STPSC1006D

600 V power Schottky silicon carbide diode

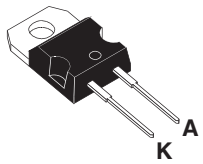
Features

- No or negligible reverse recovery
- Switching behavior independent of temperature
- Particularly suitable in PFC boost diode function

Description

The SiC diode is an ultrahigh performance power Schottky diode. It is manufactured using a silicon carbide substrate. The wide bandgap material allows the design of a Schottky diode structure with a 600 V rating. Due to the Schottky construction no recovery is shown at turn-off and ringing patterns are negligible. The minimal capacitive turn-off behavior is independent of temperature.

ST SiC diodes will boost the performance of PFC operations in hard switching conditions.



TO-220AC
STPSC1006D

Table 1. Device summary

$I_{F(AV)}$	10 A
V_{RRM}	600 V
$T_{j\ (max)}$	175 °C
$Q_{C\ (typ)}$	12 nC

1 Characteristics

Table 2. Absolute ratings (limiting values at 25 °C unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	RMS forward current		18	A
I_F	Continuous forward current	T_C = 115 °C	10	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	40	A
I_{FRM}	Repetitive peak forward current	δ = 0.1, T_C = 110 °C, T_j = 150 °C	40	A
T_{stg}	Storage temperature range		-55 to +175	°C
T_j	Operating junction temperature		-40 to +175	°C

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	2	°C/W

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$		30	300	µA
		T_j = 150 °C			210	1500	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A		1.4	1.7	V
		T_j = 150 °C			1.6	2.1	

1. t_p = 10 ms, δ < 2%
2. t_p = 500 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 1.2 \times I_{F(AV)} + 0.09 \times I_F{}^2{}_{(RMS)}$

Table 5. Other parameters

Symbol	Parameter	Test conditions	Typ	Unit
Q_c	Total capacitive charge	V_r = 400 V, I_F = 10 A dI_F/dt = -200 A/µs T_j = 150 °C	12	nC
C	Total capacitance	V_r = 0 V, T_c = 25 °C, F = 1 Mhz	650	pF

Figure 1. Forward voltage drop versus forward current (typical values)

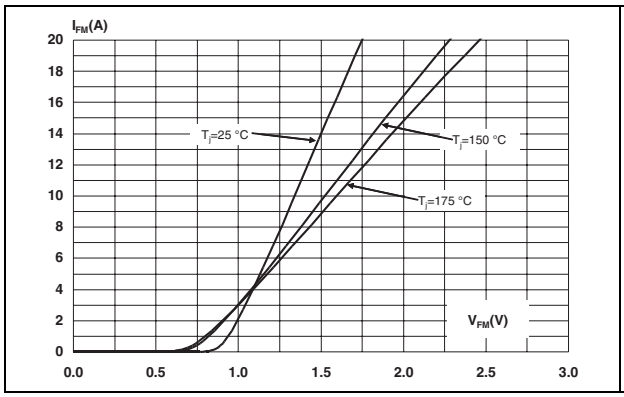


Figure 2. Reverse leakage current versus reverse voltage applied (maximum values)

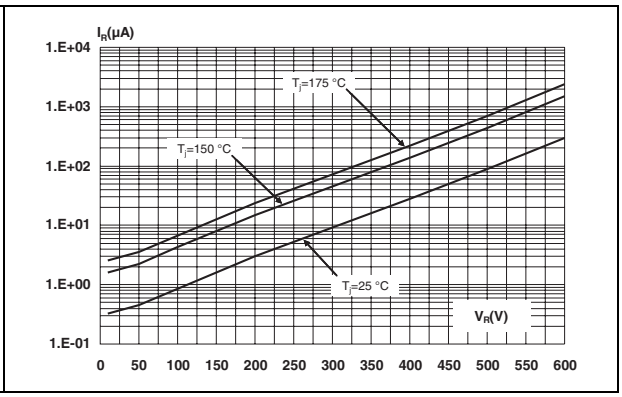


Figure 3. Peak forward current versus case temperature

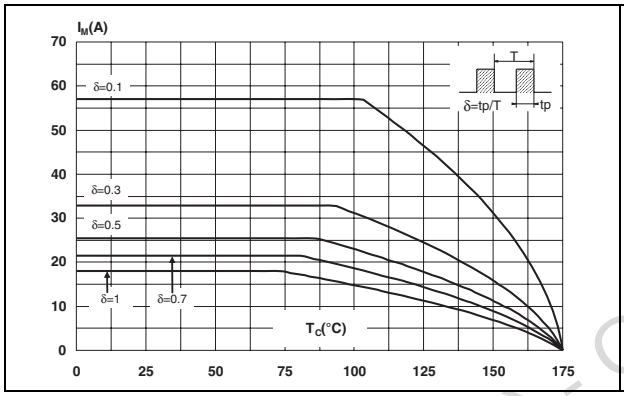


Figure 4. Junction capacitance versus reverse voltage applied (typical values)

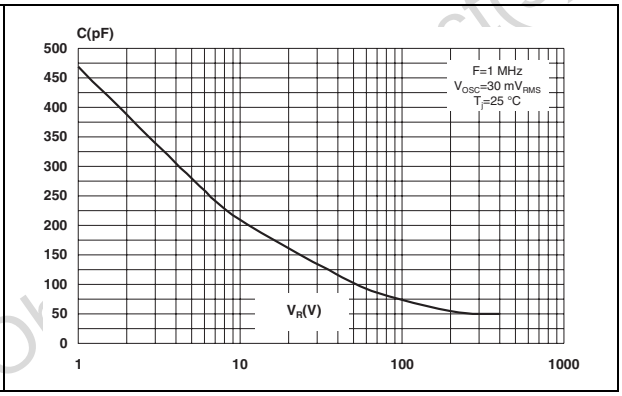


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

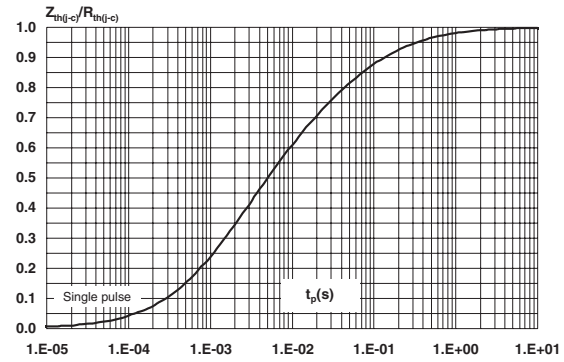


Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform, typical values)

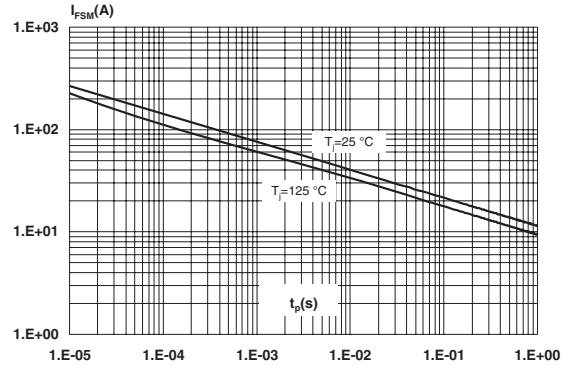
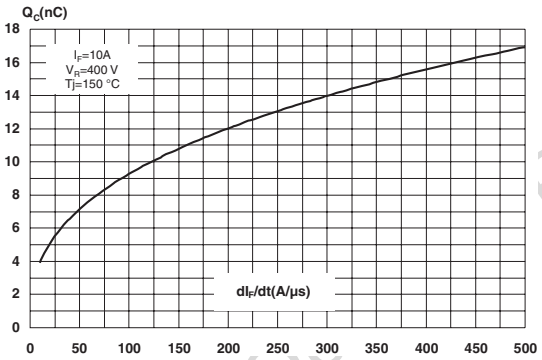


Figure 7. Total capacitive charges versus dI_F/dt (typical values)

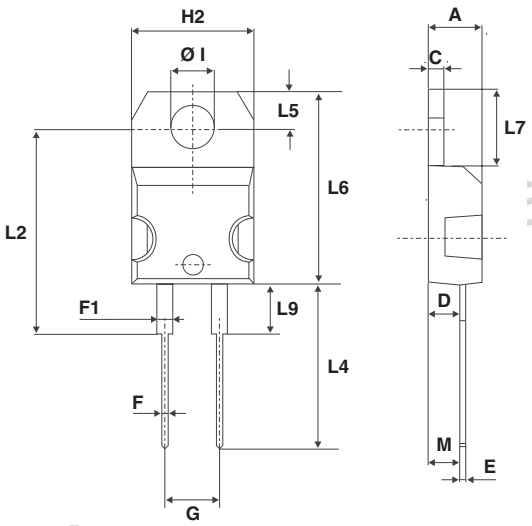


2 Package information

- Epoxy meets UL94, V0
- Cooling method: C
- Recommended torque value: 0.4 to 0.6 N·m

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at *www.st.com*.

Table 6. TO-220AC Dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPSC1006D	STPSC1006D	TO-220AC	1.86 g	50	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Description of changes
05-May-2008	1	First issue

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