Agilent Technologies Z5623A Option H81

User's and Service Guide

Agilent Technologies
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Agilent Technologies

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WARNING	**Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

CAUTION	Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

Definitions

- Specifications describe the performance of parameters covered by the product warranty (temperature –0 to 55 °C, unless otherwise noted.)
- *Typical* describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.
- *Nominal* values indicate expected performance or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

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1 Introduction

Description

The Agilent Z5623AH81 Pulse Test Set adds pulse measurement to the E8362B PNA Series Network analyzer.

NOTE This User's and Service Guide documents the use of the test set with an Agilent E8362B Network Analyzer.

Electrical Requirements

The alternating-current (AC) power that is supplied to the test set must meet the following requirements:

Voltage: 90 to 250 Vac

Frequency: 50 to 60 Hz

Available power: 40 watts minimum

If the available AC line voltage is outside the 90 to 250 Vac range, an autotransformer that provides third wire continuity to earth ground may be used.

Environmental Requirements

Operating Environment

Indoor use only

Operating temperature: 0 to 55 °C

Maximum relative humidity: 80 percent for temperatures up to 31 °C decreasing linearly to 50 percent relative humidity at 40 °C

Altitude: up to 15,000 feet (4,572 meters)

Enclosure protection: IP 20, according to IEC 529

CAUTION This product is designed for use in INSTALLATION CATEGORY II, and POLLUTION DEGREE 2, per IEC 101 and 664 respectively.

Non-Operating Storage Conditions

Temperature: –40 °C to +70 °C

Humidity: 0 to 90 percent relative at +65 °C (non-condensing)

Altitude: 0 to 15,240 meters (50,000 feet)

General Characteristics

Weight

Net: Approximately 9 kg

Shipping: Approximately 20 kg

Cabinet Dimensions

These dimensions exclude front and rear panel protrusions.

89 mm H by 425 mm W by 500 mm D (3.5 in by 16.75 in by 19.7 in)

Miscellaneous Characteristics

RF connectors: APC 3.5 mm (female)

Pulse connector: BNC (female)

Switch type: Solid State

2 Installation

Verifying the Shipment

After the test set has been unpacked, keep the original packaging materials so they can be used if you need to transport the instrument.

Check the items received against Table 1 to make sure you have received everything.

Inspect the test set and all accessories for any signs of damage that may have occurred during shipment. If your test set or any accessories appear to be damaged or missing, refer to "Contacting Agilent Sales and Service Offices" on page 42.

Table 1 **Content List**

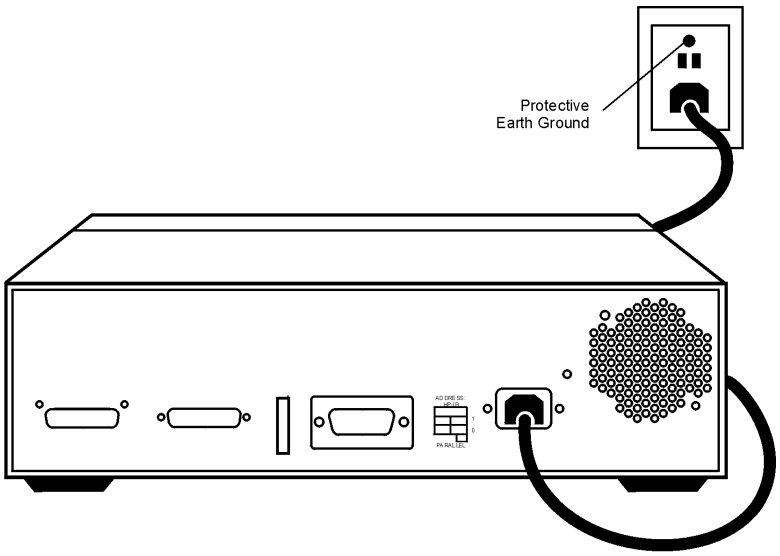
Description	Agilent Part Number	Qty
Power Cord	See Figure 2 on page 8	1
Cable Jumper	08720-20098	2
Attn 10 dB SMA	0955-0317	1
Adapter SMA male to SMA male	1250-1788	1
Cable Assy 5 inch SMA	5062-6680	1
Kit-Front Handle	5063-9226	1
Kit-Rack Mount	5063-9232	1
Cable RF, CPLR Thru	Z5623-20294	1
Cable RF, SRC OUT	Z5623-20295	1
Cable RF, R1 In Attn	Z5623-20296	1
Cable RF, R1 In	Z5623-20297	1
High Pass Filter 2-18 Ghz	Z5623-80027	1
BNC Short (attached to Pulse In)	1250-0774	1
User's and Service Guide	Z5623-90064	1

Electrical Preparations

1. Ensure that the "Electrical Requirements" on page 2 are met.
2. Verify that the power cable is not damaged and that the power source outlet provides a protective earth ground contact. Note that Figure 1 depicts only one type of power source outlet. Refer to Figure 2 to see the different types of power cord plugs that can be used with your test set.

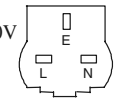
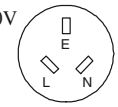
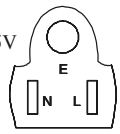
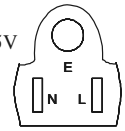
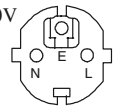
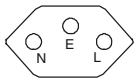
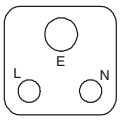
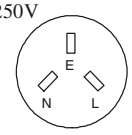
   Cables are available in different lengths. For descriptions and part numbers of cables other than those described in Figure 2, Refer to "Contacting Agilent Sales and Service Offices" on page 42.
3. If this product is to be powered by autotransformer, make sure the common terminal is connected to the neutral (grounded) side of the ac power supply.

Figure 1 **Protective Earth Ground**



WARNING **This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted into a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption of the protective conductor is prohibited.**

Figure 2 Power Cables

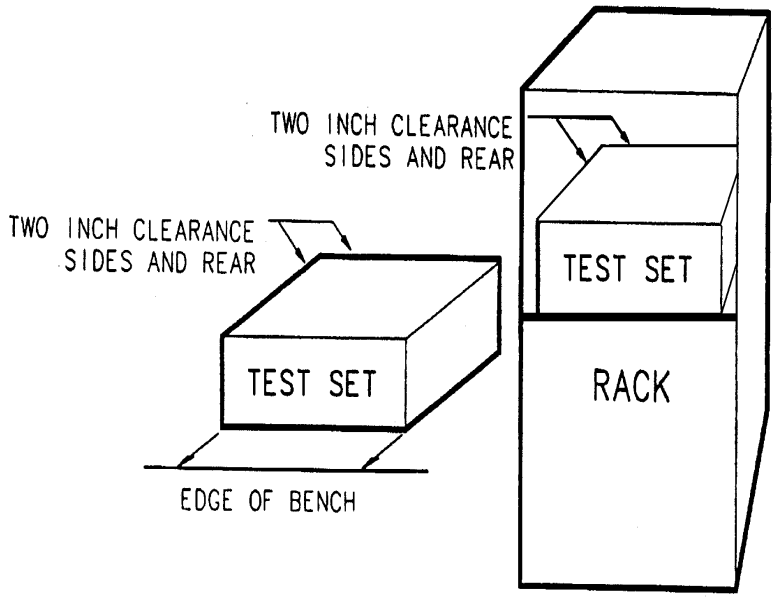
Plug Type [a]	Cable Part Number	Plug [b] Description	Length cm (in.)	Cable Color	For Use in Country
250V 	8120-8705 8120-8709	Straight BS 1363A 90˚	229 (90) 229 (90)	Mint Gray Mint Gray	Option 900 United Kingdom, Hong Kong, Cyprus, Nigeria, Singapore, Zimbabwe
250V 	8120-1369 8120-0696	Straight AS 3112 90˚	210 (79) 200 (78)	Gray Gray	Option 901 Argentina, Australia, New Zealand, Mainland China
125V 	8120-1378 8120-1521	Straight NEMA 5-15P 90˚	203 (80) 203 (80)	Jade Gray Jade Gray	Option 903 United States, Canada, Brazil, Colombia, Mexico,Philippines, Saudi Arabia, Taiwan
125V 	8120-4753 8120-4754	Straight NEMA 5-15P 90˚	229 (90) 229 (90)	Gray Gray	Option 918 Japan
250V 	8120-1689 8120-1692	Straight CEE 7/VII 90˚	200 (78) 200 (78)	Mint Gray Mint Gray	Option 902 Continental Europe, Central African Republic, United Arab Republic
230V 	8120-2104 8120-2296	Straight SEV Type 12 90˚	200 (78) 200 (78)	Gray Gray	Option 906 Switzerland
220V 	8120-2956 8120-2957	Straight SR 107-2-D 90˚	200 (78) 200 (78)	Gray Gray	Option 912 Denmark
250V 	8120-4211 8120-4600	Straight IEC 83-B1 90˚	200 (78) 200 (78)	Mint Gray Mint Gray	Option 917 South Africa, India
250V 	8120-5182 8120-5181	Straight SI 32 90˚	200 (78) 200 (78)	Jade Gray Jade Gray	Option 919 Israel

a. E =earth ground, L = line, and N = neutral.
b. Plug identifier numbers describe the plug only. The Agilent Technologies part number is for the complete cable assembly.

Environmental Preparations

1. Ensure that the "Electrical Requirements" on page 2 are met.
2. If you are installing the test set into a cabinet, ensure there are at least two inches of clearance around the sides and back of the test set and the system cabinet. See Figure 3. The convection into and out of the test set must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the test set by 4 °C for every 100 watts dissipated in the cabinet.

Figure 3 Ventilation Clearance Requirements



CAUTION If the total power dissipated in the cabinet is greater than 800 watts, forced convection must be used.

Electrostatic Discharge Protection

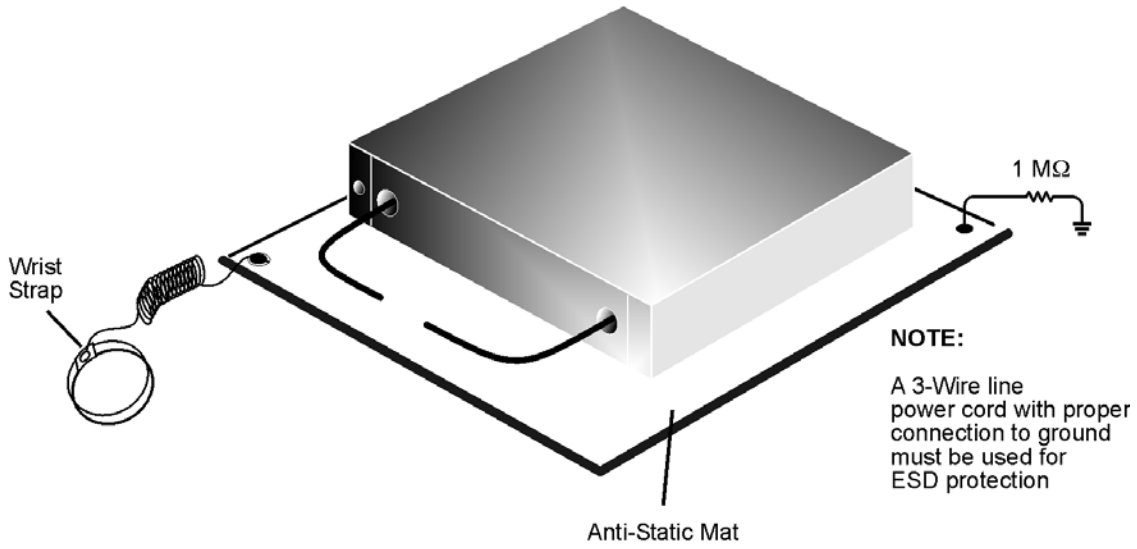
Protection against electrostatic discharge (ESD) is essential while removing or connecting cables or assemblies within the network analyzer.

Static electricity can build up on your body and can easily damage sensitive internal circuit elements when discharged. Static discharges too small to be felt can cause permanent damage. To prevent damage to the instrument:

- *always* wear a grounded wrist strap having a 1 MΩ resistor in series with it when handling components and assemblies.
- *always* use a grounded, conductive table mat while working on the instrument.
- *always* wear a heel strap when working in an area with a conductive floor. If you are uncertain about the conductivity of your floor, wear a heel strap.

Figure 4 shows a typical ESD protection setup using a grounded mat and wrist strap.

Figure 4 ESD Protection Setup



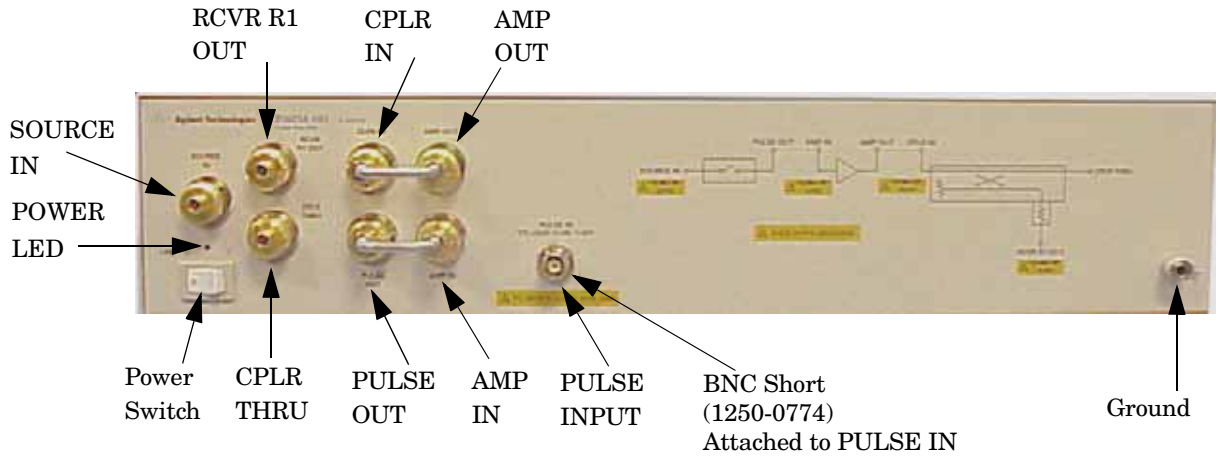
esd_setup

Test Set Familiarization

This section familiarizes the user with various front and rear panel features of the test set.

Front Panel

Figure 5 Front Panel Features



Power On Switch

The Power On switch turns the AC power to the test set on and off. The switch is located at the bottom left corner of the front panel.

The switch disconnects the mains circuits from the mains supply after the EMC filters and before other parts of the instrument.

Power LED

The power LED is illuminated when the power switch is in the on (1) position.

RF Connectors

All of the RF connectors are 50 Ω APC 3.5 mm connectors.

Pulse Connector

The pulse input connector is a 50 Ω BNC female connectors.

Rear Panel

Figure 6 **Rear Panel Features**

Line Module

The line module contains the power cable receptacle and the line fuse.

Power Cables

The line power cable is supplied in one of several configurations, depending on the destination of the original shipment.

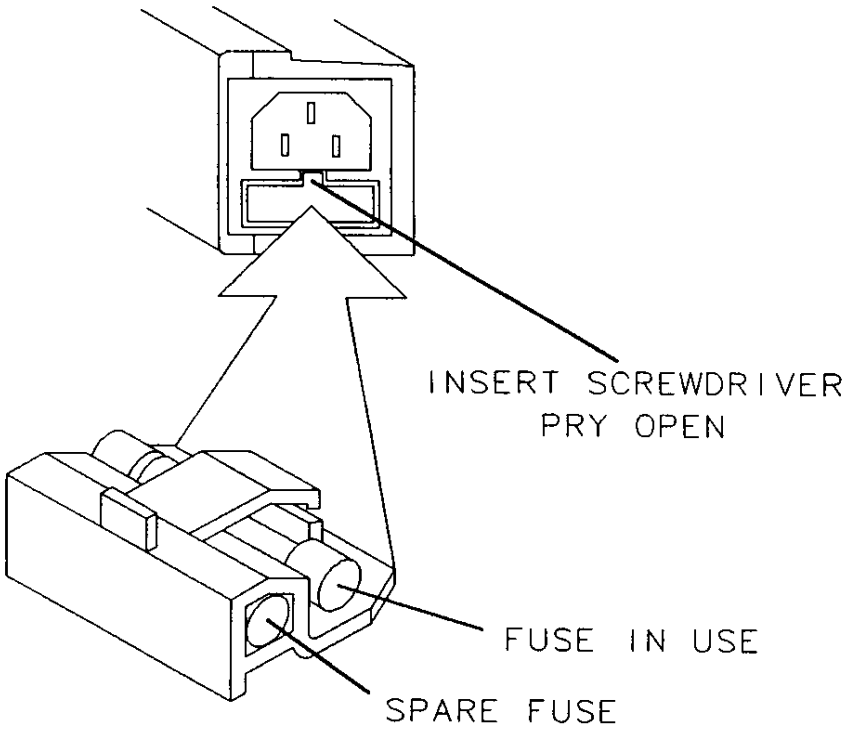
Each instrument is equipped with a three-wire power cable. When connected to an appropriate ac power receptacle, this cable grounds the instrument chassis. The type of power cable shipped with each instrument depends on the country of destination. See Figure 2 on page 8 for the part numbers of these power cables.

WARNING **This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.**

The Line Fuse

The line fuse (F 3 A/250 V, 2110-0780) and a spare reside within the line module. Figure 7 illustrates where the fuses are and how to access them.

Figure 7 Location of Line Fuses



3 Controlling the Test Set

System Performance

The following specifications describe the systems typical performance for the E8362B with Options H08 Pulsed-RF Measurement Capability and H11 External IF Access and the Z5623AH81 2-20 GHz Pulse RF Test Set. Refer to the E8362B. The internal PIN switch in the Z5623AH81 Pulse test set can extend the lower frequency range down to 500 MHz. Specifications are not given for the 500 MHz to 2 GHz range. System level performance is not measured.

CAUTION

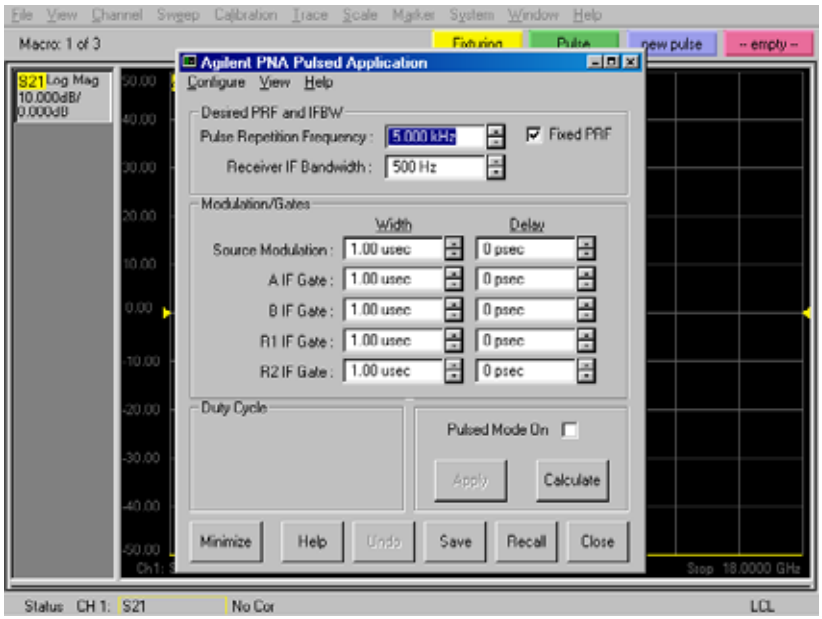
The Z5623AH81 has an internal RF Amplifier. This Amplifier will undergo compression at power levels above –5 dBm into the Source Input of the test set. When using the Z5623AH81 the 10 dB attenuator supplied, must be connected to the RCVR R1 Out port of the test to avoid compression of the PNA's R1 Mixer. Caution should be taken to protect the PNA's B Mixer by adjusting the B channel receiver attenuator to 20 dB to avoid compression. Power levels into the PNA are indicated in the PNA's Help Menu and the User's and Service Guide.

Operation

Your PNA with Option H08 comes with a VB application/DLL for the pulse application. Please review this application before connecting the Z5623AH81 test set to the PNA. This application can be found in the PNA's Help Menu under "Pulse" or Option H08. Application is shown below.

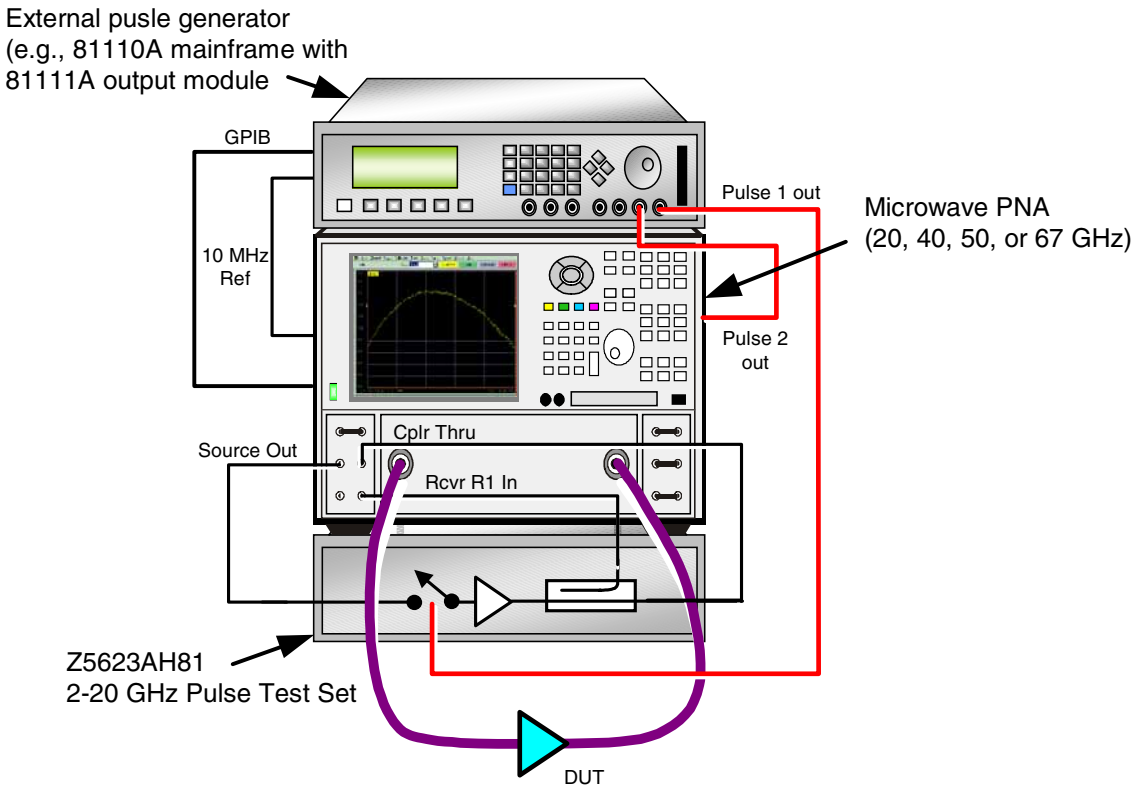
The Option H08 provides the following:

- Enables IF gates provided with Option H11.
- Provides algorithms to optimize the following:
  - IF bandwidth and shape (FIR filter taps).
  - Sample rate of instrument.
  - PRF
- Includes:
  - Dynamic link library (.dll) for automated environments.
  - Visual Basic application for stand-alone use (utilizes .dll).



System Setup

Figure 8 Typical Configuration



WARNING **The RF cables supplied with your test are designed for the E8362B. Connector damage may occur if the receiver does not have a 3.5 mm input connector.**

Figure 9 Front Panel Cable Connections

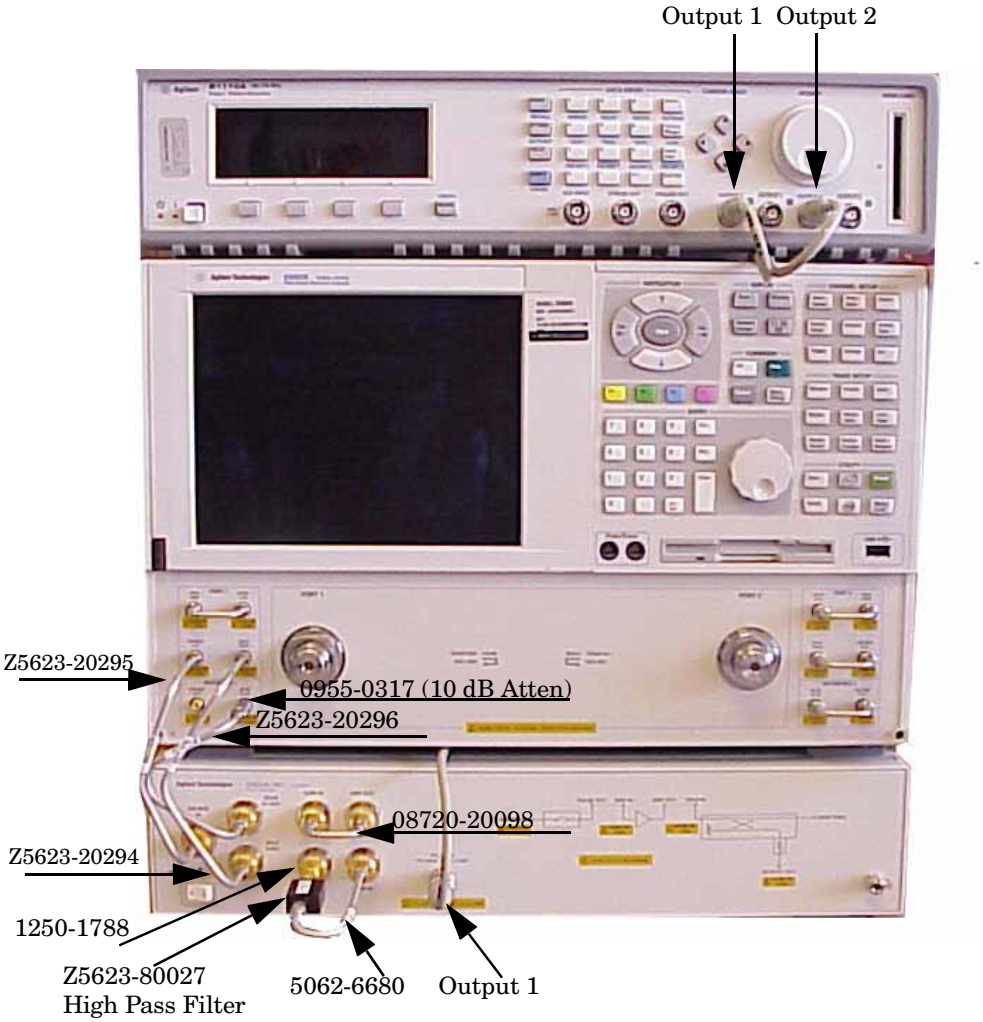


Figure 10 Rear Panel Cable Connections

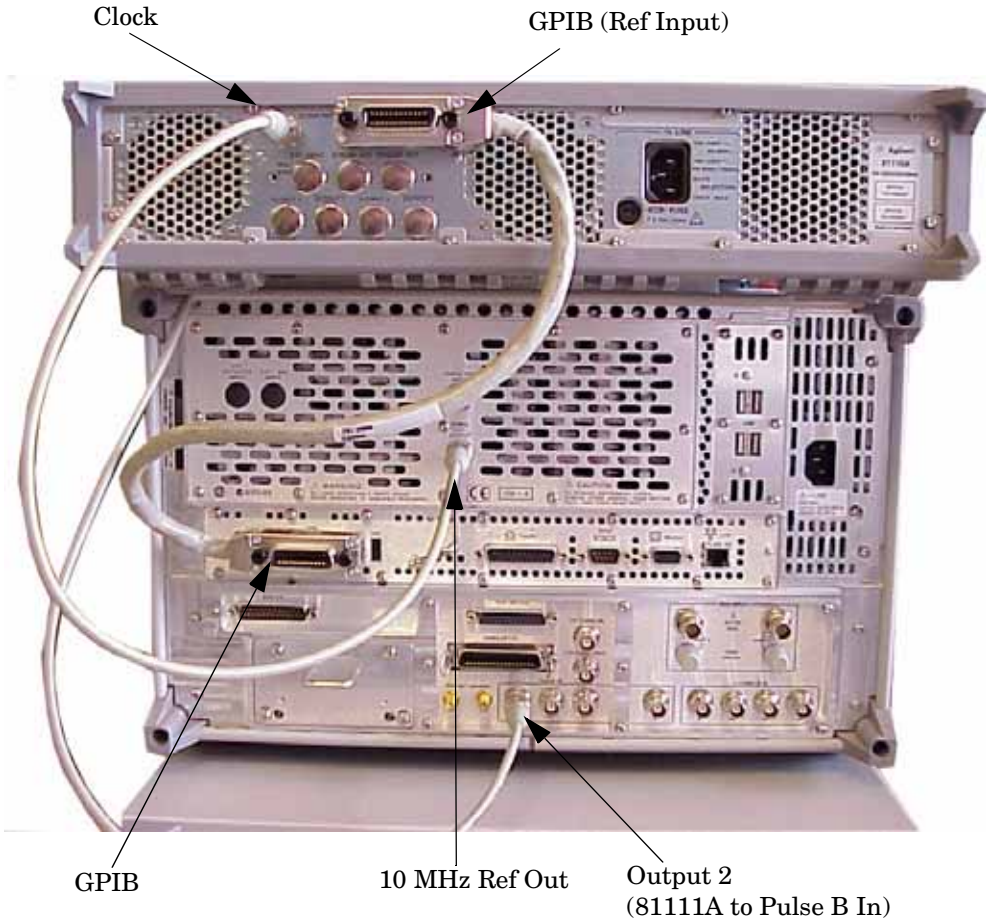


Table 2 Equipment Connection

From	To
Front Panel:	
PNA Source Out	Z5623AH81 Source In
PNA CPLR Thru	Z5623AH81 CPLR Thru
PNA RCVR R1 In	Z5623AH81 RCVR R1 Out
81111A Pulse 1 Out	Z5623AH81 Pulse In
Rear Panel:	
PNA Pulse B In	81111A Pulse 2 Out
PNA 10 MHz Ref Out	81110A 10 MHz Ref In
PNA GPIB	81110A GPIB

Front Panel Jumpers

The Z5623AH81 test set allows the user to bypass the internal amplifier. To bypass the amplifier reconfigure the jumper cables, located on the front panel, so that the Pulse Out is connect to CPLR In. Figure 12 allows the user to customize their measurement needs. Figure 13, a 2 GHz high pass filter is recommended to reduce video feed thru, see “PIN Switch Overshoot” on page 27.

Figure 11 Normal Operation

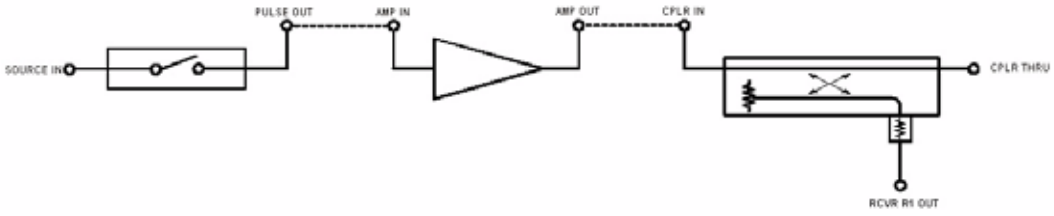


Figure 12 Bypass Operation

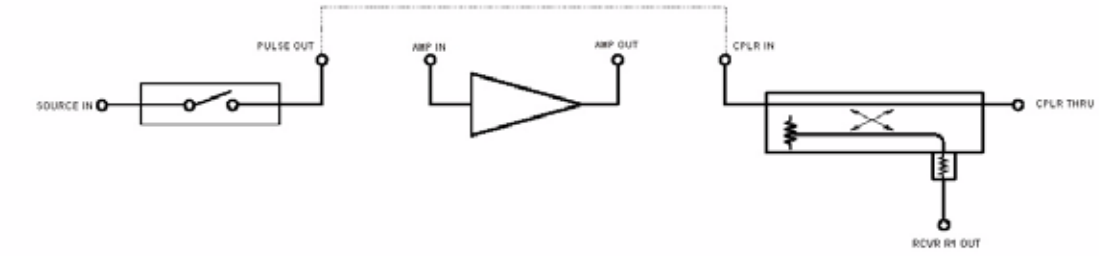
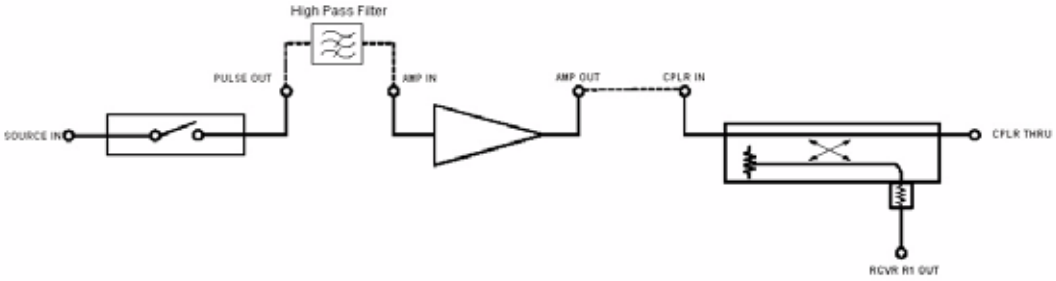


Figure 13 External Filter



General Information

- PNA E8362B Network Analyzer: 10 MHz to 20 GHz
- Z5623AH81 Test Set: 2 GHz to 20 GHz Pulse Test Set with amplifier.
- Dynamic Range: 2 GHz to 20 GHz, 70 dB
- Pulsed-RF Switch Test Set:
  - — Transition Time, 20 nanoseconds
  - — Rise/Fall Time (10% to 90%), 15 nanoseconds
  - — Pulse Width (minimum), 100 nanoseconds
  - — Trigger Level (External), 10K Ω TTL, "0" ON, "1" OFF, TTL-low-level signal turns the RF on
  - — Maximum Power Input, 10 dBm
  - — On/Off Ratio, 70 dB
- E8362B Option H08:
  - — Widest Bandwidth, 10 kHz
  - — Trigger Level (External), TTL
  - — Trigger Width (minimum), 20 nanoseconds (with external switch < 20 ns)
  - — Pulse Profile Feature

Table 3 Typical System Performance

Typical System Performance		**2-8 GHz**	**8-18 GHz**	**18-20 GHz**
Maximum Power at Port 1[1] (measured)		18 dBm	14 dBm	12 dBm
Reference Power at Port 1 (nominal)		–8 dBm	–12 dBm	–14 dBm
Minimum Power at Port 1[2] (measured)		–80 dBm	–80 dBm	–80 dBm
System Dynamic Range[3]	Pulse[4] Non-Pulse[4]	70 dB 130 dB	70 dB 120 dB	70 dB 120 dB

1. This maximum power measurement assumes that the E8362B source attenuator is set to 0 dB and the power level is set to –5 dbm (default power level is on for the E8362B). A & B receiver attenuators are set at 10 dB.
2. This minimum power measurement bypasses the internal amplifier of the Z5623AH81 Test Set.
3. Forward transmission measurements. Limited by compression level and noise floor.
4. System Dynamic Range “Pulse” indicates the on/off ratio of the PIN switch. The Non Pulse indicates if the PIN switch is on and is not used in a pulse mode application.

Test Set Damage Levels

The maximum power levels are indicated on the Z5623AH81 front panel.

CAUTION Damage to internal parts of the test set will occur if max power levels are exceeded. Consult your PNA's User's and Service Guide for maximum power handling capabilities.

Table 4 Maximum Power Levels

Source In	+10 dBm
Amp In	+10 dBm
CPLR In	+30 dBm
RCVR R1 Out	+15 dBm

PIN Switch Overshoot

Before connecting your device to the PNA with the Z5623AH81 please be advised.

CAUTION

Damage to the users device can occur due to overshoot from the internal PIN switch used in the Z5623AH81. Overshoot on the pulsed RF signal is caused by the video feed through of the pulse TTL input. It is highly recommended that a high pass filter be place between jumpers Pulse Out and Amp IN on the front panel of the Z5623AH81 to eliminate this overshoot. A high pass filter is supplied with the Z5623AH81 Pulse Test Set. You can customize your application needs by replacing the high pass filter. Refer to "Contacting Agilent Sales and Service Offices" on page 42 for customized filter kits that can be supplied for use with the Z5623AH81.

The typical performance of the PIN Switch is shown in "Pulse of PIN Switch (RF Power On/Off)." This plot shows the overshoot of the video feed thru.

Figure 14 Pulse of PIN Switch (RF Power On/Off)

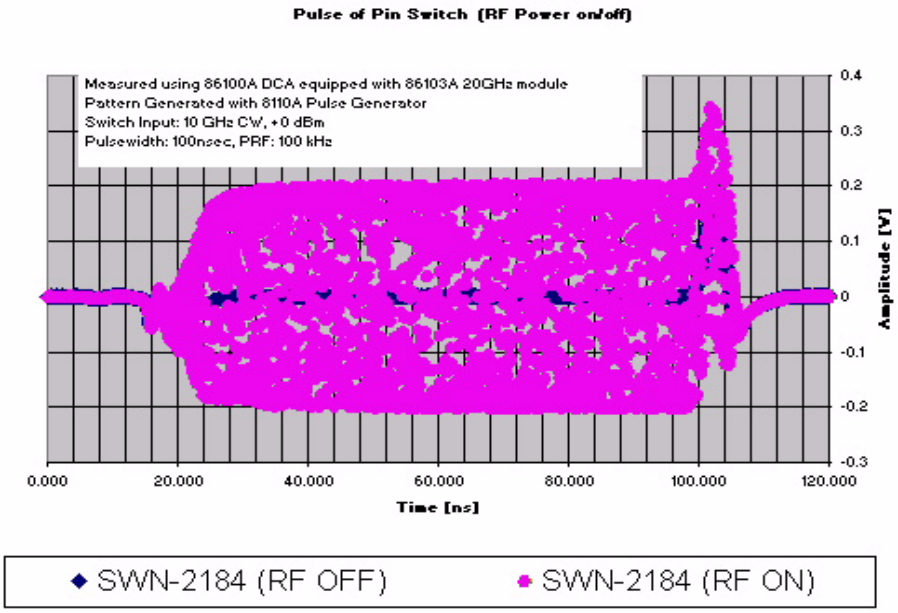
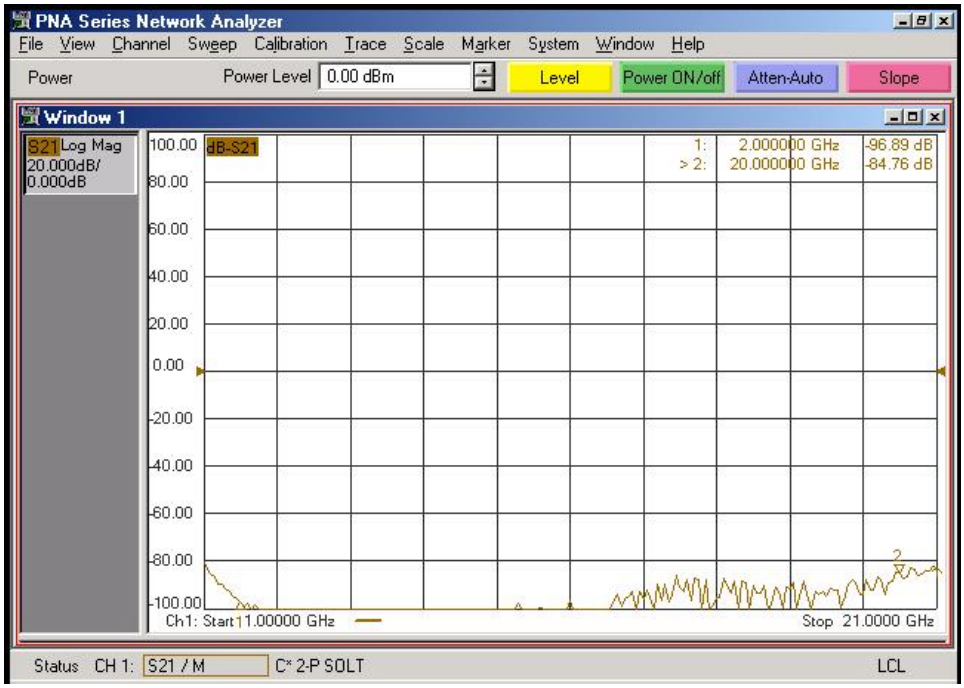


Figure 15 Typical On/Off Ratio of the PIN Switch



Test Set Performance Verification

Equipment Required

- E8362B Network Analyzer 10 MHz to 20 GHz *or equivalent*
- 85033D/E 3.5 mm Calibration Kit *or equivalent*
- BNC Male Short
- 3.5 mm 50 Ω Termination
- two 3.5 mm RF Cables, 36 inch *or equivalent*

Performance Procedure

To test the performance of the Z5623AH81 it is assumed the user is familiar with the operation of the equipment listed above.

General S-parameters are used to characterize the connection paths of the test set. Both reflection and transmission measurements are required. These measurements are made using the E8362B 3.5 mm Calibration Kit and RF cables.

Table 5 PNA Initial Setup

Start Freq	500 MHz
Stop Freq	20 GHz
Power Level	–20 dBm
IF Bandwidth	100 Hz
Number of Points	401

To display all 4 S-parameters set the network analyzer's display window to setup B.

Measurements can be made easier by setting up the PNA Markers search, tracking and search domain user states for each frequency band.

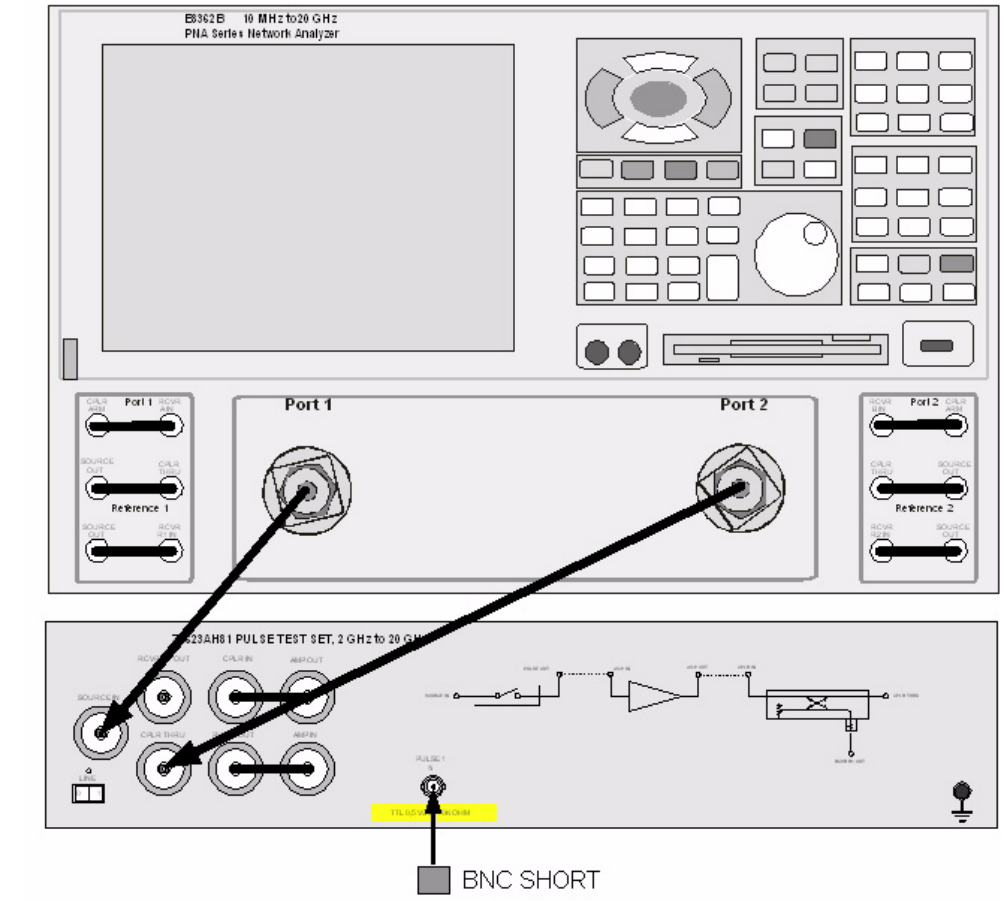
User states for markers:
Marker 1 (2 GHz - 20 GHz)

Set the marker search to Maximum in the S11, S22, and S12 windows. In the S21 window all of the markers are set to Minimum. When measuring the On/Off Ratio S21 response, set the marker to Maximum.

Source To CPLR THRU

1. Perform a 2-Port Calibration on the PNA at the ends of the RF cables. Calibration should be performed at the following settings: Refer to Table 5 on page 29.
2. Connect the RF cables shown in Figure 16. This measures the SOURCE IN to CPLR THRU and On/Off ratio.
3. Connect a BNC male short to the PULSE IN connector.
4. Measure all of the S-parameters for the SOURCE IN to CPLR THRU. Refer to Figure 17 and Figure 18 on page 32.
   - The S11/S22 measured response should be < 8 dB return loss.
   - The S21 measured response should be > +18 dB gain.
   - The S12 measured response should be < –70 dB insertion loss.
5. Set the PNA to measure S21 only and normalize the S21 response.
6. Disconnect the BNC male from the PULSE IN after the S21 response has been normalized.
7. Measure the On/Off ratio. The On/Off ratio should be < –70 dB.

Figure 16 Source In to CPLR



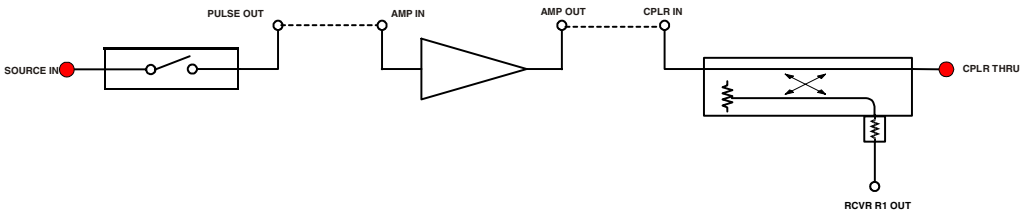


Figure 17 Source In to CPLR THUR S-Parameter Plot

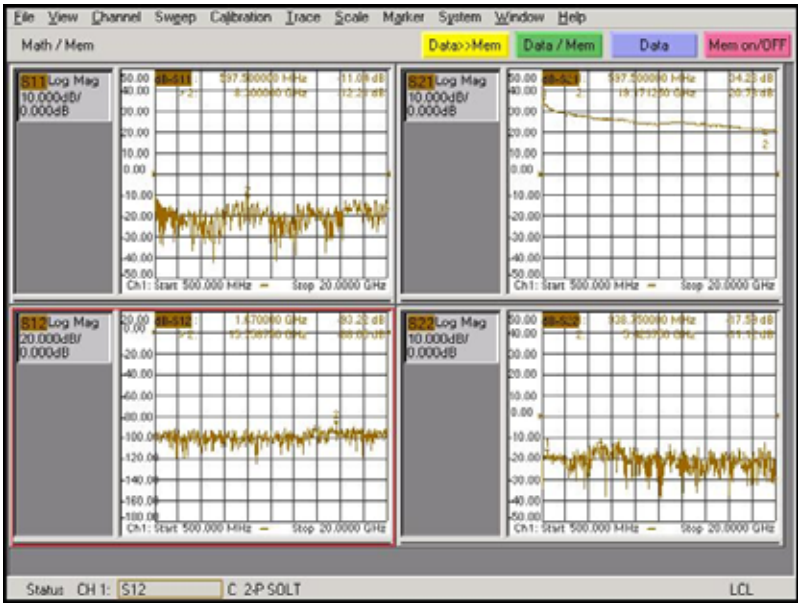
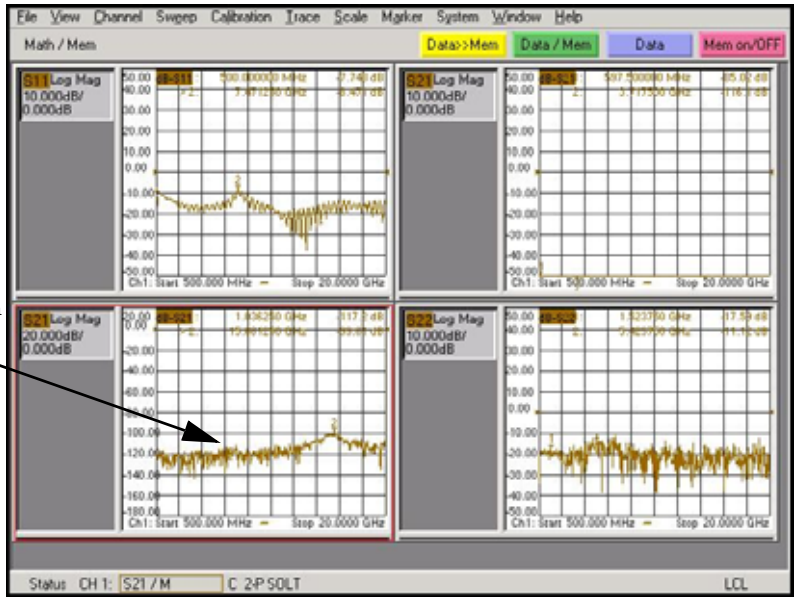


Figure 18 Source In to CPLR THUR On_Off Plot

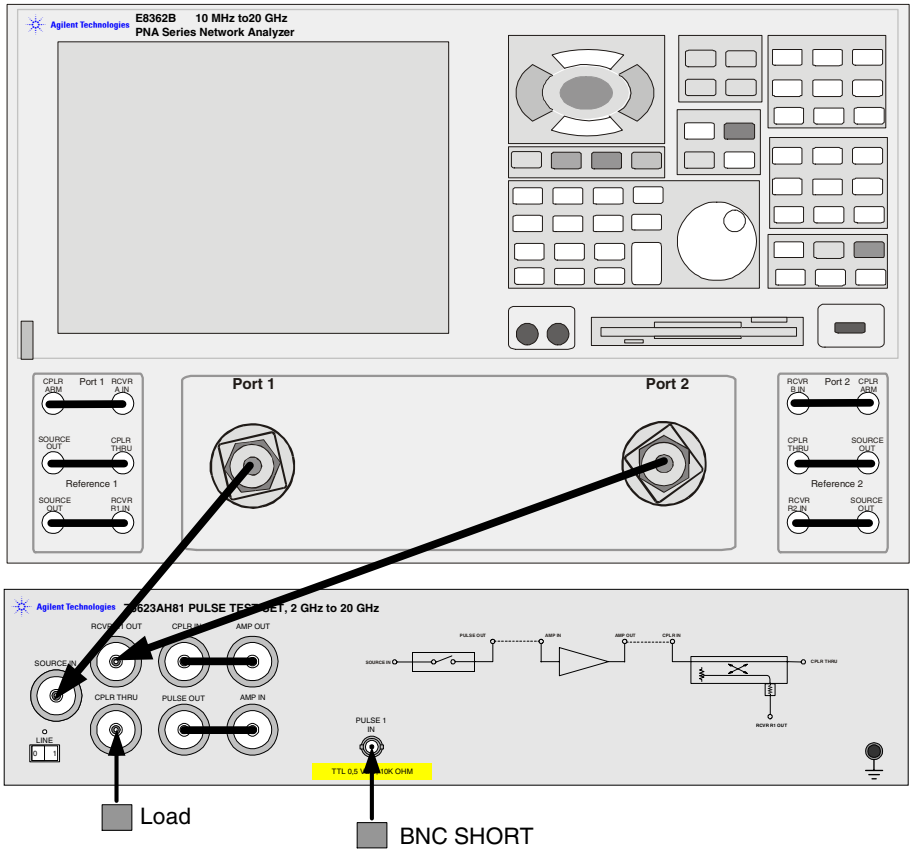
1. Change the display to S21
2. Normalize the response with the BNC short on.
3. Remove the BNC short.
4. Measure the On/Off ratio.



Source In to RCVR R1 OUT

1. Connect the RF cables shown in Figure 19. This measures the SOURCE IN to RCVR R1 OUT.
2. Reconnect a BNC male short to the PULSE IN connector.
3. Terminate the test sets CPLR THRU port using the male 3.5 mm load from the calibration kit.
4. Measure the following S-parameters for the SOURCE IN to RCVR R1 OUT. Refer to Figure 20 on page 35.
   - The S11/S22 measured response should be < 8 dB return loss.
   - The S21 measured response should be +2 dB gain.

Figure 19 SOURCE IN to RCVR R1 OUT



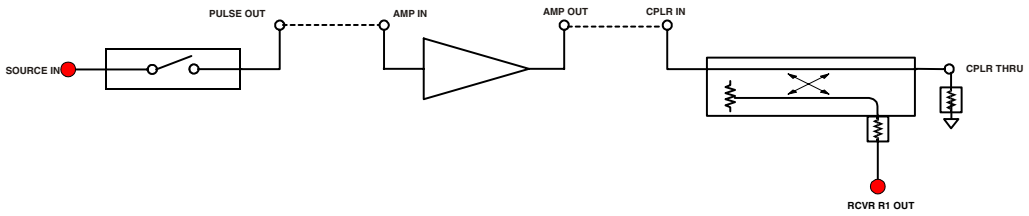
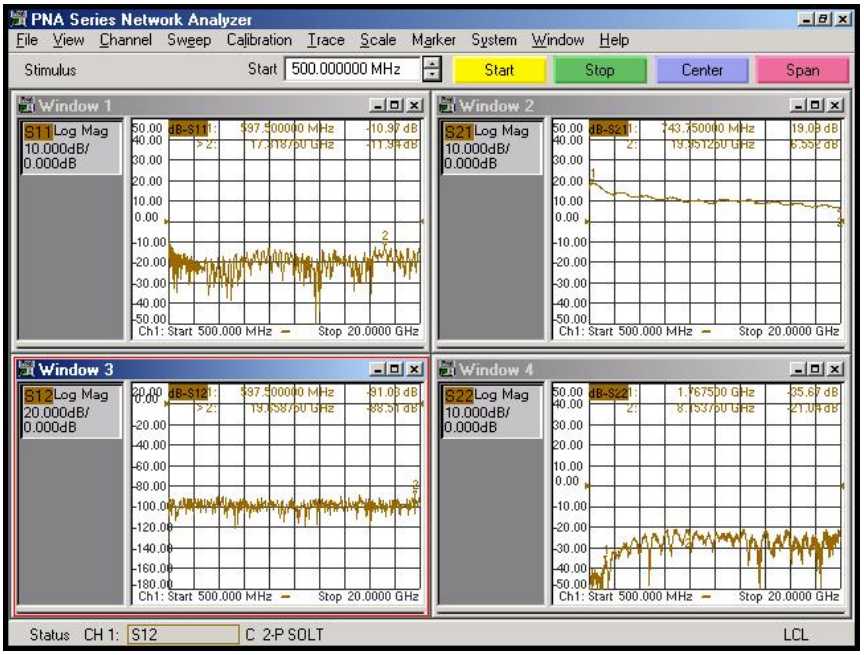


Figure 20 SOURCE IN to RCVR R1 OUT S-Parameter Plot



Replaceable Parts

The following table contains the list of replaceable parts for the test set. If any of these parts or assemblies is replaced, you must perform all performance tests to verify conformance to specifications.

NOTE The following parts are unique to this special option. To order replacement parts, please contact the Component Test / Product Generation Unit (CT/PGU) Support Group at (707) 577-6802 with the part number, module/model number, and option number. If ordering parts through your local Agilent Technologies Sales and Service Office, specify that they are ordered through the Component Test PGU Support Group.

NOTE Special options are built to order. Long lead times may be encountered when ordering replacement parts.

Description	Agilent Part Number	Qty
Jumper Cable	08720-20098	2
ATTN 10dB SMA	0955-0317	1
Adapter SMA male to SMA male	1250-1788	1
Cable Assy (5 inch SMA)	5062-6680	1
3.5 Bulkhead Connector	5062-6618	1
Kit - Front Handle	5063-9226	1
Kit - Rack Mount	5063-9232	1
Coupler, 50 GHz	5086-7658	1
Cable RF, CPLR Thru	Z5623-20294	1
Cable RF, SRC OUT	Z5623-20295	1
Cable RF, R1 IN ATTN	Z5623-20296	1
Cable RF, R1 IN	Z5623-20297	1
Pulse Bias Board Assy	Z5623-63293	1
Amplifier, 0.5 to 26.5 GHz (25 dB gain)	83017-60004	1
High Pass filter 2 to 18 GHz	Z5623-80027	1
BNC Short (attached to Pulse In)	1250-0774	1

4 Service and Safety Information

Service and Safety Information

Introduction

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the instrument. This product has been designed and tested in accordance with international standards.

Service and Support Options

NOTE There are many other repair and calibration options available from the Agilent Technologies support organization. These options cover a range of service agreements with varying response times. Contact Agilent for additional information on available service agreements for this product. Refer to "Contacting Agilent Sales and Service Offices" on page 42.

Connector Care and Cleaning

If alcohol is used to clean the connectors, the power cord to the instrument must be removed. All cleaning should take place in a well ventilated area. Allow adequate time for the fumes to disperse and moist alcohol to evaporate prior to energizing the instrument.

WARNING **To prevent electrical shock, disconnect the Agilent Technologies model product from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.**

Before Applying Power

Verify that the product is configured to match the available main power source. If this product is to be powered by autotransformer, make sure the common terminal is connected to the neutral (grounded) side of the ac power supply.

Shipping Instructions

You must always call the Agilent Technologies Instrument Support Center to initiate service before retuning your instrument to a service office. See "Contacting Agilent Sales and Service Offices" on page 42. Always transport or ship the instrument using the original packaging if possible. If not, comparable packaging must be used. Attach a complete description of the failure symptoms.

Warnings

WARNING **The WARNING notice denotes a hazard. It calls attention to a procedure, practice, or the like, which if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.**

Warnings applicable to this instrument are:

WARNING **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.**

WARNING **If this instrument is not used as specified, the protection provided by the equipment could be impaired. This instrument must be used in a normal condition (in which all means for protection are intact) only.**

WARNING **For continued protection against fire hazard replace line fuse only with same type and rating:**
• United States—F 3A/250V, Part Number 2110-0780
• Europe—F 3.15A/250V, Part Number 2110-0655
The use of other fuses or material is prohibited.

WARNING **This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall be inserted only into a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.**

WARNING **The power cord is connected to internal capacitors that may retain dangerous electrical charges for 5 seconds after disconnecting the plug from its power supply.**

WARNING **These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.**

WARNING **The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.**

WARNING **This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 664 respectively.**

Cautions

CAUTION The CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like, which if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

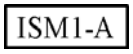
Cautions applicable to this instrument are:

CAUTION Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding (by not using this cord) can cause instrument damage.

CAUTION This instrument has autoranging line voltage input; be sure the supply voltage is within the specified range.

CAUTION Ventilation Requirements: When installing the instrument in a cabinet, the convection into and out of the instrument must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, forced convection must be used.

Instrument Markings

	When you see this symbol on your instrument, you should refer to the instrument's instruction manual for important information.
	This symbol indicates hazardous voltages.
	The laser radiation symbol is marked on products that have a laser output.
	This symbol indicates that the instrument requires alternating current (ac) input.
	The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
	The CSA mark is a registered trademark of the Canadian Standards Association.
	This symbol indicates the product meets the Australian Standards.
	This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).
	This text indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).
	This symbol indicates that the power line switch is ON.
	This symbol indicates that the power line switch is OFF or in STANDBY position.
	Safety Earth Ground. This is a Safety Class I product (provided with a protective earthing terminal). An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and secured against any unintended operation.

Contacting Agilent Sales and Service Offices

Assistance with test and measurement needs, and information on finding a local Agilent office are available on the Internet at:
http://www.agilent.com/find/assist

You can also purchase accessories or documentation items on the Internet at:
http://www.agilent.com/find

If you do not have access to the Internet, contact your field engineer.

NOTE In any correspondence or telephone conversation, refer to the product by its model number and full serial number. With this information, the Agilent representative can determine whether your unit is still within its warranty period.