# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | | 40 | V |
| $I_{F(AV)}$ | Average forward current, δ = 0.5, square wave | SMB | $T_L$ = 130 °C | 2 | A |
| | | SMB Flat | $T_L$ = 140 °C | | |
| | | SMA Flat, SMA Flat Notch | $T_L$ = 130 °C | | |
| $I_{FSM}$ | Surge non repetitive forward current | | $t_p$ = 10 ms sinusoidal | 75 | A |
| $P_{ARM}$ | Repetitive peak avalanche power | | $t_p$ = 10 µs, $T_j$ = 125 °C | 158 | 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 | SMB | 20 | °C/W |
| | | SMB Flat | 10 | |
| | | SMA Flat | 20 | |
| | | SMA Flat Notch | 20 | |

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 °C | $V_R$ = 40 V | - | | 220 | µA |
| | | $T_j$ = 100 °C | | - | | 20 | mA |
| | | $T_j$ = 125 °C | | - | 38 | 80 | mA |
| $V_F$(1) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 1 A | - | | 0.39 | V |
| | | $T_j$ = 125 °C | | - | 0.25 | 0.28 | |
| | | $T_j$ = 25 °C | $I_F$ = 2 A | - | | 0.43 | |
| | | $T_j$ = 125 °C | | - | 0.31 | 0.34 | |
| | | $T_j$ = 25 °C | $I_F$ = 4 A | - | | 0.50 | |
| | | $T_j$ = 125 °C | | - | 0.39 | 0.45 | |

1. *Pulse test: $t_p$ = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.22 \times I_{F(AV)} + 0.06 \times I_F{}^2{}_{(RMS)}$

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**

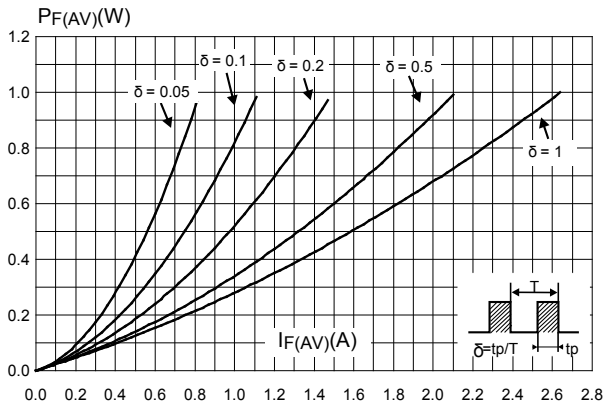



**Figure 2. Average forward current versus ambient temperature (δ = 0.5) SMB**

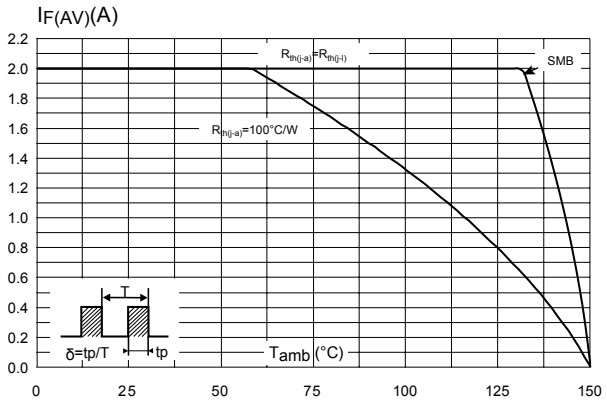



**Figure 3. Average forward current versus ambient temperature (δ = 0.5, SMB Flat)**

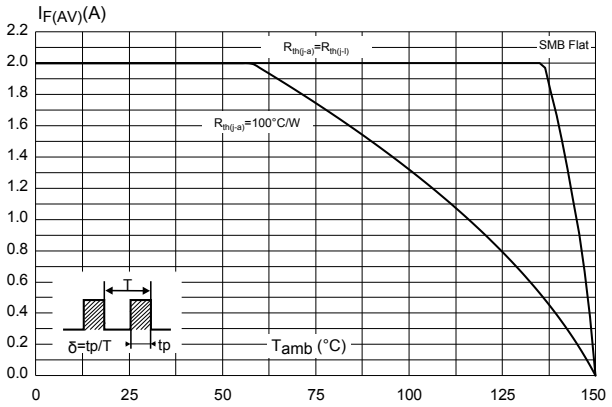



**Figure 4. Average forward current versus ambient temperature (δ = 0.5, SMA Flat, SMA Flat Notch)**

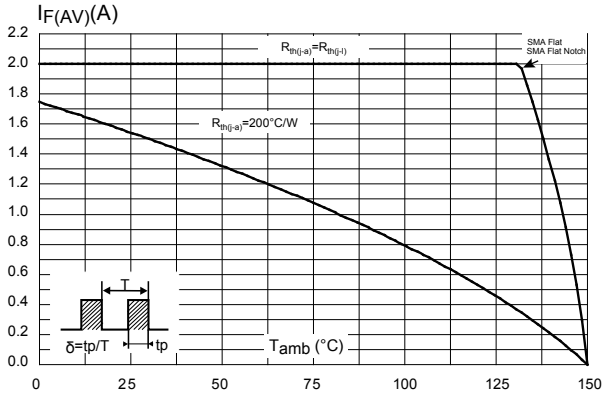


**Figure 5. Normalized avalanche power derating versus pulse duration ($T_j$ = 125 °C)**

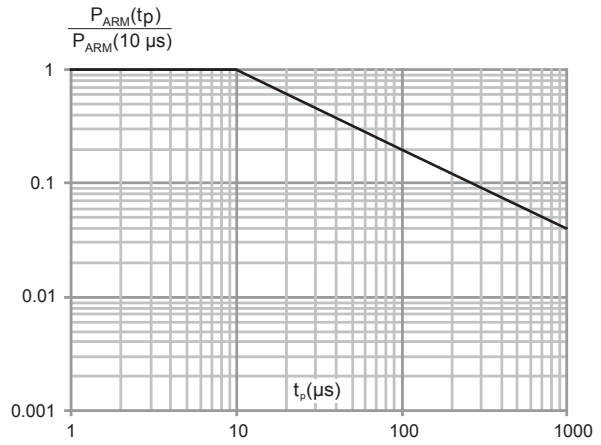



**Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)**

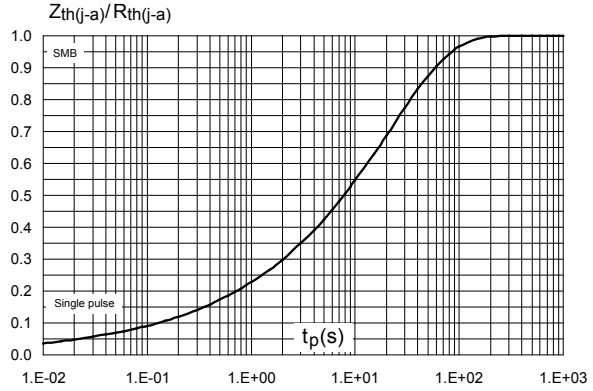



**Figure 7. Relative variation of thermal impedance junction to lead versus pulse duration (SMB flat)**

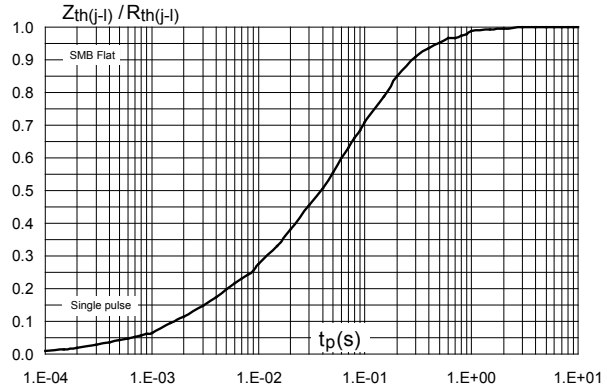



**Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA Flat)**

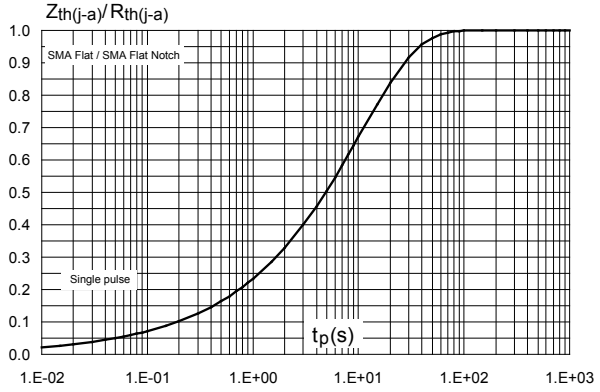



**Figure 9. Reverse leakage current versus reverse voltage applied (typical values)**

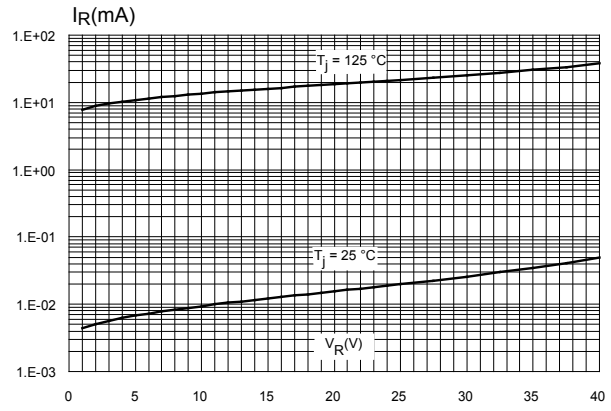



**Figure 10. Junction capacitance versus reverse voltage applied (typical values)**

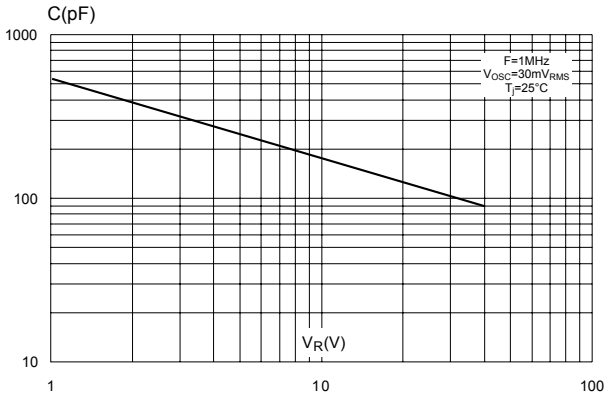


**Figure 11. Forward voltage drop versus forward current (high level)**

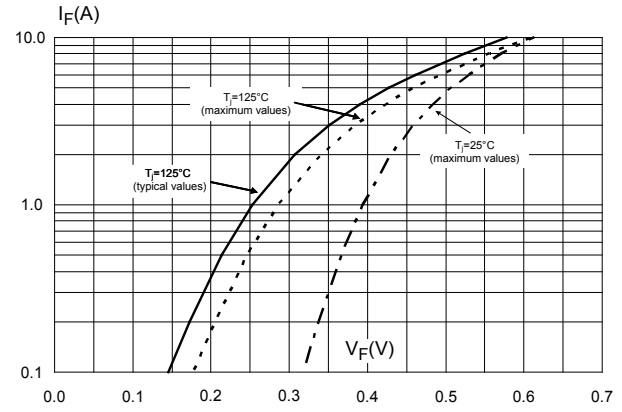



**Figure 12. Forward voltage drop versus forward current (low level)**

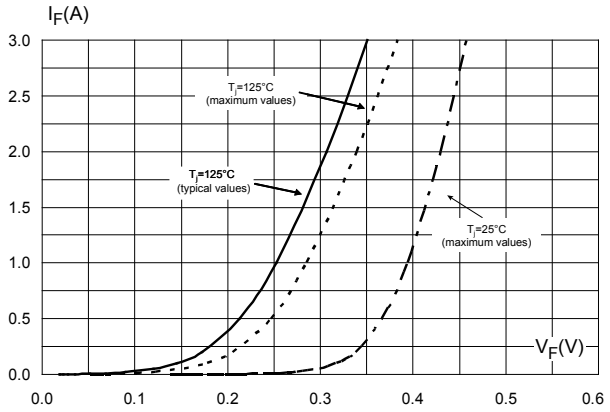



**Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (SMB)**

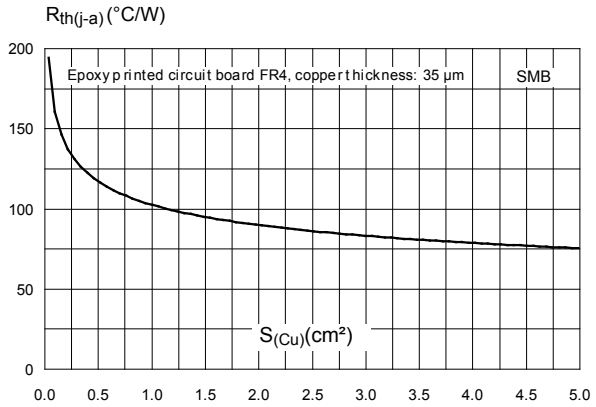



**Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (SMB flat)**

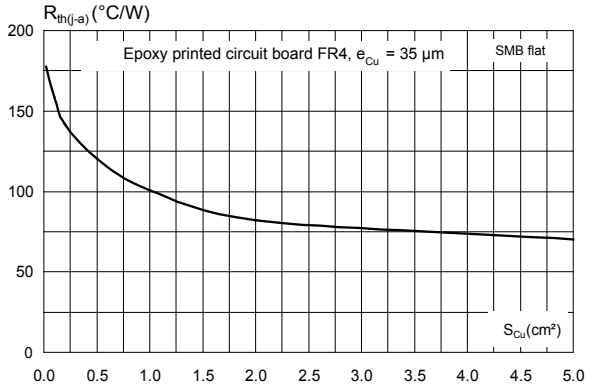
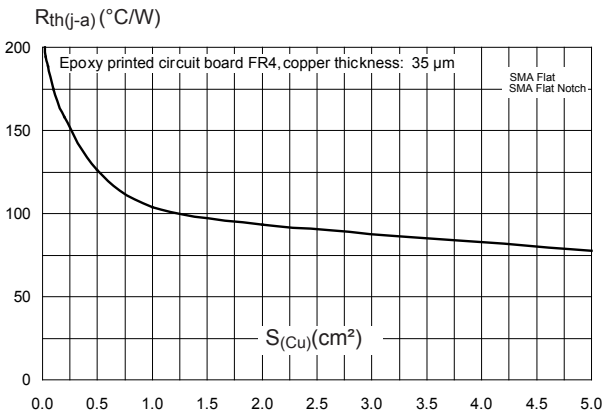



**Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (SMA Flat, SMA Flat Notch)**



# 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 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

**Figure 16. SMB package outline**

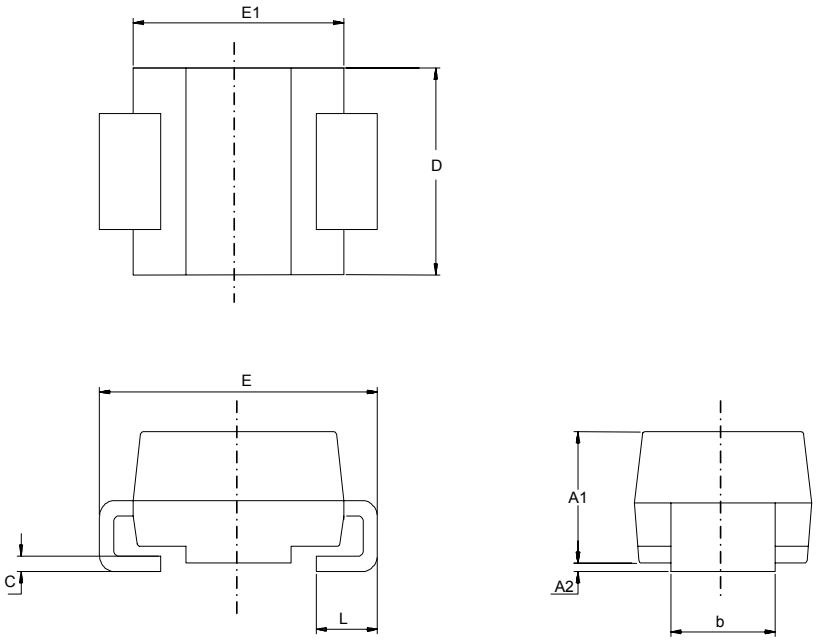
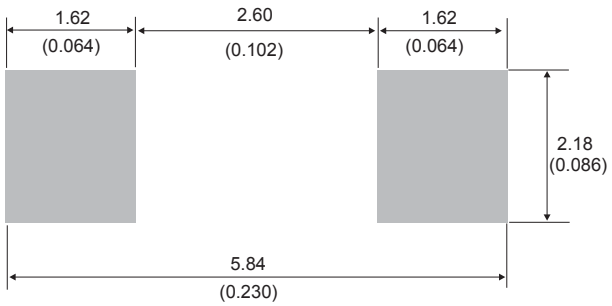


**Table 4. SMB package mechanical data**

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches (for reference only) | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.074 | 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**



## 2.2 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

**Figure 18. SMB Flat package outline**

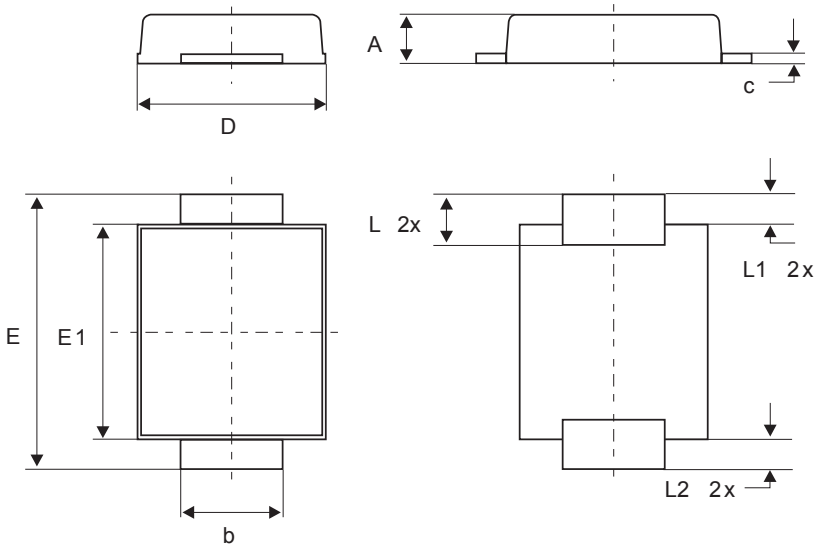
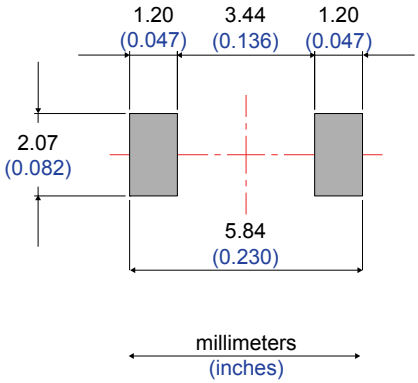



**Table 5. SMB Flat mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.90 | | 1.10 | 0.035 | | 0.044 |
| 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 |
| L1 | | 0.40 | | | 0.016 | |
| L2 | | 0.60 | | | 0.024 | |

Figure 19. **Footprint recommendations, dimensions in mm (inches)**



## 2.3 SMA Flat package information

- Epoxy meets UL94, V0
- Lead-free package

**Figure 20. SMA Flat package outline**

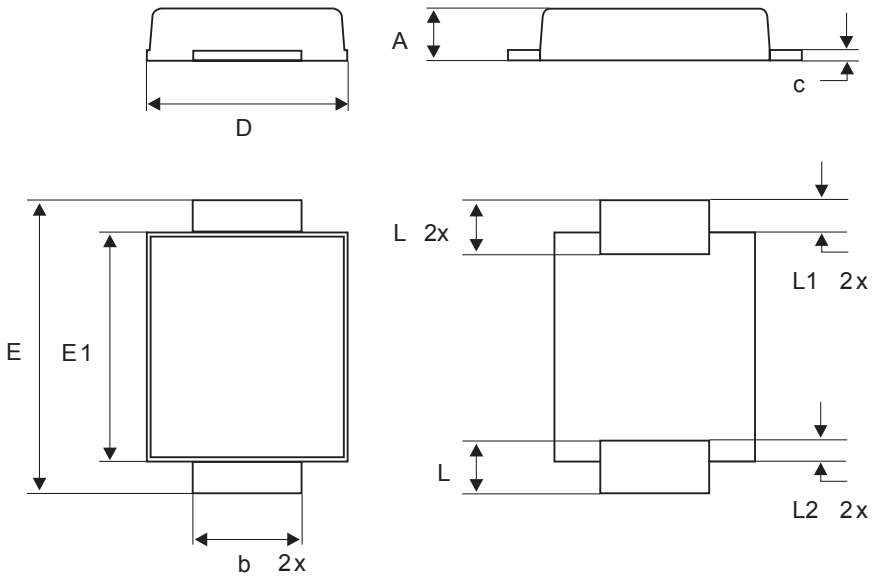
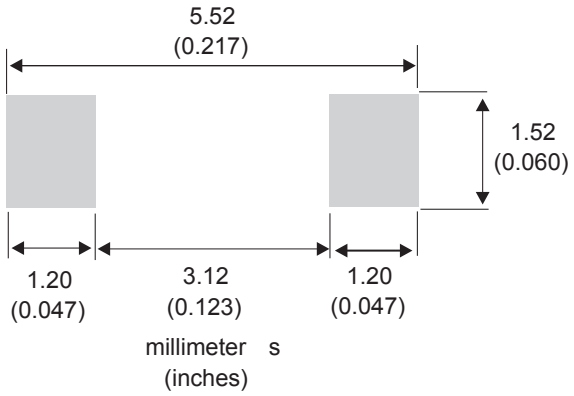



**Table 6. SMA Flat package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches (for reference only) | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.90 | | 1.10 | 0.035 | | 0.044 |
| b | 1.25 | | 1.65 | 0.049 | | 0.065 |
| c | 0.15 | | 0.40 | 0.005 | | 0.016 |
| D | 2.25 | | 2.95 | 0.088 | | 0.117 |
| E | 4.80 | | 5.60 | 0.188 | | 0.221 |
| E1 | 3.95 | | 4.60 | 0.155 | | 0.182 |
| L | 0.75 | | 1.50 | 0.029 | | 0.060 |
| L1 | | 0.50 | | | 0.020 | |
| L2 | | 0.50 | | | 0.020 | |

Figure 21. **SMA Flat recommended footprint in mm (inches)**



## 2.4 SMA Flat Notch package information

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

**Figure 22. SMA Flat Notch package outline**

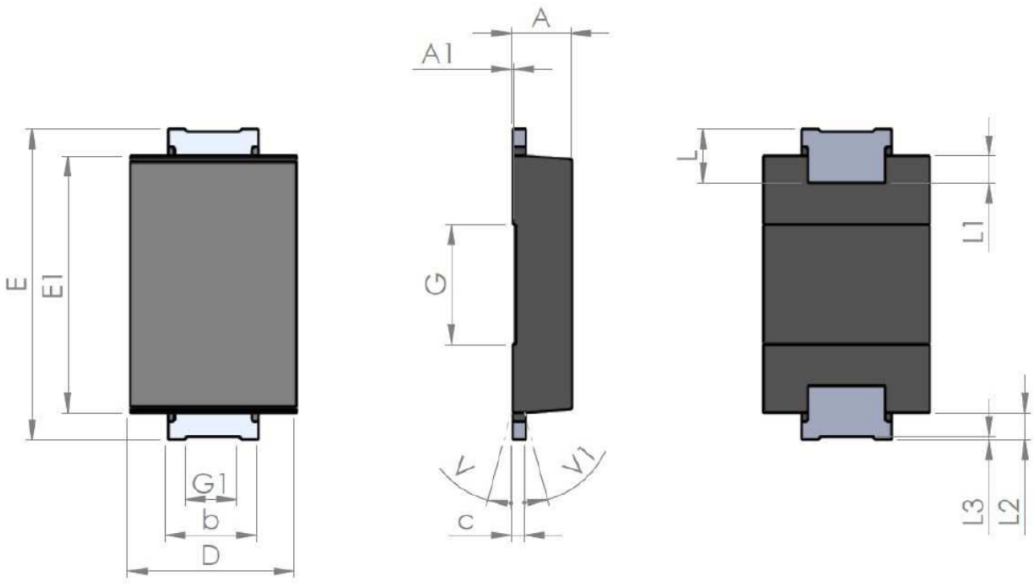
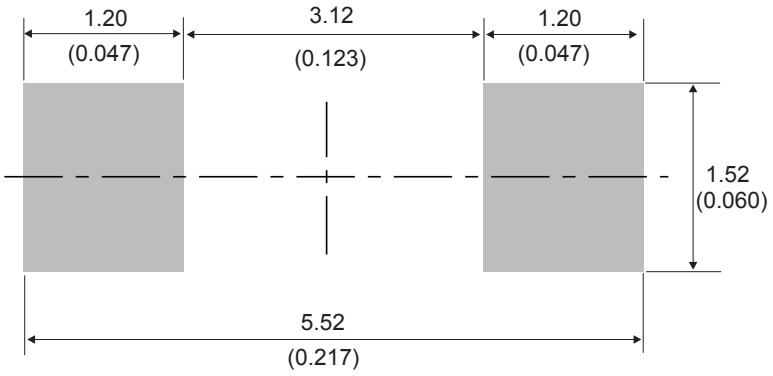



**Table 7. SMA Flat Notch package mechanical data**

| 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 23. **SMA Flat Notch recommended footprint in mm (inches)**



# 3 Ordering information

Table 8. **Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| STPS2L40U | GD4 | SMB | 0.107 g | 2500 | Tape and reel |
| STPS2L40UF | FGD4 | SMB Flat | 0.050 g | 5000 | Tape and reel |
| STPS2L40AF | F2L4 | SMA Flat | 0.035 g | 10 000 | Tape and reel |
| STPS2L40AFN | A24 | SMA Flat Notch | 0.039 g | 10 000 | Tape and reel |

## Revision history

**Table 9. Document revision history**

| Date | Version | Changes |
|---|---|---|
| Jul-2003 | 2A | Last update. |
| 31-Jan-2007 | 3 | Reformatted to current standard. Added ECOPACK statement. Added SMBflat package. |
| 18-Sep-2008 | 4 | Reformatted to current standard. Updated ECOPACK statement. Added SMAflat package. |
| 04-Dec-2018 | 5 | Updated Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified) and Figure 5. Normalized avalanche power derating versus pulse duration ($T_j$ = 125 °C). |
| 27-Sep-2019 | 6 | Added Section 2.4 SMA Flat Notch package information. |