

CPWR-AN34: 62mm Module Mounting Guide Application Note

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This document is prepared as an application note to install Cree® hardware. All parts of this application note are provided in English. If the end user of this reference design is not fluent in this language, it is your responsibility to ensure that the user understands the terms and conditions described in this document, including without limitation the hazards of and safe operating conditions prior to use / implementation.



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1. Product Scope

This application note supports all of Wolfspeed’s industry-standard 62mm module footprints, including all part numbers with a ‘BM’ in the last three digits of the part number (example: CAS300M12BM2).

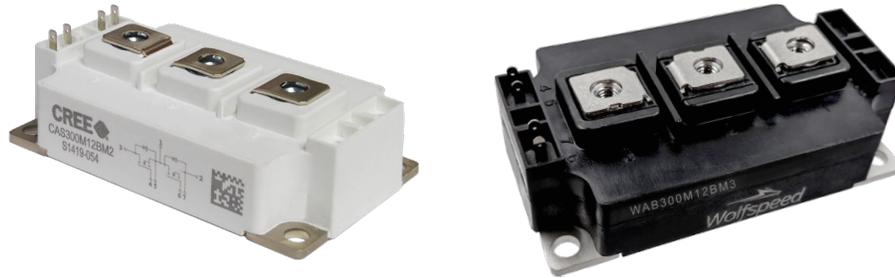


Figure 1. Example images of Wolfspeed 62mm BM Modules

2. Introduction

This document describes only how to install or mount the power module to its cold plate and how to design and construct the mechanical system in which the module will be placed. It does not describe how to operate the system once these steps are taken.

Before operating the system, please carefully review the operating limits for the individual module part number under consideration set forth in the datasheet located at www.wolfspeed.com and please ensure that appropriate safety procedures are followed when working with the system. There can be very high voltages present in the system when connected to an electrical source (and thereafter until applicable capacitors are fully discharged), and some components in the system can reach very high temperatures. Serious injury, including death by electrocution or serious injury by electrical shock or electrical burns, can occur if you do not operate the module within its operating limits or follow proper safety precautions.

To ensure system performance and reliability, consideration must be given to how the power module is attached to its cold plate. In addition, care must be taken when designing and constructing the mechanical system in which the module will be placed. More specifically, the power module must be securely held in place, while not exceeding the baseplate mounting hole and power terminals force ratings. Similarly, the module’s gate driver should be firmly attached to a rigid surface to ensure that it remains in place, while not placing excessive force on the signal pins of the power module it is attached to. Furthermore, the bussing attached to the power module must not place excessive stress on the module’s power terminals.



3. ESD Protection

Wolfspeed power modules are electrostatic sensitive devices, supplied with a conductive connection between the gate and source terminals. Maintain this connection until the driver has been connected; when the shorting connection is removed, industry-standard ESD protection practices should be used to handle the module. Assembly must be carried out by appropriately-trained staff, wearing conductive grounding bracelets at ESD-safe workstations.

4. Baseplate & Cold-Plate Specifications

A layer of thermal interface material (TIM) must be placed between the baseplate of the power module and the cold plate to create a low thermal resistance connection between the two. Before applying the TIM, it is important to make certain that the contact surfaces—the cold plate mounting surface and module baseplate—are clean and free from any type of debris. This can be achieved by using an alcohol based cleaner and a lint free cloth. The surface of the cold plate must also satisfy several key requirements which are presented below:

1. Surface flatness $\leq 50 \mu\text{m}$ per 100 mm (DIN EN ISO 1101)
2. Surface roughness $R_z \leq 10 \mu\text{m}$ (DIN EN ISO 4287)
3. No steps $> 10 \mu\text{m}$ (DIN EN ISO 4287)

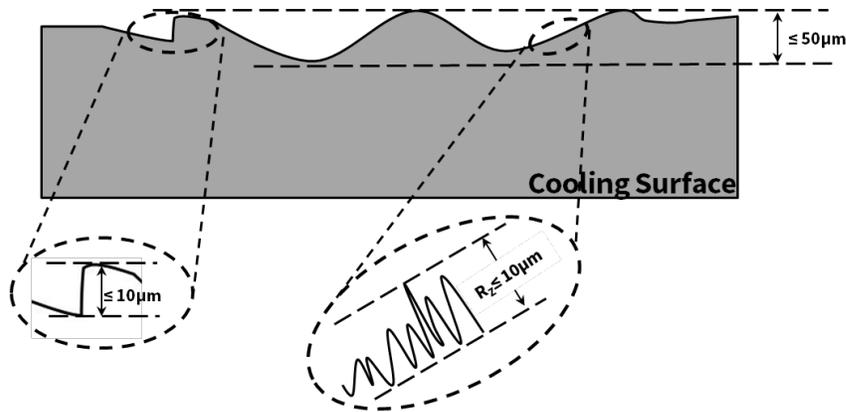


Figure 2 Cold plate Mounting Surface Requirements

After the surfaces are cleaned and the requirements listed above have been verified, a film of TIM should be applied to the module baseplate. While this may be done using several different methods, it is recommended to use a stencil with 0.006” thickness and stencil fixture, as described in further detail in Cree’s [62mm Module Thermal Interface Material Application Note](#), CPWR-AN35, located at www.wolfspeed.com. Following the application of the TIM, the module baseplate should be attached to the cold plate using the following procedure:

Carefully align the mounting holes and place the module onto the cold plate taking care not to slide the module around. Install the washers and thread in the M6 bolts until seated finger tight. Following Figure 2 and using a



torque wrench, tighten the bolts in the sequence described below until the desired torque is reached. The recommended torque for the 62mm module is 5 N-m.

1. Torque bolt number: 1 – 2 – 3– 4 to 1/3 final torque
2. Torque bolt number: 3 – 4 – 2 – 1 to 2/3 final torque
3. Torque bolt number: 2 – 1 – 3 – 4 to final torque

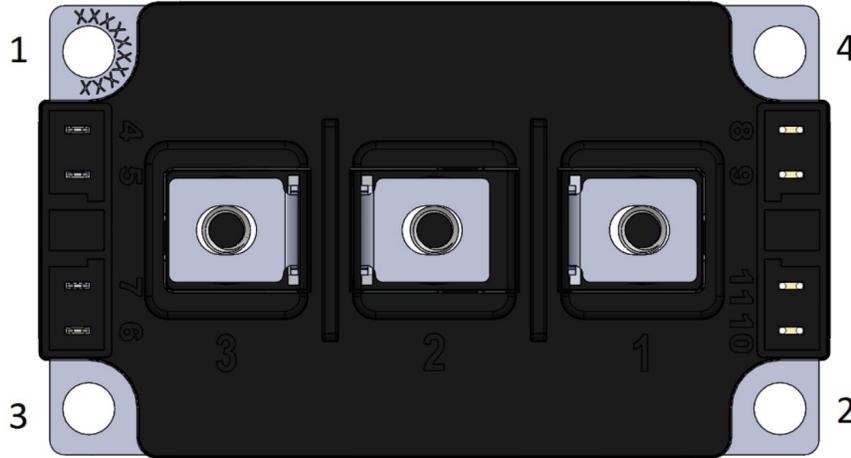


Figure 3 62mm Bolt Pattern Reference

After heat cycling the module, it is recommended to check the torque of each mounting screw.

5. Power Terminal Mounting

The power terminals of the 62mm modules are designed for DIN M6 bolts (class 6.8 minimum) tightened to 5 N-m. The engagement depth of the screw into the power terminals **must** not the maximum penetration depth of 13.0 mm. Exceeding this value may result in significant damage to the power module.

It is imperative that the bussing connected to the power terminals of the module does not place excessive force on the power terminals. This condition must be maintained even under shock and vibration conditions. Consequently, the bussing **must** have proper mechanical stress relief, which will serve as a rigid mechanical connection between the module baseplate and bussing, minimizing the amount of force that may be placed on the power terminals because of an outside force being placed on the bussing.

The power terminals of the 62mm module are threaded for M6 bolts. As such, the mounting holes in the bussing that is attached to the module should be as close to the standard M6 clearance hole of 6.6 mm as possible, given the tolerances in your system. Excessively exceeding the standard M6 clearance hole size may result in damage to the power terminals of the module.



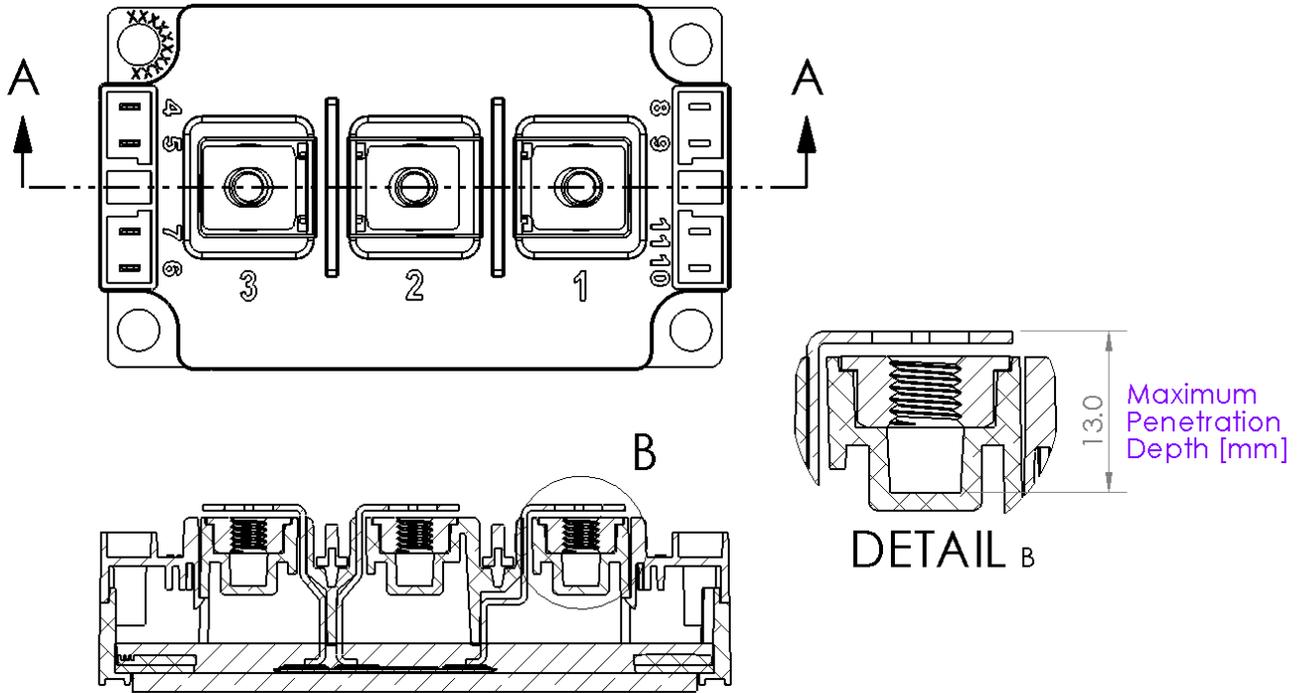


Figure 4 Power Terminal Maximum Penetration Depth

6. Gate Driver Mounting

Proper mounting of the 62mm gate driver onto the power module is presented in Figure 4. Just as the power terminals must be protected from excessive force, the signal terminals of the power module must also be protected. This criterion must be balanced with the requirement that the gate driver signal connectors remain electrically connected to the signal pins of the power module. The best way to protect the power module signal terminals from excessive force while maintaining a reliable electrical connection is by mounting the gate driver with mechanical supports in place to provide mechanical stress relief. Just as with the bussing mechanical relief, the gate driver mechanical relief should lock the position of the gate driver relative to the power module and prevent outside forces on the gate driver from stressing the signals pins of the power module.

When removing the gate driver from the power module, special care must be given to apply even pressure across all four pins to prevent damage to the pins. Excessive force or uneven pressure applied to the pins may result in permanent damage manifesting itself as the tearing of a signal pin out of the module.



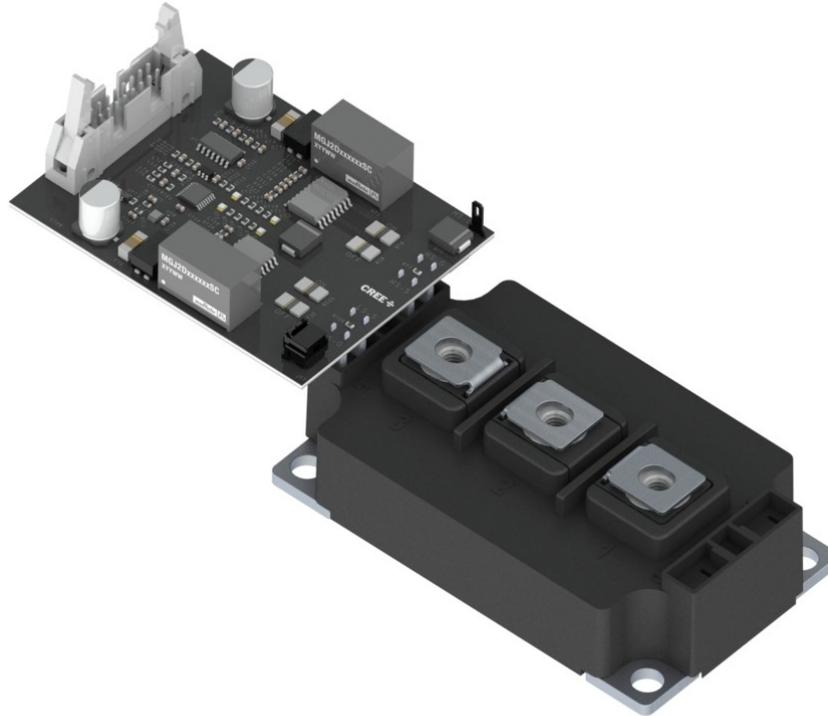


Figure 5 Proper Gate Driver Mounting

7. Revision History

Revision	Date	Notes
-	2020-04-15	Initial Release

