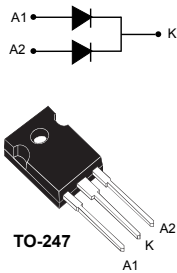


## 170 V power Schottky rectifier



### 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<sup>®</sup>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 <sub>RRM</sub>	Repetitive peak reverse voltage	170	V	
I <sub>F(RMS)</sub>	Forward rms current	80	A	
I <sub>F(AV)</sub>	Average forward current, $\delta = 0.5$ , square wave	T <sub>c</sub> = 150 °C Per diode	40	A
		T <sub>c</sub> = 140 °C Per device	80	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	500	A
P <sub>ARM</sub>	Repetitive peak avalanche power	t <sub>p</sub> = 10 $\mu$ s, T <sub>j</sub> = 125 °C	2750	W
T <sub>stg</sub>	Storage temperature range	-65 to +175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(1)</sup>	+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 <sub>th(j-c)</sub>	Junction to case	Per diode	0.7	°C/W
		Total	0.5	
R <sub>th(c)</sub>	Coupling	0.3	°C/W	

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

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 <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-		80	$\mu$ A
		T <sub>j</sub> = 125 °C		-	20	80	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 40 A	-		0.84	V
		T <sub>j</sub> = 125 °C		-	0.68	0.74	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 80 A	-		0.96	
		T <sub>j</sub> = 125 °C		-	0.80	0.86	

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

2. Pulse test: t<sub>p</sub> = 380  $\mu$ s,  $\delta < 2\%$

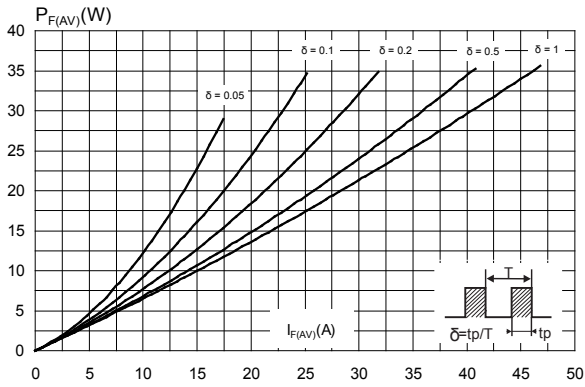
To evaluate the conduction losses, use the following equation:  $P = 0.62 \times I_{F(AV)} + 0.003 \times I_{F(RMS)}^2$

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

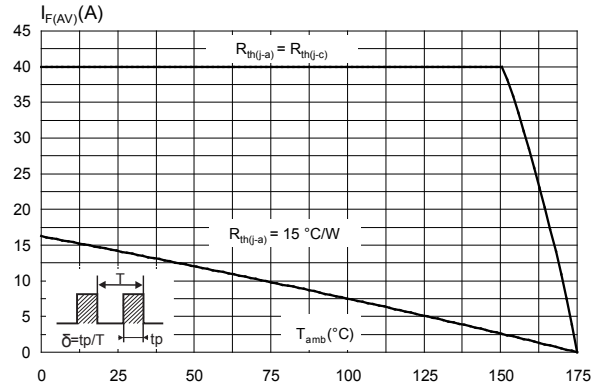
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

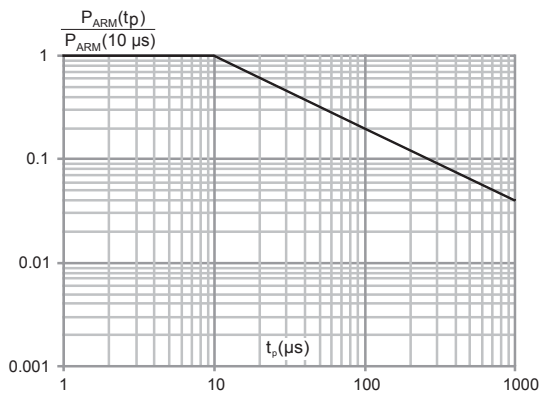
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



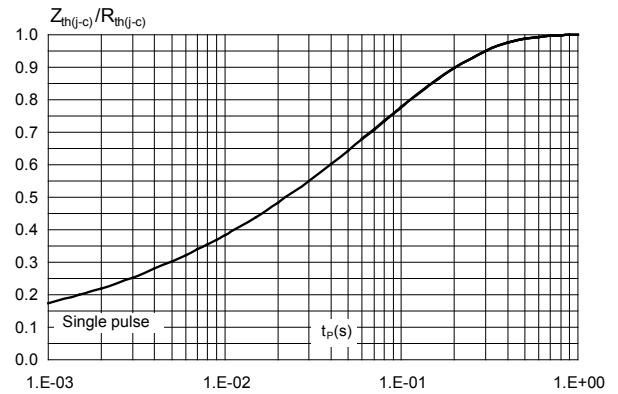
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



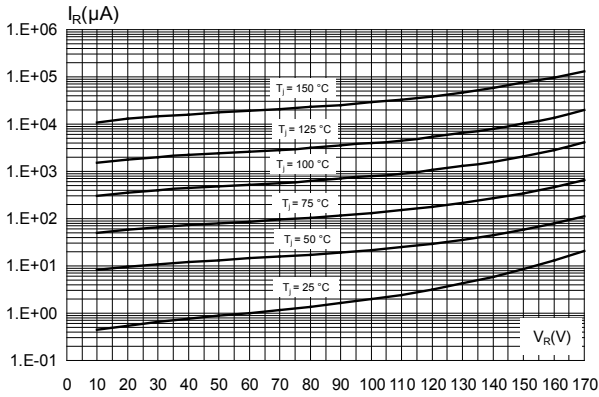
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125$  °C)**



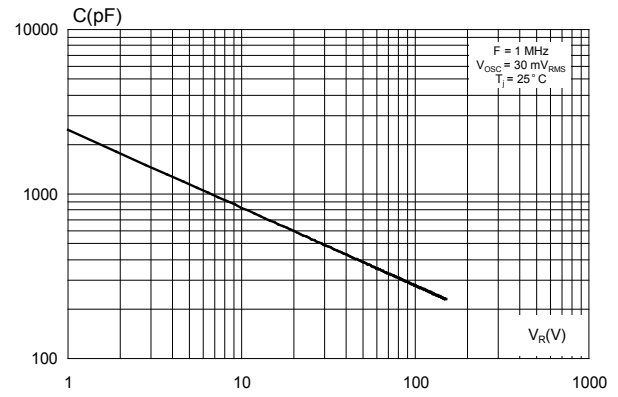
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



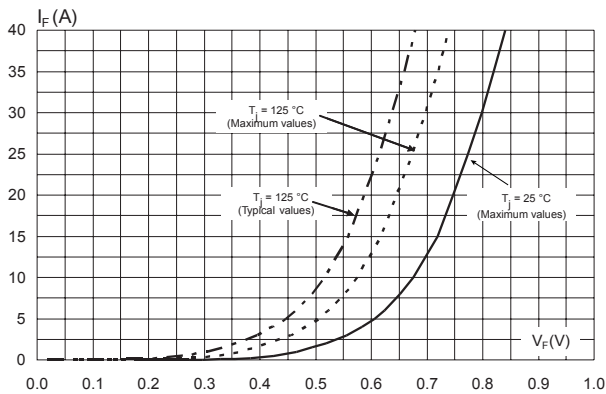
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



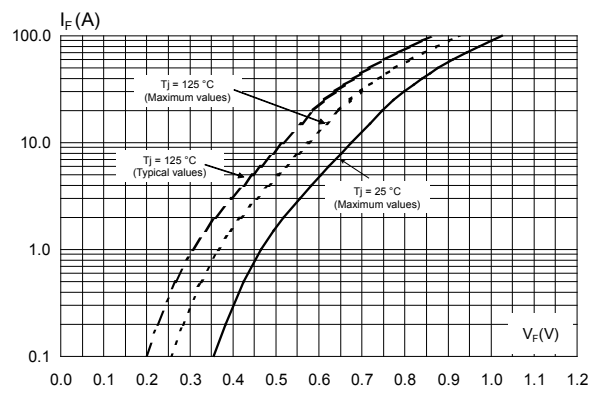
**Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)**



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



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



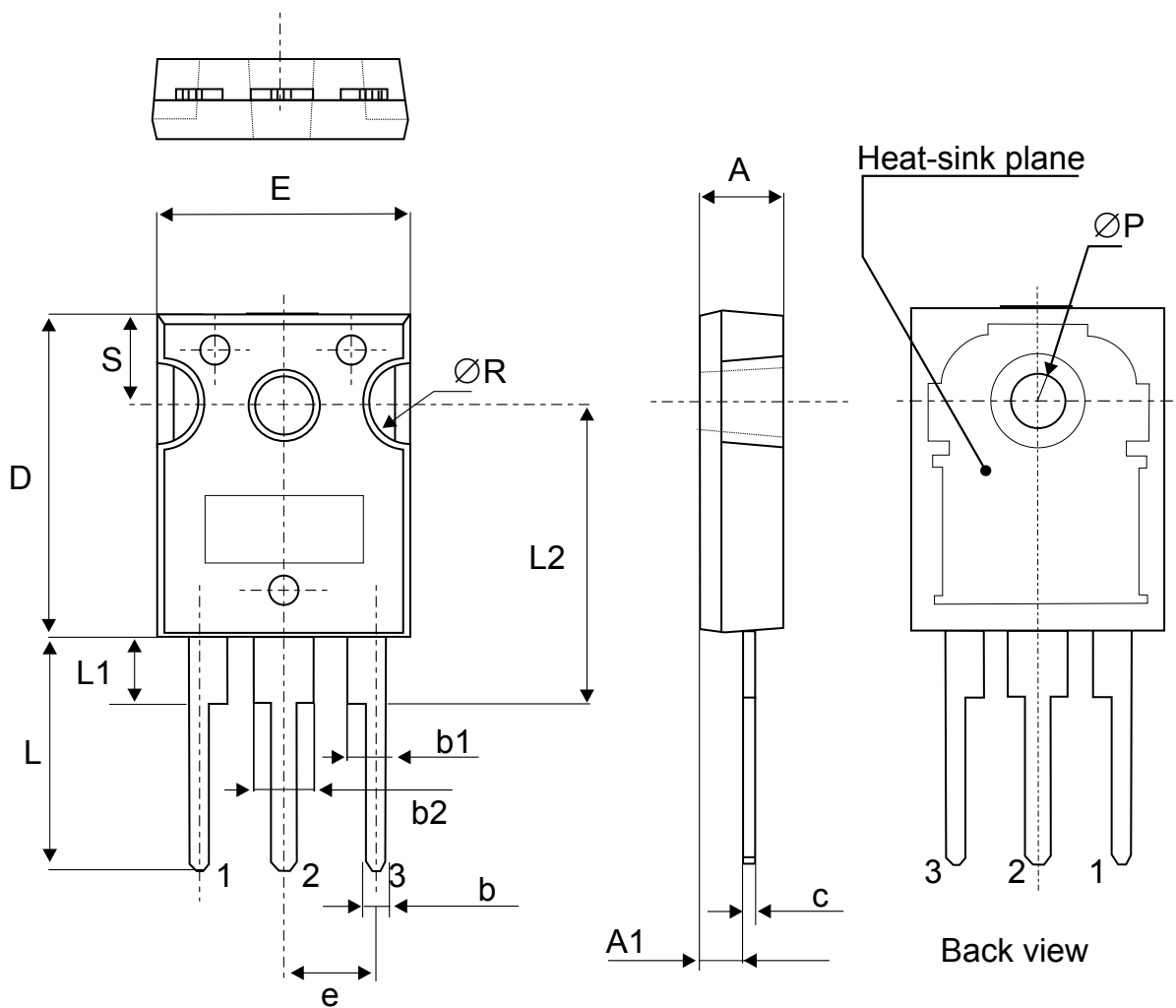
## 2 Package information

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](http://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 ( $T_j = 125\text{ °C}$ ).



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