Assembly Instruction for C6.1 PINFIN Module

1 Content

2 General information

2.1 C6.1 Application introduction

C6.1 PINFIN module has the following advantages:

1. Low thermal resistance, higher power density, suitable for water cooling system.
2. Optimized chip layout suitable for electric vehicle drive applications.
3. High reliability prolong module life.
4. Suitable for electric vehicles and other fields.

Figure 1: Application fields.

2.2 Module dimensions

[Figure 2] shows the technical drawing of C6.1 module. The main dimensions and screw specifications are listed in [Table 1].

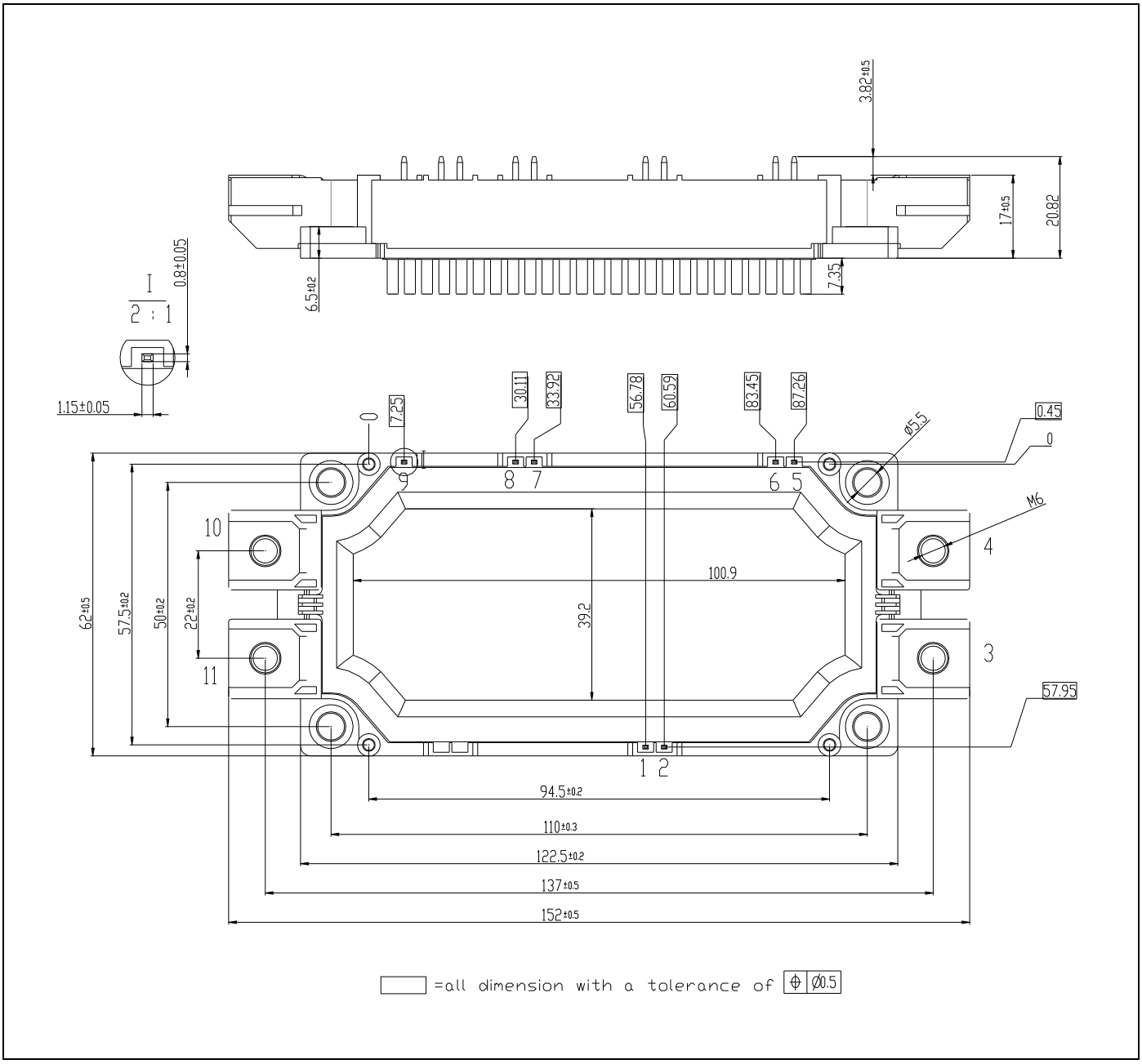


Figure 2: Technical drawing of C6.1 module.

Table 1: Main dimensions and screw specifications for C6.1 module.

Item	Specification
Length	152.1 mm
Width	62 mm

Height	28.16 mm
Busbar screw	M6
PCB fixing screw	M2.5
Base plate mounting screw	M5

3 Heat sink

[Figure 3] and [Figure 4] show the recommended dimensions for heat sink and sealing ring, respectively.

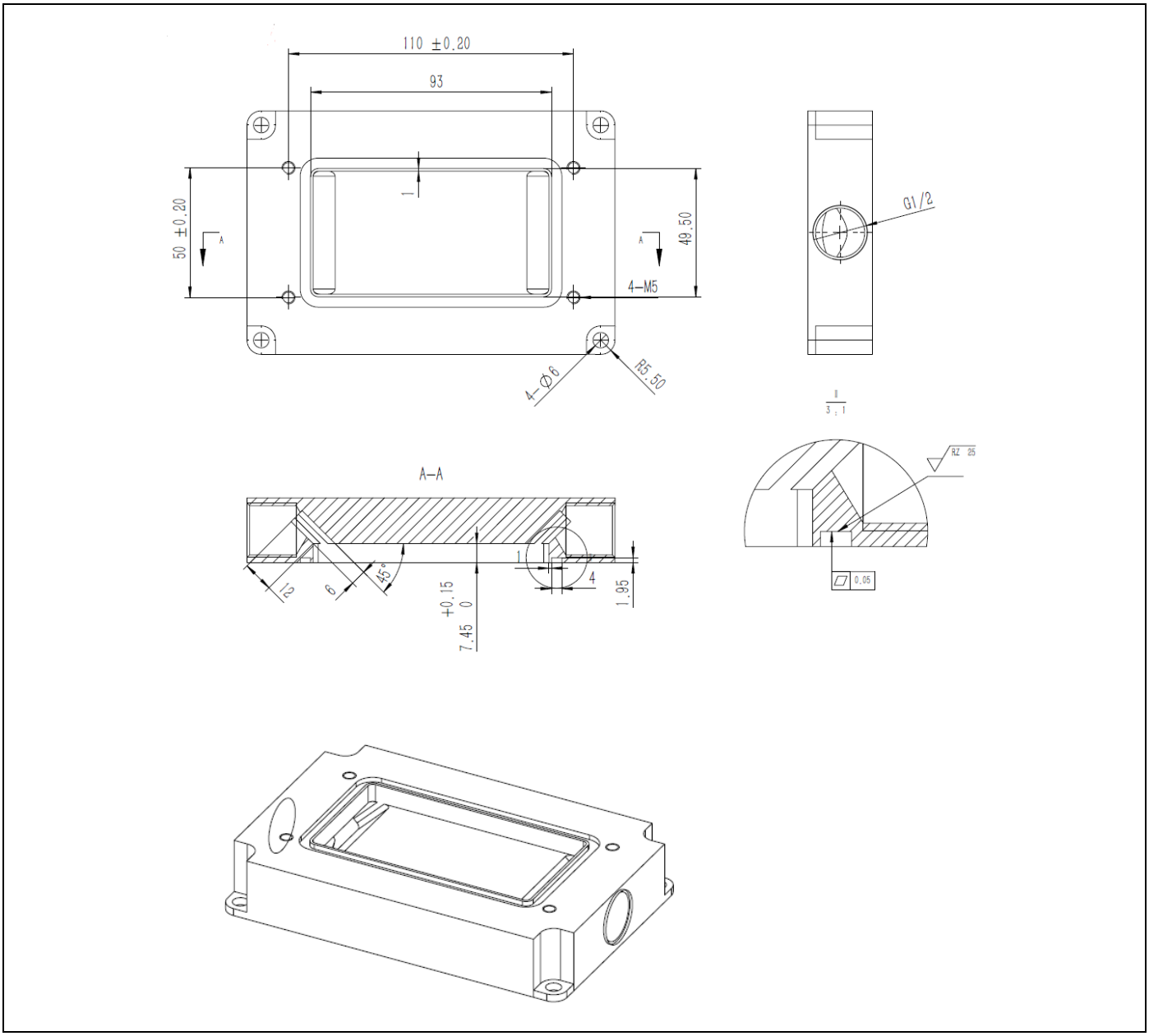


Figure 3: Technical drawing of heat sink.

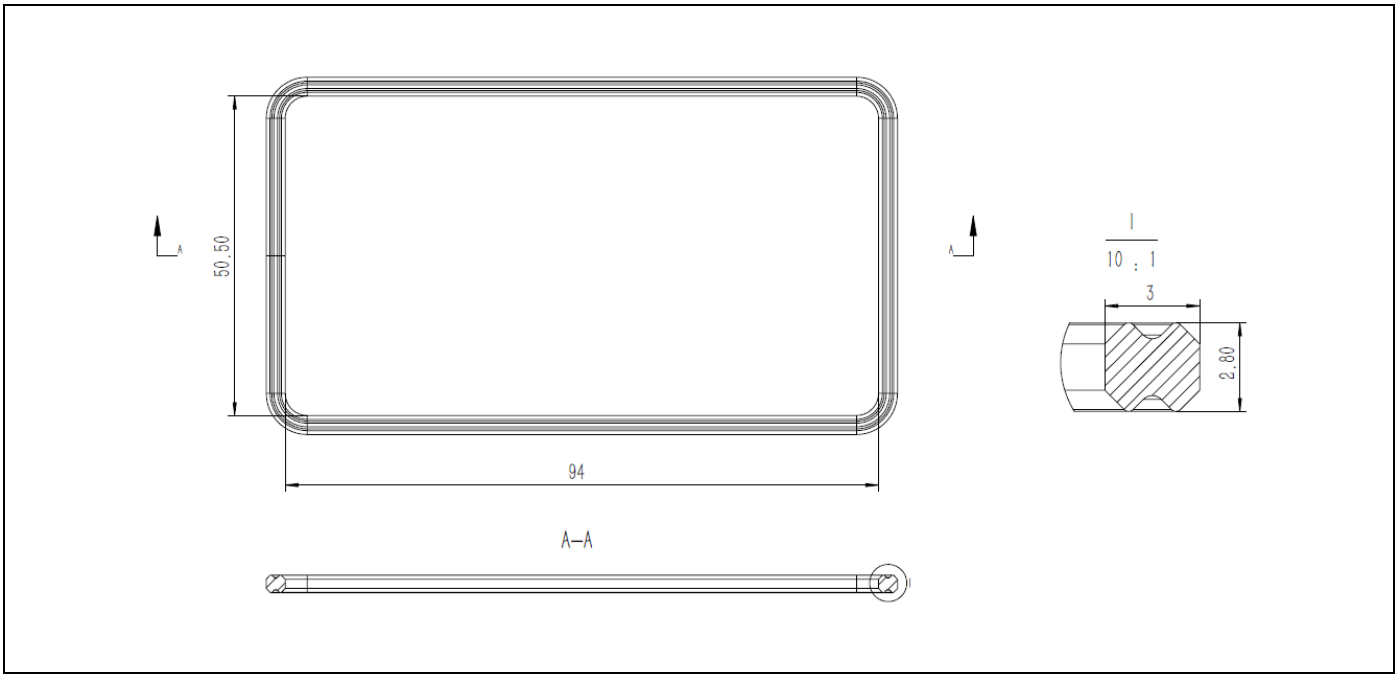


Figure 4: Technical drawing of the sealing ring.

4 Assembling instruction for PCB's on Modules

4.1 Requirements for PCB on Press-FIT module

The PressFIT technology used in the C6.1-series modules has been inspected and qualified by Starpower AG in China for Standard FR4 PCB's with tin applied chemically (IEC 60352-5).

Correct design of the plated through holes (PTH) in the PCB is essential to obtain a reliable connection between PTH and PressFIT PIN. [Table 3] Specification of the hole in the PCB.

Table 3: Specification of the hole in the PCB.

	Min.	Typ.	Max.
Hole drill diameter	1.13 mm	1.15 mm	-
Copper thickness in hole	25 µm	-	50 µm
Tin metallization in hole	-	-	15 µm
End hole diameter	1.0 mm	-	1.1 mm
End hole nominal diameter	-	1.0 mm	-
Recommended PCB thickness	1.0mm	1.6mm	

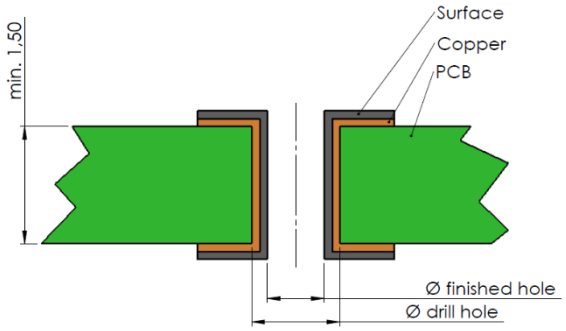


Figure 2: Structure of the PCB.

4.2 Fixing PCB on Heat Sink

The PCB has to be fixed on the heat sink by a support pillar to minimize the mechanical stress on the Pressfit PIN, as shown in [Figure 3]. The number and position of the support pillar are designed according to the system. The height between heat sink and PCB are determined by the press-in process and the tool. If the PCB thickness is 1.6mm, the gap from the PCB to module is 0.2(±0.1) mm.

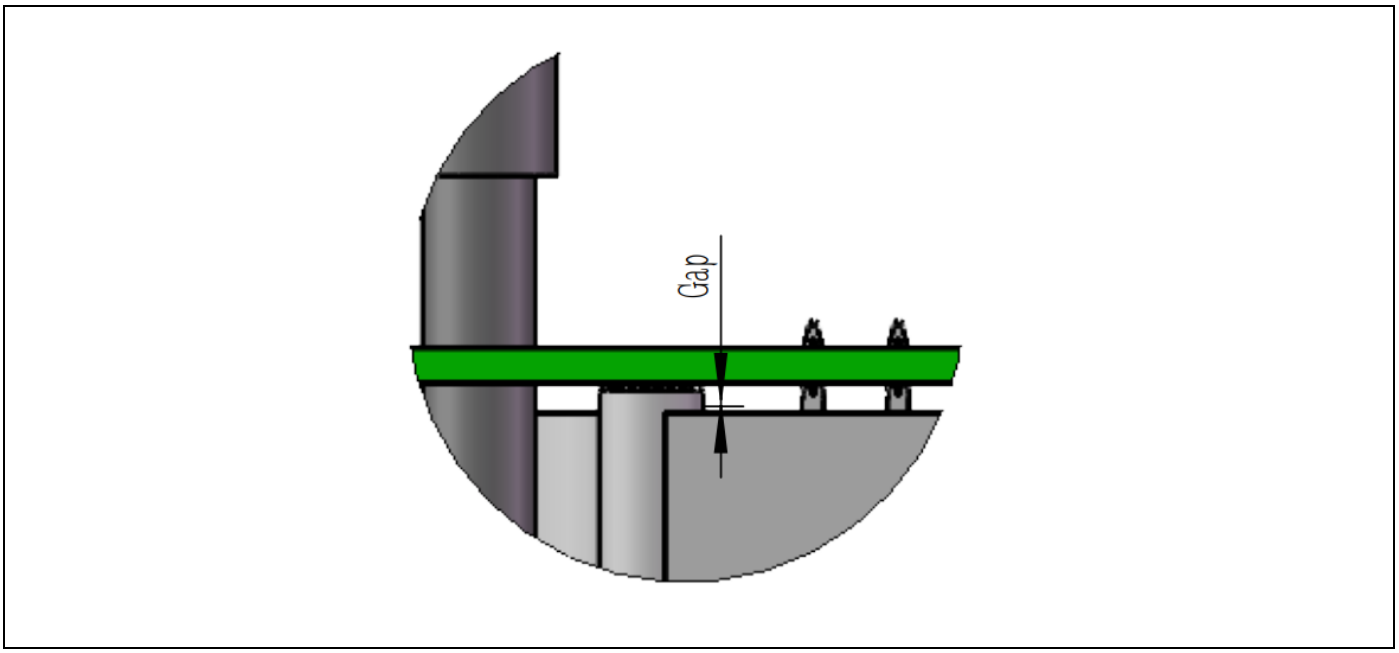


Figure 3: Mounting a PCB to the heat sink.

4.3 Introduction of Press-in Process

This section introduces the necessary press-in force and tools for the press-in process. The PressFIT module is pressed into a PCB by using a toggle lever press. A suitable PressFIT speed is chosen to avoid deformation of the pins or a non-gas-tight connection. The parameters for press-in process are listed in [Table 4].

The general press-in process can be divided into four steps.

1. The press-in tool and supporting tool should be aligned in the vertical direction to protect the bottom of the module from damage.
2. PCB is placed on the supporting tool and fixed by positioning pins.
3. The module is placed on top of the PCB and fixed by the positioning pins.
4. The upper press-in tool moves downwards to press the module into PCB.

Table 4: Parameter for press-in process.

Description	Unit	Min.	Recommended	Max.
Press-in speed	mm/s	0.4	2 - 4	5
Max allowed press force per pin	N	40	-	100

4.4 Solder temperature

The international Standard IEC 68 Section 2 (260°C <= 10s) is to be observed with all these soldering examples. This specifies a soldering temperature of 260°C and a solder time of 10s max. for the module. During the described soldering process the maximum permissible case temperature of 223°C must not be exceeded

5 Assembling C6.1 module on heat sink

C6.1 module is fixed on the heat sink with M6 screws. The fixing-screws should not exceed their maximum reinstallation times. When installing the module on the heat sink, it is recommended to tighten the screws in diagonal sequence as shown in [Figure 5].

The assembly steps are described as follows:

1. Position the module correctly on the heatsink and avoid any unnecessary movement.
2. Insert the mounting screws into the corresponding holes and pre-tighten each screw with a torque of 0.5 Nm to half the hole depth, the tightening sequence is as follows: 1→3→4→2.
3. Then tighten the screws using a tool with a torque between 3.0 Nm and 6.0 Nm in the same order: 1→3→4→2.

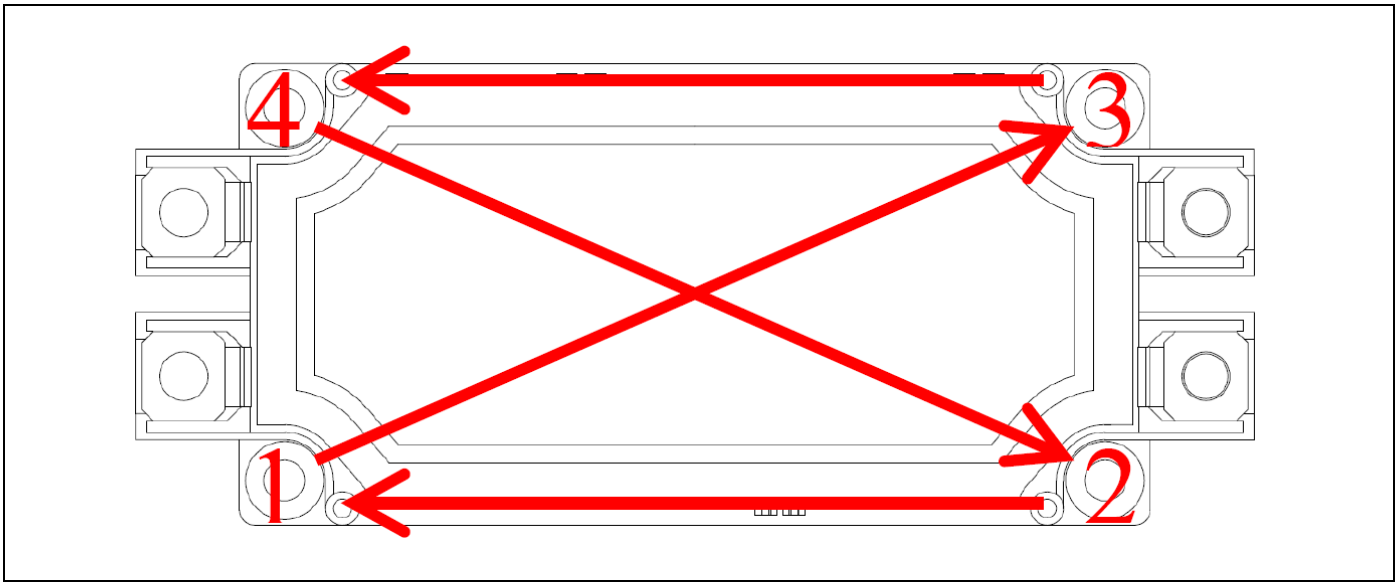


Figure 5: Tightening sequence of the fixing-screws.

6 Installation of self-tapping screws to fix PCB

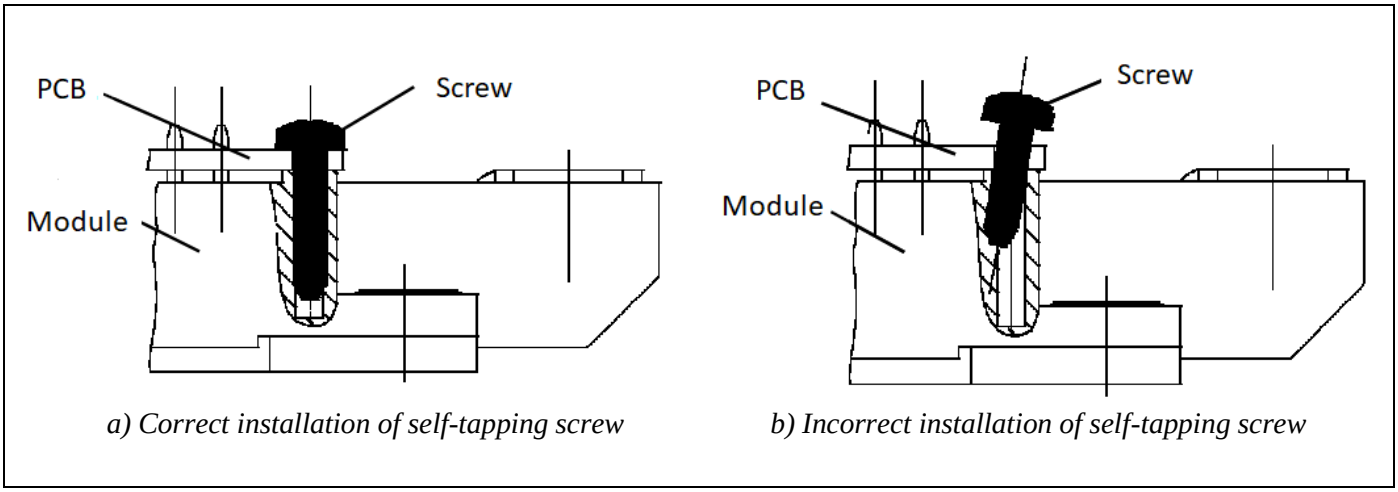
Mounting holes for self-tapping screws are provided on the upper part of the module to fix the PCB. Customers decide whether to use these mounting holes based on their requirements.
The self-tapping screw for the mounting hole is M2.5. Its effective length of the thread is between 4 mm and 10 mm, which is based on the PCB thickness, the recommendation sees [Table 2].

Table 2: Effective thread length based on PCB thickness.

PCB thickness	0.5 mm	1.0 mm	1.5 mm	2.0 mm	3.0 mm
Effective thread length	5.0 mm	5.0 mm	6.0 mm	6.0 mm	8.0 mm

Before installing the self-tapping screws, make sure that the PCB holes are aligned with the mounting holes. The self-tapping screws should be installed vertically into the holes as shown in [Figure 6].

Since there is no thread in the upper 1.5 mm depth of the mounting hole, the self-tapping screws can be easily pressed in by hand up to a distance of the PCB thickness plus 1.5 mm depth of the mounting hole. Then tighten the self-tapping screws into the mounting holes with a torque within 0.5 Nm throughout the process.



a) Correct installation of self-tapping screw *b) Incorrect installation of self-tapping screw*

Figure 6: Installation of self-tapping screws to fix PCB.

7 Installation of power terminals

There are 4 power terminals at the 2 short sides of the module. The recommended mounting screw for the power terminal is M5. The torque should be controlled between 3.0 Nm and 6.0 Nm during tightening. The insert depth of the screw into the terminal cannot exceed 10 mm.

To keep the parasitic inductance under DC as low as possible, it is recommended to use the DC busbar to complete the connection with the power terminal. When connecting the DC busbar, pay attention to the force in all directions of the power terminal. Do not exceed the maximum force that the terminal can withstand. The maximum allowable force of the power terminal in all directions is shown in [Figure 7].

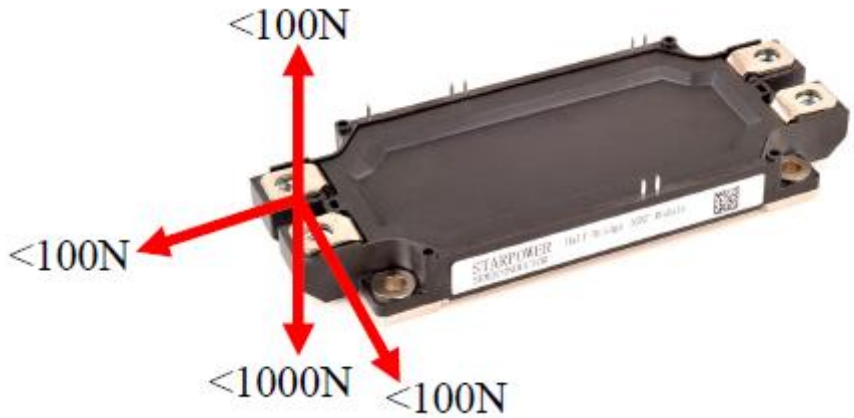


Figure 7: The maximum allowable force of the power terminal in all directions.

To reduce the stress on the power terminal after installation, the DC busbar must be additionally supported by a strut. The height of the support strut should be 0.5 mm lower than the height of the power terminal as shown in [Figure 8].

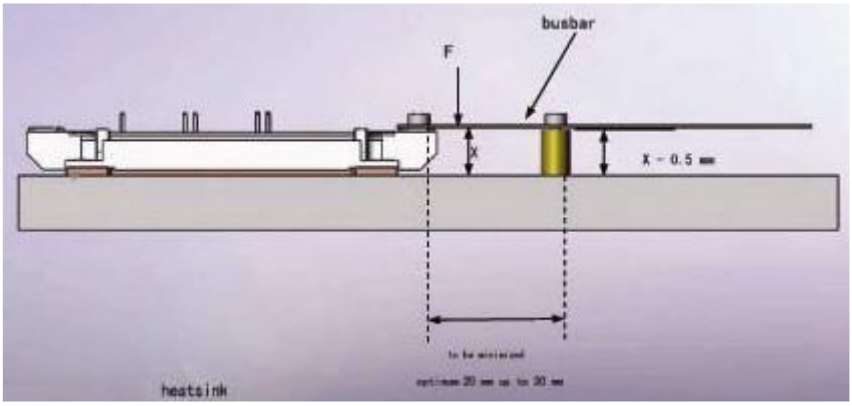


Figure 8: The height of the support strut.