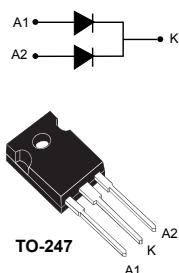


## 170 V power Schottky rectifier



### 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 <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, δ = 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 μs, 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 |
|---------------|------------------|-----------|------------|------|
| $R_{th(j-c)}$ | 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:  $\Delta T_j (\text{diode1}) = P_{(\text{diode1})} \times R_{th(j-c)} (\text{per diode}) + P_{(\text{diode2})} \times R_{th(c)}$

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          |
|----------------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R$ <sup>(1)</sup> | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     | -    |      | 80   | $\mu\text{A}$ |
|                      |                         | $T_j = 125\text{ °C}$ |                     | -    | 20   | 80   | mA            |
| $V_F$ <sup>(2)</sup> | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 40\text{ A}$ | -    |      | 0.84 | V             |
|                      |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.68 | 0.74 |               |
|                      |                         | $T_j = 25\text{ °C}$  | $I_F = 80\text{ A}$ | -    |      | 0.96 |               |
|                      |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.80 | 0.86 |               |

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

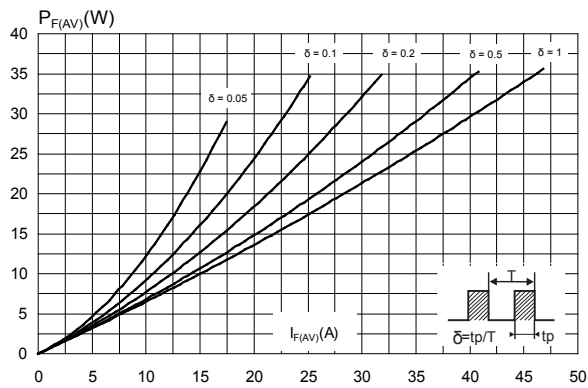
To evaluate the conduction losses, use the following equation:  $P = 0.62 \times I_{F(AV)} + 0.003 \times I_F^2 (\text{RMS})$

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

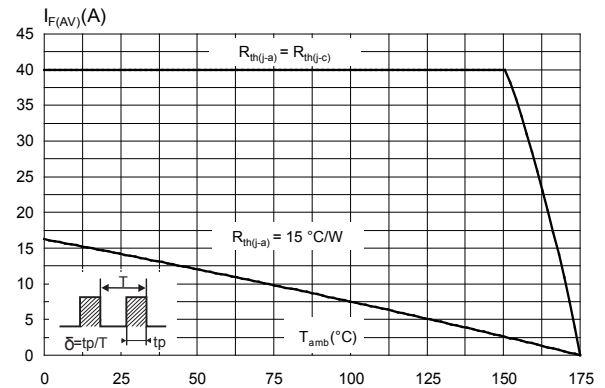
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

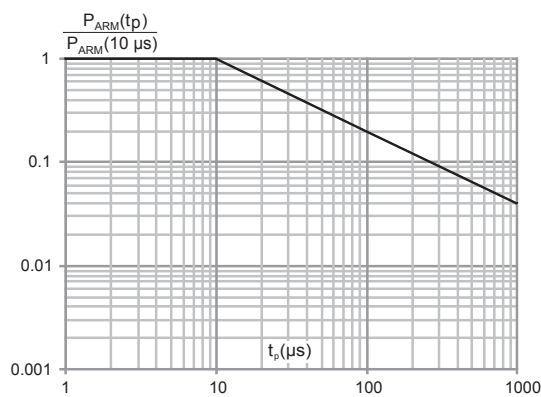
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



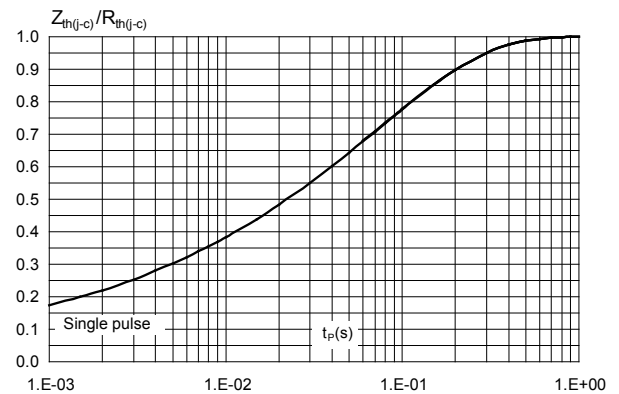
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



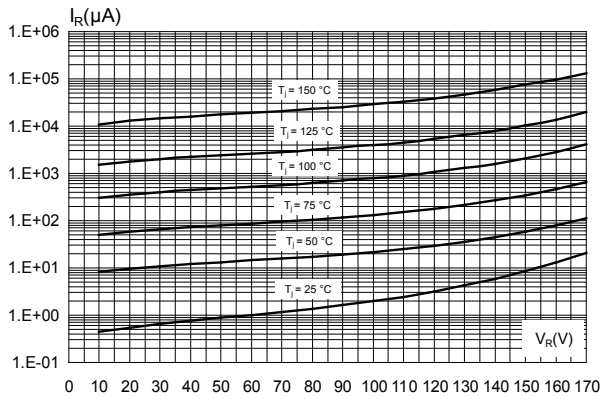
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_J = 125^\circ\text{C}$ )**



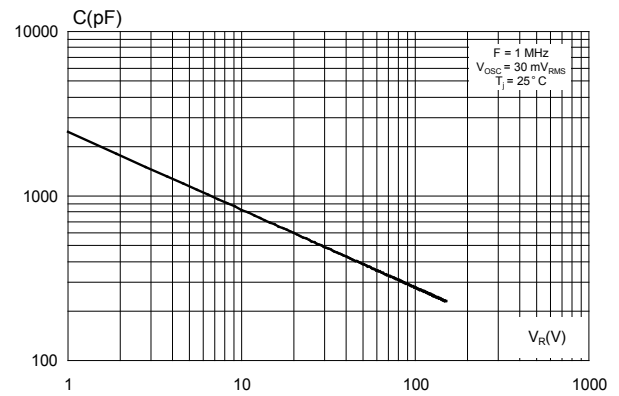
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



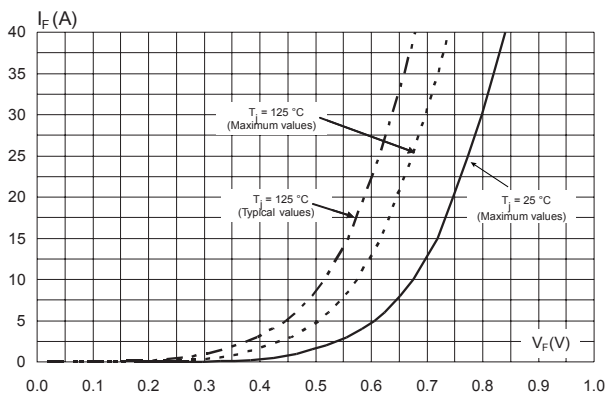
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



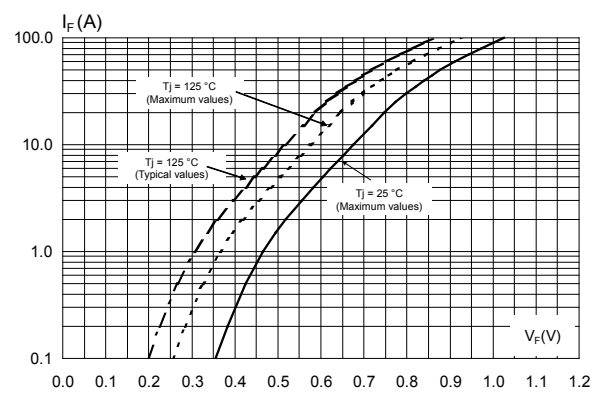
**Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)**



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



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



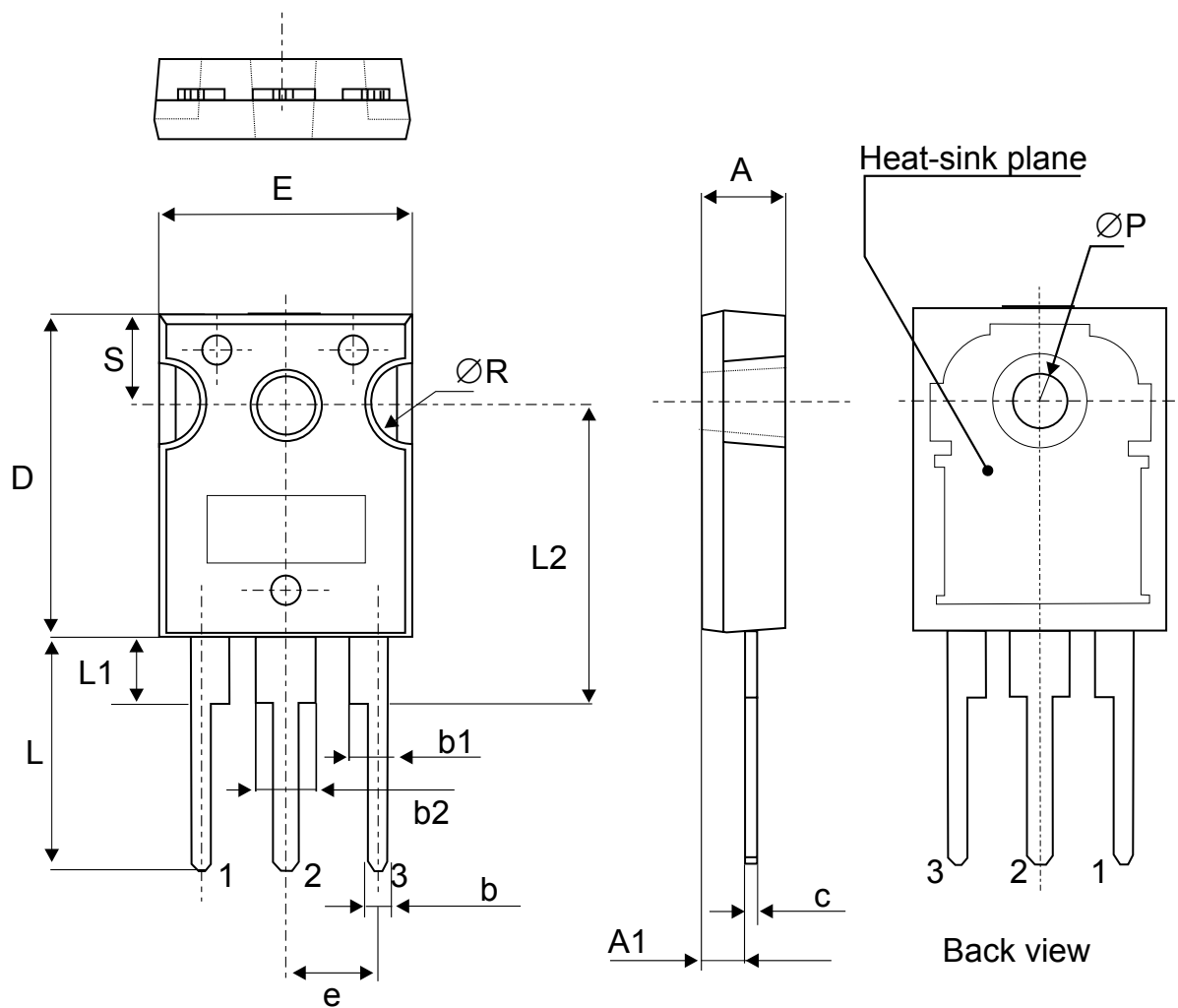
## 2 Package information

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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