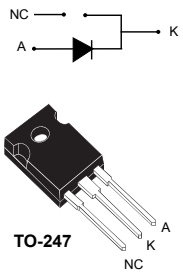
STPSC16H065A

Datasheet

650 V power Schottky silicon carbide rectifier



Features

- No or negligible reverse recovery
- Temperature independent switching behavior
- High forward surge capability
- Operating T_j from -40 °C to 175 °C
- Power efficient product
- ECOPACK®2 compliant

Applications

- DC/DC converter
- High frequency inverter
- Boost PFC function

Description

The STPSC16H065A SiC diode is an ultrahigh 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, this ST SiC diode, packaged in TO-247, will boost the performance in hard switching conditions. Its high forward surge capability ensures a good robustness during transient phases.

Product status link
STPSC16H065A

Product summary	
$I_{F(AV)}$	16 A
V_{RRM}	650 V
T_j (max.)	175 °C
V_F (typ.)	1.56 V

Product label
SUSTAINABLE TECHNOLOGY

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 °C to +175 °C	650	V
$I_{F(RMS)}$	Forward rms current		22	A
$I_{F(AV)}$	Average forward current	T_c = 115 °C(1), DC current	16	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal, T_c = 25 °C	120	A
		t_p = 10 ms sinusoidal, T_c = 125 °C	105	
		t_p = 10 µs square, T_c = 25 °C	800	
I_{FRM}	Repetitive peak forward current	T_c = 115 °C(1), T_j = 175 °C, δ = 0.1	66	A
T_{stg}	Storage temperature range		-55 to +175	°C
T_j	Operating junction temperature		-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	0.95	1.5	°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(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	12	140	µA
		T_j = 150 °C		-	120	560	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 16 A	-	1.56	1.75	V
		T_j = 150 °C		-	1.98	2.50	

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:

$P = 1.35 \times I_{F(AV)} + 0.07 \times I_F{}^2{}_{(RMS)}$

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 V	41	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	750	pF
		V_R = 300 V, T_c = 25 °C, F = 1 MHz	76	

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)

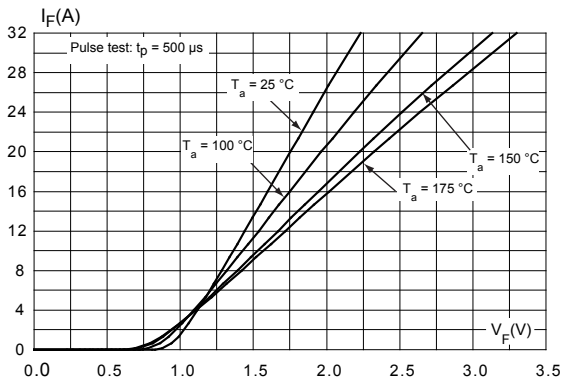


Figure 2. Forward voltage drop versus forward current (typical values, high level)

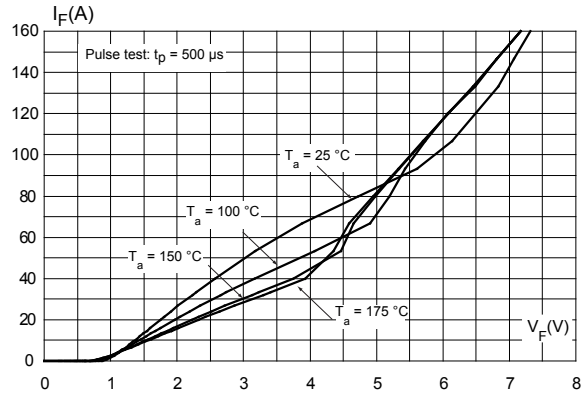


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

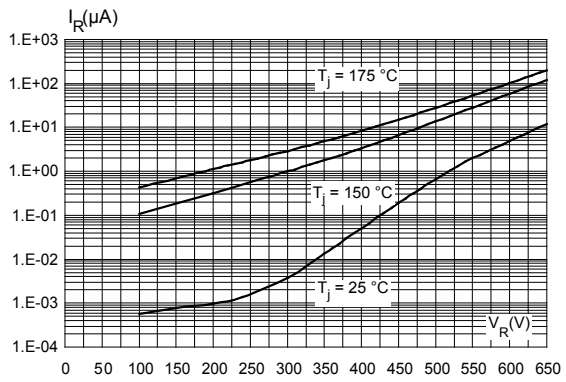


Figure 4. Peak forward current versus case temperature

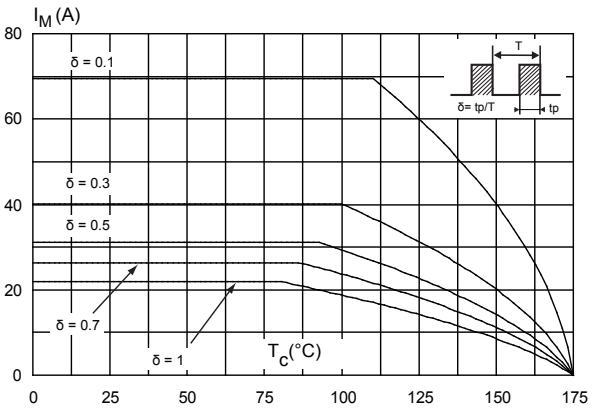


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

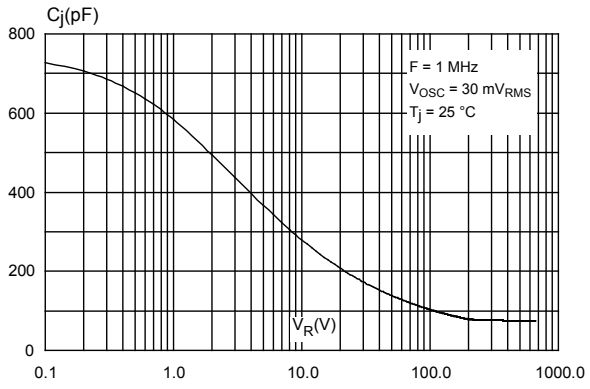


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

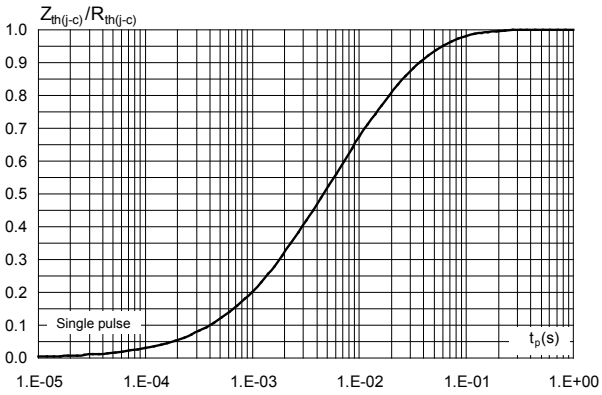


Figure 7. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

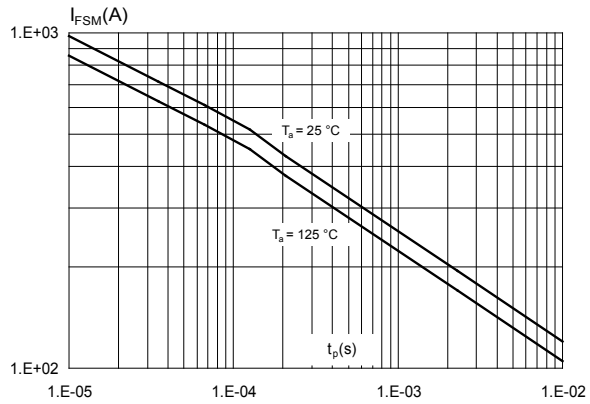
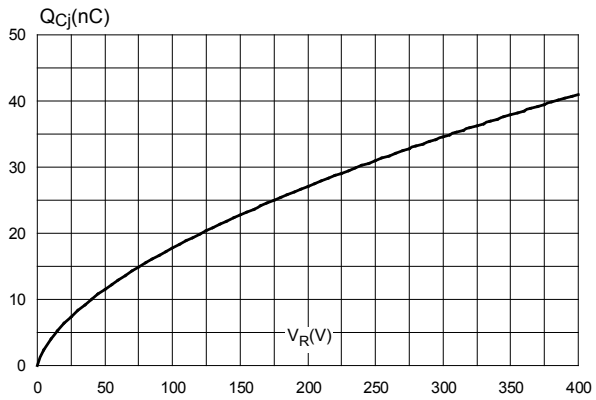


Figure 8. Total capacitive charges versus reverse voltage applied (typical values)



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 TO-247 package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m
- Maximum torque value: 1.0 N·m

Figure 9. TO-247 package outline

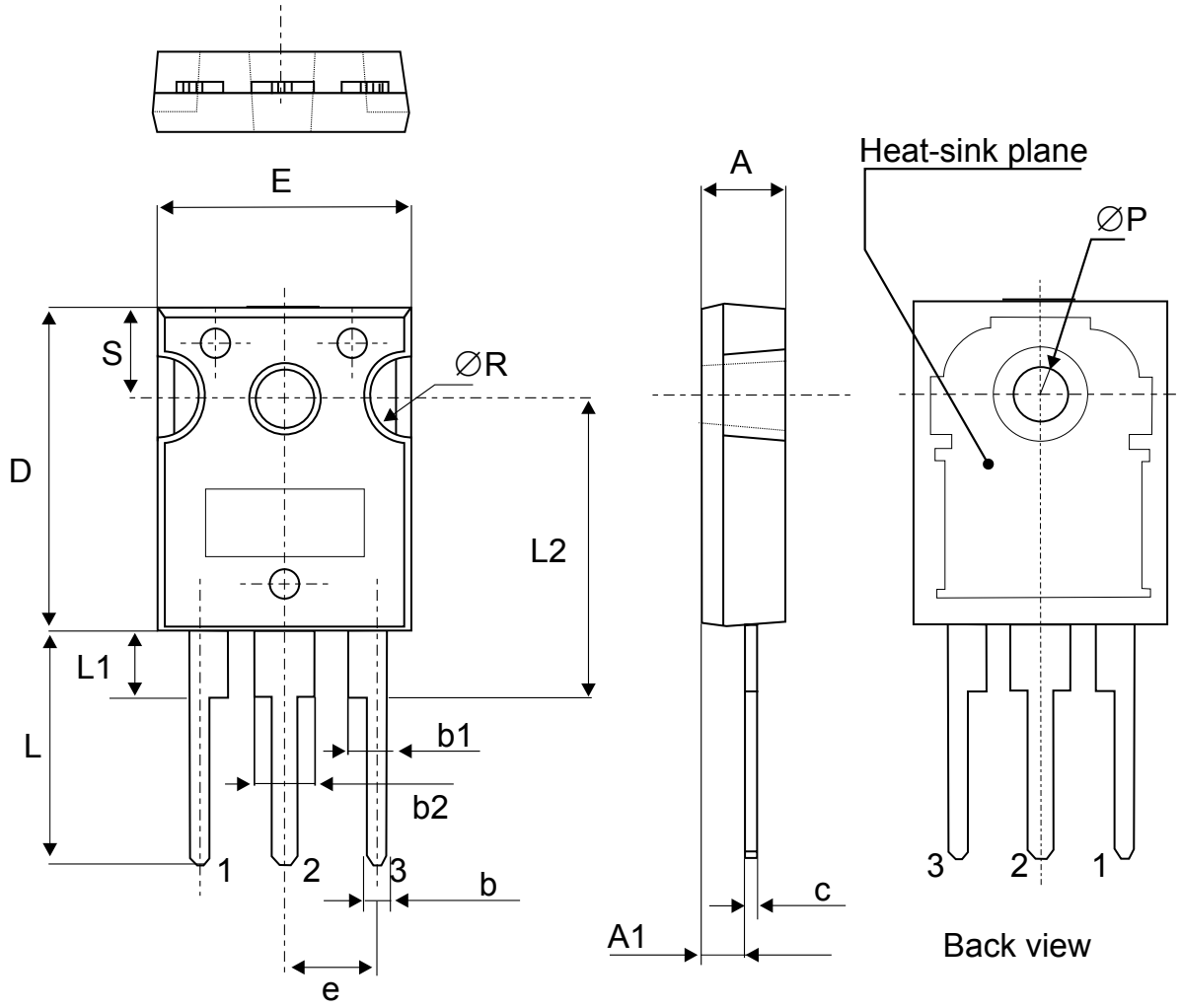


Table 5. **TO-247 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
ØP	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

3 Ordering information

Table 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC16H065AW	STPSC16H065AW	TO-247	4.43 g	30	Tube

Revision history

Table 7. **Document revision history**

Date	Version	Changes
08-Oct-2018	1	Initial release.

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