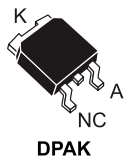


Automotive 650 V, 2 A high surge silicon carbide power Schottky diode



Product label



Features

- AEC-Q101 qualified 
- No reverse recovery charge in application current range
- Switching behavior independent of temperature
- High forward surge capability
- PPAP capable
- **ECOPACK2** compliant component
- V_{RRM} guaranteed from -40 to 175 °C
- Power efficient product

Applications

- Switch mode power supply
- PFC
- "DC/DC" converters
- LLC topologies
- Boost 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 650 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 applications, the **STPSC2H065-Y** SiC diode will boost performance in hard switching conditions.

Product status

STPSC2H065-Y

Product summary

Symbol	Value
$I_{F(AV)}$	2 A
V_{RRM}	650 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	1.38 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	$T_j = -40\text{ °C to } +175\text{ °C}$	650	V
$I_{F(RMS)}$	Forward rms current		6.5	A
$I_{F(AV)}$	Average forward current	$T_c = 160\text{ °C}^{(1)}$, DC	2	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$, $T_c = 25\text{ °C}$	20	A
		$t_p = 10\text{ ms sinusoidal}$, $T_c = 125\text{ °C}$	18	
		$t_p = 10\text{ }\mu\text{s square}$, $T_c = 25\text{ °C}$	140	
I_{FRM}	Repetitive peak forward current	$T_c = 160\text{ °C}^{(1)}$, $T_j = 175\text{ °C}$, $\delta = 0.1$	8.5	A
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	Typ. value	Max. value	Unit
$R_{th(j-c)}$	Junction to case	2.50	3.50	°C/W

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

- 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	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	1.5	20	μA
		$T_j = 150\text{ °C}$		-	17	84	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 2\text{ A}$	-	1.38	1.55	V
		$T_j = 150\text{ °C}$		-	1.60	1.95	

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

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

To evaluate the conduction losses, use the following equation:

$$P = 1.001 \times I_{F(AV)} + 0.474 \times I_{F(RMS)}^2$$

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	Typ.	Unit
$Q_{cj}^{(1)}$	Total capacitive charge	$V_R = 400 \text{ V}$	7.9	nC
C_j	Total capacitance	$V_R = 0 \text{ V}, T_c = 25 \text{ }^\circ\text{C}, F = 1 \text{ MHz}$	135	pF
		$V_R = 400 \text{ V}, T_c = 25 \text{ }^\circ\text{C}, F = 1 \text{ MHz}$	14	

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, low level)

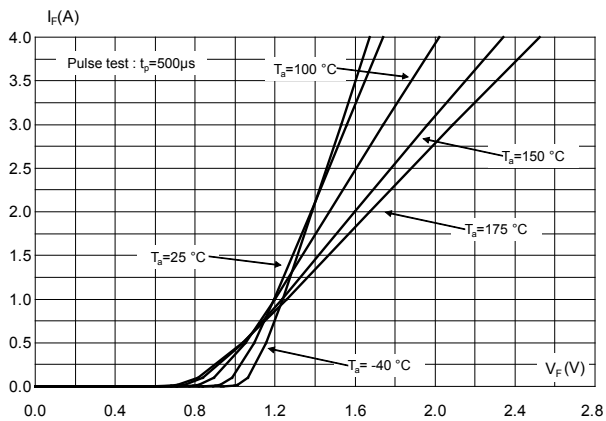


Figure 2. Forward voltage drop versus forward current (typical values, high level)

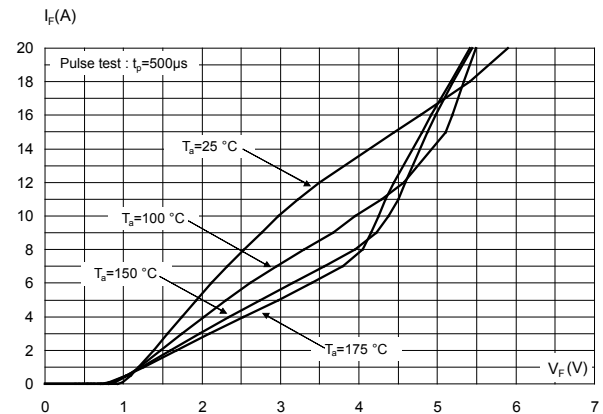


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

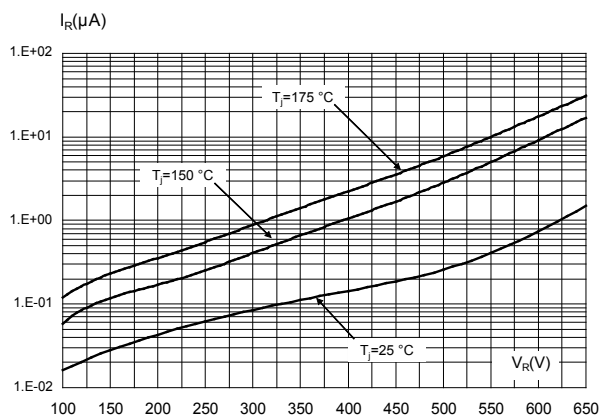


Figure 4. Peak forward current versus case temperature

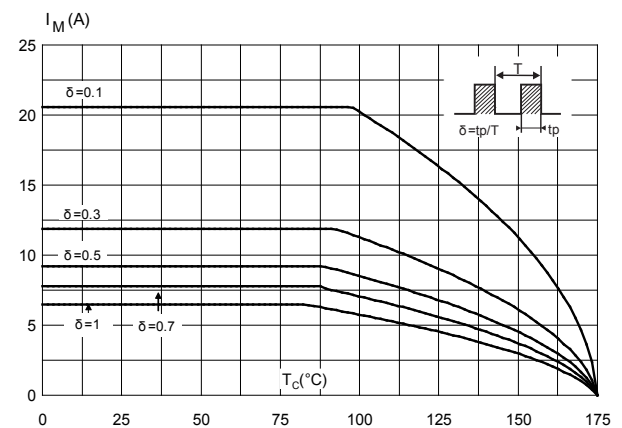


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

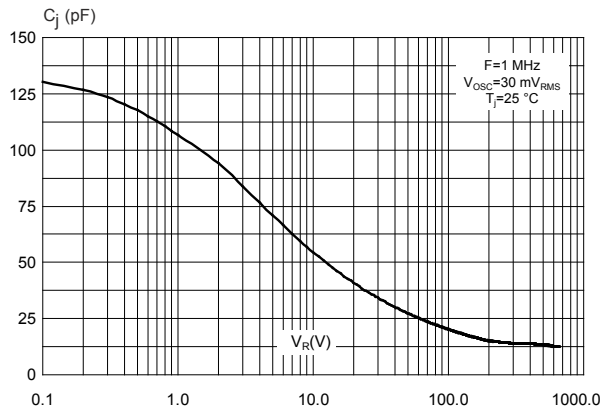


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

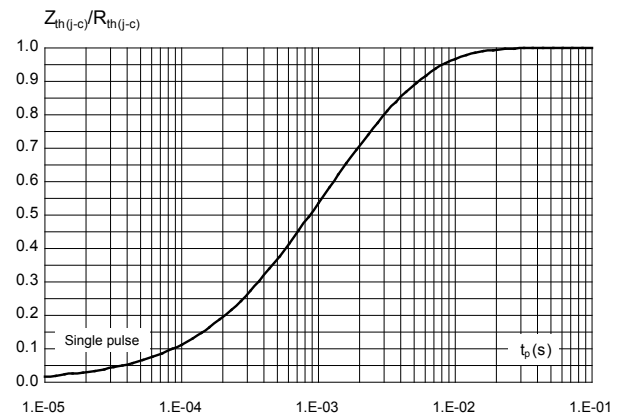


Figure 7. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

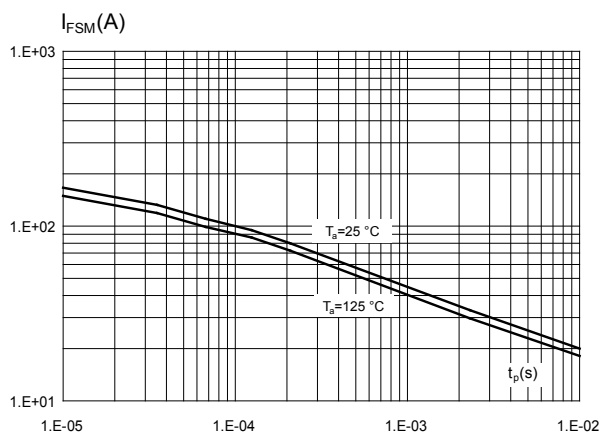
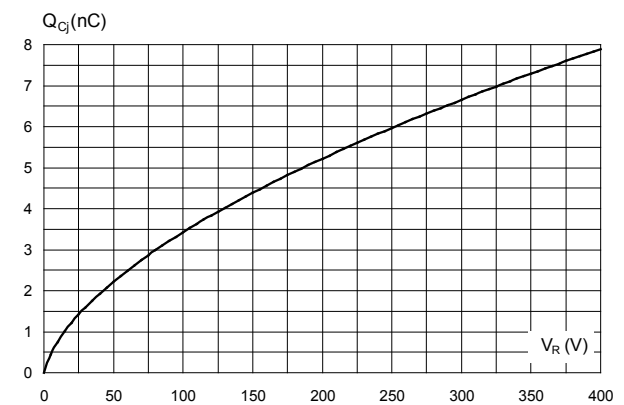


Figure 8. Total capacitive charges versus reverse voltage applied (typical values)



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.

2.1 DPAK package information

- Epoxy meets UL94, V0

Figure 9. DPAK package outline

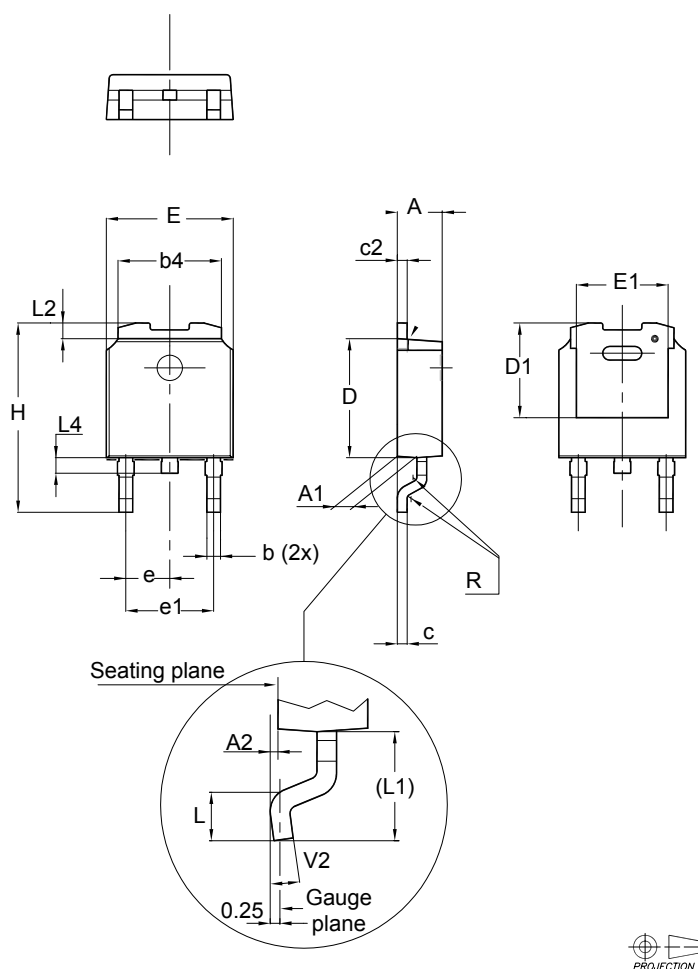
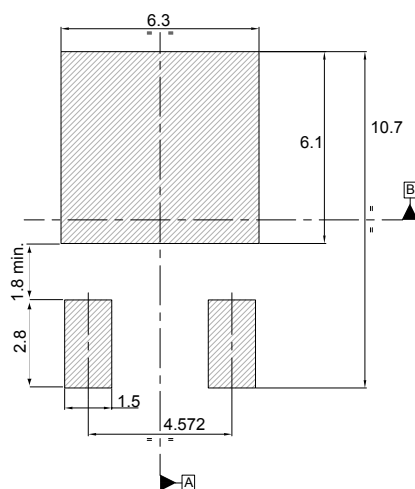


Table 5. DPAK mechanical data

Dim.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	5.20		5.40	0.205		0.213
c	0.45		0.60	0.018		0.024
c2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
D1	4.95	5.10	5.25	0.195	0.201	0.207
E	6.40		6.60	0.252		0.260
E1	4.60	4.70	4.80	0.181	0.185	0.189
e	2.159	2.286	2.413	0.085	0.090	0.095
e1	4.445	4.572	4.699	0.175	0.180	0.185
H	9.35		10.10	0.368		0.398
L	1.00		1.50	0.039		0.059
(L1)	2.60	2.80	3.00	0.102	0.110	0.118
L2	0.65	0.80	0.95	0.026	0.031	0.037
L4	0.60		1.00	0.024		0.039
R		0.20			0.008	
V2	0°		8°	0°		8°

1. Inches dimensions given for reference only

Figure 10. DPAK recommended footprint (dimensions are in mm)


The device must be positioned within $\Phi 0.05 \text{ A B}$

3 Ordering Information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC2H065BY-TR	PSC2 H065Y	DPAK	0.35 g	2500	Tape and reel

Revision history

Table 7. Document revision history

Date	Version	Changes
25-Apr-2019	1	First issue.

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