

Features

- Low forward voltage drop meaning very small conduction losses
- Low switching losses allowing high frequency operation
- Avalanche capability specified
- AEC-Q101 qualified

Description

Dual center tap Schottky barrier rectifier designed for high frequency switched mode power supplies and DC to DC converters.

Packaged in D²PAK, this device is intended for use in low voltage, high frequency inverters, free-wheeling and polarity protection for automotive applications.

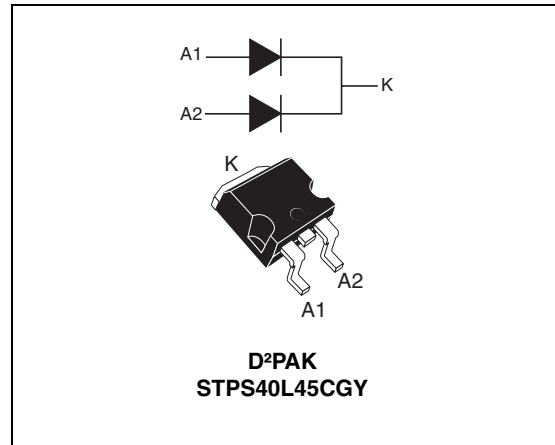


Table 1. Device summary

| Symbol | Value |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 20 A |
| V_{RRM} | 45 V |
| $T_j (max)$ | 150 °C |
| $V_F(max)$ | 0.49 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 | $T_c = 130\text{ °C}$ | per diode | 20 | A |
| | | $\delta = 0.5$ | per device | 40 | |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | 230 | A | |
| I_{RRM} | Repetitive peak reverse current | $t_p = 2\text{ }\mu\text{s}$ square F = 1 kHz | 2 | A | |
| I_{RSM} | Non repetitive peak reverse current | $t_p = 100\text{ }\mu\text{s}$ square | 3 | A | |
| P_{ARM} | Repetitive peak avalanche power | $t_p = 1\text{ }\mu\text{s}$ $T_j = 25\text{ °C}$ | 8100 | W | |
| T_{stg} | Storage temperature range | | -65 to + 150 | °C | |
| T_j | Operating junction temperature ⁽¹⁾ | | -40 to + 150 | °C | |
| dV/dt | Critical rate of rise of reverse voltage | | 10000 | V/ μs | |

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 | 1.5 | °C/W |
| | | Total | 0.8 | |
| $R_{th(c)}$ | Coupling | | 0.1 | °C/W |

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 | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | | | 0.6 | mA |
| | | $T_j = 125\text{ °C}$ | | | 140 | 280 | mA |
| $V_F^{(1)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 20\text{ A}$ | | | 0.53 | V |
| | | $T_j = 125\text{ °C}$ | $I_F = 20\text{ A}$ | | 0.42 | 0.49 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 40\text{ A}$ | | | 0.69 | |
| | | $T_j = 125\text{ °C}$ | $I_F = 40\text{ A}$ | | 0.6 | 0.7 | |

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

To evaluate the conduction losses use the following equation:

$$P = 0.28 \times I_{F(AV)} + 0.0105 I_{F(RMS)}^2$$

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

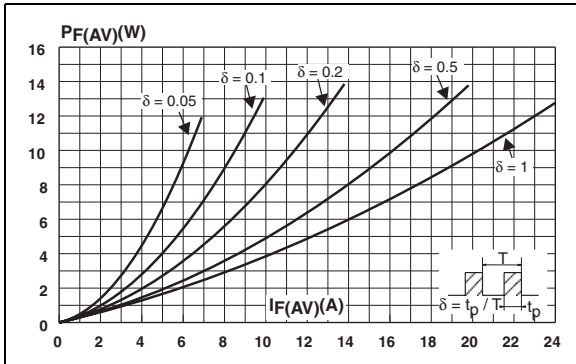


Figure 2. Average forward current versus ambient temperature (delta = 0.5, per diode)

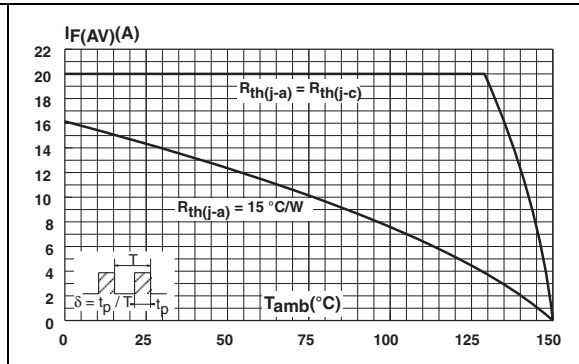


Figure 3. Normalized avalanche power derating versus pulse duration

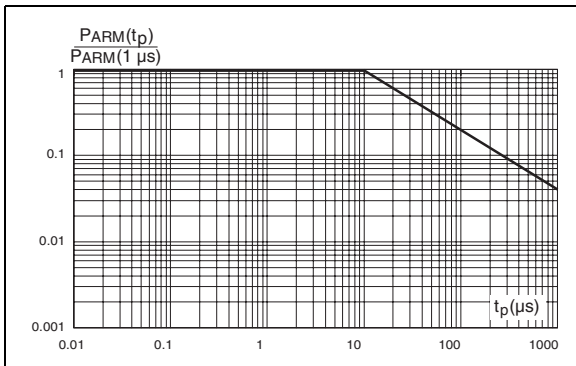


Figure 4. Normalized avalanche power derating versus junction temperature

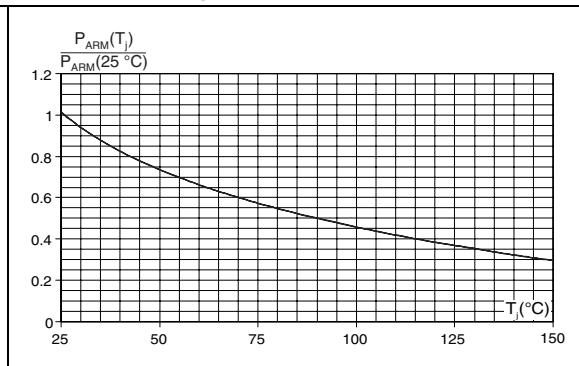


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

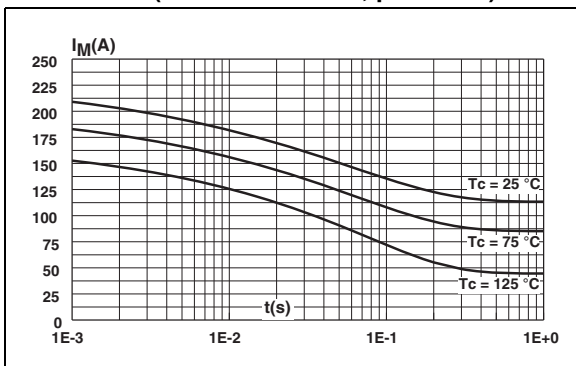


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

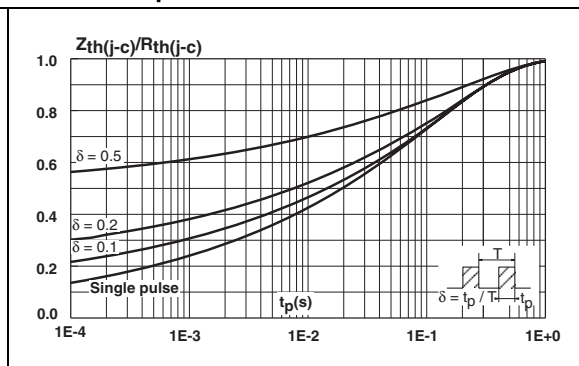


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

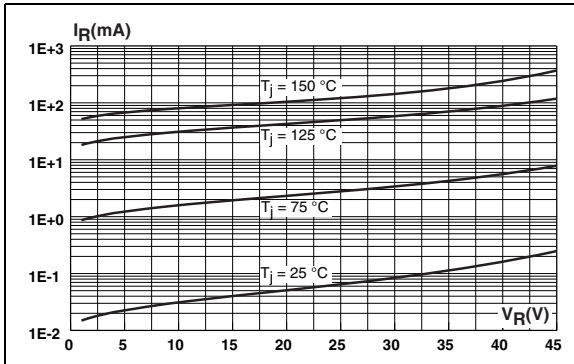


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

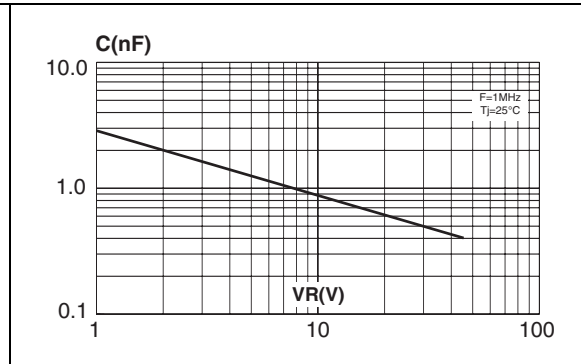


Figure 9. Forward voltage drop versus forward current (maximum values, per diode)

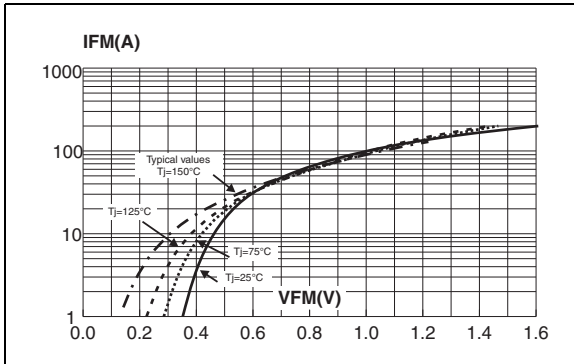
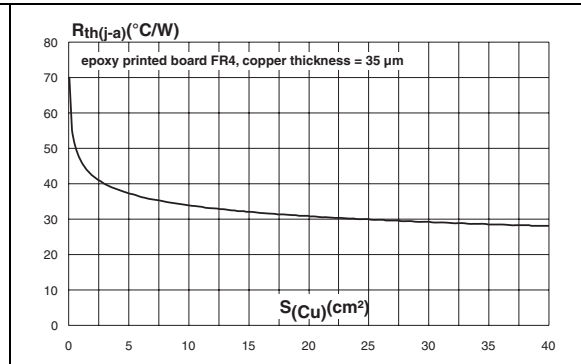


Figure 10. Thermal resistance junction to ambient versus copper surface under tab.



2 Package information

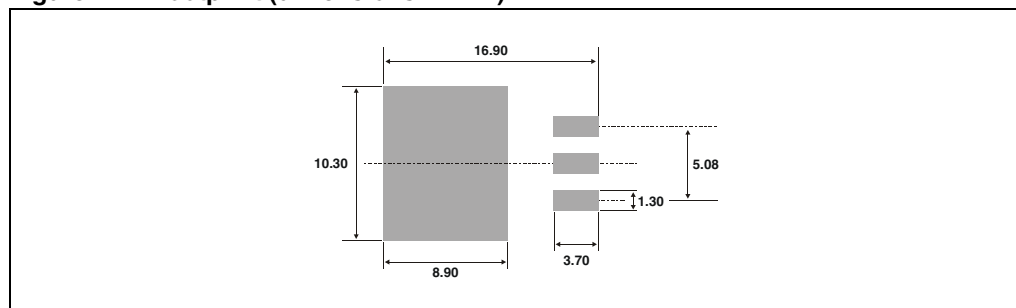
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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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 11. Footprint (dimensions in mm)



3 Ordering information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-----------------|--------------|--------------------|--------|----------|---------------|
| STPS40L45CGY-TR | STPS40L45CGY | D ² PAK | 1.8 g | 500 | Tape and Reel |

4 Revision history

Table 7. Document revision history

| Date | Revision | Changes |
|-------------|----------|--------------|
| 25-Jun-2012 | 1 | First issue. |

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