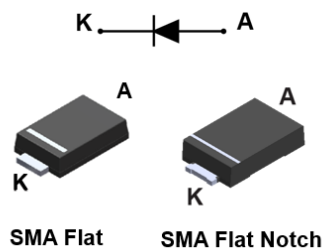


## 170 V, 2 A power Schottky rectifier



### Features

- Negligible switching losses
- High junction temperature capability
- Very small conduction losses
- Low leakage current
- Avalanche rated
- [ECOPACK2](#) component

### Applications

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

### Description

The STPS2170 is a 170 V Schottky rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in SMA Flat and SMA Flat Notch, the [STPS2170](#) is ideal for use in low voltage, high frequency inverters, freewheeling and polarity protection. Also ideal for all LED lighting applications where efficiency and space constraint are required.

| Product status           |        |
|--------------------------|--------|
| <a href="#">STPS2170</a> |        |
| Product summary          |        |
| Symbol                   | Value  |
| $I_{F(AV)}$              | 2 A    |
| $V_{RRM}$                | 170 V  |
| $T_{j(max.)}$            | 175 °C |
| $V_{F(typ.)}$            | 0.62 V |

# 1 Characteristics

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

| Symbol       | Parameter                                              |                          |                                                       | Value       | Unit |
|--------------|--------------------------------------------------------|--------------------------|-------------------------------------------------------|-------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage                        |                          |                                                       | 170         | V    |
| $V_{RRM}$    | Repetitive peak reverse voltage, $T_j = -40\text{ °C}$ |                          |                                                       | 160         | V    |
| $I_{F(RMS)}$ | Forward rms current                                    |                          |                                                       | 15          | A    |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$ , square wave  | SMA Flat, SMA Flat Notch | $T_L = 145\text{ °C}$                                 | 2           | A    |
| $I_{FSM}$    | Surge non repetitive forward current                   | SMA Flat, SMA Flat Notch | $t_p = 10\text{ ms}$ sinusoidal                       | 70          | A    |
| $P_{ARM}$    | Repetitive peak avalanche power                        |                          | $t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$ | 165         | W    |
| $T_{stg}$    | Storage temperature range                              |                          |                                                       | -65 to +175 | °C   |
| $T_j$        | 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 parameter**

| Symbol        | Parameter        |                          | Max. value | Unit |
|---------------|------------------|--------------------------|------------|------|
| $R_{th(j-l)}$ | Junction to lead | SMA Flat, SMA Flat Notch | 20         | °C/W |

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

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       |                    | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$    | -    |      | 2.8  | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 0.5  | 2.8  | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 2\text{ A}$ | -    |      | 0.82 | V             |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 0.62 | 0.67 |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 4\text{ A}$ | -    |      | 0.89 |               |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 0.70 | 0.75 |               |

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:

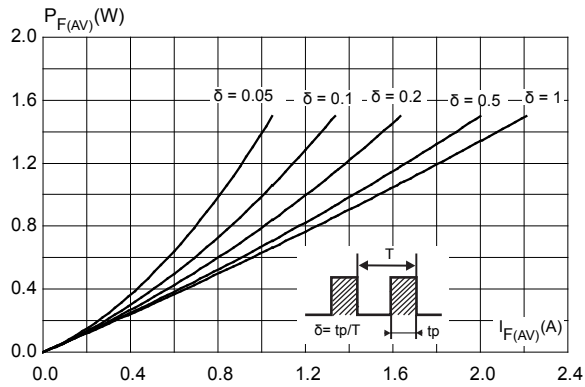
$$P = 0.59 \times I_{F(AV)} + 0.04 \times I_{F(RMS)}^2$$

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

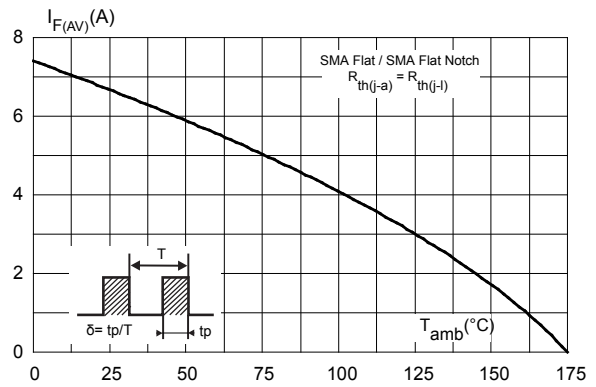
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

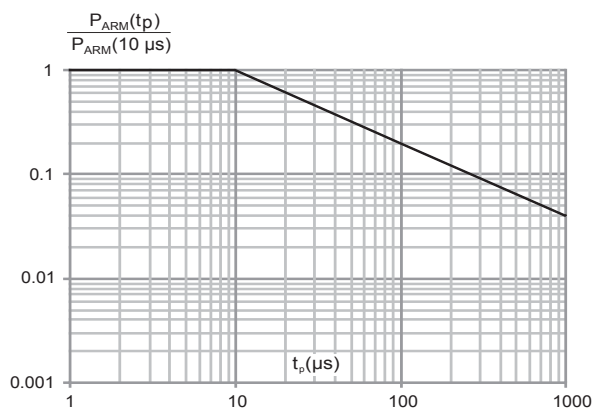
**Figure 1. Average forward power dissipation versus average forward current**



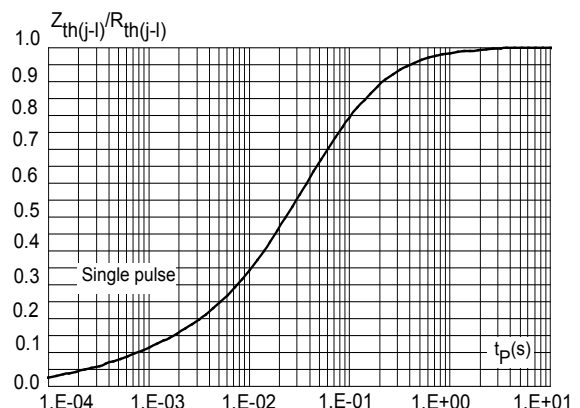
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , SMA Flat, SMA Flat Notch)**



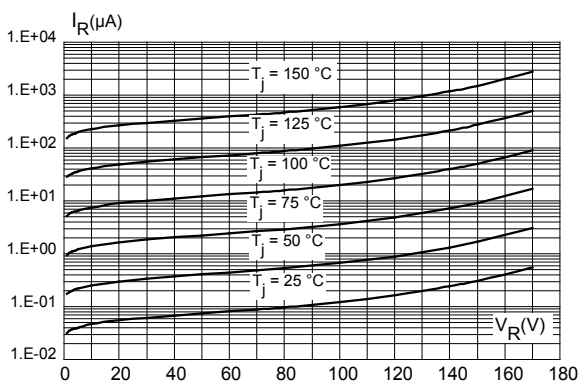
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_J = 125^\circ\text{C}$ )**



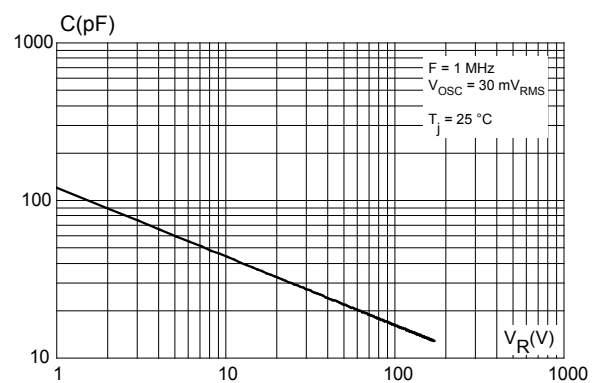
**Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration**



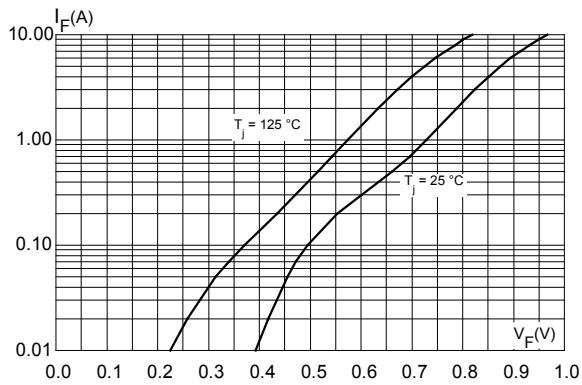
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values)**



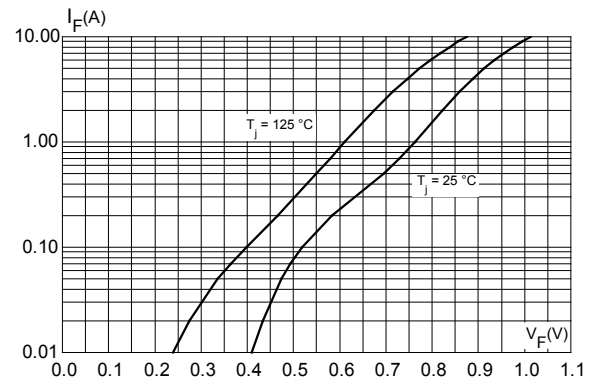
**Figure 6. Junction capacitance versus reverse voltage applied (typical values)**



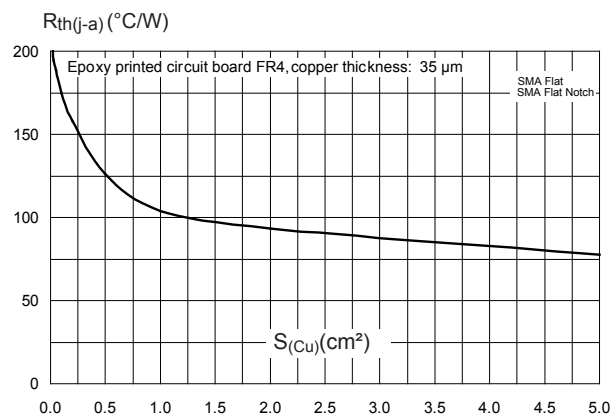
**Figure 7. Forward voltage drop versus forward current (typical values)**



**Figure 8. Forward voltage drop versus forward current (maximum values)**



**Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat, SMA Flat Notch)**



## 2 Package information

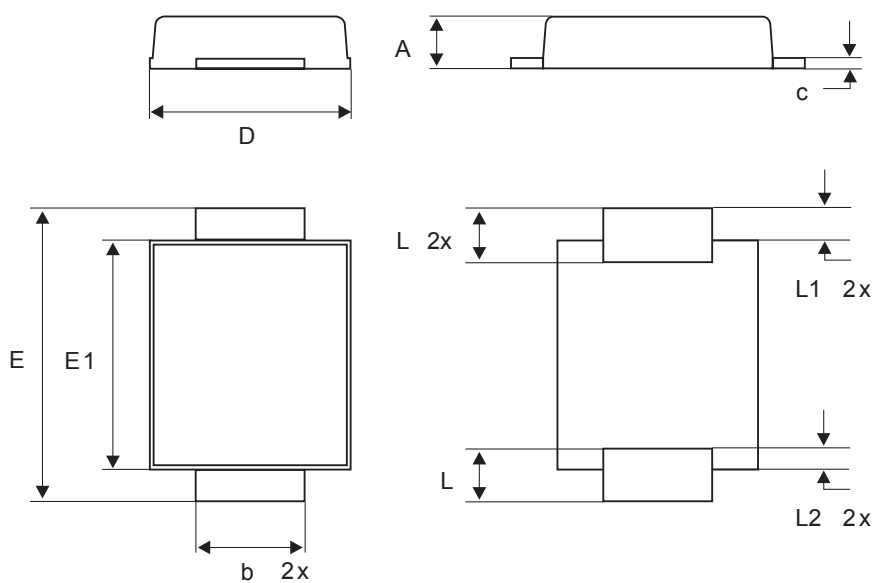
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In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com).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

## 2.1 SMA Flat package information

- Epoxy meets UL94, V0
- Lead-free package

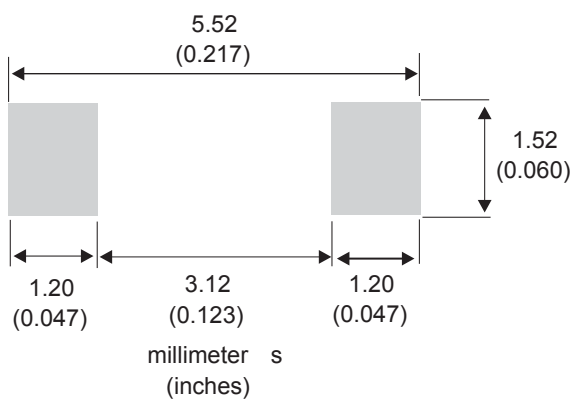
**Figure 10. SMA Flat package outline**



**Table 4. SMA Flat package mechanical data**

| Ref. | Dimensions  |      |      |                             |       |       |
|------|-------------|------|------|-----------------------------|-------|-------|
|      | Millimeters |      |      | Inches (for reference only) |       |       |
|      | Min.        | Typ. | Max. | Min.                        | Typ.  | Max.  |
| A    | 0.90        |      | 1.10 | 0.035                       |       | 0.044 |
| b    | 1.25        |      | 1.65 | 0.049                       |       | 0.065 |
| c    | 0.15        |      | 0.40 | 0.005                       |       | 0.016 |
| D    | 2.25        |      | 2.95 | 0.088                       |       | 0.117 |
| E    | 4.80        |      | 5.60 | 0.188                       |       | 0.221 |
| E1   | 3.95        |      | 4.60 | 0.155                       |       | 0.182 |
| L    | 0.75        |      | 1.50 | 0.029                       |       | 0.060 |
| L1   |             | 0.50 |      |                             | 0.020 |       |
| L2   |             | 0.50 |      |                             | 0.020 |       |

Figure 11. SMA Flat recommended footprint in mm (inches)



## 2.2 SMA Flat Notch package information

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

Figure 12. SMA Flat Notch package outline

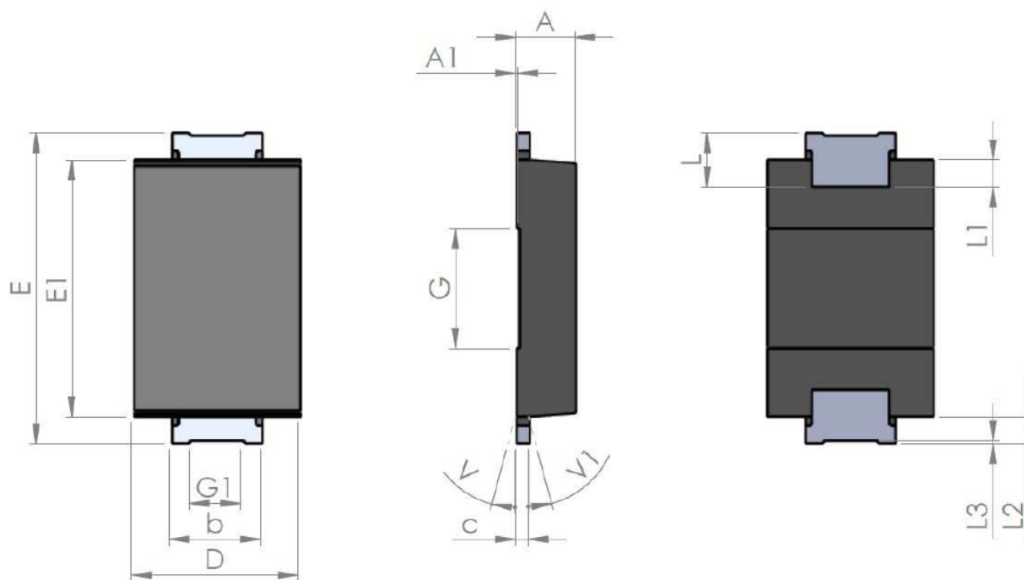
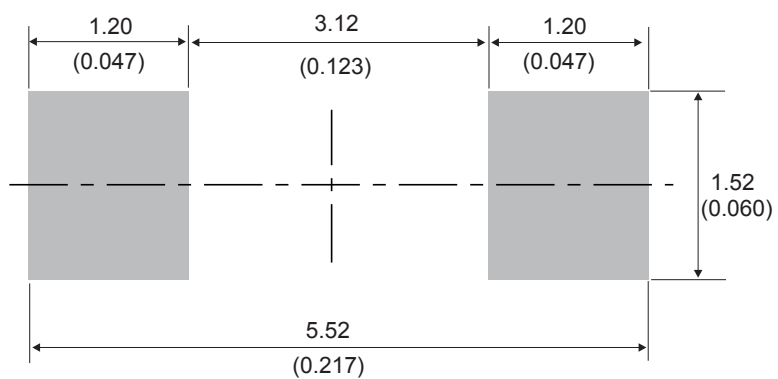


Table 5. SMA Flat Notch package mechanical data

| Ref. | Dimensions  |      |      |                             |       |       |
|------|-------------|------|------|-----------------------------|-------|-------|
|      | Millimeters |      |      | Inches (for reference only) |       |       |
|      | Min.        | Typ. | Max. | Min.                        | Typ.  | Max.  |
| A1   | 0.90        |      | 1.10 | 0.035                       |       | 0.044 |
| A1   |             | 0.05 |      |                             | 0.002 |       |
| b    | 1.25        |      | 1.65 | 0.049                       |       | 0.065 |
| C    | 0.15        |      | 0.40 | 0.005                       |       | 0.016 |
| D    | 2.25        |      | 2.90 | 0.088                       |       | 0.115 |
| E    | 5.00        |      | 5.35 | 0.196                       |       | 0.211 |
| E1   | 3.95        |      | 4.60 | 0.155                       |       | 0.182 |
| G    |             | 2.00 |      |                             | 0.079 |       |
| G1   |             | 0.85 |      |                             | 0.033 |       |
| L    | 0.75        |      | 1.20 | 0.029                       |       |       |
| L1   |             | 0.45 |      |                             | 0.018 |       |
| L2   |             | 0.45 |      |                             | 0.018 |       |
| L3   |             | 0.05 |      |                             | 0.002 |       |
| V    |             |      | 8°   |                             |       | 8°    |
| V1   |             |      | 8°   |                             |       | 8°    |

**Figure 13. SMA Flat Notch recommended footprint in mm (inches)**



### 3 Ordering information

**Table 6. Ordering information**

| Order code  | Marking | Package        | Weight  | Base qty. | Delivery mode |
|-------------|---------|----------------|---------|-----------|---------------|
| STPS2170AF  | F2170   | SMA Flat       | 0.035 g | 10 000    | Tape and reel |
| STPS2170AFN | A2170   | SMA Flat Notch | 0.039 g | 10 000    | Tape and reel |

## Revision history

**Table 7. Document revision history**

| Date        | Version | Changes                                                               |
|-------------|---------|-----------------------------------------------------------------------|
| 14-Oct-2014 | 1       | First release.                                                        |
| 08-Oct-2019 | 2       | Added <a href="#">Section 2.2</a> SMA Flat Notch package information. |

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