

### Description

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

Packaged in TO-220FPAB, this device is intended to be used in rectification and freewheeling operations in switch-mode power supplies.

**Table 1. Device summary**

| Symbol      | Value    |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 20 A |
| $V_{RRM}$   | 50 V     |
| $T_j$ (max) | +175 °C  |
| $V_F$ (typ) | 0.43 V   |

### Features

- ST advanced rectifier process
- Stable leakage current over reverse voltage
- Reduced leakage current
- Low forward voltage drop
- High frequency operation
- Insulated package: TO-220FPAB
  - Insulating voltage: 2000  $V_{RMS}$  sine

# 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         |                                 | 50           | V    |   |
| $I_{F(RMS)}$ | Forward rms current                     |                                 | 40           | A    |   |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$ | $T_c = 120\text{ °C}$           | Per diode    | 20   | A |
|              |   | $T_c = 90\text{ °C}$            | Per device   | 40   |   |
| $I_{FSM}$    | Surge non repetitive forward current    | $t_p = 10\text{ ms sinusoidal}$ | 250          | A    |   |
| $T_{stg}$    | Storage temperature range               |                                 | -65 to + 175 | °C   |   |
| $T_j^{(1)}$  | Maximum operating junction temperature  |                                 | 175          | °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 | 4.1         | °C/W |
|               |                  | Total     | 3.3         |      |
| $R_{th(c)}$   | Coupling         |           | 2.4         |      |

When diodes 1 and 2 are used simultaneously:

$$T_{j(diode1)} = P_{(diode1)} \times R_{th(j-c)}(\text{per diode}) + P_{(diode2)} \times R_{th(c)}$$

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

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     |      |      | 0.8  | mA            |
|             |                         | $T_j = 125\text{ °C}$ |                     |      | 30   | 60   | mA            |
|             |                         | $T_j = 25\text{ °C}$  | $V_R = 35\text{ V}$ |      |      | 460  | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                     |      | 20   | 40   | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 125\text{ °C}$ | $I_F = 5\text{ A}$  |      | 0.25 |      | V             |
|             |                         | $T_j = 125\text{ °C}$ | $I_F = 10\text{ A}$ |      | 0.33 |      |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 15\text{ A}$ |      | 0.41 | 0.46 |               |
|             |                         | $T_j = 125\text{ °C}$ |                     |      | 0.39 | 0.43 |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 20\text{ A}$ |      | 0.44 | 0.49 |               |
|             |                         | $T_j = 125\text{ °C}$ |                     |      | 0.43 | 0.48 |               |

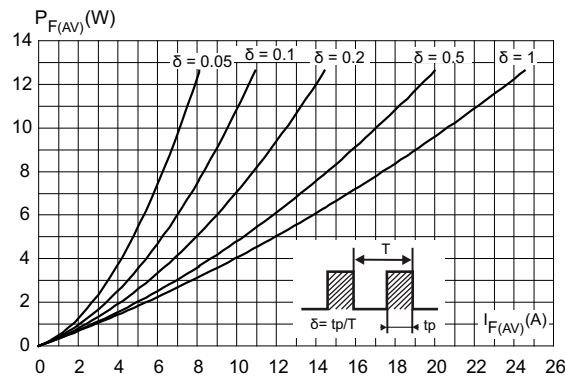
1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

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

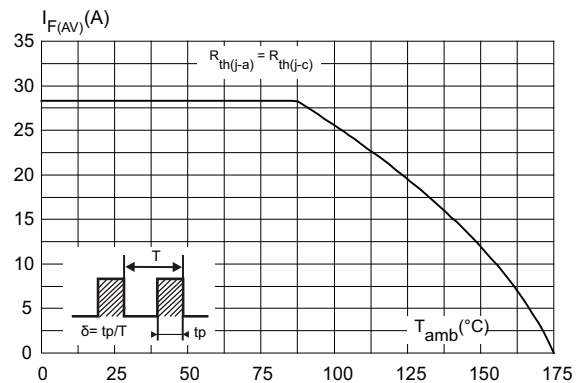
To evaluate the conduction losses use the following equation:

$$P = 0.329 \times I_{F(AV)} + 0.007 I_{F(RMS)}^2$$

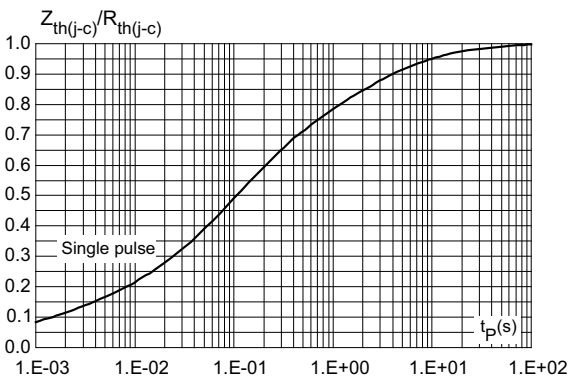
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



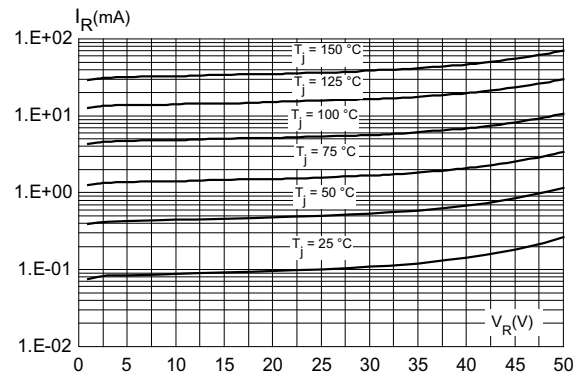
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



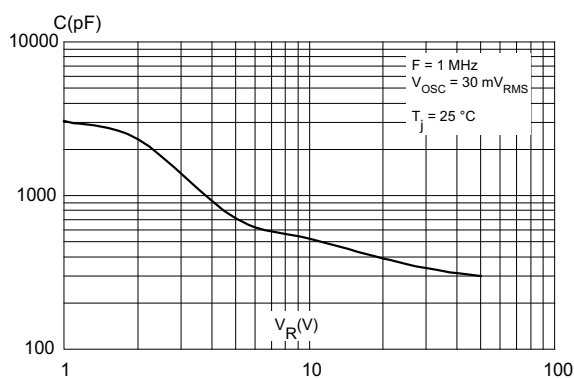
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



**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)**

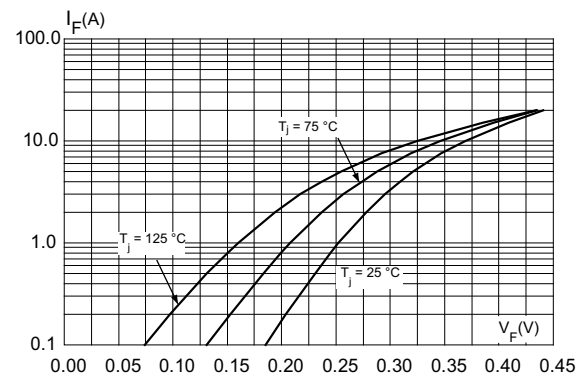
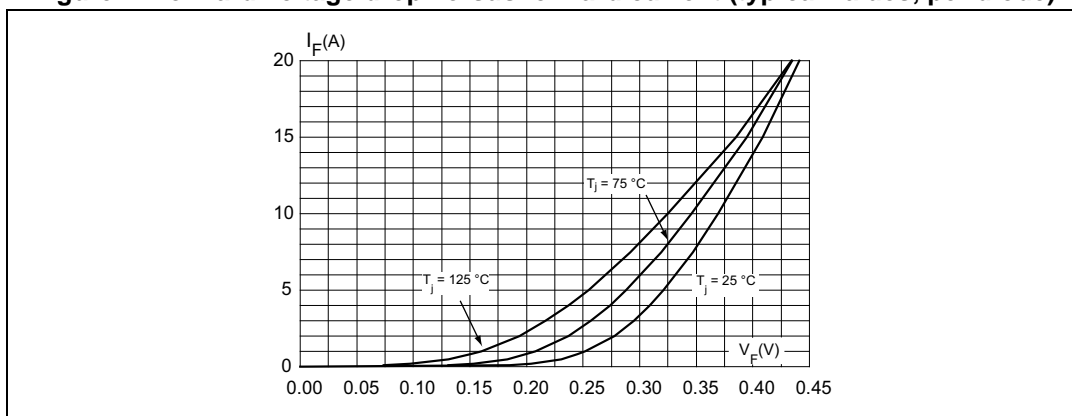


Figure 7. Forward voltage drop versus forward current (typical values, per diode)



## 2 Package information

- Epoxy meets UL94, V0
- Recommended torque value for TO-220FPAB: 0.55 N.m
- Maximum torque value for TO-220FPAB: 0.7 N.m

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

### 2.1 TO-220FPAB package information

Figure 8. TO-220FPAB package outline

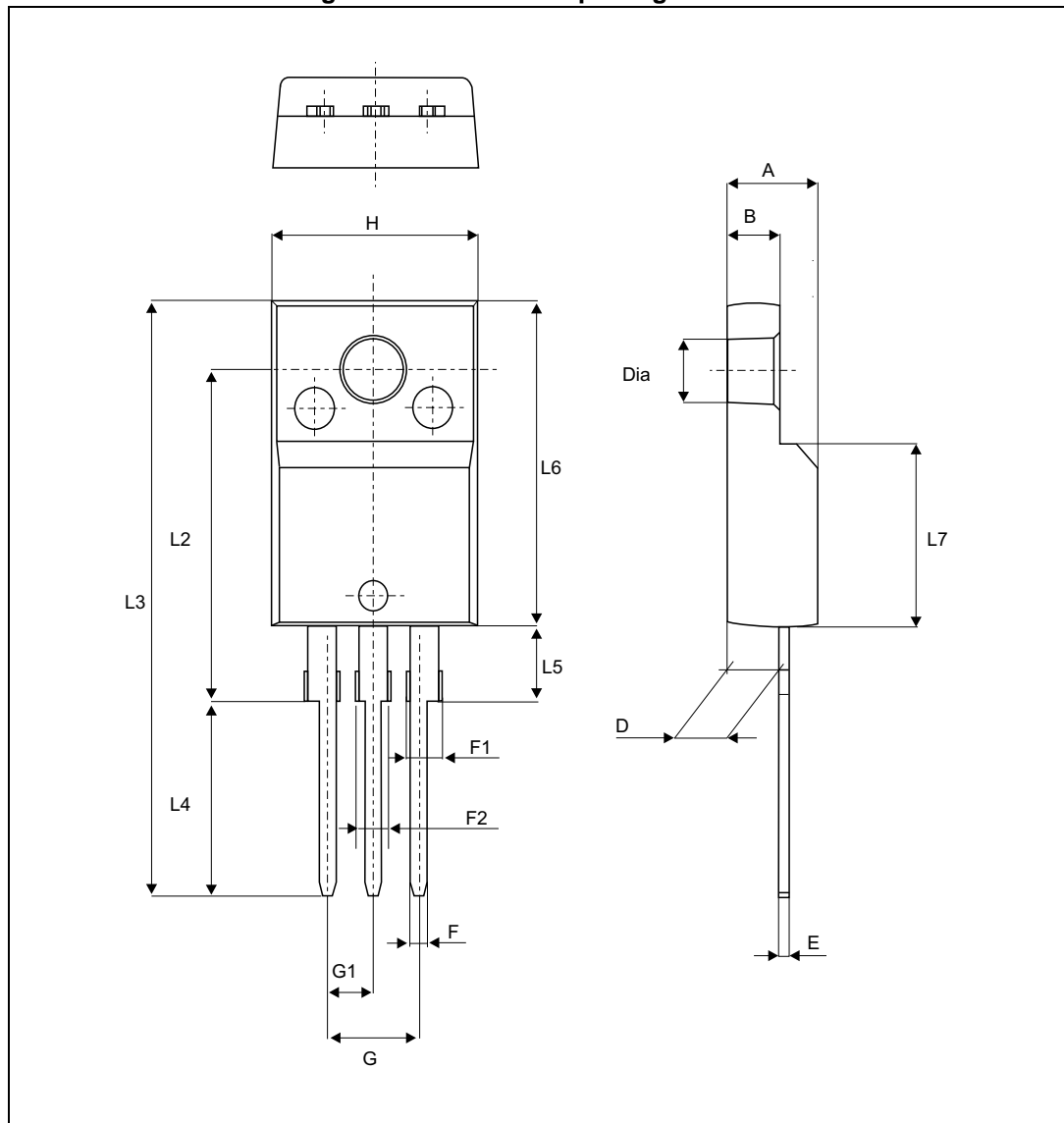


Table 5. T0-220FPAB package mechanical data

| Ref. | Dimensions  |      |      |           |      |       |
|------|-------------|------|------|-----------|------|-------|
|      | Millimeters |      |      | Inches    |      |       |
|      | Min.        | Typ. | Max. | Min.      | Typ. | Max.  |
| A    | 4.4         |      | 4.6  | 0.173     |      | 0.181 |
| B    | 2.5         |      | 2.7  | 0.098     |      | 0.106 |
| D    | 2.5         |      | 2.75 | 0.098     |      | 0.108 |
| E    | 0.45        |      | 0.70 | 0.018     |      | 0.027 |
| F    | 0.75        |      | 1    | 0.030     |      | 0.039 |
| F1   | 1.15        |      | 1.70 | 0.045     |      | 0.067 |
| F2   | 1.15        |      | 1.70 | 0.045     |      | 0.067 |
| G    | 4.95        |      | 5.20 | 0.195     |      | 0.205 |
| G1   | 2.4         |      | 2.7  | 0.094     |      | 0.106 |
| H    | 10          |      | 10.4 | 0.393     |      | 0.409 |
| L2   | 16 Typ.     |      |      | 0.63 Typ. |      |       |
| L3   | 28.6        |      | 30.6 | 1.126     |      | 1.205 |
| L4   | 9.8         |      | 10.6 | 0.386     |      | 0.417 |
| L5   | 2.9         |      | 3.6  | 0.114     |      | 0.142 |
| L6   | 15.9        |      | 16.4 | 0.626     |      | 0.646 |
| L7   | 9.00        |      | 9.30 | 0.354     |      | 0.366 |
| Dia. | 3.00        |      | 3.20 | 0.118     |      | 0.126 |

### 3 Ordering information

**Table 6. Ordering information**

| Order code   | Marking      | Package    | Weight | Base qty | Delivery mode |
|--------------|--------------|------------|--------|----------|---------------|
| FERD40U50CFP | FERD40U50CFP | TO-220FPAB | 1.9 g  | 50       | Tube          |

### 4 Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 17-Jun-2015 | 1        | Initial release. |

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