Mounting Instruction for M271/M272 Package

(PrimePACK™ Module)

Note: PrimePACK™ is registered trade mark of Infineon Technologies AG, Germany.

This document describes about recommended mounting procedures for M271/272 packages.

This mounting instruction is available only for the following modules.

2MBIxxxxVXB-120x-5x / 2MBIxxxxVXB-170x-5x
2MBIxxxxVXA-120x-5x / 2MBIxxxxVXA-170x-5x
1MBIxxxxVXB-120xL-5x / 1MBIxxxxVXB-170xL-5x
1MBIxxxxVXB-120xH-5x / 1MBIxxxxVXB-170xH-5x
1MBIxxxxVXA-120xL-5x / 1MBIxxxxVXA-170xL-5x
1MBIxxxxVXA-120xH-5x / 1MBIxxxxVXA-170xH-5x
(ex. 2MBI1000VXB-170E-50)

2MBIxxxXXA120x-5x / 2MBIxxxXXA170-5x
2MBIxxxxXXB120x-5x / 2MBIxxxxXXB170-5x
2MBIxxxxXXE120x-5x / 2MBIxxxxXXE170-5x
2MBIxxxxXXF120x-5x / 2MBIxxxxXXF170-5x
(ex. 2MBI1800XXF120P-50 / 2MBI1800XXF170-50)

} **Under development (May 15, 2017)**

1 Mounting IGBT modules

This document describes how to mount M271/M272 packages, so called “PrimePACK™”.

1.1 Mounting on heat sink

The thermal resistance between IGBT module baseplate and heat sink depends on module location on the heat sink, thermal properties, such as thermal conductivity, of heat sink, and cooling methods. This section, the module location on heat sink is focused and described. Following items should be taken into account in the IGBT module mounting process since thermal resistance will be varied according to the position of the mounted modules:

- ✓ IGBT module(s) should have thermally optimized layout on heat sink according to the mechanical-thermal design so that the modules have good heat spread to minimize the thermal resistance.
- ✓ In case of several IGBT modules to be mounted on the same heat sink, the distance between IGBT modules should be optimized based on the mechanical-thermal design and the estimated total power dissipation of each module in order to avoid the thermal coupling effect between neighbor modules.

1.2 Heat sink surface finishing (module mounting area)

Use this product with keeping the cooling fin's flatness and surface roughness in mounting area with in flatness 30μm(172x89mm M271 package), 50μm(250x89mm M272 package) and surface roughness 10μm. If the surface of the heat sink does not have enough flatness, the module may have unexpected increase of the contact thermal resistance ($R_{th(c-f)}$) between the module and the heat sink. Also, if the heat sink flatness doesn’t meet the above requirements, a high mechanical stress may be applied to the DCB on the module and it may cause insulation failure.

1.3 Application of thermal grease

Thermal grease between heat sink and module baseplate is absolutely necessary to reduce the contact thermal resistance. Screen-printing, rollers or spatulas are typical method of thermal grease pasting, however, using a stencil mask is recommended when the target grease thickness is less than 100μm.

Table 1 Recommended properties of thermal grease

Items	Recommendation
Penetration (typ.)	≥ 338
Thermal conductivity	≥ 0.92 W/mK
Thermal grease thickness	100μm ±30μm

*1) The thermal resistance between the heat sink and the module depends on the thermal grease properties and thickness. Fuji Electric strongly recommends customers to confirm contact interface after mounting whether the terminal grease spreading is good enough or not. Also Fuji Electric recommends confirmation of the thermal interface status after thermal cycling if the thermal grease

has low viscosity.

*2) Electrical document of the recommended stencil mask pattern and recommended method are also available on request.

1.4 Mounting procedure

Mounting procedures onto heat sink are described in below.

(a) The minimum and maximum screw torque for mounting screws (M5) indicated as (1)-(14) in Fig.1 are:

Minimum: 3.0Nm
Maximum: 6.0Nm

(b) Pre-fastening is recommended with 1/3 of the final torque and sequence of (1) – (14) in Fig1.

(c) Final torque must be within specified force of 3.0 to 6.0Nm with sequence of (1) – (14) in Fig1.

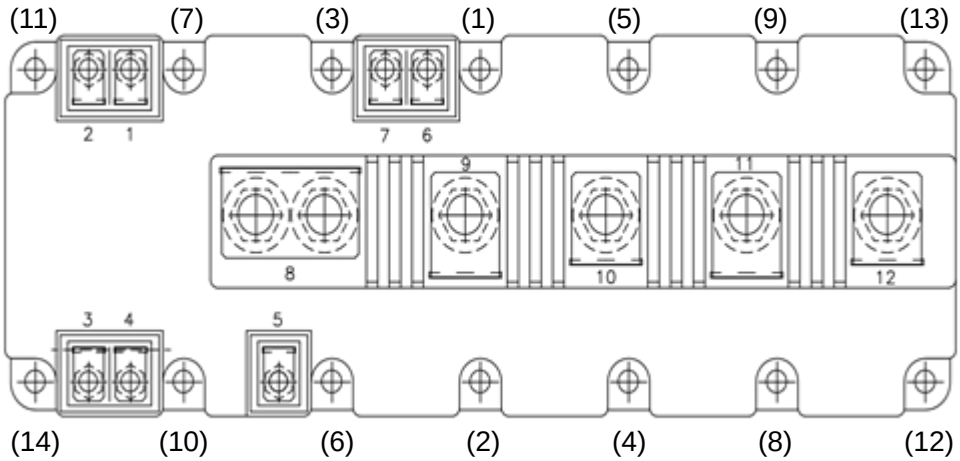

Fig1. Mounting holes connecting sequence (1) – (14) (M272 package)

1.6 Electrostatic discharge (ESD) protection

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

2 Maximum allowable strength and directions for connecting bus bars

Maximum allowable mechanical strength and directions when connecting bus bars to the main and auxiliary terminals are describes in the table below.

Direction	Strength*
A	±100 N
B	±100 N
C	100 N
D	500 N
E	±20 N
F	±20 N
G	50 N
H	200 N

*) The strength in the table is a mechanical capability for short period during mounting process

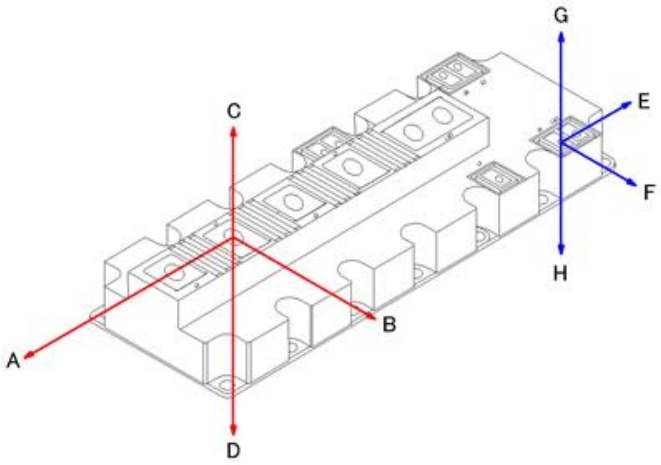

Fig. 2 Maximum allowable strength and directions (M272 package)

The connection of the auxiliary terminals has to follow the common ESD guidelines. It is not allowed that a load current flow through any of the auxiliary terminals.

We recommend using a support when bus bars are connected to the main terminals as shown in Fig.3. This measure is especially important if the modules or bus bars are subjected to vibration. The mechanical force direction applied to the terminals should be compression force, not tensile force.

Note: It is recommended that the bus bars are attached to the module (main terminals) on compression direction as shown in Fig.3. The maximum stress should be within the values shown in Fig.2

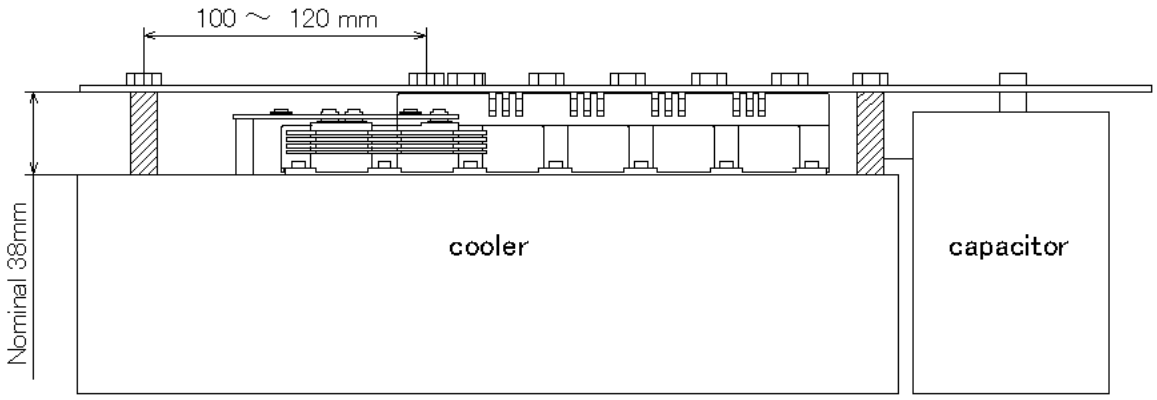

Fig. 3 Example of bus bar configuration without a stress on the module (M272 package)

Screw size and torques:

Mounting holes of base plate: M5, 3 – 6 Nm

Auxiliary terminals: M4, 1.8 – 2.1 Nm

Main terminals: M8, 8 – 10 Nm

Screw length

Max Screw length = 15mm+(Bus bar thickness)+(washer thickness)+(spring washer thickness)

Min Screw Length = 11mm+(Bus bar thickness)+(washer thickness)+(spring washer thickness)

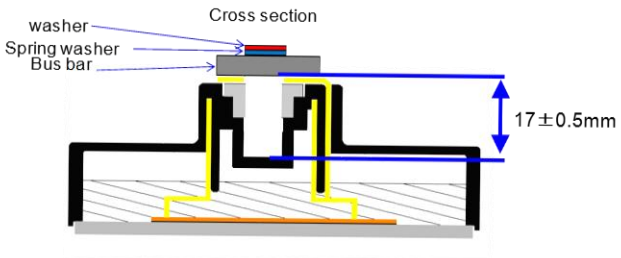

Fig.4 Cross section of main terminal

3 Caution

Don't insert any object in the main terminal screw hole of this product. This screw hole penetrates the case and inner parts of the module(Silicone gel, DCB substrate and chip) are located directly below. Thus, if rod shaped parts like a screwdriver are inserted, there is a possibility that inner parts get damaged significantly. The following describes the positions of the through screw holes of M271/M272 packages in Fig. 5,6.

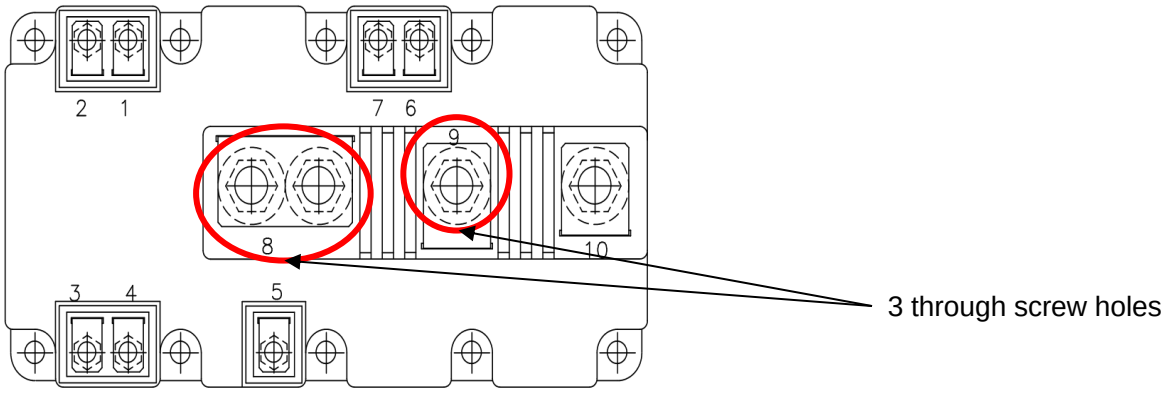

Fig.5 The positions of the through screw holes of M271 package

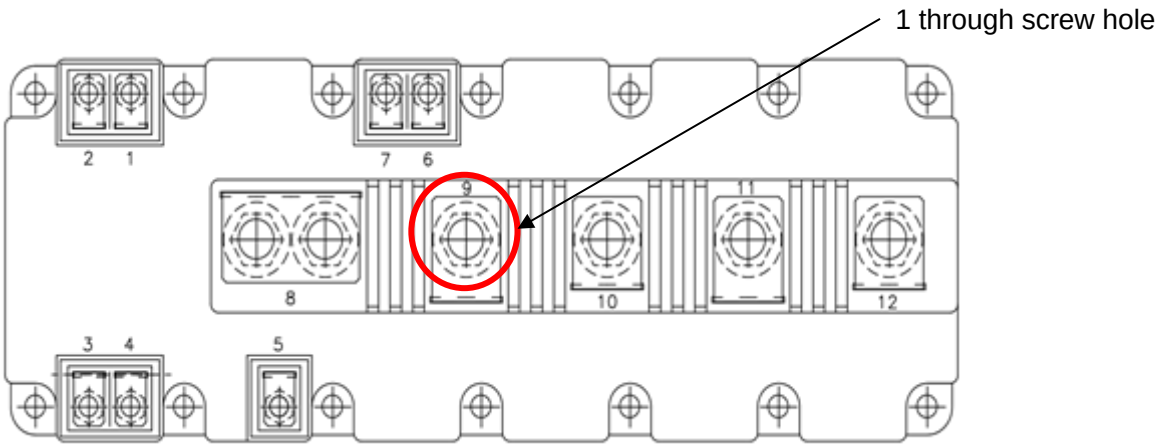

Fig.6 The position of the through screw hole of M272 package

WARNING

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