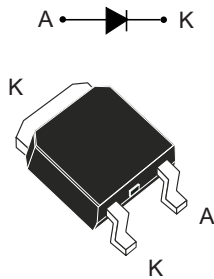


## 1200 V, 10 A, silicon carbide power Schottky diode



DPAK HV 2L

## Product label



## Product status link

[STPSC10H12B2-TR](#)

## Product summary

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

## Features

- No or negligible reverse recovery
- Switching behavior independent of temperature
- Robust high voltage periphery
- Operating  $T_j$  from -40 °C to 175 °C
- Low  $V_F$
- DPAK HV creepage distance (anode to cathode) = 3 mm min.
- ECOPACK2 compliant

## Applications

- EV Charging station
- Servers
- DC/DC
- PFC

## Description

This 10A, 1200V 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 DPAK HV, this diode is perfectly suited for a usage in PFC applications, in charging station, servers, DC/DC modules, easing the compliance to IEC-60664-1.

The [STPSC10H12B2-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

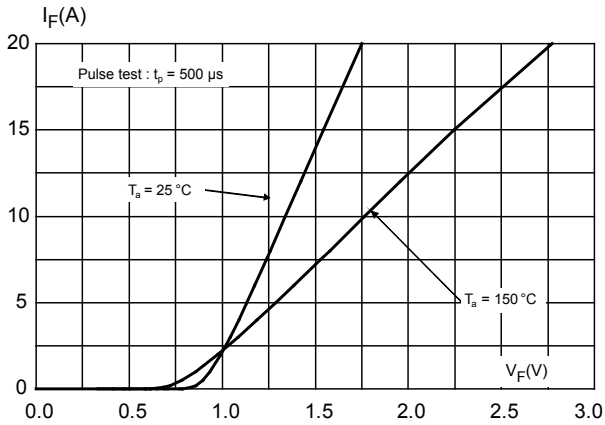
**Table 4. Dynamic electrical characteristics**

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	-	

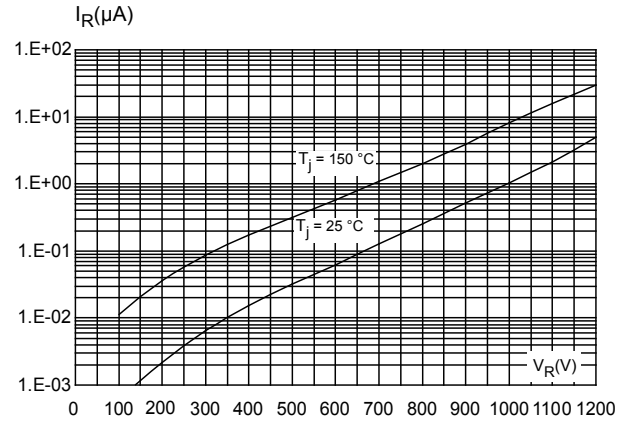
1. Most accurate value for the capacitive charge:  $Q_{Cj}(V_R) = \int_0^{V_R} C_j(V) dV$

### 1.1 Characteristics (curves)

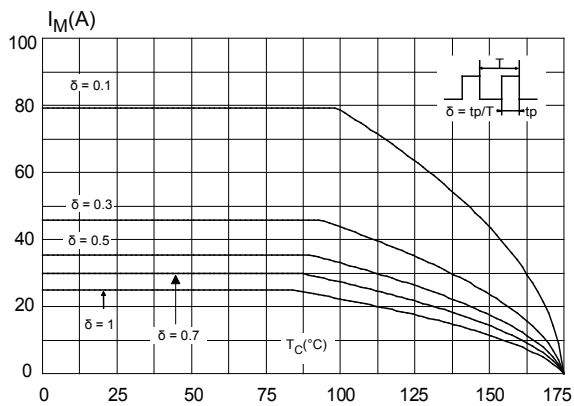
**Figure 1. Forward voltage drop versus forward current (typical values)**



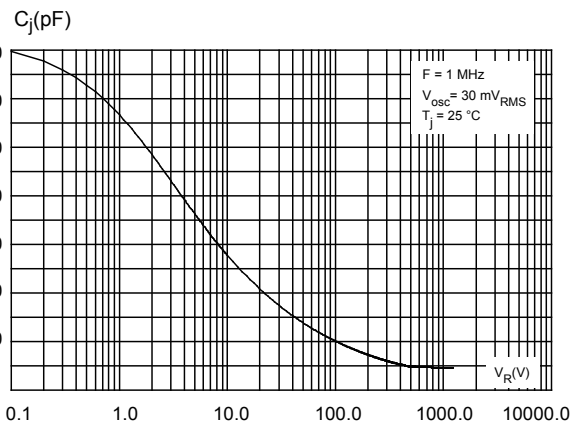
**Figure 2. Reverse leakage current versus reverse voltage applied (typical values)**



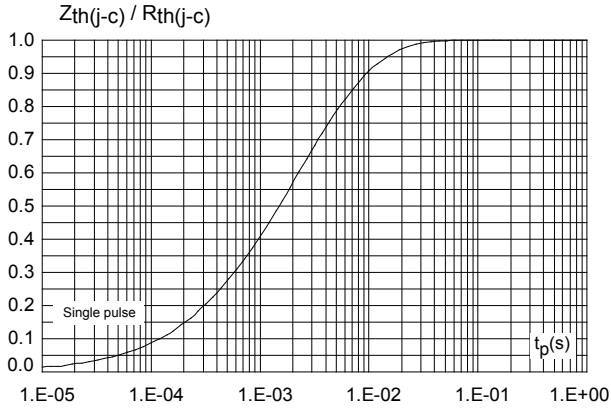
**Figure 3. Peak forward current versus case temperature**



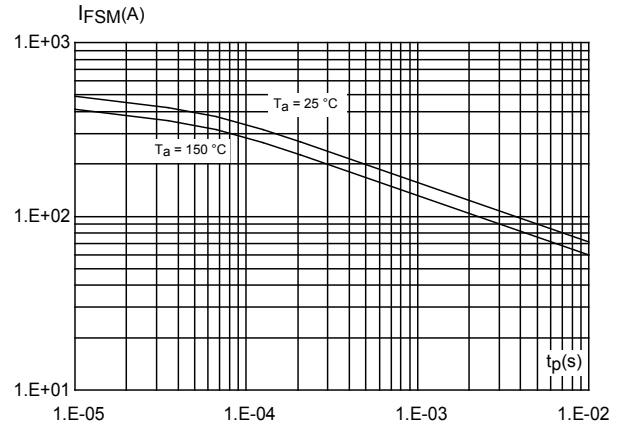
**Figure 4. Junction capacitance versus reverse voltage applied (typical values)**



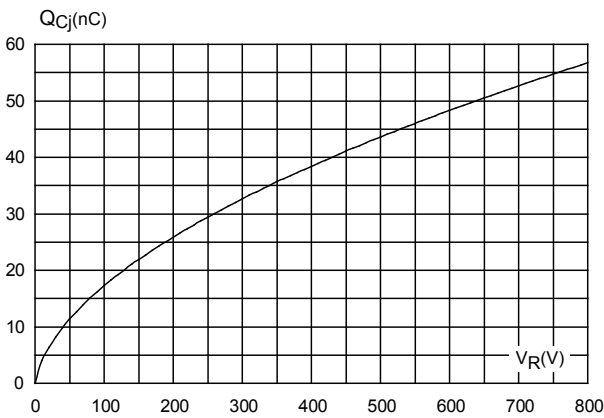
**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**



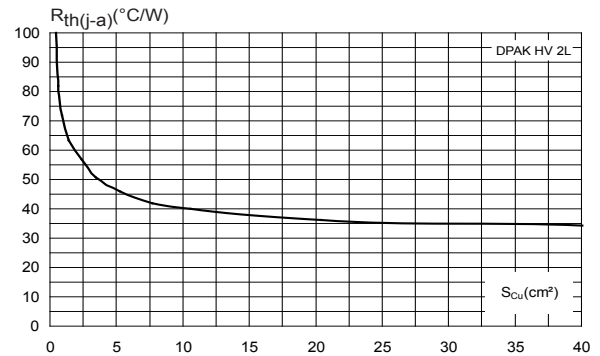
**Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**



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



**Figure 8. Thermal resistance junction to ambient versus copper surface under tab on epoxy printed board FR4,  $e_{Cu} = 35 \mu\text{m}$  (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 DPAK HV 2L package information

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

Figure 9. DPAK HV 2L package outline

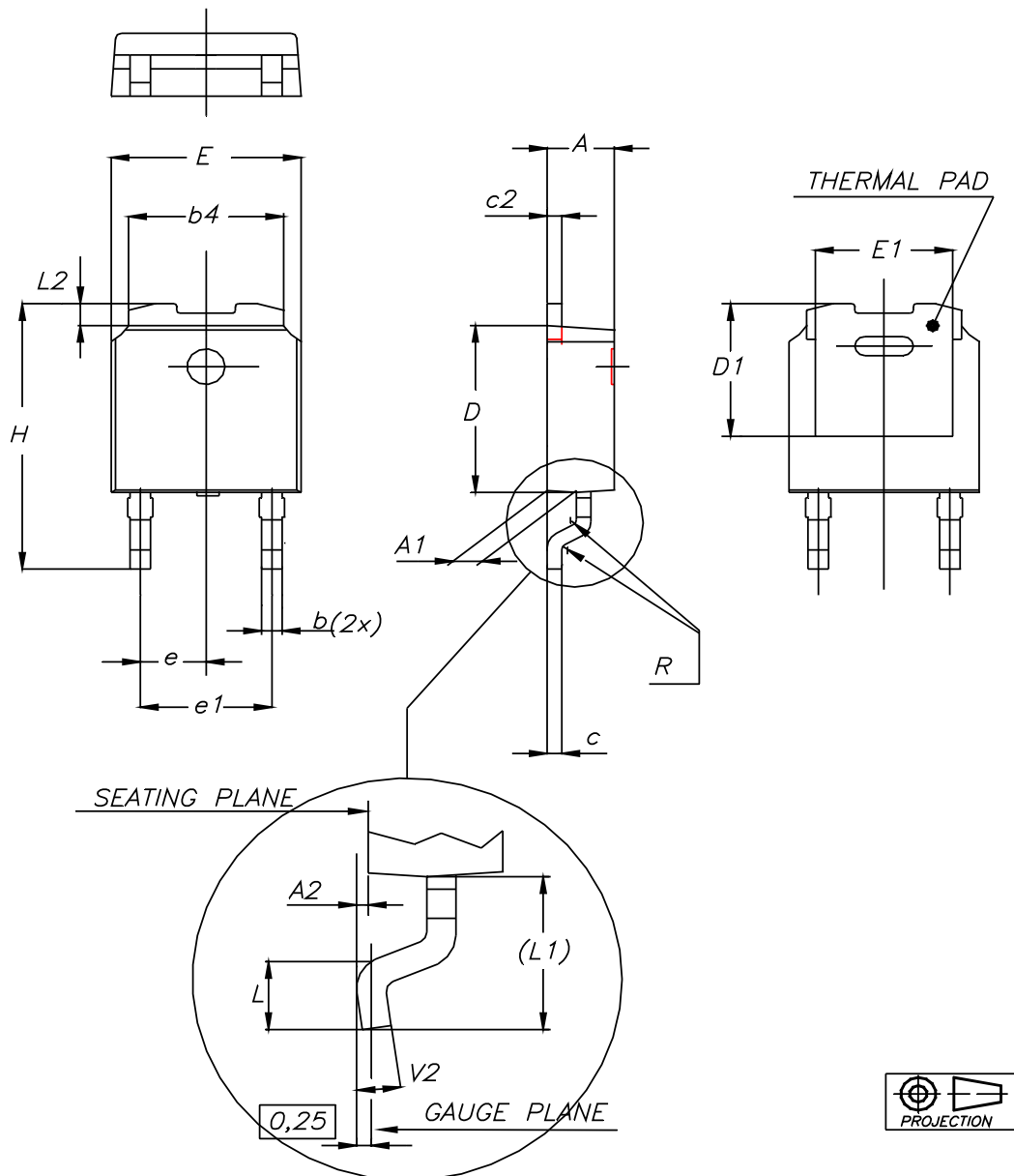
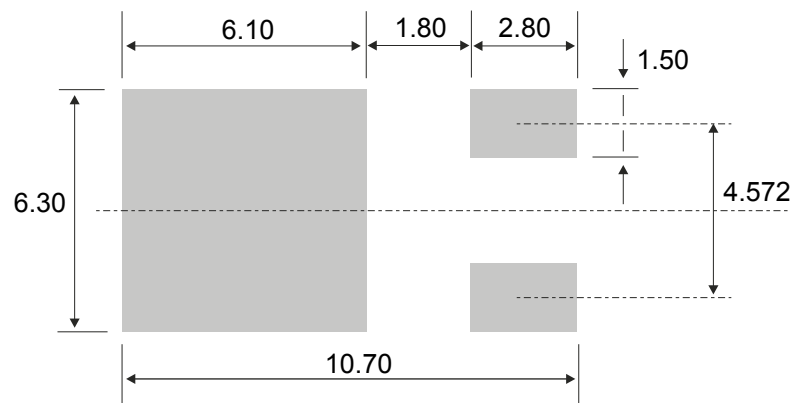


Table 5. DPAK HV 2L package mechanical data

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)



### 2.1.1 Creepage distance between Anode and Cathode

**Table 6. 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 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC10H12B2-TR	PSC10 H12	DPAK HV	0.350 g	2500	Tape and reel

## Revision history

**Table 8. Document revision history**

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

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