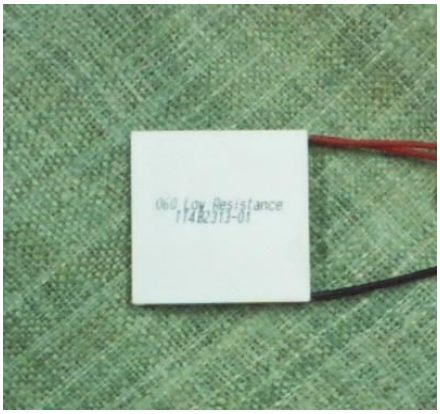
DUAL PELTIER MODULE

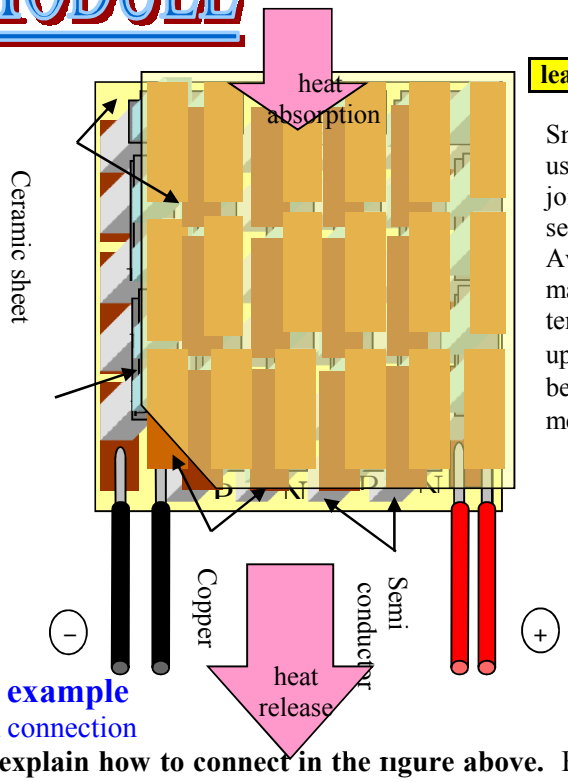
The Feature of Dual Module

By combining two Peltier modules in a dual layer, large temperature-difference can be obtained.

We tried to enhance the thermal efficiency. To attain this goal, the base material in the middle of joint area has been attempted to make as thin as possible. As a result, thermal resistance can be reduced. Also, as our dual module consists of the materials whose expansion rate is much different, the strain arises. However, by absorbing this strain at the base material, we could enhance its durability.

In addition, compared to conventional multiple module, the cost to produce our





lead-free

Sn/Sb solder is used in order to join semiconductors. Available maximum temperature is set up at 200 ℃ because the solder melts at 240 ℃.

Usage example

Parallel connection

Let us explain how to connect in the figure above. First, apply +12V to the red lead at lower right side, and then connect the black lead at lower left side to ground. In a similar way, apply +6V to the red lead at upper right side, and then connect the black lead at upper left side to ground independently.

Large temperature-difference can be obtained between heat absorption side and heat release side.

Serial connection

First, apply +14V to the red lead at lower right side, and then connect the black lead at lower left side to the red lead at upper right side. Finally, connect the black lead at upper left side to ground.

In spite of power saving, our dual module can obtain as high temperature-difference as single module. As the amount of absorbed

Parallel connection

Product	Imax (A)	Qcmax (W)	Vmax (V)	ΔTmax (℃)	external dimension (mm)			
					W	L	T	recital
DV2F4085	2.6/8.5	41	8/17	90	40	40	6	heat absorption 040Ty
DV2F4060	2.5/6	38	7/17	86	40	40	6	heat absorption 040Ty
DV2F6085	2.8/8.5	43	6/17	78	40	40	6	heat absorption 060Ty

attention 1) attention 1) **Notation:** heat absorption/ heat release, current and voltage in a dual module

Serial connection

Experimental performance (apply +14V) ∗ Vmax is 17V Th=50℃

Product	14V=I (A)	er comsump (W)	Qcmax (W)	ΔTmax (℃)	external dimension (mm)			
					W	L	T	recital
DV2F4085	2.5	35	26.5	60	40	40	6	heat absorption 085Ty
DV2F4060	2.2	30.8	24	60	40	40	6	heat absorption 060Ty
DV2F6085	3.6	50.4	30	60	40	40	6	heat absorption 085Ty

Our dual module consists of two peltier modules whose features are different each other, and is combined in a dual layer. As a result, the performance changes due to the way of applied voltage. Also, the combination of modules enables to choose the ⊿Tmax or Qcmax value. Therefore, we can offer Peltier modules you need. Please contact Da Vinci (right information) for details.

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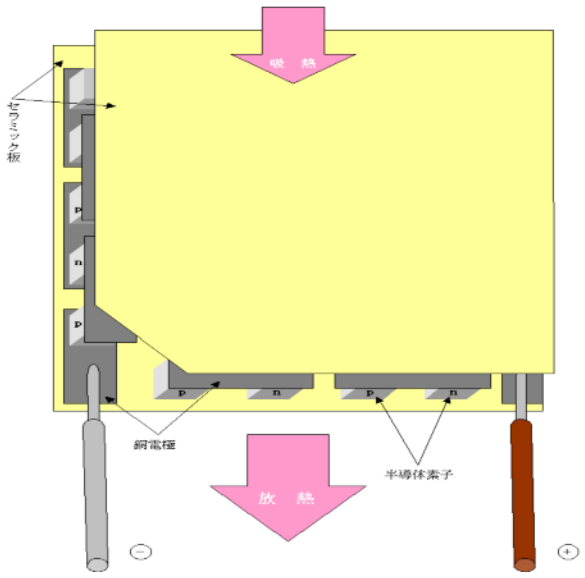
● Basic knowledge of thermal module

Figure 1



Working principle

Peltier effects mean, when two different metals or semiconductors connect together and conduct electricity, one gives off cold, while the other gives off heat. Today, practical Peltier devices consist of semiconductors. Let us explain how to work in figure 2 in the following section.

In terms of the action of electrons in Peltier effect, electrons travel from minus electrode to P type semiconductor. However, their speed is slow because of the transfer on its hole. When electrons reach a metal electrode drawn in blue, they travel faster in an electron cloud.

Our module produces large effect of heat absorption and heat release against semiconductors whose potential energy is so different. This is because verocity difference among them is added.

On the other hand, the action of electrons in Zeebeck effect is generated with electromotive force. This force is produced from temperature difference between heat absorption side and heat release side in the figure, which has nothing to do with external voltage.

In Peltier effect, electrons travel to cool down heat release side (drawn in blue arrows). With this action, the larger temperature difference ≪⊿T≫ between heat absorption side and heat release side is obtained, the less effect is due to back electromotive force in Zeebeck effect.

Hence, in the environment where large ⊿T can be

1. About thermal module

● Known as Peltier devices, or heat-to-electricty converting devices.

● A component having heat transferred from obverse side to reverse side. With switching the current polarity, it is capable of getting heat or cool.

● Electronic component working as small heat pump.

2. Feature

● Small and light. Ability to adjust temperature partly and exactly (heating or cooling).

● No pollution with refrigerant gas like CFC. No vibration or noise.

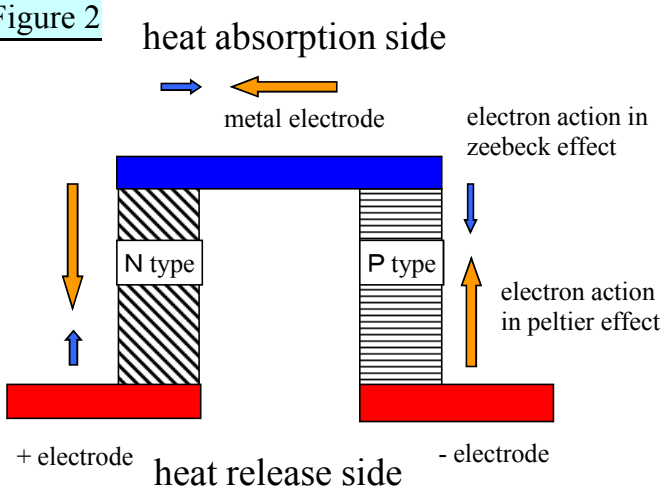
3. Principle

Thermal module is a cooling device consisting of N type and P type semiconductor pair. With direct current, one absorbs heat (cooling), and the other releases heat (heating).

With switching the current polarity, it is capable of getting heat or cool（Peltier effect）.

Our module is the most suitable for high-accuracy temperature control or local cooling that heater or heat sink cannot be accepted. In addition, temperature difference enables to generate electricity（Zeebeck effect）.

Figure 2



Our dual module consists of Peltier devices. They are combined in a dual layer with thin film sandwiched between metal electrodes drawn in blue in the figure 2. Now, patent is pending. Please contact representative given below for detailed technical inquiry or asking for sample.

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