

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.

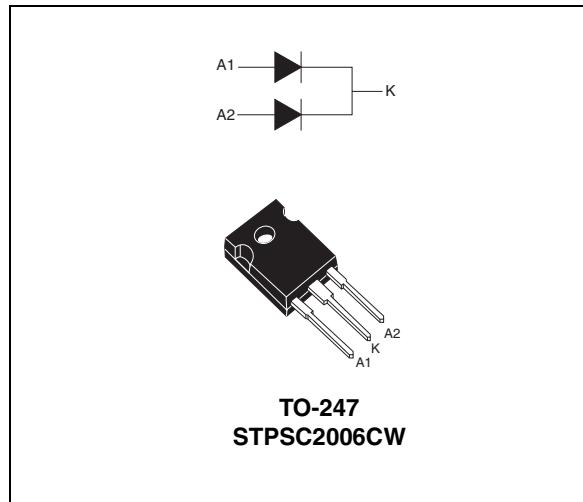


Table 1. Device summary

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

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

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

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	$V_r = 400 \text{ V}, I_F = 10 \text{ A}, dI_F/dt = -200 \text{ A}/\mu\text{s}$ $T_j = 150 \text{ }^\circ\text{C}$	12	nC
C	Total capacitance	$V_r = 0 \text{ V}, T_c = 25 \text{ }^\circ\text{C}, F = 1 \text{ MHz}$		650 pF