

Keysight 16048E Test Leads

Operation and
Service Manual

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Manual Printing History

The manual's printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates that are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

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Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

- **Ground The Instrument**
To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.
- **DO NOT Operate In An Explosive Atmosphere**
Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
- **Keep Away From Live Circuits**
Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.
- **DO NOT Service Or Adjust Alone**
Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- **DO NOT Substitute Parts Or Modify Instrument**
Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Keysight Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.
- **Dangerous Procedure Warnings**
Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are presenting this instrument. Use extreme caution when handling, testing, and adjusting this instrument.

Certification

Keysight Technologies certifies that this product met its published specifications at the time of shipment from the factory. Keysight Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility, or to the calibration facilities of other International Standards Organization members.

Warranty

This Keysight Technologies instrument product is warranted against defects in material and workmanship for a period corresponding to the individual warranty periods of its component products. Instruments are warranted for a period of one year. Fixtures and adapters are warranted for a period of 90 days. During the warranty period, Keysight Technologies Company will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Keysight Technologies. Buyer shall prepay shipping charges to Keysight Technologies and Keysight Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Keysight Technologies from another country.

Keysight Technologies warrants that its software and firmware designated by Keysight Technologies for use with an instrument will execute its programming instruction when properly installed on that instrument. Keysight Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

IMPORTANT

No other warranty is expressed or implied. Keysight Technologies specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. Keysight Technologies shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Keysight Technologies products.

For any assistance, contact your nearest Keysight Technologies Sales and Service Office. Addresses are provided at the back of this manual.

Safety Symbol

General definitions of safety symbols used on the instrument or in manuals are listed below.



Instruction Manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instrument manual.

WARNING

This warning sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.

CAUTION

This Caution sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE

Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

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1 Operation

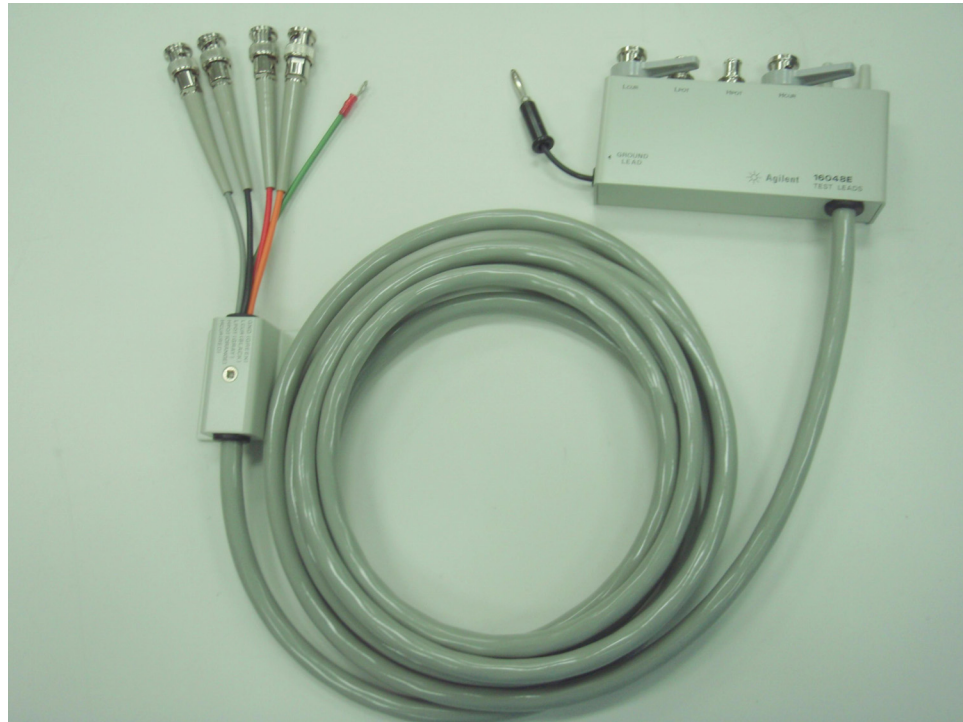
This operating note provides complete information on the 16048E Test Leads. The 16048E is shown in [Figure 1-1](#), its physical dimensions are given in [Table 1-1](#). To order additional copies of this operating note, use the part number listed on the rear cover.

Product Description

The 16048E consists of a direct attachment, 4-terminal pair type fixture which is equipped with four BNC (m) terminated-coaxial test leads. These test leads are used to attach user-fabricated test fixtures. Cable length is 4 meter. The 16048E is shown in [Figure 1-1](#).

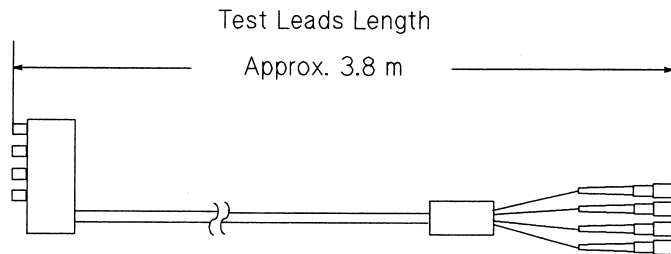
Figure 1-1

Product overview



Specifications

Table 1-1 Specifications of the 16048E

Function:	4-terminal pair type fixture which is equipped with four BNC (m) terminated-coaxial test leads.
Connector Type:	BNC male
Cable Length:	Approximately 4 m
Test Leads Length:	<p>Approximately 3.8 m</p>  <p>The diagram shows a horizontal line representing the test leads. On the left, there is a rectangular fixture with four small protrusions. On the right, there is a rectangular connector with four BNC connectors extending from it. A double-headed arrow above the line spans from the fixture to the connector, with the text 'Test Leads Length' and 'Approx. 3.8 m' above it. A break symbol (two curved lines) is shown on the line between the fixture and the connector.</p>
Maximum Voltage:	± 42 V peak max. (AC+DC)
Frequency Range:	DC to 30 MHz
Weight:	690 g

Compensation for Fixture Residual Impedance Error

The 16048E has inherent stray capacitance, residual inductance, and residual resistance that affect the accuracy of measured values. To compensate for, or negate, these residuals to minimize measurement error, the instrument's Open/Short compensation procedure should be performed. The procedure is given in the instrument's operating manual.

Operation

Setup and Measurement Procedure

Setup and measurement procedure is as follows:

1. Connect the 16048E directly to the UNKNOWN terminals and GUARD terminal of the instrument.
2. Connect the user-fabricated test fixture to the test leads.
3. Perform Open/Short compensation as described in the instrument's operation manual.
4. Connect the DUT to the 16048E test fixture.

NOTE

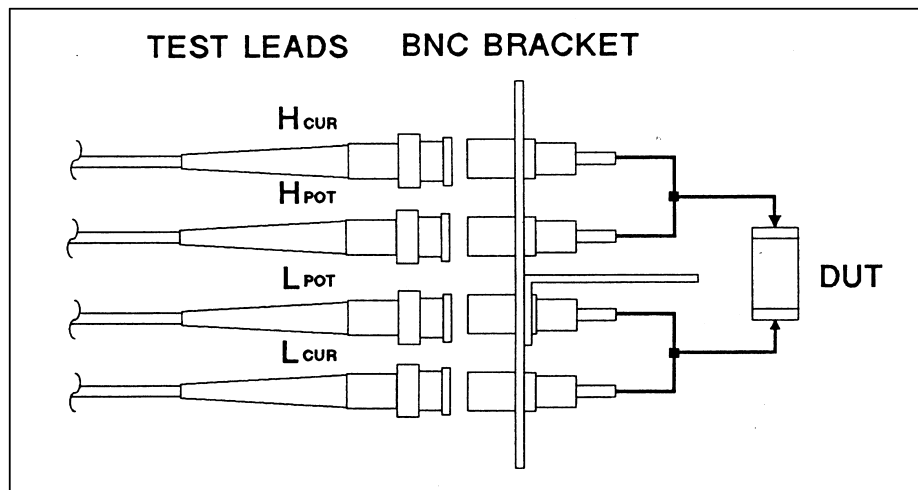
Connect the green lead to the chassis or grounded part on the test fixture to reduce the effects of stray capacitance between the DUT and the test fixture.

BNC Bracket

A BNC bracket (Keysight PN 16032-60001) is furnished with the 16048E. **Figure 1-2** shows an example for using the BNC bracket with the 16048E. By connecting the 16048E to the BNC bracket, the 16048E's outer shield conductors are connected together to construct the four-terminal pair measurement circuit configuration. For further details about the four-terminal pair measurement refer to the instrument's Operation Manual.

Figure 1-2

BNC bracket application



Operation
Operation

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Service

Maintenance

An exploded view of the 16048E (for parts identification) is shown in [Figure 2-1](#) and [Figure 2-2](#). Do not disassemble any further than shown. Maintenance consists principally of cleaning contacts and replacing worn or damaged parts. Take special care when cleaning contacts. To order parts, use the Keysight Technologies part numbers listed in [Table 2-1](#) and [Table 2-2](#). If a faulty part is located in an assembly that cannot be disassembled, order the next higher assembly or return the whole device to the nearest Keysight Technologies Sales/Service Office for repair or replacement.

Figure 2-1 **Parts Identification 1/2**

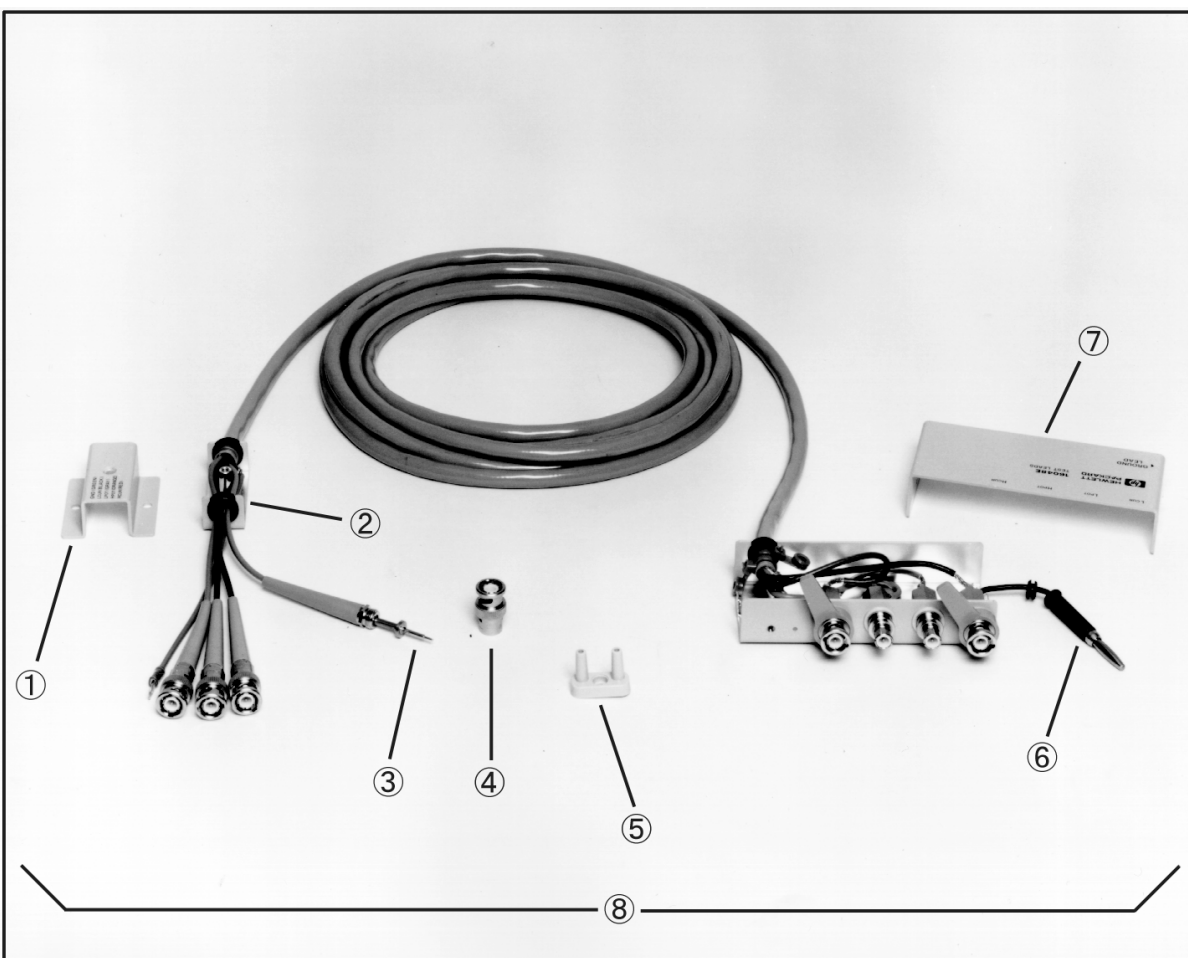


Table 2-1 **Parts Identification 1/2**

Reference	Keysight Part No.	Qty.	Description
1	16048-04013	1	COVER TOP
	2360-0192	1	SCREW
2	16048-04014	1	COVER BOTTOM
3	1250-0089	4	CONTACT
4	1250-0052	4	CONNECTOR BNC
5	16047-40000	1	STOPPER
	2190-0260	1	WASHER
	2200-0013	1	SCREW
6	16048-61612	1	CABLE ASSEMBLY
	0400-0203	1	GROMMET
7	16048-04015	1	COVER TOP
	2360-0192	2	SCREW
8	16048-60002	1	TEST LEAD (1 through 7)

Figure 2-2 **Parts Identifications 2/2**

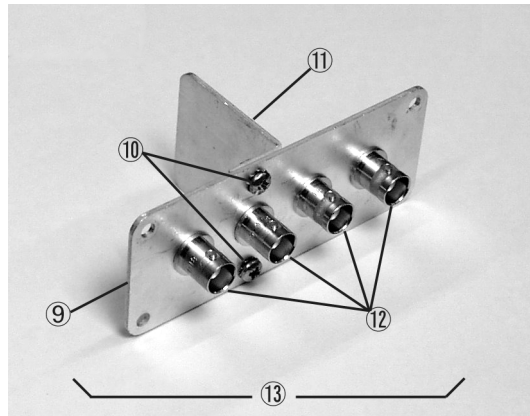


Table 2-2 **Parts Identification 2/2**

Reference	Keysight Part No.	Qty.	Description
9	16032-10021	1	PLATE
10	2360-0115	2	SCREW

Service
Maintenance

Reference	Keysight Part No.	Qty.	Description
11	16032-10022	1	PLATE
12	1250-0188	4	CONNECTOR BNC
	2190-0016	4	WASHER
	2950-0001	4	NUT
13	16032-60001	1	BNC BRACKET (9 through 12)

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