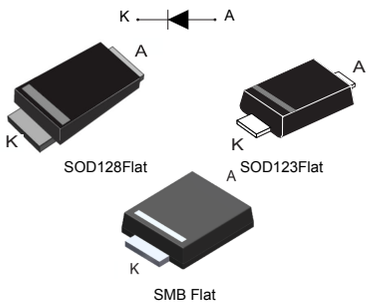
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# STPST2H100

Datasheet

## 100 V - 2 A power Schottky trench rectifier




## Features

- High junction temperature capability
- Low forward voltage drop
- Low recovery charges
- Reduces conduction, reverse and switching losses
- Avalanche tested
- Flat packages
- ECOPACK2 compliant

## Applications

- DC/DC converter
- LED lighting
- Flyback topology
- Auxiliary power supply
- Switch mode power supply (SMPS)

**Product label**

SUSTAINABLE TECHNOLOGY

**Product status link**

STPST2H100

| Product summary | |
|---|---|
| $I_{F(AV)}$ | 2 A |
| $V_{RRM}$ | 100 V |
| $T_j$ (max.) | 175 °C |
| $V_F$ (typ.) | 0.620 V |

## Description

This 2 A, 100 V rectifier is based on ST trench technology that achieves the best-in-class $V_F/I_R$ trade-off for a given silicon surface.

Integrated in flat and space-saving packages, this STPST2H100 trench rectifier is intended to be used in high frequency miniature switched mode power supplies. It is also an ideal candidate for auxiliary power supply in telecom, server, or smart metering. ST trench rectifiers are adapted to freewheeling, OR-ring or reverse polarity protection applications, and can be the perfect companion device to our transistors, drivers, or ST VIPer products.

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# 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, δ = 0.5, square wave | SOD123Flat | $T_L$ = 140 °C | 2 | A |
| | | SOD128Flat | $T_L$ = 140 °C | | |
| | | SMB Flat | $T_L$ = 150 °C | | |
| $I_{FSM}$ | Surge non repetitive forward current | SOD123Flat | $t_p$ = 10 ms sinusoidal | 35 | A |
| | | SOD128Flat | | | |
| | | SMB Flat | | | |
| $I_{AS}$ | Single pulse avalanche current(1) | $T_j$ = 25°C, L = 300 µH, $V_{DD}$ = 15 V | | 3 | A |
| $T_{stg}$ | Storage temperature range | | | -65 to +175 | °C |
| $T_j$ | Maximum operating junction temperature(2) | | | +175 | °C |

1. *Please refer to Figure 1 and Figure 2 for the unclamped inductive switching test circuit, and waveform.*
2. *($dP_{tot}/dT_j$) < ($1/R_{th(j-a)}$) condition to avoid thermal runaway for a diode on its own heatsink.*

**Table 2. Thermal resistance parameter**

| Symbol | Parameter | | Typ. value | Unit |
|---|---|---|---|---|
| $R_{th(j-l)}$ | Junction to lead | SOD123Flat | 15 | °C/W |
| | | SOD128Flat | 14 | |
| | | SMB Flat | 11 | |

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 | $T_j$ = 125 °C | $V_R$ = 70 V | - | 0.25 | 0.75 | mA |
| | | $T_j$ = 25 °C | $V_R$ = 100 V | - | | 2.7 | µA |
| | | $T_j$ = 125 °C | | - | 0.45 | 1.5 | mA |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 1 A | - | 0.590 | 0.655 | V |
| | | $T_j$ = 125 °C | | - | 0.520 | 0.575 | |
| | | $T_j$ = 25 °C | $I_F$ = 2 A | - | 0.725 | 0.805 | |
| | | $T_j$ = 125 °C | | - | 0.620 | 0.670 | |

1. *Pulse test: $t_p$ = 5 ms, δ < 2%*
2. *Pulse test: $t_p$ = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.480 \times I_{F(AV)} + 0.095 \times I_F{}^2{}_{(RMS)}$

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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

**Figure 1. Current and voltage waveforms for avalanche energy test across D.U.T (device under test)**

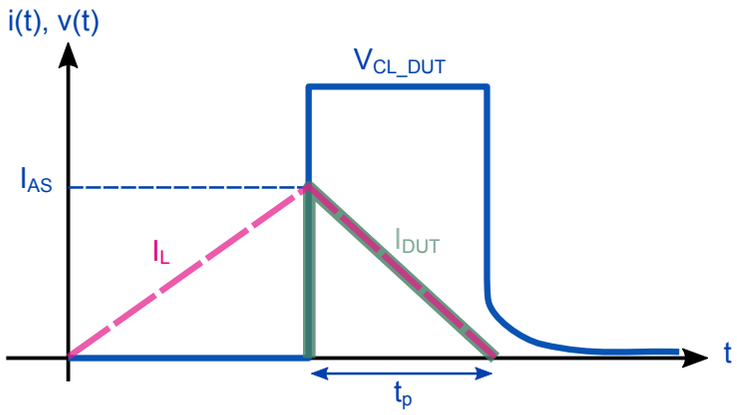
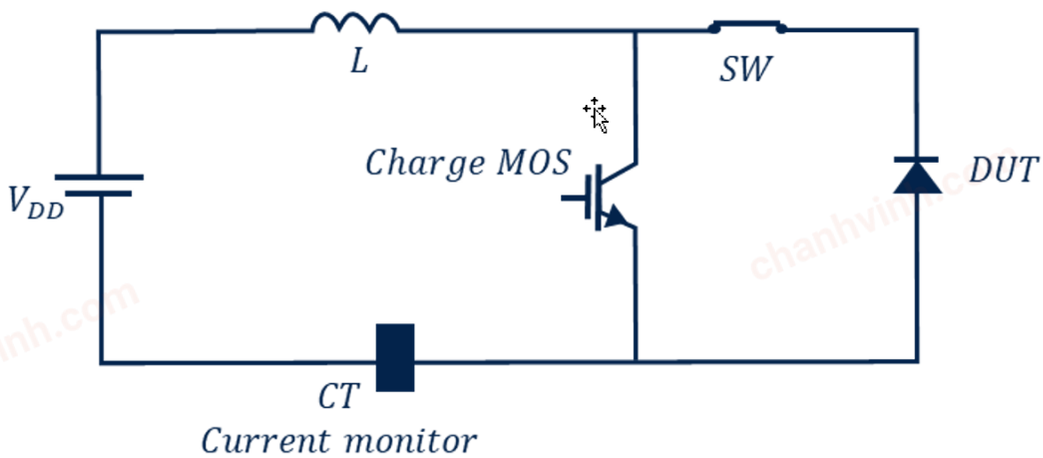



**Figure 2. Unclamped Inductive Switching Test circuit**




$$E_{AS} = \frac{1}{2} \times L \times {I_{AS}}^2 \times \left( \frac{V_{CLDUT}}{V_{CLDUT} - V_{DD}} \right) \cong \frac{1}{2} \times L \times {I_{AS}}^2$$

$$t_p = \left( \frac{L \times I_{AS}}{V_{CLDUT} - V_{DD}} \right)$$

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## 1.1 Characteristics (curves)

**Figure 3. Average forward current versus lead temperature (δ = 0.5)**

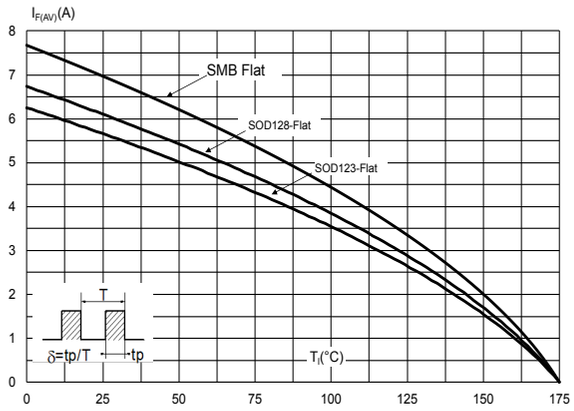



**Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration (SOD123Flat)**

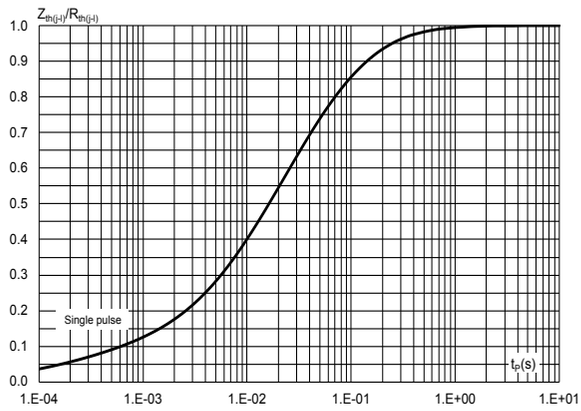



**Figure 5. Relative variation of thermal impedance junction to lead versus pulse duration (SOD128Flat)**

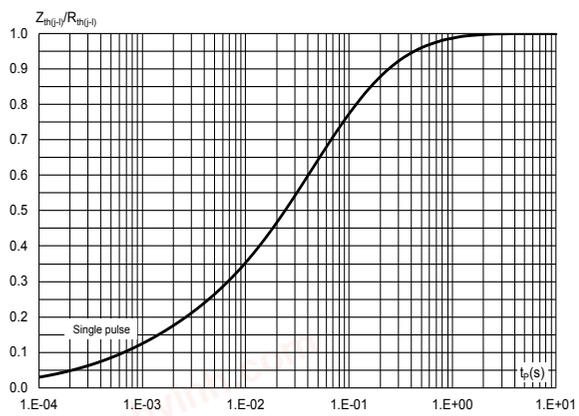



**Figure 6. Relative variation of thermal impedance junction to lead versus pulse duration (SMB Flat)**

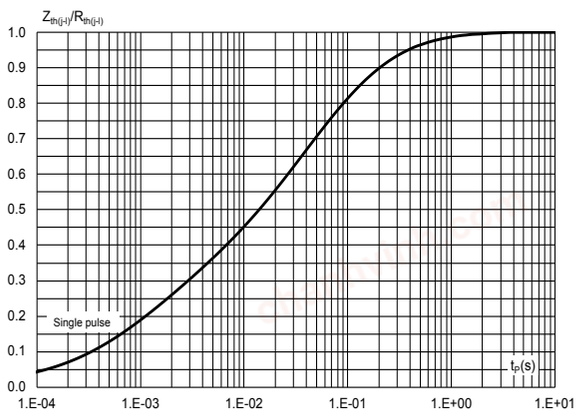



**Figure 7. Reverse leakage current versus reverse voltage applied (typical values)**

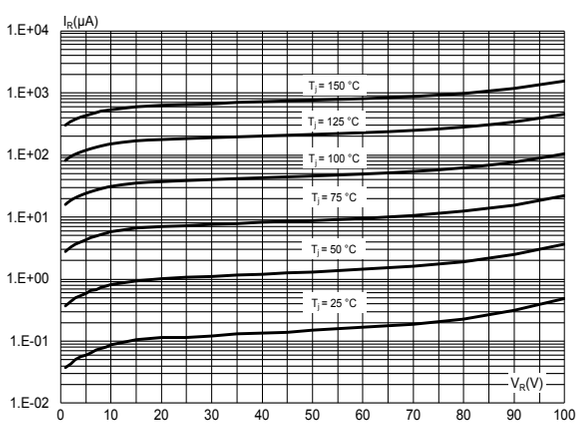
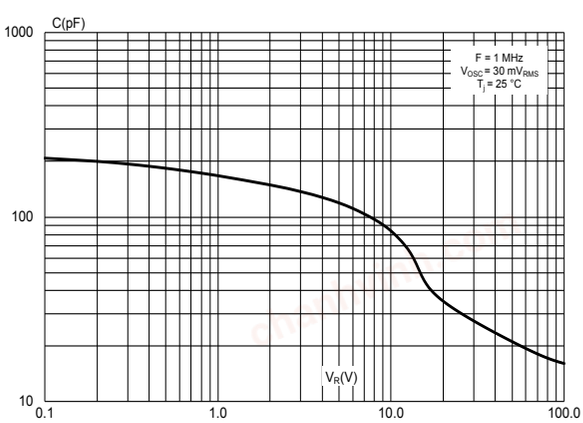



**Figure 8. Junction capacitance versus reverse voltage applied (typical values)**



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**Figure 9. Forward voltage drop versus forward current (typical values)**

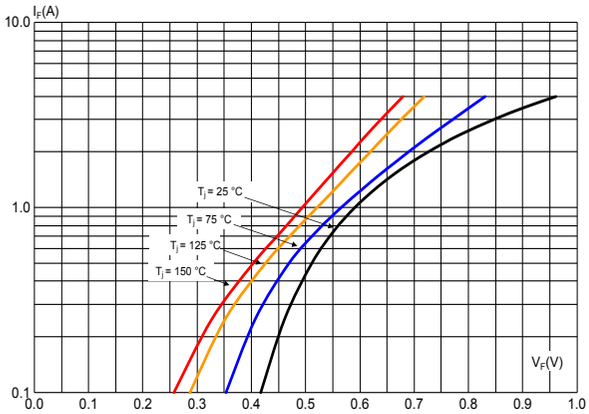



**Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (typical values, epoxy printed board FR4, $e_{Cu}$= 70 µm)**

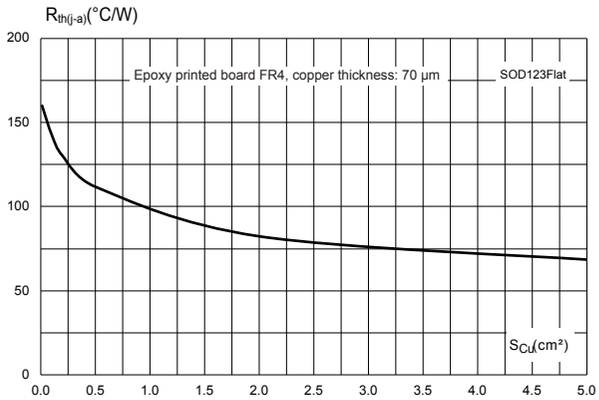



**Figure 11. Thermal resistance junction to ambient versus copper surface under each lead (typical values, epoxy printed board FR4, $e_{Cu}$= 70 µm)**

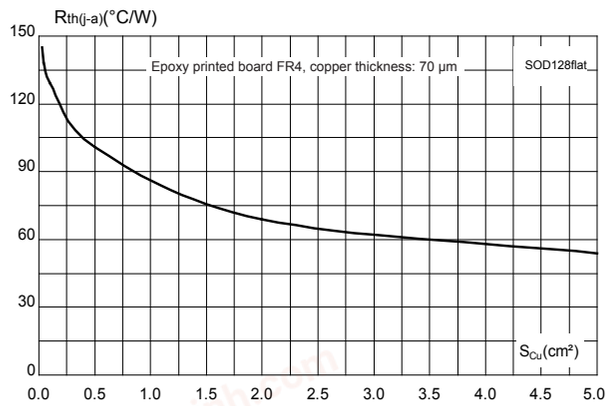
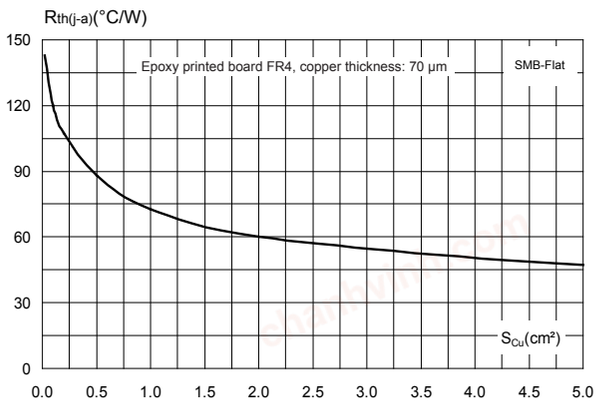



**Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (typical values, epoxy printed board FR4, $e_{Cu}$= 70 µm)**



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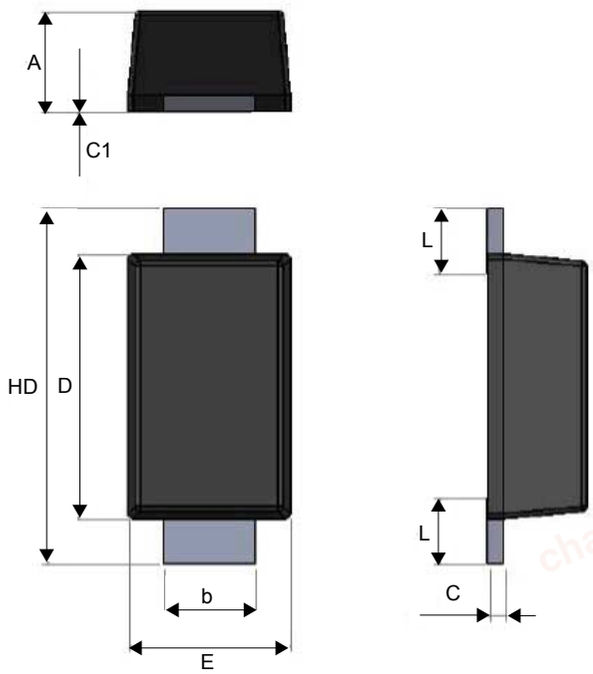


# 2 Package information

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 SOD123Flat package information

**Figure 13. SOD123Flat package outline**




*Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

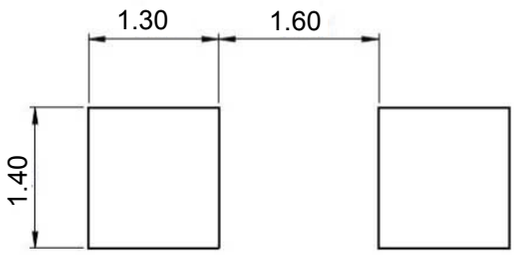
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Table 4. **SOD123Flat package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches (for reference only) | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.86 | 0.98 | 1.10 | 0.034 | 0.038 | 0.043 |
| b | 0.80 | 0.90 | 1.00 | 0.031 | 0.035 | 0.039 |
| c | 0.08 | 0.15 | 0.25 | 0.003 | 0.006 | 0.009 |
| c1 | 0.00 | | 0.10 | 0.000 | | 0.004 |
| D | 2.50 | 2.60 | 2.70 | 0.098 | 0.102 | 0.106 |
| E | 1.50 | 1.60 | 1.80 | 0.059 | 0.063 | 0.070 |
| HD | 3.30 | 3.50 | 3.70 | 0.130 | 0.137 | 0.146 |
| L | 0.45 | 0.65 | 0.85 | 0.018 | 0.025 | 0.033 |

Figure 14. **SOD123Flat footprint dimensions (mm)**




*Note: For package and tape orientation, reel and inner box dimensions and tape outline please check TN1173.*

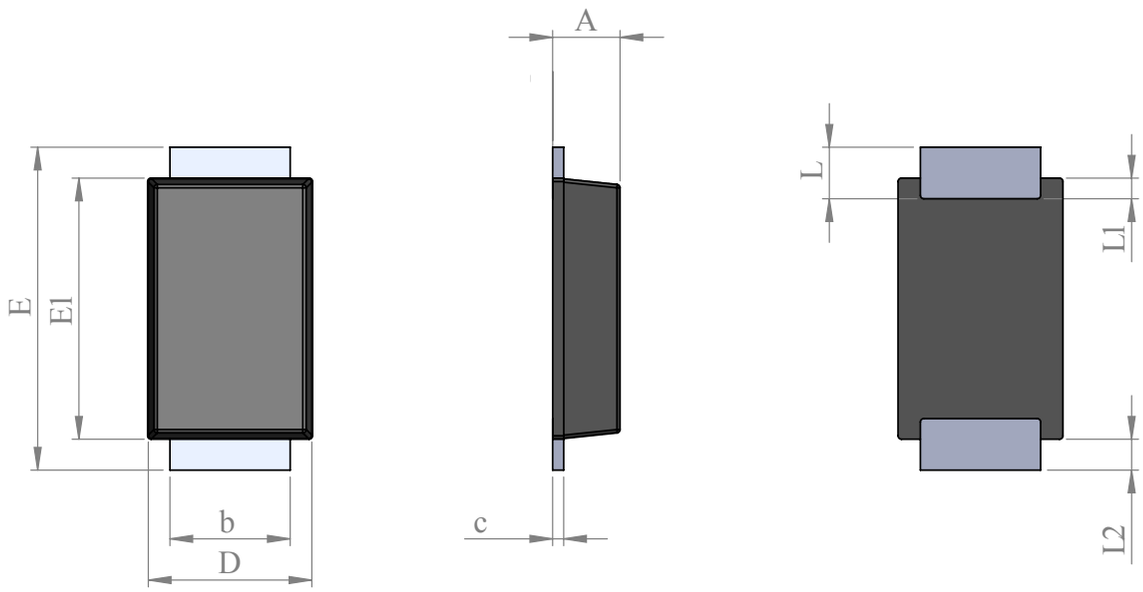
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## 2.2 SOD128Flat package information

- Lead-free package

**Figure 15. SOD128Flat package outline**




*Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

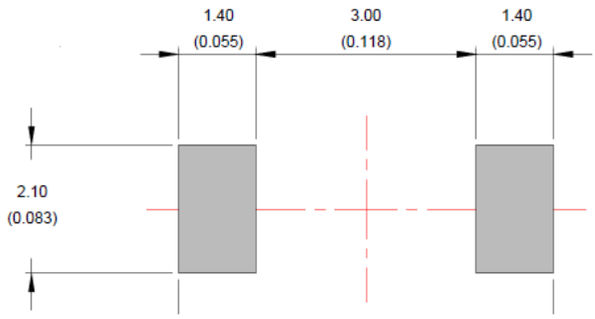
**Table 5. SOD128Flat package mechanical data**

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.93 | 1.03 | 0.037 | 0.041 |
| b | 1.69 | 1.81 | 0.067 | 0.071 |
| c | 0.10 | 0.22 | 0.004 | 0.009 |
| D | 2.30 | 2.50 | 0.091 | 0.098 |
| E | 4.60 | 4.80 | 0.181 | 0.189 |
| E1 | 3.70 | 3.90 | 0.146 | 0.154 |
| L | 0.55 | 0.85 | 0.026 | 0.033 |
| L1 | 0.30 typ. | | 0.012 typ. | |
| L2 | 0.45 typ. | | 0.018 typ. | |

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Figure 16. **SOD128Flat footprint in mm (inches)**




*Note: For package and tape orientation, reel and inner box dimensions and tape outline please check TN1173.*

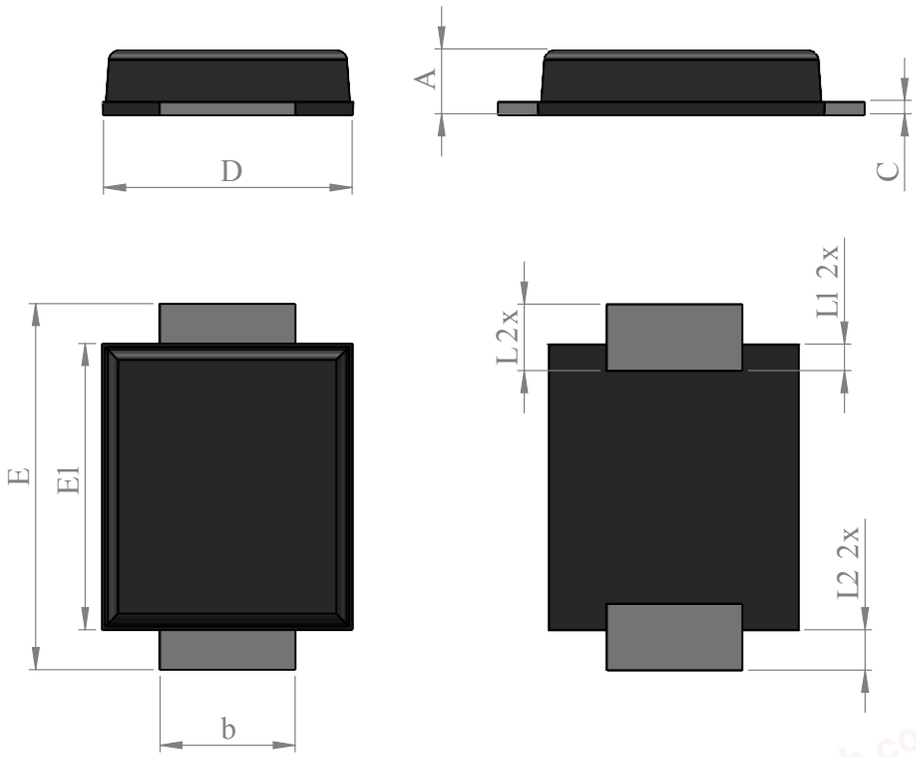
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## 2.3 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

**Figure 17. SMB Flat package outline**




*Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

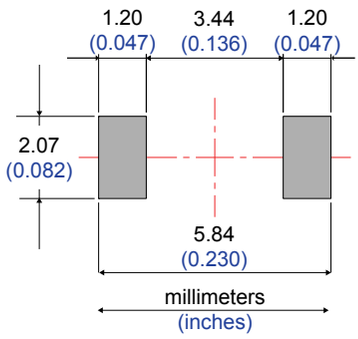
**Table 6. SMB Flat mechanical data**

| 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 | |

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**Figure 18. Footprint recommendations, dimensions in mm (inches)**




*Note: For package and tape orientation, reel and inner box dimensions and tape outline please check TN1173.*

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# 3 Ordering information

Table 7. **Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| STPST2H100ZF | T02 | SOD123 Flat | 12.5 mg | 3000 | Tape and reel |
| STPST2H100AF | T2H1 | SOD128 Flat | 26.4 mg | 3000 | |
| STPST2H100UF | T2H1 | SMB Flat | 50.0 mg | 5000 | |

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## Revision history

Table 8. **Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 16-Dec-2022 | 1 | Initial release. |
| 26-May-2023 | 2 | Updated Figure 15. |
| 21-Jul-2023 | 3 | Updated *Features*. |

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