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Caution

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注意

Agilent 16034Hを破損する可能性がありますので、衝撃を与えないように取扱いには注意してください。特に、試料を載せる上面側および突起物のある左右側面には 絶対に衝撃を与えないで下さい。

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Agilent 16034H Test Fixture

Operation Manual

Fourth Edition



Agilent Technologies

Agilent Part No. 16034-90012

January 2001

Printed in Japan

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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.

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April 1999	Second Edition (part number: 16034-90012)
December 1999	Third Edition (part number: 16034-90012)
January 2001	Fourth Edition (part number: 16034-90012)

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

- Ground the instrument

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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 Agilent Technologies 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

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent 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.

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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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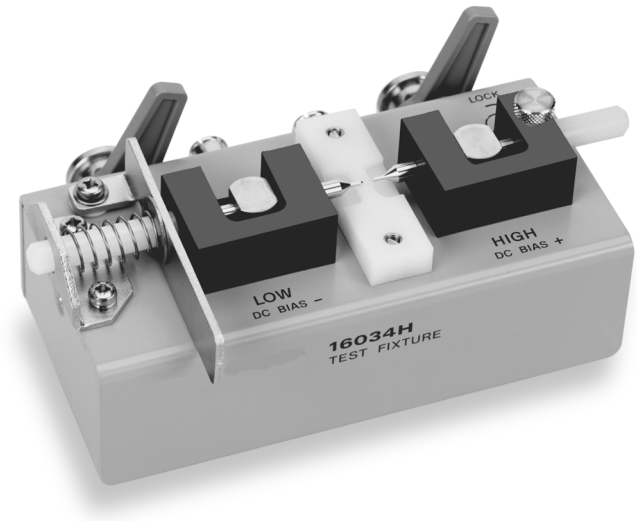
1 Overview

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Product Overview

The 16034H is designed for chip type components. This test fixture can take measurements of the chip type L,C,R. The 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**



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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 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.

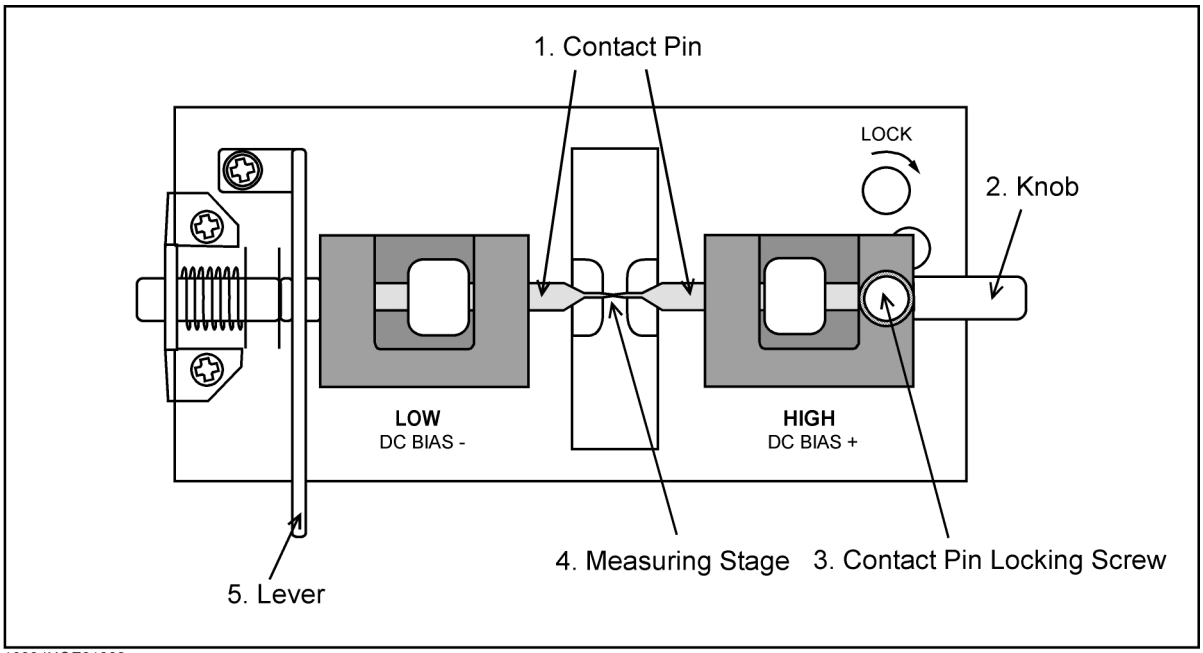
Table 1-1 Contents

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

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Functions

Figure 1-2 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.

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2 Operation

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

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Performing Open and Short Correction

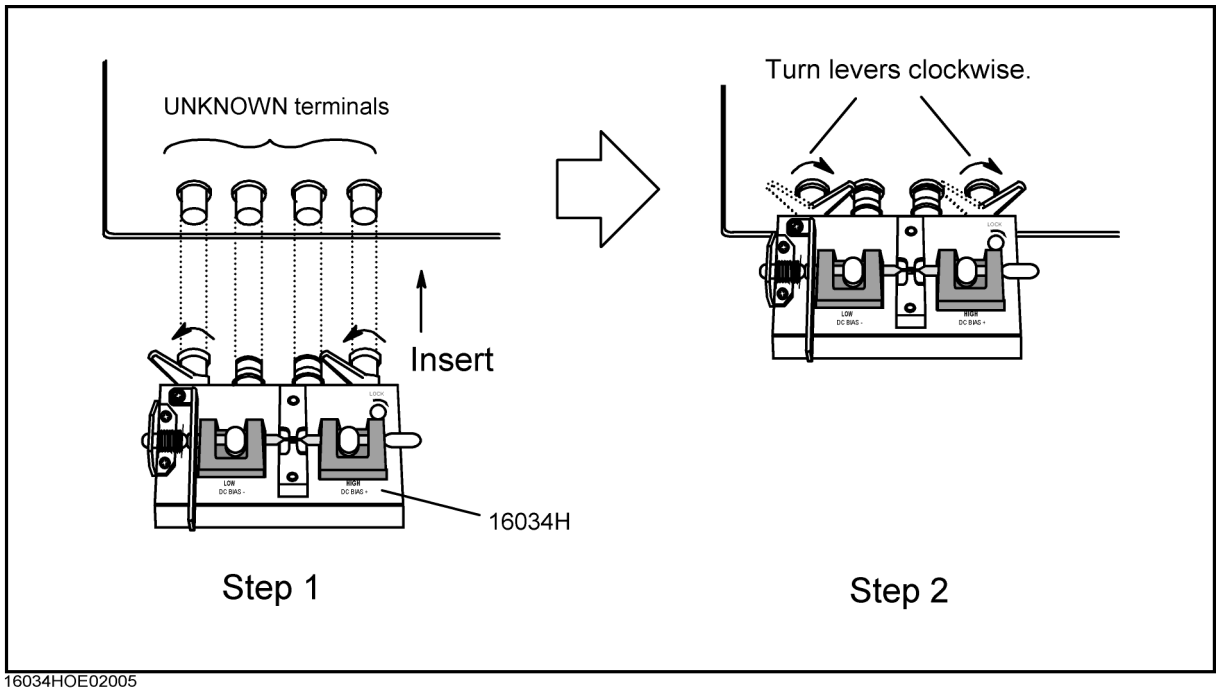
To enhance measurement accuracy, open and short correction should be done before DUT measurement. The following procedure shows correction and measurement by the 16034H.

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

Connecting the 16034H

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

Figure 2-1 Connecting the 16034H



16034HOE02005

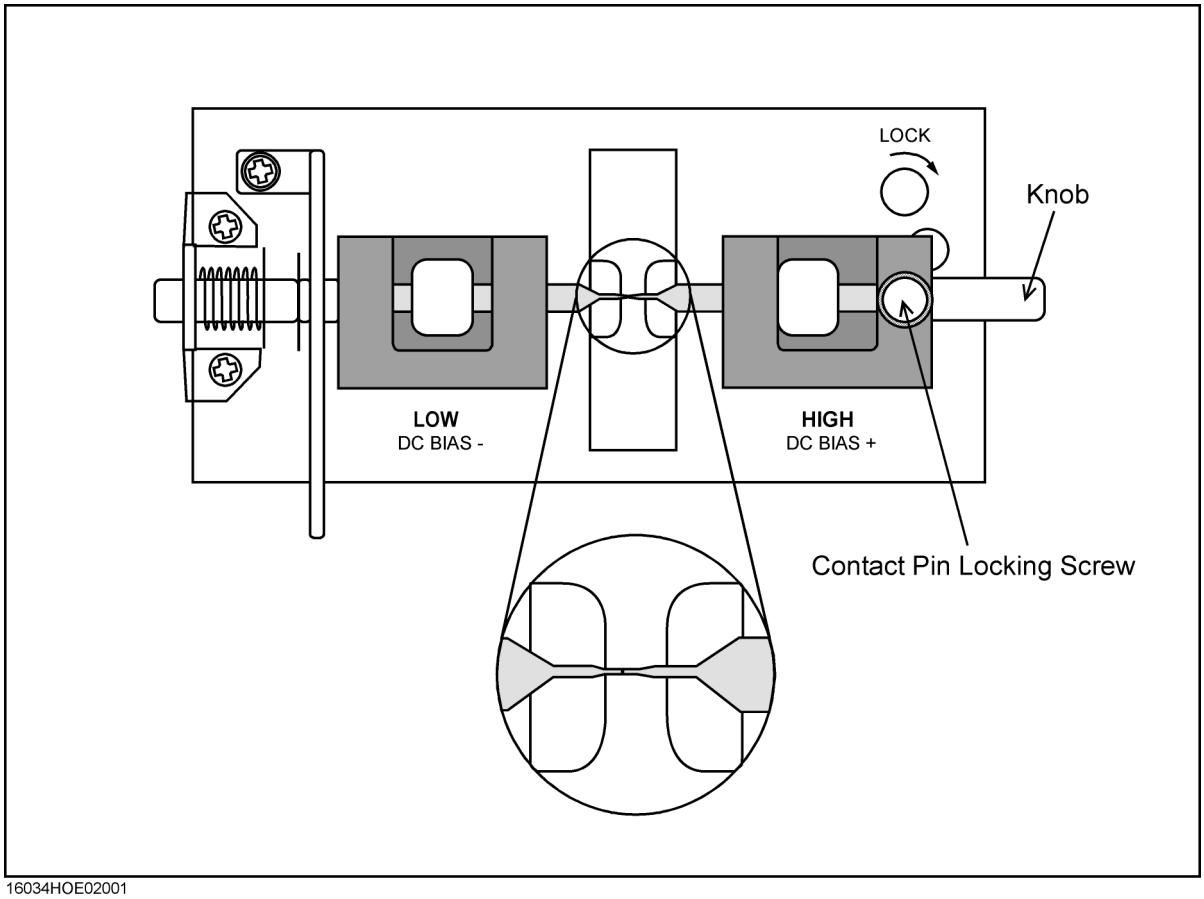
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Performing Short Correction

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.

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Performing Open Correction

The open correction procedure is as follows.

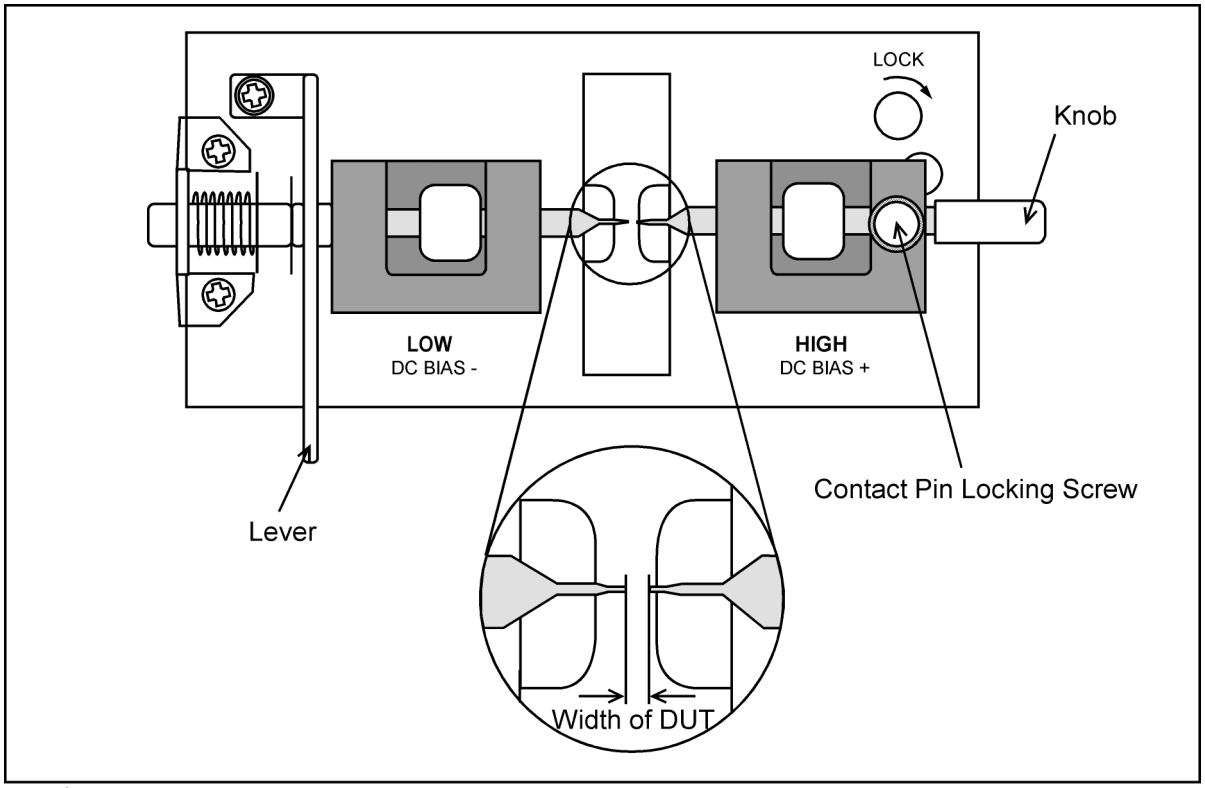
1. Push the HIGH side contact pin so that the distance between the HIGH and the LOW contact pins matches the DUT's width (Figure 2-3).

   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.

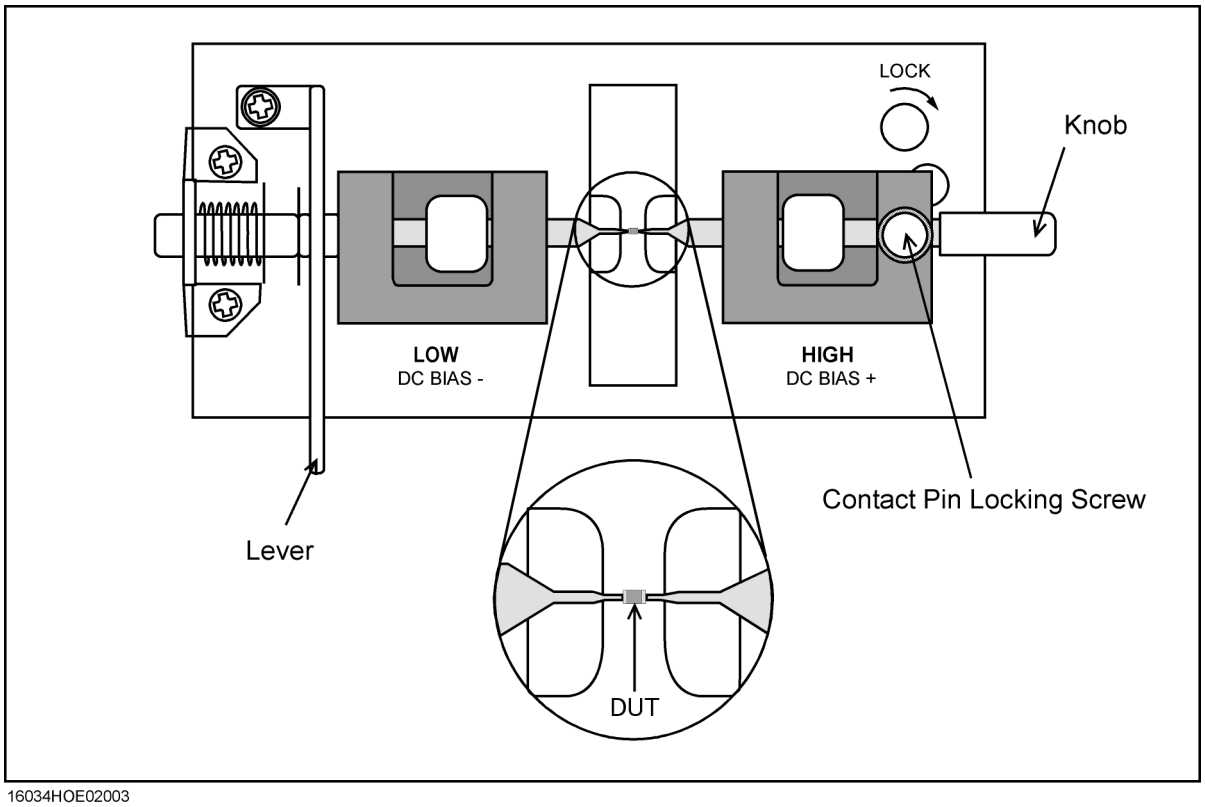
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DUT Measurement

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



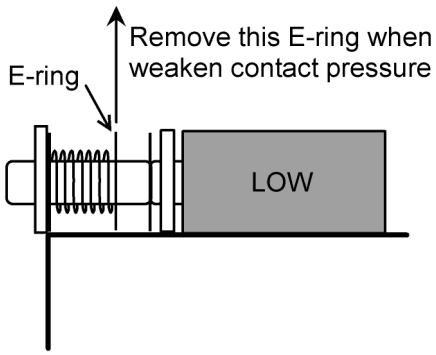
16034HOE02003

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.

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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.

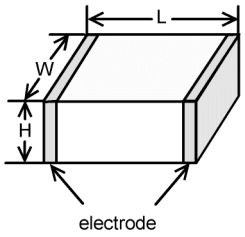
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3 Specifications and Supplemental Performance Characteristics

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

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Specifications

Applicable Instruments		LCR meters and Impedance Analyzers with four-terminals
Applicable DUT Type		Chip components
Applicable DUT dimensions		 0.6 mm ≦ H ≦ 3.0 mm 0.6 mm ≦ W ≦ 15.0 mm 0.1 mm ≦ L ≦ 5.0 mm
Maximum Voltage		± 40 V peak max. (AC+DC)
Operating Environment	temp.	0°C to +55°C
	humidity	15% to 95%RH (@ wet bulb temp. < 40°C)
Non Operating Environment	temp.	- 40°C to +70°C
	humidity	≤ 90 % RH (@ wet bulb temp. < 65°C)
Dimensions		Approximately 120 (W) × 50 (H) × 70 (D) mm
Weight		Approximately 200 g

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Supplemental Performance Characteristics

This section provides useful data on the 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 Ze [%] of the |Z| measurement is calculated by substituting the values in the table below into the following equation.

$Ze\ [\%] = \pm \{A + (Zs/Zx + Yo \times Zx) \times 100\}$

where

A [%]	Additional Error (Proportional Error)
Zs [Ω]	Short Repeatability (Impedance)
Yo [S]	Open Repeatability (Admittance)
Zx [Ω]	Measured Value (Impedance)

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

where f is frequency (MHz).

D Measurement

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

If $Dx \leq 0.1$:

$$De = Ze / 100$$

If $0.1 < Dx \leq 0.5$:

$$De = (Ze / 100) \times (1 + Dx)$$

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

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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 ≤ 0.1:

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

If 0.1 < Dx ≤ 0.5:

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

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

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

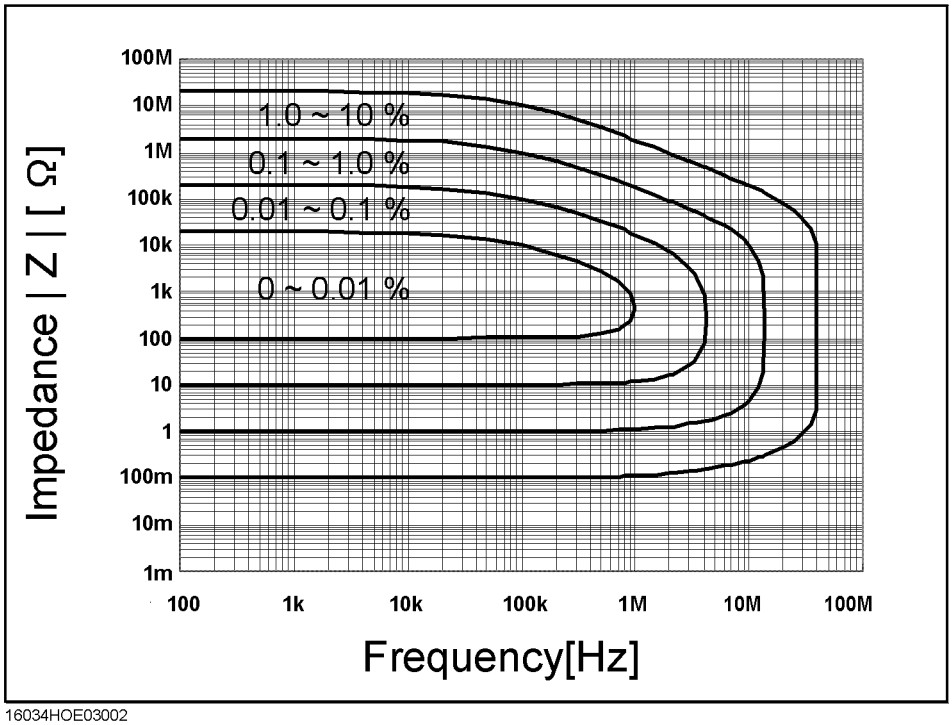
where

f: measurement signal frequency

Csx: measured value of Cs

Rsx: measured value of Rs.

Figure 3-1 Additional Error in |Z| measurement



16034HOE03002

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Contact Pressure

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

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

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