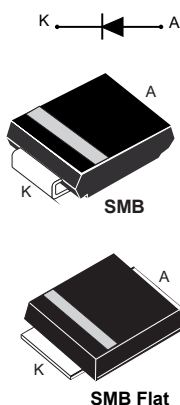


## 100 V power Schottky rectifier



### Features

- Negligible switching losses
- High junction temperature capability
- Low leakage current
- Good trade-off between leakage current and forward voltage drop
- Avalanche capability specified
- ECOPACK®2 compliant

### Applications

- Switching diode
- Battery charger
- SMPS
- DC/DC converter
- Telecom power
- LED lighting

### Description

This 100 V power Schottky rectifier is ideal for switch mode power supplies, for 12 V rails and high frequency converters.

Packaged in SMB and SMB Flat, the [STPS3H100](#) is optimized for use in consumer and computer applications where low drop forward voltage is required to reduce power dissipation.

#### Product status link

[STPS3H100](#)

#### Product summary

|              |        |
|--------------|--------|
| $I_{F(AV)}$  | 3 A    |
| $V_{RRM}$    | 100 V  |
| $T_J$ (max.) | 175 °C |
| $V_F$ (typ.) | 0.63 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                       |          |                                                          | 100         | V    |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$ square wave   | SMB      | $T_I = 115\text{ °C}$                                    | 3           | A    |
|             |                                                       | SMB Flat | $T_I = 140\text{ °C}$                                    |             |      |
| $I_{FSM}$   | Surge non repetitive forward current                  |          | $t_p = 10\text{ ms sinusoidal}$                          | 75          | A    |
| $P_{ARM}$   | Repetitive peak avalanche power                       |          | $t_p = 10\text{ }\mu\text{s}$ ,<br>$T_j = 125\text{ °C}$ | 172         | 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 | SMB      | 25         | °C/W |
|               |                  | SMB Flat | 15         |      |

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 | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$    | -    |      | 1.00 | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 0.40 | 1.00 | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 3\text{ A}$ | -    |      | 0.84 | V             |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 0.63 | 0.68 |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 6\text{ A}$ | -    |      | 0.92 |               |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 0.71 | 0.76 |               |

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:

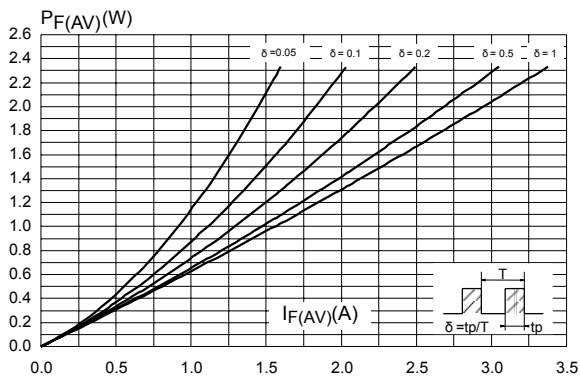
$$P = 0.6 \times I_{F(AV)} + 0.027 \times I_F^2(RMS)$$

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

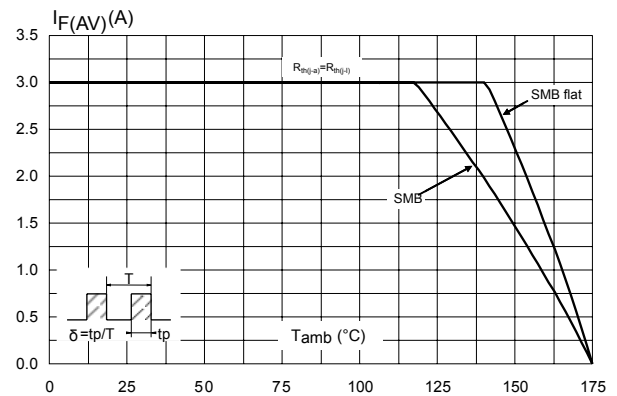
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

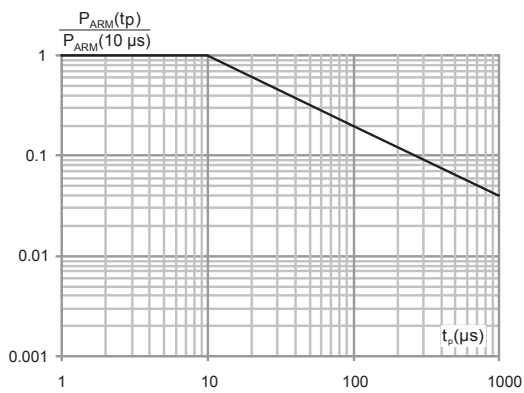
**Figure 1. Average forward power dissipation versus average forward current**



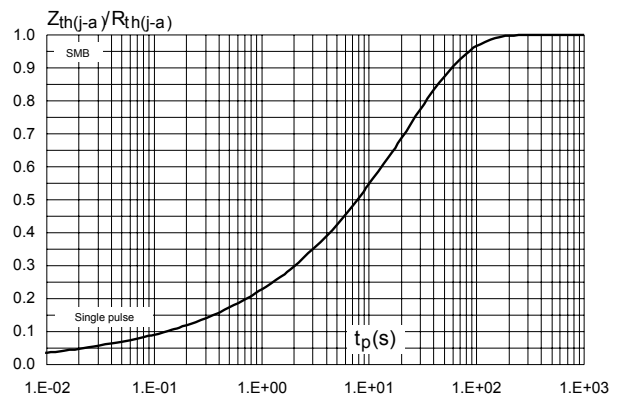
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ )**

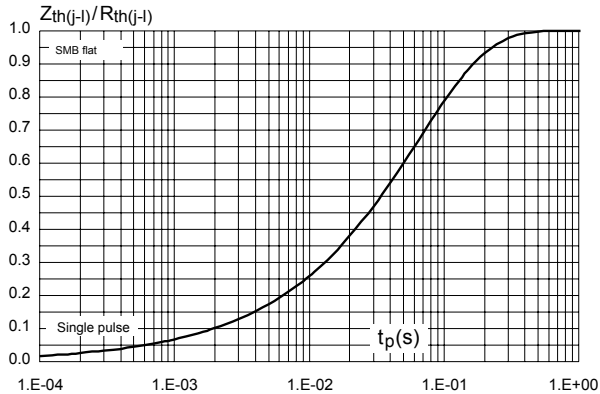
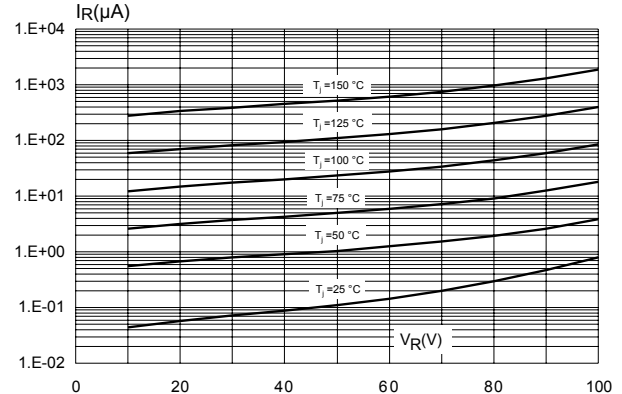
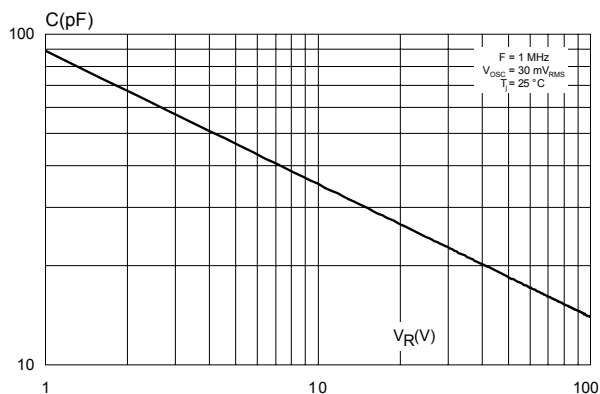
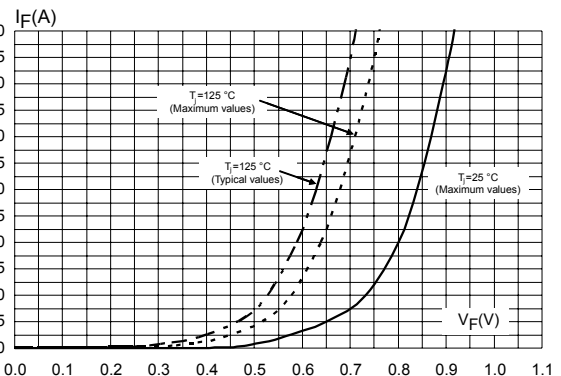
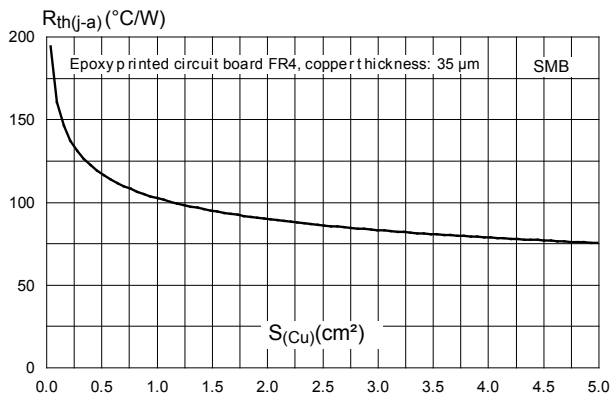
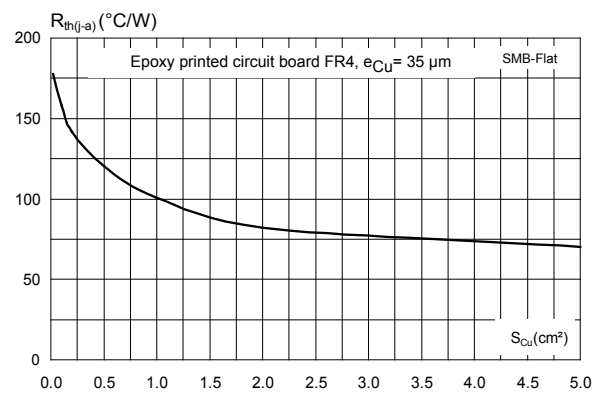


**Figure 3. Normalized avalanche power derating versus junction temperature ( $T_j = 125$  °C)**



**Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)**



**Figure 5. Relative variation of thermal impedance junction to lead versus pulse duration (SMB Flat)**

**Figure 6. Reverse leakage current versus reverse voltage applied (typical values)**

**Figure 7. Junction capacitance versus reverse voltage applied (typical values)**

**Figure 8. Forward voltage drop versus forward current**

**Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (SMB)**

**Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (SMB Flat)**


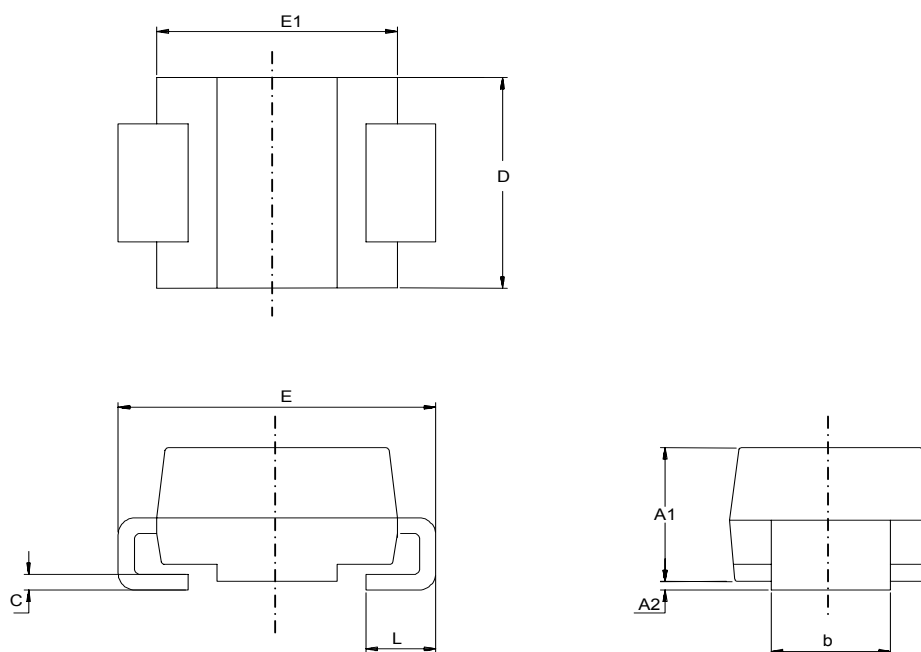
## 2 Package information

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 SMB package information

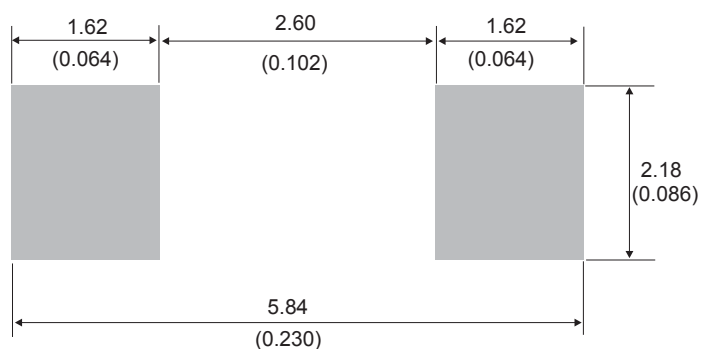
- Epoxy meets UL94, V0
- Lead-free package

**Figure 11. SMB package outline**



**Table 4. SMB package mechanical data**

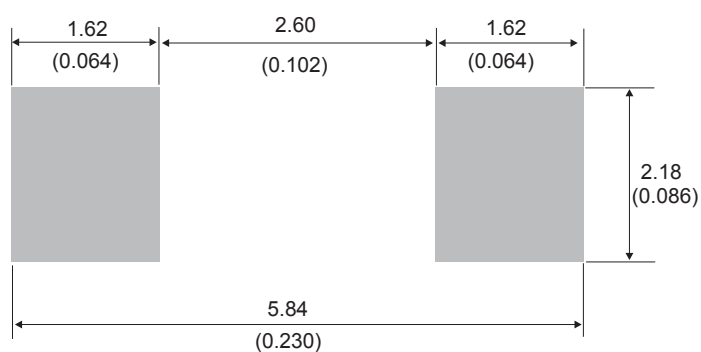
| Ref. | Dimensions  |      |                             |        |
|------|-------------|------|-----------------------------|--------|
|      | Millimeters |      | Inches (for reference only) |        |
|      | Min.        | Max. | Min.                        | Max.   |
| A1   | 1.90        | 2.45 | 0.0748                      | 0.0965 |
| A2   | 0.05        | 0.20 | 0.0020                      | 0.0079 |
| b    | 1.95        | 2.20 | 0.0768                      | 0.0867 |
| c    | 0.15        | 0.40 | 0.0059                      | 0.0157 |
| D    | 3.30        | 3.95 | 0.1299                      | 0.1556 |
| E    | 5.10        | 5.60 | 0.2008                      | 0.2205 |
| E1   | 4.05        | 4.60 | 0.1594                      | 0.1811 |
| L    | 0.75        | 1.50 | 0.0295                      | 0.0591 |

**Figure 12. SMB recommended footprint**


**Table 5. SMB package mechanical data**

| Ref. | Dimensions  |      |                       |        |
|------|-------------|------|-----------------------|--------|
|      | Millimeters |      | Inches <sup>(1)</sup> |        |
|      | Min.        | Max. | Min.                  | Max.   |
| A1   | 1.90        | 2.45 | 0.0748                | 0.0965 |
| A2   | 0.05        | 0.20 | 0.0020                | 0.0079 |
| b    | 1.95        | 2.20 | 0.0768                | 0.0867 |
| c    | 0.15        | 0.40 | 0.0059                | 0.0157 |
| D    | 3.30        | 3.95 | 0.1299                | 0.1556 |
| E    | 5.10        | 5.60 | 0.2008                | 0.2205 |
| E1   | 4.05        | 4.60 | 0.1594                | 0.1811 |
| L    | 0.75        | 1.50 | 0.0295                | 0.0591 |

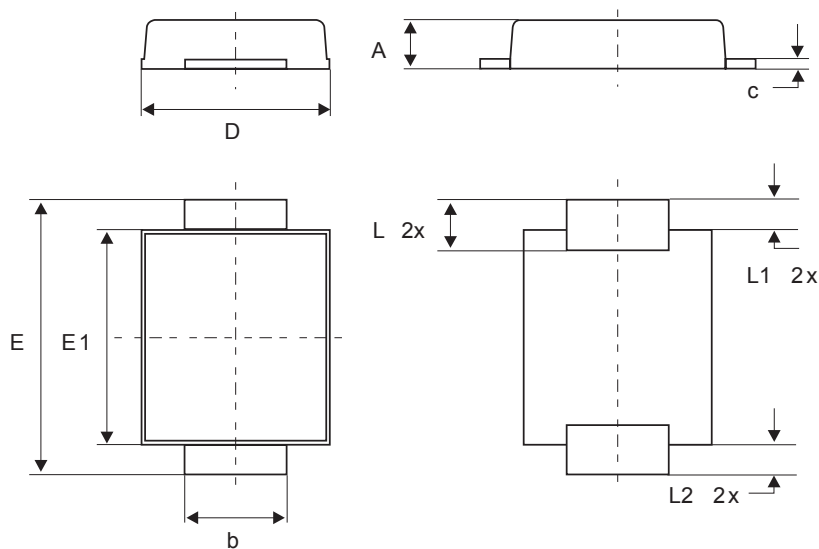
1. For reference only

**Figure 13. SMB recommended footprint**


## 2.2 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

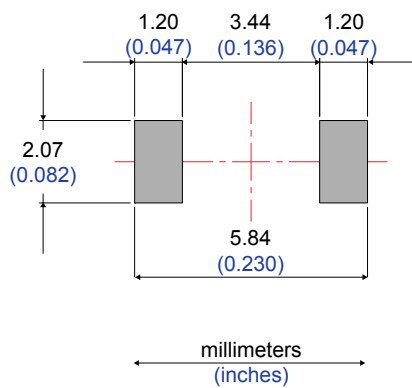
**Figure 14.** SMB Flat package outline



**Table 6.** SMB Flat mechanical data

| Ref. | Dimensions  |      |      |                             |       |       |
|------|-------------|------|------|-----------------------------|-------|-------|
|      | Millimeters |      |      | Inches (for reference only) |       |       |
|      | Min.        | Typ. | Max. | Min.                        | Typ.  | Max.  |
| A    | 0.90        |      | 1.10 | 0.035                       |       | 0.043 |
| b    | 1.95        |      | 2.20 | 0.077                       |       | 0.087 |
| c    | 0.15        |      | 0.40 | 0.006                       |       | 0.016 |
| D    | 3.30        |      | 3.95 | 0.130                       |       | 0.156 |
| E    | 5.10        |      | 5.60 | 0.201                       |       | 0.220 |
| E1   | 4.05        |      | 4.60 | 0.159                       |       | 0.181 |
| L    | 0.75        |      | 1.50 | 0.030                       |       | 0.059 |
| L1   |             | 0.40 |      |                             | 0.016 |       |
| L2   |             | 0.60 |      |                             | 0.024 |       |

**Figure 15. Footprint recommendations, dimensions in mm (inches)**



### 3 Ordering information

**Table 7. Ordering information**

| Order code  | Marking | Package  | Weight  | Base qty. | Delivery mode |
|-------------|---------|----------|---------|-----------|---------------|
| STPS3H100U  | G31     | SMB      | 0.107 g | 2500      | Tape and reel |
| STPS3H100UF | FG31    | SMB Flat | 0.050 g | 5000      | Tape and reel |

## Revision history

**Table 8. Document revision history**

| Date         | Version | Changes                                                                                                                                                                                                                                                 |
|--------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15-Jan-2010  | 1       | First issue.                                                                                                                                                                                                                                            |
| 27-Sept-2018 | 2       | <p>Updated cover page.</p> <p>Updated <a href="#">Table 1. Absolute ratings</a> (limiting values at 25 °C, unless otherwise specified).</p> <p>Removed figure 3, figure 4, figure 5 and figure 6.</p> <p>Minor text changes to improve readability.</p> |

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