

Power Schottky rectifier

Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified

Description

Single chip Schottky rectifiers suited to switched mode power supplies and high frequency DC to DC converters.

Packaged in SMA and SMB, this device is especially intended for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.

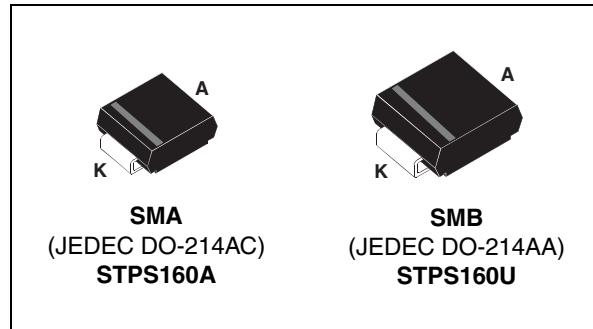


Table 1. Device summary

| Symbol | Value |
|-------------|--------|
| $I_{F(AV)}$ | 1 A |
| V_{RRM} | 60 V |
| $T_j(max)$ | 150 °C |
| $V_F(max)$ | 0.57 V |

1 Characteristics

Table 2. Absolute ratings (limiting values)

| Symbol | Parameter | | Value | Unit |
|--------------------|---|--|---------------|------|
| V _{RRM} | Repetitive peak reverse voltage | | 60 | V |
| I _{F(AV)} | Average forward current | T _L = 130 °C δ = 0.5 | 1 | A |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | 75 | A |
| I _{RRM} | Repetitive peak reverse current | t _p = 2 μs F = 1 kHz square | 1 | A |
| I _{RSM} | Non repetitive peak reverse current | t _p = 100 μs square | 1 | A |
| P _{ARM} | Repetitive peak avalanche power | t _p = 1 μs T _j = 25 °C | 2400 | W |
| T _{stg} | Storage temperature range | | - 65 to + 150 | °C |
| T _j | Maximum operating junction temperature ⁽¹⁾ | | 150 | °C |
| dV/dt | Critical rate of rise of reverse voltage | | 10000 | V/μs |

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance

| Symbol | Parameter | | Value | Unit |
|----------------------|------------------|-----|-------|------|
| R _{th(j-l)} | Junction to lead | SMA | 30 | °C/W |
| | | SMB | 23 | |

Table 4. 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 | | | 1.1 | 4 | mA |
| V _F ⁽²⁾ | Forward voltage drop | T _j = 25 °C | I _F = 1 A | | | 0.67 | V |
| | | T _j = 125 °C | | | 0.49 | 0.57 | |
| | | T _j = 25 °C | I _F = 2 A | | | 0.8 | |
| | | T _j = 125 °C | | | 0.58 | 0.65 | |

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:

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

Figure 1. Average forward power dissipation versus average forward current

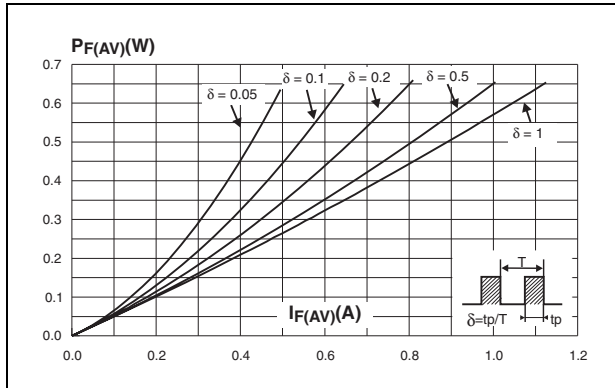


Figure 2. Average forward current versus ambient temperature (delta = 0.5)

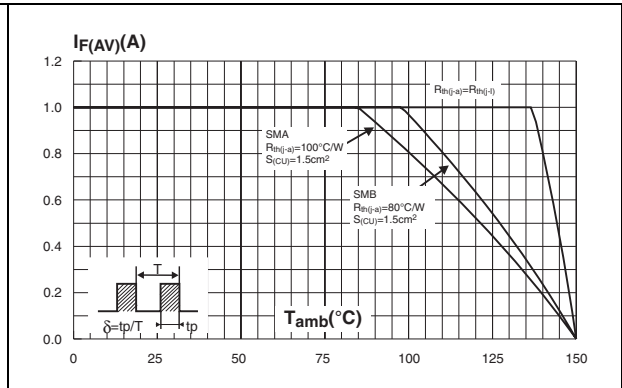


Figure 3. Normalized avalanche power derating versus pulse duration

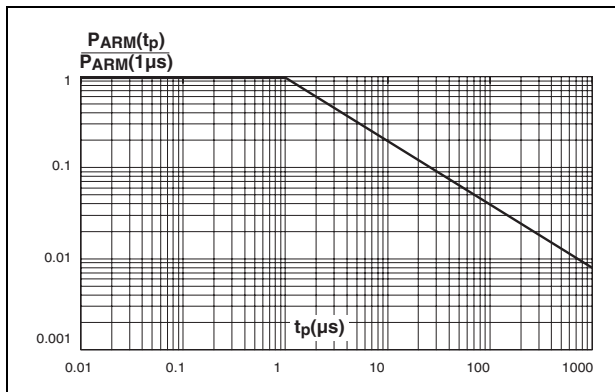


Figure 4. Normalized avalanche power derating versus junction temperature

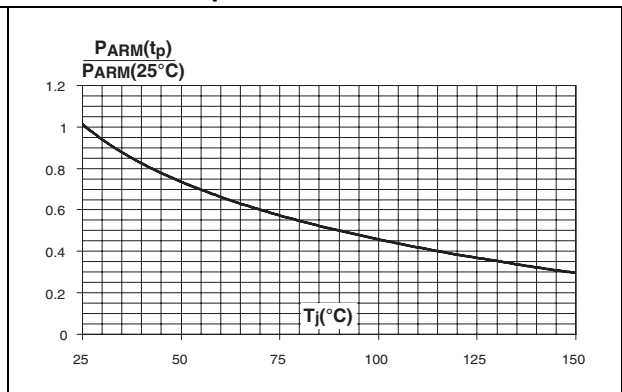


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) (SMA)

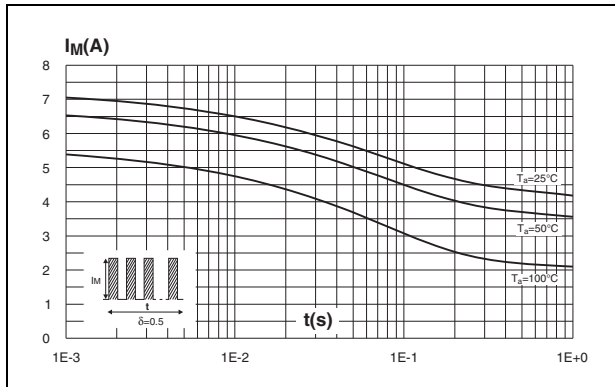


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values) (SMB)

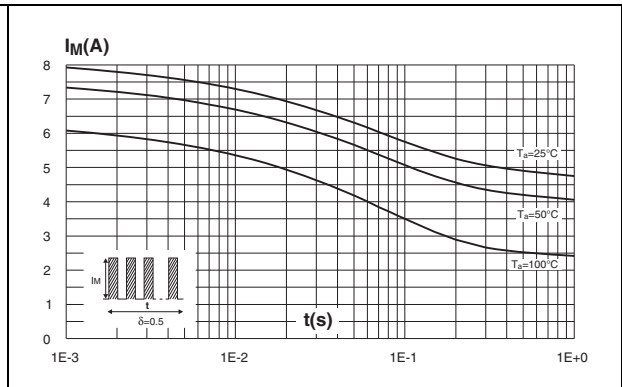


Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

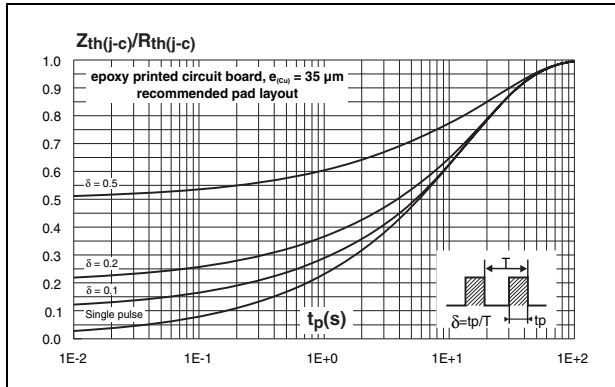


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

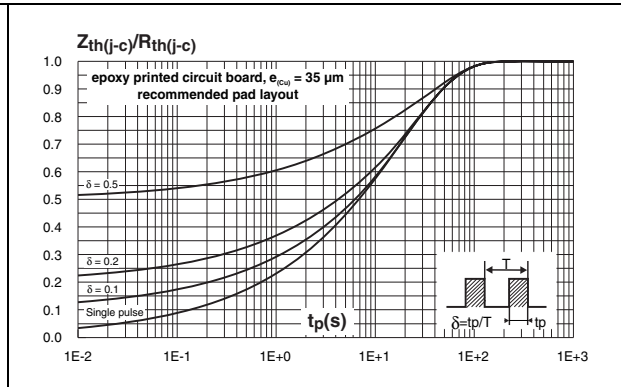


Figure 9. Reverse leakage current versus reverse voltage applied (typical values)

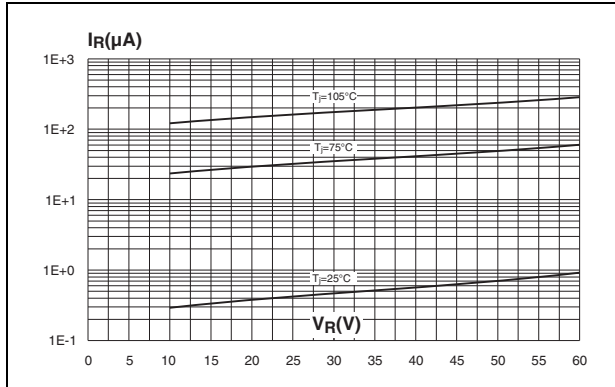


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

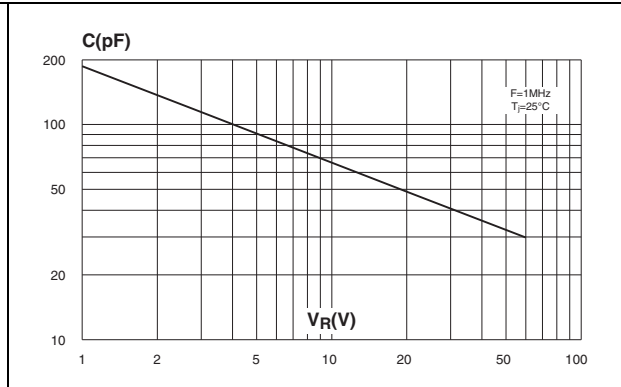


Figure 11. Forward voltage drop versus forward current (maximum values)

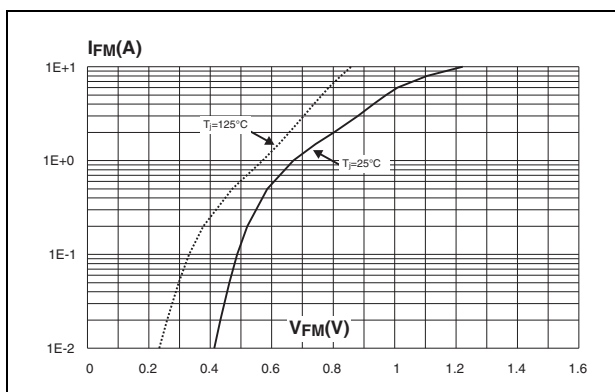


Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

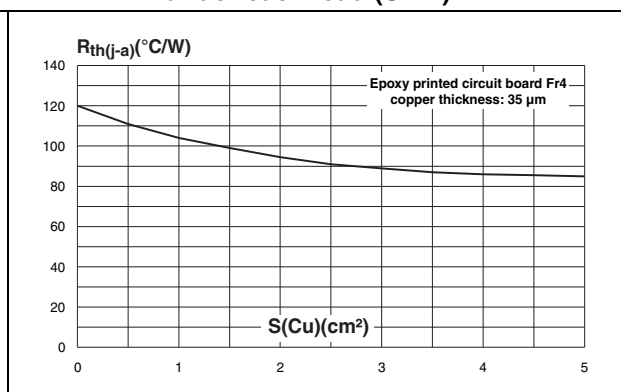
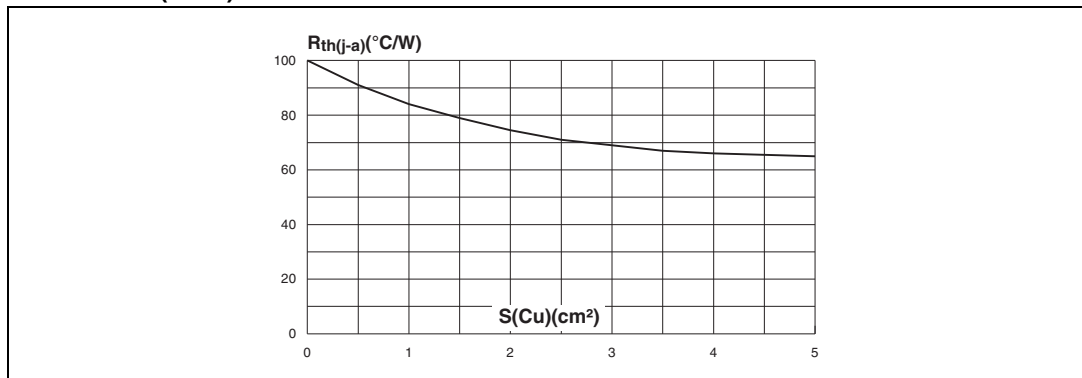


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35 μm) (SMB)



2 Package information

- Epoxy meets UL94, V0
- Band indicates cathode

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Table 5. SMA dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.094 |
| 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. Footprint, dimensions in mm (inches)

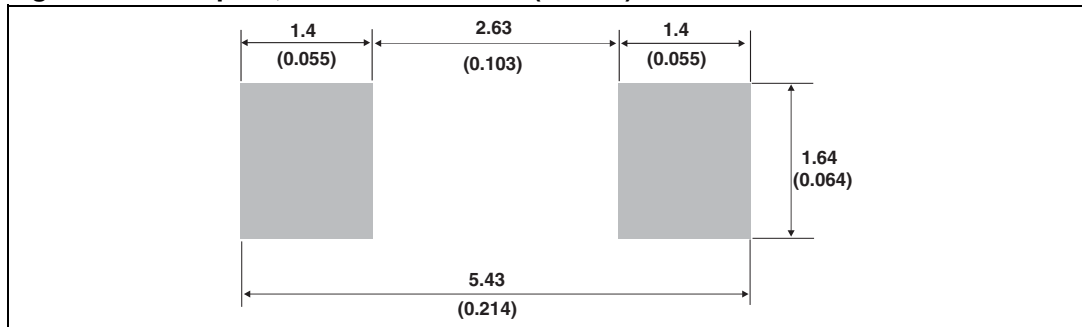
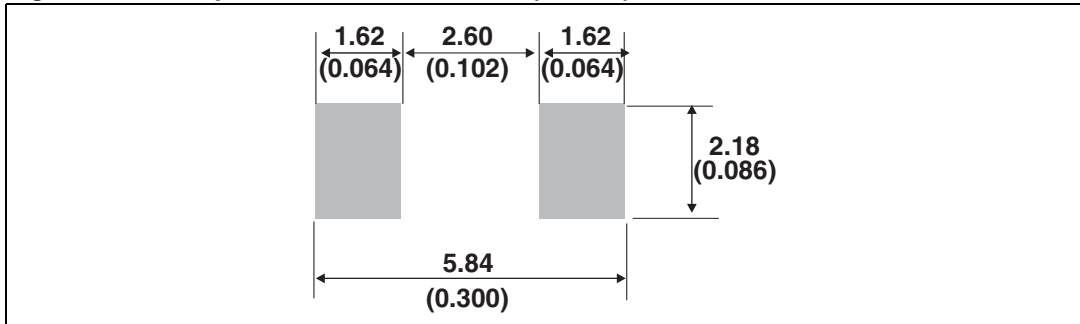


Table 6. SMB dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.096 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 1.95 | 2.20 | 0.077 | 0.087 |
| c | 0.15 | 0.40 | 0.006 | 0.016 |
| D | 3.30 | 3.95 | 0.130 | 0.156 |
| E | 5.10 | 5.60 | 0.201 | 0.220 |
| E1 | 4.05 | 4.60 | 0.159 | 0.181 |
| L | 0.75 | 1.50 | 0.030 | 0.059 |

Figure 15. Footprint, dimensions in mm (inches)



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 |
| STPS160U | E16 | SMB | 0.107 g | 2500 | Tape and reel |

4 Revision history

Table 8. Document revision history

| Date | Revision | 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. $I_{F(RMS)}$ removed from Table 2 . Package dimensions and footprints updated. Ecopack statement added. |
| 18-Mar-2010 | 9 | Updated package illustration on page 1 . |

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