

High-speed, Large-capacitance MLCC Inspection with Constant Voltage

C HiTESTER 3504



GP-IB

RS-232C

CE

3 Year Warranty

- High speed measurement of 2ms
- Supports C measurements with voltage dependency characteristics through the use of constant voltage testing (CV)
- Model 3504-60 can detect contact failure on all 4 terminals for increased reliability
- BIN function on the 3504-60/-50 is ideal for sorting machines
- Model 3504-40 offers high speed and affordability, perfect for integrating into taping machines
- In all models, contact error is constantly monitored during measurement, contributing to increased yield

Model No. (Order Code)	3504-40	(Built-in RS-232C interface)
	3504-50	(Built-in GP-IB, RS-232C)
	3504-60	(Built-in GP-IB, RS-232C)

This product is not supplied with measurement probes or test fixtures. Please select and purchase the measurement probe or test fixture options appropriate for your application separately. For an RS-232C connection: A crossover cable for interconnection can be used. You can use the RS-232C CABLE 9637 without hardware flow control.

Basic specifications (Accuracy guaranteed for 6 months)

Measurement parameters	C (capacitance), D (loss coefficient tan δ)
Measurement range	C: 0.9400 pF to 20.0000 mF, D: 0.00001 to 1.99999
Basic accuracy	(Typ.) C: ±0.09 % rdg ±10 dgt, D: ±0.0016
Measurement frequency	120 Hz, 1 kHz
Measurement signal level	100 mV (3504-60 only), 500 mV, 1 V rms CV 100 mV Measurement range: up to 170 μF range (Source frequency 1 kHz), up to 1.45 mF range (Source frequency 120 Hz) CV 500 mV Measurement range: up to 170 μF range (Source frequency 1 kHz), up to 1.45 mF range (Source frequency 120 Hz) CV 1V Measurement range: up to 70 μF range (Source frequency 1 kHz), up to 700 μF range (Source frequency 120 Hz)
Output impedance	5Ω (In open terminal voltage mode outside of the CV measurement range)
Display	LED (six digits, full scale count depends on measurement range)
Measurement time	2 ms (Typ. value. Depends on measurement configuration settings)
Functions	4-terminal contact check function (3504-60 only) BIN (measurement values can be classified by rank) (3504-50, 3504-60), Trigger-synchronous output, Setting configurations can be stored, Comparator, Averaging, Low-C reject (bad contact detection), Chatter detection, EXT. I/O, RS-232C GP-IB (3504-50, 3504-60)
Power supply	Selectable from 100, 120, 220 or 240 V AC ±10 %, 50/60 Hz, 110 VA max.
Dimensions and mass	260 mm (10.24 in)W × 100 mm (3.94 in)H × 220 mm (8.66 in)D, 3.8 kg(134.0 oz)
Included accessories	Power cord ×1, Instruction manual ×1, Spare fuse ×1

PC communication



GP-IB CONNECTOR CABLE 9151-02
2m (6.56 ft) length

Probe and Test fixtures



PINCHER PROBE L2001
Cable length 73 cm (2.40 ft), DC to 8 MHz, impedance characteristics of 50 Ω, 4-terminal pair configuration, tip electrode spacing: 0.3 (0.01 in) to 6 mm (0.24 in)



CONTACT TIPS IM9901
To replace the tip on the L2001, regular size, bundled with the L2001



CONTACT TIPS IM9902
To replace the tip on the L2001, small size



SMD TEST FIXTURE 9699
Direct connection type. For measuring SMDs with electrodes on the bottom. DC to 120 MHz, test sample dimensions: 1.0 mm (0.04 in) to 4.0 mm (0.16 in) wide, max. 1.5 mm (0.06 in) high



SMD TEST FIXTURE 9677
Direct connection type. For measuring SMDs with electrodes on the side. DC to 120 MHz, test sample dimensions: 3.5 mm ±0.5 mm (0.14 in ±0.02 in)



SMD TEST FIXTURE 9263
Direct connection type. DC to 8 MHz, test sample dimensions: 1 mm (0.04 in) to 10 mm (0.39 in)



TEST FIXTURE 9262
Direct connection type. DC to 8 MHz, measurable conductor diameter: ø0.3 (0.01 in) to 2 mm (0.08 in)



TEST FIXTURE 9261
DC to 8 MHz, 1 m (3.28 ft) length, impedance characteristics of 75 Ω



4-TERMINAL PROBE 9140
DC to 100 kHz, 1 m (3.28 ft) length, impedance characteristics of 75 Ω

High-precision Portable Resistance Meter Measures from μΩ to MΩ

RESISTANCE METER RM3548



USB 2.0

CE

3 Year Warranty

- 0.02 % basic accuracy, 0.1 μΩ max. resolution, 1A max. testing current
- Measure from 0.0 μΩ (testing current 1 A) to 3.5 MΩ
- Easily record up to 1,000 data points in memory simply by applying the instrument's probes
- Smoothly capture temperature-rise test data using interval measurement
- Portable design is ideal for maintenance and testing of large equipment

Model No. (Order Code) **RM3548**

Basic specifications (Accuracy guaranteed for 1 year)

Resistance range	3 mΩ (3.5000 mΩ display max., 0.1 μΩ resolution) to 3 MΩ range (3.5000 MΩ display max., 100 Ω resolution), 10 steps Measurement accuracy: ±0.020 % rdg ±0.007 % f.s.
Testing current	[at 3 mΩ range] 1 A DC to [at 3 MΩ range] 500 nA DC
Open-terminal voltage	5.5 V DC max.
Temperature measurement	-10.0°C to 99.9°C, accuracy: ±0.5°C (Temperature Sensor Z2002 and RM3548 combined accuracy)
Measurement speed	Fixed
Display refresh rate	Without OVC: approx. 100ms, With OVC: approx. 230ms
Functions	Temperature correction, temperature conversion, offset voltage compensation (OVC), comparator (ABS/REF%), length conversion, judgment sound setting, auto hold, auto power save (APS), Averaging, panel store/panel load, USB communication interface (RM3548 internal memory is recognized as a mass storage device when connected to a PC)
Memory storage	Number of recordable data points: (manual/auto) Up to 1,000, (interval) Up to 6,000; Interval: 0.2s to 10.0s (0.2s steps); Acquisition of data from memory: display, USB mass storage (CSV, TXT files)
Power supply	LR6 (AA) Alkaline batteries ×8, Continuous use: 10 hours (Under our company's conditions), Rated power consumption: 5 VA max.
Dimensions and mass	192 mm (7.56 in) W × 121 mm (4.76 in) H × 55 mm (2.17 in) D, 770 g (27.2 oz)
Included accessories	Clip type lead L2107 ×1, Temperature sensor Z2002 ×1, LR6 Alkaline battery ×8, Instruction manual ×1, USB Cable(A-to-mini B type) ×1, Strap ×1, Spare fuse ×1

*The L2107, Z2002 are bundled with the RM3548

Measurement Leads



CLIP TYPE LEADS L2107
A: 130 mm (5.12 in), B: 84 mm (3.31 in), L: 1.1 m (3.61 ft), 60 V DC



FOUR TERMINAL LEAD 9453
A: 280 mm (11.02 in), B: 118 mm (4.65 in), L: 1.36 m (4.46 ft), 60 V DC



PIN TYPE LEAD 9465-10
A: (red) 45 mm (1.77 in.), (black) Max. 400 mm (15.75 in.), B: 177 mm (6.97 in.), L: 1925 mm (6.32 ft)(red)



TIP PIN 9465-90
To replace the tip on the 9465-10, (one piece)



PIN TYPE LEAD 9465-11
A: (red) 45 mm (1.77 in.), (black) 1970 mm (6.46 ft), B: 177 mm (6.97 in.), L: (red) 1980 mm (6.5 ft), (black) 3900 mm (12.8 ft)



PIN TYPE LEAD 9772
A: (red) 45 mm (1.77 in.), (black) Max. 400 mm (15.75 in.), B: 173 mm (6.81 in.), L: 1921 mm (6.30 ft)(red)



TIP PIN 9772-90
To replace the tip on the 9772, L2100, (one piece)



LARGE CLIP TYPE LEAD 9467
A: 300 mm (11.81 in), B: 131 mm (5.16 in), L: 1350 mm (4.43 ft), tip ø 28 mm (1.10 in), 50 V DC



TEMPERATURE SENSOR Z2002
100 mm (3.94 in) length

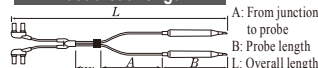


LED COMPARATOR ATTACHMENT L2105
2 m (6.56 ft) length



ZERO ADJUSTMENT BOARD 9454
For the L2100, 9465-10, 9465, 9461

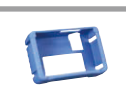
About lead length



Note: For L2107, length "A" can be extended by roughly 0.8 m (2.62 ft) by cutting the binding tube. Length "A" for all other leads cannot be extended.



CARRYING CASE C1006
For the RM3548

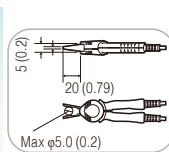


PROTECTOR Z5041

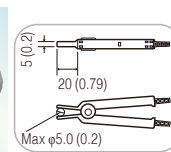
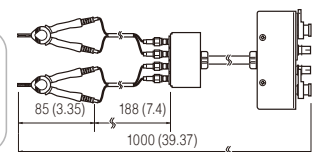
For LCR Meters and Impedance Analyzers Probes & Test Fixtures and Applicable SMD size

Please use the probes specified below. For probe characteristic impedance of 50 Ω, a 50 Ω coaxial cable is used. For probe characteristic impedance of 75 Ω, a 75 Ω coaxial cable is used.

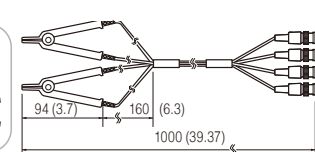
Probes and Test Fixtures for Lead Components



FOUR-TERMINAL PROBE L2000
Cable length 1 m (3.28 ft), DC to 8 MHz, impedance characteristics of 50 Ω, 4-terminal pair configuration, measurable conductor diameter: φ0.3 (0.01 in) to 5 mm (0.20 in)



4-TERMINAL PROBE 9140-10
Cable length 1 m (3.28 ft), DC to 200 kHz, impedance characteristics of 50 Ω, 4-terminal pair configuration, measurable conductor diameter: φ0.3 (0.01 in) to 5 mm (0.20 in)



4-TERMINAL PROBE 9140
Cable length 1 m (3.28 ft), DC to 100 kHz, impedance characteristics of 75 Ω, 4-terminal configuration, measurable conductor diameter: φ0.3 (0.01 in) to 5 mm (0.20 in)



TEST FIXTURE 9261-10
Cable length 1 m (3.28 ft), DC to 8 MHz, impedance characteristics of 50 Ω, 4-terminal pair configuration, measurable conductor diameter: φ0.3 (0.01 in) to 1.5 mm (0.06 in)



TEST FIXTURE 9261
Impedance characteristics of 75 Ω, 4-terminal configuration, Other specifications are the same as for the 9261-10



TEST FIXTURE 9262
Direct connection type, DC to 8 MHz, measurable conductor diameter: φ0.3 (0.01 in) to 2 mm (0.08 in)

Test Fixtures for SMDs

Applicable SMD size

✓ : Measurable
▲ : Not recommended

SMD type	Length: L	Width: W	IM9202	IM9201	IM9110	IM9100	L2001 with tip IM9901	L2001 with tip IM9902	9699	9677	9263
JIS CODE (metric)	EIA CODE (inch)										
0201	008004	0.25 mm (0.01 in)			✓						
0402	01005	0.40 mm (0.02 in)				✓					
0603	0201	0.60 mm (0.02 in)		✓		✓		✓		▲	
1005	0402	1.00 mm (0.04 in)		✓		✓		✓		✓	
1608	0603	1.60 mm (0.06 in)	✓	✓		✓		✓	✓	✓	▲
2012	0805	2.00 mm (0.08 in)	✓	✓		✓		✓	✓	▲	✓
3216	1206	3.20 mm (0.13 in)	✓	✓		✓		✓	▲	✓	✓
3225	1210	3.20 mm (0.13 in)	✓	✓		✓		✓	▲		✓
4532	1812	4.50 mm (0.18 in)	✓			✓		✓			✓
5750	2220	5.70 mm (0.22 in)	✓			✓		✓			✓

Use in combination



TEST FIXTURE STAND IM9200
Includes magnifying glass



TEST FIXTURE IM9202
Use in combination with the IM9200



SMD TEST FIXTURE IM9201
Use in combination with the IM9200



ADAPTER(3.5mm/7mm) IM9906
3.5 mm (0.14 in) male to 7 mm (0.28 in) conversion



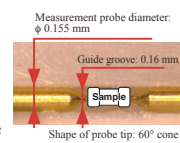
CALIBRATION KIT IM9905
Open/Short/Load set



SMD TEST FIXTURE IM9110
Direct connection two-terminal measurement type for measuring SMDs, DC to 1 MHz, measurable sample sizes: 008004 (inch)

Probe contact

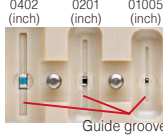
Advanced contact technology delivers highly reproducible measurement results.



SMD TEST FIXTURE IM9100
Direct connection type, SMDs with electrodes on the bottom, DC to 8 MHz, metric (inch): 0402(01005), 0603(0201), 1005(0402)

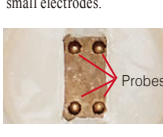
SMD positioning mechanism

Test pieces can be positioned easily and reliably using templates and guide grooves for various SMD sizes.

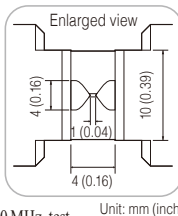


High-precision four-terminal measurement

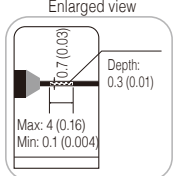
The fixture uses stable, high-precision four-terminal measurement to reliably apply four probes to the SMD's small electrodes.



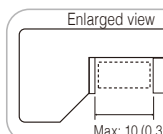
SMD TEST FIXTURE 9699
Direct connection type. For measuring SMDs with electrodes on the bottom; DC to 120 MHz, test sample dimensions: 1.0 mm (0.04 in) to 4.0 mm (0.16 in) wide, max. 1.5 mm (0.06 in) high



SMD TEST FIXTURE 9677
Direct connection type. For measuring SMDs with electrodes on the side; DC to 120 MHz, test sample dimensions: 3.5 mm ±0.5 mm (0.14 in ±0.02 in)



SMD TEST FIXTURE 9263
Direct connection type, DC to 8 MHz, Test sample dimensions: 1 mm (0.04 in) to 10 mm (0.39 in)



PINCHER PROBE L2001
Cable length 73 cm (2.40 ft), DC to 8 MHz, impedance characteristics of 50 Ω, 4-terminal pair configuration, tip electrode spacing: 0.3 (0.01 in) to 6 mm (0.24 in)



CONTACT TIPS IM9901
To replace the tip on the L2001, regular size, bundled with the L2001



CONTACT TIPS IM9902
To replace the tip on the L2001, small size

Resistance Meters

Featuring Super-high Accuracy and Multi-channel Capabilities (20 channels with 4-terminal measurement)

RESISTANCE METER RM3545



- 0.006% basic accuracy, 0.01 $\mu\Omega$ max. resolution, 1A max. testing current
- Measure from 0.00 $\mu\Omega$ (testing current 1 A) to 1200 M Ω
- Multiplexer Unit Z3003 (option) provides 20-channels of 4-terminal measurements for a complete assessment of multi-point signals (RM3545-02 only)
- Low-power resistance measurement with an open voltage not exceeding 20 mV
- High-speed, comprehensive productivity support delivers decisions in as little as 2.0 ms from start to finish

Model No. (Order Code)	RM3545
	RM3545-01 (Built-in GP-IB interface)
	RM3545-02 (Support for the multiplexer unit)

Basic specifications (Accuracy guaranteed for 1 year)

Resistance range	10 m Ω (12.00000 m Ω display max., 10 n Ω resolution) to 1000 M Ω range (1200.0 M Ω display max., 100 k Ω resolution), 12 steps [LP ON] 1000 m Ω (1200.00 m Ω display max., 10 $\mu\Omega$ resolution) to 1000 Ω range (1200.00 Ω display max., 10 m Ω resolution), 4 steps Measurement accuracy: $\pm 0.006\%$ rdg $\pm 0.001\%$ f.s.
Testing current	1 A DC to 100 nA DC [LP ON] 1 mA to 5 μ A DC
Open-terminal voltage	20 V DC max. (10 k Ω range or more), 5.5 V DC max. (1000 Ω range or less) [LP ON] 20 mV DC max.
Temperature measurement	-10.0°C to 99.9°C, accuracy: $\pm 0.5^\circ\text{C}$ (Temperature Sensor Z2001 and RM3545 combined accuracy), -99.9°C to 999.9°C (analog input)
Measurement speed	FAST (2.0ms) / MED (50Hz: 22ms, 60Hz: 19ms) / SLOW1 (102ms) / SLOW2 (202ms) * Measurement speed is different at each range, 2.0 ms is the fastest value
Functions	Temperature correction, temperature conversion, offset voltage compensation (OVC), comparator (ABS/ REF%), BIN, key-lock (OFF, menu lock, all lock), display digit count selection function (7-digit/ 6-digit/ 5-digit), automatic power supply frequency settings (AUTO/ 50Hz/ 60Hz), scaling, judgment sound setting, auto hold, averaging, statistical calculations, panel store/panel load, D/A output.
Multiplexer	[Only RM3545-02] Support unit: Z3003 (Install up to 2 units)
Communication interfaces	Select from GP-IB (RM3545-01 only), RS-232C, PRINTER (RS-232C), or USB. Remote function, communications monitor function, data output function, memory (50)
Power supply	100 V to 240 V AC, 50 Hz/60 Hz, Rated power consumption: 40 VA max.
Dimensions and mass	215 mm (8.46 in) W \times 80 mm (3.15 in) H \times 306.5 mm (12.07 in) D [RM3545/RM3545-01] 2.5 kg (88.2 oz), [RM3545-02] 3.2 kg (112.9 oz)
Included accessories	Power cord $\times 1$, Clip type lead L2101 $\times 1$, temperature sensor Z2001 $\times 1$, Male EXT I/O connector $\times 1$, Instruction manual $\times 1$, Application disc $\times 1$, USB cable (A-to-B type) $\times 1$, Spare fuse $\times 1$

*The L2101, Z2001 are bundled with the RM3545 series

Measurement Leads / Input scanner

<p>PIN TYPE LEAD L2100 A: 300 mm (11.81 in), B: 172 mm (6.77 in), L: 1.4 m (4.59 ft), 1000 V DC max.</p>	<p>TIP PIN 9772-90 To replace the tip on the Pin type lead 9772, L2100/L2110, (one piece)</p>	<p>CLIP TYPE LEAD L2101 A: 250 mm (9.84 in), B: 84 mm (3.31 in), L: 1.5 m (4.92 ft)</p>	<p>TIP PIN 9770-90 Replacement tip for pin type lead 9770, L2102</p>	<p>PIN TYPE LEAD L2102 A: 250 mm (9.84 in), B: 178 mm (7.01 in), L: 1.5 m (4.92 ft)</p>	<p>TIP PIN 9771-90 Replacement tip for pin type lead 9771, L2103</p>	<p>PIN TYPE LEAD L2103 A: 250 mm (9.84 in), B: 176 mm (6.93 in), L: 1.5 m (4.92 ft)</p>	<p>4-TERMINAL LEAD L2104 A: 280 mm (11.02 in), B: 149 mm (5.87 in), L: 1.5 m (4.92 ft)</p>
<p>FOUR-POINT ARRAY PROBE RM9010-01 A: 1215 mm (47.83 in), B: 73.5 mm (2.89 in), L: 1.5 m (4.92 ft)</p>	<p>FOUR-POINT ARRAY PROBE RM9010-02 A: 1120 mm (44.09 in), B: 84 mm (3.31 in), L: 1.5 m (4.92 ft)</p>	<p>TEMPERATURE SENSOR Z2001 1.75 m (5.74 ft) length</p>	<p>LED COMPARATOR ATTACHMENT L2105 2 m (6.56 ft) length</p>	<p>About lead length A: From junction to probe B: Probe length L: Overall length Note: For L2101 to L2104, length "A" can be extended by roughly 1.1 m (3.61 ft) by cutting the binding tube.</p>		<p>MULTIPLEXER UNIT Z3003 4-wire 10ch or 2-wire 21ch input scanning</p>	

*The 9151-02 is only for the RM3545-01

PC Communication

<p>RS-232C CABLE 9637 For the PC, 9pin - 9pin, cross, 1.8m (5.91 ft) length</p>	<p>GP-IB CONNECTOR CABLE 9151-02 2m (6.56 ft) length</p>
--	---

Long-Selling Model for Low Resistance Measurement

RESISTANCE METER RM3544



USB 2.0
RM3544-01

RS-232C
RM3544-01



3 year
Warranty

- 0.02 % basic accuracy, 1 $\mu\Omega$ max. resolution, 300 mA max. measurable current
- Measure from 0.000 m Ω (testing current 300 mA) to 3.5 M Ω
- Probe for guard jack use and increased measurement current yield an instrument that's more resistant to noise
- Optional LED COMPARATOR AT ATTACHMENT and high-volume judgment tones combine to ensure PASS/FAIL judgments are communicated reliably in the noisy environment of the production floor
- EXT I/O interface with NPN/PNP support can accommodate a variety of automated production lines (-01 model)

Model No. (Order Code) **RM3544** (No interfaces)
RM3544-01 (Built-in EXT I/O, RS-232C, USB)

Basic specifications (Accuracy guaranteed for 1 year)

Resistance range	30 m Ω (35,000 m Ω display max., 1 $\mu\Omega$ resolution) to 3 M Ω range (3,5000 M Ω display max., 100 Ω resolution), 9 steps Measurement accuracy: $\pm 0.020\%$ rdg $\pm 0.007\%$ f.s.
Testing current	[at 30 m Ω range] 300 mA DC to [at 3 M Ω range] 500 nA DC
Open-terminal voltage	5.5 V DC max.
Temperature measurement	-10.0 $^{\circ}\text{C}$ to 99.9 $^{\circ}\text{C}$, accuracy: $\pm 0.5\text{ }^{\circ}\text{C}$ (Temperature Sensor Z2001 and RM3544 combined accuracy)
Measurement speed	FAST (50Hz: 21ms, 60Hz: 18ms) / MED (101ms) / SLOW (401ms)
Display refresh rate	N/A
Functions	Temperature correction, comparator (ABS/REF%), key-lock (OFF, menu lock, all lock), display digit count selection function (5 digits/ 4 digits), automatic power supply frequency settings (AUTO/50Hz/60Hz), scaling, judgment sound setting, auto hold, averaging, panel store/panel load
Memory storage	N/A
Communication interfaces	[Only RM3544-01] Select from RS-232C, PRINTER (RS-232C), or USB Remote function, communications monitor function, data output function
Power supply	100 V to 240 V AC, 50 Hz/60 Hz, Rated power consumption: 15 VA max.
Dimensions and mass	215 mm (8.46 in) W \times 80 mm (3.15 in) H \times 166 mm (6.54 in) D [RM3544] 0.9 kg (31.7 oz), [RM3544-01] 1.0 kg (35.3 oz)
Included accessories	[RM3544] Power cord \times 1, Clip type lead L2101 \times 1, Instruction manual \times 1, Spare fuse \times 1 [RM3544-01] Power cord \times 1, Clip type lead L2101 \times 1, Male EXT I/O connector \times 1, Instruction manual \times 1, Application disc \times 1, USB cable (A-to-B type) \times 1, Spare fuse \times 1

Resistance Meters

*The L2101 is bundled with the RM3544 series

Measurement Leads / Input scanner

PIN TYPE LEAD L2100
A: 300 mm (11.81 in), B: 172 mm (6.77 in), L: 1.4 mm (4.59 ft), 1000 V DC max.

TIP PIN 9772-90
To replace the tip on the Pin type lead 9772, L2100/L2110, (one piece)

CLIP TYPE LEAD L2101
A: 250 mm (9.84 in), B: 84 mm (3.31 in), L: 1.5 m (4.92 ft)

TIP PIN 9770-90
Replacement tip for pin type lead 9770, L2102

PIN TYPE LEAD L2102
A: 250 mm (9.84 in), B: 178 mm (7.01 in), L: 1.5 m (4.92 ft)

TIP PIN 9771-90
Replacement tip for pin type lead 9771, L2103

PIN TYPE LEAD L2103
A: 250 mm (9.84 in), B: 176 mm (6.93 in), L: 1.5 m (4.92 ft)

4-TERMINAL LEAD L2104
A: 280 mm (11.02 in), B: 149 mm (5.87 in), L: 1.5 m (4.92 ft)

TEMPERATURE SENSOR Z2001
1.75 m (5.74 ft) length

LED COMPARATOR ATTACHMENT L2105
2 m (6.56 ft) length

About lead length

A: From junction to probe
B: Probe length
L: Overall length
Note: For L2101 to L2104, length "A" can be extended by roughly 1.1 m (3.61 ft) by cutting the binding tube.

PC Communication

*For the RM3544-01

RS-232C CABLE 9637
For the PC, 9pin - 9pin, cross, 1.8m (5.91 ft) length

Resistance Meter for Ultra-low and Low Shunt Resistance

RESISTANCE HiTESTER RM3543



GP-IB
RM3543-01

RS-232C



3 year
Warranty

- Advanced enough to measure 0.1 m Ω shunts with room to spare at $\pm 0.16\%$ accuracy & 0.01 $\mu\Omega$ resolution performance
- Superb repeatable measurement accuracy
- Advanced contact-check, comparator, and data export functions
- Intuitive user interface and strong noise immunity are ideal for automated systems

Model No. (Order Code) **RM3543**
RM3543-01 (Built-in GP-IB interface)

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

Basic specifications (Accuracy guaranteed for 1 year)

Measurement method	Four-terminal, constant-current DC
Resistance range	10 m Ω (max. 12,000,000 m Ω , 0.01 $\mu\Omega$ resolution) to 1000 Ω range (max. 1200,000 Ω , 1 m Ω resolution), 6 steps
Display	Monochrome graphic LCD 240 \times 64 dot, white LED backlight
Measurement accuracy	[at 10 m Ω range, with SLOW mode, average 16 times settings] $\pm 0.060\%$ rdg $\pm 0.001\%$ f.s.
Testing current	[at 10 m Ω range] 1 A DC to [at 1000 Ω range] 1 mA DC
Open-terminal voltage	20 V DC max. Note: 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 M Ω)
Sampling rate	FAST, MEDIUM, SLOW, 3 settings
Integration time	[at 10 m Ω range, default value] FAST 2.0 ms, MED 5.0 ms, SLOW 1 PLC, Setting range: 0.1 ms to 100.0 ms, or 1 to 5 PLC at 50 Hz, 1 to 6 PLC at 60 Hz Note: PLC = one power line cycle (mains wave-form period)
Other functions	Comparator (compare setting value with measurement value), Delay, OVC (offset voltage compensation), Average, Measurement fault detection, Probe short-circuit detection, Improve contact, Current mode setting (A pulse application function that applies current only during measurement), Auto-memory, Statistical calculations, Settings monitor (when using two instruments, a difference in settings causes warning notification), Retry, Trigger function, etc.
Interfaces	External I/O, RS-232C, Printer (RS-232C), GP-IB (Model RM3543-01)
External I/O	Trigger, Hold input, Comparator output, Settings monitor terminal, Service power output +5V, +12V, etc.
Power supply	100 V to 240 V AC, 50 Hz/60 Hz, 40 VA max.
Dimensions and mass	260 mm (10.24 in) W \times 88 mm (3.46 in) H \times 300 mm (11.81 in) D, 3.0 kg (105.8 oz)
Included accessories	Power cord \times 1, EXT I/O male connector \times 1, Instruction manual \times 1, Operation guide \times 1

4-TERMINAL PROBE 9500
DC to 1 MHz, 1 m (3.28 ft) length

4-TERMINAL PROBE 9140
DC to 100 kHz, 1 m (3.28 ft) length, impedance characteristics of 75 Ω

TEST FIXTURE 9262
Direct connection type, DC to 8 MHz, measurable conductor diameter: $\phi 0.3$ (0.01 in) to 2 mm (0.08 in)

SMD TEST FIXTURE 9263
Direct connection type, DC to 8 MHz, Test sample dimensions: 1 mm (0.04 in) to 10 mm (0.39 in)

PC communication

RS-232C CABLE 9637
For the PC, 9pin - 9pin, cross, 1.8m (5.91 ft) length

GP-IB CONNECTOR CABLE 9151-02
2m (6.56 ft) length

Resistance Meters

High-Speed Resistance Meter Ideal for Automated Lines; Compatible with Super-Small Electronic Components

RESISTANCE METER RM3542A



GP-IB
RM3542-51
RS-232C



- Applied voltage limit function lets you switch the detection voltage to 5 V or less
- Contact improvement function suppresses rush current to aid in probing of super-small components
- Extensive selection of measurement ranges ensures the right detection voltage and delivers stable measurement
- Scaling function corrects for mounting state and test stage differences

Model No. (Order Code) **RM3542-50**
RM3542-51 (Built-in GP-IB interface)

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

Basic specifications (Accuracy guaranteed for 1 year)

Resistance range	[at Low Power OFF] 100 mΩ range (max. 120.0000 mΩ, 0.1 μΩ resolution) to 100 MΩ range (max. 120.0000 MΩ, 100 Ω resolution), 16 steps [at Low Power ON] 1000 mΩ range (max. 1200.000 mΩ, 1 μΩ resolution) to 1000 Ω range (max. 1200.000 Ω, 1 mΩ resolution), 6 steps
Display	Monochrome graphic LCD 240 × 64 dot, white LED backlight
Measurement accuracy	[with SLOW mode, at 100 mΩ range] ±0.015 % rdg ±0.002 % f.s. [with SLOW mode, at 1000 Ω range] ±0.006 % rdg ±0.001 % f.s. (best case)
Testing current	[at 100 mΩ range] 100 mA DC to [at 100 MΩ range] 100 nA DC
Open-terminal voltage	20 V DC max. (with applied voltage limit function enabled: 10 V DC max.)
Sampling rate	FAST, MEDIUM, SLOW, 3 settings
Measurement times	[at 100 Ω / 300 Ω / 1000 Ω ranges, with Low Power OFF] FAST: 0.9 ms, MED: 3.6 ms, SLOW: 17 ms (minimum time)
Integration time	0.1 ms to 100.0 ms, or 1 to 5 PLC at 50 Hz, 1 to 6 PLC at 60 Hz <i>Note: PLC = one power line cycle (mains wave-form period)</i>
Other functions	Comparator (compare setting value with measurement value), Delay (set to allow for mechanical delay of trigger input and probing, or set to allow for measurement object response), Applied Voltage Limit Function, Scaling Function, OVC (offset voltage compensation), Measurement fault detection, Probe short-circuit detection, Improve contact, Auto-memory, Statistical calculations, Settings monitor (when using two instruments, a difference in settings causes warning notification), Retry, Trigger function, Sample printing, etc.
Interfaces	RS-232C, Printer (RS-232C), GP-IB (Model RM3542-51)
External I/O	Trigger, Hold input, Comparator output, Settings monitor terminal
Power supply	100 V to 240 V AC, 50 Hz/60 Hz, 30 VA max.
Dimensions and mass	260 mm (10.24 in) W × 88 mm (3.46 in) H × 300 mm (11.81 in) D, 2.9 kg (102.3 oz)
Included accessories	Power cord ×1, EXT. I/O male connector ×1, Instruction manual ×1, Operation guide ×1

Other options: refer to the detailed catalog

Probe and Test fixtures



SMD TEST FIXTURE IM9100
Direct connection type. For measuring SMDs with electrodes on the bottom. DC to 8 MHz. Measurable sample sizes: 01005 to 0402 (EIA), 0402 to 1005 (JIS)



4-TERMINAL PROBE 9140-10
Cable length 1 m (3.28 ft). DC to 200 kHz, 50 Ω, measurable conductor diameter: ø0.3 mm (0.01 in) to 5 mm (0.20 in)



TEST FIXTURE 9262
Direct connection type, DC to 8 MHz, measurable conductor diameter: ø0.3 (0.01 in) to 2 mm (0.08 in)



SMD TEST FIXTURE 9263
Direct connection type, DC to 8 MHz, Test sample dimensions: 1 mm (0.04 in) to 10 mm (0.39 in)

PC communication



RS-232C CABLE 9637
For the PC, 9pin - 9pin, cross, 1.8m (5.91 ft) length



GP-IB CONNECTOR CABLE 9151-02
2m (6.56 ft) length

Measure in as Fast as 0.9 ms, Optimized for Automated Systems

RESISTANCE HiTESTER RM3542



GP-IB
RM3542-01
RS-232C



- High speed and accuracy maximize productivity in automated systems
- Multiple checking functions ensure proper contact for reliable measurements
- Low-power resistance mode measures chip inductors and EMC suppression components
- Supports sample inspections during the manufacturing process

Model No. (Order Code) **RM3542**
RM3542-01 (Built-in GP-IB interface)

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

Basic specifications (Accuracy guaranteed for 1 year)

Resistance range	[at Low Power OFF] 100 mΩ range (max. 120.0000 mΩ, 0.1 μΩ resolution) to 100 MΩ range (max. 120.0000 MΩ, 100 Ω resolution), 10 steps [at Low Power ON] 1000 mΩ range (max. 1200.000 mΩ, 1 μΩ resolution) to 1000 Ω range (max. 1200.000 Ω, 1 mΩ resolution), 4 steps
Display	Monochrome graphic LCD 240 × 64 dot, white LED backlight
Measurement accuracy	[with SLOW mode, at 100 mΩ range] ±0.015 % rdg ±0.002 % f.s. [with SLOW mode, at 1000 Ω range] ±0.006 % rdg ±0.001 % f.s. (the best case)
Testing current	[at 100 mΩ range] 100 mA DC to [at 100 MΩ range] 100 nA DC
Open-terminal voltage	20 V DC max.
Sampling rate	FAST, MEDIUM, SLOW, 3 settings
Measurement times	[at 100 Ω / 1000 Ω ranges, with Low Power OFF] FAST: 0.9 ms, MED: 3.6 ms, SLOW: 17 ms (minimum time)
Integration time	0.1 ms to 100.0 ms, or 1 to 5 PLC at 50 Hz, 1 to 6 PLC at 60 Hz <i>Note: PLC = one power line cycle (mains wave-form period)</i>
Other functions	Comparator (compare setting value with measurement value), Delay (set to allow for mechanical delay of trigger input and probing, or set to allow for measurement object response), OVC (offset voltage compensation), Measurement fault detection, Probe short-circuit detection, Improve contact, Auto-memory, Statistical calculations, Settings monitor (when using two instruments, a difference in settings causes warning notification), Retry, Trigger function, etc.
Interfaces	RS-232C, Printer (RS-232C), GP-IB (Model RM3542-01)
External I/O	Trigger, Hold input, Comparator output, Settings monitor terminal
Power supply	100 V to 240 V AC, 50 Hz/60 Hz, 30 VA max.
Dimensions and mass	260 mm (10.24 in) W × 88 mm (3.46 in) H × 300 mm (11.81 in) D, 2.9 kg (102.3 oz)
Included accessories	Power cord ×1, EXT. I/O male connector ×1, Instruction manual ×1, Operation guide ×1

Other options: refer to the detailed catalog

Probe and Test fixtures



4-TERMINAL PROBE 9140
DC to 100 kHz, 1 m (3.28 ft) length, impedance characteristics of 75 Ω



TEST FIXTURE 9262
Direct connection type, DC to 8 MHz, measurable conductor diameter: ø0.3 (0.01 in) to 2 mm (0.08 in)



SMD TEST FIXTURE 9263
Direct connection type, DC to 8 MHz, Test sample dimensions: 1 mm (0.04 in) to 10 mm (0.39 in)

PC communication



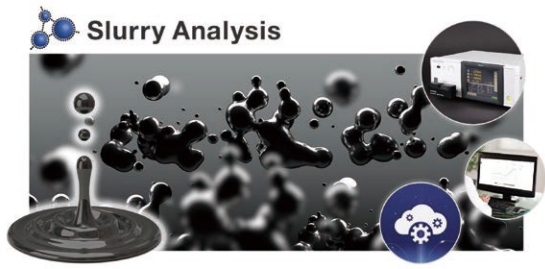
RS-232C CABLE 9637
For the PC, 9pin - 9pin, cross, 1.8m (5.91 ft) length



GP-IB CONNECTOR CABLE 9151-02
2m (6.56 ft) length

For estimating and approaching the ideal slurry internal state

Slurry Analytical System



- A proprietary Hioki algorithm analyzes impedance measured values for LiB electrode slurries.
- Analysis Results “DCR, Rratio, Uniformity” indicate electron conductivity of Slurry.
- The latest version is available anytime by a Cloud-based, easy-to-use analysis tool.
- Able to choose license plan, fit the right solution for your needs.
- Easily measure the impedance of slurry in the measurement environment recommended by HIOKI.

Model No. (Order Code)	SA2631-01	(License card, the period of use is 3 consecutive days.)
	SA2631-03	(License card, the period of use is 30 consecutive days.)
	SA2631-05	(License card, the period of use is 365 consecutive days.)
	SA9001	(ELECTRODE CELL, sold in lots of 50.)
	SA9002	(SA9001 dedicated test fixture.)
	IM3536	(DC, or 4 Hz to 8 MHz)
	IM3536-01	(Special order product: DC, or 4 Hz to 10 MHz.)

*Please purchase electrode cells and licenses as necessary based on your expected frequency of use and experimental plan.
 *Sensitive information will be shared with customers, including during use of analysis functionality.
 Customers are responsible for determining whether to make purchases through a retailer.

Basic specifications (Electrode Cell SA9001)

Material	Container: polypropylene (PP), electrode: brass (nickel plated)
Capacity	Approx. 1 mL
Electrode pin	Diameter (Area where liquid to be measured comes in contact): 3 mm ±0.1 mm Electrode interval: 6 mm ±0.3 mm
Dimensions and mass	Approx. 27W × 42H × 37D mm (1.06"W × 1.65"H × 1.46"D) (including the electrode), approx. 2.3 g (0.1 oz.)

Basic specifications (Test Fixture SA9002)

Measurable frequency	DC to 10 MHz
Connectable sample	SA9001 Electrode Cell
Residual impedance	Residual resistance during short circuit 200 mΩ or less (reference for 100 Hz) Inter-electrode stray capacitance 0.2 pF or less (reference for 1 MHz)
Dimensions and mass	Approx. 98W × 38H × 24D mm (3.86"W × 1.50"H × 0.94"D) (excluding protruding parts), approx. 210 g (7.4 oz.)
Included accessory	Shorting plate for compensation

Measurement conditions*

*If using an instrument other than the IM3536 or IM3536-01 - Use the Electrode Cell SA9001. The analytical algorithm assumes use of the SA9001. - Check whether the Test Fixture SA9002 can be connected to the instrument. - Acquire data under the measurement conditions listed below. - Prepare a CSV file to send to the system.

Measurement parameters	Frequency, Rs (ReZ), X (ImZ)
Frequency sweep range	4 Hz (+3 Hz) to 10 MHz (-5 MHz)
Number of measurement points	Logarithmic interval, 500 points (±10 points)
Applied signal	Constant-voltage, ±100 mV

Available material categories

- The system uses the appropriate analytical algorithm to analyze the data based on the selected material category combination. - You may not be able to select some combinations, and some material categories may not be available. If you encounter this issue, perform the analysis using the default model. - There's no need to specify material proportions. - In some cases, the system may not be able perform analysis. - Hioki plans to add material categories over time.

Active materials	LCO, NMC, NCA, LMO, LFP, Graphite, LTO, Si, SiO, None
Conductive aid	Acetylene black, Carbon nanotube, Graphite
Binder	PVDF, SBR, None
Dispersant	CMC, MC, PVP, None
Solvent	NMP, Water

Quantify Composite Layer Resistance and Interface Resistance in Li-ion Battery Electrode Sheets

ELECTRODE RESISTANCE MEASUREMENT SYSTEM RM2610



- Isolate and quantify composite layer resistance and interface resistance* in positive- and negative-electrode sheets used in lithium-ion batteries.
- Composite layer resistance values and interface resistance* values are helping LIBs to evolve and improve.
- *Contact resistance of current collector and material layer.
- Verify the uniformity of LIB electrode sheets.
- Visualize variations in composite layer resistance and interface resistance caused by differences in materials, composition, and manufacturing conditions.

Model No. (Order Code)	RM2610	(system product)
------------------------	---------------	------------------

Basic specifications

Measurement target	Positive and negative electrode sheets for rechargeable lithium-ion batteries
Measurement parameters	Composite resistivity [Ωcm] Interface resistance (contact resistance) between the composite layer and current collector [Ωcm^2]
Computation method	Inverse problem analysis of potential distribution using the finite volume method
Information necessary for computation	• Composite layer thickness [μm] (for 1 side) • Current collector thickness [μm] • Current collector volume resistivity [Ωcm]
Measurement time	- Contact check + potential measurement : approx. 30 sec. - Calculation : approx. 35 sec. (on a PC with Intel core i5-7200U CPU) The measurement time may vary depending on the measurement target and the processing capacity of the PC.
Measurement current	1 μA (min.) to 10 mA (max.)
Number of probes	46
Recommended PC specifications	CPU: 4 or more threads RAM: 8 GB or greater (4 GB required) Operating system: Windows 7 (64-bit), 8 (64-bit), 10 (64-bit)
Temperature measurement function	Measures temperature near the test fixture
Included accessories	TEMPERATURE SENSOR Z2001 ×1, USB cable ×1, USB license key ×1, Probe check board ×1, Power cord ×1, Instruction manual ×1

*The RM2611 Electrode Resistance Meter requires regular calibration. For more information about calibration, please contact your HIOKI distributor

