

HP 16034H Test Fixture

Operation Manual

Second Edition



HP Part No. 16034-90012

April 1999

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Notices

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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 incorporated in reprints do not necessitate a new printing date.) The manual part number changes when extensive technical changes are incorporated.

January 1999 First Edition

April 1999 Second Edition

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. Such noncompliance would also violate safety standards of design, manufacture, and intended use of the instrument.

The Hewlett-Packard Company 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 grounded by using the supplied power cable's grounding prong.

- 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 clearly constitutes a safety hazard.

- Keep away from live circuits

Operators 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

To avoid the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained in operational condition.

- 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 present in this instrument. Use extreme caution when handling, testing, or adjusting this instrument.

Certification

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard 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 Hewlett-Packard 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, Hewlett-Packard 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 HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instruction when properly installed on that instrument. HP 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. HP 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. HP 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 Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard 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 its 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.



Alternating Current



Direct Current



On (Supply)



Off (Supply)



In position of push-button switch



Out position of push-button switch



Frame (or chassis) terminal: A connection to the frame (chassis) of the equipment, which normally includes all exposed metal structure.

WARNING

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

NOTE

This Note sign denotes important information. It calls attention to a procedure, practice, or condition which is essential for the user to understand.

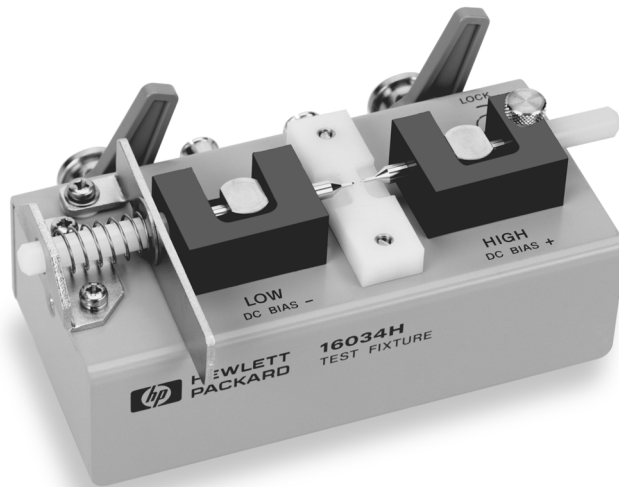
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1 Overview

Product Overview

The HP 16034H is designed for chip type components. This test fixture can take measurements of the chip type L,C,R. The HP 16034H has a flat measuring stage so that the DUT can easily slide on it. This mechanism enables measurement of an array type component.

Figure 1-1 Product Overview



Incoming Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the HP 16034H has been checked mechanically and electrically. The contents of the shipment should be as listed in Table 1-1. If the contents are incomplete, if there is mechanical damage or defect, notify the nearest Hewlett-Packard office. If the shipping container is damaged, or the cushioning material shows signs of unusual stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping materials for the carrier's inspection.

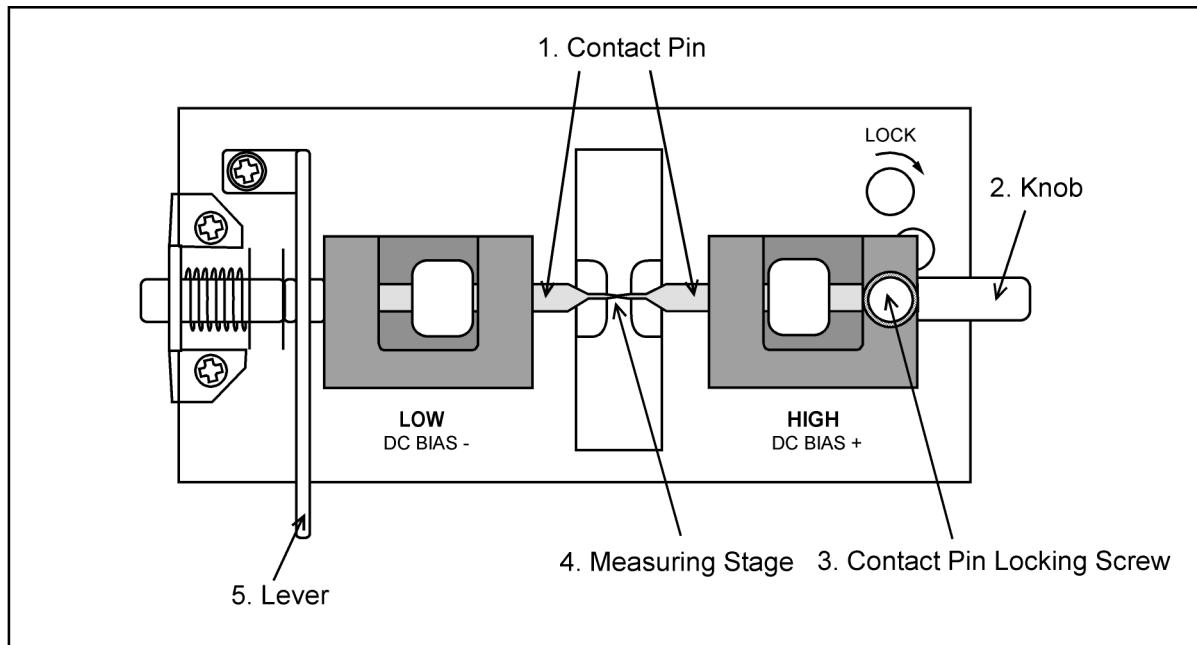
Table 1-1

Contents

Description	HP Part Number	Qty.
HP 16034H	-	1
100 Ω SMD Resistance	0699-2488	10
Case for 100 Ω SMD Resistance	1540-0692	1
Operation Manual	16034-90012	1

Functions

Figure 1-2 HP 16034H Parts



16034HOE01002

No.	Part	FUNCTION
1	Contact Pin	Contact for DUT electrode. LOW side Contact Pin connected to a instrument's L_{CUR} , L_{POT} and HIGH side Contact Pin connected to a instrument's H_{CUR} , H_{POT} .
2	Knob	For lateral adjustment of HIGH side Contact Pin.
3	Contact Pin Locking Screw	For securing HIGH side Contact Pin's position by turning clockwise.
4	Measuring Stage	Where DUT is mounted.
5	Lever	For pulling back Low side Contact Pin before placing DUT between contact pins.

2 **Operation**

This chapter describes the proper methods for open and short correction and DUT measurement.

Performing Open and Short Correction

To enhance measurement accuracy, open and short correction should be done before DUT measurement. The following procedure shows correction and measurement by the HP 16034H.

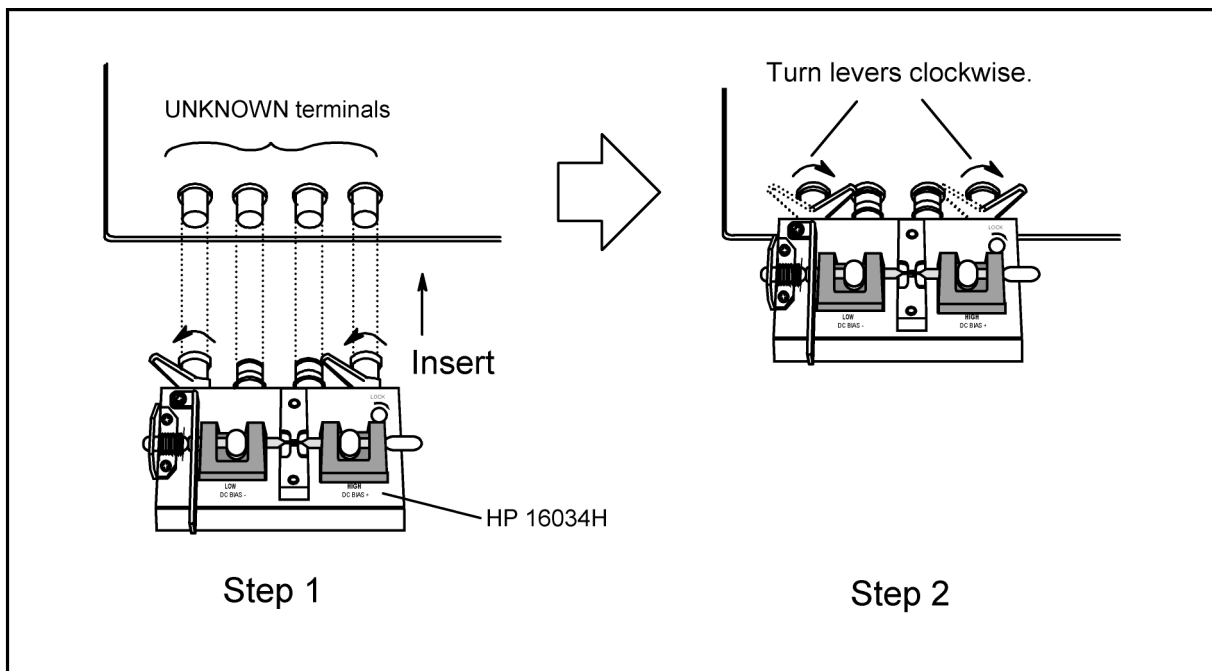
CAUTION

Take care to avoid rough handling and never allow any mechanical shock to the HP 16034H, especially against the contact pins from the sides or any to the parts mounted on top of the fixture.

Connecting the HP 16034H

1. Set the cable length to 0 m in the instrument.
2. Connect the HP 16034H directly to the UNKNOWN terminals as shown in Figure 2-1.

Figure 2-1 Connecting the HP16034H



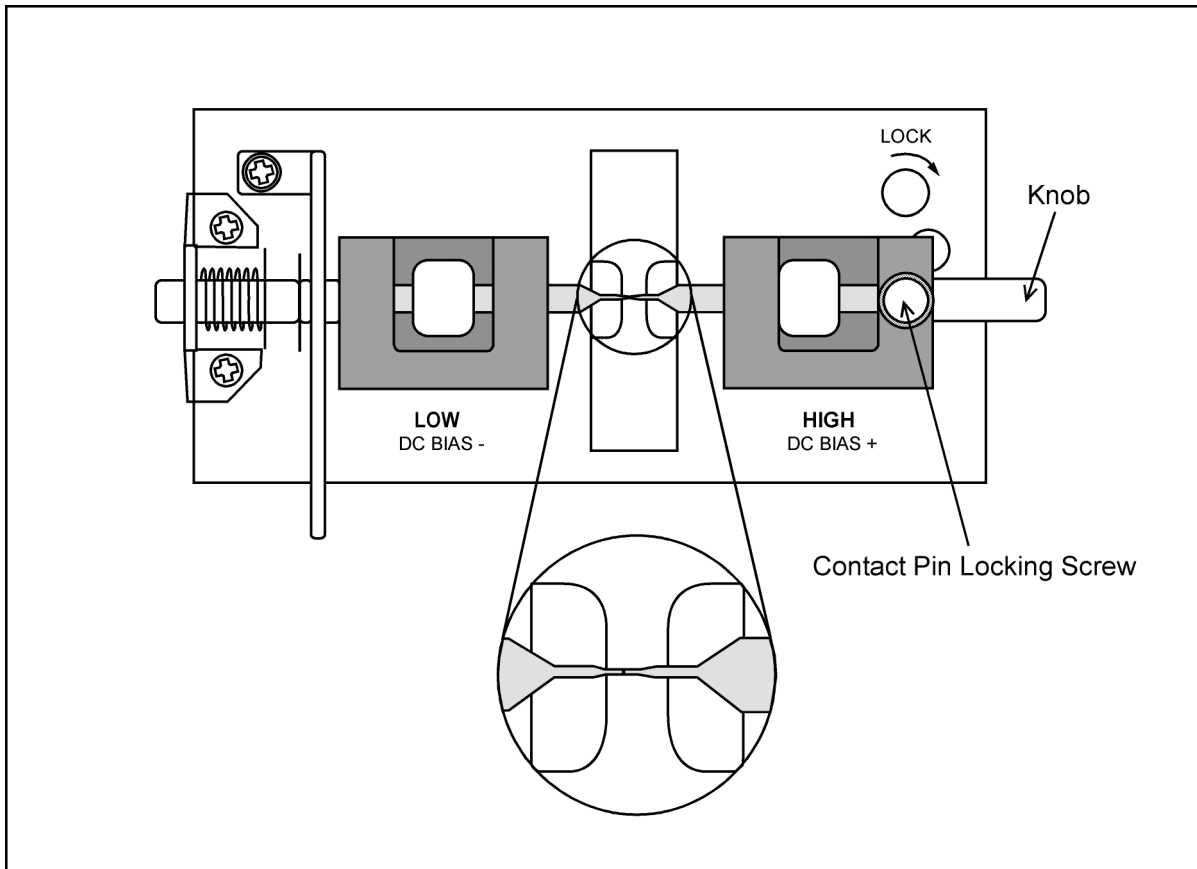
16034HOE02005

Performing Short Correction

The short correction procedure is as follows.

1. Push the HIGH side contact pin's knob to the left to make firm contact with the LOW side contact pin (Figure 2-2). Tighten the contact pin locking screw to secure the HIGH side contact pin.

Figure 2-2 Contact pin position for short correction



16034HOE02001

2. Perform the short correction as described in the specific instrument's manual.

Operation
Performing Open and Short Correction

Performing Open Correction

The open correction procedure is as follows.

1. Push the HIGH side contact pin so that the distance between the HIGH and the LOW contact pins matches the DUT's width (Figure 2-3).

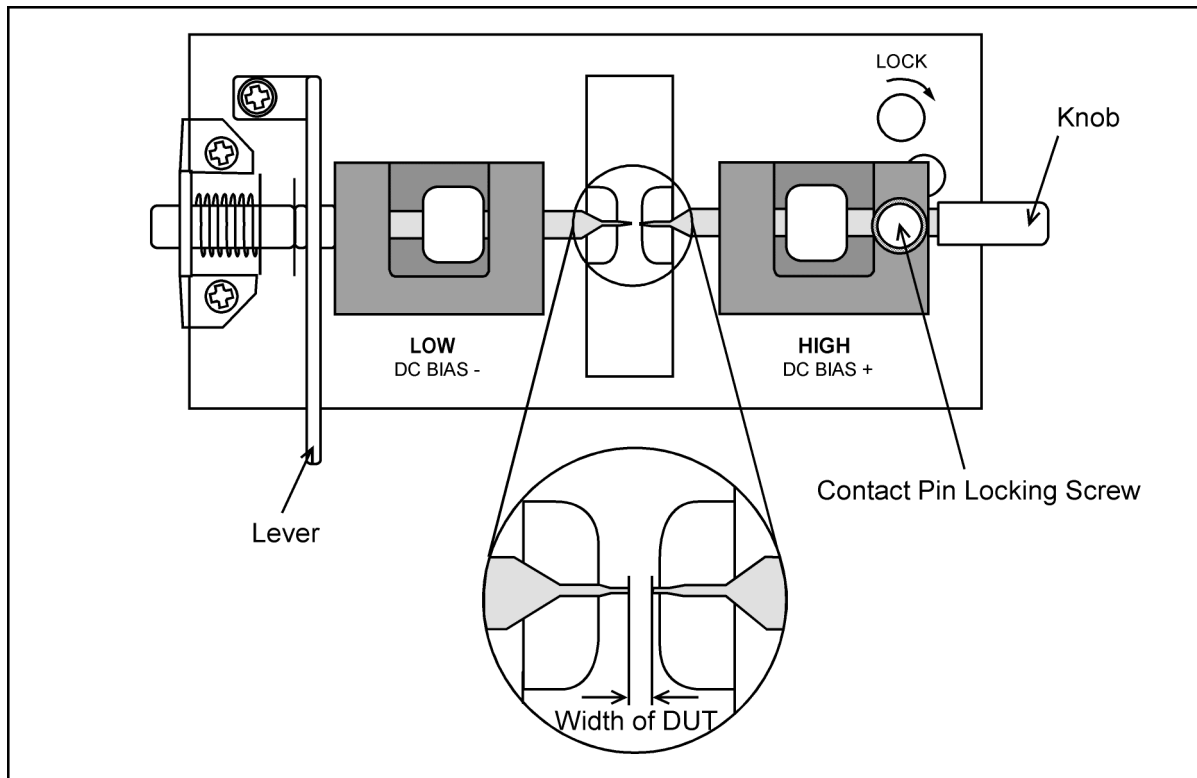
It is recommended that you place the DUT on the measuring stage and precisely position the HIGH side contact pin to actual DUT width.

NOTE

Before performing open correction, remove the DUT used for positioning by pulling back the lever to release the LOW side contact pin.

2. Tighten the contact pin locking screw to secure the HIGH side contact pin.

Figure 2-3 Contact pin position for open correction



16034HOE02002

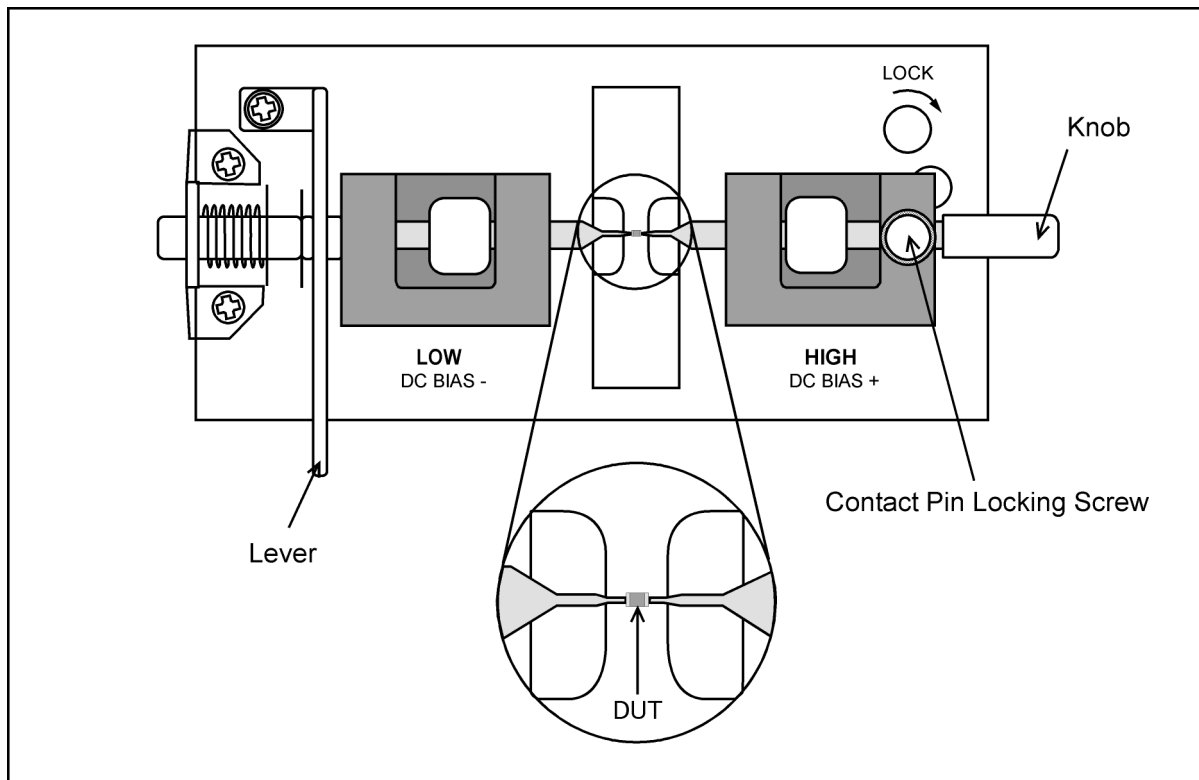
3. Perform the open correction as described in the specific instrument's manual.

DUT Measurement

Before performing DUT measurement, open and short correction should be done as described in the previous sections. If measurement frequency is over 3 MHz, perform load correction before the DUT measurement described later onwards.

1. Adjust the HIGH side contact pin so that the DUT is positioned on the center of the measuring stage and secure the contact pin with the contact pin locking screw.
2. Release the LOW side contact pin with the lever and set the DUT on the measuring stage
3. Ease back slowly on the lever until the LOW side contact pin makes gentle contact with the DUT.

Figure 2-4 Contact pin position for DUT measurement



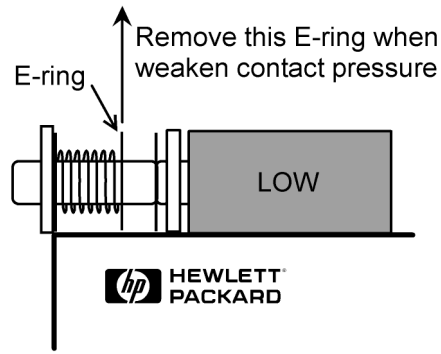
16034HOE02003

4. Perform the measurement as described in the specific instrument's manual.
5. To measure the same size DUT repeatedly, simply release the LOW side contact pin with the lever when to changing the DUT without moving the HIGH side contact pin.

To measure an array type DUT, take measurements at each electrode by sliding the DUT on the stage after releasing the LOW side contact pin with the lever.

NOTE

Measurement values can vary depending on contact pressure when measuring ferrite inductors or multi-layer ceramic capacitors with high permittivity. When measuring this kind of device, removing the E-ring can weaken the spring pre-load. However, this technique may increase contact resistance and thus degrades the accuracy of D parameter measurements.



NOTE

Be sure to keep the contact pins clean at the points where they make contact with DUTs.

DUT measurement over 3 MHz

Before performing DUT measurement over 3 MHz, performing load correction is recommended.

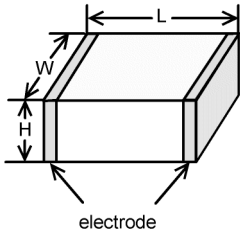
The proportional error factor in the additional error caused by the fixture is in proportion to the frequency squared. Therefore, the error increases greatly as the frequency goes high. To reduce this error, perform load correction.

1. Set the 100 Ω SMD resistor on the fixture the same way as a DUT measurement, and perform measurement at 3 MHz to determine the value of the 100 Ω SMD resistor.
2. Set the measured resistance and inductance values to the instrument as load value.
3. Perform load correction.

3 Specifications and Supplemental Performance Characteristics

This chapter provides specifications and supplemental performance characteristics of the HP 16034H test fixture.

Specifications

Applicable Instruments		LCR meters and Impedance Analyzers with four-terminals
Applicable DUT Type		Chip components
Applicable DUT dimensions		 <p> $0.6 \text{ mm} \leq H \leq 3.0 \text{ mm}$ $0.6 \text{ mm} \leq W \leq 15.0 \text{ mm}$ $0.1 \text{ mm} \leq L \leq 5.0 \text{ mm}$ </p>
Maximum Voltage		$\pm 40 \text{ V}$ peak max. (AC+DC)
Operating Environment	temp.	0°C to $+55^{\circ}\text{C}$
	humidity	15% to 95%RH (@ wet bulb temp. $< 40^{\circ}\text{C}$)
Non Operating Environment	temp.	$- 40^{\circ}\text{C}$ to $+70^{\circ}\text{C}$
	humidity	$\leq 90 \%$ RH (@ wet bulb temp. $< 65^{\circ}\text{C}$)
Dimensions		Approximately 120 (W) \times 50 (H) \times 70 (D) mm
Weight		Approximately 200 g

Supplemental Performance Characteristics

This section provides useful data on the HP 16034H. These supplemental performance characteristics should not be considered specifications.

Frequency Range

With OPEN/SHORT correction ≤ 3 MHz

With OPEN/SHORT/LOAD correction ≤ 110 MHz

Additional Error (With OPEN/SHORT correction)

Additional errors are calculated as follows.

|Z| Measurement

Additional error Z_e [%] of the |Z| measurement is calculated by substituting the values in the table below into the following equation.

$$Z_e \text{ [%]} = \pm \{ A + (Z_s/Z_x + Y_o \times Z_x) \times 100 \}$$

where

A [%] Additional Error (Proportional Error)

Z_s [Ω] Short Repeatability (Impedance)

Y_o [S] Open Repeatability (Admittance)

Z_x [Ω] Measured Value (Impedance)

Z_s	$\{ 10 + 13 \times (f / 10) \} \times 10^{-3} [\Omega]$
Y_o	$\{ 5 + 500 \times (f / 10) \} \times 10^{-9} [S]$
A	$0.5 \times (f / 10)^2 \text{ [%]}$

where f is frequency (MHz).

D Measurement

Additional error D_e of the D measurement is calculated by additional error Z_e [%] of |Z| measurement as follows.

If $D_x \leq 0.1$:

$$D_e = Z_e / 100$$

If $0.1 < D_x \leq 0.5$:

$$D_e = (Z_e / 100) \times (1 + D_x)$$

where D_x is the measured value of D. It is necessary for Z_e to be below 10 %.

NOTE D is not expressed as a percentage but as an absolute value.

Rs (ESR) Measurement

Additional error Rse[%] of the Rs measurement is calculated by additional error Ze [%] of |Z| measurement as follows.

If $Dx \leq 0.1$:

$$Rse [\%] = Ze / Dx$$

If $0.1 < Dx \leq 0.5$:

$$Rse [\%] = (Ze / Dx) \times \sqrt{(1 + Dx^2)}$$

Dx is the measured value of D and is calculated as follows.

$$Dx = 2 \times \pi \times f \times Csx \times Rsx,$$

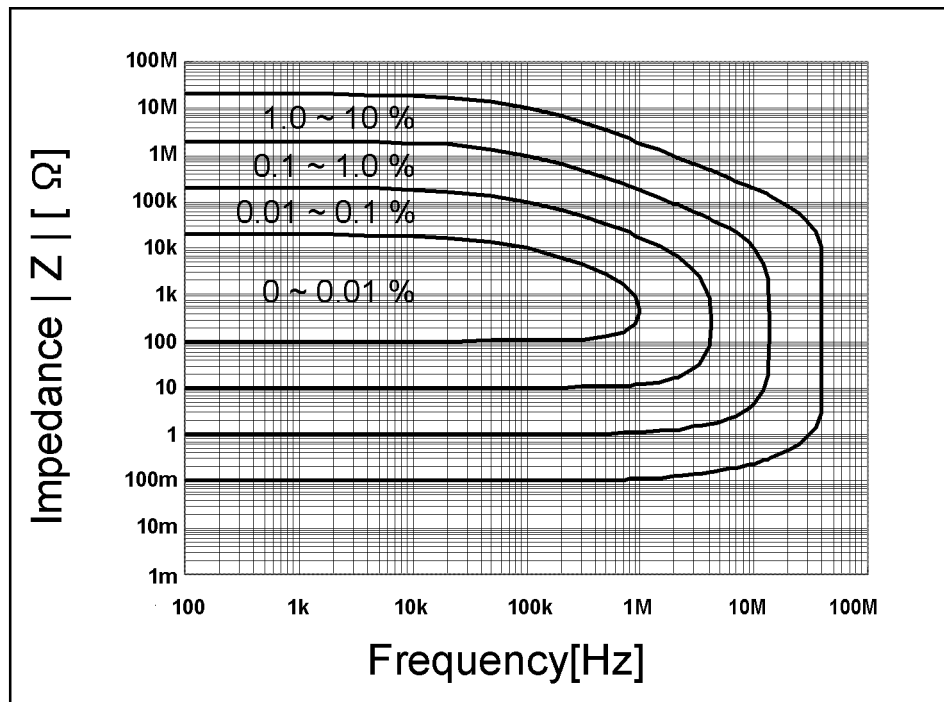
where

f: measurement signal frequency

Csx: measured value of Cs

Rsx: measured value of Rs.

Figure 3-1 Additional Error in |Z| measurement



16034HOE03002

Contact Pressure

The following data are supplemental performance characteristics for the spring that applies contact pressure.

Spring constant	37 gf/mm \pm 10 %
Spring pre-load	Approximately 400 g (without E-ring, approximately 20 g)