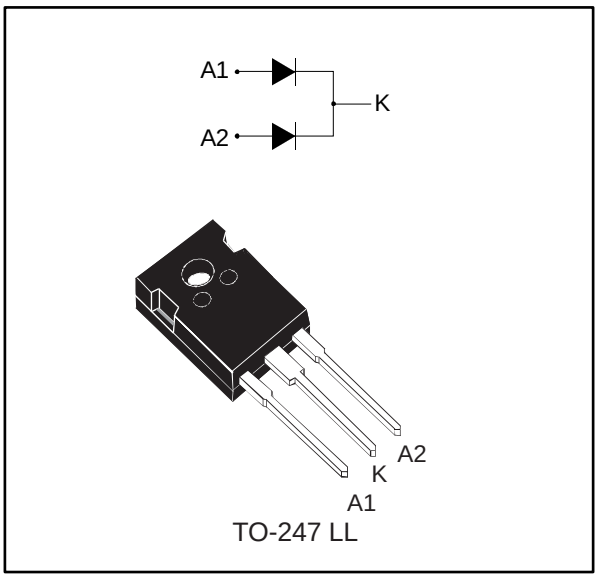
STPSC40H12C

1200 V power Schottky silicon carbide diode

Datasheet - production data



TO-247 LL

Features

- No or negligible reverse recovery
- Switching behavior independent of temperature
- Robust high voltage periphery
- Operating T_j from -40 °C to 175 °C
- ECOPACK®2 compliant

Description

The SiC diode, available in TO-247 LL, 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 1200 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 and secondary side applications, this ST SiC diode will boost the performance in hard switching conditions. This rectifier will enhance the performance of the targeted application. Its high forward surge capability ensures a good robustness during transient phases.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 x 20 A
V_{RRM}	1200 V
T_j (max.)	175 °C
V_F (typ.)	1.35 V

This is information on a product in full production.

www.st.com

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage (T_j = -40 °C to +175 °C)			1200	V
$I_{F(RMS)}$	Forward rms current			38	A
$I_{F(AV)}$	Average forward current	T_C = 150 °C, DC current	Per diode/per device	20/40	A
		T_C = 135 °C, DC current		27/54	
		T_C = 25 °C, DC current		38/76	
I_{FRM}	Repetitive peak forward current	T_C = 150 °C, T_j = 175 °C, δ = 0.1		79	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	T_C = 25 °C	140	A
			T_C = 150 °C	120	
		t_p = 10 µs square	T_C = 25 °C	700	
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Operating junction temperature range			-40 to +175	°C

Table 3: Thermal resistance parameters

Symbol	Parameter		Typ. value	Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.40	0.55	°C/W
		Per device	0.20	0.28	

Table 4: Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	10	120	µA
		T_j = 150 °C		-	60	800	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 20 A	-	1.35	1.50	V
		T_j = 150 °C		-	1.75	2.25	

Notes:

(1)Pulse test: t_p = 10 ms, δ < 2%

(2)Pulse test: t_p = 500 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 1.07 \times I_{F(AV)} + 0.059 \times I_{F^2(RMS)}$

Table 5: Dynamic electrical characteristics (per diode)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Q_{Cj}(1)	Total capacitive charge	V_R = 800 V	-	129	-	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	-	1650	-	pF
		V_R = 800 V, T_c = 25 °C, F = 1 MHz	-	110	-	

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, per diode)

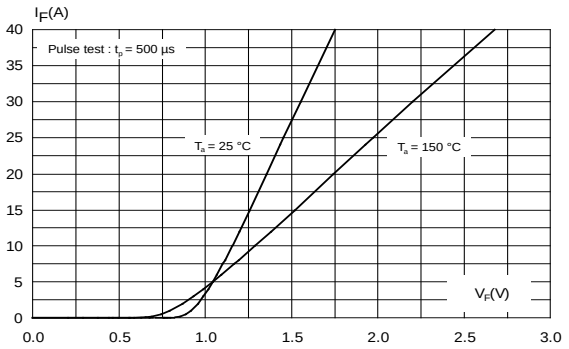


Figure 2: Reverse leakage current versus reverse voltage applied (typical values, per diode)

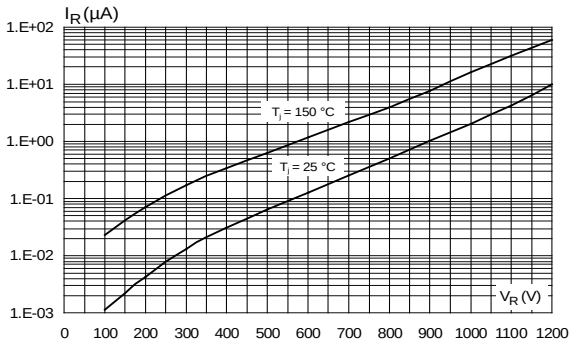


Figure 3: Peak forward current versus case temperature (per diode)

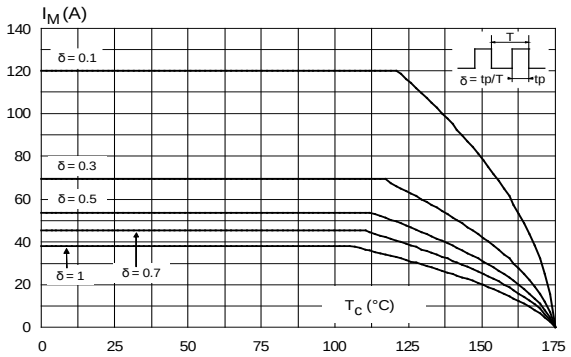


Figure 4: Junction capacitance versus reverse voltage applied (typical values, per diode)

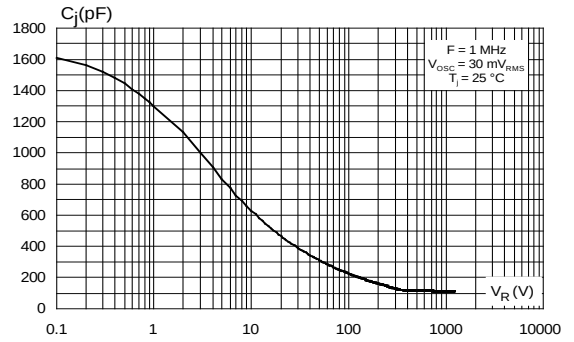


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration

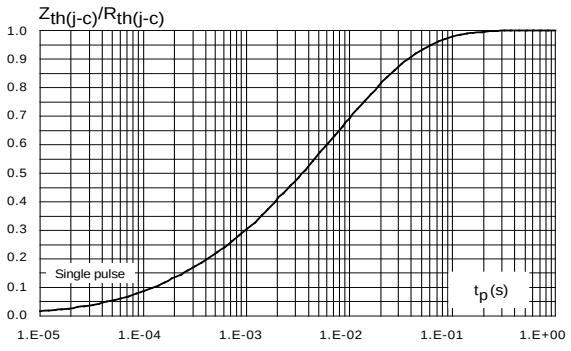


Figure 6: Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform, per diode)

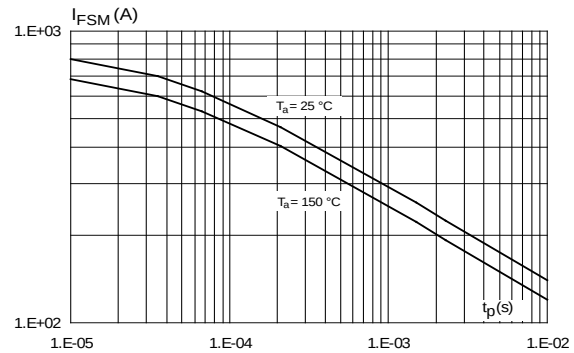
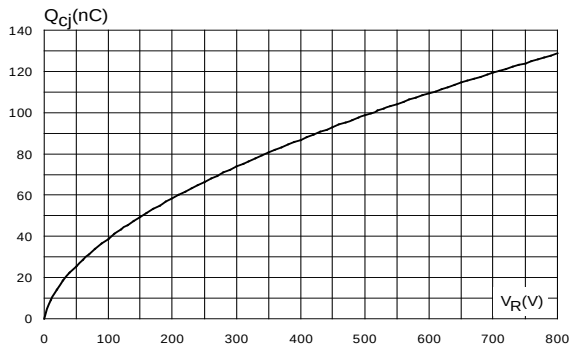


Figure 7: Total capacitive charges versus reverse voltage applied (typical values, per diode)



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)
- Recommended torque value: 0.9 to 1.2 N·m

2.1 TO-247 long leads package information

Figure 8: TO-247 long leads package outline

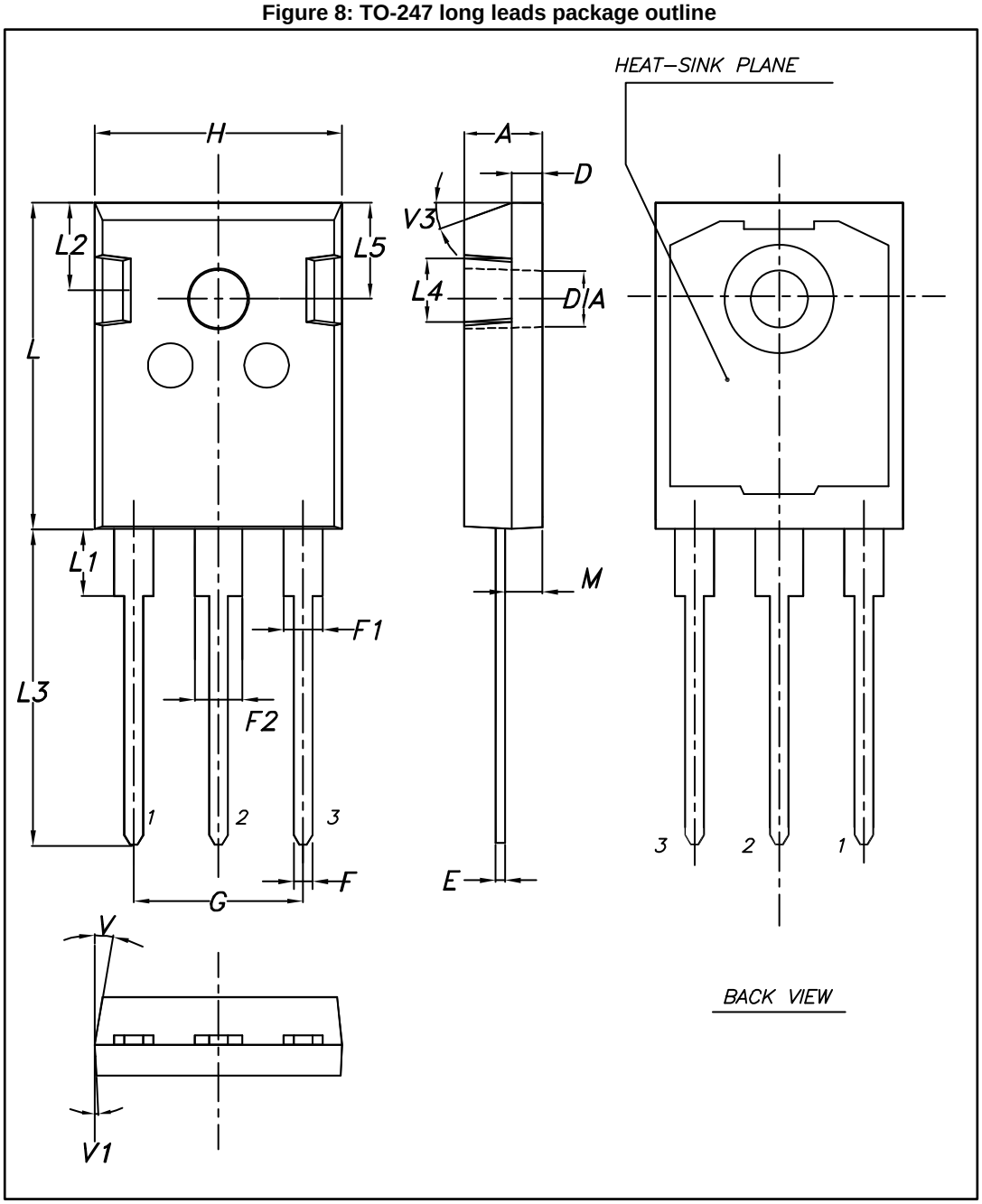


Table 6: TO-247 long leads package mechanical data

Dim.	mm.			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.90		5.15	0.192		0.202
D	1.85		2.10	0.072		0.082
E	0.55		0.67	0.021		0.026
F	1.07		1.32	0.042		0.051
F1	1.90		2.38	0.074		0.093
F2	2.87		3.38	0.110		0.133
G		10.90 BSC			0.429 BSC	
H	15.77		16.02	0.620		0.630
L	20.82		21.07	0.810		0.820
L1	4.16		4.47	0.163		0.175
L2	5.49		5.74	0.216		0.225
L3	20.05		20.30	0.789		0.799
L4	3.68		3.93	0.144		0.154
L5	6.04		6.29	0.237		0.247
M	2.25		2.55	0.088		0.100
V		10°			10°	
V1		3°			3°	
V3		20°			20°	
DIA	3.55		3.66	0.139		0.143

3 Ordering information

Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC40H12CWL	STPSC40H12CWL	TO-247 LL	6.09 g	30	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
28-Feb-2017	1	Initial release.

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