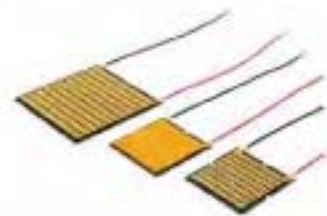


# Peltier Device



**TAISEI Co.,Ltd.**

# Peltier Device in the 21st Century

## Uni-Thermo

**Long-life.  
High reliability**

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## Features of Uni-Thermo

- \* Succession in making a single crystal of this element.
- \* Skeleton Structure.  
(Flexible Structure - relief of thermal distortion.-)
- \* Precise Processing Technology Accumulated by  
Watch Precise Technique.

Under these technologies, we provide an ideal electronic peltier cooling which has an excellent performance, reliability, environmental, compact, and superior in everything belonging to this device.

1. Superior cooling efficiency.  
(Max. temperature gap, Endothermic quantity.)
2. High-speed respons.
3. High reliability, long-life.
4. High precision thickness control.
5. Utilization of large-sized (70x70 mm square) module.
6. Electric insulation can be selected according to application.
7. Made with Pb-free.



# Comparison with a Conventional Peltier Device

## Ordinary Peltier Device

### History

1834: Discovery of Peltier effect.

1954: Discovery of BiTe solid solution.

— Since 45 years, the forecast for the mass usage looks very hard.

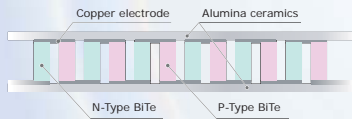
### Features of Materials

Polycrystal in Ingot Configuration  
Diameter 30 mm Length 250 mm

Sintering Body in Disk Configuration  
Diameter 60 mm Height 30 mm

### Shape of Materials

Rigid Body Structure



### Feature of Manufacturing Method and Device

- 1) 3 times cutting process. It waste much of materials.
- 2) It is easy to be broken due to rigid body structure.
- 3) On-Off control (quick cooling) can not be operated.
- 4) The thermo transfer is slow due to the polycrystal and sintering body.
- 5) Coefficient of performance (COP) is not changed for 20 to 30 years due to the polycrystal and rigid body structure.

## Uni-Thermo

### History

1994: Invention of monocrystal in needle configuration method.

1998: Development of Skeleton type devices.

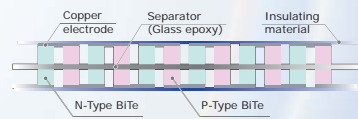
— Since 2000: Mass usage can be expected.

### Features of Materials

Monocrystal in needle configuration  
Diameter 1.8 mm Length 120 mm

### Shape of Materials

Flexible Structure



### Feature of Manufacturing Method and Device

- 1) Only 1 cutting processes, material is utilized in the maximum.
- 2) The high reliability due to Relaxing flexible structure.
- 3) ON - OFF control is possible.
- 4) Quick response. (rapid cooling and heating performance.)
- 5) Coefficient of performance (COP) is improved 25% max superior than conventional peltier devices.

# 40 Kapton Peltier Module The Result of Operating Reliability Test

## 1 : Method of Testing

Sample : 40 type Thermoelectric module with insulating cover by kapton film. (Kapton™ is polyimide film manufactured by)

Test Equipment : Endurance Test Equipment

Method of Testing : Divert an electric current to an order direction, a reverse direction to an element in turn, and cooling side temperature and radiation of heat side temperature go to a state of 25 °C, 80 °C and return. A drive electric current is a rating electric current.

Figure-1. A Figure Of Principle For Testing

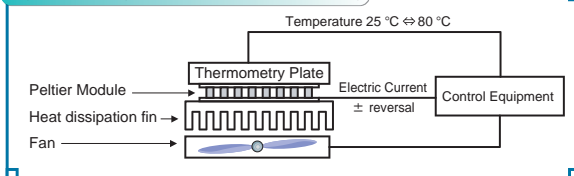
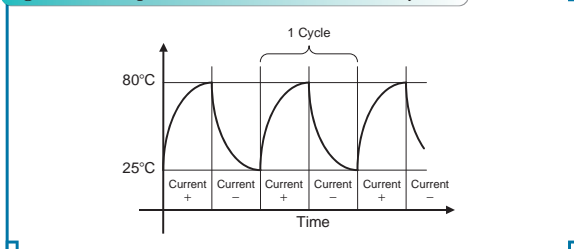


Figure-2 A Temperature Profile Of Thermometry Plate



## 2 : Test Criterion

Internal Resistance  $\pm$  max.10%

## 3 : Reliability Test Result

At 478,000, cycles there is no resistance abnormality. Testing cycle frequency and resistance change are shown in the figure 3. For comparing, the Endurance test result of the other companies item of the same module size is shown in the figure 4. This item was broken in 2,900 cycles.

Figure -3. TAISEI 40 Kapton Item Endurance Test Result

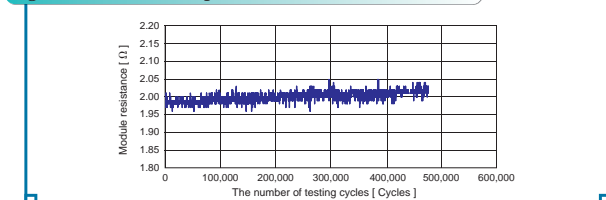
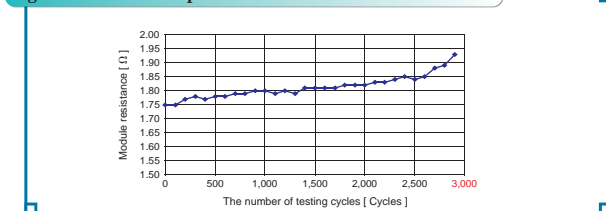





Figure -4. Other Companies Item 40 Endurance Test Result

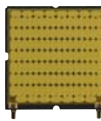






## UNITHERMO™ 70 SERIES

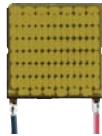


Module Type	UT-7070KA-M	UT-7070AL-M	UT-7070CE-M	
1. I max.	7.5 A	7.5 A	7.5 A	Occurs at Q max. (Th=50 °C)
2. V max.	30.0 V (DC)	30.0 V (DC)	30.0 V (DC)	"
3. Δt max.	74.0 °C (typ.)	72.0 °C (typ.)	75.0 °C (typ.)	"
4. Q max.	125.0 W (typ.)	132.0 W (typ.)	140.0 W (typ.)	"
5. Internal Resistance	2.90 Ω ± 10 %	2.90 Ω ± 10 %	2.90 Ω ± 10 %	Th=25 °C
6. Dimension	71.0 mm × 72.0 mm	72.0 mm × 73.0 mm	76.2 mm × 76.2 mm	
Thickness	3.05 ± 0.10 mm	5.07 ± 0.10 mm	4.20 ± 0.10 mm	
7. Number of Thermocouple	241	241	241	P/N Pair
8. Wire Length	215 ± 2 mm	215 ± 2 mm	215 ± 2 mm	From Edge of Separator
9. Weight	80.0 g ± 10 %	90.0 g ± 10 %	85.0 g ± 10 %	
10. Bolting Torque	4~6 kgf (apply torque in alternating between screw)	4~6 kgf (apply torque in alternating between screw)	4~6 kgf (apply torque in alternating between screw)	Commendable Condition
11. Usable Temperature	150 °C max.	150 °C max.	150 °C max.	
12. Moisture Protection	—	Silicone Resin	Silicone Resin	
13. Insulating Method	Elastomer & Polyimide Film	Elastomer	Ceramics	
14. Insulating Resistance	DC500 V, 500 MΩ min.	DC100 V, 50 MΩ min.	—	
15. Appearance				

## UNITHERMO™ 40 SERIES

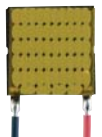


Module Type	UT-4040KA-M	UT-4040AL-M	UT-4040CE-M	
1. I max.	7 A	7.0 A	7.0 A	Occurs at Q max. (Th=50 °C)
2. V max.	19.0 V (DC)	19.0 V (DC)	19.0 V (DC)	"
3. Δt max.	74.0 °C (typ.)	72.0 °C (typ.)	75.0 °C (typ.)	"
4. Q max.	59.0 W (typ.)	62.0 W (typ.)	64.0 W (typ.)	"
5. Internal Resistance	1.90 Ω ± 10 %	1.90 Ω ± 10 %	1.90 Ω ± 10 %	Th=25 °C
6. Dimension	45.0 mm × 46.0 mm	47.0 mm × 48.0 mm	50.8 mm × 50.8 mm	
Thickness	2.58 ± 0.10 mm	3.52 ± 0.10 mm	3.73 ± 0.10 mm	
7. Number of Thermocouple	127	127	127	P/N Pair
8. Wire Length	135 ± 2 mm	135 ± 2 mm	215 ± 2 mm	From Edge of Separator
9. Weight	19.5 g ± 10 %	26.0 g ± 10 %	32.0 g ± 10 %	
10. Bolting Torque	4~6 kgf (apply torque in alternating between screw)	4~6 kgf (apply torque in alternating between screw)	4~6 kgf (apply torque in alternating between screw)	Commendable Condition
11. Usable Temperature	150 °C max.	150 °C max.	150 °C max.	
12. Moisture Protection	—	Silicone Resin	Silicone Resin	
13. Insulating Method	Elastomer & Polyimide Film	Elastomer	Ceramics	
14. Insulating Resistance	DC500 V, 500 MΩ min.	DC100 V, 50 MΩ min.	—	
15. Appearance				



## UNITHERMO™ 30 SERIES

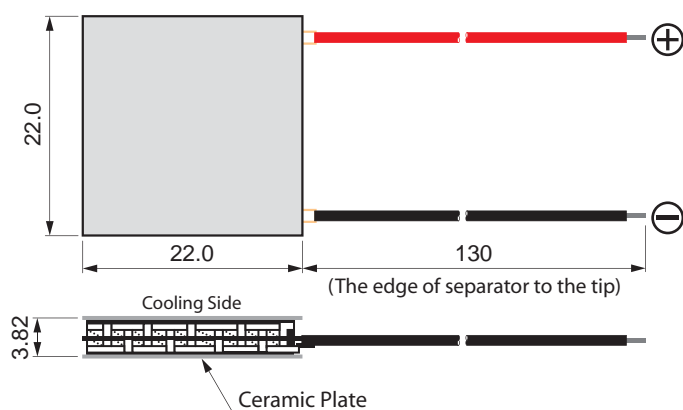
Module Type	UT-3030KA-M	UT-3030AL-M	UT-3030CE-M	
1. I max.	3.5 A	3.5 A	3.5 A	Occurs at Q max. (Th=50 °C)
2. V max.	15.0 V (DC)	15.0 V (DC)	15.0 V (DC)	"
3. Δt max.	72.0 °C (typ.)	72.0 °C (typ.)	75.0 °C (typ.)	"
4. Q max.	25.0 W (typ.)	25.0 W (typ.)	27.0 W (typ.)	"
5. Internal Resistance	2.75 Ω ± 10 %	2.75 Ω ± 10 %	2.75 Ω ± 10 %	Th=25 °C
6. Dimension	28.0 mm × 29.0 mm	30.0 mm × 30.0 mm	30.0 mm × 30.0 mm	
Thickness	2.58 ± 0.10 mm	3.52 ± 0.10 mm	3.82 ± 0.10 mm	
7. Number of Thermocouple	97	97	97	P/N Pair
8. Wire Length	130 ± 2 mm	130 ± 2 mm	130 ± 2 mm	From Edge of Separator
9. Weight	8.6 g ± 10 %	11.9 g ± 10 %	9.0 g ± 10 %	
10. Bolting Torque	2~4 kgf (apply torque in alternating between screw)	2~4 kgf (apply torque in alternating between screw)	2~4 kgf (apply torque in alternating between screw)	Commendable Condition
11. Usable Temperature	150 °C max.	150 °C max.	150 °C max.	
12. Moisture Protection	—	Silicone Resin	Silicone Resin	
13. Insulating Method	Elastomer & Polyimide Film	Elastomer	Ceramics	
14. Insulating Resistance	DC500 V, 500 MΩ min.	DC100 V, 50 MΩ min.	—	
15. Appearance				

## UNITHERMO™ 20 SERIES

Module Type	UT-2020KA-M	UT-2020AL-M	UT-2020CE-M	
1. I max.	3.2 A	3.2 A	3.2 A	Occurs at Q max. (Th=50 °C)
2. V max.	6.2 V (DC)	6.2 V (DC)	6.2 V (DC)	"
3. Δt max.	67.0 °C (typ.)	67.0 °C (typ.)	70.0 °C (typ.)	"
4. Q max.	13.0 W (typ.)	13.0 W (typ.)	13.0 W (typ.)	"
5. Internal Resistance	1.40 Ω ± 10 %	1.40 Ω ± 10 %	1.40 Ω ± 10 %	Th=25 °C
6. Dimension	21.0 mm × 21.0 mm	22.0 mm × 22.0 mm	22.0 mm × 22.0 mm	
Thickness	2.58 ± 0.10 mm	3.52 ± 0.10 mm	3.82 ± 0.10 mm	
7. Number of Thermocouple	49	49	49	P/N Pair
8. Wire Length	130 ± 2 mm	130 ± 2 mm	130 ± 2 mm	From Edge of Separator
9. Weight	5.6 g ± 10 %	7.3 g ± 10 %	8.0 g ± 10 %	
10. Bolting Torque	2~4 kgf (apply torque in alternating between screw)	2~4 kgf (apply torque in alternating between screw)	2~4 kgf (apply torque in alternating between screw)	Commendable Condition
11. Usable Temperature	150 °C max.	150 °C max.	150 °C max.	
12. Moisture Protection	—	Silicone Resin	Silicone Resin	
13. Insulating Method	Elastomer & Polyimide Film	Elastomer	Ceramics	
14. Insulating Resistance	DC500 V, 500 MΩ min.	DC100 V, 50 MΩ min.	—	
15. Appearance				



### Dimensional Outlines

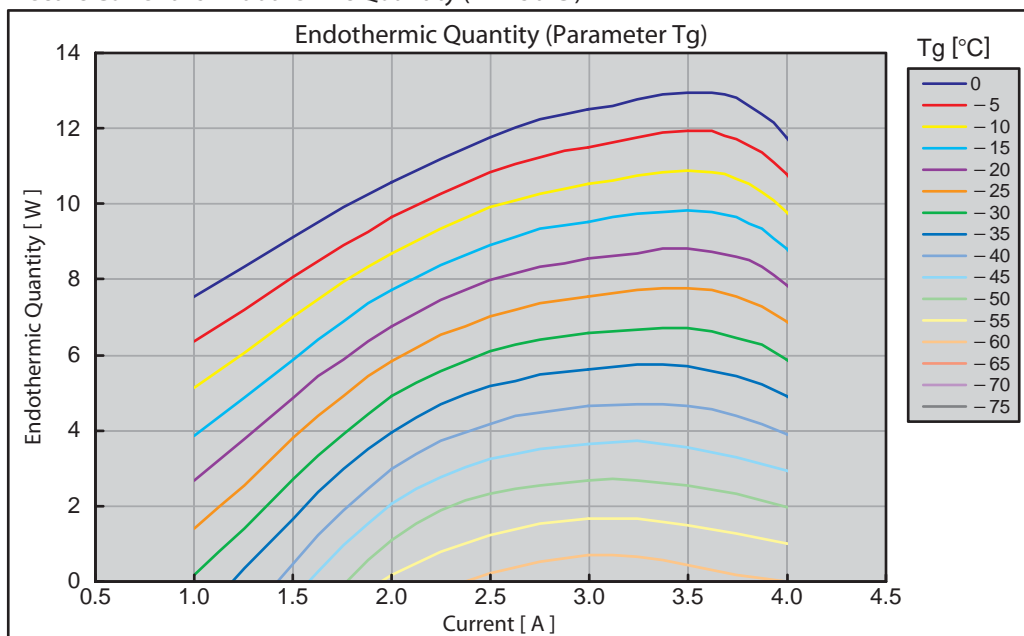


### Specifications

Requirements	Specifications	Remarks
Max. Current	3.2 A	Max. Endothermic Quantity at 50 °C
Max. Working V.	6.2 V (DC)	
Max. Temperature Difference	70.0 °C (typ.)	
Max. Endothermic Quantity	13.0 W (typ.)	
Internal Resistance	1.40 Ω ± 10 %	
Electrode Terminal	Lead Wire (Red : +, Black : -)	Th=25 °C
Size	22.0 × 22.0 × 3.82 ± 0.10 [mm]	
Number of Elements	P / N Pair 49 Elements	
Lead Wire Length	130 ± 2 mm	From Edge of Separator
Weight	8.0 g ± 10 %	
Tightening Strength (Recommend)	2 ~ 4 kgf Equal Load	Commendable Condition
Working Temp. Range	150 °C max.	
Moisture Protection	Silicone Resin	
Insulation Method	Ceramics	
Insulation Resistance	—	

### Typical Performance

Electric Current vs Endothermic Quantity ( Th=50°C )



Note: The upper data shows the characteristics up to 4.0A.



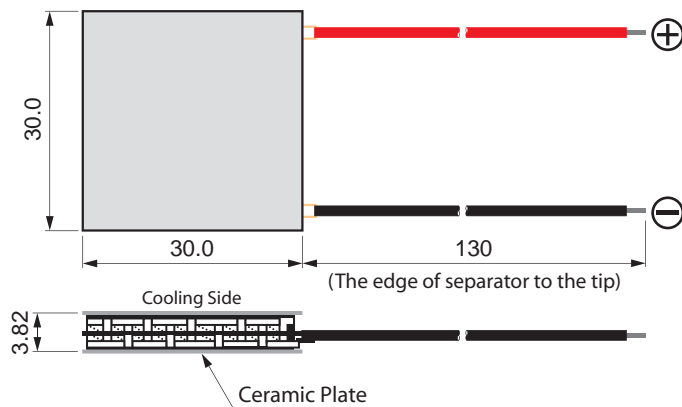
\* Specifications of products are subject to change without notice.

\* The values are subject to the measurement results available in our internal measurement instrument and equipment.

e-ut-2020ce-m\_05



### Dimensional Outlines



Unit : mm

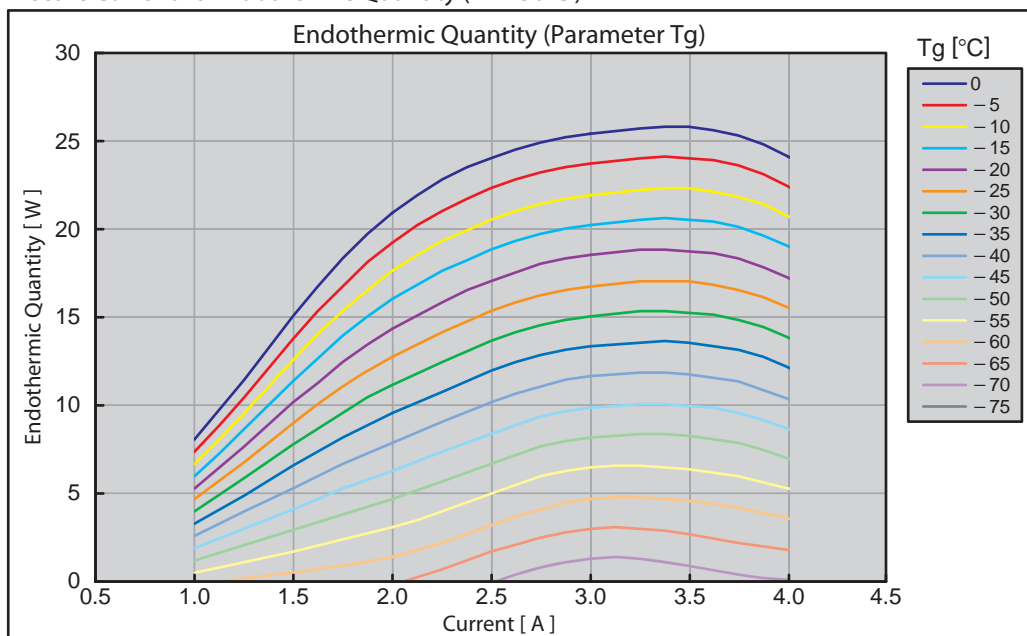


### Specifications

Requirements	Specifications	Remarks
Max. Current	3.5 A	Max. Endothermic Quantity at 50 °C Th=25 °C
Max. Working V.	15.0 V (DC)	
Max. Temperature Difference	75.0 °C (typ.)	
Max. Endothermic Quantity	27.0 W (typ.)	
Internal Resistance	2.75 Ω ± 10 %	
Electrode Terminal	Lead Wire (Red : +, Black : -)	
Size	30.0 × 30.0 × 3.82 ± 0.10 [mm]	
Number of Elements	P / N Pair 97 Elements	
Lead Wire Length	130 ± 2 mm	From Edge of Separator
Weight	9.0 g ± 10 %	
Tightening Strength (Recommend)	2 ~ 4 kgf Equal Load	Commendable Condition
Working Temp. Range	150 °C max.	
Moisture Protection	Silicone Resin	
Insulation Method	Ceramics	
Insulation Resistance	—	

### Typical Performance

Electric Current vs Endothermic Quantity ( Th=50°C )



Note: The upper data shows the characteristics up to 4.0A.



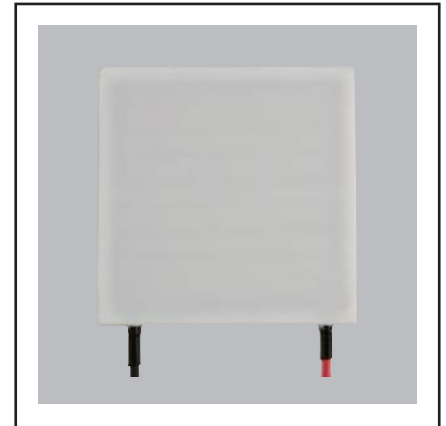
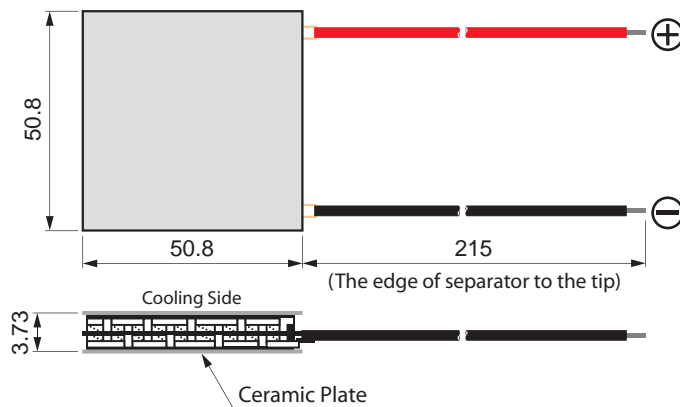
\* Specifications of products are subject to change without notice.

\* The values are subject to the measurement results available in our internal measurement instrument and equipment.

e-ut-3030ce-m\_05



### Dimensional Outlines

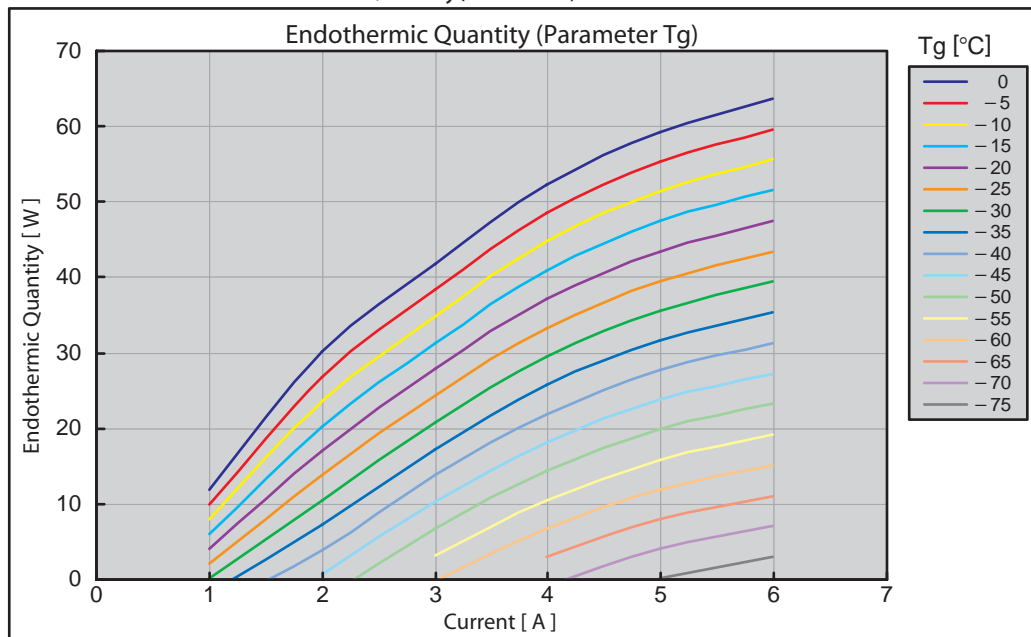


### Specifications

Requirements	Specifications	Remarks
Max. Current	7.0 A	Max. Endothermic Quantity at 50 °C
Max. Working V.	19.0 V (DC)	
Max. Temperature Difference	75.0 °C (typ.)	
Max. Endothermic Quantity	64.0 W (typ.)	
Internal Resistance	1.90 Ω ± 10 %	
Electrode Terminal	Lead Wire (Red : +, Black : -)	Th=25 °C
Size	50.8 × 50.8 × 3.73 ± 0.10 [mm]	
Number of Elements	P / N Pair 127 Elements	
Lead Wire Length	215 ± 2 mm	From Edge of Separator
Weight	32.0 g ± 10 %	
Tightening Strength (Recommend)	4 ~ 6 kgf Equal Load	Commendable Condition
Working Temp. Range	150 °C max.	
Moisture Protection	Silicone Resin	
Insulation Method	Ceramics	
Insulation Resistance	—	

### Typical Performance

Electric Current vs Endothermic Quantity( Th=50°C )



Note: The upper data shows the characteristics up to 6.0A.



\* Specifications of products are subject to change without notice.

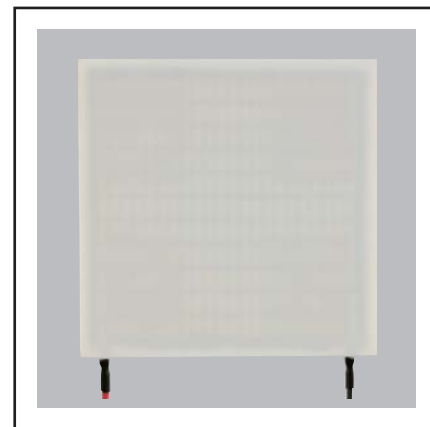
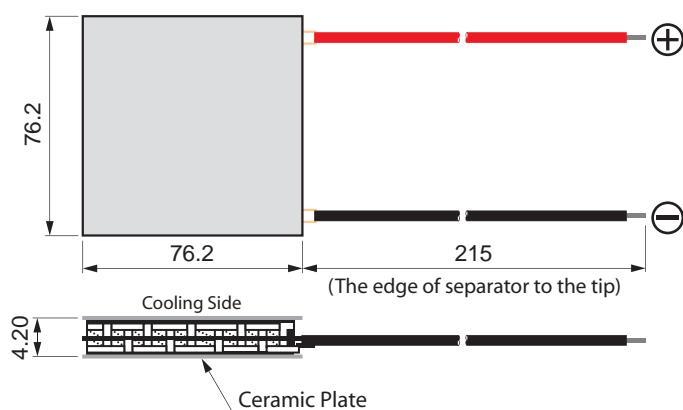
\* The values are subject to the measurement results available in our internal measurement instrument and equipment.

e-ut-4040ce-m\_07





### Dimensional Outlines

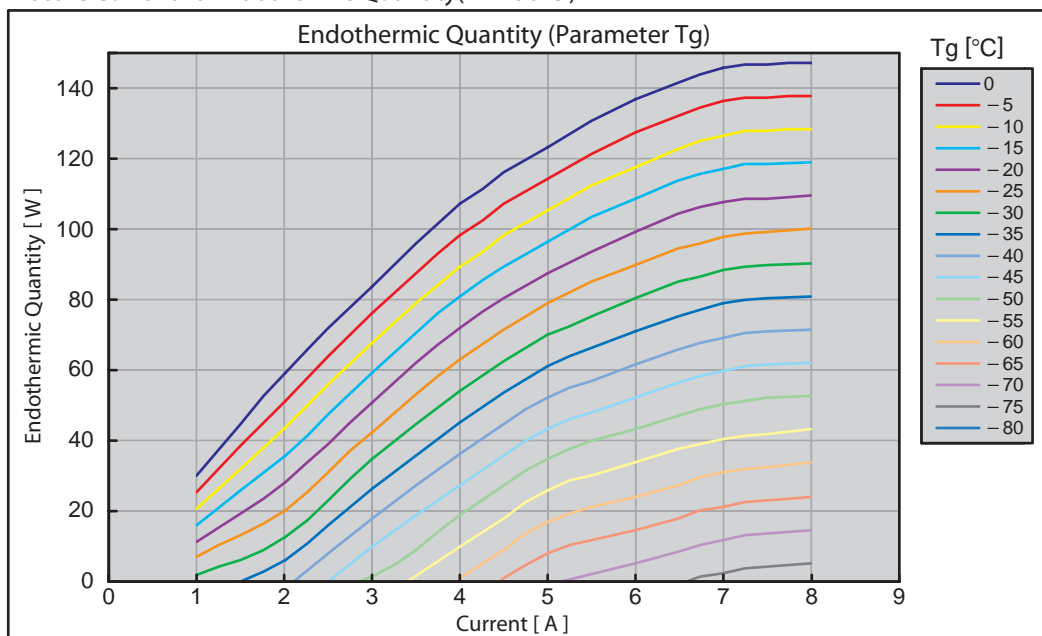


### Specifications

Requirements	Specifications	Remarks
Max. Current	7.5 A	Max. Endothermic Quantity at 50 °C
Max. Working V.	30.0 V (DC)	
Max. Temperature Difference	75.0 °C (typ.)	
Max. Endothermic Quantity	140.0 W (typ.)	
Internal Resistance	2.90 Ω ± 10 %	
Electrode Terminal	Lead Wire (Red : +, Black : -)	Th=25 °C
Size	76.2 × 76.2 × 4.20 ± 0.10 [mm]	
Number of Elements	P / N Pair 241 Elements	
Lead Wire Length	215 ± 2 mm	From Edge of Separator
Weight	85.0 g ± 10 %	
Tightening Strength (Recommend)	4 ~ 6 kgf Equal Load	Commendable Condition
Working Temp. Range	150 °C max.	
Moisture Protection	Silicone Resin	
Insulation Method	Ceramics	
Insulation Resistance	—	

### Typical Performance

Electric Current vs Endothermic Quantity (Th=50°C)



Note: The upper data shows the characteristics up to 8.0A.



\* Specifications of products are subject to change without notice.

\* The values are subject to the measurement results available in our internal measurement instrument and equipment.

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## Cooling Unit

It is possible to comply with the unit composition, peltier device, heat-sink and fan.

In the table below, it shows the module or jacket\*1 matching with heat sink and fan and it shows the reach temp to the cooling face. It raises up the max. efficiency ratio in the limited dimension that our customer has designed.

\*1 Please refer to the jacket types available.

Module Type		UT-7070J-HS	UT-7040WJ-HS100	UT-4040J-HS100
Cooling Capacity (at 25 °C)	Endothermic Quantity [ W ]	80 (Typ.)	35 (Typ.)	35 (Typ.)
	Temperature Difference [ °C ]	50 (Typ.)	60 (Typ.)	48 (Typ.)
Rated Voltage	Peltie	DC24V	DC24V	DC12V
	Fan	DC24V	DC24V	DC12V
Rated Current (at 25 °C)	DC [ A ]	6.5	4.0	6.0
Starting Current (at 25 °C)	DC [ A ] max.	9.0	5.5	7.0
Dimension of Cooling Plate	[ mm ]	74□	55□	55□
Working Temp. Range		- 20 ~ + 70 °C	- 20 ~ + 70 °C	- 20 ~ + 70 °C
Working Humidity Range		85%RH max.	85%RH max.	85%RH max.
Max. Allowable working Temp. of Cooling Plate		120 °C	120 °C	120 °C
Noise	[ dB ]	49	37	37
Overall size	[ mm ]	128 × 172 × (135)	100 × 100 × (88)	100 × 100 × (82)
Weight	[ g ]	2,200	850	680
Corresponding Controller		TA-150 TA-150C TA-300	TA-150 TA-150C TA-300	TA-150 TA-150C TA-300
Appearance				

## Jacket Types

It is easy to be installed to the heat sink and to be provided with a jacket specs to increase the life strength of a peltier. It is possible to be installed a cooling unit.

### Approx. Dimensions

Types	Size [mm]	Remarks
70 standard	120 × 120 × (17.3)	Thickness is changed by dielectric form.
40 standard	100 × 100 × (15.8)	
30 standard	80 × 80 × (15.8)	



\* Specifications of products are subject to change without notice.

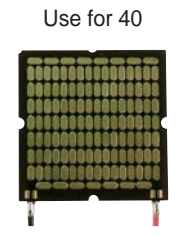
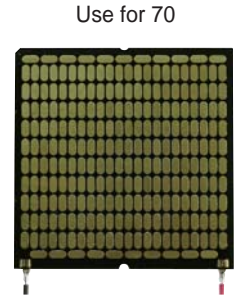
\* The values are subject to the measurement results available in our internal measurement instrument and equipment.



**References for Installed Basic Module**

In the cooling unit or jacket, the module in a skeleton type for both sides (ref. right photo.) is provided and it performs high cooling efficiency and superior reliability.

UT-4040TJ-HS	UT-3030J-HS80	UT-3020WJ-HS100	UT-2020J-HS40
65 (Typ.)	18 (Typ.)	8 (Typ.)	8 (Typ.)
45 (Typ.)	48 (Typ.)	60 (Typ.)	43 (Typ.)
DC24V	DC12V	DC12V	DC5V
DC24V	DC12V	DC12V	DC5V
5.5	3.5	2.5	2.0
7.0	4.0	3.5	4.0
85 × 60	30□	25□	20
-20 ~ +70 °C	-20 ~ +70 °C	-20 ~ +70 °C	-20 ~ +70 °C
85%RH max.	85%RH max.	85%RH max.	85%RH max.
120 °C	120 °C	120 °C	120 °C
37	35	37	33
100 × 100 × (82)	80 × 80 × (82)	100 × 100 × (84)	40 × 40 × (60.5)
800	400		100
TA-150	TA-150	TA-150	TA-100C
TA-150C	TA-150C	TA-150C	
TA-300	TA-300	TA-300	



**Special shape element**

Will correspond to the custom shape.



**Example**  
 Left : UT-3006CE-M  
 Center : UT-2006CE-M  
 Right : UT-1010CU-M

\* Specifications of products are subject to change without notice.  
 \* The values are subject to the measurement results available in our internal measurement instrument and equipment.

# THERMO ELECTRIC PELTIER CONTROLLER

## Model TA-150 / TA-150C

### ◆ Features ◆

#### Downsizing High Precision Peltier Controller

Temperature Control ◆  $\pm 0.1\text{ }^{\circ}\text{C}$   
 External Dimension ◆ W 146 × D 127 × H 47 mm

#### High Cost Performance by Simple Basic Function

Input Volt ◆ 12 V ~ 24 V  
 Output Current ◆ 7 A max.  
 Temp. Control Range ◆  $-80\text{ }^{\circ}\text{C} \sim +150\text{ }^{\circ}\text{C}$

#### Simple Method of Handling

The method of Temperature and parameters are very simple and easy.

#### PC Communication function\* loaded

Temperature setting and supervision are possible from PC by communication function\*.

\*Communication function is option.  
 No communication function model : TA-150  
 Communication function model : TA-150C

Please consult for needs of a substrate.



### Specifications

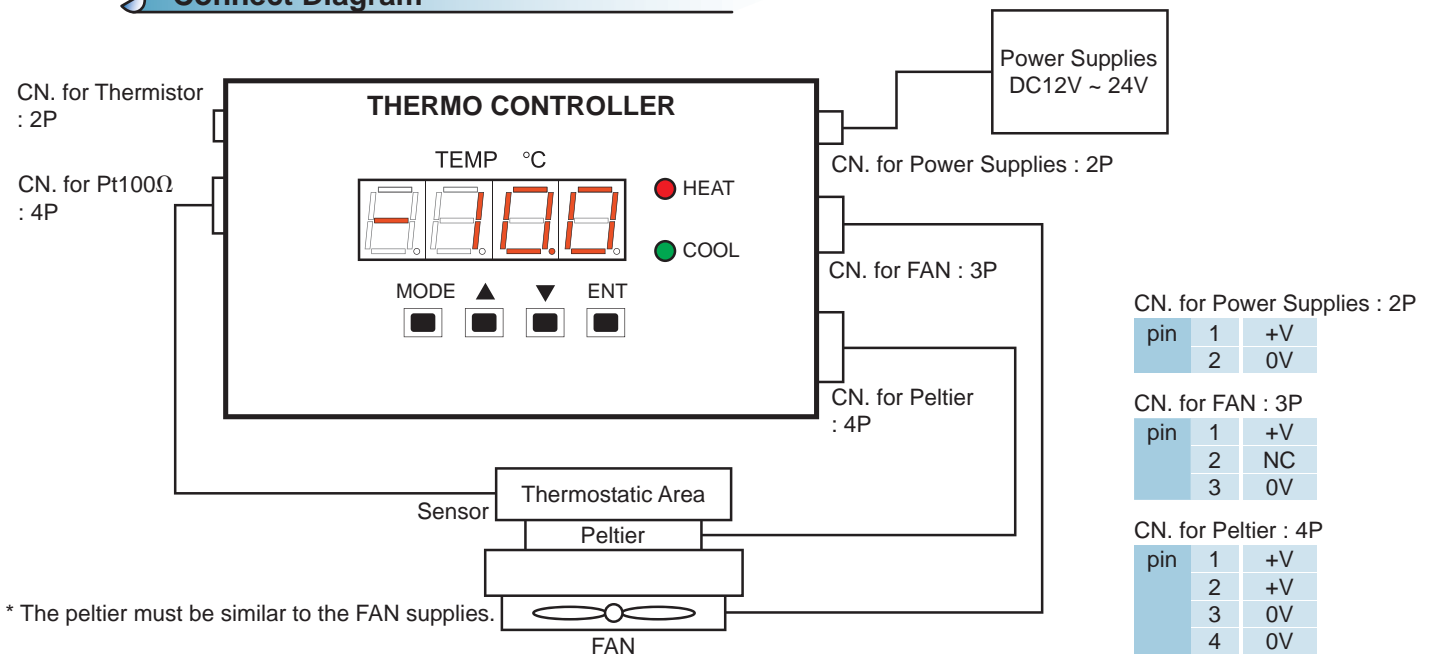
Temperature Range	$-80\text{ }^{\circ}\text{C} \sim +150\text{ }^{\circ}\text{C}$ (Pt100 $\Omega$ in use) $-30\text{ }^{\circ}\text{C} \sim +80\text{ }^{\circ}\text{C}$ (Thermistor in use)
Temperature Setting	Possible in increments of 0.1 $^{\circ}\text{C}$
Temperature Indication	Possible in increments of 0.1 $^{\circ}\text{C}$
Indicator	Temperature Function
	LED indicator Red LED in heating Green LED in cooling
Control Method	PI control
P Range	0.1 to 99.9 $^{\circ}\text{C}$
I Range	1 to 1999 sec.
Peltier Drive Method	PWM drive
Temp. Sensor	Thermistor, Pt100 $\Omega$ (Impossible to use simultaneously)
Safety Function	At braking a sensor, the power is off.
Input / Output Connector	2P connector for Power Supplies, 4P connector for Peltier, 3P connector for FAN 2P connector for Thermistor, 4P connector for Pt100 $\Omega$
PC Communication function (option)	PC to Controller : RS-232C <sup>*1</sup> , USB <sup>*1</sup> , RS-422 <sup>*1</sup> , RS-485 <sup>*1</sup> Controller to Controller : RS-485 Controller maximum connection quantity : 32
Recommended Sensor	Pt100 $\Omega$ : in conformity with New JIS standard C-1604-1989 Thermistor : 10 k $\Omega$ at 25 $^{\circ}\text{C}$ Tolerance : $\pm 1\%$ B standard figure : 3435 K $\pm 1\%$ (Temperature precision depends on sensor precision.)
Power Supplies	Outer supplies (DC 12 V to DC 24 V)
Electric Current	DC 24 V 0.15 A, DC 12 V 0.25 A (Controller Unit)
Peltier Drive Capability	DC 24 V 7 A (at Maximum)
Working Environment	Inside area
Working Temp. Range	$+10\text{ }^{\circ}\text{C} \sim +40\text{ }^{\circ}\text{C}$
Working Humidity Range	85 % max. (No evidence of dew)
Outer Dimensions	W 146 × D 127 × H 47 mm (Except projection)
Weight	640 g (for the main unit only)

It is impossible to use simultaneously, USB, RS-232C, RS-422 and RS-485.

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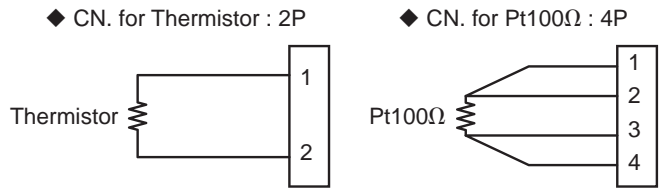
## Connect Diagram



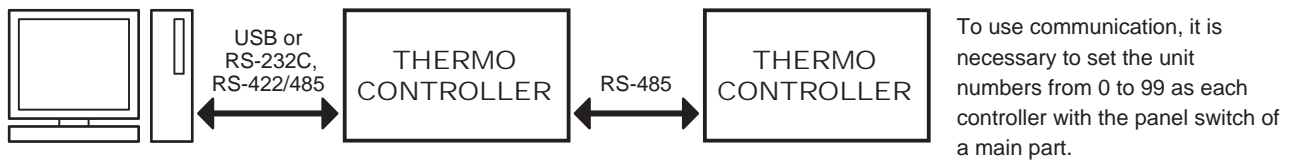
### Matching Connector Housing and Contact

For Thermistor	H2P-SHF-AA	JST Mfg. Co., Ltd.
For Pt100Ω	H4P-SHF-AA	JST Mfg. Co., Ltd.
For FAN	H3P-SHF-AA	JST Mfg. Co., Ltd.
(Matching Contact)	SHF-001T-0.8BS	JST Mfg. Co., Ltd.)
For Power Supplies	VHR-2N	JST Mfg. Co., Ltd.
For Ppeltier	VHR-4N	JST Mfg. Co., Ltd.
(Matching Contact)	SVH-21T-P1.1	JST Mfg. Co., Ltd.)

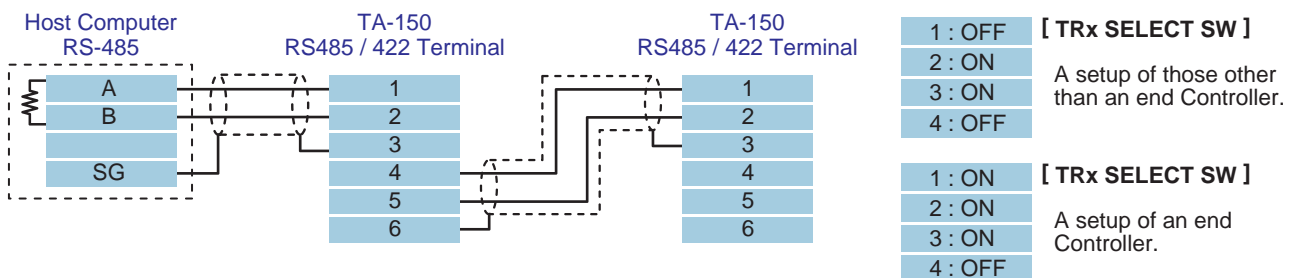
### Connector Pin Assign



## Example of Connection



### Connection of RS-485, and a switch setup



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