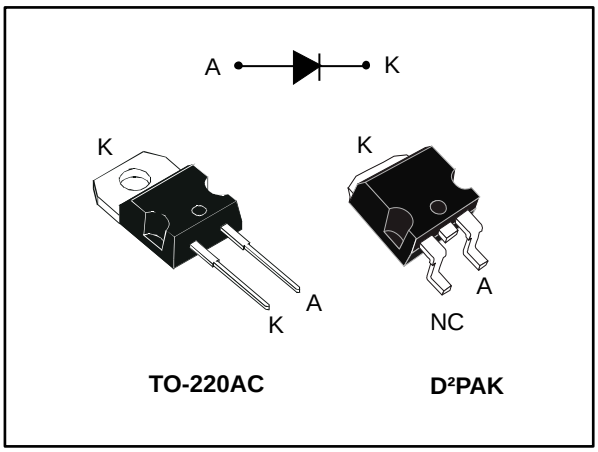
STPSC10H12-Y

Automotive grade 1200 V power Schottky silicon carbide diode

Datasheet - production data



Features

- AEC-Q101 qualified
- No or negligible reverse recovery
- Switching behavior independent of temperature
- Robust high voltage periphery
- PPAP capable
- Operating T_j from -40 °C to 175 °C
- ECOPACK®2 compliant

Description

The SiC diode, available in TO-220AC and D²PAK, 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. 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 and secondary side applications, this ST SiC diode will boost the performance in hard switching conditions. This rectifier will enhance the performance of the targeted application. 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}	1200 V
T_j(max.)	175 °C
V_F(typ.)	1.35 V

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage (T_j = -40 °C to +175 °C)			1200	V
$I_{F(RMS)}$	Forward rms current			25	A
$I_{F(AV)}$	Average forward current	T_C = 155 °C, DC current		10	A
I_{FRM}	Repetitive peak forward current	T_C = 155 °C, T_j = 175 °C, δ = 0.1		38	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	T_C = 25 °C	71	A
			T_C = 150 °C	60	
		t_p = 10 µs square	T_C = 25 °C	420	
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Operating junction temperature range			-40 to +175	°C

Table 3: Thermal parameters

Symbol	Parameter	Typ.	Max.	Unit
$R_{th(j-c)}$	Junction to case	0.65	0.9	°C/W

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	5	60	µA
		T_j = 150 °C		-	30	400	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	1.35	1.50	V
		T_j = 150 °C		-	1.75	2.25	

Notes:

(1)Pulse test: t_p = 10 ms, δ < 2%

(2)Pulse test: t_p = 500 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 1.03 \times I_{F(AV)} + 0.122 \times I_{F^2(RMS)}$

Table 5: Dynamic electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Q_{Cj} (1)	Total capacitive charge	V_R = 800 V	-	57	-	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	-	725	-	pF
		V_R = 800 V, T_c = 25 °C, F = 1 MHz	-	47	-	

Notes:

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

1.1 Characteristics (curves)

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

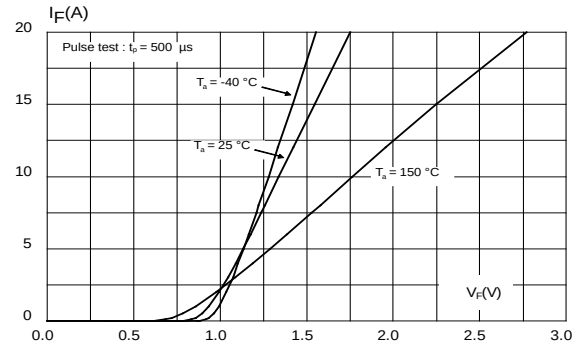


Figure 2: Reverse leakage current versus reverse voltage applied (typical values)

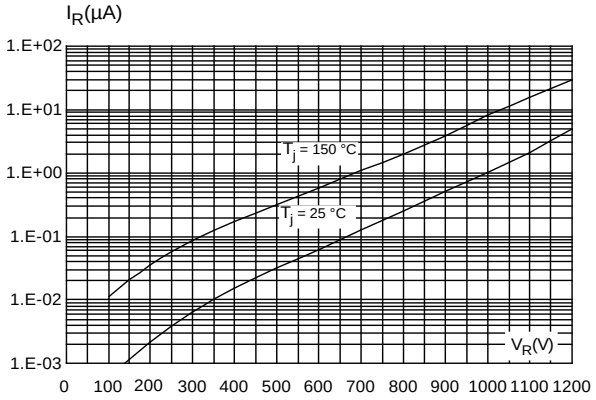


Figure 3: Peak forward current versus case temperature

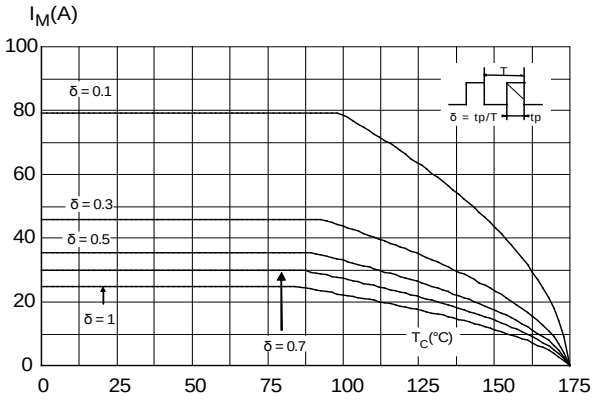


Figure 4: Junction capacitance versus reverse voltage applied (typical values)

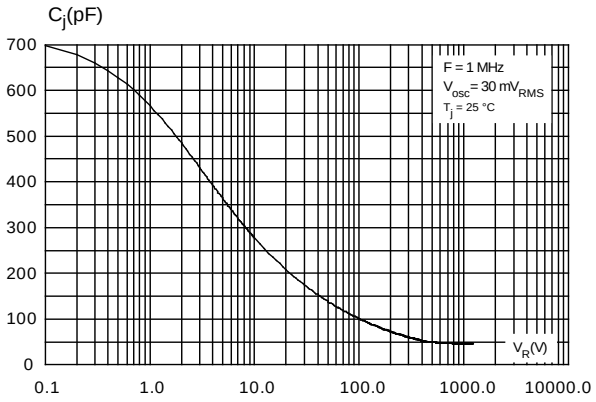


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration

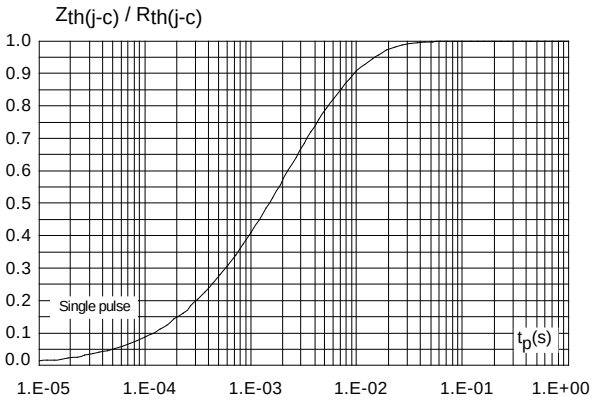


Figure 6: Non- repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

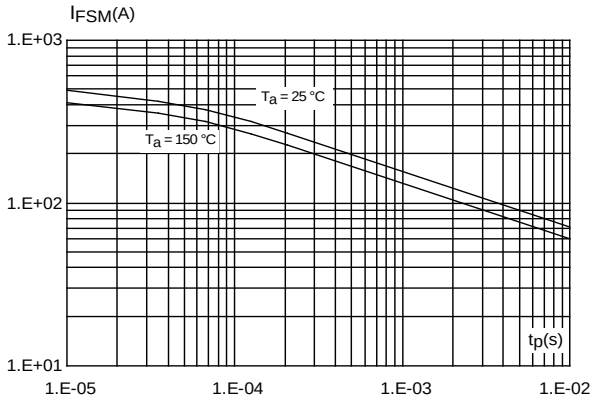


Figure 7: Total capacitive charges versus reverse voltage applied (typical values)

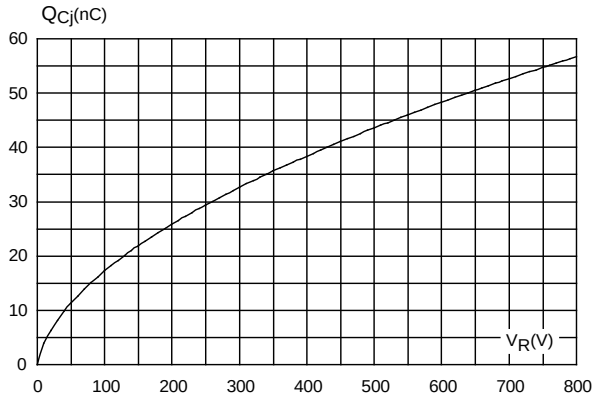
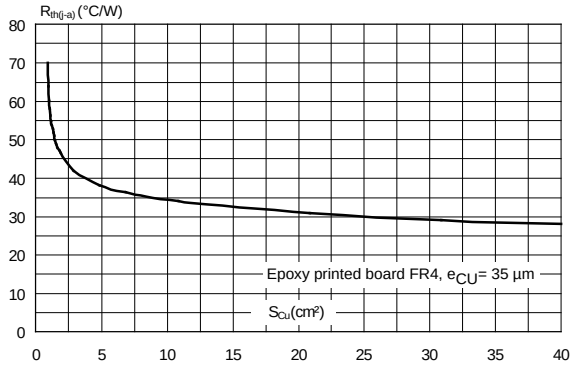


Figure 8: Thermal resistance junction to ambient versus copper surface under tab for D²PAK package (typical values)



2 Package information

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.

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.7 N·m

2.1 TO-220AC rectifier package information

Figure 9: TO-220AC package outline

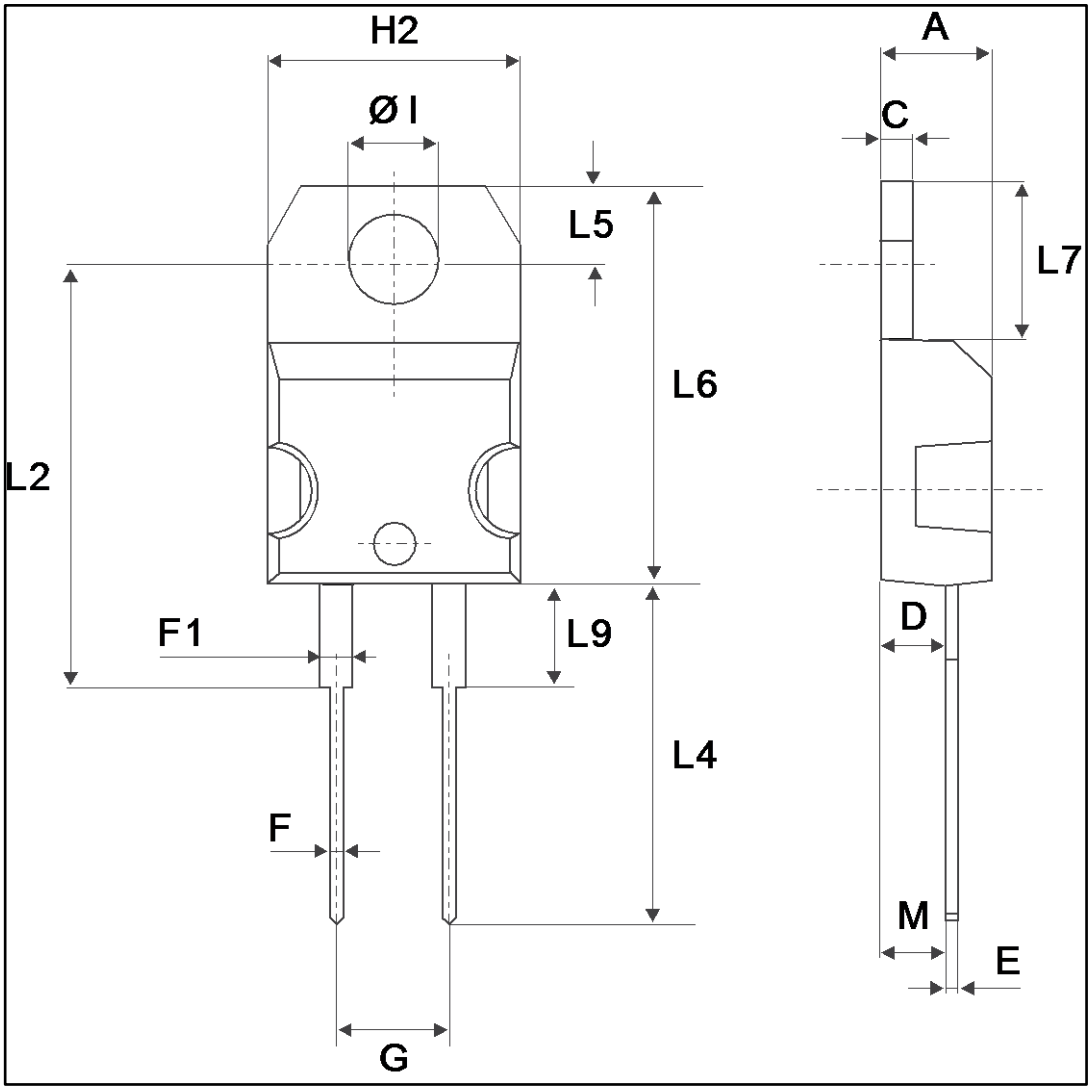


Table 6: TO-220AC package mechanical data

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	3.75	3.85	0.147	0.151

2.2 D²PAK package information

Figure 10: D²PAK package outline

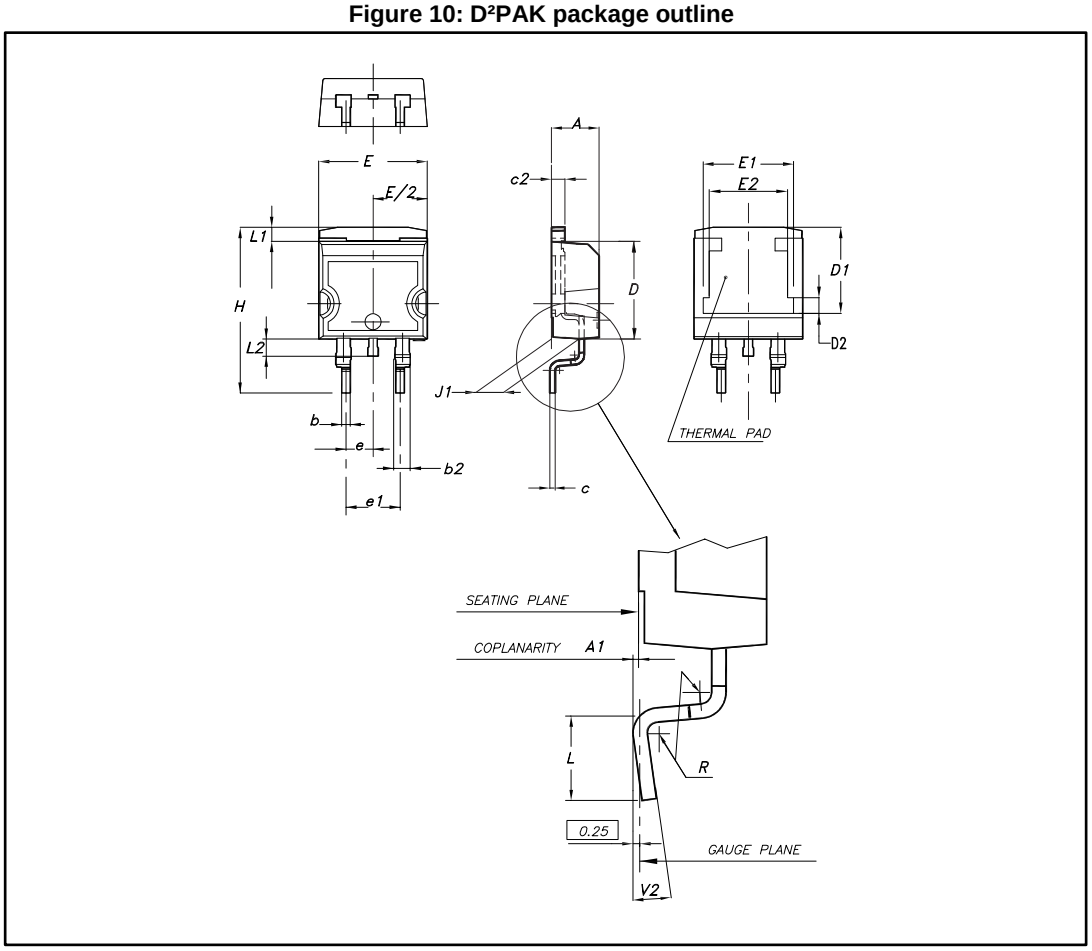
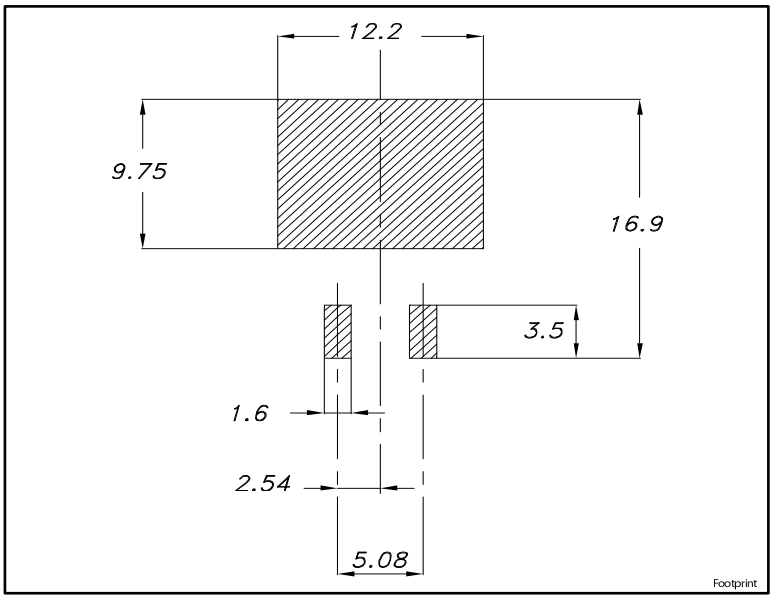


Table 7: D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
A1	0.03		0.23	0.001		0.009
b	0.70		0.93	0.028		0.037
b2	1.14		1.70	0.045		0.067
c	0.45		0.60	0.018		0.024
c2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1	7.50	7.75	8.00	0.295	0.305	0.315
D2	1.10	1.30	1.50	0.043	0.051	0.060
E	10		10.40	0.394		0.409
E1	8.50	8.70	8.90	0.335	0.343	0.346
E2	6.85	7.05	7.25	0.266	0.278	0.282
e		2.54			0.100	
e1	4.88		5.28	0.190		0.205
H	15		15.85	0.591		0.624
J1	2.49		2.69	0.097		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.40	0.049		0.055
L2	1.30		1.75	0.050		0.069
R		0.4			0.015	
V2	0°		8°	0°		8°

Figure 11: D²PAK recommended footprint (dimensions are in mm)



3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC10H12DY	STPSC10H12DY	TO-220AC	1.86 g	50	Tube
STPSC10H12GY-TR	STPSC10H12GY	D²PAK	1.48 g	1000	Tape and reel

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
05-Jan-2017	1	Initial release.
23-Jan-2017	2	Added D²PAK package.

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