

STPSC1006

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 band gap 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.

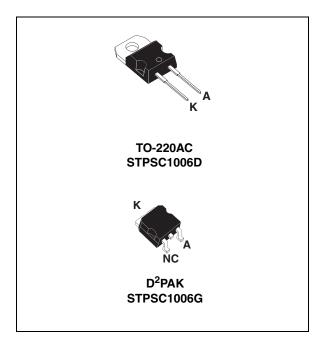


Table 1.Device summary

	•
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	Par	Value	Unit	
V _{RRM}	Repetitive peak reverse voltage		600	V
I _{F(RMS)}	Forward rms current		18	А
I _{F(AV)}	Average forward current	$T_{c} = 115 \ ^{\circ}C, \ \delta = 0.5$	10	А
Surge non repetitive forward	Surge per repetitive ferward	$t_p = 10 \text{ ms} \text{ sinusoidal}, T_c = 25 \text{ °C}$	40	
	current	$t_p = 10 \text{ ms} \text{ sinusoidal}, T_c = 125 ^\circ\text{C}$	32	А
		t_p = 10 µs square, T_c = 25 °C	160	
I _{FRM}	Repetitive peak forward current $\begin{cases} \delta = 0.1, T_C = 110 \ ^\circ C, \\ T_j = 150 \ ^\circ C \end{cases}$		40	А
T _{stg}	Storage temperature range		-55 to +175	°C
Тj	Operating junction temperature		-40 to +175	°C

Table 3. Thermal resistance

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

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions		Min.	Тур.	Max.	Unit
I _R ⁽¹⁾	Reverse leakage	T _j = 25 °C	V _R = V _{RRM}	-	30	150	μA
^{IR} current	current	T _j = 150 °C		-	210	1500	
V (2)	V _F ⁽²⁾ Forward voltage drop	T _j = 25 °C	I _F = 10 A	-	1.4	1.7	V
VF Y		T _j = 150 °C	F = 10 A	-	1.6	2.1	v

1. $t_p = 10 \text{ ms}, \delta < 2\%$

2. $t_p = 500 \ \mu s, \ \delta < 2\%$

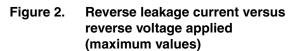
To evaluate the conduction losses use the following equation: P = 1.2 x $I_{F(AV)}$ + 0.09 x $I_{F}{}^{2}_{(RMS)}$

Table 5. Other parameters

Symbol	Parameter	Test conditions	Тур.	Unit
Q _c	Total capacitive charge	V_r = 400 V, I_F = 10 A dI_F/dt = -200 A/µs T_j = 150 $^\circ C$	12	nC
С	Total canacitance	$V_r = 0 V$, $T_c = 25 °C$, $F = 1 Mhz$	650	рF
C Total capacitance	V_r = 400 V, T_c = 25 °C, F = 1 Mhz	50	μL	



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



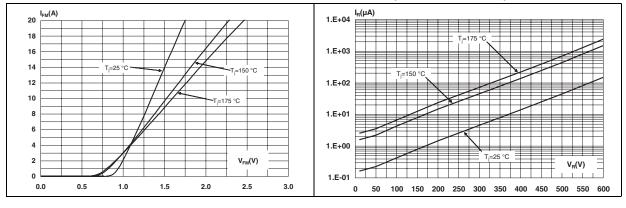
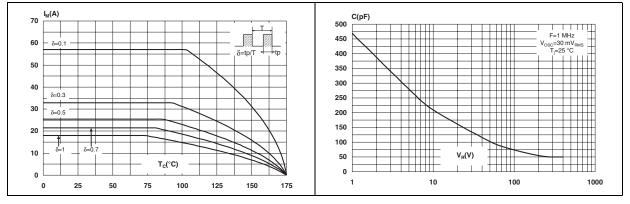


Figure 3. Peak forward current versus case temperature

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





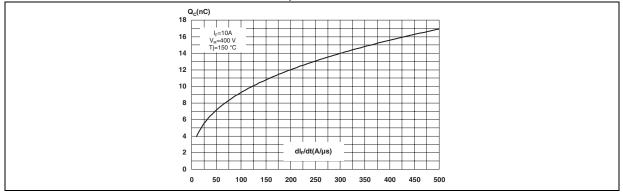
1.E+00

Relative variation of thermal Figure 6. Non-repetitive peak surge forward Figure 5. current versus pulse duration impedance junction to case versus pulse duration (sinusoidal waveform) I_{FSM}(A) ./R... 1.E+03 1.0 0.9 0.8 1 0.7 1.E+02 T_c=25 0.6 1 0.5 °C 0.4 1.E+01 0.3 0.2 0.1 t_p(s) Single pulse t_p(s) ____ +++++ 0.0 1.E+00 1.E-05 1.E-04 1.E-03 1.E-02 1.E-01 1.E+00 1.E+01 1.E-04 1.E-02 1.E-01

1.E-05

1.E-03

Total capacitive charge versus dl_F/dt (typical values) Figure 7.



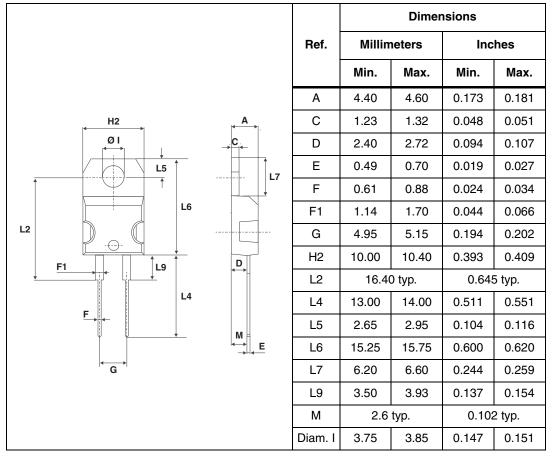


2 Package information

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

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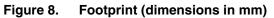
Table 6. TO-220AC dimensions

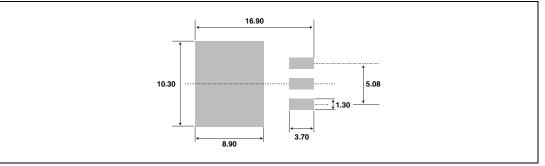




				Dimer	sions	
		Ref.	Millimeters		Inches	
			Min.	Max.	Min.	Max.
		А	4.40	4.60	0.173	0.181
	<u>▲</u>	A1	2.49	2.69	0.098	0.106
	C2→→→	A2	0.03	0.23	0.001	0.009
		В	0.70	0.93	0.027	0.037
L		B2	1.14	1.70	0.045	0.067
		С	0.45	0.60	0.017	0.024
		C2	1.23	1.36	0.048	0.054
→ B2 → B		D	8.95	9.35	0.352	0.368
G		Е	10.00	10.40	0.393	0.409
		G	4.88	5.28	0.192	0.208
		L	15.00	15.85	0.590	0.624
	M↓ ★↓ V2	L2	1.27	1.40	0.050	0.055
	← │ ↓	L3	1.40	1.75	0.055	0.069
		М	2.40	3.20	0.094	0.126
		R	0.40 typ.		0.016 typ.	
		V2	0°	8°	0°	8°

Table 7.D²PAK dimensions







3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPSC1006D	STPSC1006D	TO-220AC	1.86 g	50	Tube
STPSC1006G-TR	STPSC1006G	D ² PAK	1.48 g	1000	Tape and reel

4 Revision history

Table 9.Document revision history

Date	Revision	Changes
24-Sep-2009	1	First issue.
16-Jun-2010	2	Added D ² PAK package.
3-Nov-2010	3	Updated Table 8.



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