THE DATASHEET OF

SMA6J70CA-TR

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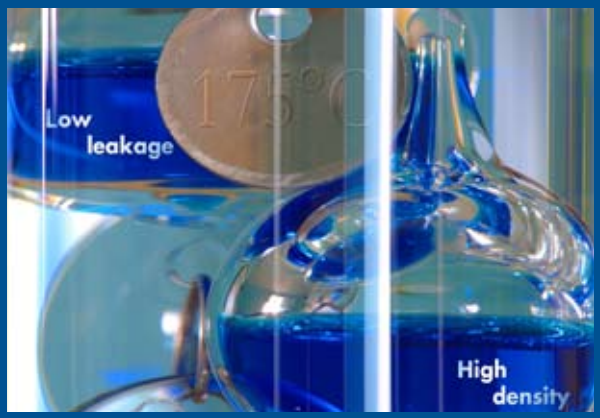
SMA6J and SMM4F high-temperature Transil™ series

A new Transil generation to boost your application



Portable equipment requires small form factors and low consumption. Furthermore, environmental requirements are becoming more prominent.

The SMM4F and SMA6J series implement improved Transil planar technology to provide 175 °C operating junction temperature with high reliability.

They take into account the IEC 61000-4-5 surge requirements requested by designers in many segments such as telecommunications, SMPS, industrial applications and others.

Key features

Package

The SMM4F series is the first 400-watt Transil series packaged in a flat STmite, while other devices are proposing a maximum of 200 W in SMF or 400 W in SMA packages. The SMA6J is the first 600-watt series packaged in SMA compared to 300 or 400 W from other sources.

STmite flat	SMA	SMB
8 mm²	13 mm²	20 mm²

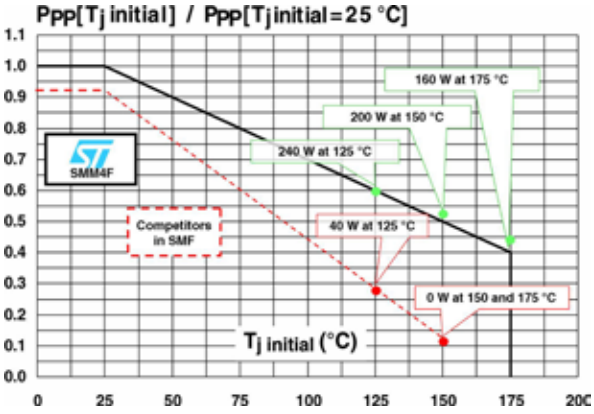
The standard SMA package (DO-214AC) is 13 mm² with a thickness of 2.23 mm, while the STmite flat features 8 mm² with a maximum thickness of 0.95 mm.

Maximum junction temperature

- Requirements on maximum junction temperature depend on targeted applications, the most stressful being SMPS. Although the ambient temperature range is often limited to -20 °C to + 70 °C, the initial junction temperature when power devices are confined in a very small SMPS box can be close to 150 °C.
- Both the SMA6J and SMM4F series are specified with $T_{j\,max}$ = 175 °C to be 100% compatible with ST rectifiers already rated at 175 °C.
- Devices currently on the market offer either 400 W (SMA) or 200 W (SMF) at 25 °C, but power capability decreases to zero when the temperature reaches 150°C.

Derating curves (provided in the datasheets) show power capability at 150 °C and 175 °C.

- The SMA6J is able to provide 300 W (10/1000 µs surge), while others have a zero power capability.
- The SMM4F is able to deliver 200 W (10/1000 µs surge) at 150 °C, whereas an SMF product can only deliver this at 25 °C.
- At 125°C, the SMM4F is 600% more robust than SMF devices.



Leakage current

- Telecommunication makers often request products to be specified at 25 and 85 °C. Both Transil series are rated at 1 µA low leakage at 85 °C, which is the same leakage value from others… at 25 °C!
- Rated leakage current at 25 °C is at least 5 times lower thanks to planar technology.

Surge parameters

The most common surge standard, whatever the application, is IEC 61000. IEC 61000-4-5 requires final equipment to be tested with 8/20 µs surges at various levels depending on environment and applications. To be in line with our customers' requirements, both SMA6J and SMM4F series ensure surge capability (I_{PP}) and maximum clamping voltage (V_{CL}) with 8/20 µs surges, as well as fully supporting 10/1000 µs surges.

The maximum surge capability of a Transil is important, but the most important is to be sure that the application is well protected. For this reason, the maximum clamping voltage (V_{CL}) of the SMA6J series has been reduced regarding standard series:

- Regular SMBJ12: V_{CLmax} = 19.9 V @ 31 A
- SMA6J12: V_{CLmax} = 18.8 V @ 31 A

Surge levels are well defined in the standards, but the remaining current in the application may be different.

ST provides the temperature coefficient (αT) and dynamic resistance (R_D) to calculate V_{CLmax} whatever the surges and temperatures are, using the following formula:

$$V_{BR} @ T_J = V_{BR} @ 25°C \times (1 + \alpha T \times (T_J - 25))$$

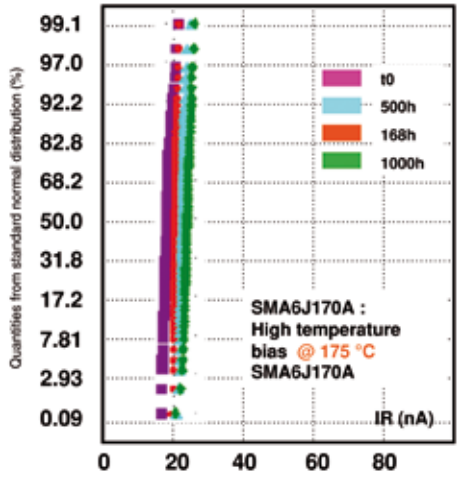
$$V_{CLmax} = R_D \times I_{PP} + V_{BRmax}$$

Environmental considerations

Both the SMA6J and SMM4F series have been developed according to RoHS 6 standards, and ST has gone one step further with a halogen-free molding compound on the SMM4F.

Reliability

The SMA6J and SMM4F pass reliability tests at 175 °C without drifts.



Key benefits

- Lower leakage current than standard series (0.2 µA versus 1 and 5 µA @ 25 °C)
  - Suitable for portable equipment
- Maximum clamping voltage specified according to 8/20 µs surges
  - Compatible with the main standard in the industry (IEC 61000-4-5)
- Lower clamping voltage than standard series
  - Better protection for the same surge level
- Smaller and thinner package for more power
  - Saves PCB area for high-density cards and compatible with HDD thickness

Targeted applications

- Hard disk drives
- Battery chargers
- Industrial equipment
- SMPS
- Telecom equipment
- General purpose applications

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