

## Automotive power Schottky rectifier

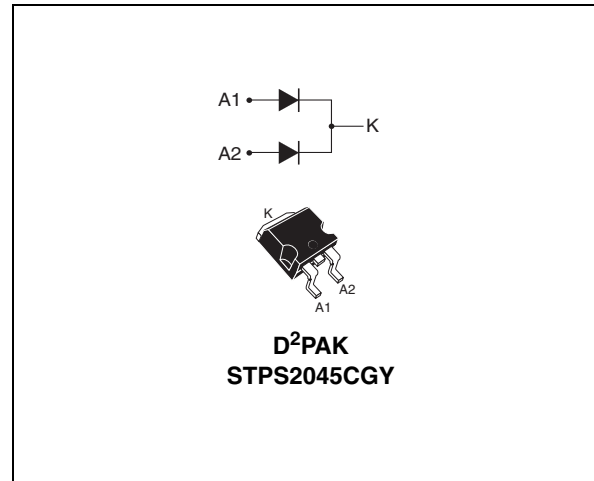
### Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Avalanche rated
- AEC-Q101 qualified

### Description

Dual center tap Schottky rectifier suited for high frequency DC to DC converters.

Packaged in D<sup>2</sup>PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



**Table 1. Device summary**

|              |          |
|--------------|----------|
| $I_{F(AV)}$  | 2 x 10 A |
| $V_{RRM}$    | 45 V     |
| $T_{j(max)}$ | 175 °C   |
| $V_{F(typ)}$ | 0.57 V   |

# 1 Characteristics

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

| Symbol       | Parameter  |                                   |           | Value       | Unit                   |
|--------------|--|-----------------------------------|-----------|-------------|------------------------|
| $V_{RRM}$    | Repetitive peak reverse voltage  |                                   |           | 45          | V                      |
| $I_{F(RMS)}$ | Forward rms current  |                                   |           | 30          | A                      |
| $I_{F(AV)}$  | Average forward current $\delta = 0.5$   | $T_c = 155\text{ }^\circ\text{C}$ | Per diode | 10          | A                      |
| $I_{FSM}$    | Surge non repetitive forward current $t_p = 10\text{ ms sinusoidal}$                         |                                   |           | 180         | A                      |
| $P_{ARM}$    | Repetitive peak avalanche power $t_p = 1\text{ }\mu\text{s}, T_j = 25\text{ }^\circ\text{C}$ |                                   |           | 4000        | W                      |
| $T_{stg}$    | Storage temperature range  |                                   |           | -65 to +175 | $^\circ\text{C}$       |
| $T_j$        | Maximum operating junction temperature <sup>(1)</sup>  |                                   |           | -40 to +175 | $^\circ\text{C}$       |
| $dV/dt$      | Critical rate of rise of reverse voltage   |                                   |           | 10000       | $\text{V}/\mu\text{s}$ |

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 resistances parameters**

| Symbol        | Parameter        |           | Value | Unit                      |
|---------------|------------------|-----------|-------|---------------------------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 2.2   | $^\circ\text{C}/\text{W}$ |
|               |                  | Total     | 1.3   |                           |
| $R_{th(c)}$   | Coupling         |           | 0.3   | $^\circ\text{C}/\text{W}$ |

When the diodes 1 and 2 are used simultaneously :

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

**Table 4. Static electrical characteristics (per diode)**

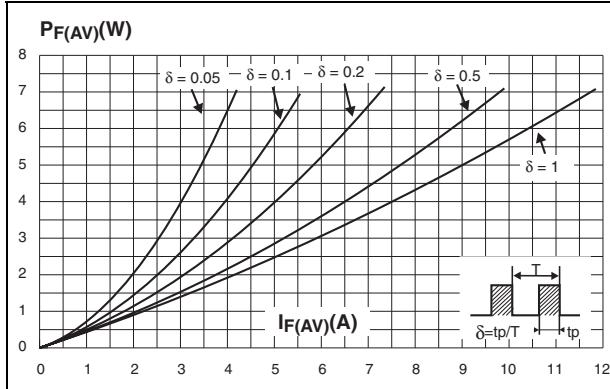
| Symbol      | Test conditions         |                                   |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^\circ\text{C}$  | $V_R = V_{RRM}$     | -    | -    | 100  | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ }^\circ\text{C}$ |                     | -    | 7    | 15   | mA            |
| $V_F^{(1)}$ | Forward voltage drop    | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 10\text{ A}$ | -    | 0.5  | 0.57 | V             |
|             |                         | $T_j = 25\text{ }^\circ\text{C}$  | $I_F = 20\text{ A}$ | -    | -    | 0.84 |               |
|             |                         | $T_j = 125\text{ }^\circ\text{C}$ |                     | -    | 0.65 | 0.72 |               |

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

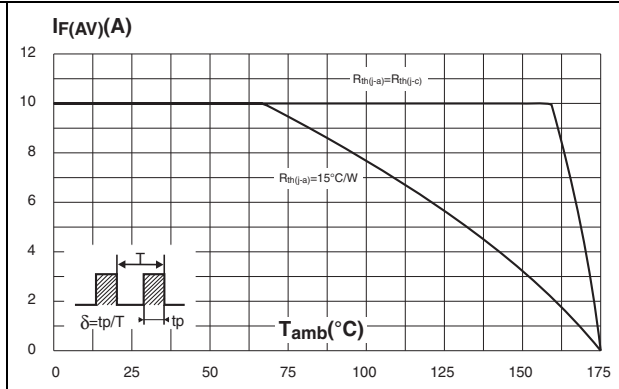
To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$$

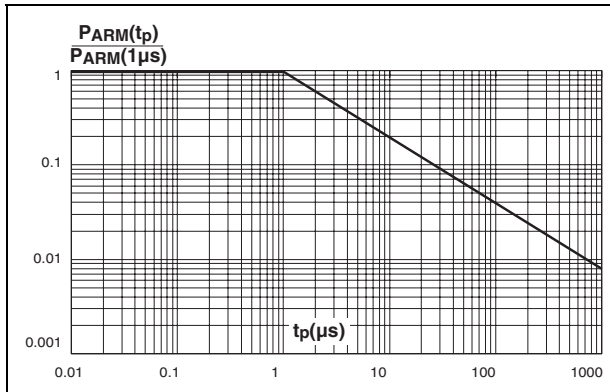
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



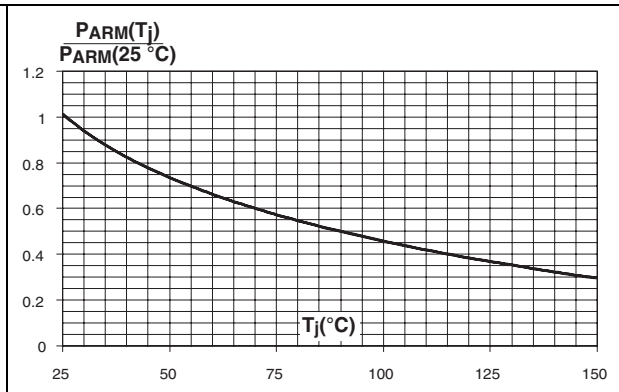
**Figure 2. Average forward current versus ambient temperature (delta = 0.5, per diode)**



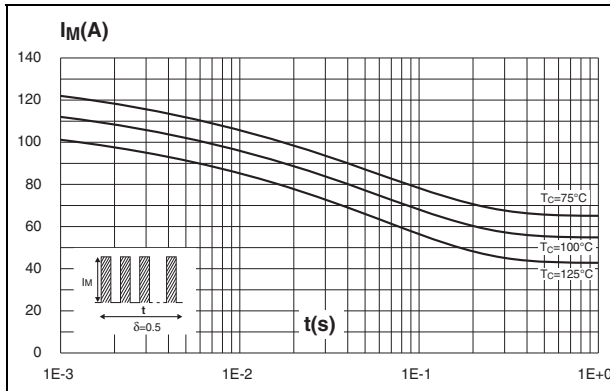
**Figure 3. Normalized avalanche power derating versus pulse duration**



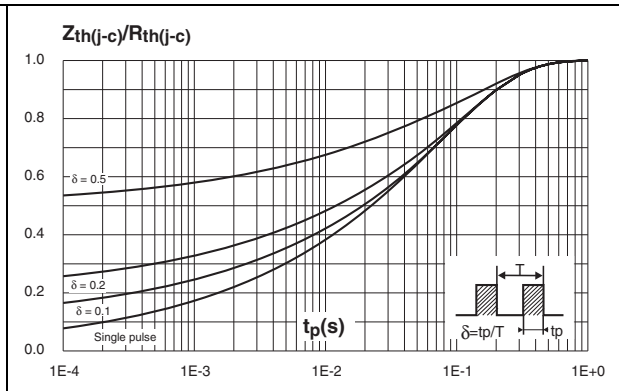
**Figure 4. Normalized avalanche power derating versus junction temperature**



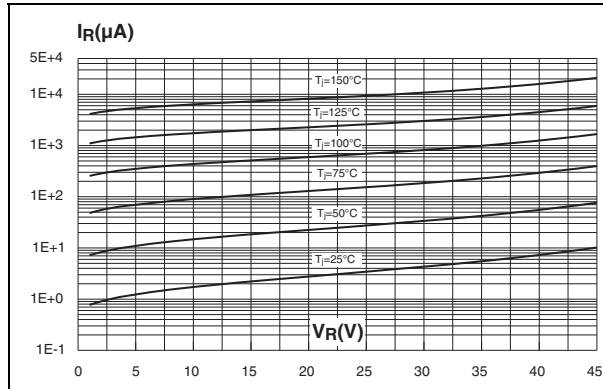
**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)**



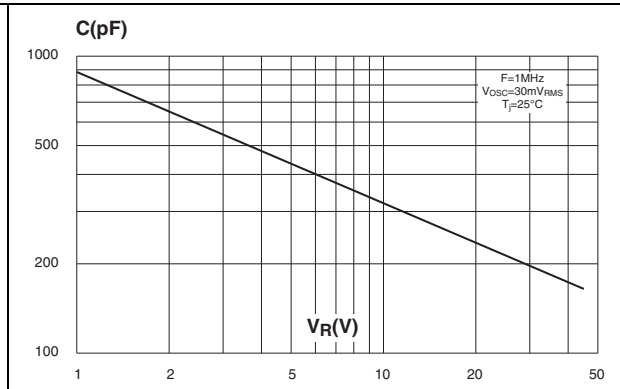
**Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration**



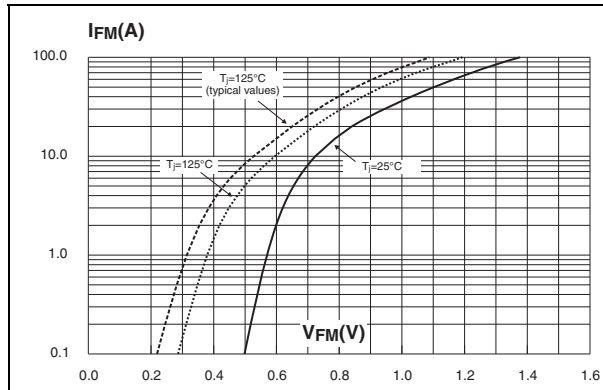
**Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



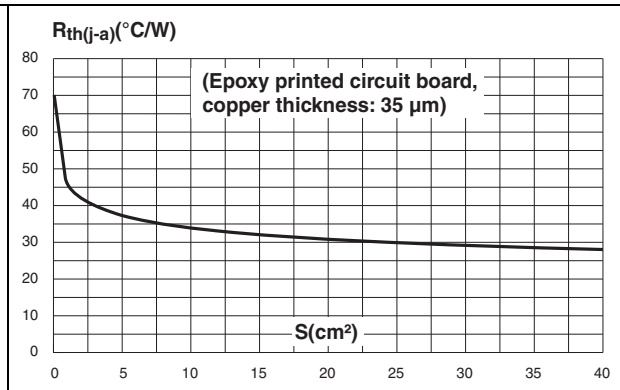
**Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 9. Forward voltage drop versus forward current (maximum values, per diode)**



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



## 2 Package information

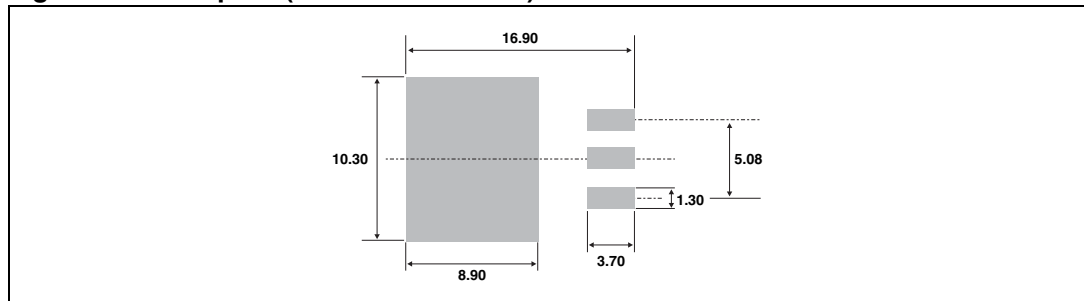
- Epoxy meets UL94, V0
- Lead-free package

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**Table 5. D<sup>2</sup>PAK 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 11. Footprint (dimensions in mm)**



### 3 Ordering information

Table 6. Ordering information

| Order code     | Marking     | Package            | Weight | Base qty | Delivery mode |
|----------------|-------------|--------------------|--------|----------|---------------|
| STPS2045CGY-TR | STPS2045CGY | D <sup>2</sup> PAK | 1.48 g | 1000     | Tape and reel |

### 4 Revision history

Table 7. Document revision history

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 24-May-2011 | 1        | Initial release. |

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