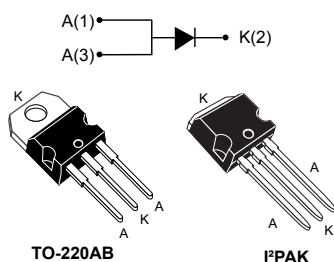


## 100 V power Schottky rectifier



### Features

- High current capability
- Avalanche rated
- Low forward voltage drop
- High frequency operation
- ECOPACK®2 compliant

### Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Desktop power supply

### Description

This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB and I²PAK, the [STPS20SM100S](#) is intended to be used in notebook, game station and desktop adaptors, providing in these applications a good efficiency at both low and high load.

| Product status link          |        |
|------------------------------|--------|
| <a href="#">STPS20SM100S</a> |        |
| Product summary              |        |
| $I_{F(AV)}$                  | 20 A   |
| $V_{RRM}$                    | 100 V  |
| $T_j$ (max.)                 | 150 °C |
| $V_F$ (typ.)                 | 0.63 V |

# 1 Characteristics

**Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified)**

| Symbol       | Parameter                                             | Value                                                         | Unit |
|--------------|-------------------------------------------------------|---------------------------------------------------------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage                       | 100                                                           | V    |
| $I_{F(RMS)}$ | Forward rms current                                   | 30                                                            | A    |
| $I_{F(AV)}$  | Average forward current $\delta = 0.5$ , square wave  | $T_C = 125\text{ °C}$<br>20                                   | A    |
| $I_{FSM}$    | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$ sinusoidal<br>350                        | A    |
| $P_{ARM}$    | Repetitive peak avalanche power                       | $t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$<br>1080 | W    |
| $T_{stg}$    | Storage temperature range                             | -65 to +150                                                   | °C   |
| $T_j$        | Maximum operating junction temperature <sup>(1)</sup> | 150                                                           | °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 |
|---------------|------------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | 1.3        | °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 (with terminals 1 and 3 short circuited)**

| Symbol               | Parameter               | Test conditions       | Min. | Typ. | Max. | Unit          |
|----------------------|-------------------------|-----------------------|------|------|------|---------------|
| $I_R$ <sup>(1)</sup> | Reverse leakage current | $T_j = 25\text{ °C}$  | -    | 10   | 30   | $\mu\text{A}$ |
|                      |                         | $T_j = 125\text{ °C}$ |      | 10   | 30   | mA            |
|                      |                         | $T_j = 25\text{ °C}$  | -    | 5    |      | $\mu\text{A}$ |
|                      |                         | $T_j = 125\text{ °C}$ |      | 5    |      | mA            |
| $V_F$ <sup>(2)</sup> | Forward voltage drop    | $T_j = 25\text{ °C}$  | -    | 565  |      | mV            |
|                      |                         | $T_j = 125\text{ °C}$ |      | 480  |      |               |
|                      |                         | $T_j = 25\text{ °C}$  | -    | 685  |      |               |
|                      |                         | $T_j = 125\text{ °C}$ |      | 560  | 620  |               |
|                      |                         | $T_j = 25\text{ °C}$  | -    | 800  | 900  |               |
|                      |                         | $T_j = 125\text{ °C}$ |      | 630  | 700  |               |

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:

$$P = 0.6 \times I_{F(AV)} + 0.005 \times I_F^2 \text{ (RMS)}$$

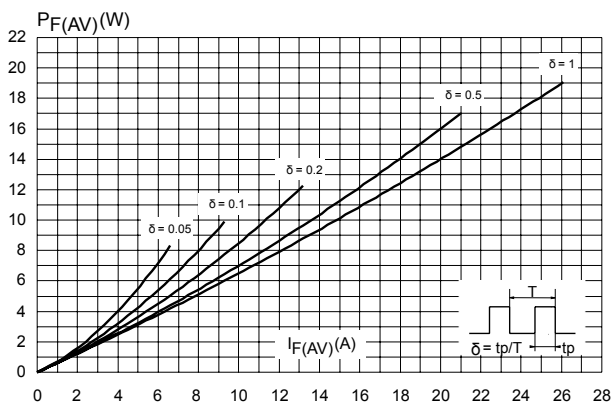
For more information, please refer to the following application notes related to the power losses:

- AN604: Calculation of conduction losses in a power rectifier

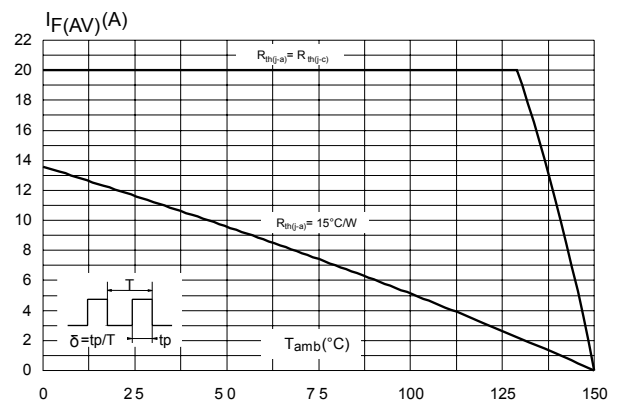
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

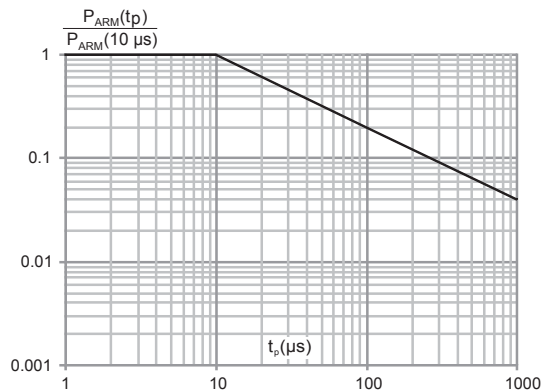
**Figure 1. Average forward power dissipation versus average forward current (terminals 1 and 3 short circuited)**



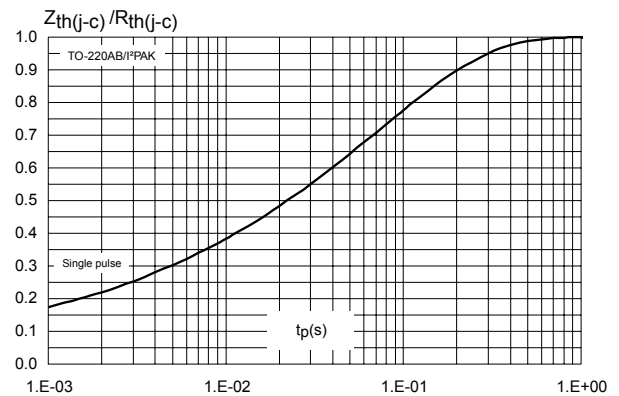
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , terminals 1 and 3 short circuited)**



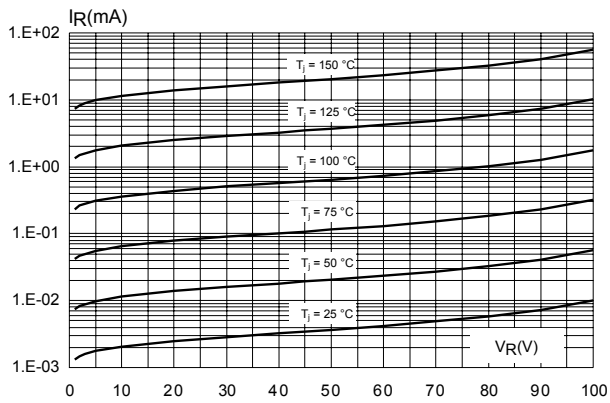
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



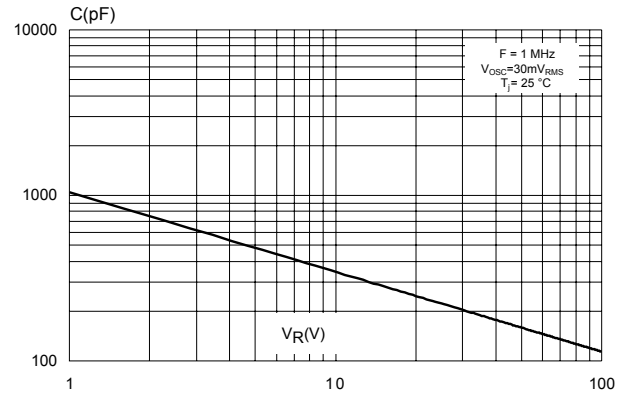
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



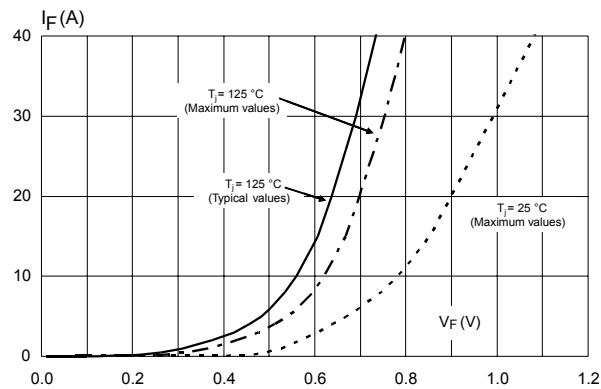
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values)**



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



**Figure 7. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)**



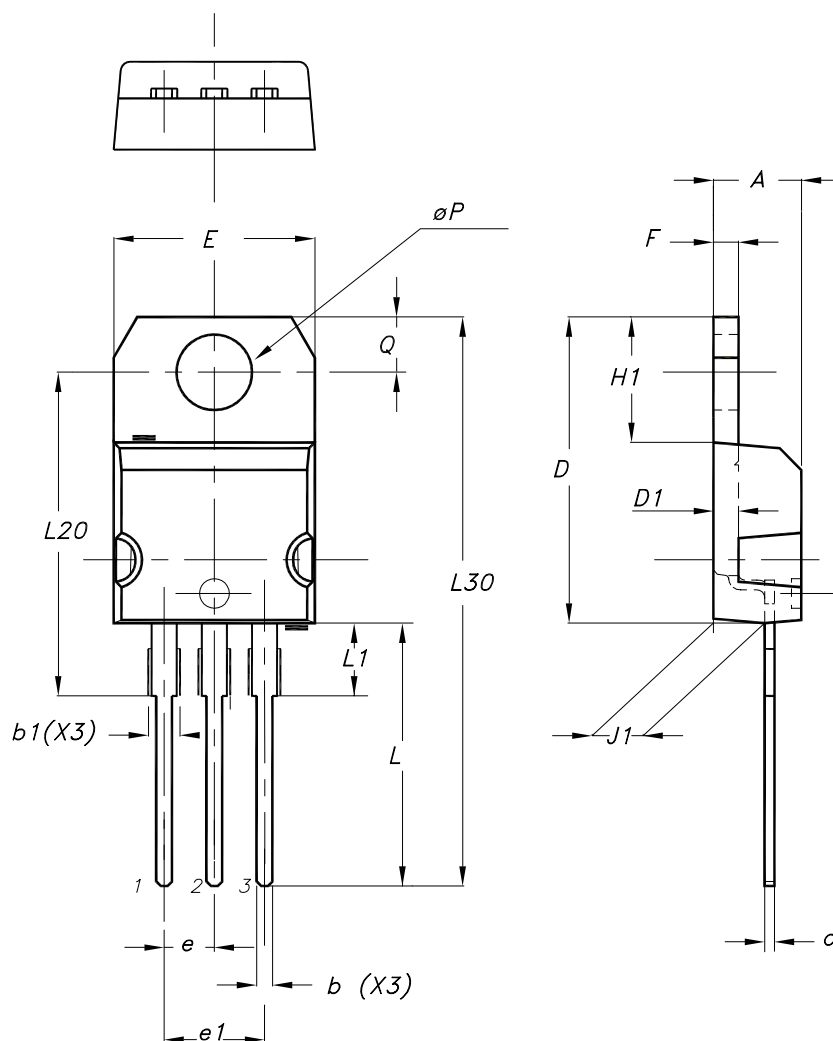
## 2 Package information

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-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 8. TO-220AB package outline**



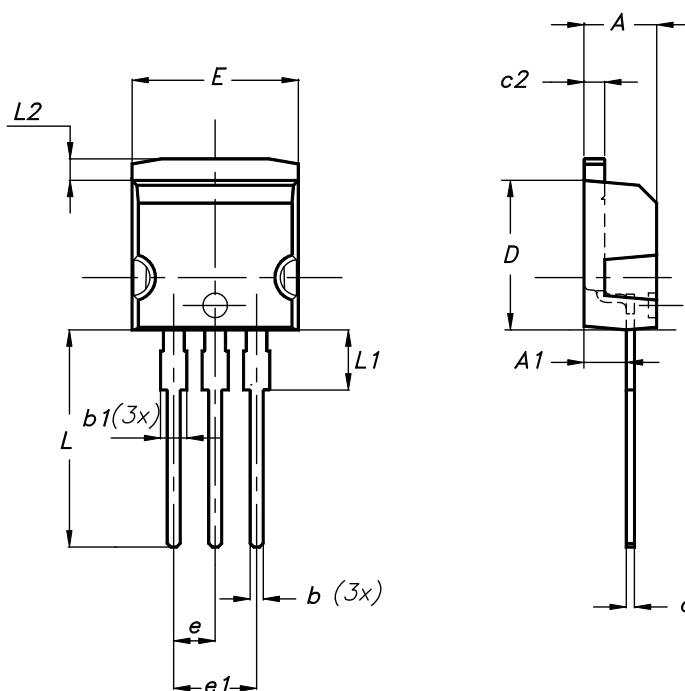
**Table 4. TO-220AB package mechanical data**

| Ref. | Dimensions  |       |                             |       |
|------|-------------|-------|-----------------------------|-------|
|      | Millimeters |       | Inches (for reference only) |       |
|      | Min.        | Max.  | Min.                        | Max.  |
| A    | 4.40        | 4.60  | 0.173                       | 0.181 |
| b    | 0.61        | 0.88  | 0.240                       | 0.035 |
| b1   | 1.14        | 1.55  | 0.045                       | 0.061 |
| c    | 0.48        | 0.70  | 0.019                       | 0.028 |
| D    | 15.25       | 15.75 | 0.600                       | 0.620 |
| D1   | 1.27 typ.   |       | 0.050 typ.                  |       |
| E    | 10.00       | 10.40 | 0.394                       | 0.409 |
| e    | 2.40        | 2.70  | 0.094                       | 0.106 |
| e1   | 4.95        | 5.15  | 0.195                       | 0.203 |
| F    | 1.23        | 1.32  | 0.048                       | 0.052 |
| H1   | 6.20        | 6.60  | 0.244                       | 0.260 |
| J1   | 2.40        | 2.72  | 0.094                       | 0.107 |
| L    | 13.00       | 14.00 | 0.512                       | 0.551 |
| L1   | 3.50        | 3.93  | 0.138                       | 0.155 |
| L20  | 16.40 typ.  |       | 0.646 typ.                  |       |
| L30  | 28.90 typ.  |       | 1.138 typ.                  |       |
| θP   | 3.75        | 3.85  | 0.148                       | 0.152 |
| Q    | 2.65        | 2.95  | 0.104                       | 0.116 |

## 2.2 I<sup>2</sup>PAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

**Figure 9. I<sup>2</sup>PAK package outline**



**Table 5. I<sup>2</sup>PAK package mechanical data**

| Ref. | Dimensions  |       |                             |       |
|------|-------------|-------|-----------------------------|-------|
|      | Millimeters |       | Inches (for reference only) |       |
|      | Min.        | Max.  | Min.                        | Max.  |
| A    | 4.40        | 4.60  | 0.173                       | 0.181 |
| A1   | 2.40        | 2.72  | 0.094                       | 0.107 |
| b    | 0.61        | 0.88  | 0.024                       | 0.035 |
| b1   | 1.14        | 1.70  | 0.044                       | 0.067 |
| c    | 0.49        | 0.70  | 0.019                       | 0.028 |
| c2   | 1.23        | 1.32  | 0.048                       | 0.052 |
| D    | 8.95        | 9.35  | 0.352                       | 0.368 |
| e    | 2.40        | 2.70  | 0.094                       | 0.106 |
| e1   | 4.95        | 5.15  | 0.195                       | 0.203 |
| E    | 10.00       | 10.40 | 0.394                       | 0.409 |
| L    | 13.00       | 14.00 | 0.512                       | 0.551 |
| L1   | 3.50        | 3.93  | 0.138                       | 0.155 |
| L2   | 1.27        | 1.40  | 0.050                       | 0.055 |

### 3 Ordering information

**Table 6. Ordering information**

| Order code    | Marking     | Package            | Weight | Base qty. | Delivery mode |
|---------------|-------------|--------------------|--------|-----------|---------------|
| STPS20SM100ST | PS20SM100ST | TO-220AB           | 1.95 g | 50        | Tube          |
| STPS20SM100SR | PS20SM100SR | I <sup>2</sup> PAK | 1.50 g | 50        | Tube          |

## Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                                                                                            |
|-------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25-Mar-2009 | 1        | First issue.                                                                                                                                                                                                                                       |
| 16-Apr-2010 | 2        | Updated package graphic for TO-220AB on front page and in <i>Table 5</i> .                                                                                                                                                                         |
| 11-May-2017 | 3        | Removed TO-220FPAB and D <sup>2</sup> PAK packages.                                                                                                                                                                                                |
| 17-Oct-2018 | 4        | Updated cover page and <a href="#">Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified)</a> .<br>Removed figure 1 and figure 9.<br>Minor text changes to improve readability. |

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