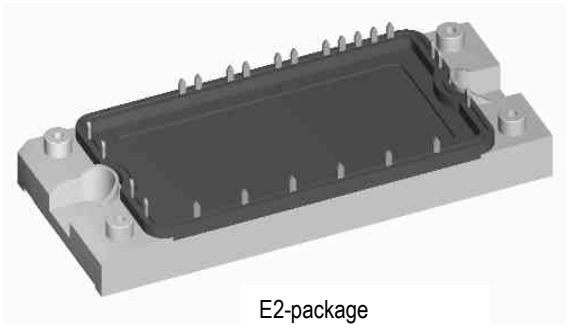
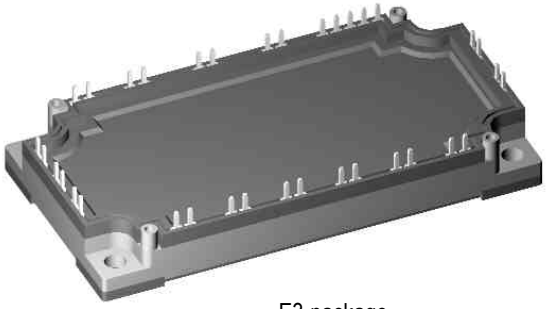
IXAN0035

Mounting Instructions for _*A7* /_ E7 /_ A8 and _E8 Module Series



E2-package



E3-package

Basic instructions

These module series are highly integrated power modules. Therefore it is necessary to follow some basic assembly rules. In general semiconductors should be mounted so that adjacent parts do not heat them up. The cross-sectional area of the power leads must be adequate to prevent the power semiconductors from being heated up due to load current flow. Modules should be mounted in a way that tension, pressure or mechanical vibrations cannot cause mechanical stress to the connection between leads, package and baseplate.

Base plate

Due to the high power integration and the resulting cooling requirements, the base plate of these modules is designed with a convex shape to ensure optimized thermal contact for a module when mounted properly on to the heatsink.
The bow of the base plate is measured across a section where DCBs and chips are mounted. The typical bow across a 75mm section along the longitudinal axis is 100µm convex. These values are tested at a sample basis at final testing and are also used to supervise the quality of the soldering process. Other measuring techniques may lead to different values and there are certain areas of the baseplate with a more even shape.

Heatsink requirements

The heatsink design greatly influences the thermal dissipation of the system. Therefore the flatness of the heatsink across the module mounting area should be less than 25µm with a roughness R_Z less than 10µm which is a standard requirement for heatsinks.

For the case of natural convection cooling, the heatsink fins must be arranged so that the air can flow freely from the bottom to the top. For the case of forced convection by air or liquid, the module can be mounted in any position as long as the cooling medium amount is sufficient for the load.

Mounting to heatsink

The use of thermal grease is recommended to ensure low case-to-sink thermal resistance. We recommend using either DC340 (Dow Corning) or silicone free HTCP (Electrolube) or equivalent thermal grease. It should be applied with a thickness of about 60 to 80µm by using a roller. Thermal grease contact and distribution will improve during the first hours and after heating up the system for the first time. Removing some modules from their heatsink after mounting to inspect the entire area of the metal base plate is an ideal measure to control the minimum thickness of grease. The modules bottom surface must be wetted completely with thermal grease. For more information see our video on the IXYS Data Book CD.

For proper mounting, it is recommended to use M5 screws secured by a lock washer and flat washer torqued to between 2.7 - 3.3 Nm (24 – 29 lb-inch). The minimum required thread depth in aluminum heatsinks is 12 mm (0.48 in) and 10 mm (0.40

in) in copper heat sinks. All mounting holes should be free of burrs. First lightly tighten all mounting screws before tightening the screws to their final torque value in a step pattern using a torque wrench or torque screwdriver.

PCB mounting

The PCB holes for the module pins have to be designed for a maximum tolerance of 0.4 mm in diameter according to the nominal position (see datasheet drawing).

It is essential to design the copper traces on the PCB in a way to prevent damages to the PCB and / or to the module by excessive heating. A copper thickness of 105 µm usually is used. The maximum RMS current determines the width of the copper pattern. Forced air-cooling for the PCB can improve the temperature situation.

Mounting height from the heatsink to the lower side of the PCB is 17 mm +/- 0.5 mm.

Tension and mechanical stress from PCB to the module pins has to be avoided by screwing the PCB down to the modules stand-offs. Self-tapping screws (for example EJOT PT® self-tapping screws of the dimension K25 with 2.5 mm diameter) are recommended for the mechanical connection between module and PCB. The maximum thread depth into the module mounting studs is 9mm. This dimension plus the PCB board thickness determines the length of the self-tapping screw. The recommended screw torque is 1.5 Nm (13 lb-inch). Depending on the design of the power stage, additional support from the heatsink to the PCB might be necessary.

A good solder contact is required for proper conduction between terminal pins and PCB and ensures good heat dissipation. Wave soldering process or manual soldering is suitable to solder the pins to the PCB. Soldering conditions must not be exceeded to prevent overheating of the device. Soldering time must not exceed 3s at a temperature of 260°C.

Washing is not allowed due to holes in the module cover.

Disassembly

For disassembly the solder connection must be undone properly by an appropriate technique. Then any screw connections to the PCB and to the heatsink need to be removed. The modules should be either slid off the heat sink or rotated on the heatsink surface to overcome adhesion of the thermal grease. Pulling directly on the module housing may cause separation of module base plate and package.