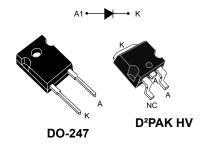


Automotive high voltage rectifier for bridge applications



Features

- AEC-Q101 qualified
- · Ultra low conduction losses
- · Ultra-low reverse losses
- High junction temperature capability (+175 °C)
- V_{RRM} guaranteed from -40 to +175 °C
- D²PAK HV creepage distance (anode to cathode) = 5.38 mm min. (with top coating)
- PPAP capable
- ECOPACK[®]2 compliant (DO-247)

Applications

- · On board charger
- 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-Y is especially suitable for use as input bridge diode in battery chargers.

Product status link

STBR3012-Y

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	Non-repetitive surge reverse voltage		V
V _{RRM}	Repetitive peak reverse voltage $T_j = -40 ^{\circ}\text{C}$ to +175 $^{\circ}\text{C}$		1200	V
I _{F(RMS)}	Forward rms current		45	А
I _{F(AV)}	Average forward current T_C = 155 °C, δ = 0.5 square wave		30	Α
I _{FSM}	Surge non repetitive forward current $t_p = 10 \text{ ms sinusoidal}$		300	А
T _{stg}	Storage temperature range		-65 to +175	°C
Tj	Operating junction temperature -		-40 to +175	°C

Table 2. Thermal parameters

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

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
L Daviere leskers overet		T _j = 25 °C	V - V	-		2	
'R	I _R Reverse leakage current	T _j = 150 °C	$V_R = V_{RRM}$	-	10	100	μA
V _F Forward voltage drop		T _j = 25 °C	I _E = 30 A	-	1.05	1.3	V
		T _j = 150 °C	1F - 30 A	_	0.95	1.2	V

- 1. Pulse test: t_p = 5 ms, δ < 2%
- 2. Pulse test: t_p = 380 μ s, δ < 2%

To evaluate the conduction losses, use the following equation:

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

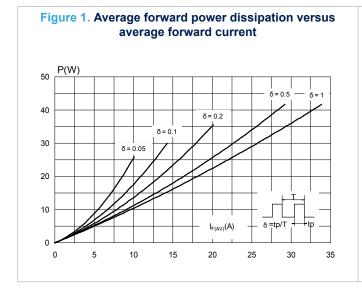
For more information, please refer to the following application notes related to the power losses:

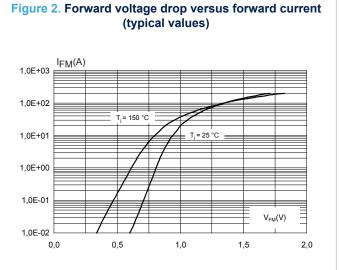
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses in a power diode

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1.1 **Characteristics (curves)**



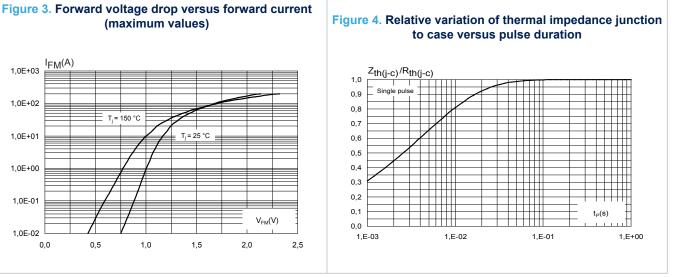


(maximum values) $\underline{\mathsf{I}_{\mathsf{FM}}}(\mathsf{A})$ 1,0E+03 1,0E+02 T_i = 150 °C 1,0E+01 1,0E+00 1,0E-01

2,0

1,5

2,5



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1,0E-02

0,5



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

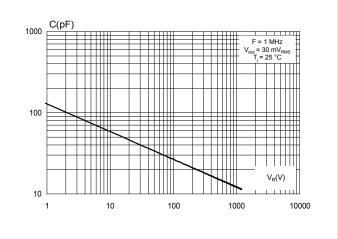


Figure 6. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

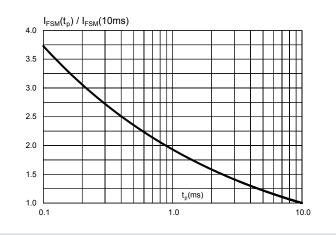


Figure 7. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)

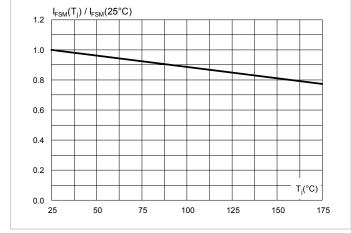
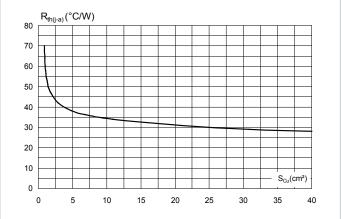


Figure 8. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu} = 35μm) (D²PAK HV)



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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

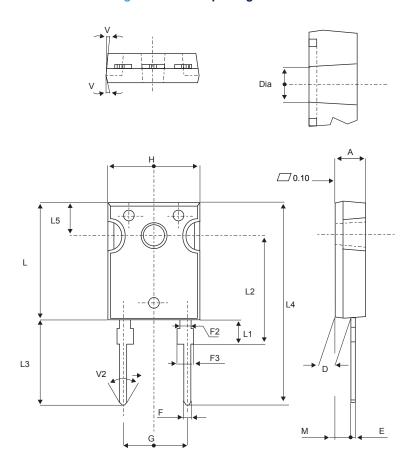




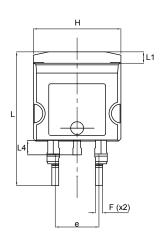
Table 4. DO-247 package mechanical data

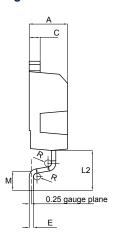
	Dimensions				
Ref.	Millim	eters	Inch	nches	
	Min.	Max.	Min.	Max.	
Α	4.85	5.15	0.191	0.203	
D	2.20	2.60	0.086	0.102	
E	0.40	0.80	0.015	0.031	
F	1.00	1.40	0.039	0.055	
F2	2.00	typ.	0.078	typ.	
F3	2.00	2.40	0.078	0.094	
G	10.90 typ.		0.429 typ.		
Н	15.45	15.75	0.608	0.620	
L	19.85	20.15	0.781	0.793	
L1	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.		
М	2.00	3.00	0.078	0.118	
V	5°		5°		
V2	60)°	60	0	
Dia.	3.55	3.65	0.139	0.143	

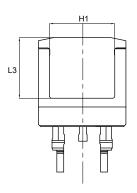


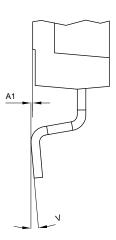
2.2 D²PAK high voltage package information

Figure 10. D²PAK high voltage package outline









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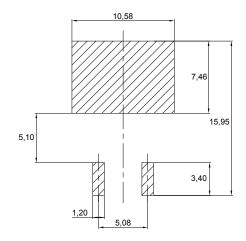
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Table 5. D²PAK high voltage package mechanical data

D-f		Dimensions	
Ref.	Min.	Тур.	Max.
А	4.30		4.70
A1	0.03		0.20
С	1.17		1.37
е	4.98		5.18
Е	0.50		0.90
F	0.78		0.85
Н	10.00		10.40
H1	7.40		7.80
L	15.30	15.30	
L1	1.27	7 1.4	
L2	4.93	4.93	
L3	6.85	6.85	
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



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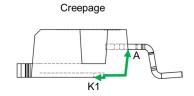
2.2.1 Creepage distance between anode and cathode

Table 6. Creepage distance between anode and cathode

Symbol	Parameter			
Cd _{A-K1}	Minimum creepage distance between A and K1 (with top coating)		5.38	mm
Cd _{A-K2}	Minimum creepage distance between A and K2 (without top coating) D²PAK HV			

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

Creepage

A K2

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

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3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STBR3012WY	STBR3012WY	DO-247	4.4 g	30	Tube
STBR3012G2Y-TR	STBR3012G2Y	D²PAK HV	1.48 g	1000	Tape and reel



Revision history

Table 8. Document revision history

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



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