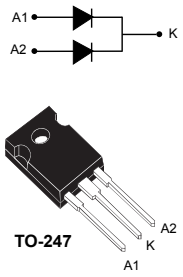
STPS80170C

Datasheet

170 V 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 capability
- ECOPACK®2 compliant

Applications

- Switching diode
- SMPS
- DC/DC converter
- Telecom power

Description

This dual diode common cathode Schottky rectifier is suited for high frequency switched mode power supplies.

Packaged in TO-247, the STPS80170C is optimized for use to enhance the reliability of the application.

Product status	
STPS80170C	
Product summary	
$I_{F(AV)}$	2 x 40 A
V_{RRM}	170 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.68 V

1 Characteristics

Table 1. Absolute ratings (limiting values per diode at 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			170	V
$I_{F(RMS)}$	Forward rms current			80	A
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	T_c = 150 °C	Per diode	40	A
		T_c = 140 °C	Per device	80	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		500	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C		2750	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature (1)			+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	0.7	°C/W
		Total	0.5	
$R_{th(c)}$	Coupling		0.3	°C/W

When the diodes 1 and 2 are used simultaneously: $\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

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	$V_R = V_{RRM}$	-		80	µA
		T_j = 125 °C		-	20	80	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 40 A	-		0.84	V
		T_j = 125 °C		-	0.68	0.74	
		T_j = 25 °C	I_F = 80 A	-		0.96	
		T_j = 125 °C		-	0.80	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: $P = 0.62 \times I_{F(AV)} + 0.003 \times I_F{}^2{}_{(RMS)}$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

1.1 Characteristics (curves)

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

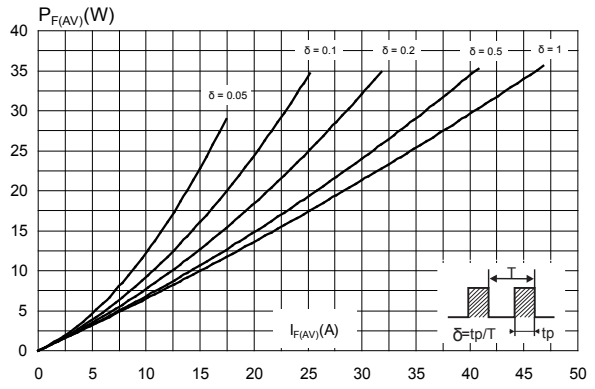


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

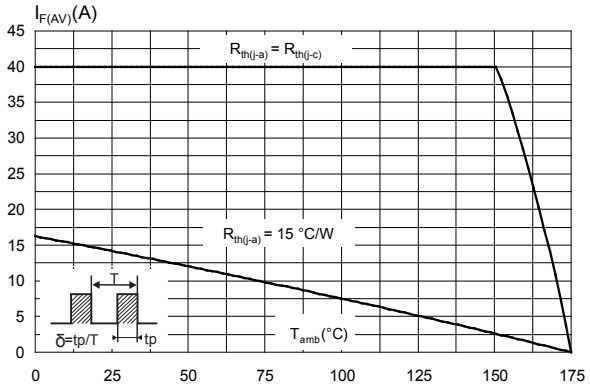


Figure 3. Normalized avalanche power derating versus pulse duration (T_j= 125 °C)

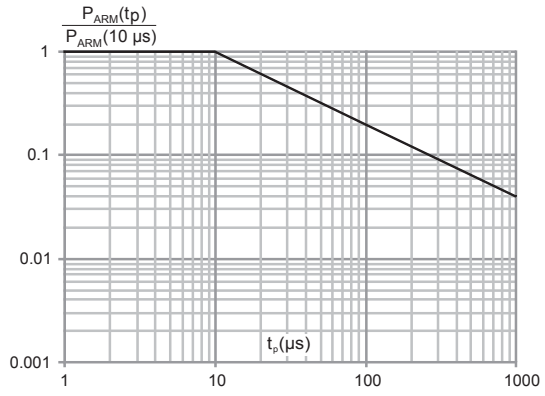


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

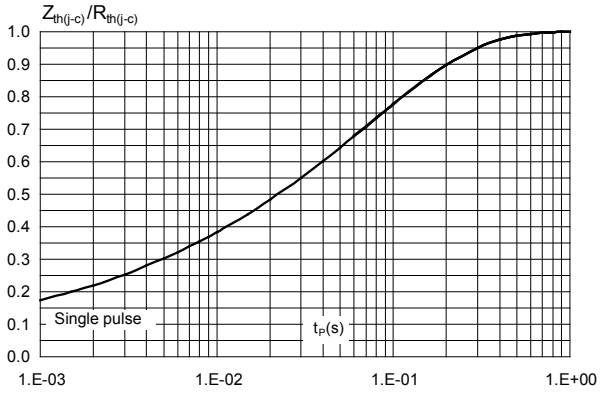


Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)

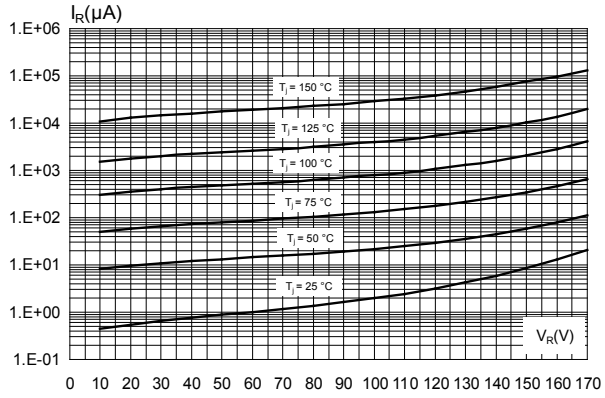


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

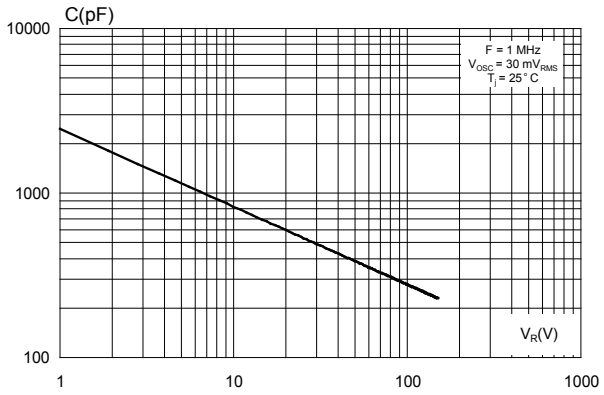


Figure 7. Forward voltage drop versus forward current (per diode, low level)

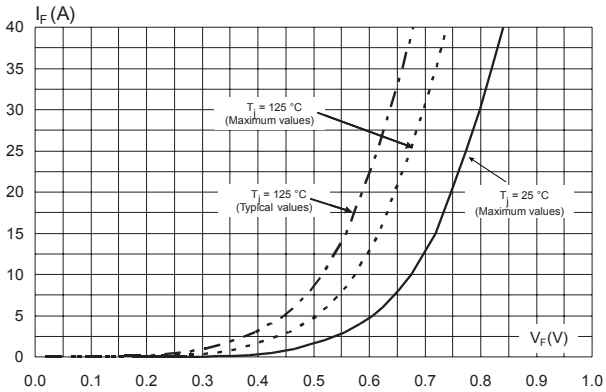
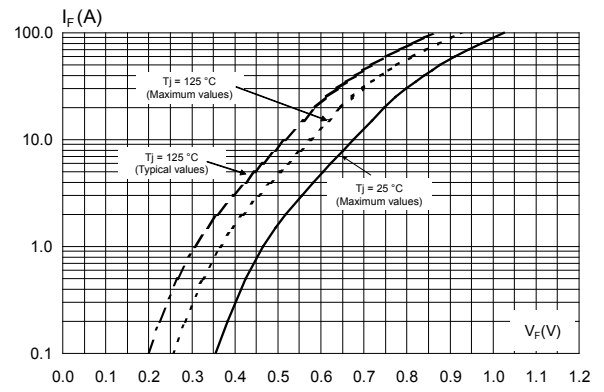


Figure 8. Forward voltage drop versus forward current (per diode, high level)



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 TO-247 package_information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m
- Maximum torque value: 1.0 N·m

Figure 9. TO-247 package outline

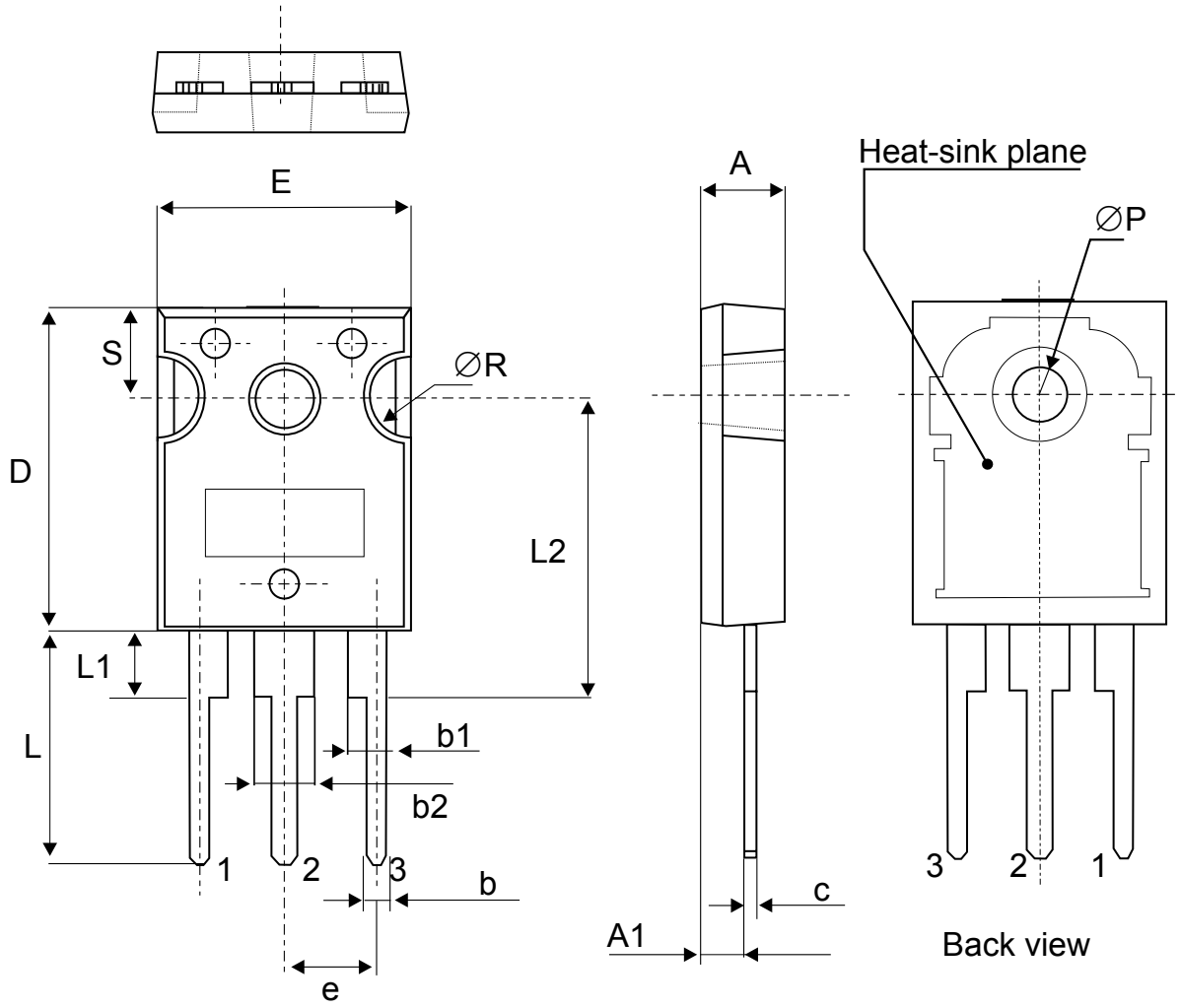


Table 4. **TO-247 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
ØP	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

3 Ordering information

Table 5. **Order code**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS80170CW	STPS80170CW	TO-247	4.36 g	30	Tube

Revision history

Table 6. Document revision history

Date	Revision	Changes
16-Sep-2005	1	First issue.
18-Jan-2018	2	Minor text change to improve readability. Updated Section 2.1: "TO-247 package information".
09-Aug-2018	3	Updated Table 1. Absolute ratings (limiting values per diode at 25 °C, unless otherwise specified) and Figure 3. Normalized avalanche power derating versus pulse duration (T_j= 125 °C).

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