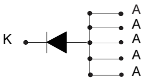
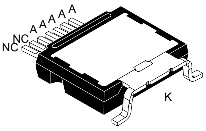
STPSC30G065L2Y

Datasheet

Automotive 650 V, 30 A high surge silicon carbide power Schottky diode





HU3PAK

Product label

Product status link
STPSC30G065L2Y

Product summary	
$I_{F(AV)}$	30 A
V_{RRM}	650 V
T_j (max.)	175 °C
V_F (typ.)	1.30 V

Features

- AEC-Q101 qualified and PPAP capable
- No reverse recovery charge in application current range
- Switching behavior independent of temperature
- High forward surge capability
- Operating T_j from -55 °C to 175 °C
- SMD with top side cooling package (HU3PAK)
- ECOPACK2 compliant component

Applications

- OBC (On board battery chargers)
- EV Charging station

Description

The SiC diode STPSC30G065L2Y, housed in HU3PAK, is an ultrahigh performance power Schottky rectifier. It is manufactured using a silicon carbide substrate. The wide band-gap material allows the design of a low V_F 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.

Based on latest technology optimization, this diode has an improved forward surge current capability, making it ideal for use in PFC, where this ST SiC diode boosts the performance in hard switching conditions. Using the latest design improvement of the "G" series of ST SiC diodes, as well as implemented tests in production, this diode is becoming the reference point in the combination of efficiency and application robustness to the application design.

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 = -55 °C to +175 °C)			650	V
$I_{F(RMS)}$	Forward rms current			63	A
$I_{F(AV)}$	Average forward current	T_c = 135 °C, δ = 1		30	A
I_{FRM}	Repetitive peak forward current	T_c = 135 °C, T_j = 175 °C, δ = 0.1, f_{sw} > 10 kHz		129	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	T_c = 25 °C	200	A
			T_c = 150 °C	160	
		t_p = 10 µs square	T_c = 25 °C	1100	
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Operating junction temperature range			-55 to +175	°C

Table 2. **Thermal resistance parameters**

Symbol	Parameter	Value		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Junction to case	0.50	0.71	°C/W

For more information, please refer to the following application note:

- TN1378 : HU3PAK package mounting and thermal behavior

Table 3. **Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	25	300	µA
		T_j = 175 °C		-	150	1200	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 30 A	-	1.30	1.45	V
		T_j = 175 °C		-	1.49	1.70	

1. *Pulse test: t_p = 10 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.879 \times I_{F(AV)} + 0.027 \times I_F{}^2{}_{(RMS)}$

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	Min.	Typ.	Max.	Unit
Q_{Cj} (1)	Total capacitive charge	V_R = 400 V	-	86	-	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	-	1890	-	pF
		V_R = 400 V, T_c = 25 °C, F = 1 MHz	-	120	-	

1. *Most accurate value for the capacitive charge:* $Q_{cj}(V_R) = \int_0^{V_R} C_j(V)dV$

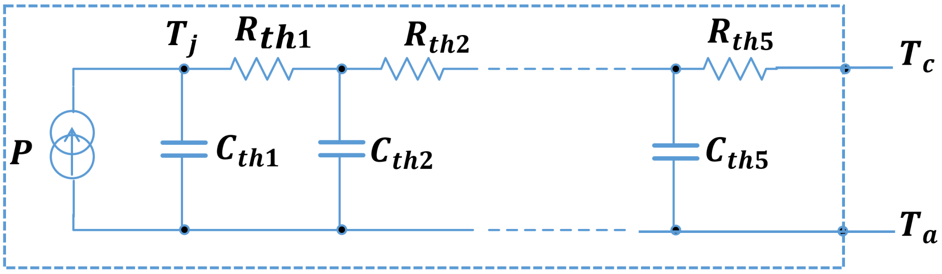


Figure 1. **Thermal transient impedance model circuit of the diode – $Z_{th(j-c)}$**

Table 5. **Components typical values of the diode thermal transient impedance model $Z_{th(j-c)}$**

Ref.	Value (K/W)	Ref.	Value (J/K)
R_{th1}	16.73 m	C_{th1}	0.85 m
R_{th2}	116.23 m	C_{th2}	1.34 m
R_{th3}	142.48 m	C_{th3}	2.43 m
R_{th4}	177.96 m	C_{th4}	7.57 m
R_{th5}	45.43 m	C_{th5}	99.02 m

1.1 Characteristics (curves)

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

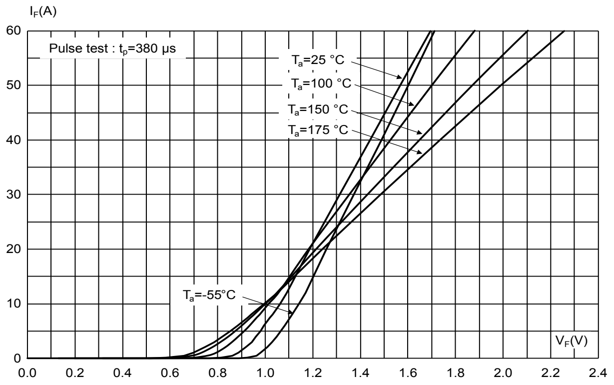


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

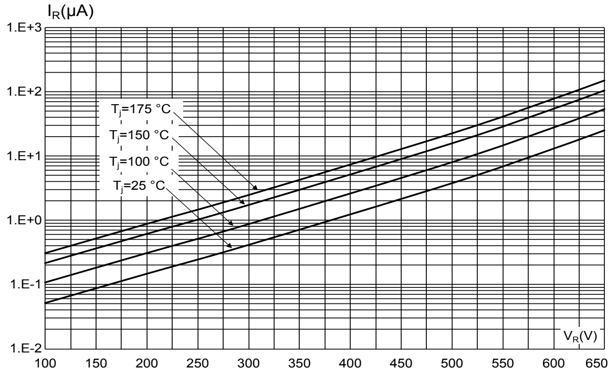


Figure 4. Peak forward current versus case temperature (f_{SW} > 10 kHz)

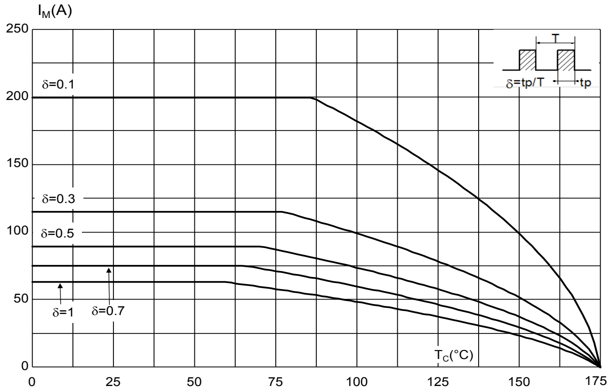


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

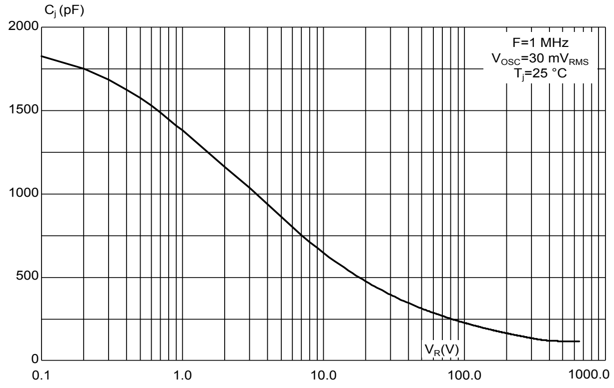


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

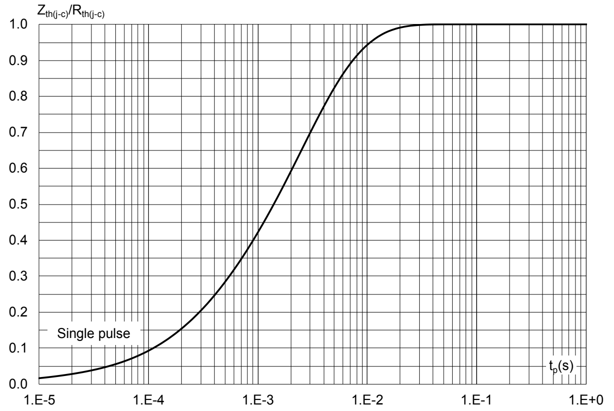


Figure 7. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

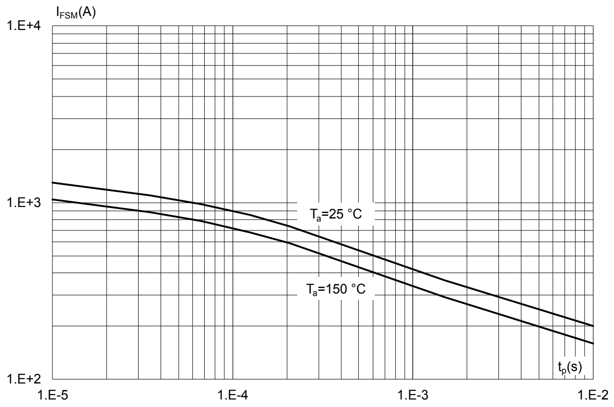
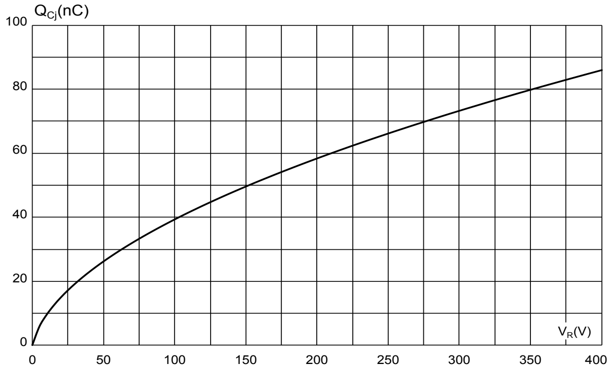


Figure 8. Total capacitive charges versus reverse voltage applied (typical values)



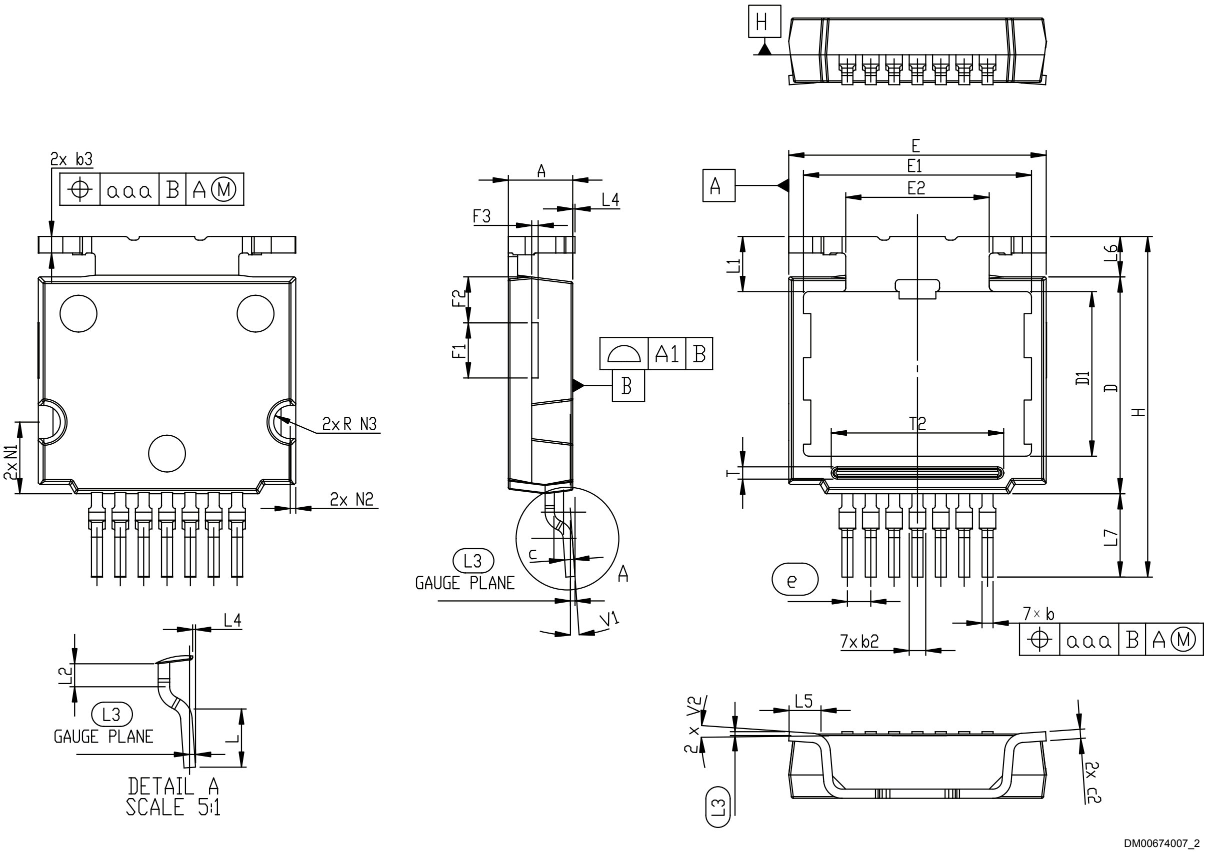
2 Package information

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 HU3PAK package information

- Epoxy meets UL94, V0

Figure 9. **HU3PAK package outline**



Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. **HU3PAK package mechanical data**

Ref.	Dimensions		
	mm		
	Min.	Typ.	Max.
A	3.40	3.50	3.60
A1		0.05	
b	0.50	0.60	0.70
b2	0.50	0.70	1.00
b3	0.80	0.90	1.00
c	0.40	0.50	0.60
c2	0.40	0.50	0.60
D	11.70	11.80	11.90
D1	8.80	8.955	9.10
E	13.90	14.00	14.10
E1	12.30	12.40	12.50
E2	7.75	7.80	7.85
e	BSC 1.27		
H	18.00	18.58	19.00
L	2.40	2.52	2.60
L1		3.05	
L2	0.90	1.00	1.10
L3	BSC 0.26		
L4	0.075	0.125	0.175
L5	1.83	1.93	2.03
L6	2.14	2.24	2.34
L7	4.44	4.54	4.64
aaa		0.10	
F1	2.90	3.00	3.10
F2	2.40	2.50	2.60
F3	0.25	0.35	0.45
N1	3.80	3.90	4.00
N2	0.25	0.30	0.45
N3	0.80	0.90	1.00
T	0.50	0.67	0.70
T2	9.18	9.38	9.43
θ1		0°	8°
θ2		0°	8°

1. Package outline exclusive of any mold flashes dimensions.
2. Package outline exclusive of burr dimensions.
3. Max resin gate protrusion: 0.25 mm.
4. The planarity of the package backside 50 micron max.
5. BSC: basic spacing between centers

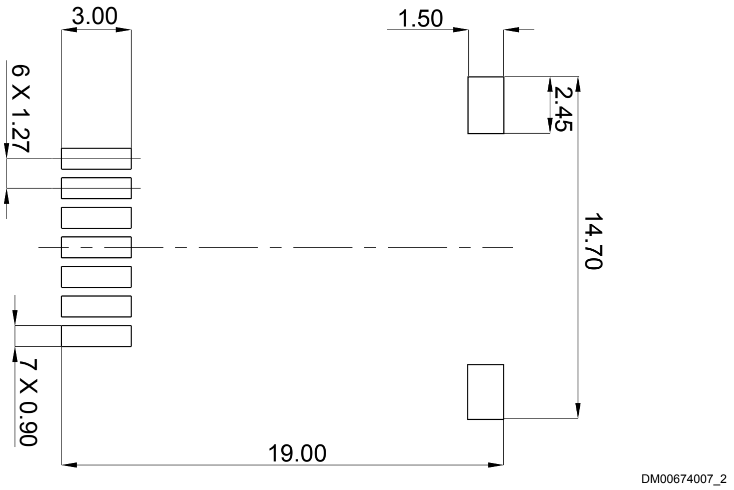


Figure 10. **HU3PAK recommended footprint (dimensions are in mm)**

Note: *For packing details you can see technical note TN1173: Packing information for IPAD, protection, rectifiers, thyristors and AC Switches.*

3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC30G065L2Y	PSC30G065L2Y	HU3PAK	2.34 g	600	Tape and reel

Revision history

Table 8. **Document revision history**

Date	Revision	Changes
24-Jun-2025	1	Initial release.

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2025 STMicroelectronics – All rights reserved