STPSC6H065

650 V power Schottky silicon carbide diode

Datasheet – production data

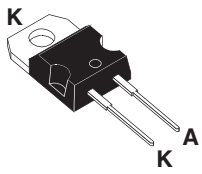
Features

- 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 more margin during transient phases.



TO-220AC
STPSC6H065D

D²PAK
STPSC6H065G

DPAK
STPSC6H065B

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	6 A
V_{RRM}	650 V
T_j (max)	175 °C
$Q_{C\ (typ)}$	10 nC

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		21	A
$I_{F(AV)}$	Average forward current	DPAK, T_c = TBD °C, δ = 0.5	6	A
		TO-220AC, T_c = 122 °C, δ = 0.5		
		D^2PAK, T_c = TBD °C, δ = 0.5		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal, T_c = 25 °C	60	A
		t_p = 10 ms sinusoidal, T_c = 125 °C	52	
		t_p = 10 µs square, T_c = 25 °C	400	
T_{stg}	Storage temperature range		-55 to +175	°C
T_j	Operating junction temperature		-40 to +175	°C

Table 3. Thermal resistance (typical values)

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	DPAK	1.6	°C/W
		TO-220AC		
		D^2PAK		

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	5	60	µA
		T_j = 150 °C		-	50	250	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 6 A	-	1.56	1.75	V
		T_j = 150 °C		-	1.98	2.5	

1. t_p = 10 ms, δ < 2%
2. t_p = 500 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 1.35 \times I_{F(AV)} + 0.192 \times I_F{}^2{}_{(RMS)}$

Table 5. Other parameters

Symbol	Parameter	Test conditions	Typ.	Unit
Q_c	Total capacitive charge	V_r = 400 V, I_F = 6 A dI_F/dt = -500 A/µs T_j = 150 °C	10	nC
C	Total capacitance	V_r = 0 V, T_c = 25 °C, F = 1 Mhz	300	pF
		V_r = 400 V, T_c = 25 °C, F = 1 Mhz	30	

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

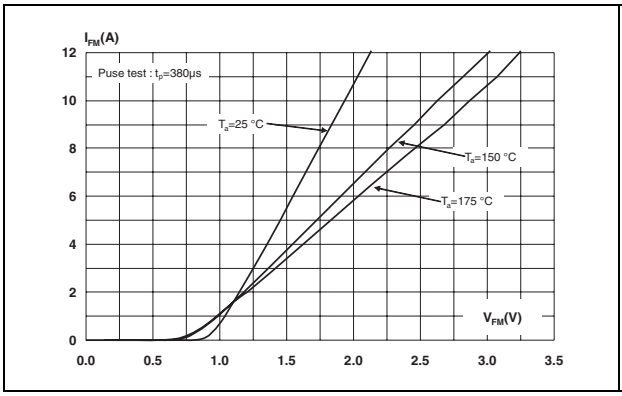


Figure 2. Forward voltage drop versus forward current (typical values, high level)

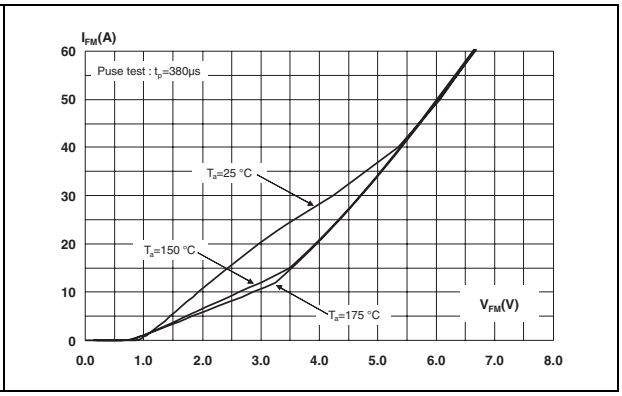


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

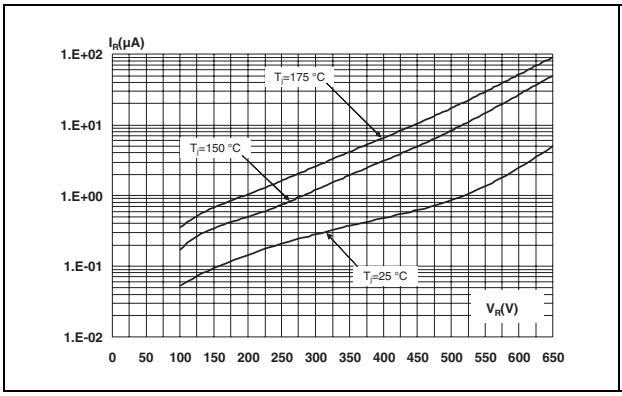


Figure 4. Peak forward current versus case temperature

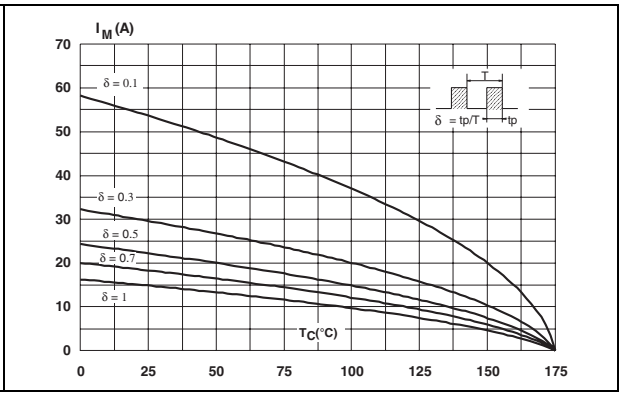


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

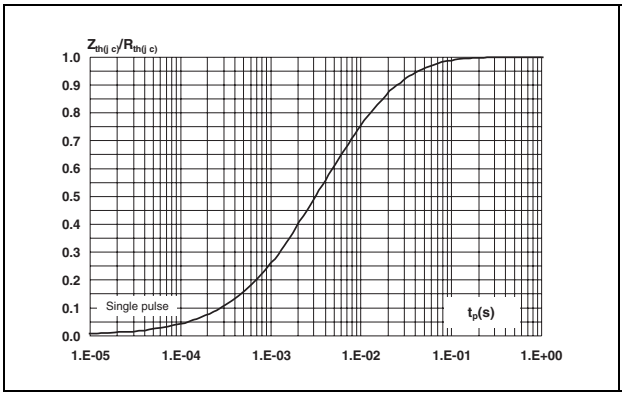


Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

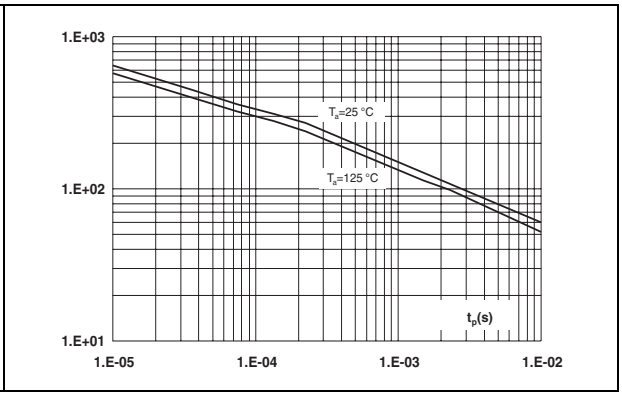
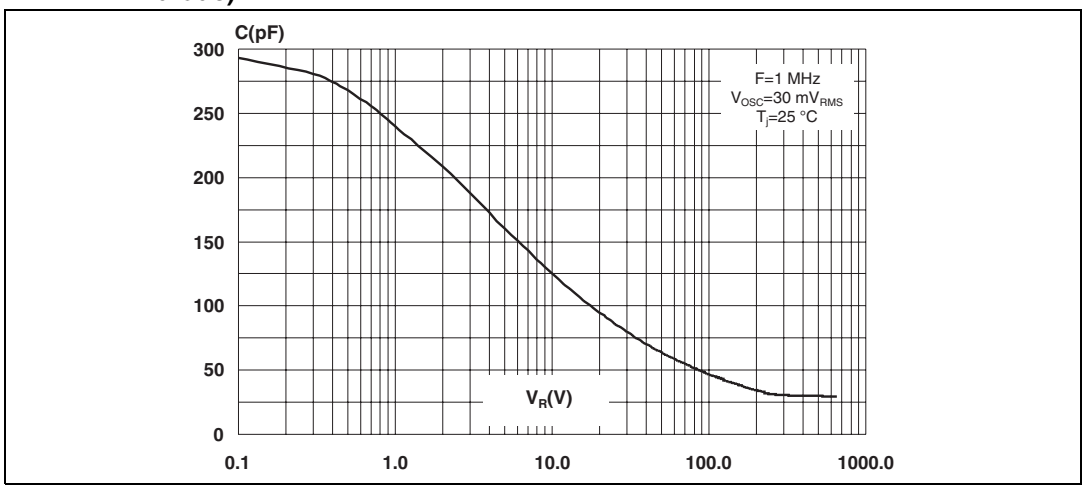


Figure 7. Junction capacitance versus reverse voltage applied (typical values, per diode)



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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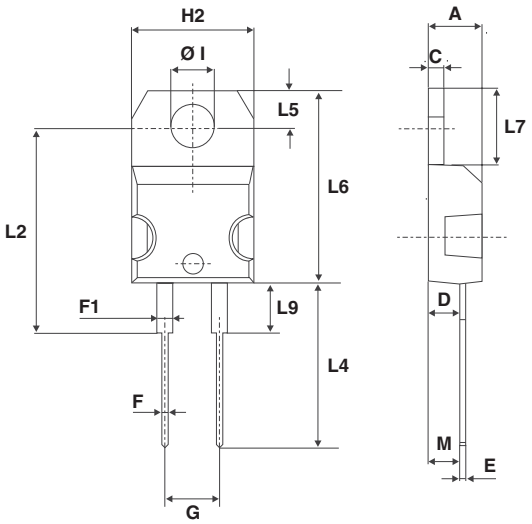
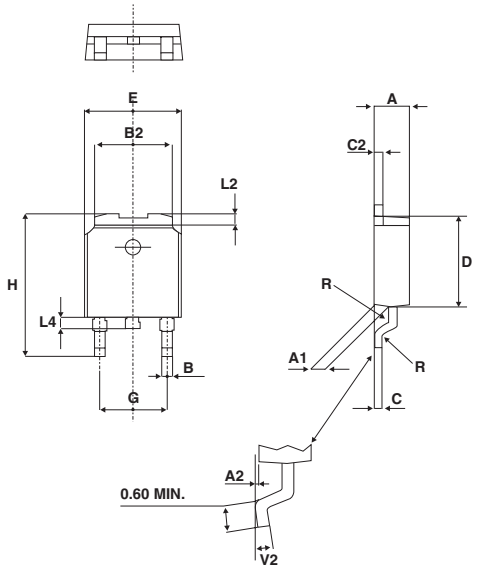
Table 6. TO-220AC dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

Table 7. DPAK Dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 8. Footprint (dimensions in mm)

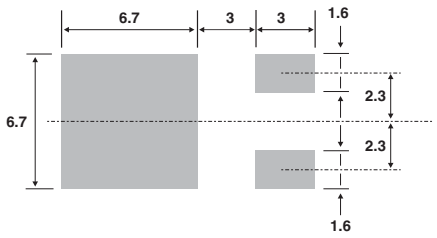
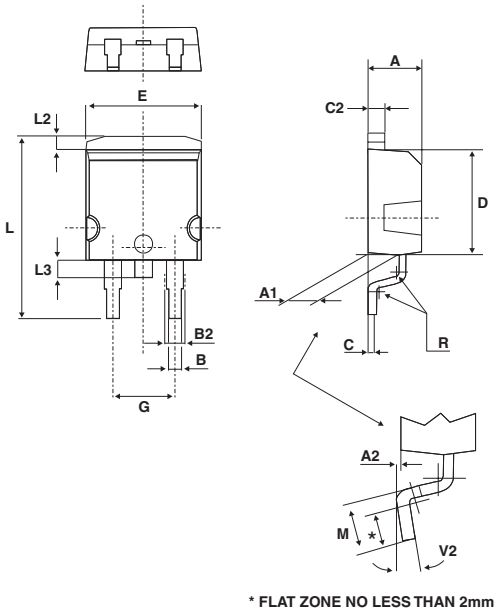
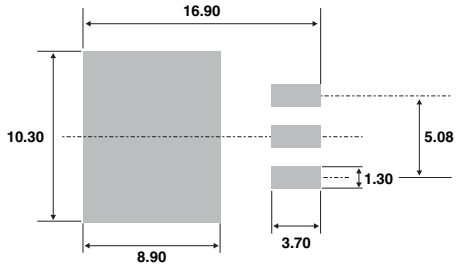


Table 8. D²PAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	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
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 9. Footprint (dimensions in mm)



3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPSC6H065D	STPSC6H065D	TO-220AC	1.86 g	50	Tube
STPSC6H065G-TR	STPSC6H065G	D^2PAK	1.48 g	1000	Tape and reel
STPSC6H065B-TR	STPSC6H065	DPAK	0.3 g	2500	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
18-Jun-2012	1	First issue.

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