

Features

- Low forward voltage drop
- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low thermal resistance
- 200 °C maximum junction temperature
- Avalanche rated

Description

This device is a dual center tap Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters.

Packaged in D²PAK, this device is especially intended for use in low voltage, high frequency inverters, freewheeling and polarity protection applications. Also ideal for PV cell-bypass diode for junction and smart junction boxes.

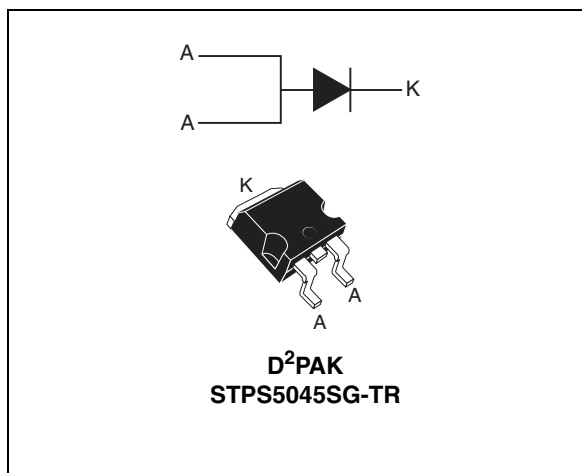


Table 1. Device summary

| Symbol | Value |
|-------------|--------|
| $I_{F(AV)}$ | 50 A |
| V_{RRM} | 45 V |
| T_j (max) | 200 °C |
| V_F (max) | 0.48 V |

1 Characteristics

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

| Symbol | Parameter | | Value | Unit |
|-------------------------------|--|---|-------------|------|
| V _{RRM} | Repetitive peak reverse voltage | | 45 | V |
| I _{F(RMS)} | Forward rms current | | 90 | A |
| I _{F(AV)} | Average forward current $\delta = 0.5$ | T _c = 135 °C | 50 | A |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | 600 | A |
| P _{ARM} | Repetitive peak avalanche power | t _p = 10 μ s T _j = 125 °C | 1200 | W |
| T _{stg} | Storage temperature range | | -65 to +175 | °C |
| T _j ⁽¹⁾ | Maximum operating junction temperature in DC forward mode ⁽²⁾ | | +200 | °C |
| | Maximum operating junction temperature | | +175 | °C |

- $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink
- Maximum operating junction temperature only in DC forward mode

Table 3. Thermal resistance

| Symbol | Parameter | Value | Unit |
|----------------------|------------------|-------|------|
| R _{th(j-c)} | Junction to case | 1.0 | °C/W |

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} | | 0.090 | 0.36 | mA |
| | | T _j = 75 °C | V _R = 20 V | | 0.7 | 1.9 | |
| | | T _j = 125 °C | V _R = V _{RRM} | | 65 | 185 | |
| V _F ⁽²⁾ | Forward voltage drop | T _j = 25 °C | I _F = 50 A | | 0.55 | 0.61 | V |
| | | T _j = 125 °C | | | 0.48 | 0.56 | |
| | | T _j = 200 °C | I _F = 10 A | | 0.22 | | |
| | | | I _F = 20 A | | 0.28 | | |

- Pulse test: t_p = 5 ms, $\delta < 2\%$
- Pulse test: t_p = 380 μ s, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.38 \times I_{F(AV)} + 0.0036 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

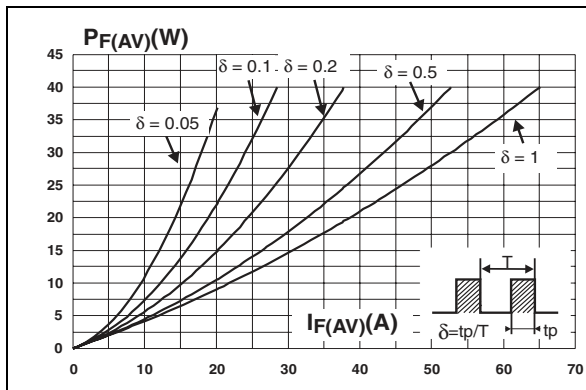


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

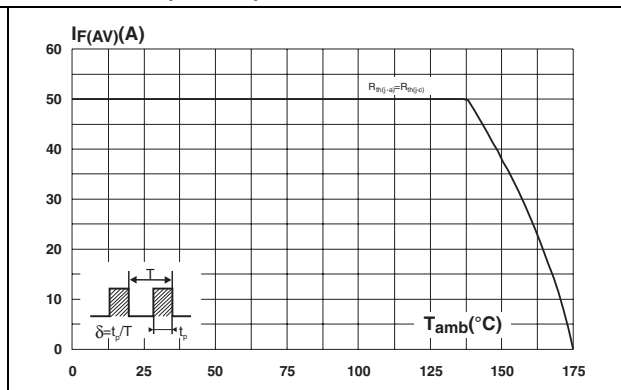


Figure 3. Normalized avalanche power derating versus pulse duration

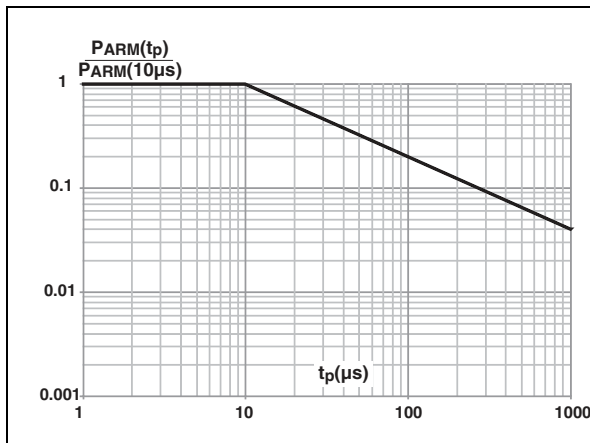


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

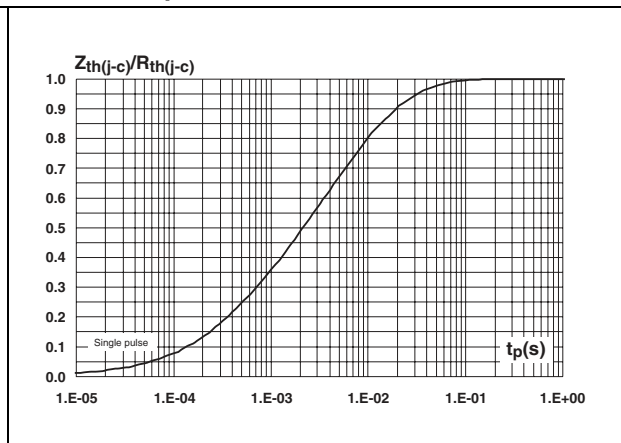


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

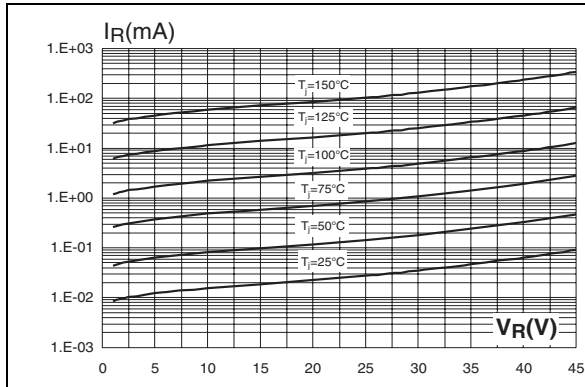


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

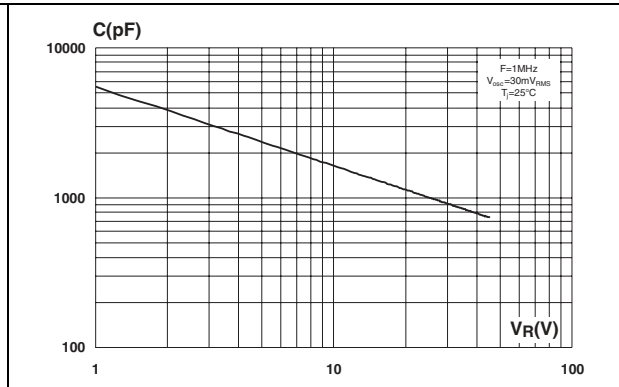


Figure 7. Forward voltage drop versus forward current

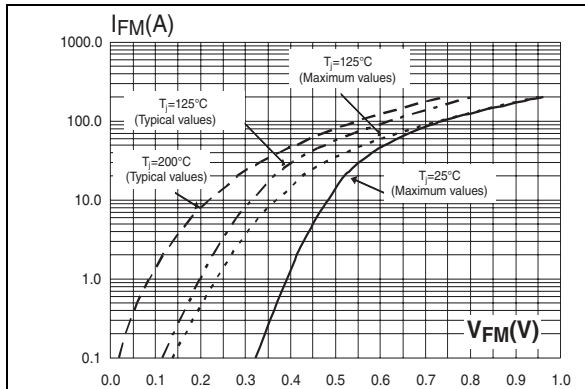
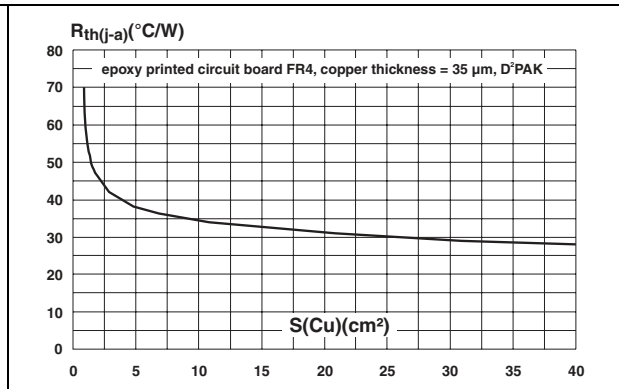


Figure 8. Thermal resistance junction to ambient versus copper surface under tab



2 Package information

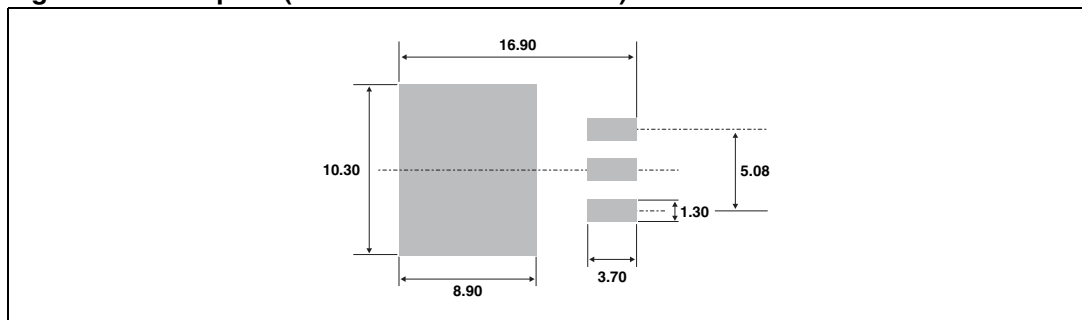
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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. D²PAK dimensions

| Ref | Dimensions | | | |
|-----|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| A1 | 2.49 | 2.69 | 0.098 | 0.106 |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 |
| B | 0.70 | 0.93 | 0.027 | 0.037 |
| B2 | 1.14 | 1.70 | 0.045 | 0.067 |
| C | 0.45 | 0.60 | 0.017 | 0.024 |
| C2 | 1.23 | 1.36 | 0.048 | 0.054 |
| D | 8.95 | 9.35 | 0.352 | 0.368 |
| E | 10.00 | 10.40 | 0.393 | 0.409 |
| G | 4.88 | 5.28 | 0.192 | 0.208 |
| L | 15.00 | 15.85 | 0.590 | 0.624 |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 |
| L3 | 1.40 | 1.75 | 0.055 | 0.069 |
| M | 2.40 | 3.20 | 0.094 | 0.126 |
| R | 0.40 typ. | | 0.016 typ. | |
| V2 | 0° | 8° | 0° | 8° |

Figure 9. Footprint (dimensions in millimeters)



3 Ordering information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|------------|--------------------|--------|----------|---------------|
| STPS5045SG-TR | STPS5045SG | D ² PAK | 1.48 g | 1000 | Tape and reel |

4 Revision history

Table 7. Revision history

| Date | Revision | Changes |
|--------------|----------|--------------|
| 28-June-2012 | 1 | First issue. |

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