Keysight Technologies 11612V Option K68 and K69

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.

KEYSIGHT TECHNOLOGIES

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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Safety Notices

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.

Table of Contents

11612V K68 and K69

Description 2
Verifying the Shipment 3
Electrostatic Discharge Protection 3
Performance Characteristics 4
Bias Network 6
Safety and Information 7
Introduction 7
Safety Earth Ground 7
Declaration of Conformity 7
Statement of Compliance 7
Before Applying Power 8
Connector Care and Cleaning Precautions 9
Regulatory Information 10
Instrument Markings 10
Battery Collection 11
Electrical Safety Compliance 11
EMI and EMC Compliance 11
Keysight Support, Services, and Assistance 12
Service and Support Options 12
Contacting Keysight 12
Shipping Your Product to Keysight for Service or Repair 12

Table of Contents

11612V K68 and K69

Description

The Keysight 11612V bias networks provide the capability to supply DC bias directly to a device under test along with RF signals, without the need to use patch or adapter connectors. This enables convenient and accurate measurements of current, DC voltages, and S-parameters. Each bias network provides a force connection to allow input of a current or voltage signal, and a sense connection to allow monitoring of voltage or current, as well as a connection for the application of an active ground. RF Input connectors accept signals from an RF Network Analyzer, and RF+DC bias signals are routed together from the RF/DC Output to a test fixture or wafer probes. The force, sense, and ground are triaxial connectors. The RF connectors are 1.85 mm (f).

The bias networks are intended to be used with an Keysight Network Analyzer System with the force and sense cables from the SMUs of the DC Source/Monitor (DC subsystem) connected to the force and sense connectors on the bias networks. The ground cable from the GDNU is connected to the ground connector on one of the bias networks (usually port 2). The ground connector on the other bias network is left open. The RF cables from the network analyzer test set ports are connected to the RF IN ports of the bias networks. The RF/DC OUT ports of the bias networks are connected by conformable cables to the Probe Station or Test fixture. The Keysight 11612V Option K68 is intended for use at Port 1 of the network analyzer, and Keysight 11612V Option K69 at Port 2.

Verifying the Shipment

To verify the contents shipped with your product, refer to the “Box Content List” 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 12. Keep the damaged shipping materials (if any) for inspection by the carrier and an Keysight Technologies representative.

Electrostatic Discharge Protection

Electrostatic discharge (ESD) can damage or destroy electronic components. The instrument 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 heal-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 Meg ohm of isolation from ground.

Performance Characteristics

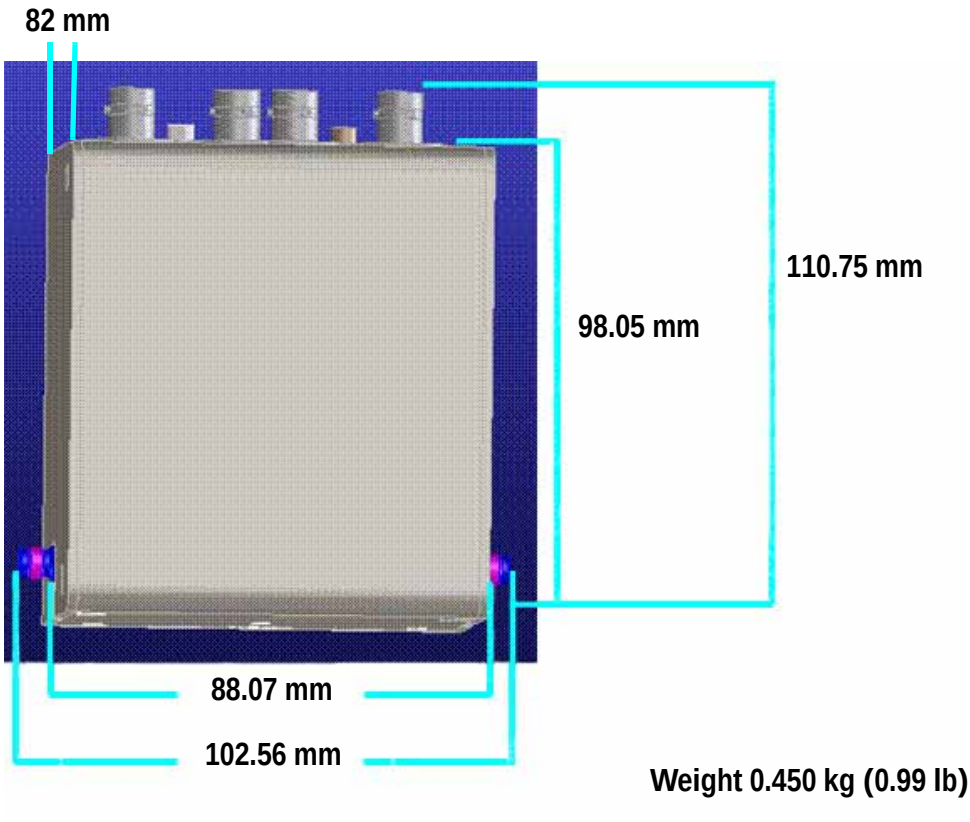
WARNING **If any of the maximum ratings are exceeded, damage may occur to the bias network assembly.**

Performance parameters (subject to change) are typical over a temperature range of 20 to 30 °C.

Table 1 Performance Parameters

Description	Typical (dB)
S11 Port 1 (RF Input) and S22 Port 2 (RF & DC Output) Return Loss	
10 MHz to 45 MHz	> 5
45 MHz to 20 GHz	> 9
20 GHz to 40 GHz	> 7
40 GHz to 67 GHz	> 7
S21 Insertion Loss	
10 MHz to 45 MHz	< 2
45 MHz to 10 GHz	< 3
10 GHz to 60 GHz	< 5
60 GHz to 67 GHz	< 5.5
RF Max Input Level to RF Input Port Damage Level	
11612VK68/69	+30 dBm (1 Watt)
Maximum DC Bias	
11612VK68/69	± 40 Vdc, 500 mA
Maximum DC Leakage Current	
11612VK68/69	100 nA (< 50 nA typ)

Figure 1 Dimensions



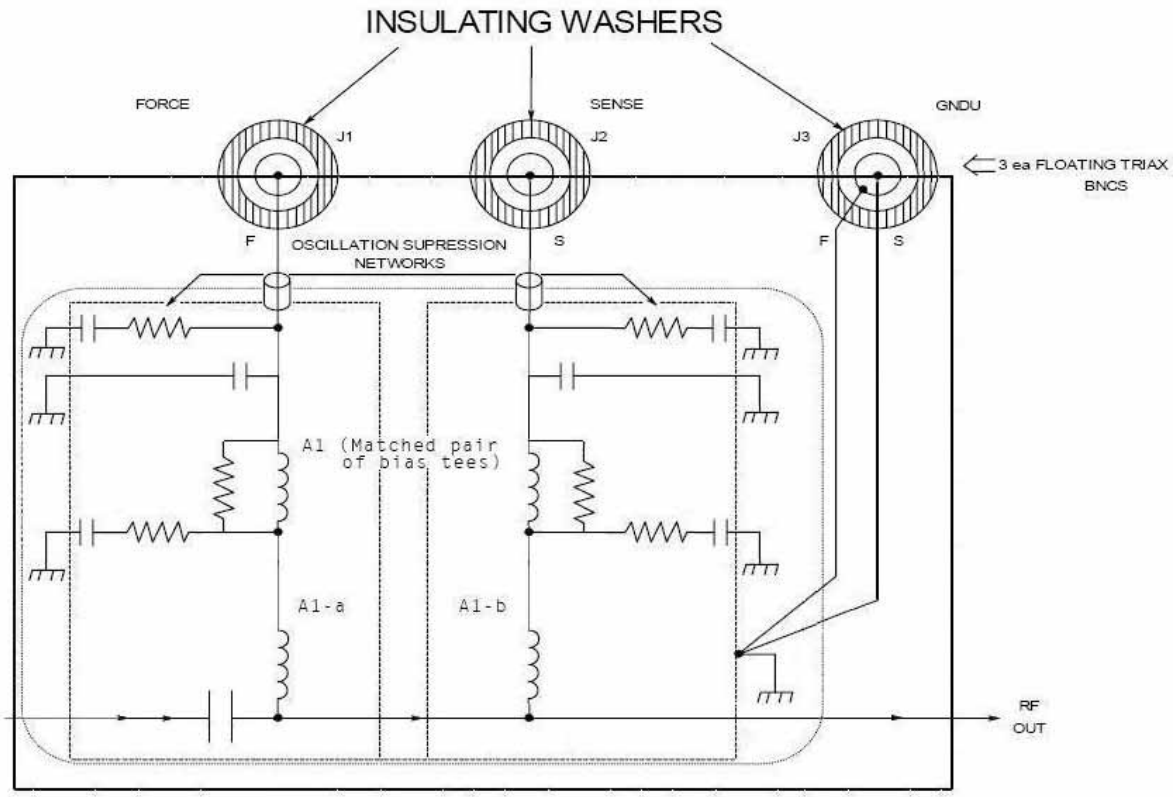
Supplemental Characteristics

RF Connectors	1.85 mm female
Impedance (RF path)	50 Ohms (nominal)

Bias Network

Internally, each bias network includes two bias-tees, one for force and one for sense. The force bias-tee includes a capacitor that functions as a DC block and highpass filter. The sense bias-tee provides a through path for DC voltage. Oscillation suppression networks are located on each DC path to help prevent bias oscillation of the DUT. Figure 2 is a schematic diagram of the bias network.

Figure 2 Diagram of the 11612V Option K68 and K69 Bias Network



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

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.corporate.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.**

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.

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.

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.

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.**

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.**

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

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

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

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.

WARNING	**To prevent electrical shock, disconnect the Keysight 11612V K68 and K69 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.**

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.**

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.

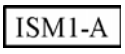
This symbol indicates that the power line switch is in the STANDBY position.

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.

IP 2 0

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 12 for assistance.

Electrical Safety Compliance

SAFETY

Complies with European Low Voltage Directive 2014/35/EU

- IEC/EN 61010-1:2010, 3rd Edition
- Canada: CSA C22.2 No. 61010-1-12
- USA: UL std no. 61010-1, 3rd 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.

A 급 기기 (업무용 방송통신기자재)이 기기는 업무용 (A 급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주 의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으 로 합니다 .

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.

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.

Shipping Your Product to Keysight for Service or Repair

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.

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.