

## Automotive high voltage power Schottky rectifier

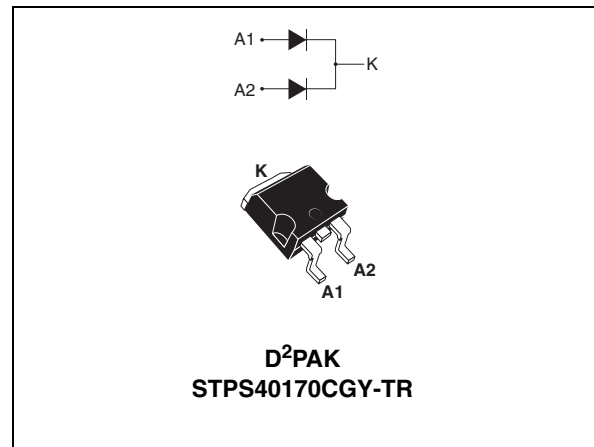
### Features

- High junction temperature capability
- Low leakage current
- Good trade off between leakage current and forward voltage drop
- Low thermal resistance
- High frequency operation
- Avalanche specification
- AEC-Q101 qualified

### Description

Dual center tab Schottky rectifier suited for high frequency switched mode power supplies.

Packaged in D<sup>2</sup>PAK, these devices are intended for use to enhance the reliability of the application in automotive segment.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	2 x 20 A
$V_{RRM}$	170 V
$T_j$	175 °C
$V_F (max)$	0.75 V

# 1 Characteristics

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

Symbol	Parameter		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage		170	V	
I <sub>F(RMS)</sub>	Forward rms current		60	A	
I <sub>F(AV)</sub>	Average forward current	T <sub>c</sub> = 150 °C δ = 0.5	Per diode	20	A
			Per device	40	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	250	A	
P <sub>ARM</sub>	Repetitive peak avalanche power	t <sub>p</sub> = 1 μs T <sub>j</sub> = 25° C	14100	W	
T <sub>stg</sub>	Storage temperature range		-65 to + 175	°C	
T <sub>j</sub>	Operating junction temperature <sup>(1)</sup>		-40 to + 175	°C	
dV/dt	Critical rate of rise 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 resistance parameters**

Symbol	Parameter		Value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	1.2	°C/W
		Total	0.85	
R <sub>th(c)</sub>	Coupling		0.5	

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

**Table 4. Static electrical characteristics (per diode)**

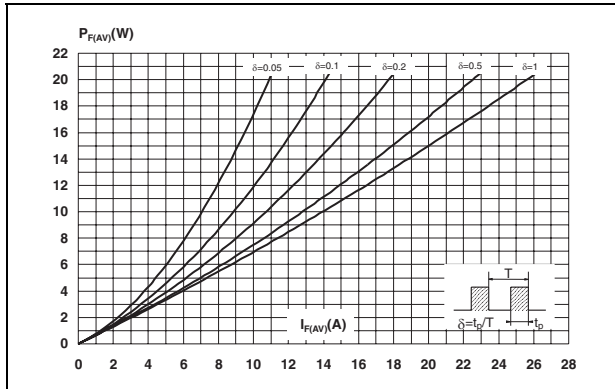
Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>			30	μA
		T <sub>j</sub> = 125 °C			7	30	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 20 A			0.92	V
		T <sub>j</sub> = 125 °C			0.69	0.75	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 40 A			1.00	
		T <sub>j</sub> = 125 °C			0.79	0.86	

1. Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

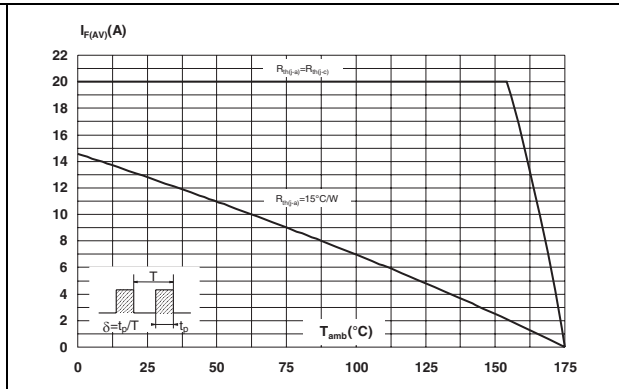
2. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

To evaluate the conduction losses use the following equation :  $P = 0.64 \times I_{F(AV)} + 0.0055 I_{F(RMS)}^2$

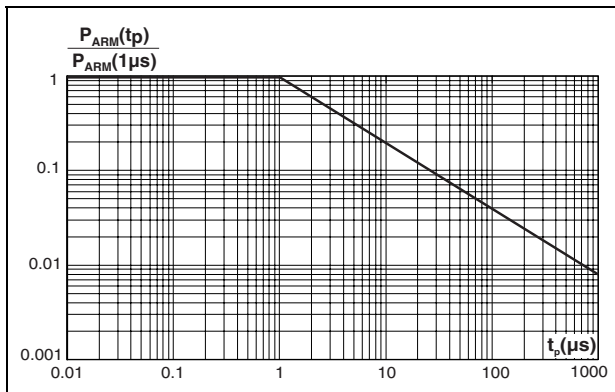
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



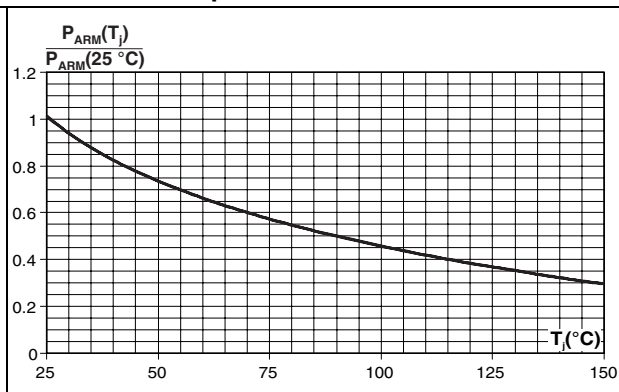
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



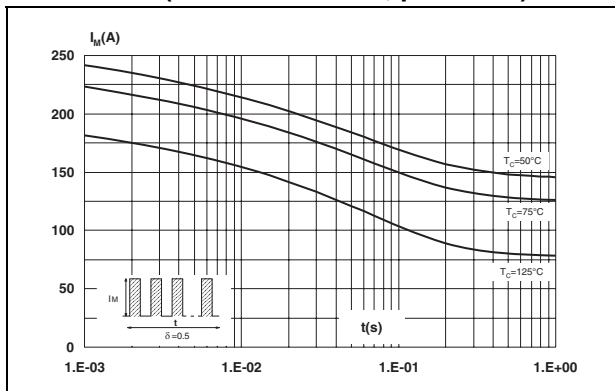
**Figure 3. Normalized avalanche power derating versus pulse duration**



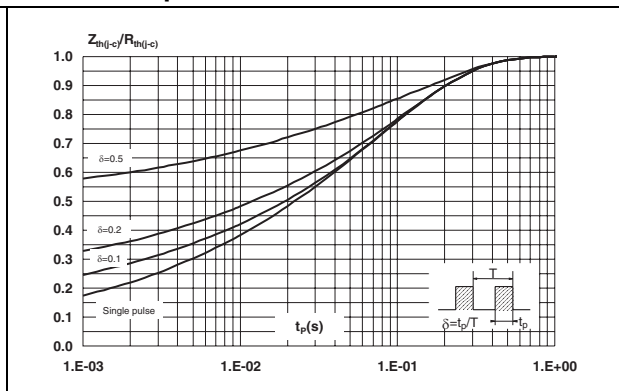
**Figure 4. Normalized avalanche power derating versus junction temperature**



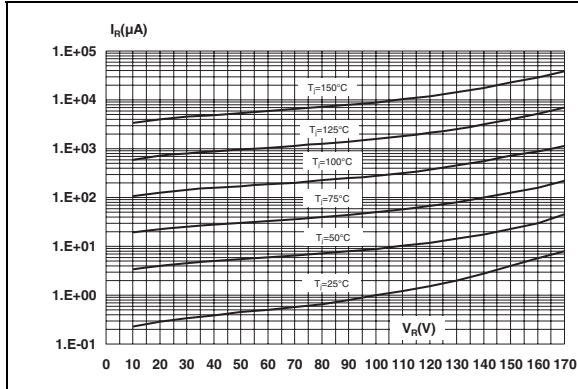
**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)**



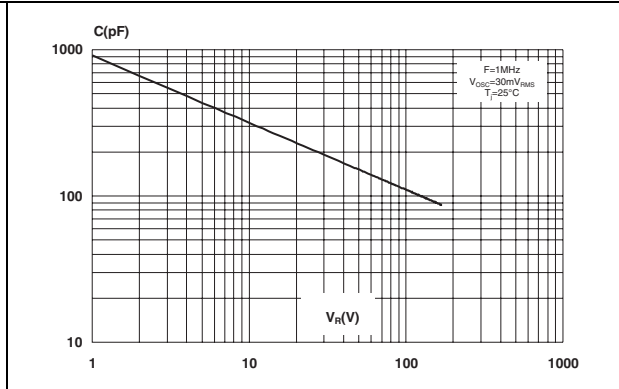
**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration**



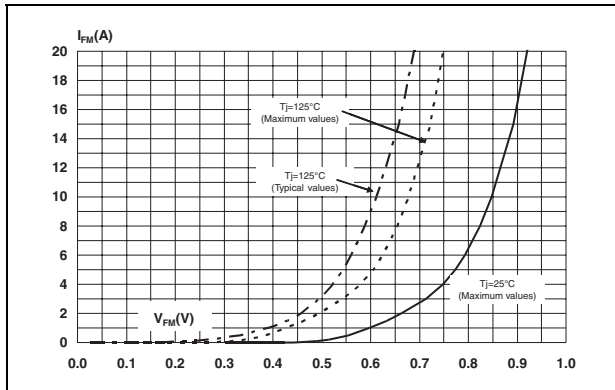
**Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



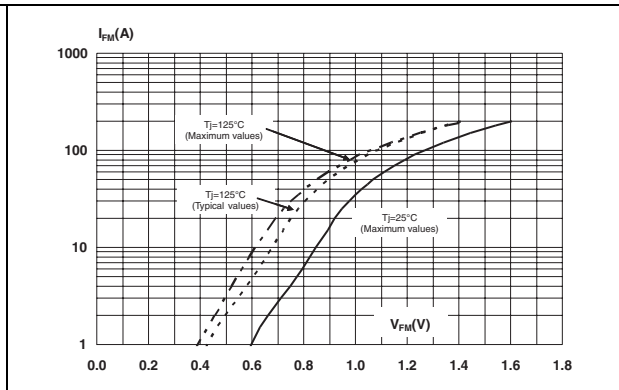
**Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)**



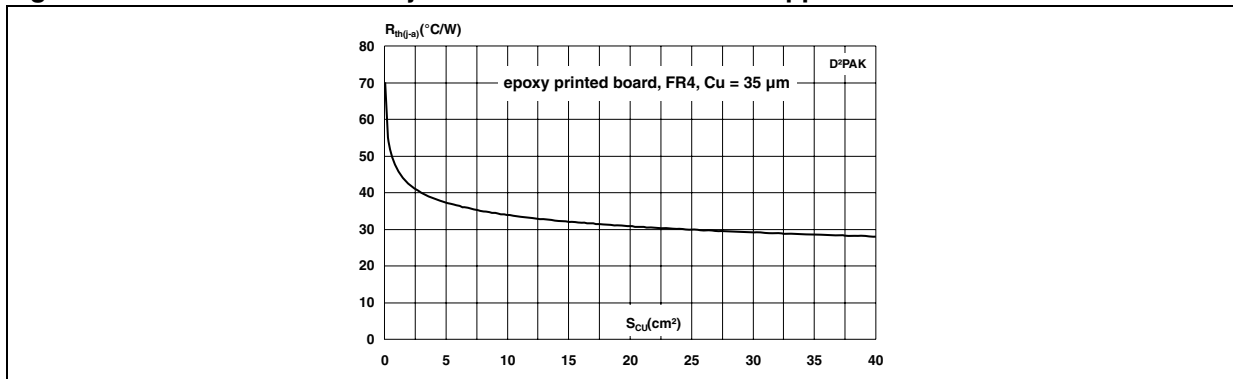
**Figure 9. Forward voltage drop versus forward current (per diode, low level)**



**Figure 10. Forward voltage drop versus forward current (per diode, high level)**



**Figure 11. Thermal resistance junction to ambient versus copper surface under tab**



## 2 Package information

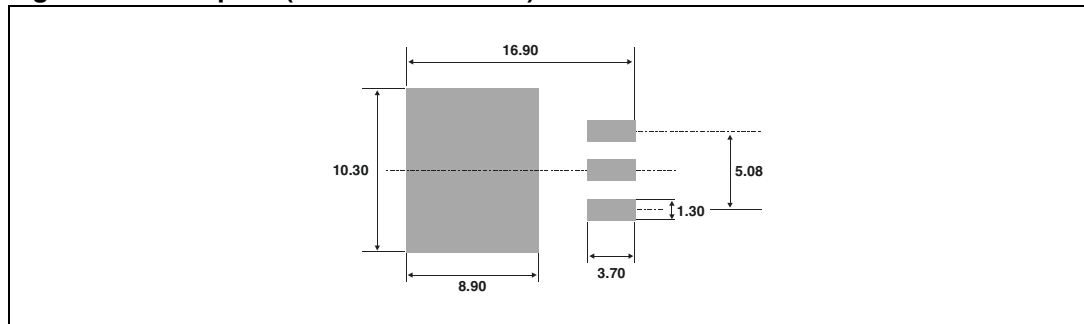
- Epoxy meets UL94, V0.
- Cooling method: by conduction (C)

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](http://www.st.com). ECOPACK® is an ST trademark.

**Table 5. D<sup>2</sup>PAK 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 12. Footprint (dimensions in mm)**



### 3 Ordering information

**Table 6. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS40170CGY-TR	STPS40170CGY	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel

### 4 Revision history

**Table 7. Revision history**

Date	Revision	Changes
03-Nov-2011	1	Initial release.

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