User's and Service Guide

HP 85025A/B/D/E Detectors

HEWLETT PACKARD

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Safety Notes

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument.

Caution	Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would 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.

⚠ The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.

How to Use This Guide

This guide uses the following conventions:

(Front-Panel Key)	This represents a key physically located on the instrument.
`Softkey`	This indicates a "softkey," a key whose label is determined by the instrument's firmware.
`Screen Text`	This indicates text displayed on the instrument's screen.

Documentation Description

This manual contains information on operating, testing, and servicing the HP 85025A/B/D/E detectors.

Contents

1

General Information

This manual contains information on operating, testing, and servicing the HP 85025A/B/D/E detectors. Figure 1-1 shows the detectors.

Product Description

The HP 85025A/B/D/E detectors are specifically designed for use with HP 8757 Series scalar network analyzers.

Table 1-1. HP 85025 Series Detector Descriptions

HP Detector	Connector Type	Frequency Range
HP 85025A	Type-N (m)	.01 to 18 GHz
HP 85025A Option 001	precision 7 mm	.01 to 18 GHz
HP 85025B	precision 3.5 mm (m)	.01 to 26.5 GHz
HP 85025D	precision 2.4 mm (m)	.01 to 50 GHz
HP 85025E	precision 3.5 mm (m)	.01 to 26.5 GHz

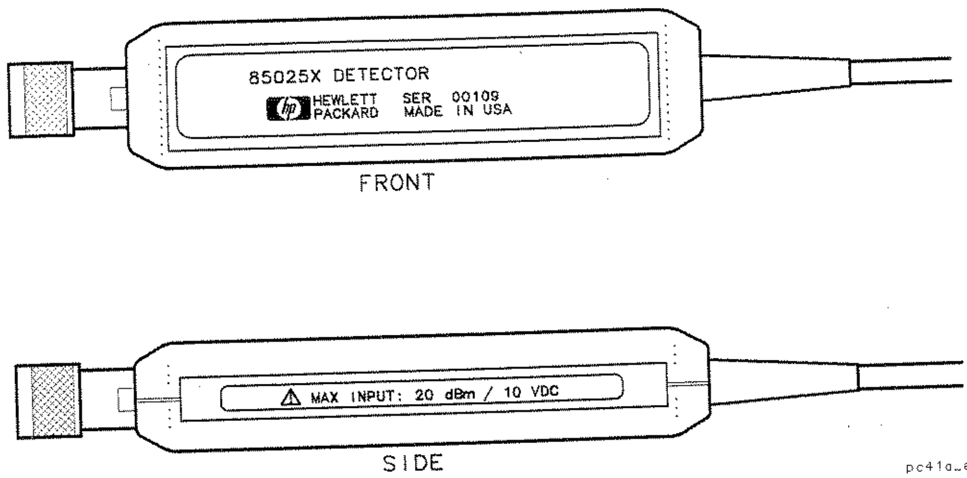


Figure 1-1. HP 85025A/B/D/E Detector

Specifications and Supplemental Characteristics

Tables 1-2 through 1-6 list detector specifications, when used with an HP 8757 Series scalar network analyzer. These specifications represent the warranted performance standards or limits against to which you can test the device.

Table 1-7 lists supplemental (typical, non-warranted) detector characteristics, when used with one of the above-mentioned analyzers.

Note Specifications describe the instrument's warranted performance over the temperature range of 25°C, ±5°C.

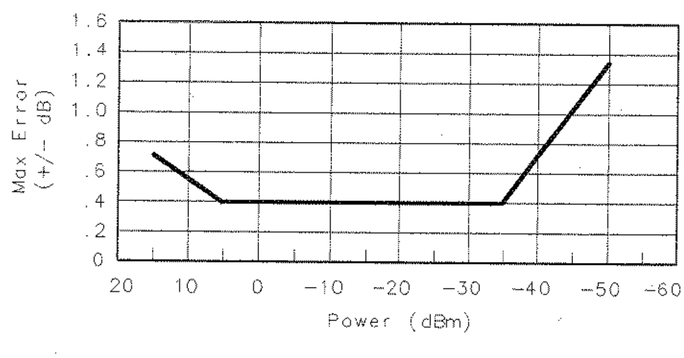
Table 1-2. HP 85025A/B/D/E Detector General Specifications

Dynamic Range (on all HP 8757 Series analyzer's detector inputs):	
AC mode	+16 to −55 dBm
DC mode	+16 to −50 dBm
Nominal Impedance	50Ω
Maximum Input Power	+20 dBm (100 mW), ±10 VDC

Table 1-3.
HP 85025A Detector Specifications (Including Option 001)

Frequency Range	0.01 to 18 GHz
Return Loss:	
10 MHz to 40 MHz	10 dB
40 MHz to 4 GHz	20 dB
4 GHz to 18 GHz	17 dB
Frequency Response (in DC mode, input power −10 dBm):	
10 MHz to 40 MHz	+0.25 dB/−0.75 dB
40 MHz to 18 GHz	±0.5 dB

Absolute Power Accuracy (in DC mode, 50 MHz, calibrated at 0 dBm)



Dynamic Power Accuracy

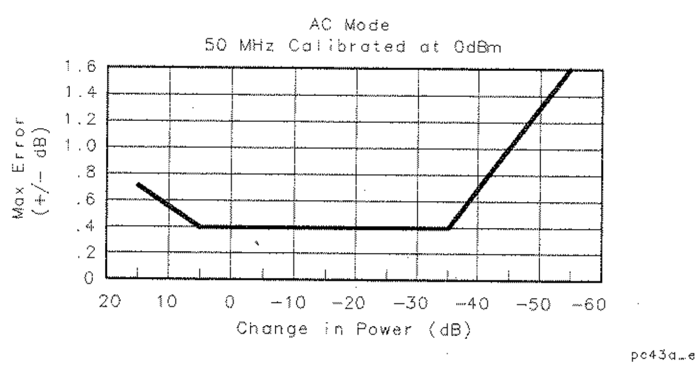
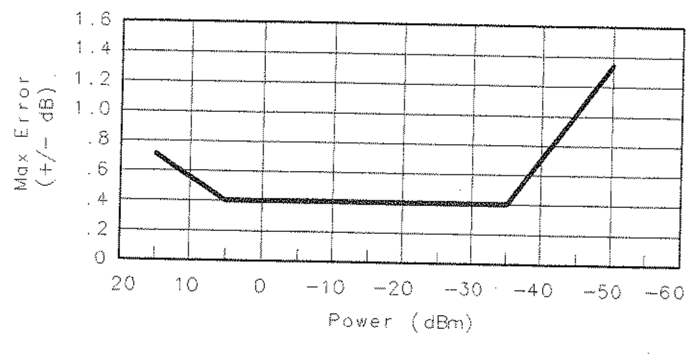


Table 1-4. HP 85025B Detector Specifications

Frequency Range	0.01 to 26.5 GHz
Return Loss:	
10 MHz to 40 MHz	10 dB
40 MHz to 4 GHz	20 dB
4 GHz to 18 GHz	17 dB
18 GHz to 26.5 GHz	12 dB
Frequency Response (in DC mode, input power −10 dBm):	
10 MHz to 40 MHz	+0.25 dB/−0.75 dB
40 MHz to 18 GHz	±0.5 dB

Absolute Power Accuracy (in DC mode, 50 MHz, calibrated at 0 dBm)



Dynamic Power Accuracy

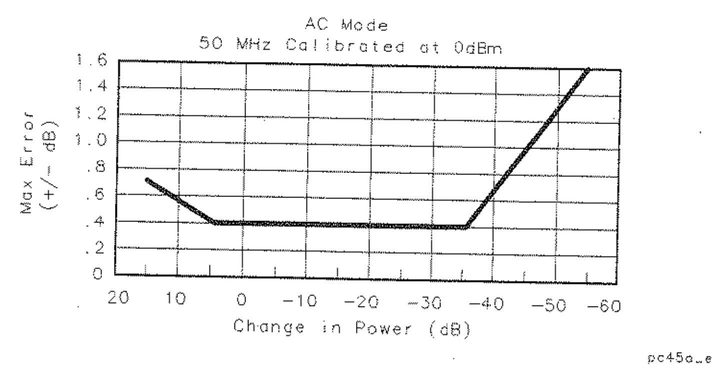
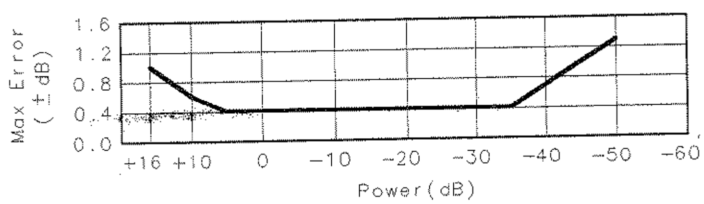


Table 1-5. HP 85025D Detector Specifications

Frequency Range	0.01 to 50 GHz
Return Loss:	
10 MHz to 40 MHz	10 dB
40 MHz to 100 MHz	20 dB
100 MHz to 14 GHz	23 dB
14 GHz to 34 GHz	20 dB
34 GHz to 40 GHz	15 dB
40 GHz to 50 GHz	9 dB
Frequency Response (in DC mode, input power −10 dBm):	
10 MHz to 40 MHz	+0.25 dB/−0.75 dB
40 MHz to 20 GHz	±0.5 dB
20 GHz to 26.5 GHz	+1/−0.5 dB
26.5 GHz to 40 GHz	+2.5/−0.5 dB
40 GHz to 50 GHz	+3.0/−0.5 dB

Absolute Power Accuracy (in DC mode, 50 MHz, calibrated at 0 dBm)



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Dynamic Power Accuracy

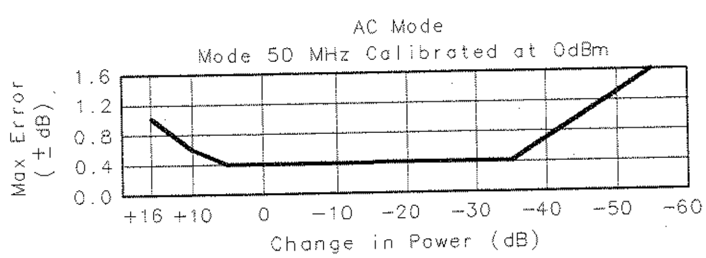

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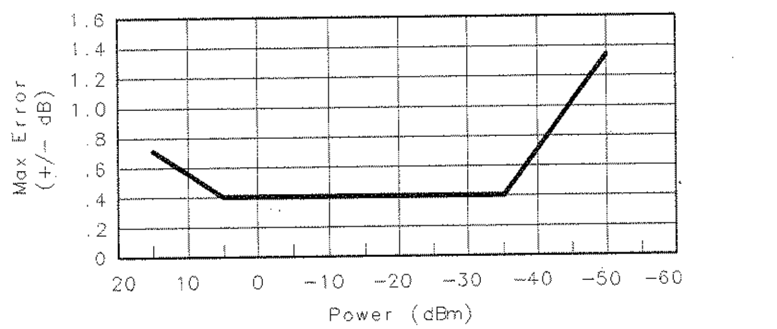
Table 1-6. HP 85025E Detector Specifications

Frequency Range	0.01 to 26.5 GHz
Return Loss:	
10 MHz to 40 MHz	10 dB
40 MHz to 100 MHz	20 dB
100 MHz to 25 GHz	25 dB
25 GHz to 26.5 GHz	23 dB
Frequency Response (in DC mode, input power −10 dBm):	
10 MHz to 40 MHz	+0.25 dB/−0.75 dB
40 MHz to 18 GHz	±0.5 dB
18 MHz to 26.5 GHz	±0.5 dB at 18 GHz to ±1.4 dB at 26.5 GHz

Absolute Power Accuracy (in DC mode, 50 MHz, calibrated at 0 dBm)



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Dynamic Power Accuracy

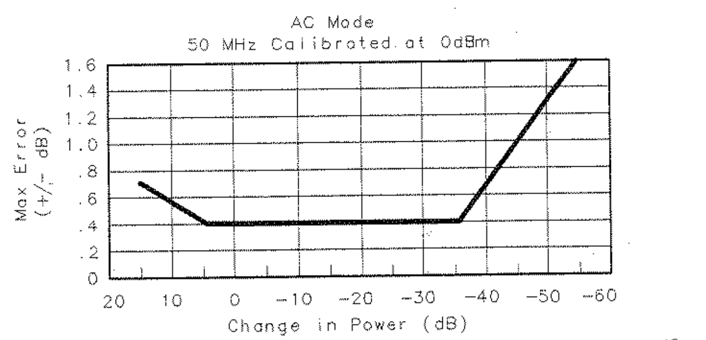

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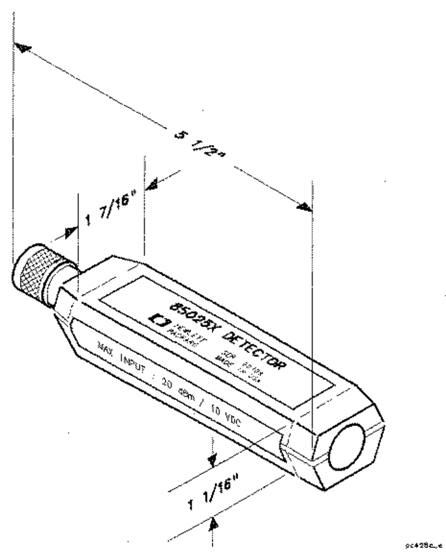
Table 1-7.
HP 85025A/B/D/E Detector Supplemental Characteristics

RF Connector Mechanical Tolerances:	
Recession of the male center conductor from reference plane:	
HP 85025A	0.207 to 0.210 inches[1]
HP 85025A Option 001	0.000 to 0.003 inches
HP 85025B	0.000 to 0.003 inches
HP 85025D	0.000 to 0.002 inches
HP 85025E	0.000 to 0.003 inches
Cable Length	1.22 m (48 inches)
Weight (Including cable):	
Net:	0.24 kg (0.5 lb)
Shipping:	1.0 kg (2.2 lb)
Dimensions[2] (Including input connector, not including cable)	



1 Because a type-N gage calibration block zeros the gage at a 0.207-inch offset, the gage displays a 0.207- to 0.210-inch offset as 0.000 to 0.003 inches.

2 The model used in this illustration is an HP 85025A. Because of varying input connector lengths, the overall length measurements for the other detector models covered by this manual are:
HP 85025A Option 001: 5 3/16 inches
HP 85205B: 5 1/8 inches
HP 85025D: 5 1/4 inches
HP 85025E: 5 7/16 inches

Operating Environment

The detector will operate safely under the following conditions, but its performance is not necessarily warranted. See the specifications section for more information.

Temperature: 0° to +55°C.

Humidity: Up to 95%. Protect the detector from temperature extremes which can cause condensation.

Altitude: Up to 4,572 m (15,000 ft).

Accessories

The detectors come with a 2-meter cable. A 25-foot and 200-foot cable can be ordered separately. Table 6-1 lists the accessories that are available for use with these detectors.

Storage and Shipment

To keep your detector in proper working condition, keep the following suggestions in mind when storing or shipping it.

Environment

Store or ship the detectors in environments within the following limits:

Temperature: −25° to +75°C.

Humidity: Up to 95%. Protect the detector from temperature extremes which can cause condensation.

Altitude: Up to 4,572 m (15,000 ft).

Packaging

Use containers and materials identical or comparable to those used in factory packaging. If you ship the detector, follow these packaging instructions:

1. Wrap the detector in the original pouch and box. If they are not available, wrap the detector in heavy paper and use a strong shipping container.
2. Provide a firm cushion that prevents movement inside the container. Use a layer of shock-absorbing material around all sides of the detector.
3. Seal the shipping container securely.
4. Mark the shipping container *FRAGILE*.

Returning a Detector for Service

When you make an inquiry, either by mail or by telephone, refer to the detector by both model number and full serial number.

If you ship the detector to a Hewlett-Packard office or service center, fill out a blue service tag (provided at the back of this manual), and include the following information:

1. Company name and address.

   Do not use an address with a P.O. box number because products cannot be returned to a post office box.
2. The complete phone number of a technical contact person.
3. The complete model and serial number of the detector.
4. The type of service required (calibration, repair).
5. Any other information that could expedite service, such as failure condition or cause.

2

Installation

Refer to the following information when using the detector. Do not drop the detector or subject it to excessive mechanical shock.

Initial Inspection

1. Check the shipping container and packaging material for damage.
2. Check that the shipment is complete.
3. Check connector, cable, and detector body for mechanical damage.
4. Check the detector electrically:

   Either perform the operator's check in Chapter 3, "Operation" or make a measurement in Chapter 4, "Performance Tests."

If any of the following conditions exist, notify your nearest Hewlett-Packard office:

- Incomplete shipment.
- Mechanical damage or defect.
- Failed electrical test.

If you find damage or signs of stress to the shipping container or the cushioning material, keep them for the carrier's inspection. Hewlett-Packard does not wait for a claim settlement before arranging for repair or replacement.

Electrostatic Discharge (ESD)

ESD can damage the highly sensitive circuits in this device; charges as low as 100 V can destroy a detector. ESD damage occurs most often as you connect or disconnect a device. Use this detector at a static-safe workstation and wear a grounding strap. *Never* touch the input connector center contacts or the cable contact pins.

Static-Safe Work Station

Figure 2-1 illustrates a static-safe station using two types of ESD protection that you can use either together or separately:

- A conductive table mat and wrist-strap combination.
- A conductive floor mat and heel-strap combination.

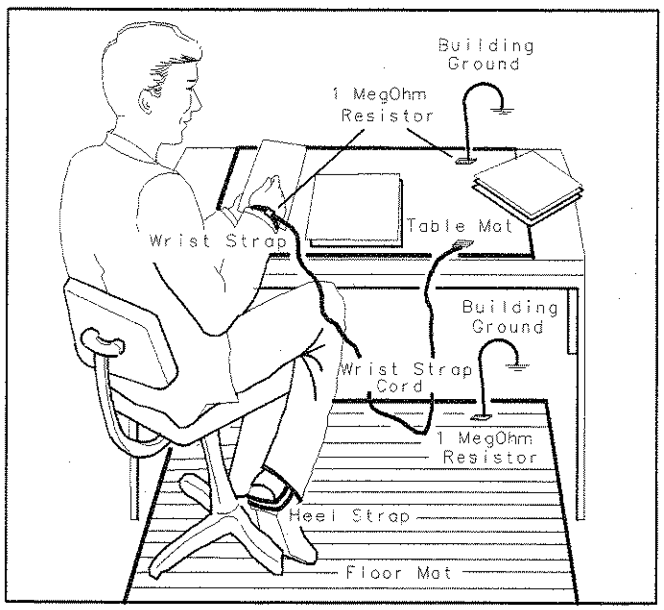


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Figure 2-1. Example of a Static-Safe Work Station

Static-Safe Practices

- Before cleaning, inspecting, or making a connection to a static-sensitive device or test port, ground yourself as far as possible from the test port.
- Discharge static electricity from a device before connecting it. Touch the device briefly (through a resistor of at least 1 MΩ) to either the outer shell of the test port, or another exposed ground. This discharges static electricity and protects test equipment circuitry.

Power Requirements

The scalar network analyzer supplies power for the detector.

Mating Connectors

Table 1-7 lists connector mechanical tolerances. *Microwave Connector Care* (HP part number 08510-90064) provides information on the proper maintenance, inspection, and gaging of connectors.

Connecting the Detector

1. The HP 85025A/B/D/E cables plug into the connectors on the front panel of the HP 8757 Series scalar network analyzer. With the cable plug key downward, insert the multi-pin (DC) connector into the A input on the front panel of the analyzer.
2. To secure the DC connector in the analyzer, turn the *outer* shell clockwise.
3. Connect the RF input to the test device by turning the male connector's *outer* shell clockwise.

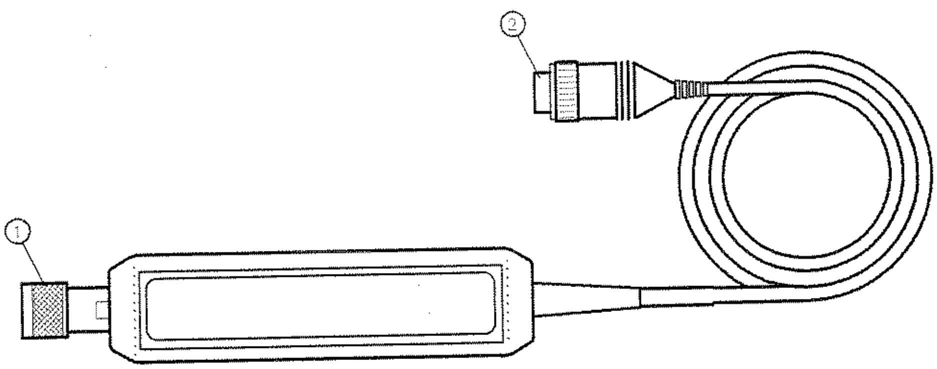
3

Operation

Caution

- Electrostatic discharge (ESD) can damage the highly sensitive circuits in this device; charges as low as 100 V can destroy your detector.
- ESD damage occurs most often as you connect or disconnect a device. Use this detector at a static-safe workstation and wear a grounding strap. *Never* touch the input connector center contacts or the cable contact pins.
- Do *not* apply more than +20 dBm RF power or more than ±10 VDC to the detector. Higher power/voltage can electrically damage the detector.
- Before you connect a RF cable to the detector, always discharge the static electricity that may have accumulated on the cable's outer conductor to instrument ground. This is most important if the cable is very long or connected to a large antenna.
- Do not drop the detector or subject it to mechanical shock.

Features



1. **RF INPUT CONNECTOR.** This connector accepts the RF input signal. The RF input connector varies with the detector selected.
2. **DC CONNECTOR.** This connector supplies the necessary DC voltage for operation of the HP 85025A/B/D/E, and feeds the detector output signal to the network analyzer.

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Figure 3-1. Detector Features

Operating Theory

The HP 85025A/B/D/E can detect either unmodulated RF signals in DC mode or square wave amplitude modulated RF signals in AC mode. In either AC or DC detection mode, the detector provides a 27.778 MHz square wave signal for the analyzer to interpret and display.

In AC detection mode, and RF or microwave signal is amplitude modulated with a 27.778 MHz square wave. The detector demodulates (envelope detects) this signal to produce a 27.778 MHz signal with a peak-to-peak voltage that corresponds to the magnitude of the RF signal at the detector input.

In DC detection mode, no modulation is required. The detector diode in the HP 85025A/B/D/E converts the RF signal into an equivalent DC voltage. The detector chops the DC voltage at a 27.778 kHz rate, and this chopped signal is then amplified. The amplified signal simulates the signal produced by AC detection.

Measurement System Configuration

With an HP 8757 Series scalar network analyzer using an HP 85025A/B/D/E detector, system configuration requires special attention. AC mode is the default state of the analyzer system and there are no further requirements to initiate a measurement. However, to enable DC mode operation, a series of keystrokes is required.

DC Detection mode

DC detection offers greater power measurement accuracy and the ability to characterize oscillators and modulation-sensitive devices. Figure 3-2 depicts a typical measurement setup for 0.01 to 50 GHz, using an HP 8350B sweep oscillator/RF plug-in as the source.

1. On the analyzer, press (PRESET). Connect the detector(s).
2. DC detection mode must be selected. On the analyzer, press (SYSTEM) and select MODE DC.

   When the MODE DC softkey is selected, the source's square wave modulation is automatically switched OFF.

Accurate DC Measurements

Zeroing the Detector

When you make DC detection measurements, it is important to perform this detector zeroing procedure to compensate for the effects of DC drift and temperature fluctuations. This zeroing procedure eliminates small DC voltages from the diode detector that would otherwise cause amplitude measurement errors at low ($\leq$40 dBm) power levels. Zeroing also establishes the displayed noise level with no RF signal applied (the system's noise floor).

Autozero

Pressing the autozero softkey AUTOZRO switches OFF the source RF signal output and automatically zeros the detector.

The repeat autozero function softkey (REPT AZ ON/OFF) periodically repeats the autozero. You must use an HP-IB interfaced sweeper to take advantage of this function because the analyzer must be able to switch OFF the RF output of the sweeper to perform the autozeroing.

Manual Zero

Manual zero, represented by the MANUAL softkey, is similar to zeroing a power meter.

1. Remove the RF signal from the detector's RF input.
2. On the analyzer, press MANUAL to perform the zeroing.

Refer to "Operation," in the *HP 8757C/E Scalar Network Analyzer Operating Manual* or *HP 8757D Scalar Network Analyzer Operating Manual* for detailed information on these and other softkeys.

In the DC mode, the HP 85025A/B/D/E is specified for absolute power level accuracy. In regard to these specifications, the following conditions apply:

- The equipment has had a 30 minute warm-up period.
- The detector zeroing procedure has been performed.
- The offset has been adjusted with a calibrated 0 dBm, 50 MHz signal applied.
- Trace averaging is enabled on the analyzer at low power levels, as required.
- The source harmonics are below −40 dBc.
- The source SWR is 1.0.

To increase the accuracy of absolute power level measurements, select DET OFFSET to properly set the system response to a 0 dBm signal. After zeroing the detector, follow these steps to set the detector offset:

1. On the analyzer, press (CAL) DET OFFSET DET A (or the appropriate input port). Press (0) (dB). This ensures the 0 dB offset.
2. Connect the detector to the POWER REF output of a calibrated power meter, such as an HP 436A or HP 438A. Switch the POWER REF output ON.
3. Press (CURSOR) AUTOSCALE.
4. Press (CAL) MORE DET OFFSET.

5. Press DET A (or the appropriate input port) and use the entry keys to enter the value opposite in sign to the cursor reading being displayed. The display should now indicate a power reading of 0.00 dBm.

Note Pressing (PRESET) on the analyzer does not reset any DC OFFSET to zero, and the SAVE/RECALL registers do not save or recall the offset value(s).

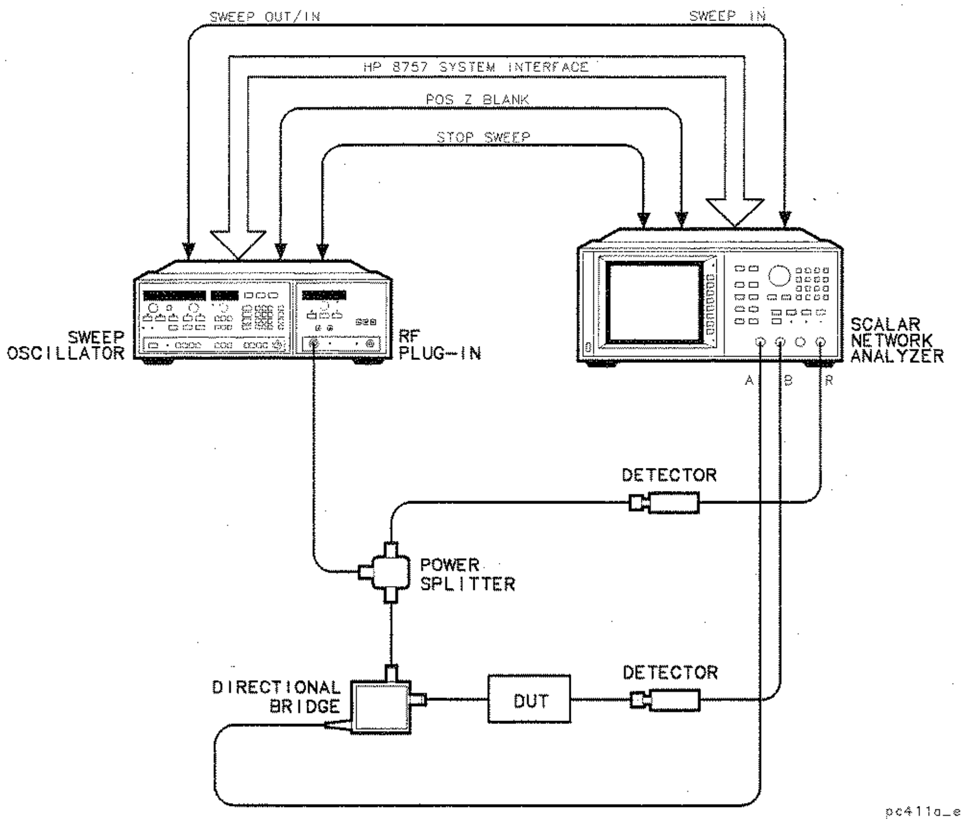


Figure 3-2. Typical System Setup for 0.01 to 50 GHz Measurements

AC Detection Measurements

For the majority of measurements, AC detection is still the preferred method. AC detection offers greater sensitivity and immunity to noise and drift across time and temperature. AC detection amplitude measurements with this scalar network analyzer system require a modulation envelope. This envelope is provided through a 27.778 kHz square wave amplitude modulation of the RF test signal. Test set connections vary depending on the source. Figure 3-2 depicts a typical measurement setup. The 27.778 kHz modulation is supplied by the sweep oscillator.

Operator's Check

The following procedure provides a quick operational check of the HP 85025A/B/D/E detector.

Table 3-1. Equipment Required for Operator's Check

Description	HP Model/Part Number
Detector	HP 85025A/B/D/E
HP-IB cable	HP 10833A/B/C/D
Bandpass filter	any within the frequency range of the sweeper
Sweep oscillator	any compatible with the HP 8757 Series scalar network analyzer
BNC cables (3 required)	HP part number 8120-1839

Procedure

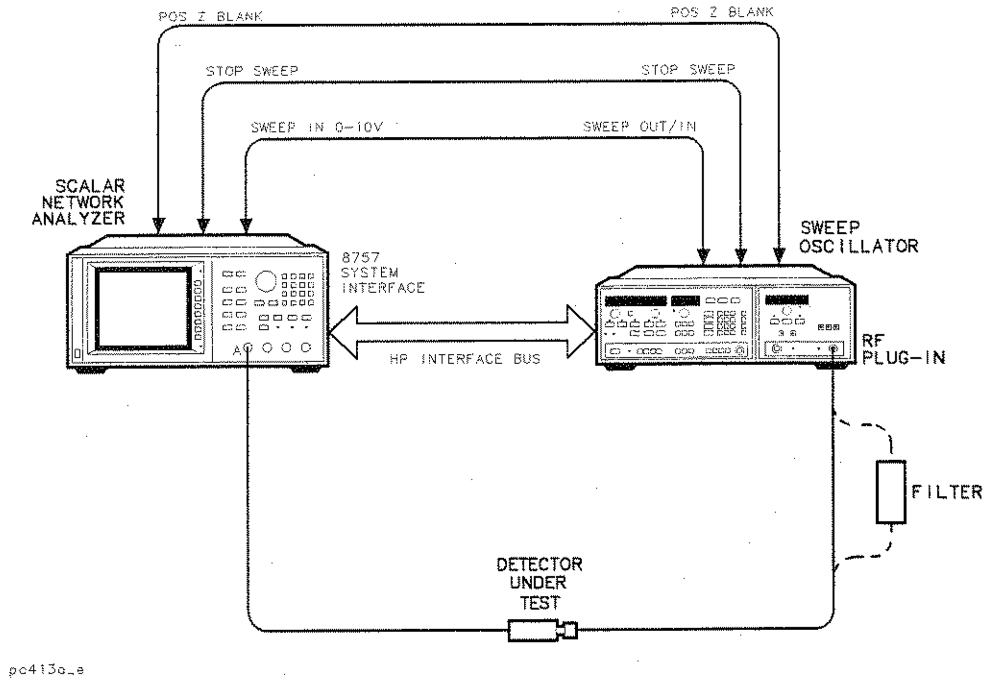


Figure 3-3. Operator's Check Equipment Setup

1. Connect the equipment as shown in Figure 3-3, with the detector connected to input A on the analyzer. Form a thru connection by connecting the detector's RF input to the RF output of the source. Switch all of the instruments' line powers ON and allow them to warm-up.
2. If the HP 8757 Series analyzer's system interface is not engaged (the analyzer's status line displays SYSINTF OFF), press (SYSTEM) MORE SWEEP MODE SYSINTF ON.
3. On the analyzer, press (PRESET). The analyzer's channel 1 should be active and measuring input A.
4. Adjust the STOP and START frequencies on the source to include the frequency range of the device under test (the bandpass filter).

5. Switch OFF the analyzer's channel 2 by pressing CHANNEL (2) twice.
6. On the analyzer, press (CURSOR) MAX to place the cursor at the maximum value of the trace. The CRSR value is displayed in the active entry area of the analyzer. Adjust the output power of the RF plug-in until the cursor value on the analyzer reads +16 dBm (this power level may not be attainable on all sources). This value is the upper limit of the dynamic range of the analyzer.
7. Press (DISPLAY) MEAS—MEM to store the trace in memory. The analyzer's message line displays CHAN 1 MEAS TO MEMORY.
8. Disconnect the detector from the RF OUTPUT of the source. Press (AVG) AVG ON to activate the averaging function. The averaging value will be 8. Wait a few seconds to allow the trace to settle.
9. Press (CURSOR) MAX. A cursor value of −55 dBm or lower should be displayed in the active entry area. This value represents the noise floor power level.
10. Insert the bandpass filter between the RF output of the source and the detector. Wait a few seconds to allow the trace to settle.
11. Press (CURSOR) MAX to find the trace maximum. The CRSR value displayed in the active entry area now represents the minimum insertion loss of your test device. Verify that the bandpass filter shape is as expected.
12. Press (SYSTEM) MODE AC/DC until the DC mode is activated. Allow the trace to settle. The trace should look similar to the trace observed in step 11, however the noise floor may be up to 5 dB higher. If the noise floor level has increased more than 5 dB, zero the detector.

If the Operator's Check Fails

Since the detector is measuring the output of an external source, problems may be due to the source, rather than the detector. Verify that the source output as well as the bandpass filter waveform are accurate. Note that bandpass filters can vary considerably from unit to unit.

If the average noise floor is not below −50 dBm in DC mode, try zeroing the detector. The instructions for zeroing the detector can be found earlier in this chapter.

Table 4-1. Recommended Equipment

Description	Recommended Model
Equipment Common to all HP 85025A/B/D/E Detectors	
Scalar network analyzer	HP 8757C/D/E
Sweep oscillator	HP 8350B
Power meter	HP 436A, HP 437B or HP 438A
Equipment required for HP 85025A Detectors	
RF plug-in	HP 83592C
Power sensor	HP 8481A
Directional bridge	HP 85027C
Shielded open	HP part number 85032-20002
Short	HP 11511A
Adapter type-N(m) to type-N(m)	HP part number 1250-1475
Attenuator	HP 8491B Option 010
Equipment required for HP 85025A Option 001 Detectors	
RF plug-in	HP 83592C
Power sensor	HP 8481A Option 001
Directional bridge	HP 85027A
Calibrated open/short	HP part number 85021-60001
Adapter type-N(m) to type-N(m)	HP part number 1250-1475
Attenuator	HP 8492A Option 010
Equipment required for HP 85025B Detectors	
RF plug-in	HP 83595C
Power sensor	HP 8485B
Directional bridge	HP 85027B
Calibrated open/short	HP part number 85037-60001
Attenuator	HP 8493C Option 010
Equipment required for HP 85025D Detectors	
Sweep oscillator	HP 8350B
RF plug-in	HP 83597B
Power sensor	HP 8487A
Directional bridge	HP 85027D
Open 2.4 mm(m)	HP 85141A
Short 2.4 mm(m)	HP 85140A
Adapter 2.4 mm(f) to 2.4 mm(f)	HP 11900B
Attenuator	HP 8490D Option 010

Table 4-1. Recommended Equipment (continued)

Description	Recommended Model
Equipment required for HP 85025E Detectors	
RF plug-in	HP 83595C
Power sensor	HP 8485A
Directional bridge	HP 85027B
Calibrated open/short	HP part number 85037-60001
Attenuator	HP 8493C Option 010

Return Loss Performance Test

This performance test uses an HP 8757C/D/E scalar network analyzer system to measure the return loss of the detector.

HP 85025A/B/D/E Return Loss Performance Test Procedure

Specifications

Specifications apply at a temperature range of 25°C ±5°C. For the detector's return loss specifications, refer to Tables 1-2 through 1-6.

Description

The return loss of the HP 85025A/B/D/E can be measured using the test system described in this procedure. The test setup is calibrated using an open/short to minimize frequency response and phasing errors. The detector under test is then connected to the TEST PORT of the bridge, and its return loss is measured on the analyzer.

The return loss should be greater than the limits listed in Tables 1-2 through 1-6. There is a certain amount of measurement uncertainty in any scalar network analyzer system. The return loss uncertainty for each detector is given in Tables 4-2 through 4-4. Conformance to specification cannot be assured unless the return loss of the detector is equal to the specified return loss plus the measurement uncertainty. Failure to meet specification cannot be proven unless measured return loss equals the specified return loss minus the measurement uncertainty. The measurement uncertainty is based on the worst case specifications for the test devices in the measurement.

Example A:

The specified return loss for an HP 85025A detector at 1 GHz is 20 dB. The measurement uncertainty is ±1.4 dB.

If the detector's measured return loss is 20 dB +1.4 dB (21.4 dB or higher), the detector is definitely within specification.

If the measured return loss is within the specified return loss plus-or-minus the measurement uncertainty, the detector may or may not be within specification. One way to reduce the measurement uncertainties is to measure the detector using a vector network analyzer.

Example B:

If the HP 85025A in Example A measures 20 dB ±1.4 dB (i.e. from 18.6 to 21.4 dB), it cannot be determined if it is or is not within specification.

If the measured return loss is less than the specified return loss minus the measurement uncertainty, the detector is definitely out of specification.

Example C:

If the HP 85025A in Example A and B measured less than 20 dB −1.4 dB (18.6 dB or less), the detector is definitely out of specification.

The three main sources of error in these measurements come from:

- Bridge directivity
- Source match of the bridge
- Dynamic accuracy of the analyzer

The first two vary with frequency while dynamic accuracy varies with the measured return loss amplitude.

Tables 4-2, 4-3, and 4-4 show measurement uncertainty for the HP 85025A/B, HP 85025D, and HP 85025E detectors, respectively. The tables assume you are using the corresponding connector-compatible HP directional bridges. For example, an HP 85027A bridge with an HP 85025A detector.

Table 4-2.
HP 85025A/B Return Loss with Measurement Uncertainty

Model	Specified Return Loss and Measurement Uncertainty vs Frequency			
	0.01 to 0.04 GHz	0.04 to 4.0 GHz	4.0 to 18 GHz	18 to 26.5 GHz
HP 85025A	10 ±0.6 dB	20 ±1.4 dB	17 ±1.1 dB	
HP 85025A Option 001	10 ±0.6 dB	20 ±1.1 dB	17 ±0.7 dB	
HP 85025B	10 ±0.6 dB	20 ±1.1 dB	17 ±0.7 dB	12 ±0.9 dB

Table 4-3.
HP 85025D Return Loss with Measurement Uncertainty

Specified Return Loss and Measurement Uncertainty vs Frequency					
0.01 to 0.04 GHz	0.04 to 0.1 GHz	0.1 to 14 GHz	14 to 34 GHz	24 to 40 GHz	40 to 50 GHz
10 ±5 dB	20 +2, -5 dB	23 +3, -2 dB	20 +3, -2 dB	15 +2, -1.5 dB	9 +2, -1.5 dB

Table 4-4.
HP 85025E Return Loss with Measurement Uncertainty

Specified Return Loss and Measurement Uncertainty vs Frequency			
0.01 to 0.04 GHz	0.04 to 0.1 GHz	0.1 to 25 GHz	25 to 26.5 GHz
10 ±0.5 dB	20 ±1 dB	25 ±2 dB	23 ±1.8 dB

Note An HP 85027A/B/C/D directional bridge (depending on the connector type) is used to measure the detector return loss.

Return Loss Measurement

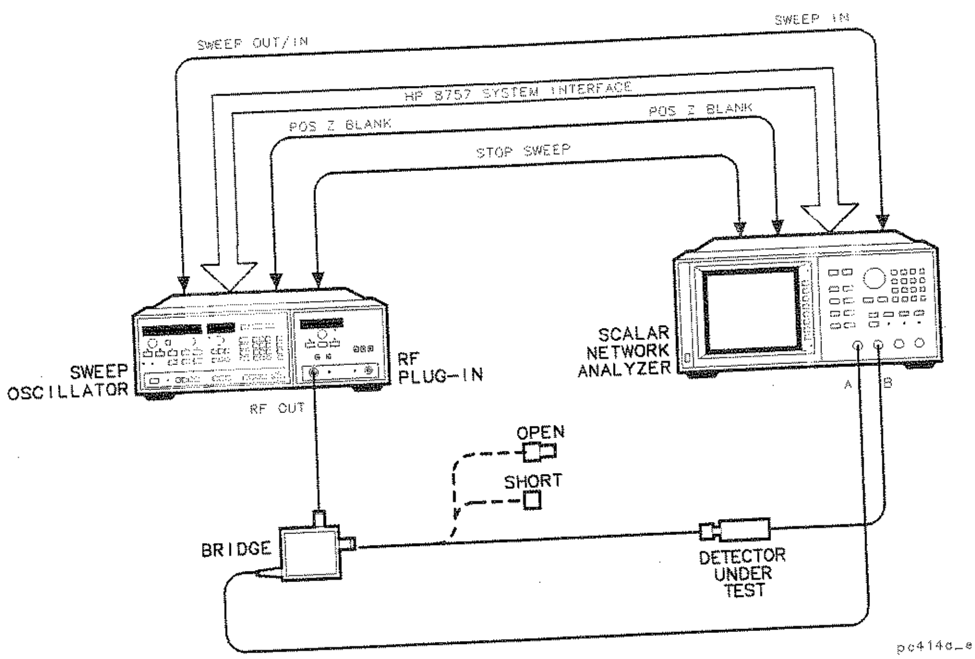


Figure 4-1. Setup for HP 85025A/B/D/E Return Loss Test

1. Connect the equipment as shown in Figure 4-1, leaving the directional bridge TEST PORT unconnected.
2. Press (PRESET) on the analyzer. This will reset both the network analyzer and the sweep oscillator (the source).

   Allow 30 minutes for warm-up.
3. On the source, press (START) (10) (MHz) (STOP) (40) (MHz).
4. On the RF plug-in, press (POWER LEVEL) and adjust the output power with the power level knob for a −3 dBm power level indication.

5. On the analyzer, press CHAN 2 OFF to switch channel 2 OFF. Press FUNCTION (MEAS) A. Press FUNCTION (REF) REF POSN, then use the step keys or the knob to move REF POSN one line down from the top of the CRT graticule.

6. On the analyzer, press FUNCTION (SCALE) AUTO SCALE.

Calibrating the Scalar Network Analyzer

7. On the analyzer, press FUNCTION (CAL) SHORT/OPEN. Follow the directions (prompts) appearing on the CRT:

   a. Connect the short to the TEST PORT of the directional bridge, then press STORE SHORT on the analyzer. Remove the short.

   b. Connect the open to the TEST PORT of the directional bridge, then press STORE OPEN on the analyzer. Remove the open.

   The CRT will display SHORT/OPEN CAL SAVED IN CH1 MEM.

8. Press FUNCTION (DISPLAY) MEAS-MEM.

9. Connect the detector to be tested to the TEST PORT of the directional bridge. On the analyzer, press FUNCTION (CURSOR) and turn the analyzer's front panel knob to read the highest value (worst case return loss).

Record the worst case value in the space provided on the *Performance Test Record*, located at the end of this chapter.

Return Loss from 40 MHz to 18 GHz (to 26.5 GHz for HP 85025B/E only, to 50 GHz for HP 85025D only)

10. On the source, reset the START/STOP frequencies by pressing (START) (40) (MHz). Next, for an HP 85025A detector, press (STOP) (18) (GHz), for an HP 85025B/E detector, press (26.5) (GHz), or for an HP 85025D detector, press (50) (GHz).

11. On the analyzer, ensure FUNCTION MEAS POWER A is still active. Remove the detector.

12. It will be necessary to recalibrate the analyzer, since a new range of frequencies has been selected for measurement. Repeat the steps in the section titled "Calibrating the Measurement System."

Ensure that channel 1 display MEAS-MEM is active. MEAS-MEM is highlighted when active.

13. Connect the detector to the TEST PORT of the directional bridge.
14. On the analyzer, press FUNCTION (SCALE) (5) (dB). The CRT display should be somewhat similar to Figure 4-2.

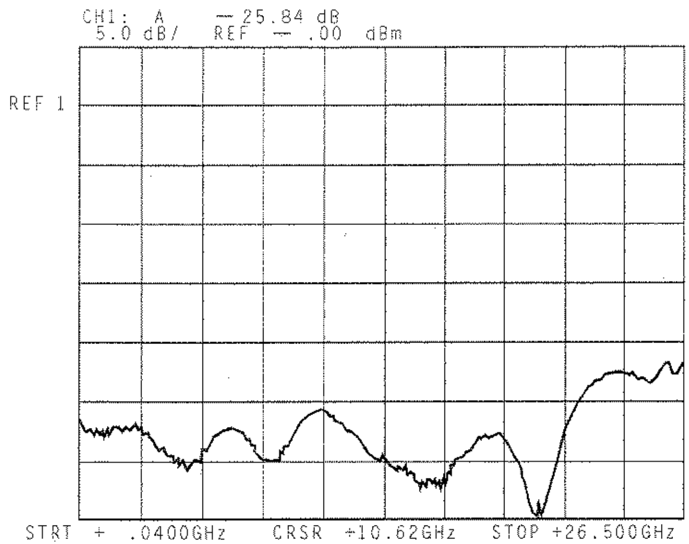


Figure 4-2.
HP 85025A/B/E Return Loss 0.04 GHz to Maximum Frequency

15. On the analyzer, press (CURSOR). Use the cursor to find the highest trace value in each specification range.

Note	A specification range is a range of frequencies which have the same return loss specification. For example, the HP 85025A specification from 0.4 to 4 GHz.

16. Record each value in the *Performance Test Record*.

This completes the HP 85025A/B/D/E return loss performance test procedure.

If This Test Fails

Check the detector's input connector to make sure there is no damage. Open the detector's case and check the connection between the input connector and the PC board. Check that the detector is connected securely to the front panel of the analyzer. Replace the connector if necessary. If the detector still fails, refer to the "Service" chapter for more troubleshooting information.

Frequency Response Performance Test

Description

The frequency response of the HP 85025A/B/D/E detector is specified as the maximum peak-to-peak deviation from a constant input signal level of −10 dBm, as measured over the specified frequency range. At Hewlett-Packard, frequency response is measured with the use of an automated test station traceable to the U.S. National Institute of Standards and Technology (NIST).

To simplify the measurement procedure, frequency response is measured with a nominal −10 dBm signal applied. First, the source is characterized for frequency response using a calibrated power meter/sensor combination. Next, the DUT is characterized. Finally, a point-by-point difference is computed, plotted and compared to the specification window. Differences in the values recorded due to the different measurement scheme should be negligible.

The manual test described in this procedure has an approximate root sum of the squares (RSS) uncertainty ranging from ±0.19 dB to ±0.37 dB for HP 85025A/B/E detectors and ±0.12 dB to ±0.76 dB for HP 85025D detectors. This implies that a "good" detector, well within the limits of its specifications, could measure out of specifications.

This measurement is only an indication of the detector's response within these limits. If greater measurement accuracy is desired, a test system that minimizes the sources of measurement uncertainty will be required. An error analysis of the sources of measurement uncertainty follows.

Table 4-5. Approximate Error Analysis at 18 GHz for HP 85025A/B/E Detectors

Uncertainty	HP 85025A Option 001	HP 85025A	HP 85025B	HP 85025E
Power Sensor CAL Factor Uncertainties (RSS)	1.5%	1.5%	1.5%	1.5%
Mismatch between Attenuator and Power Sensor	5.2%	3.8%	2.1%	2.4%
Mismatch between Attenuator and Detector	5.9%	4.2%	3.3%	1.5%
Miscellaneous System Errors	1.1%	1.1%	1.1%	3.2%
RSS Calculation	8.1%	6.0%	4.3%	4.5%
Total RSS Uncertainties Expressed in dB	+0.34 to −0.37	+0.25 to −0.27	+0.18 to −0.19	+0.19 to −0.20

Table 4-6. Approximate Error Analysis for the HP 85025D Detector

Uncertainty	26.5 GHz	40 GHz	50 GHz
Power sensor CAL factor approximate uncertainties	1.5%	2%	2.5%
Mismatch between attenuator and power Sensor	1.3%	3.8%	7.4
Mismatch between attenuator and detector	1.4	4.2	14.3
Miscellaneous system errors	1.1%	1.1%	1.1%
RSS calculation	2.7%	6.1%	16.3%
Total RSS uncertainties expressed in dB	+0.12 to −0.12	+0.26 to −0.27	+0.64 to −0.76

Uncertainties are smaller at lower frequencies. The error analysis is done assuming the power sensor, attenuator, and DUT all mate without the use of adapters. A standard HP 85025A is used with an HP 8481A and HP 8491B. An HP 85025A Option 001 detector is used with an HP 8481A Option 001 and HP 8492A. The HP 85025B/E is used with an HP 8485A and HP 8493C. The HP 85025D is used with an HP 8487A and HP 8490D.

Equipment Required

Equipment Common to HP 85025A/B/D/E

Sweep oscillator .... HP 8350B

Scalar network analyzer .... HP 8757C/D/E

Power meter .... HP 436A

Additional Test Equipment Required for HP 85025A

RF plug-in .... HP 83592C
Power sensor .... HP 8481A
10 dB attenuator .... HP 8491B Option 010

Additional Test Equipment Required for HP 85025A Option 001

RF plug-in .... HP 83592C
Power sensor .... HP 8481A
10 dB attenuator .... HP 8492A Option 010

Additional Test Equipment Required for HP 85025B

RF plug-in .... HP 83592C
Power sensor .... HP 8485A
10 dB attenuator .... HP 8493C Option 010
Adapter, type-N(m) to 3.5 mm(f) .... HP part number 1250-1744

Additional Test Equipment Required for HP 85025D Only

RF plug-in .... HP 83597B
Power Sensor .... HP 8487A
10 dB attenuator .... HP 8490D Option 010
Adapter, 2.4 mm(f) to 2.4 mm(f) .... HP 11900B

Additional Test Equipment Required for HP 85025E Only

RF plug-in .... HP 83595C
Power Sensor .... HP 8485A
10 dB attenuator .... HP 8493C Option 010
Adapter, 3.5 mm(f) to 3.5 mm(f) .... HP part number 1250-1749

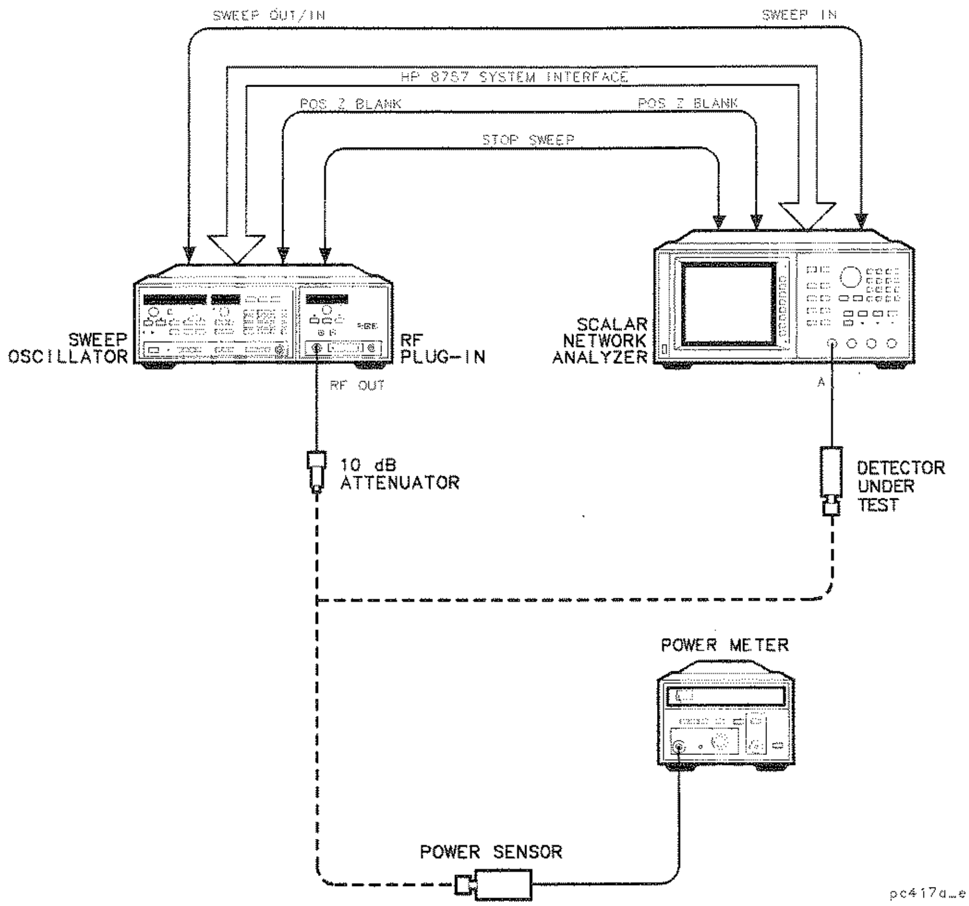


Figure 4-3. Frequency Response Measurement Setup

Specifications

Specifications apply at a temperature range of 25°C ±5°C. For the detector's return loss specifications, refer to Tables 1-2 through 1-6.

HP 85025A/B/D/E Frequency Response Performance Test Procedure

Note **For HP 85025D detectors:**

While the detector is specified down to 10 MHz, the power sensor used in this procedure is only calibrated down to 50 MHz. If data is required below 50 MHz, characterize the power sensor to 10 MHz, or use an additional power sensor which covers this frequency range, and correlate the results with the data above 50 MHz.

Configuring the System

1. Connect the equipment as shown in Figure 4-3, with nothing connected to the attenuated output of the source. Switch ON all equipment and allow 30 minutes for warm-up.
2. On the power meter, press (dBm) mode.

   Zero and calibrate the power meter. If you are unsure of how to do this, refer to the power meter's Operating and Service Manual.

   (RANGE HOLD) and (POWER REF) should remain out.

   Set the CAL FACTOR % dial on the power meter to the value indicated for 50 MHz on the power sensor CAL FACTOR chart.
3. On the analyzer, press (PRESET) (CHANNEL) `CHAN 2 OFF` INSTRUMENT STATE (SYSTEM) `MODE DC`.
4. On the analyzer, zero the detector by pressing `DC DET ZERO MANUAL CONT`.

   When the zero is complete, the display will indicate: `MANUAL ZERO COMPLETE`.
5. Connect the power meter/sensor to the attenuated RF output.
6. On the source/RF plug-in, press (CW) (5) (0) (MHz).
7. Adjust the power level for an indication of −10 dBm on the power meter.

   Do *not* readjust the power level for the remainder of this test.

Characterizing the Source

8. On the source, press (CW) and enter the desired test frequency as indicated on the *Performance Test Record* located at the end of this chapter. For example: (CW) (0.01) (GHz).
9. Using the CAL FACTOR chart on the power sensor, set the CAL FACTOR % dial on the power meter to the value indicated for the test frequency as needed. Use the nearest frequency value.
10. Note the reading on the power meter.
11. Record this value and the test frequency in the *Performance Test Record*.
12. Repeat steps 9 and 10 until the source is characterized to your satisfaction.

Characterizing the Detector

13. Disconnect the power meter/sensor.
14. On the analyzer, zero the detector by pressing DC DET ZERO AUTOZRO.

    When the zero is complete, the display will indicate: AUTOZERO COMPLETED.
15. Connect the detector between the attenuated output of the source and INPUT A of the analyzer.
16. On the analyzer, press CHAN 2 OFF to switch channel 2 OFF. Press FUNCTION (CURSOR) to switch the cursor ON.
17. On the source, press (CW) and enter the value of the first test frequency. Remember to use only the test frequencies used in steps 9 through 11.

    Note the value indicated by the analyzer's cursor display and record it in the *Performance Test Record*.

    Repeat this step until all of the same frequency points have been characterized.

Computing the Maximum Error

18. Using the values recorded in steps 10 and 15, subtract the value in step 10 from the value in step 15 for each of the test frequencies. Record the difference in the space provided on the *Performance Test Record*.

    Now use these values to plot a point-to-point variation curve on the graph provided in the *Performance Test Record*. The peak-to-peak variations determine the frequency response of the detector.

This completes the procedure for measuring frequency response.

Power Accuracy Performance Test

Specifications

Refer to Table 1-2 through Table 1-6. Specifications apply at 25°C ±5°C.

Description

Power accuracy is measured with consideration given to the following conditions (the order is not important):

- Power accuracy is measured at 50 MHz.
- If in DC mode, autozero has been performed (not necessary for AC mode).
- All equipment has been allowed to warm-up for 30 minutes.
- Source harmonics are below −40 dBc.
- This performance test includes mismatch effects. Specifications assume no mismatch.
- Trace averaging should be used on the analyzer as required.
- Offset active and adjusted with a calibrated 0 dBm, 50 MHz signal applied (DC mode only).

The recommended method for testing power accuracy is to use an HP 8116A pulse/function generator as the source. An HP 8116A provides the amplitude necessary to check the detector to its full specifications. Both AC and DC modes must be tested to verify the performance specifications of the detector.

Note that the DC mode test is an "absolute" measurement, requiring the use of a calibrated power meter to set a level of 0 dBm. Using the HP 436A as a calibrated 0 dBm, 50 MHz source introduces a maximum measurement uncertainty of ±0.07 dB.

AC power accuracy testing is done with the HP 8116A modulated by an HP 11665B.

An alternate procedure is provided using an HP 8350B with an RF plug-in as the source. This method does not test the detector to its full specifications (tests to

+10 dBm) and should not be used when traceability to the National Institute of Standards and Technology (NIST) is required.

Equipment Required

Pulse/function generator .... HP 8116A
Scalar network analyzer .... HP 8757C/D/E
50 MHz bandpass filter .... HP part number 08757-80027
3 dB attenuator .... HP 8491B
Calibrated 10 dB step attenuator .... HP 355D Option 001/H88
Calibrated 1 dB step attenuator .... HP 355C Option 001/H88
Modulator (AC mode only) .... HP 11665B
Power meter (DC mode only) .... HP 436A/438A
Adapters .... as required

Note Calibrated attenuation is used in the power accuracy calculations below. Calibrated step attenuators include a calibration report at 50 MHz to improve measurement accuracy. The report lists the actual attenuation of each step at one frequency of interest. The calibration report may be ordered as an option with the step attenuators when purchased or performed as a service afterwards.

Procedure

Absolute Power Accuracy in DC Mode Performance Test

1. Connect the equipment as shown in Figure 4-4. Do not connect detector to attenuator output. Do not use the modulator for this test (AC mode only). Switch all the equipment ON and allow 30 minutes warm-up time.

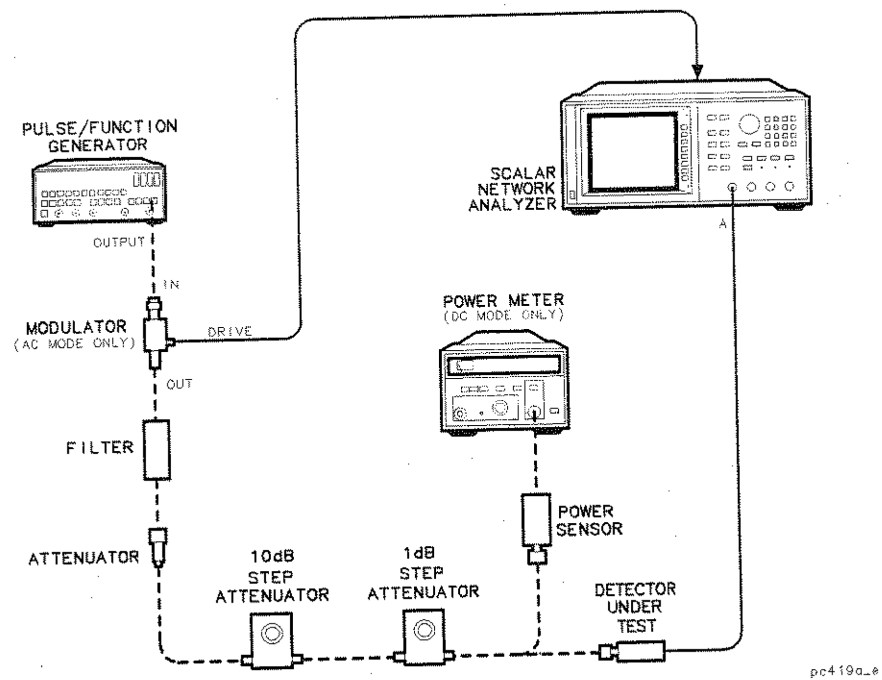


Figure 4-4. Absolute Power Accuracy Test Setup

2. For each of the power levels specified in columns 2 and 3 of the *Performance Test Record*, record the required calibration data of the step attenuators (10 dB step attenuator data in column 4 and 1 db step attenuator data in column 5).

3. Calculate the calibrated power level for each power level and record this value in column 6 CAL PWR LVL. An example follows:

1. Nominal PWR LVL	2. Nominal 10 dB STEP ATTEN	3. Nominal 1 dB STEP ATTEN	4. CAL ATTEN	5. CAL ATTEN	6. CAL PWR LVL
0	10	6	10.02	6.01	−0.03

16 dBm –(column 4 + column 5) = CAL PWR LVL

16 dBm –(10.02 dB + 6.01 dB) = –0.03 dBm

4. On the HP 8116A, set a frequency of 50 MHz by pressing Sine Function (P) Duty (DTY). Using the VERNIER rocker keys adjust for a 50% duty cycle display.

   Press Frequency (FRQ). Using the VERNIER and RANGE rocker keys adjust for a 50 MHz display.

   Select normal operation. LED NORMAL ON.

5. On the analyzer, press (PRESET) CHAN 2 OFF. Switch continuous wave ON and select DC mode for the detector by pressing INSTRUMENT STATE (SYSTEM) MORE SWEEP MODE CW ON, INSTRUMENT STATE (SYSTEM) MODE DC.

6. Configure the analyzer inputs and perform a manual DC zero.

   On the analyzer, press FUNCTION (CAL) CONFIG SYSTEM DC DET ZERO MANUAL CONT.

7. Perform the detector offset calibration.

   On the analyzer, press DET OFFSET A (0) (dB). This ensures 0 dB of offset.

8. Connect the detector to the power meter POWER REF output.

9. Switch POWER REF output ON.

10. On the analyzer, perform the following:

    a. Press FUNCTION (SCALE) AUTO SCALE FUNCTION (CURSOR). Note the reading for use in step b.

b. Press FUNCTION (CAL) DET OFFSET A. Using the ENTRY keys, enter the value opposite in sign to the reading noted above.

Example: CRSR = +.45 dBm

Press (-) (.) (4) (5) (dB)

c. Press FUNCTION (CURSOR). The display should indicate a power level of 0.00 dBm. If not, repeat the detector DC ZERO and OFFSET CALIBRATION (steps 6 and 7) until a 0.00 dBm power level is obtained.

11. On the step attenuators, set the attenuators for a total of 16 dB attenuation. Set the HP 355C to 6 dB and set the HP 355D to 10 dB.
12. Connect the DUT to the attenuated output.
13. On the HP 8116A enable the output by pressing (DISABLE). The DISABLE LED should deactivate.

    Refer to the *Performance Test Record* at the end of this chapter for the calibrated power level computed at nominal 0 dBm. Use the VERNIER rocker keys to adjust the output power to the CAL PWR LVL.
14. Note the cursor value displayed on the CRT. Record this value in the space provided in column 7 of the *Performance Test Record.*
15. Set both attenuators to 0 dB attenuation. Note and record the cursor value.
16. Set the attenuators for the next Nominal PWR LVL (dBm).

Note For nominal power levels of −16 dBm and below, use a combination of AVERAGING ON and SMOOTHING ON to reduce trace noise and obtain a stable reading. Refer to the *Performance Test Record* for the specified AVERAGING FACTOR. Allow for settling time after resetting the attenuator(s).

17. When the cursor reading has stabilized, note and record the value in column 7.
18. Repeat steps 13 and 14 for each nominal power level listed on the *Performance Test Record.*
19. Calculate the Dynamic Accuracy Error as follows:

    Dynamic Accuracy Error = MEAS PWR LVL − CAL PWR LVL

    Include and preserve signs in this calculation. Enter this value in the Dynamic ACCY Error (dBm), column 8, of the *Performance Test Record.*

Dynamic Accuracy in AC Mode Performance Test

20. Connect equipment as shown in Figure 4-4. Connect the modulator's DRIVE INPUT to the analyzer's rear panel MODULATOR OUTPUT. Connect the DUT to the attenuated output. Switch the equipment ON and allow 30 minutes for warm-up.
21. Record and calculate the data as necessary into columns 4, 5, and 6 of the *Performance Test Record*. If the attenuators used in this test are the same as the ones used in steps 2 and 3, copy the data from the Absolute Power Accuracy in DC Mode *Performance Test Record* (columns 4, 5, and 6).
22. On the analyzer, press (PRESET) CHAN 2 OFF FUNCTION (CURSOR).
23. Set the 10 dB step attenuator to 10 dB and set the 1 dB step attenuator to 6 dB.
24. On the HP 8116A, set a frequency of 50 MHz by pressing Sine Function (P) Duty (DTY). Using the VERNIER rocker keys adjust for a 50% duty cycle display.

    Press Frequency (FRQ). Using the VERNIER and RANGE rocker keys adjust for a 50 MHz display.

    Select normal operation. LED NORMAL on.

    Refer to the *Performance Test Record* for the CAL PWR LVL computed at nominal 0 dBm. Use the VERNIER rocker keys to adjust the output power to the CAL PWR LVL as displayed by the CURSOR on the analyzer.
25. Note and record on the *Performance Test Record* the cursor value displayed.
26. Set both attenuators to 0 dB. Note and record the cursor value.
27. Set the attenuators for the next Nominal PWR LVL. Continue the procedure as outlined in steps 24 through 26 of the DC Mode Test for each of the Nominal PWR LVLs listed on the *Performance Test Record*.

    This completes the procedure for measuring dynamic accuracy.

Power Accuracy, Alternate Procedure Using an HP 8350B (+10 dBm maximum)

Alternate Equipment

Sweep oscillator	HP 8350B
RF plug-in	HP 83592B
Scalar network analyzer	HP 8757C/D/E
50 MHz bandpass filter	HP Part Number 08757-80027
3 dB attenuator	HP 8491B
Calibrated 10 dB step attenuator	HP 355D Option 001/H88
Calibrated 1 dB step attenuator	HP 355C Option 001/H88
Power meter (DC mode only)	HP 436A or 438A
Adapters	as required

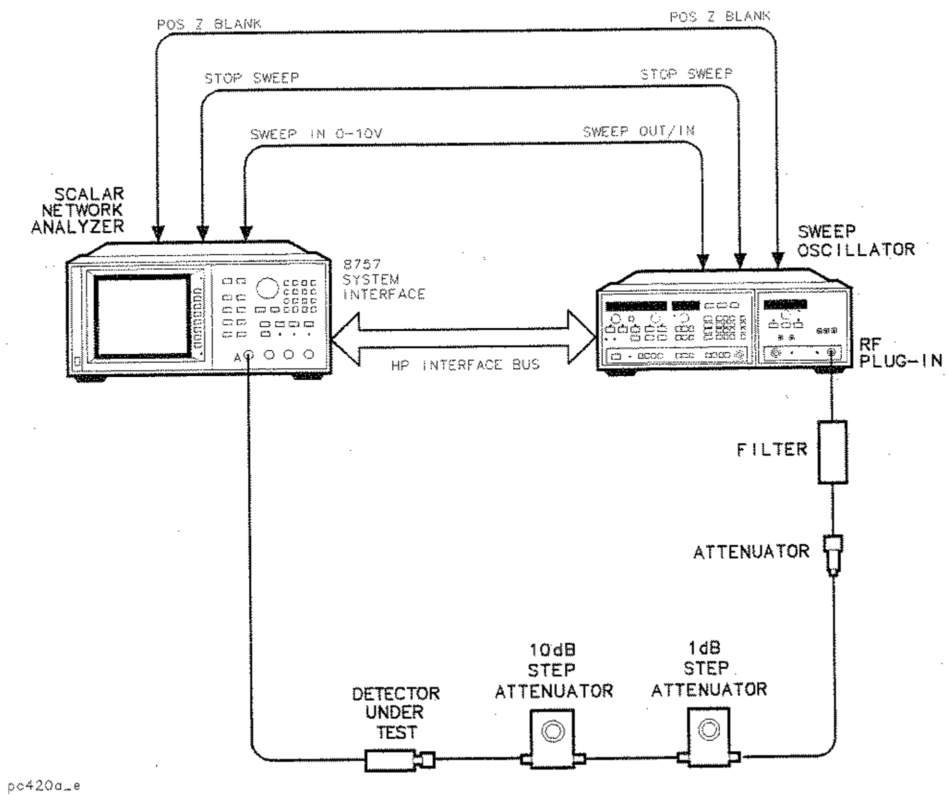


Figure 4-5. Power Accuracy Alternate Test Setup

Procedure

1. Connect the equipment as shown in Figure 4-5. Allow 30 minutes warm-up time.

2. For each of the nominal power levels specified in the *Performance Test Record* (Alternate Procedure), calculate the Calibrated Power Level. Refer to steps 2 and 3 in the Absolute Power Accuracy in DC Mode Performance Test for details. Change all +16 dBm references to +10 dBm.

Absolute Power Accuracy in DC Mode, Alternate Procedure

3. Do not connect the detector to the attenuated output.
4. On the analyzer, press (PRESET) CHAN 2 OFF INSTRUMENT STATE (SYSTEM) (MODE DC). Next, press (CAL) CONFIG SYSTEM DC DET ZERO MANUAL CONT DET OFFSET A (0) (dB).
5. Connect the detector to the power meter POWER REF output.
6. Switch the POWER REF output ON.
7. On the analyzer, press (SCALE) AUTO SCALE (CURSOR). Note the reading.

   On the analyzer, press (CAL) DET OFFSET A. Using the ENTRY keys, enter the value opposite in sign to the reading noted above.
8. On the analyzer, press (CURSOR). The display should indicate a power level of 0.00 dBm. If not, repeat the detector zero and offset calibration until a 0.00 dBm power level is obtained (steps 4 through 7).
9. Set the 10 dB step attenuator to 10 dB.
10. Connect the DUT to the attenuated output.
11. On the source, switch square wave modulation OFF. Set a CW frequency of 50 MHz.
12. Refer to the *Performance Test Record* for the CAL PWR LVL computed at nominal 0 dBm. Adjust the output power to the CAL PWR LVL.
13. Note the cursor value displayed on the CRT. Record this value in column 7 of the *Performance Test Record*.
14. Set the attenuators for the next nominal PWR LVL. Continue the procedure as outlined in steps 9 through 13 of the Absolute Power Accuracy in DC Mode Performance Test for each of Nominal PWR LVLs listed on the *Performance Test Record*. (Nominal −55 dBm is for AC Test only).

Dynamic Accuracy in AC Mode, Alternate Procedure

15. Repeat steps 1 and 2 of Absolute Power Accuracy in DC Mode Performance Test, Alternate Procedure. Connect the DUT to the attenuated output.
16. Preset the analyzer. Switch OFF channel 2. Switch ON the cursor.
17. Set the 10 dB step attenuator to 10 dB.
18. On the source set CW to 50 MHz.
19. Refer to the *Performance Test Record* for the CAL PWR LVL computed at nominal 0 dBm. Adjust the output power to the CAL PWR LVL.
20. Note and record the displayed cursor value.
21. Set both attenuators to 0 dB. Note and record the cursor value.
22. Set the attenuators for the next nominal PWR LVL. Continue the procedure as outlined in steps 17 through 19 of the Absolute Power Accuracy in DC Mode Performance Test for each of the nominal PWR LVLs listed on the *Performance Test Record.*

This completes the power accuracy alternate procedure.

Performance Test Record

HP 85025A/B/D/E Detector Performance Test Record (1 of 9)

Test Facility ____________________	Report Number ____________________
____________________	Date ____________________
____________________	Customer ____________________
____________________	Tested by ____________________
Model ____________________	Ambient temperature ______________ °C
Serial Number ____________________	Relative humidity ______________ %
Options ____________________	
Special Notes	
____	
____	

HP 85025A/B/D/E Detector Performance Test Record (2 of 9)

Model________________________ Report Number ________________ Date __________

Test Equipment Used	Model Number	Trace Number	Cal Due Date
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

HP 85025A/B/D/E Detector Performance Test Record (3 of 9)

Test Description	Specification	Measured Results	Measurement Uncertainty[1]
HP 85025A/B Return Loss			
10 MHz to 40 MHz	$\geq$ 10 dB	______	±1.4 dB
0.04 GHz to 4.0 GHz	$\geq$ 20 dB	______	±1.1 dB
4 GHz to 18 GHz	$\geq$ 17 dB	______	±1.4 dB
18 GHz to 26.5 GHz[2]	$\geq$ 12 dB	______	±1.1 dB
HP 85025D Return Loss			
10 MHz to 40 MHz	$\geq$ 10 dB	______	±0.5 dB
0.04 GHz to 0.10 GHz	$\geq$ 20 dB	______	+2, −5 dB
0.10 GHz to 14 GHz	$\geq$ 23 dB	______	+3, −2 dB
14 GHz to 34 GHz	$\geq$ 20 dB	______	+3, −2 dB
34 GHz to 40 GHz	$\geq$ 15 dB	______	+2, −1.5 dB
40 GHz to 50 GHz	$\geq$ 9 dB	______	+2, −1.5 dB
HP 85025E Return Loss			
10 MHz to 40 MHz	$\geq$ 10 dB	______	±1.4 dB
0.04 GHz to 0.1 GHz	$\geq$ 20 dB	______	±1.1 dB
0.1 GHz to 25 GHz	$\geq$ 25 dB	______	±1.4 dB
25 GHz to 26.5 GHz	$\geq$ 23 dB	______	±1.1 dB

1 Using the equipment and procedures documented in this manual.

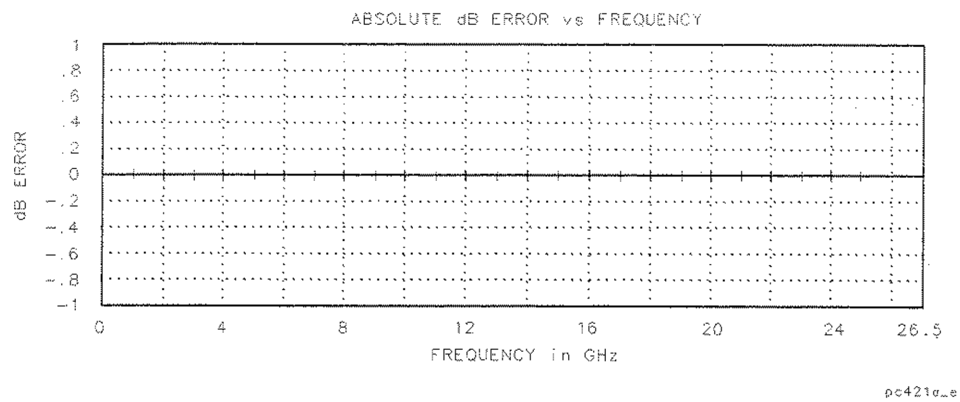
2 HP 85025B only

HP 85025A/B/D/E Detector Performance Test Record (4 of 9)

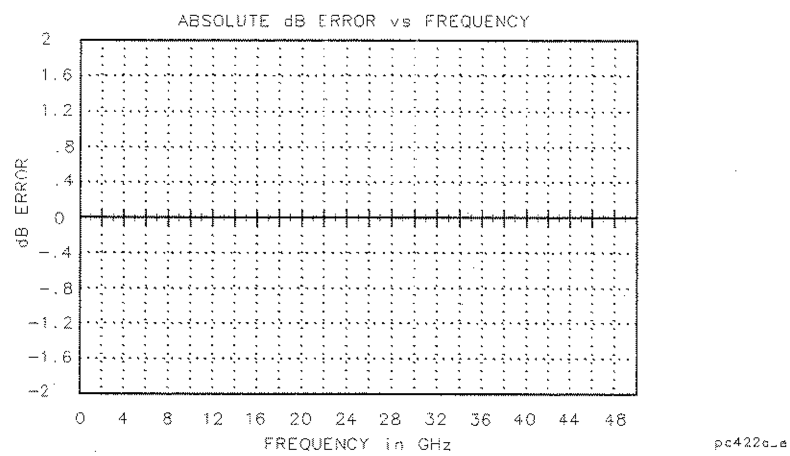
Frequency Response				
Test Frequency		Source Step 10	Detector Step 15	Difference Step 16
Recommended	Actual			
0.01 GHz				
2.00 GHz				
4.00 GHz				
6.00 GHz				
8.00 GHz				
10.0 GHz				
12.0 GHz				
14.0 GHz				
16.0 GHz				
18.0 GHz				
20.0 GHz				
21.0 GHz				
22.0 GHz				
23.0 GHz				
24.0 GHz				
25.0 GHz				
26.0 GHz				
26.5 GHz				
28.0 GHz				
30.0 GHz				
32.0 GHz				
34.0 GHz				
36.0 GHz				
38.0 GHz				
40.0 GHz				
42.0 GHz				
44.0 GHz				
46.0 GHz				
48.0 GHz				
50.0 GHz				

HP 85025A/B/D/E Detector Performance Test Record (5 of 9)

HP 85025A/B/E Absolute dB Error Versus Frequency



HP 85025D Absolute dB Error Versus Frequency



HP 85025A/B/D/E Detector Performance Test Record (6 of 9)

Absolute Power Accuracy in DC Mode								
1. Nominal PWR LVL (dBm)	2. Nominal 120 dB ATTEN Setting (dB)	3. Nominal 12 dB ATTEN Setting (dB)	4. CAL ATTEN (120 dB ATTN)	5. CAL ATTEN (12 dB ATTN)	6. CAL PWR LVL (dBm) (16 dBm - CAL ATTN)	7. MEAS PWR LVL (Cursor) (dBm)	8. Dynamic ACCY Error (dBm)	9. Upper Limit[1] (HP 85025A/B/D/E unless noted otherwise)
0	10	6					REF	REF
16	0	0						0.70[2] 1.0[3]
13	0	3						0.61[2] 0.76[3]
10	0	6						0.52
6	10	0						0.40
3	10	3						0.40
0	10	6					REF	REF
−3	10	9						0.40
−6	20	2						0.40
−10	20	6						0.40
−13	20	9						0.40
−16[4]	30	2						0.40
−20[4]	30	6						0.40
−25[4,5]	40	1						0.40
−30[4,5]	40	6						0.40
−35[4,6]	50	1						0.40
−40[4,6]	50	6						0.70
−45[4,7]	60	1						1.0
−50[4,7]	60	6						1.3

1 Upper limit does not include measurement uncertainties.

2 HP 85025A/B only

3 HP 85025D/E only

4 Smoothing ON

5 Averaging ON, Averaging Factor=4

6 Averaging ON, Averaging Factor=8

7 Averaging ON, Averaging Factor=8

HP 85025A/B/D/E Detector Performance Test Record (7 of 9)

Dynamic Accuracy in AC Mode								
1. Nominal PWR LVL (dBm)	2. Nominal 120 dB ATTEN Setting (dB)	3. Nominal 12 dB ATTEN Setting (dB)	4. CAL ATTEN (120 dB ATTN)	5. CAL ATTEN (12 dB ATTN)	6. CAL PWR LVL (dBm) (16 dBm - CAL ATTN)	7. MEAS PWR LVL (Cursor) (dBm)	8. Dynamic ACCY Error (dBm)	9. Upper Limit[1] (HP 85025A/B/D/E unless noted otherwise)
0	10	6					REF	REF
16	0	0						0.70[2], 1.0[3]
13	0	3						0.61[2], 0.76[3]
10	0	6						0.52
6	10	0						0.40
3	10	3						0.40
0	10	6					REF	REF
−3	10	9						0.40
−6	20	2						0.40
−10	20	6						0.40
−13	20	9						0.40
−16[4]	30	2						0.40
−20[4]	30	6						0.40
−25[4,5]	40	1						0.40
−30[4,5]	40	6						0.40
−35[4,6]	50	1						0.40
−40[4,6]	50	6						0.70
−45[4,7]	60	1						1.0
−50[4,7]	60	6						1.3
−55[4,8]	70	1						1.6

1 Upper limit does not include measurement uncertainties.

2 HP 85025A/B only

3 HP 85025D/E only

4 Smoothing ON

5 Averaging ON, Averaging Factor = 4

6 Averaging ON, Averaging Factor = 8

7 Averaging ON, Averaging Factor = 8

8 Averaging ON, Averaging Factor = 32

HP 85025A/B/D/E Detector Performance Test Record (8 of 9)

Alternate Tests								
1. Nominal PWR LVL (dBm)	2. Nominal 120 dB ATTEN Setting (dB)	3. Nominal 12 dB ATTEN Setting (dB)	4. CAL ATTEN (120 dB ATTN)	5. CAL ATTEN (12 dB ATTN)	6. CAL PWR LVL (dBm) (16 dBm - CAL ATTN)	7. MEAS PWR LVL (Cursor) (dBm)	8. Dynamic ACCY Error (dBm)	9. Upper Limit[1]
0	10	0					REF	REF
10	0	0						0.52
6	0	4						0.40
3	0	7						0.40
0	10	0					REF	REF
−3	10	3						0.40
−6	10	6						0.40
−10	20	0						0.40
−13	20	3						0.40
−16	20	6						0.40
−20	30	0						0.40
−25[2]	30	5						0.40
−30[2]	40	0						0.40
−35[2,3]	40	5						0.40
−40[2,3]	50	0						0.70
−45[2,4]	50	5						1.0
−50[2,4]	60	0						1.3
−55[2,5]	60	5						1.6
−50[2,5]	60	6						1.3
−55[2,6]	70	1						1.6

1 Upper limit does not include measurement uncertainties.

2 Smoothing ON

3 Averaging ON, Averaging Factor=4

4 Averaging ON, Averaging Factor=8

5 Averaging ON, Averaging Factor=8

6 Averaging ON, Averaging Factor=32

HP 85025A/B/D/E Detector Performance Test Record (9 of 9)

RF Input Connector Mechanical Tolerances			
Connector	**Minimum Recession (inches)**[1]	**Maximum Recession (inches)**	**Measured Recession (inches)**
HP 85025A Type-N male	0.207	0.210[2]	________
HP 85025A Option 001 Precision 7 mm[3]	0.000	0.003	________
Precision 7 mm Collet Resilience	Collet must spring back out after being depressed		Pass ______ Fail ______
HP 85025B/E Precision 3.5 mm male	0.000	0.003	________
HP 85025D Precision 2.4 mm male	0.000	0.002	________

1 Minimum recession must NEVER be less than the minimum recession tolerance. If a connector fails this specification, immediately replace it. Such connectors will damage any connector mated to it.

2 The type-N gage calibration block zeros the gage at a 0.207 inch offset. Therefore the 0.207 inch to 0.210 inch recession is displayed as 0.000 to 0.003 inches on the gage.

3 With collet removed.