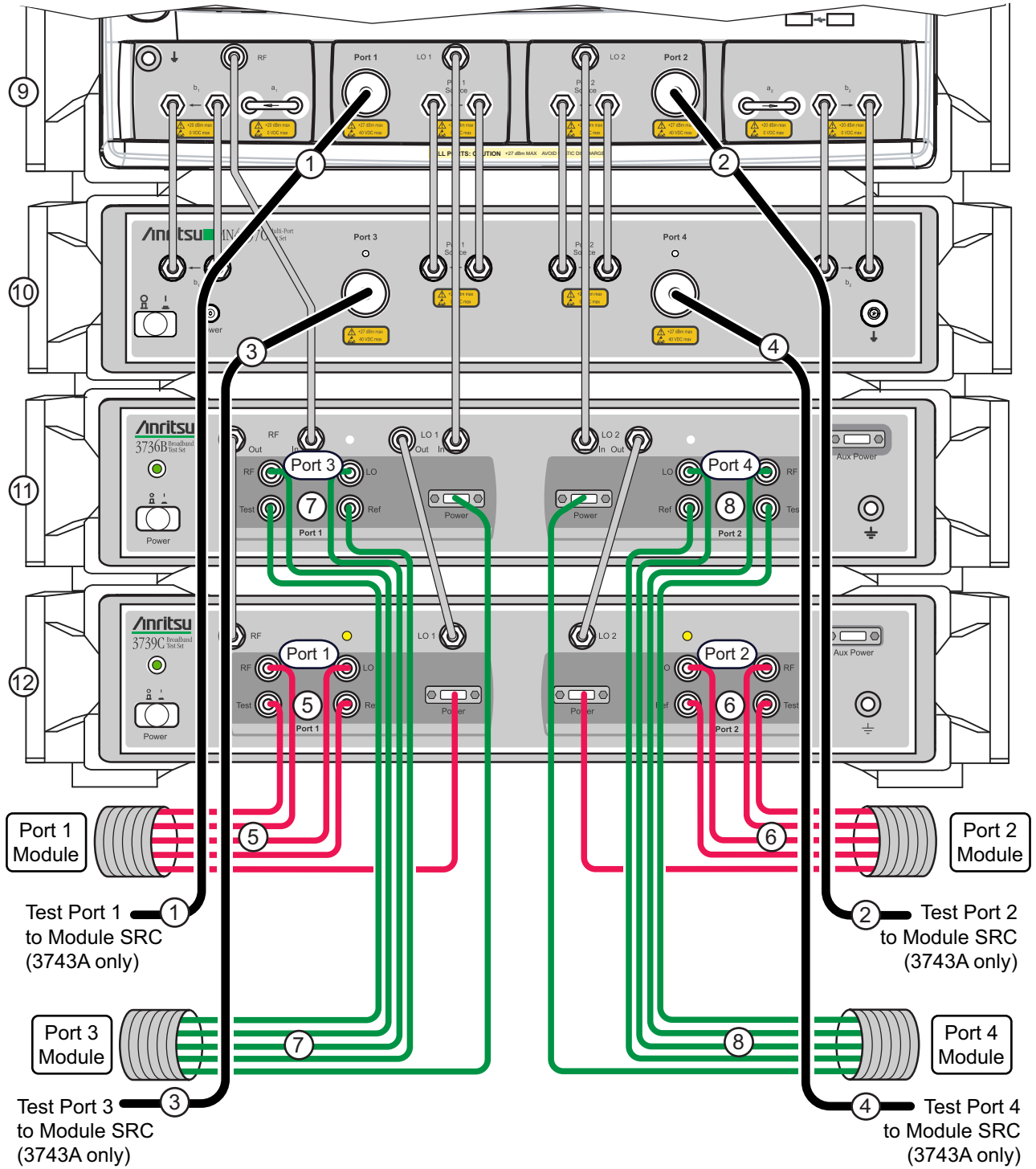


Figure 2-7. Front Panel to mm-Wave Module Connections

Note The cables for Test Port 1 through Test Port 4 to Module SRC are not used with modules 3744A-EE, 3744A-EW, or 3744A-Rx.

Table 2-4. ME7838A4 Cable Interconnect Part Numbers and Locations (1 of 2)

Index	Part Number	Description	Connection From	Connection To
1 2 3 4	806-209 ^{a,b}	Coaxial Phase Stable Cable (4 each) V male-female flexible, 36 in (Used with 3743A Broadband Modules only) Tighten at VNA and Test Set using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	VNA ports labeled: Port 1 Port 2 MN469xC ports: Port 3 Port 4	3743A port labeled: (Port 1 Module) SRC (Port 2 Module) SRC (Port 3 Module) SRC (Port 4 Module) SRC
5 6 7 8	75685-1 ^a	mm-Wave Module Interface Cables (for 3743A, 3744A-EE, 3744A-EW modules) Group of 5 cables for each port Tighten at Test Set using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	3739C Test Set: Port 1, Port 2 RF, LO, Test, Ref, Power/Signal 3736B Test Set Port1, Port 2 (Port 3, Port 4) RF, LO, Test, Ref, Power/Signal	mm-Wave Modules: Port 1, Port 2 Modules RF, LO, Test, Ref, Power/Signal mm-Wave Modules Port 3, Port 4 Modules RF, LO, Test, Ref, Power/Signal
5 6 7 8	75685-2 ^a	OML Module Interface Cables Group of 4 cables for each port Tighten at Test Set using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	3739C Test Set Port 1, Port 2 RF, LO, Test, Ref 3736B Test Set Port1, Port 2 (Port 3, Port 4) RF, LO, Test, Ref	OML Modules Port 1, Port 2 Modules RF, LO, Test IF, Ref IF OML Modules Port 3, Port 4 Modules RF, LO, Test IF, Ref IF
5 6 7 8	75685-3 ^a	VDI Module Interface Cables Group of 4 cables for each port Tighten at Test Set using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	3739C Test Set Port 1, Port 2 RF, LO, Test, Ref 3736B Test Set Port1, Port 2 (Port 3, Port 4) RF, LO, Test, Ref	VDI Modules Port 1, Port 2 Modules RF Input, LO Input, Meas. IF, Ref IF VDI Modules Port 3, Port 4 Modules RF Input, LO Input, Meas. IF, Ref IF
5 6 7 8	75685-3 ^a	mm-Wave Module Interface Cables (for 3744A-Rx modules) Group of 3 cables for each port Tighten at Test Set using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	3739C Test Set Port 1, Port 2 LO, Test, Power/Signal 3736B Test Set Port1, Port 2 (Port 3, Port 4) LO, Test, Power/Signal	Rx Modules Port 1, Port 2 Modules LO, Test, Power/Signal Rx Modules Port 3, Port 4 Modules LO, Test, Power/Signal

Table 2-4. ME7838A4 Cable Interconnect Part Numbers and Locations (2 of 2)

Index	Part Number	Description	Connection From	Connection To
9	MS464xA VNA - Option 051, 061, or 062, and 08x (Banded)			
	MS464xB VNA - Option 051, 061, or 062, and 08x (Banded)			
	MS4647A VNA - Option 051, 061, or 062, and 08x (Broadband)			
	MS4647B VNA - Option 051, 061, or 062, and 08x (Broadband)			
10	MN4694C Test Set (Banded)			
	MN4697C Test Set (Broadband)			
11	3736B Test Set			
12	3739C Test Set			

- a. Do not yet connect the cable ends to the Millimeter-Wave modules. Module connection instructions follow this section.
- b. Cable 806-209 Coaxial Phase Stable Cable is not included or required when using the 3744A-EE, 3744A-EW mm-Wave modules, or the 3744A-Rx Receiver Module.

2-10 Front Panel to Millimeter-Wave Module Connections

Connect the 3736B and 3739C Broadband Test Set test port cables to the 3743A, 3744A-EE, 3744A-EW, or 3744A-Rx Modules as shown below, observing the correct torque limits for each connector. See [Figure 2-8](#) and [Table 2-5](#). Route the cable assemblies through the module cable restraint.

Note

It is easier to first connect the cables to the module and then mount the module in its bracket.

Observe torque instructions where indicated. Each module (except the 3744A-Rx) is characterized for a specific VNA Serial Number and VNA Test Port as designated on the module port assignment label. Ensure the module matches the correct VNA and Test Set port.

For more detailed information on the modules including DUT Waveguide (WG) connection alignment and custom bracket mounting, refer to **10410-00311-VectorStar™ Broadband/Banded Millimeter-Wave Modules Reference Manual**.

Inverting a Module

If necessary, a module can be turned over in the bracket to change the elevation of the W1 connector. To turn the module over:

1. Remove the six knurled head thumbscrews from the module.
2. Turn the module over.
3. Install the six thumbscrews.

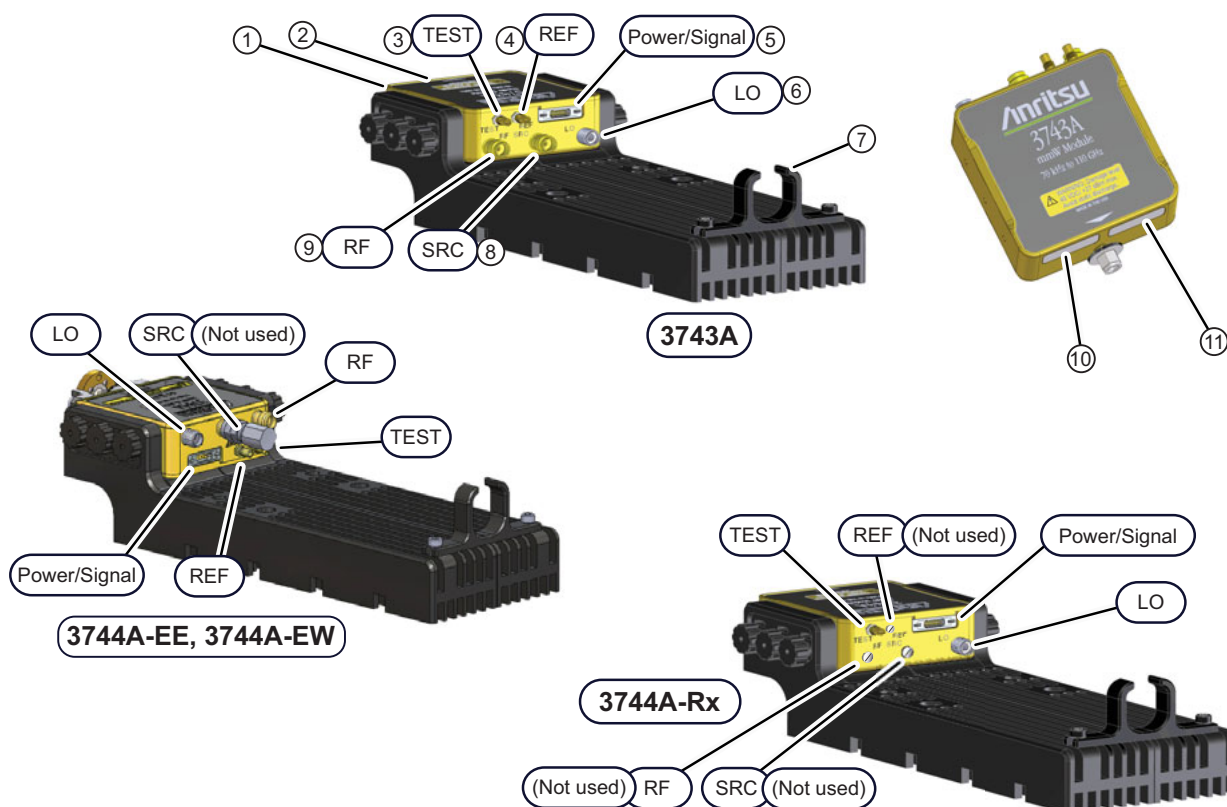


Figure 2-8. Millimeter-Wave Module Connections

Table 2-5. Millimeter-Wave Module Connections

Index	Cable P/N	Description
1	N/A	Millimeter-Wave Module in bracket
2	N/A	<p>W1 - 1 mm Connector (<i>3743A, 3744A-Rx modules</i>)</p> <ul style="list-style-type: none"> • Tighten using a torque end wrench and a plain end wrench • 6 mm Torque End Wrench set to 0.45 N·m (4 lbf·in). Recommended is Anritsu 01-504. • 6 mm / 7 mm Open End Wrench. Recommended is Anritsu 01-505. <p>WR-10 or WR-12 Adapter - 1 mm connector (<i>3744A-EE, 3744A-EW modules</i>)</p> <ul style="list-style-type: none"> • Use Waveguide Adapter Toolkits (74394-2, 74394-3, or 74394-4). • Tighten using a torque end wrench and a plain end wrench. • 6 mm Torque End Wrench set to 0.45 N·m (4 lbf·in). Recommended is Anritsu 01-504. • 6 mm / 7 mm Open End Wrench. Recommended is Anritsu 01-505.
3		<p>TEST - SSMC Connector (<i>3743A, 3744A-EE, 3744A-EW, and 3744A-Rx modules</i>)</p> <ul style="list-style-type: none"> • Tighten using a 4 mm (5/32 in) torque end wrench set to less than 0.22 N·m (2 lbf·in). • Recommended is Anritsu 01-511 torque wrench.
4	75685-1 ^a or	<p>REF - SSMC Connector (<i>3743A, 3744A-EE, and 3744A-EW modules</i>)</p> <ul style="list-style-type: none"> • Tighten using a 4 mm (5/32 in) torque end wrench set to less than 0.22 N·m (2 lbf·in). • Recommended is Anritsu 01-511 torque wrench.
5	75685-3 ^{b,c}	<p>Power/Signal Bi-Lobe™ Connector (<i>3743A, 3744A-EE, 3744A-EW, 3744A-Rx</i>)</p>
6		<p>LO - K Connector (<i>3743A, 3744A-EE, 3744A-EW, and 3744A-Rx modules</i>)</p> <ul style="list-style-type: none"> • Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). • Recommended is Anritsu 01-201.
7		Module Power and I/O Cable Restraint
8	806-209 ^d	<p>SRC - V Connector (<i>3743A module only</i>)</p> <ul style="list-style-type: none"> • Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). • Recommended is Anritsu 01-201.
9	75685-1 ^a	<p>RF - V Connector (<i>3743A, 3744A-EE, and 3744A-EW modules</i>)</p> <ul style="list-style-type: none"> • Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). • Recommended is Anritsu 01-201.
10	N/A	Factory Calibrated Port Assignment Label
11	N/A	Module Serial Number Label

a. 3743A, 3744A-EE, and 3744A-EW modules use cable assembly 75685-1.

b. The REF cable is not used in the 75685-3 cable assembly.

c. 3744A-Rx module uses cable assembly 75685-3.

d. Cable 806-209 Coaxial Phase Stable Cable is used only with the 3743A modules.

Millimeter-Wave Module Operating Environment

The following notes should be observed when operating the 3743A and 3744A-xx mm-Wave Modules:

- Thermal heat sinking similar to the supplied mounting brackets of the Millimeter-Wave Module should be considered in custom mounting applications.
- Each 3743A Module consumes a maximum of 12 watts.
- Each 3744A-EE and 3744A-EW Module consumes a maximum of 12 watts.
- Each 3744A-Rx Module consumes a maximum of 7 watts.
- The primary heat sink paths for the module is the two side mounting surfaces of the mounting bracket.
- With the attached cable mounting brackets, the case temperature rise is approximately 15 °C to 20 °C above ambient.
- A three (3) Year warranty is valid for all versions of 3744A and 3743A modules, with or without mounting brackets attached.

2-11 Front Panel to OML/VDI Module Connections

Connect the front panel cables between the 3736B and 3739C Test Sets, and the OML or VDI frequency extension modules as shown in [Figure 2-9](#), [Figure 2-10](#), and [Figure 2-11](#), and as described in [Table 2-6](#), [Table 2-7](#), and [Table 2-8](#).

Caution To avoid connector damage, observe torque requirements where indicated.

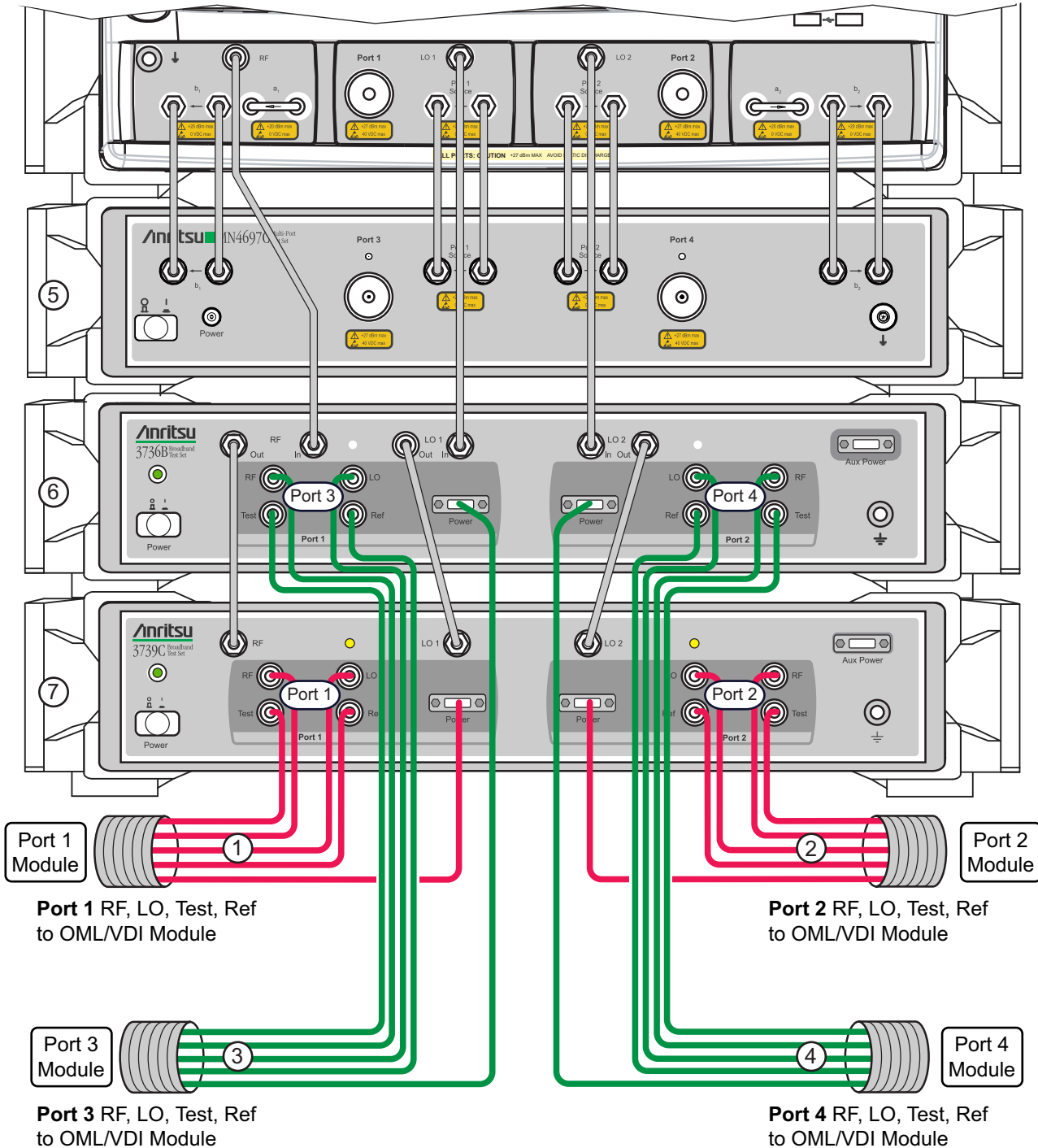


Figure 2-9. Cable Connections between 3736B, 3739C Test Sets, and OML or VDI Frequency Extension Modules

Table 2-6. ME7838A4 OML/VDI Cable Interconnect Part Numbers and Locations

Index	Part Number	Description	Connection From	Connection To
1	75685-2 (2 each)	OML Module Interface Cable Assembly Group of 4 cables for each port	3739C Test Set Port 1, Port 2 Ref RF LO Test	OML Modules: Port 1, Port 2 Modules Ref IF RF Input LO Input Test IF
2		OML Module Interface Cable Assembly Group of 4 cables for each port	3736B Test Set Port 1, Port 2 (Port 3, Port 4) Ref RF LO Test	OML Modules: Port 3, Port 4 Modules Ref IF RF Input LO Input Test IF
3	75685-2 (2 each)	VDI Module Interface Cables Assembly Group of 4 cables for each port	3739C Test Set Port 1, Port 2 RF Ref Test LO	VDI Modules: Port 1, Port 2 Modules RF Input Ref. IF Meas. IF LO Input
4		VDI Module Interface Cables Assembly Group of 4 cables for each port	3736B Test Set Port 1, Port 2 (Port 3, Port 4) RF Ref Test LO	VDI Modules: Port 3, Port 4 Modules RF Input Ref. IF Meas. IF LO Input
5	MN469xC Test Set			
6	3736B Test Set			
7	3739C Test Set			

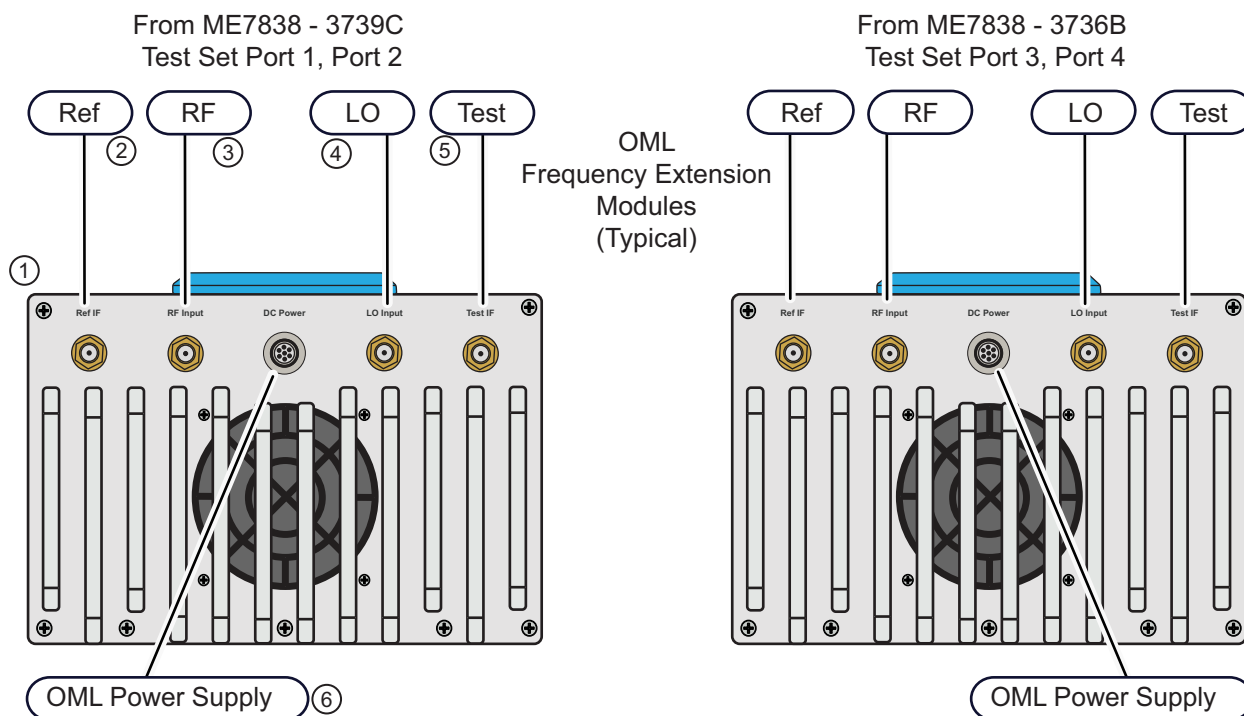


Figure 2-10. VNA Test Set Cable Connections to OML Modules

Table 2-7. OML Module Connections

Index	Cable P/N	Description
1	N/A	OML Module
2	75685-2	Ref IF - SMA Connector <ul style="list-style-type: none"> Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). Recommended is Anritsu 01-201.
3		RF Input - SMA Connector <ul style="list-style-type: none"> Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). Recommended is Anritsu 01-201.
4		LO Input - SMA Connector <ul style="list-style-type: none"> Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). Recommended is Anritsu 01-201.
5		Test IF - SMA Connector <ul style="list-style-type: none"> Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). Recommended is Anritsu 01-201.
6	N/A	OML Module Power Supply Connector

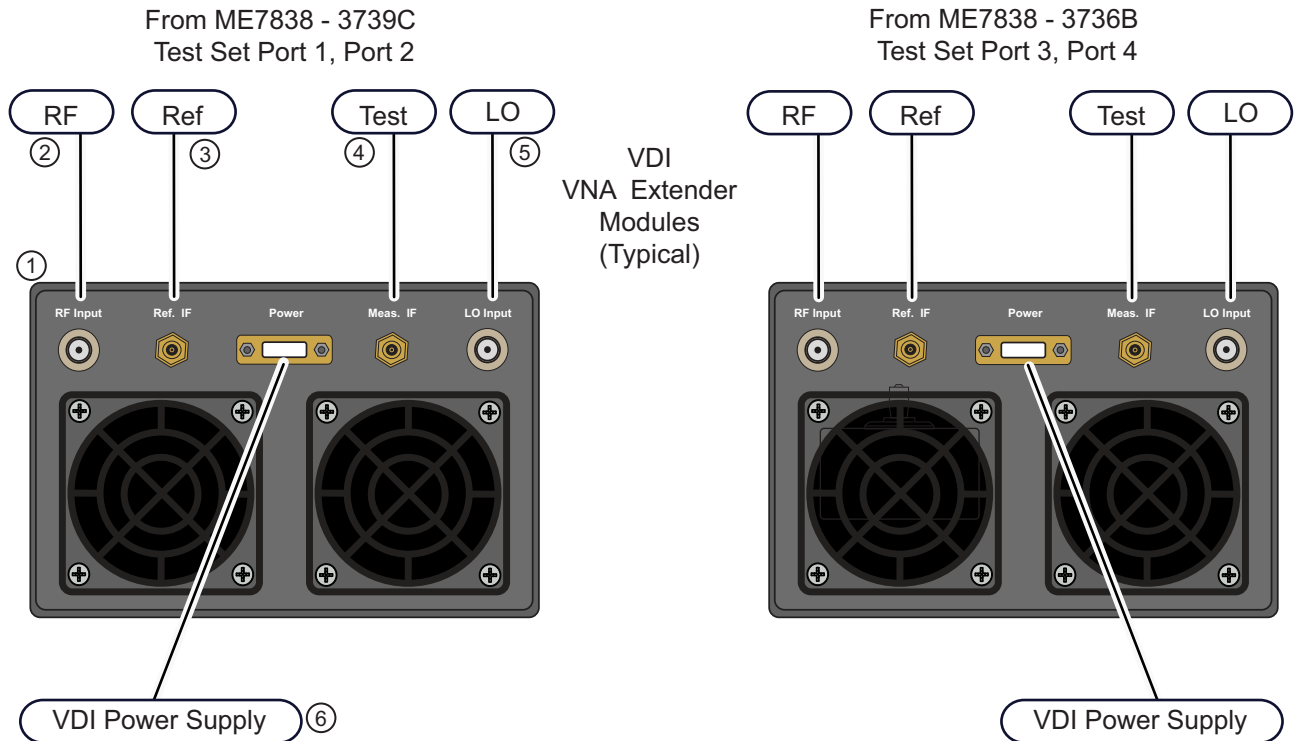


Figure 2-11. VNA Test Set Cable Connections to VDI Modules

Table 2-8. VDI Module Connections

Index	Cable P/N	Description
1	N/A	VDI Module
2	75685-2	RF Input - K (2.92 mm) Connector • Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). • Recommended is Anritsu 01-201.
3		Ref. IF - SMA Connector • Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). • Recommended is Anritsu 01-201.
4		Meas. IF - SMA Connector • Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). • Recommended is Anritsu 01-201.
5		LO Input - K (2.92 mm) Connector • Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in). • Recommended is Anritsu 01-201.
6 ^a		VDI Module Power Supply Connector

a. The VDI module connectors may differ slightly than on the illustration shown above. For example, depending on the model and date built, the power supply connector may be round instead of rectangular.

Chapter 3 — ME7838A4 Initial System Checkout

3-1 Introduction

This chapter provides the general initial system checkout for a completely assembled ME7838A4 Broadband/Banded Millimeter-Wave System. Since the ME7838A4 supports both the MS464xA and MS464xB Series VNAs, this chapter has an initial system checkout section for each VNA series:

- [Section 3-4 “MS464xA VNA Broadband/Banded Configuration” on page 3-3](#)
- [Section 3-5 “MS464xB VNA Broadband/Banded Configuration” on page 3-11](#)

Once this procedure is complete, the system is ready for full calibration and system performance verification.

3-2 Power Up Procedure

Use this procedure to power up the MS464xA/B VNA and the 3739C Broadband Test Set. There are no AC power connections for the Millimeter-Wave Modules.

1. Connect the **AC Line Cord** to AC main power at the rear panel of each test set.
2. At the VNA Rear Panel, connect the **AC Line Cord** to the AC main power.
 - Power requirements are 90 to 264 VAC, 47 to 63 Hz, power factor controlled.
3. Make sure a USB or PS2 **mouse** is connected to the VNA.

Power Up Sequence

Power up each unit in the following sequence:

4. At the MN469xC Multiport Test Set front panel press the left side **AC Power Button**.
The yellow **Power LED** should light.
5. At the 3736B Master Test Set front panel press the left side **AC Power Button**.
The green **Power LED** should light.
6. At the 3739C Broadband Test Set front panel press the left side **AC Power Button**.
The green **Power LED** should light.
7. At the MS464xA/B VNA Rear Panel, turn the **AC Power Rocker Switch** to “|” or **ON**.
 - The front panel **Standby/Operate** key illuminates with an orange Standby LED.
 - The VNA is in Standby mode.
8. At the MS464xA/B VNA Front Panel, Press and hold the **Standby/Operate** key for at least one (1) second.
 - The Standby/Operate key illuminates with a green Operate LED.
 - The VNA is in Operate mode.

3-3 VNA Preset Procedure

1. Depending on the instrument preset configuration, do either [Step 2](#) or [Step 3](#) below.
2. If the VNA is configured to preset to the factory as-shipped default configuration:
 - a. Press the VNA front panel **Preset** button.

The VNA resets to the factory-default configuration,
 - b. Continue with the next applicable section.
3. If the VNA has been configured to a user-defined preset:
 - a. Use the right side menus to navigate to the PRESET SETUP menu.

Utilities | System | Setup | Preset Setup
 - b. Select the Default button, and then click the Preset icon on the icon toolbar.

The VNA resets to the factory-default configuration.
 - c. Continue with the next applicable section.

3-4 MS464xA VNA Broadband/Banded Configuration

Receiver Configuration for Broadband

Configure the VNA for Modular Broadband Operation by performing the following steps:

1. Make sure the MS4647A VNA and the 3739C Broadband Test Set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure” on page 3-2](#).
3. At the MAIN menu, select Application. The APPLICATION menu appears.
4. MAIN | Application | APPLICATION
5. Select the BB/mmWave (3739 Test Set) button in the Receiver Configuration area.

The Standard, Multiple Source, and BB/mmWave (3738 Test Set) buttons are deselected.

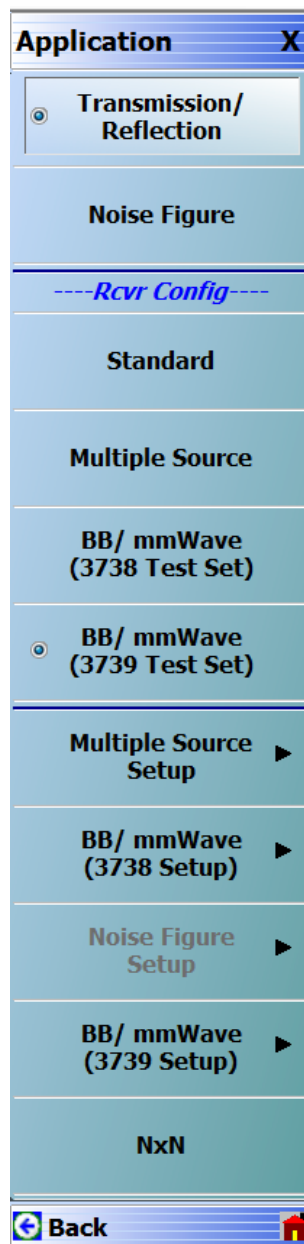


Figure 3-1. Broadband Configuration Selection (MS464xA Menu)

3739 Setup for Broadband

Configure the VectorStar VNA for Broadband Operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure” on page 3-2.](#)
3. Navigate to the Application menu and select:

Application | BB/mmWave (3739 Setup) | Broadband to 125 GHz

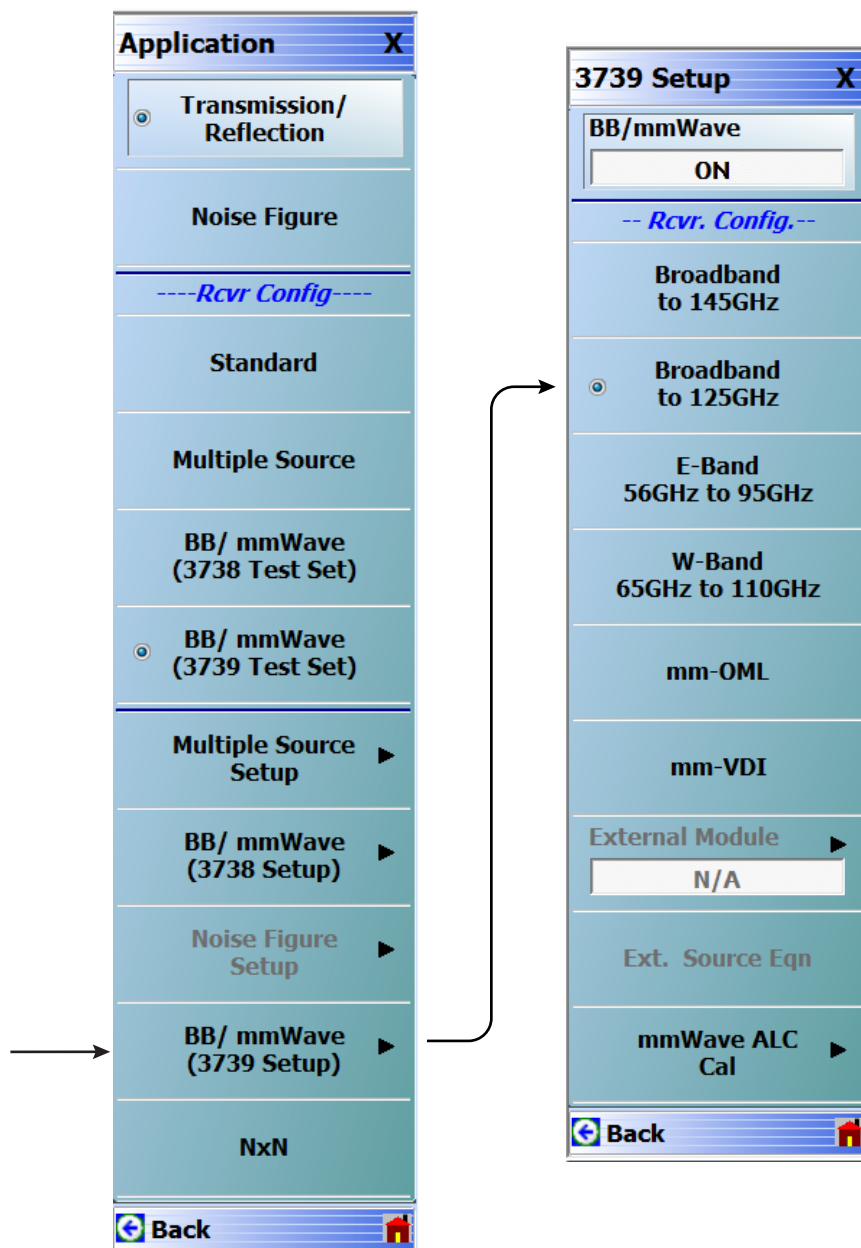


Figure 3-2. 3739 Setup for Broadband Module (MS464xA Menu)

Frequency Setup

1. Navigate to the FREQUENCY menu.
 - MAIN | Frequency | FREQUENCY
2. At the FREQUENCY menu, set the following frequency parameters:
 - Start Frequency = **70.000000000 kHz**
 - Stop Frequency = **125.000000000 GHz**
 - # of Points = **201**
3. The following frequency parameters are automatically set:
 - Center Frequency = **62.500035000 GHz**
 - Span Frequency = **124.999930000 GHz**
 - Step Size = **624.999650 MHz**
4. The system should now be sweeping fully from 70 kHz to 125 GHz.

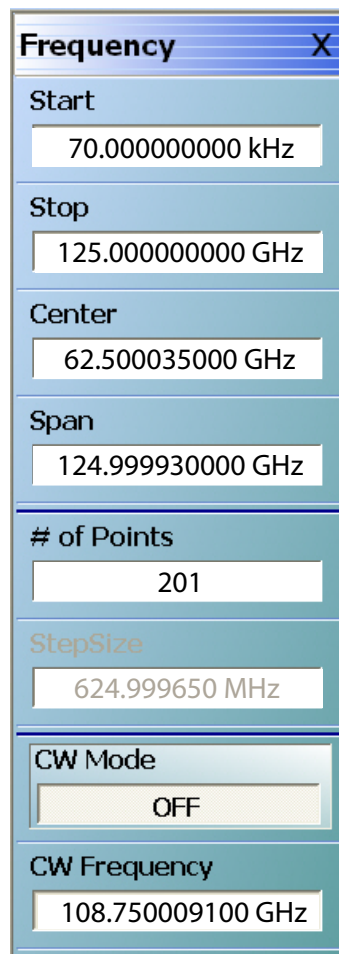


Figure 3-3. FREQUENCY Menu – Settings for 70 kHz to 125 GHz Sweep

Receiver Configuration for Multiple Source

Configure the VectorStar VNA for Multiple Source Broadband Operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure” on page 3-2](#).
3. From the Application menu select Multiple Source Setup.
4. If not already done, from the Multiple Source menu, toggle Multiple Source to ON.
5. Select Ext. Mod. Ctrl.
6. On the External Module Ctrl dialog, select 125 GHz.

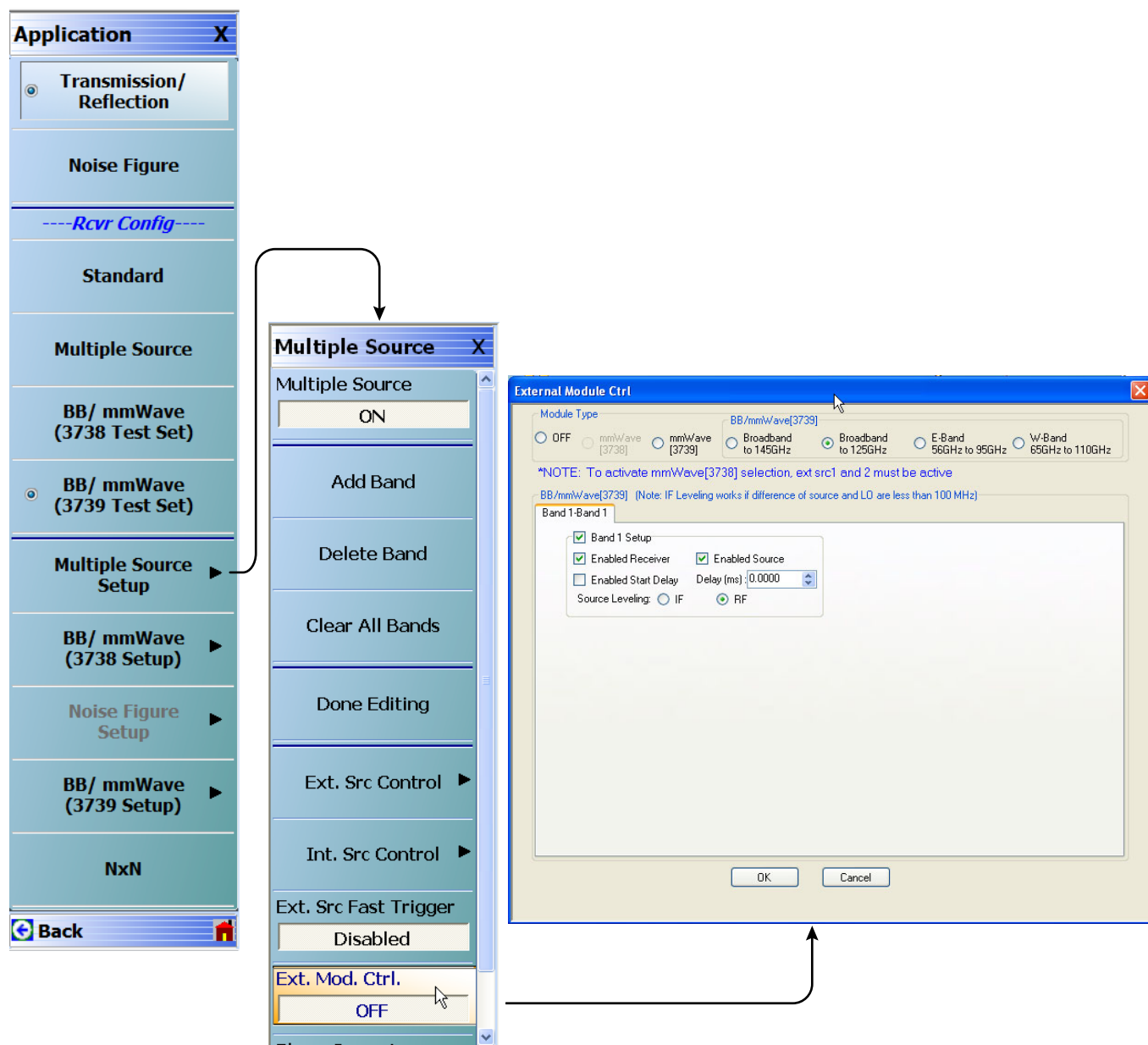


Figure 3-4. Receiver Configuration for Multiple Source (MS464xA Menu)

3739 Setup for Banded Modules

Configure the VectorStar VNA for BB/mmWave Operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure”](#) on page 3-2.
3. From the Application menu select BB/mmWave (3739 Setup).
4. Select E-Band or W-Band depending on your 3744A module.

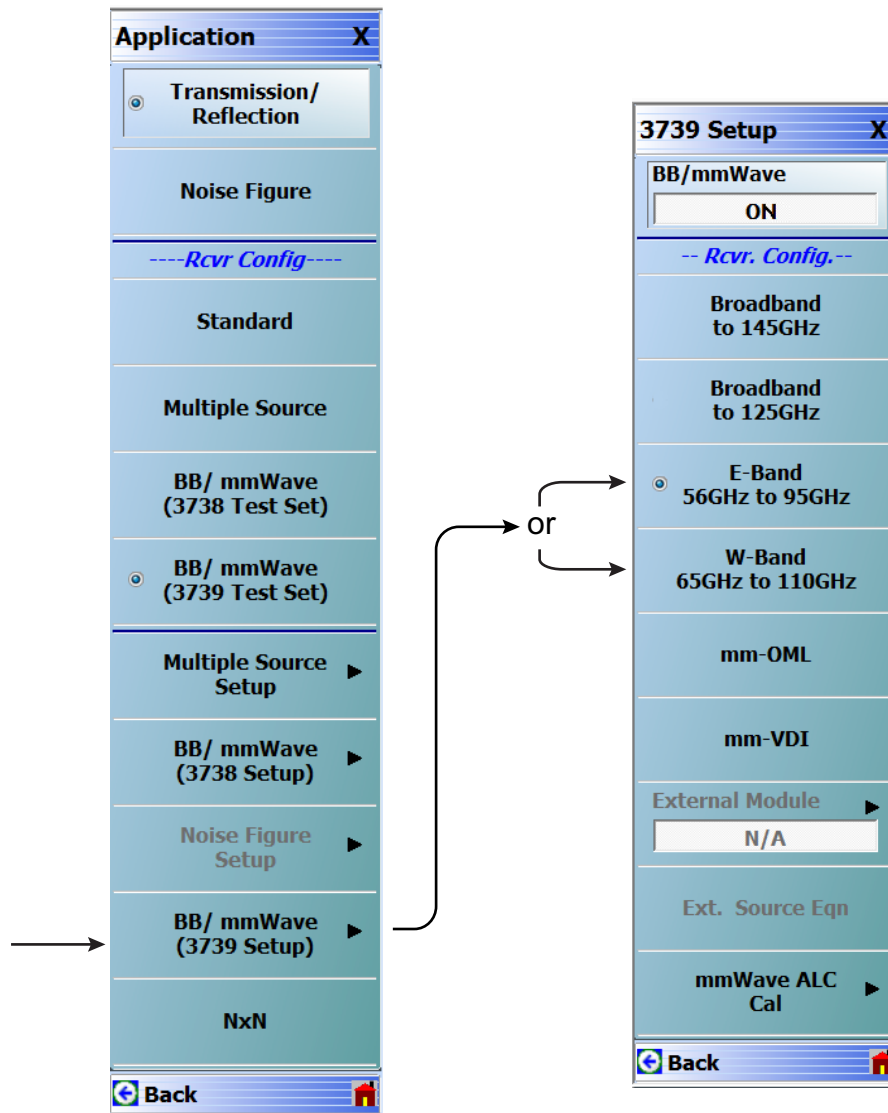


Figure 3-5. 3739 Setup for Banded Modules (MS464xA Menu)

3739 Setup for OML/VDI Selection

Configure the VectorStar VNA for OML or VDI operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure”](#) on page 3-2.
3. Navigate to the Application menu and select:

Rcvr Setup | BB/mmWave (3739 Setup) | mm-OML (or mm-VDI)

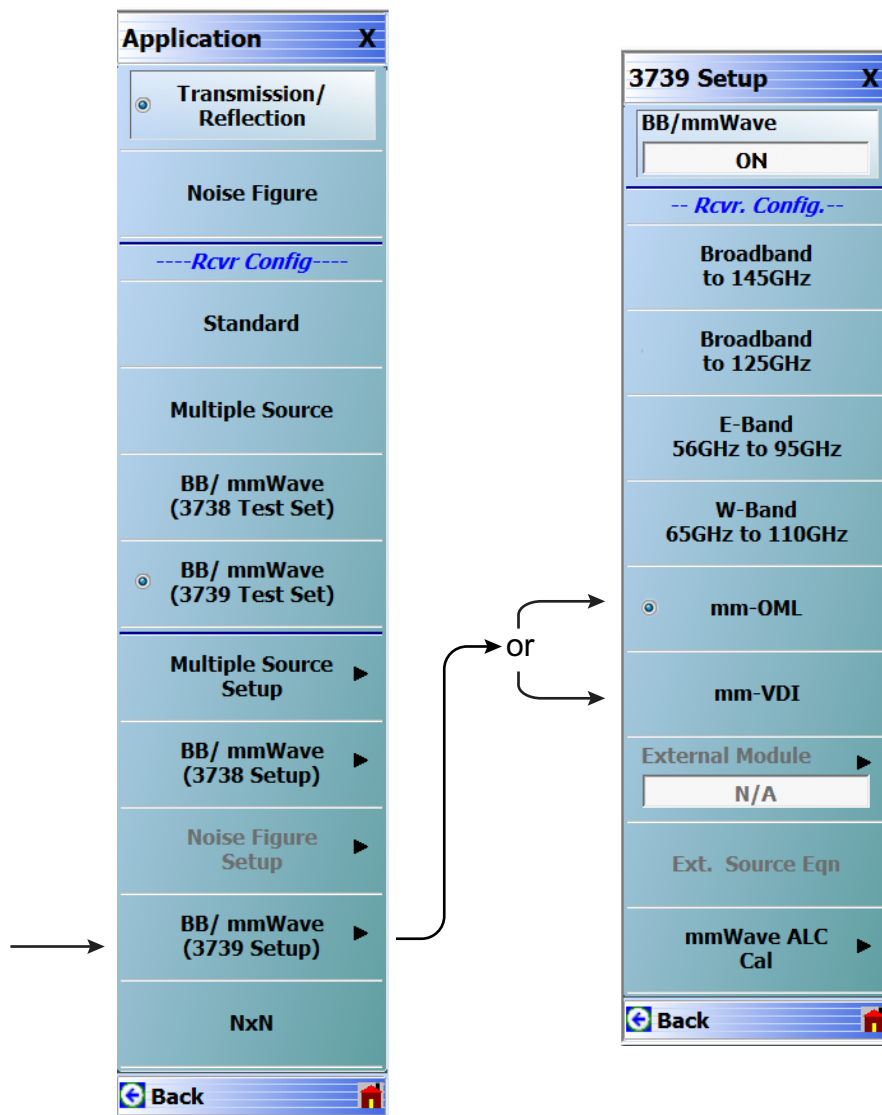


Figure 3-6. 3739 Setup for OML/VDI Selection

OML Band Selection

Configure the VectorStar VNA for OML operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure” on page 3-2](#).
3. Navigate to the Application menu and select BB/mmWave (3739 Setup).

The 3739 Setup menu opens ([Figure 3-7](#)).

4. Select External Module.
5. Select the applicable OML module band and click Apply.

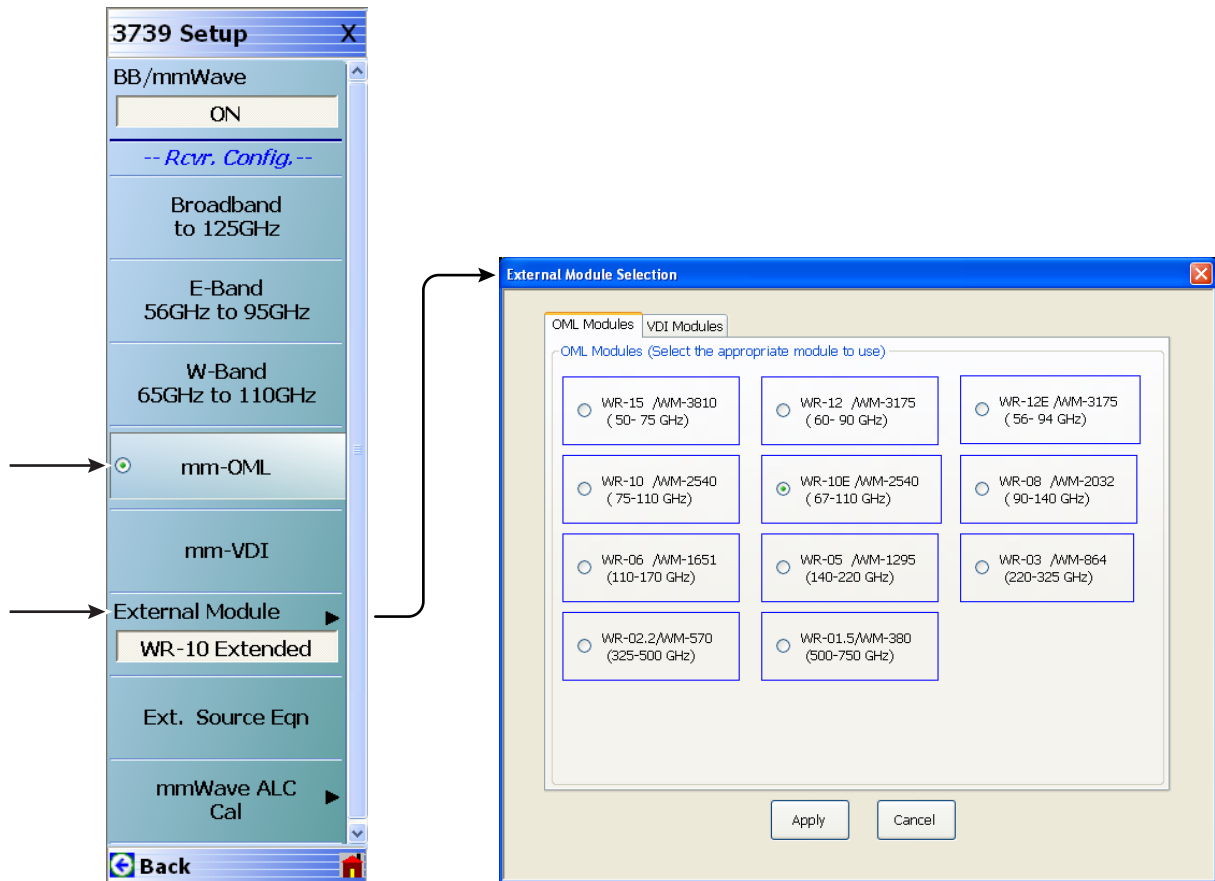


Figure 3-7. 3739 Setup Menu – OML Selection

VDI Band Selection

Configure the VectorStar VNA for OML operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure” on page 3-2](#).
3. Navigate to the Application menu and select BB/mmWave (3739 Setup).

The 3739 Setup menu opens ([Figure 3-8](#)).

4. Select External Module.
5. Select the applicable VDI module band and Module Type and click Apply.

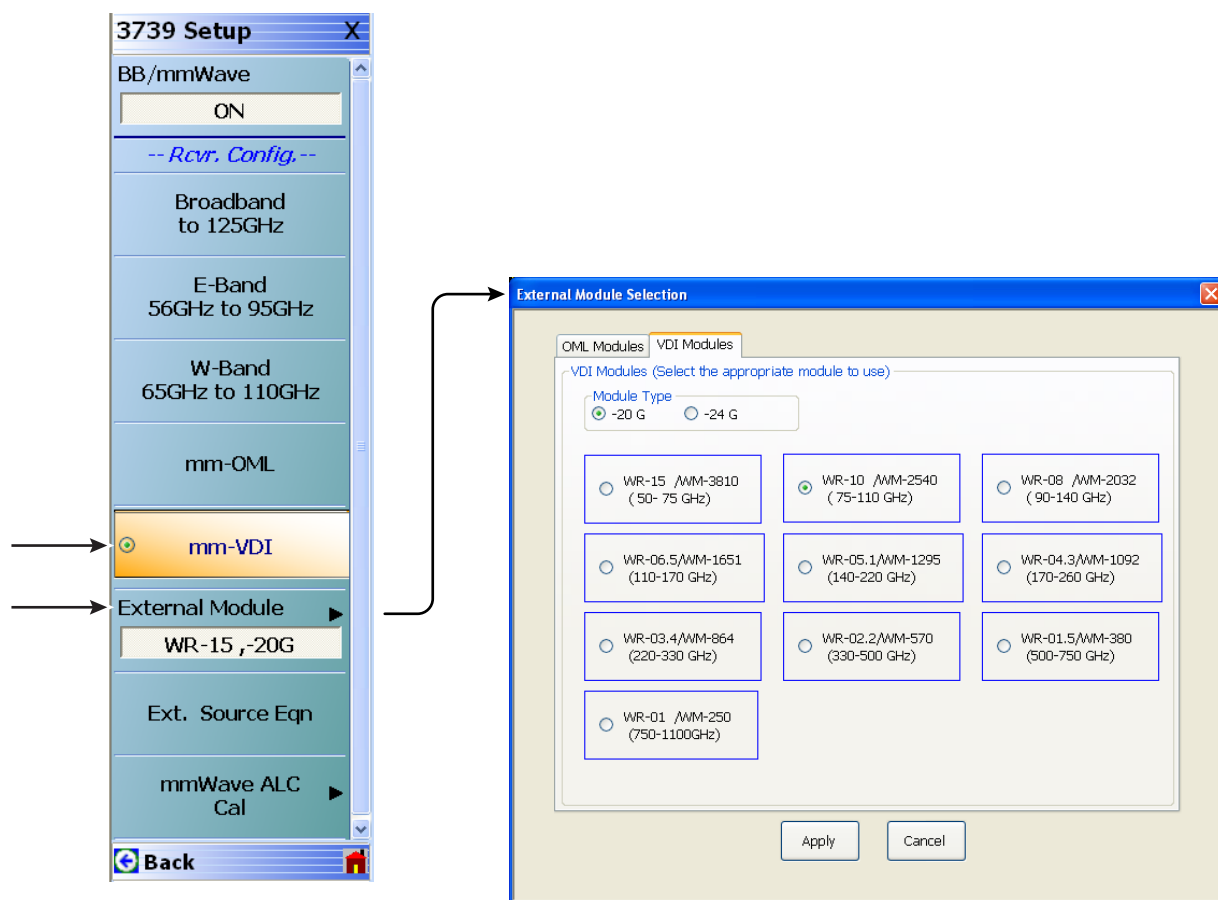


Figure 3-8. 3739 Setup Menu – VDI Band Selection

3-5 MS464xB VNA Broadband/Banded Configuration

Configure the VNA for Modular Broadband Operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure” on page 3-2.](#)

Receiver Configuration for Broadband

1. At the MAIN menu, select Application. The APPLICATION menu appears as shown in [Figure 3-9.](#)

MAIN | Application | APPLICATION

2. Select the Rcvr Config Button to open the Rcvr Config menu.
3. Select the BB/mmWave (3739 Test Set) button.

The Receiver Config button on the Application menu now shows 3739 Test Set is selected.

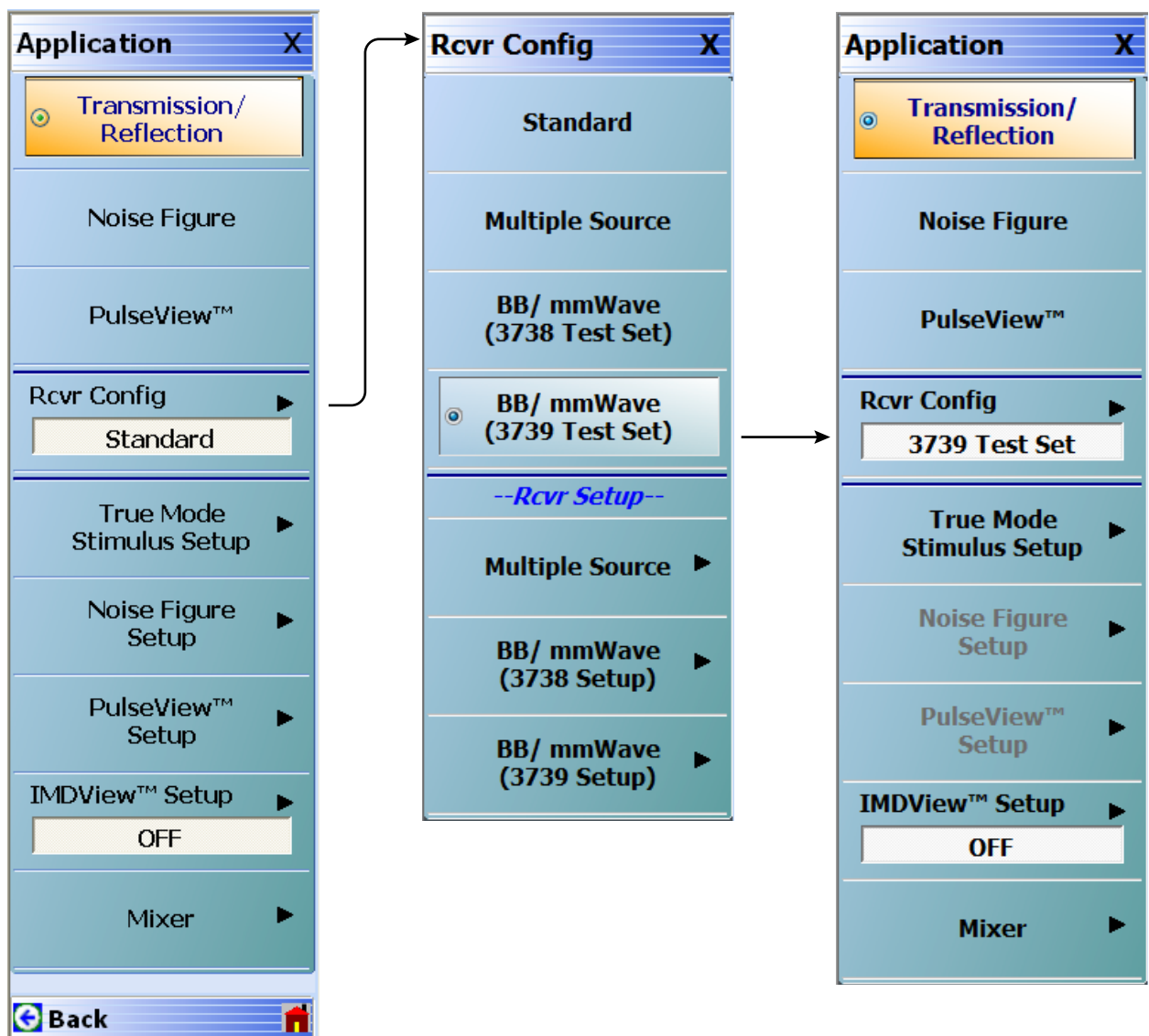


Figure 3-9. APPLICATION Menu – Receiver Configuration to 3739 Test Set

3739 Setup for Broadband

Configure the VectorStar VNA for Broadband Operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure”](#) on page 3-2.
3. Navigate:
Main | Application | Rcvr Config
4. Select the BB/mmWave (3739 Setup) button to open the 3739 SETUP menu.
5. Select Broadband to 125 GHz as shown in [Figure 3-10](#).

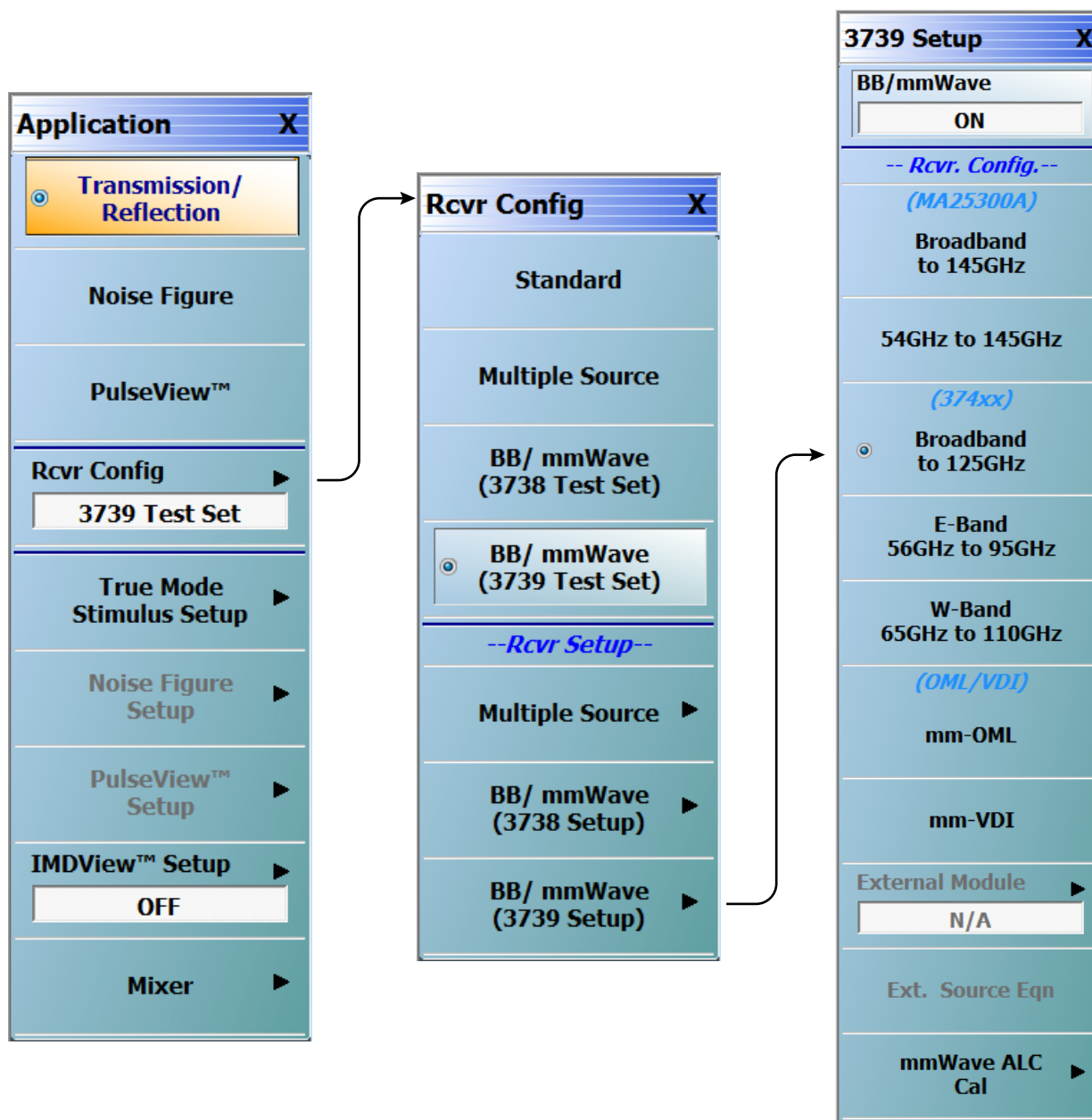


Figure 3-10. 3739 Setup for Broadband Modules

Frequency Setup

1. Navigate to the FREQUENCY menu.
 - MAIN | Frequency | FREQUENCY
2. At the FREQUENCY menu, set the following frequency parameters:
 - Start Frequency = **70.000000000 kHz**
 - Stop Frequency = **125.000000000 GHz**
 - # of Points = **201**
3. The following frequency parameters are automatically set:
 - Center Frequency = **62.500035000 GHz**
 - Span Frequency = **124.999930000 GHz**
 - Step Size = **624.999650 MHz**
4. The system should now be sweeping fully from 70 kHz to 125 GHz.

The screenshot shows the 'Frequency' menu with the following settings:

Parameter	Value
Start	70.000000000 kHz
Stop	125.000000000 GHz
Center	62.500035000 GHz
Span	124.999930000 GHz
# of Points	201
StepSize	624.999650 MHz
CW Mode	OFF
CW Frequency	108.750009100 GHz

Figure 3-11. FREQUENCY Menu – Settings for 70 kHz to 125 GHz Sweep

Receiver Configuration for Multiple Source

To configure the VectorStar VNA for Multiple Source Broadband Operation:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure” on page 3-2](#).
3. Navigate: Main | Application | Rcvr Config | (See [Figure 3-12](#)).
4. From the Rcvr Config menu select the Multiple Source button, then in the Rcvr Setup area, select Multiple Source to open that menu.
5. From the Multiple Source menu select External Module Ctrl to open the dialog box.
6. Select Broadband to 125 GHz.

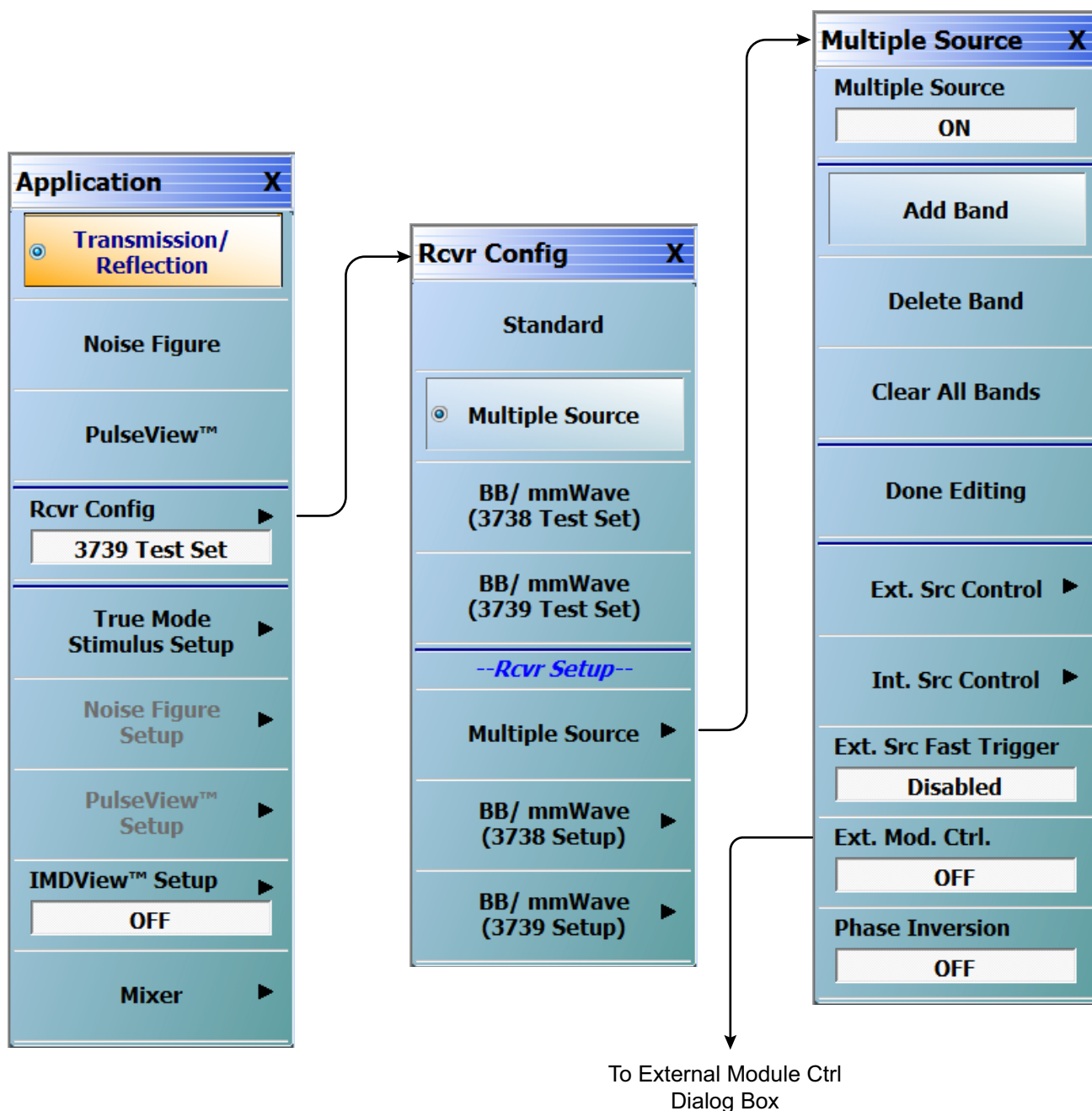


Figure 3-12. Receiver Configuration for Multiple Source (MS464xB Menu) (1 of 2)

From Ext. Mod. Ctrl
(Multiple Source Menu)

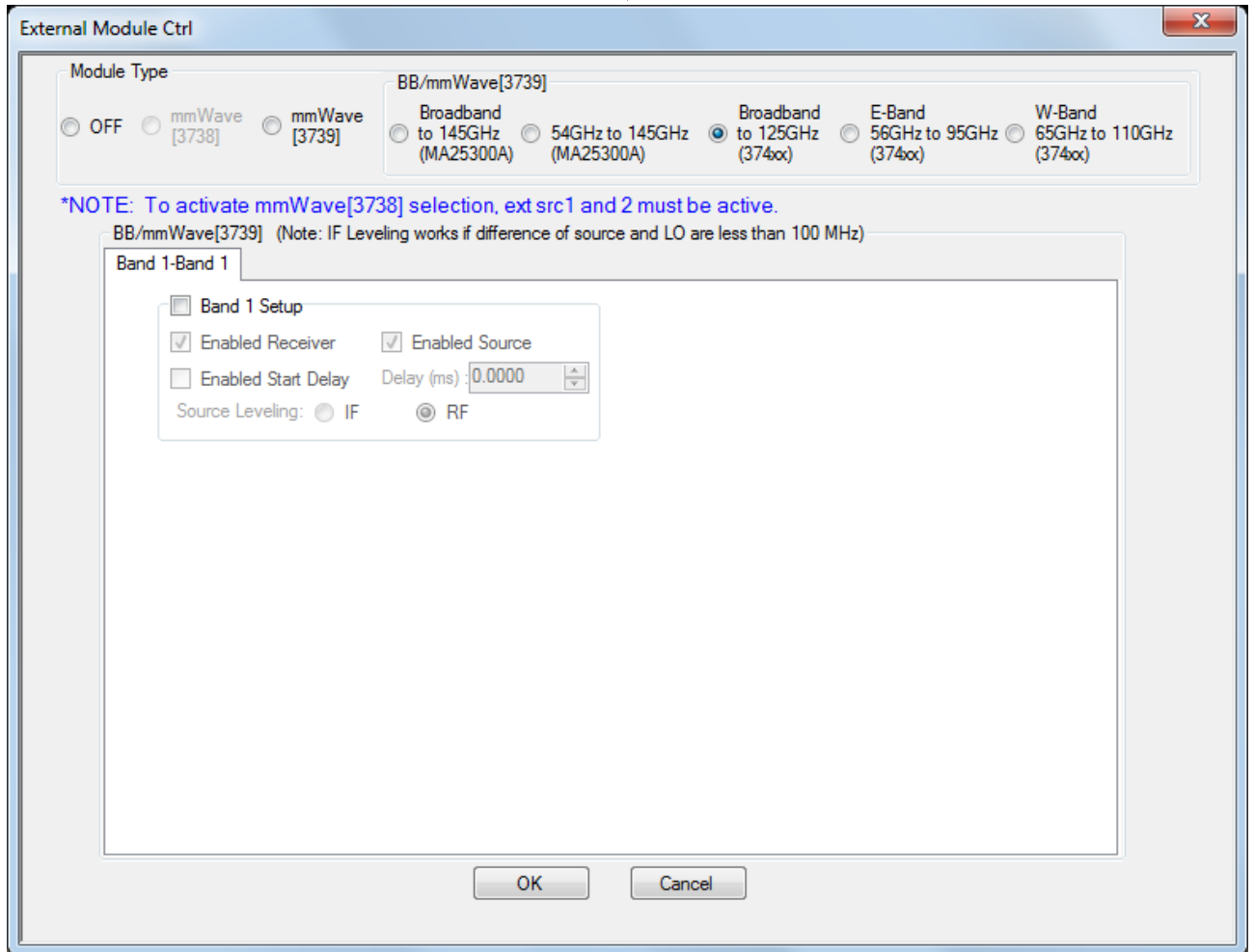


Figure 3-12. Receiver Configuration for Multiple Source (MS464xB Menu) (2 of 2)

3739 Setup for Banded Modules

Configure the VectorStar VNA for Banded Operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure”](#) on page 3-2.
3. Navigate: Application | Rcvr Config | BB/mmWave (3739 Setup)
4. Make Banded selection from the 3739 Setup menu.

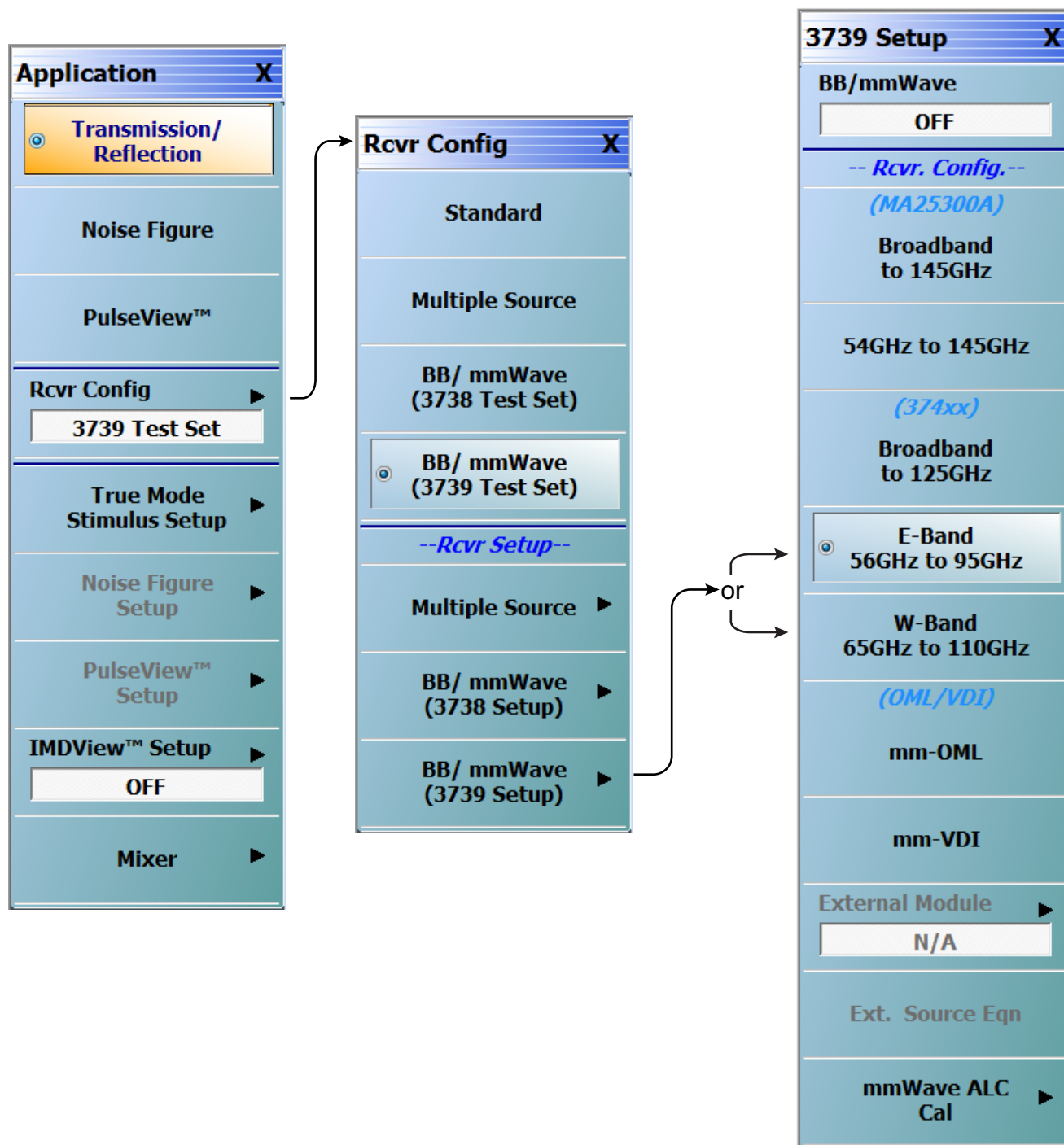


Figure 3-13. 3739 Setup for Banded Modules

3739 Setup for OML/VDI Selection

Configure the VectorStar VNA for OML or VDI operation by performing the following steps:

1. Make sure the VNA and the broadband test set are both on and warmed up.
2. If not already done, perform [Section 3-3 “VNA Preset Procedure”](#) on page 3-2.
3. Navigate to the Application menu and select:

RcvrConfig | BB/mmWave (3739 Setup) | mm-OML (or mm-VDI)

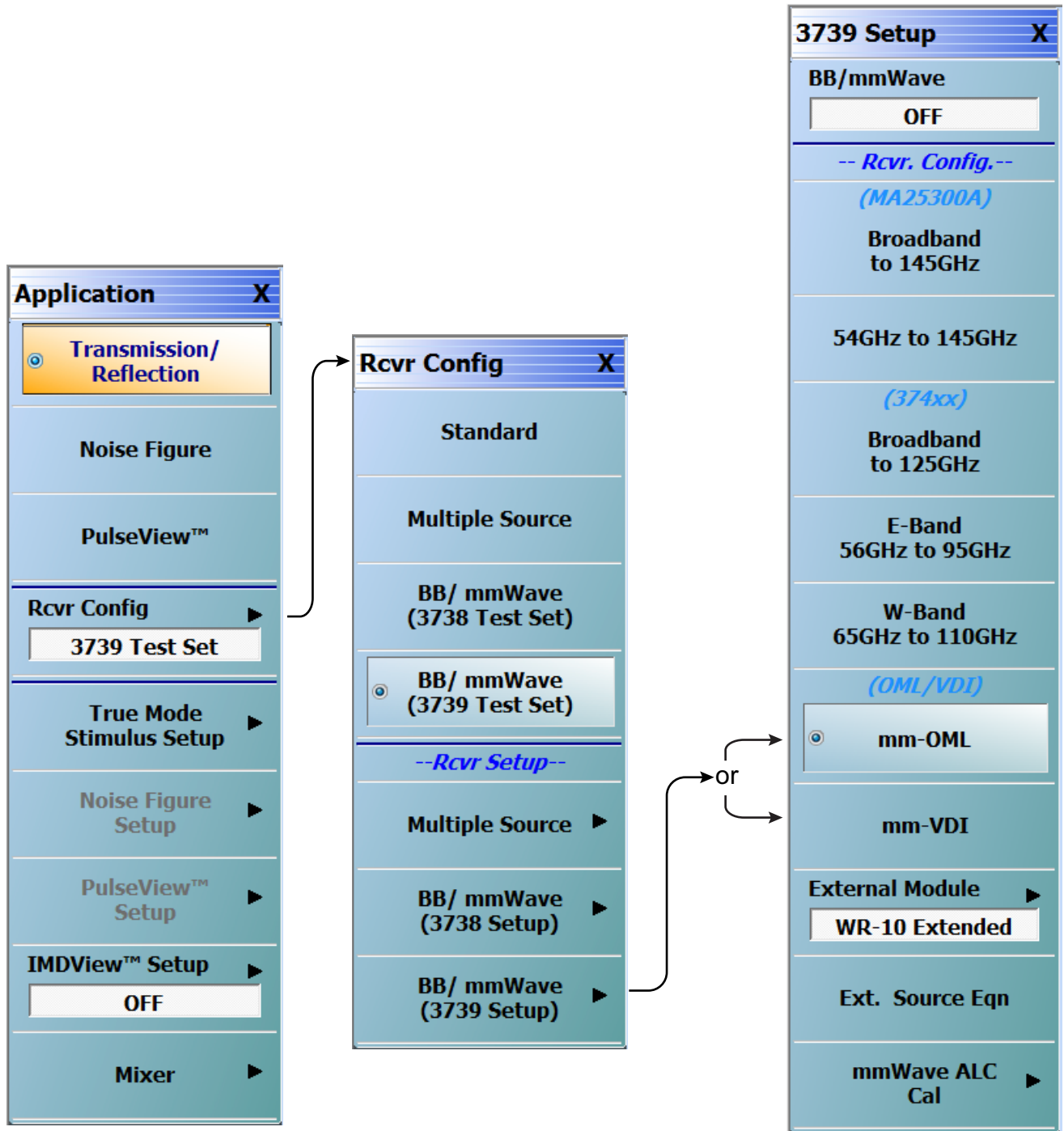


Figure 3-14. 3739 Setup for OML/VDI Selection

OML Band Selection

1. At the MAIN menu, select Application. The APPLICATION menu appears.

MAIN | Application | APPLICATION

2. From the Application menu select:

Rcvr Config | BB/mmWave (3739 Setup) | External Module

3. Select the applicable OML module band from the dialog box and click Apply.

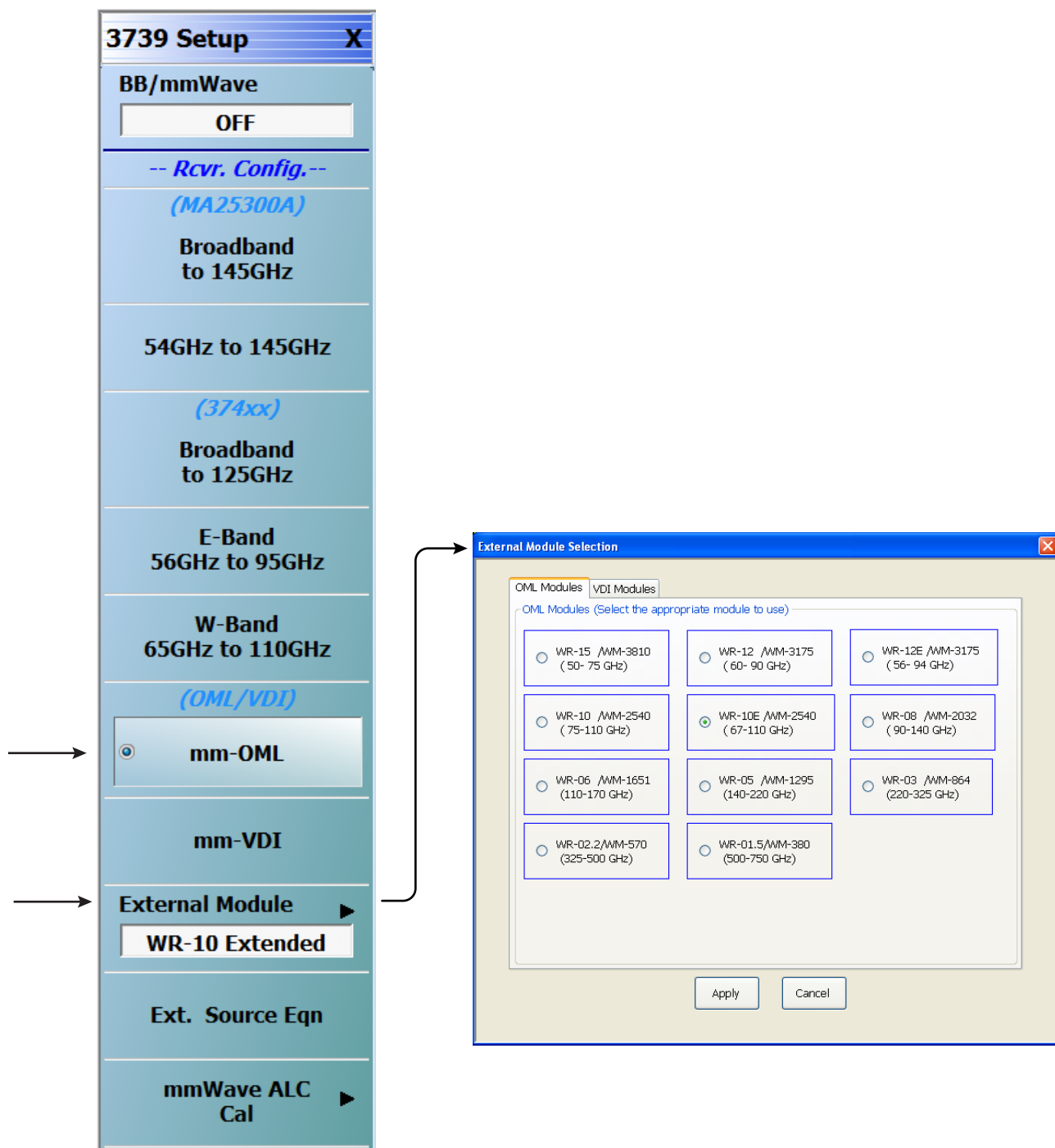


Figure 3-15. 3739 Setup Menu – OML Band Selection

VDI Band Selection

1. At the MAIN menu, select Application. The APPLICATION menu appears.

MAIN | Application | APPLICATION

2. From the Application menu select:

Rcvr Setup | BB/mmWave (3739 Setup) | External Module

3. Select the applicable VDI module type and band from the dialog box and click Apply.

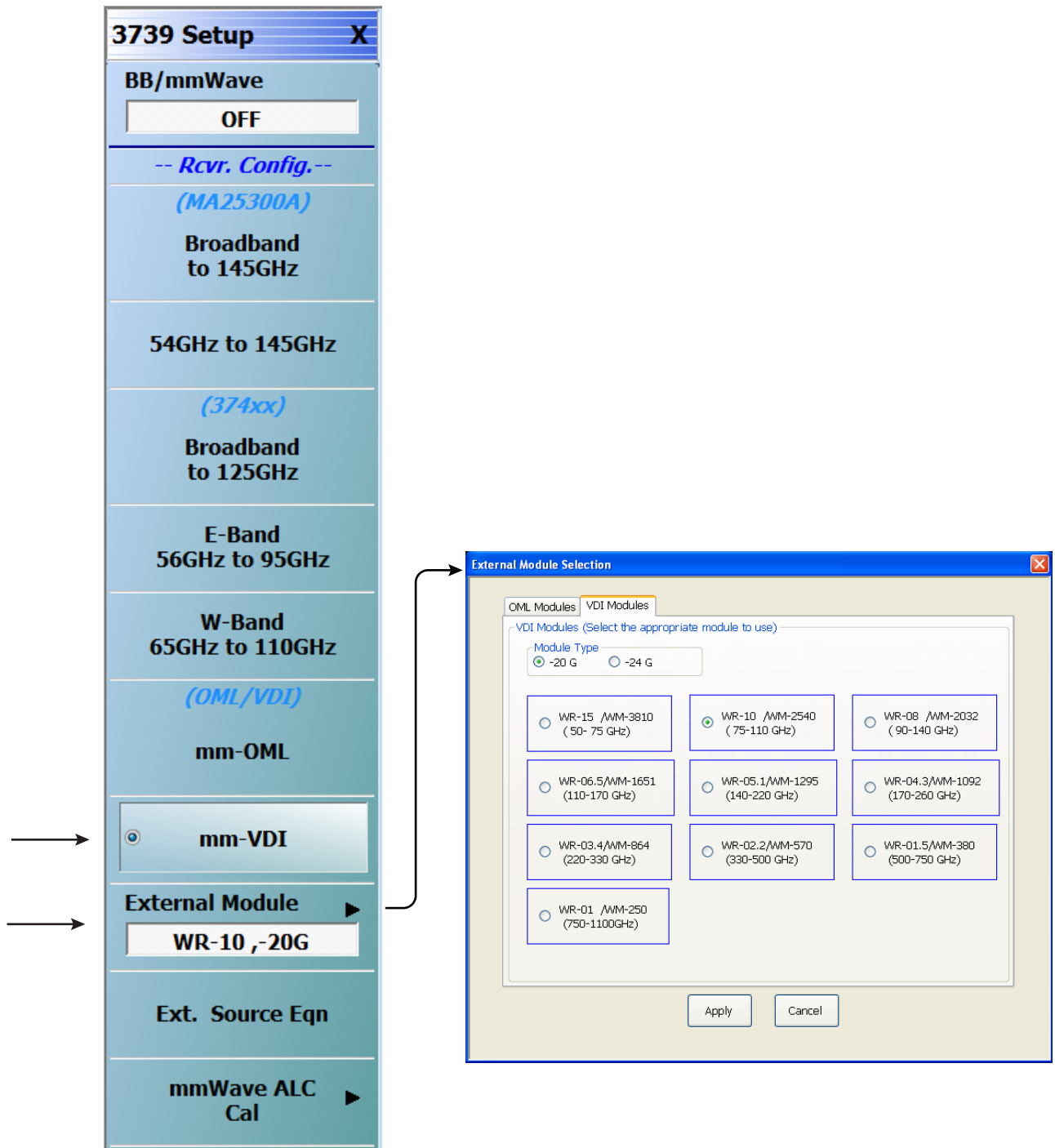


Figure 3-16. 3739 Setup Menu – VDI Band Selection

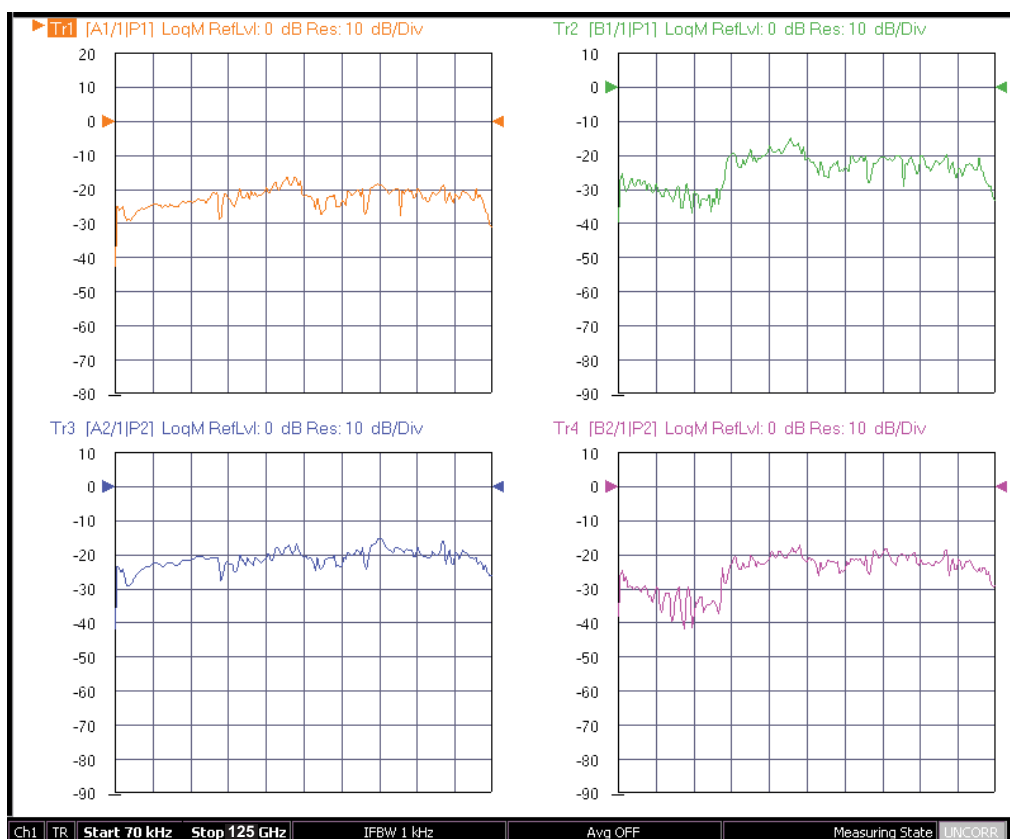
3-6 ME7838A4 Configuration Verification – BB/mmW Modules

Note This verification procedure applies when using 3743A broadband modules.

1. Ensure the system is sweeping from 70 kHz to 125 GHz.
2. Ensure that Trace 1 is set to S11, Trace 2 set to S12, Trace 3 set to S21, and Trace 4 set to S22.
3. Select Trace 1 and then select Display | DISPLAY | Trace Format, and set to **Log Mag**.
4. Select Response | RESPONSE | User-defined. The USER-DEFINED menu appears.
 - a. Set USER-DEFINED | Numerator to **A1**.
 - b. Set USER-DEFINED | Denominator to **1**.
 - c. On the USER-DEFINED menu, select **Port 1** as the Driver Port.
 - d. Using a mouse, move the Reference Line as shown below ([Figure 3-17](#)) to Reference Position = **0**.

Note The Reference Line position can also be set from the SCALE menu in the Reference Position field.

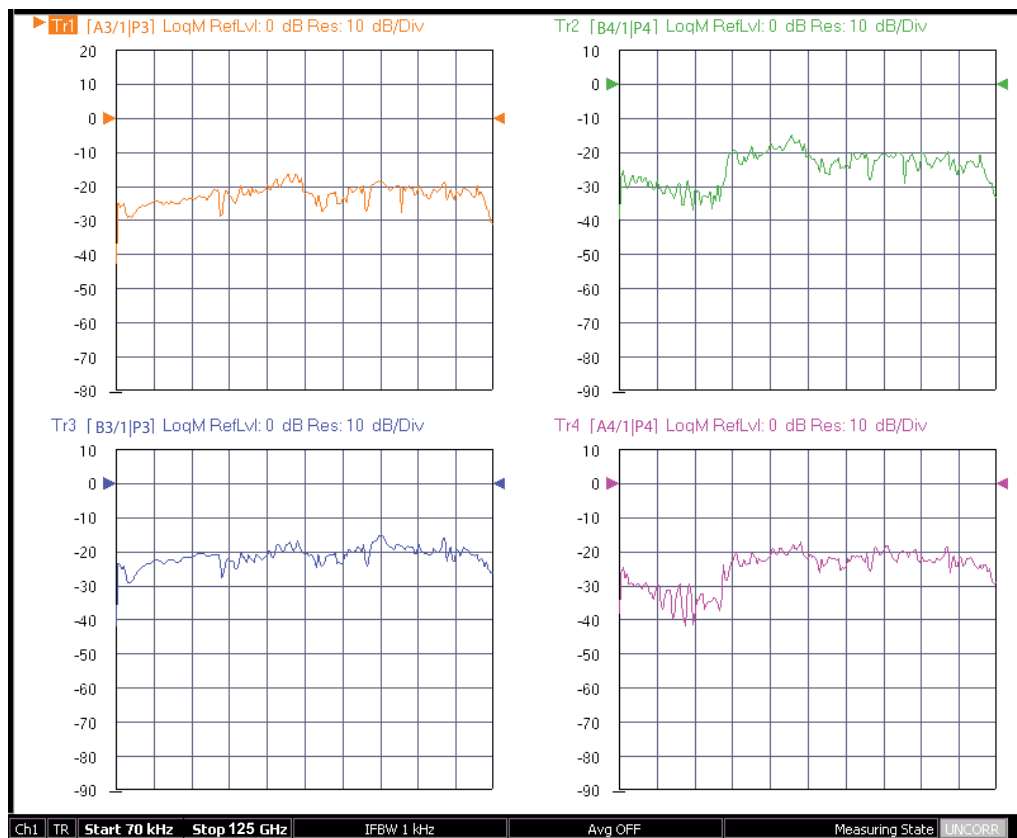
5. For Trace 2, repeat Step 4, setting Numerator = **B1**, Denominator = **1**, Driver Port = **1**.
6. For Trace 3, repeat Step 4, setting Numerator = **A2**, Denominator = **1**, Driver Port = **2**.
7. For Trace 4, repeat Step 4, setting Numerator = **B2**, Denominator = **1**, Driver Port = **2**.
8. Connect **shorts** to **Ports 1 and 2** on the MS464xB VNA, and ensure the resultant display looks similar to [Figure 3-17 on page 3-20](#) (125 GHz shown).



Non-Ratioed Parameters for Initial Checkout

Figure 3-17. Typical Four-Trace Display - Shorts on MS464xB VNA Port 1 and Port 2

9. Select Trace 1 and then select Response | RESPONSE | User-defined. The USER-DEFINED menu appears.
 - a. Set USER-DEFINED | Numerator to **A3**.
 - b. Set USER-DEFINED | Denominator to **1**.
 - c. On the USER-DEFINED menu, select **Port 3** as the Driver Port.
 - d. Using a mouse, move the Reference Line as shown below (Figure 3-18) below to Reference Position = **0**.
10. For Trace 2, repeat Step 9, setting Numerator = **B4**, Denominator = **1**, Driver Port = **4**, Reference Position = **9**.
11. For Trace 3, repeat Step 9, setting Numerator = **B3**, Denominator = **1**, Driver Port = **3**, Reference Position = **9**.
12. For Trace 4, repeat Step 9, setting Numerator = **A4**, Denominator = **1**, Driver Port = **4**, Reference Position = **8**.
13. Connect shorts to Port 3 and Port 4 on the MN469xC Test Set, and ensure the resultant display looks similar to Figure 3-18 (125 GHz shown).



Non-Ratioed Parameters for Initial Checkout

Figure 3-18. Typical Four-Trace Display - Shorts on MN469xC Test Set Port 3 and Port 4

VNA Power Down

1. With the VNA in operate mode, the front panel **Standby/Operate** button is illuminated with a green LED.
2. Press and hold the **Standby/Operate** button for at least one (1) second. The orange **Standby LED** is illuminated with an orange LED. The VNA is in Standby mode.
3. To completely shut down the VNA, at the rear panel, set the **AC Power Rocker Switch** in the AC Power Input Module to “O” or OFF.
4. If required, disconnect the VNA Power Cord from the AC Mains.

Test Set Power Down

5. At the Test Set front panel, press the **AC Power Button**. The green **Power LED** goes out.
6. If required, disconnect the Test Set rear panel AC Power Cord from the AC main power source.

Appendix A — ME7838A4 Series Multiport Specifications

A-1 ME7838A4 Multiport Broadband/Banded VNA System Specifications

The latest technical data sheets and other reference materials for the ME7838A4, MS464xA/B, and other VectorStar™ VNA systems can be downloaded from <http://www.anritsu.com>. The three recommended documents are:

- VectorStar™ ME7838A4 Broadband/Banded mm-Wave VNA Technical Data Sheet – 11410-00704
- VectorStar™ MS464xA Series VNA Technical Data Sheet – 11410-00432
- VectorStar™ MS464xB Series VNA Technical Data Sheet – 11410-00611
- VectorStar™ MN469xC Series VNA Technical Data Sheet – 11410-00777

Enter the document part number in the home page search frame and a link to the latest version of that document will be displayed for download.

Index

Numerics

10410-00311- BB/Banded mmW Modules RM	A-1
11410-00432 MS4640A VNA TDS	A-1
11410-00611 MS4640B VNA TDS	A-1
11410-00704 ME7838A4 BB/mm TDS	A-1
2600-496 SPV Software	1-12
3656B Calibration/Verification Kit	1-12
3743A BB/mm-Wave Module	1-10
3744A-EE mm-Wave Module	1-10
3744A-EW mm-Wave Module	1-10
3744A-Rx Receiver Module	1-10
4-Trace Display	3-20
806-206 Phase Stable Cable 70 cm	1-11
806-209 Phase Stable Cable 91 cm	1-11

A

Abbreviations	
TDS (Technical Data Sheet)	A-1
Anritsu, contact	1-14
Assembly Notes	2-1

C

Cable Connections (MS464xA VNA)	2-4
Cable Connections (MS464xBA)	2-7
Calibration/Verification Kit	1-12
Checkout, ME7838A4	3-1
Configuration Options	1-10
Contacting Anritsu	1-14

D

Documentation	1-13, A-1
Driver Port	3-20

F

Four Trace Display	3-20
--------------------	------

I

Initial Check ME7838A4	3-1
Introduction	1-1

L

Links	
contacting Anritsu	1-14

M

Major Configuration Options	1-10
ME7838A4 BB/mm TDS 11410-00704	A-1
ME7838A4 Multiport System	1-1
ME7838A4 System Checkout	3-1
Millimeter Wave Modules	
3744A-EE mm-Wave Module	1-10
3744A-EW mm-Wave Module	1-10
MN4694C Multiport Test Set	1-1

MN4697C Multiport Test Set	1-1
Module Cable Connections	2-18, 2-20
MS4640A VNA TDS 11410-00432	A-1
MS4640A-002 Time Domain Option	1-10
MS4640A-007 Receiver Offset Option	1-10
MS4640B VNA TDS 11410-00611	A-1
MS4640B-002 Time Domain Option	1-10
MS4640B-007 Receiver Offset Option	1-10
MS4647A/B-051 Front Panel Loops Option	1-12
MS4647A/B-062 AMS 4 Attenuator Option	1-12

N

Non-Ratioed Parameters	3-20, 3-21
Notes	2-1

O

OML Module Cable Connections	2-22
Options	1-10

P

Part Numbers	
01-201	2-1
10410-00266	1-13
10410-00267	1-13
10410-00269	1-13
10410-00270	1-13
10410-00278	1-13
10410-00279	1-13
10410-00285	1-13
10410-00287	1-13
10410-00288	1-13
10410-00305	1-13
10410-00317	1-13
10410-00318	1-13
10410-00319	1-13
10410-00320	1-13
10410-00322	1-13
10410-00323	1-13
10450-00040	1-13
11410-00432	1-13
11410-00452	1-13
11410-00513	1-13
11410-00611	1-13
2600-496	1-12
3656B	1-12
Performance Specifications	1-12
Phase Stable Interconnect Cable	1-11

R

Rear Panel Connections	2-4, 2-7
Reference Position	3-20
Related Documentation	1-13

S

Safety Symbols
 For Safety Safety-2
 In Manuals Safety-1
 On Equipment Safety-1
Semirigid Cable Connections 2-11
Site 1-11
Software Verification (SPV) Software 1-12

T

Technical Data Sheet (TDS) A-1
Technical Documentation 1-13
Torque Wrench 01-201 2-1
Trace Display 3-20, 3-21
Trace Settings 3-20, 3-21

U

URL, Contacting Anritsu 1-14

V

VDI Module Cable Connections 2-23
Verification Kit 1-12
VNA Menus
 DENOMINATOR menu 3-21
 NUMERATOR menu 3-21
 RESPONSE menu 3-20
 USER-DEFINED menu 3-20, 3-21
VNA Settings
 Sweeping Range 3-20
 Trace Reference Position 3-20
 Trace Settings 3-20, 3-21

W

Website, Contacting Anritsu 1-14

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