

# Agilent

## 4339B/4349B High Resistance Meters

### Technical Overview

**Within Budget  
Without Compromise**

#### Introducing the Agilent Technologies 4339B and 4349B High Resistance Meters Used for Making Ultra- High Resistance Measurements

For precision bench-top applications, the 1-channel 4339B is the premier solution for accurate high resistance and low current tests. For high resistance testing in manufacturing environments, the 4349B offers simultaneous 4-channel high resistance measurements for increased test throughput.



#### Satisfy Your Needs for ...

##### High quality results

- High confidence testing with contact check function
- Remove parasitics with error correction
- Consistent data with 0.6% basic accuracy
- Compensation for handler contact chattering with trigger delay

##### Versatile measurements

- Select from four test parameters
- Use a variety of test fixtures and accessories
- Perform a charge-measure-discharge sequence with the test sequence program function
- Save and recall up to ten measurement setups

##### High test throughput: 4349B

- 9.5 ms measurements
- 4-channels for multiple DUTs
- 4-channel simultaneous testing
- Fast contact checking: 2 ms/measurement
- GPIB and handler interfaces
- Ideal for high volume capacitor testing

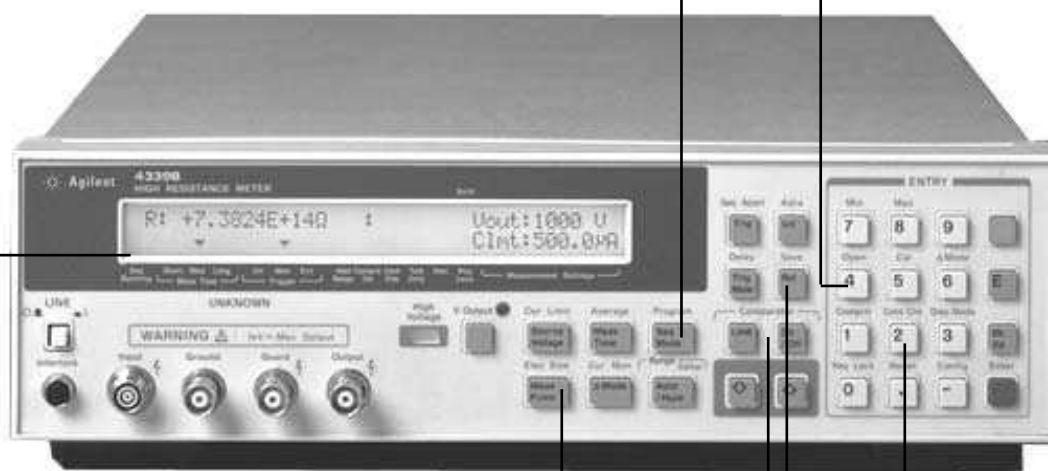


**Agilent Technologies**

**Display:**  
LCD with back-light. Displays measurement values, instrument states, and comparator results.

**Test sequence program:**  
Controls a series of resistance measurements. (Charge-measure-discharge)

**Open:**  
Compensates leakage current and capacitance in test fixtures and cables.



**Measurement parameter:**  
Selects the right parameter for the measurement.

**Comparator:**  
Selects values for high, in, and low testing.

**Save/Recall:**  
Stores and retrieves up to 10 measurement states.

**Contact check:**  
Verifies reliability of capacitor test connections.



Agilent 4349B 4-channel high resistance meter

### Key parameters and specifications

	Agilent 4339B	Agilent 4349B
<b>Test channels</b>	1	2ch, Option 4349B-001 4ch, Option 4349B-700
<b>Test voltage (Vdc)</b>	0.1 to 1000	Requires external power source <sup>1</sup>
<b>Measurement parameters</b>	R, I, pv, ps	R, I
<b>Measurement range (Ω)</b>	10 <sup>3</sup> to 1.6x10 <sup>16</sup>	10 <sup>3</sup> to 10 <sup>15</sup>
<b>Basic accuracy</b>	0.6%	2%
<b>Display resolution</b>	3 / 4 / 5 digits	3 / 4 / 5 digits
<b>Measurement time</b>	10 ms/30 ms/390 ms	9.5 ms/28 ms/98 ms/397 ms

1. External power source required for resistance measurements. Recommendation for external power source for measurement for 1 GΩ sample at 100 Vdc with accuracy = ±10%:

- Ripple: ≤ 1 mVrms (50/60 Hz)
- Wideband noise: ≤ 5 μVrms/Hz (50 Hz)
- Switching noise: ≤ 50 mVrms (100 kHz)

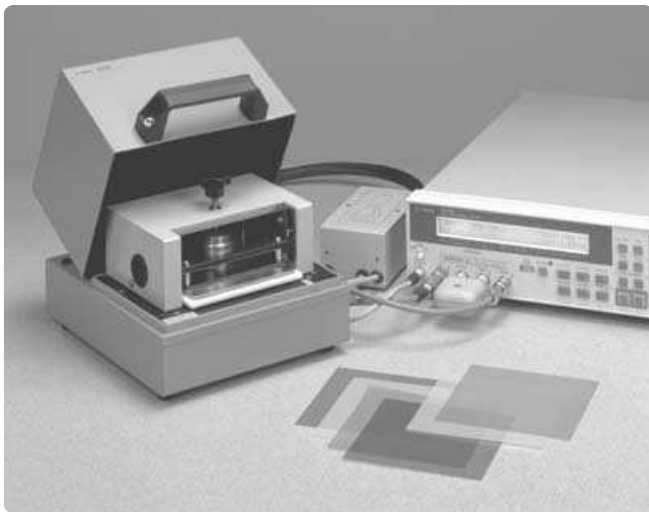


**High quality measurements with flexible hardware**

- Resolve data to 5 digits (3, 4, or 5 digits selectable)
- Make precise measurements with 0.6% basic accuracy
- Verify DUT performance at the exact voltage rating
- Reliable and safety measurements with Agilent 16339A component test fixture

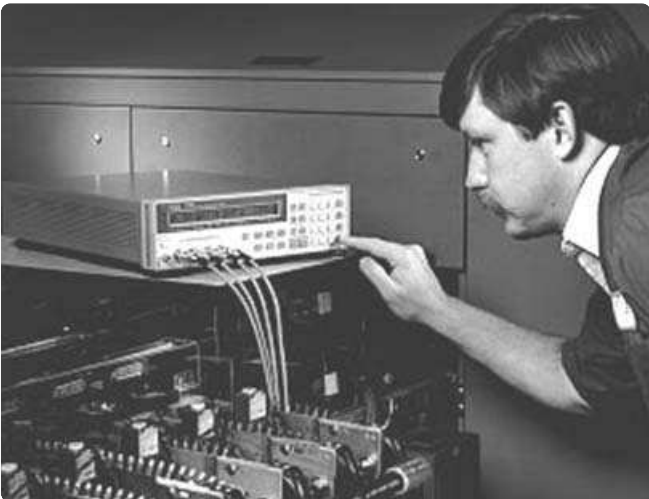
**4339B solutions for high voltage material testing**

- Resistivity mathematics built-in: surface and volume
- Agilent 16008B resistivity cell for solid samples
- Easy measurements with test sequence program function (controls charge-measure-discharge sequence)
- Customize your fixture cabling with the Agilent 16117C test leads



**System features you need to be successful**

- Maximize accuracy with error correction
- Test capacitor contact failure with contact check function
- Automate testing with GPIB interface
- Reduce ground-loops with isolated handler interface
- Pass/Fail testing with comparator function (high/in/low)



**Capacitor evaluation with the 4349B**

- Optimize capacitor Vdc rating tests
- Increase throughput four times with 4-channels
- Improve reliability with contact check
- Get low noise results with Agilent 16117E test lead

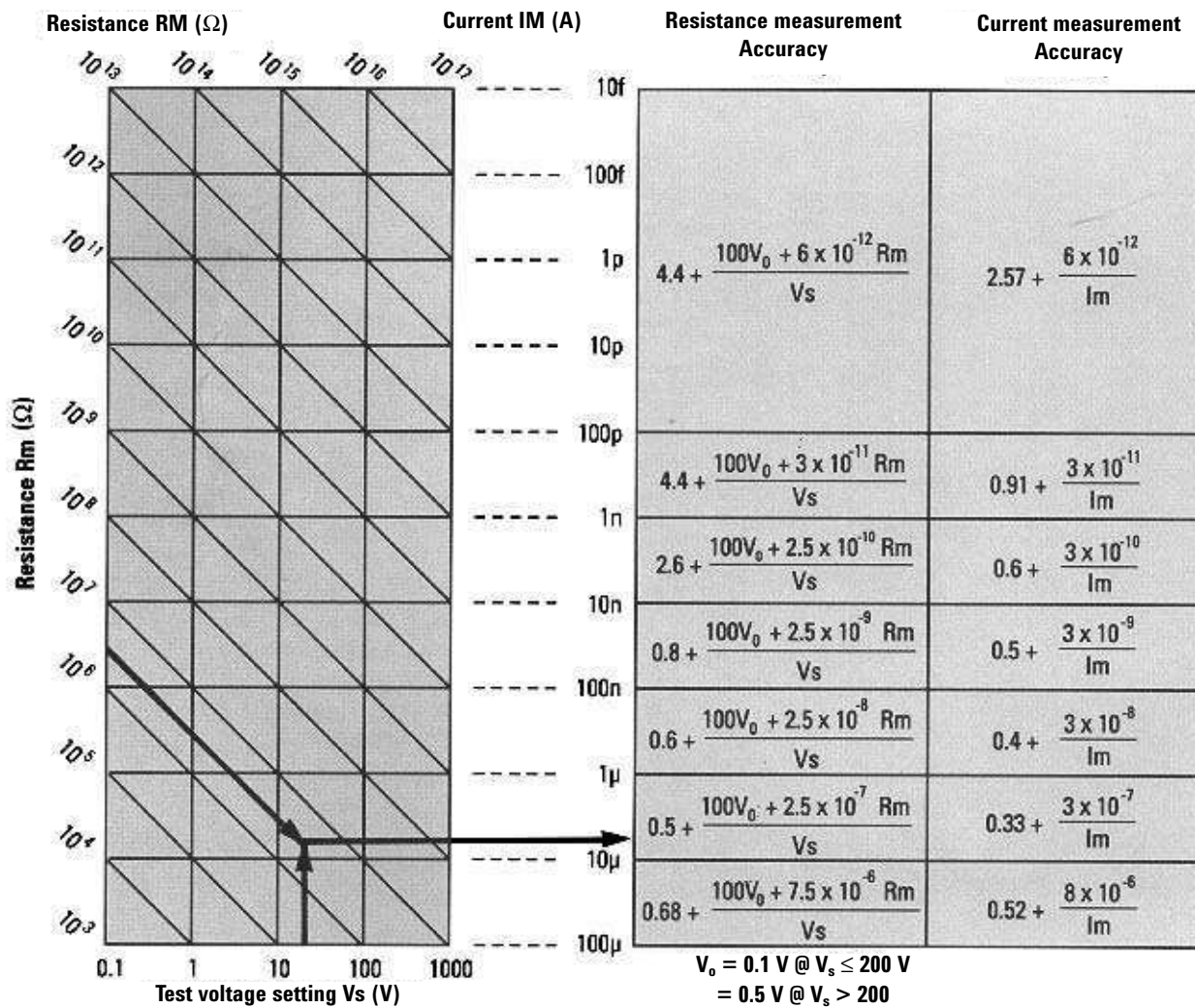


Figure 1. Conversion diagram

Table 1. Agilent 4339B measurement accuracy ( $\pm\%$  of reading)

**Specifications**  
**Measurement Accuracy**

**Agilent 4339B test conditions\*:**

1. Warm up time:  $\geq 30$  minutes
2. Ambient temperature:  $23 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$
3. Test cable length:  $\leq 1.5$  meters
4. Open error correction performed
5. Long measurement time setting
6. Contact check: off

**Accuracy parameters:**

$R_m$ : Measured resistance value in  $\Omega$   
 $I_m$ : Measured current value in amperes  
 $V_s$ : Source voltage in volts  
 $V_0$ :  $0.1 \text{ V} @ V_s \leq 200 \text{ V}$ ,  $0.5 \text{ V} @ V_s > 200 \text{ V}$

**Accuracy example:**

To determine the accuracy of a measurement use Figure 1, "Conversion diagram".  
 For example: determine the accuracy of a  $5 \text{ M}\Omega$  ( $= 5 \times 10^6 \Omega$ ) measurement at  $50 \text{ Vdc}$ .  
 $R_m = 5 \times 10^6 \Omega$   
 $V_s = 50 \text{ V}$

The intersection of  $R_m$  running parallel to the  $10^6 \Omega$  diagonal line intersects the vertical  $V_s$  line at the second row from the bottom of the diagram. Moving horizontally across to Table 1, the following equation is found:

$$0.5 + \frac{100 V_0 + (2.5 \times 10^{-7} \times R_m)}{V_s}$$

Entering the values for  $R_m$ ,  $V_0$ , and  $V_s$  yields an accuracy of  $\pm 0.725\%$ .



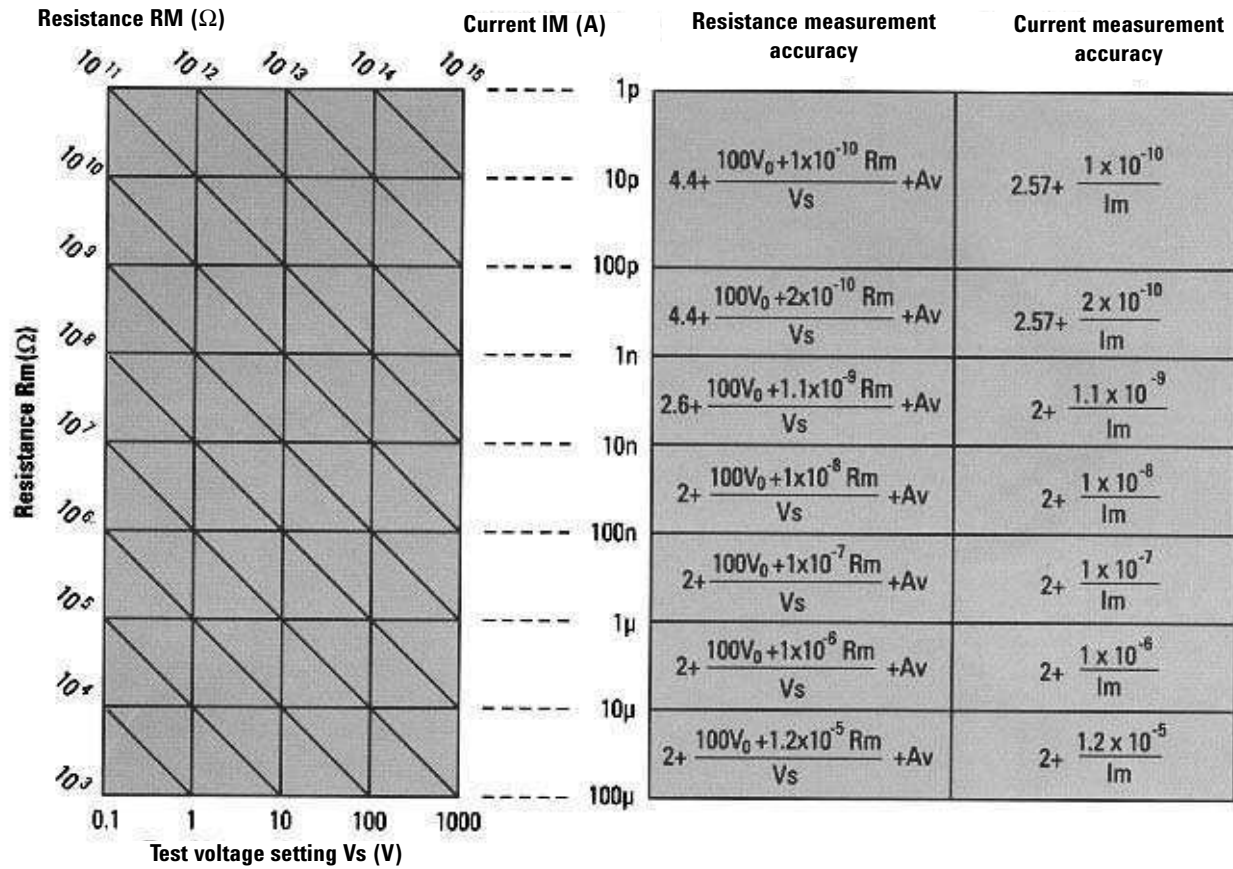


Figure 2. Conversion diagram

Table 2. Agilent 4349B measurement accuracy ( $\pm\%$  of reading)

**Agilent 4349B test conditions!:**

1. Warm up time:  $\geq 30$  minutes
2. Ambient temperature:  $23 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$
3. Test cable length:  $\leq 1.5$  meters
4. Open error correction performed
5. 30 ms measurement time setting

**Accuracy parameters:**

$R_m$ : Measured resistance value in ohms  
 $I_m$ : Measured current value in amperes

**External power supply parameters:**

$V_s$ : Source voltage in volts  
 $V_0$ : Source offset voltage in Volts  
 $Av$ : Voltage accuracy

1. Other test condition data available in the operation manual.

## Other Specifications

### Measurement parameters/ranges

Parameter	Range
<b>Agilent 4339B</b>	
R (dc resistance)	10 <sup>3</sup> Ω to 1.6 x 10 <sup>16</sup> Ω
I (dc current)	60 fA to 100 μA
ps (surface resistivity)	Refer to operation manual
pv (volume resistivity)	Refer to operation manual
<b>Agilent 4349B</b>	
R (dc resistance)	10 <sup>3</sup> Ω to 10 <sup>15</sup> Ω
I (dc current)	1 pA to 100 μA

### Measurement conditions and functions

*DC test voltage (4339B):* 0 V to 1000 V, 0.1 V steps @ V ≤ 200V, 1.0 V steps @ V > 200 V

*DC test voltage (Agilent 4349B):* None supplied, use external power supplies and voltage data entry for resistance measurements. Maximum of 5000 V input and 5 digit numerical entry.

*Max current (Agilent 4339B):* 10 mA @ ≤ 100 V, 5 mA @ ≤ 250 V, 2 mA @ ≤ 500 V, 1 mA @ ≤ 1 kV

*Number of test channels:*  
4339B: 1 channel,  
4349B: Option 4349B-700:4 ch  
Option 4349B-001:2 ch

*Ranging:* Auto and hold

*Trigger:* Internal, manual, and external

*Delay time (trigger):* 0 ms to 9999 ms in 1 ms steps

*Test cable lengths:* 2 meters maximum

*Measurement time (typical):*  
4339B: 10 ms / 30 ms / 390 ms  
4349B: 9.5 ms / 28 ms / 98 ms / 397 ms

### Other instrument functions

*Error correction:* Open (removes errors due to parasitics).

*Comparator:* High, in, and low for each of the test parameters.

*Save/Recall:* 10 instrument states from non-volatile memory.

*Contact check:* Detects contact failure for capacitive devices (2 ms).

*GPIB:* Agilent's implementation of IEEE 488 for control and data.

*Handler interface:* Negative logic and isolated. Signals are high/in/low, no contact, EOM, index, alarm, keylock, ext. trigger.

### Physical characteristics

*Power:* 90 – 132 Vac or 198 – 264 Vac.  
47 Hz – 66 Hz. 45 VA (typical)

*Operating*

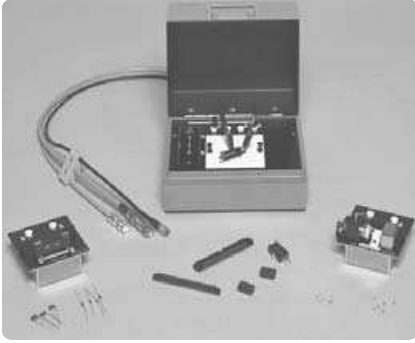
*temperature/humidity:*

0 – 45 °C/≤ 95% RH @ 40 °C.

*Dimensions:* 320(W) x 100(H) x 450(D) mm.

*Weight:* 6.5 kg (typical).

## Test Fixtures/Accessories



**Agilent 16339A component test fixture**  
For manual high voltage testing of discrete components. For 4339B only.



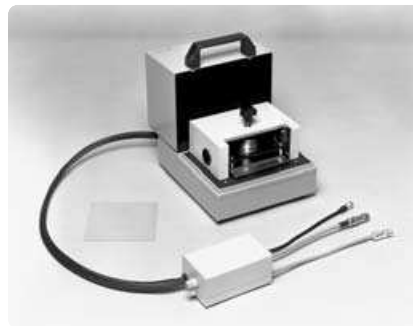
**Agilent 16117B low noise test leads**  
Wide jaw clip leads for 4339B. 1 meter cable. Applicable measurement range:  $\leq 1 \times 10^{11} \Omega$  (typical). For 4339B only. Option 16117B-001 adds a pair of pin-type probes. Option 16117B-002 adds a pair of socket adapters for connecting to a custom made fixture. Option 16117B-003 adds a pair of alligator clips.



**Agilent 16117C low noise test leads**  
Interlock, voltage source, and current sensing cables. Terminations are threaded triaxial, standard BNC, and bare interlock pair. Female BNC and triaxial connectors are included. For 4339B only.



**Agilent 16118A tweezer test fixture**  
Tweezer test fixture for easy testing for chip components. Maximum applied voltage: 100 Vdc. Applicable measurement range:  $\leq 1 \times 10^{11} \Omega$  (typical). For 4339B only.



**Agilent 16008B resistivity cell**  
For resistivity measurements of dry sheet samples. Upper electrode is spring loaded to apply pressure. Surface and volume measurements. Installed with 50 mm diameter electrode. Option 16008B-001 adds 26 mm/76 mm diameter electrodes. Option 16008B-002 adds 26 mm diameter electrode. For 4339B only. Maximum applied voltage: 1000 Vdc. Sheet thickness range: 10  $\mu\text{m}$  to 100 mm.



**Agilent 16117E low noise test lead**  
Male-triaxial to male-triaxial connectors. One meter cable. One female-triaxial connector included. For 4349B only.

## Ordering Information

○ = Choose ONE and ONLY one

☐ = Choose any combination

### Agilent 4339B High Resistance Meter<sup>1</sup>

Furnished accessories: shunt connector

#### Documentation options<sup>2</sup>

- ☐ Option 4339B-ABA Add specified quantities of English manual
- ☐ Option 4339B-ABJ Add specified quantities of Japanese manual
- ☐ Option 4339B-0BW Add service documentation, assembly level

#### Certification option

- ☐ Option 4339B-1A7 ISO 17025 compliant calibration

#### Agilent 4339B test fixtures and accessories

- Agilent 16008B Resistivity cell (50 mm diameter electrode)
- ☐ Option 16008B-001 Add 26 mm and 76 mm diameter electrodes
- ☐ Option 16008B-002 Add 26 mm diameter electrode

- Agilent 16117B Low noise test leads
- ☐ Option 16117B-001 Add pin probes
- ☐ Option 16117B-002 Add soldering sockets
- ☐ Option 16117B-003 Add alligator clips<sup>3</sup>

- Agilent 16117C Low noise test leads
- Agilent 16118A Tweezer test fixture
- Agilent 16339A Component test fixture

### Agilent 4349B High Resistance Meter<sup>4</sup>

#### Test channel options<sup>5</sup>

- Option 4349B-700 4-channels
- Option 4349B-001 2-channels

#### Agilent 4349B high resistance meter<sup>6</sup>

##### Documentation options

- ☐ Option 4349B-ABA Add specified quantities of English manual
- ☐ Option 4349B-ABJ Add specified quantities of Japanese manual
- ☐ Option 4349B-0BW Add service documentation, assembly level

##### Cabinet options<sup>7</sup>

- ☐ Option 4349B-1CM Rack mount kit
- ☐ Option 4349B-1CN Front handle kit

##### Certification option

- ☐ Option 4349B-1A7 ISO 17025 compliant calibration

### Agilent 4349B Test Fixtures and Accessories

- Agilent 16117E Low noise test lead

## Web Resource

[www.agilent.com/find/lcmeters](http://www.agilent.com/find/lcmeters)

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[www.agilent.com/find/contactus](http://www.agilent.com/find/contactus)

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Product specifications and descriptions in this document subject to change without notice.

1. Test fixture is not furnished with the 4339B.
2. Manual is not furnished with the 4339B.
3. The alligator clips are not furnished as standard.
4. External power source required for resistance measurements.
5. 2-channels to 4-channels upgrade not available.
6. Manual is not furnished as standard.
7. Rack flange and handle kit are not compatible.



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