Capacitor Temperature Characteristic Evaluation System
(Dielectric Characteristic Evaluation System)
AMQ
Automatically record capacitors' temperature and frequency characteristics

"Capacitor Temperature Characteristics Evaluation System" is an automated multi-channel system that combines an environmental test chamber with measurement and evaluation system, to collect data efficiently.
**Environmental Test Chambers**

**Platinous J Series Temperature Chamber**
As a line of industry standard test chambers, the Platinous Series pursues new environmental standards for ideal, eco-friendly environmental test chambers in addition to reliability, performance, operability, and safety.

<table>
<thead>
<tr>
<th>Model</th>
<th>Temperature range</th>
<th>Inside capacity (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>−40 to +100°C</td>
<td>120, 225, 408, 800</td>
</tr>
<tr>
<td>PG</td>
<td>−70 to +100°C</td>
<td>306, 800</td>
</tr>
</tbody>
</table>

**Mini Subzero Compact Ultra Low Temperature Chamber**
Mini Subzero supports a wide temperature range covering the ultra-low-temperature range (−75°C / −85°C) to the high-temperature range (+100°C / +180°C). This chamber also offers remote monitoring and operation.

<table>
<thead>
<tr>
<th>Model</th>
<th>Temperature range</th>
<th>Inside capacity (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC-712</td>
<td>−75 to +100°C</td>
<td>64</td>
</tr>
<tr>
<td>MC-812</td>
<td>−85 to +180°C</td>
<td></td>
</tr>
</tbody>
</table>
This system can be used to evaluate the electrostatic capacity (C), loss factor (D), and impedance (Z) of capacitors and various materials in a specific temperature environment.

- **Automatic measurement of up to 64 channels**
  The system can measure multiple channels of electrostatic capacity (C), loss factor (D), and impedance (Z) in different temperature environments. You can select the number of channels in the multiple of eight, up to 64 channels.

- **The graph function allows for real-time review of measurement results**
  Collected data, including the values of electrical characteristics and rate of change at different temperatures, frequencies, and time, can be reviewed in real time through a variety of graph functions.

- **Selectable from different test modes**
  Three test modes are available: temperature characteristic evaluation test, constant operation test, and frequency characteristics test.

  <Temperature characteristic evaluation test>
  In this test mode, characteristic data is automatically recorded and synchronized with changes in temperature up to 40 steps.

  <Constant operation test>
  This test mode measures changes in characteristics over time in a specific temperature environment and automatically records data.

  <Frequency characteristic evaluation test>
  This test mode automatically records characteristic data at various frequencies while changing the frequency in a specific temperature environment. Testing can be combined with a temperature characteristic evaluation test or constant operation test.

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**Applications**

- **Capacitors**
  - Electrostatic capacity (C)
  - Loss factor (D)
  - Temperature characteristics of impedance (Z)
  - Frequency characteristics

- **Electronic materials**
  - Printed boards
  - Flux
  - Insulation materials (resin, film, etc.)
  - Dielectric materials (titanium, ceramic, tantalum, aluminum electrolytic materials, etc.)
A variety of optional jigs are available for different test samples (optional)
In addition to dedicated jigs for SMD components, we offer jigs customized to the shape of discrete devices.

Features

System Block Diagram

1. System controller
   Computer and monitor for system management to register test conditions, check operating status, and perform data processing.

2. Uninterruptible power supply
   Backup power supply for the system controller.

3. RS-232C
   Operator controls and monitors the temperature of the environmental test system from the system controller.

4. Scanner unit
   This unit measures the electrostatic capacity (C), loss factor (D), and impedance (Z) of standard 8 channels with the tip of the measuring cable. You can increase the number of channels up to 64 per unit, in 8 channel increments.

5. Measuring cable
   Coaxial cable made of Teflon connected to the specimen or jig inside the test system.

6. Relay unit
   This unit connects the measuring cable attached to the specimen or jig inside the test system to the scanner unit. The relay unit makes connection easy.

7. Specimen attachment jig (optional)
   Snap-on jig for attaching SMD components or discrete devices.

8. LCR meter
   This meter measures electrostatic capacity (C), loss factor (D), and impedance (Z).

9. Insulation resistance tester (optional)
   This tester measures insulation resistance.

10. RS-485 (optional)
    From the environmental test system Options menu, RS-485 communication can be selected as the communication protocol for the system controller and environmental test system.
Main monitor screen

Setting the test conditions

Set the test conditions: LCR Meter Measurement Conditions, Measurement Level, Frequency Characteristics, Schedule *1, Insulation Resistance Measurement *1. The conditions set up can be saved as a file.

*1 Available as optional add-ons

Temperature characteristics test *2

- Select “Temp characteristics test” under Test mode.
- In Temp setting mode, you can select “Step setup” or “Arbitrary setup.”

Constant operation test *2

- Select “Constant operation test” under Test mode.

Start test

- Parameter measurement starts automatically with the set conditions after starting the test.
- You can check the progress of the test and test results in real time.

*2 DC bias is only applied during measurement.
## TEST ITEMS, MEASUREMENT ITEMS and CONDITIONS, and DATA PROCESSING

<table>
<thead>
<tr>
<th>Test item</th>
<th>Measurement items and conditions</th>
<th>Data recording and graph display*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature characteristics test (Changes in characteristics with respect to temperature)</td>
<td>• Measurement method</td>
<td>AC four-terminal pair measurement Electrostatic capacity (C), loss factor (D), and impedance (Z) Measurement range: 20 Hz to 1 MHz Temperature range: −40°C to +180°C</td>
</tr>
<tr>
<td>Constant operation test (Changes in characteristics with respect to time)</td>
<td>• Measurement parameters</td>
<td>Records the changes in measurements for each temperature value. X axis: Temperature Y axis: Selectable from measurement items</td>
</tr>
<tr>
<td></td>
<td>• Measured frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Temperature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Compensation function</td>
<td></td>
</tr>
</tbody>
</table>

* The recorded measurement results can be reviewed in a graph and list in real time. Eight channels worth of data can be displayed on a graph. Channels to be displayed can be selected according to preference.

### Graph display

Graphs showing the time, temperature, and frequency for a measurement item can be displayed. Display can be switched between absolute values and rate of change.

### Data display

Measured data is displayed. Data on screen can be converted to CSV format.

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>AMQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement items</td>
<td>Electrostatic capacity (C), loss factor (D), impedance (Z), resistance (Rs, Rp)<em>, and inductance (Ls, Lp)</em></td>
</tr>
<tr>
<td>Test items</td>
<td>• Temperature characteristic evaluation test (change with respect to temperature) • Constant operation test (change with respect to test time) • Frequency characteristic evaluation test (change with respect to frequency)</td>
</tr>
<tr>
<td>Channel configuration</td>
<td>8 channels (standard); max. 64 channels expandable in 8 channel increments</td>
</tr>
<tr>
<td>Measurement method</td>
<td>AC four-terminal pair measurement (measuring cable tip)</td>
</tr>
<tr>
<td>Measurement range</td>
<td>• Measured frequency: 20 Hz to 1 MHz • Electrostatic capacity (C): 50 pF to 5 mF • Loss factor (D): 0.0001 to 9.9999 • Impedance (Z): 10 mΩ to 100 MΩ</td>
</tr>
<tr>
<td>Measuring instrument</td>
<td>LCR meter (Keysight Technologies)</td>
</tr>
<tr>
<td>Measurement range</td>
<td>Select AUTO, 10 Ω, 100 Ω, 300 Ω, 1 kΩ, 3 kΩ, 10 kΩ, 30 kΩ, or 100 kΩ</td>
</tr>
<tr>
<td>DC bias</td>
<td>±0 to ±40V</td>
</tr>
<tr>
<td>Measurement interval</td>
<td>1 min. to 1,500 min. (during constant operation)</td>
</tr>
<tr>
<td>Temperature steps</td>
<td>Select from mode that specifies 40-step start/end temperature and step interval and mode for entering desired temperature</td>
</tr>
<tr>
<td>Frequency steps</td>
<td>Max. 50 steps (set to desired value)</td>
</tr>
<tr>
<td>Compensation</td>
<td>Short compensation, open compensation</td>
</tr>
<tr>
<td>Environmental test system control</td>
<td>Enables temperature data capture synchronized with measurement and the temperature control of the environmental test system with RS-485 function.</td>
</tr>
<tr>
<td>Measuring cable</td>
<td>Coaxial cable made of Teflon (Characteristic impedance (Z), 50 Ω, 95 pF/m)</td>
</tr>
<tr>
<td>External dimensions</td>
<td>530 (W) × 1832 (H) × 800 (D) mm (excluding protrusions)</td>
</tr>
<tr>
<td>Power supply equipment</td>
<td>Power supply 100 VAC ±10% 1φ 50/60 Hz 15 A</td>
</tr>
</tbody>
</table>

* Measured data depends on the specimen and test conditions.

### Options

- Insulation resistance measurement function
- Internal chamber resistance measurement function
- Dedicated jigs for SMD components
- Dedicated jigs for discrete devices
  Jigs can be made to order according to samples
Specifications are subject to change without notice due to design improvements.

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