STPS40L45C-Y

Automotive power Schottky rectifier

Datasheet – production data

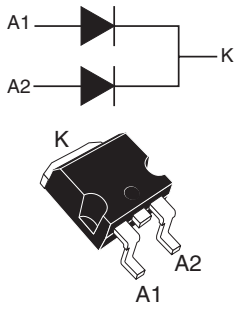
Features

- Low forward voltage drop meaning very small conduction losses
- Low switching losses allowing high frequency operation
- Avalanche capability specified
- AEC-Q101 qualified

Description

Dual center tap Schottky barrier rectifier designed for high frequency switched mode power supplies and DC to DC converters.

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



D²PAK
STPS40L45CGY

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 20 A
V_{RRM}	45 V
T_j (max)	150 °C
V_F(max)	0.49 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	T_c =130 °C δ = 0.5	per diode per device	20 40	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		230	A
I_{RRM}	Repetitive peak reverse current	t_p = 2 µs square F = 1 kHz		2	A
I_{RSM}	Non repetitive peak reverse current	t_p = 100 µs square		3	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C		8100	W
T_{stg}	Storage temperature range			-65 to + 150	°C
T_j	Operating junction temperature (1)			-40 to + 150	°C
dV/dt	Critical rate of rise of 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 resistances

Symbol	Parameter		Value	Unit
$R_{th\ (j-c)}$	Junction to case	Per diode Total	1.5 0.8	°C/W
$R_{th(c)}$	Coupling		0.1	°C/W

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	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			0.6	mA
		T_j = 125 °C			140	280	mA
V_F(1)	Forward voltage drop	T_j = 25 °C	I_F = 20 A			0.53	V
		T_j = 125 °C	I_F = 20 A		0.42	0.49	
		T_j = 25 °C	I_F = 40 A			0.69	
		T_j = 125 °C	I_F = 40 A		0.6	0.7	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.28 \times I_{F(AV)} + 0.0105\ I_F{}^2{}_{(RMS)}$

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

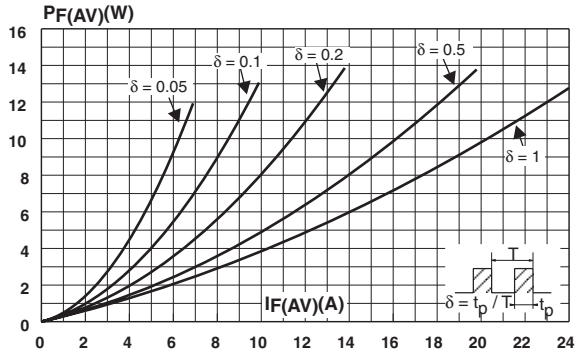


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

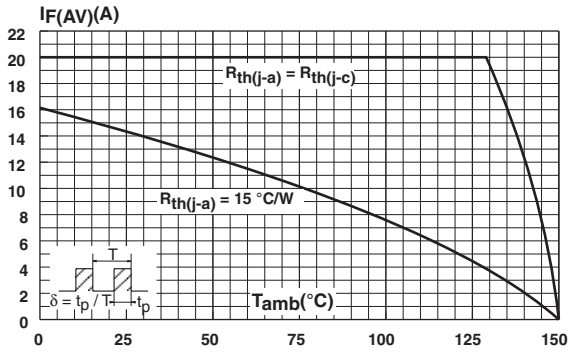


Figure 3. Normalized avalanche power derating versus pulse duration

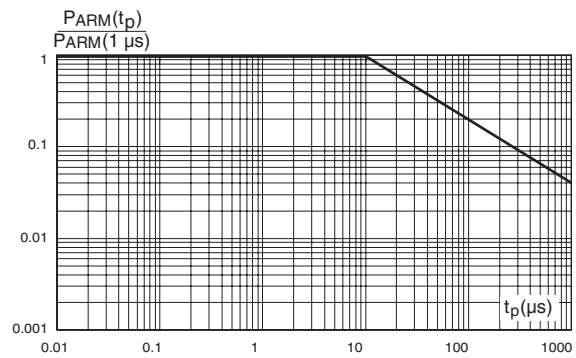


Figure 4. Normalized avalanche power derating versus junction temperature

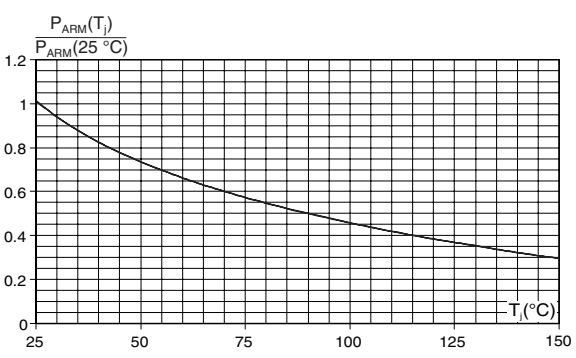


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

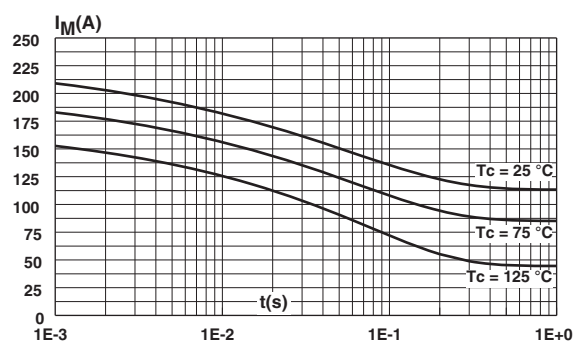


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

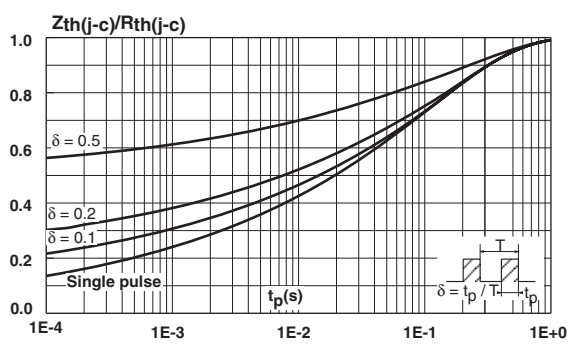


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

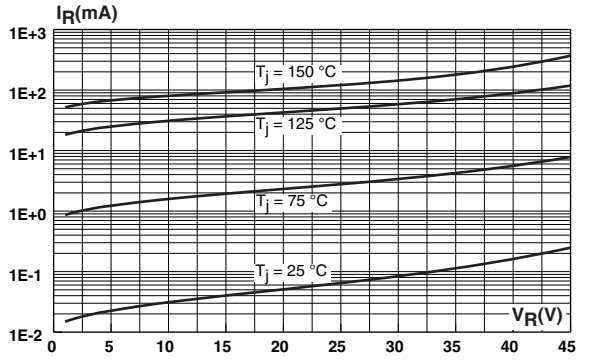


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

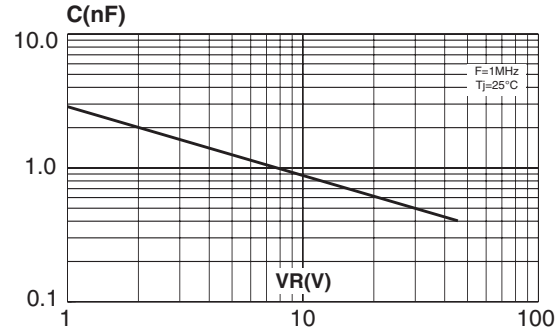


Figure 9. Forward voltage drop versus forward current (maximum values, per diode)

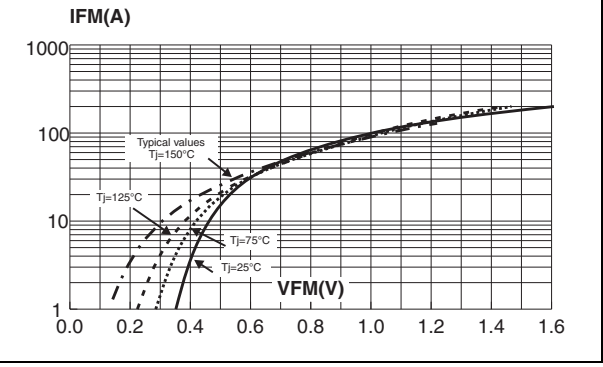
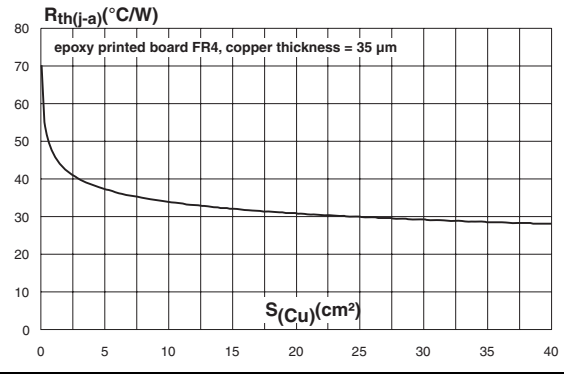


Figure 10. Thermal resistance junction to ambient versus copper surface under tab.

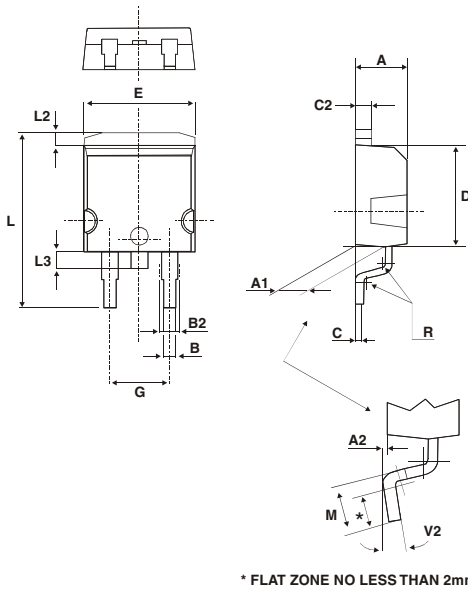


2 Package information

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

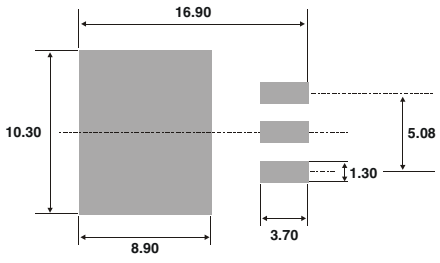
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

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 11. Footprint (dimensions in mm)



3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS40L45CGY-TR	STPS40L45CGY	D²PAK	1.8 g	500	Tape and Reel

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
25-Jun-2012	1	First issue.

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