

# Keysight Technologies N5256/7/8A

## User's Guide

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to [www.keysight.com](http://www.keysight.com).

Millimeter-wave  
Modules

# Notices

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## Where to Find the Latest Information

Documentation is updated periodically. For the latest information about these products, including instrument software upgrades, application information, and product information, browse to the following URL, search for the name of your product:

<http://www.keysight.com/find>

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### CAUTION

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

### WARNING

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

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# N5256/7/8A

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## Introduction

The Keysight Technologies N5256A, N5257A and N5258A 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>

Millimeter Modules:

N5256AW02, W03, W05, W06, W08, W10, W12, W15, W22, X10, X12, N5257AR02, R03, R05, R06, R08, R10, R12, R15, R22 N5258AD02, D03, D05, D06, D08, D10, D12, D15, D22

**Figure 1** OML Network Analysis Products



## 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 **"Contacting Keysight" on page 27**. Keep the damaged shipping materials (if any) for inspection by the carrier and an Keysight Technologies representative.

---

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

---

## 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 "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 "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 "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 1 Model and Option List**

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

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

## 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, with the exception of the N5256AW01 and N5257AR01 that use separate power supplies included with the product.
- 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 following are recommended:
  - U8001A DC Power Supply (0 to 30 V, 0 to 3 A, 90 W) or equivalent
  - DC Bias Cable (N5260-60042).
- 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.

---

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

---

**Table 2** 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 3 N5256A Waveguide Model and Options<sup>1</sup>**

Waveguide Modules	Frequency Range	Waveguide Band
N5256AW01	500 to 750 GHz	WR-1.5
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
N5256AW12	60 to 90 GHz	WR-12
N5256AW15	50 to 75 GHz	WR-15
N5256AW22	33 to 50 GHz	WR-22
N5256AX10	67 to 110 GHz	WR-10
N5256AX12	56 to 94 GHz	WR-12

1. Waveguide models maybe 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 4 N5257A Waveguide Model and Options<sup>1</sup>**

Waveguide Modules	Frequency Range	Waveguide Band
N5257AR01	500 to 750 GHz	WR-1.5
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
N5257AR12	60 to 90 GHz	WR-12
N5257AX12	56 to 94 GHz	WR-12
N5257AR15	50 to 75 GHz	WR-15
N5257AR22	33 to 50 GHz	WR-22

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

**Table 5 N5258A Waveguide Model and Options<sup>1</sup>**

Waveguide Modules	Frequency Range	Waveguide Band
N5258AD02	325 to 500 GHz	WR-2.2
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
N5258AD12	60 to 90 GHz	WR-12
N5258AD15	50 to 75 GHz	WR-15
N5258AD22	33 to 50 GHz	WR-22

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 6](#), [Table 7](#) and [Table 8](#) for your specific module).
- Model N5256A 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 (W10, W15) and N5258A (W10, W15) includes a Waveguide 20 dB Attenuator.

**Table 6 N5256A Waveguide Model**

Keysight Model Number	Keysight Part Number	Vendor Module Part Number
<b>N5256A Standard</b>		
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
N5256AW12-STD	N5260-80011	V12VNA2-T/R
N5256AW15-STD	N5260-80024	V15VNA2-T/R
N5256AW22-STD	N5260-80042	V22VNA2-T/R
N5256AX10-STD	N5260-60004	N21VNA2-T/R-67-1
N5256AX12-STD	N5260-80047	V12VNA2-TR-5694
<b>N5256A Option 001<sup>1</sup></b>		
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

**Table 6 N5256A Waveguide Model**

Keysight Model Number	Keysight Part Number	Vendor Module Part Number
N5256AW10-001	N5260-80036	V10VNA2-T/R-A
N5256AW12-001	N5260-80112	V12VNA2-T/R-A
N5256AW15-001	N5260-80052	V15VNA2-T/R-A
N5256AX10-001	N5260-60003	N21VNA2-T/R-67-A-1
N5256AX12-001	N5260-80115	V12VNA2-T/R-A-5694
<b>N5256A Option 002<sup>2</sup></b>		
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
N5256AW12-002	N5260-80134	V12VNA2-T/R-RLA
N5256AX12-002	N5260-80215	V12VNA2-T/R-5694-RLA
N5256AW15-002	N5260-80056	V15VNA2-T/R-RLA
<b>N5256A Option 003<sup>3</sup></b>		
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
N5256AW12-003	N5260-80135	V12VNA2-T/R-A-RLA
N5256AW15-003	N5260-80057	V15VNA2-T/R-A-RLA
<b>N5256A Option 004<sup>4,5</sup></b>		
N5256AW03-004	N5260-80058	V03VNA2-T/R
N5256AW10-004	N5260-80055	V10VNA2-T/R

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 13](#) for Option 004 rear panel features.

**Table 7 N5257A Waveguide Model**

Keysight Model Number	Keysight Part Number	OML Part Number
<b>N5257A Standard</b>		
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
N5257AR12	N5260-80034	V12VNA2-T
N5257AX12	N5260-80057	V12-VNA2-T-5694
N5257AR15	N5260-80033	V15VNA2-T
<b>N5257A Option 001<sup>1</sup></b>		
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
N5257AR12-001	N5260-80211	V12VNA2-T-LOA
N5257AX12-001	N5260-80216	V12-VNA2-T-5694-LOA
N5257AR15-001	N5260-80066	V15VNA2-T-LOA

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

**Table 8 N5258A Waveguide Model**

Keysight Model Number	Keysight Part Number	OML Part Number
<b>N5258A Standard</b>		
N5258AD03	TBD	V03VNA2-T2
N5258AD05	TBD	V05VNA2-T2
N5258AD06	N5260-80043	V06VNA2-T2
N5258AD08	TBD	V08VNA2-T2
N5258AD10	N5260-80021	V10VNA2-T2
N5258AD12	N5260-80034	V12VNA2-T2
N5258AD15	N5260-80026	V15VNA2-T2
<b>N5258A Option 001<sup>1</sup></b>		
N5258AD03-001	TBD	V03VNA2-T2-LOA
N5258AD05-001	TBD	V05VNA2-T2-LOA
N5258AD06-001	TBD	V06VNA2-T2-LOA
N5258AD08-001	TBD	V08VNA2-T2-LOA
N5258AD10-001	N5260-80029	V10VNA2-T2-LOA
N5258AD12-001	N5260-80211	V12VNA2-T2-LOA
N5258AD15-001	N5260-80031	V15VNA2-T2-LOA

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

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## Front and Rear Panel Features

**Figure 2** Rear Panel Power Supply Connector

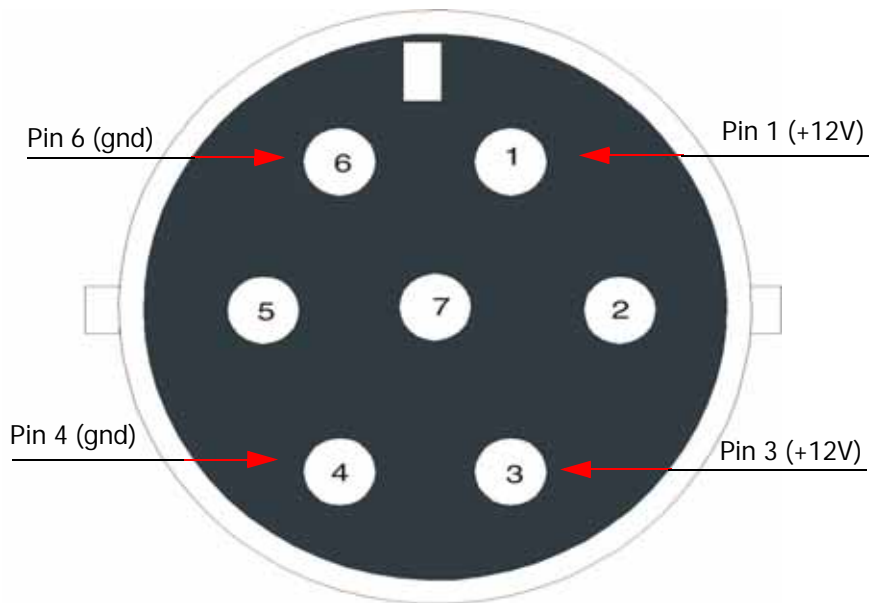


Figure 3 N5256A or N5257A Front Panel



Figure 4 N5256A Rear Panel





Figure 5 N5256A Option 001, 003 or 004

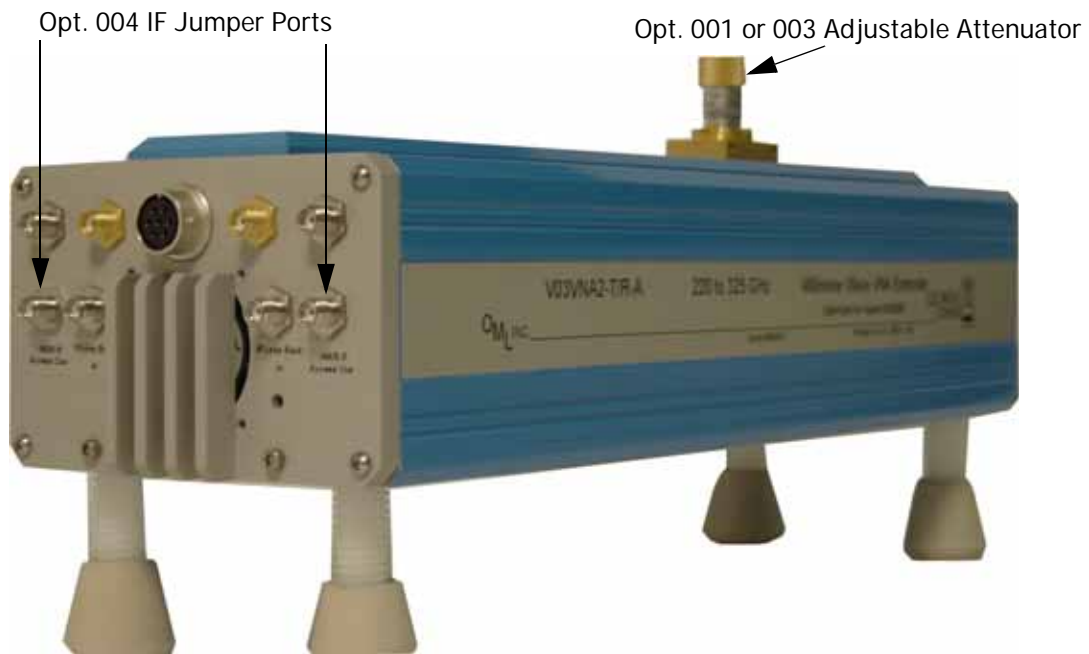
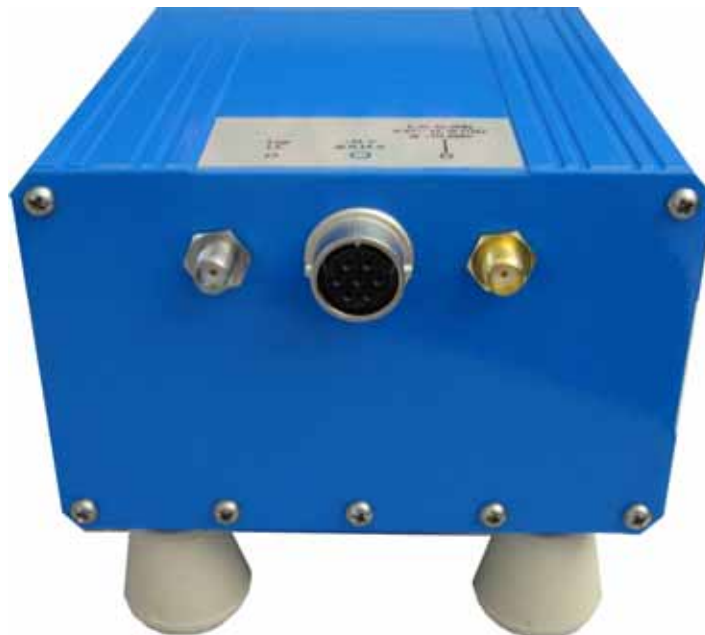


Figure 6 N5257A Single Receiver Rear Panel



**Figure 7** N5258A Dual Receiver Front Panel



**Figure 8** N5258A Dual Receiver Rear Panel



# Block Diagrams

Figure 9 N5256A Standard

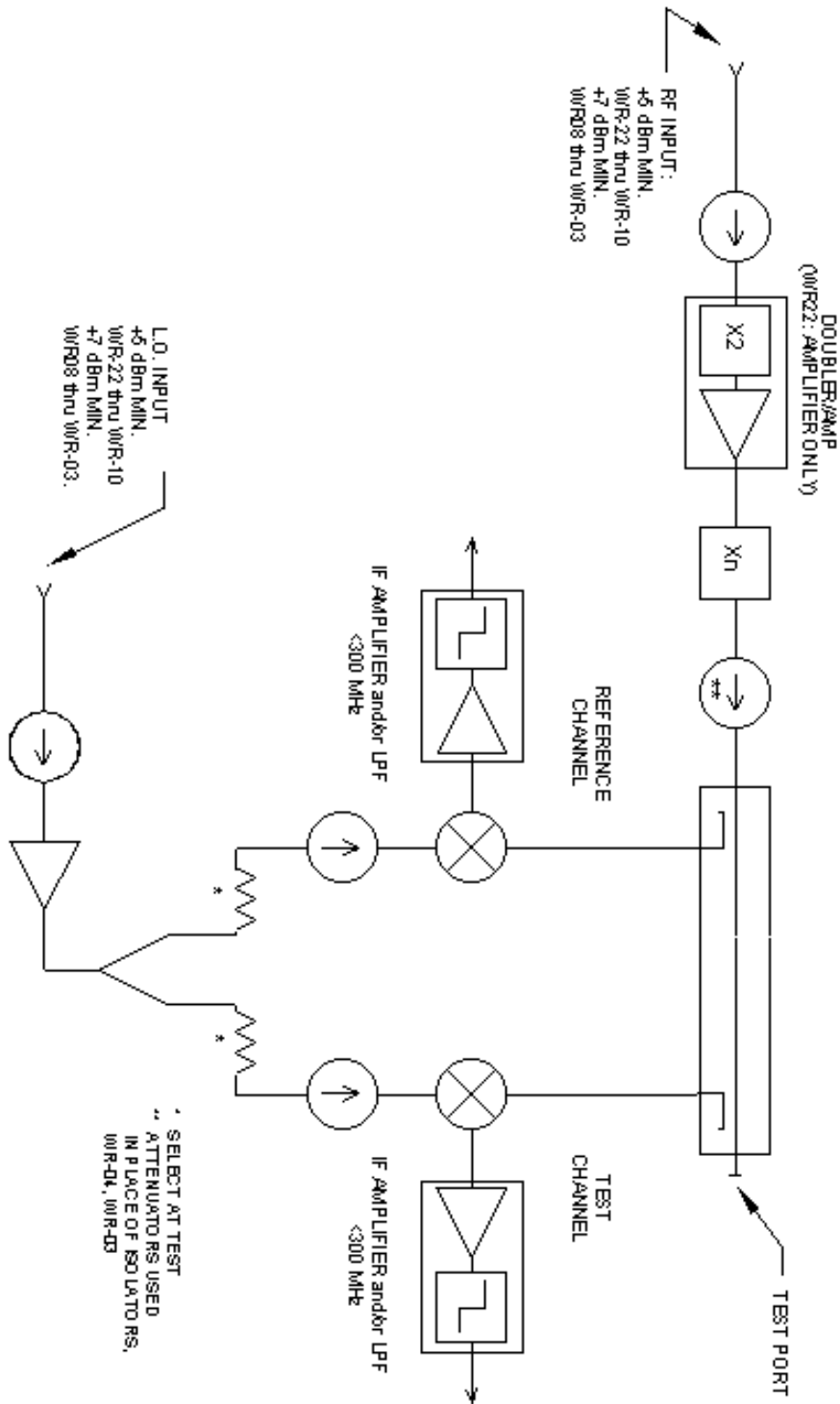


Figure 10 N5256A Option 004

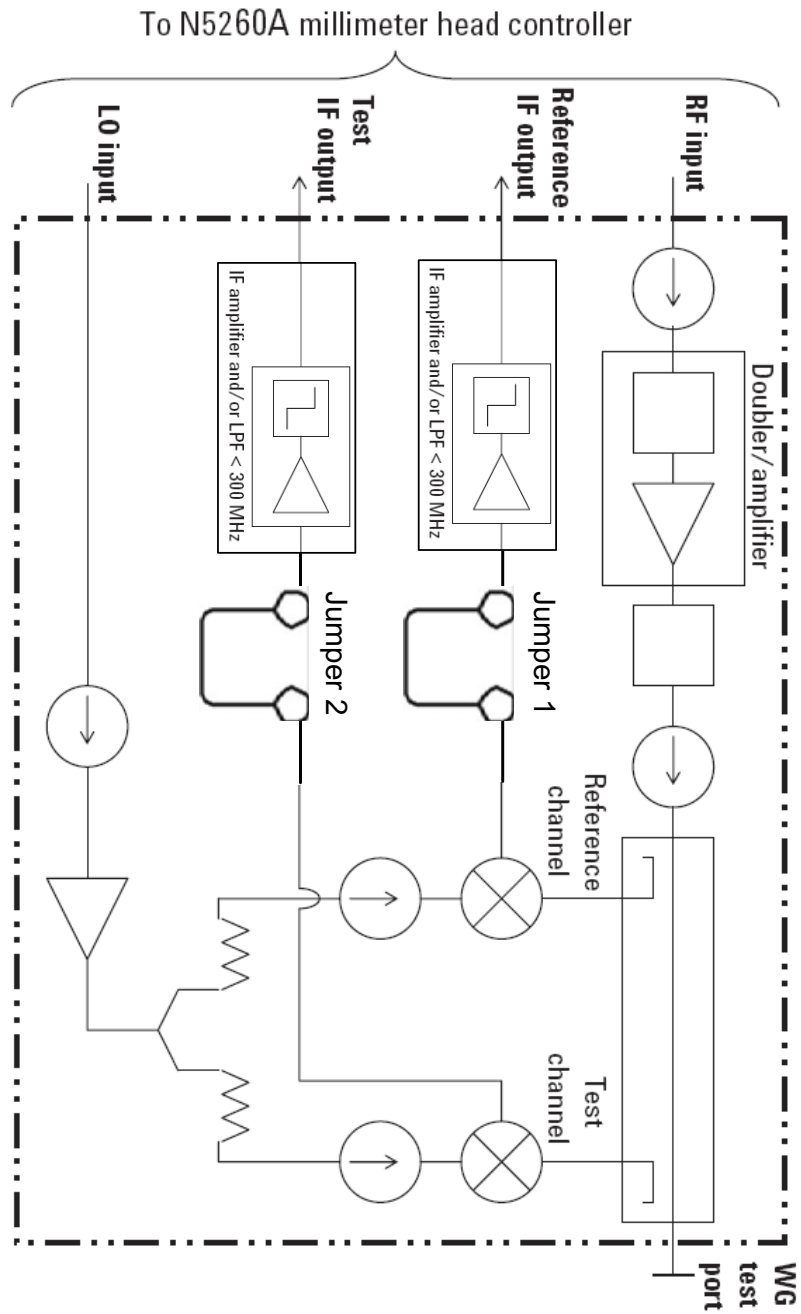


Figure 11 N5257A

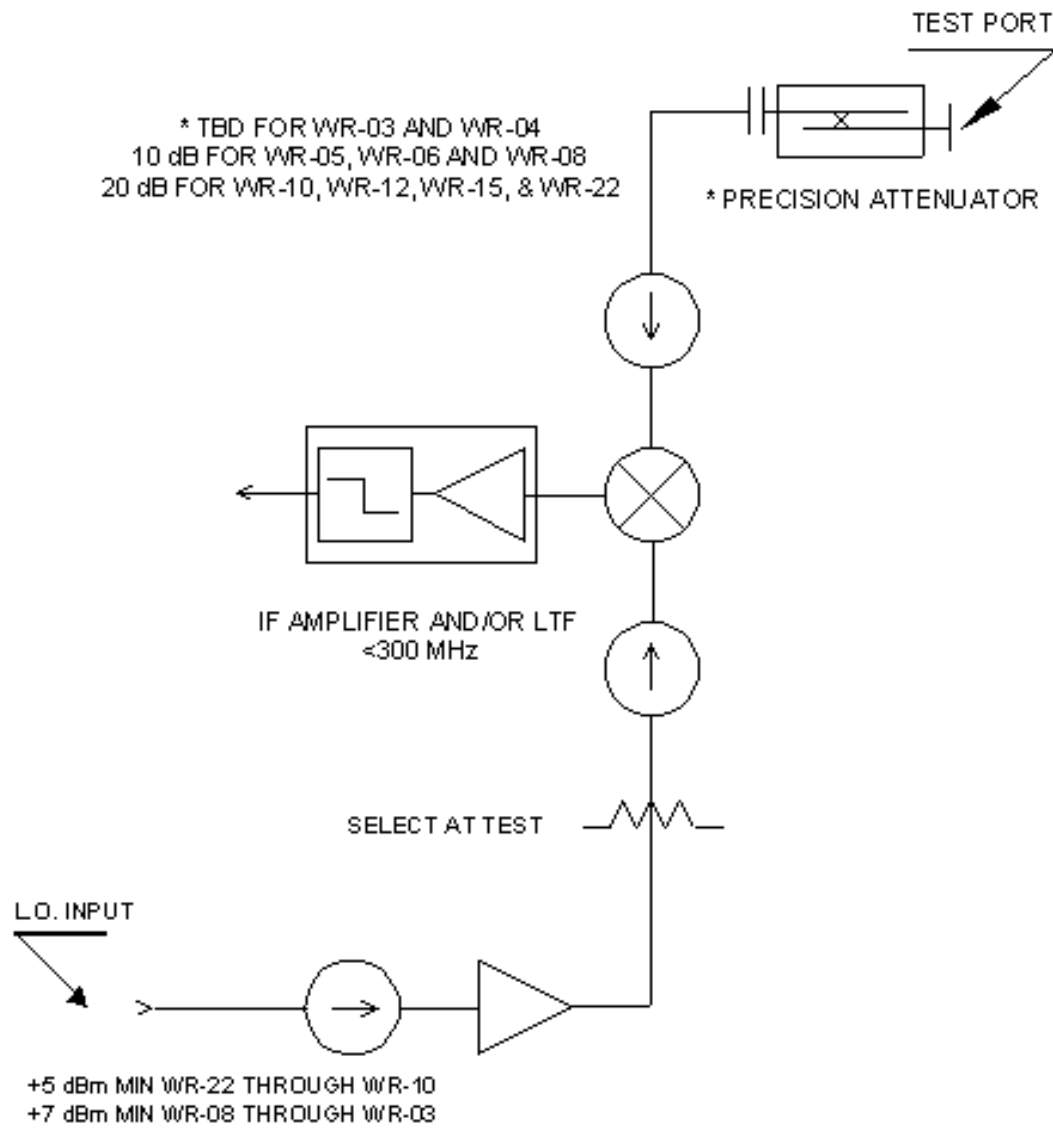
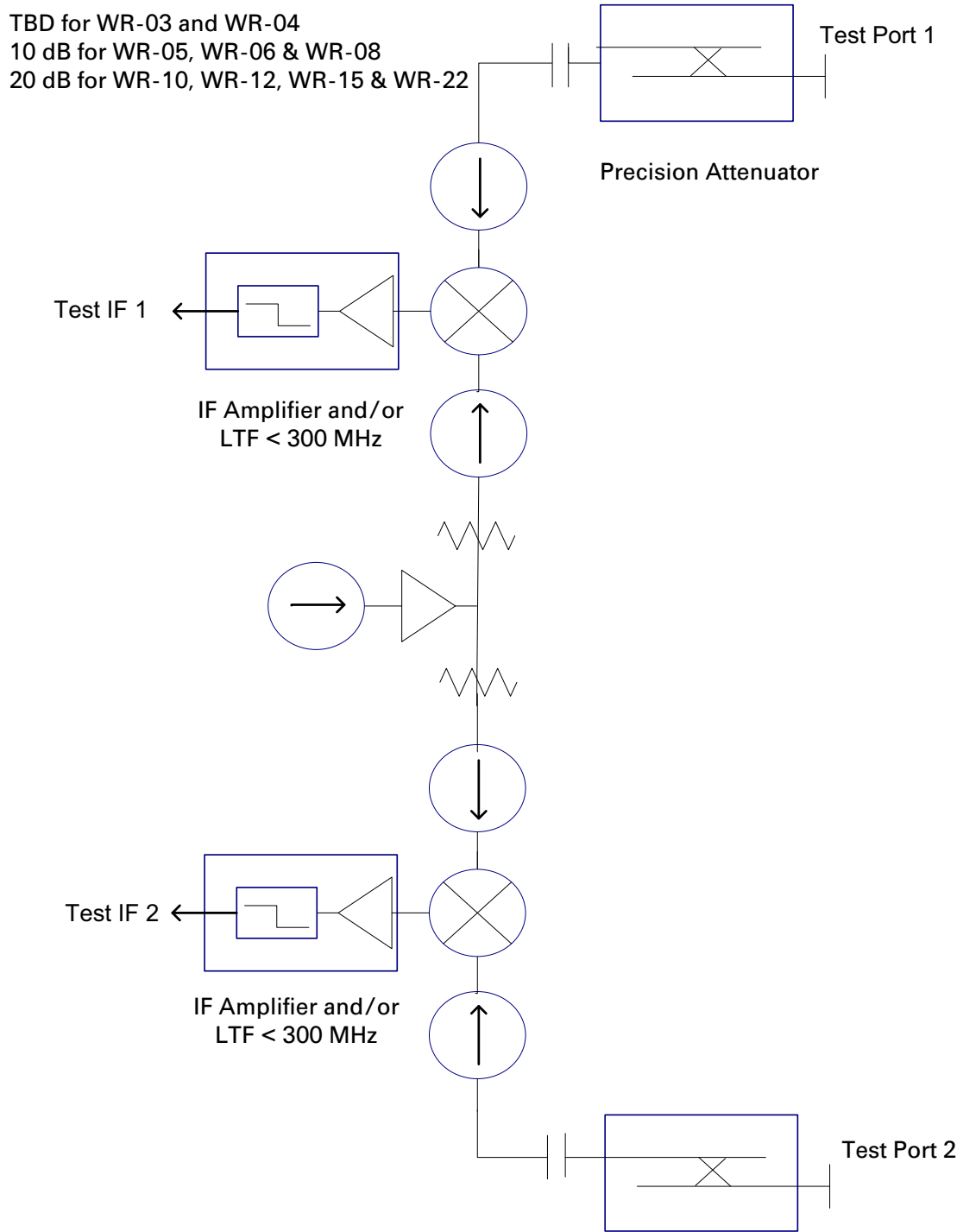


Figure 12 N5258A



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## Drawings and Dimensions

Figure 13 VNA2-T/R Series Modules

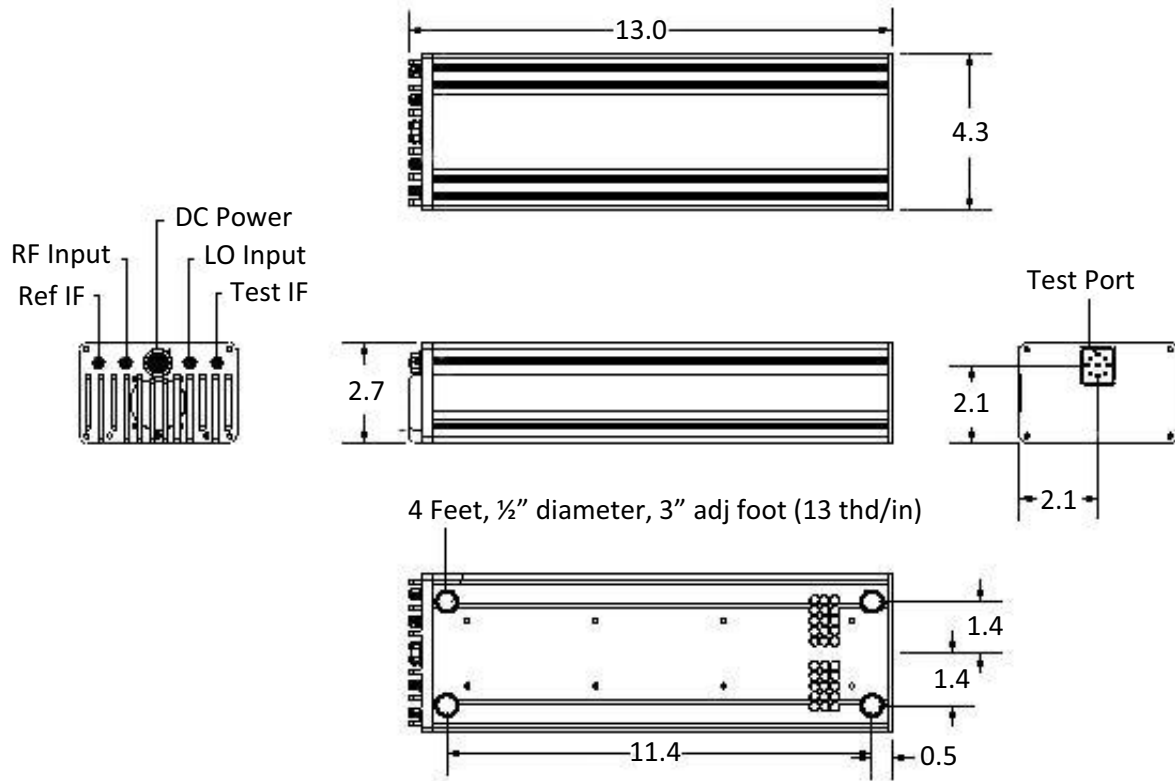
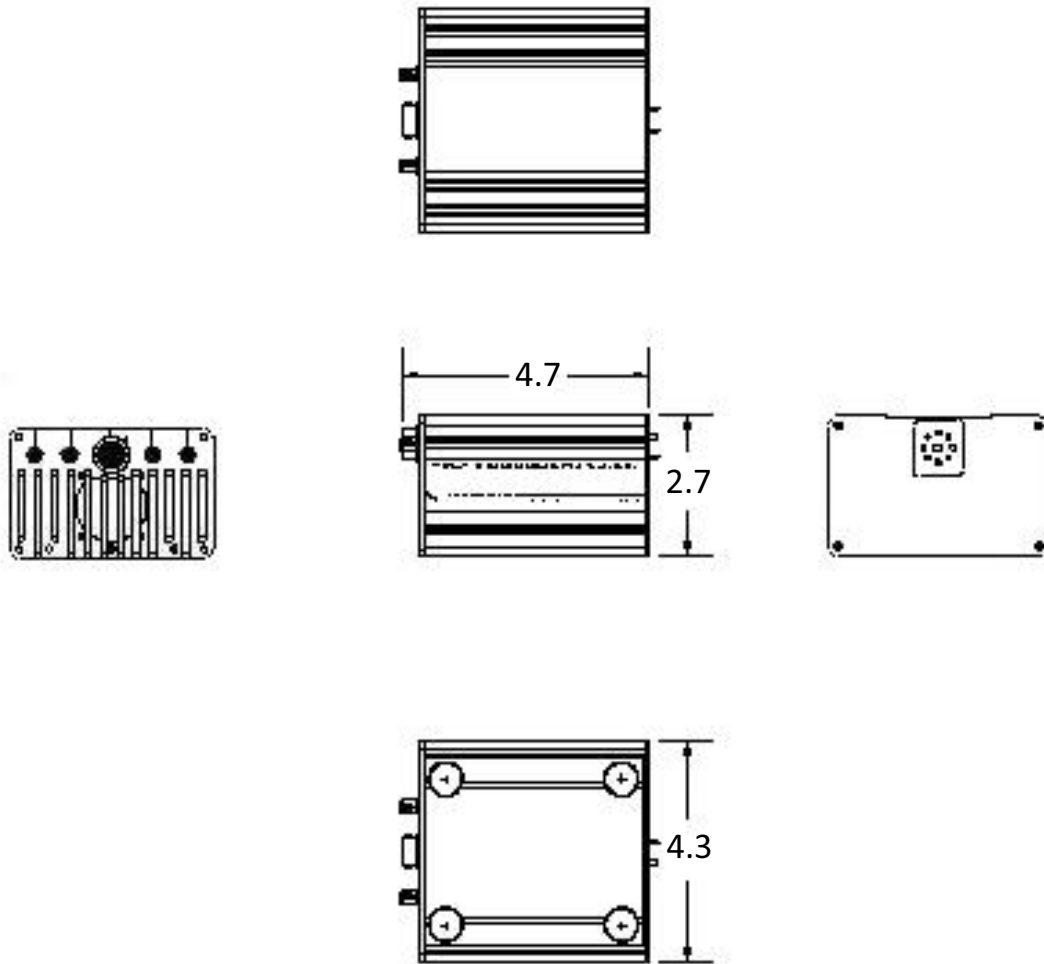


Figure 14 VNA2-T Series Modules





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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.

### 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 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.

---

**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.

---

### Declaration of Conformity

Declarations of Conformity for this product and for other Keysight products may be downloaded from the Keysight Regulatory Website. Click on "Declarations of Conformity" and enter your product number to find the latest Declaration of Conformity statement.

<http://regulations.about.keysight.com>

### Statement of Compliance

This instrument has been designed and tested in accordance with CAN/CSA 22.2 No. 61010-1-04, UL Std No. 61010-1 (2nd Edition).

## 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.

---

---

**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.

---

---

**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.

---

---

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

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---

**CAUTION** Before switching on this instrument, make sure the supply voltage is in the specified range.

---

---

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

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

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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** For continued protection against fire hazard replace line fuse only with same type and rating. The use of other fuses or material is prohibited.

---

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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** 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).

---

### 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** To prevent electrical shock, disconnect the Keysight N5256/7/8A 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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## Regulatory Information

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

### Instrument Markings



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 as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).



This 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. (If accompanied by a year, it is when the design was proven.)



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



This mark designates the product is an Industrial Scientific and Medical Group 1 Class A product (reference CISPR 11, Clause 5)



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



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: MSIP-REM-YYY-ZZZZZZZZZZZZZZ.

## Battery Collection

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 27](#) for assistance.

## Electrical Safety Compliance

### SAFETY

Complies with European Low Voltage Directive 2014/35/EU

- IEC/EN 61010-1:2010, 3<sup>rd</sup> Edition
- Canada: CSA C22.2 No. 61010-1-12
- USA: UL std no. 61010-1, 3<sup>rd</sup> Edition
- Acoustic statement (European Machinery Directive 2022/42/EC, 1.7.4.2U)  
 Accoustical noise emission  
 LpA<70 dB  
 Operator position  
 Normal operation mode  
 Per ISO 7779

## EMI and EMC Compliance

### EMC

Complies with European EMC Directive 2014/30/EU

- IIEC 61326-1:2012/EN 61326-1:2013
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11:2011
- ICES/NMB-001  
 This ISM device complies with Canadian ICES-001.  
 Cet appareil ISM est conforme a la norme NMB du Canada.
- South Korean Class A EMC declaration: This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

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## Electrostatic Discharge Protection

Electrostatic discharge (ESD) can damage or destroy electronic components. The product is shipped in materials that prevent damage from static, and should only be removed from the packaging in an anti-static area ensuring that the correct anti-static precautions are taken.

Two types of ESD protection are listed below. Purchase acceptable ESD accessories from your local supplier.

- Conductive table-mat and wrist-strap combination
- Conductive floor-mat and heel-strap combination

Both types, when used together, provide a significant level of ESD protection. To ensure user safety, static-safe accessories must provide at least 1 M $\Omega$  of isolation from ground.

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**WARNING** These techniques for a static-safe work station should not be used when working on circuitry with a voltage potential greater than 500 volts.

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## 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 measurement needs, and information on finding a local Keysight office are available on the Internet at:

<http://www.keysight.com/find/assist>

You can also purchase accessories or documentation items on the Internet at:

<http://www.keysight.com/find>

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 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

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**IMPORTANT**

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:

- 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.
- 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.
- Contact Keysight for instructions on where to ship your analyzer.

