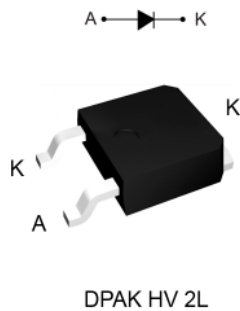



## Automotive 1200 V, 2 A power Schottky silicon carbide diode



## Features

- AEC-Q101 qualified 
- PPAP capable
- No or negligible reverse recovery
- High forward surge capability
- Operating  $T_j$  from  $-40\text{ }^\circ\text{C}$  to  $175\text{ }^\circ\text{C}$
- Creepage distance of 3 mm as per IEC 60664-1
- **ECOPACK2** compliant component

## Applications

- Bootstrap function of SiC MOS-FETS
- Snubber diode
- Switching diode

## Description

The 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.

Especially suited for use in boot strap, snubber circuits, or clamping functions of SiC MOS-FETs, the **STPSC2H12-Y** diode will help designers getting the best possible performance of their controlled switches in all conditions. This rectifier will enhance the performance of the targeted application.

Its improved creepage distance ensures the compatibility with industrial and automotive creepage standards.

## Product label



## Product status link

[STPSC2H12-Y](#)

## Product summary

$I_{F(AV)}$	2 A
$V_{RRM}$	1200 V
$T_j$ (max.)	175 °C
$V_F$ (typ.)	1.35 V

# 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	10	A
$I_{F(AV)}$	Average forward current	$T_c = 160\text{ °C}$ , DC <sup>(1)</sup>	2
		$T_c = 120\text{ °C}$ , DC <sup>(1)</sup>	5
$I_{FRM}$	Repetitive peak forward current	$T_c = 160\text{ °C}$ , $T_j = 175\text{ °C}$ , $\delta = 0.1$ , $f_w > 10\text{ kHz}$	9
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal, $T_c = 25\text{ °C}$	15
		$t_p = 10\text{ ms}$ sinusoidal, $T_c = 150\text{ °C}$	13
$T_{stg}$	Storage temperature range	-65 to +175	°C
$T_j$	Operating junction temperature range	-40 to +175	°C

1. Value based on  $R_{th(j-c)max}$ .

**Table 2. Thermal resistance parameters**

Symbol	Parameter	Value		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Junction to case	1.9	2.7	°C/W

For more information, please refer to the following application note:

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R$ <sup>(1)</sup>	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	1	12	$\mu\text{A}$
		$T_j = 150\text{ °C}$		-	6	80	
$V_F$ <sup>(2)</sup>	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 2\text{ A}$	-	1.35	1.50	V
		$T_j = 150\text{ °C}$		-	1.75	2.25	

1. Pulse test:  $t_p = 10\text{ ms}$ ,  $\delta < 2\%$

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

To evaluate the conduction losses, use the following equation:

$$P = 1.12 \times I_{F(AV)} + 0.565 \times I_{F(RMS)}^2$$

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**

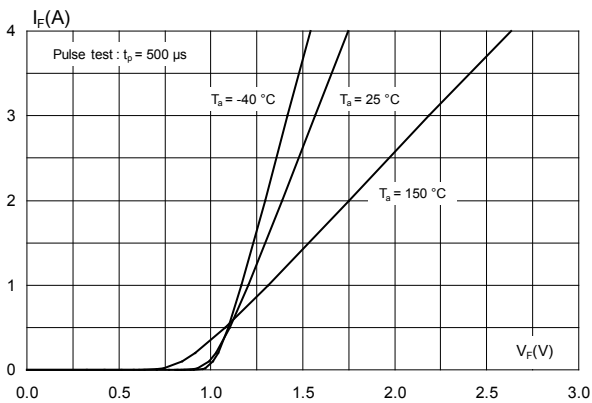
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$Q_{Cj}$ <sup>(1)</sup>	Total capacitive charge	$V_R = 800\text{ V}$	-	15.6	-	nC

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C <sub>j</sub>	Total capacitance	V <sub>R</sub> = 0 V, T <sub>C</sub> = 25 °C, F = 1 MHz	-	190	-	pF
		V <sub>R</sub> = 800 V, T <sub>C</sub> = 25 °C, F = 1 MHz	-	13	-	

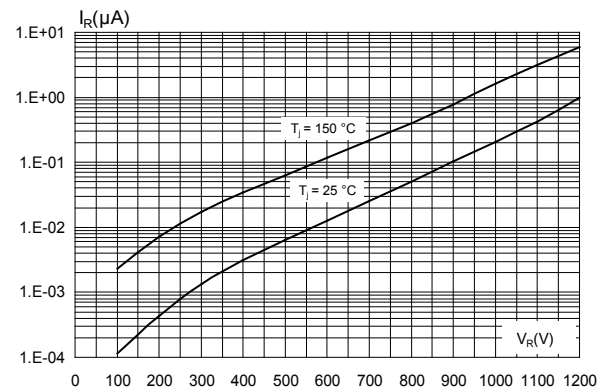
1. Most accurate value for the capacitive charge:  $Q_{Cj}(V_R) = \int_0^{V_R} C_j(V) dV$

## 1.1 Characteristics (curves)

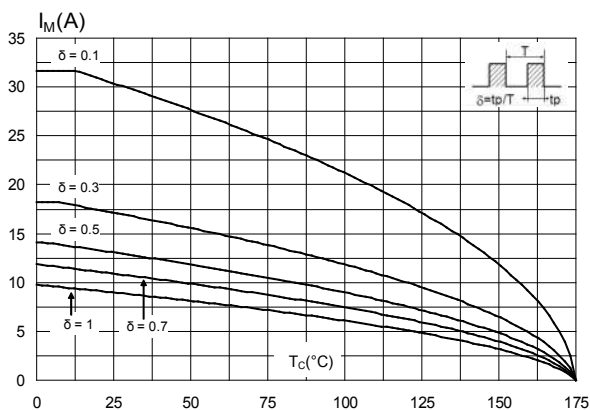
**Figure 1. Forward voltage drop versus forward current (typical values)**



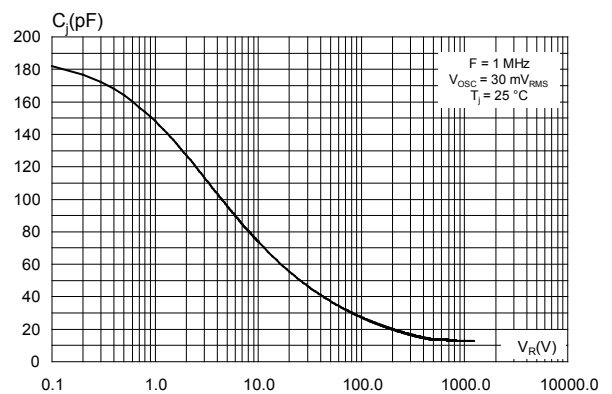
**Figure 2. Reverse leakage current versus reverse voltage applied (typical values)**



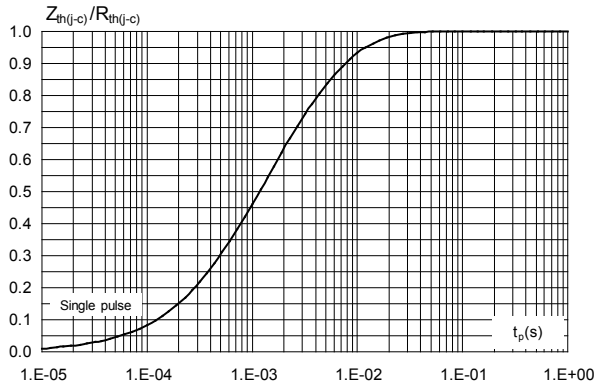
**Figure 3. Peak forward current versus case temperature (f<sub>w</sub> > 10 kHz)**



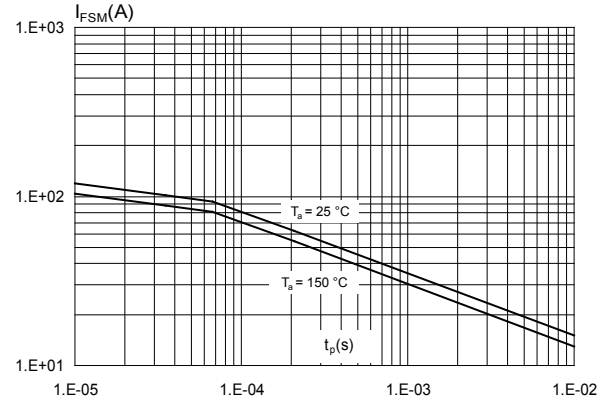
**Figure 4. Junction capacitance versus reverse voltage applied (typical values)**



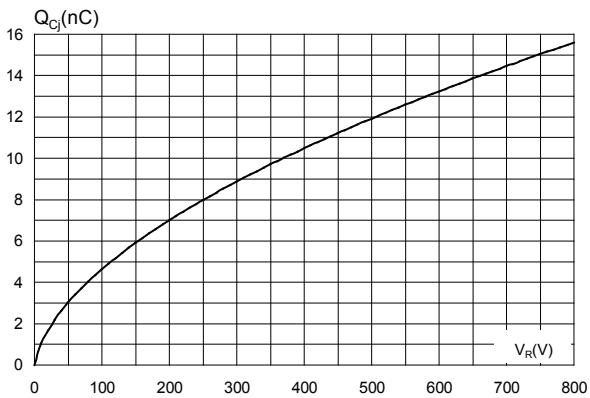
**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**



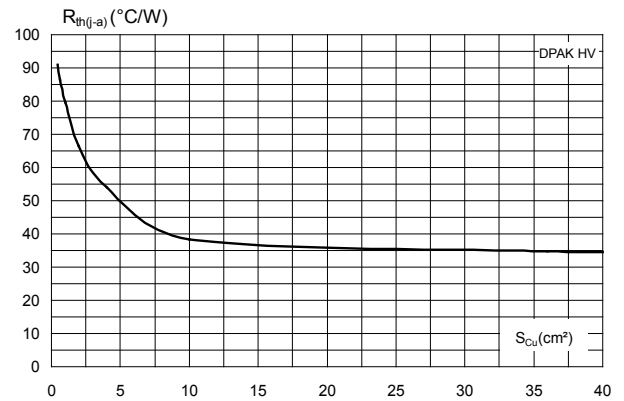
**Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**



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



**Figure 8. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4,  $e_{Cu} = 70\text{ }\mu\text{m}$ )**



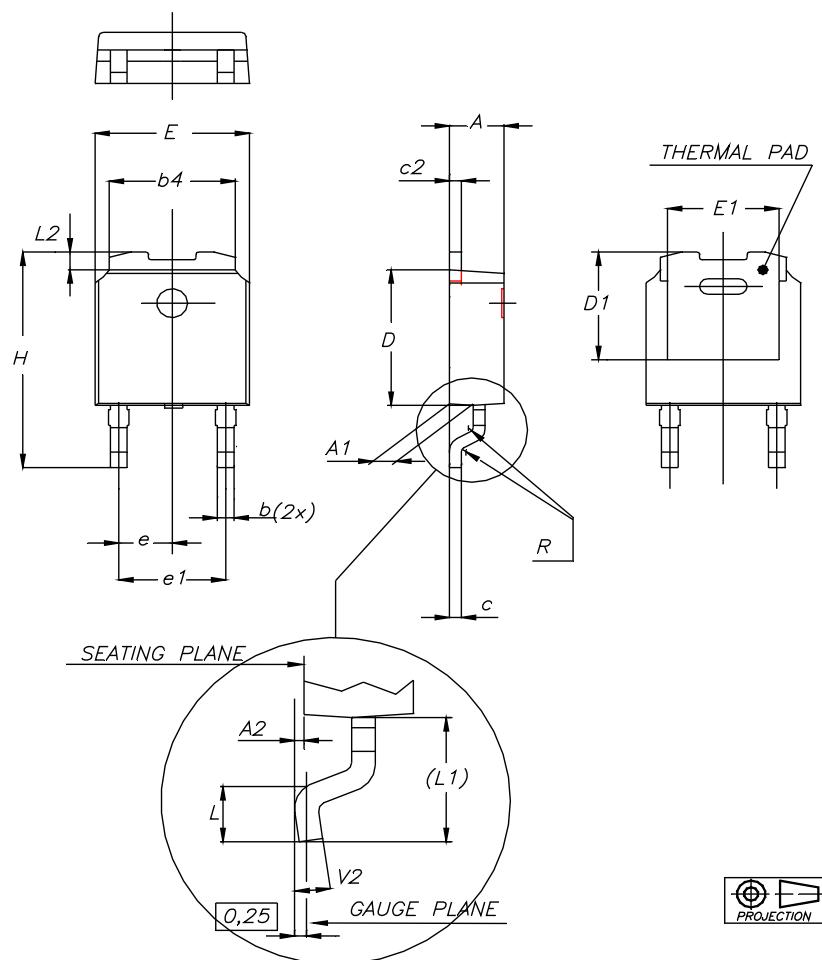
## 2 Package information

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 DPAK HV 2L package information

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

Figure 9. DPAK HV 2L package outline

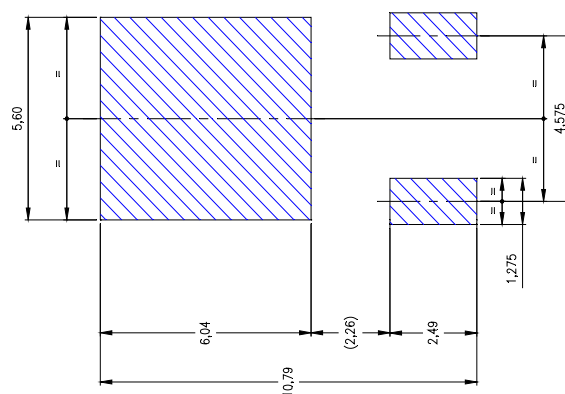


**Note:** This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. 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	5.10	5.40	0.204	0.201	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 10. Footprint (dimensions in mm)



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

### 2.1.1 Creepage distance between anode and cathode

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

Symbol	Parameter		Value	Unit
Cd <sub>A-K</sub>	Minimum creepage distance between A and K	DPAK HV	3.0	mm

*Note:* DPAK HV creepage distance (anode to cathode) =3.0 mm min. (refer to IEC 60664-1)

### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC2H12B2Y-TR	PSC2 H12Y	DPAK HV	0.350 g	2500	Tape and reel



## Revision history

**Table 8. Document revision history**

Date	Revision	Changes
19-Sep-2019	1	Initial release.
21-Sep-2021	2	Updated Figure 2.

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