

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
- ECOPACK[®]2 compliant component

Description

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.

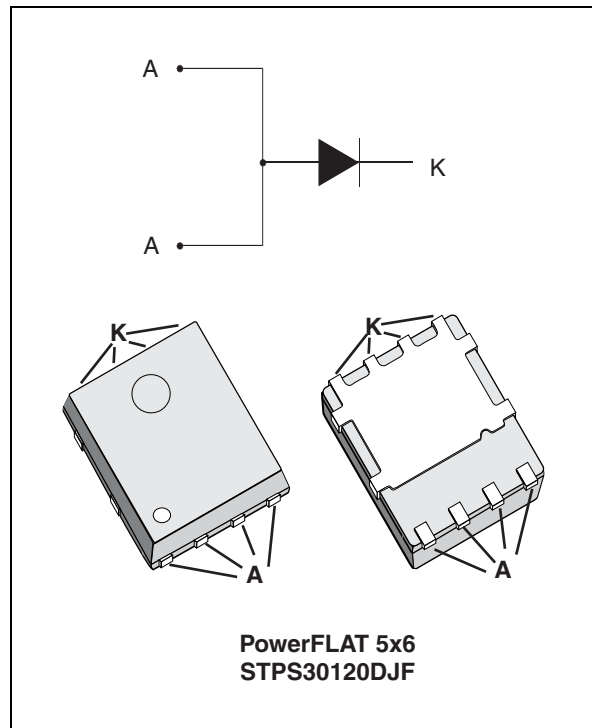


Table 1. Device summary

| Symbol | Value |
|-------------|--------|
| $I_{F(AV)}$ | 30 A |
| V_{RRM} | 120 V |
| $T_j (max)$ | 150 °C |
| $V_F(typ)$ | 0.61 V |

TM: PowerFLAT is a trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute Ratings (limiting values, anode terminals short circuited)

| Symbol | Parameter | Value | Unit |
|--------------|---|--|------|
| V_{RRM} | Repetitive peak reverse voltage | 120 | V |
| $I_{F(RMS)}$ | Forward rms current | 45 | A |
| $I_{F(AV)}$ | Average forward current | $T_c = 80\text{ °C}, \delta = 0.5$ | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms sinusoidal}$ | A |
| P_{ARM} | Repetitive peak avalanche power | $t_p = 1\text{ }\mu\text{s } T_j = 25\text{ °C}$ | 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 | 2.5 | °C/W |

Table 4. Static electrical characteristics (anode terminals short circuited)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|---------------------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | | 35 | μA |
| | | $T_j = 125\text{ °C}$ | | 5.5 | 16 | mA |
| $V_F^{(1)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 15\text{ A}$ | | 0.84 | V |
| | | $T_j = 125\text{ °C}$ | | 0.61 | 0.67 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 30\text{ A}$ | | 0.92 | |
| | | $T_j = 125\text{ °C}$ | | 0.68 | 0.75 | |

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

To evaluate the conduction losses use the following equation:

$$P = 0.61 \times I_{F(AV)} + 0.005 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

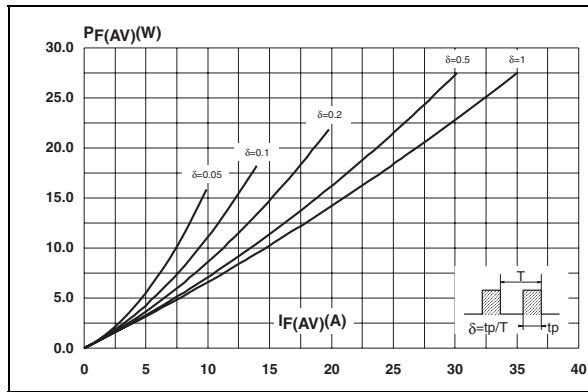


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

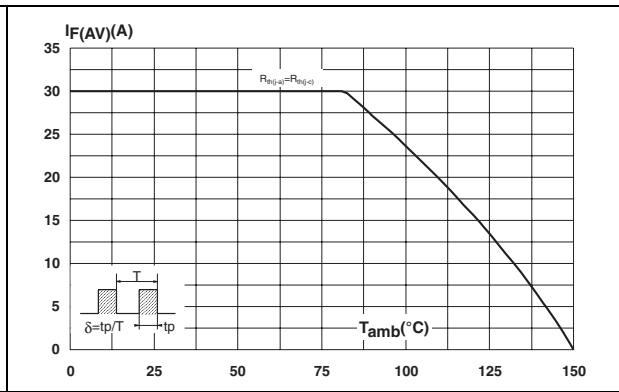


Figure 3. Normalized avalanche power derating versus pulse duration

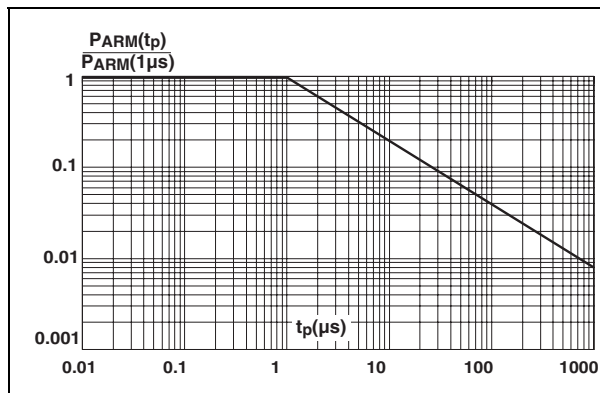


Figure 4. Normalized avalanche power derating versus junction temperature

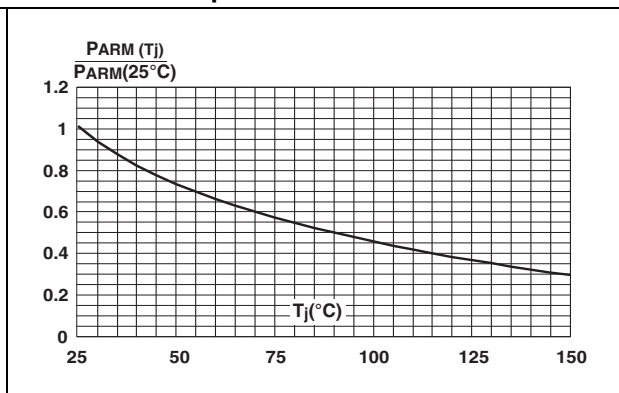


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values)

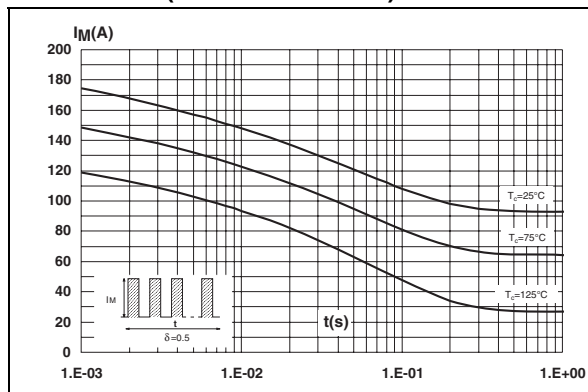


Figure 6. Relative variation of thermal impedance, junction to case, versus pulse duration

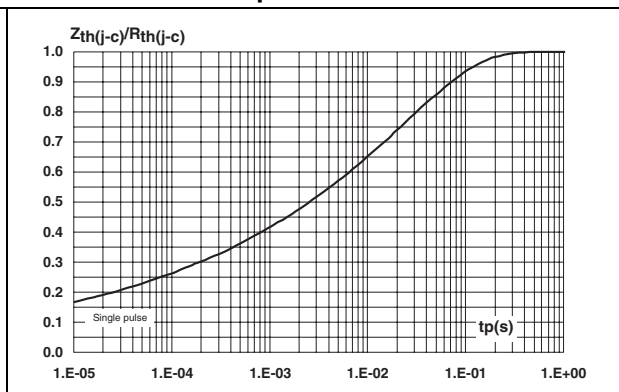


Figure 7. Reverse leakage current versus reverse voltage applied (typical values)

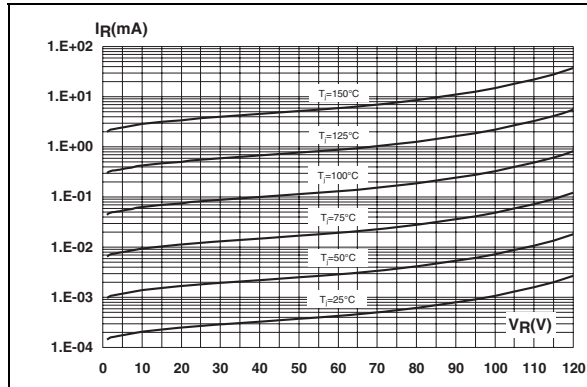


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

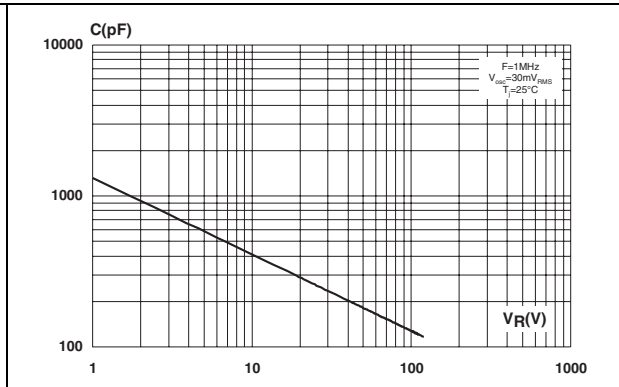


Figure 9. Forward voltage drop versus forward current

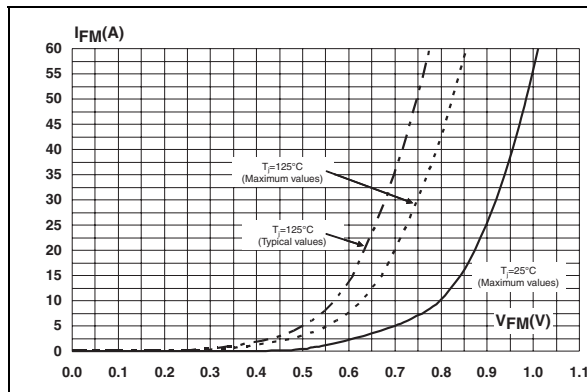
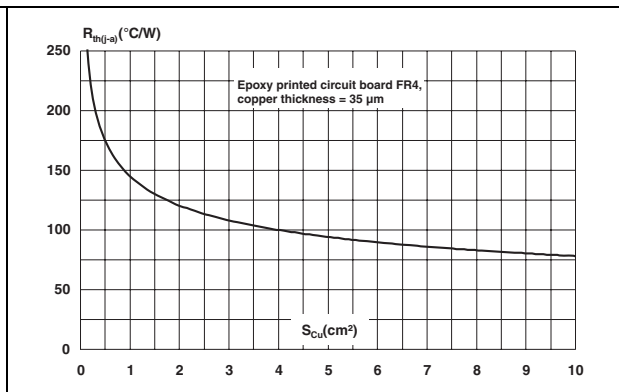


Figure 10. Thermal resistance junction to ambient versus copper surface under tab



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)

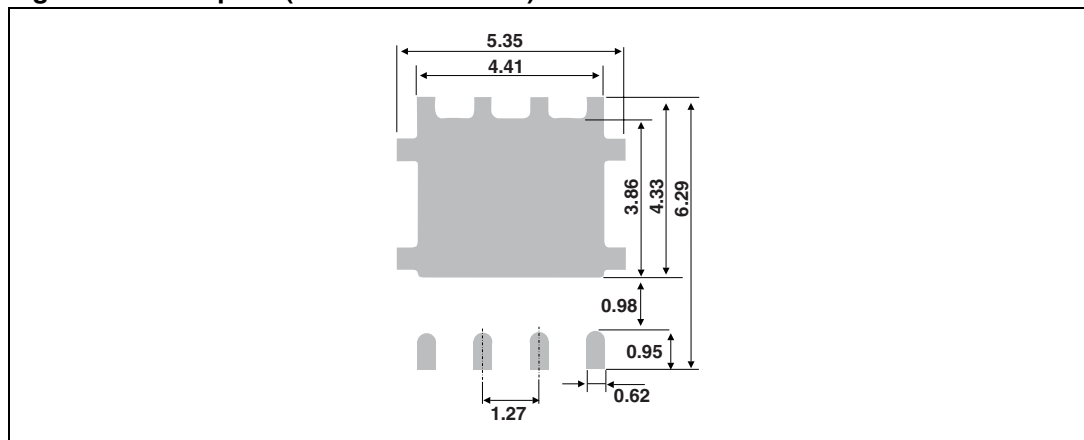
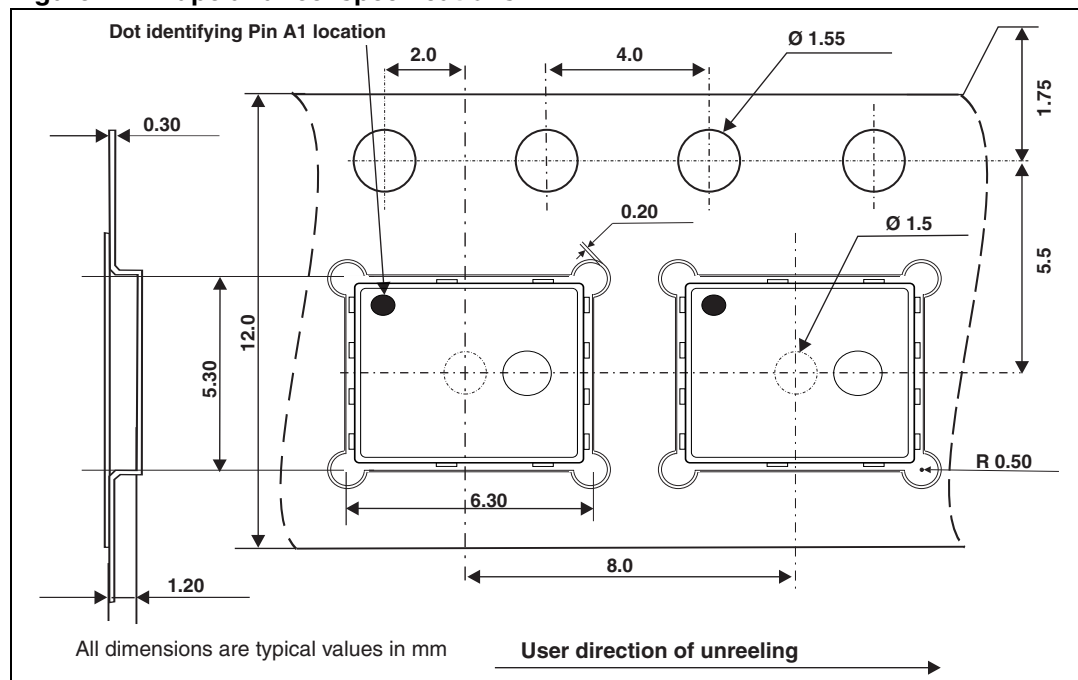


Figure 12. Tape and reel specifications



3 Ordering Information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-----------------|----------|---------------|---------|----------|---------------|
| STPS30120DJF-TR | PS30 120 | PowerFLAT 5x6 | 0.095 g | 3000 | Tape and reel |

4 Revision history

Table 7. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 18-May-2009 | 1 | First issue. |
| 09-Nov-2009 | 2 | Updated Table 1 . |
| 25-Feb-2010 | 3 | Corrected order code and marking in Table 6 . |
| 30-Jul-2010 | 4 | Replace Power QFN with PowerFLAT. |
| 20-May-2011 | 5 | Updated package graphics. Added mention of terminals to captions of Table 2 and Table 4 . Updated base quantity and marking in Table 6 . Added Figure 12 . |

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