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Automotive power Schottky rectifier

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Avalanche rated
- AEC-Q101 qualified

Description

Dual center tap Schottky rectifier suited for high frequency DC to DC converters.

Packaged in D²PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

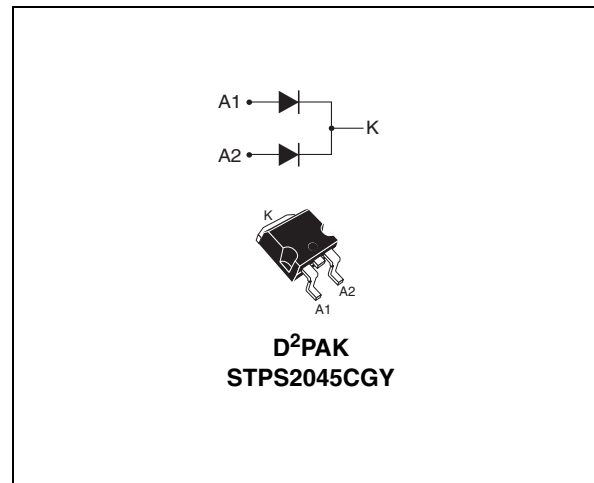


Table 1. Device summary

$I_{F(AV)}$	2 x 10 A
V_{RRM}	45 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.57 V

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		45	V
$I_{F(RMS)}$	Forward rms current		30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	$T_c = 155\text{ }^\circ\text{C}$ Per diode	10	A
I_{FSM}	Surge non repetitive forward current $t_p = 10\text{ ms}$ sinusoidal		180	A
P_{ARM}	Repetitive peak avalanche power $t_p = 1\text{ }\mu\text{s}, T_j = 25\text{ }^\circ\text{C}$		4000	W
T_{stg}	Storage temperature range		-65 to +175	$^\circ\text{C}$
T_j	Maximum operating junction temperature ⁽¹⁾		-40 to +175	$^\circ\text{C}$
dV/dt	Critical rate of rise of reverse voltage		10000	V/ μs

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	2.2	$^\circ\text{C/W}$
		Total	1.3	
$R_{th(c)}$	Coupling		0.3	$^\circ\text{C/W}$

When the diodes 1 and 2 are used simultaneously :

$$T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$	-	-	100	μA
		$T_j = 125\text{ }^\circ\text{C}$				
$V_F^{(1)}$	Forward voltage drop	$T_j = 125\text{ }^\circ\text{C}$	-	0.5	0.57	V
		$T_j = 25\text{ }^\circ\text{C}$				
		$T_j = 125\text{ }^\circ\text{C}$				

1. Pulse test : $t_p = 380\text{ }\mu\text{s}, \delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current (per diode)

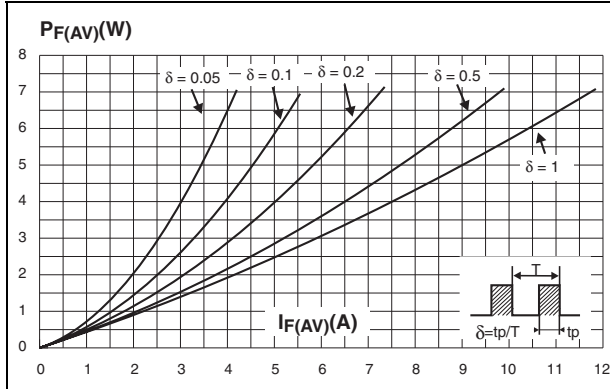


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

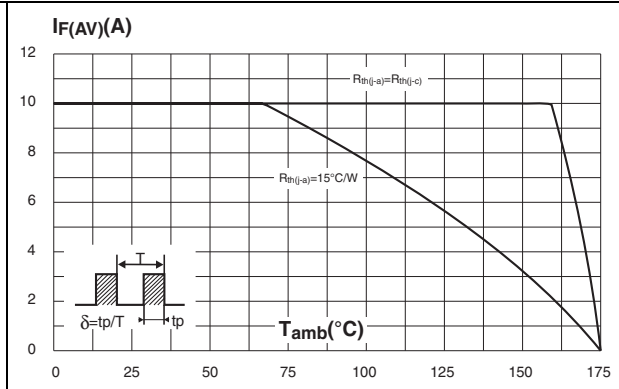


Figure 3. Normalized avalanche power derating versus pulse duration

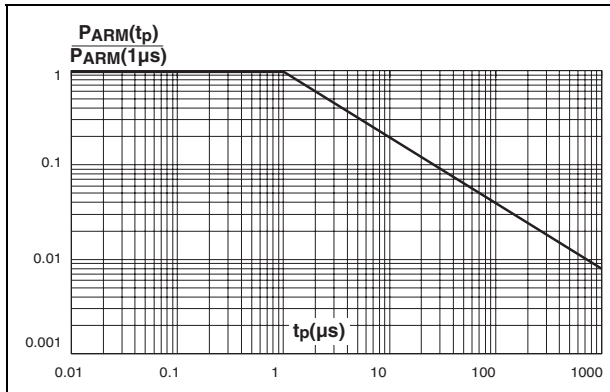


Figure 4. Normalized avalanche power derating versus junction temperature

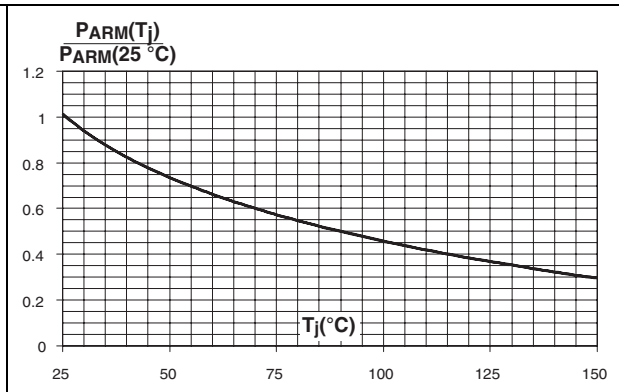


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

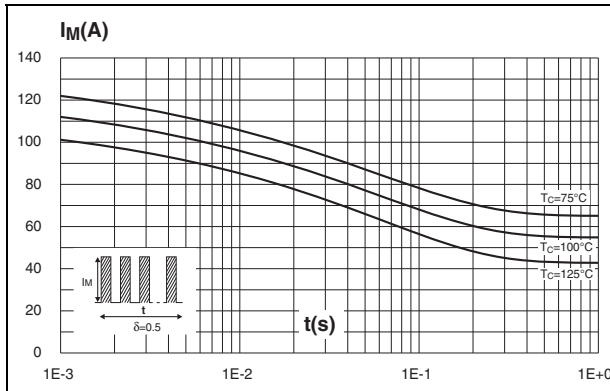


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration

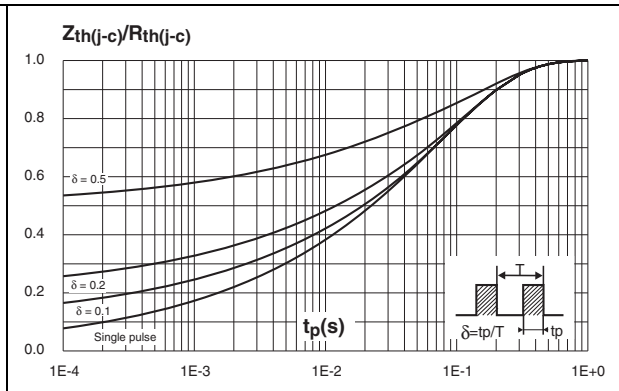


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

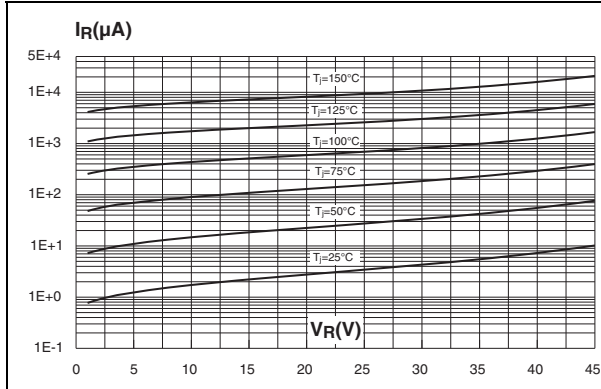


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

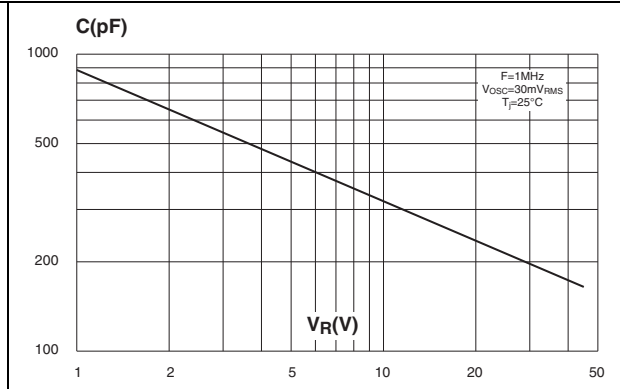


Figure 9. Forward voltage drop versus forward current (maximum values, per diode)

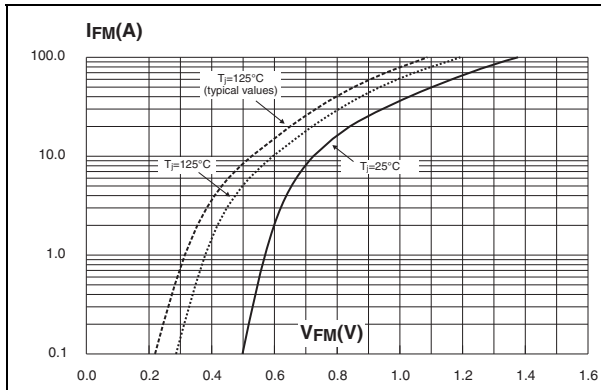
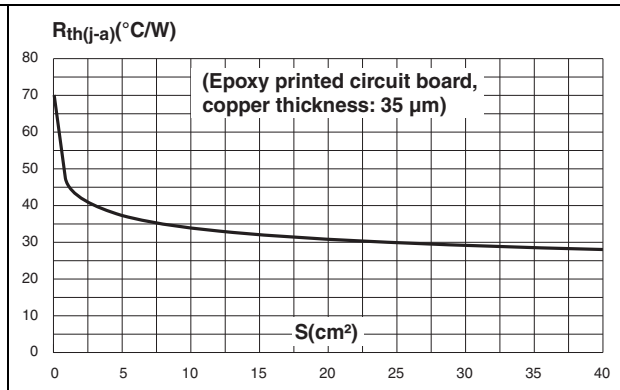


Figure 10. Thermal resistance junction to ambient versus copper surface under tab



2 Package information

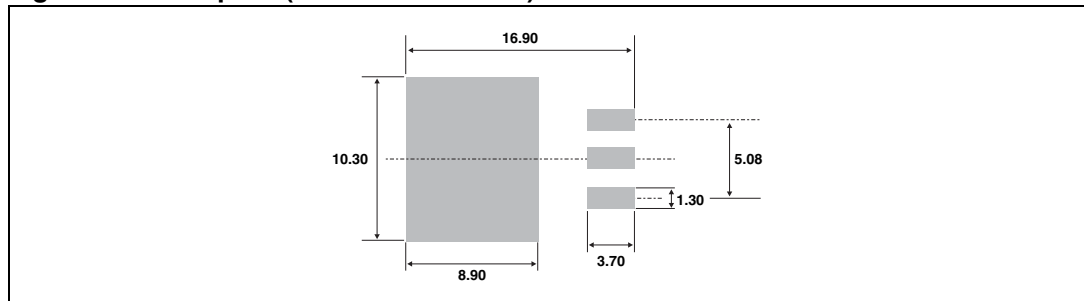
- Epoxy meets UL94, V0
- Lead-free package

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.

Table 5. D²PAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 11. Footprint (dimensions in mm)



3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS2045CGY-TR	STPS2045CGY	D ² PAK	1.48 g	1000	Tape and reel

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
24-May-2011	1	Initial release.

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