

Features

- No or negligible reverse recovery
- Switching behavior independent of temperature
- Dedicated to PFC applications
- High forward surge capability

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 650 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.

Especially suited for use in PFC applications, this ST SiC diode will boost the performance in hard switching conditions. Its high forward surge capability ensures a good robustness during transient phases.

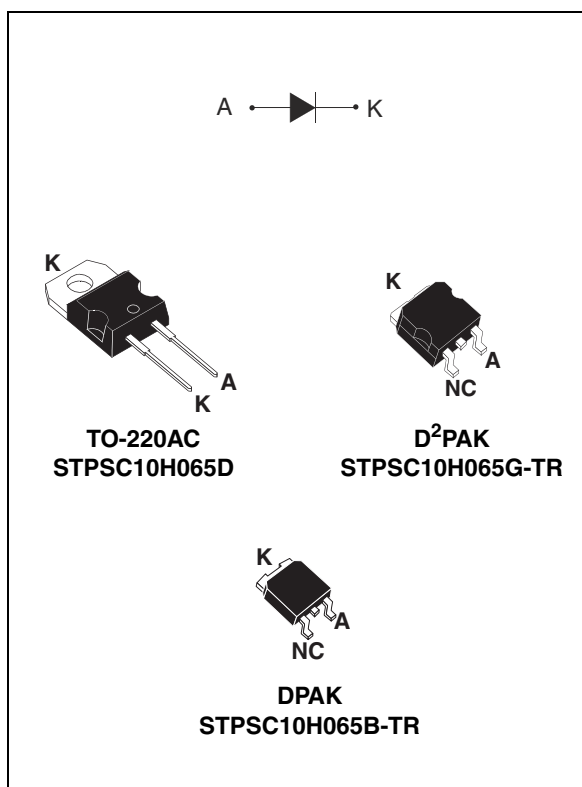


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	10 A
V_{RRM}	650 V
T_j (max)	175 °C

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		650	V
$I_{F(RMS)}$	Forward rms current		22	A
$I_{F(AV)}$	Average forward current	$T_c = 120\text{ °C}, \delta = 0.5$	10	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}, T_c = 25\text{ °C}$	90	A
		$t_p = 10\text{ ms sinusoidal}, T_c = 125\text{ °C}$	80	
		$t_p = 10\text{ }\mu\text{s square}, T_c = 25\text{ °C}$	470	
I_{FRM}	Repetitive peak forward current	$T_c = 120\text{ °C}, T_j = 150\text{ °C}, \delta = 0.1$	36	A
T_{stg}	Storage temperature range		-55 to +175	°C
T_j	Operating junction temperature ⁽¹⁾		-40 to +175	°C

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance (typical values)

Symbol	Parameter	Value		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Junction to case	1.25	1.5	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions	Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	9	μA
		$T_j = 150\text{ °C}$		-	85	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	1.56	V
		$T_j = 150\text{ °C}$		-	1.98	

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:

$$P = 1.35 \times I_{F(AV)} + 0.115 \times I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions	Typ.	Unit
$Q_{cj}^{(1)}$	Total capacitive charge	$V_R = 400\text{ V},$	28.5	nC
C_j	Total capacitance	$V_R = 0\text{ V}, T_c = 25\text{ °C}, F = 1\text{ MHz}$	480	pF
		$V_R = 400\text{ V}, T_c = 25\text{ °C}, F = 1\text{ MHz}$	48	

1. Most accurate value for the capacitive charge: $Q_{cj} = \int_0^{V_{OUT}} C_j(V_R).dV_R$

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

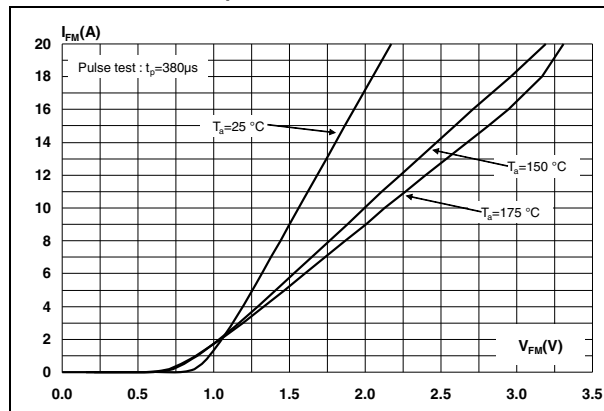


Figure 2. Forward voltage drop versus forward current (typical values, high level)

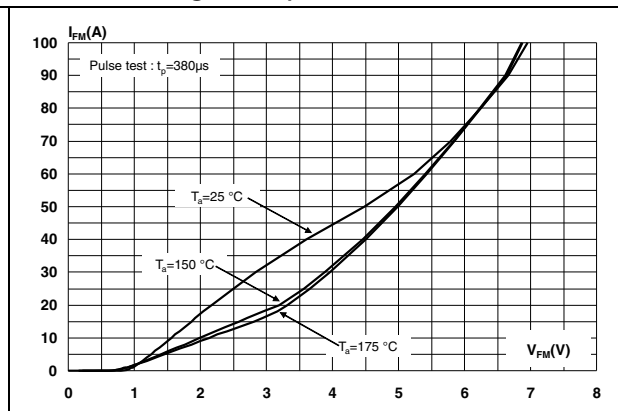


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

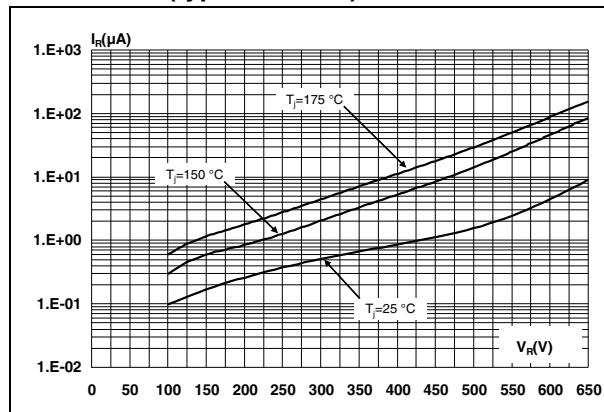


Figure 4. Peak forward current versus case temperature

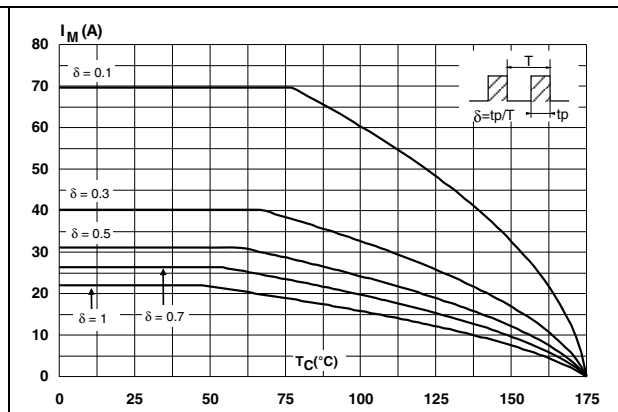


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

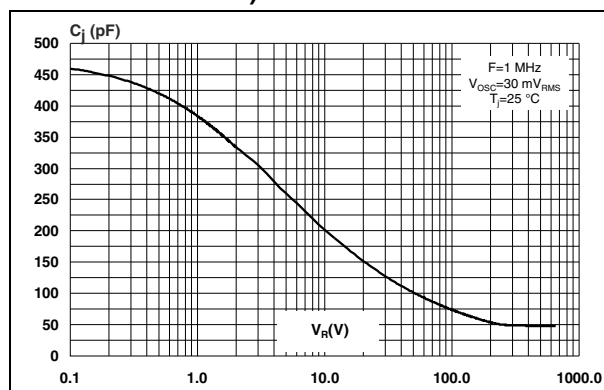
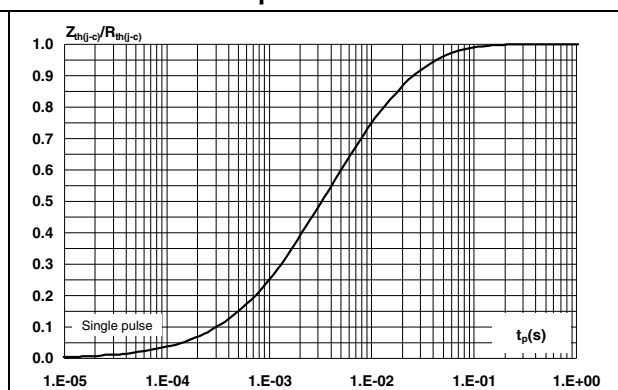


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration



3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPSC10H065D	STPSC10H065D	TO-220AC	1.86 g	50	Tube
STPSC10H065G-TR	STPSC10H065G	D ² PAK	1.48 g	1000	Tape and reel
STPSC10H065B-TR	STPSC 10H065	DPAK	0.32 g	2500	Tape and reel