

Low drop power Schottky rectifier

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward voltage drop
- Low thermal resistance
- High avalanche capability specified

Description

Dual center tap Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters.

Packaged in PowerFLAT™, this device is intended for use in low voltage, high frequency inverters, free-wheeling and polarity protection applications.

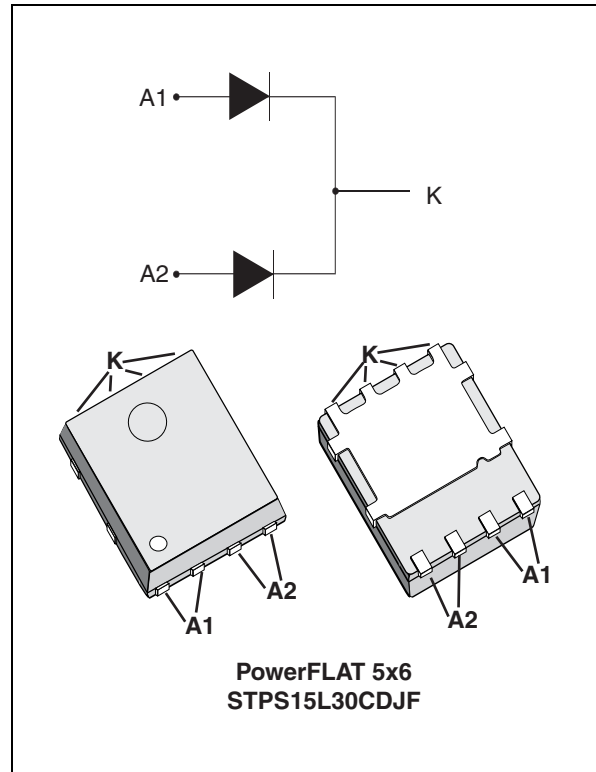


Table 1. Device summary

| Symbol | Value |
|-------------|-----------|
| $I_{F(AV)}$ | 2 x 7.5 A |
| V_{RRM} | 30 V |
| T_j (max) | 150 °C |
| V_F (typ) | 0.34 V |

TM: PowerFLAT is a trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

| Symbol | Parameter | | Value | Unit | |
|---------------------|---|---|--------------|------|---|
| V _{RRM} | Repetitive peak reverse voltage | | 30 | V | |
| I _{F(RMS)} | Forward rms current | | 10 | A | |
| I _{F(AV)} | Average forward current $\delta = 0.5$ | T _c = 140 °C | Per diode | 7.5 | A |
| | | | Per device | 15 | |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | 75 | A | |
| I _{RRM} | Peak repetitive reverse current | t _p = 2 μ s square F= 1 kHz | 1 | A | |
| P _{ARM} | Repetitive peak avalanche power | t _p = 1 μ s T _j = 25 °C | 2800 | W | |
| T _{stg} | Storage temperature range | | -65 to + 175 | °C | |
| T _j | Maximum operating junction temperature ⁽¹⁾ | | 150 | °C | |

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-c)} | Junction to case | Per diode | 2.5 | °C/W |
| | | Total | 1.6 | |
| R _{th(c)} | Coupling | | 0.7 | |

When 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 °C | V _R = V _{RRM} | - | - | 1 | mA |
| | | T _j = 125 °C | | - | 70 | 140 | mA |
| V _F ⁽¹⁾ | Forward voltage drop | T _j = 25 °C | I _F = 7.5 A | - | - | 0.48 | V |
| | | T _j = 125 °C | I _F = 7.5 A | - | 0.34 | 0.39 | |
| | | T _j = 25 °C | I _F = 15 A | - | - | 0.57 | |
| | | T _j = 125 °C | I _F = 15 A | - | 0.44 | 0.51 | |

1. Pulse test: t_p = 380 μ s, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.27 \times I_{F(AV)} + 0.016 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current (per diode)

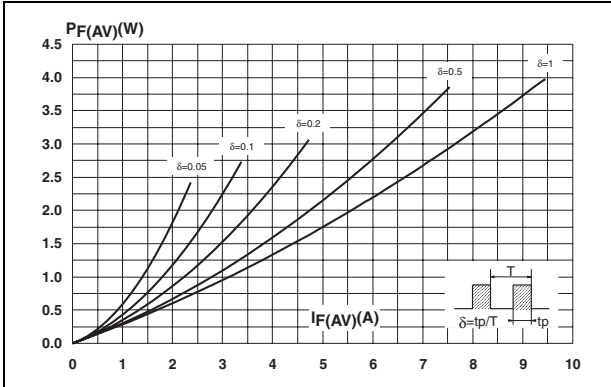


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

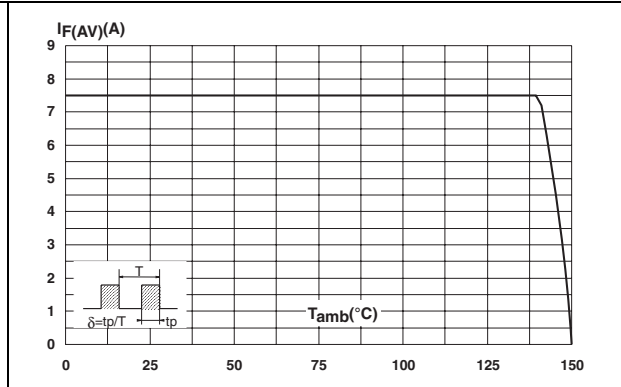


Figure 3. Normalized avalanche power derating versus pulse duration

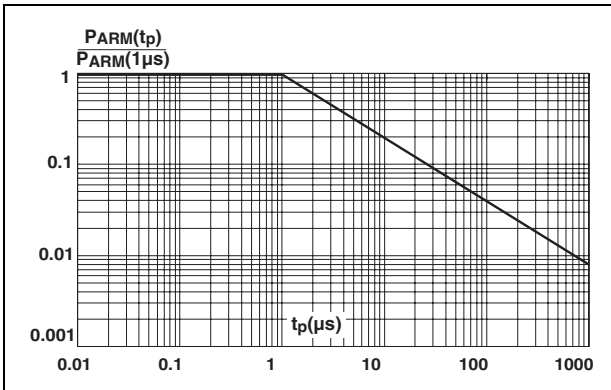


Figure 4. Normalized avalanche power derating versus junction temperature

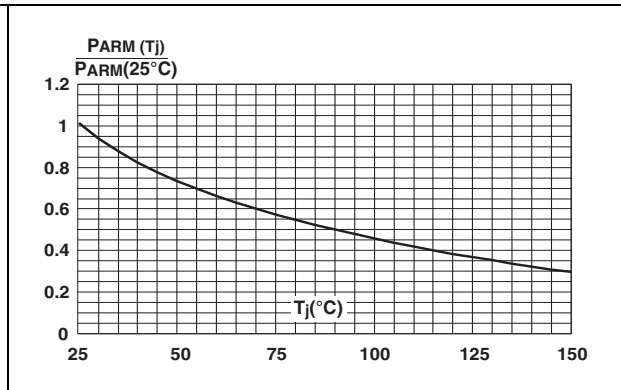


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

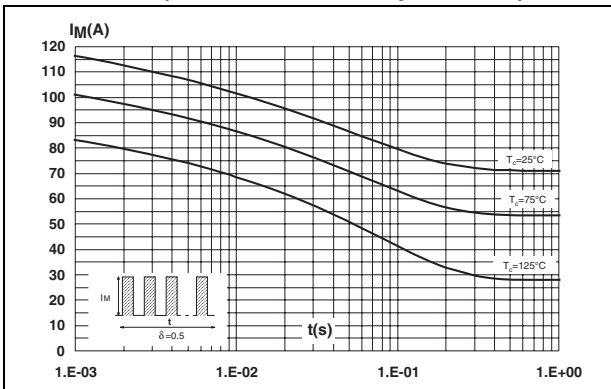


Figure 6. Relative variation of thermal impedance, junction to case, versus pulse duration

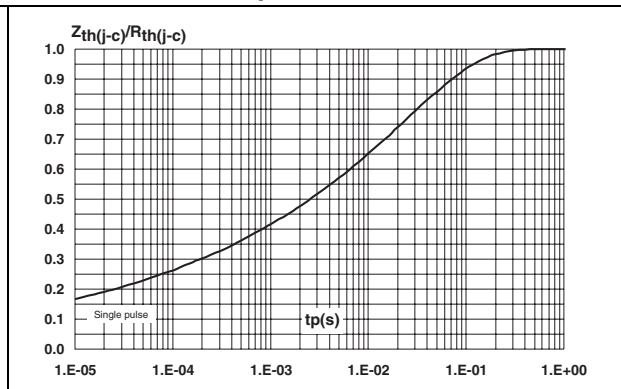


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

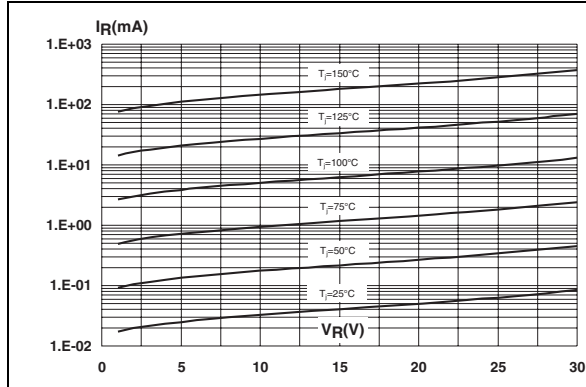


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

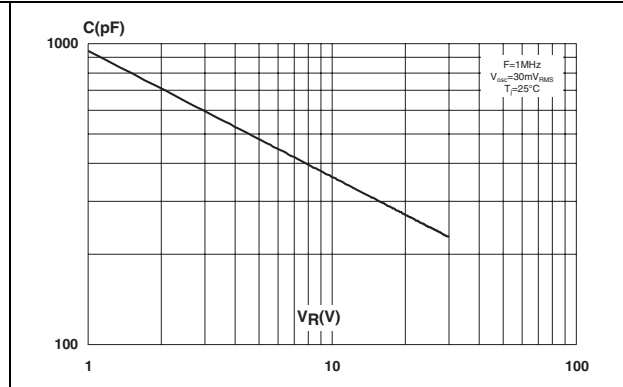


Figure 9. Forward voltage drop versus forward current (per diode)

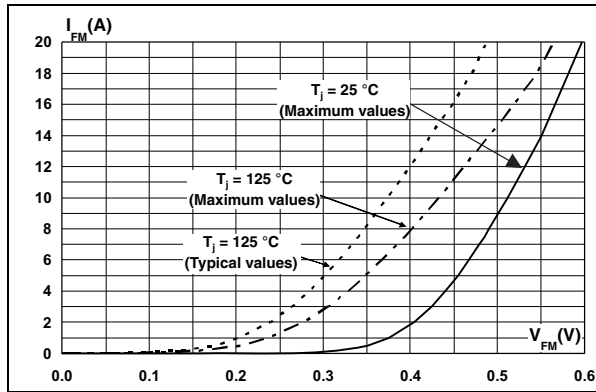
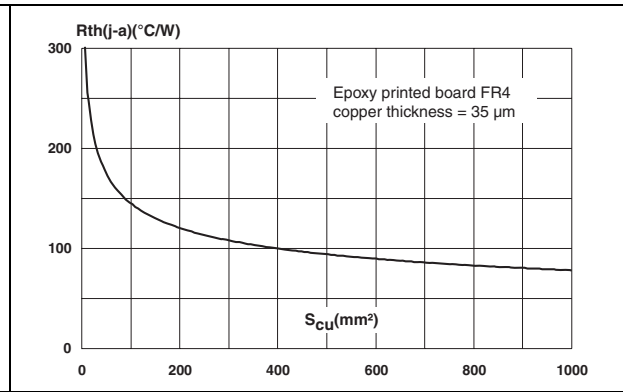


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead



2 Package information

- Epoxy meets UL94,V0
- Lead-free package

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.

Table 5. PowerFLAT 5x6 dimensions

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.80 | | 1.00 | 0.031 | | 0.039 |
| A1 | 0.02 | | 0.05 | 0.001 | | 0.002 |
| A2 | | 0.25 | | | 0.010 | |
| b | 0.30 | | 0.50 | 0.012 | | 0.020 |
| D | | 5.20 | | | 0.205 | |
| D2 | 4.11 | | 4.31 | 0.162 | | 0.170 |
| e | | 1.27 | | | 0.050 | |
| E | | 6.15 | | | 0.242 | |
| E2 | 3.50 | | 3.70 | 0.138 | | 0.146 |
| L | 0.50 | | 0.80 | 0.020 | | 0.031 |
| K | 1.275 | | 1.575 | 0.050 | | 0.062 |

Figure 11. Footprint (dimensions in mm)

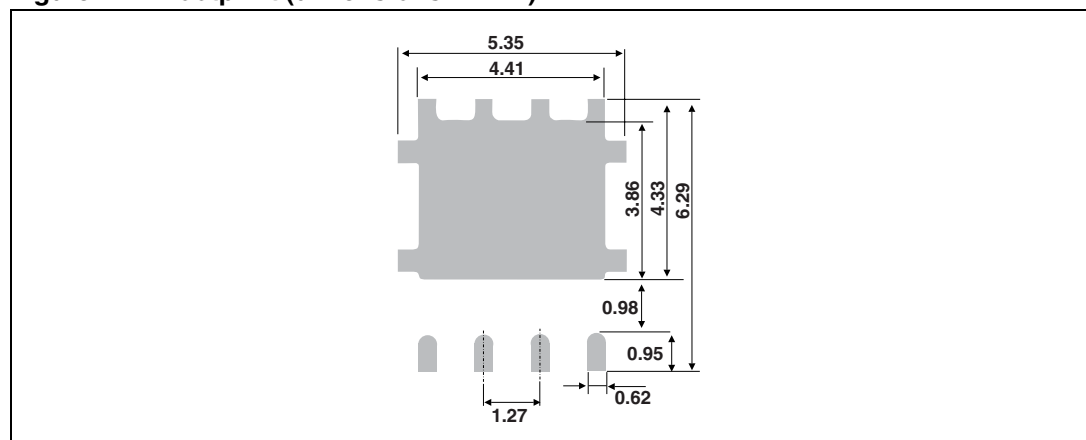
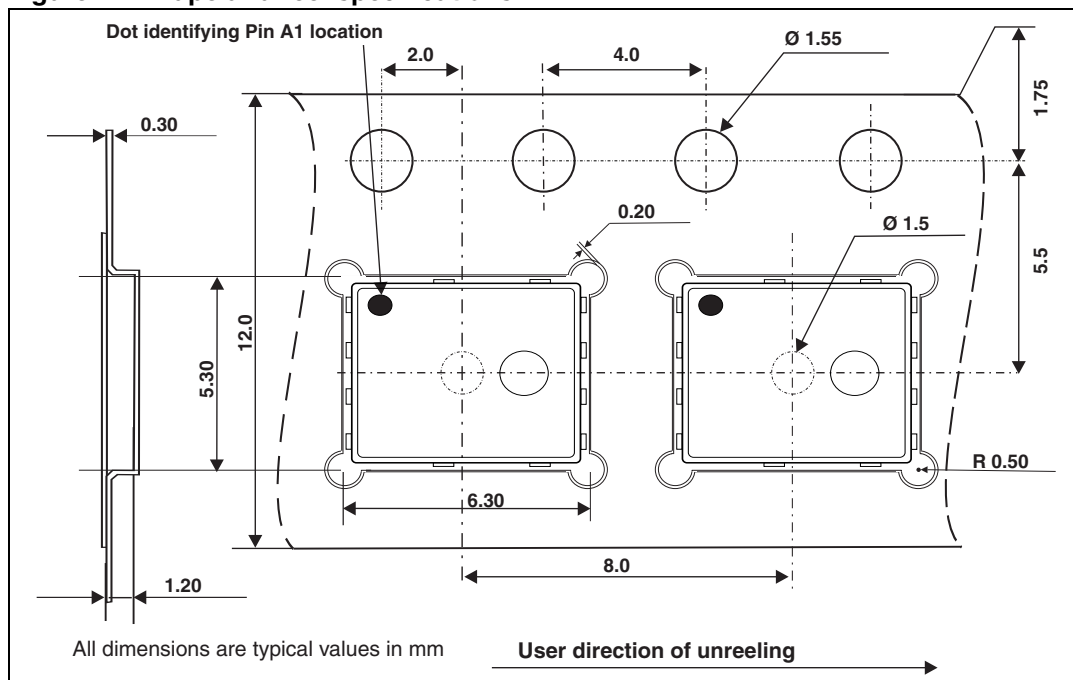


Figure 12. Tape and reel specifications



3 Ordering information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-----------------|-----------|---------------|---------|----------|---------------|
| STPS15L30CDJFTR | PS15 L30C | PowerFLAT 5x6 | 0.095 g | 3000 | Tape and reel |

4 Revision history

Table 7. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 13-May-2009 | 1 | First issue. |
| 09-Nov-2009 | 2 | Updated Table 1 . |
| 30-Jul-2010 | 3 | Replace Power QFN with PowerFLAT. Updated Figure 9 . |
| 18-May-2011 | 4 | Added reference E in Table 5 . Updated package graphics. Removed dash from order code and updated marking in Table 6 . Added Figure 12 . |

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