



Mounting Instructions for MTP Modules

By Marcello Turnaturi, Vishay Semiconductors

This application note introduces Vishay's MTP rectifier-switch modules and discusses the assembly and printed circuit board issues involved in their use.

MTP modules are designed to provide reliable performance in rugged 20 A to 100 A industrial applications. A single housing is used to integrate power components, providing higher power density. Various die selections are available in several configurations. An integrated thermal sensor is also offered as an option.

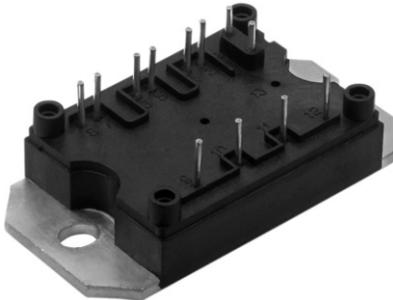


Fig. 1 - Example of MTP module

Introduction

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

- Fully isolated
- Compact and easy to mount
- Low profile package suitable for assembly on printed circuit boards
- Low junction to case thermal resistance

These attributes allow MTP modules to fit into existing assembly processes using standard reflow profiles.

Important factors in the assembly process are:

- Heatsink design
- PCB design
- Power leads size/area
- Distance from adjacent heating parts
- Solder paste choice
- Reflow profile
- Protection against electrostatic discharge (ESD)

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

ESD protection

IGBT and MOSFET modules are sensitive to ESD. All MTP modules are ESD-protected during shipment with an antistatic tube. 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 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 heatsink mounting surface must be clean, with no dirt, corrosion, or surface oxide. It is very important to keep the mounting surface free from particles exceeding 0.05 mm (2 mils) in thickness

Mounting Instructions for MTP Modules

Mounting Operation Steps

Inspect the module to insure that the contact surface of the base is clean, and that there are no lumps or bulges on the baseplate that could damage the base or reduce heat transfer across the surfaces.

Make a uniform coat on the heatsink mounting surfaces and module baseplate with a good quality thermal compound. Screen printing of the compound, or direct application with a roller or spatula, is recommended. The test conditions for thermal resistance values on the datasheet specify a uniform layer of thermal compound with a thickness of 0.08 mm. The thermal conductivity of the compound should not be less than 1.5 W/mK. Apply uniform pressure on the package to force the compound to spread over the entire contact area and check the device bottom surface to verify that coverage is full and uniform.

Bolt the module to the heatsink using the two fixing holes. An even amount of torque should be applied for each individual mounting screw. An M4 screw should be used with lock washers. A torque wrench, accurate in the specified range, must be used to achieve optimum results when mounting the module. 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. Full tightening of both the screws can then be completed applying the recommended torque (see data in bulletins). Over-tightening the mounting screw may result in 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 opposite sequence to allow the spread of the compound.

The convexity of the module baseplate ranges from 0.02 to 0.10 mm (0.787 to 3.937 mils) when measured between the two fixing holes. This provides for an optimal contact area with the heatsink (Figure 2).

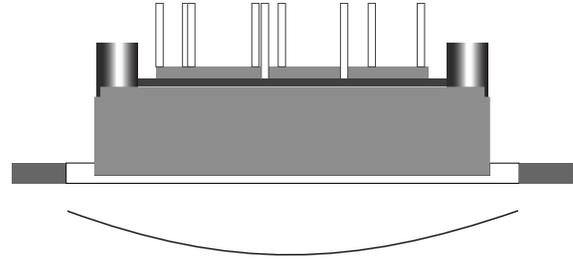


Fig. 2 - Description of “module convexity”

Solder to PCB

The PCB must be designed with appropriate tolerances on its hole diameters.

Soldering operations must be done so as to avoid inducing any mechanical stress from pulling or tensioning the module pins. The module stand-off can be used to help align the PCB and keep proper distance.

MTP modules can be soldered to the PCB using hand iron or wave soldering processes. To prevent overheating of the device, we suggest that soldering time not exceed 8 to 10 seconds at a temperature of 260 °C.

The mounting of the module on the heatsink can be done either before or after soldering the module pins onto the PCB.