

AN-9086

SPM[®] 3 Package Mounting Guidance

Mounting Guidance

This application note shows the electric spacing and mounting guidance of SPM[®] 3 package.

Electric Spacing

The electric spacing specification of SPM 3 package is shown in Table 1. Figure 1 and Figure 2 show detailed dimensions.

Table 1. SPM 3 Package Typical Electric Spacing

Location	Clearance [mm]	Creepage Distance [mm]
Between Power Terminals	4.42	4.62
Between Control Terminals	3.15	5.34
Between Terminals & H/S	3.10	4.23

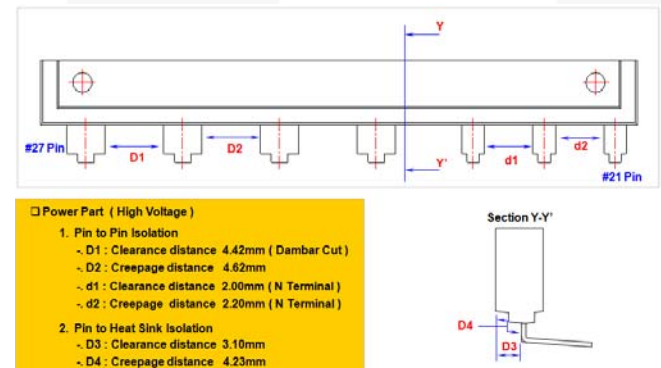


Figure 1. Between Power Terminals Part

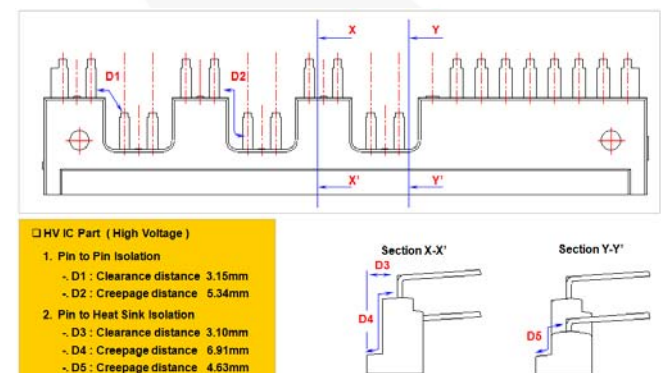


Figure 2. Between Control Terminals Part

Mounting Method and Precautions

When installing a module to a heat sink, excessive uneven fastening force might apply stress to the inside of chips, which leads to damage or degradation of the device. Figure 3 shows recommended fastening order.

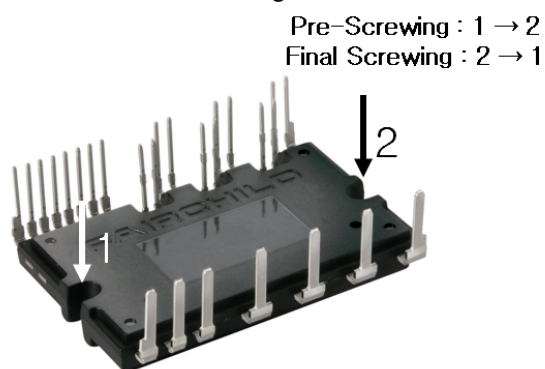


Figure 3. Mounting Screws Fastening Order:
Pre-Screwing: 1 → 2; Final Screwing: 2 → 1

Notes:

- Do not apply excessive torque when mounting screws. Too much torque may cause ceramic cracks as well as destruction of screws and the heat sink.
- Avoid tightening only one side at once. Figure 3 shows the recommended torque order for mounting screws. Uneven mounting can damage the ceramic substrate. The pre-screwing torque needs to be set as 20~30% of the maximum torque rating.

PACKAGE WARPAGE : MAX. 150μm

WARPAGE MEASUREMENT POINT : REFER TO BELOW POINT

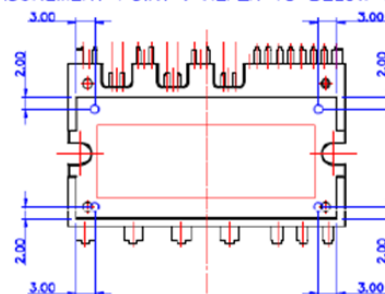


Figure 4. Measurement Points of Package Surface Flatness (Blue circles)

Note:

- The measurement points for the flatness of the package surface are at the package center and the four outside corners.

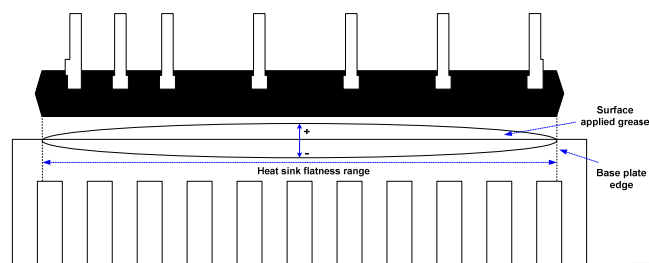


Figure 5. Measurement Point of Heat Sink Flatness

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

Properly apply thermal-conductive grease over the contact surface between the module and the heat sink.

It is also useful for preventing contact surface corrosion. Furthermore, ensure the grease has stable quality and long endurance within the wide operation temperature range. Use a torque wrench to fasten screws to the specified torque rating. Exceeding the maximum torque limitation can cause damaged or degradation. Use care not to have anything left on the contact surface.

Thermal Compound

- Use a minimum, 150 μm 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 with torque below 0.8 N·m (by hand or driver)
- Apply impact torque 0.6 ~ 1.4 N·m crosswise
- Use recommended screws SEMS screw (included spring/plain washer M3)



Figure 6. SEMS Screw (Size M3, Spring Washer 5.0Φ, Plain Washer 7.5Φ)

Table 2. Mounting Torque and Heat Sink Flatness Specifications

Parameter	Conditions	Limits			Unit
		Min.	Typ.	Max.	
Device Flatness	See Figure 4	0		+150	μm
Heat Sink Flatness	See Figure 5	-50		+100	μm
Mounting Torque	Screw: M3				
	See Figure 6				
	Recommended 0.7 N·m	0.6	0.7	0.8	N·m
	Recommended 7.1 kgf·cm	6.2	7.1	8.1	kgf·cm
Weight	Module weight		15		g

Note:

- SEMS screws (include spring/plain washer, M3) are recommended.

Related Resources

[Motion SPM® 3 Series datasheet](#)

[PFC SPM 3 Series datasheet](#)

[AN-9035 - 600V Motion SPM 3 ver.2 Series application note](#)

[AN-9044 - 600V Motion SPM 3 ver.4 Series application note.](#)

[AN-9090 - Boost PFC SPM 3 ver. 2 Series application note](#)

[AN-9041 - Bridgeless PFC SPM 3 Series application note](#)

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