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AN-9072

Smart Power Module, Motion SPM[®] 45 Series Mounting Guidance

Mounting Guidance

This application note shows the electric spacing and mounting guidance of Motion SPM[®] 45 Series.

Electric Spacing

The electric spacing specification of Motion SPM[®] 45 Series is shown in Table 1.

Table 1. Typical Electric Spacing of Motion SPM[®] 45 Series

	Clearance [mm]	Creepage Distance [mm]
Between Power Terminals	3.08	3.28
Between Control Terminals	2.35	4.95
Between Terminals & Heat Sink	2.05	2.05

Mounting Method and Precautions

When installing a module to a heat sink, excessive uneven fastening force might apply stress to inside chips, which can lead to damage or degradation of the device. An example of recommended fastening order is shown in Figure 1.

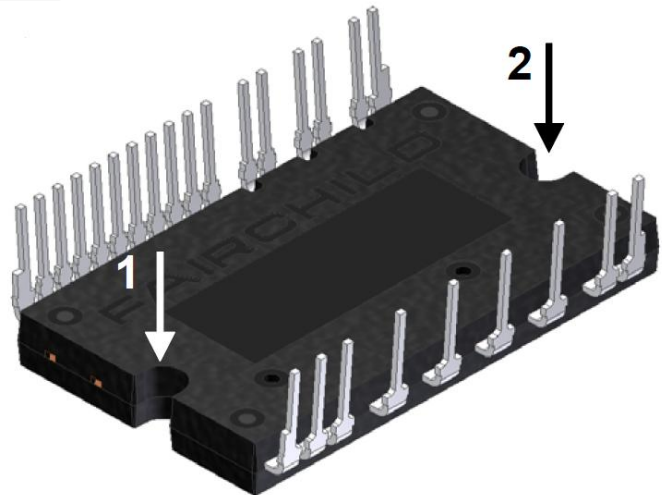


Figure 1. Mounting Screws Fastening Order: Pre-Screwing: 1 → 2; Final Screwing: 2 → 1

Notes:

1. Do not over torque when mounting screws. Excess mounting torque may cause ceramic cracks, as well as screw and heat-sink damage.
2. Avoid one-side tightening stress, Figure 1 shows the recommended torque order for mounting screws. Uneven mounting can cause the SPM ceramic substrate to be damaged. The pre-screwing torque is set to 20~30% of maximum torque rating.

Table 2. Mounting Torque and Heat Sink Flatness Specifications

Parameter	Conditions	Limits			Units	
		Min.	Typ.	Max.		
Device Flatness	See Figure 2	0		+120	μm	
Heat Sink Flatness	See Figure 3	-50		+100	μm	
Mounting Torque	Screw: M3	Recommended 0.7N·m	0.6	0.7	0.8	N·m
		Recommended 7.1kg·m	6.2	7.1	8.1	kg·cm
Weight			11		g	

Note:

3. Recommend using SEMS screw (include spring/plain washer, M3) in fastening screws.

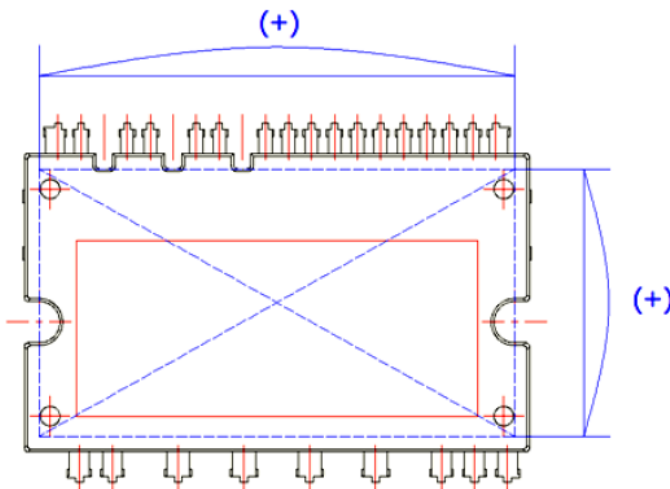


Figure 2. Measurement Point of Package Surface Flatness

Note:

4. The measurement point of flatness of the package surface is package center point compared with outside four points.

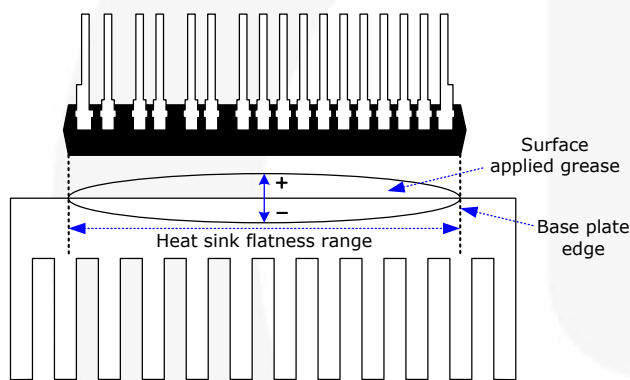


Figure 3. Measurement Point of Heat Sink Flatness

To get the most effective heat dissipation, it is necessary to enlarge the contact area as much as possible, which minimizes the contact thermal resistance.

Properly apply thermal-conductive grease over the contact surface between a module and heat sink, which is also useful for preventing the contact surface from corrosion. Ensure the grease has stable quality and long-term endurance within a wide operating temperature range. Use a torque wrench to fasten up to the specified to torque rating. Exceeding the maximum torque limitation might cause a module to be damaged or degraded. Pay careful attention not to have any dirt remaining on the contact surface.

Thermal Compound

- Use a minimum 150µm layer of thermal grease to the module base plate or to the heat sink.
- While fastening the module, a rim of thermal compound must be observed around the mounted module.

Fixing Sequence

- Fix all screws 0.5N·m under (by hand or driver).
- Apply impact torque maximum 0.8N m crosswise.
- Use recommended SEMS screw (included spring/plain washer M3).



Figure 4. SEMS Screw (Size M3, Spring Washer 5.0Φ, Plain Washer 7.5Φ)

Related Resources

[FNA40560 — Smart Power Module Motion SPM® 45](#)

[FNA40860 — Smart Power Module Motion SPM® 45](#)

[FNA41060 — Smart Power Module Motion SPM® 45](#)

[FNA41560 — Smart Power Module Motion SPM® 45](#)

[FNB40560 — Smart Power Module Motion SPM® 45](#)

[FNB41060 — Smart Power Module Motion SPM® 45](#)

[FNB41560 — Smart Power Module Motion SPM® 45](#)

[FNB43060Tx — Smart Power Module Motion SPM® 45](#)

[AN-9070 — Smart Power Module Motion SPM® 45 User Guide](#)

[AN-9071 — Smart Power Module Motion SPM® 45 Thermal Performance Information](#)

[Motion Control Design Tool](#)

NOTE:

In this and other Fairchild documentation and collateral, the following terms are interchangeable:

DIP = Motion SPM® 2, Mini-DIP = Motion SPM® 3, Tiny-DIP = Motion SPM® 5, and μ Mini-DIP = Motion SPM® 45

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