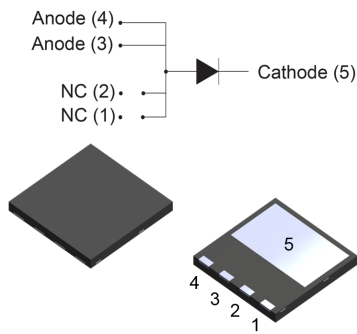


## 650 V power Schottky silicon carbide diode



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
- Low drop forward voltage
- Power efficient product
- ECOPACK®2 compliant component

## Applications

- Switch mode power supply
- Boost PFC
- Bootstrap diode
- LLC clamping function
- High frequency inverter applications

## Description

This 4 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 STPSC4H065DLF in PowerFLAT™8x8 HV, enables low drop forward voltage associated to high surge capabilities in low space environment such as Telecom & Network, Industrial or Renewable energy domains.

## Product status link

[STPSC4H065DLF](#)

## Product summary

Symbol	Value
$I_{F(AV)}$	4 A
$V_{RRM}$	650 V
$V_{F(typ.)}$	1.38 V
$T_{j(max.)}$	175 °C

## 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		11	A
$I_{F(AV)}$	Average forward current	$T_c = 140\text{ °C}^{(1)}$ , DC	4	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$ , $T_c = 25\text{ °C}$	38	A
		$t_p = 10\text{ ms sinusoidal}$ , $T_c = 125\text{ °C}$	35	
		$t_p = 10\text{ }\mu\text{s square}$ , $T_c = 25\text{ °C}$	400	
$I_{FRM}$	Repetitive peak forward current	$T_c = 140\text{ °C}^{(1)}$ , $T_j = 175\text{ °C}$ , $\delta = 0.1$	17	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	2.6	3.9	°C/W

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
		$T_j$	$V_R$				
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	3	40	$\mu\text{A}$
		$T_j = 150\text{ °C}$		-	35	170	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 4\text{ A}$	-	1.38	1.55	V
		$T_j = 150\text{ °C}$		-	1.60	1.95	

1.  $t_p = 10\text{ ms}$ ,  $\delta < 2\%$

2.  $t_p = 500\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 1.00 \times I_{F(AV)} + 0.237 \times I_{F(RMS)}^2$$

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**

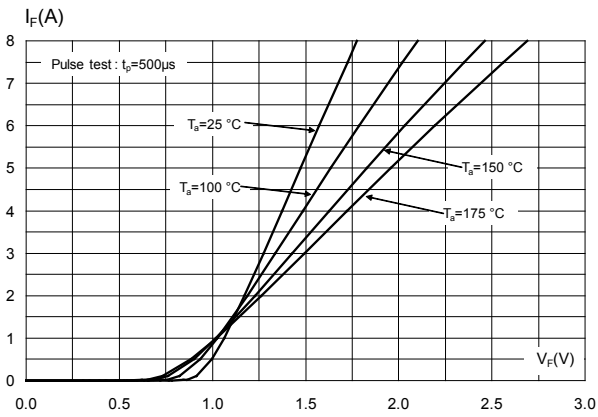
Symbol	Parameter	Test conditions	Typ.	Unit
$Q_{cj}^{(1)}$	Total capacitive charge	$V_R = 400 \text{ V}$	14.3	nC
$C_j$	Total capacitance	$V_R = 0 \text{ V}, T_c = 25 \text{ }^\circ\text{C}, F = 1 \text{ MHz}$	245	pF
		$V_R = 400 \text{ V}, T_c = 25 \text{ }^\circ\text{C}, F = 1 \text{ MHz}$	25	

1. Most accurate value for the capacitive charge:

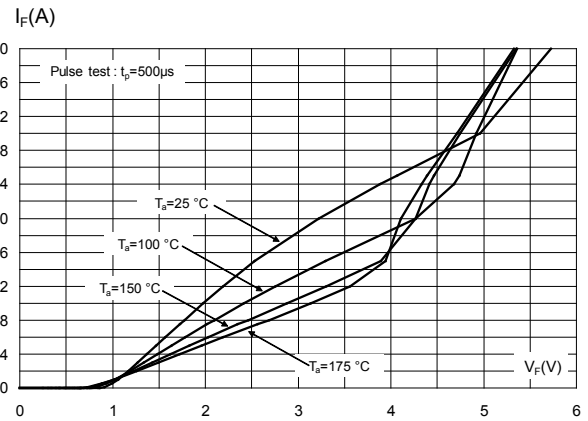
$$Q_{cj}(V_R) = \int_0^{V_R} C_j(V) dV$$

## 1.1 Characteristics (curves)

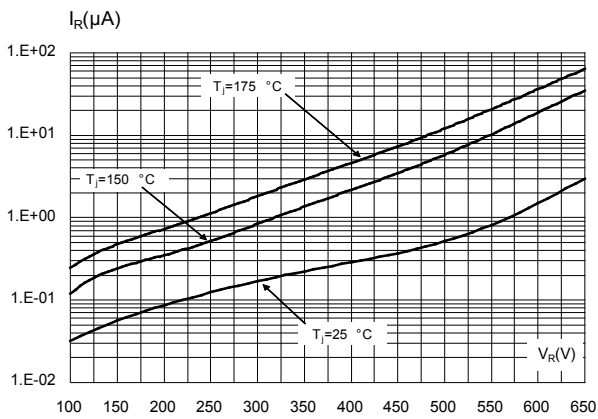
**Figure 1. Forward voltage drop versus forward current (typical values, low level)**



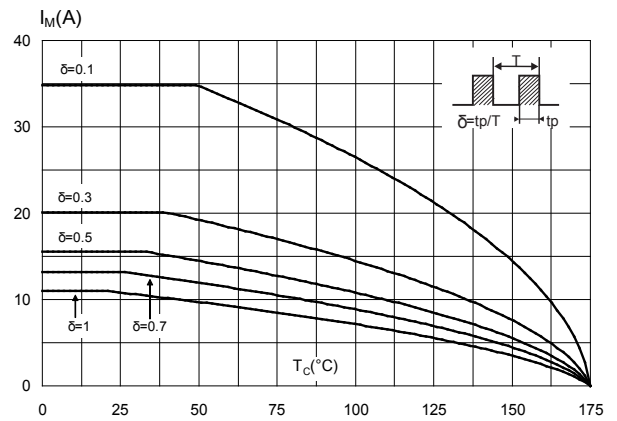
**Figure 2. Forward voltage drop versus forward current (typical values, high level)**

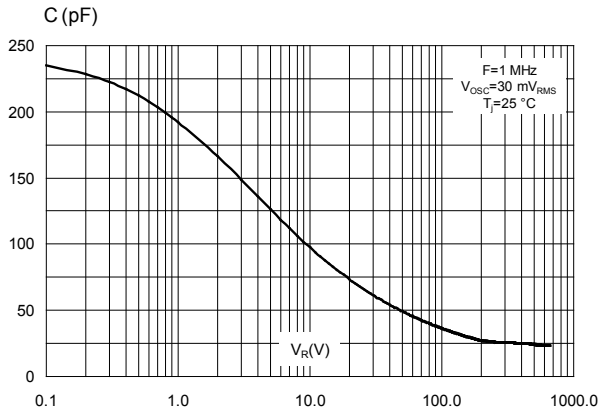
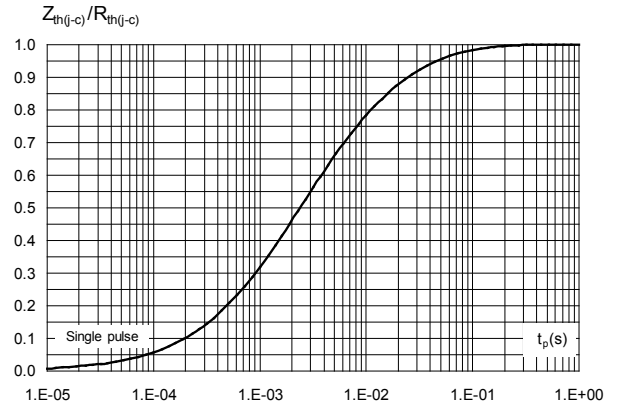
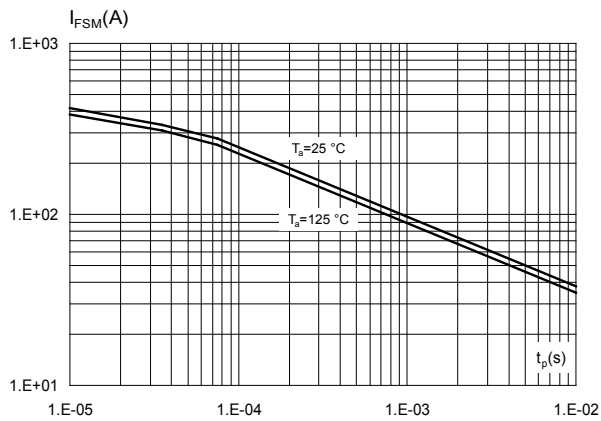
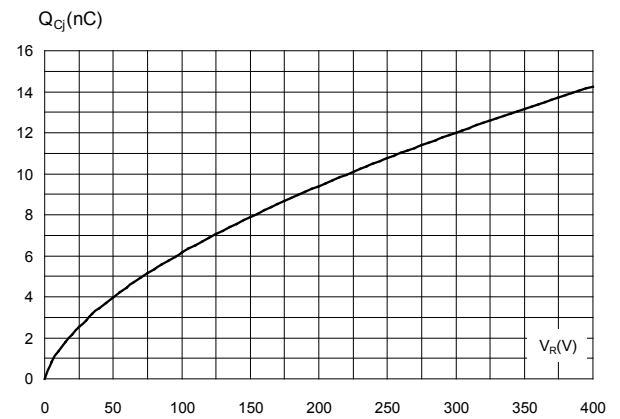


**Figure 3. Reverse leakage current versus reverse voltage applied (typical values)**



**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)**


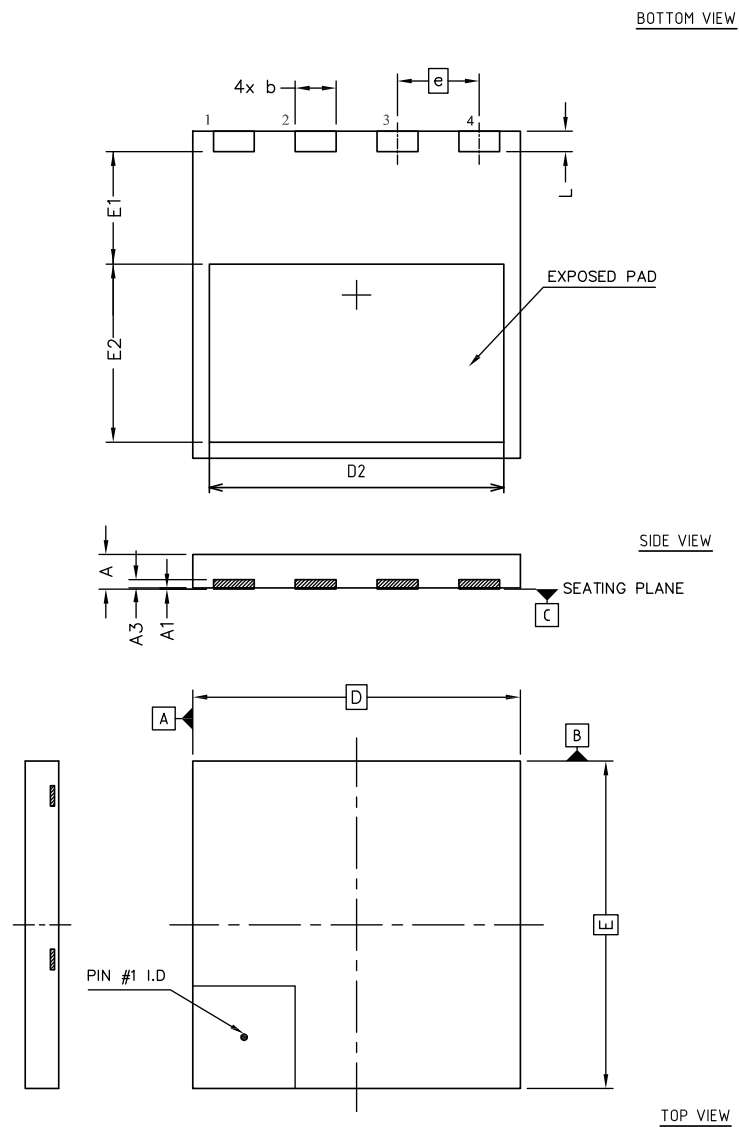
## 2 Package information

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 PowerFLAT™ 8x8 HV package information

- Epoxy meets UL94, V0
- Lead-free Package

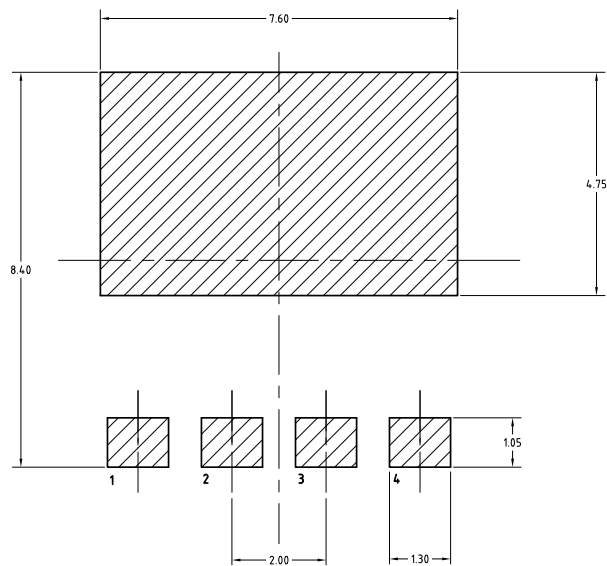
**Figure 9. PowerFLAT™ 8x8 HV package outline**



**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

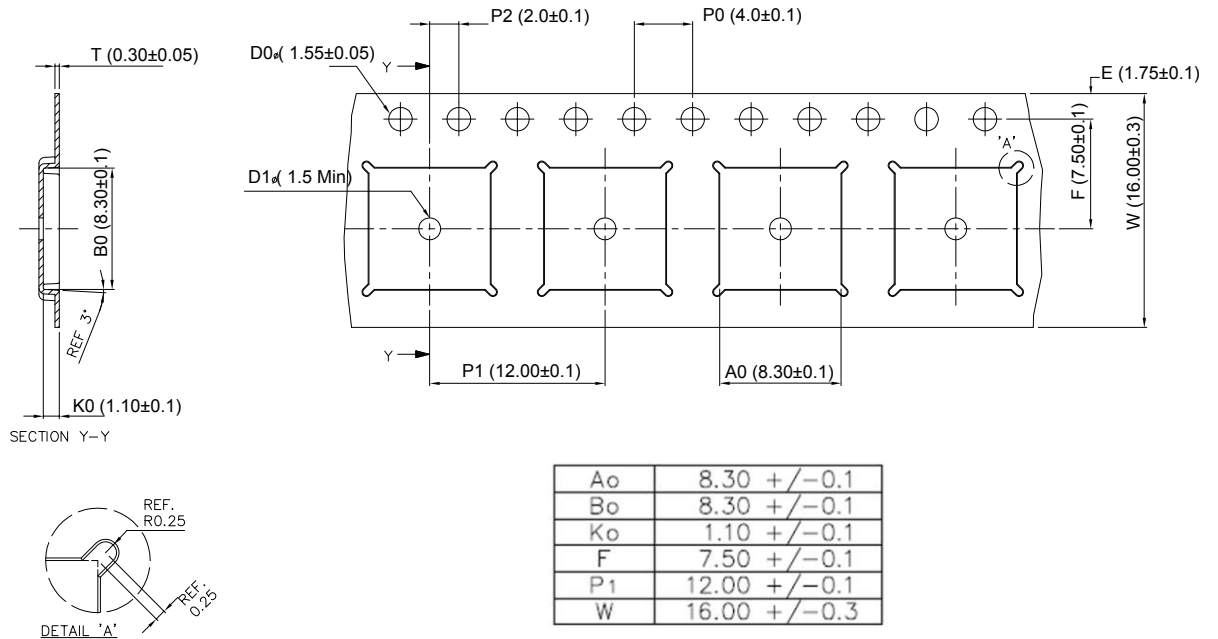
**Figure 10. PowerFLAT™ 8x8 HV footprint**



*Note: All dimensions are in millimeters.*

## 2.2 PowerFLAT™ 8x8 HV packing information

Figure 11. PowerFLAT™ 8x8 HV tape



Note: All dimensions are in millimeters.

Figure 12. PowerFLAT™ 8x8 HV package orientation in carrier tape

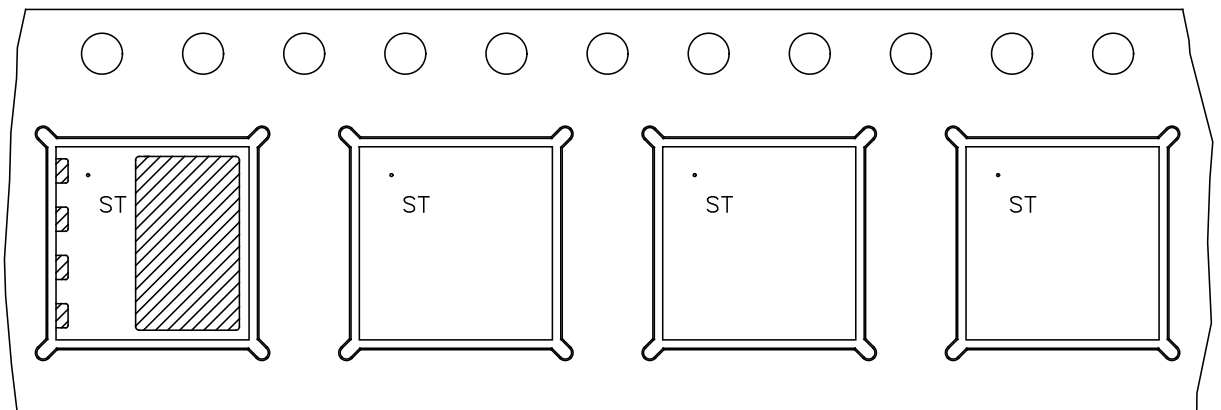
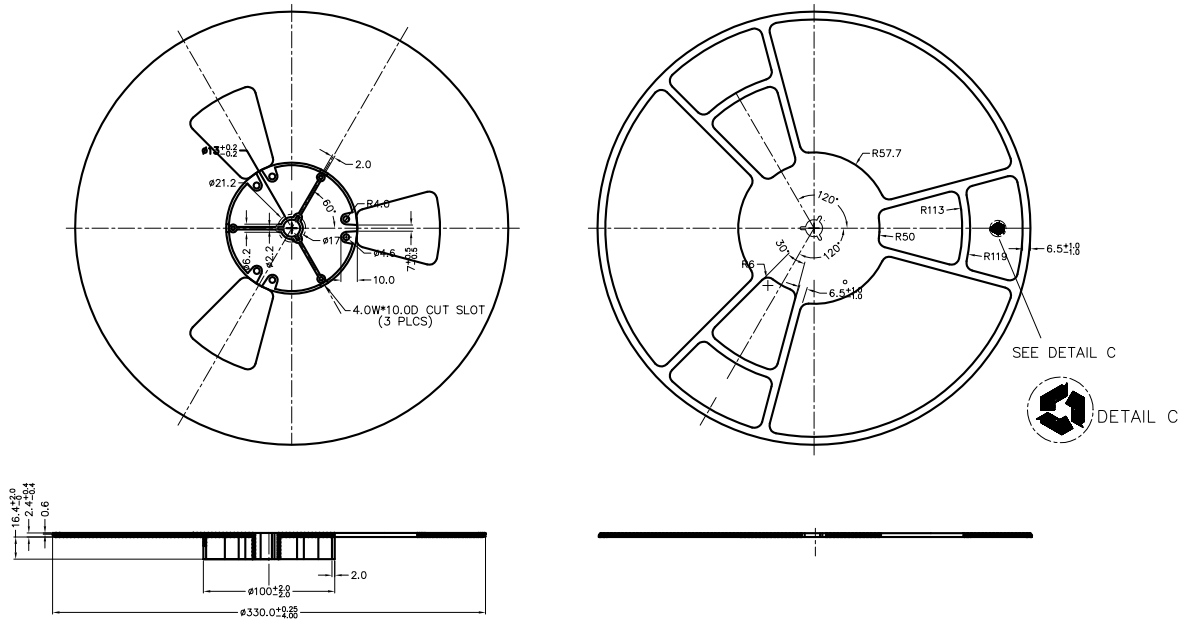




Figure 13. PowerFLAT™ 8x8 HV reel



Note: All dimensions are in millimeters.

### 3 Ordering Information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC4H065DLF-TR	PSC4H065	PowerFLAT™ 8x8 HV	170 mg	3000	Reel

## Revision history

**Table 7. Document revision history**

Date	Version	Changes
29-Nov-2018	1	Initial release.

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