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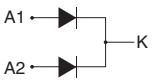
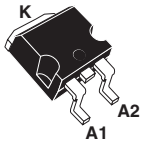
STPS40170C-Y

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





D^2PAK
STPS40170CGY-TR

Description

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

Packaged in D^2PAK, 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_{RRM}	Repetitive peak reverse voltage			170	V
$I_{F(RMS)}$	Forward rms current			60	A
$I_{F(AV)}$	Average forward current	T_c = 150 °C δ = 0.5	Per diode	20	A
			Per device	40	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		250	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25° C		14100	W
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Operating junction temperature(1)			-40 to + 175	°C
dV/dt	Critical rate of rise reverse voltage			10000	V/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance parameters

Symbol	Parameter		Value	Unit
$R_{th\ (j-c)}$	Junction to case	Per diode	1.2	°C/W
		Total	0.85	
$R_{th\ (c)}$	Coupling		0.5	

When the diodes 1 and 2 are used simultaneously :
ΔT_j(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			30	µA
		T_j = 125 °C			7	30	mA
V_F (2)	Forward voltage drop	T_j = 25° C	I_F = 20 A			0.92	V
		T_j = 125 °C			0.69	0.75	
		T_j = 25 °C	I_F = 40 A			1.00	
		T_j = 125 °C			0.79	0.86	

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 = 0.64 x $I_{F(AV)}$ + 0.0055 $I_F^2{}_{(RMS)}$

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

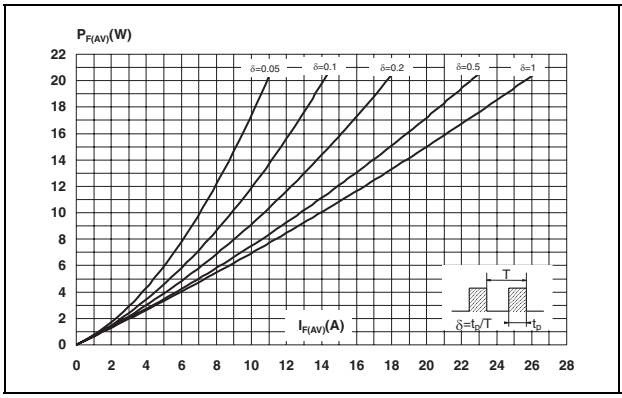


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

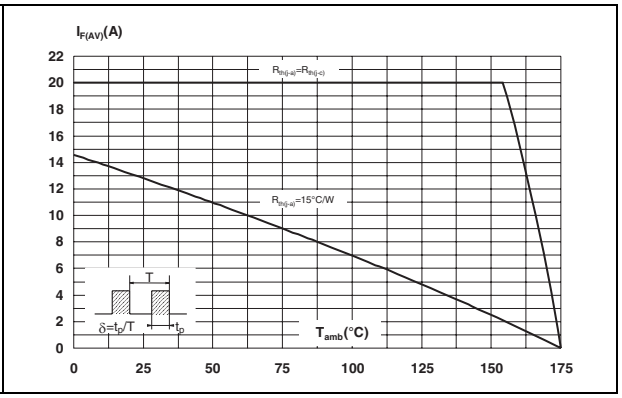


Figure 3. Normalized avalanche power derating versus pulse duration

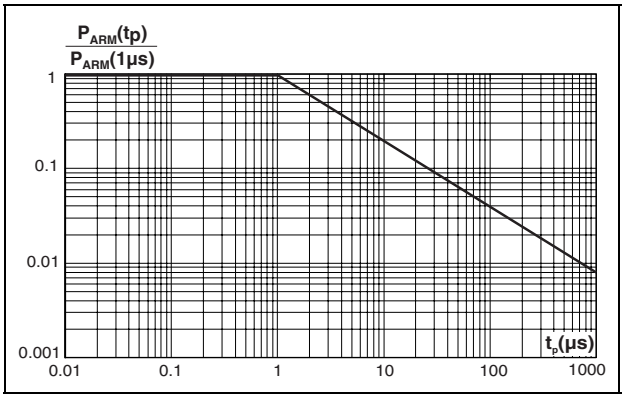


Figure 4. Normalized avalanche power derating versus junction temperature

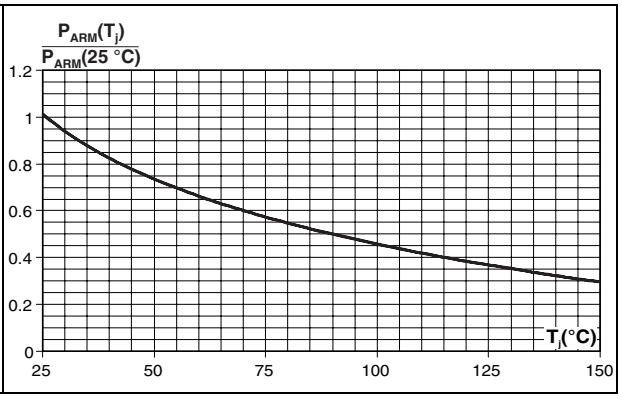


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

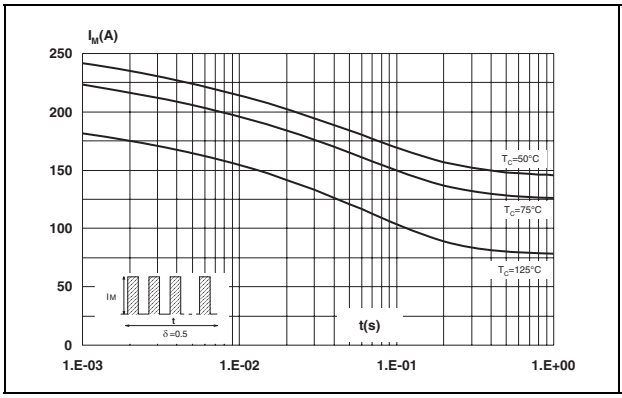


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

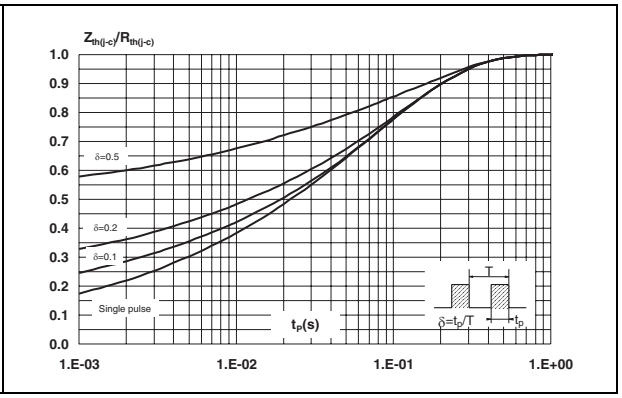


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

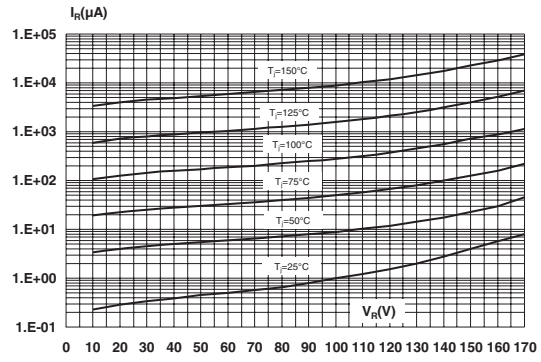


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

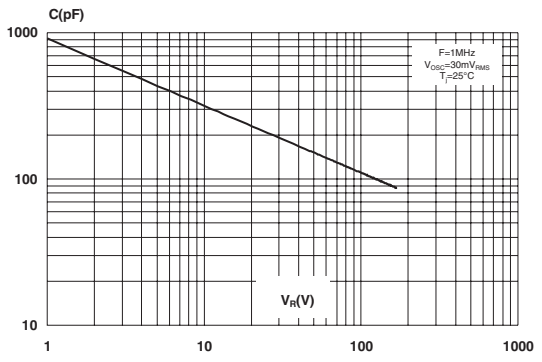


Figure 9. Forward voltage drop versus forward current (per diode, low level)

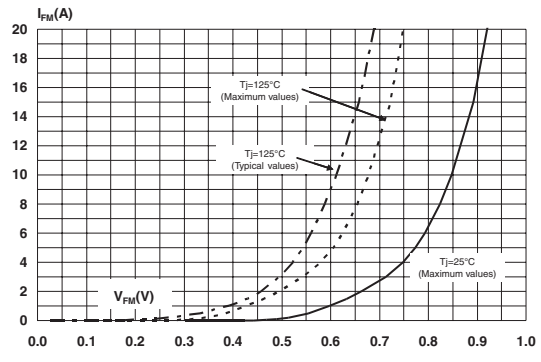


Figure 10. Forward voltage drop versus forward current (per diode, high level)

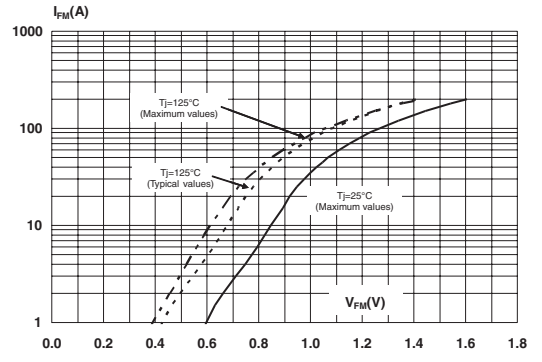
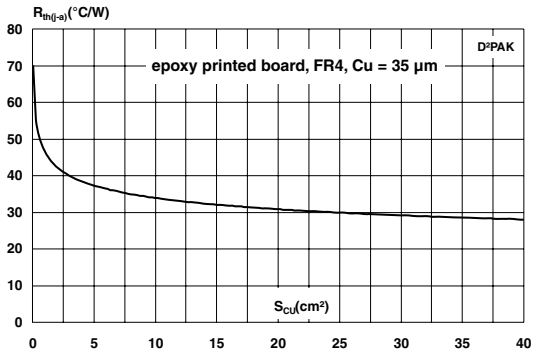


Figure 11. Thermal resistance junction to ambient versus copper surface under tab

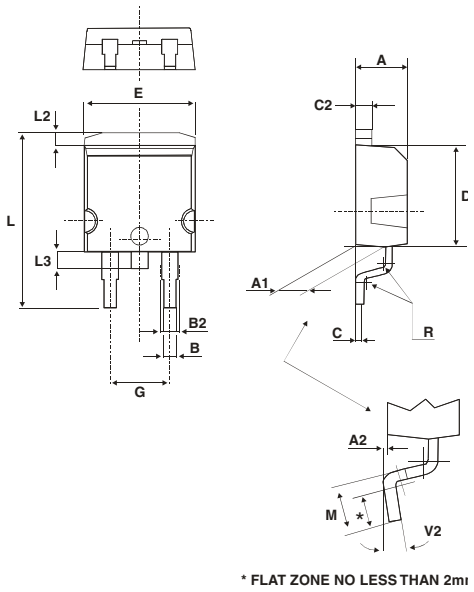


2 Package information

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

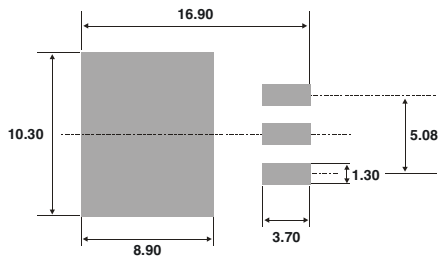
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

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 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^2PAK	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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