

APPLICATION NOTE

AN-Number: AN2003-01 (replaces AN2002-06)

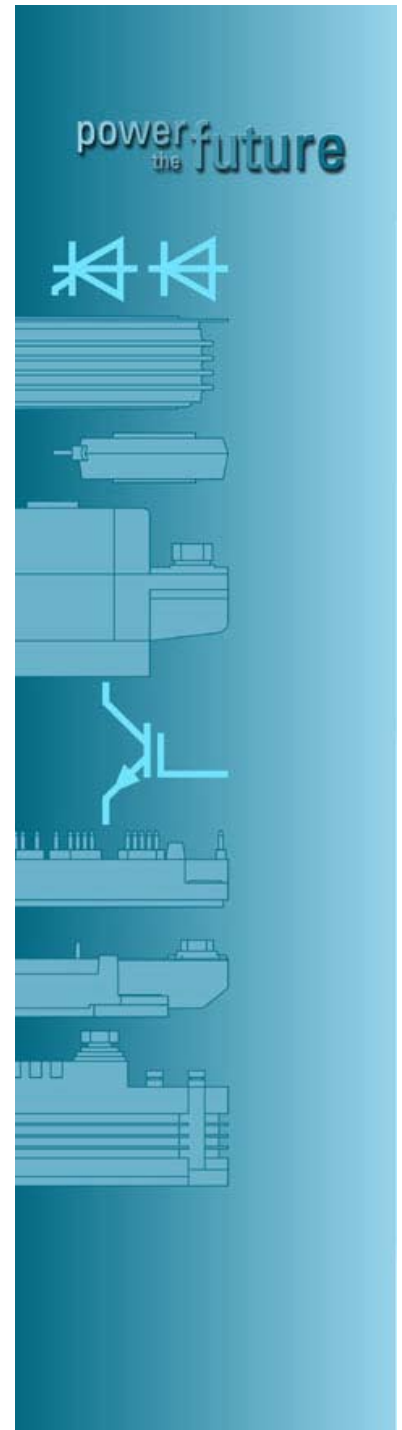
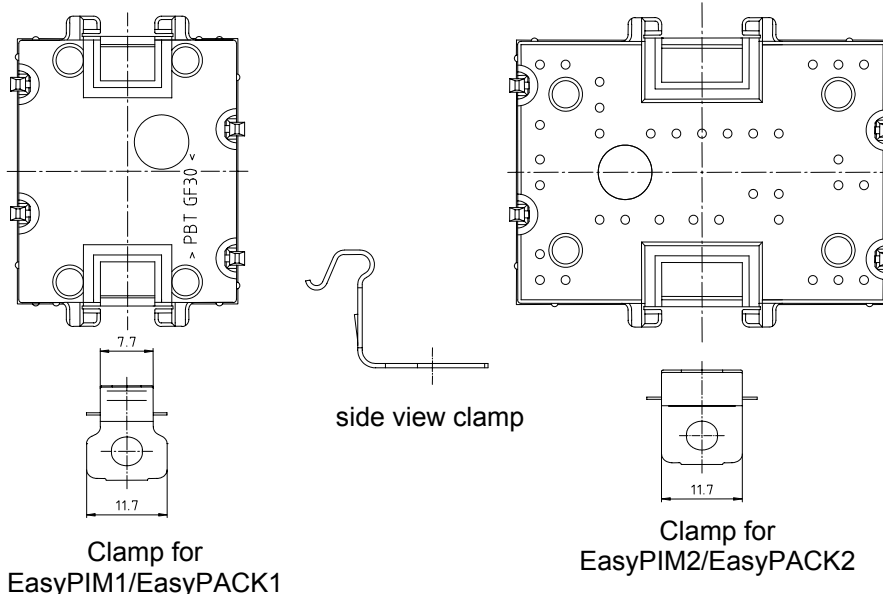
Mounting instructions for EasyPIM / EasyPACK modules with screw clamps

1. General information

The mounting instructions outlined below are recommended for the safe and reliable operation of these modules in industry standard applications. These recommendations are based on our experiences gained during laboratory and field tests.

Described is the mounting of EasyPIM- and EasyPACK modules (case style Easy1 and Easy2). These modules are intended to be mounted on a circuit board (PCB) $1,6 \pm 0,2$ mm thick. To attach the module to the heat sink reliable and simple appropriate screw clamps are available for each type of module.

Each module is bolted with two screw clamps on the heat sink. These clamps can be ordered from eupec separately.



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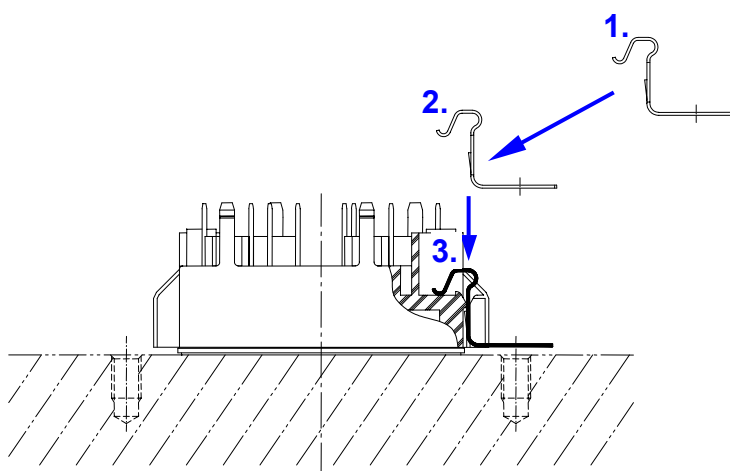
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2. Fastening the screw clamp in the module

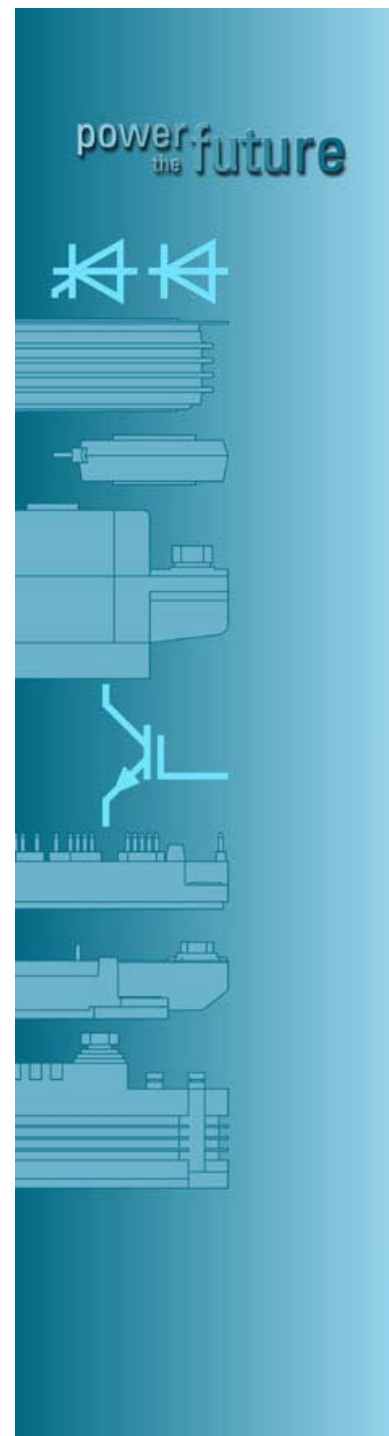
First the two clamps are inserted into the clamp guides on each side until they lock in place. Care has to be taken that the clamps are put in perpendicular to the sides of the housing, in order to avoid binding of the clamp in the plastic. The clamps should not be deformed or bent during this process (avoid any excess force on the screw hole flange and hook area). Inserted properly, the clamps are locked in place and can not fall out during further assembly steps.

Note: No foreign materials are allowed between module and clamp as well as in the clamp guides.



3. Soldering the module into the PCB

The EasyPIM / EasyPACK module is locked into the circuit board (PCB) first. Locking takes place via the locking hooks present on the module into the appropriate holes of the PCB (for hole pattern and layout: see data sheet).



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After locking the module, all pins are to be soldered.

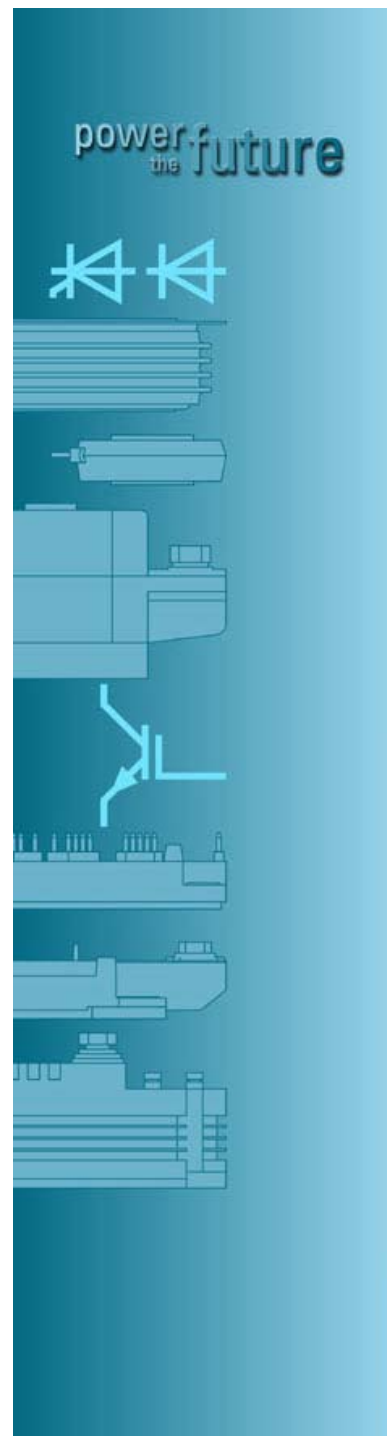
Note: The locking hooks do not serve as strain relief after soldering, but are only an aid during the assembly process. A strong application of force (deflection) on the PCB within the area of the soldering pins should be avoided.

4. Applying the thermal compound

The contact areas of module and heat sink must be free of any particles and damage as well as any other contamination. Before the module is installed onto the heat sink, apply approx. a 100 µm thick film of thermal compound, uniform over the entire module bottom. The recommended method is to apply the thermal compound with rollers, a spatula or screen printing. The quantity of thermal compound is sufficient if a small rim forms around the edge of the module.

Thickness of thermal paste	approx. 100 µm
Quality of heat sink surface of the modul mounting area	
Roughness (according to DIN 4768-1)	$R_z \leq 10 \mu\text{m}$
Flatness based on a length of 100 mm	$\leq 50 \mu\text{m}$

Note: 1. The flatness of the heat sink should not exceed the values specified in the table over the entire module mounting surface including the area of the clamp.
2. If the layer of thermal compound is applied too thick, the thermal resistance R_{th} between module and heat sink will increase.



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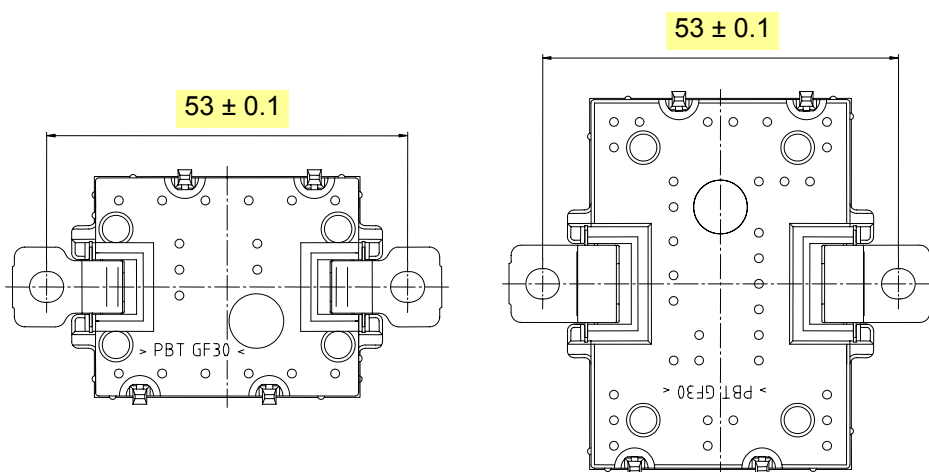
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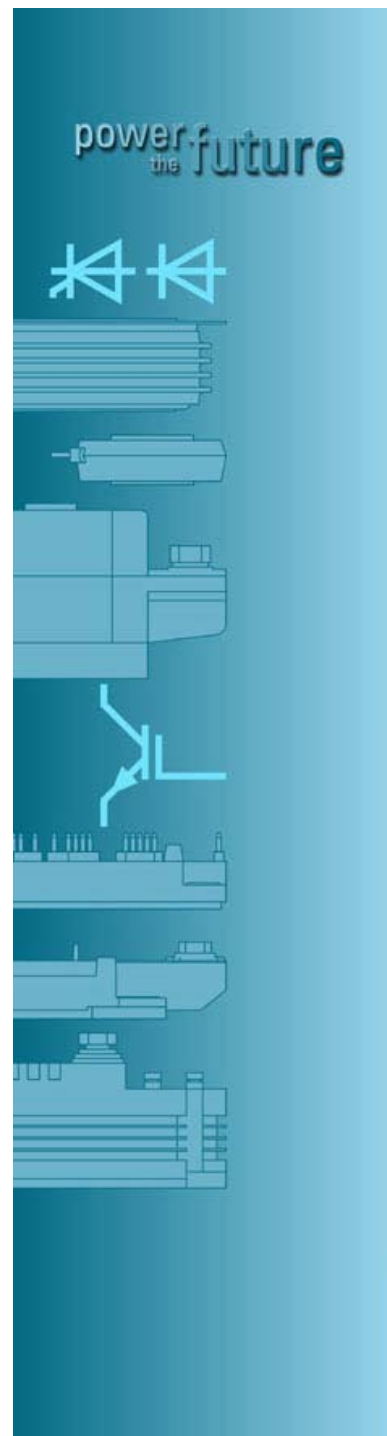
5. Assembly of the module on the heat sink

The modules are mounted onto the heat sink with screw clamps and M4 screws. See drawing below.



Note: If the module is soldered first into the circuit board or if a subsequent disassembly of the module is desired, appropriate sized through holes must be provided in the PCB (hole size depends on screwdriver or screw head diameter / washer).

The module is to be positioned on the heat sink in such a way that the holes of the screw clamps are lined up over the threaded holes of the heat sink. The mounting surface must be clean and free from contamination.

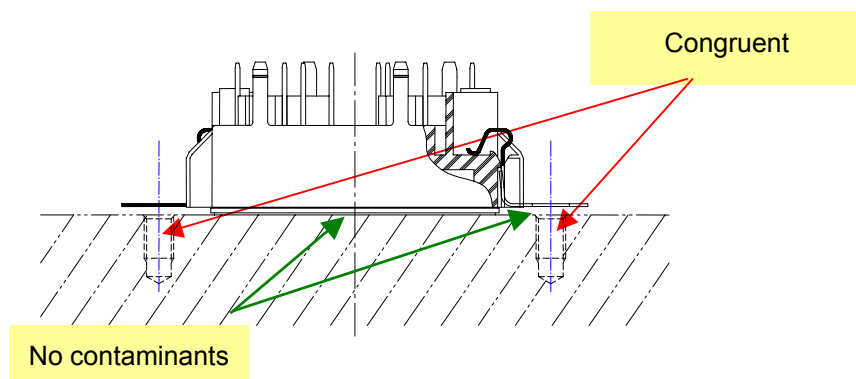


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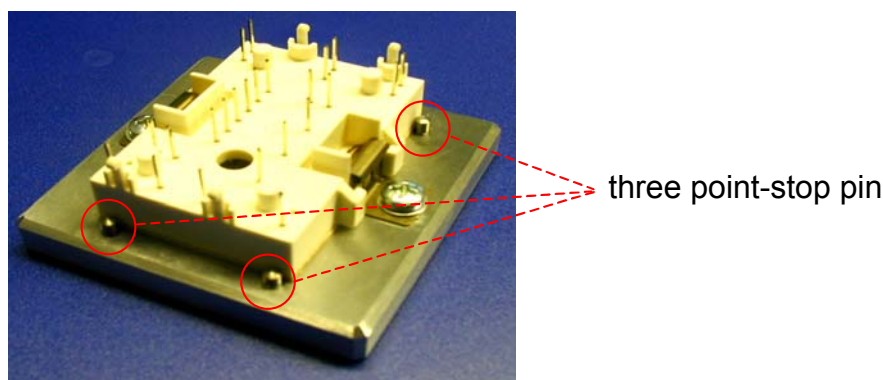
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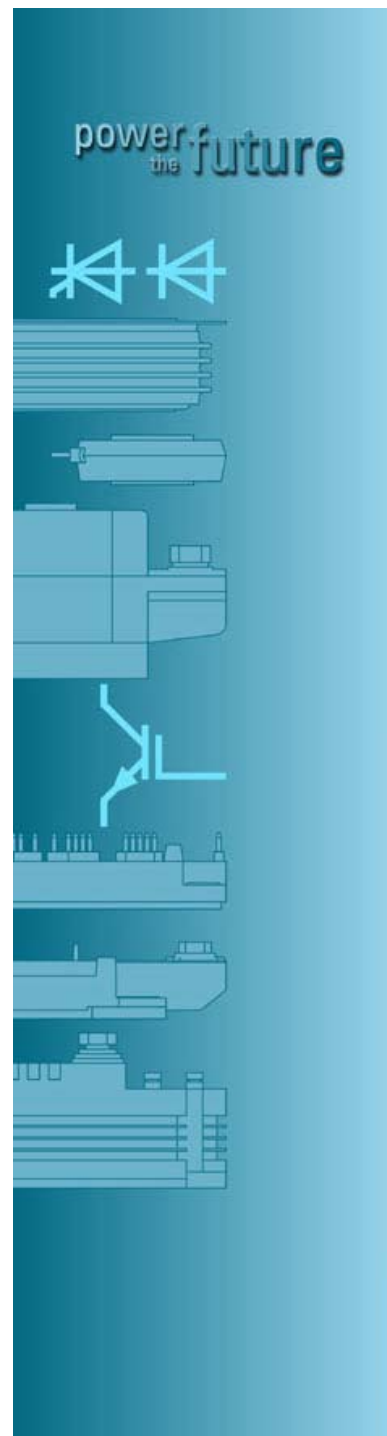


In order to position the module on the heat sink correctly a three point-stop pin on the heat sink is recommended.



Note: If mechanical stops are used it is to be made certain that the ceramic edge of the module is not damaged.

After the module is positioned properly first one screw is inserted through the flange of the clamp and the screw is tightened in accordance with the next picture. Make sure that the module does not flip up and tilt (do not apply pressure on the clamp itself).

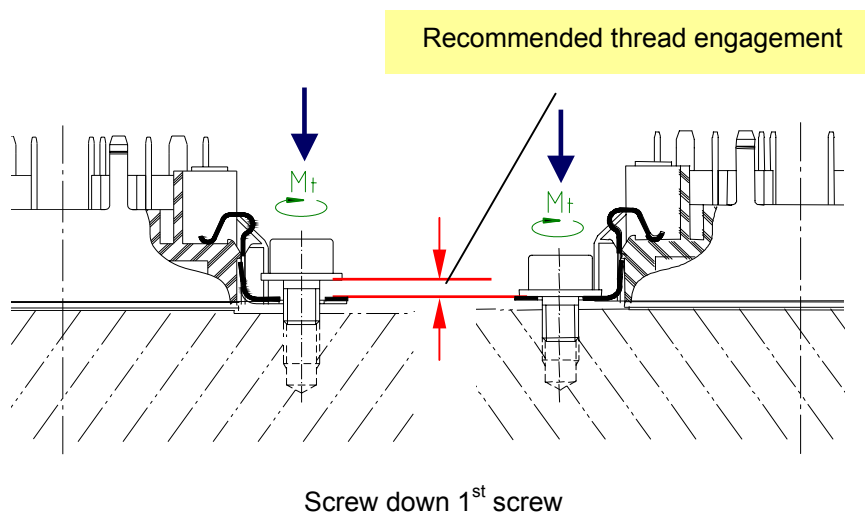


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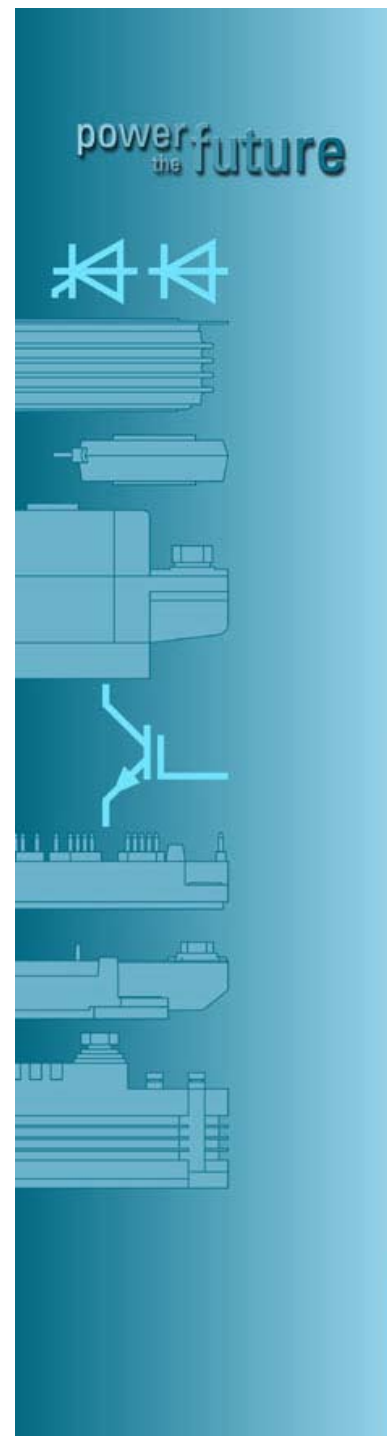
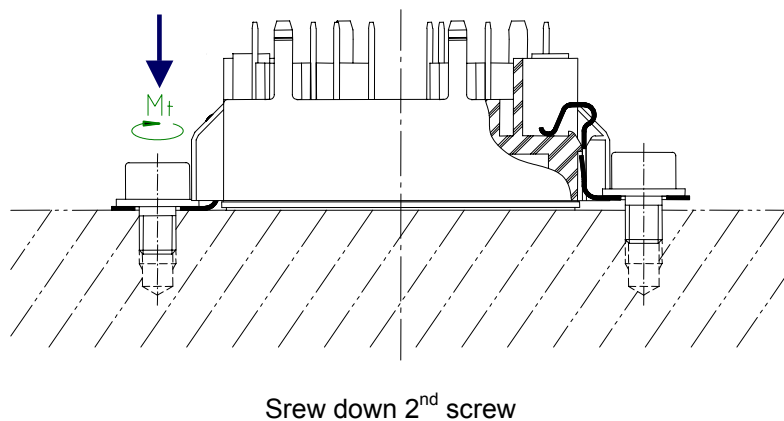
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The second screw is then applied to the opposite clamp and bolted firmly with the heat sink.



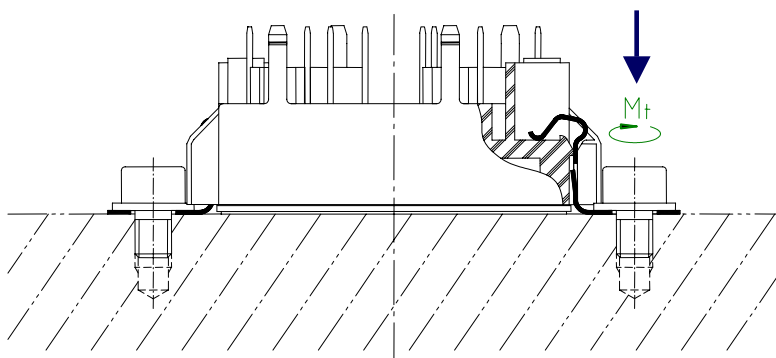
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In the final step, the first, still loose screw is tightened completely.



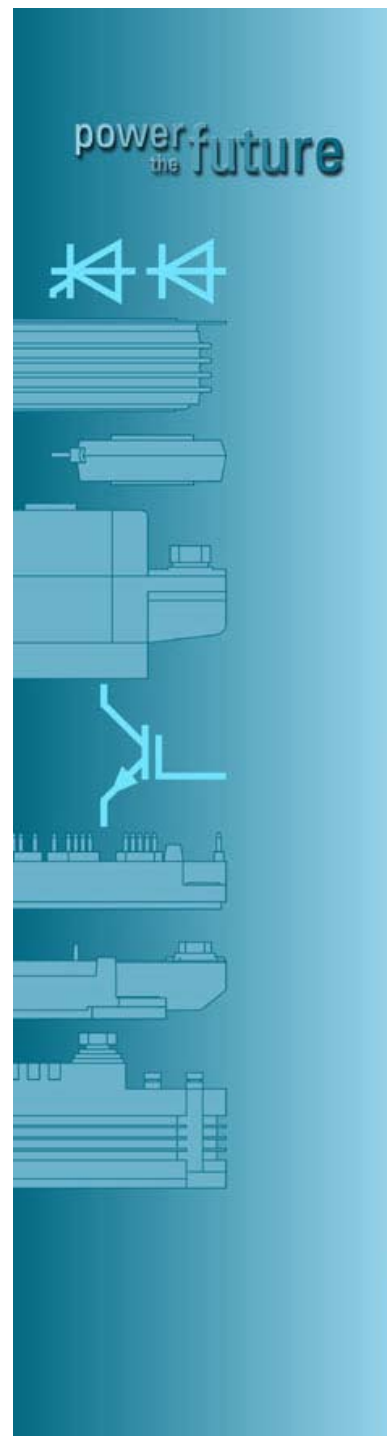
Screw	M4
Recommended mounting torque	$M_a = 2.0 - 2.3 \text{ Nm}^*$
Recommended thread engagement for screws with property class 4.8 to 6.8 for different materials	
Aluminium cast alloy	$2.2 \times d = 8.8 \text{ mm}^*$
Aluminium alloy hardened	$1.2 \times d = 4.8 \text{ mm}^*$
Aluminium alloy not hardened	$1.6 \times d = 6.4 \text{ mm}^*$
Washer to DIN 125	$D = 9 \text{ mm}$

* as per technical literature

Note: Alternatively both screws can be fastened at the same time and tightened.

6. System considerations

If the module is correctly installed onto the heat sink and into the circuit board, the screw clamps apply the necessary pressure and



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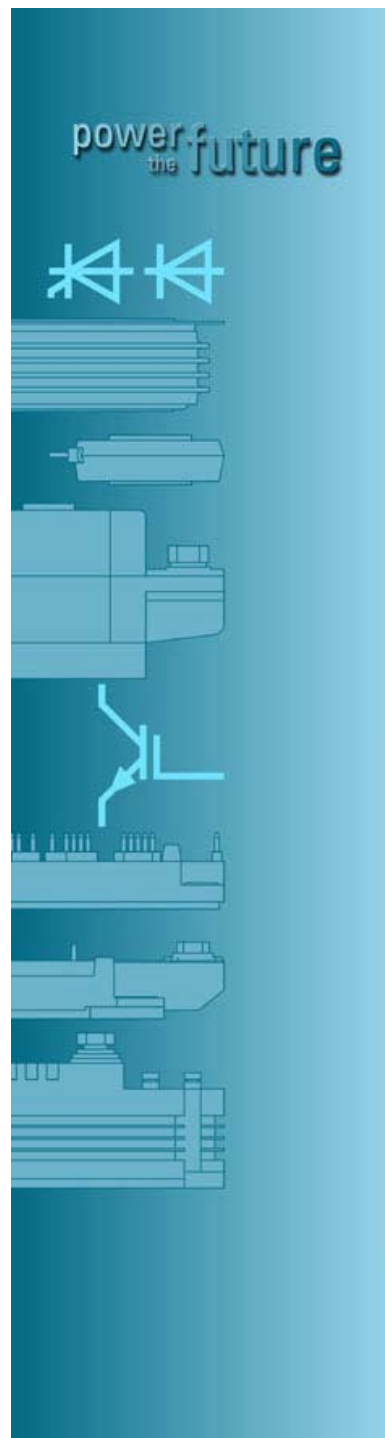
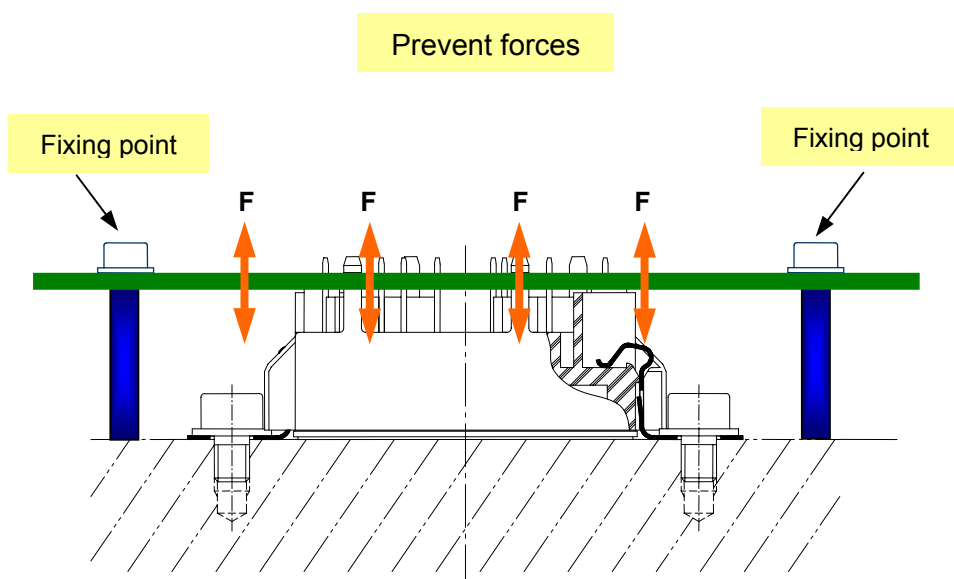
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ensure an optimal thermal resistance between module and heat sink.

Since the circuit board is connected only by the soldered pins with the module, suitable measures have to guarantee, that any possible vibrations of the PCB are not transferred to the solder pins. Any possible movement between soldered terminals and the case have to be avoided. Therefore the circuit board has to be fixed in addition to the heat sink itself.

In order to minimize any vibrations this strain relief should be provided as close as possible to the module. Any direct force to the module must be avoided.



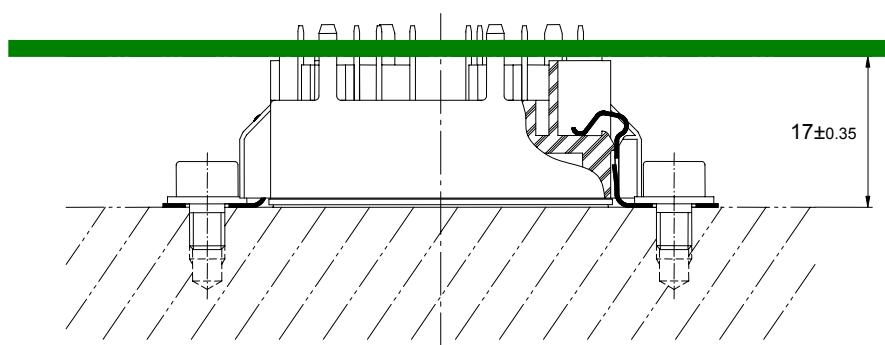
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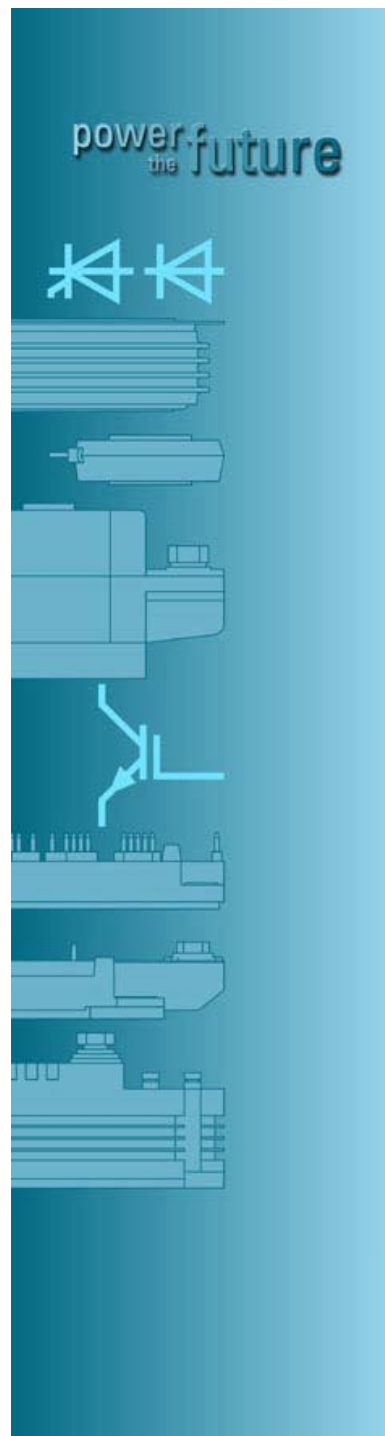
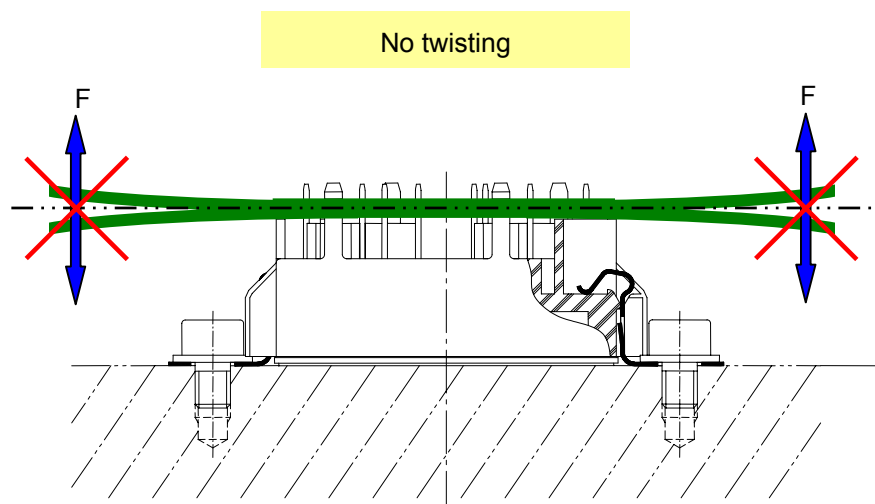
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Taking into account the various tolerances of the heat sink, module and circuit board the assembly height of the modules results to $17 \text{ mm} \pm 0.35 \text{ mm}$.



Bending and warping of the circuit board has to be avoided.



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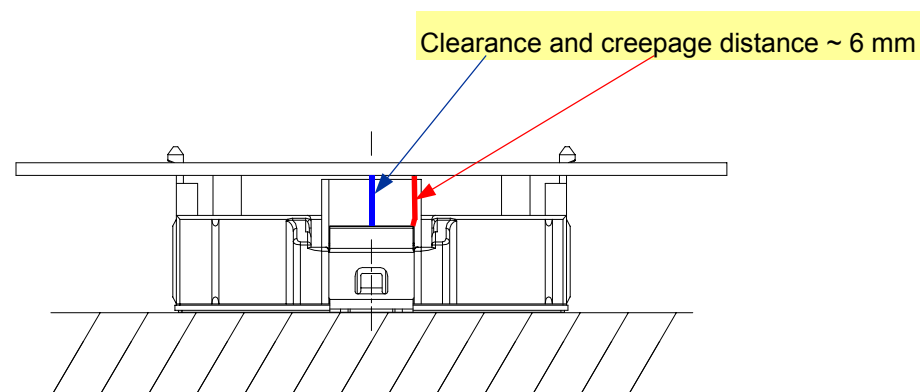
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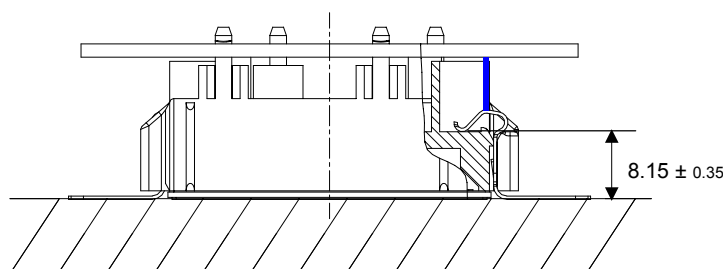
7. Clearance and creepage distances

When defining the layout of the circuit board appropriate creepage and strike distances have to be maintained. This is particularly important within the area of the screw bracket, underneath the circuit board. In order to meet the respective requirements regarding clearance and creepage distances, special attention should be given to this location and/or additional measures for isolation should be considered.

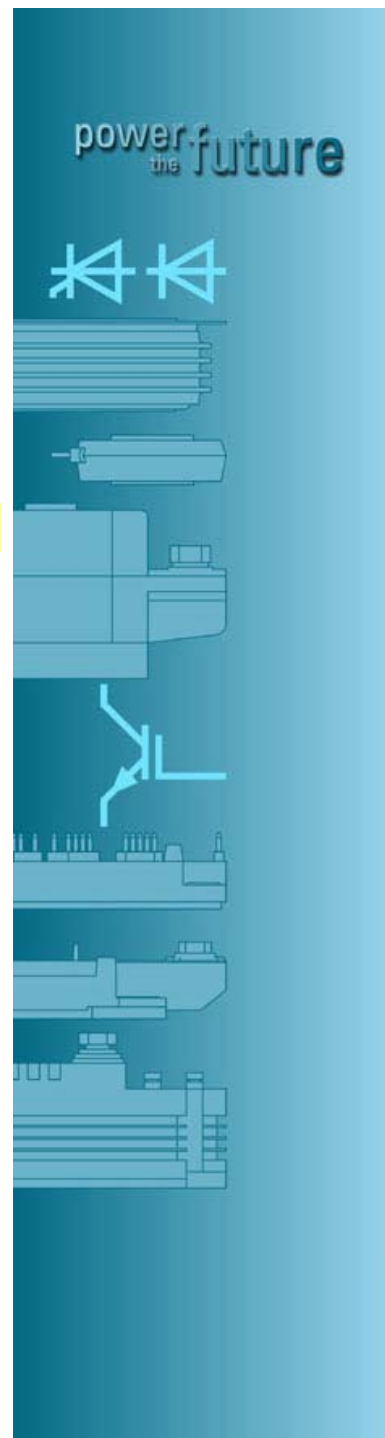


— Clearance distance
— Creepage distance

for Easy 1 and Easy 2 housing
600 V & 1200 V



Note: The given values of the clearance and creepage distances are measured values. The values relate to nominal size.



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