Modules

Application Note

Mounting Instructions for INT-A-PAK Modules

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This application note introduces Vishay´s INT-A-PAK (IAP) modules. It covers their key features and gives instructions for using heatsinks with the modules.

IAP modules are designed to provide reliable performance. A single housing is used to integrate power components, providing higher power density. Various die selections are available in several configurations.

Fig. 1 - Examples of IAP Modules

INTRODUCTION

Vishay's IAP modules are distinguished by these key features:

- Fully isolated from the metal base, allowing common heatsink and compact assemblies to be built
- Wire-bonded internal connections
- Screwable electrical terminals secured against axial pull-out. They are fixed to the module housing via a click-stop feature
- Low junction-to-case thermal resistance

Important factors in the assembly process are:

- Heatsink design
- Power leads size/area
- Distance from adjacent heating parts
- Protection against electrostatic discharge (ESD)

Recommendations for each of these items and requirements for mounting IAP modules to the heatsink are discussed in the following sections.

ESD PROTECTION

IGBT, MOSFET, and Ultrafast diode modules are sensitive to ESD. All IAP modules built with such configurations are protected against ESD during shipment; they are separated in a carton box and protected by an antistatic sponge. Anyone handling or working with the modules during the assembly process must wear a conductive grounded wristband.

HEATSINK SPECIFICATION

The contact surface of the heatsink must be flat, with a recommended tolerance of < 0.03 mm (< 1.18 mils) and a levelling depth (surface roughness) of < 0.02 mm (< 0.79 mils), according to DIN/ISO 1302. In general, a milled or machined surface is satisfactory if prepared with tools in good working condition. The heat sink mounting surface must be clean, with no dirt, corrosion, or surface oxides. It is very important to keep the mounting surface free from particles exceeding 0.05 mm (2 mils) in thickness.

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THERMAL COMPOUND

Coat the heatsink surface and the power module base plate uniformly with a good quality thermal compound. Apply uniform pressure on the package to force the compound to spread over the entire contact area. The purpose of thermal grease is to fill gaps at the base plate/heatsink interface, and its use is recommended to ensure low case-to-sink thermal resistance. The thermal conductivity of the compound should be not less than 1.5 W/mK. The suggested thermal grease is DC340 (Dow Corning), silicone-free HTCP (Electrolube), or an equivalent. Screen printing and rubber rolling are the preferred methods for applying the grease. A final grease layer thickness in the range of 80 µm to 100 µm is considered suitable for most applications.

MOUNTING TO HEATSINK

The module baseplate is typically slightly bended with convexity not exceeding 0.19 mm (7.8 mils) when measured between the two fixing holes. This provides an optimal contact area with the heatsink.

Confirm that there are not any foreign particles on the surface of the screen tooling and plate. Place a suitable amount of thermal compound on the plate and spread it equably by using a roller or spatula. Thermal grease contact and distribution will be improved during the first hours and after heating up the system for the first time.

Bolt the module to the heat sink using the fixing holes. An even amount of torque should be applied for each individual mounting screw. For proper mounting it is recommended to use M6 screws secured by a lock washer and flat washer. Please refer to each individual data sheet to find the maximum torque that can be applied. A torque wrench that is accurate in the specified range must be used in mounting the module to achieve optimum results.

The minimum suggested thread depth is 10 mm to 11 mm (0.40 in to 0.43 in) in heatsinks. All mounting holes should be free of burrs. The first mounting screw should be tightened to one third of the recommended torque; the second screw should then be tightened to the same torque.

Over-tightening the mounting screw may lead to deformation of the package, which would hence increase the thermal resistance and damage the semiconductors. After a period of three hours, check the torque with a final tightening in the opposite sequence to allow the spread of the compound.

POWER LEADS OR BUS BARS CONNECTION

An even amount of torque should be applied for each individual screw. For proper connection, it is recommended to use fit screws (refer to the individual datasheet or outline dimensions) secured by a lock washer and flat washer. The maximum thread depth into the module mounting studs should conform to each individual package outline drawing in the datasheet. Also refer to each individual datasheet to find the maximum torque that can be applied. A torque wrench that is accurate in the specified range must be used in fixing screws of the power leads or bus bars to achieve optimum results.

SIGNAL TERMINAL AND HOUSING CONNECTION

For IAPs built with black plastic housing, we recommend using receptacle fast-on terminals (with locking lance, for 2.8 x 0.8 tab (series 110) ref. PN.AMP 150571-2 or equivalent) and tinned copper stranded cable (UL 758, style 1558, AWG 22 (0.32 mm^2) laid 19 x 0.16 ETFE insulation, ext. dia. 1.25 mm, temperature rating 125 °C). In addition, a 2-way polarized connector housing can be used, as shown in the dimensional detail (the represented version refers to left “SX” and right “DX” connector housings) (Fig. 2).

For IAPs built with white plastic housing, we recommend using receptacle fast-on terminal with locking lance, for 2.8 x 0.5 tab (series 110) ref. PN.AMP 42067-1 or equivalent.

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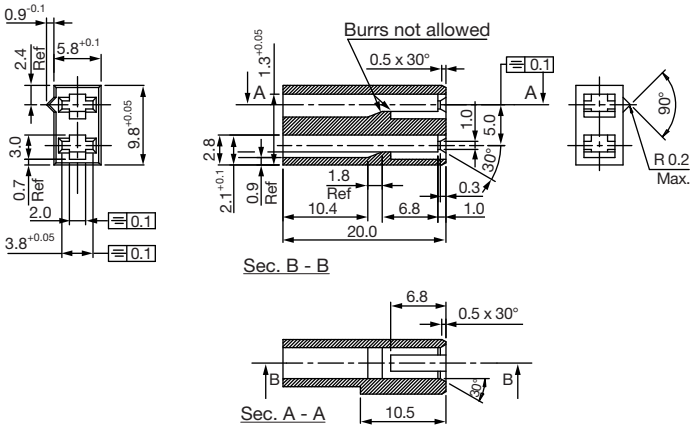
2 ways polarized connector
housing, dimensional detail



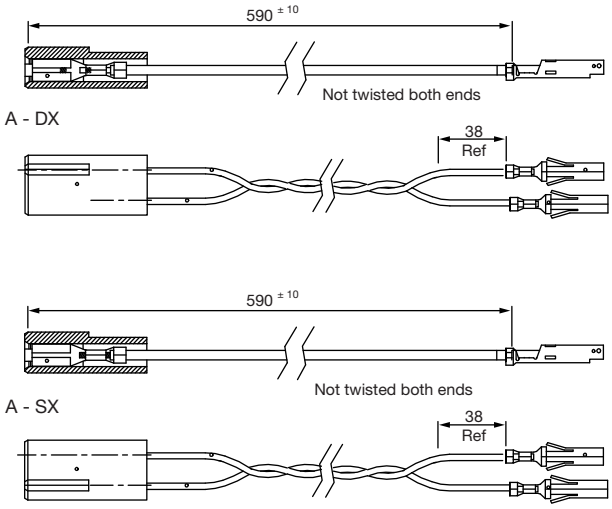


Fig. 2

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