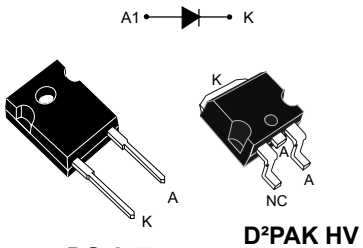
STBR3012

Datasheet

High voltage rectifier for bridge applications



DO-247 D²PAK HV

Features

- Ultra low conduction losses
- Ultra-low reverse losses
- High junction temperature capability (+175 °C)
- D²PAK HV creepage distance (anode to cathode) = 5.38 mm min. (with top coating)
- ECOPACK®2 compliant (DO-247)

Applications

- SMPS
- Bridge

Description

The high quality design of this diode has produced a device with consistently reproducible characteristics and intrinsic ruggedness. These characteristics make it ideal for heavy duty applications that demand long term reliability like automotive applications.

Thanks to its ultra-low conduction losses, the STBR3012 is especially suitable for use as input bridge diode in battery chargers.

Product status link
STBR3012

Product summary	
Symbol	**Value**
$I_{F(AV)}$	30 A
V_{RRM}	1200 V
T_j	+175 °C
V_F (typ.)	0.95 V

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RSM}	Non-repetitive surge reverse voltage		1500	V
V_{RRM}	Repetitive peak reverse voltage		1200	V
$I_{F(RMS)}$	Forward rms current		45	A
$I_{F(AV)}$	Average forward current	T_C = 155 °C, δ = 0.5 square wave	30	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	300	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature		+175	°C

Table 2. Thermal parameters

Symbol	Parameter	Typ. value	Unit
$R_{th(j-c)}$	Junction to case	0.45	°C/W

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

- AN5088: Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		2	µA
		T_j = 150 °C		-	10	100	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 30 A	-	1.05	1.3	V
		T_j = 150 °C		-	0.95	1.2	

1. *Pulse test: t_p = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.96 \times I_{F(AV)} + 0.008 \times I_F{}^2{}_{(RMS)}$

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 in a power diode

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

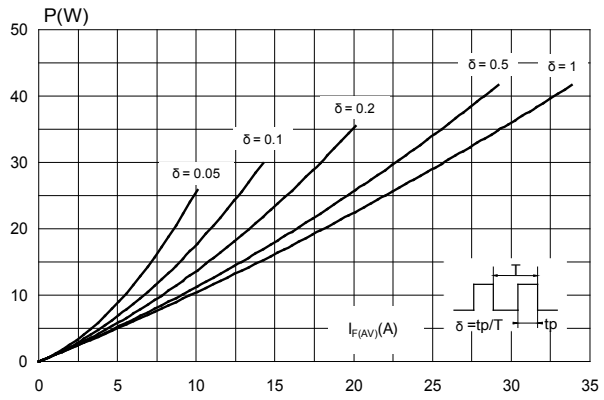


Figure 2. Forward voltage drop versus forward current (typical values)

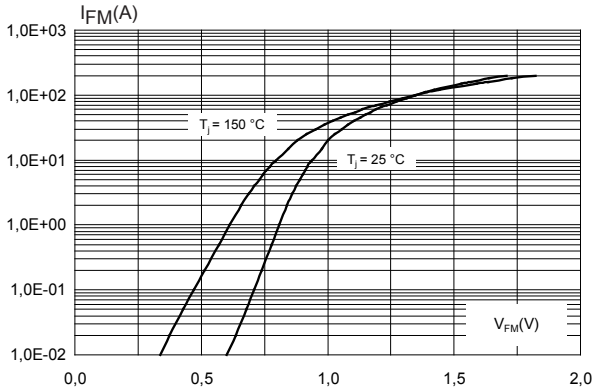


Figure 3. Forward voltage drop versus forward current (maximum values)

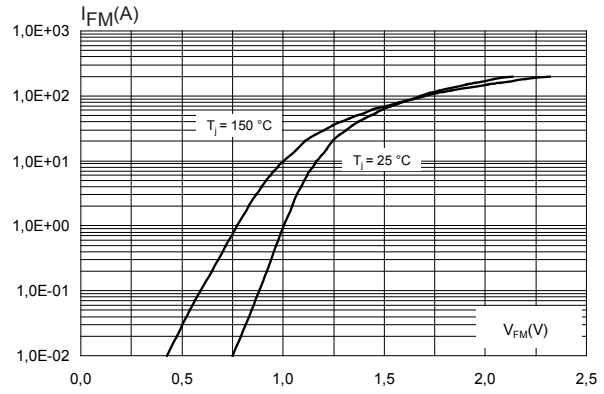


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

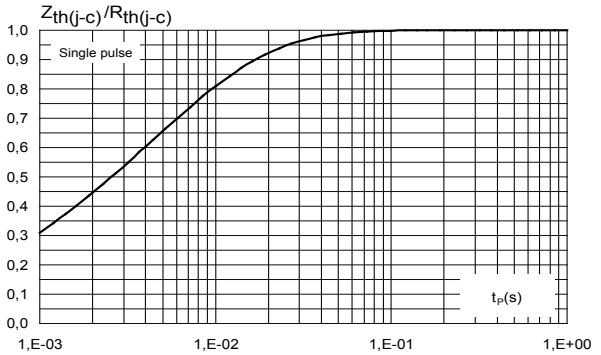


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

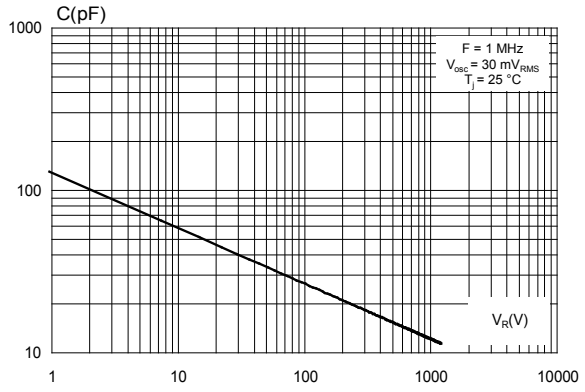


Figure 6. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

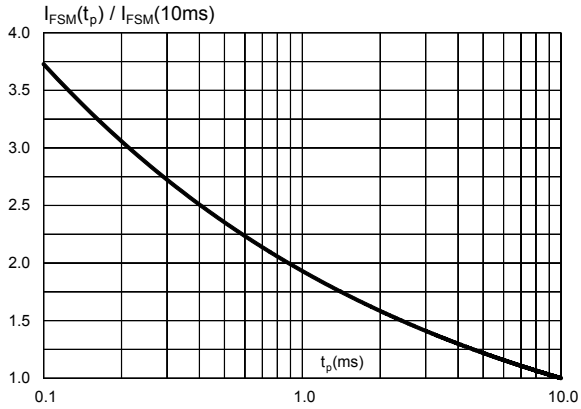


Figure 7. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)

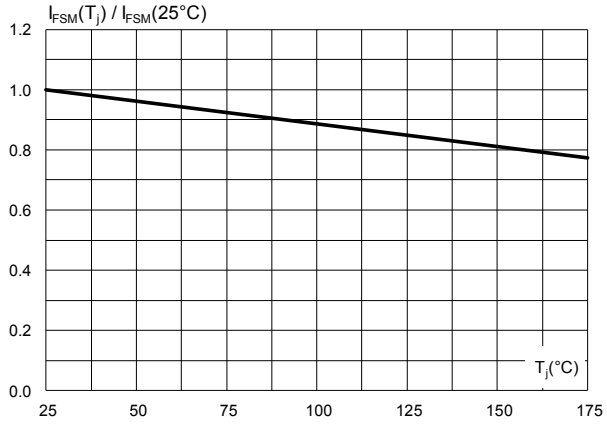
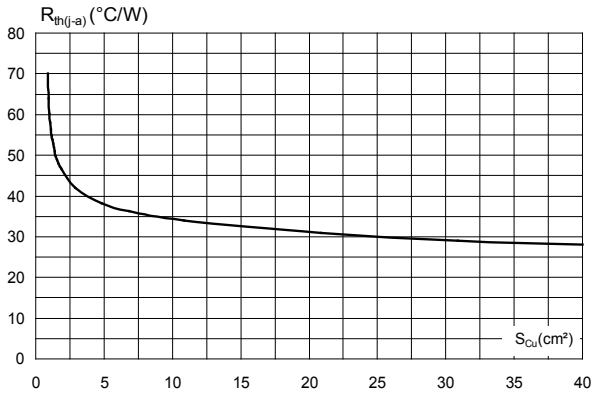


Figure 8. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu} = 35µm) (D²PAK HV)



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 DO-247 package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m (DO-247)
- Maximum torque value: 1.0 N·m (DO-247)

Figure 9. DO-247 package outline

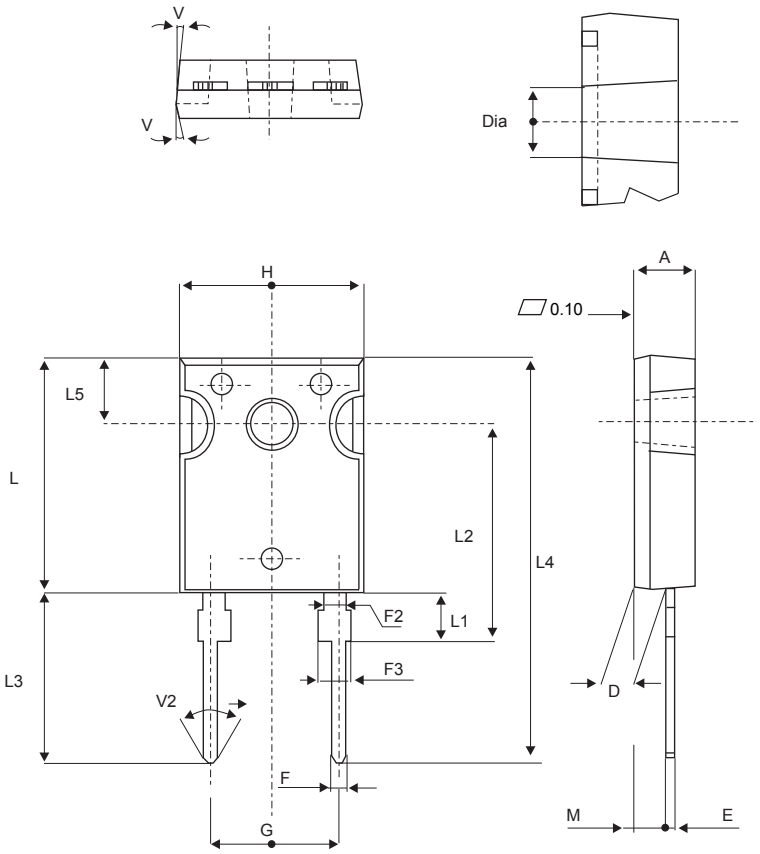


Table 4. DO-247 package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.85	5.15	0.191	0.203
D	2.20	2.60	0.086	0.102
E	0.40	0.80	0.015	0.031
F	1.00	1.40	0.039	0.055
F2	2.00 typ.		0.078 typ.	
F3	2.00	2.40	0.078	0.094
G	10.90 typ.		0.429 typ.	
H	15.45	15.75	0.608	0.620
L	19.85	20.15	0.781	0.793
L1	3.70	4.30	0.145	0.169
L2	18.50 typ.		0.728 typ.	
L3	14.20	14.80	0.559	0.582
L4	34.60 typ.		1.362 typ.	
L5	5.50 typ.		0.216 typ.	
M	2.00	3.00	0.078	0.118
V	5°		5°	
V2	60°		60°	
Dia.	3.55	3.65	0.139	0.143

2.2 D²PAK high voltage package information

Figure 10. D²PAK high voltage package outline

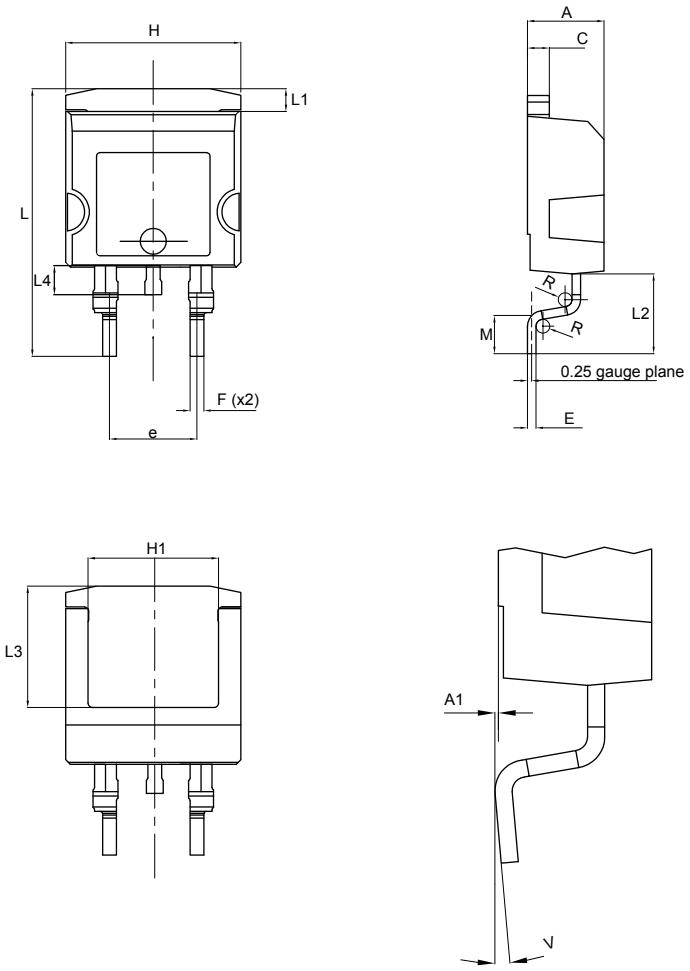
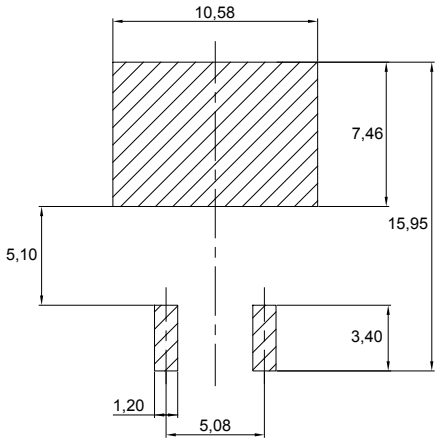


Table 5. D²PAK high voltage package mechanical data

Ref.	Dimensions		
	Min.	Typ.	Max.
A	4.30		4.70
A1	0.03		0.20
C	1.17		1.37
e	4.98		5.18
E	0.50		0.90
F	0.78		0.85
H	10.00		10.40
H1	7.40		7.80
L	15.30		15.80
L1	1.27		1.40
L2	4.93		5.23
L3	6.85		7.25
L4	1.5		1.7
M	2.6		2.9
R	0.20		0.60
V	0°		8°

Figure 11. D²PAK High Voltage footprint in mm



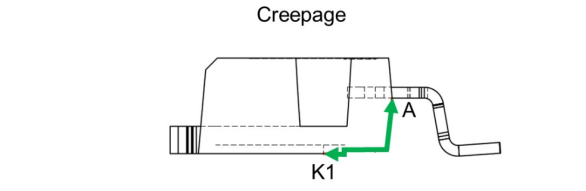
2.2.1 Creepage distance between anode and cathode

Table 6. Creepage distance between anode and cathode

Symbol	Parameter		Value	Unit
Cd_{A-K1}	Minimum creepage distance between A and K1 (with top coating)	D²PAK HV	5.38	mm
Cd_{A-K2}	Minimum creepage distance between A and K2 (without top coating)		3.48	

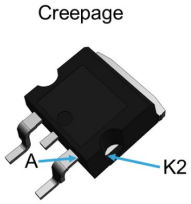
Note: D²PAK HV creepage distance (anode to cathode) = 5.38 mm min. (refer to IEC 60664-1)

Figure 12. Creepage with top coating



Minimum distance between A & K1 = 5.38 mm (with top coating)

Figure 13. Creepage without top coating



Minimum distance between A & K2 = 3.48 mm (without top coating)

3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STBR3012W	STBR3012W	DO-247	4.4 g	30	Tube
STBR3012G2-TR	STBR3012G2	D²PAK HV	1.48 g	1000	Tape and reel

Revision history

Table 8. **Document revision history**

Date	Revision	Changes
02-Nov-2016	1	First issue.
19-Nov-2018	2	Added D²PAK HV.

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