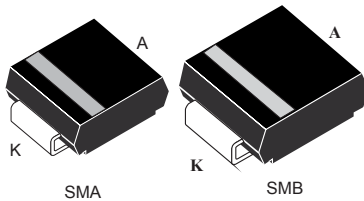


Automotive high voltage power Schottky rectifier



Features

- AEC-Q101 qualified
- Negligible switching losses
- High junction temperature capability
- Low leakage current
- Good trade off between leakage current and forward voltage drop
- Avalanche capability specified
- ECOPACK[®]2 compliant component
- PPAP capable
- V_{RRM} guaranteed from -40°C to $+175^{\circ}\text{C}$

Description

Schottky rectifiers packaged in SMA or SMB, and designed for high frequency miniature switched mode power supplies as DC/DC converters for automotive applications. It is particularly suited for LED lighting applications, ADAS power, and ECU (Engine Control Unit) in automotive environment.

| Product status | |
|-----------------|---|
| STPS1H100-Y | |
| Product summary | |
| Symbol | Value |
| $I_{F(AV)}$ | 1 A |
| V_{RRM} | 100 V |
| T_j (range) | -40°C to $+175^{\circ}\text{C}$ |
| $V_{F(max.)}$ | 0.62 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, T _j = -40 °C to +175 °C | | 100 | V | |
| I _{F(RMS)} | Forward rms current | | 10 | A | |
| I _{F(AV)} | Average forward current, δ = 0.5 | SMA T _L = 150 °C | 1 | A | |
| | | SMB T _L = 155 °C | | | |
| I _{FSM} | Surge non repetitive forward current | | t _p = 10 ms sinusoidal | 50 | A |
| P _{ARM} | Repetitive peak avalanche power | | t _p = 10 μs, T _j = 125 °C | 108 | W |
| T _{stg} | Storage temperature range | | -65 to +175 | °C | |
| T _j | Maximum operating junction temperature ⁽¹⁾ | | +175 | °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 parameters

| Symbol | Parameter | | Max. value | Unit |
|----------------------|------------------|-----|------------|------|
| R _{th(j-l)} | Junction to lead | SMA | 30 | °C/W |
| | | SMB | 25 | |

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 = V _{RRM} | - | | 4 | μA |
| | | T _j = 125 °C | | - | 0.2 | 0.5 | mA |
| V _F ⁽²⁾ | Forward voltage drop | T _j = 25 °C | I _F = 1 A | - | | 0.77 | V |
| | | T _j = 125 °C | | - | 0.58 | 0.62 | |
| | | T _j = 25 °C | I _F = 2 A | - | | 0.86 | |
| | | T _j = 125 °C | | - | 0.65 | 0.70 | |

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:

$$P = 0.54 \times I_{F(AV)} + 0.08 \times I_{F(RMS)}^2$$

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

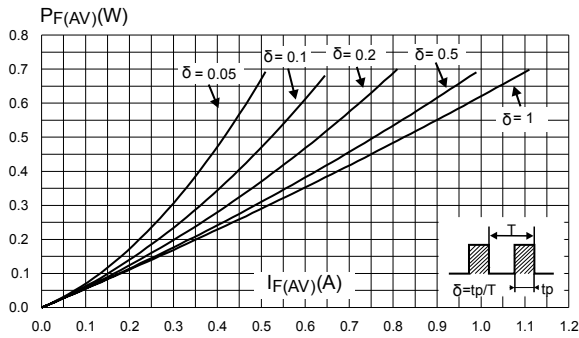


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

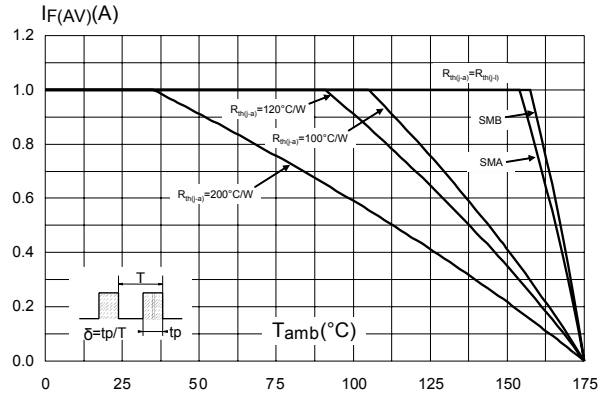


Figure 3. Normalized avalanche power derating versus junction temperature ($T_j = 125^\circ\text{C}$)

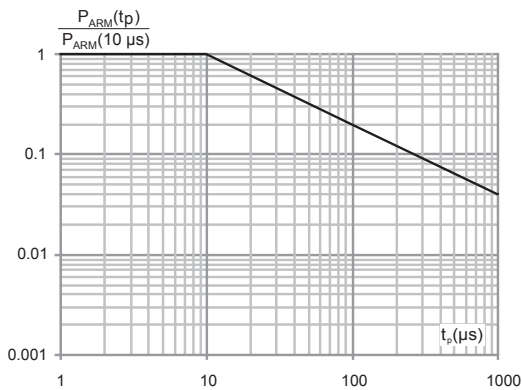


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

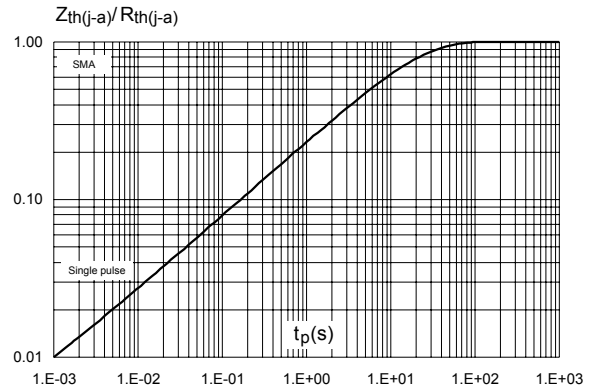


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

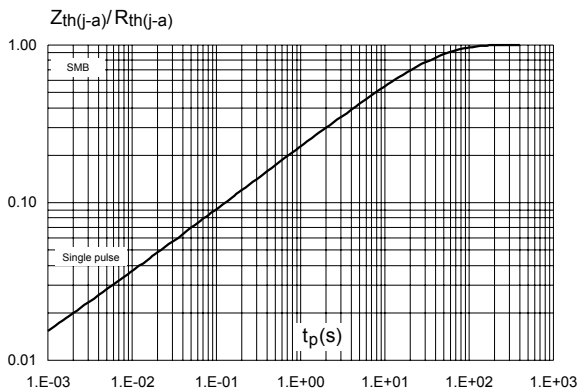


Figure 6. Reverse leakage current versus reverse voltage applied (typical values)

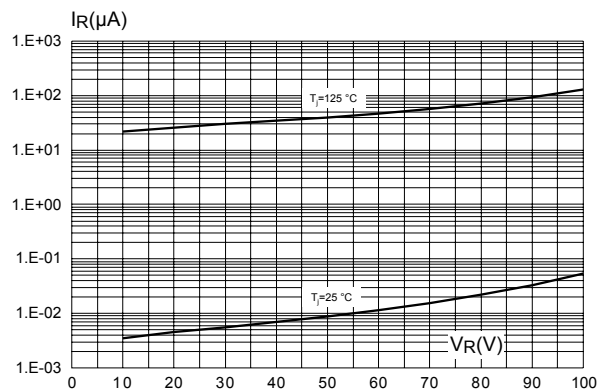


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

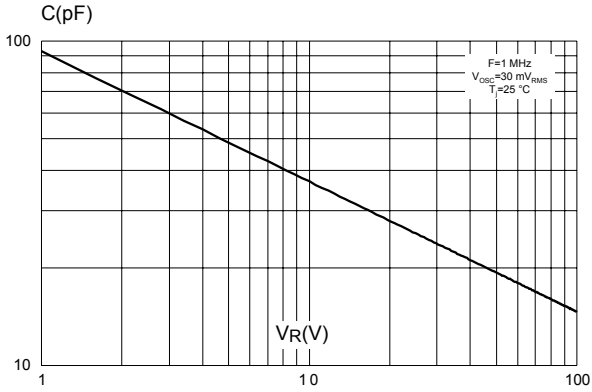


Figure 8. Forward voltage drop versus forward current (maximum values)

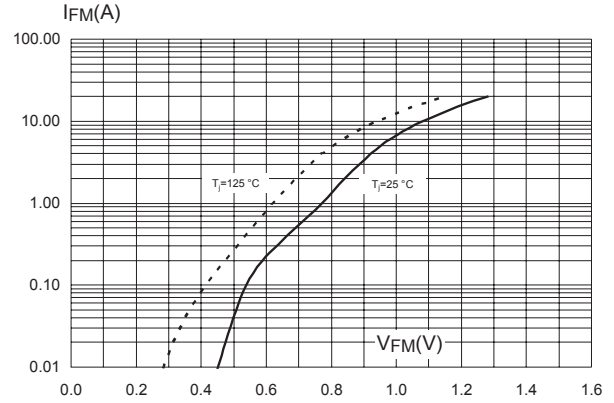


Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

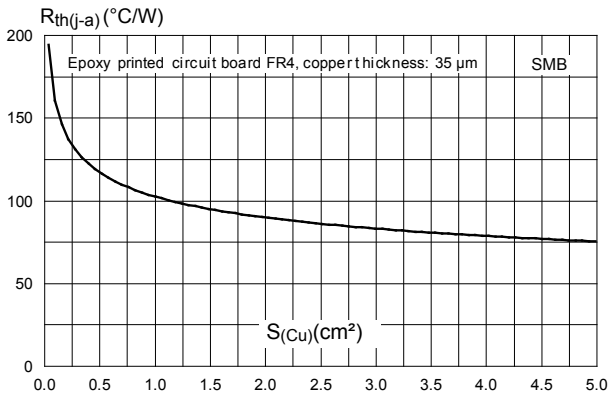
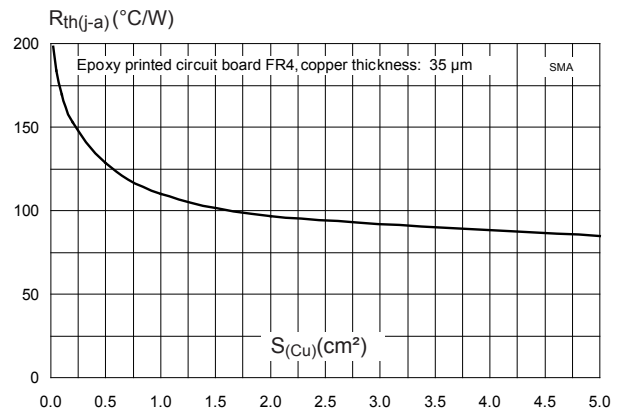


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (SMA)



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 11. SMB package outline

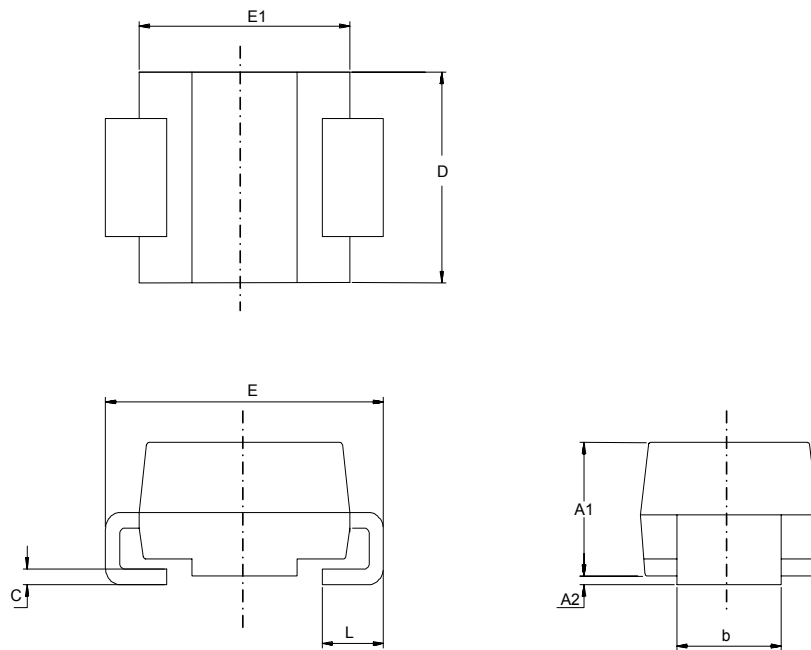
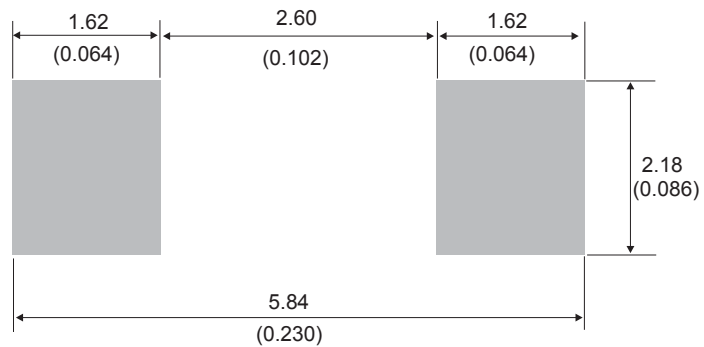


Table 4. SMB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|------|--------|--------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.0748 | 0.0965 |
| A2 | 0.05 | 0.20 | 0.0020 | 0.0079 |
| b | 1.95 | 2.20 | 0.0768 | 0.0867 |
| c | 0.15 | 0.40 | 0.0059 | 0.0157 |
| D | 3.30 | 3.95 | 0.1299 | 0.1556 |
| E | 5.10 | 5.60 | 0.2008 | 0.2205 |
| E1 | 4.05 | 4.60 | 0.1594 | 0.1811 |
| L | 0.75 | 1.50 | 0.0295 | 0.0591 |

Figure 12. SMB recommended footprint



2.2 SMA package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 13. SMA package outline

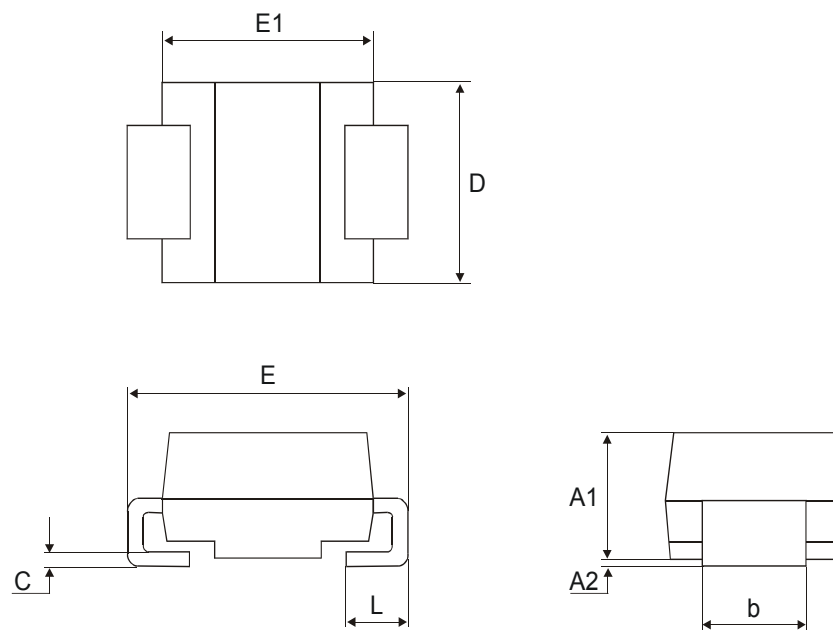
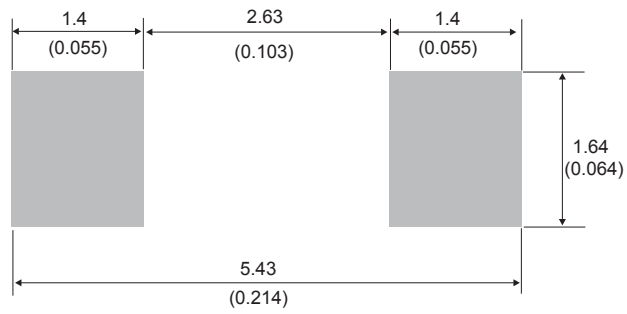


Table 5. SMA package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.097 |
| 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 14. SMA recommended footprint in mm (inches)



3 Ordering Information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|-------------|---------|---------|---------|-----------|---------------|
| STPS1H100AY | S11Y | SMA | 0.068 g | 5000 | Tape and reel |
| STPS1H100UY | G11Y | SMB | 0.107 | 2500 | |

Revision history

Table 7. Document revision history

| Date | Version | Changes |
|-------------|---------|--|
| 3-Dec-2010 | 1 | Initial release. |
| 10-Apr-2018 | 2 | Update Figure 3 "Normalized avalanche power derating versus pulse duration" with P_{ARM} 10 μ s curve. |

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9