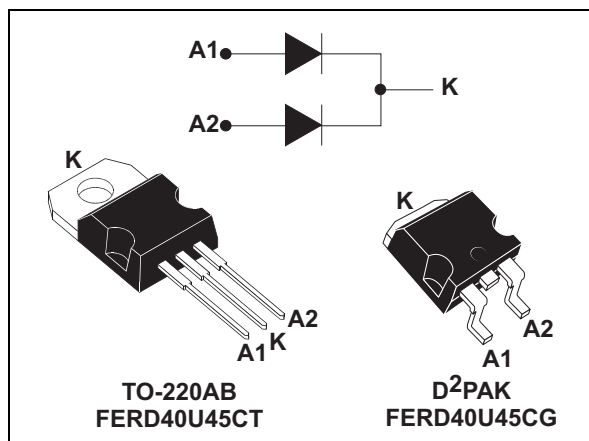




### Description

This dual rectifier is based on a proprietary technology that achieves the best in class  $V_F/I_R$  for a given silicon surface.

Packaged in TO-220AB, and D<sup>2</sup>PAK, this device is intended to be used in switch mode power supplies, or automotive applications

**Table 1. Device summary**

|             |          |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 20 A |
| $V_{RRM}$   | 45 V     |
| $V_F(typ)$  | 0.31 V   |

### Features

- ST advanced rectifier process
- Stable leakage current over reverse voltage
- Low forward voltage drop
- High frequency operation

# 1 Characteristics

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

| Symbol              | Parameter                                             |                                                                          |                         | Value        | Unit |
|---------------------|-------------------------------------------------------|--------------------------------------------------------------------------|-------------------------|--------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                                                          |                         | 45           | V    |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                                                          |                         | 40           | A    |
| I <sub>F(AV)</sub>  | Average forward current, δ = 0.5                      | T <sub>C</sub> =150° C<br>T <sub>C</sub> =145° C                         | Per diode<br>Per device | 20<br>40     | A    |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | t <sub>p</sub> = 10 ms sinusoidal                                        |                         | 275          | A    |
| T <sub>stg</sub>    | Storage temperature range                             |                                                                          |                         | -65 to + 175 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature <sup>(1)</sup> | TO-220AB, D <sup>2</sup> PAK                                             |                         | 175          | °C   |
|                     |                                                       | D <sup>2</sup> PAK (DC forward current without reverse bias, t = 1 hour) |                         | 200          |      |

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 | 1.6   | °C/W |
|               |                  | Total     | 1.1   |      |
| $R_{th(c)}$   | Coupling         |           | 0.5   | °C/W |

When the diodes 1 and 2 are used simultaneously:

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

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

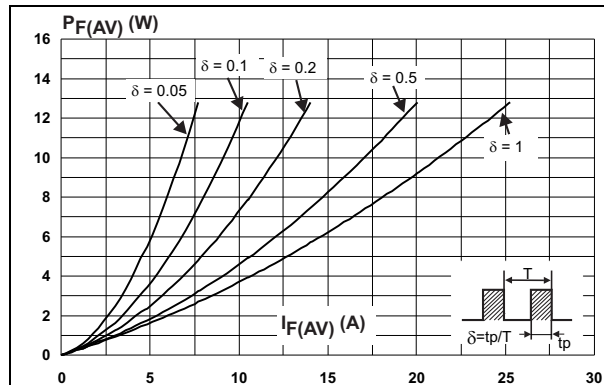
| Symbol      | Parameter               | Test Conditions            |                      | Min. | Typ. | Max.  | Unit |
|-------------|-------------------------|----------------------------|----------------------|------|------|-------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25^\circ \text{C}$  | $V_R = V_{RRM}$      |      |      | 1800  | μA   |
|             |                         | $T_j = 125^\circ \text{C}$ |                      |      | 50   | 100   | mA   |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25^\circ \text{C}$  | $I_F = 10 \text{ A}$ |      | 0.35 | 0.385 | V    |
|             |                         | $T_j = 125^\circ \text{C}$ |                      |      | 0.31 | 0.34  |      |
|             |                         | $T_j = 25^\circ \text{C}$  | $I_F = 20 \text{ A}$ |      | 0.42 | 0.46  |      |
|             |                         | $T_j = 125^\circ \text{C}$ |                      |      | 0.42 | 0.46  |      |

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

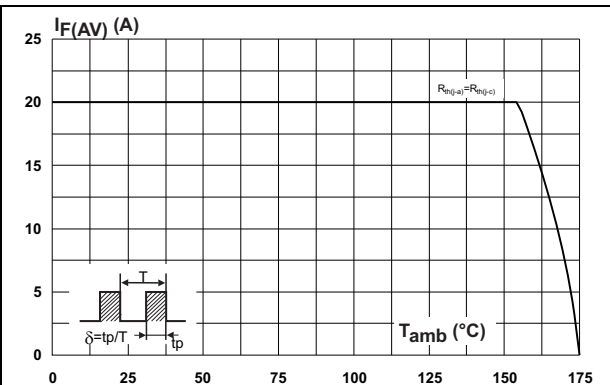
To evaluate the conduction losses use the following equation:

$$P = 0.28 \times I_{F(AV)} + 0.009 I_{F(RMS)}^2$$

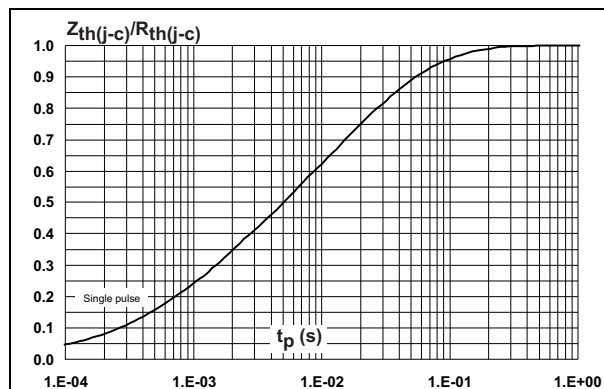
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



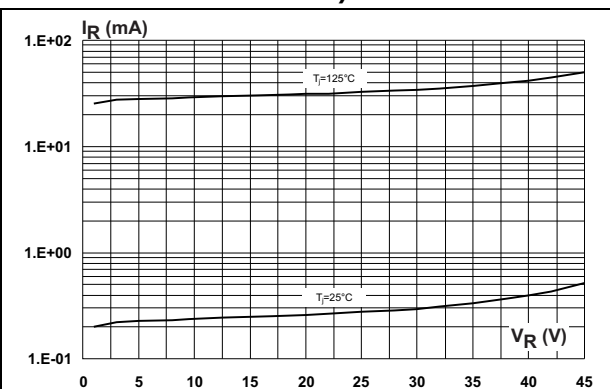
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



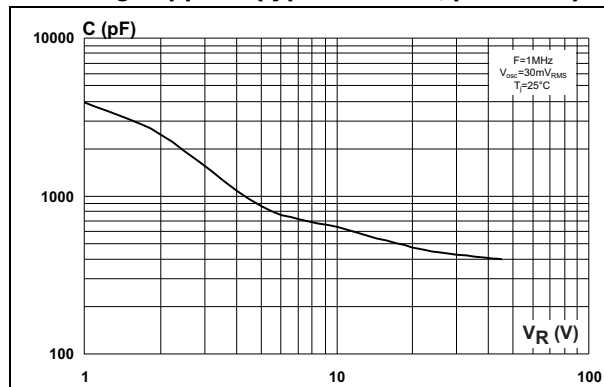
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



**Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 6. Forward voltage drop versus forward current (typical values, per diode)**

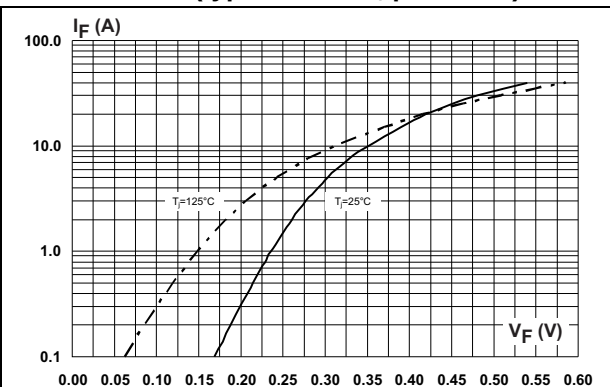
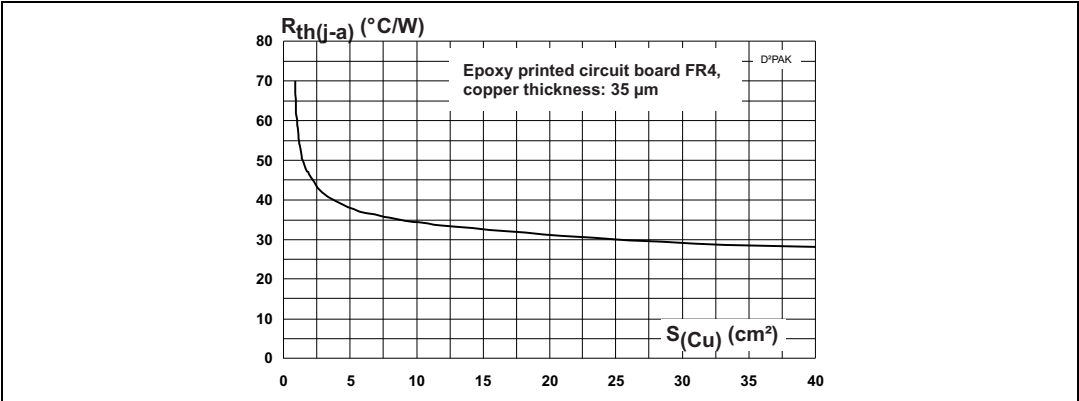


Figure 7. Thermal resistance junction to ambient versus copper surface under tab  
(typical values)



## 2 Package Information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m (TO-220AB)

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**Figure 8. TO-220AB dimension definitions**

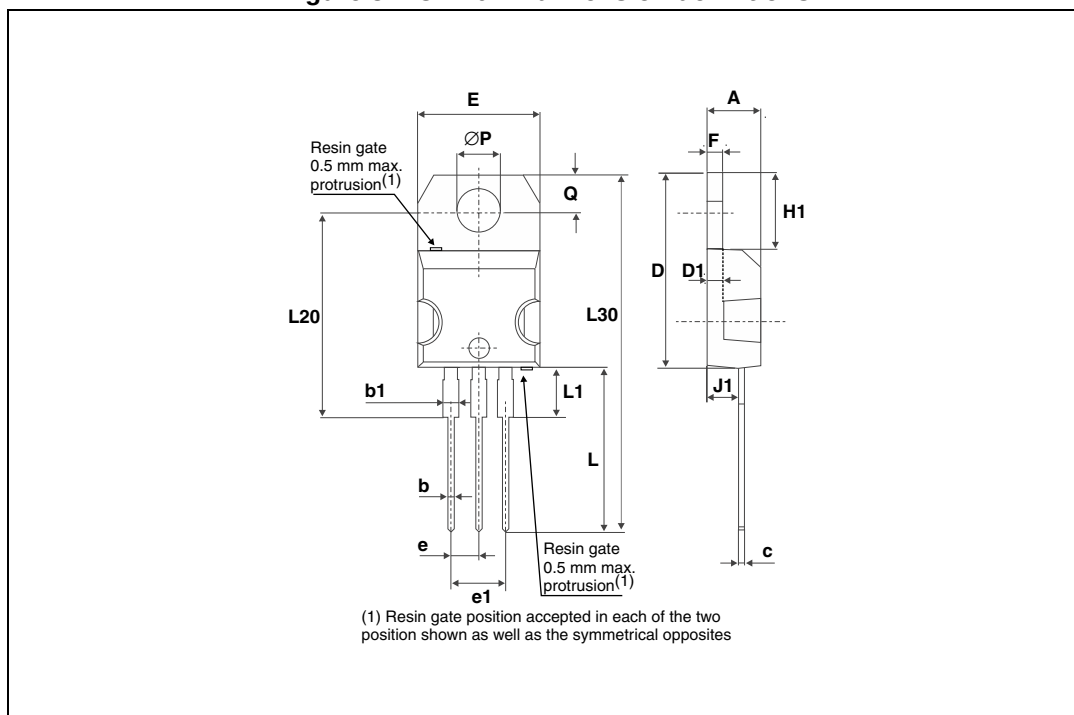
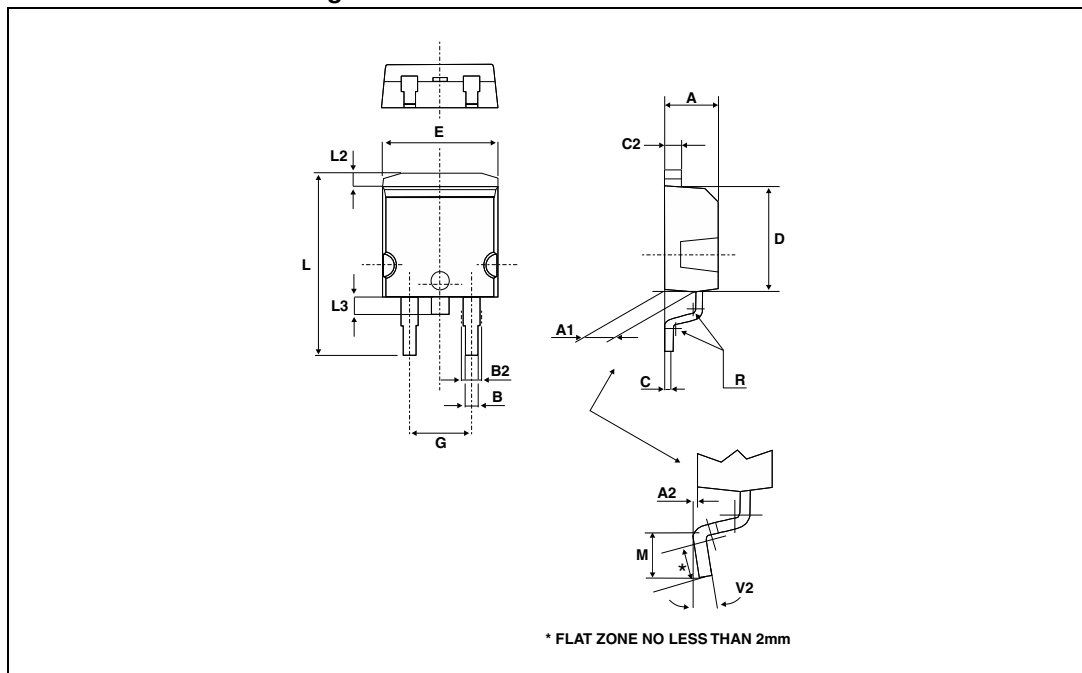


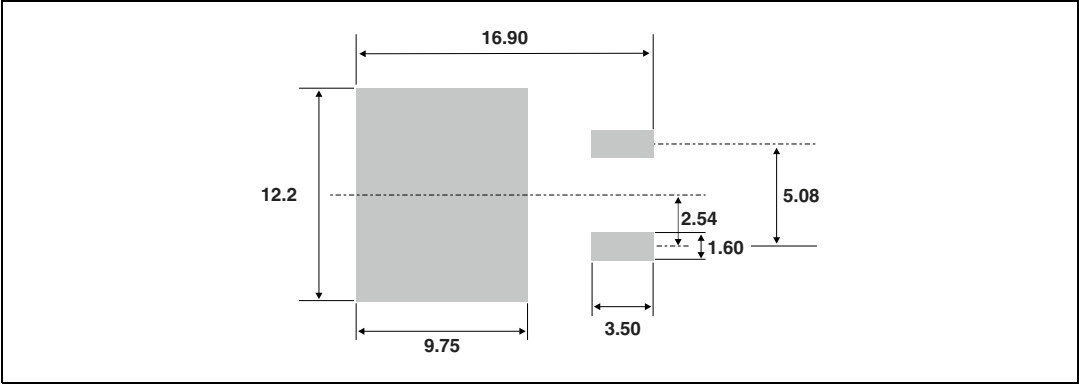
Table 5. TO-220AB dimension values

| Ref. | Dimensions  |       |           |       |
|------|-------------|-------|-----------|-------|
|      | Millimeters |       | Inches    |       |
|      | Min.        | Max.  | Min.      | Max.  |
| A    | 4.40        | 4.60  | 0.17      | 0.18  |
| b    | 0.61        | 0.88  | 0.024     | 0.035 |
| b1   | 1.14        | 1.70  | 0.045     | 0.067 |
| c    | 0.48        | 0.70  | 0.019     | 0.027 |
| D    | 15.25       | 15.75 | 0.60      | 0.62  |
| D1   | 1.27 typ.   |       | 0.05 typ. |       |
| E    | 10          | 10.40 | 0.39      | 0.41  |
| e    | 2.40        | 2.70  | 0.094     | 0.106 |
| e1   | 4.95        | 5.15  | 0.19      | 0.20  |
| F    | 1.23        | 1.32  | 0.048     | 0.052 |
| H1   | 6.20        | 6.60  | 0.24      | 0.26  |
| J1   | 2.40        | 2.72  | 0.094     | 0.107 |
| L    | 13          | 14    | 0.51      | 0.55  |
| L1   | 3.50        | 3.93  | 0.137     | 0.154 |
| L20  | 16.40 typ.  |       | 0.64 typ. |       |
| L30  | 28.90 typ.  |       | 1.13 typ. |       |
| ØP   | 3.75        | 3.85  | 0.147     | 0.151 |
| Q    | 2.65        | 2.95  | 0.104     | 0.116 |

Figure 9. D<sup>2</sup>PAK dimension definitionsTable 6. D<sup>2</sup>PAK 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   | 1.30        | 1.75  | 0.051      | 0.069 |
| M    | 2.29        | 2.79  | 0.090      | 0.110 |
| R    | 0.40 typ.   |       | 0.016 typ. |       |
| V2   | 0°          | 8°    | 0°         | 8°    |

Figure 10. D<sup>2</sup>PAK footprint (dimensions in mm)





### 3 Ordering Information

**Table 7. Ordering information**

| Order code     | Marking     | Package            | Weight | Base qty | Delivery mode |
|----------------|-------------|--------------------|--------|----------|---------------|
| FERD40U45CT    | FERD40U45CT | TO-220AB           | 2.2 g  | 50       | Tube          |
| FERD40U45CG-TR | FERD40U45CG | D <sup>2</sup> PAK | 1.8 g  | 500      | Tape and reel |

### 4 Revision history

**Table 8. Document revision history**

| Date        | Revision | Description of Changes |
|-------------|----------|------------------------|
| 13-Nov-2013 | 1        | Previous version       |

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