STPSC2006CW

600 V power Schottky silicon carbide diode

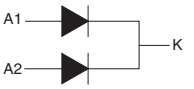
Features

- 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.



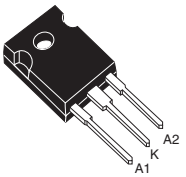


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Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 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, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			600	V
$I_{F(RMS)}$	Forward rms current			18	A
$I_{F(AV)}$	Average forward current	T_c = 115 °C, δ = 0.5	Per diode	10	A
		T_c = 100 °C, δ = 0.5	Per device	20	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal, T_c = 25 °C t_p = 10 ms sinusoidal, T_c = 125 °C t_p = 10 µs square, T_c = 25 °C		40 32 160	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	Maximum operating junction temperature range			-40 to +175	°C

Table 3. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	2	°C/W
		Total	1.2	°C/W
$R_{th(c)}$	Coupling		0.4	°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	150	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 per diode

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, per diode)

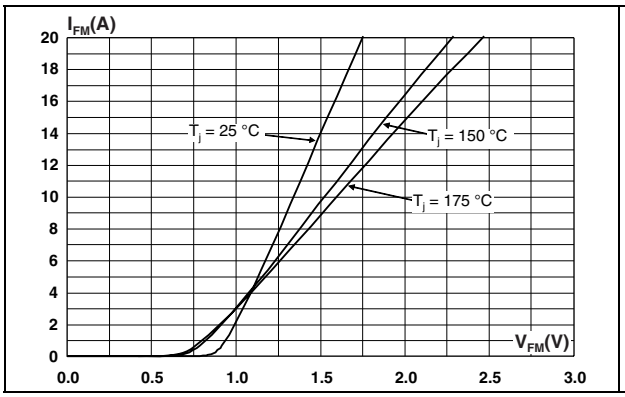


Figure 2. Reverse leakage current versus reverse voltage applied (maximum values, per diode)

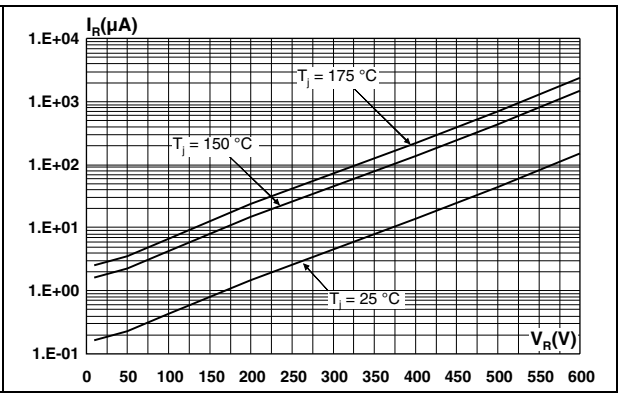


Figure 3. Peak forward current versus case temperature (per diode)

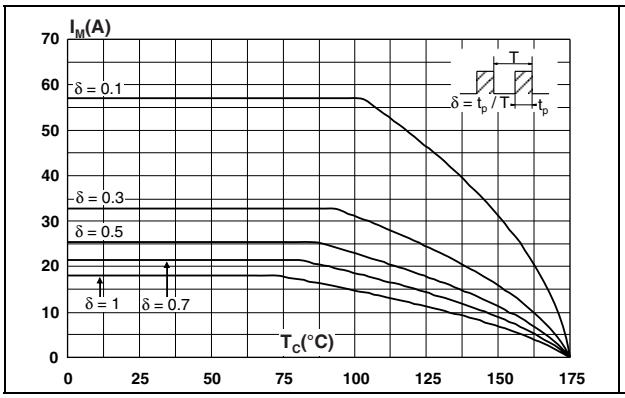


Figure 4. Junction capacitance versus reverse voltage applied (typical values, per diode)

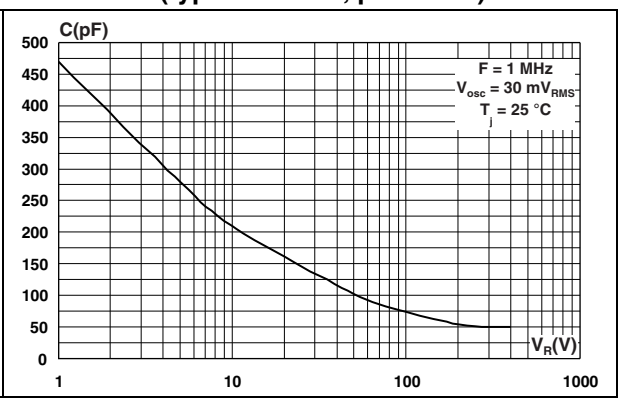


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

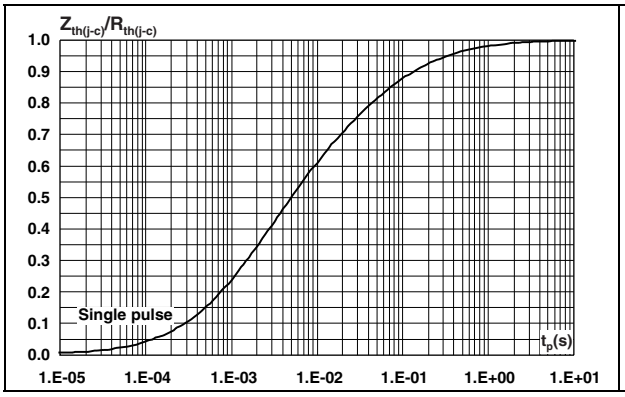


Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform, per diode)

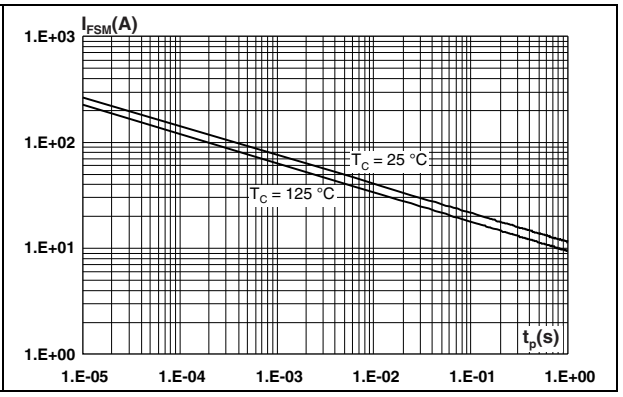
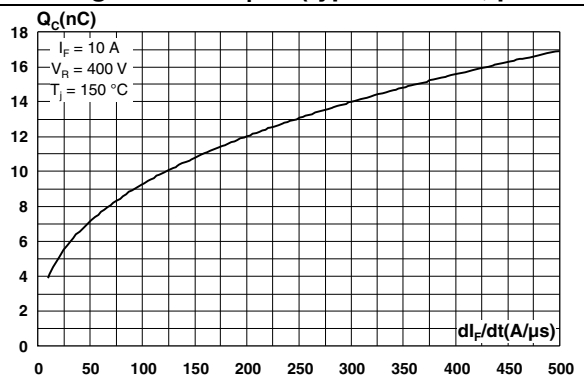


Figure 7. Total capacitive charge versus dI_F/dt (typical values, per diode)

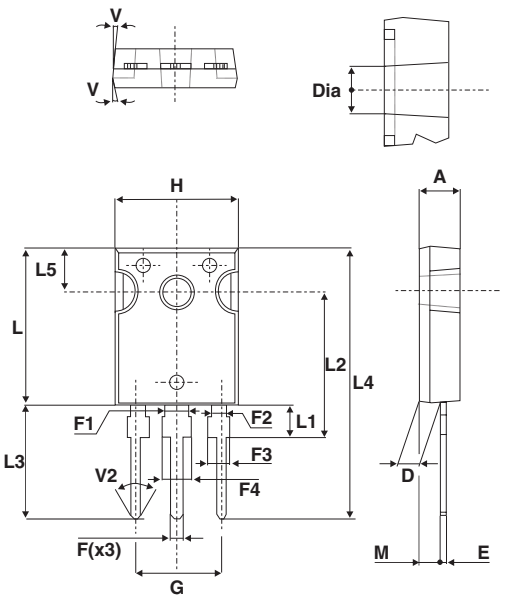


2 Package information

- Epoxy meets UL94, V0
- Cooling method: convection (C)
- Recommended torque value: 0.55 to 1.0 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 6. TO-247 dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.85	5.16	0.191	0.203
D	2.20	2.60	0.086	0.102
E	0.40	0.80	0.015	0.031
F	1.00	1.40	0.039	0.055
F1	3.00 typ.		0.118 typ.	
F2	2.00 typ.		0.079 typ.	
F3	1.90	2.40	0.075	0.094
F4	3.00	3.40	0.118	0.134
G	10.90 typ.		0.429 typ.	
H	15.45	16.03	0.608	0.631
L	19.85	21.09	0.781	0.830
L1	3.70	4.30	0.146	0.169
L2	18.30	19.13	0.720	0.753
L3	14.20	20.30	0.559	0.799
L4	34.05	41.38	1.341	1.629
L5	5.35	6.30	0.211	0.248
M	2.00	3.00	0.079	0.118
V	5° typ.		5° typ.	
V2	60° typ.		60° typ.	
Dia.	3.55	3.65	0.140	0.144

3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPSC2006CW	STPSC2006CW	TO-247	4.36 g	30	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
01-Mar-2011	1	First issue.