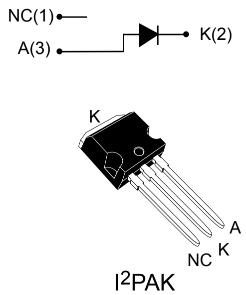
STPSC10C065-Y

Datasheet

Automotive 650 V power Schottky silicon carbide diode



I^2PAK

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, the STPSC10C065-Y will boost performance in hard switching conditions.

Product status link
STPSC10C065-Y

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

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 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, DC current(1)	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 = 125 °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

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 2. **Thermal resistance parameters**

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

Table 3. **Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	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	

1. *Pulse test: t_p = 10 ms, $\delta < 2\%$*
2. *Pulse test: t_p = 500 µs, $\delta < 2\%$*

To evaluate the conduction losses, use the following equation:

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

Table 4. **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 = 300 V, T_c = 25 °C, F = 1 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, low level)

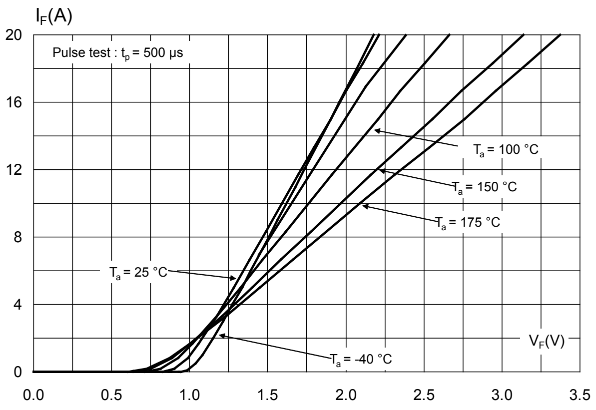


Figure 2. Forward voltage drop versus forward current (typical values, high level)

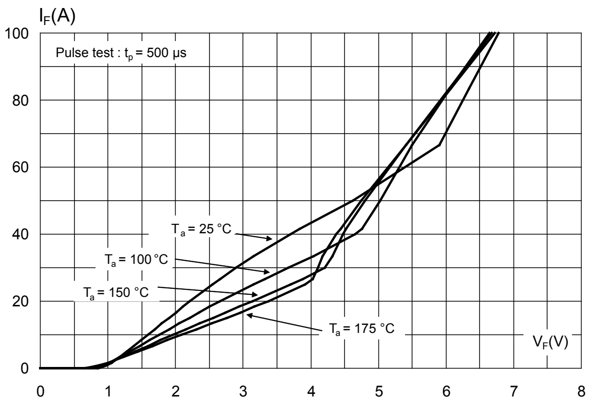


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

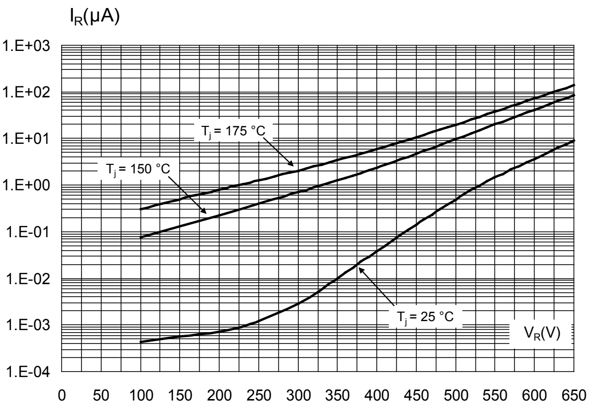


Figure 4. Peak forward current versus case temperature

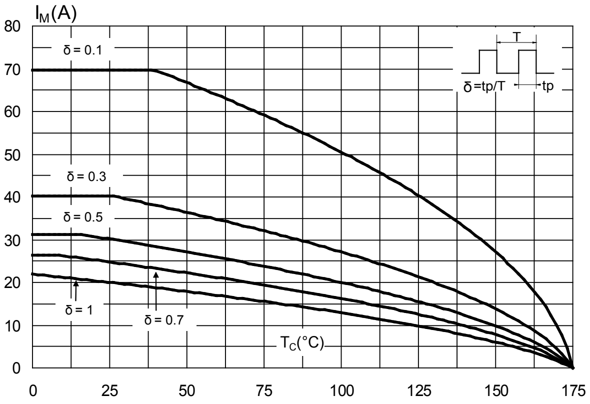


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

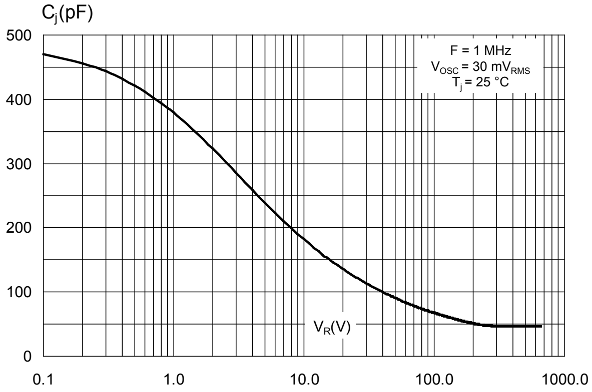


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

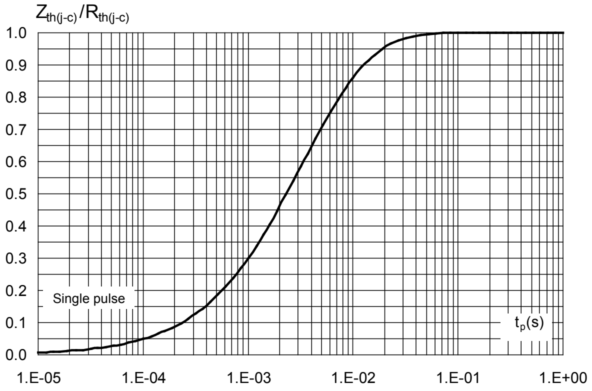


Figure 7. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

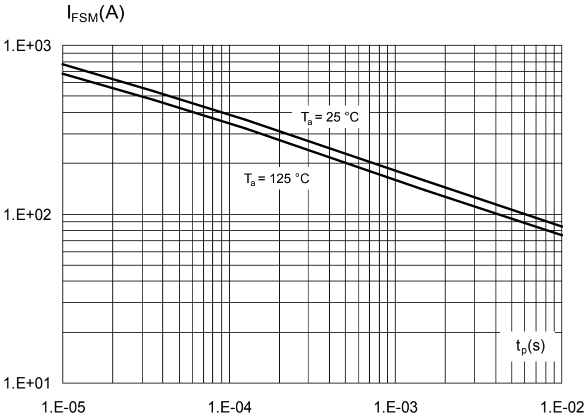
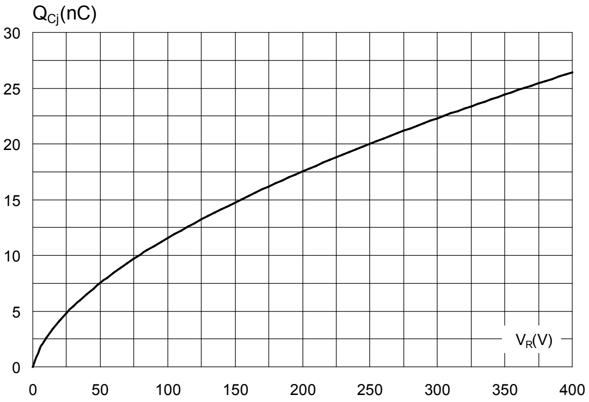


Figure 8. Total capacitive charges versus reverse voltage applied (typical values)



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 I²PAK package information

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

Figure 9. I²PAK package outline

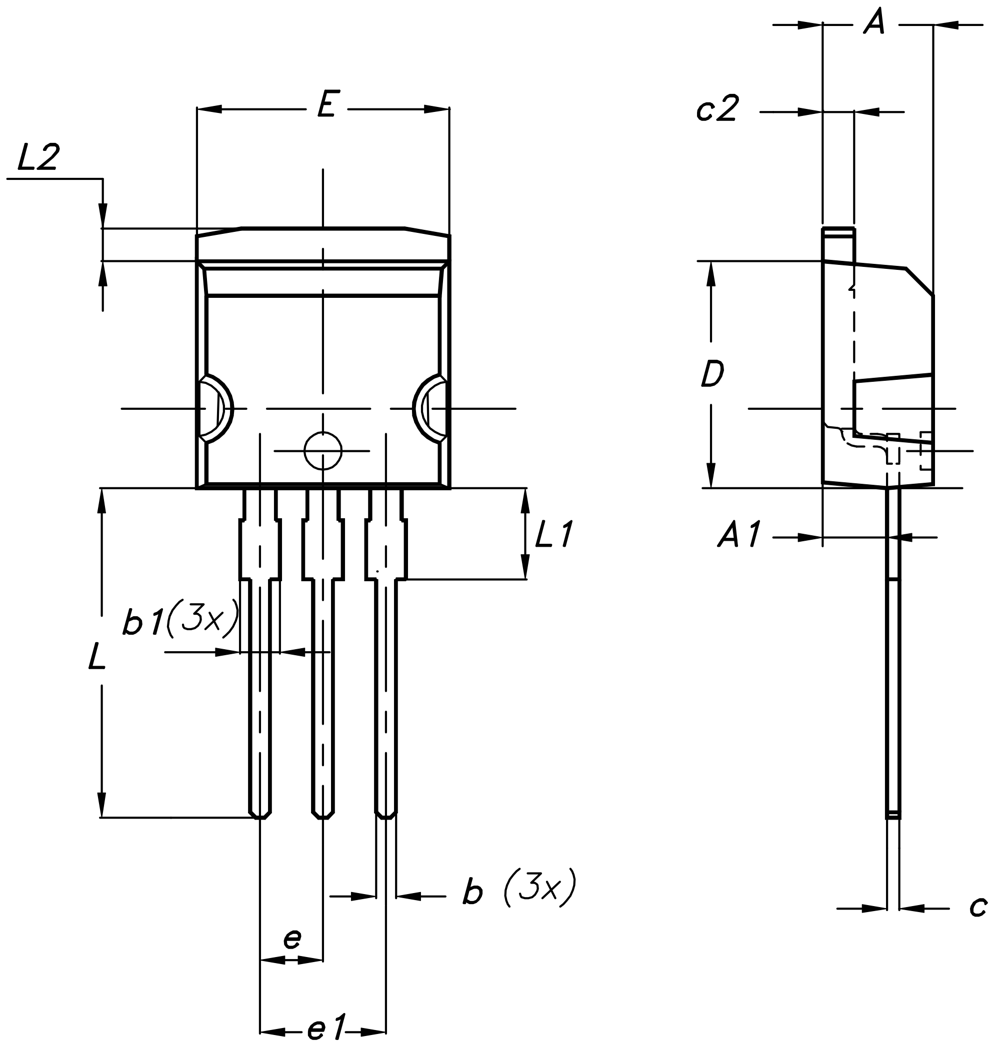


Table 5. I²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	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	10.00	10.40	0.394	0.409
L	13.00	14.00	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 6. **Ordering information**

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

Revision history

Table 7. Document revision history

Date	Revision	Changes
16-Feb-2018	1	First issue.
24-Sep-2018	2	Corrected cover image.