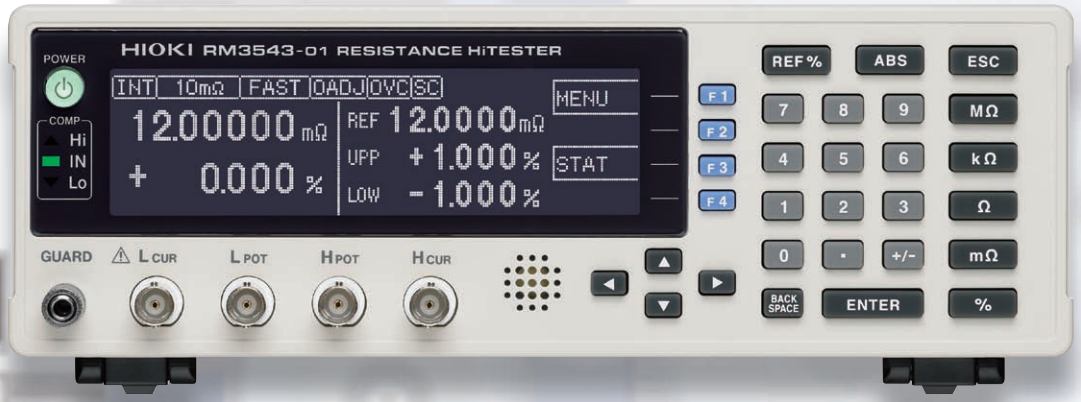
HIOKI

New

RESISTANCE HiTESTER
RM3543/RM3543-01

Component measuring instruments



CE

Resistance Meter for Ultra-low and Low Shunt Resistance

Measuring 0.1 mΩ with a High Accuracy of ±0.16% and High Resolution of 0.01 μΩ*

The **RM3543** and **RM3543-01** Resistance HiTESTERs can measure DC resistance such as a low shunt resistance with high speed and high accuracy using the DC four-terminal method. Shunt resistance of 0.1 mΩ can be measured with an accuracy of ±1%. The resistance meters provide advanced contact-check, comparator, and data export functions. In addition, its intuitive user interface and strong noise immunity are suitable for use in automated systems.

* When 10 mΩ range, measurement speed SLOW, and average 16 times are set

ISO 9001 JMI-0216

ISO14001 JQA-E-90091

INTERNET HIOKI Website

www.hioki.com

HIOKI company overview, new products, environmental considerations and other information are available on our website.

Shunt Resistance Meters Capable of Measuring 0.1 mΩ

RESISTANCE HiTESTER RM3543/RM3543-01

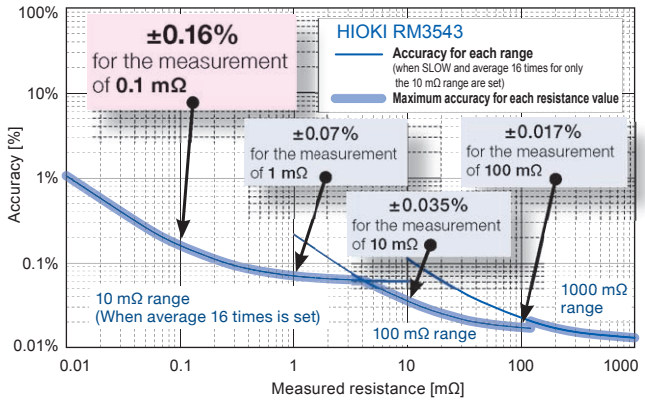
Features

- Measure 0.1 mΩ with a high accuracy of ±0.16%
- Superb repeatable measurement accuracy
- User-friendly operability

1. Ultra-accurate and high-resolution resistance meter ideal for incorporation in automated systems.

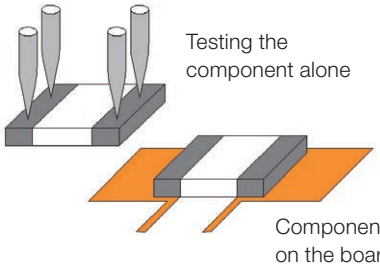
Advanced Enough to Measure 0.1 mΩ ±1% Shunts with Room to Spare

The shunt resistance meters provide higher efficiency and accuracy. Using the AVERAGE function, 0.1mΩ ±1% shunts can be measured at a high ±0.16% accuracy and high resolution of 0.01 μΩ



Scaling Function Corrects Differences to Simulate Testing Component Mounted on Board

The scaling function can correct the differences in the measurement resistance values between the component alone and the component mounted on the board. The function is useful in testing a current detection resistor for low resistances such as a shunt resistance.



OVC (Offset Voltage Compensation)

Thermal EMF occurs at the contact point of different metals. This voltage affects measurements, and if large enough, can cause measurement errors. The offset voltage compensation function minimizes the effect of thermal EMF to maintain measurement accuracy. Particularly when measuring shunt resistances and low resistances where the detection voltage is small, OVC is essential to maintain accuracy.

Maximum Measurement Current of 1 A and Pulse Application Function Reduce Heat Generation of Samples

A pulse application function that applies current only during measurement reduces heat generation that may cause unstable resistance measurement values. In addition, the maximum measurement current of 1 A, a thermal electromotive force cancellation function, and an ultra-low noise measurement circuit minimize the variation in the measurement values.

Easy Setup Using Numerical Keypad

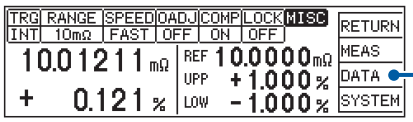
The user-friendly interface features a high-contrast graphic LCD display, function keys and numerical keypad. Numbers can be input from the numerical keypad easily and speedily to configure the settings for the comparator.

Contact Improver and Check Functions

2. Positive contact assures reliable measurements

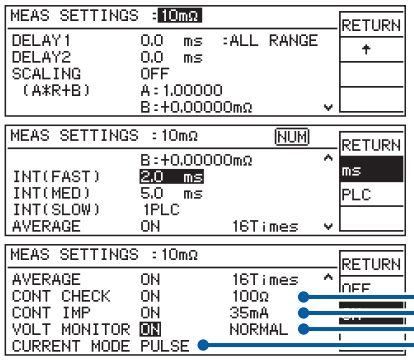
Select contact-check and make other adjustments to ensure accurate measurement and the best performance.

Configuration Screen (MISC)



Measurement Configuration Screen (MEAS)

Configure the settings for various types of contact-check and fine-tune the measurement timing.



● Always-On Contact Checking

High-speed, reliable measurements are achieved by performing contact checks while measuring (instead of before and after, as done until now).

● Contact Improver Function Makes Reliable Contacts Quickly

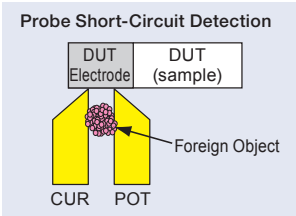
The "Contact Improver" function improves bad contacts between probes and test samples. Contacts errors are reduced by penetrating oxidation and impurities between probes and samples.
Reducing contact errors can increase productivity and quality. The intensity of the Contact Improver function can be adjusted to suit the probe type.

● Voltage Monitor Function Monitors Contact Condition Changes

The Voltage Monitor function detects large voltage fluctuations due to changes in current terminal contact resistance or noise from mechanical vibrations as contact errors. This increases the reliability of the measured values.

● Probe Short-Circuit Detection Function Ensures Reliable Four-Terminal Measurements

A conductive foreign object between the POT and CUR probe tips inhibits reliable four-terminal measurements. Short-circuited probe anomalies are detected by checking the resistance between these tips when not measuring.



3. Speed and functions required for automated systems have been achieved

● Strong Noise Immunity Meeting the IEC Standard Requirements Ensures Stable Operation in an Industrial Noise Environment

The noise immunity meets the requirements for the IEC61326, 61000-3-2, and 61000-3-3 standards. Even if noise is generated by the on-off operation of a large inductor nearby, the impact on the measurement values is minimized.

● Settings Monitor Function Minimizes Risk of Human Error

When using two instruments, a difference in settings disables TRIG input and causes a warning notification.
This function eliminates setting mistakes caused by human error.

● High-speed Data Export and Data Memory Functions

High-speed processing of measured values enables high-speed export to the external interfaces. (RS-232C: 2 ms and GP-IB: 1 ms) Furthermore, the memory function to store 30,000 records enables batch transfer. Statistical calculation and data printing functions useful for production control are also available.

● Measurement Times *1,*2

Values in parenthesis are for 50 Hz (where timing depends on line frequency), units are in milliseconds

Range	Measurement Speed		
	FAST	MED	SLOW
10mΩ	11	17	40 (47)
100mΩ (1A)	5.0	13	36 (43)
100mΩ (100mA)	3.8	13	36 (43)
1000mΩ	2.0	6.4	35 (41)
10Ω	1.6	6.0	34 (41)
100Ω	1.6	4.0	34 (41)
1000Ω	1.6	4.0	34 (41)

Tolerance: ±10% ±0.2 ms

*1. Under default settings except those specified, without retries.
*2. The measurement time for the average n times is obtained by multiplying the above measurement time by a factor of n.
Example: The measurement time for the 10 mΩ range, SLOW, and the average 16 times is 640 (752) ms.

RM3543 Measurement Accuracy

Conditions of Guaranteed Accuracy

● After 30-minute warm-up time. ● Add ±(0.1% measurement accuracy)/ºC to the accuracy specifications below between 0 and 18ºC, and between 28 and 40ºC
● Temperature variation after self-calibration must be within ±2ºC.

Resistance Measurement [1-year accuracy (@23 ±5ºC, 80% RH or less)]

Accuracy = ±(% rdg. + % f.s.)
(f.s. = calculated 1,000,000 dgt., where 0.001% f.s. = 10 dgt.)

Example. 0.015 + 0.008 ..... 0.015% rdg. + 0.008% f.s.

Range	Maximum display Value*1	Resolution	FAST	MEDIUM	SLOW	Measurement Current*2	OVC	Open-Circuit Voltage
10mΩ (Average 16 times*3)	12.00000mΩ	10nΩ	0.060+0.005	0.060+0.003	0.060+0.001*3	1A	ON	20Vmax*4,*5
10mΩ					0.060+0.002			
100mΩ (1A)	120.0000mΩ	100nΩ	0.060+0.003	0.060+0.002	0.060+0.001	1A	ON	
100mΩ (100mA)	120.0000mΩ	100nΩ	0.015+0.008	0.015+0.003	0.015+0.002	100mA	ON	
1000mΩ	1200.000mΩ	1μΩ	0.012+0.003	0.012+0.002	0.012+0.001	100mA	ON	
10Ω	12.00000Ω	10μΩ	0.010+0.003	0.008+0.002	0.008+0.001	10mA	ON	
100Ω	120.0000Ω	100μΩ	0.009+0.003	0.007+0.002	0.007+0.001	10mA	ON	
1000Ω	1200.000Ω	1mΩ	0.008+0.003	0.006+0.002	0.006+0.001	1mA	ON	

*1. Negative values can be up to 10% of positive full scale. *2. Measurement current precision is ±5%.
*3. When the average ON 16 times or more is set (SLOW is specified only for the 10 mΩ range, other specifications not dependent on AVERAGE setting.)
*4. Voltage when not measuring is 20 mV or less, with current mode set at PULSE and Contact Improver Setting set at OFF/PULSE (measured with a voltmeter having 10 MΩ).
*5. With the sum of resistances of the cables, sample, and contacts less than (open-circuit voltage) / (measurement current).
Example: 1 A measurement current can be used when the sum of resistances of the cables, sample, and contacts is no more than 2 Ω.

RM3543 Specifications

Measurement types	Resistance: 0.00000 mΩ (10 mΩ range) to 1200.000 Ω
Measurement method	Four-terminal, constant-current DC Measurement terminals: 22-mm BNC female jacks
Range switching	Comparator on: Auto-range setting according to comparator reference or upper threshold setting. Comparator off: Manual range setting
Zero-Adjustment	Range: -1 to 10 Ω (wiring resistance compensation for two-terminal measurements)
Trigger	Internal or External
Sampling	Fast, Medium, and Slow
Integration time setting function*1	0.1 to 100.0 ms, PLC*2 setting available 1 to 5 PLC @ 50 Hz, 1 to 6 PLC @60 Hz *2. One PLC = one power line cycle (mains waveform period)
Delay	DELAY1 = Set to allow for mechanical delay of trigger input and probing (affects all ranges), from 0.0 to 100.0 ms DELAY2*1 = Set to allow for measurement object response (each range independently), from 0.0 to 100.0 ms
Functions	Self-calibration, probe short-circuit detection, Contact Improver, current mode setting, OVC (offset voltage compensation), settings monitor, retry, average (OFF, 2 to 32 times), scaling, statistical calculations, key-lock, comparator (relative tolerance or absolute range modes), EOM pulse width setting, data export, binary data output, auto-memory
Measurement fault detection functions	Out-of-range detection, contact check, current monitor, voltage monitor
Memory storage	30,000 values (volatile memory, no backup)
Interfaces	EXT I/O, RS-232C, Printer, Settings Monitor Functional terminals (SET MONITOR) GP-IB (Model RM3543-01)
RS-232C bit rates	9,600, 19,200, or 38,400 bps

RM3543 General Specifications

Operating temperature and humidity	0ºC (32ºF) to 40ºC (104ºF), 80% RH or less (non-condensating)
Storage temperature and humidity	10ºC (50ºF) to 50ºC (122ºF), 80% RH or less (non-condensating)
Operating environment	Indoors, Pollution Degree 2, up to 2,000 m (6,562 ft) ASL
Rated mains supply voltage	100 to 240 V AC ±10%
Rated mains supply frequency	50 / 60 Hz
Power consumption	40 VA
Insulation withstand potential	1.62 kV AC for 15s, with 10 mA cutoff current Between all mains supply terminals and protective ground, interfaces, and measurement jacks
Dimensions	Approx. 260 mm (10.24 in) W × 88 mm (3.46 in) H × 300 mm (11.81 in) D (without projections)
Mass	Approx. 3.0 kg (105.8 oz)
Accessories	One each power cord, EXT I/O male plug
Applicable Standards	Safety: EN61010-1 EMC: EN61326, EN61000-3-2, EN61000-3-3

*1. Settable for each range independently

Odering information

RESISTANCE HiTESTER RM3543
RESISTANCE HiTESTER RM3543-01
(with GP-IB interface)

Test fixtures are not supplied with the unit.
Select an optional test fixture when ordering.

● Optional accessories

4-TERMINAL PROBE 9140 (1 m (3.28 ft))
TEST FIXTURE 9262 (direct connection type)
SMD TEST FIXTURE 9263 (direct connection type)
4-TERMINAL PROBE 9500 (1 m (3.28 ft))
GP-IB CONNECTION CABLE 9151-02 (2 m (6.56 ft))
RS-232C CABLE 9637 (9-pin to 9-pin crossed cable / 1.8 m (5.91 ft))
RS-232C CABLE 9638 (9-pin to 25-pin crossed cable / 1.8 m (5.91 ft))

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