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STPSC1206

600 V power Schottky silicon carbide diode

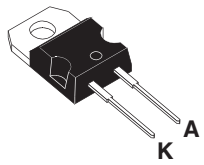
Features

- No reverse recovery
- Switching behavior independent of temperature
- Dedicated to PFC boost diode

Description

These diodes are manufactured using silicon carbide substrate. This wide bandgap material supports the manufacture of a Schottky diode structure with a high voltage rating. Such diodes exhibit no or negligible recovery characteristics. The recovery characteristics are independent of the temperature.

Using these diodes will significantly reduce the switching power losses of the associated MOSFET, and thus increase the efficiency of the overall application. These diodes will then outperform the power factor correction circuit operating in hard switching conditions.



TO-220AC
STPSC1206D

Table 1. Device summary

$I_{F(AV)}$	12 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)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	Forward rms current		30	A
$I_{F(AV)}$	Average forward current	T_c = 110 °C, δ = 0.5	12	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	50 40 200	A
I_{FRM}	Repetitive peak forward current	T_c = 105 °C, T_j = 150 °C, δ = 0.1	50	A
T_{stg}	Storage temperature range		-55 to +175	°C
T_j	Operating junction temperature		-40 to +175	°C

Table 3. Thermal resistance

Symbol	Parameter	Maximum value	Unit
$R_{th(j-c)}$	Junction to case	1.75	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	30	150	µA
		T_j = 150 °C		-	200	1500	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 12 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:
$P = 1.2 \times I_{F(AV)} + 0.075 \times I_{F^2(RMS)}$

Table 5. Other parameters

Symbol	Parameter	Test conditions	Typ.	Unit
Q_c	Total capacitive charge	V_r = 400 V, I_F = 12 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	750	pF
		V_r = 400 V, T_c = 25 °C, F = 1 Mhz	65	

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

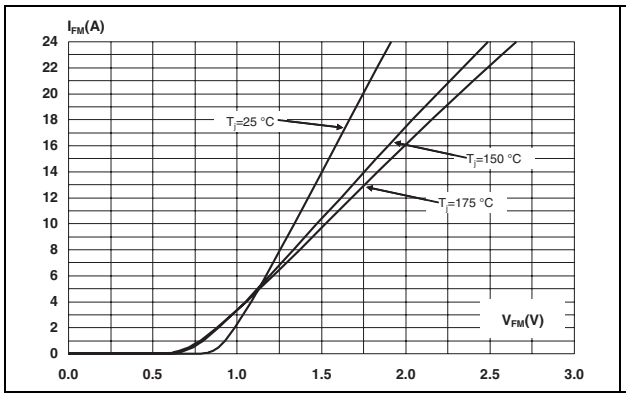


Figure 2. Reverse leakage current versus reverse voltage applied (maximum values)

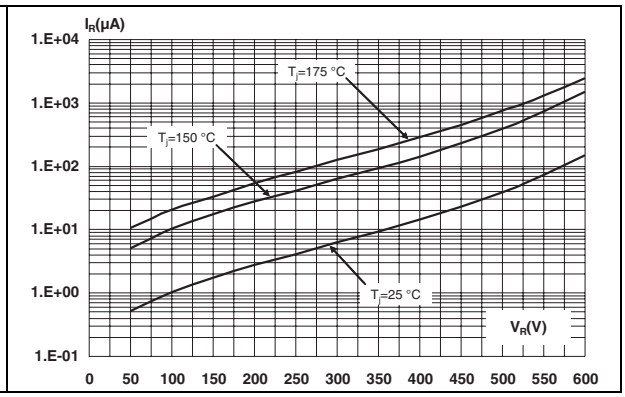


Figure 3. Peak forward current versus case temperature

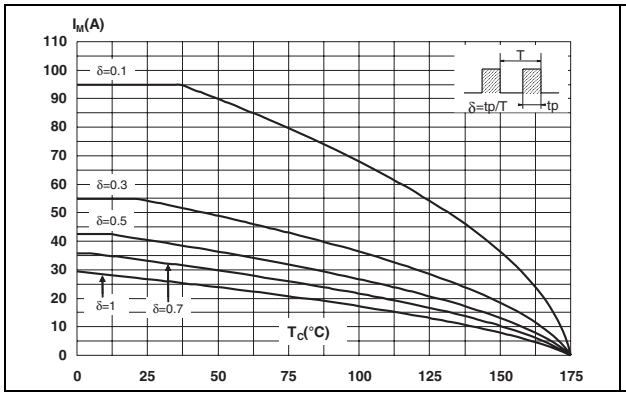


Figure 4. Junction capacitance versus reverse voltage applied (typical values)

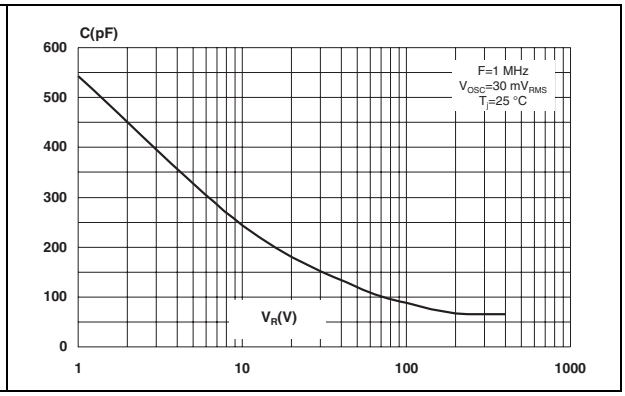


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

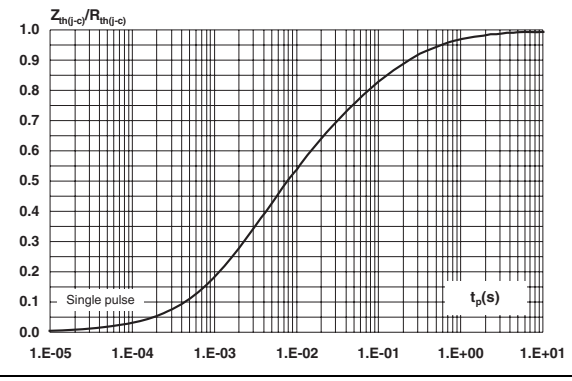


Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

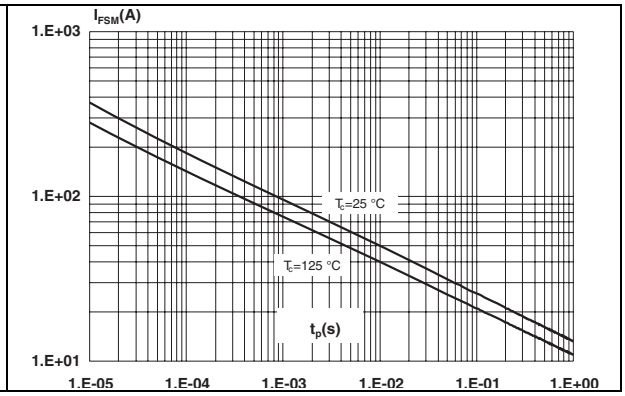
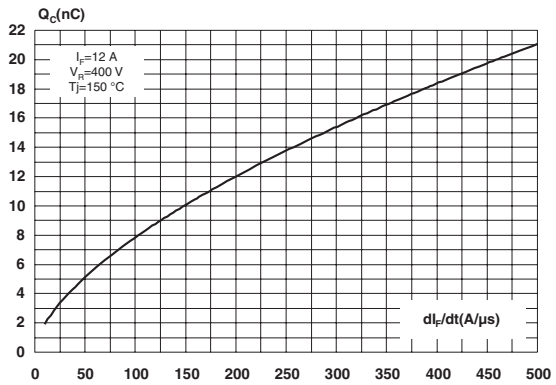


Figure 7. Total capacitive charges versus dI_F/dt (typical values)

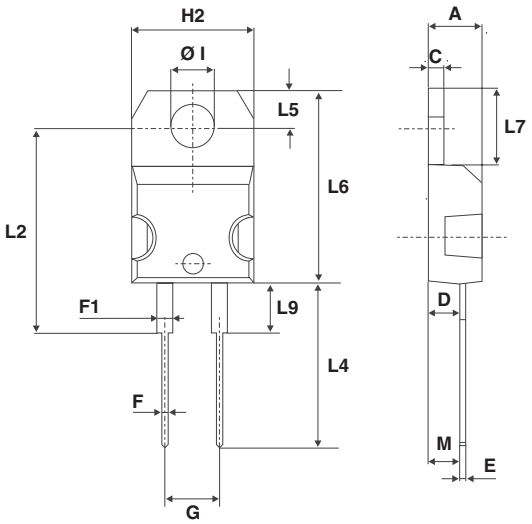


2 Package information

- Epoxy meets UL94, V0
- Colling method: convection (C)
- Recommended torque: 0.4 to 0.6 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-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

3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPSC1206D	STPSC1206D	TO-220AC	1.86 g	50	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
28-Sep-2009	1	First issue.