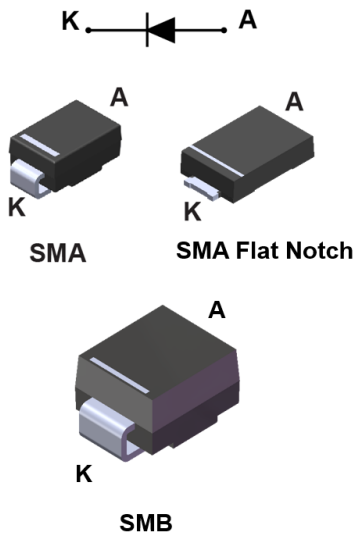


30 V, 1 A low drop power Schottky rectifier



Features

- Very low forward voltage drop for less power dissipation
- Surface mount miniature packages
- Avalanche rated
- ECOPACK2 compliant

Applications

- Cordless appliance
- SSD
- Battery charger
- Telecom power
- DC / DC converter

Description

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 STPS1L30 is ideal for use in parallel with MOSFETs in synchronous rectification.

| Product status | |
|-----------------|--------|
| STPS1L30 | |
| Product summary | |
| Symbol | Value |
| $I_{F(AV)}$ | 1 A |
| V_{RRM} | 30 V |
| $T_{j(max.)}$ | 150 °C |
| $V_{F(typ.)}$ | 0.26 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 | 30 | V | | |
| $I_{F(RMS)}$ | Forward rms current | 10 | A | | |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$, square wave | SMA | $T_L = 135\text{ °C}$ | 1 | A |
| | | SMA Flat Notch | $T_L = 140\text{ °C}$ | | |
| | | SMB | $T_L = 140\text{ °C}$ | | |
| I_{FSM} | Surge non repetitive forward current | SMA | $t_p = 10\text{ ms sinusoidal}$ | 75 | A |
| | | SMA Flat Notch | | 90 | |
| | | SMB | | 75 | |
| P_{ARM} | Repetitive peak avalanche power | $t_p = 10\text{ }\mu\text{s}, T_j = 125\text{ °C}$ | 110 | 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 | °C/W |
| | | SMA Flat Notch | 20 | |
| | | SMB | 25 | |

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 | $T_j = 25\text{ °C}$ | - | | 200 | μA |
| | | $T_j = 100\text{ °C}$ | - | 6 | 15 | mA |
| $V_F^{(1)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | - | | 0.395 | V |
| | | $T_j = 125\text{ °C}$ | - | 0.260 | 0.300 | |
| | | $T_j = 25\text{ °C}$ | - | | 0.445 | |
| | | $T_j = 125\text{ °C}$ | - | 0.325 | 0.375 | |

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

To evaluate the conduction losses, use the following equation:

$$P = 0.225 \times I_{F(AV)} + 0.075 \times I_{F(RMS)}^2$$

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

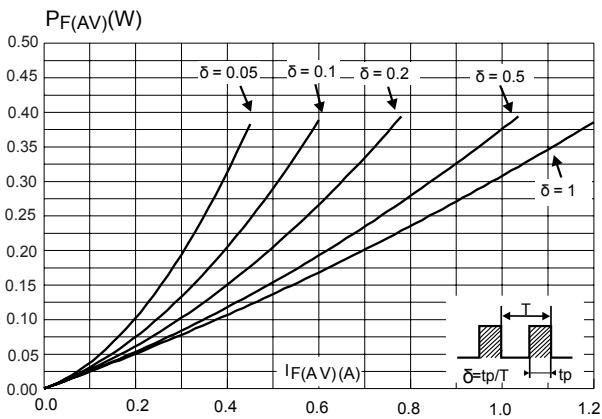


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

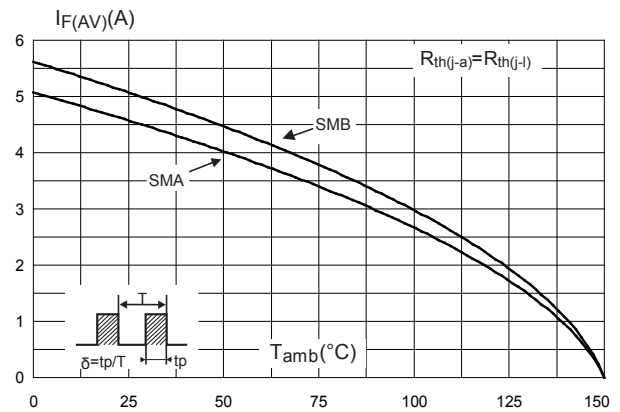


Figure 3. Normalized avalanche power derating versus junction temperature ($T_j = 125\text{ °C}$)

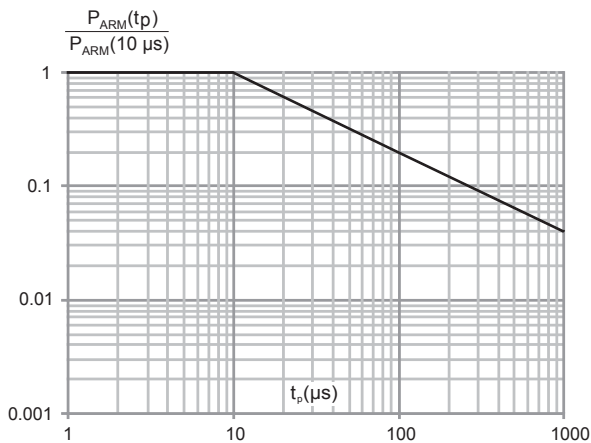


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

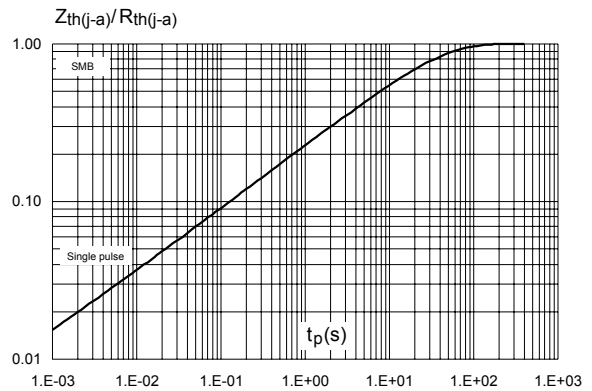


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

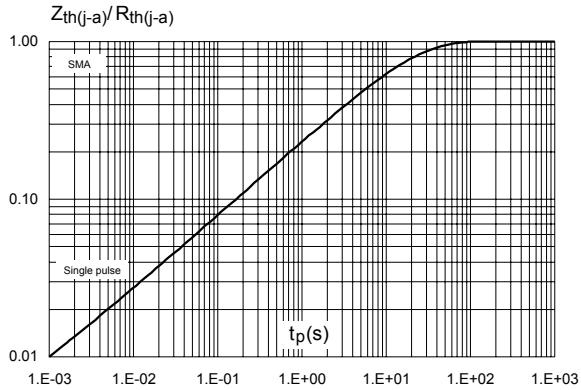


Figure 6. Reverse leakage current versus reverse voltage applied (typical values)

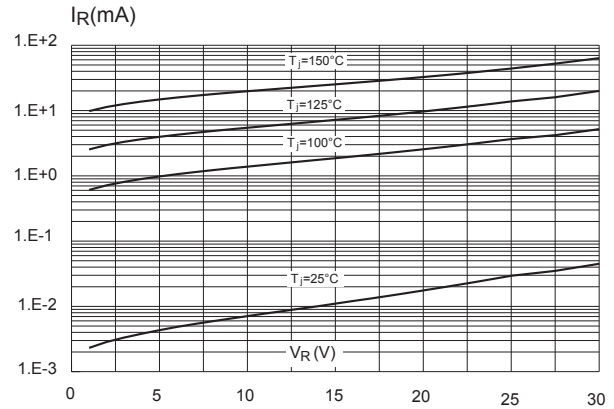


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

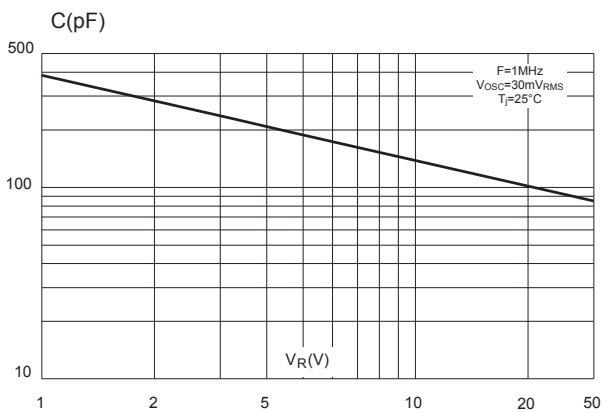


Figure 8. Forward voltage drop versus forward current (typical values, high level)

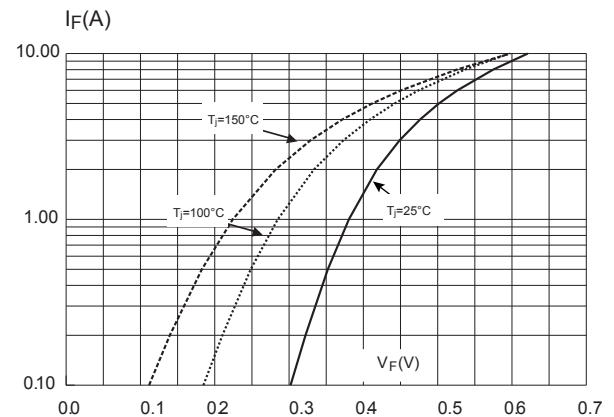


Figure 9. Forward voltage drop versus forward current (maximum values, low level)

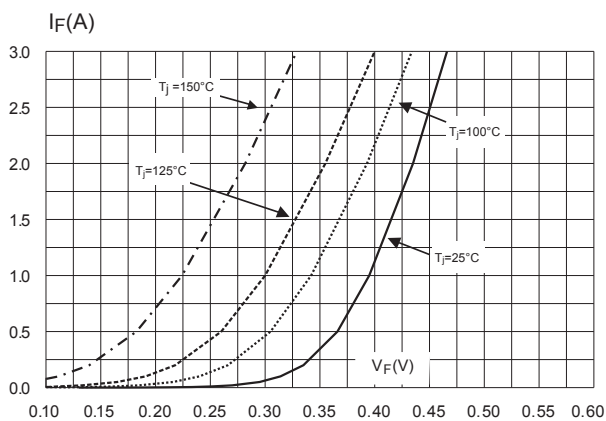


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

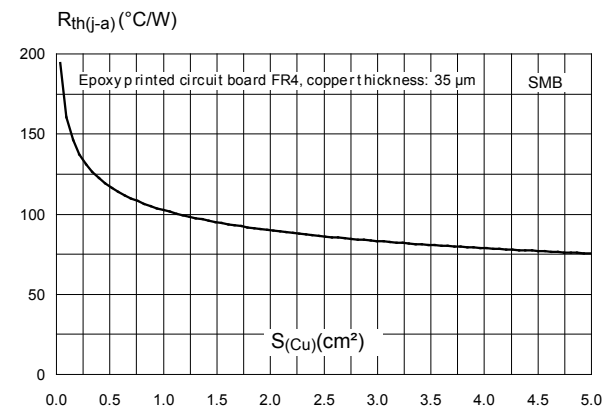


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

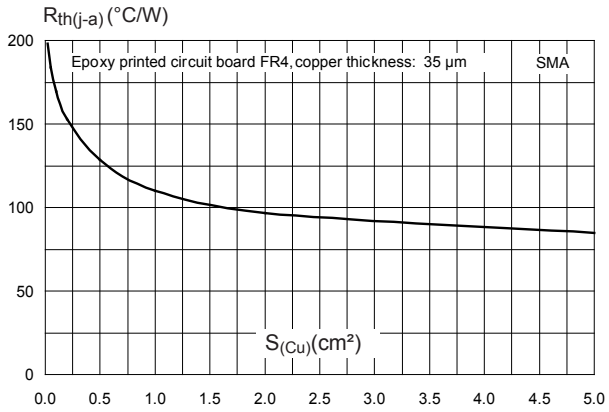
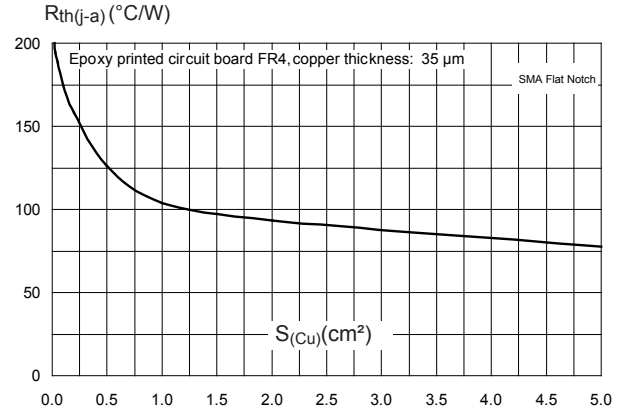


Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat Notch)



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 13. SMA package outline

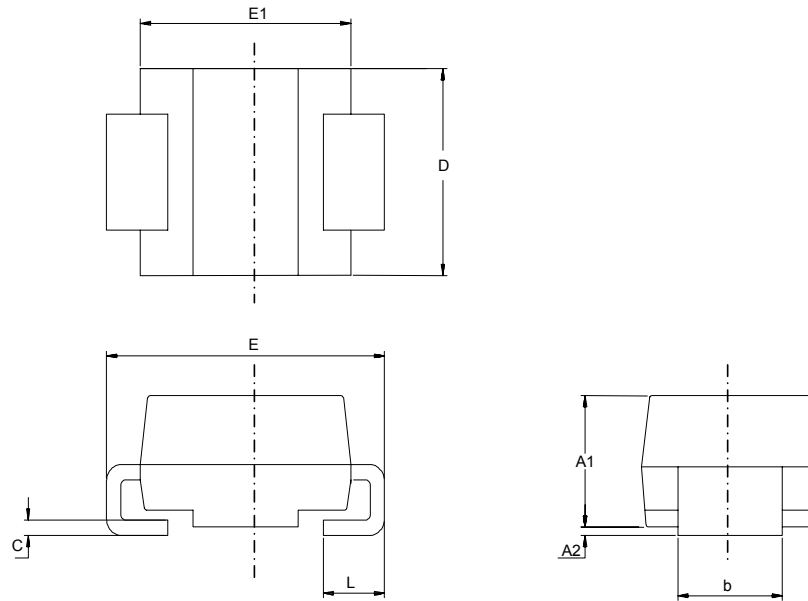
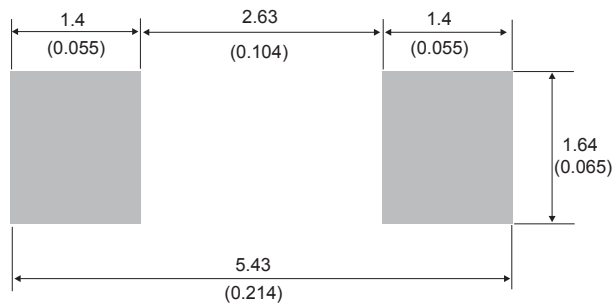


Table 4. SMA package mechanical data

| 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 14. 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 15. SMA Flat Notch package outline

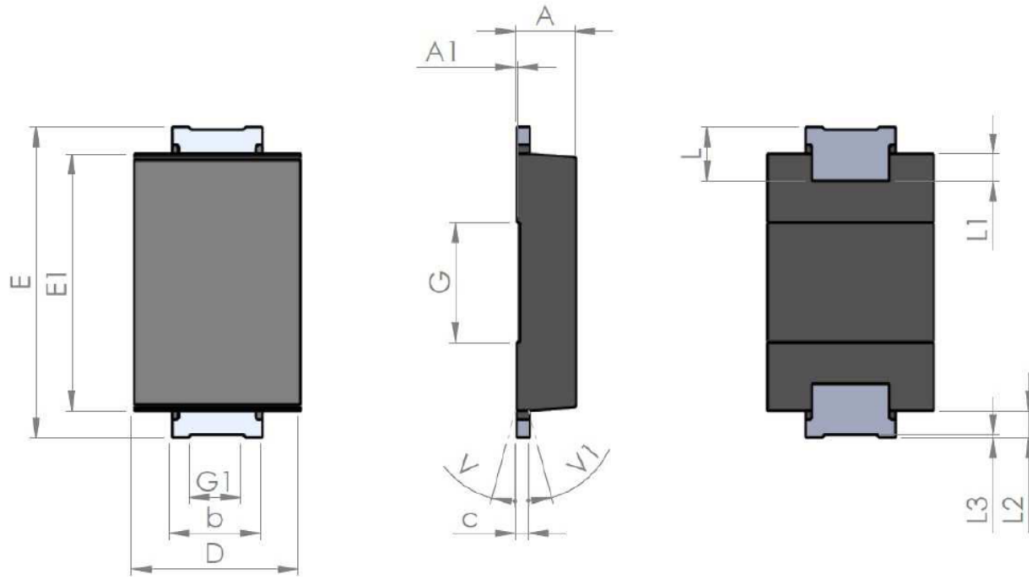
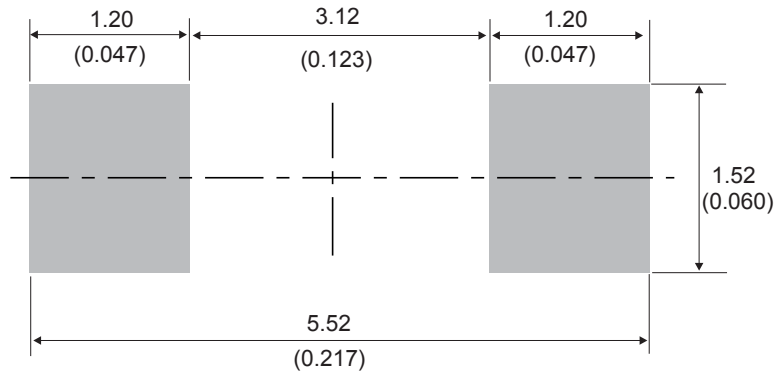


Table 5. SMA Flat Notch package mechanical data

| 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 16. SMA Flat Notch recommended footprint in mm (inches)



2.3 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 17. SMB package outline

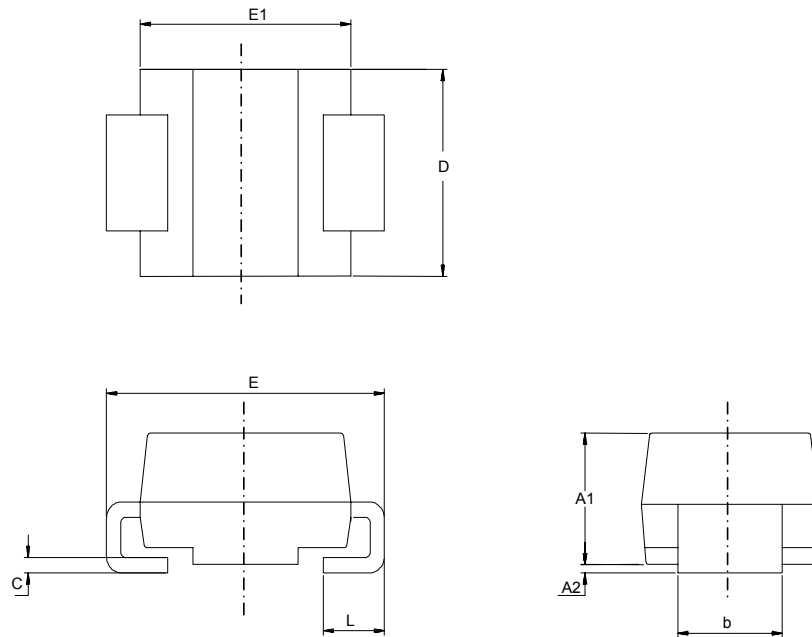
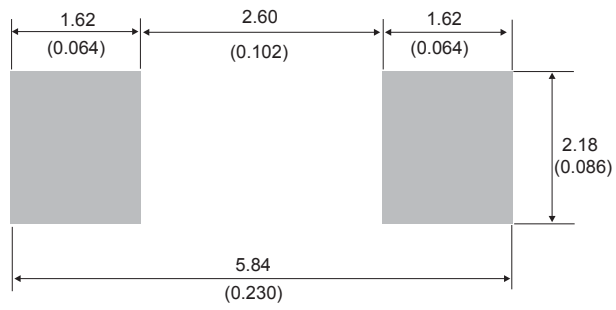


Table 6. SMB package mechanical data

| 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 18. SMB recommended footprint



3 Ordering Information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|-------------|---------|----------------|---------|-----------|---------------|
| STPS1L30A | GB3 | SMA | 0.068 g | 5000 | Tape and reel |
| STPS1L30AFN | A13 | SMA Flat Notch | 0.039 g | 10 000 | Tape and reel |
| STPS1L30U | G23 | SMB | 0.107 g | 2500 | Tape and reel |

Revision history

Table 8. Document revision history

| Date | Version | Changes |
|-------------|---------|---|
| Jul-2003 | 5A | Last update. |
| Aug-2004 | 6 | SMA package dimensions update. Reference A1 max changed from 2.70 mm (0.106 inc.) to 2.03 mm (0.080 inc). |
| 17-Sep-2018 | 7 | Updated Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified) and Figure 3. Normalized avalanche power derating versus junction temperature (T_j = 125 °C) . |
| 26-Sep-2019 | 8 | Added Section 2.2 SMA Flat Notch package information . |

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