

Description

This dual center tap field effect rectifier provides stable leakage current over the full range of reverse voltage and low forward voltage drop.

Packaged in TO-220AB, I²PAK or D²PAK, this device is intended to be used in solar bypass junction boxes and in switch mode power supplies.

Table 1. Device summary

| Symbol | Value |
|-------------|--|
| $I_{F(AV)}$ | 2 x 15 A |
| V_{RRM} | 45 V |
| $T_j(max)$ | +175 °C (up to 200 °C forward mode only on D ² PAK) |
| $V_F(typ)$ | 0.35 V |

Features

- Advanced rectifier proprietary process
- Stable leakage current over reverse voltage
- Reduce leakage current
- Low forward voltage drop
- High frequency operation

1 Characteristics

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

| 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, δ = 0.5 | T _c = 155 °C | Per diode | 15 | A |
| | | T _c = 155 °C | Per device | 30 | |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | 250 | A | |
| T _{stg} | Storage temperature range | | -65 to + 175 | °C | |
| T _j | Maximum operating junction temperature | | 175 | °C | |
| T _j | Maximum operating temperature on D ² PAK (DC forward current without reverse bias, t = 1 hour) ⁽¹⁾ | | 200 | °C | |

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 resistance

| Symbol | Parameter | | Value (max) | Unit |
|----------------------|------------------|-----------|-------------|------|
| R _{th(j-c)} | Junction to case | Per diode | 1.6 | °C/W |
| | | Total | 1.05 | |
| R _{th(c)} | Coupling | | 0.5 | |

When diodes 1 and 2 are used simultaneously:

$$T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit | |
|-------------|-------------------------|-----------------------------------|----------------------|------|-------|---------------|---|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^\circ\text{C}$ | $V_R = V_{RRM}$ | | 600 | μA | |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | 25 | 50 | mA | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 7.5\text{ A}$ | | 0.305 | 0.350 | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 10\text{ A}$ | | 0.350 | 0.395 | |
| | | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ | | 0.420 | 0.470 | |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | 0.420 | 0.450 | |

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$
2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.27 \times I_{F(AV)} + 0.012 I_{F(RMS)}^2$$

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

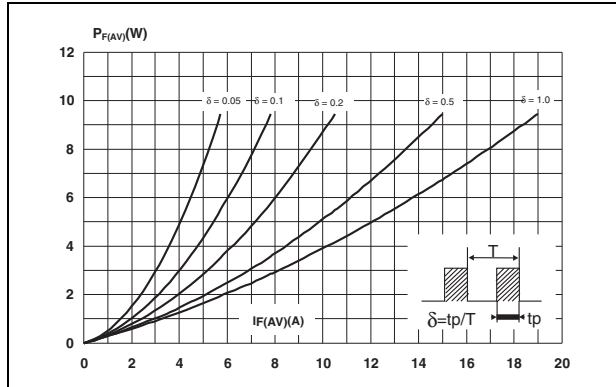


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

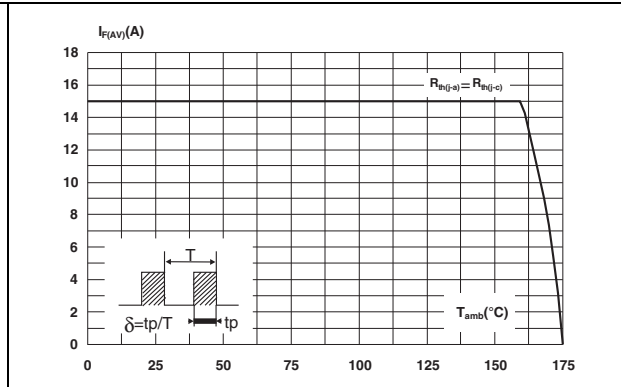


Figure 3. Junction capacitance versus reverse voltage applied (typical values, per diode)

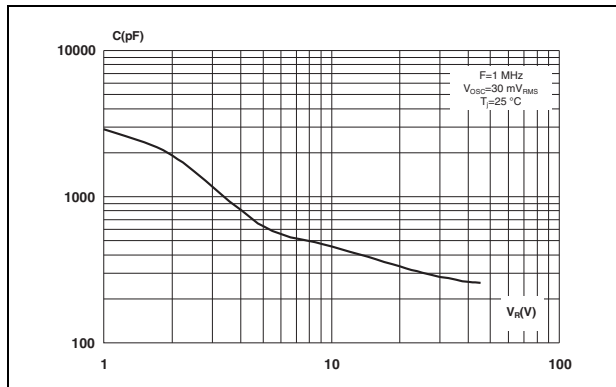


Figure 4. Forward voltage drop versus forward current (per diode)

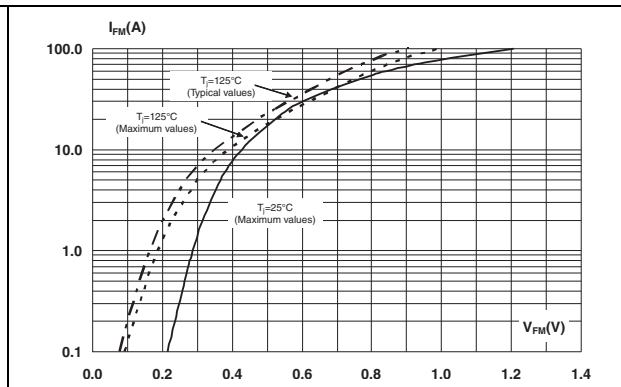


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

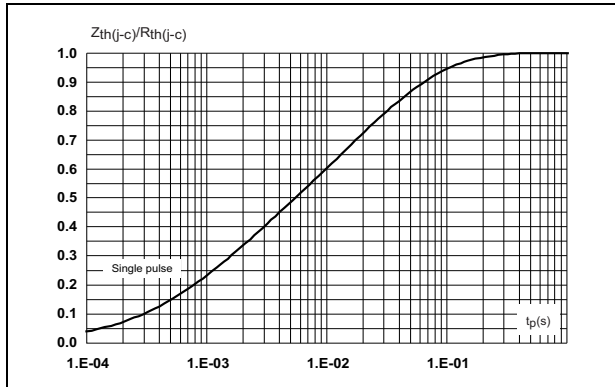
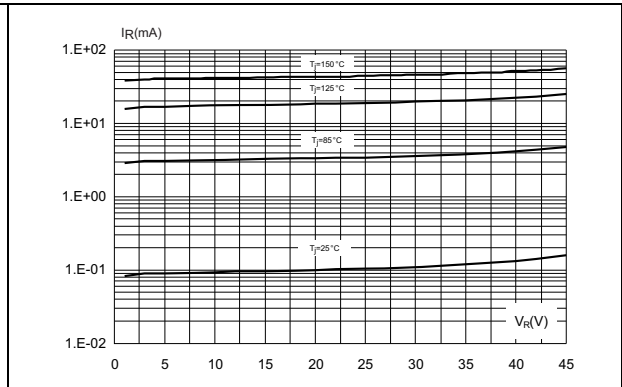


Figure 6. Reverse leakage current versus reverse voltage applied (typical values, per diode)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 to 1.0 N·m

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Figure 7. D²PAK dimension definitions

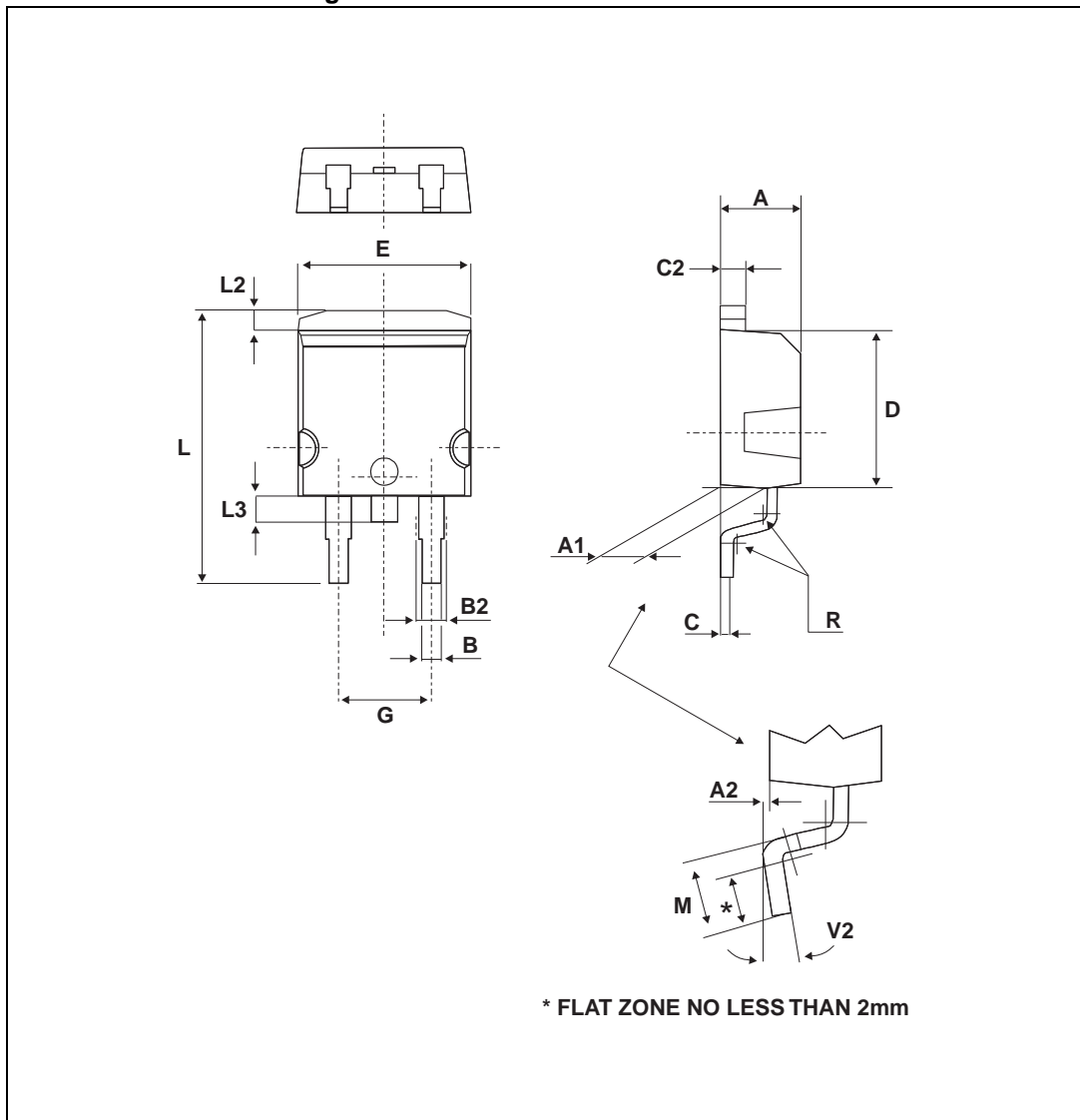


Table 5. D²PAK dimension values

| 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 8. Footprint (dimensions in mm)

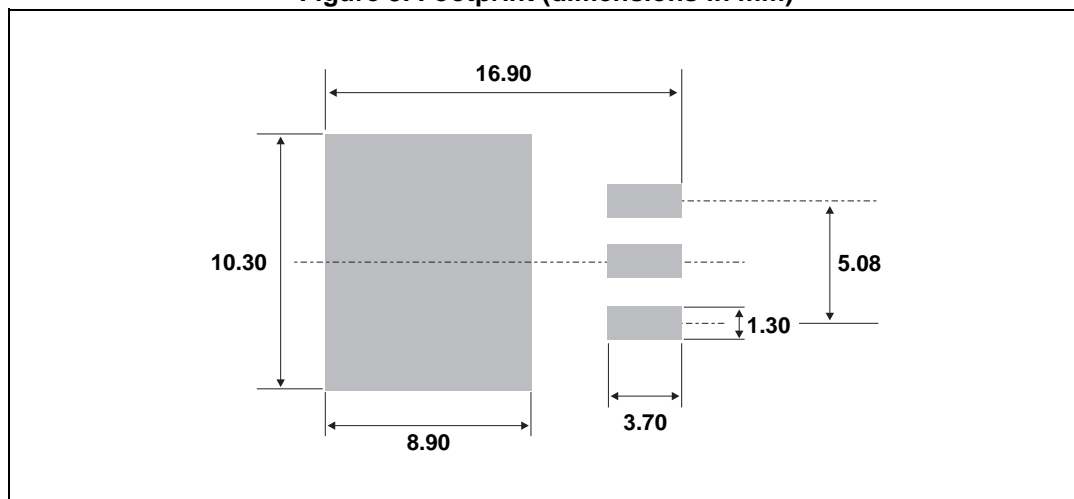


Figure 9. TO-220AB dimension definitions

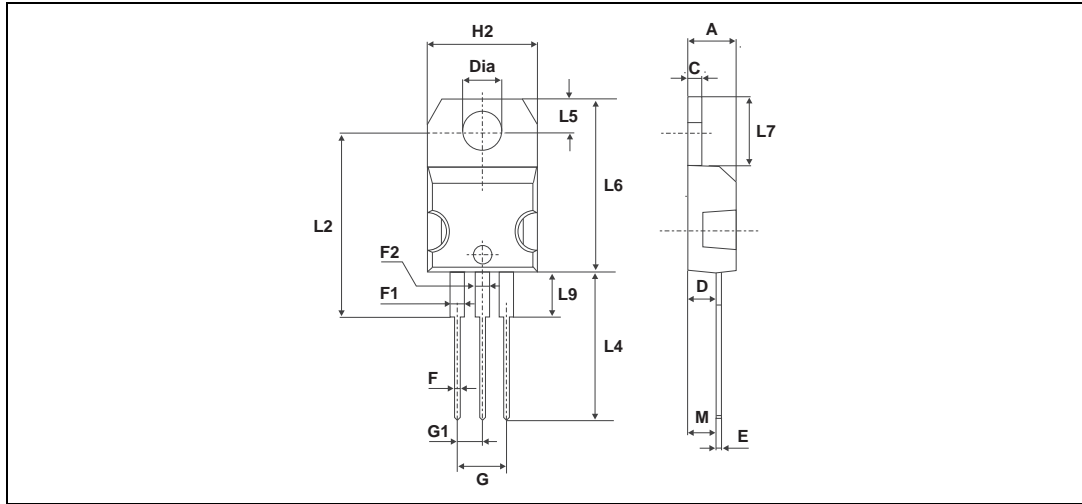


Table 6. TO-220AB dimension values

| 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 |

Figure 10. I²PAK dimension definitions

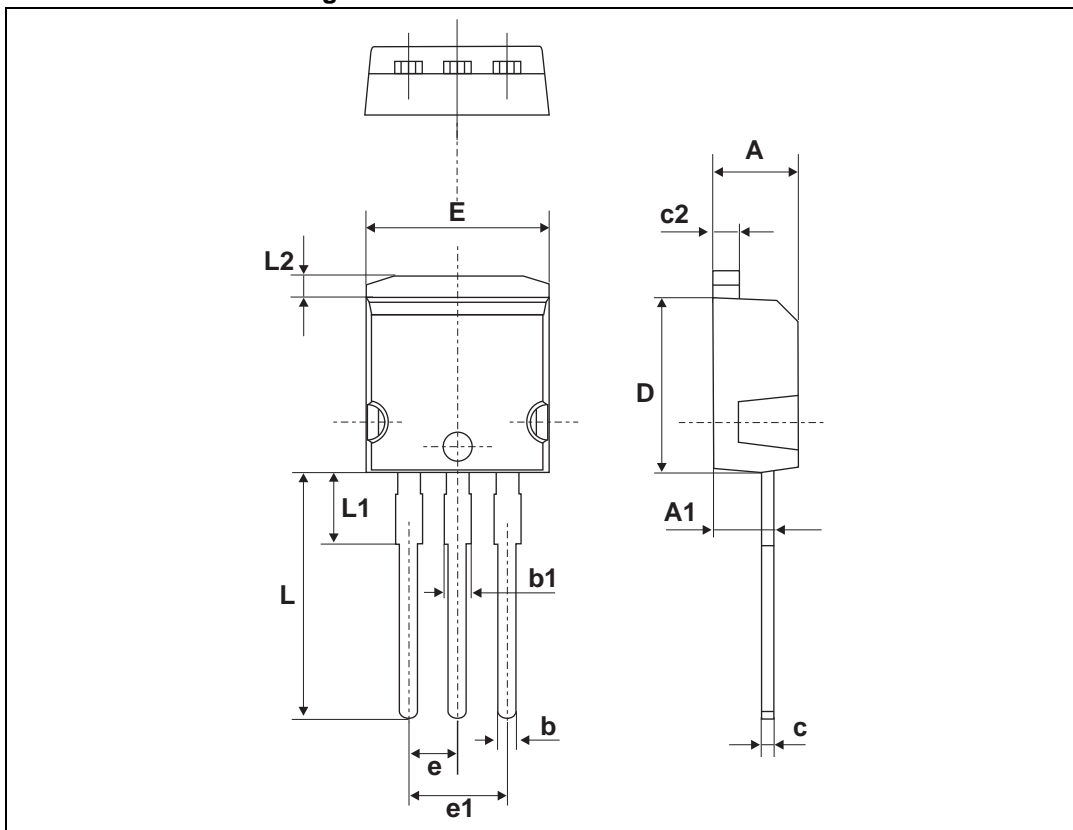


Table 7. I²PAK dimension values

| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| A1 | 2.40 | 2.72 | 0.094 | 0.107 |
| b | 0.61 | 0.88 | 0.024 | 0.035 |
| b1 | 1.14 | 1.70 | 0.044 | 0.067 |
| c | 0.49 | 0.70 | 0.019 | 0.028 |
| c2 | 1.23 | 1.32 | 0.048 | 0.052 |
| D | 8.95 | 9.35 | 0.352 | 0.368 |
| e | 2.40 | 2.70 | 0.094 | 0.106 |
| e1 | 4.95 | 5.15 | 0.195 | 0.203 |
| E | 10 | 10.40 | 0.394 | 0.409 |
| L | 13 | 14 | 0.512 | 0.551 |
| L1 | 3.50 | 3.93 | 0.138 | 0.155 |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 |

3 Ordering information

Table 8. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|-------------|--------------------|--------|----------|---------------|
| FERD30M45CT | FERD30M45CT | TO-220AB | 2.2 g | 50 | Tube |
| FERD30M45CG-TR | FERD30M45CG | D ² PAK | 1.5 g | 1000 | Tape and reel |
| FERD30M45CR | FERD30M45CR | I ² PAK | 1.4 g | 50 | Tube |

4 Revision history

Table 9. Document revision history

| Date | Revision | Changes |
|-------------|----------|-----------------------------------|
| 12-Nov-2012 | 1 | Initial release. |
| 12-Nov-2013 | 2 | Updated title. |
| 11-Jul-2014 | 3 | Added I ² PAK package. |

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