

# Agilent

## 4338B Milliohm Meter

### 10 $\mu\Omega$ to 100 k $\Omega$

Technical Overview



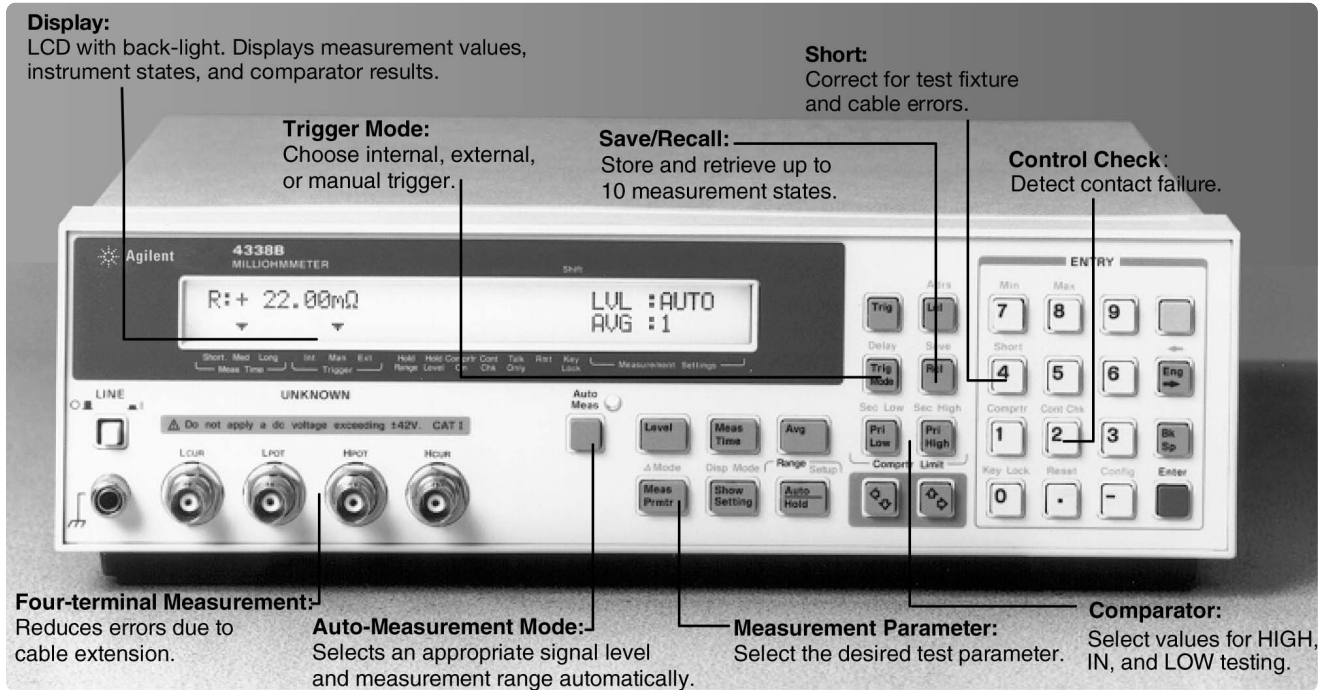
#### Introduction

Ideal for precise measurements of extremely low resistances using an ac test signal, the Agilent Technologies 4338B suits bench-top applications that require flexible testing and reliable results. The milliohm meter satisfies system throughput demands for fast, high-quality measurements.



Agilent Technologies

# The Agilent 4338B



## Satisfy Your Needs for ...

### High-quality testing

- Remove parasitics with error correction
- Achieve consistent results with 0.4% basic accuracy
- Verify test connections with contact check function
- Stabilize data with selectable measurement times and averaging
- Eliminate trigger timing errors with trigger delay

### Operating versatility

- Select from 5 impedance parameters
- Pick from 7 probes, test fixtures, and accessories
- Configure the instrument quickly with Save/Recall
- Reduce test complexity with auto-measurement function

### Fast test throughput

- Get 34 ms/measurement speed
- Perform Pass/Fail testing with comparator function
- Operate remotely via the GPIB interface
- Use the built-in handler interface

## Key Parameters and Specifications

### Test frequency:

1 kHz

### Impedance parameter sets:

R, |Z|-θ, R-L, R-X

### Basic accuracy:

0.4%

### Test current levels:

1 μA, 10 μA, 100 μA, 1 mA, 10 mA

### Error correction:

Short compensation

### Display digits:

3, 4, or 5 digits (selectable)

### Save/recall:

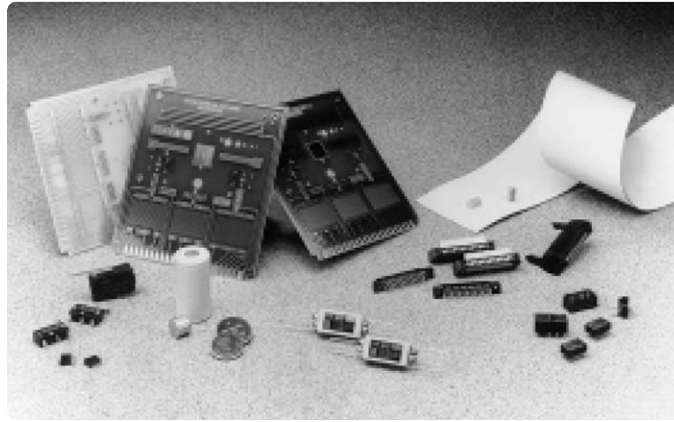
10 instrument states

### Interfaces:

GPIB and handler interface

**Satisfy your need for high-quality testing**

- Resolve data to 5 digits
- Make precise measurements with 0.4% basic accuracy
- Eliminate impedance calculations; select the parameter you need: R, |Z|,  $\theta$ , L, X
- Verify DUT performance under simulated operating conditions
- Perform dry contact testing with minimal test signal ( $\leq 20$  mV)
- Obtain high-confidence testing with contact check function



**Test electromechanical devices**

- Perform dry contact testing with low-level test signals
- Select from a variety of probes and test fixtures to fit your application
- Resolve measurements to  $10 \mu\Omega$
- Test switches, cables, connectors, relays, and pc board traces

**Make precise ultra-low resistance measurements with the 4338B.**

**Evaluate battery internal resistance**

- Protect your investment with voltage protection on terminals (Max. 42 Vdc)
- Perform non-invasive testing with no effects on charge/discharge cycles
- Avoid polarization effects with an ac test signal



**System features for automation in manufacturing**

- Maximize accuracy with error correction
- Automate testing with GPIB interface for computer control
- Reduce ground-loops with isolated handler interface
- Continue testing after ac power loss with non-volatile memory
- Perform pass/fail testing with comparator function (HIGH, IN, LOW)

**Use the milliohm meter for electromechanical contact testing.**



**The 4338B is ideal for battery evaluation.**

# Agilent 4338B Specifications

## Measurement accuracy

Measured Resistance $R_m$ ( $\Omega$ )	Test Signal Current				
	1 $\mu$ A	10 $\mu$ A	100 $\mu$ A	1 mA	10 mA
100k	$0.4 + 0.0005 R_m$				
10k	$0.4 + \frac{250}{R_m} + 0.0005 R_m$				
1k	$0.4 + \frac{13}{R_m} + 0.0005 R_m$	$0.4 + \frac{25}{R_m} + 0.0005 R_m$			
100	$0.4 + \frac{4}{R_m} + 0.0005 R_m$	$0.4 + \frac{1.3}{R_m} + 0.0005 R_m$	$0.4 + \frac{2.5}{R_m} + 0.0005 R_m$		
10		$0.4 + \frac{0.4}{R_m}$	$0.4 + \frac{0.13}{R_m}$	$0.4 + \frac{0.25}{R_m}$	
1	$0.4 + \frac{1.5}{R_m}$		$0.4 + \frac{0.041}{R_m}$	$0.4 + \frac{0.014}{R_m}$	$0.4 + \frac{0.026}{R_m}$
100m		$0.4 + \frac{0.15}{R_m}$		$0.4 + \frac{0.005}{R_m}$	$0.4 + \frac{0.0023}{R_m}$
10m			$0.4 + \frac{0.016}{R_m}$	$0.4 + \frac{0.0025}{R_m}$	$0.4 + \frac{0.0014}{R_m}$
1m				$1.2 + \frac{0.0025}{R_m}$	
100 $\mu$					$1.2 + \frac{0.0012}{R_m}$
10 $\mu$					

Table 1. Measurement accuracy ( $\pm$  % of reading)

### Measurement conditions

The following test conditions apply for the data shown in Table 1:<sup>1</sup>

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: 0 meter
4. Short error correction performed.
5. Measurement time: LONG

### Measurement parameters/ranges

Parameter	Range
R	10 $\mu\Omega$ to 100 k $\Omega$
X,  Z	10 $\mu\Omega$ to 100 k $\Omega$ (typical)
L	10 nH to 10 H (typical)
$\theta$	-180 $^\circ$ to +180 $^\circ$

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

## Measurement conditions and functions

*Test frequency:* 1 kHz  $\pm$  0.1%

*AC test signal level (rms current):*  
1  $\mu$ A, 10  $\mu$ A, 100  $\mu$ A, 1 mA, 10 mA

*Maximum applied AC voltage:*  
20 mV peak

*Maximum DC voltage to BNC terminals:* 42 V

*Ranging:* Auto and hold

*Maximum cable length:* 2 meters

*Trigger:* Internal, manual, and external

*Delay time:* 0 to 9999 ms in 1-ms steps

*Averaging:* 1 to 256

*Measurement time (typical):*

Short	Medium	Long
34 ms	70 ms	900 ms

## Other instrument functions

*Math functions:* Deviation ( $\Delta$ ) and percent deviation ( $\% \Delta$ ).

*Short error correction:*

Eliminates measurement errors due to parasitic impedances in cables and test fixtures.

*Comparator:* HIGH, IN, and LOW for primary and secondary parameters.

*Continuous memory:* All instrument settings are automatically saved for up to 72 hours when power is lost or the instrument is turned off.

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

*Contact check:* Detects contact failure.

*GPIB:* Implementation of IEEE-488 for control and data.

*Handler interface:*

Negative logic and optically isolated; output signals: HIGH/IN/LOW, end-of-measurement, index, and alarm; input signals are keylock and external trigger.

## Physical characteristics

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

*Operating temperature:* 0 °C to 45 °C

*Dimensions:* 320(W) x 100(H) x 300(D) mm

*Weight:* 4.5 kg

# Test Fixtures/Accessories for the Agilent 4338B Milliohm Meter



## 16005-60011 Kelvin clip lead (large)

Cable length, 0.4 meter. Jaws mate with large terminal devices. One lead supplied only.



## 16006-60001 pin-type probe lead

Cable length, 0.4 meter. Spring-loaded probe tips for firm contact. Useful for manual contact measurements. One lead supplied only.



## 16005-60012 Kelvin IC clip lead (red clip)

**16005-60014 Kelvin IC clip lead (black clip)**  
Cable length, 0.4 meter. Small contacts for devices with fine leads. One lead supplied only.



## 16007-60001 alligator clip lead (red clip)

## 16007-60002 alligator clip lead (black clip)

Alligator clip lead. Cable length, 0.4 meter. Each test lead has a separate alligator clip voltage and current terminal. One lead supplied only.



## 16143-60011 mating cable

Interface between test leads and 4338B. Cable length, 0.5 meter.



## 16338A test lead kit

Contains one each of the following: 16143-60011, 16005-60012/14, 16007-60001/2, carrying case. Contains two each of the following: 16005-60011 and 16006-60001.

## Ordering information

### Agilent 4338B milliohm meter

#### *Furnished accessories:*

Power cable

(Test fixtures are not furnished as standard.)

#### Manual options<sup>1</sup>

**4338B-ABA** U.S - English localization

**4338B-ABJ** Japan - Japanese localization

**4338B-0BW** Add service manual

#### Cabinet options

**4338B-1CM** Rack mount kit

**4338B-1CN** Front handle kit

(Rack flange handle kit is not compatible.)

#### Calibration certificate option

**4338B-1A7** ISO 17025 compliant calibration

## Test fixtures and accessories:

**16005-60011** Kelvin clip lead (1 lead only)

**16005-60012** Kelvin IC clip lead, red clip (1 lead only)

**16005-60014** Kelvin IC clip lead, black clip (1 lead only)

**16006-60001** pin-type probe lead (1 lead only)

**16007-60001** alligator clip lead, red (1 lead only)

**16007-60002** alligator clip lead, black (1 lead only)

**16143-60011** mating cable (Requires 2 leads)

**16338A** test lead kit.

Includes 16005-60011, 16005-60012/14, 16006-60001, 16007-60001/2 leads, 16143-60011 mating cable and carrying case.

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1. Manual is not furnished as standard.

## Web Resource

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



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