

### Main product characteristics

|             |        |
|-------------|--------|
| $I_{F(AV)}$ | 1 A    |
| $V_{RRM}$   | 60 V   |
| $T_j (max)$ | 150° C |
| $V_F(max)$  | 0.57 V |

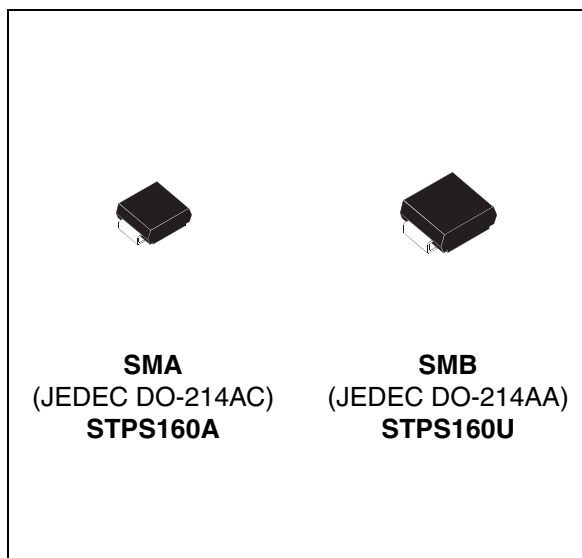
### Features and benefits

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified

### Description

Single chip Schottky rectifiers suited to switched mode power supplies and high frequency DC to DC converters.

Packaged in SMA and SMB, this device is especially intended for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.



### Order codes

| Part number | Marking |
|-------------|---------|
| STPS160A    | GA6     |
| STPS160U    | E16     |

# 1 Characteristics

**Table 1. Absolute ratings (limiting values)**

| Symbol      | Parameter                                             |                                                        | Value        | Unit             |
|-------------|-------------------------------------------------------|--------------------------------------------------------|--------------|------------------|
| $V_{RRM}$   | Repetitive peak reverse voltage                       |                                                        | 60           | V                |
| $I_{F(AV)}$ | Average forward current                               | $T_L = 130^\circ\text{C}$ $\delta = 0.5$               | 1            | A                |
| $I_{FSM}$   | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$ sinusoidal                        | 75           | A                |
| $I_{RRM}$   | Repetitive peak reverse current                       | $t_p = 2\text{ }\mu\text{s}$ $F = 1\text{ kHz}$ square | 1            | A                |
| $I_{RSM}$   | Non repetitive peak reverse current                   | $t_p = 100\text{ }\mu\text{s}$ square                  | 1            | A                |
| $P_{ARM}$   | Repetitive peak avalanche power                       | $t_p = 1\text{ }\mu\text{s}$ $T_j = 25^\circ\text{C}$  | 2400         | W                |
| $T_{stg}$   | Storage temperature range                             |                                                        | -65 to + 150 | $^\circ\text{C}$ |
| $T_j$       | Maximum operating junction temperature <sup>(1)</sup> |                                                        | 150          | $^\circ\text{C}$ |
| $dV/dt$     | Critical rate of rise of reverse voltage              |                                                        | 10000        | V/ $\mu\text{s}$ |

1.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

**Table 2. Thermal resistance**

| Symbol        | Parameter        |     | Value | Unit               |
|---------------|------------------|-----|-------|--------------------|
| $R_{th(j-l)}$ | Junction to lead | SMA | 30    | $^\circ\text{C/W}$ |
|               |                  | SMB | 23    |                    |

**Table 3. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions           |                    | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|---------------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$    |      |      | 4    | $\mu\text{A}$ |
|             |                         | $T_j = 125^\circ\text{C}$ |                    |      | 1.1  | 4    | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25^\circ\text{C}$  | $I_F = 1\text{ A}$ |      |      | 0.67 | V             |
|             |                         | $T_j = 125^\circ\text{C}$ |                    |      | 0.49 | 0.57 |               |
|             |                         | $T_j = 25^\circ\text{C}$  | $I_F = 2\text{ A}$ |      |      | 0.8  |               |
|             |                         | $T_j = 125^\circ\text{C}$ |                    |      | 0.58 | 0.65 |               |

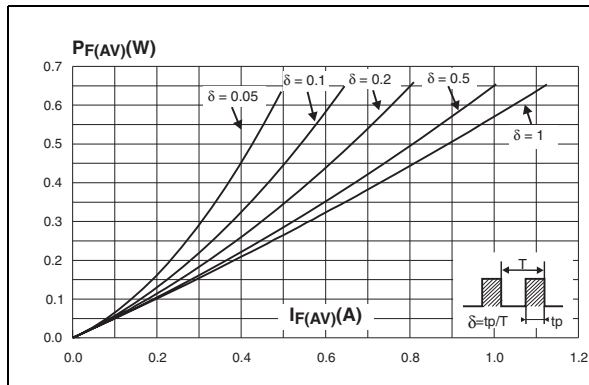
1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

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

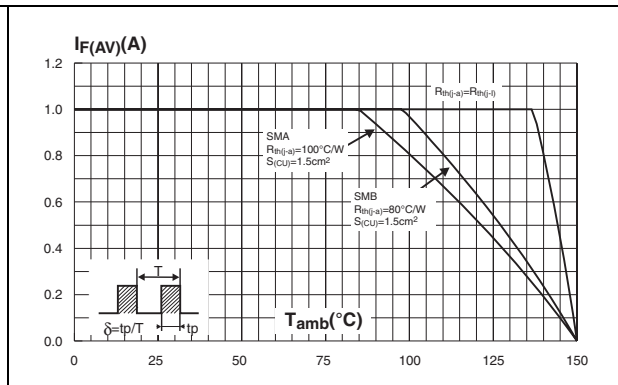
To evaluate the conduction losses use the following equation:

$$P = 0.49 \times I_{F(AV)} + 0.08 I_F^2_{(RMS)}$$

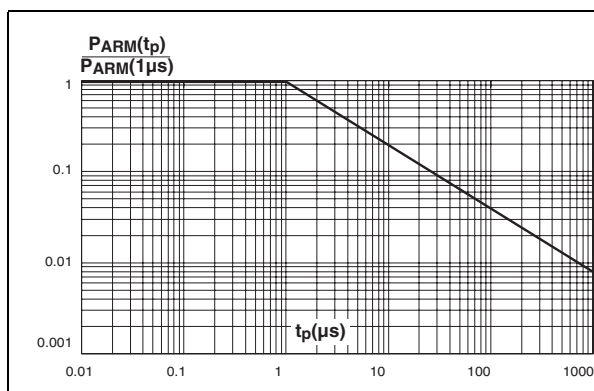
**Figure 1. Average forward power dissipation versus average forward current**



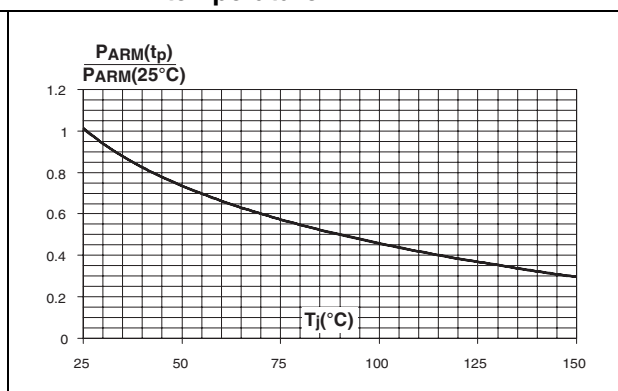
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ )**



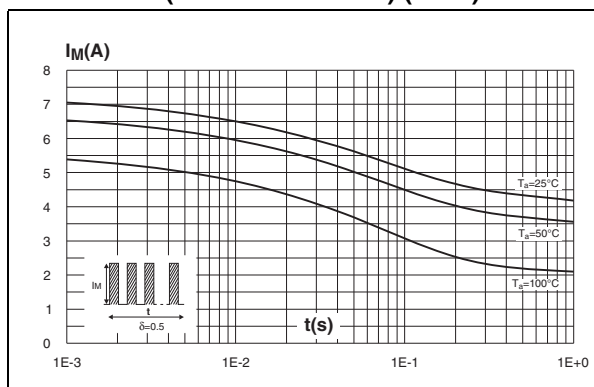
**Figure 3. Normalized avalanche power derating versus pulse duration**



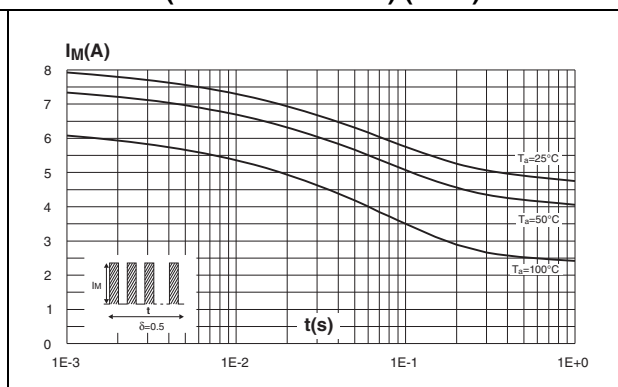
**Figure 4. Normalized avalanche power derating versus junction temperature**



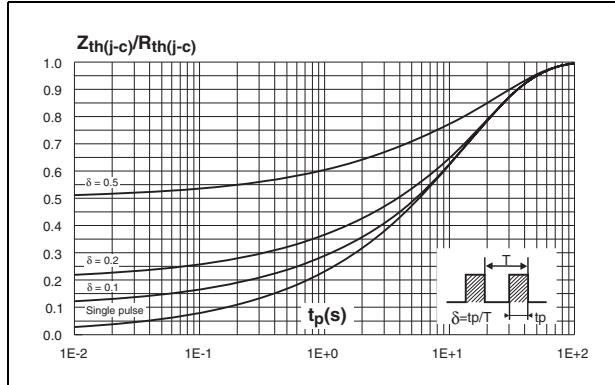
**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) (SMA)**



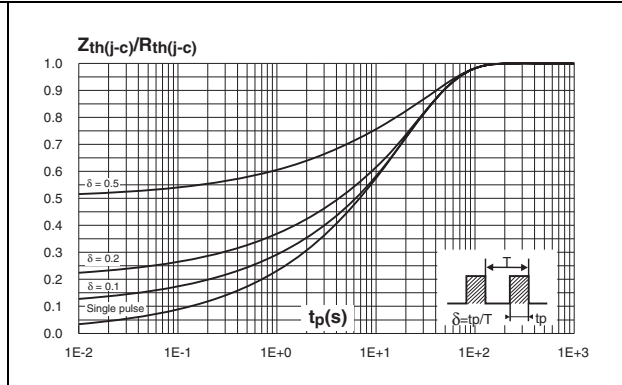
**Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values) (SMB)**



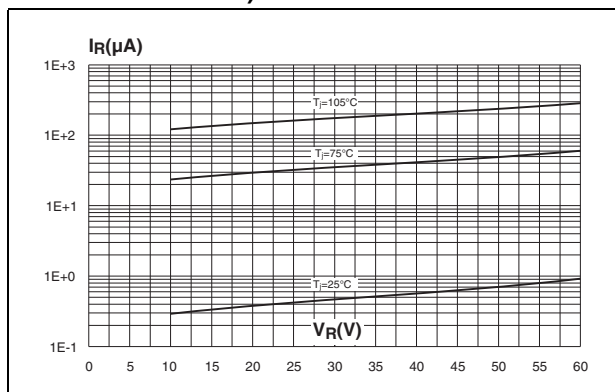
**Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board,  $e_{(Cu)} = 35 \mu m$ , recommended pad layout) (SMA)**



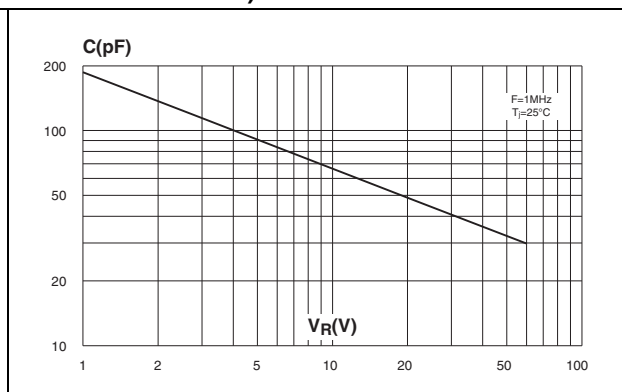
**Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board,  $e_{(Cu)} = 35 \mu m$ , recommended pad layout) (SMB)**



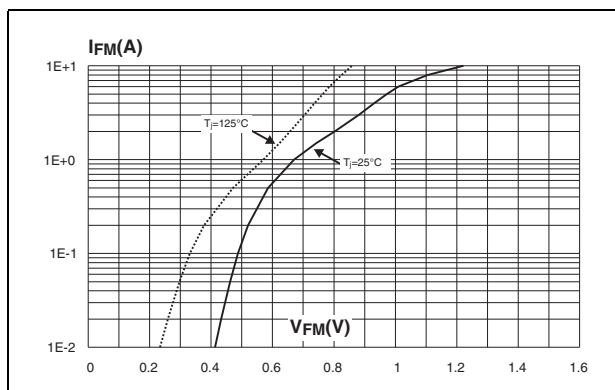
**Figure 9. Reverse leakage current versus reverse voltage applied (typical values)**



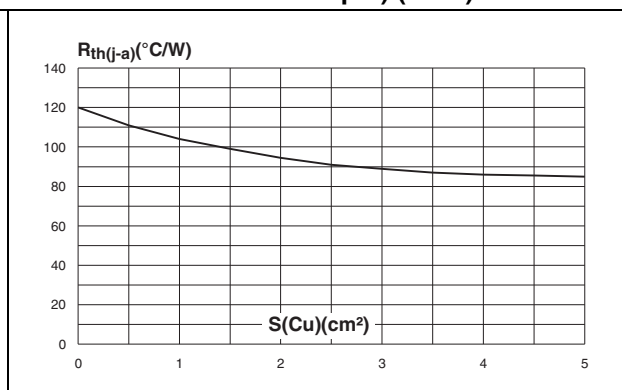
**Figure 10. Junction capacitance versus reverse voltage applied (typical values)**



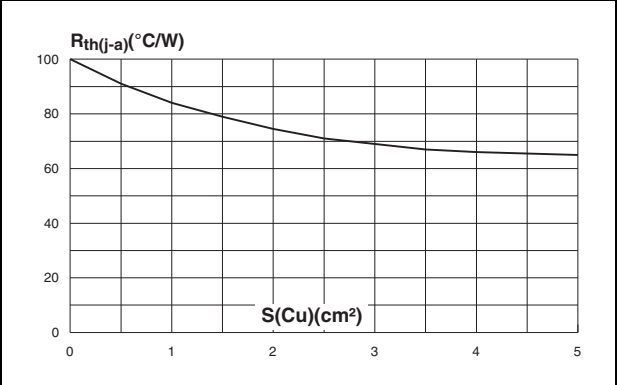
**Figure 11. Forward voltage drop versus forward current (maximum values)**



**Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness:  $35 \mu m$ ) (SMA)**



**Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35  $\mu\text{m}$ ) (SMB)**



## 2 Package information

- Epoxy meets UL94, V0
- Band indicates cathode

**Figure 14. SMA package mechanical data**

| Ref | Dimensions  |      |        |       |
|-----|-------------|------|--------|-------|
|     | Millimeters |      | Inches |       |
|     | Min.        | Max. | Min.   | Max.  |
| A1  | 1.90        | 2.45 | 0.075  | 0.094 |
| A2  | 0.05        | 0.20 | 0.002  | 0.008 |
| b   | 1.25        | 1.65 | 0.049  | 0.065 |
| c   | 0.15        | 0.40 | 0.006  | 0.016 |
| D   | 2.25        | 2.90 | 0.089  | 0.114 |
| E   | 4.80        | 5.35 | 0.189  | 0.211 |
| E1  | 3.95        | 4.60 | 0.156  | 0.181 |
| L   | 0.75        | 1.50 | 0.030  | 0.059 |

Figure 15. SMA footprint dimensions (in millimeters)

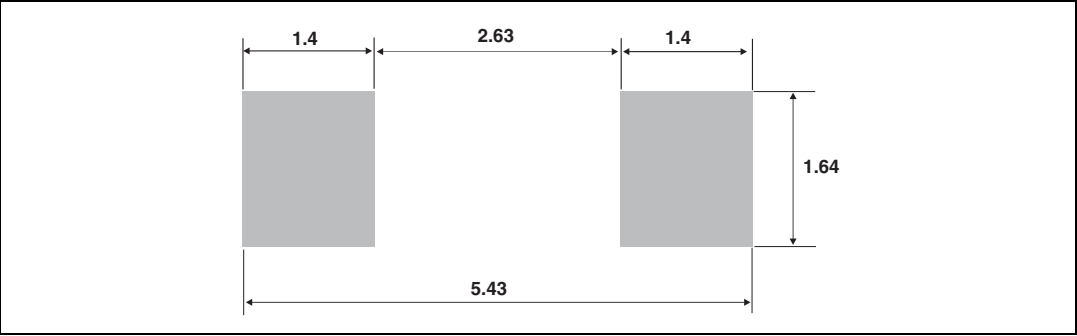
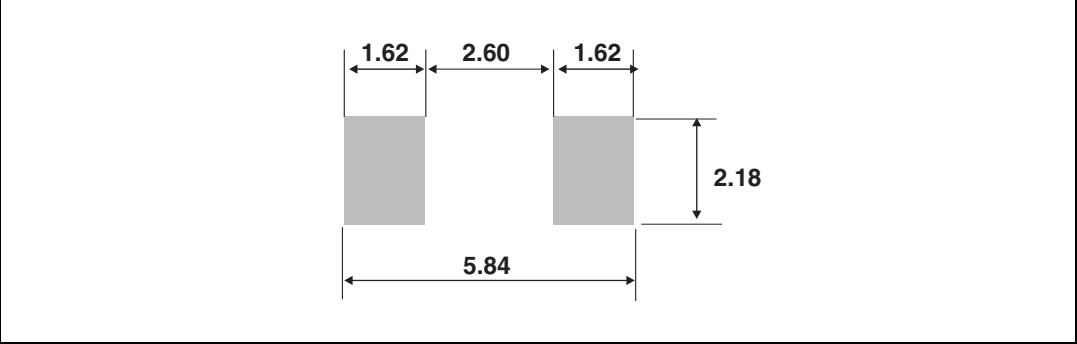


Figure 16. SMB package mechanical data

| Ref | Dimensions  |      |        |       |
|-----|-------------|------|--------|-------|
|     | Millimeters |      | Inches |       |
|     | Min.        | Max. | Min.   | Max.  |
| A1  | 1.90        | 2.45 | 0.075  | 0.096 |
| A2  | 0.05        | 0.20 | 0.002  | 0.008 |
| b   | 1.95        | 2.20 | 0.077  | 0.087 |
| c   | 0.15        | 0.40 | 0.006  | 0.016 |
| E   | 5.10        | 5.60 | 0.201  | 0.220 |
| E1  | 4.05        | 4.60 | 0.159  | 0.181 |
| D   | 3.30        | 3.95 | 0.130  | 0.156 |
| L   | 0.75        | 1.50 | 0.030  | 0.059 |

Figure 17. SMB footprint dimensions (in millimeters)



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

### 3 Ordering information

| Ordering type | Marking | Package | Weight  | Base qty | Delivery mode |
|---------------|---------|---------|---------|----------|---------------|
| STPS160A      | GA6     | SMA     | 0.068 g | 5000     | Tape and reel |
| STPS160U      | E16     | SMB     | 0.107 g | 2500     | Tape and reel |

### 4 Revision history

| Date        | Revision | Description of changes                                                                                                                   |
|-------------|----------|------------------------------------------------------------------------------------------------------------------------------------------|
| Jul-2003    | 6A       | Last update.                                                                                                                             |
| Aug-2004    | 7        | SMA package dimensions update. Reference A1 max changed from 2.70 mm (0.106 inc.) to 2.03 mm (0.080 inc).                                |
| 16-Feb-2007 | 8        | Reformatted to current standards. $I_{F(RMS)}$ removed from Table 1. Package dimensions and footprints updated. Ecopack statement added. |

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