Quality is more than a word

ESPEC

Rapid-Rate Thermal Cycle Chamber

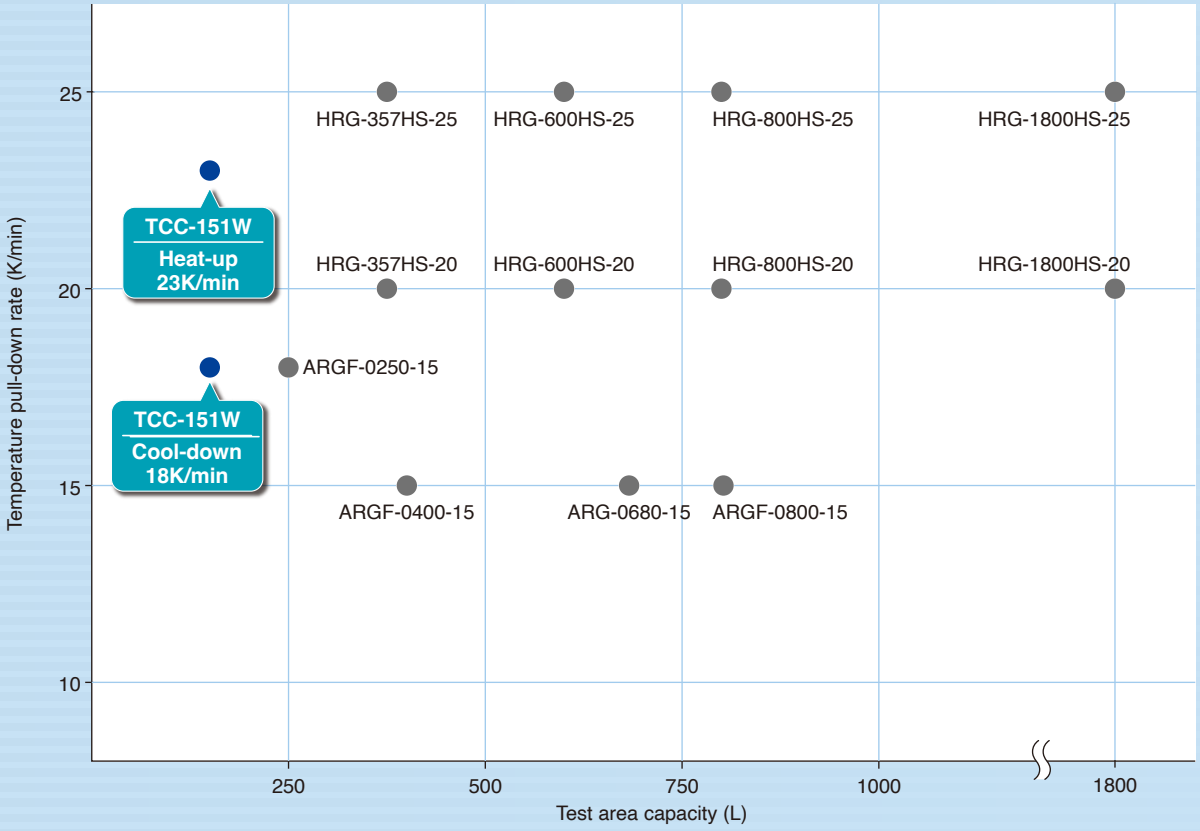
TCC-151W

CAT.NO.E20132-Z2402

A thermal cycle chamber that achieves a temperature change rate of 23K/min and specimen temperature ramp control of 15K/min

This thermal cycle chamber can be rapidly changed air temperature
while controlling specimen temperature for the way such as JEDEC standard and screening.
It features a built-in web application that can be used to operate the chamber from a PC or tablet.
This web application allows you to check the status of the chamber
remotely using a web browser.

A rapid-rate thermal cycle chamber and environmental stress chamber



* Temp. rate of change according to IEC 60068-3-5
* Set conditions: +180°C、−70°C

Rapid-Rate Thermal Cycle Chamber TCC-151W

* Shown are equipped with options.

AR - Rapid-Rate Temperature Cycle Type (Up to 15K/min)

*Temperature types (ARGF and ARG) are not equipped with a water tank.

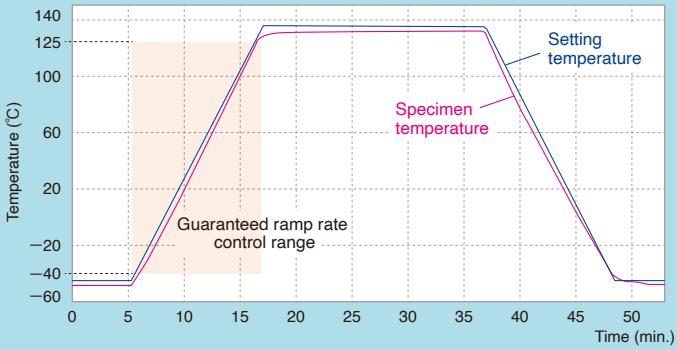
High-Rate Thermal Cycle Chamber HRG (Up to 25K/min)

Performance

For accurate life evaluation testing that meets JEDEC standard

Specimen temperature ramp control (example)

■ Specimen temperature control data



Test conditions

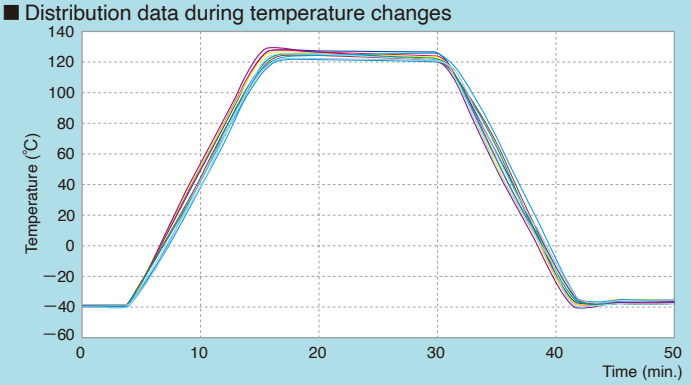
High temp. soak : +130℃
Low temp. soak : −45℃
Ramp rate : 15K/min
Control point : Front center specimen on the lower level
Specimen : Printed Circuit Board, 145 × 130 mm, 90 pcs.

Measurement method

45 specimens placed in two rows on two levels in the specimen basket, with thermocouples attached to the surface of each specimen at the control point.

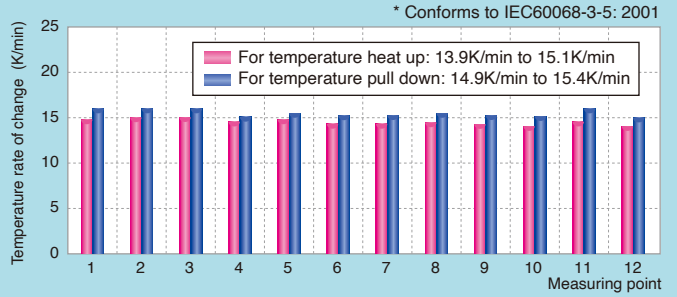
Distribution performance during temperature changes (example)

■ Distribution data during temperature changes



■ Temperature rate of change at twelve measuring points (Average)

* Conforms to IEC60068-3-5: 2001

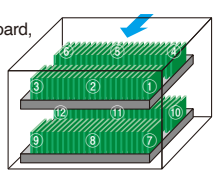


Test conditions

High temp. soak : +125℃
Low temp. soak : −40℃
Ramp rate : 15K/min
Control point : Air outlet sensor
Specimen : Printed Circuit Board, 145 × 130 mm, 90 pcs.

Measurement method

As shown on the right, thermocouples are attached to the specimens at twelve measuring points.



Fatigue life depends on the rate of strain and the strain waveform. In the case of thermal cycle chambers, the strain rate fluctuates based on the temperature change rate, while the strain waveform is influenced by the symmetry of the specimen temperature change waveform during temperature increase and decrease.

Highly reproducible ramp control

Using the TCC specimen temperature ramp control, the ramp rate can be regulated so that strain waveforms can be symmetrical.
Furthermore, the strain rate can be held constant even if the number of samples is different per test, by maintaining the same ramp rate. This allows tests to be carried out with exceptionally high reproducibility.

Meet JESD22-A104F

Standard tests that require specimen temperature ramp rates of 15K/min or less (−40℃ to + 125℃) can be carried out with ease and accuracy.
In addition, this chamber is also designed to execute tests at a temperature change rate of 10K/min to 15K/min as stated in IEC60749-25 and at 15K/min mentioned in JESD22-A104F.
This chamber is ideally suited to automotive test requirements, life assessments for solder joints, and reliability assessments for semiconductor devices and packages.

Maximized temperature uniformity for equal thermal load to the specimen

Performance

Dual-side wiring for enhanced operability

The chamber comes with 25 × 100mm oval cable ports on both the left and right sides for the simple wiring of flat cables. The internal dimension of the chamber are W800 × H500 × D400 mm, and the capacity is 160 L.

* Accommodates approximately 60 B5-sized (176 × 250 mm) boards in an upright position.

The integrated control panel on the door maximizes usable space inside the chamber.

Specimen can be inserted or removed during testing

Testing can be paused upon completion of any given cycle. Specimen can be inserted or removed during testing, enable to reduce overall test time by joint testing.

Conductor resistance evaluations

The TCC can be used in conjunction with the Espec Resistance Evaluation System (AMR) (sold separately) used for continuos measurement of micro resistance of conductor components, such as solder joints under temperature cycle conditions, allowing for real-time detection of micro-crack formation.
In addition, effective scheduling management has been facilitated by the integration of automatic measurement and data logging systems.

Complies with international safety standards

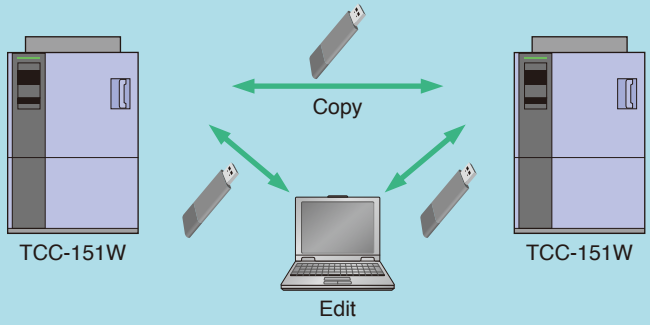
ISO 12100, Safety of machinery
IEC 60204-1, Low voltage
EMC IEC 61000-6-2, 6-4

Test area

Example of connection between Conductor Resistance Evaluation System (AMR) and TCC

High-resolution 7-inch display

Program Copy and Computer Editing



※Some items may not be copied between different models chambers with different options.

Ramp rate input available (patent pending) \NEW/

The step time can be calculated automatically just by inputting the ramp rate.

Convenient notification function

INFO icon flashes to show chamber information, such as door ajar alarm and whatever you select.

Multi-language support

You can change the language of the controller by pressing the Language icon and choosing the language. You can select from Japanese, English, Traditional Chinese, Simplified Chinese, and Korean.

Test profile copying without a PC

The chamber comes with a USB port that can be used with USB memory devices (not included) to share test profiles with other chambers.

Networks

* An Intranet environment is required.

Test-supporting network functions

Remote monitoring and control (via Ethernet connection)

The chamber is equipped with a web application that enables monitoring of the chamber status and operation from a web browser, which ensures operability from a remote location.
Passwords for user-level access can also be set using the web browser.

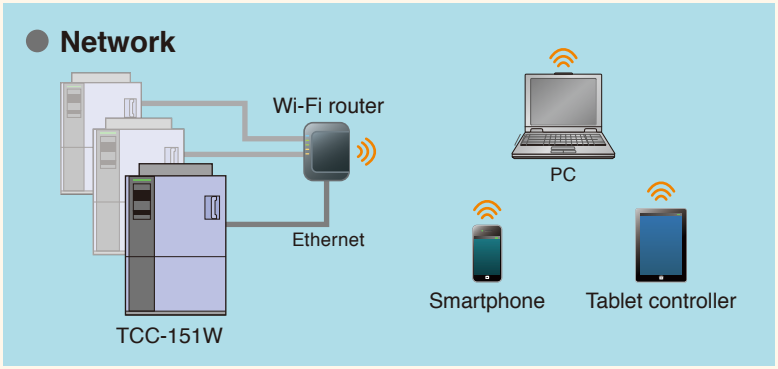
Editing test profiles via a browser

It is possible to edit the test profiles registered in the chamber using a web browser.

Email alarm notification

Details on alarms that have been triggered will be sent to pre-registered e-mail addresses. It is also possible to transmit e-mails when testing has finished.
*An Intranet environment is required to transmit e-mails.

Image

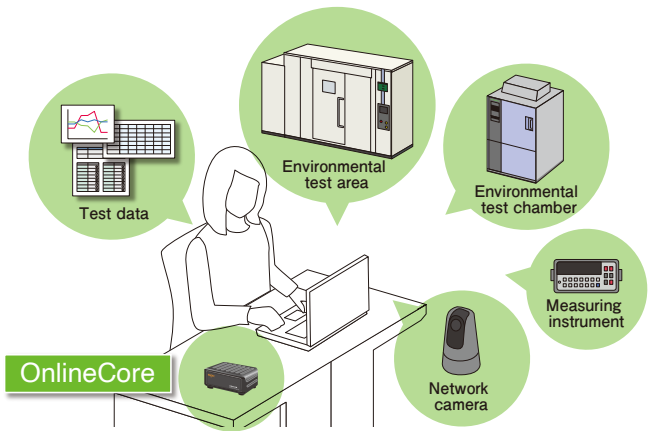


Centralized management of environmental test chambers and peripheral devices

ESPEC OnlineCore (Sold separately)

Operating status can be quickly ascertained via a web browser just by connecting to an Intranet environment. This enables chambers to be managed centrally to enable speedy maintenance, etc.

* Inquire regarding types of models that can be connected.

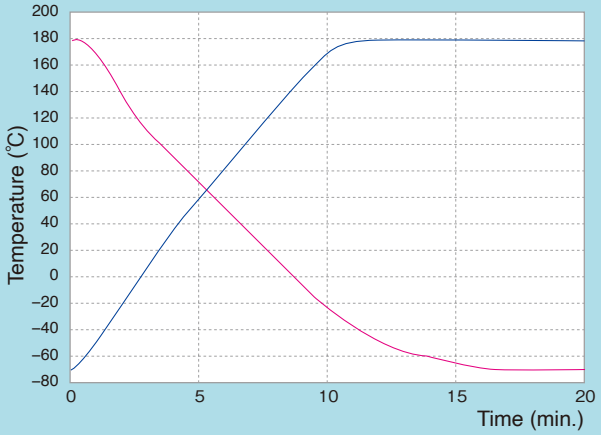


SPECIFICATIONS

Model			TCC-151W				
System			Balanced Temperature Control system (BTC system)				
Performance *1	Temperature range		−70℃ to +180℃ (−94°F to +356°F)				
	Temperature fluctuation		±0.5℃ −70℃ to +180℃, after temperature stabilization				
	Temperature change	Temperature range	−45℃ → +155℃ *2 Target temp.: −70℃ → +180℃	+155℃ → −45℃ *2 Target temp.: +180℃ → −70℃	−23.5℃ → +108.5℃ Target temp.: −40℃ → +125℃	+108.5℃ → −23.5℃ Target temp.: +125℃ → −40℃	+108.5℃ ⇔ −23.5℃ Target temp.: +125℃ ⇔ −40℃
		Specimen	None	None	None	None	Yes *3
		Control target	Chamber temp.	Chamber temp.	Chamber temp.	Chamber temp.	Chamber temp. or Specimen temp.
		Ramp control	Off	Off	Off	Off	On
		Performance	23K/min	18K/min	26K/min	20K/min	15K/min
	Allowable heat load		8 kW (−20℃)				
Construction	Exterior material		Cold-rolled rust-proofed steel plate				
	Interior material		18-8 Cr-Ni Stainless steel plate				
	Door		Single door (hinge on left, handle on right)				
	Heater		Nichrome strip wire heater				
	Refrigeration unit	System	Mechanical cascade refrigeration system (water-cooled condenser)				
		Compressor	Scroll-type				
		Expansion system	Electronic expansion valve				
		Refrigerant	R-404A, R23				
	Cooler		Plate fin cooler				
	Air circulator		Sirocco fan				
Inside dimensions *4			W800 × H500 × D400 mm				
Outside dimensions *4			W1000 × H1808 × D1915 mm				
Capacity			160 L				
Weight			950 kg				
Load capacity			Shelf bracket support maximum load : 25kg Specimen basket (equally distributed load) : 5kg per level				
Utility requirements	Allowable ambient conditions		+5℃ to +35℃ (+41°F to +95°F), up to 75%rh				
	Power supply	200V AC 3 ϕ 50/60Hz	115A				
		220V AC 3 ϕ 60Hz	111A				
		380V AC 3 ϕ 50Hz	61A				
		400V AC 3 ϕ 50Hz	60A				
	Cooling water supply pressure *5		0.2Mpa Gauge to 0.5 Mpa Gauge				
	Max. water flow rate		4100L/h (at reference water temp. +25℃)				
	Piping connection size		Carbon steel pipe, ID 32 mm (drain and supply)				
	Operating cooling water temp. range		+5℃ to +32℃ (+41°F to +89.6°F)				
Noise level *6			Max. 65 dB				

*1 The performance values are based on IEC60068-3-5:2006, and JTM K07:2007, under the conditions of a +23℃ ambient temperature, cooling water temperature +25℃, rated voltage, and no specimen.
*2 Refer to Fig on page 8.
*3 Specimen: (glass epoxy PCB) 5kg + Jig: 4kg (ESPEC standard jig)
*4 Excluding protrusions.
*5 Rate depends on the cleanliness of the heat exchanger
*6 Noise level was measured in an anechoic room at a height of 1.2 m from the floor and a distance of 1 m from the chamber front panel (JIS-Z-8731:1999 A-weighted sound pressure level).

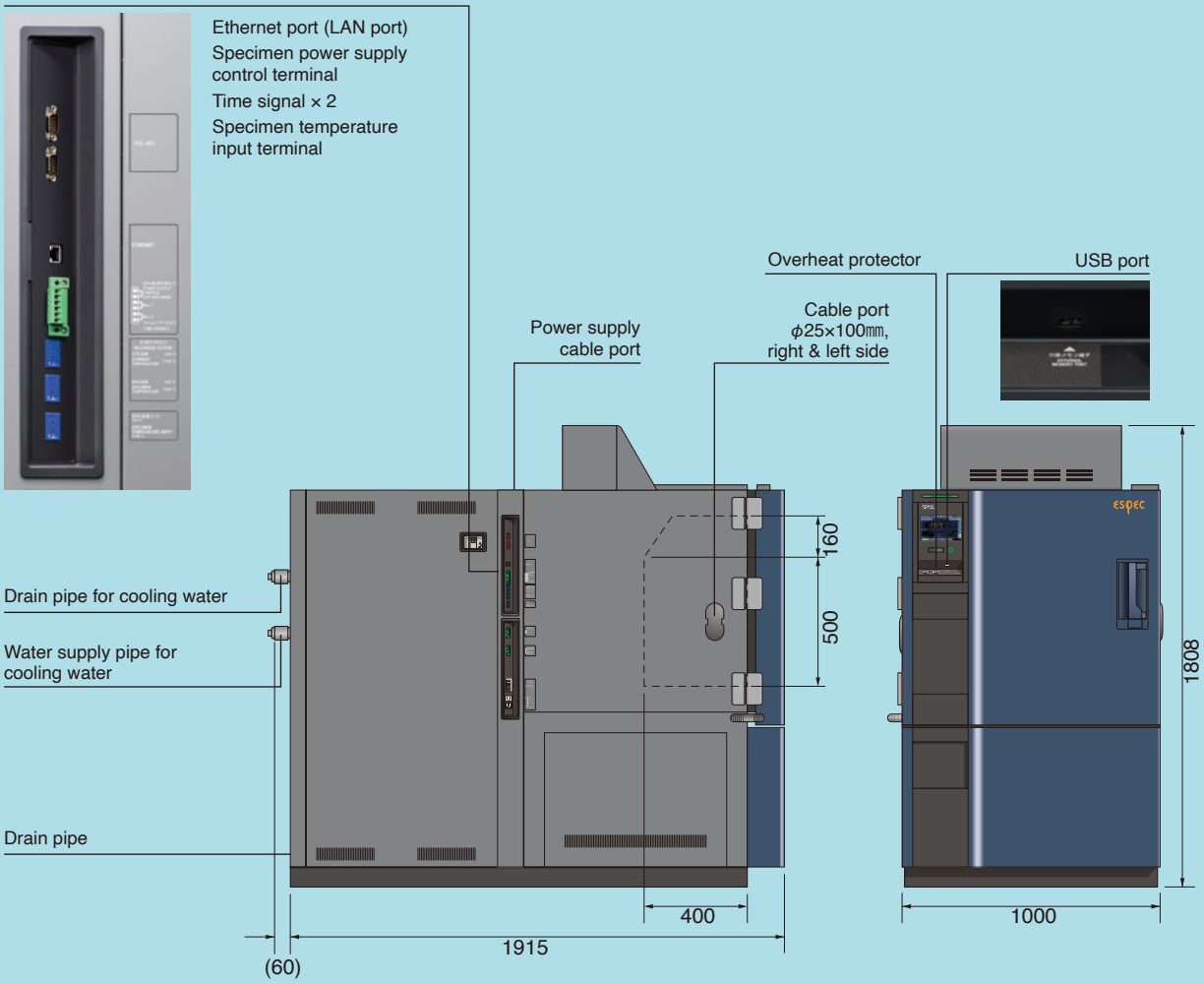
TEMPERATURE CHANGE GRAPH



Temperature range: — −45℃ to +155℃ (setting: −70℃, +180℃)
— +155℃ to −45℃ (setting: +180℃, −70℃)
Specimen load: None
Temperature control: Chamber temperature
Ramp control: Off
Performance: — Max. 9 min. (32K or more/min)
— Max. 11 min. (18K or more/min)

DIMENSIONS/FITTINGS LOCATION

Unit: mm

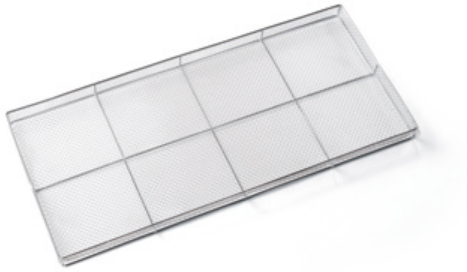


SAFETY DEVICES

- Leakage breaker for 200, 220, 380V AC supply
- Circuit breaker for 400V AC supply
- Mechanical compartment cover and electrical compartment door switch
- Thermal fuse for control circuit short-circuit protection
- System error
- Motor reverse prevention relay
- Thermal fuse
- Air circulator short-circuit protection
- Air circulator Thermal switch
- Overheat protector
- Temp upper limit deviation alarm
- Temp upper / lower limit absolute alarm
- Chamber door switch
- Room temperature compensation burn-out detection circuit
- Dry bulb temperature burn-out detection circuit
- Product temperature burn-out detection circuit (only when product temperature control)
- Specimen power supply control terminal
- Cooling water pressure switch
- Heater overcurrent protection
- Refrigeration circuit temperature burn-out detection circuit
- Refrigerator short-circuit protection
- Refrigerator overcurrent protection
- Refrigerator high/low pressure switch
- Cooling tower interlock terminal

ACCESSORIES

- Flat cable port rubber plug (Silicone sponge rubber) 2
- Specimen basket 2
  (18-8 Cr-Ni stainless steel: 5 mesh per inch)
  W700×H40×D346 mm/ load capacity 5kg



- Shelf brackets (7 positions available, pitch 60mm) 4
- Cartridge fuse
  Type B, 250V 4A 1
  250V 5A 1
  250V 6A 1
- Specimen temperature measuring thermocouple 1
- Specimen temperature input connector 1
- Strainer R1 1/4 in. (32A) 1
- Nipple R1 1/4 in. (32A) × R1 1/4 in. (32A) 1
- Strainer element (#30 mesh) 1
- Operation manual ..... 1 set
- Warranty card 1

*Power cable is optional, not equipped as standard fitting.

Safety precautions

- Do not use specimens which are explosive or inflammable, or which contain such substances. To do so could be hazardous, as this may lead to fire or explosion.
- Do not place corrosive materials in the chamber. If corrosive substances or liquid is used, the life of the unit may be significantly shortened specifically because of the corrosion of stainless steel, resin and silicone materials.
- Do not place life forms or substances that exceed allowable heat generation.
- Be sure to read the operation manual before operation.

TEST STANDARD (TCC-151W COMPATIBILTY)

Test standard		Temperature setting		Temperature change rate	Soak time	Number of cycles
		High temperature (℃)	Low temperature (℃)			
JESD22-A104F	G	+125 (+15, −0)	−40 (+0, −10)	Specimen temperature, 15K/min or less	1, 5, 10, 15 min.	Not specified
	I	+115 (+15, −0)	−40 (+0, −10)			
	J	+100 (+15, −0)	0 (+0, −10)			
	K	+125 (+15, −0)	0 (+0, −10)			
	L	+110 (+15, −0)	−55 (+0, −10)			
	N	+80 (+15, −0)	−40 (+0, −10)			
	R	+125 (+15, −0)	−25 (+0, −10)			
IEC 60749-25	G	+125 (+15, −0)	−40 (+0, −10)			
	I	+115 (+15, −0)	−40 (+0, −10)			
	J	+100 (+15, −0)	0 (+0, −10)			
	K	+125 (+15, −0)	0 (+0, −10)			
	L	+110 (+15, −0)	−55 (+0, −10)			
	N	+80 (+15, −0)	−30 (+0, −10)			
	O	+125 (+15, −0)	−25 (+0, −10)			
IEC 60068-2-14 Nb (JIS C 60068-2-14 Nb)		+175 ±2 +155 ±2 +125 ±2 +100 ±2 +85 ±2 +70 ±2 +55 ±2 +40 ±2 +30 ±2	−65 ±3 −55 ±3 −40 ±3 −25 ±3 −5 ±3 +5 ±3	1±0.2K/min 3±0.6K/min 5±1K/min 10±2K/min 15±2K/min (AVG) Average for up to five minutes	3 hours, 2 hours, 1 hour, 30 min., 10 min. 3 hours if not specified in product specifications	2
IEC-61747-5 (EIAJ ED-2531B)		+100 ±2 +95 ±2 +90 ±2 +85 ±2 +80 ±2 +75 ±2 +70 ±2 +65 ±2 +60 ±2 +55 ±2 +50 ±2 +45 ±2 +40 ±2 +35 ±2 +30 ±2	−50 ±3 −45 ±3 −40 ±3 −35 ±3 −30 ±3 −25 ±3 −20 ±3 −15 ±3 −10 ±3 −5 ±3 0 ±3	1±0.2K/min 3±0.6K/min 5±1.0K/min (AVG) Average for up to five minutes	3 hours, 2 hours, 1 hour, 30 min., 10 min. 3 hours if not specified in product specifications	2
JESD22-A105C	A	+85 (+10, −0)	−40 (+0, −10)	6.25K/min	10 min.	1000
	B	+125 (+10, −0)	−40 (+0, −10)	5.5K/min		
IPC-9701	TC1	100	0	Specimen temperature, 20℃/min or less	Specimen temperature, 10 min.	200 500 1000 3000 6000
	TC2	100	−25			
	TC3	125	−40			
	TC4	125	−55			
	TC5	100	−55			
IPC-TM-650 2.6.6	A	+125 (+3, −0)	−65 (+0, −5)	——	30 min.	5
	B	+85 (+3, −0)	−55 (+0, −5)			
LV 124 L-03		——		4℃/min	15 min.	——
SAE-J1211		+85~+150	−40	4K/min to 6K/min	Low temperature, 4 hours	——

OPTIONS

Power cable

- 5 m
- 10 m

* Power cable is optional, not equipped as standard fitting.

Specimen basket / shelf bracket

Equivalent to standard accessory.
- Material: Stainless steel (5 mesh)

Additional cable port

Provided in addition to the standard cable ports. (Right & left sides)
Location: Right & left side of the main unit
Internal diameter: ϕ 25 × 100 mm
* This cable port cannot be retrofitted on the field.

Cable port rubber plug

Prevents air leakage from the cable port.

Interface

- RS-485
- RS-232C
- GPIB

Location: Terminal panel

Communication cables

- RS-485 5m/ 10m/ 30m
- GPIB 2m/ 4m

Paperless recorder

Records temperature of each section such as the temperature inside the chamber.
Display: 5.7inch color touch panel
Number of inputs (Initial setting):
2 (4 more channels can be turned ON)
Data saving cycle: 5 seconds
Temperature range: −100℃ to +220℃
Internal memory: 8MB
External memory media:
CF memory card (256 MB)
External memory function: USB port

Chart recorder

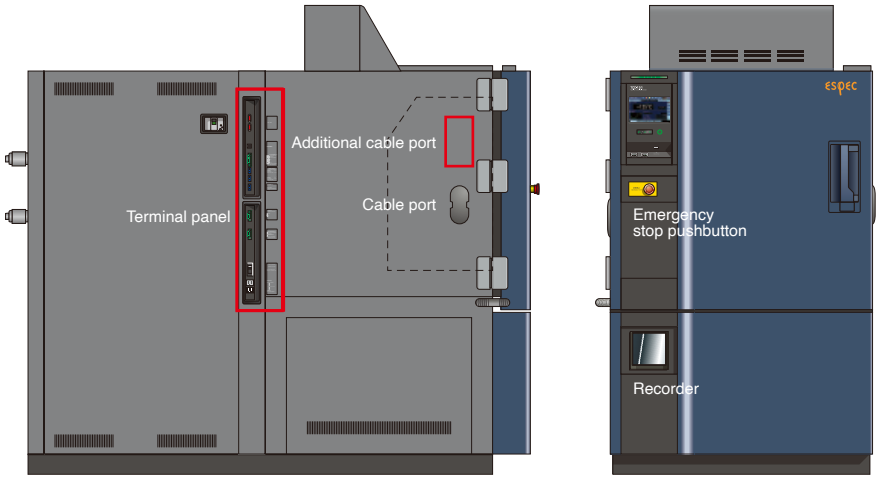
−100℃ to +220℃ /100 mm
- RK-63: 3 pens
- RK-64: 6 dots

Recorder wiring

Preparation of a power cable, temperature sensor, and a grounding wire for additional installation in the future.

Recorder terminal

Used to output the temperature within test area and specimen temperature.



〈Left side〉 〈Front〉

OPTIONS

Thermocouple

Attached to specimens to measure specimen temperature.
- Thermocouple type T without ball (Copper/ Copper-Nickel)

* Same as accessory items

Temperature attainment output

When the temperature in the chamber reaches the set values, the chamber sends out a contact signal.

Additional overheat protector

Additional preventive measures can be taken for excessive temperature rise in the chamber, in addition to the standard equipped overheat protector.

Overcool protector

If the temperature inside the chamber decreases excessively, the chamber stops operating to prevent the specimens from being damaged.

Door opening signal output terminal

Equips the chamber with a terminal that outputs the door open status.
Capable of controlling an external device that operates along with door operation and records the temperature disturbance history.

Status output terminal

When the chamber is setting operation such as “Error”, interlock with connecting devices.

Operation:
When connecting with N.O. contact (normally open contact), output “close” contact.
When connecting with N.C. contact (normally close contact), output “open” contact.
Power supply capacity: 250 V AC, 3 A
Accessory: Plug
Location: Terminal panel
Right side or within the control board (retrofit is not available)

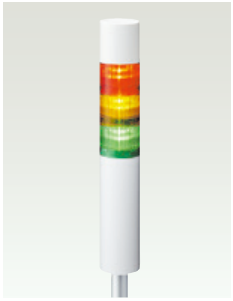
*The circuit shall be connected by customer.

Status indicator light

Select light color, lighting, and blinking or buzzer sound.
- 1 level, light: 1 color, height: 534 mm
- 2 levels, light: 2 colors, height: 574 mm
- 3 levels, light: 3 colors, height: 614 mm
- 4 levels, light: 4 colors, height: 654 mm

Pole length: 290 mm

* The pole can be shortened in units of 10 mm to a minimum height of 50 mm.



Emergency stop pushbutton

Stops the chamber immediately.

With guard

With cover

Anchoring fixtures

Used to bolt the chamber to the floor.

Chamber dew tray

Prevents water leaks from the chamber onto the floor.

Image

*To prevent damage in the event of water leakage, other preventive measures are also available.

Casters

Installed for mobility.
Casters: 4
Levelling-feet: 4

Operation manual

- CD
- Booklet

Reports & certificates

- Testing and inspection report
- Test data
- Calibration report
- Calibration certificate
- Traceability certificate
- Traceability system chart

■Some photographs presented in this catalog contain Japanese display.

AR - Rapid-Rate Temperature Cycle Type

Up to 15K/min

Model *1		ARGF-0250-15	ARGF-0400-15	ARG-0680-15	ARGF-0800-15
Temperature range		–70°C to +180°C (–94°F to +356°F)			
Temperature fluctuation		±0.3K			
Temp. rate of change	Heat up rate	18K/min	15K/min		
	Pull down rate	18K/min	15K/min		
Allowable heat load		Test area temperature: +20°C			
		6000W		9500W	9000W
Capacity		249L	398L	680L	784L
Inside dimensions mm *2		W600×H830×D500	W600×H830×D800	W850×H1000×D800	W1000×H980×D800
Outside dimensions mm *2		W800×H1703×D1900	W800×H1703×D2200	W1050×H1955×D2255	W1200×H1853×D2200

*1: Temperature and humidity models also available.
*2: Dimensions do not include protrusions.

High-Rate Thermal Cycle Chamber HRG

Up to 25K/min

Image

Model *1		HRG-357HS-20	HRG-600HS-20	HRG-800HS-20	HRG-1800HS-20	HRG-357HS-25	HRG-600HS-25	HRG-800HS-25	HRG-1800HS-25
Temperature range		–70°C to +180°C (–94°F to +356°F)							
Temp. rate of change	Heat up rate	20K/min				25K/min			
	Pull down rate	20K/min				25K/min			
Inside dimensions (W×H×Dmm) *2		700 850 600	1000 1000 600	1000 1000 800	1500 1200 1000	700 850 600	1000 1000 600	1000 1000 800	1500 1200 1000
Capacity		357L	600L	800L	1800L	357L	600L	800L	1800L

*1: Temperature and humidity models also available.
*2 Dimensions do not include protrusions.

ESPEC CORP. https://www.espec.co.jp/english

Head Office
3-5-6, Tenjinbashi, Kita-ku, Osaka 530-8550, Japan
Tel : 81-6-6358-4741 Fax : 81-6-6358-5500

ESPEC NORTH AMERICA, INC.
Tel : 1-616-896-6100 Fax : 1-616-896-6150

ESPEC EUROPE GmbH
Tel : 49-211-361850-0

ESPEC ENVIRONMENTAL CHAMBERS SALES AND ENGINEERING LTD. STI. (Turkey)
Tel : 90-212-438-1841 Fax : 90-212-438-1871

ESPEC ENVIRONMENTAL EQUIPMENT (SHANGHAI) CO., LTD.
Head Office
Tel : 86-21-51036677 Fax : 86-21-63372237
BEIJING Branch
Tel : 86-10-64627025 Fax : 86-10-64627036
GUANGZHOU Branch
Tel : 86-20-83317826 Fax : 86-20-83317825
SHENZHEN Branch
Tel : 86-755-83674422 Fax : 86-755-83674228
SUZHOU Branch
Tel : 86-512-68028890 Fax : 86-512-68028860
TIANJIN Branch
Tel : 86-22-26210366 Fax : 86-22-26282186
XI'AN Branch
Tel : 86-29-88312908 Fax : 86-29-88455957
CHENGDU Branch
Tel : 86-28-88457756 Fax : 86-28-88474456
WUXI Branch
Tel : 86-510-82735036 Fax : 86-510-82735039

ESPEC TEST TECHNOLOGY (SHANGHAI) CO., LTD.
Tel : 86-21-68798008 Fax : 86-21-68798088

ESPEC ENGINEERING (THAILAND) CO., LTD.
Tel : 66-3-810-9353 Fax : 66-3-810-9356

ESPEC ENGINEERING VIETNAM CO., LTD.
Mail : EEV_support@espec-vn.com

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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 JSA Solutions Co.,Ltd.

＊ The organization of these certificates is ESPEC CORP. Japan.

JSA QMS JIS Q 9001 JSAQ 004

JAB MS CM001

ISO 27001 (JIS Q 27001)
Quality Management System Assessed and Registered

＊ The organization of these certificates is ESPEC CORP. Japan.

JSA ISMS JIS Q 27001 JSAI 165

ISMS-AC ISMS ISR006

ISO 14001 (JIS Q 14001)
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