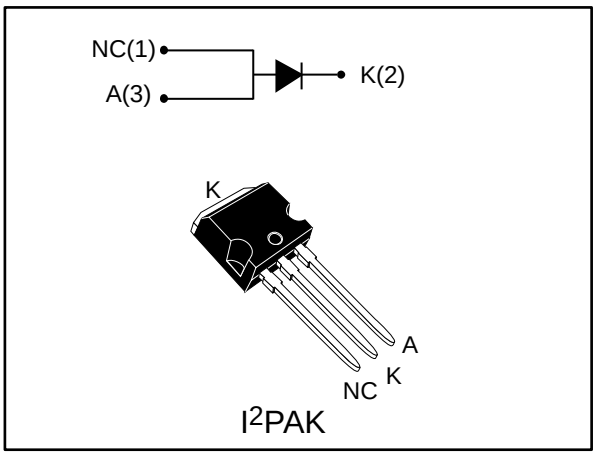
STPSC10C065-Y

Automotive 650 V power Schottky silicon carbide diode

Datasheet - production data



Features

- AEC-Q101 qualified
- No reverse recovery charge in application current range
- Switching behavior independent of temperature
- Recommended to PFC applications
- PPAP capable
- ECOPACK®2 compliant component

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, this ST SiC diode will boost performance in hard switching conditions.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	10 A
V_{RRM}	650 V
T_j (max.)	175 °C

This is information on a product in full production.

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1 Characteristics

Table 2: Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage	T_j from -40 °C to 175 °C	650	V
$I_{F(RMS)}$	Forward rms current		22	A
$I_{F(AV)}$	Average forward current	T_C = 120 °C(1), DC current	10	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal, T_c = 25 °C	85	A
		t_p = 10 ms sinusoidal, T_c = 150 °C	75	
		t_p = 10 µs square, T_c = 25 °C	500	
T_{stg}	Storage temperature range		-55 to +175	°C
T_j	Operating junction temperature(2)		-40 to +175	°C

Notes:

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

(2)$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3: Thermal parameters

Symbol	Parameter	Value		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Junction to case	1.3	2.0	°C/W

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	9	100	µA
		T_j = 150 °C		-	85	425	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	1.56	1.75	V
		T_j = 150 °C		-	1.98	2.50	

Notes:

(1)Pulse test: t_p = 5 ms, δ < 2%

(2)Pulse test: t_p = 500 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 1.35 \times I_{F(AV)} + 0.12 \times I_{F^2(RMS)}$

Table 5: Dynamic electrical characteristics

Symbol	Parameter	Test conditions	Typ.	Unit
Q_{Cj}(1)	Total capacitive charge	V_R = 400 V	26.4	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	480	pF
		V_R = 400 V, T_c = 25 °C, F = 1 MHz	47	

Notes: (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)

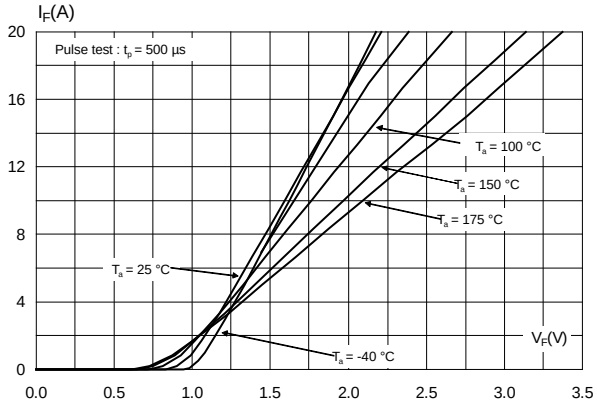


Figure 2: Forward voltage drop versus forward current (typical values, high level)

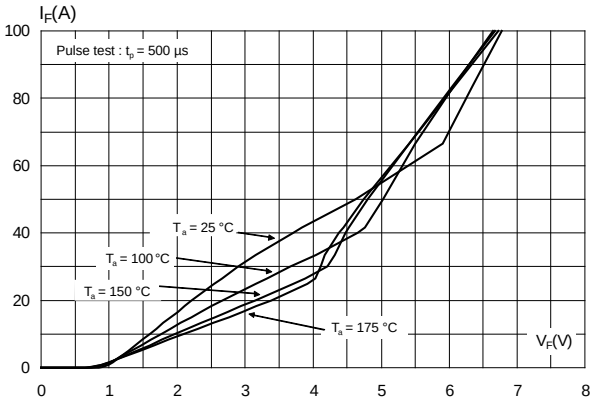


Figure 3: Reverse leakage current versus reverse voltage applied (typical values)

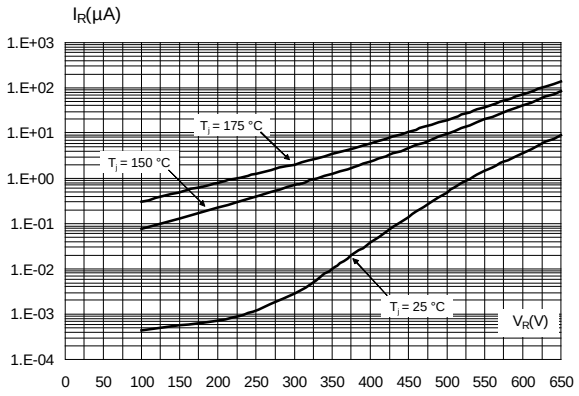


Figure 4: Peak forward current versus case temperature

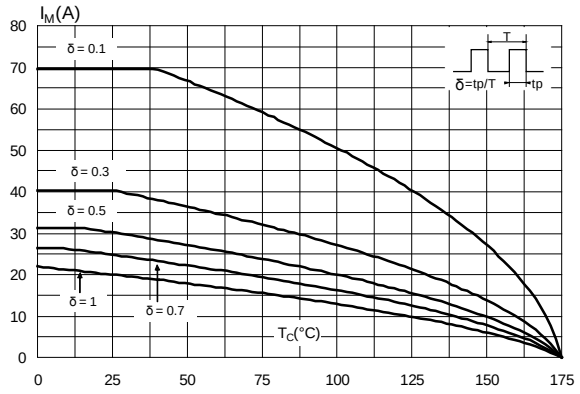


Figure 5: Junction capacitance versus reverse voltage applied (typical values)

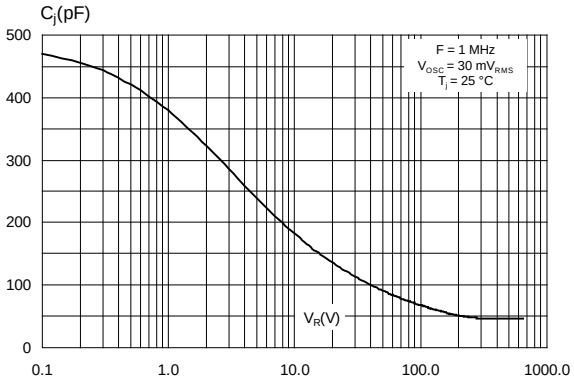


Figure 6: Relative variation of thermal impedance junction to case versus pulse duration

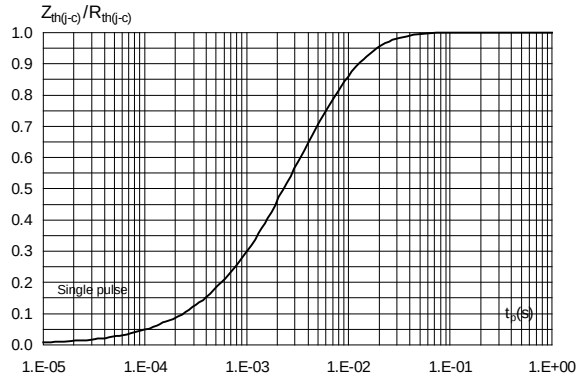


Figure 7: Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

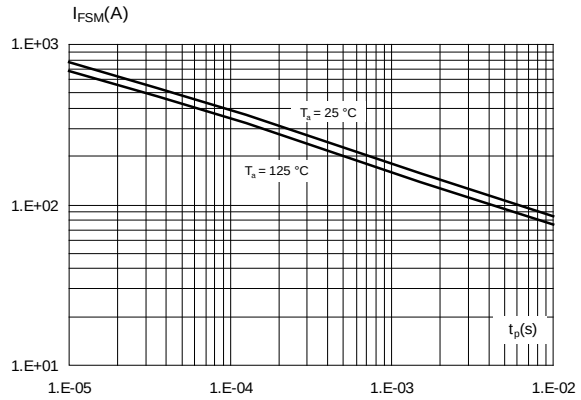
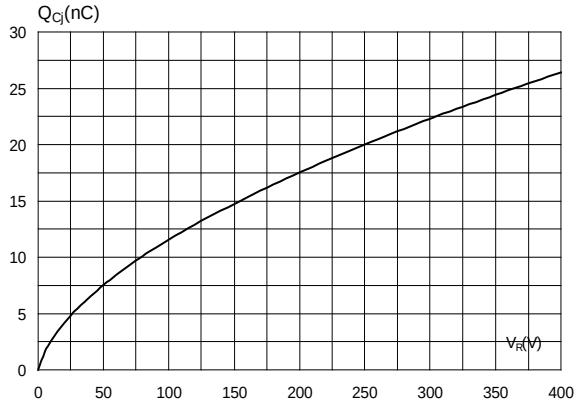


Figure 8: Total capacitive charges versus reverse voltage applied (typical values)



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.

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

2.1 I²PAK package information

Figure 9: I²PAK package outline

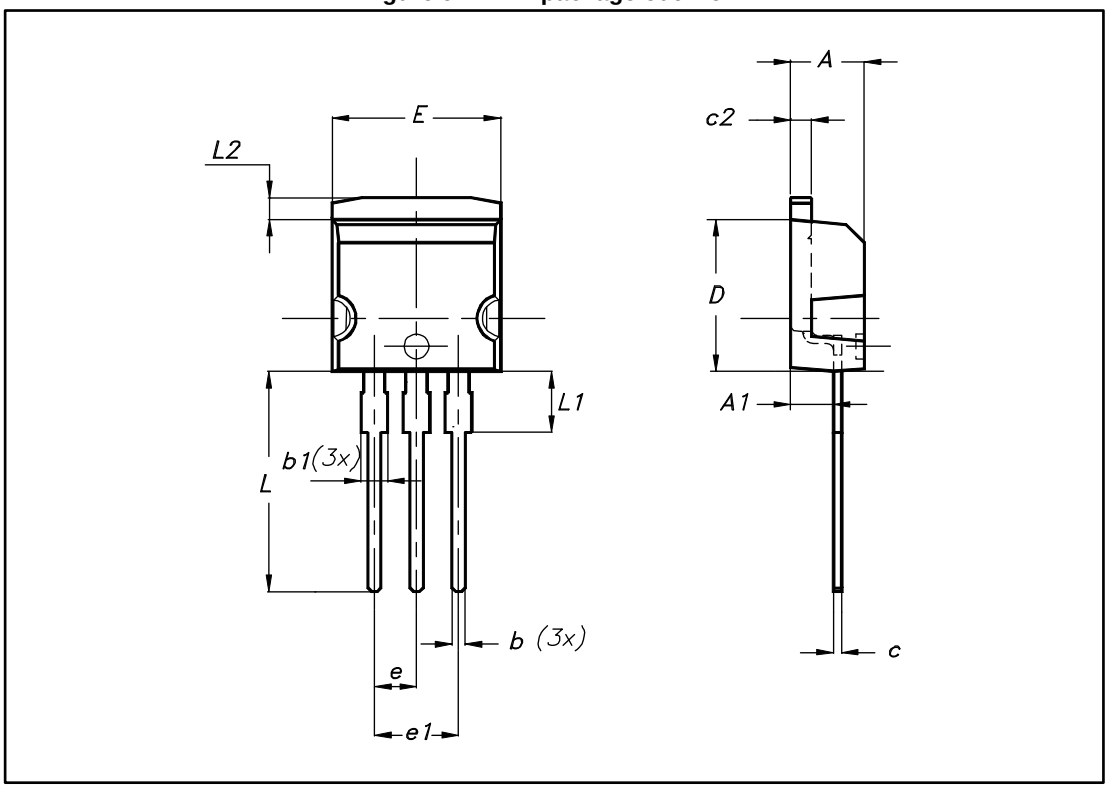


Table 6: I²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
A1	2.40		2.72	0.094		0.107
b	0.61		0.88	0.024		0.035
b1	1.14		1.70	0.044		0.067
c	0.49		0.70	0.019		0.028
c2	1.23		1.32	0.048		0.052
D	8.95		9.35	0.352		0.368
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.195		0.203
E	10		10.40	0.394		0.409
L	13		14	0.512		0.551
L1	3.50		3.93	0.138		0.155
L2	1.27		1.40	0.050		0.055

3 Ordering information

Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC10C065RY	PSC10C065RY	I²PAK	1.5 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
16-Feb-2018	1	First issue.

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