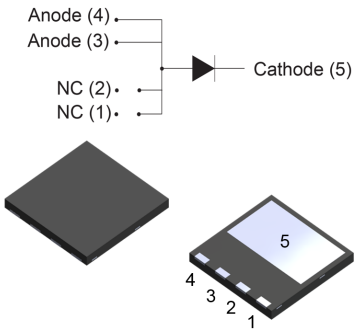
STPSC10065DLF

Datasheet

650 V, 10 A power Schottky silicon carbide diode



PowerFLAT™ 8x8 HV

Features

- Less-than-1mm height package
- High creepage package
- No or negligible reverse recovery
- Temperature independent switching behavior
- High forward surge capability
- Very low drop forward voltage
- Power efficient product
- ECOPACK2 compliant component

Applications

- Boost PFC
- Bootstrap diode
- LLC clamping function
- High frequency inverter applications

Description

This 10 A, 650 V, 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.

Qualified in low profile package, the STPSC10065DLF in PowerFLAT™ 8x8 HV, enables low drop forward voltage associated to high surge capabilities in low space environment such as telecom and network, industrial or renewable energy domains.

Product status link
STPSC10065DLF

Product summary	
Symbol	**Value**
$I_{F(AV)}$	10 A
V_{RRM}	650 V
$V_{F(typ.)}$	1.30 V
$T_{j(max.)}$	175 °C

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		18	A
$I_{F(AV)}$	Average forward current	T_c = 140 °C(1), DC	10	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal, T_c = 25 °C t_p = 10 ms sinusoidal, T_c = 125 °C t_p = 10 µs square, T_c = 25 °C	48 39 210	A
I_{FRM}	Repetitive peak forward current	T_c = 140 °C(1) , T_j = 175 °C, δ = 0.1, f_W > 10 kHz	44	A
T_{stg}	Storage temperature range		-55 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	1.4	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	$V_R = V_{RRM}$	-	7	130	µA
		T_j = 150 °C		-	53	900	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	1.30	1.45	V
		T_j = 150 °C		-	1.45	1.65	

1. *t_p = 10 ms, δ < 2%*
2. *t_p = 500 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.97 \times I_{F(AV)} + 0.068 \times I_F{}^2{}_{(RMS)}$

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	34	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	670	pF
		V_R = 400 V, T_c = 25 °C, F = 1 MHz	55	

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)

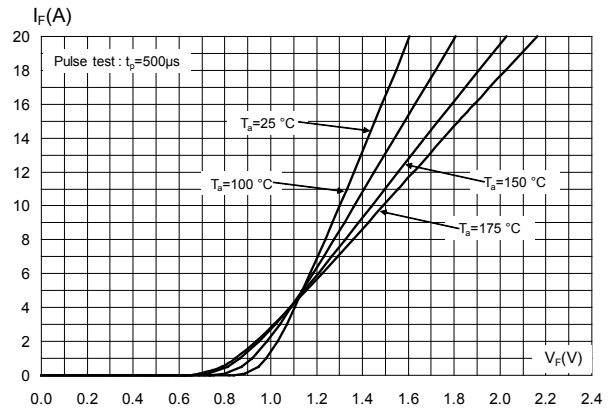


Figure 2. Reverse leakage current versus reverse voltage applied (typical values)

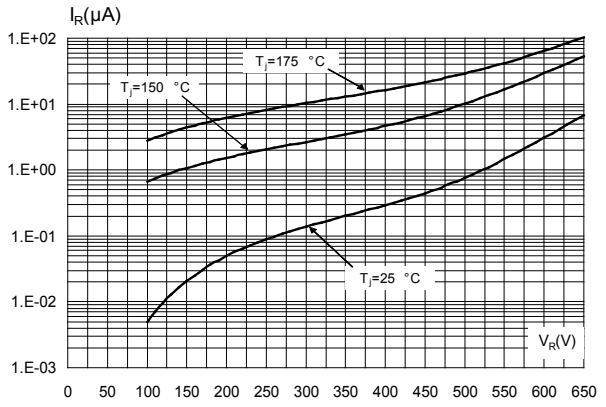


Figure 3. Peak forward current versus case temperature (fw > 10 kHz)

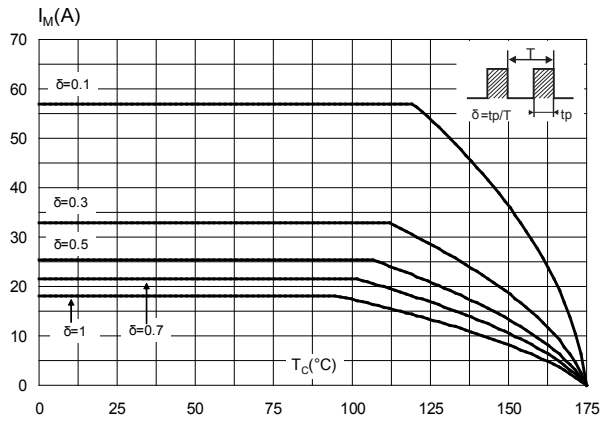


Figure 4. Junction capacitance versus reverse voltage applied (typical values)

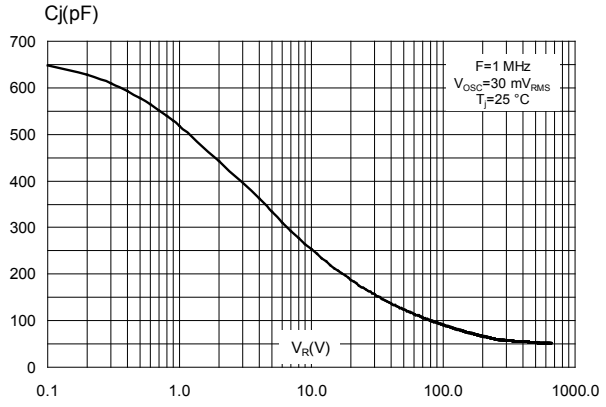


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

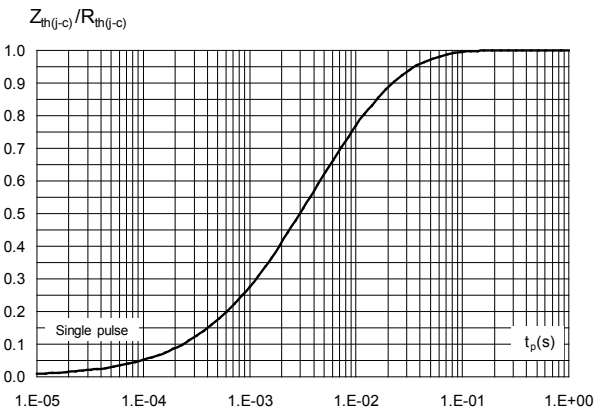


Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

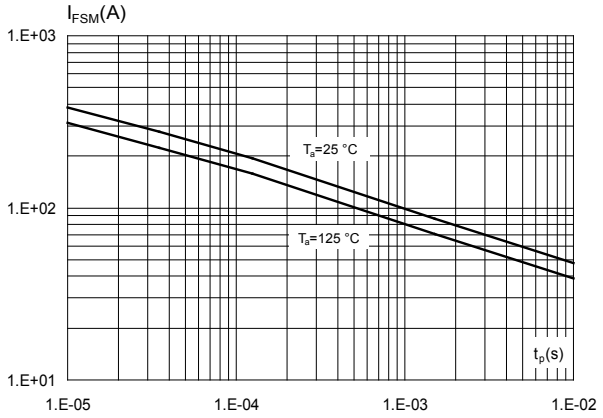
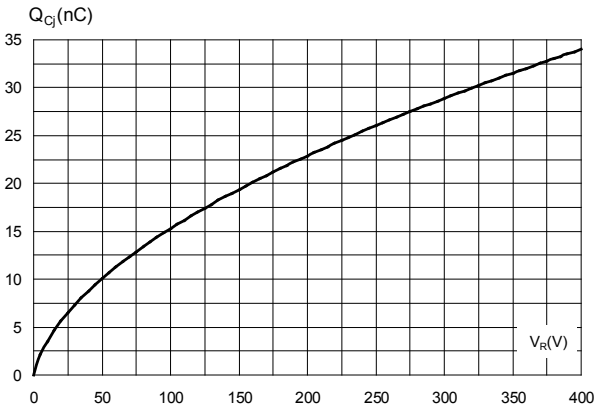


Figure 7. Total capacitive charges versus reverse voltage applied (typical values)



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 PowerFLAT™ 8x8 HV package information

- Epoxy meets UL94, V0
- Lead-free Package

Figure 8. PowerFLAT™ 8x8 HV package outline

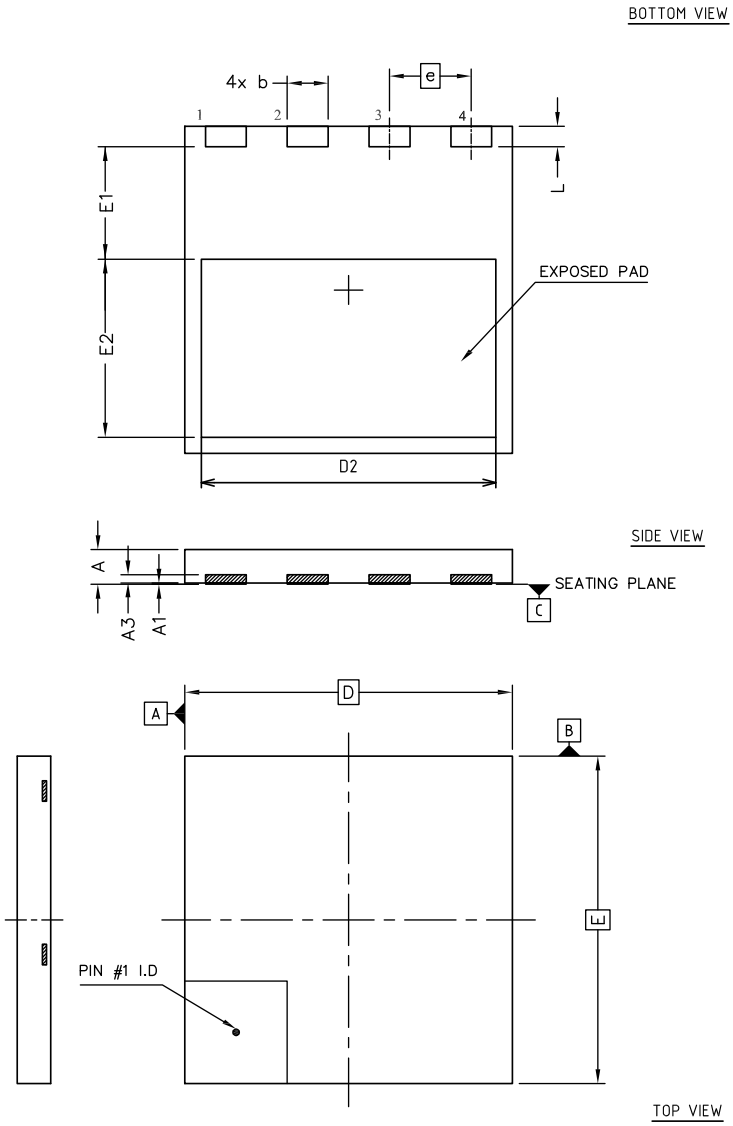
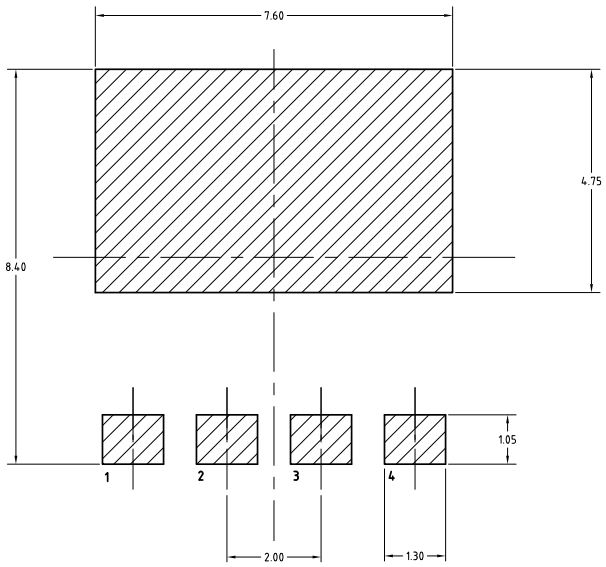


Table 5. PowerFLAT™ 8x8 HV mechanical data

Ref.	Dimensions (in mm)		
	Min.	Typ.	Max.
A	0.75	0.85	0.95
A1	0.00		0.05
A3	0.10	0.20	0.30
b	0.90	1.00	1.10
D	7.90	8.00	8.10
E	7.90	8.00	8.10
D2	7.10	7.20	7.30
E1	2.65	2.75	2.85
E2	4.25	4.35	4.45
e		2.00	
L	0.40	0.50	0.60

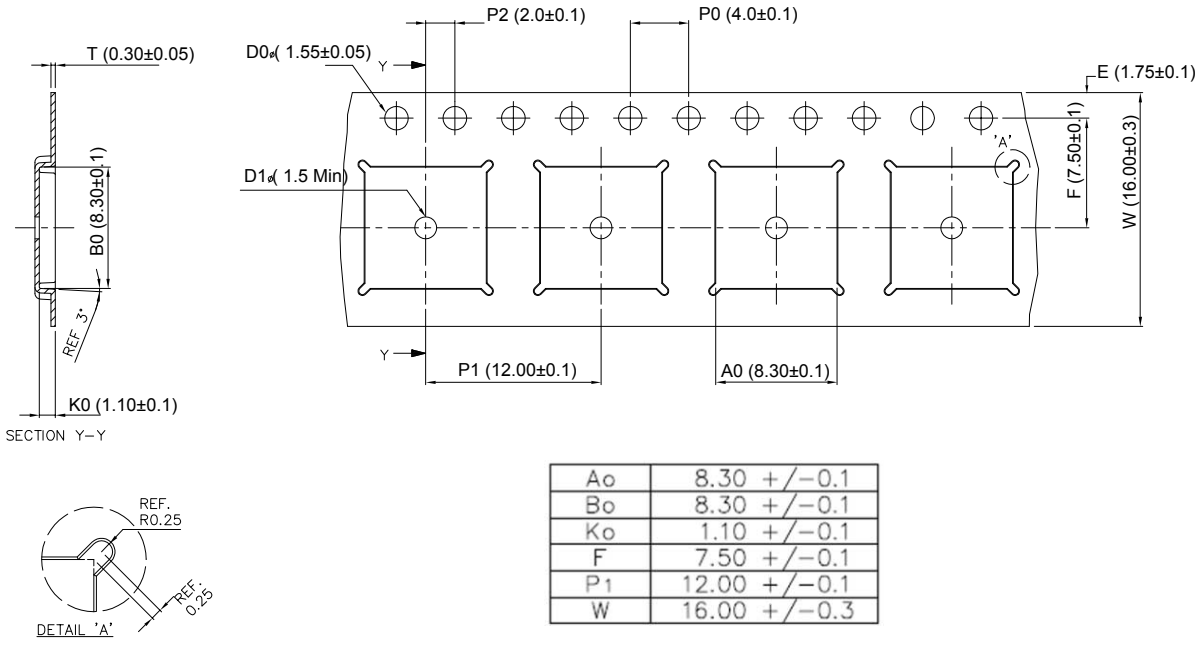
Figure 9. PowerFLAT™ 8x8 HV footprint



Note: All dimensions are in millimeters.

2.2 PowerFLAT™ 8x8 HV packing information

Figure 10. **PowerFLAT™ 8x8 HV tape**



Ao	8.30 +/−0.1
Bo	8.30 +/−0.1
Ko	1.10 +/−0.1
F	7.50 +/−0.1
P1	12.00 +/−0.1
W	16.00 +/−0.3

Note: All dimensions are in millimeters.

Figure 11. **PowerFLAT™ 8x8 HV package orientation in carrier tape**

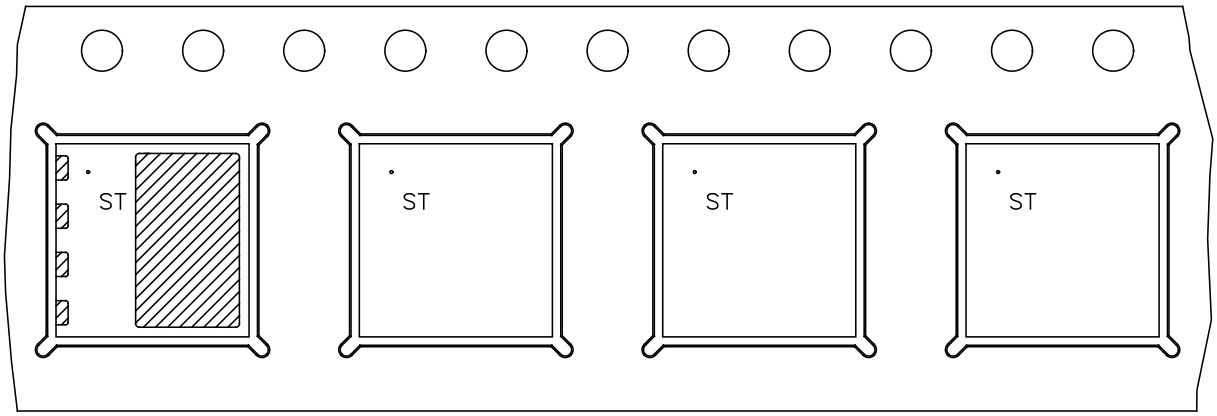
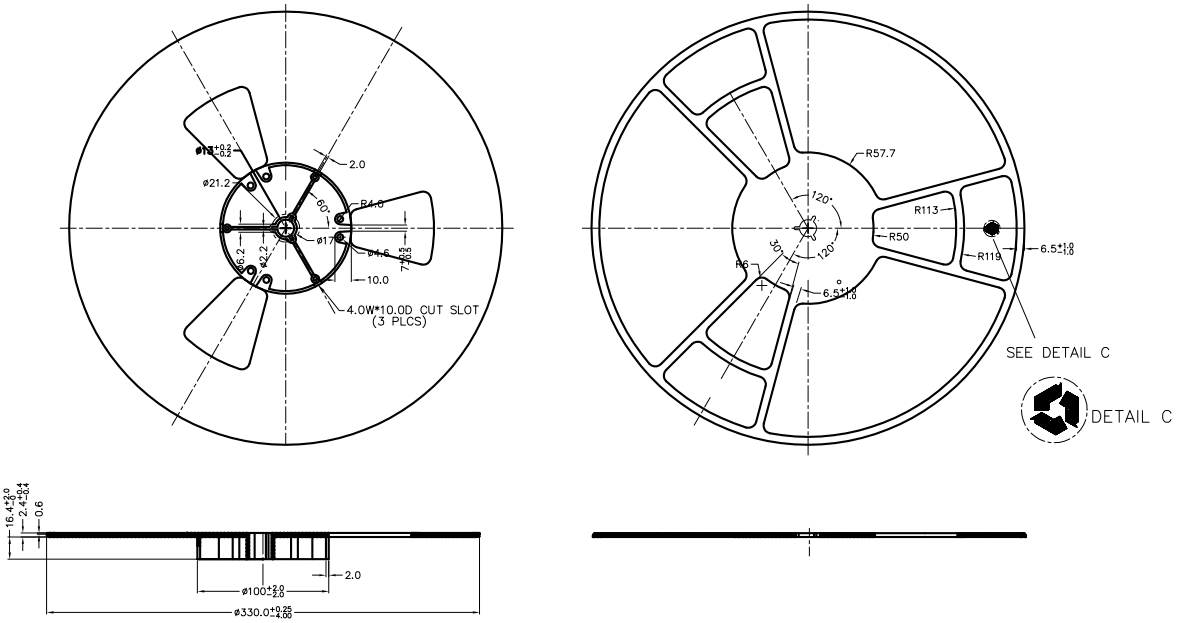


Figure 12. **PowerFLAT™ 8x8 HV reel**



Note: All dimensions are in millimeters.

3 Ordering Information

Table 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC10065DLF-TR	PSC10065	PowerFLAT 8x8 HV	170 mg	3000	Reel

Revision history

Table 7. **Document revision history**

Date	Version	Changes
04-Nov-2019	1	Initial release.