

## Automotive power Schottky rectifier

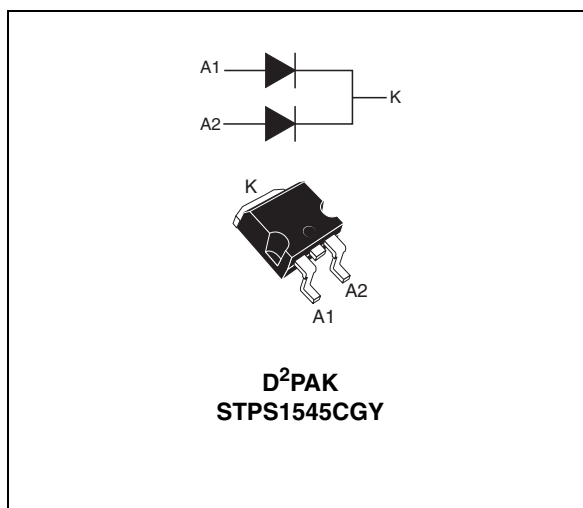
### Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Avalanche capability specified
- 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 7.5 A |
| $V_{RRM}$    | 45 V      |
| $T_J(max)$   | 175 °C    |
| $V_{F(max)}$ | 0.57 V    |

# 1 Characteristics

**Table 2. Absolute Ratings (limiting values)**

| Symbol       | Parameter                                             |                                                                 |           | Value       | Unit               |
|--------------|-------------------------------------------------------|-----------------------------------------------------------------|-----------|-------------|--------------------|
| $V_{RRM}$    | Repetitive peak reverse voltage                       |                                                                 |           | 45          | V                  |
| $I_{F(RMS)}$ | RMS forward voltage                                   |                                                                 |           | 20          | A                  |
| $I_{F(AV)}$  | Average forward current $\delta = 0.5$                | $T_c = 157\text{ }^{\circ}\text{C}$                             | Per diode | 7.5         | A                  |
| $I_{FSM}$    | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$<br>Sinusoidal                              |           | 150         | A                  |
| $I_{RRM}$    | Peak repetitive reverse current                       | $t_p = 2\text{ }\mu\text{s square}$<br>$F = 1\text{ kHz}$       |           | 1           | A                  |
| $I_{RSM}$    | Non repetitive peak reverse current                   | $t_p = 100\text{ }\mu\text{s square}$                           |           | 2           | A                  |
| $P_{ARM}$    | Repetitive peak avalanche power                       | $t_p = 1\text{ }\mu\text{s}$ $T_j = 25\text{ }^{\circ}\text{C}$ |           | 2700        | 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       | 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**

| Symbol        | Parameter        |                    | Value      | Unit                 |
|---------------|------------------|--------------------|------------|----------------------|
| $R_{th(j-c)}$ | Junction to case | Per diode<br>Total | 3.0<br>1.7 | $^{\circ}\text{C/W}$ |
| $R_{th(c)}$   | Coupling         |                    | 0.35       |                      |

When the diodes 1 and 2 are used simultaneously :

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

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

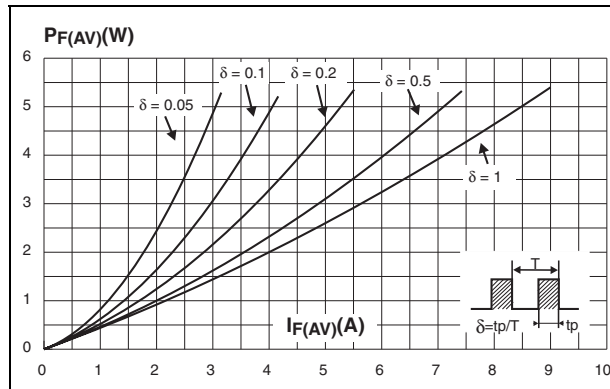
| Symbol      | Parameter               | Test conditions                     |                      | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-------------------------------------|----------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^{\circ}\text{C}$  | $V_R = V_{RRM}$      | -    | -    | 100  | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ }^{\circ}\text{C}$ |                      | -    | 5    | 15   | mA            |
| $V_F^{(1)}$ | Forward voltage drop    | $T_j = 125\text{ }^{\circ}\text{C}$ | $I_F = 7.5\text{ A}$ | -    | 0.5  | 0.57 | V             |
|             |                         | $T_j = 25\text{ }^{\circ}\text{C}$  | $I_F = 15\text{ A}$  | -    | -    | 0.84 |               |
|             |                         | $T_j = 125\text{ }^{\circ}\text{C}$ | $I_F = 15\text{ A}$  | -    | 0.65 | 0.72 |               |

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

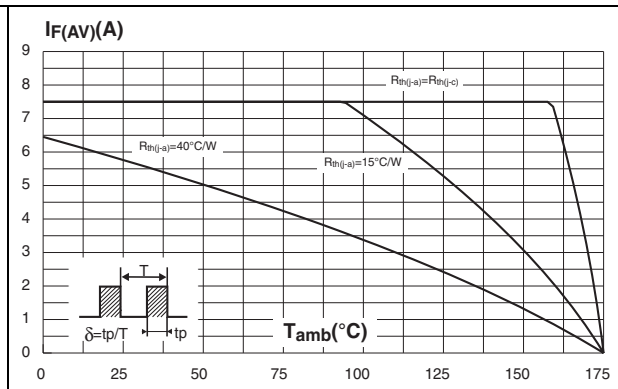
To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.020 I_F^2(\text{RMS})$$

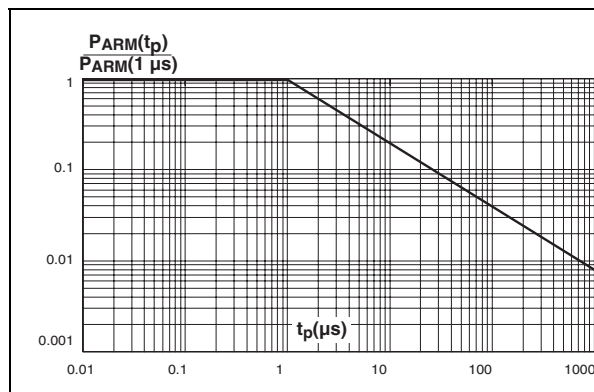
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



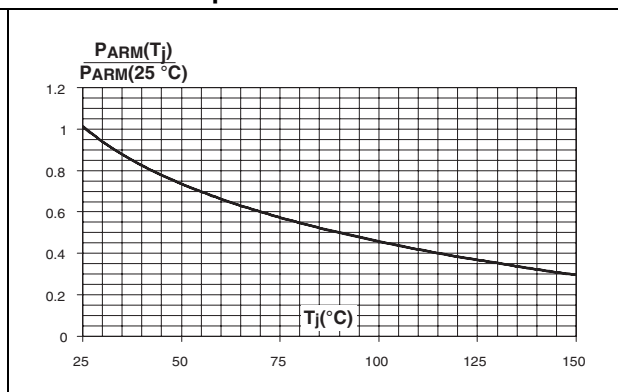
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



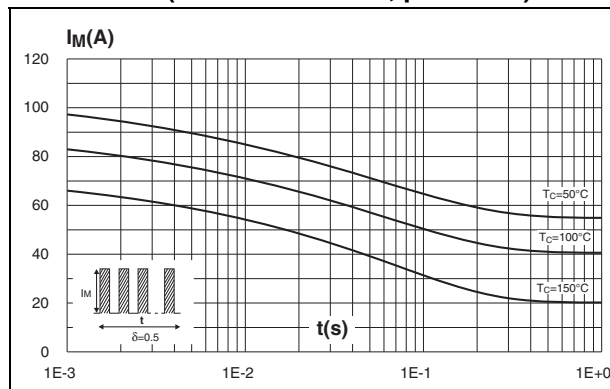
**Figure 3. Normalized avalanche power derating versus pulse duration**



**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**

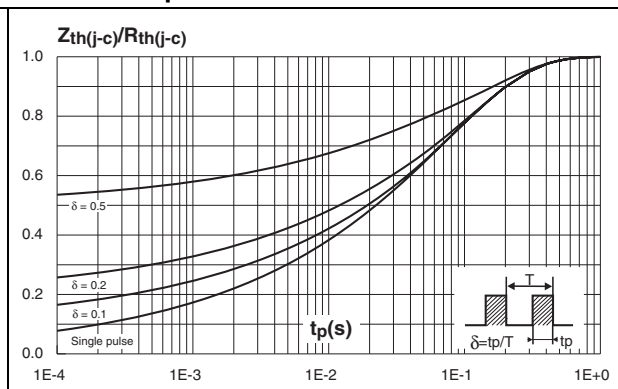


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

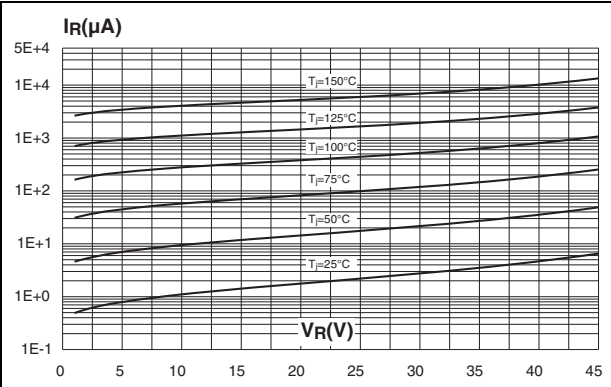


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

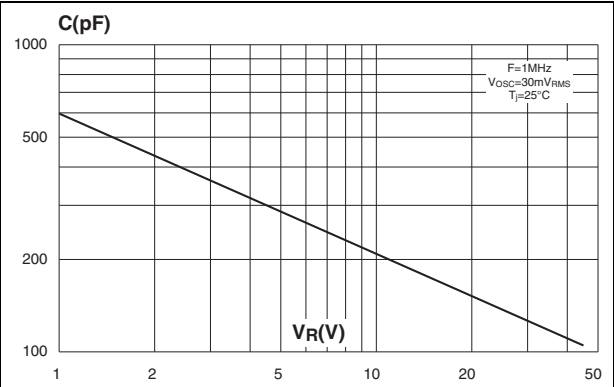


Figure 9. Forward voltage drop versus forward current (maximum values, per diode)

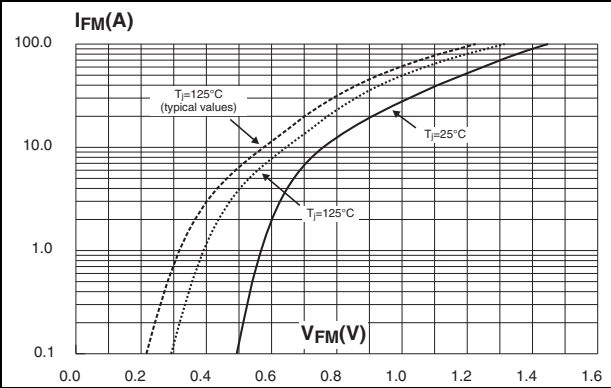
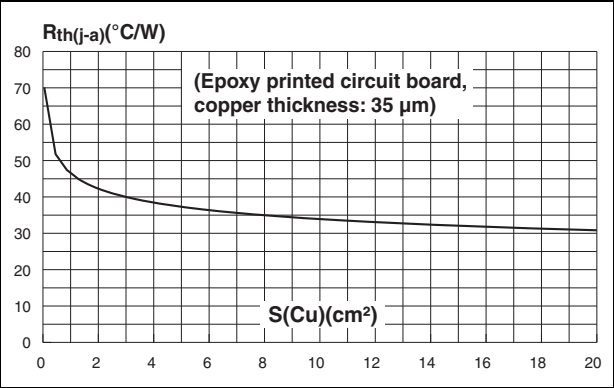


Figure 10. Thermal resistance junction to ambient versus copper surface under tab



# 2 Package Information

- Epoxy meets UL94, V0
- Lead-free package

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Figure 11. D<sup>2</sup>PAK dimensions

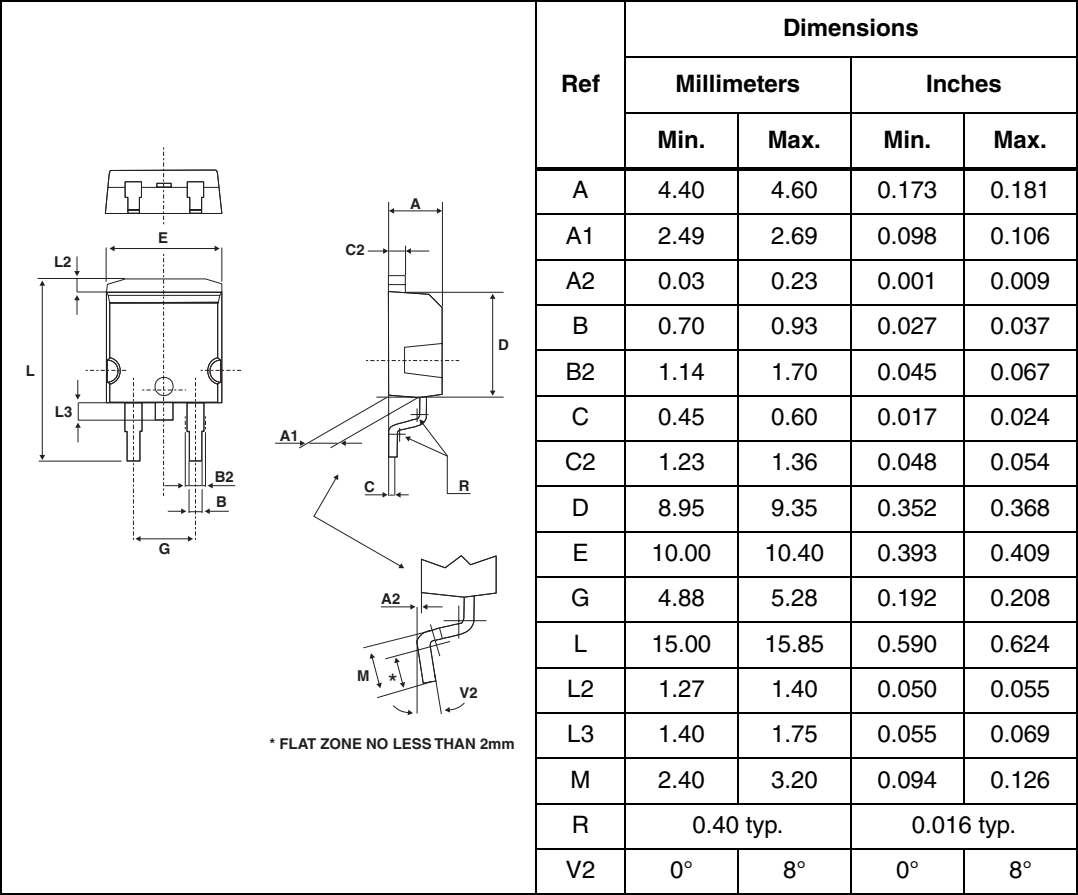
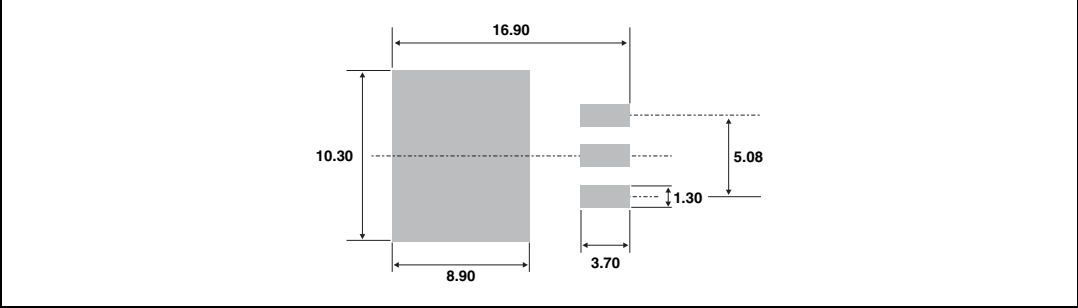


Figure 12. Footprint (dimensions in millimeters)



### 3 Ordering information

**Table 5. Ordering information**

| Order code     | Marking     | Package            | Weight | Base qty | Delivery mode |
|----------------|-------------|--------------------|--------|----------|---------------|
| STPS1545CGY-TR | STPS1545CGY | D <sup>2</sup> PAK | 1.48 g | 1000     | Tape and reel |

### 4 Revision history

**Table 6. Document revision history**

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 23-May-2011 | 1        | Initial release. |

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