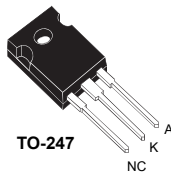
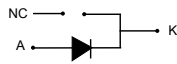


## 650 V power Schottky silicon carbide rectifier



### Features

- No or negligible reverse recovery
- Temperature independent switching behavior
- High forward surge capability
- Operating  $T_j$  from  $-40\text{ }^{\circ}\text{C}$  to  $175\text{ }^{\circ}\text{C}$
- Power efficient product
- ECOPACK<sup>®</sup>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 $^{\circ}\text{C}$
$V_F$ (typ.)	1.56 V

#### Product label



# 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		22	A
$I_{F(AV)}$	Average forward current	$T_c = 115\text{ °C}^{(1)}$ , DC current	16	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$ , $T_c = 25\text{ °C}$	120	A
		$t_p = 10\text{ ms sinusoidal}$ , $T_c = 125\text{ °C}$	105	
		$t_p = 10\text{ }\mu\text{s square}$ , $T_c = 25\text{ °C}$	800	
$I_{FRM}$	Repetitive peak forward current	$T_c = 115\text{ °C}^{(1)}$ , $T_j = 175\text{ °C}$ , $\delta = 0.1$	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	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	12	140	$\mu\text{A}$
		$T_j = 150\text{ °C}$		-	120	560	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 16\text{ A}$	-	1.56	1.75	V
		$T_j = 150\text{ °C}$		-	1.98	2.50	

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:

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

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	$V_R = 400\text{ V}$	41	nC
$C_j$	Total capacitance	$V_R = 0\text{ V}, T_c = 25\text{ }^\circ\text{C}, F = 1\text{ MHz}$	750	pF
		$V_R = 300\text{ V}, T_c = 25\text{ }^\circ\text{C}, F = 1\text{ MHz}$	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)

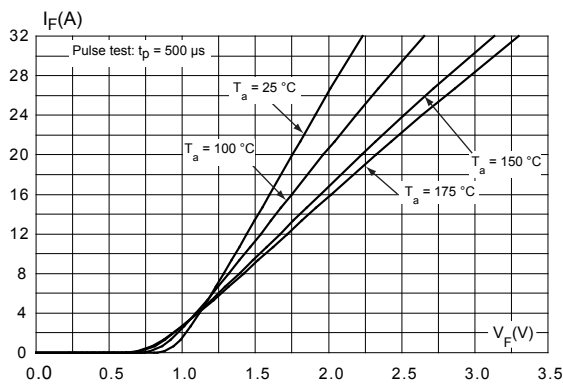


Figure 2. Forward voltage drop versus forward current (typical values, high level)

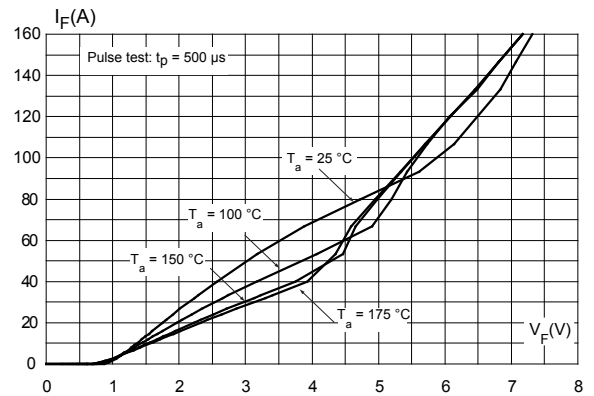


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

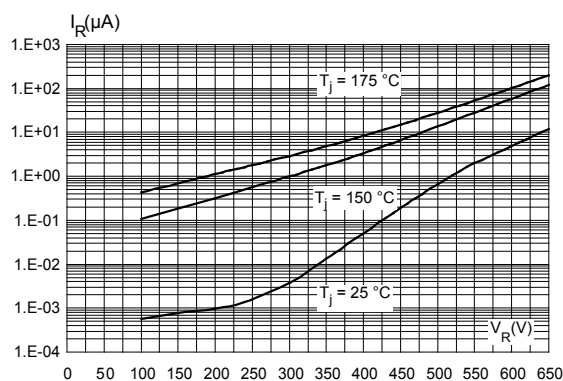
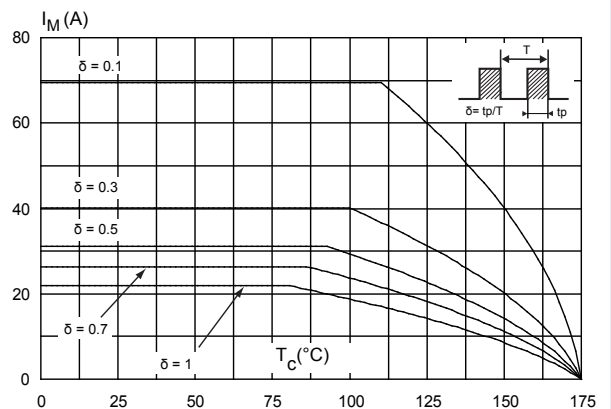
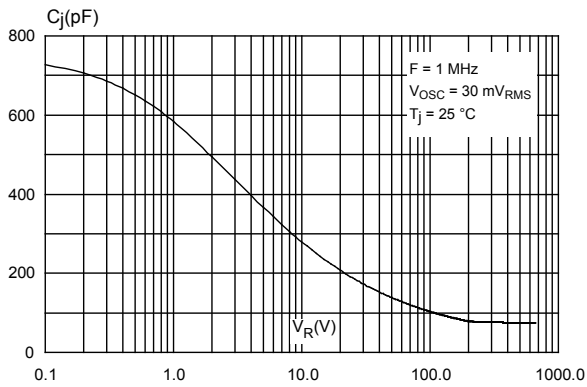
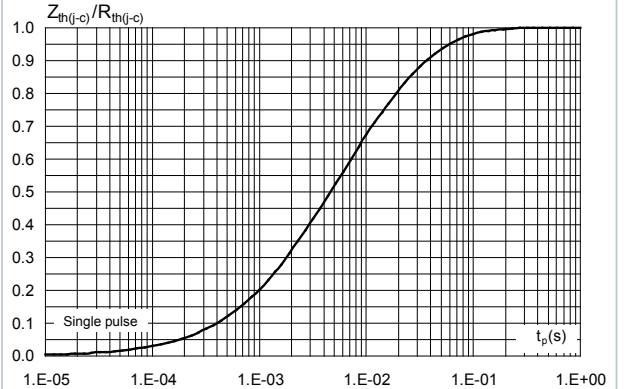
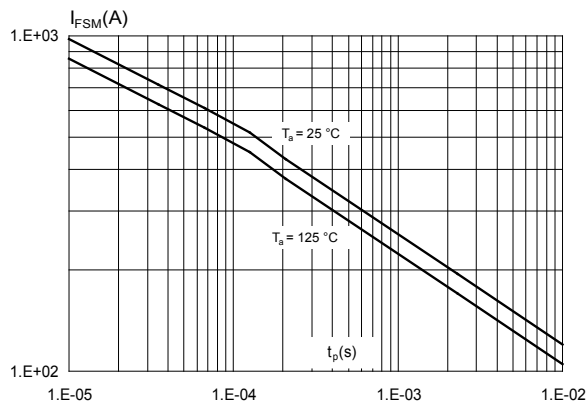
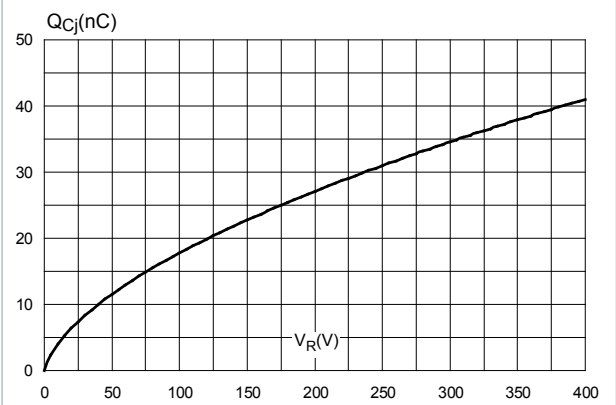


Figure 4. Peak forward current versus case temperature



**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)**


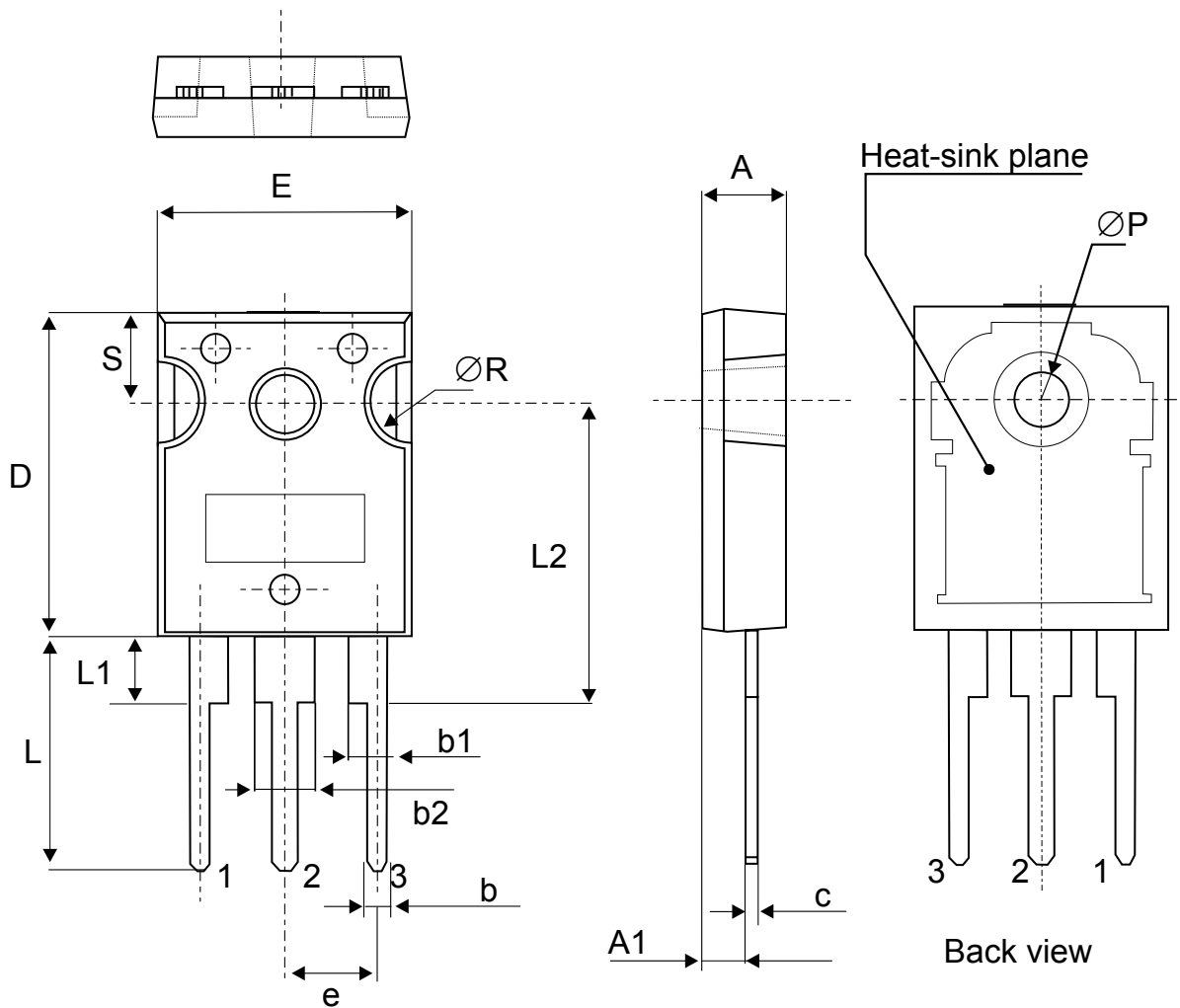
## 2 Package information

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](http://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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