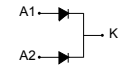
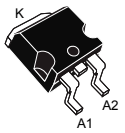
STPS40170C-Y

Datasheet

Automotive high voltage power Schottky rectifier





D²PAK

Features

- AEC-Q101 qualified
- 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

Description

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

Packaged in D²PAK, the STPS40170C-Y is used to enhance the reliability in automotive applications, and more precisely in DC/DC converters in hybrid and electrical vehicles.

Product status link	
STPS40170C-Y	
Product 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 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage, T_j = -40 °C to +175 °C			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
		T_c = 145 °C, δ = 0.5	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 = 10 µs, T_j = 125 °C		1015	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Operating junction temperature range(1)			-40 to +175	°C

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

Table 2. Thermal resistance parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.20	°C/W
		Total	0.85	
$R_{th(c)}$	Coupling		0.50	

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 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		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: tp = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

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

1.1 Characteristics (curves)

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

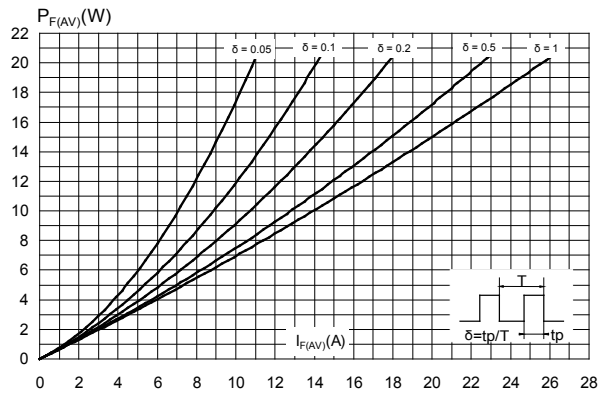


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

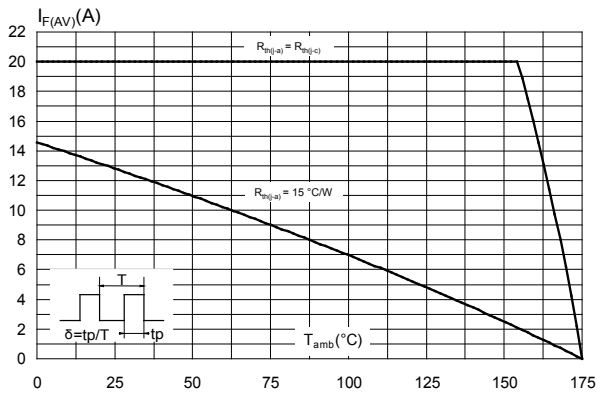


Figure 3. Normalized avalanche power derating versus junction temperature (T_j = 125 °C)

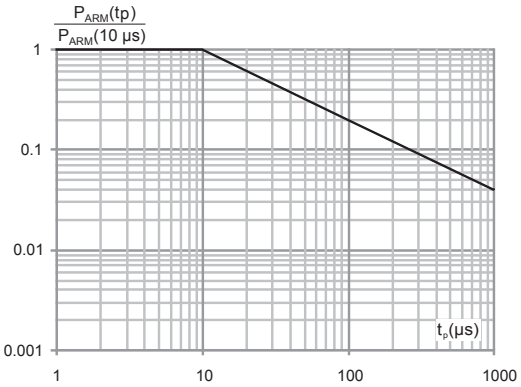


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

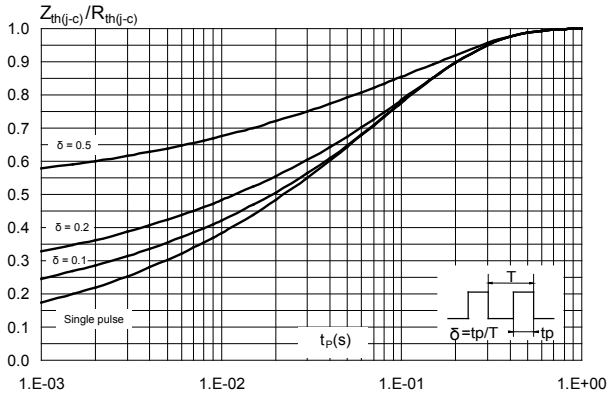


Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)

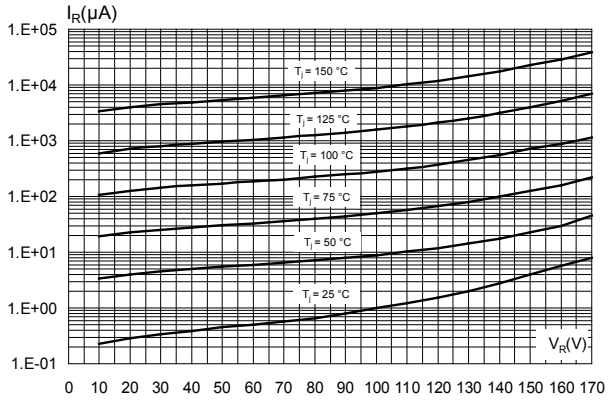


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

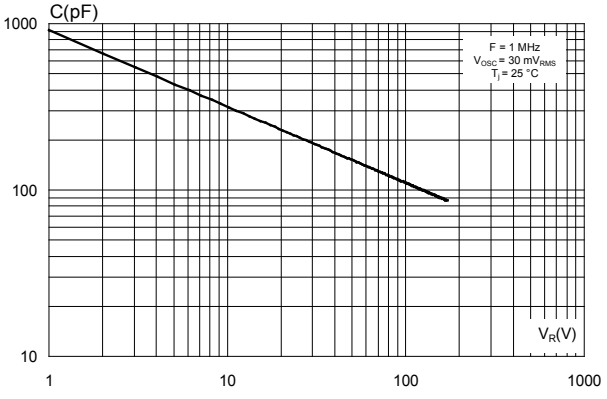


Figure 7. Forward voltage drop versus forward current (per diode, low level)

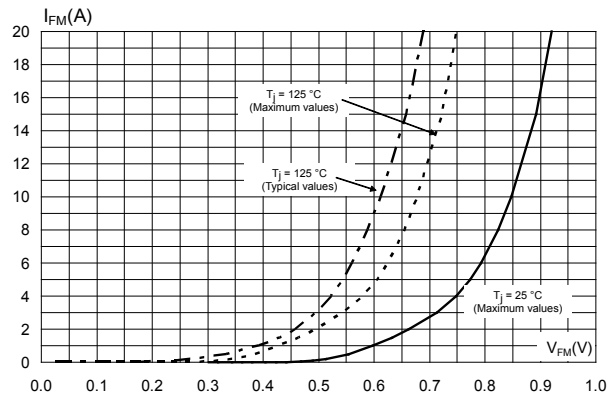


Figure 8. Forward voltage drop versus forward current (per diode, high level)

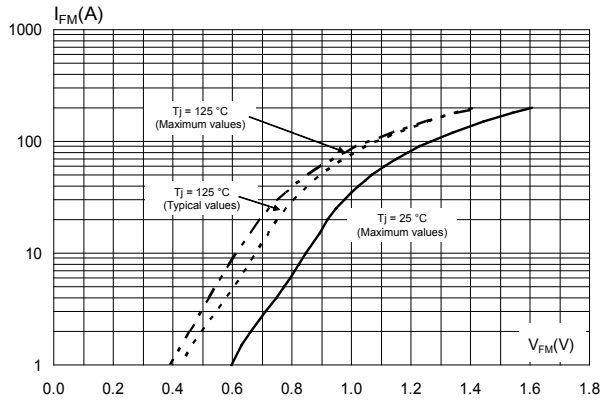
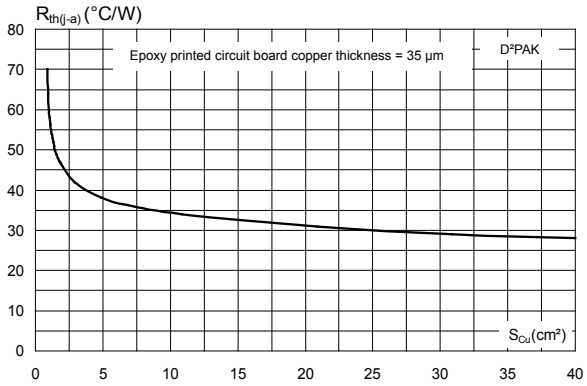


Figure 9. Thermal resistance junction to ambient versus copper surface under tab



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 D²PAK package information

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

Figure 10. D²PAK package outline

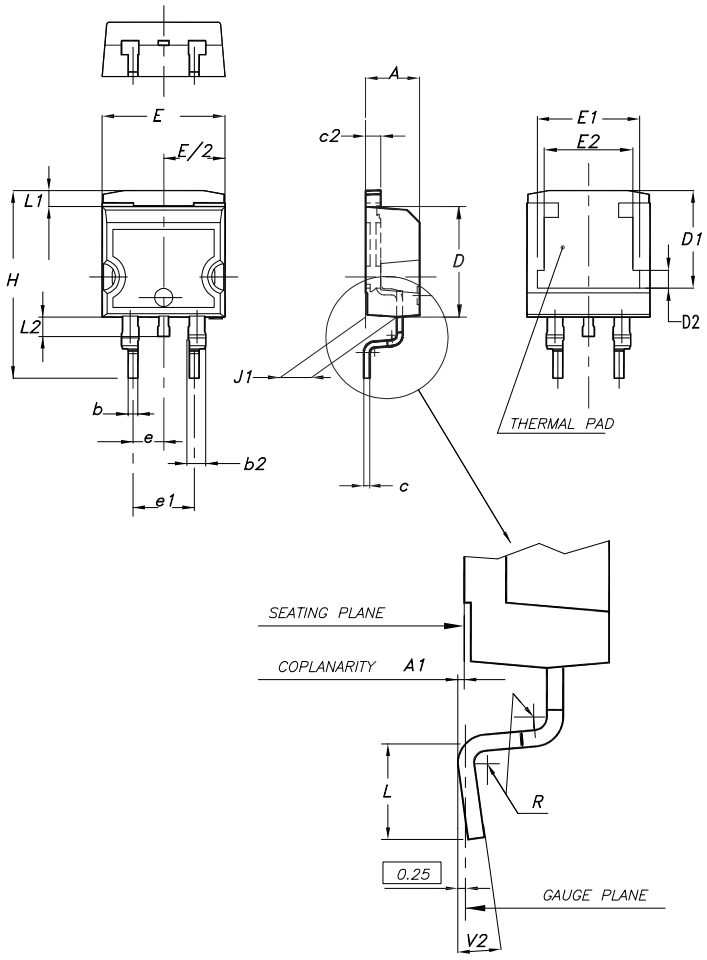
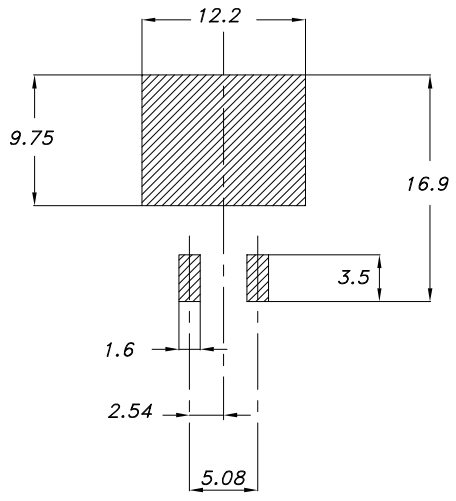


Table 4. **D²PAK package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
A1	0.03		0.23	0.001		0.009
b	0.70		0.93	0.028		0.037
b2	1.14		1.70	0.045		0.067
c	0.45		0.60	0.018		0.024
c2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1	7.50	7.75	8.00	0.295	0.305	0.315
D2	1.10	1.30	1.50	0.043	0.051	0.060
E	10		10.40	0.394		0.409
E1	8.50	8.70	8.90	0.335	0.343	0.346
E2	6.85	7.05	7.25	0.266	0.278	0.282
e		2.54			0.100	
e1	4.88		5.28	0.190		0.205
H	15		15.85	0.591		0.624
J1	2.49		2.69	0.097		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.40	0.049		0.055
L2	1.30		1.75	0.050		0.069
R		0.4			0.015	
V2	0°		8°	0°		8°

Figure 11. **D²PAK recommended footprint (dimensions are in mm)**



3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS40170CGY-TR	STPS40170CGY	D²PAK	1.48 g	1000	Tape and reel

Revision history

Table 6. Document revision history

Date	Version	Changes
03-Nov-2011	1	Initial release.
09-Apr-2018	2	Removed figure 4 and figure 5. Updated Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, per diode) and Figure 3. Normalized avalanche power derating versus junction temperature (T_j = 125 °C). Updated Section ● Description. Minor text changes to improve readability.