



**THE DATASHEET OF  
STPSC2006CW**



## 600 V power Schottky silicon carbide diode

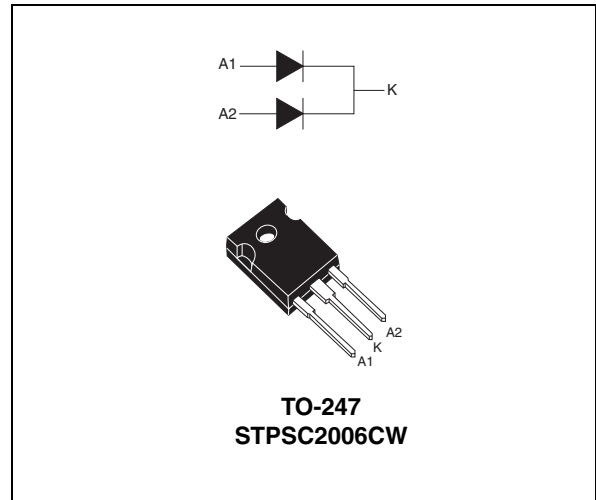
### Features

- 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.



**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	$T_c = 115\text{ °C}, \delta = 0.5$	Per diode	10	A
		$T_c = 100\text{ °C}, \delta = 0.5$	Per device	20	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}, T_c = 25\text{ °C}$		40	A
		$t_p = 10\text{ ms sinusoidal}, T_c = 125\text{ °C}$		32	
		$t_p = 10\text{ }\mu\text{s square}, T_c = 25\text{ °C}$		160	
$I_{FRM}$	Repetitive peak forward current	$\delta = 0.1, T_c = 110\text{ °C}, T_j = 150\text{ °C}$	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	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	30	150	$\mu\text{A}$
		$T_j = 150\text{ °C}$		-	210	1500	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	1.4	1.7	V
		$T_j = 150\text{ °C}$		-	1.6	2.1	

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

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

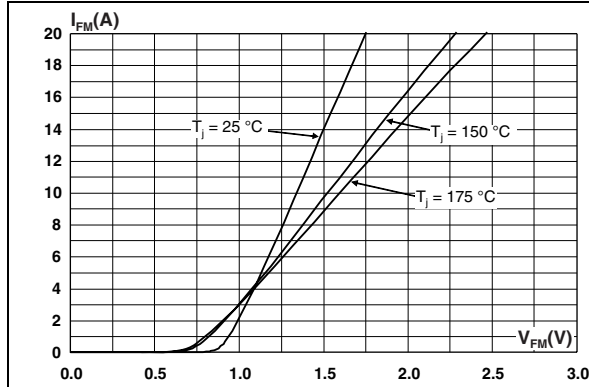
To evaluate the conduction losses use the following equation:

$$P = 1.2 \times I_{F(AV)} + 0.09 \times I_{F(RMS)}^2$$

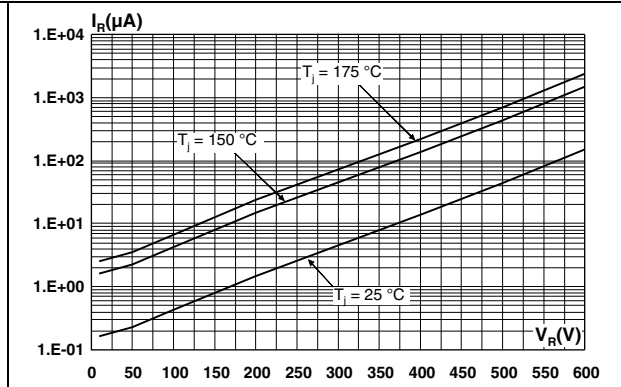
**Table 5. Other parameters per diode**

Symbol	Parameter	Test conditions	Typ.	Unit
$Q_C$	Total capacitive charge	$V_r = 400\text{ V}, I_F = 10\text{ A}, di_F/dt = -200\text{ A}/\mu\text{s}$ $T_j = 150\text{ °C}$	12	nC
C	Total capacitance	$V_r = 0\text{ V}, T_c = 25\text{ °C}, F = 1\text{ Mhz}$	650	pF

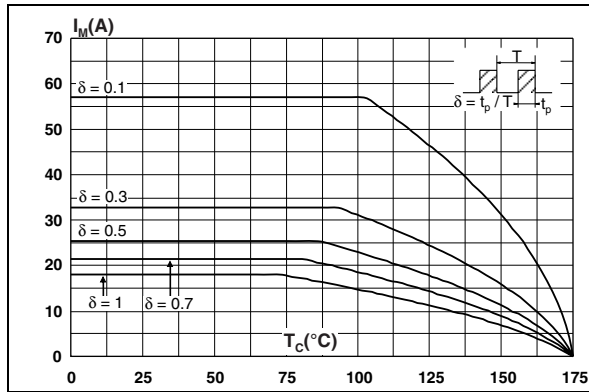
**Figure 1. Forward voltage drop versus forward current (typical values, per diode)**



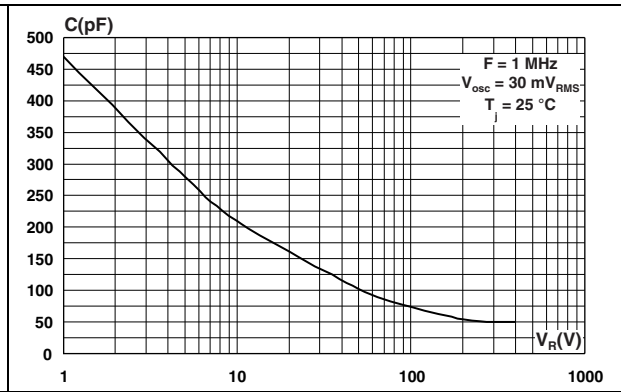
**Figure 2. Reverse leakage current versus reverse voltage applied (maximum values, per diode)**



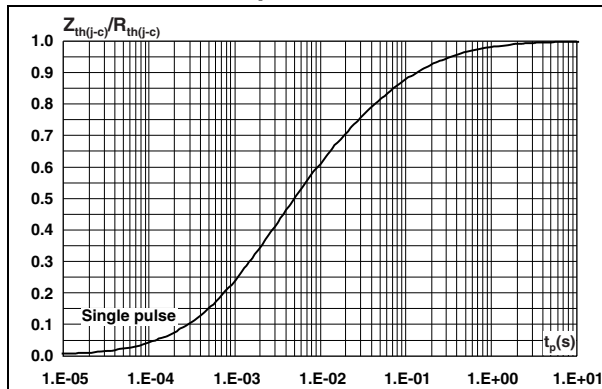
**Figure 3. Peak forward current versus case temperature (per diode)**



**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)**

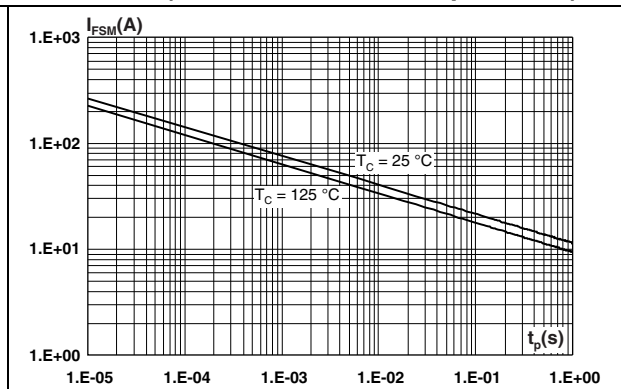
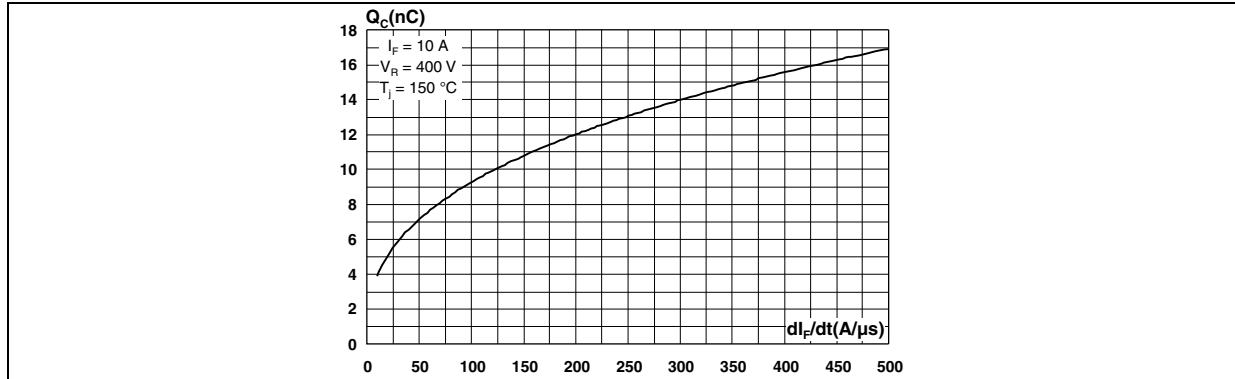


Figure 7. Total capacitive charge versus  $di_F/dt$  (typical values, per diode)



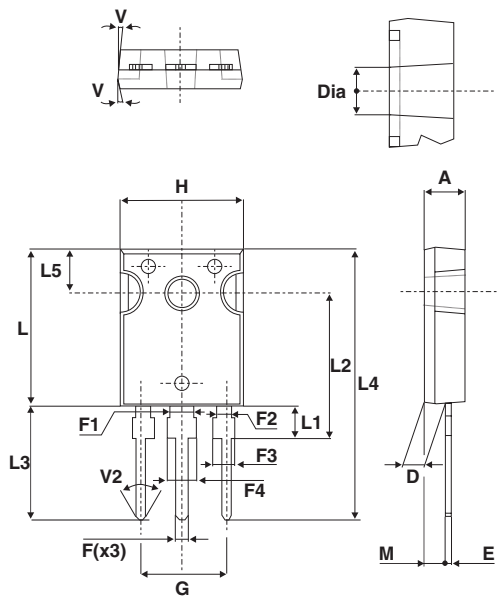
## 2 Package information

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

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**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.

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