

Keysight Technologies  
N5256/7/8A/B

Millimeter-wave Module

# Notices

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N5256/7/8A/B

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## SERVICE NOTE

For models N5256AW12, N5257AR12, N5258AD12, N5256AX12, N5257AX12, N5256AW15, N5257AR15, and N5258AD15, the LO multiplier number has changed from 5 to 6. Modules with OML s/n  $\leq$  16xxxx (made before 2017) have the LO multiplier number 5 indicated on the module's rear label and are not compatible with new modules for system configuration.

Please note that "A" models are not compatible with "B" models.

# N5256/7/8A/B

## Introduction

The Keysight Technologies N5256A/B, N5257A/B and N5258A/B are Millimeter-wave Modules that are manufactured for Keysight by Oleson Microwave Labs (OML) as a customer ordering convenience. This document provides information for the models and options available for each product. Refer to documentation supplied with this product or go to the OML website at: <http://www.omlinc.com>.

The Keysight Technologies N5256AW01 and N5257AR01 are manufactured for Keysight by Virginia Diodes, Inc. (VDI). Refer to the Product Note (N5256-90002) and the VDI document included with this product or go to the VDI website at: <http://www.vadiodes.com>.

For system configuration information refer to the Keysight Millimeter-wave Network Analyzer 10 MHz to 110 GHz, with Extensions to 1.1 THz (5989-7620EN), available on the Keysight Technologies web site at: <http://literature.cdn.keysight.com/litweb/pdf/5989-7620EN.pdf>.

For Directly Connecting a millimeter-wave module to a network analyzer, the following are recommended:

- OML VDCPW12-5, 12 VDC Power Supply, N5260-80891, (7-pin output circular jack) included with product, or
- U8100A DC Power Supply (0 to 30 V, 0 to 3 A, 90 W) or equivalent
- DC Bias Cable (N5260-60042)

**Table 1** Power Supply Voltage, Frequency, and Power Ratings

|                                 |  |
|---------------------------------|--|
| Nominal Voltage and/or Range:   | Input: 100-240 VAC (AC/DC Adapter)<br>Output: 12 VDC (AC/DC Adapter) |
| Nominal Frequency and/or Range: | Input: 50-60 Hz (AC/DC Adapter)                                      |
| Power in Watts, VA, or Current: | Input: 1.4 A (AC/DC Adapter)<br>Output: 5 A (AC/DC Adapter)          |

**Figure 1** OML Network Analysis Products



## Description

The millimeter-wave modules are designed for use with the N5260/61/62A Millimeter-wave Module Controllers for banded vector network analyzer systems. Refer to the N5250C or N5261/62A Users Guides (N5260-90001 or N5262-90001) for system connections, operation and functional check.

The N5256A/B “T/R” Millimeter-wave Module contains an RF source multiplier, dual directional coupler, reference downconverter and a test downconverter. The T/R Millimeter-wave Module is usually the primary module of a millimeter-wave VNA system. A single T/R module allows the measurement of S11 reflection coefficient only.

The N5257A/B “T” Millimeter-wave Module is a “receive only” module that contains a test downconverter to receive the test signal from a T/R Millimeter-wave Module. The use of a T module, as the second module, allows the system capability to measure S11 and S21 only.

The N5258A/B “T2” series is a “dual receive only” module that contains two test downconverters to receive test signals from two antennas, a power splitter or two T/R Millimeter-wave Modules.

The use of two T/R modules in the millimeter-wave VNA system allows for all four S-parameters to be measured. The test downconverters of T/R modules are the receivers for the signal from the modules sources. When the two modules waveguide are connected, S11 and S21 are measured on the forward direction, S22 and S11 are measured when the signal path is reversed.

**Table 2 Model List**

| Instrument <sup>1</sup> | Description   |
|-------------------------|---|
| N5256A/B                | Transmission / Reflection Modules for use with N526xA Controller.           |
| N5257A/B                | Single Path Transmission (Receiver) Modules for use with N526xA Controller. |
| N5258A/B                | Dual Path Transmission (Receiver) Modules for use with N526xA Controller.   |

1. Refer to individual tables for specific model and options.

## Verifying the Shipment

To verify the contents shipped with your product, refer to the "Box Content List" and the documentation included with the shipment.

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 [“Keysight Support, Services, and Assistance” on page 33](#). Keep the damaged shipping materials (if any) for inspection by the carrier and an Keysight Technologies representative.

### NOTE

**The Keysight part number and serial number is on the bottom of the module, refer to the model and serial number when requesting service or information.**

## N5256/7/8A Model Features

- The millimeter-wave modules have a power connector feature that is designed to operate with the N5260/61/62A Millimeter-wave Module controllers. A separate external power supply from OML (VDCPW12-5, 12 VDC, with a 7-pin output circular jack) is included for a direct connection configuration.
- The RF, LO and IF connectors are 3.5 mm female SMA type.
- RF and DC power cables are included with millimeter-wave controllers, or may be purchased separately. A separate power supply is recommended if the millimeter-wave modules are placed greater than 30 feet from the controller.
- The waveguide connectors uses a 4-40 thread screw. OML supplies a 3/32 inch captive screw and VDI supplies a 5/64 inch captive screw.
- The millimeter-wave modules have adjustable feet for leveling height when connecting to other equipment.
- For indoor use only.

### CAUTION

Do not remove the feet. Air flow on the bottom and rear panel of the module must be unobstructed.

**Table 3** Waveguide Flange

| Frequency Range | Frequency Band | EIA Waveguide | Mil Spec Flange MLF-3955/ | UG-XXX/U Equivalent |
|-----------------|----------------|---------------|---------------------------|---------------------|
| 500 to 750 GHz  | n/a            | WR-1.5        | n/a                       | n/a                 |
| 325 to 500 GHz  | n/a            | WR-2.2        | n/a                       | UG-387/U-M          |
| 220 to 325 GHz  | n/a            | WR-03         | 74-005                    | UG-387/U-M          |
| 140 to 220 GHz  | G              | WR-05         | 74-003                    | UG-387/U-M          |
| 110 to 170 GHz  | D              | WR-06         | 74-002                    | UG-387/U-M          |
| 90 to 140 GHz   | F              | WR-08         | 74-001                    | UG-387/U-M          |
| 75 to 110 GHz   | W              | WR-10         | 67B-010                   | UG-387/U-M          |
| 60 to 90 GHz    | E              | WR-12         | 67B-009                   | UG-387/U            |
| 50 to 75 GHz    | V              | WR-15         | 67B-008                   | UG-385/U            |
| 33 to 50 GHz    | Q              | WR-22         | 67B-006                   | UG-383/U            |
| 56 to 94 GHz    | E (extended)   | WR-12         | 67B-M03/74-001            | UG-387/U            |



## Ordering Configurations

**Table 4** N5256A Waveguide Model and Options<sup>1</sup>

| Waveguide Modules | Frequency Range | Waveguide Band |
|-------------------|-----------------|----------------|
| N5256AW02         | 325 to 500 GHz  | WR-2.2         |
| N5256AW03         | 220 to 325 GHz  | WR-03          |
| N5256AW05         | 140 to 220 GHz  | WR-05          |
| N5256AW06         | 110 to 170 GHz  | WR-06          |
| N5256AW08         | 90 to 140 GHz   | WR-08          |
| N5256AW10         | 75 to 110 GHz   | WR-10          |

**Table 5** N5257A Waveguide Model and Options<sup>1</sup>

| Waveguide Modules | Frequency Range | Waveguide Band |
|-------------------|-----------------|----------------|
| N5257AR02         | 325 to 500 GHz  | WR-2.2         |
| N5257AR03         | 220 to 325 GHz  | WR-03          |
| N5257AR05         | 140 to 220 GHz  | WR-05          |
| N5257AR06         | 110 to 170 GHz  | WR-06          |
| N5257AR08         | 90 to 140 GHz   | WR-08          |
| N5257AR10         | 75 to 110 GHz   | WR-10          |

1. Waveguide models may be ordered with Option 001 (Adjustable RF Attenuator), Option 002 (15 dB Gain, RF and LO Internal Amplifiers), Option 003 (Option 001 and Option 002), or Option 004 (IF amp bypass jumpers).

**Table 6** N5258A Waveguide Model and Options<sup>1</sup>

| Waveguide Modules | Frequency Range | Waveguide Band |
|-------------------|-----------------|----------------|
| N5258AD03         | 220 to 325 GHz  | WR-03          |
| N5258AD05         | 140 to 220 GHz  | WR-05          |
| N5258AD06         | 110 to 170 GHz  | WR-06          |
| N5258AD08         | 90 to 140 GHz   | WR-08          |
| N5258AD10         | 75 to 110 GHz   | WR-10          |

1. Waveguide models may be ordered with Option 001 (15 dB Gain LO Internal Amplifier).

**Table 7** N5256B Waveguide Model and Options<sup>1</sup>

| Waveguide Modules | Frequency Range | Waveguide Band  |
|-------------------|-----------------|---|
| N5256BW12         | 60 to 90 GHz    | WR-12, T/R module (LO x6), cables not included          |
| N5256BX12         | 56 to 94 GHz    | Extended WR-12, T/R module (LO x6), cables not included |
| N5256BW15         | 50 to 75 GHz    | WR-15, T/R module (LO x6), cables not included          |

1. Waveguide models may be ordered with Option 001 (Adjustable RF Attenuator), Option 002 (15 dB Gain, RF and LO Internal Amplifiers), Option 003 (Option 001 and Option 002), or Option 004 (IF amp bypass jumpers).

**Table 8**                      **N5257B Waveguide Model and Options<sup>1</sup>**

| <b>Waveguide Modules</b> | <b>Frequency Range</b> | <b>Waveguide Band</b>  |
|--------------------------|------------------------|--|
| N5257BR12                | 60 to 90 GHz           | WR-12, Receiver module (LO x6), cables not included          |
| N5257BX12                | 56 to 94 GHz           | Extended WR-12, Receiver module (LO x6), cables not included |
| N5257BR15                | 50 to 75 GHz           | WR-15, Receiver module (LO x6), cables not included          |

1. Waveguide models maybe ordered with Option 001 (15 dB Gain LO Internal Amplifier).

## Cross Reference Model and Option Numbers

The following millimeter-wave module model part numbers correspond with the Keysight Technologies part numbers.

Each module ordered includes one each of the standard accessories listed below:

- Documentation Envelope (Performance Graphs and Certificate of Compliance).
- Millimeter-wave Module (Refer to [Table 9](#), [Table 10](#) and [Table 11](#) for your specific module).
- Model N5256A/B includes a Waveguide Section.
- Model N5257A (W02, W03) and N5258A (W02, W03) includes a Waveguide Section.
- Model N5257A (W05, W06, W08) and N5258A (W05, W06, W08) includes a Waveguide 10 dB Attenuator.
- Model N5257A/B (W10, W15) and N5258A (W10, W15) includes a Waveguide 20 dB Attenuator.

### NOTE

**Only Keysight approved accessories shall be used.**

---

**Table 9**                      **N5256A/B Waveguide Models**

| <b>Keysight Model Number</b>   | <b>Keysight Part Number</b> | <b>Vendor Module Part Number</b> |
|--|-----------------------------|----------------------------------|
| N5256A/B Standard (Note: "A" models are not compatible with "B" models)                |                             |                                  |
| N5256AW02-STD  | N5260-80039                 | V02VNA2-T/R                      |
| N5256AW03-STD  | N5260-80017                 | V03VNA2-T/R                      |
| N5256AW05-STD  | N5260-80019                 | V05VNA2-T/R                      |
| N5256AW06-STD  | N5260-80012                 | V06VNA2-T/R                      |
| N5256AW08-STD  | N5260-80015                 | V08VNA2-T/R                      |
| N5256AW10-STD  | N5260-60020                 | V10VNA2-T/R                      |
| N5256BW12-STD  | N5260-80692                 | V12VNA2R-T/R                     |
| N5256BW15-STD  | N5260-80686                 | V15VNA2R-T/R                     |
| N5256BX12-STD  | N5260-80668                 | V12VNA2R-TR-5694                 |
| N5256A/B Option 001 <sup>1</sup> (Note: "A" models are not compatible with "B" models) |                             |                                  |
| N5256AW03-001  | N5260-80038                 | V03VNA2-T/R-A                    |
| N5256AW05-001  | N5260-80035                 | V05VNA2-T/R-A                    |
| N5256AW06-001  | N5260-80044                 | V06VNA2-T/R-A                    |
| N5256AW08-001  | N5260-80116                 | V08VNA2-T/R-A                    |
| N5256AW10-001  | N5260-80036                 | V10VNA2-T/R-A                    |
| N5256AW12-001  | N5260-80112                 | V12VNA2-T/R-A                    |
| N5256AW15-001  | N5260-80052                 | V15VNA2-T/R-A                    |
| N5256AX12-001  | N5260-80115                 | V12VNA2-T/R-A-5694               |
| N5256BW12-001  | N5260-80691                 | V12VNA2R-T/R-A                   |
| N5256BX12-001  | N5260-80667                 | V12VNA2R-T/R-A-5694              |
| N5256BW15-001  | N5260-80685                 | V15VNA2R-T/R-A                   |

(Continued on next page)

**Table 9** N5256A/B Waveguide Models (Continued)

| Keysight Model Number  | Keysight Part Number | Vendor Module Part Number |
|--|----------------------|---------------------------|
| N5256A/B Option 002 <sup>2</sup> (Note: "A" models are not compatible with "B" models) |                      |                           |
| N5256AW02-002  | N5260-80061          | V02VNA2-T/R-RLA           |
| N5256AW03-002  | N5260-80142          | V03VNA2-T/R-RLA           |
| N5256AW05-002  | N5260-80143          | V05VNA2-T/R-RLA           |
| N5256AW06-002  | N5260-80063          | V06VNA2-T/R-RLA           |
| N5256AW08-002  | N5260-80144          | V08VNA2-T/R-RLA           |
| N5256AW10-002  | N5260-80053          | V10VNA2-T/R-RLA           |
| N5256A Option 003 <sup>3</sup>   |                      |                           |
| N5256AW03-003  | N5260-80130          | V03VNA2-T/R-A-RLA         |
| N5256AW05-003  | N5260-80129          | V05VNA2-T/R-A-RLA         |
| N5256AW06-003  | N5260-80117          | V06VNA2-T/R-A-RLA         |
| N5256AW08-003  | N5260-80118          | V08VNA2-T/R-A-RLA         |
| N5256AW10-003  | N5260-80054          | V10VNA2-T/R-A-RLA         |
| N5256A Option 004 <sup>4,5</sup>   |                      |                           |
| N5256AW03-004  | N5260-80058          | V03VNA2-T/R               |
| N5256AW10-004  | N5260-80055          | V10VNA2-T/R               |
| N5256A Option HLP  |                      |                           |
| N5256AW10-HLP  | N5260-80227          | V10VNA2-T/R-LP            |
| N5256A Option IMD <sup>6</sup>   |                      |                           |
| N5256AW10-IMD  | N5260-80230          | V10VNA2-T/R-IMD           |

1. Waveguide models with Option 001 (Adjustable RF Attenuator).
2. Waveguide models with Option 002 (15 dB Gain, RF and LO Internal Amplifiers).
3. Waveguide models with Option 003 (Option 001 and Option 002), or Option 004 (IF Amplifier Bypass Jumpers).
4. Waveguide modules with IF Amplifier Bypass Jumpers.
5. Refer to [Figure 5 on page 19](#) for Option 004 rear panel features.
6. Refer to [http://www.omlinc.com/images/pdf/Library/Application\\_Notes/Simplified\\_Millimeter\\_Wave\\_IMD\\_Measurements.pdf](http://www.omlinc.com/images/pdf/Library/Application_Notes/Simplified_Millimeter_Wave_IMD_Measurements.pdf) for Option IMD

**Table 10**                      **N5257A/B Waveguide Models**

| <b>Keysight Model Number</b>   | <b>Keysight Part Number</b>                           | <b>OML Part Number</b> |
|--------------------------------|---|------------------------|
| N5257A/B Standard              | (Note: "A" models are not compatible with "B" models) |                        |
| N5257AR02                      | N5260-80062   | V02VNA2-T              |
| N5257AR03                      | N5260-80037   | V03VNA2-T              |
| N5257AR05                      | N5260-80041   | V05VNA2-T              |
| N5257AR06                      | N5260-80013   | V06VNA2-T              |
| N5257AR08                      | N5260-80045   | V08VNA2-T              |
| N5257AR10                      | N5260-80023   | V10VNA2-T              |
| N5257A Option 001 <sup>1</sup> | (Note: "A" models are not compatible with "B" models) |                        |
| N5257AR02-001                  | N5260-80072   | V02VNA2-T-LOA          |
| N5257AR03-001                  | N5260-80071   | V03VNA2-T-LOA          |
| N5257AR05-001                  | N5260-80070   | V05VNA2-T-LOA          |
| N5257AR06-001                  | N5260-80069   | V06VNA2-T-LOA          |
| N5257AR08-001                  | N5260-80068   | V08VNA2-T-LOA          |
| N5257AR10-001                  | N5260-80067   | V10VNA2-T-LOA          |

1. Waveguide models with Option 001 (15 dB Gain LO Internal Amplifier).

**Table 11**                      **N5258A/B Waveguide Models**

| <b>Keysight Model Number</b>   | <b>Keysight Part Number</b>                           | <b>OML Part Number</b> |
|--------------------------------|---|------------------------|
| N5258A Standard                | (Note: "A" models are not compatible with "B" models) |                        |
| N5258AD03                      | TBA   | V03VNA2-T2             |
| N5258AD05                      | TBA   | V05VNA2-T2             |
| N5258AD06                      | N5260-80043   | V06VNA2-T2             |
| N5258AD08                      | TBA   | V08VNA2-T2             |
| N5258AD10                      | N5260-80021   | V10VNA2-T2             |
| N5258A Option 001 <sup>1</sup> | (Note: "A" models are not compatible with "B" models) |                        |
| N5258AD03-001                  | TBA   | V03VNA2-T2-LOA         |
| N5258AD05-001                  | TBA   | V05VNA2-T2-LOA         |
| N5258AD06-001                  | TBA   | V06VNA2-T2-LOA         |
| N5258AD08-001                  | TBA   | V08VNA2-T2-LOA         |
| N5258AD10-001                  | N5260-80029   | V10VNA2-T2-LOA         |

1. Waveguide models with Option 001 (15 dB Gain LO Internal Amplifier).



## Front and Rear Panel Features

Figure 2 Rear Panel Power Supply Connector

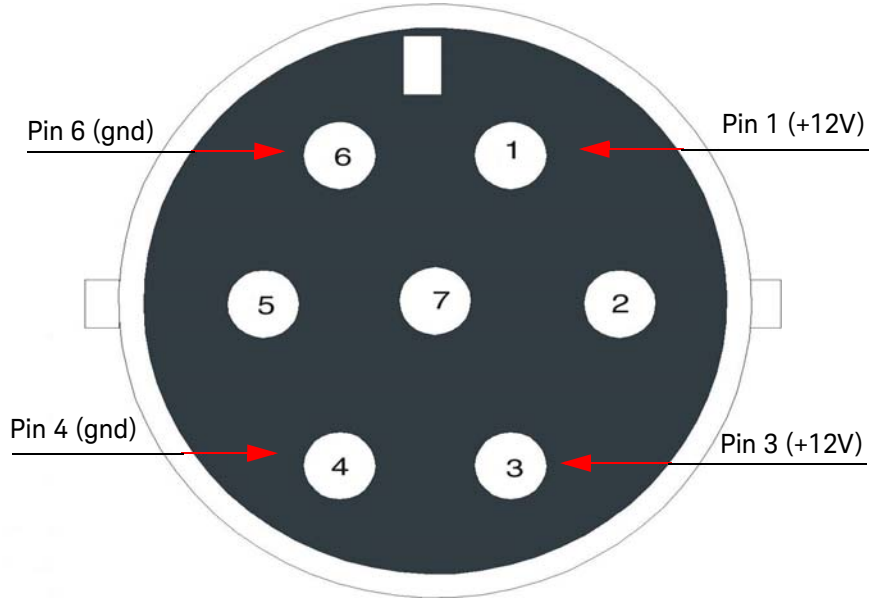


Figure 3 N5256A/B or N5257A/B Front Panel



Figure 4 N5256A/B Rear Panel



Figure 5 N5256A/B Option 001, 003 or 004



Figure 6 N5257A/B Single Receiver Rear Panel

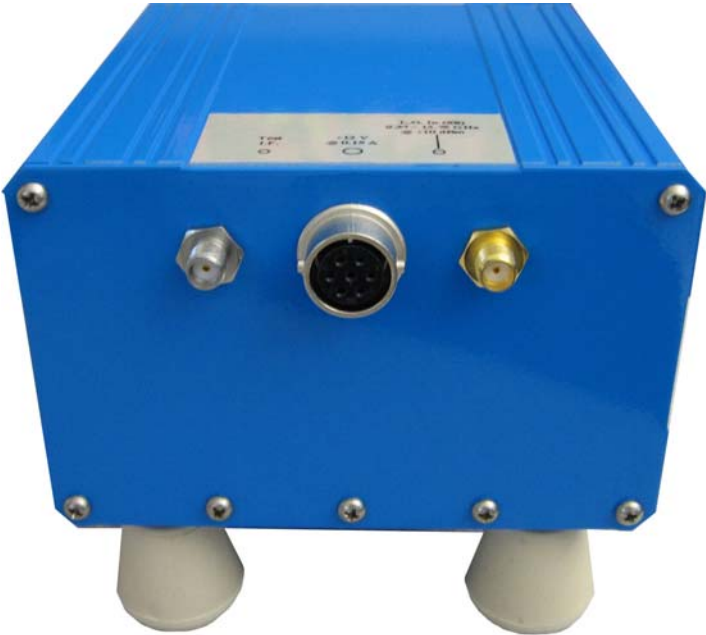


Figure 7

N5258A/B Dual Receiver Front Panel



Figure 8

N5258A/B Dual Receiver Rear Panel

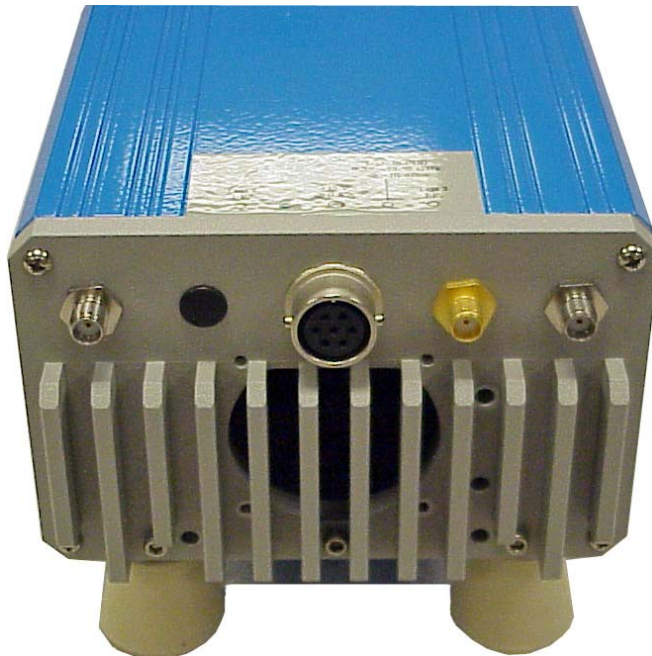




Figure 10

N5256A Option 004

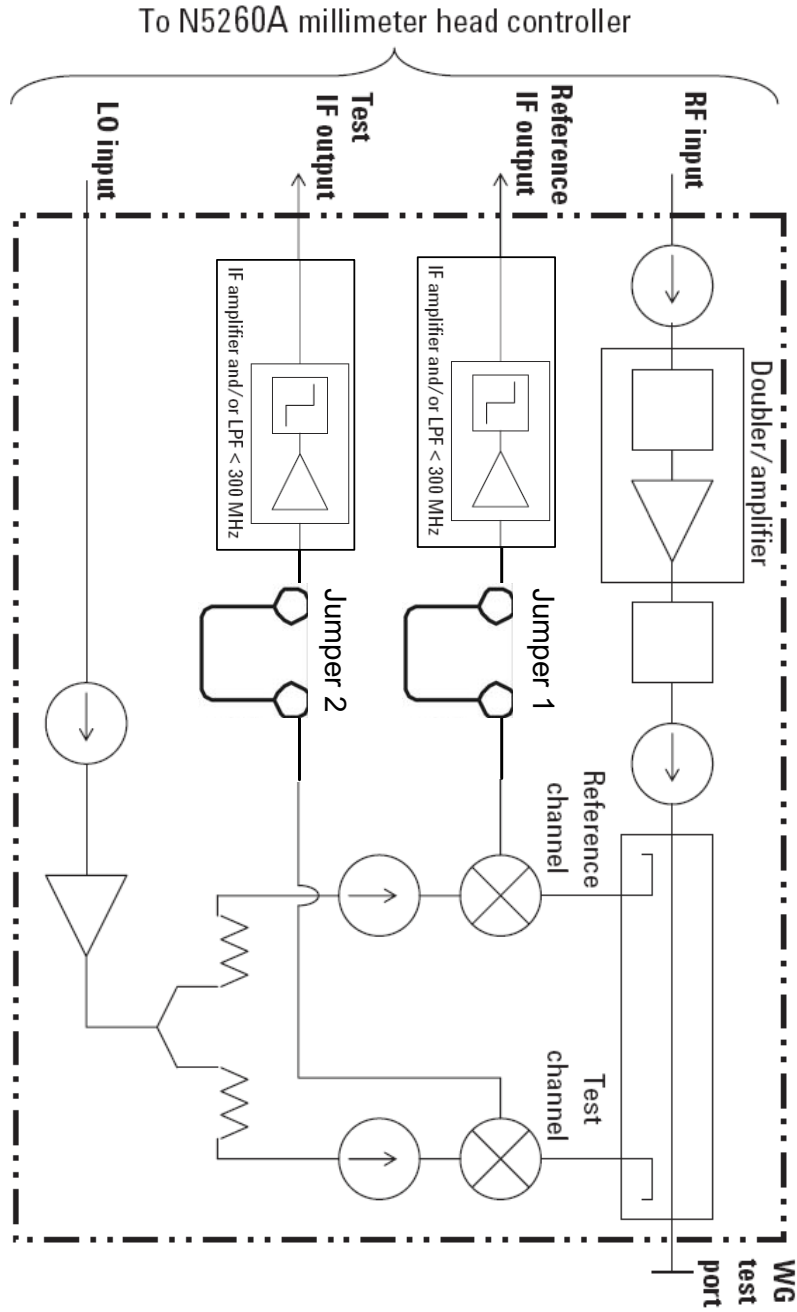
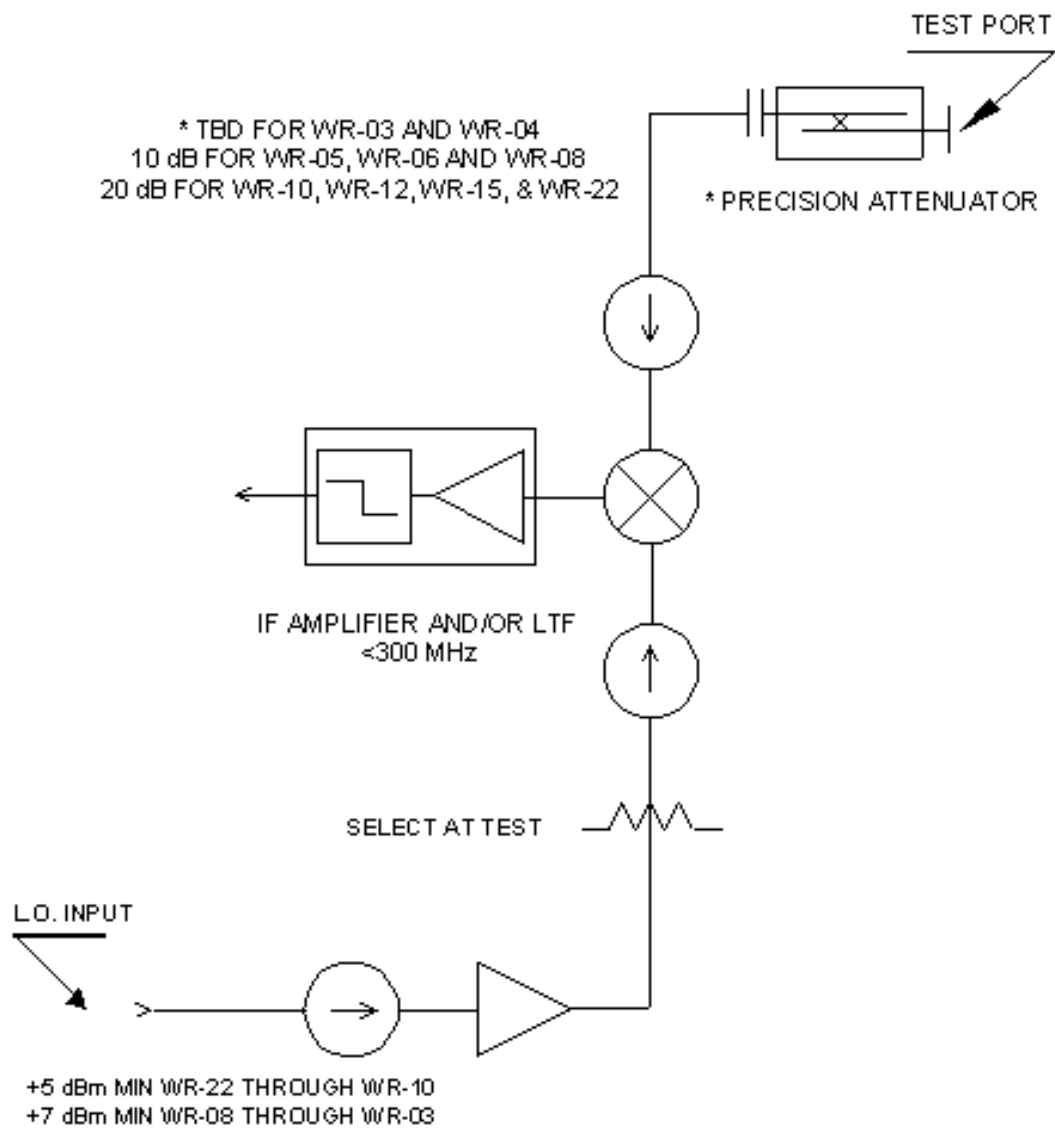


Figure 11

N5257A/B



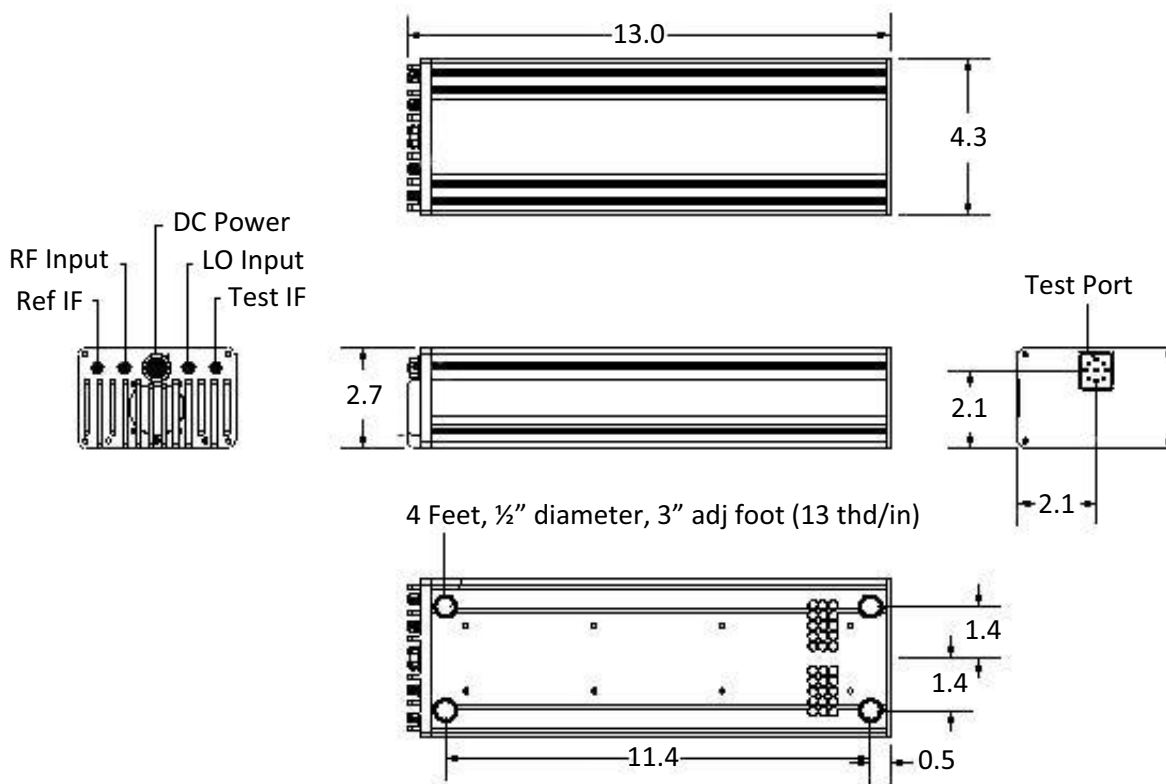




## Drawings and Dimensions

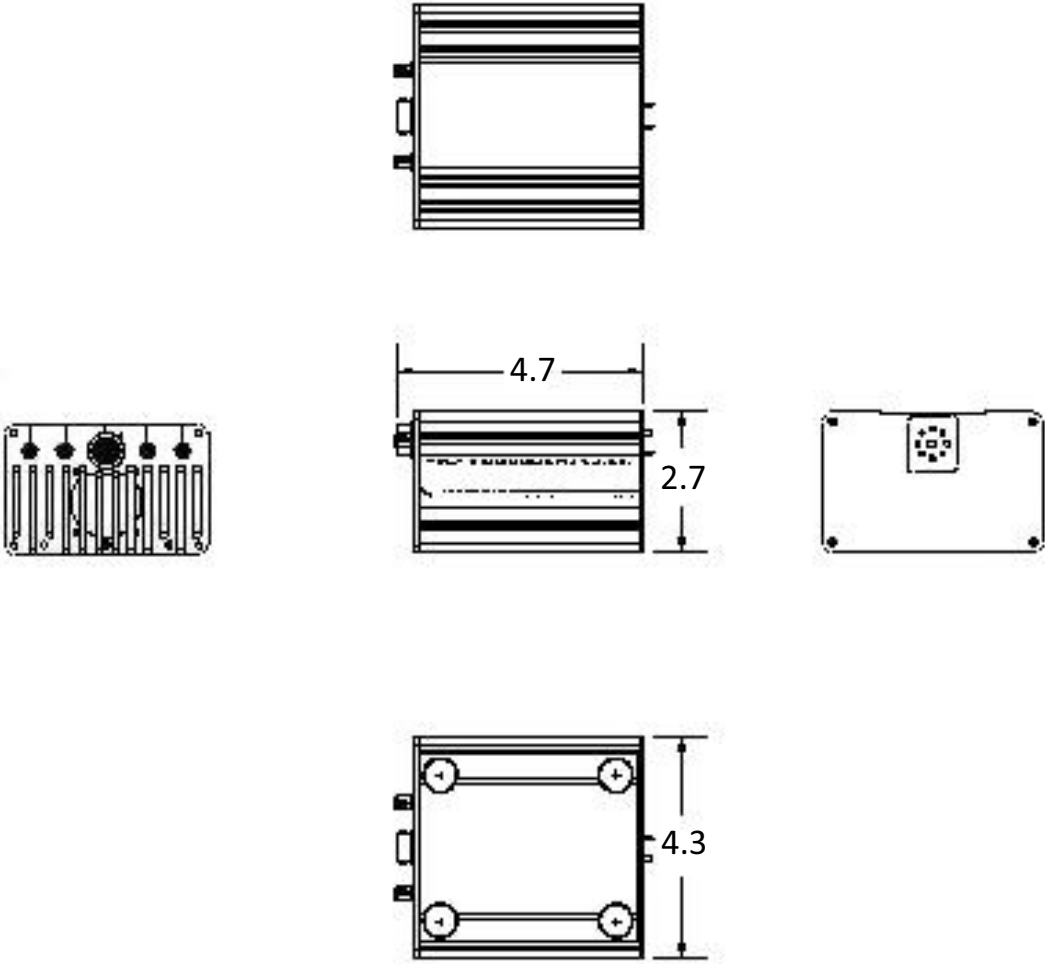
Weight of VNA2-T/R Series Module:  $\leq 6.0$  lbs.

Figure 13 VNA2-T/R Series Modules



Weight of VNA2-T Series Module:  $\leq 3.0$  lbs.

Figure 14 VNA2-T Series Modules



## Safety and Regulatory 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.

### Safety 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 be only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

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#### **CAUTION**

Always use the three prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage and the risk of electrical shock.

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### Declaration of Conformity

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

### Statement of Compliance

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.

## Before Applying Power

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

### 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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### CAUTION

The Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure, to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.

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### CAUTION

This product is designed for use in Installation Category II and Pollution Degree 2.

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### CAUTION

Verify that the premise electrical voltage supply is within the range specified on the instrument.

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### CAUTION

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

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### CAUTION

This instrument has auto-ranging line voltage input, be sure the supply voltage is within the specified range and voltage fluctuations do not to exceed 10 percent of the nominal supply voltage.

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## Servicing

### NOTE

For models **N5256AW12**, **N5257AR12**, **N5258AD12**, **N5256AW15**, **N5257AR15**, and **N5258AD15**, the LO multiplier number has changed from 5 to 6. Modules with OML s/n  $\leq 16xxxx$  (made before 2017) have LO multiplier number 5 indicated on the module's rear label and are not compatible with new modules for system configuration. **Please note that "A" models are not compatible with "B" models.**

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### WARNING

**Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to manufacturer's instructions.**

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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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### WARNING

**Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device). Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and easily reached by the operator) may be used as a disconnecting device.**

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### WARNING

**The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply.**

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### WARNING

**To prevent electrical shock, disconnect the Keysight Technologies N5256/7/8A/B from mains electrical supply before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.**

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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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## Connector Care and Cleaning Precautions

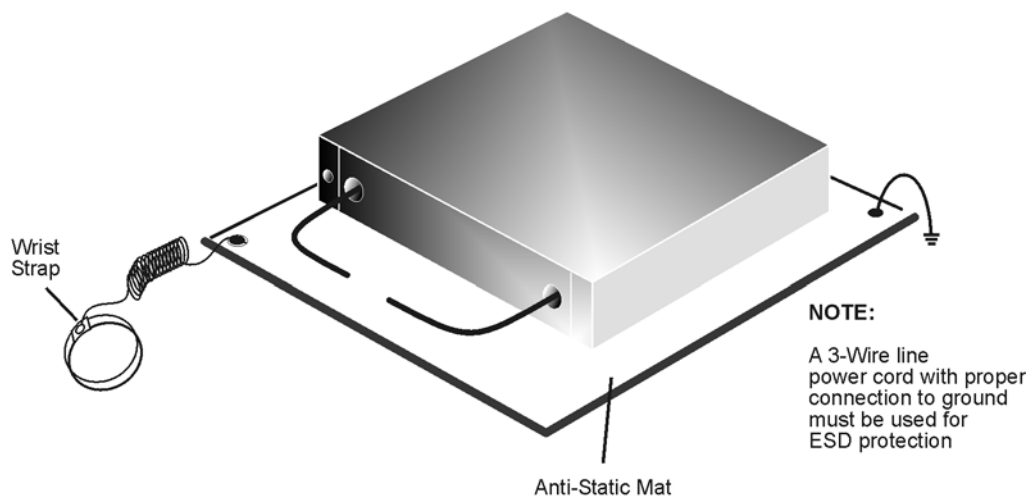
Remove the power cord to the instrument. To clean the connectors use alcohol in a well ventilated area. Allow all residual alcohol moisture to evaporate, and fumes to dissipate prior to energizing the instrument.

## Electrostatic Discharge Protection

Protection against electrostatic discharge (ESD) is essential while removing assemblies from or connecting cables to the instrument. 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 in front of your test equipment.
- always wear a grounded wrist strap with grounding cord, 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 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 15 ESD Protection Setup



ku310b

## Instrument Markings

Listed below are definitions for the markings that may be found on the product.



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.



The AC symbol indicates the required nature of the line module input power.



This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive).



This symbol indicates that the power line switch is ON.



This symbol indicates that the power line switch is in the STANDBY position.



This symbol indicates that the power line switch is in the OFF position.



This symbol is used to identify a terminal which is internally connected to the product frame or chassis.



The CE mark is a registered trademark of the European Community.  
Note: Some options of this product may not conform to the EU Directive. In this case, the CE mark may be removed.

ccr.keysight@keysight.com The Keysight email address is required by EU directives applicable to our product.



The CSA mark is a registered trademark of the CSA International.



This is a symbol of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 5).



This is a marking to indicate product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001). Cet appareil ISM est conforme à la norme NMB du Canada.



Direct Current.



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



The RCM mark is a registered trademark of the Australian Communications and Media Authority.



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.



South Korean Certification (KC) mark; includes the marking's identifier code which follows the format: R-R-Kst-PLYXXXXXXXXXXXX.

**Battery** Do not throw batteries away but collect as small chemical waste, or in accordance with your country's requirements. You may return the battery to Keysight Technologies for disposal. Refer to "Contacting Keysight" on page 33 for assistance.

**EMC** Complies with the essential requirements of the European EMC Directive as well as current editions of the following standards (dates editions are cited in the Declaration of Conformity):

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

### South Korea Class A EMC Declaration

If there is a "KC" mark on the product, then the following statement applies:

This equipment has been conformity assessed for use in business environments. In a residential environment, this equipment may cause radio interference.

※ This EMC statement applies to the equipment only for use in a business environment.

| 사용자 안내문  |
|--|
| 이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서<br>가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다. |

※ 사용자 안내문은 "업무용 방송통신기자재"에만 적용한다.

### Safety:

Complies with the following standard (dates and editions are cited in the Declaration of Conformity): IEC/EN 61010-1

### Declaration of Conformity:

To find a current Declaration of Conformity for a specific Keysight product, go to:  
<http://www.keysight.com/go/conformity>

### Acoustic Statement (European Machinery Directive):

- Acoustic noise emission  
LpA < 70 dB  
Operator position  
Normal operation mode Per ISO 7779



## Keysight Support, Services, and Assistance

### Service and Support Options

There are many other repair and calibration options available from the Keysight Technologies support organization. These options cover a range of service agreements with varying response times. Contact Keysight for additional information on available service agreements for this product.

### Contacting Keysight

Assistance with test and measurements needs and information or finding a local Keysight office are available at: <http://www.keysight.com/find/assist>

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

#### NOTE

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

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

#### NOTE

**Keysight 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 Keysight for repair.**

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

- To improve turn-around time, return your test set along with your analyzer and cables to Keysight so that we may verify the operation of the complete system.
- 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 Keysight in the same configuration as it was originally shipped.
- Ship the analyzer using the original or comparable antistatic packaging materials.
- Contact Keysight for instructions on where to ship your analyzer.

This information is subject to change without notice.  
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