

Mounting Instructions for EconoPACK-Plus

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This manual describes the recommended method of how to install and use
EconoPACK-Plus safely.

Sep.01th 2004

1-1 Mounting on cooling fin

Since thermal resistance varies according to the position of the mounted modules, pay attention to the following points:

- a. When mounting only one module , position it in the center of the cooling fin in order to minimize the thermal resistance.
- b. When mounting several modules , determine the individual positions on the cooling fin according to the amount of heat that each module generates. Allow more room for modules that generate more heat.

1-2 Cooling fin surface finishing (module mounting area)

The mounting surface of the cooling fin should be finished to the roughness of 10 μ m or less and a warp based on a length of 100mm should be 50 μ m or less. If the surface of the cooling fin is not flat enough , there will be a sharp increase in the contact thermal resistance ($R_{th(c-f)}$). If the flatness of the cooling fin does not meet the above requirements , the mounted module will place extreme stress on the DBC substrate possibly destroying its insulating barrier.

Roughness : 10 μ m \geq

Flatness of the cooling fin : 50 μ m \geq (based on a length of 100mm)

1-3 Thermal compound application

To reduce the contact thermal resistance , we recommend applying thermal compound with screen printing, rollers or spatulas between the cooling fin and the base plate of the module. Recommended thickness of the compound is approx.100μm.

Recommended thermal compound for your reference.

Penetration(typ.)	≥ 338
Thermal conductivity	$\geq 0.92 \text{ W/m}\cdot\text{k}$
Thickness of the compound	$100\mu\text{m} \pm 30 \mu \text{ m}$

【NOTE】

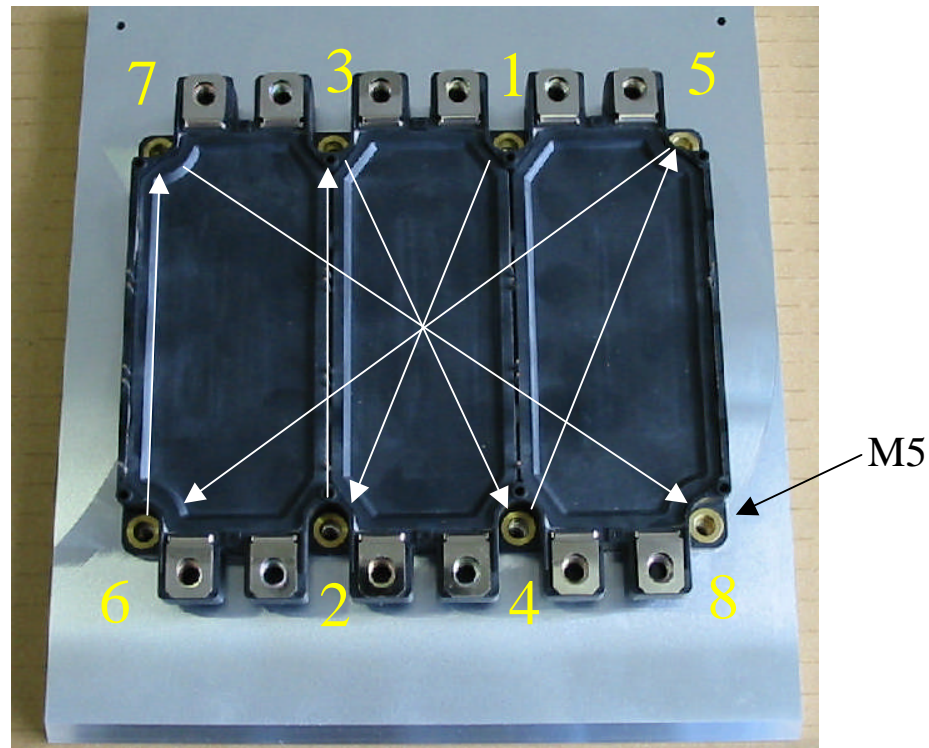
- 1) The contact thermal resistance is dependent on the compound's efficiency and thickness.
The thickness of the compound could be lessened if the warp of the cooling fin could be reduced.
Please use the above table as a reference to decide the thickness of the compound being used.
- 2) Please confirm the expansion of the compound when the module is installed with high viscosity compound. On the other hand, Please note that low viscosity compound may flow out due to the temperature cycle.

1-4 Mounting procedure

1) Recommended tightening torques : $3 \pm 0.5 \text{N.m}$ (M5)

2) Initial : torque 0.5 to 1.0 (Nm) , sequence (1) -(2) -(3)-(4)-(5)-(6)-(7)-(8)

3) Final : Full specified torque (3.5 Nm) , sequence (1) -(2) -(3)-(4)-(5)-(6)-(7)-(8)



1-5 ESD

If excessive static electricity is applied to the control terminals, the devices can be broken.
Some countermeasures against static electricity is necessary.

2-1 Bus bar connection

- 1) Screw : M6
- 2) Screw length : Bus bar thickness + (7mm to 9mm)
- 3) Tightening torque : 3.5 to 5 [Nm]
- 4) Allowable terminal temperature : $\leq 100^{\circ}\text{C}$

Note :

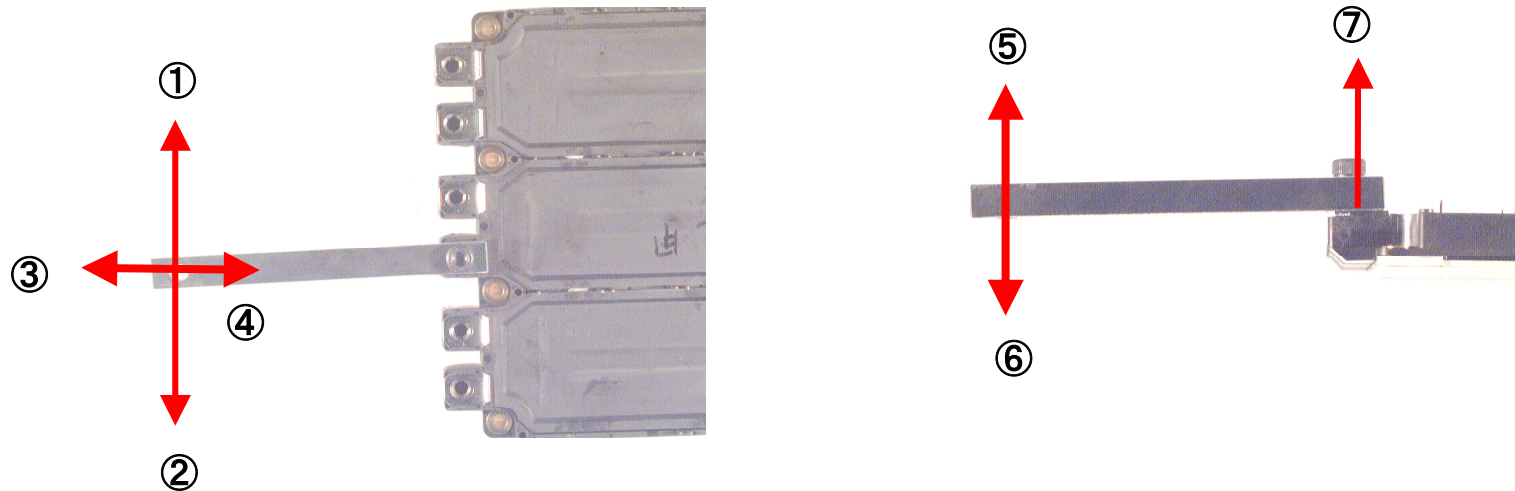
In case of connecting a bus bar to the main terminal, avoid excessive force to a terminal part.

Especially, the applied force at the end of the copper bar will act as much bigger to the terminal part, because of proportional moment to the copper bar length.

Moreover, if a screw will be tightened while position gap has been in the connection part of a terminal and a copper bar, stress will be generated continuously in a terminal part, and becomes the cause of breakage.

Please fasten so that position gap does not occur.

2-2 Limitation of forces for the mounted conductors.



Force direction	①	②	③	④	⑤	⑥	⑦
Strength	5Nm	3Nm	500N	500N	5Nm	5Nm	500N

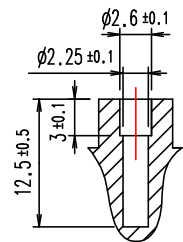
3-1 Fixing by screw

The hole diameter is 2.25mm and 2.6mm.

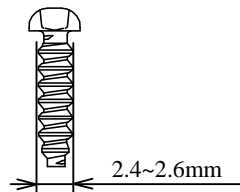
Therefore, a diameter of 2.4-2.6mm is recommended.

1. Screw type : Self tapping screw (In Japan, M2.6 self tapping screw)

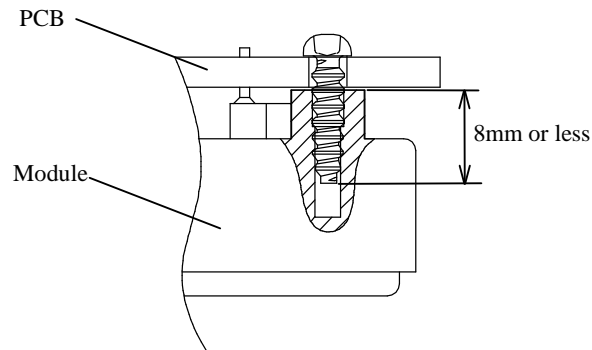
Mounting hole



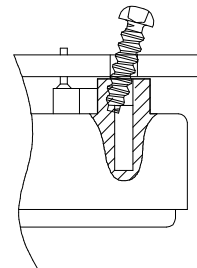
Screw



2. Screw Length :PCB thickness +(5mm to 8mm)

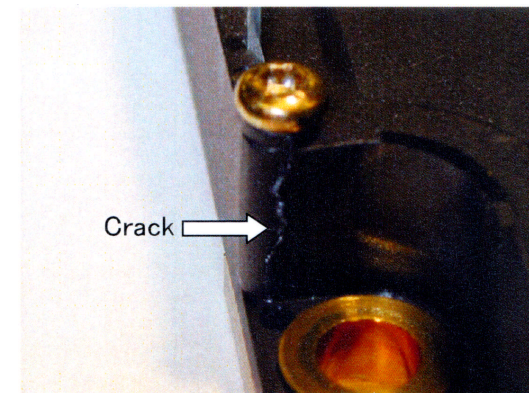


NG example.



Note : Recommended tightening torque : 0.4 +/- 0.05 N·m
(Make installation of the screw perpendicular to the module.)

3.Recommended tightening method : hand tightening
Note :When high speed tightening tool is used to the tightening, the part of the module case may be damaged. Please confirm in advance.



Note : The case might break if screws beside the above recommendation are used.
Please confirm before using them.

3-2 Soldering pin-terminals

- 1) Plating of pin terminal : Sn/Cu (lead free plating)
- 2) Recommended soldering method : flow soldering or hand soldering
- 3) Soldering condition

a. Flow soldering

Pre heat : $\leq 125^{\circ}\text{C}$

Post heat : $\leq 265^{\circ}\text{C}/11\text{sec}$

b. Hand soldering (by Soldering iron)

iron tip temperature : $\leq 410^{\circ}\text{C}$

soldering time : $\leq 5\text{sec}/\text{terminal}$