

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.



Example of AMQ connected with a Compact ultra low temperature chamber

Electrochemical Migration Evaluation System **AMI**

The Electrochemical Migration Evaluation System easily and efficiently evaluates product life and insulation resistance, and has numerous applications from low-voltage testing to high-voltage testing.

■ Evaluation targets

- Printed boards
- Insulation materials
- Semiconductor materials

Capacitor Leakage Test System **AMI-C**

The Capacitor Leakage Test System automatically evaluates insulation degradation characteristics of capacitors in high temperature and high temperature/humidity environments.

■ Evaluation targets

- Capacitors



Example of AMI Connected with a temp. & humid. Chamber

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.

Model	Temperature range	Inside capacity (L)
PU	-40 to +100°C	120, 225, 408, 800
PG	-70 to +100°C	306, 800



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.

Model	Temperature range	Inside capacity (L)
MC-712	-75 to +100°C	64
MC-812	-85 to +180°C	

Features



Example of AMQ connected with a Compact ultra low temperature chamber



Dedicated jigs for SMD components (option)

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.

Applications

● Capacitors

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

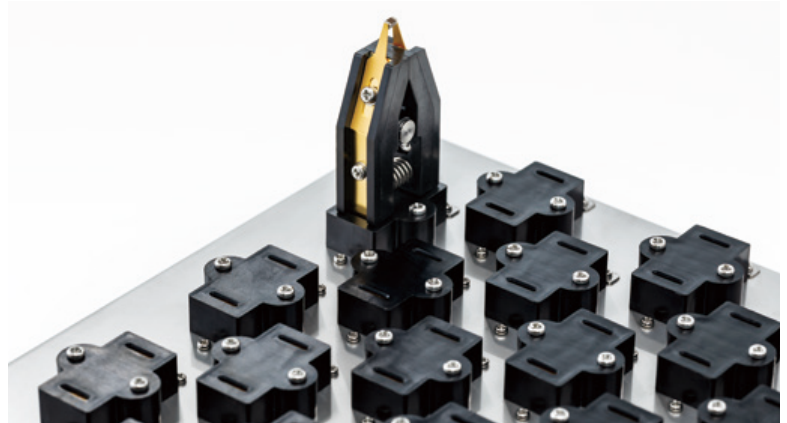
● Electronic materials

- Printed boards
- Flux
- Insulation materials (resin, film, etc.)
- Dielectric materials (titanium, ceramic, tantalum, aluminum electrolytic materials, etc.)

Features

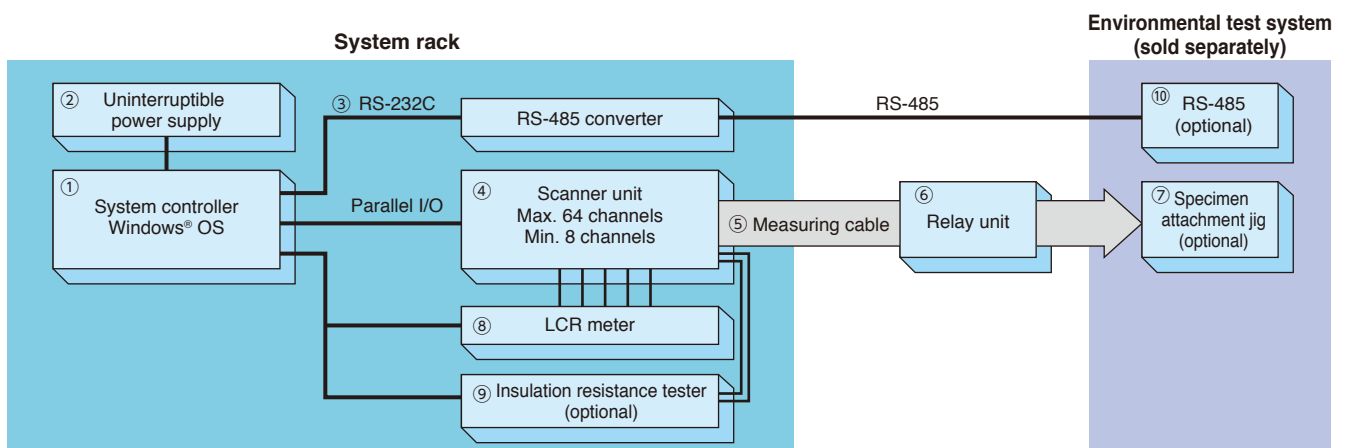
● **A variety of optional jigs are available for different test samples (optional)**

In addition to dedicated jigs for SMD components, we offer jigs customized to the shape of discrete devices.



Dedicated jigs for SMD components (option)

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.

TESTING PROCEDURE

Main monitor screen

The screenshot shows the 'Capacitor Temperature Characteristic Evaluation System' interface. On the left, there are controls for Chamber 1, including 'Preset temp' (0.0), 'Monitor temp' (0.0), and 'Control state' (Under stopping). Below these are fields for 'Modules and measuring instrument measurement state'. On the right, a table titled 'The operating state according to module' shows 8 test runs, all in 'Under stopping' state. Below the table are module selection buttons (Module 1-8), a 'Data file' field (20190308M1-1.TRN), and a 'Measurement information classified by temp frequency characteristic(arbitrary temp) channel' section with channel selection buttons (Ch1-Ch8) and a data table with columns for Temp, Measuring value, and Change rate[%].

- Displays the system's temperature setting and monitor temperature.
- Shows the measurement result for each channel.
- Shows the progress of the test.

Setting the test conditions

The dialog box shows 'Measurement condition retention file name' (TEST) and tabs for 'Insulation resistance Measurement conditions', 'LCR meter Measurement conditions', 'Measurement level', 'Frequency characteristic', and 'Schedule'. The 'LCR meter Measurement conditions' tab is active, showing 'Capacitance parameter selection' (Cs, Cp), 'Range' (AUTO), 'Average' (4), 'ALC Mode' (checked), 'Integration mode select' (Short, Medium, Long), and 'Calibration selection' (Open, Short, Load).

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.

• Step setup

The 'Step setup' dialog shows 'Temp characteristics evaluation test setup' with 'Temp setting mode' (Step setup) selected. It includes fields for 'Start temp', 'End temp', and 'Base temp of charge rate calculation'.

• Arbitrary setup

The 'Arbitrary setup' dialog shows 'Temp characteristics evaluation test setup' with 'Temp setting mode' (Arbitrary setup) selected. It includes a table for 'Arbitrary temp setting' with columns for Temp [°C], Starting time [min], and a 'Base temp of charge rate calculation' field.

*2 DC bias is only applied during measurement.

Start test

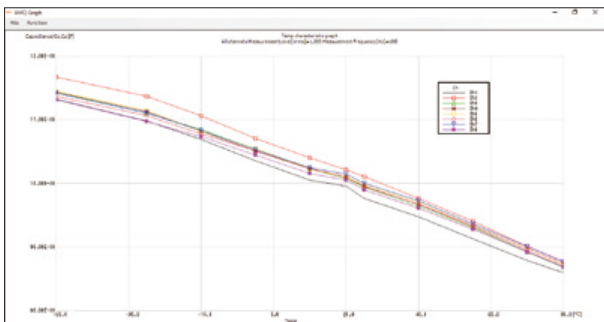
- Parameter measurement starts automatically with the set conditions after starting the test.
- You can check the progress of the test and test results in real time.

TEST ITEMS, MEASUREMENT ITEMS and CONDITIONS, and DATA PROCESSING

Test item	Measurement items and conditions	Data recording and graph display*
Temperature characteristics test (Changes in characteristics with respect to temperature)	<ul style="list-style-type: none"> Measurement method Measurement parameters 	Records the changes in measurements for each temperature value. X axis: Temperature Y axis: Selectable from measurement items
Constant operation test (Changes in characteristics with respect to time)	<ul style="list-style-type: none"> Measured frequency Temperature Compensation function 	

* 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

Model	AMQ	
Measurement items	Electrostatic capacity (C), loss factor (D), impedance (Z), resistance (Rs, Rp)*, and inductance (Ls, Lp)*	
Test items	<ul style="list-style-type: none"> 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) 	
Channel configuration	8 channels (standard); max. 64 channels expandable in 8 channel increments	
Measurement control	Measurement method	AC four-terminal pair measurement (measuring cable tip)
	Measurement range	<ul style="list-style-type: none"> 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
	Measuring instrument	LCR meter (Keysight Technologies)
	Measurement range	Select AUTO, 10 Ω, 100 Ω, 300 Ω, 1 kΩ, 3 kΩ, 10 kΩ, 30 kΩ, or 100 kΩ
	DC bias	±0 to ±40V
	Measurement interval	1 min. to 1,500 min. (during constant operation)
	Temperature steps	Select from mode that specifies 40-step start/end temperature and step interval and mode for entering desired temperature
	Frequency steps	Max. 50 steps (set to desired value)
Compensation	Short compensation, open compensation	
Environmental test system control	Enables temperature data capture synchronized with measurement and the temperature control of the environmental test system with RS-485 function.	
Measuring cable	Coaxial cable made of Teflon (Characteristic impedance (Z), 50 Ω, 95 pF/m)	
External dimensions	530 (W) × 1832 (H) × 800 (D) mm (excluding protrusions)	
Power supply equipment	Power supply 100 VAC ±10% 1φ 50/60 Hz 15 A	

● Model

AMQ — — C

Number of channels

● Options

- Insulation resistance measurement function
- Internal chamber temperature monitoring function
- Dedicated jigs for SMD components



- Dedicated jigs for discrete devices
- Jigs can be made to order according to samples

* Measured data depends on the specimen and test conditions.

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ISO 9001/JIS Q 9001

Quality Management System Assessed and Registered

ESPEC CORP. has been assessed by and registered in the Quality Management System based on the International Standard ISO 9001:2015 (JIS Q 9001:2015) through the Japanese Standards Association (JSA).

* Registration : ESPEC CORP.
(Overseas subsidiaries not included)

ISO 14001 (JIS Q 14001)

Environmental Management System Assessed and Registered

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