300 Times Better Noise Resistance

Max. $2 \times 10^{18} \Omega$ Display
Min. 0.1 fA Resolution
Max. 6.4 ms Measurement Speed
Max. 2000 V Output

SUPER MEGOHM METER
SM7120

Flexible, Multipurpose Design
Electrometer
Picoammeter
IR Meter

Max. 1000 V Output
SM7110

New
4CH Microcurrent Measurement
SM7420
Highly stable measurements with strong noise resistance

The stability you need for high resistance measurements

1/60 Variability, 300x Noise Resistance

Advanced 2 kV floating circuitry

Stability (repeatability) against power supply noise and external noise has improved dramatically due to a combination of new Super Megohm floating circuitry and triaxial connectors. Variability in normal usage environments is reduced to 1/60 compared to previous models, and to 1/300* in conditions where 50 V noise is applied.

* Compared to legacy model, the DSM-8104

16 mm large-diameter triaxial connector

The large-diameter triaxial connector newly adopted for current input terminals has a triple coaxial structure with the internal shield connected to the GUARD (COM) line and the external shield connected to the GROUND. This achieves both stability against noise and safety during high-voltage inspections.
Graphical LCD

Select 3- to 6-Digit Display

Direct Setting Keys

**Supports components with high voltage resistance**

**2000 V / 2×10^{19} \, \Omega** Measurement

Perfect for EVs and other high-voltage applications

Improved high voltage resistance and isolation performance in components are essential to meet the demands for high efficiency in recent years for applications such as automotive parts and wearable devices. The SM7120 can output 2000 V without an external power supply, ensuring that it will remain relevant even as inspection requirements expand going forward.

* 2×10^{19} \, \Omega = 20,000 \text{P (peta)} \, \Omega

**Supports mass production of 1600 units/minute**

Min. 6.4 ms High-Speed Inspection

6.4 ms = 4.1 ms measurement + 2.3 ms contact check

Achieve high-speed measurement with an inspection time (from TRIG input to INDEX output) of 6.4 ms when contact checks that are essential for mass production inspections are included, and 7.0 ms when comparator measurement is included.

**MLCC high-speed inspection with pre-charge function** *

Large-capacity outputs of 2000 V/1.8 mA (SM7120 only) and 1000 V/10 mA are available, to reduce sample charging time. [Charging terminals are equipped as standard.] The max. 50 mA/250 V pre-charge function achieves high throughput for MLCC mass production inspections. *SM7110, SM7120

<table>
<thead>
<tr>
<th>Model</th>
<th>Measurement channel</th>
<th>Maximum output voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM7110</td>
<td>1ch</td>
<td>1000 V</td>
</tr>
<tr>
<td>SM7120</td>
<td>1ch</td>
<td>2000 V</td>
</tr>
<tr>
<td>SM7420</td>
<td>4ch</td>
<td>-----</td>
</tr>
</tbody>
</table>
Simultaneous measurement of temperature and humidity

Temperature and humidity must be managed together, because changes in either can affect insulation resistance. Models SM7120, SM7110 and SM7420 are equipped to perform highly accurate temperature and humidity measurements (temperature ±0.5°C (±0.9°F), humidity ±5% R.H.), for the measurement and management of new materials. (When using the optional Z2011 HUMIDITY SENSOR: Temperature -40°C to 80°C (-40°F to 176°F), Humidity 20% to 80%)

Sequence control [D/A output]

In sequence mode, set the time (max. 999.9 s) for "Discharge" - "Recharge" - "Measurement" - "Discharge", to perform repeated measurements without using a computer. During measurement, current fluctuations can also be saved to recorders from D/A output.

For even more precise evaluations, use external control such as USB to perform voltage resistance testing on semiconductors or to check the voltage dependence of new material.

Auto averaging

With the SM series, auto averaging monitors fluctuations in current and automatically determines the optimum average, so there is no need to make changes to settings while observing measurement results. Unexpected measurement fluctuations, such as transient responses in recharge current and unstable contacts with large variations, are automatically removed to achieve stable measurement results. (An average of a specified number with fixed measurement conditions is also possible.)

5-stage measurement speed

Speed switches between FAST, FAST2, MID, SLOW, and SLOW2 based on environment, and can be set according to environment such as FAST2 at ½ PLC for the internal integration time.

Evaluate Semiconductors and New Materials

Auto Average to Cancel Irregular Input

[Simultaneous measurement of temperature and humidity]

[Sequence control] [D/A output]

Auto Averaging Image

[Electrode presets]

A variety of electrode and shield box presets are provided according to material. The electrode constant is set automatically by simply entering the name of the electrode to be used, allowing resistivity to be measured easily and accurately.

[Panel save/load]

Electrode names and various settings, such as the 60-second settings for sequence control, can be saved as panel data. This means that material switching can be performed easily simply by loading panel data.
Make Mass Production More Practical than Ever

High-Performance Contact Checks for Picoammeter Mode (Using External Power Source)

- **[Low capacity contact checks]**
  The SM7110/SM7120 is equipped with contact checks that can identify low-capacity capacitors of only a few pF as well as measured objects with a small capacitance. (Reference value: 0.1 pF to 99.99 pF)

- **[2-band selection]**
  As with battery production lines, select the frequency for contact checks to prevent the minute check signals on site with multiple various measuring instruments from getting crossed.
  These two contact checks can also be used in picoammeter mode with an external power supply. These are high-performance contact checks that prevent unnecessary retries and excess detection due to the effects of an external power supply, and that also prevent takt reduction and worsening yield ratio.

- **[CH independent contact checks]**
  The SM7420 using an external power source enables check frequencies and delay settings to be changed for each measurement channel, achieving detailed settings that match the line design.

Faster Line Construction

- **[External interfaces]**
  There are three types of external interface: GP-IB, RS-232C, and USB, as well as the built-in EXT I/O for easy linkage with programmable controllers.

- **[Communication monitor] [EXT I/O test]**
  Because the communication monitor and EXT I/O test function can be used to assess all interfaces, work can be performed while observing operation conditions in real time as necessary during line construction.

Flexible Setup Changes

- **[Cable length correction]**
  Replace measuring cables without adjustment by simply registering the cable length. (Cable length that can be registered: 0.5 m to 3.0 m (1.64 ft to 9.84 ft))
  Capacitance contact check functions that are generally included with electrometers and picoammeters will require the impedance matching to be reset whenever the cable length changes. With the SM series, replacement is possible without any adjustments.

- **[Jig capacity open correction]**
  With the SM series, open correction is provided for jig switching, for a flexible response to changes in line structure without the need for adjustments.

High-Speed Low-Current Measurement and Large-Capacity Output: Perfect for MLCC Mass Production Lines

- **[Input impedance 1 kΩ]**
  Because the SM7110, SM7120, SM7420 offers low input impedance of 1 kΩ for all current range and speed settings, there is no delay due to "settling time".
  This is optimal for mass production lines, because there is no reduction in speed due to switching range.

- **[Max. 50 mA /250 V, 1.8 mA /2000 V large capacity output, low noise]**
  For the insulation resistance measurement of a capacitive sample such as MLCC, charging time when voltage is applied is also important, in addition to the inspection speed. Reduced charging time allows a shorter inspection takt. The SM series has a built-in large-capacity, low-noise power supply, for reliable and even higher performance of MLCC.
Electrodes for a Variety of Materials and Uses

**SURFACE/VOLUME RESISTANCE MEASUREMENT ELECTRODE SM9001**

Measure sheets, film, plate products, materials, and antistatic flooring materials as they are - no need to cut samples

- Compliance Standards
  JIS C2170, IEC61340-2-3

"Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation"

Measure without cutting samples

**Electrode Shapes Compliant with Standards**

- Ring electrode
  - Inner diameter: φ57 mm (2.24 in)
  - Outer diameter: φ63 mm (2.48 in)

- Counter-electrode with integrated stand
  - Electrode dimensions: 108 × 100 mm (4.26 × 3.94 in)

- Main body electrode
  - φ50.5 mm (1.99 in)

The electrode on the main body uses conductive rubber in a size conforming to standards. Just place the electrode on the sample or measurement point to make stable measurements under a load of 2.5 kg (88.2 oz). Furthermore, measurement voltage up to 1000 V enables highly accurate measurements.

**Test Before Use With the SM9002 Verification Fixture for Surface Resistance Measurement (Optional)**

The SM9002 Verification Fixture for Surface Resistance Measurement (optional) allows you to check the operation of the electrode to increase the reliability of measurement results.

**Verification Fixture for Surface Resistance Measurement SM9002**

Main body electrode (Bottom view of the SM9001)

Counter-electrode with integrated stand (SM9001 accessory)

- Electrode dimension: 100 × 100 mm (3.94 × 3.94 in)

* When connecting electrodes and shield boxes to SM7110/SM7120, note that CONVERSION ADAPTER Z5010 or a change of connectors is required.

**Resistivity Measurement**

Resistivity (specific resistance) is measured to determine the quality of an insulating material. Resistivity can be classified as volume resistivity or surface resistivity, respectively indicated by the resistance between two sides relative to that of a 1 cm³ cube, or by the resistance relative to that of a 1 cm² surface. HIQIKI’s super megohm meter SM series provides a wide variety of electrodes to ensure easy measurement regardless of sample material or condition.

**Options**

**VERIFICATION FIXTURE FOR SURFACE RESISTANCE MEASUREMENT SM9002**

(With integrated low resistance [500 kΩ]/high resistance [1 TΩ] test surfaces)

When using the SM9002
**Application Map**

- **ELECTRODE FOR CHIP CAPACITOR SME-8360**
  - This electrode is for measuring the insulation resistance of chip capacitors, with an adjustable jig from 0 mm to 11 mm (0.04 to 0.43 in). An interlock connection cable is connected to the main unit, so that measurement voltage becomes "OFF" while the lid is open to ensure safety.
  - Dimensions: 200 mm (7.87 in) W × 52 mm (2.05 in) H × 150 mm (5.91 in) D, Lead length: 85 cm (2.79 ft)

- **LIQUID SAMPLE ELECTRODE SME-8330**
  - An electrically guarded electrode for liquid samples. * Inspection data sheet included
  - Measurement resistance up to 10¹⁰ Ω cm (at 1000 V).
  - Total volume: 25 mL
  - Capacitance between main and counter electrode: Approx. 45 pF
  - Electrode constant: Approx. 500 cm (16.41 ft)
  - Distance between electrodes: 1 mm (0.04 in)
  - Dimensions: φ36 × 140 mm (1.42 × 5.51 in)
  - JIS C 2101 compliant
  - Accessories: Connection cable 60 cm (1.97 ft) length Red:0GA00029, Black:0GA00030

- **SURFACE RESISTANCE MEASUREMENT ELECTRODE SME-8301**
  - Simply press the tips of the electrode onto the sample to measure surface resistance.
  - Use this to measure the surface resistance of samples used for static electricity measures. Measure resistance up to 10¹¹ Ω.
  - Dimensions: φ60 × 50 mm (2.36 × 1.97 in), Lead length: 1 m (3.28 ft)

- **SURFACE RESISTANCE MEASUREMENT ELECTRODE SME-8302**
  - An electrode for surface resistance of curved samples and small samples, such as resin and rubber processed goods.
  - Surface resistance can be measured by pressing the rubber tips at the tip onto the sample. Measure electrodes up to 10¹¹ Ω at 10 mm intervals or greater.
  - Dimensions: φ40 × 115 mm (0.16 × 4.53 in), Lead length: 1 m (3.28 ft)

**SHIELDING BOX SME-8350**

- This is used as a sample accommodation box during measurement of a high-insulation resistance samples, or inductive or capacitive samples to perform electromagnetic shielding. When used in combination with mass electrode SME-8320, the electrode can be used as a counter electrode or a guard electrode.
- When measuring electronic components such as capacitors and transducers, external noise and leakage currents are prevented to ensure stable measurement.
- Dimensions: 250 mm (9.84 in) W × 100 mm (3.94 in) H × 200 mm (7.87 in) D, Lead length: 80 cm (2.62 ft)
- * Connection option for SME7110 and SME7120 Interlock connection cable DSM8104F

**MASS ELECTRODE SME-8320**

- This is an electrode for plate samples for use together with SHIELDING BOX SME-8350. This electrode enables extremely easy measurement of surface and volume resistivity even on carpets and other coarse surfaces.
- The main electrode dia. is 50 mm (1.97 in), and the ring electrode inner dia. and outer dia. are 70 mm (2.76 in) and 80 mm (3.15 in), respectively. A jig that holds the electrodes in a concentric arrangement and two banana clips are also included.
- Dimensions: 215 mm (8.46 in) W × 78 mm (3.07 in) H × 165 mm (6.50 in) D, Lead length: 75 cm (2.46 ft)
- * Connection option for SME7110 and SME7120 Interlock connection cable DSM8104F

**ELECTRODE FOR FLAT SAMPLE SME-8311**

- An electrode for measuring the resistivity of plate samples.
- Samples of 40 to 100 mm (1.57 to 3.94 in) square by up to 8 mm (0.31 in) in thickness are measurable.
- The main electrode dia. is 19.6 mm (0.77 in) and inner & outer dia. of the ring electrode are 24.1 mm (0.95 in) & 28.8 mm (1.13 in), respectively.
- The fundamental specifications are the same as SME-8310.
- Dimensions: 215 mm (8.46 in) W × 78 mm (3.07 in) H × 165 mm (6.50 in) D, Lead length: 75 cm (2.46 ft)
- * Connection option for SME7110 and SME7120 Interlock connection cable DSM8104F

**ELECTRODE FOR FLAT SAMPLE SME-8310**

- An electrode for measuring the resistivity of plate samples.
- Samples of 100 mm (3.94 in) square by up to 8 mm (0.31 in) in thickness are measurable.
- The main electrode dia. is 50 mm (1.97 in) and inner & outer dia. of the ring electrode are 70 mm (2.76 in) & 80 mm (3.15 in), respectively.
- An interlock connection cable is connected to the main unit, so that measurement voltage becomes "OFF" while the lid is open to ensure safety.
- A selector switch allows selection of volume resistivity or surface resistivity.
- Dimensions: 215 mm (8.46 in) W × 78 mm (3.07 in) H × 165 mm (6.50 in) D, Lead length: 75 cm (2.46 ft)
- * Connection option for SME7110 and SME7120 Interlock connection cable DSM8104F

**Not CE Marked**

Electrode not required

When connecting electrodes and shield boxes to SM7110/SM7120, note that CONVERSION ADAPTER ZS010 or a change of connectors is required.
**General Specifications**

**Basic Specifications**
- Operating environment: Indoors, pollution degree 2, altitude up to 2000 m (6562 ft)
- Operating temperature and humidity range: 0°C to 40°C (32°F to 104°F), 80% RH or less, no condensation
- Storage temperature and humidity range: -10°C to 50°C (14°F to 122°F), 80% RH or less, no condensation
- Power supply/Maximum rated power consumption: 100 V to 240 V AC (50 Hz/60 Hz); 45 VA
- Dielectric withstand voltage: 4000 V AC, sensed current: 10 mA
- Between all mains supply terminals and protective ground, interfaces, and measurement jacks (voltage setting value for calculation) EXT.V only
- Measurement: 1 ms to 999.9 s, Other than measurement: 0 ms to 999.9 s
- Accuracy guarantee temperature and humidity range: 23°C ±5°C (73°F ±9°F), 80% RH or less
- Guaranteed accuracy period after adjustment made by Hioki: 1 year
- Guaranteed accuracy period: 1 year
- Accuracy guarantee conditions: Guaranteed accuracy period after adjustment made by Hioki: 1 year
- Accuracy guarantee temperature and humidity range: 23°C ±5°C (73°F ±9°F), 80% RH or less
- Warm-up time: 30 min. or more
- Power supply frequency range: 50/60 Hz ±2 Hz
- Temperature coefficient: Add ±(measurement accuracy × 1/10)°C for the following ranges: 0°C to 18°C (32°F to 64°F) and 28°C to 40°C (82°F to 104°F).

**Measurement Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SM7110 / SM7120</th>
<th>SM7420</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement channel</td>
<td>1ch</td>
<td>4ch</td>
</tr>
<tr>
<td>Measurement parameter</td>
<td>DC current, DC voltage, temperature, humidity</td>
<td>DC current, temperature, humidity</td>
</tr>
<tr>
<td>Applied voltage</td>
<td>SM7110: 0.1 V to 1000.0 V</td>
<td>SM7120: 0.1 V to 2000.0 V</td>
</tr>
<tr>
<td>Measurement method</td>
<td>Current measurement method through application of constant voltage to measured object</td>
<td>Ammeter</td>
</tr>
<tr>
<td>Warning display</td>
<td>Voltage output value: Red LED comes on when approx. 30 V or higher</td>
<td>-----</td>
</tr>
<tr>
<td>Current input terminals</td>
<td>Triaxial BNC connector</td>
<td>Triaxial BNC connector</td>
</tr>
<tr>
<td>Voltage output terminal</td>
<td>Banana terminal</td>
<td>-----</td>
</tr>
<tr>
<td>COM terminal</td>
<td>-----</td>
<td>Banana terminal</td>
</tr>
<tr>
<td>Change voltage output terminal</td>
<td>Banana terminal</td>
<td>-----</td>
</tr>
<tr>
<td>GUARD terminal</td>
<td>Banana terminal</td>
<td>-----</td>
</tr>
<tr>
<td>Interlock Input Terminal</td>
<td>BNC terminal</td>
<td>-----</td>
</tr>
<tr>
<td>Max. rated voltage to ground</td>
<td>2000 V DC</td>
<td>-----</td>
</tr>
<tr>
<td>Ammeter input resistance</td>
<td>1 kΩ ±10%</td>
<td>-----</td>
</tr>
<tr>
<td>Display refresh rate</td>
<td>200 ms ±5 ms (display refreshment can be turned ON/OFF during measurement.)</td>
<td>-----</td>
</tr>
<tr>
<td>Display unit</td>
<td>Monochrome graphic LCD</td>
<td>-----</td>
</tr>
<tr>
<td>Accuracy guarantee conditions</td>
<td>Guaranteed accuracy period</td>
<td>1 year</td>
</tr>
<tr>
<td></td>
<td>Guaranteed accuracy period after adjustment made by Hioki</td>
<td>1 year</td>
</tr>
<tr>
<td></td>
<td>Accuracy guarantee temperature and humidity range: 23°C ±5°C (73°F ±9°F), 80% RH or less</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>Warm-up time: 30 min. or more</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>Power supply frequency range: 50/60 Hz ±2 Hz</td>
<td>-----</td>
</tr>
</tbody>
</table>

**Functional Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SM7110 / SM7120</th>
<th>SM7420</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured value display mode</td>
<td>Display 1: Select one of the following: Resistance/current/surface or volume or liquid resistivity</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Display 2: Measurement voltage (voltage monitor)</td>
<td>×</td>
</tr>
<tr>
<td>Voltage output function</td>
<td>Sink/source (supports recharging and discharging)</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Selection when output is OFF: Discharge/high impedance (Hi-Z)</td>
<td>×</td>
</tr>
<tr>
<td>Voltage for resistance calculation</td>
<td>Select from the following: V.MONI (voltage measurement value)/MES.V (voltage setting value)/EXT.V (voltage setting value for calculation)</td>
<td>EXTV only</td>
</tr>
<tr>
<td>Delay Function</td>
<td>Time from trigger input until start of measurement</td>
<td>Shared for all channels</td>
</tr>
<tr>
<td>Averaging Function</td>
<td>Measurement value averaging (OFF / ON / AUTO)</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>ON: 2 to 255</td>
<td>Shared for all channels</td>
</tr>
<tr>
<td></td>
<td>AUTO Automatically changes the number of averaging iterations based on the amount of change in the measurement value</td>
<td>○</td>
</tr>
<tr>
<td>Self-Calibration</td>
<td>Set time: 1 s to 600 s *Automated when the power is turned on</td>
<td>○</td>
</tr>
<tr>
<td>Cable length correction function</td>
<td>Correction range: 0.5 m to 3.0 m (1.64 ft to 9.84 ft)</td>
<td>Each CH</td>
</tr>
<tr>
<td>Jig Capacity</td>
<td>Display range: 0.00 pF to 99.99 pF</td>
<td>Each CH</td>
</tr>
<tr>
<td>Open Correction Function</td>
<td>Capacity measurement accuracy ±(20% rdg. ±0.1 pF)</td>
<td>Each CH</td>
</tr>
<tr>
<td>Contact Check Function</td>
<td>Capacitance measurement method using high-frequency signals</td>
<td>Each CH</td>
</tr>
<tr>
<td></td>
<td>Display range: 0.000 pF to 99.999 pF</td>
<td>Each CH</td>
</tr>
<tr>
<td></td>
<td>Measurement frequency: 300 KHz / 245 KHz</td>
<td>Each CH</td>
</tr>
<tr>
<td>Comparator Function</td>
<td>Determine with dgt. value (HI, IN, LO)</td>
<td>○</td>
</tr>
<tr>
<td>Sequence Program</td>
<td>Executes the Discharge - Recharge - Measurement - Discharge pattern in order Measurement: 1 ms to 999.9 s, Other than measurement: 0 ms to 999.9 s</td>
<td>×</td>
</tr>
<tr>
<td>Other functions</td>
<td>Judgment sound setting function, interlock function, reset, self-test</td>
<td>○</td>
</tr>
</tbody>
</table>

**Accessories**
- Power cord x1, Instruction manual x1, CD-R (Communications command instruction manual, USB driver)
- EXTV I/O male connector x1
- SM7110/SM7120: Short plug x1

**Compliance standard**
- EMC:EN61326
- Safety:EN61010
- Dimensions/mass
  - SM7110/SM7120: 330 mm (12.99 in) W × 80 mm (3.15 in) H x 450 mm (17.72 in) D, 5.9 kg (208.1 oz)
  - SM7420: 330 mm (12.99 in) W × 80 mm (3.15 in) H x 450 mm (17.72 in) D, 6.5 kg (229.3 oz)

**Measurement parameter**
- DC current, DC voltage, temperature, humidity
- DC current, temperature, humidity

**Display method**
- EXT (index display) or UNIT (units display), Number of significant figures: 3 to 6
**Accuracy Specifications**

### Current measurement accuracy

<table>
<thead>
<tr>
<th>Range</th>
<th>Max. display</th>
<th>Resolution</th>
<th>FAST / FAST2</th>
<th>MED</th>
<th>SLOW</th>
<th>SLOW2</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 pA</td>
<td>19.9999 pA</td>
<td>0.1 pA</td>
<td>–</td>
<td>–</td>
<td>2.0+450</td>
<td>2.0+30</td>
</tr>
<tr>
<td>200 pA</td>
<td>199.999 pA</td>
<td>1 pA</td>
<td>–</td>
<td>1.0+600</td>
<td>1.0+45</td>
<td>1.0+30</td>
</tr>
<tr>
<td>2 nA</td>
<td>1.99999 nA</td>
<td>10 pA</td>
<td>0.5+600</td>
<td>0.5+40</td>
<td>0.5+30</td>
<td>0.5+20</td>
</tr>
<tr>
<td>20 nA</td>
<td>19.9999 nA</td>
<td>100 pA</td>
<td>0.5+30</td>
<td>0.5+20</td>
<td>0.5+15</td>
<td>0.5+10</td>
</tr>
<tr>
<td>200 nA</td>
<td>199.999 nA</td>
<td>1000 pA</td>
<td>0.5+30</td>
<td>0.5+20</td>
<td>0.5+15</td>
<td>0.5+10</td>
</tr>
<tr>
<td>2 μA</td>
<td>1.99999 μA</td>
<td>10 pA</td>
<td>0.5+30</td>
<td>0.5+20</td>
<td>0.5+15</td>
<td>0.5+10</td>
</tr>
<tr>
<td>20 μA</td>
<td>19.9999 μA</td>
<td>100 pA</td>
<td>0.5+30</td>
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<td>0.5+15</td>
<td>0.5+10</td>
</tr>
<tr>
<td>200 μA</td>
<td>199.999 μA</td>
<td>1 nA</td>
<td>0.5+30</td>
<td>0.5+20</td>
<td>0.5+15</td>
<td>0.5+10</td>
</tr>
<tr>
<td>2 mA</td>
<td>1.99999 mA</td>
<td>10 nA</td>
<td>0.5+30</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

### Temperature/Humidity Measurement Accuracy

When used together with the Z2011 HUMIDITY SENSOR
- **Temperature accuracy range**: -40.00°C to 80.00°C ±0.5°C
- **Humidity accuracy range**: 20.0% RH to 80.0% RH ±5 RH

### Resistance accuracy

Current measurement accuracy + voltage measurement accuracy

Accuracy is not guaranteed if the voltage setting value is selected to calculate resistance.

- **Resistance display range**: 50 Ω to 2×10¹⁰Ω
- **Resistivity display range**: 50 Ω to 9.99999×10¹⁰Ω

### SM7110 / SM7120 Voltage specifications

**Voltage measurement accuracy**

<table>
<thead>
<tr>
<th>Range</th>
<th>Max. display</th>
<th>Resolution</th>
<th>Voltage measurement accuracy (±% rdg. ± dgt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V</td>
<td>10.000 V</td>
<td>0.001 V</td>
<td>0.03+2</td>
</tr>
<tr>
<td>100 V</td>
<td>100.00 V</td>
<td>0.01 V</td>
<td>0.03+2</td>
</tr>
<tr>
<td>1000 V</td>
<td>1000.0 V</td>
<td>0.1 V</td>
<td>0.03+2</td>
</tr>
<tr>
<td>2000 V*</td>
<td>2000.0 V</td>
<td>0.1 V</td>
<td>0.2+2</td>
</tr>
</tbody>
</table>

**Voltage Generation Accuracy** Setting when output is OFF: Discharge or Hi-Z

<table>
<thead>
<tr>
<th>Range</th>
<th>Setting voltage range</th>
<th>Setting resolution</th>
<th>Voltage generation accuracy (±% setting, ±% f.s.)</th>
<th>Time from the START signal until voltage output</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V</td>
<td>0.1 V to 10.0 V</td>
<td>0.1 V</td>
<td>0.1+0.05</td>
<td>0.1 ms max.</td>
</tr>
<tr>
<td>100 V</td>
<td>10.1 V to 100.0 V</td>
<td>0.1 V</td>
<td>0.1+0.05</td>
<td>0.1 ms max.</td>
</tr>
<tr>
<td>1000 V</td>
<td>101 V to 1000 V</td>
<td>1 V</td>
<td>0.1+0.05</td>
<td>0.1 ms max.</td>
</tr>
<tr>
<td>2000 V*</td>
<td>1001 V to 2000 V</td>
<td>1 V</td>
<td>0.2+0.10</td>
<td>0.1 ms max.</td>
</tr>
</tbody>
</table>

**Voltage Generation Current Limiter**

<table>
<thead>
<tr>
<th>Recharge setting</th>
<th>Setting voltage range</th>
<th>As per settings</th>
<th>Total current</th>
<th>Current value Measurement</th>
<th>Recharge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ON</strong></td>
<td>0.1 V to 250.0 V</td>
<td>50 mA</td>
<td>50 mA</td>
<td>5 mA</td>
<td>45 mA</td>
</tr>
<tr>
<td></td>
<td>10 mA</td>
<td>10 mA</td>
<td>10 mA</td>
<td>5 mA</td>
<td>5 mA</td>
</tr>
<tr>
<td></td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
</tr>
<tr>
<td></td>
<td>251 V to 1000 V</td>
<td>10 mA</td>
<td>10 mA</td>
<td>5 mA</td>
<td>5 mA</td>
</tr>
<tr>
<td></td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
</tr>
<tr>
<td></td>
<td>1001 V to 2000 V*</td>
<td>1.8 mA</td>
<td>1.8 mA</td>
<td>1.8 mA</td>
<td>0 mA</td>
</tr>
<tr>
<td><strong>OFF</strong></td>
<td>0.1 V to 250.0 V</td>
<td>50 mA</td>
<td>50 mA</td>
<td>50 mA</td>
<td>0 mA</td>
</tr>
<tr>
<td></td>
<td>10 mA</td>
<td>10 mA</td>
<td>10 mA</td>
<td>10 mA</td>
<td>0 mA</td>
</tr>
<tr>
<td></td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>0 mA</td>
</tr>
<tr>
<td></td>
<td>251 V to 1000 V</td>
<td>10 mA</td>
<td>10 mA</td>
<td>10 mA</td>
<td>0 mA</td>
</tr>
<tr>
<td></td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>0 mA</td>
</tr>
<tr>
<td></td>
<td>1001 V to 2000 V*</td>
<td>1.8 mA</td>
<td>1.8 mA</td>
<td>1.8 mA</td>
<td>0 mA</td>
</tr>
</tbody>
</table>
External Interface

**SM7110/SM7120**

**EXT I/O Interface (with test function)**

You can use the rear panel's switch to select either the NPN type (which supports sink output) or the PNP type (which supports source output) for the input signal polarity to match the programmable controller's common polarity.

**Connector**

- **Connector used**: 37-pin D-sub female connector with #4-40 inch screws
- **Compatible connectors**: DC-37F-ULR (solder type), DCSP-JB37PR (crimped type)
- **Japan Aviation Electronics Industry, Ltd.**

<table>
<thead>
<tr>
<th>Input Signals</th>
<th>Input type</th>
<th>Photocoupler isolation: Non-voltage contact inputs (Current sync output supported) (negative logic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input ON voltage</td>
<td>1 V or less</td>
<td></td>
</tr>
<tr>
<td>Input OFF voltage</td>
<td>OPEN (Shield current: 100 μA or less)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Signals</th>
<th>Output type</th>
<th>Photocoupler isolation: Open drain npn output (non-polar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. load voltage</td>
<td>30 V</td>
<td></td>
</tr>
<tr>
<td>Max. output current</td>
<td>50 mA/ch</td>
<td></td>
</tr>
<tr>
<td>Residual voltage</td>
<td>0.5 V (10 mA), 1.0 V (50 mA)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Built-in insulation power</th>
<th>Output voltage</th>
<th>Sink output support +5.0 V ±10% Source output support -5.0 V ±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. output current</td>
<td>100 mA</td>
<td></td>
</tr>
<tr>
<td>External power input Limit</td>
<td>Limit</td>
<td></td>
</tr>
<tr>
<td>Isolated Floating from protective ground potential and measurement circuitry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation rating</td>
<td>Terminal-to-ground voltage: 50 V DC, 33 V rms AC, 46.7 V peak AC or less</td>
<td></td>
</tr>
</tbody>
</table>

**Dynamic Chart (Voltage output, External trigger measurement)**

- **Output terminal BNC terminal**
- **Voltage output** 0 V to 2 V DC: 2.0 V at current range F.S. (Select the output ch. for the SM7420)
- **Output impedance** 1 kΩ

**D/A Output**

- **Output terminal** BNC terminal
- **Output voltage** 0 V to 2 V DC: 2.0 V at current range F.S. (Select the output ch. for the SM7420)
- **Output impedance** 1 kΩ

**Interlock Input (SM7110/SM7120)**

- **Input terminals** BNC terminal (Parallel with the EXT I/O terminal)
- **Interlock operation** When this setting is enabled, interlock is disengaged when Lo is input or when there is a short circuit between terminals.
- **Operation when the function is enabled** Output and measurement of the measurement voltage are stopped. Measurement is not possible by key or communication.

**TEMPSENSOR Terminal**

- **Input sensor** Z2011 HUMIDITY SENSOR

**Communication Monitor**

Monitor the USB, RS-232C, and GP-IB transmission contents on the panel.

**GP-IB Interface**

- **Communication method** IEEE-488.2 compliant
- **Interface function** SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
- **Addresses** 0~30

**RS-232C Interface**

- **Connector** Series B receptacle
- **Communication specifications**
  - Full duplex, start stop synchronization, stop bit of 1 (fixed), data length of 8 (fixed), no parity, no flow control
  - Communication speed (bps) 4800 / 9600 / 19200 / 38400 / 115200

**USB Device**

- **Connector** Series B receptacle
- **Electrical specifications**
  - USB2.0 (Full-speed)
  - CDC class (COM mode)
  - HID class (USB keyboard mode)

- **Output terminal** BNC terminal
- **Voltage output** 0 V to 2 V DC: 2.0 V at current range F.S. (Select the output ch. for the SM7420)
- **Output impedance** 1 kΩ

- **Input terminals** Banana terminal
Monitor the USB, RS-232C, and GP-IB transmission contents on the panel.

Model: SUPER MEGOHM METER SM7110
SUPER MEGOHM METER SM7120
SUPER MEGOHM METER SM7420

<table>
<thead>
<tr>
<th>Model No. (Order Code)</th>
<th>Measurement channel</th>
<th>Maximum output voltage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM7110</td>
<td>1ch</td>
<td>1000 V</td>
<td></td>
</tr>
<tr>
<td>SM7120</td>
<td>1ch</td>
<td>2000 V</td>
<td></td>
</tr>
<tr>
<td>SM7420</td>
<td>4ch</td>
<td></td>
<td>Dedicated microcurrent measurement</td>
</tr>
</tbody>
</table>

Measurement probe not included with main unit. Please purchase an optional probe that matches your measurement application.

Options

Probes

<table>
<thead>
<tr>
<th>PIN TYPE LEAD (RED) L2230</th>
<th>PIN TYPE LEAD (BLACK) L2231</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length: 1 m (3.28 ft)</td>
<td>Cable length: 1 m (3.28 ft)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLIP TYPE LEAD (RED) L2232</th>
<th>CLIP TYPE LEAD (RED) L2233</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length: 1 m (3.28 ft)</td>
<td>Cable length: 1 m (3.28 ft)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPEN LEAD (RED) L2234</th>
<th>OPEN LEAD (RED) L2235</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length: 3 m (9.84 ft)</td>
<td>Cable length: 3 m (9.84 ft)</td>
</tr>
</tbody>
</table>

Communication Interfaces

- RS-232C CABLE 9637: 9pin-9pin, cross, Cord length: 1.8 m (5.91 ft)
- RS-232C CABLE 9638: 9pin-25pin, cross, Cord length: 1.8 m (5.91 ft)
- GP-IB CONNECTION CABLE 9151-02: Cord length: 2 m (6.56 ft)

Contact your local Hioki distributor for information about the pricing and specifications for the CONVERSION ADAPTER Z5010.

Supports 0201 Size Packages

Electrode for SMD Samples SM9060

Fine chip electrode with floating structures that can ignore jig surface resistance * EIA SIZE: 008004

Operability
Simple chuck for size 0201

Measurement Performance
Accurate measurement due to floating structures

The fine chip is easily secured via the groove, and a dedicated wire probe firmly holds the sample.

During an inspection, the stage lowers so that the surface resistance of the jig can be ignored, allowing the sample to be measured accurately.

When connecting electrodes to a SUPER MEGOHM METER, note a change of connectors is required.
This high-speed test system combines the 4ch microcurrent SUPER MEGOHM METER SM7420 with an external power source, or the 8ch SUPER MEGOHM METER SM7810, developed for leakage current tests, with a 32ch output POWER SUPPLY UNIT SM7860.

Perfect for equipping on automated machines, use this to construct the fastest MLCC leakage current inspection line.

- The SUPER MEGOHM METER SM7810 achieves the fastest MLCC leakage current inspection line in the industry with 8ch simultaneous measurement up to a speed of 6.8 ms, as well as reduces automated machine takt time to contribute to cost reduction for an MLCC super-mass production line.
- Select a POWER SUPPLY UNIT SM7860 based on maximum applied voltage and functionality to support all kinds of inspection lines including recharging and discharging.

For detailed specifications, refer to the unit catalog, "SUPER MEGOHM METER SM7810 / POWER SOURCE UNIT SM7860."

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