Cold Plate for Direct Cooling Module

Compliant with Infineon HybridPACK™ Drive* design guide

※https://www.infineon.com/dgdl/Infineon-HybridPACK_Drive-ApplicationNotes-v01_04-EN.pdf?fileId=5546d4625f2e26bc015f4de5822e13ec

Appearance

*We will ship with fittings and hoses assembled upon request.
*The barb fittings in the photo are examples.

Model

K2118　Cold Plate for Direct Cooling Module

Dimensions

HybridPACK™ Drive

Assembly Instructions for the HybridPACK™ Drive

Power Module Cooling System

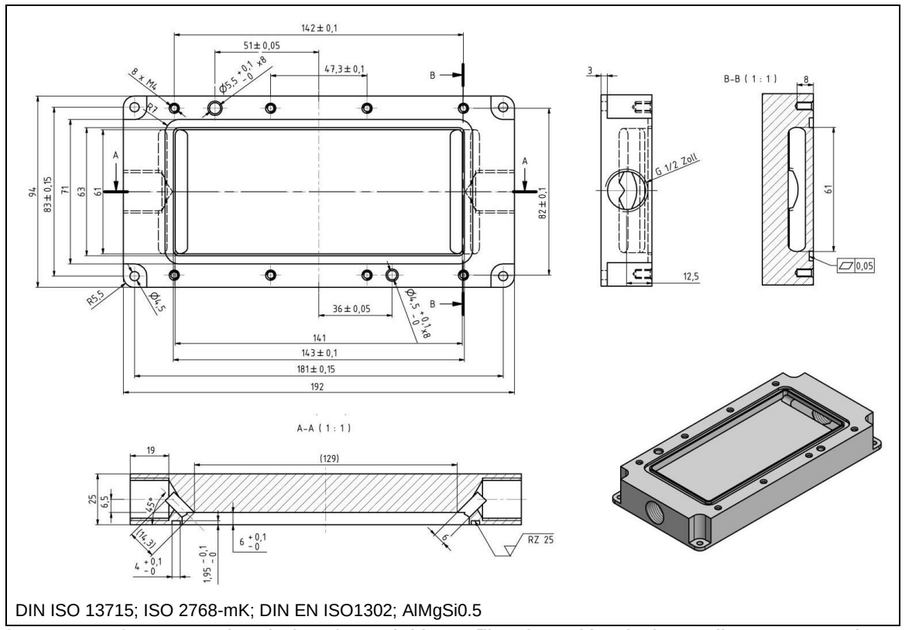
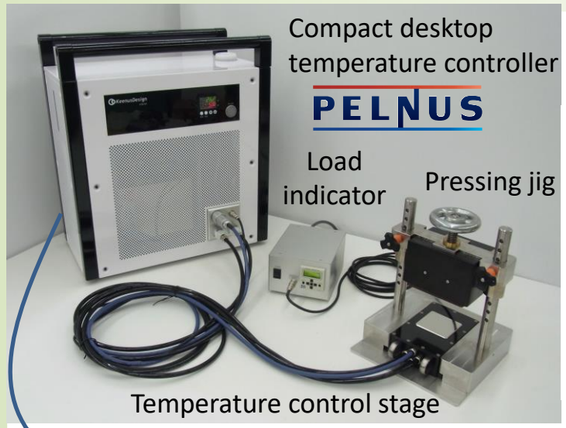
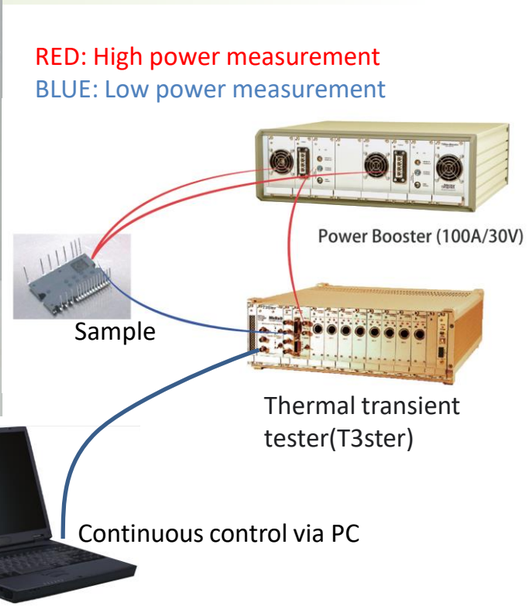


Figure 21 Reference cooler design for HybridPACK™ Drive with PinFin Cooling Structure (e.g. FS820R08A6P2B).

The guideline has two different flow channel depths, both of which can be accommodated.
The O-ring portion is compatible with a change in groove dimensions to one with better availability.

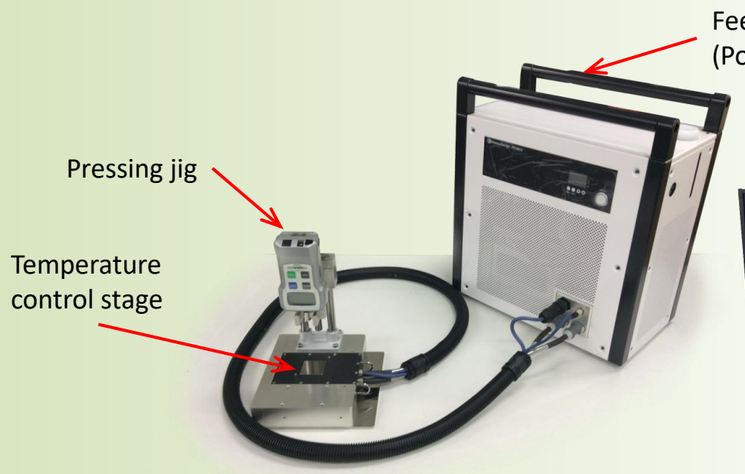
Thermal Characteristics Test, Measurement & Evaluation Peripherals for T3ster





Pressing jig for heater TEG chip (P.74~)

Desktop temperature controller PELNUS (P.60~)



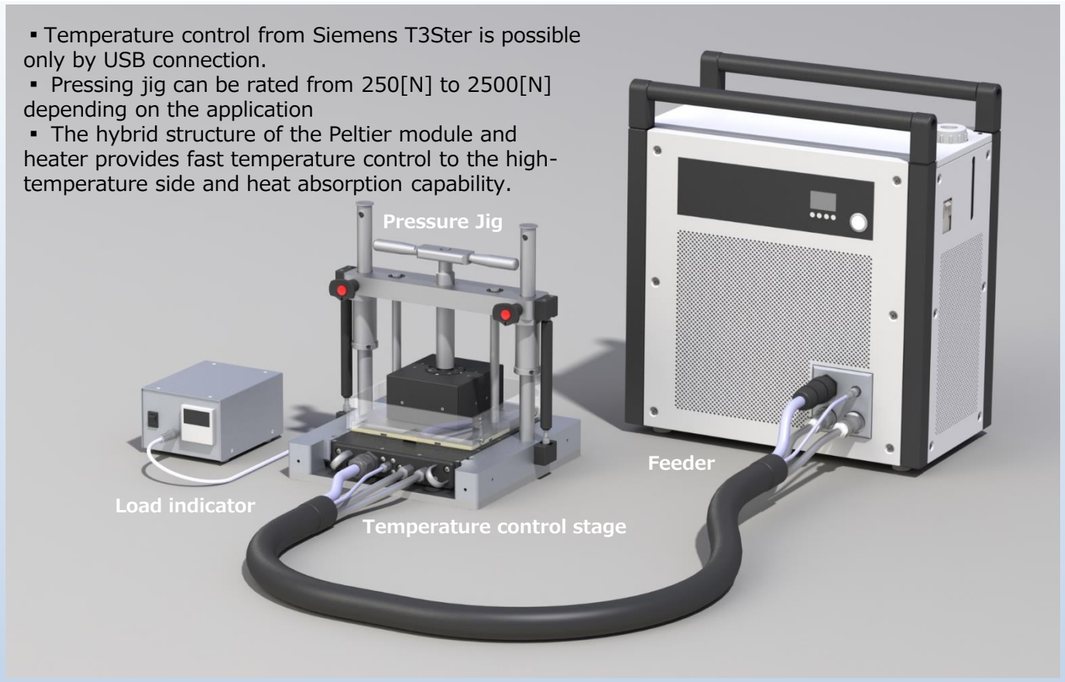
Rack mount for T3ster (P.76)

T3ster

Temperature Control Stage and Pressure Jig for T3Ster®

Combined with Siemens "T3Ster" to measure thermal resistance with high accuracy

Compact desktop temperature controllers capable of controlling temperatures from 25°C (room temperature) to 200°C PELNUS (PELNUS) enables thermal load testing and temperature control of semiconductors on a desktop.
Water-cooled plates and compressors have large temperature errors, making it impossible to achieve the optimal thermal design. The desktop temperature controller PERNUS can provide good temperature distribution by temperature constraining the entire plate.



Pressing jig for heater TEG chip

For measurement of bonding materials and TIMs with very small-time constants and associated contact thermal resistance.

✓ Heater to the sample set on the high-precision temperature-controlled stage
TEG chip is positioned, pressurized, and energized with a probe.

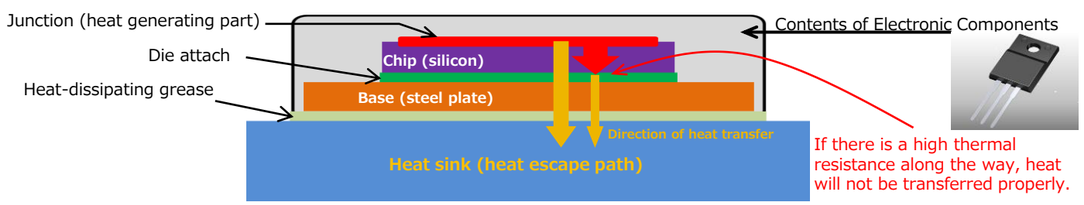
✓ Suitable for measurement of junction materials and TIMs with very small-time constants and their associated contact thermal resistance.
✓ Heating load of up to 40 W on the heater TEG tip is supported.

✓ The fixture can be used for cooling and evaluation while controlling the load.
✓The Heater TEG chip size is □5mm and the maximum heat generation load is 40W.

Features of the temperature-controlled pressure jig for T3Ster

What is T3Ster?

In addition to external temperature fluctuations, it is also necessary to take into consideration the effects of heat generated by the component itself. For this reason, various mechanical elements such as the internal structure of electronic components, their materials, and the state of contact between them are optimized to efficiently transfer self-heating to the outside.
The electronic components are designed to efficiently transfer self-heating to the outside by optimizing various mechanical elements such as the internal structure and materials of the electronic components and their contact conditions.



The contents of electronic components are composed of a variety of materials, and depending on the contact conditions and material properties, there is a resistance to heat transfer (thermal resistance). It is important to identify areas of high thermal resistance.

The thermal resistance value is used as a judgment factor at this time. Thermal resistance is a value that indicates where there are areas where it is difficult for heat to be transferred. If there are areas with high thermal resistance, the temperature rises in those areas, so the challenge is how to reduce the thermal resistance.
However, it is difficult to measure the thermal resistance quantitatively since it is inside small electronic components.

The T3Ster from Siemens is a device that makes it possible to measure the internal thermal resistance of electronic components at high speed and with high accuracy by applying an external current to them.

T3Ster measurement environment

When measuring with the T3Ster, the measurement environment must be set up by the American standard called JEDEC.
Specifically, "the sample is placed on a temperature-controlled metal plate, and a controlled load is applied.
Users who have introduced the T3Ster have had difficulty achieving this by placing samples on a commercial hot plate and using their fingers to press or place a weight on it, etc., and have had difficulty in achieving this.
Also, because the T3Ster is a very accurate measuring instrument, the environment in which the sample electronic components are placed, especially the temperature, must be accurately controlled, or else the results will differ from one measurement to the next. PERNUS solves this problem with its high-precision temperature control stage and pressure fixture.

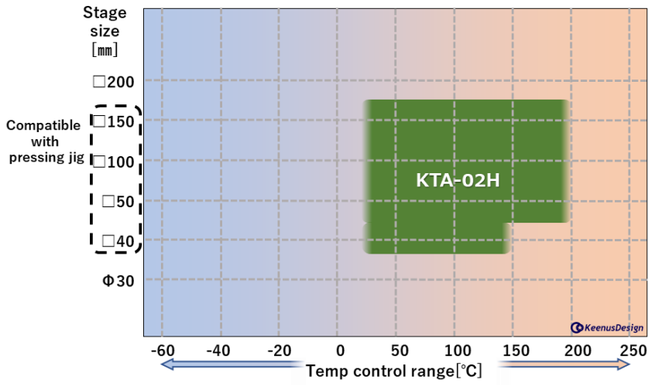
Compact, high-performance temperature control system

The use of a Peltier module in the temperature control unit provides compact, quick, and vibration-free temperature control compared to compressor-type units. Even though compressed air is not required, and no power supply work is needed, it provides high-performance temperature control on a tabletop.

Temperature Control System Configuration

The PELNUS temperature controller is a highly functional and safe product consisting of a "feeder" that controls temperature and a "temperature control stage" that provides a temperature-controlled surface. The functionality and safety can be further expanded by connecting our wide variety of external devices.

Temperature Control Stage Size and Temperature Control Range ：



Temperature-controlled stages have different components and structures depending on the combination of their temperature-controlled surface dimensions and control temperature range.
However, a single PERNUS (KTA-02H) feeder can control all sizes of temperature control stages.

We also offer solution packages for specific applications and are expanding our offerings. Please check our website for the latest information.

Configuration / Options ：

OPT Classification	Model	KTA-02H			
Feeder Option	**Casters (selection)**	・None ・Attached : With 4-wheel lockΦ40[㎜]			
Temperature control stage	**Dimensions of temperature control stage [mm] (selection)**	□40 (For TEG use only)		□50, 100, 150	
	Temperature control range (selection)	25℃～130℃		25℃～150℃ 25℃～200℃	
	Attachment Plate (optional)	None		・None ・Attached : Protection/jig plate	
Pressure Jig	**Corresponding stage dimensions [㎜]**	□40	□50	□100	□150
	Load ratings[N]	500	250	250, 400 800	250, 400 800, 1500 2500
External device Note.1	**Power shutdown box (optional)**	Detects overcurrent, leakage current, and emergency stop button to shut off AC power.			
	Leak detection box (optional)	Wide-area leak sensor ribbon detects liquid leakage and stops temperature control operation.			
	Interlock cover (optional)	Door lock operation and door open detection interlocked to stop temperature control operation.			
	Emergency stop button (optional)	Temperature control operation is stopped by pressing the abnormality stop button.			
	Dry Air (optonal)	Continuously generates dry air to prevent condensation inside equipment and the installation environment.			

Note 1: Can be linked to feeder by connecting to "input contacts for external optional equipment" (except power shutoff box)

Safety

Safety :

Item (Sensor)	Alarming Conditions and Functions	Operation at the time of alarm
Return to power	If a power failure occurs during the temperature control operation, the temperature control operation starts up in a stopped state after the power failure returns.	Temperature control operation: stopped Pumps: operating
Low tank water level detection (Float sensor)	Alarms when the float sensor in the circulating fluid reserve tank detects a drop in water level.	Temperature control operation: stopped Pump: stopped Alarm: display, buzzer alarm
Overheat Prevention (Temperature sensors for temperature control)	Alarms are issued when the temperature sensor installed in the temperature control stage exceeds the set temperature.	Temperature control operation: stopped Pump: operating Alarm: display, buzzer
Overheat prevention (Sensor for overheat detection)	Alarms are issued when the overheat detection sensor installed in the temperature control stage exceeds the set abnormal temperature.	Temperature control operation: stopped Pump: operating Alarm: display, buzzer
Low liquid flow detection (flow sensor)	Alarms when a flow sensor installed in the circulating liquid flow path, detects a drop-in flow rate.	Temperature control operation: stopped Pump: operating Alarm: display, buzzer
Leakage and overcurrent detection (leakage breaker)	The main switch (circuit breaker with leakage current detection) shuts off power when leakage current or overcurrent is detected	Power source: Shutdown
Prevention of abnormal overpressure of circulating liquid (Pressure release valve) Note.1	In the event of an abnormal pressure increase in the circulating fluid, the pressure valve is released to protect the entire temperature control system.	Discharges circulating fluid through drainage tube
External connection device input (Optional)	Alarms are issued in conjunction with alarm/attention inputs from external connection devices (optional)	Temperature control operation: stopped Pumps: operate or stop Alarm: display, buzzer

Note 1: Installed only when deemed necessary for safety reasons in anticipation of power outages and other situations during high-temperature operation.

FAQ

Q What kind of equipment is PELNUS?

Despite its desktop-size housing, this device can control the heat load on the stage at room temperature, and the high-temperature side can be controlled up to 200°C.
By directly pressing solids against the counterpart and controlling the temperature, the temperature is more stable than with other types such as those that cool by blowing gas at the counterpart.

Q How will it be used?

It is used in combination with transient thermal resistance analyzers and as a temperature controller for burn-in tests at R&D sites for power devices, etc.

Q How does cooling work?

The heat from the Peltier element is finally dissipated into the atmosphere by a radiator and fan. Since no refrigerator or liquid nitrogen is used, there is little noise or vibration, and the system is designed so that it will not break down even if the power supply suddenly fails.

Q What is the size of the stage?

We offer general-purpose types (□50mm, □100mm, □150mm) and a specialized type (□40mm) for pressurizing TEG chips as standard products. We also offer other custom sizes to meet your needs.

Q Can samples be pressed?

Pressing jig options are available for all the above 4 standard sizes (□50mm, □100mm, □150mm, □40mm for TEG).

Q What maintenance is needed?

Because plastic tubing is used, there is some evaporation of circulating fluid.
It is necessary to replenish the circulating fluid when it decreases, but this is infrequent. (about half a year to once a year)

Q Can you even support sockets and jigs for devices?

Sockets and jigs are also available. Multiple jig plates can be exchanged according to the application because of the use of attachment plates that can be installed and exchanged on the temperature-controlled stage surface.

Q We need a 250°C environment for testing the latest power semiconductors. Is it possible?

The TECNUS non-air constant-temperature chamber series offers systems for 250°C standard. We are specialized in designing mechanisms that require electrical knowledge, such as temperature range, stage size, and jig design, and we can respond to customization from a single unit.

Ordering Model List/Specifications/Dimensions

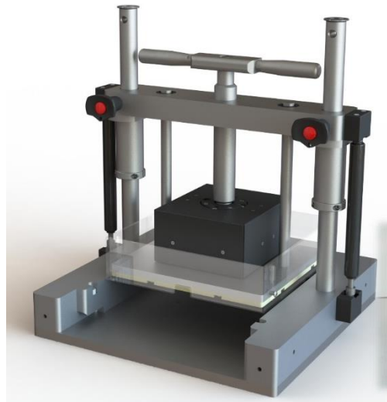
Feeder

KTA-02H

Temperature control stage

PDS-150

Pressing Jig



Load indicator

PDPT-150

Attachment Plate

PDSAP-SQ150

Please refer to TECNUS for the following models, specifications, and dimensional drawings of non-air constant-temperature chambers.
-Leak detection box
-Power shutoff box
-Interlock cover
-Emergency stop button
-Dry air generator

Model / Option

Model :

Model	Specification	Control temperature range
KTA-02H	Standard machine (Circulating fluid: air-cooled)	25℃～130℃/150℃/200℃

Option :

◎ : Mandatory selection (select only one type from the category)
○ : Selectable (multiple selections within a category, no selection possible)
× : Not selectable

Category	Model KTA-02H	Order No.	Specification
Circulating fluid	◎	**#LQD001**	Ethylene glycol solution
	◎	**#LQD002**	Purified water
	◎	**#LQD003**	"Contrime" aqueous solution
Casters	○	**#CAS001**	Resin Φ40mm with lock x 4 wheels

Circulating fluid :

- To prevent corrosion of the circulating fluid flow path and to prevent the circulating fluid from decomposing, we strongly recommend the use of ethylene glycol solution unless there is a special reason to use it.
- Circulating fluid is a consumable product. We also offer various types of circulating fluid for maintenance.
- "Contrime": (Cold and hot water system corrosion inhibitor manufactured by Dia Aqua Solutions Co.)
  Application: Corrosion prevention of iron and copper waterways, bacteria control in water systems
  Safety: Not hazardous, does not contain environmentally harmful substances and can be discharged to sewage if diluted.

Product appearance

KTA-02H

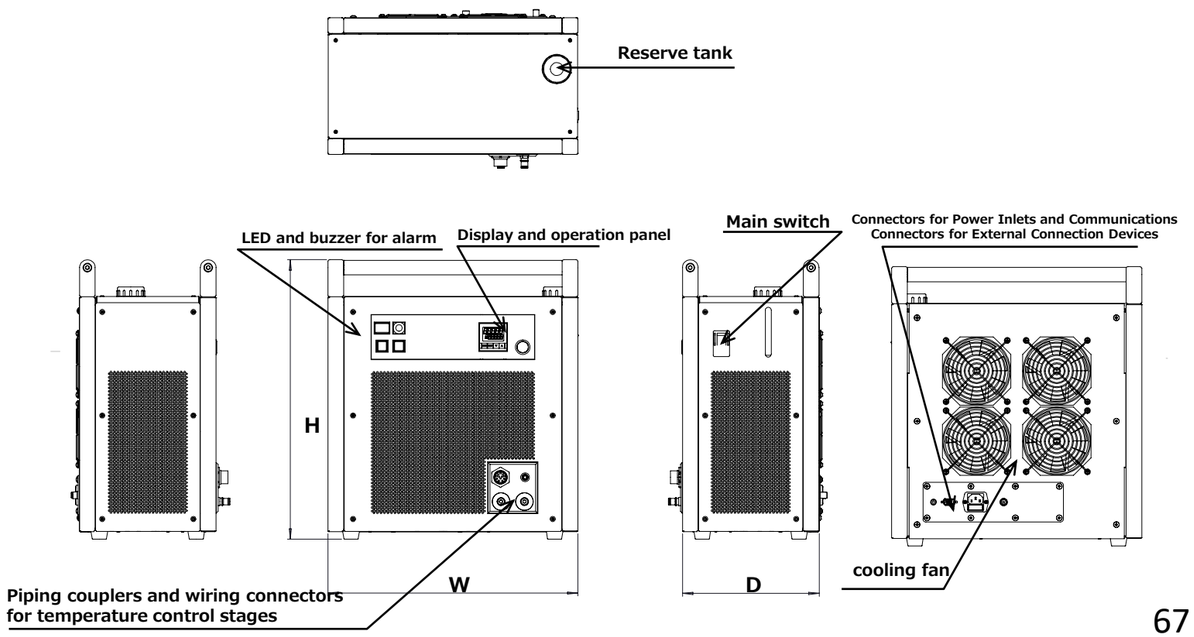
Specification

Model	KTA-02H
Operating environment temperature/humidity	15℃～30℃ / 5%～85% (No condensation)
Storage temperature/humidity	5℃～40℃ / 5%～90% (No condensation)
Circulating liquid/Cooling liquid	Standard: Ethylene glycol solution (Concentration: 30%)
Circulating liquid Reserve tank capacity [ml]	250
Display/Operation	・Display/operation: Temperature controller with integrated feeder and temperature control start button
Temperature control (PID)	・PWM control of Peltier and heater in the temperature control stage ・Liquid cooling for Peltier heat dissipation
Control temperature range	25℃～130℃/150℃/200℃
External communication Note.1	RS485: For T3ster temperature control For loader communication (temperature controller setting, data logging)
Input for external connection	・Input: Alarm
Power supply rating AC100V 50/60Hz	1200W Interrupting ratings: overcurrent/15A, leakage current/15mA
External dimensions [㎜]	W427 x D234 x H478(H506/With casters OPT)　(Not including protrusions)
Mass [kg]	16

Note.1 : USB⇔RS485 conversion with attached　communication cable to connect to feeder
Connection I/F on T3ster/PC side is USB

Standard accessories:
Specifications and instruction manual / Temperature calibration certificate / Power cable / Communication cable (PC side: USB)/ CD (loader communication application & Driver)

Dimensions



Temperature control stage

Model / Option

Model :

Model	Specifications Stage surface dimensions [mm] (control temperature range)	Connection target (feeder)
PDS-40	W40xD40　(25℃～130℃)	KTA-02H
PDS-50	W60xD60　(25℃～150℃/25℃～200℃)	KTA-02H
PDS-100	W110xD110 (25℃～150℃/25℃～200℃)	KTA-02H
PDS-150	W160xD160 (25℃～150℃/25℃～200℃)	KTA-02H

・The numeral part of the model's name indicates the effective temperature control surface dimensions.
・PDS-40 is available as a solution package "Pressure Fixture for Heater TEG Chip".
For details, please refer to P.74: Siemens Product Option "Pressure Fixture for Heater TEG Chip" in this catalog.

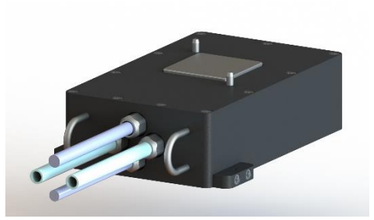
Option :

Category	Model				Order No.	Control temperature range	Connected Products
	PDS-40	PDS-50	PDS-100	PDS-150			
Temperature control range	◎	×	×	×	#TRG011	25℃～130℃	KTA-02H
	×	◎	◎	◎	#TRG012	25℃～150℃	KTA-02H
	×	◎	◎	◎	#TRG013	25℃～200℃	KTA-02H

◎ : Mandatory selection (select only one type from the category)
○ : Selectable (multiple selections within a category, no selection possible)
× : Not selectable

Product appearance

PDS-150



PDS-40

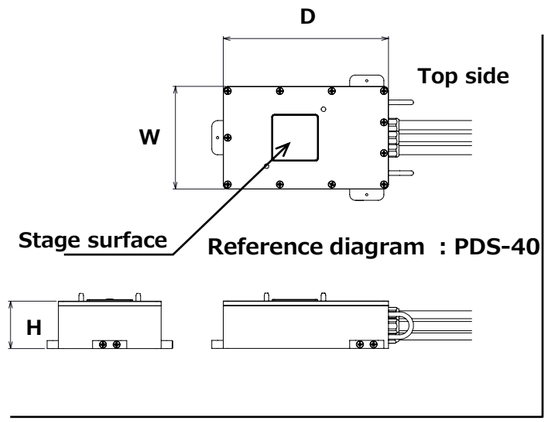
Temperature control stage

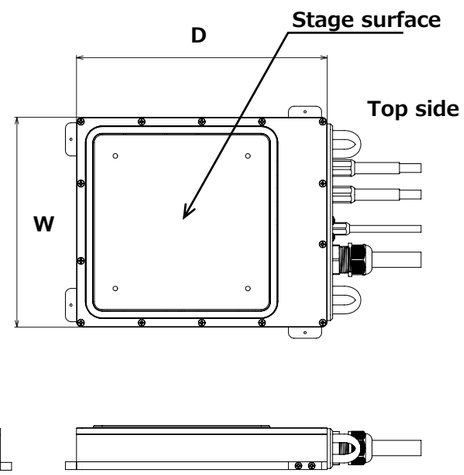
Specification

Model	PDS-40 Note.1	PDS-50	PDS-100	PDS-150
Stage surface dimensions [㎜]	W40 x D40	W60 x D60	W110 x D110	W160 x D160
Effective temperature control surface dimensions [㎜]	W40 x D40	W50 x D50	W100 x D100	W150 x D150
Stage temperature control range	25℃～130℃	25℃～150℃ 25℃～200℃		
Stage Materials	Copper, nickel plated			
Piping and wiring length [m]	1.5			
External dimensions [㎜] Note. 2	W90 D145 H42	W90 D145 H42	W160 D200 H38	W190 D227 H38
Mass [kg]	2	2	4	6

Note.1: PDS-40 is available as a solution package "Pressure Fixture for Heater TEG Chip".
For details, please refer to P.74: Siemens Product Option "Pressure Fixture for Heater TEG Chips" in this catalog.
Note 2: Refer to the external view. Excluding protrusions and cables.

Dimensions





Pressure Jig

Model / Option

Model

Model	Rated load[N] (display device)	Connection target (temperature control stage)
PDPT-TEG	500 (built-in)	PDS-40
PDPT-50	250 (external BOX)	PDS-50
PDPT-100	250, 400, 800,1000 (external BOX)	PDS-100
PDPT-150	250, 400, 800, 1500, 2500 (外付けBOX)	PDS-150

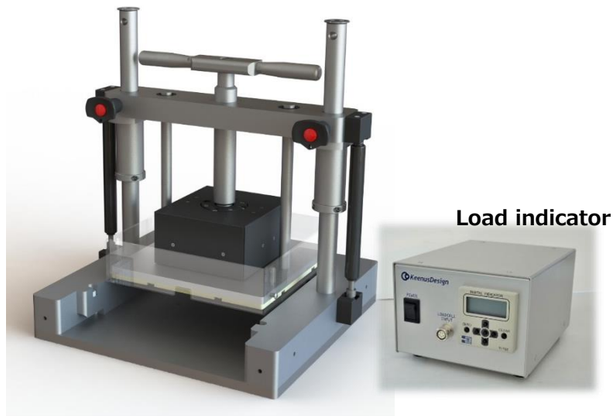
PDPT-TEG is available as a solution package "Pressure Fixture for Heater TEG Chip".
For details, please refer to P.74: Siemens Product Option "Pressure Fixture for Heater TEG Chip" in this catalog.

Option :

Category	Model: PDPT-TEG	PDPT-50	PDPT-100	PDPT-150	Order No.	Rated capacity[N]
Rated capacity	◎	×	×	×	**#LDW500**	500
	×	◎	◎	◎	**#LDW250**	250
	×	×	◎	◎	**#LDW400**	400
	×	×	◎	◎	**#LDW800**	800
	×	×	◎	◎	**#LDW101**	1000
	×	×	◎	◎	**#LDW151**	1500
	×	×	×	◎	**#LDW251**	2500

◎ : Mandatory selection (select only one type from the category)
○ : Selectable (multiple selections within a category, no selection possible)
× : Not selectable

Product appearance



PDPT-150

PDPT-TEG

Pressure Jig

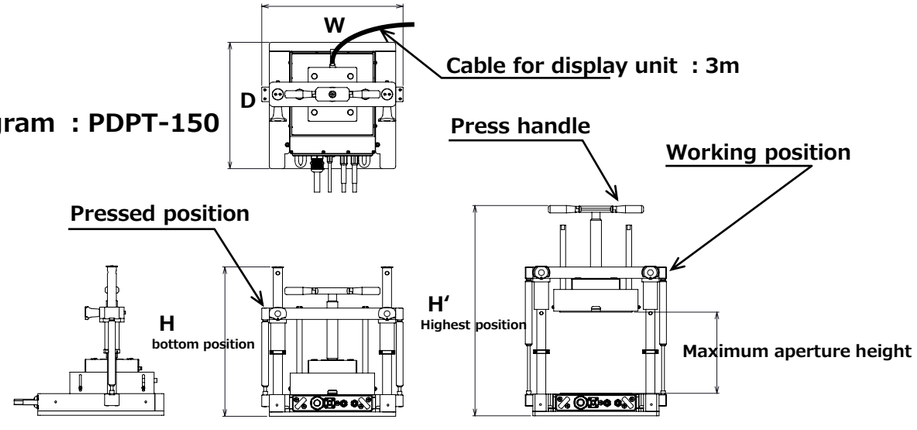
Specification

Model Note.1	PDPT-TEG Note.2	PDPT-50	PDPT-100	PDPT-150
Rated load[N]	500	250	250, 400, 800	250, 400, 800 1500, 2500
Measurement system [N]	±1.5	±0.6	±0.6, ±1, ±2	±0.6, ±1, ±2 ±4, ±6
External connection I/O	None	▪ OUTPUT: Analog output, 2 comparators ▪ INPUT: Tare, clear, hold		
Load Indicator External dimensions Mass	built-in	W123 x D154 x H89 [㎜] 1.5 [kg]		
Maximum aperture height [㎜] Note.3	NA	90-180	90-180	90-180
External dimensions [㎜] Note.4	W211 x D200 H306-H'383	W233 x D200 H335-H'453	W283 x D253 H332-H'464	W313 x D280 H332-H'466
Mass [kg]	6	14	18	20

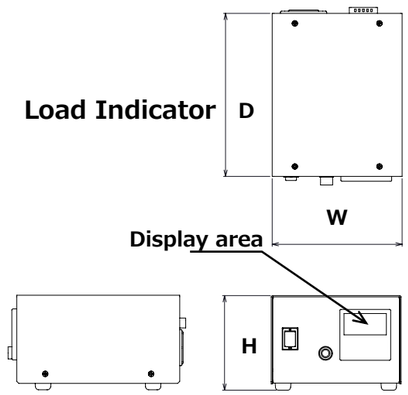
Note.1: Refer to the external view. External dimensions exclude protrusions and cables.
Note.2: PDPT-TEG is available as a solution package "Pressure Fixture for Heater TEG Chip".
For details, please refer to P.74: Siemens Product Option "Pressure Fixture for Heater TEG Chip" in this catalog.
Note 3: The aperture can be adjusted to two different heights for pressurization and working, the values represent the maximum value for each.
Note.4: The length of the cable for the indicator is 3 m. The PDPT-TEG has no wiring because the indicator is built into the main unit.

Dimensions

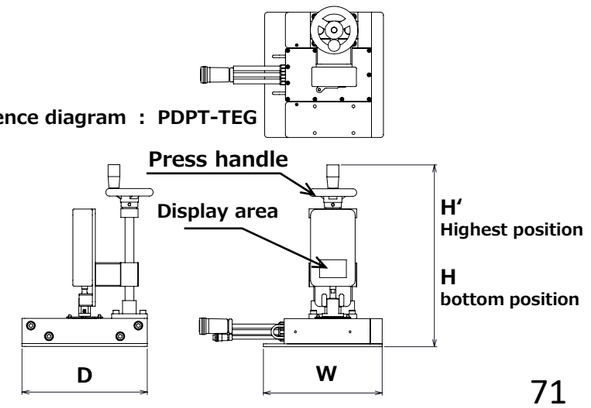
Reference diagram : PDPT-150



Load Indicator



Reference diagram : PDPT-TEG



Attachment Plate

Model / Option

Model

Model	Installation target (temperature control stage)
PDSAP-50	PDS-50
PDSAP-100	PDS-100
PDSAP-150	PDS-150

By installing the attachment plate, the height of the opening of the pressure fixture is lowered by 5mm.
The attachment plate for PDS-40 is not available.

Option :

◎ : Mandatory selection (select only one type from the category)
○ : Selectable (multiple selections within a category, no selection possible)
× : Not selectable

Category	Model: PDSAP-50	Model: PDSAP-100	Model: PDSAP-150	Order No.	Specification
Additional machining	○	○	○	**#CST001**	Additional screw holes (free design))
	○	○	○	**#CST002**	Additional marking (free design)

Additional machining:
- We may not be able to accept your request if your request causes performance or structural problems.
  #CST001: Add threaded holes on the plate for mounting samples or jigs.
  #CST002: Marking (laser) can be made on the surface of the plate for positioning samples, etc.
- For processing work, customers are requested to submit design drawings.
- Please contact us for details.

Product appearance

PDSAP-SQ150

Attachment Plate

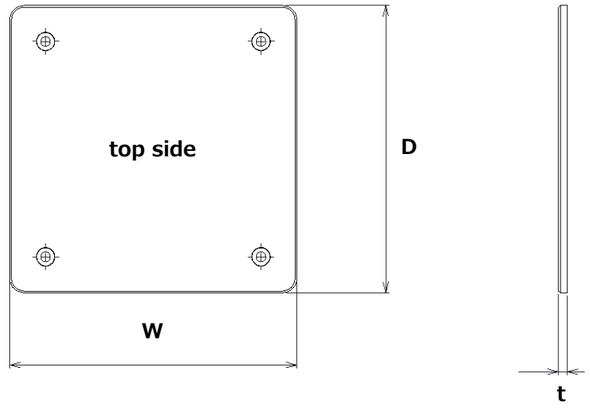
Specification

Model	PDSAP-50	PDSAP-100	PDSAP-150
Corresponding temperature control stage	PDS-50	PDS-100	PDS-150
External dimensions [㎜]	W60 D60 t5	W110 D110 t5	W160 D160 t5
Material properties	copper		
Surface treatment	nickel plating		
Mass [kg]	0.2	0.5	1.1
Option Note.1	Threaded hole processing (addition: free design) Marking processing (addition: free design)		

Note.1: For machining operations, the following design drawings must be submitted according to customer requirements.
"Thread hole machining instruction drawings", "Marking machining instruction drawings"

Dimensions : PDSAP-50/100/150

Reference diagram : PDSAP-150



Other

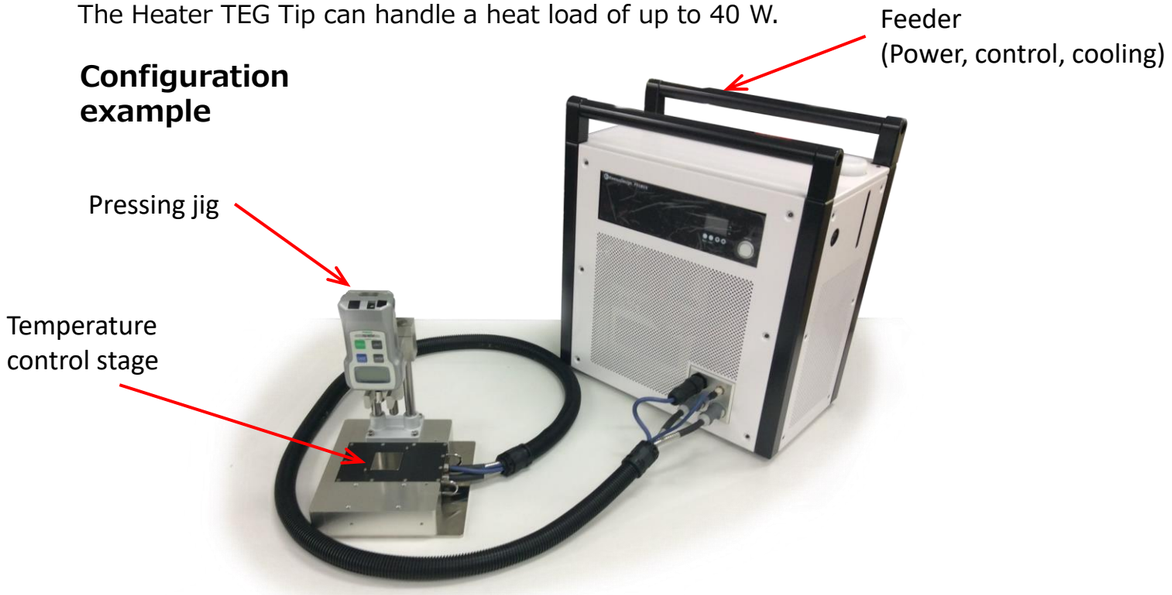
Please refer to TECNUS for the following models, specifications,
and dimensional drawings of non-air constant-temperature chambers.
-Leak detection box
-Power shutoff box
-Interlock cover
-Emergency stop button
-Dry air generator

Pressure jig for heater TEG chip

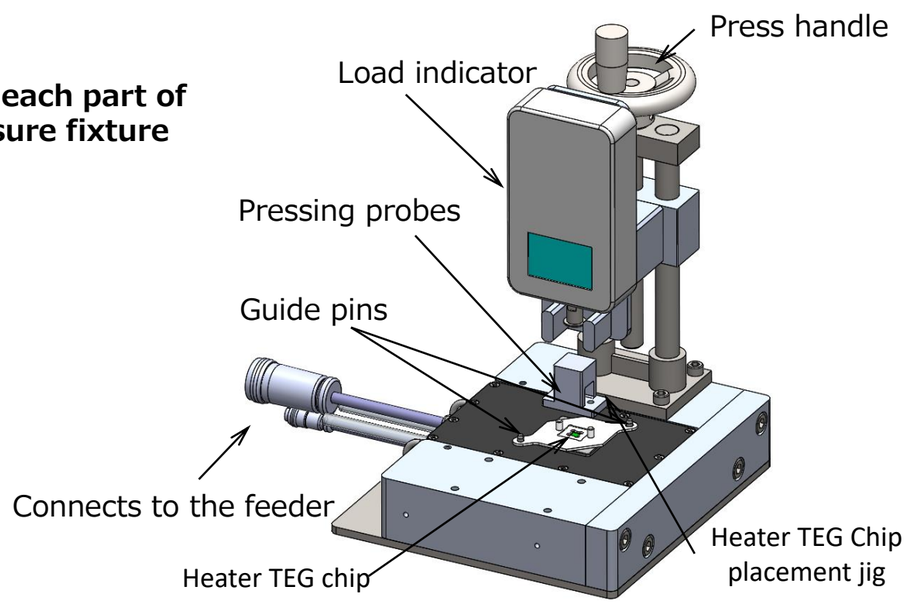
For measurement of bonding materials with small time constants, TIM, and associated contact thermal resistance

This product is a jig that positions a heater TEG chip on a workpiece set on a high-precision temperature-controlled stage and applies pressure and current with a probe. It is suitable for measuring bonding materials and TIMs with very small-time constants and their associated contact thermal resistance.
The Heater TEG Tip can handle a heat load of up to 40 W.

Configuration example



Name of each part of the pressure fixture



1. This fixture allows cooling and evaluation while controlling the load.
2. The size of the heater TEG chip is □5 mm and the maximum heat generation load is 40 W.
3. A separate temperature control feeder (KTA-02) is required for temperature control of the stage.

Product specification

Temperature control stage (dedicated to heater TEG chip pressure jig)		
Dimensions of the temperature control unit	W40 x D40 mm	base
External dimensions	W145 x D90 x H43 mm	not including protrusions
Mass	Approx. 2.1kg	Including cable, when full of water
Temperature control range	25℃～125℃	
Temperature control method	Peltier + water cooling system	
Material of temperature-controlled stage	copper	Nickel plating
Cable & Tube Length	1.5m	

Heater TEG chip pressure jig		
Upper pressure limit	50N	
Minimum resolution	0.1N	
Measurement Accuracy	±0.3%(R.C.)	
External dimensions (max.)	W200 x H306 x D211mm	
Applicable Workpiece Dimensions	□3mm,□5mm	t3mm
Corresponding TEG dimensions	□3mm,□5mm	t0.3mm
Mass	Approx. 5.5kg	
Power source for load cell	Rechargeable (AC adapter included)	

Model

TPT-□-□-□

Temperature controlled feeder	0	None
	1	attached
Circulating fluid	0	Ethylene glycol solution
	1	Purified water
Heater TEG chip size	03	□3mm
	05	□5mm

For details on circulating fluid, please refer to the Power Cycle Test Chamber Option List → Circulating Fluid.

Q&A

Q: What kind of samples is it suitable for evaluating?
A: It is best suited for thermal resistance evaluation of bonding materials, TIMs, and packages. Since the pressing load can be adjusted while checking, test reproducibility can be ensured.

Q: Is there a safety cover to prevent accidental touching during testing?
A: An interlock cover that can also control door locking is available as an option. Please see the interlock cover page for details.

Introduction video

Getting the K-Factor of a TEG Chip
You can see a video of the process.

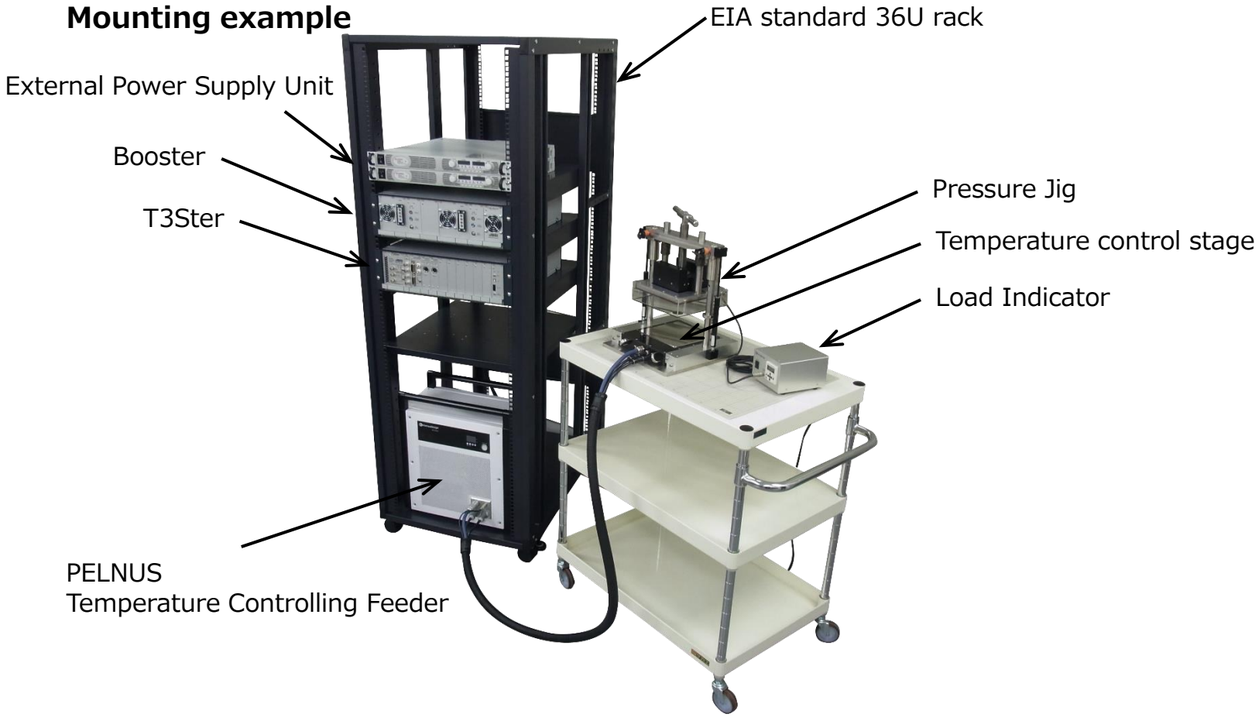
https://youtu.be/L_zKthS9fJA

Siemens T3ster® Rackmount

T3ster accessories and options are all mounted together.

Peripheral equipment and options for Siemens' T3Ster thermal resistance measuring instrument can be mounted together. On-site installation is also available.

Mounting example



Shelves and support angles are selected and placed according to the system configuration.

Product specification

Standard configuration specifications (rack only)	
Dimensions	W600 x D850 x H1750mm
Mass	50.1kg
Material properties	Steel (melamine baking coating)
Load-bearing capacity	Total load capacity 200kg

Model

K1711-61901

MEMO