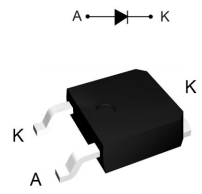
STPSC5G12

Datasheet

1200 V, 5 A power Schottky high surge silicon carbide diode



DPAK HV 2L

Features

- None or negligible reverse recovery
- Switching behavior independent of temperature
- Robust high voltage periphery
- Operating T_j from -55 °C to 175 °C
- DPAK HV creepage distance (anode to cathode) = 3 mm min.
- ECOPACK2 compliant component

Product label

SUSTAINABLE TECHNOLOGY

STPOWER

Product status link

STPSC5G12

Product summary

$I_{F(AV)}$	5 A
V_{RRM}	1200 V
T_j (max.)	175 °C
V_F (typ.)	1.35 V

Applications

- DC/DC converter
- Boost PFC
- EV Charging station

Description

The SiC diode, available in DPAK HV 2L, is an ultrahigh performance power Schottky rectifier. It is manufactured using a silicon carbide substrate. The wide band-gap material allows the design of a low V_F Schottky diode structure with a 1200 V rating. Thanks to the Schottky construction, no recovery is shown during turn-off and ringing patterns are negligible. The minimal capacitive turn-off behavior is independent of temperature.

Based on latest technology optimization, this ST SiC diode has an improved forward surge current capability, and is ideal to boost the performance in hard switching conditions while bringing robustness to the design. Its high forward surge capability ensures a good robustness during transient phases.

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage (T_j = -55 °C to +175 °C)			1200	V
$I_{F(RMS)}$	Forward rms current			15	A
$I_{F(AV)}$	Average forward current	T_c = 155 °C, δ = 1		5	A
I_{FRM}	Repetitive peak forward current	T_c = 155 °C, T_j = 175 °C, δ = 0.1, f_{sw} > 10 kHz		20	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	T_c = 25 °C	50	A
			T_c = 150 °C	37	
		t_p = 10 µs square	T_c = 25 °C	345	
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Operating junction temperature range			-55 to +175	°C

Table 2. Thermal resistance parameters

Symbol	Parameter	Value		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Junction to case	1.2	1.7	°C/W

For more information you can refer to:

- AN5088: Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	2.5	37.5	µA
		T_j = 150 °C		-	8	125	
		T_j = 175 °C			18		
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-	1.35	1.50	V
		T_j = 150 °C		-	1.75	2.10	
		T_j = 175 °C			1.90		

1. *Pulse test: t_p = 10 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.924 \times I_{F(AV)} + 0.235 \times I_F{}^2{}_{(RMS)}$

For more information, refer to the following application notes related to the power losses:

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

Table 4. Dynamic electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Q_{Cj} (1)	Total capacitive charge	V_R = 800 V	-	26	-	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	-	380	-	pF
		V_R = 800 V, T_c = 25 °C, F = 1 MHz	-	20	-	

1. *Most accurate value for the capacitive charge:* $Q_{cj}(V_R) = \int_0^{V_R} C_j(V)dV$

Figure 1. Thermal transient impedance model circuit of the diode – $Z_{th(j-c)}$

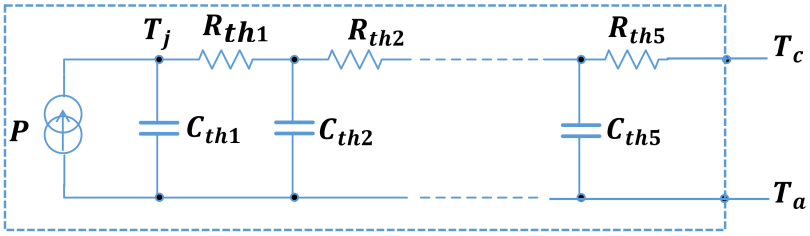


Table 5. Components typical values of the diode thermal transient impedance model $Z_{th(j-c)}$

Ref.	Value (K/W)	Ref.	Value (J/K)
R_{th1}	53.54 m	C_{th1}	0.45 m
R_{th2}	441.7 m	C_{th2}	0.38 m
R_{th3}	446.8 m	C_{th3}	1.36 m
R_{th4}	209.25 m	C_{th4}	6.38 m
R_{th5}	49.71 m	C_{th5}	80.13 m

1.1 Characteristics (curves)

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

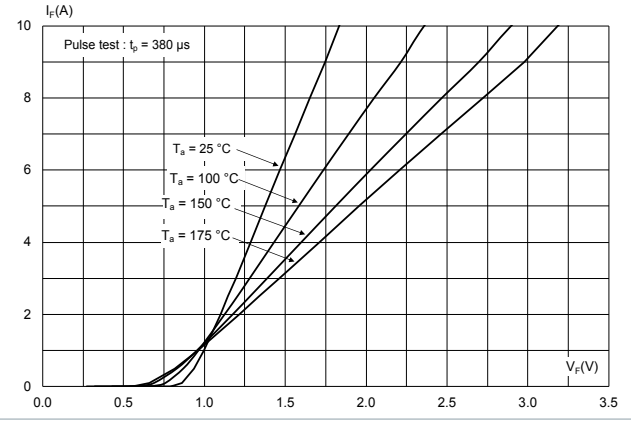


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

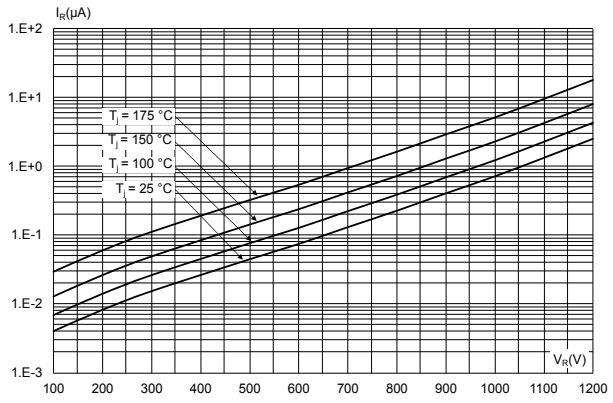


Figure 4. Peak forward current versus case temperature (f_{SW} > 10 kHz)

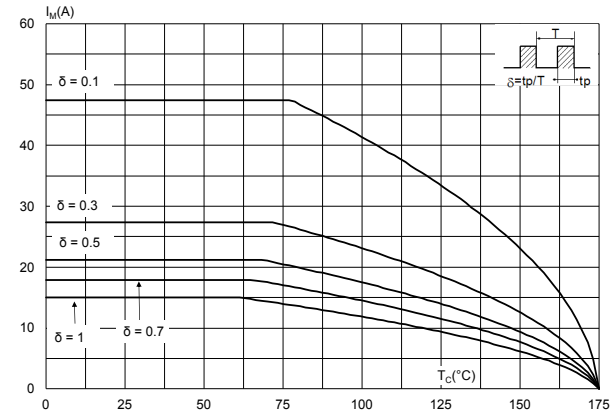


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

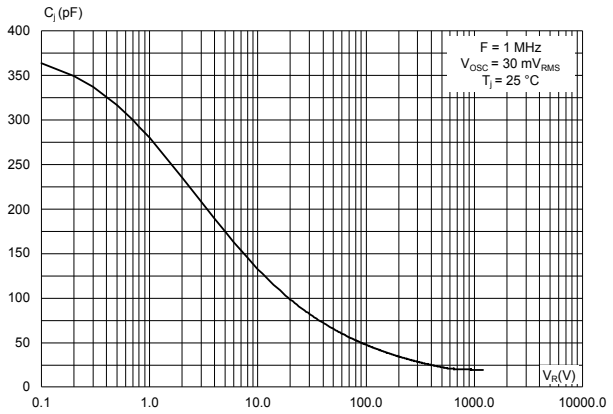


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

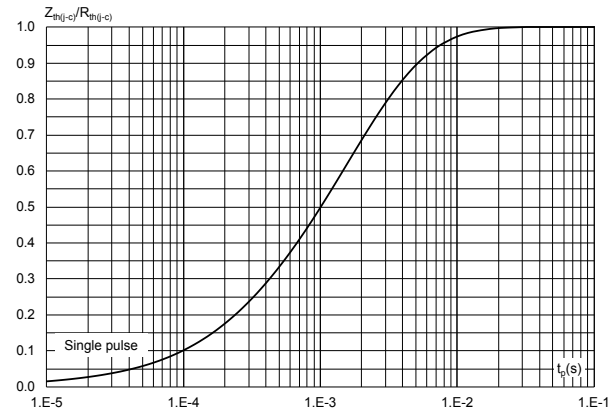


Figure 7. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

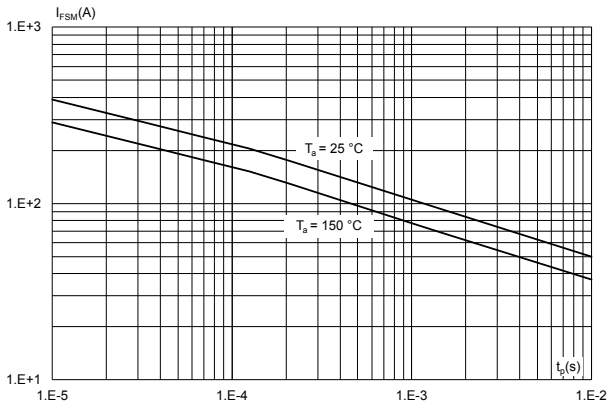


Figure 8. Total capacitive charges versus reverse voltage applied (typical values)

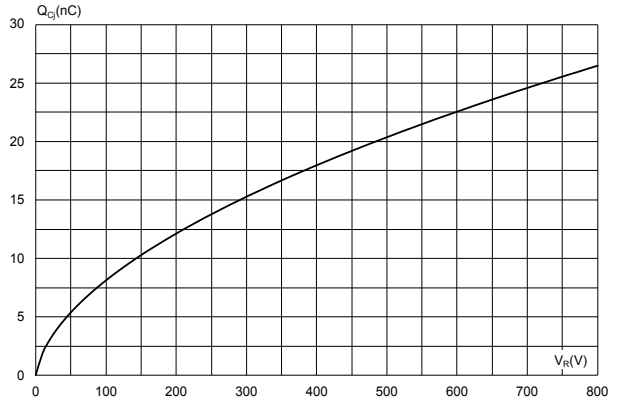
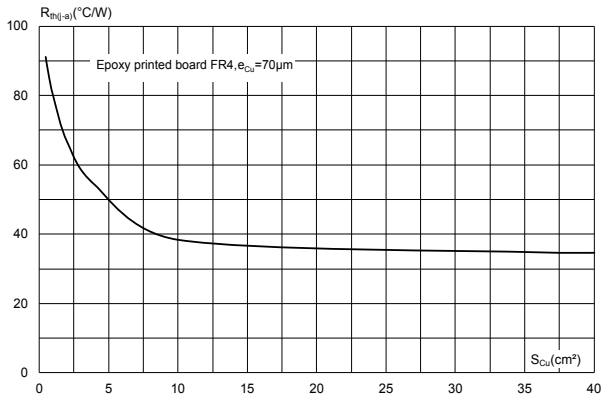


Figure 9. Thermal resistance junction to ambient versus copper surface under tab (typical values)



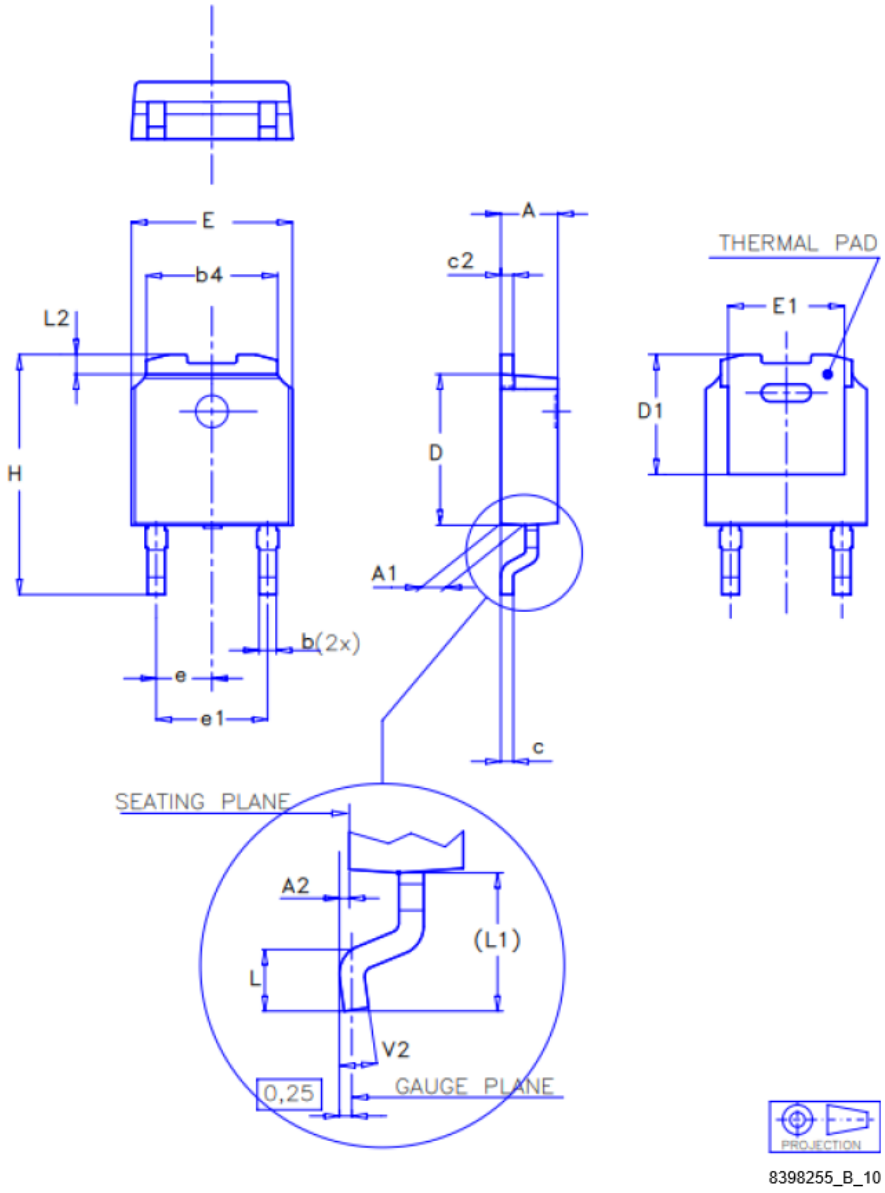
2 Package information

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.

2.1 DPAK HV 2L package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

Figure 10. DPAK HV 2L package outline

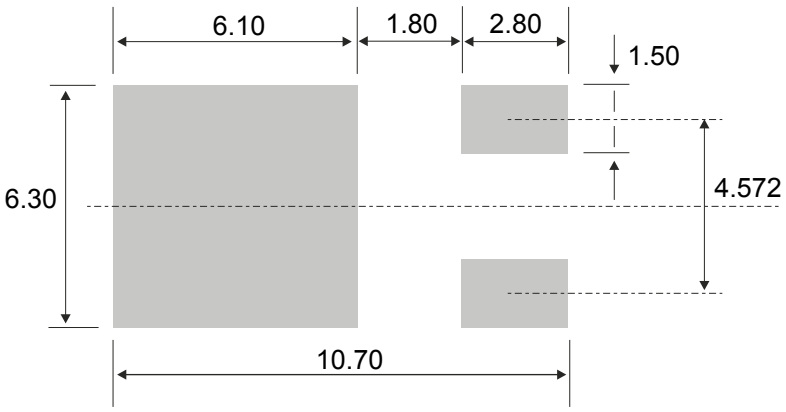


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. DPAK HV 2L package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20	2.29	2.40	0.086	0.090	0.095
A1	0.90		1.10	0.035		0.044
A2	0.03		0.23	0.001		0.010
b	0.64	0.76	0.90	0.025	0.030	0.036
b4	5.20	5.30	5.40	0.201	0.204	0.213
c	0.45		0.60	0.017		0.024
c2	0.48		0.60	0.018		0.024
D	6.00		6.20	0.236		0.245
D1	4.60	4.70	4.80	0.181	0.185	0.189
E	6.40		6.60	0.251		0.260
E1	4.95	5.10	5.25	0.194	0.201	0.207
e	2.16	2.28	2.40	0.085	0.090	0.095
e1	4.40		4.60	0.173		0.182
H	9.35		10.10	0.368		0.398
L	1.00		1.50	0.039		0.060
L1	2.60	2.80	3.00	0.102	0.110	0.119
L2	0.65	0.80	0.95	0.025	0.031	0.038
V2	0°		8°	0°		8°

Figure 11. Footprint (dimensions in mm)



Note: For package and tape orientation, reel and inner box dimensions and tape outline see TN1173.

2.2 Creepage distance between anode and cathode

Table 7. Creepage distance between anode and cathode

Symbol	Parameter		Value	Unit
Cd_{A-K}	Minimum creepage distance between A and K	DPAK HV	3.0	mm

Note: DPAK HV creepage distance (anode to cathode) = 0.3 mm min. (refer to IEC 60664-1)

3 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC5G12B2-TR	PSC5G12B2	DPAK HV 2L	0.346 g	2500	Tape and reel

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
21-Oct-2025	1	Initial release.

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