

SINCE 1889



Yamato Scientific
America

Yamato Thermal Resistivity Test System

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Thermal Resistivity Test System

Thermal Evaluation of Metallized Ceramic Substrates



TE100

Specimen load	10 kg	Sampling rate	100 sampling/sec (max)	Temperature characteristics	Resolution $\geq 0.01^\circ\text{C}$	Electrical resistance measurement error	$\pm 0.1\text{m}\Omega$ (range 70-130 Ω)
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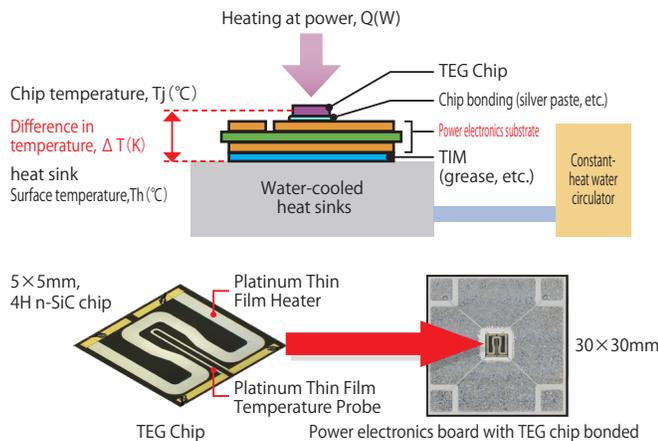
- Evaluates thermal characteristics (thermal resistance) of power device substrates
- Capable of evaluating heat dissipation characteristics due to module structure
- Capable of measuring and evaluating heat dissipation characteristics of individual substrate materials
- Evaluated according to "International Organization for Standardization ISO 4825-1:2023"

Effective thermal resistance of power electronics board, $R_{th}(K/W)$

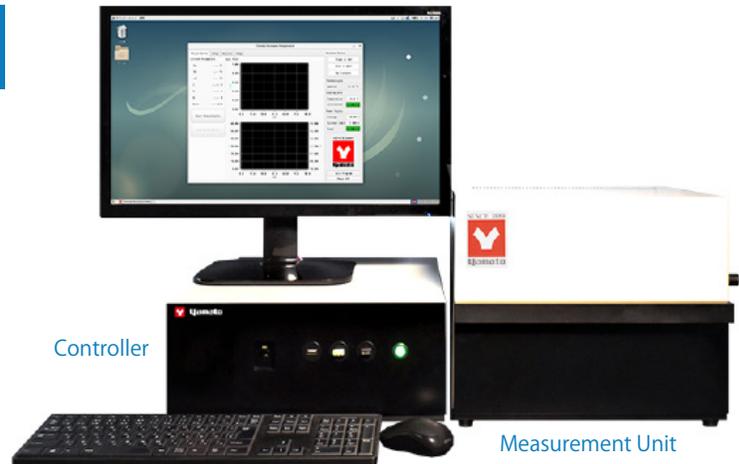
Can be calculated from chip temperature, heatsink surface temperature, and applied power

Thermal Resistance Calculation Method

Formula: $R_{th} = \Delta T / Q$



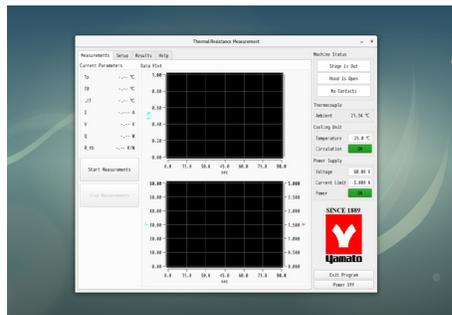
Equipment Configuration



* Monitor, keyboard and mouse to be provided by the user

ANALYSIS SYSTEM (SOFTWARE) AS STANDARD

- Simple operation screen with "Setting", "Measurement", "Result", and "Help"
- Centralized Heating of TEG Chips and cooling by CFA302 Water Circulator



SPECIFICATION OF TE100

Compatible specimen size (ISO4825-1:2023)	30 x 30 mm	
Specimen load	10 kg	
Temperature characteristics	Resolution $\geq 0.01^\circ\text{C}$	
Electrical resistance measurement error	$\pm 0.1\text{m}\Omega$ (70 ~ 130 Ω)	
Sampling rate	100 sampling/sec (max)	
Supply voltage	AC100V 50/60Hz	
Size	Controller	W380 × D470 × H180mm
	Measurement unit	W380 × D400 × H320mm

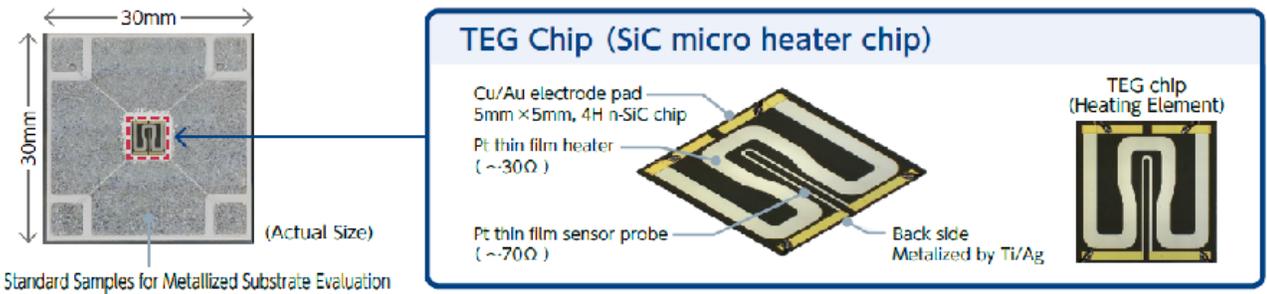
ISO 4825-1:2023

Fine ceramics (advanced ceramics, advanced technical ceramics) --
Test method for thermal property measurements of metallized ceramic substrates
Part 1: Evaluation of thermal resistance for use in power modules.



TEG CHIP (CONSUMABLE)

The TEG Chip is Attached to a Sample for Evaluation, such as a Metallized Substrate.



Standard Samples for Metallized Substrate Evaluation

SPECIFICATION OF TEG CHIP

Heat generation intensity	1KW / cm ²
Maximum input power	about 250W.
Temperature increase rate	1.4×10 ⁴ K/sec
Size	W5×D5×H0.35mm

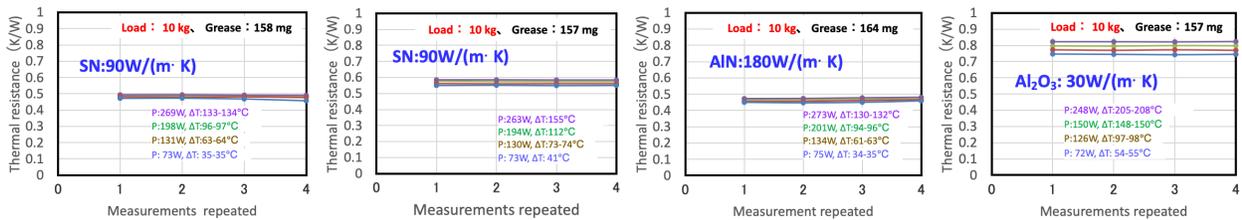
SPECIFICATION OF CIRCULATOR CFA302

Circulation Method	External Closed System Circulation
Cooling Method	Air cooling
Temperature control range	- 10 ~ 60°C
Power supply	AC100V 13.8A
Size	W380×D565×H725mm



Thermal property measurements with good reproducibility

Determine slight differences in thermal resistance due to ceramic materials and thicknesses



(a-1) 0.3mmCu/0.32mmSi₃N₄/0.3mmCu (a-2) 0.3mmCu/0.64mmSi₃N₄/0.3mmCu (b) 0.3mmCu/0.64mmAlN/0.3mmCu (d) 0.3mmCu/0.64mmAl₂O₃/0.3mmCu

Target Markets for TE100

- Power semiconductors, such as for automotive, electrical, and railroad applications. It contributes to high thermal conductivity design of semiconductors.
- Ceramic substrate manufacturer
- Heat transfer material manufacturer (grease, heat transfer sheets)
- Diamond attach bonding material manufacturer
- Heat sink manufacturer

Is TE100 only applicable to metallized ceramic substrates?

It can be applied to ceramic substrates, heat transfer materials, heat sinks, and other power semiconductor components.