

Power Schottky rectifier

Features

- High current capability
- Avalanche rated
- Low forward voltage drop current
- High frequency operation

Description

This dual center tap schottky rectifier is suited for high frequency switch mode power supplies.

Packaged in TO-247 and TO-220AB, this device provides desktop SMPS designers with a low forward voltage drop device, and reduced leakage current, with the objective of making the application compliant with environmental care standards, or suitable for 80+ requirements.

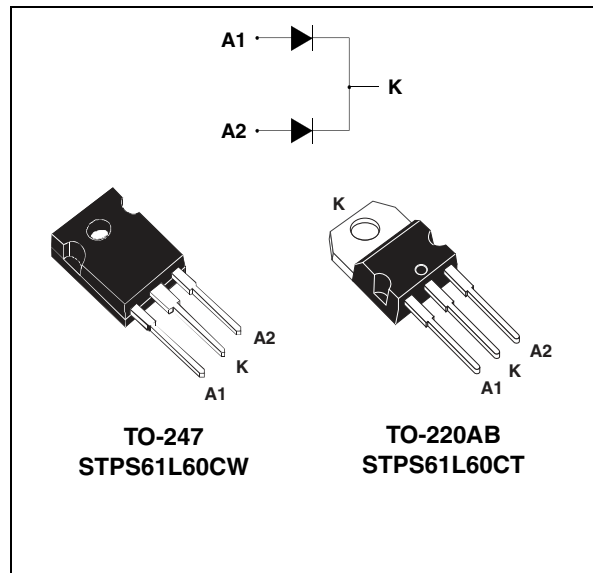
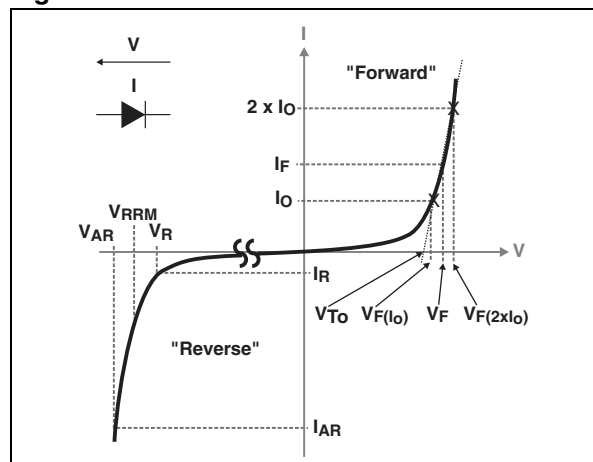


Table 1. Device summary

| | |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 30 A |
| V_{RRM} | 60 V |
| T_j (max) | 150 °C |
| V_F (typ) | 0.560 V |

Figure 1. Electrical characteristics (a)



- a. V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in [Figure 12](#) V_{AR} and I_{AR} are pulse measurements ($t_p < 1 \mu s$). V_R , I_R , V_{RRM} and V_F are static characteristics

1 Characteristics

Table 2. Absolute ratings (limiting values per diode at 25 °C unless otherwise specified)

| Symbol | Parameter | | | Value | Unit |
|---------------------------------|---|---|-------------------------|--------------|------|
| V _{RRM} | Repetitive peak reverse voltage | | | 60 | V |
| I _{F(RMS)} | Forward rms voltage | | | 50 | A |
| I _{F(AV)} | Average forward current δ = 0.5 | T _c = 125 °C T _c = 120 °C | Per diode Per device | 30 60 | A |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | T0-247 T0-220AB | 530 400 | A |
| P _{ARM} | Repetitive peak avalanche power | t _p = 1 μs T _j = 25 °C | | 11500 | W |
| V _{ARM} ⁽¹⁾ | Maximum repetitive peak avalanche voltage | t _p < 1 μs T _j < 150 °C, I _{AR} < 43 A | | 80 | V |
| V _{ASM} ⁽¹⁾ | Maximum single pulse peak avalanche voltage | t _p < 1 μs T _j < 150 °C, I _{AR} < 43 A | | 80 | V |
| T _{stg} | Storage temperature range | | | -65 to + 175 | °C |
| T _j | Maximum operating junction temperature ⁽²⁾ | | | 150 | °C |

1. Refer to [Figure 12](#)

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

Table 3. Thermal resistances

| Symbol | Parameter | | | Value | Unit |
|----------------------|------------------|----------|--------------------|-------------|------|
| R _{th(j-c)} | Junction to case | TO-247 | Per diode Total | 0.95 0.6 | °C/W |
| | | TO-220AB | Per diode Total | 1.1 0.7 | |
| R _{th(c)} | Coupling | TO-247 | | 0.25 | |
| | | TO-220AB | | 0.3 | |

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------------------|---------------------|------|-------|-------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^\circ\text{C}$ | $V_R = V_{RRM}$ | - | - | 0.8 | mA |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | - | 150 | 350 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 5\text{ A}$ | - | 0.360 | - | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 5\text{ A}$ | - | 0.255 | - | |
| | | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ | - | 0.460 | 0.540 | |
| | | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ | - | 0.415 | 0.480 | |
| | | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 30\text{ A}$ | - | 0.580 | 0.660 | |
| | | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 30\text{ A}$ | - | 0.560 | 0.620 | |

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

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

To evaluate the conduction losses use the following equation: $P = 0.44 \times I_{F(AV)} + 0.006 \times I_F^2(RMS)$

Figure 2. Average forward power dissipation vs. average forward current (per diode)

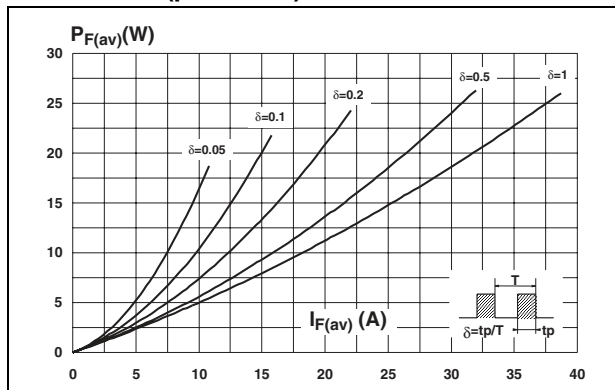


Figure 3. Average forward current vs. ambient temperature (delta = 0.5, per diode)

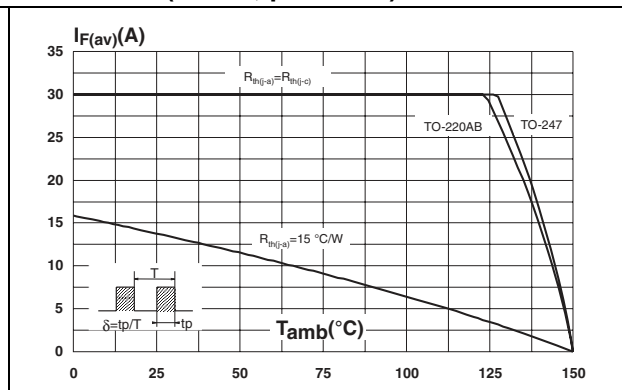


Figure 4. Normalized avalanche power derating vs. pulse duration

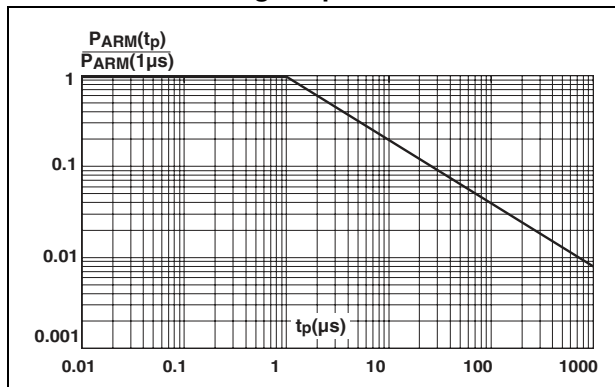


Figure 5. Normalized avalanche power derating vs. junction temperature

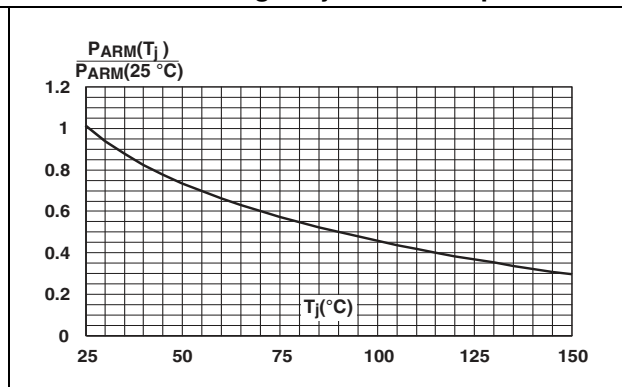


Figure 6. Non repetitive surge peak forward current vs. overload duration (max. values, per diode, TO-247)

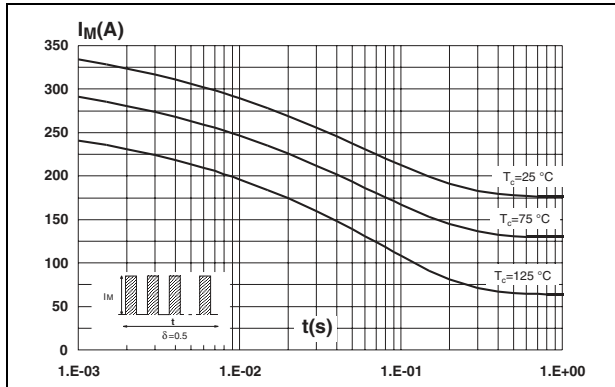


Figure 7. Non repetitive surge peak forward current vs. overload duration (max. values, per diode, TO-220AB)

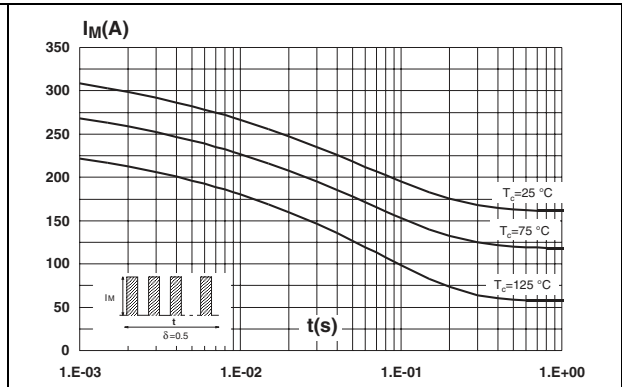


Figure 8. Relative variation of thermal impedance junction to case vs. pulse duration

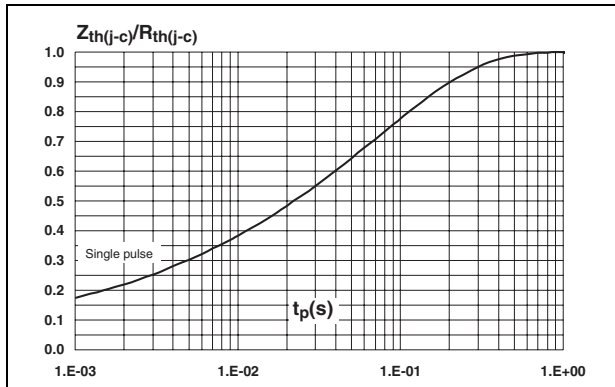


Figure 9. Reverse leakage current vs. reverse voltage applied (typical values, per diode)

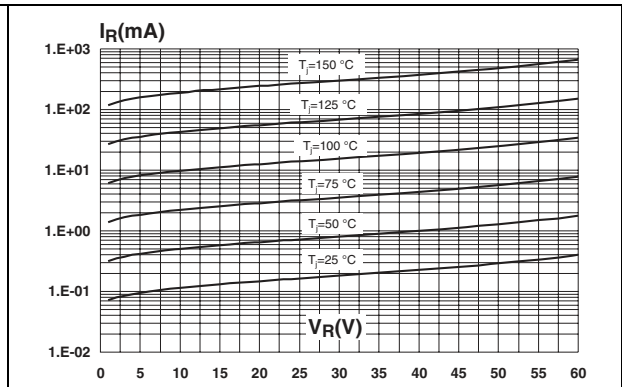


Figure 10. Junction capacitance vs. reverse voltage applied (typical values, per diode)

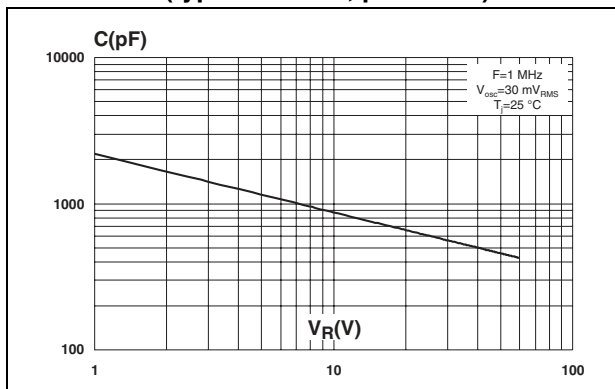


Figure 11. Forward voltage drop vs. forward current (per diode)

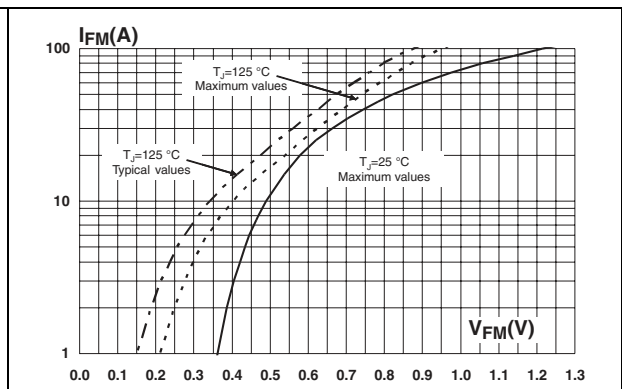
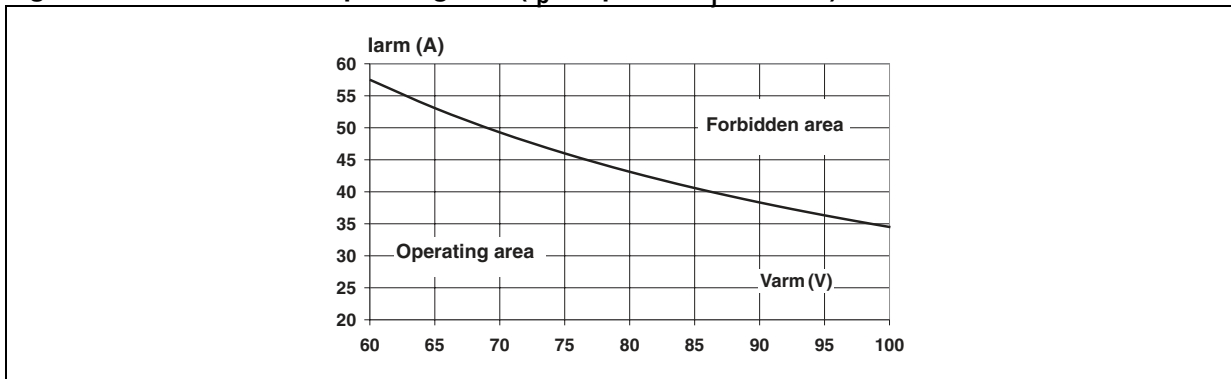


Figure 12. Reverse safe operating area ($t_p < 1 \mu\text{s}$ and $T_j < 150 \text{ }^\circ\text{C}$)

2 Package information

- Epoxy meets UL94, V0
- Cooling method: conduction
- Torque value:
 - TO-247 - 0.55 N·m recommended, 1.0 N·m maximum
 - TO-220AB - 0.4 to 0.6 N·m

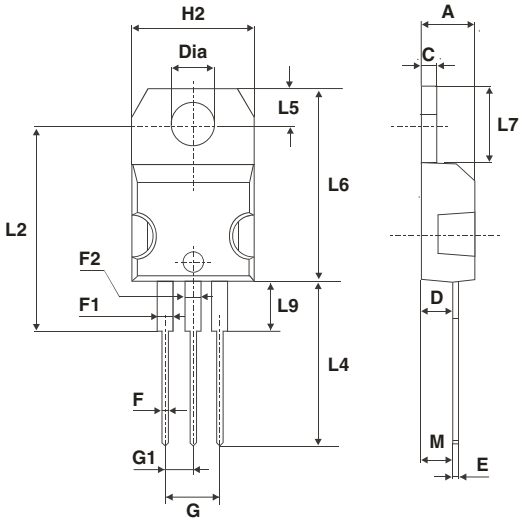
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Table 5. TO-247 dimensions

| Ref. | Dimensions | | | |
|-------------------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.85 | 5.15 | 0.191 | 0.203 |
| A1 | 2.20 | 2.60 | 0.086 | 0.102 |
| b | 1.00 | 1.40 | 0.039 | 0.055 |
| b1 | 2.00 | 2.40 | 0.078 | 0.094 |
| b2 | 3.00 | 3.40 | 0.118 | 0.133 |
| c | 0.40 | 0.80 | 0.015 | 0.031 |
| D ⁽¹⁾ | 19.85 | 20.15 | 0.781 | 0.793 |
| E | 15.45 | 15.75 | 0.608 | 0.620 |
| e | 5.45 typ. | | 0.215 typ. | |
| L | 14.20 | 14.80 | 0.559 | 0.582 |
| L1 | 3.70 | 4.30 | 0.145 | 0.169 |
| L2 | 18.50 typ. | | 0.728 typ. | |
| ØP ⁽²⁾ | 3.55 | 3.65 | 0.139 | 0.143 |
| ØR | 4.50 | 5.50 | 0.177 | 0.217 |
| S | 5.50 typ. | | 0.216 typ. | |

1. Dimension D plus gate protrusion does not exceed 20.5 mm
2. Resin thickness around the mounting hole is not less than 0.9 mm

Table 6. TO-220AB dimensions



| Ref. | Dimensions | | | |
|-------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 0.88 | 0.024 | 0.034 |
| F1 | 1.14 | 1.70 | 0.044 | 0.066 |
| F2 | 1.14 | 1.70 | 0.044 | 0.066 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| G1 | 2.40 | 2.70 | 0.094 | 0.106 |
| H2 | 10 | 10.40 | 0.393 | 0.409 |
| L2 | 16.4 typ. | | 0.645 typ. | |
| L4 | 13 | 14 | 0.511 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.259 |
| L9 | 3.50 | 3.93 | 0.137 | 0.154 |
| M | 2.6 typ. | | 0.102 typ. | |
| Diam. | 3.75 | 3.85 | 0.147 | 0.151 |

3 Ordering information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-------------|-------------|----------|--------|----------|---------------|
| STPS61L60CW | STPS61L60CW | TO-247 | 4.4 g | 30 | Tube |
| STPS61L60CT | STPS61L60CT | TO-220AB | 2.23 g | 30 | Tube |

4 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 18-May-2009 | 1 | Initial release. |
| 29-Jun-2010 | 2 | Added Figure 1 and Figure 12 . Added parameters V_{ARM} and V_{ASM} to Table 2 . Updated Table 5 . |

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