

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low thermal resistance
- Avalanche capability specified
- AEC-Q101 qualified

Description

Dual center tab Schottky rectifier suited for switch mode power supplies and high frequency DC to DC converters.

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

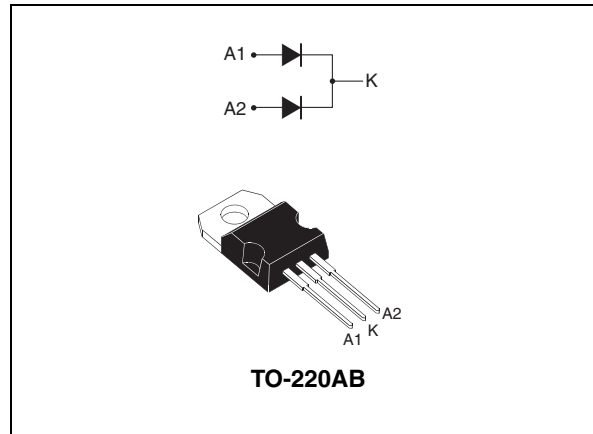


Table 1. Device summary

| Symbol | Value |
|--------------|------------|
| $I_{F(AV)}$ | 2 x 12.5 A |
| V_{RRM} | 45 V |
| $T_{j(max)}$ | 175 °C |
| $V_{F(max)}$ | 0.57 V |

1 Characteristics

Table 2. Absolute ratings (limiting values, 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 = 160 °C | Per diode | 12.5 | A |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | | 200 | A |
| P _{ARM} | Repetitive peak avalanche power | t _p = 1 μ s, T _j = 25 °C | | 4800 | W |
| T _{stg} | Storage temperature range | | | -65 to + 175 | °C |
| T _j | Operating junction temperature range ⁽¹⁾ | | | -40 to + 175 | °C |
| dV/dt | Critical rate of rise reverse voltage | | | 10000 | V/ μ 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 | 1.6 | °C/W |
| R _{th(c)} | Coupling | | 0.6 | °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 | Tests conditions | | Min. | Typ. | Max. | Unit |
|-------------------------------|-------------------------|-------------------------|-----------------------------------|------|------|------|---------|
| I _R ⁽¹⁾ | Reverse leakage current | T _j = 25 °C | V _R = V _{RRM} | | | 125 | μ A |
| | | T _j = 125 °C | | | 9 | 25 | mA |
| V _F ⁽¹⁾ | Forward voltage drop | T _j = 125 °C | I _F = 12.5 A | | 0.50 | 0.57 | V |
| | | T _j = 25 °C | I _F = 25 A | | | 0.84 | |
| | | T _j = 125 °C | I _F = 25 A | | 0.65 | 0.72 | |

1. Pulse test: t_p = 380 μ s, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.012 \times I_{F(RMS)}^2$$

Figure 1. Conduction losses versus average current

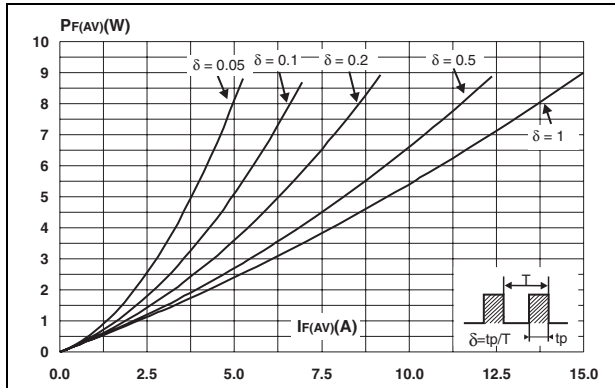


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

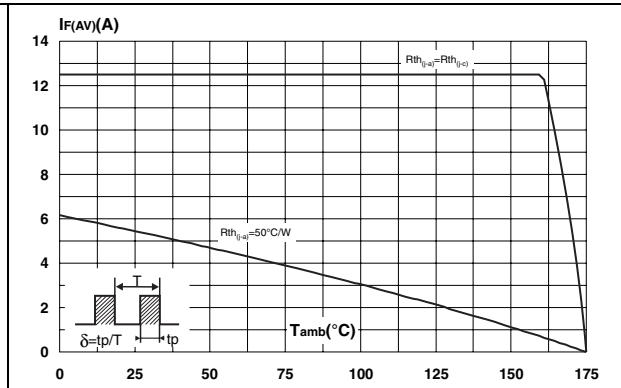


Figure 3. Normalized avalanche power derating versus pulse duration

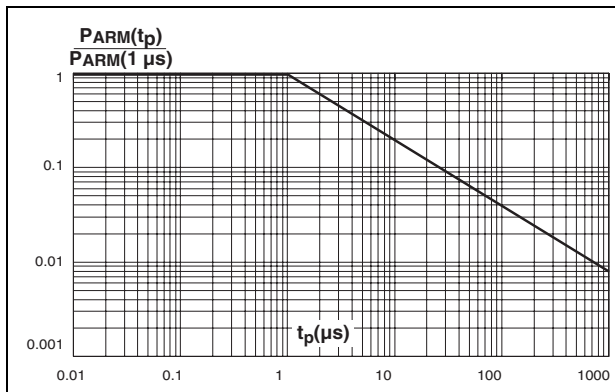


Figure 4. Normalized avalanche power derating versus junction temperature

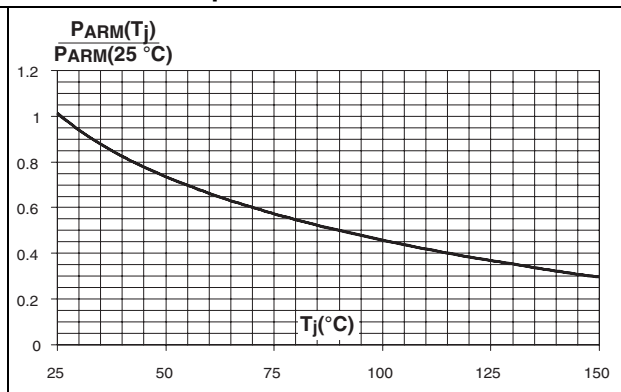


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values)

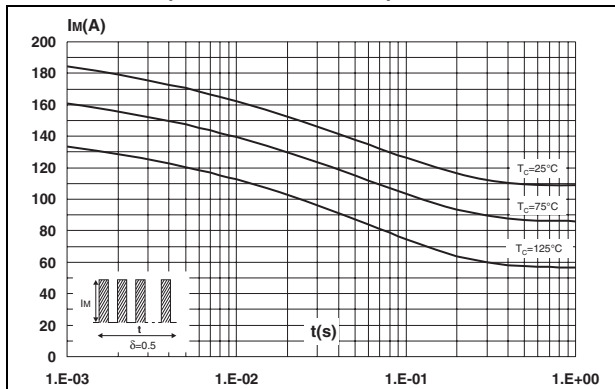


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

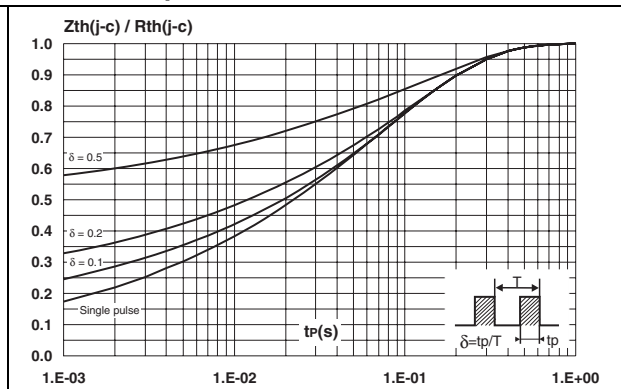


Figure 7. Reverse leakage current versus reverse voltage applied (typical values)

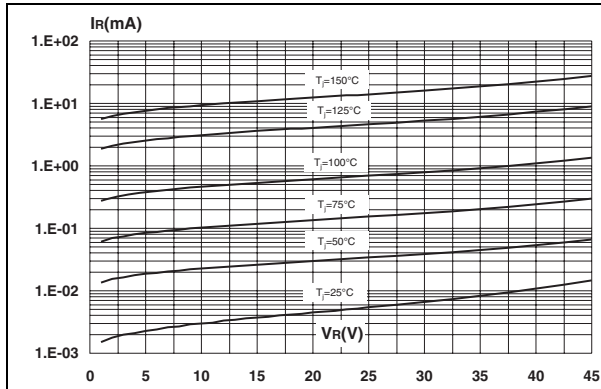


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

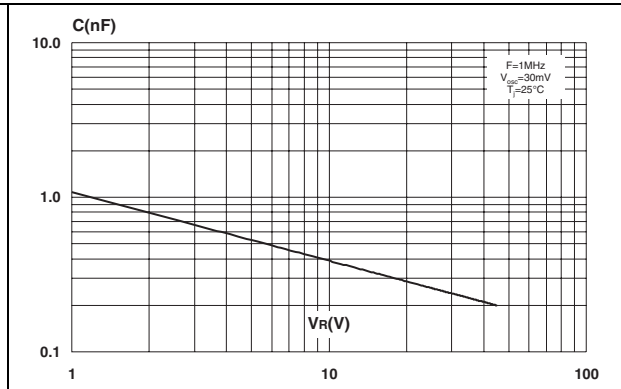


Figure 9. Forward voltage drop versus forward current

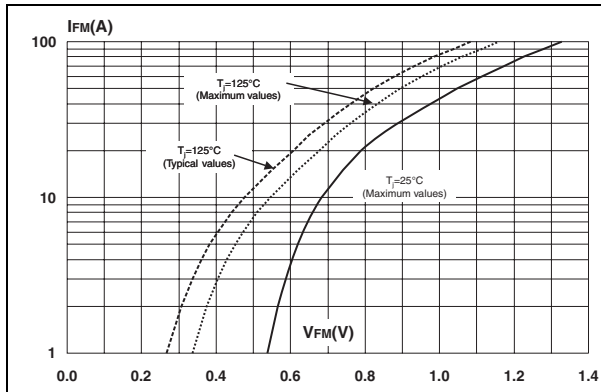
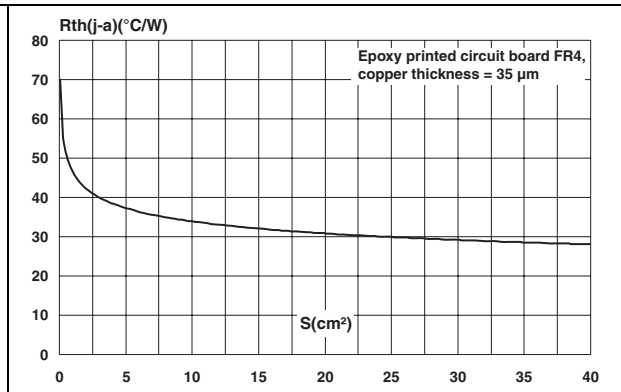


Figure 10. Thermal resistance junction to ambient versus copper surface under tab



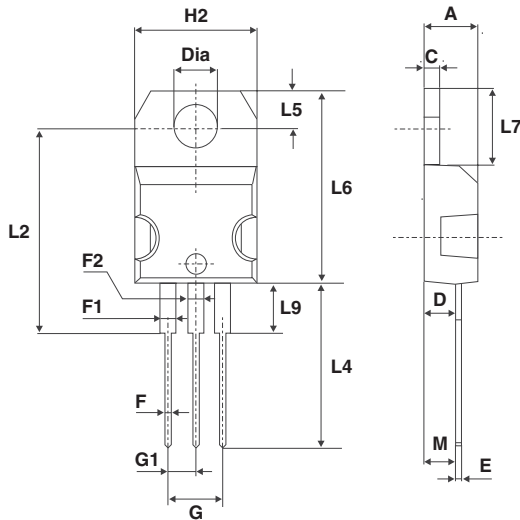
2 Package information

- Epoxy meets UL94, V0
- Lead-free package

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Table 5. TO-220AB dimensions

| Ref. | Dimensions | | | |
|-------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 0.88 | 0.024 | 0.034 |
| F1 | 1.14 | 1.70 | 0.044 | 0.066 |
| F2 | 1.14 | 1.70 | 0.044 | 0.066 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| G1 | 2.40 | 2.70 | 0.094 | 0.106 |
| H2 | 10 | 10.40 | 0.393 | 0.409 |
| L2 | 16.4 typ. | | 0.645 typ. | |
| L4 | 13 | 14 | 0.511 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.259 |
| L9 | 3.50 | 3.93 | 0.137 | 0.154 |
| M | 2.6 typ. | | 0.102 typ. | |
| Diam. | 3.75 | 3.85 | 0.147 | 0.151 |



Note: Leads are raw copper on all exposed areas before plating finishing.

3 Ordering information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-------------|-------------|----------|--------|----------|---------------|
| STPS2545CTY | STPS2545CTY | TO-220AB | 1.9 g | 50 | Tube |

4 Revision history

Table 7. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 19-Sep-2011 | 1 | First issue. |
| 28-Jun-2012 | 2 | Corrected typographical error in Table 3 . |

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