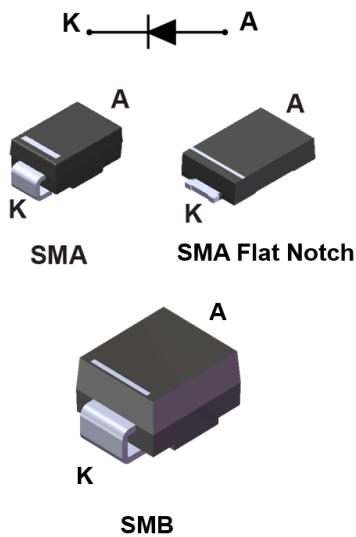


60 V, 1 A power Schottky rectifier



Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified
- [ECOPACK2](#) compliant

Applications

- Lighting
- Battery charger
- DC / DC converter
- Notebook adapter
- Switching diode

Description

Single Schottky rectifiers designed for high frequency miniature switched mode power supplies such as adaptors and on board DC/DC converters.

Packaged in SMA, SMA Flat Notch or SMB, the [STPS160](#) is ideal for use in parallel with MOSFETs in synchronous and low voltage secondary rectification.

| Product status | |
|-----------------|--------|
| STPS160 | |
| Product summary | |
| Symbol | Value |
| $I_{F(AV)}$ | 1 A |
| V_{RRM} | 60 V |
| $T_{j(max.)}$ | 150 °C |
| $V_{F(typ.)}$ | 0.49 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 | | 60 | V | |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$, square wave | SMA | $T_L = 130\text{ °C}$ | 1 | A |
| | | SMA Flat Notch, SMB | $T_L = 135\text{ °C}$ | | |
| I_{FSM} | Surge non repetitive forward current | SMA, SMB | $t_p = 10\text{ ms}$ sinusoidal | 75 | A |
| | | SMA Flat Notch | | 100 | |
| P_{ARM} | Repetitive peak avalanche power | | $t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$ | 180 | W |
| T_{stg} | Storage temperature range | | -65 to +150 | °C | |
| T_j | Maximum operating junction temperature ⁽¹⁾ | | +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 |
|---------------|------------------|----------------|------|
| $R_{th(j-l)}$ | Junction to lead | SMA | 30 |
| | | SMA Flat Notch | 20 |
| | | SMB | 23 |

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 | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | | 4 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 1.1 | 4 | mA |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$ | - | | 0.67 | V |
| | | $T_j = 125\text{ °C}$ | | - | 0.49 | 0.57 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 2\text{ A}$ | - | | 0.8 | |
| | | $T_j = 125\text{ °C}$ | | - | 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:

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

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

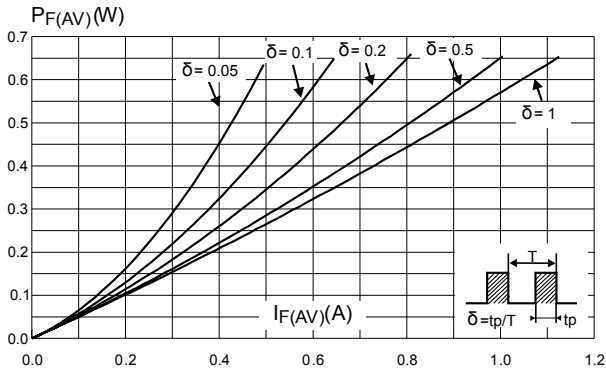


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

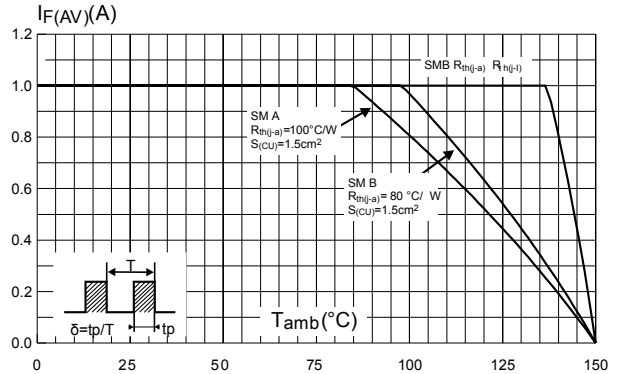


Figure 3. Normalized avalanche power derating versus pulse duration ($T_j = 125^\circ\text{C}$)

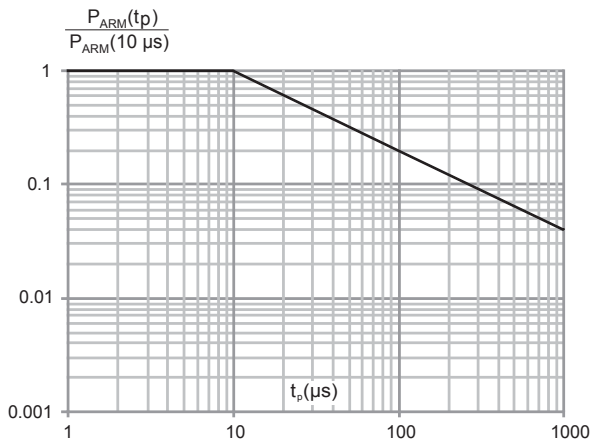


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

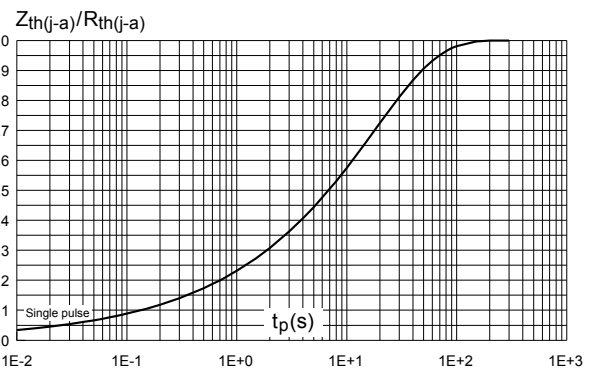


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

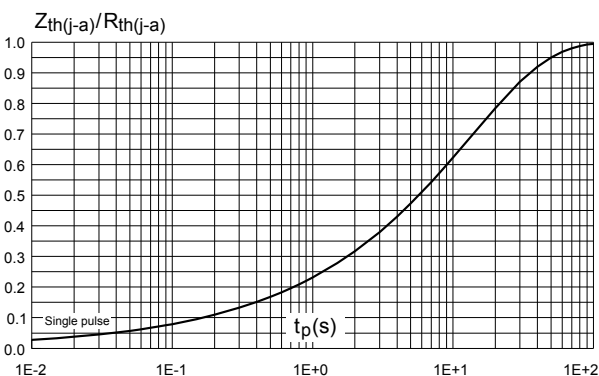


Figure 6. Reverse leakage current versus reverse voltage applied (typical values)

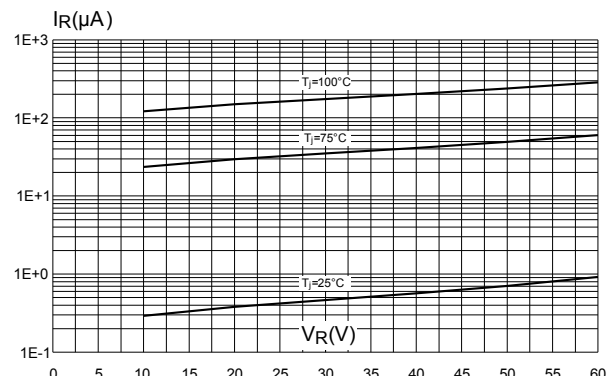


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

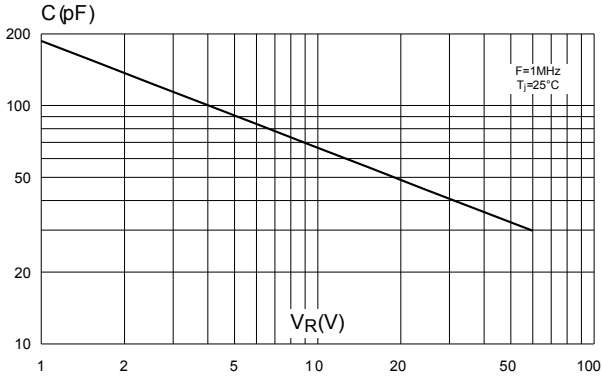


Figure 8. Forward voltage drop versus forward current (maximum values)

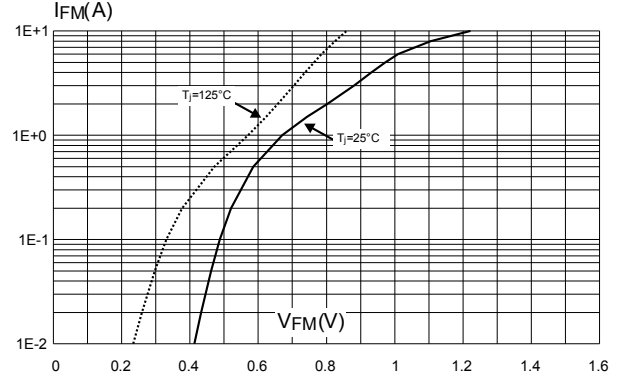


Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

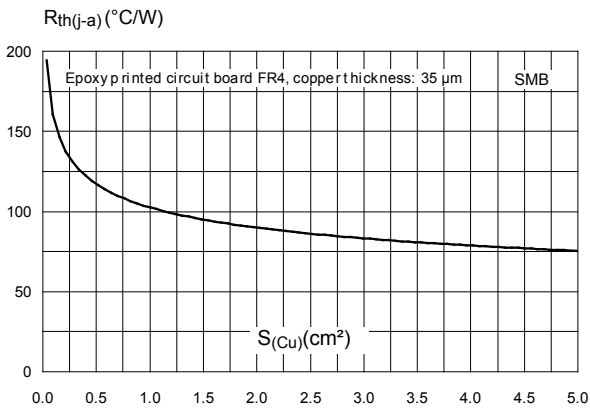


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

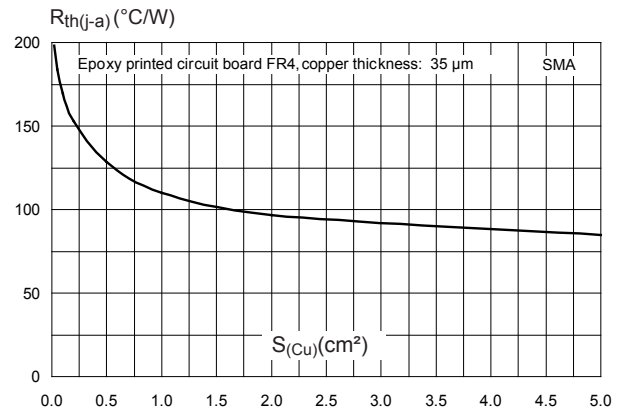
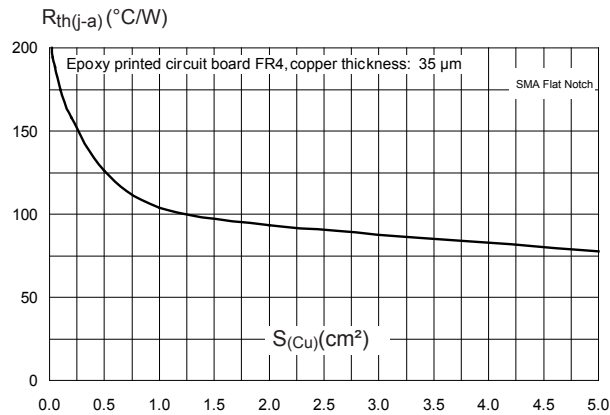


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat Notch)



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. ECOPACK is an ST trademark.

2.1 SMA package information

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

Figure 12. SMA package outline

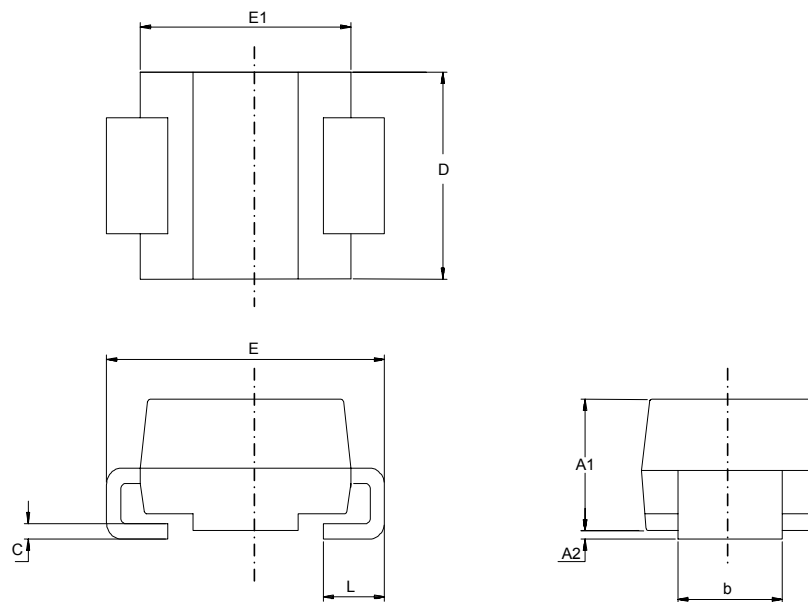
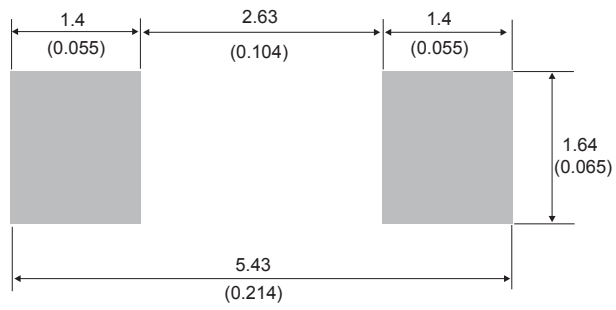


Table 4. SMA package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|------|-----------------------------|-------|
| | Millimeters | | Inches (for reference only) | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.074 | 0.097 |
| A2 | 0.05 | 0.20 | 0.001 | 0.008 |
| 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 | 4.80 | 5.35 | 0.188 | 0.211 |
| E1 | 3.95 | 4.60 | 0.155 | 0.182 |
| L | 0.75 | 1.50 | 0.029 | 0.060 |

Figure 13. SMA 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 14. SMA Flat Notch package outline

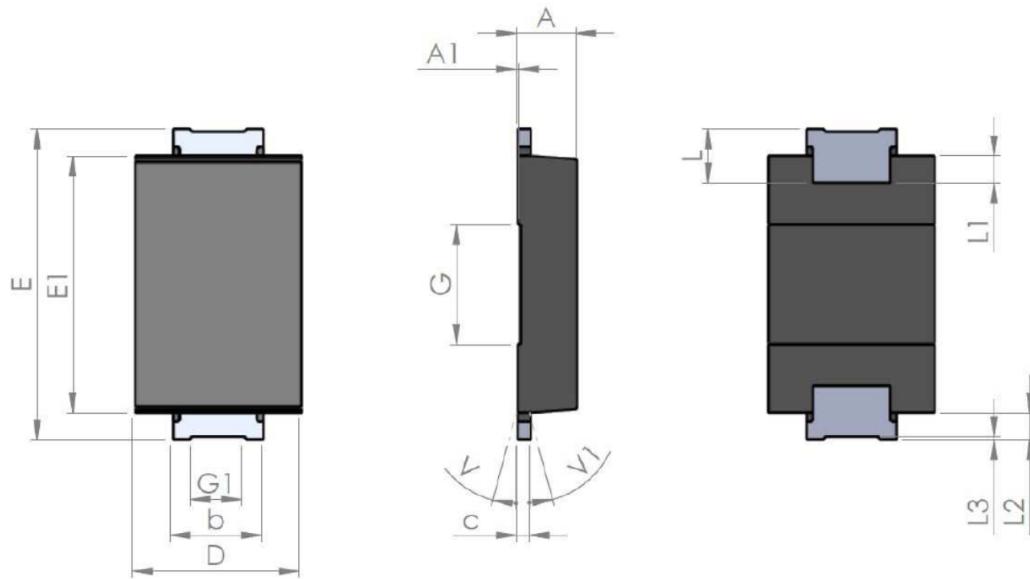
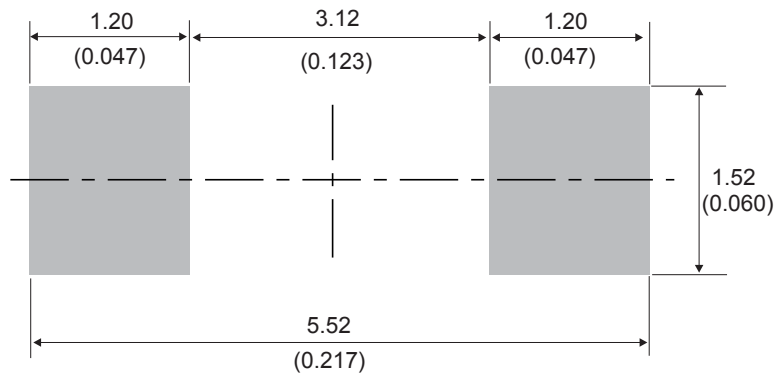


Table 5. SMA Flat Notch package mechanical data

| 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 15. SMA Flat Notch recommended footprint in mm (inches)



2.3 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 16. SMB package outline

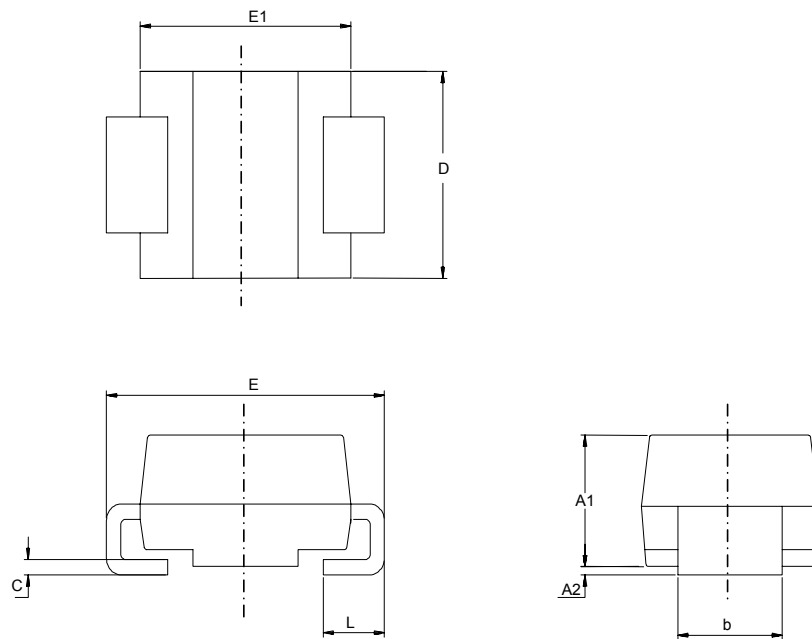
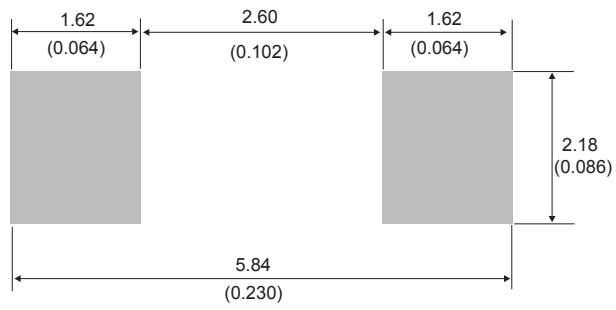


Table 6. SMB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|------|-----------------------------|-------|
| | Millimeters | | Inches (for reference only) | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.074 | 0.097 |
| A2 | 0.05 | 0.20 | 0.001 | 0.008 |
| b | 1.95 | 2.20 | 0.076 | 0.087 |
| c | 0.15 | 0.40 | 0.005 | 0.016 |
| D | 3.30 | 3.95 | 0.129 | 0.156 |
| E | 5.10 | 5.60 | 0.200 | 0.221 |
| E1 | 4.05 | 4.60 | 0.159 | 0.182 |
| L | 0.75 | 1.50 | 0.029 | 0.060 |

Figure 17. SMB recommended footprint



3 Ordering Information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|------------|---------|----------------|---------|-----------|---------------|
| STPS160A | GA6 | SMA | 0.068 g | 5000 | Tape and reel |
| STPS160AFN | A160 | SMA Flat Notch | 0.039 g | 10 000 | Tape and reel |
| STPS160U | E16 | SMB | 0.107 g | 2500 | Tape and reel |

Revision history

Table 8. Document revision history

| Date | Version | 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. IF(RMS) removed from Table 2. Package dimensions and footprints updated. Ecopack statement added. |
| 18-Mar-2010 | 9 | Updated package illustration on page 1. |
| 08-Oct-2019 | 10 | Added Section 2.2 SMA Flat Notch package information . |

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