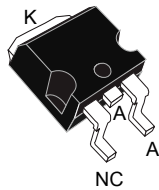


## Automotive 1200 V, 10 A, silicon carbide power Schottky diode


 D<sup>2</sup>PAK HV

## Product label




## Product status link

[STPSC10H12G2Y-TR](#)

## Product summary

$I_{F(AV)}$	10 A
$V_{RRM}$	1200 V
$T_j$ (max.)	175 °C
$V_F$ (typ.)	1.35 V

## 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
- Low  $V_F$
- D<sup>2</sup>PAK HV creepage distance (anode to cathode) = 5.38 mm min.
- ECOPACK2 compliant

## Applications

- On board charger (OBC)
- DC/DC
- PFC

## Description

This 10 A, 1200 V SiC diode is an ultra-high performance power Schottky diode. It is manufactured using a silicon carbide substrate. The wide band gap material allows the design of a 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.

Housed in D<sup>2</sup>PAK HV, this diode is perfectly suited for a usage in PFC applications, in OBC, DC/DC for EV, easing the compliance to IEC-60664-1.

The **STPSC10H12G2Y-TR** will boost performances in hard switching conditions. Its high forward surge capability ensures 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 ( $T_j = -40\text{ °C}$ to $+175\text{ °C}$ )		1200	V
$I_{F(RMS)}$	Forward rms current		25	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$ , square wave	$T_c = 155\text{ °C}$ , DC current	10	A
$I_{FRM}$	Repetitive peak forward current	$T_c = 155\text{ °C}$ , $T_j = 175\text{ °C}$ , $\delta = 0.1$	38	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal, $T_c = 25\text{ °C}$	71	A
		$t_p = 10\text{ ms}$ sinusoidal, $T_c = 150\text{ °C}$	60	
$T_{stg}$	Storage temperature range		-65 to +175	°C
$T_j$	Operating junction temperature <sup>(1)</sup>		-40 to +175	°C

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

**Table 2. Thermal resistance parameters**

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

**Table 3. Static electrical characteristics**

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

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 500\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

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

For more information, please 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

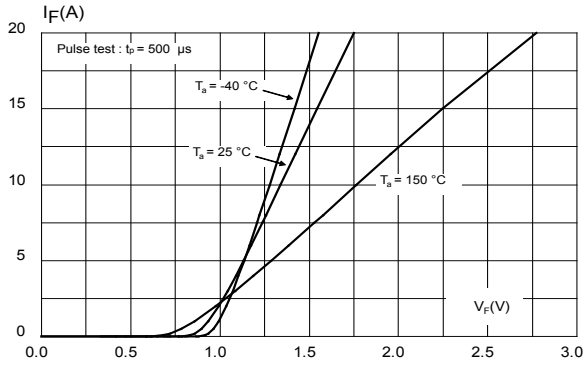
**Table 4. Dynamic electrical characteristics**

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

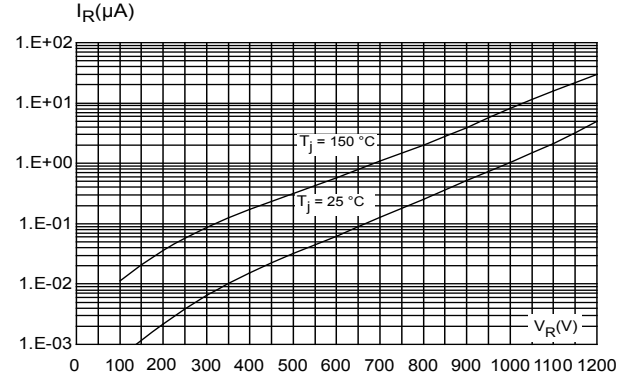
1. Most accurate value for the capacitive charge:  $Q_{Cj}(V_R) = \int_0^{V_R} C_j(V) dV$

### 1.1 Characteristics (curves)

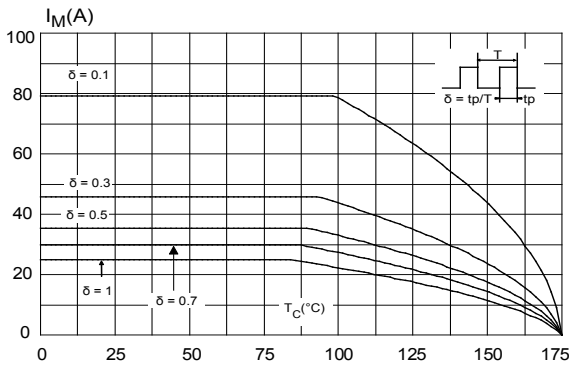
**Figure 1. Forward voltage drop versus forward current (typical values)**



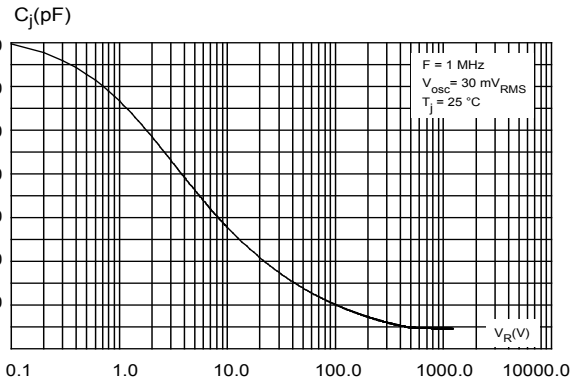
**Figure 2. Reverse leakage current versus reverse voltage applied (typical values)**



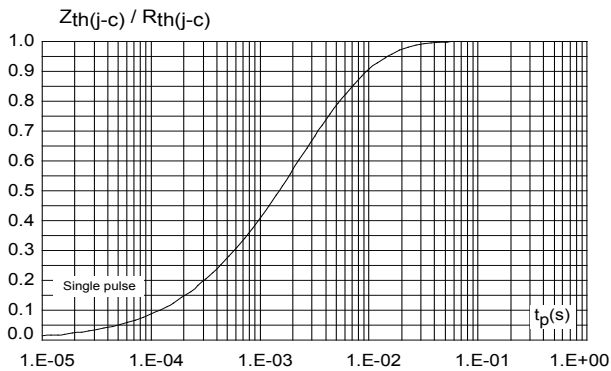
**Figure 3. Peak forward current versus case temperature**



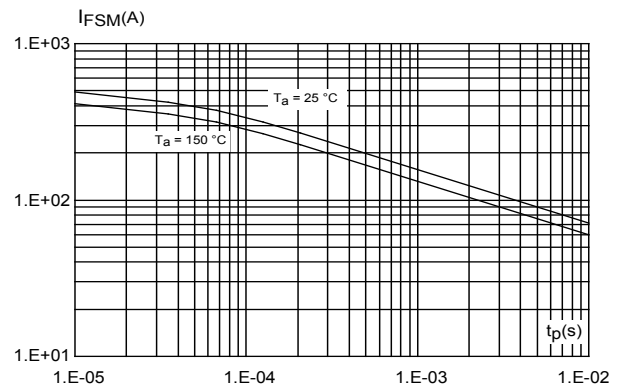
**Figure 4. Junction capacitance versus reverse voltage applied (typical values)**



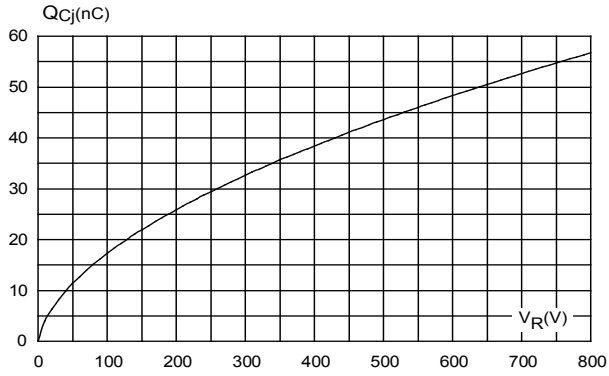
**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**



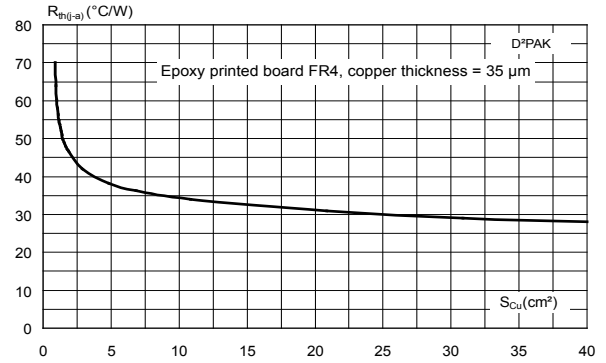
**Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**



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



**Figure 8. Thermal resistance junction to ambient versus copper surface under tab for D<sup>2</sup>PAK package (typical values)**



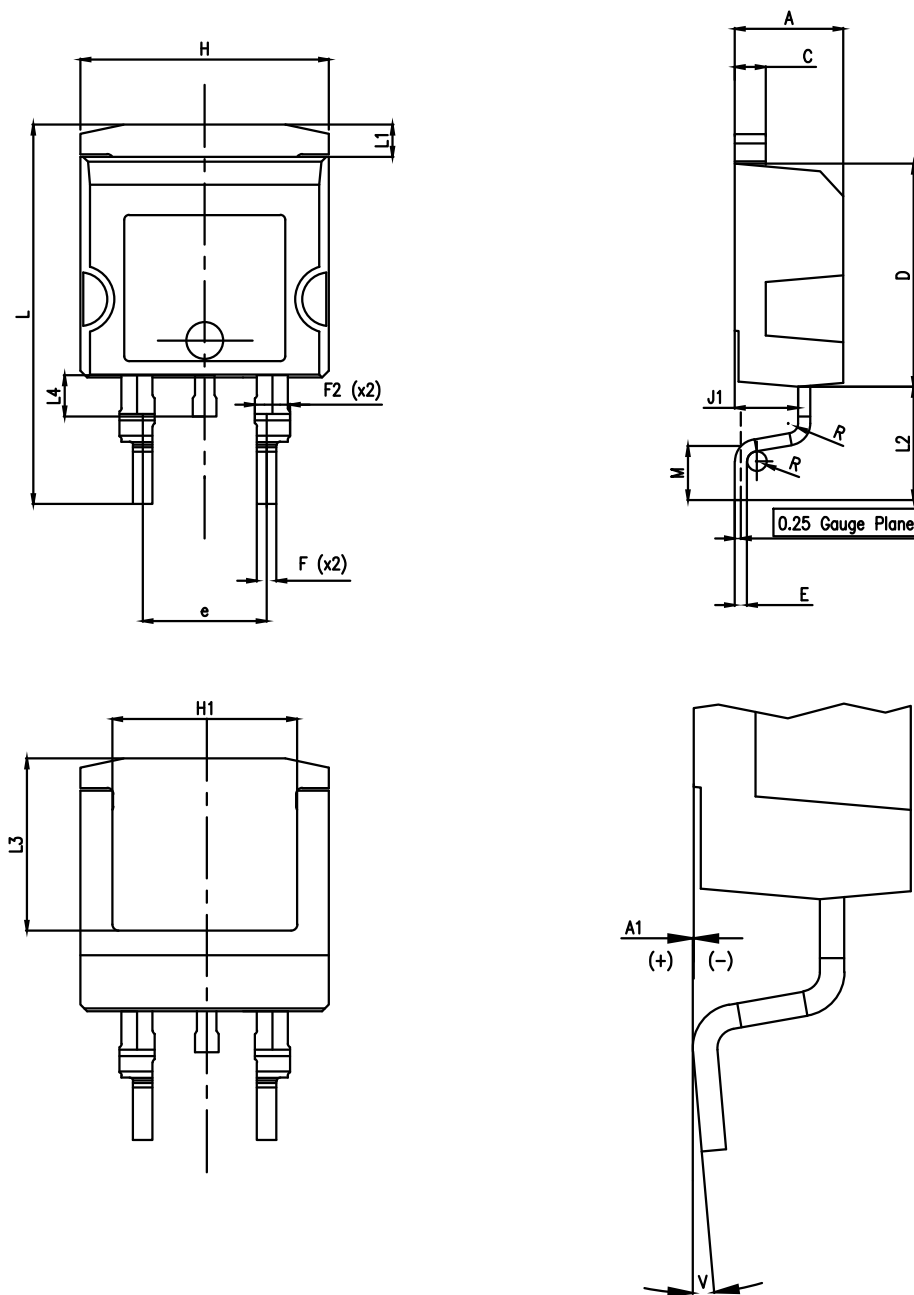
## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 D<sup>2</sup>PAK high voltage package information

- Epoxy meets UL94, V0

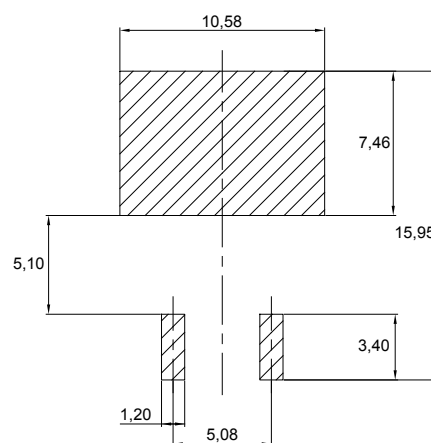
Figure 9. D<sup>2</sup>PAK high voltage package outline



**Table 5. D<sup>2</sup>PAK high voltage package mechanical data**

Ref.	Dimensions		
	Min.	Typ.	Max.
A	4.30	-	4.70
A1	0.03	-	0.20
C	1.17	-	1.37
D	8.95	-	9.35
e	4.98	-	5.18
E	0.50	-	0.90
F	0.78	-	0.85
F2	1.14	-	1.70
H	10.00	-	10.40
H1	7.40	-	7.80
J1	2.49	-	2.69
L	15.30	-	15.80
L1	1.27	-	1.40
L2	4.93	-	5.23
L3	6.85	-	7.25
L4	1.5	-	1.7
M	2.6	-	2.9
R	0.20	-	0.60
V	0°	-	8°

**Figure 10. D<sup>2</sup>PAK high voltage footprint in mm**



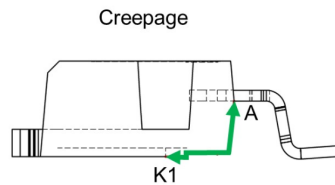
### 2.1.1 Creepage distance between Anode and Cathode

**Table 6. Creepage distance between anode and cathode**

Symbol	Parameter		Value	Unit
Cd <sub>A-K1</sub>	Minimum creepage distance between A and K1 (with top coating)	D <sup>2</sup> PAK HV	5.38	mm
Cd <sub>A-K2</sub>	Minimum creepage distance between A and K2 (without top coating)		3.48	

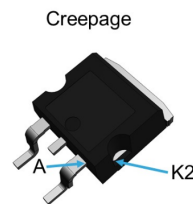
*Note:* D<sup>2</sup>PAK HV creepage distance (anode to cathode) = 5.38 mm min. (refer to IEC 60664-1)

**Figure 11. Creepage with top coating**



Minimum distance between A & K1 = 5.38 mm (with top coating)

**Figure 12. Creepage without top coating**



Minimum distance between A & K2 = 3.48 mm (without top coating)



### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC10H12G2Y-TR	SC10H12G2Y	D <sup>2</sup> PAK HV	1.48 g	1000	Tape and reel

## Revision history

**Table 8. Document revision history**

Date	Revision	Changes
31-Aug-2020	1	First issue.

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