

# **Agilent Technologies**

## **Z5602A Options H24/H35/H50/H51/H52**

### **User's and Service Guide**

#### **50 MHz Precision Power Reference**

Use this manual with the following document:  
E4440A Calibration and Adjustment Software Getting Started Guide  
Part Number E4440-90555



**Agilent Technologies**

**Manufacturing Part Number: Z5602-90005**

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## **Warranty Statement**

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## Safety Notes

The following safety notes are used throughout this document. Familiarize yourself with each of these notes and its meaning before performing any of the procedures in this document.

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<b>WARNING</b>	<b>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.</b>
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<b>CAUTION</b>	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.
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## 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.
- *Characteristic Performance* describes performance parameter that the product is expected to meet before it leaves the factory, but is not verified in the field and is not covered by the product warranty. A characteristic includes the same guard bands as a specification.



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**Contents**

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## **Z5602A Option H24/H35/H50/H51/H52**

## Description

The Agilent Z5602A Precision Power Reference is a portable 50 MHz sine wave source that requires a very short warm-up time. Traditionally, the process to determine the amplitude accuracy of a source used to calibrate a device under test (DUT) involved power meter measurements and associated calculations to determine the uncertainty of the power meter, the interconnect cables and the VSWR effects of the power meter/source and source/DUT. The Agilent Z5602A Precision Power Reference can achieve the same accuracy as the calibration source built into a power meter, and mates directly with the Type-N female connectors on the spectrum analyzer inputs. The Precision Power Reference greatly reduces the measurement uncertainties mentioned above.

The Precision Power Reference is available in three different connector types: 2.5 mm, 3.5 mm and Type-N (m). Additionally, the Type-N version has 3 different power levels: 0 dBm, -25 dBm and -30 dBm. Each Precision Power Reference has a power cable that can be directly connected to the probe power outlet (-12.6V, +15V) on a spectrum analyzer or other instruments with the probe power feature.

The small size and portability of the Precision Power Reference increases the potential for use in automated production test systems.

## Verifying the Shipment

Verify that you have received the proper option items listed in [Table 1](#). Inspect the shipping container. If the container or packing material is damaged, it should be kept until the contents of the shipment have been checked mechanically and electrically. If there is physical damage refer to [“Contacting Agilent” on page 10](#). Keep the damaged shipping materials (if any) for inspection by the carrier and an Agilent Technologies representative.

**Table 1** Option Numbers with Connector Types

Option	Connector	Output Power
H24	2.4 mm (f)	-25 dBm
H35	3.5 mm (f)	-25 dBm
H50	Type-N (m)	0 dBm
H51	Type-N (m)	-25 dBm
H52	Type-N (m)	-30 dBm



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## Connecting the Precision Power Reference

1. Turn On the spectrum analyzer.
2. Connect the Precision Power Reference to the RF Input connector.
3. Connect the probe power cable from the reference to the probe power output connector.
4. Perform a factory **Preset** on the spectrum analyzer so that it is in a known state.

**Figure 1** Front Panel



## Amplitude Accuracy

The PSA Series spectrum analyzer requires the Z5602A Option H24/H35/H50/H51 or H52 when adjusting the amplitude of the internal 50 MHz reference.

The following example illustrates how the Option H51 version of the Precision Power Reference can be used to verify the amplitude accuracy of the Agilent E4440A Spectrum Analyzer at 50 MHz.

Verify that the spectrum analyzer has been turned On for a minimum of 30 minutes.

### Typeface Key Conventions

The following key conventions are used throughout this document.

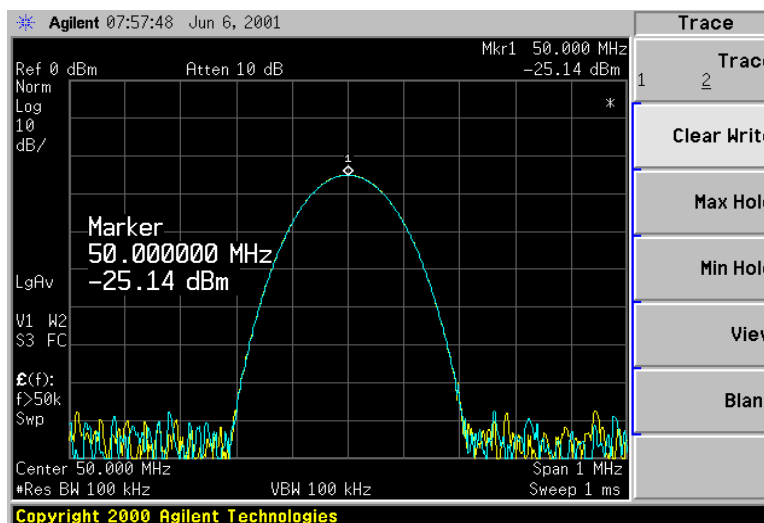
- **[HARDKEYS]** are labeled front panel keys
- **SOFTKEYS** are unlabeled key whose function is indicated on the instrument display

### Adjustment Procedure

Perform the following front panel keystrokes on the spectrum analyzer.

1. Press **[SYSTEM] > Alignments > Align All Now** to trigger an alignment on the spectrum analyzer.
2. Connect the Precision Power Reference to the spectrum analyzer as shown in [Figure 1 on page 3](#).
3. To view the Precision Power Reference signal, set the spectrum analyzer controls as follows:
  - a. Press **[Frequency] > [50 MHz] > [Span] > [1 MHz] > [Single] > [Peak Search]**
  - b. Compare the signal amplitude displayed on the spectrum analyzer to the power level shown on the calibration sticker attached to the Precision Power Reference. For example; the spectrum analyzer marker value may be  $-25.07$  dBm and the calibration sticker on your Precision Power Reference may indicate  $-25.009$  dBm. Therefore, the spectrum analyzer amplitude error is  $-0.061$  dB.

**Figure 2** Agilent Z5602A Option H51 Signal



## Specifications

The specifications for the Agilent Z5602A Option H24/H35/H50/H51/H52 Precision Power References are listed [Table 2](#).

No warm up time is required for the Precision Power Reference once the power is turned on.

**Table 2 50 MHz Precision Power Reference Specifications**

Parameter	Specifications <sup>1</sup>				
Item	H24	H35	H50	H51	H52
Connector Type	2.4 mm	3.5 mm	Type-N (m)	Type-N (m)	Type-N (m)
Power Level	-25 dBm	-25 dBm	-0 dBm	-25 dBm	-30 dBm
Frequency Drift	$ \Delta f  \leq 2.5$ KHz	$ \Delta f  \leq 2.5$ KHz	$ \Delta f  \leq 2.5$ KHz	$ \Delta f  \leq 2.5$ KHz	$ \Delta f  \leq 2.5$ KHz
Typical VSWR	1.06	1.06	1.06	1.06	1.06
Output Power Variation Over 20 °C – 30 °C	$\pm 0.004$ dBm	$\pm 0.004$ dBm	$\pm 0.004$ dBm	$\pm 0.004$ dBm	$\pm 0.004$ dBm
Output Power Variation Over 0 °C – 55 °C	$\pm 0.02$ dBm	$\pm 0.02$ dBm	$\pm 0.02$ dBm	$\pm 0.02$ dBm	$\pm 0.02$ dBm
Total Harmonic Content	< -45 dBc	< -45 dBc	< -45 dBc	< -45 dBc	< -45 dBc
Amplitude Error Due to Harmonic Content	< 0.0001 dB	< 0.0001 dB	< 0.0001 dB	< 0.0001 dB	< 0.0001 dB

1. The recommended cal cycle on the Agilent Z5602A Precision Power Reference is 1 year.

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## Safety and 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 accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

### Declaration of Conformity

A copy of the Declaration of Conformity is available upon request, or a copy is available on the Agilent Technologies web site at <http://regulations.corporate.agilent.com/DoC/search.htm>

### Statement of Compliance

This instrument has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

### Connector Care and Cleaning Precautions

Remove the power cord to the instrument. To clean the connectors use alcohol in a well ventilated area. Allow all residual alcohol moisture to evaporate, and fumes to dissipate prior to energizing the instrument.

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**WARNING**     **If flammable cleaning materials are used, the material shall not be stored, or left open in the area of the equipment. Adequate ventilation shall be assured to prevent the combustion of fumes, or vapors.**

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## Before Applying Power

Verify that the premises electrical supply is within the range of the instrument. The instrument has an autoranging power supply.

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

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**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.**

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**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.**

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**WARNING** **The opening of covers or removal of parts is likely to expose the user to dangerous voltages. Disconnect the instrument from all voltage sources before opening.**

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

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## Regulatory Information

This section contains information that is required by various government regulatory agencies.

### Instrument Markings



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).



The CE mark is a registered trademark of the European Community. (If accompanied by a year, it is when the design was proven.)

ICES/NMB-001

This is a marking to indicate product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001).



Korean Certification (KC) mark. Must include the marking's identifier code that has up to 26 digits and follows this format: KCC-VWX-YYY-Z...

IP 2 0

The instrument has been designed to meet the requirements of IP 2 0 for ingress and operational environment.



N10149

This is a required mark signifying compliance with an EMC requirement. The C-Tick mark is a registered trademark of the Australian Spectrum Management Agency.



Indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.



This symbol on all primary and secondary packaging indicates compliance to China standard GB 18455-2001.

### EMC Information

Complies with European EMC Directive 2004/108/EC

- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- This ISM device complies with Canadian ICES-001.  
Cet appareil ISM est conforme à la norme NMB du Canada.

### Acoustic Statement

Complies with European Machinery Directive 2002/42/EC, 1.7.4.2u

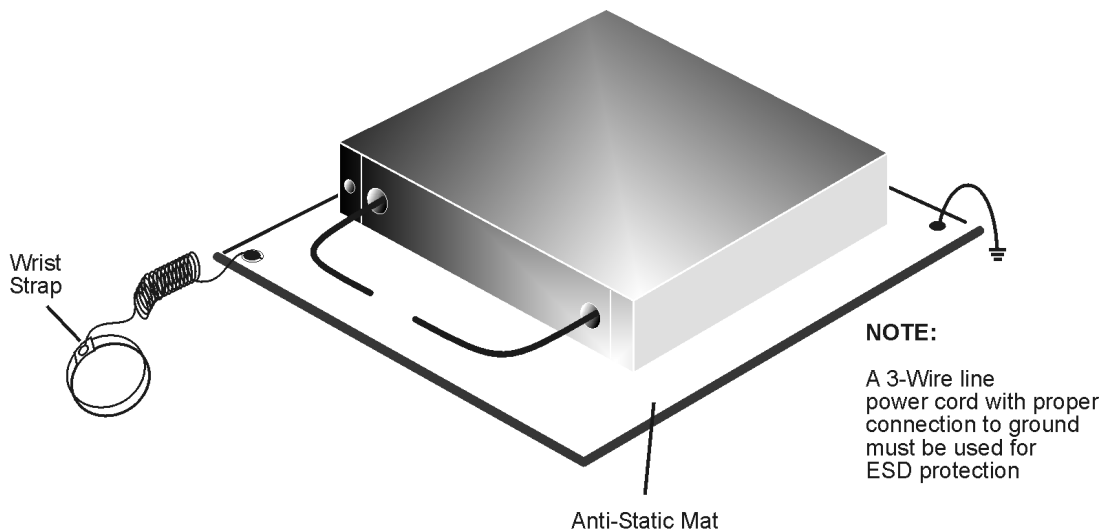
- Acoustic noise emission
- LpA <70 dB
- Operator position
- Normal operation mode

## Electrostatic Discharge Protection

Protection against electrostatic discharge (ESD) is essential while removing assemblies from or connecting cables to 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* have a grounded, conductive table mat (9300-0797) in front of your test equipment.
- *always* wear a grounded wrist strap (9300-1367) with grounding cord (9300-0980), connected to a grounded conductive table mat, having a 1 MW resistor in series with it, when handling components and assemblies or when making connections.
- *always* wear a heel strap (9300-1126) when working in an area with a conductive floor. If you are uncertain about the conductivity of your floor, wear a heel strap.
- *always* ground yourself before you clean, inspect, or make a connection to a static-sensitive device or test port. You can, for example, grasp the grounded outer shell of the test port or cable connector briefly.
- *always* ground the center conductor of a test cable before making a connection to the analyzer test port or other static-sensitive device. This can be done as follows:
  1. Connect a short (from your calibration kit) to one end of the cable to short the center conductor to the outer conductor.
  2. While wearing a grounded wrist strap, grasp the outer shell of the cable connector.
  3. Connect the other end of the cable to the test port and remove the short from the cable.

**Figure 3 ESD Protection Setup**



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## Agilent Support, Services, and Assistance

### Service and Support Options

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.

### Contacting Agilent

Assistance with test and measurements needs and information or finding a local Agilent office are available on the Web at: <http://www.agilent.com/find/assist>

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

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**NOTE** In any correspondence or telephone conversation, refer to the Agilent product by its model number and full serial number. With this information, the Agilent representative can determine the warranty status of your unit.

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### Shipping Your Product to Agilent for Service or Repair

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**IMPORTANT** Agilent Technologies reserves the right to reformat or replace the internal hard disk drive in your analyzer as part of its repair. This will erase all user information stored on the hard disk. It is imperative, therefore, that you make a backup copy of your critical test data located on the analyzer's hard disk before shipping it to Agilent for repair.

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If you wish to send your instrument to Agilent Technologies for service or repair:

- Include a complete description of the service requested or of the failure and a description of any failed test and any error message.
- Remove and retain the front handles and all rack mount hardware. The analyzer should be sent to Agilent in the same configuration as it was originally shipped.
- Ship the analyzer using the original or comparable antistatic packaging materials.
- Contact Agilent for instructions on where to ship your analyzer.