

### Features

- CMOS proprietary process
- Stable leakage current over reverse voltage
- Low forward voltage drop
- High frequency operation

### Description

This single rectifier is based on a proprietary technology, enabling to achieve the best in class  $V_F/I_R$  trade-off for a given silicon surface.

Packaged in PowerFLAT™ 5x6, this device is intended to be used in rectification and freewheeling operations in switch-mode power supplies.

Table 1. Device summary

| Symbol      | Value   |
|-------------|---------|
| $I_{F(AV)}$ | 30 A    |
| $V_{RRM}$   | 50 V    |
| $T_j(max)$  | +150 °C |
| $V_F(typ)$  | 0.33 V  |

TM: PowerFLAT is a trademark of STMicroelectronics

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, at 25 °C, unless otherwise specified, anode terminals short-circuited)**

| Symbol       | Parameter                               | Value                           | Unit |
|--------------|---|---------------------------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage         | 50                              | V    |
| $I_{F(RMS)}$ | Forward rms current                     | 45                              | A    |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$ | $T_c = 95\text{ °C}$            | A    |
| $I_{FSM}$    | Surge non repetitive forward current    | $t_p = 10\text{ ms sinusoidal}$ | A    |
| $T_{stg}$    | Storage temperature range               | -65 to + 175                    | °C   |
| $T_j^{(1)}$  | Maximum operating junction temperature  | 150                             | °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 | 2.6         | °C/W |

**Table 4. Static electrical characteristics (anode terminals short-circuited)**

| Symbol      | Parameter               | Test conditions                           | Min. | Typ.  | Max. | Unit |
|-------------|-------------------------|---|------|-------|------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 125\text{ °C}$ $V_R = 35\text{ V}$ |      | 25    |      | mA   |
|             |                         | $T_j = 25\text{ °C}$ $V_R = V_{RRM}$      |      |       | 0.8  |      |
|             |                         | $T_j = 125\text{ °C}$ $V_R = V_{RRM}$     |      | 30    | 60   |      |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$ $I_F = 5\text{ A}$   |      | 0.32  |      | V    |
|             |                         | $T_j = 125\text{ °C}$ $I_F = 5\text{ A}$  |      | 0.25  |      |      |
|             |                         | $T_j = 25\text{ °C}$ $I_F = 10\text{ A}$  |      | 0.37  |      |      |
|             |                         | $T_j = 125\text{ °C}$ $I_F = 10\text{ A}$ |      | 0.33  |      |      |
|             |                         | $T_j = 25\text{ °C}$ $I_F = 15\text{ A}$  |      | 0.415 | 0.47 |      |
|             |                         | $T_j = 125\text{ °C}$ $I_F = 15\text{ A}$ |      | 0.39  | 0.45 |      |

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:

$$P = 0.205 \times I_{F(AV)} + 0.017 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current

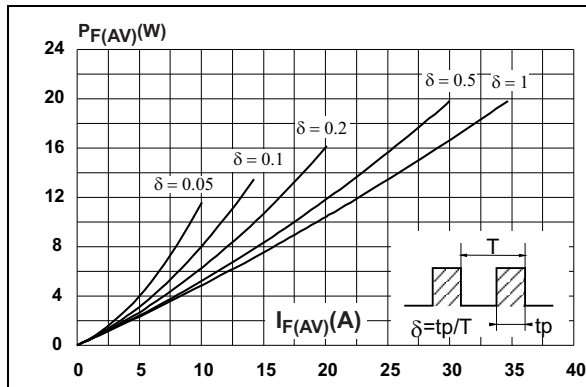
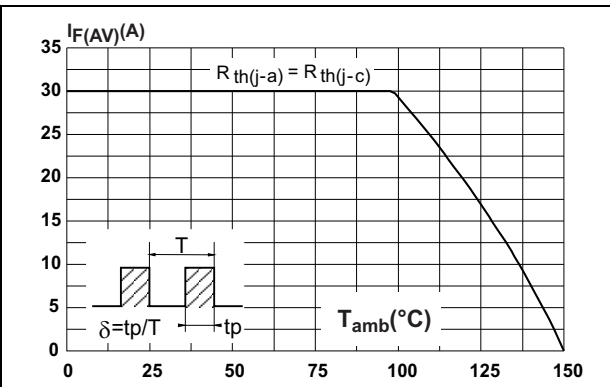
Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ )

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

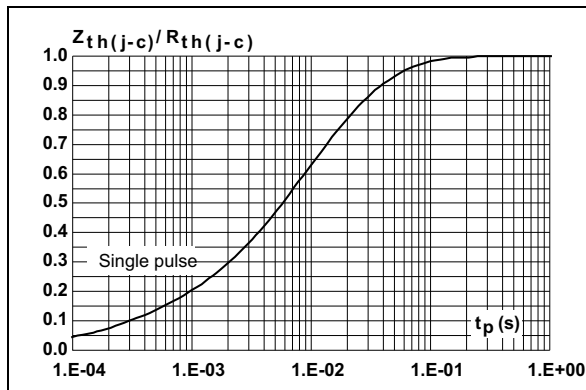


Figure 4. Reverse leakage current versus reverse voltage applied (typical values)

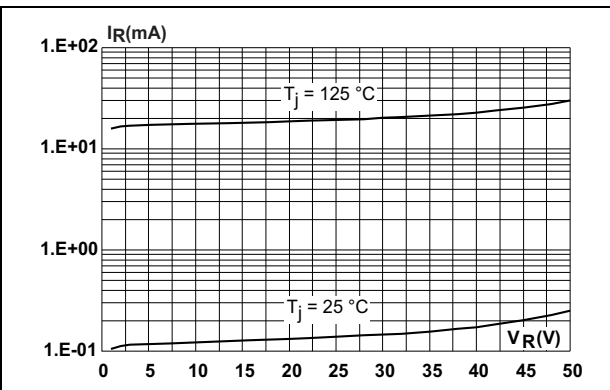


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

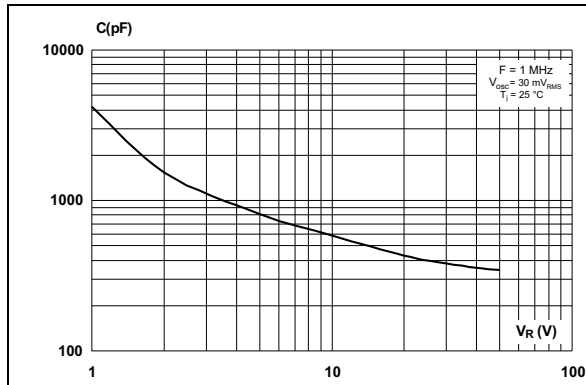


Figure 6. Forward voltage drop versus forward current (typical values)

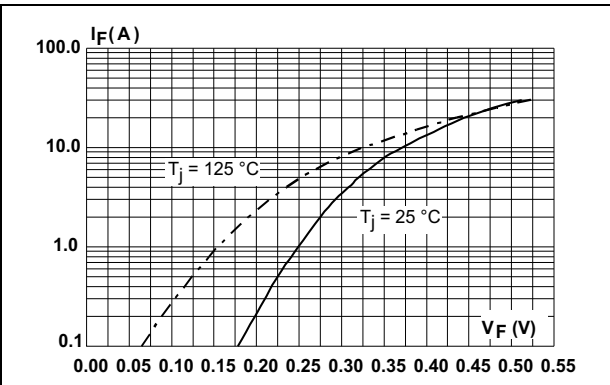
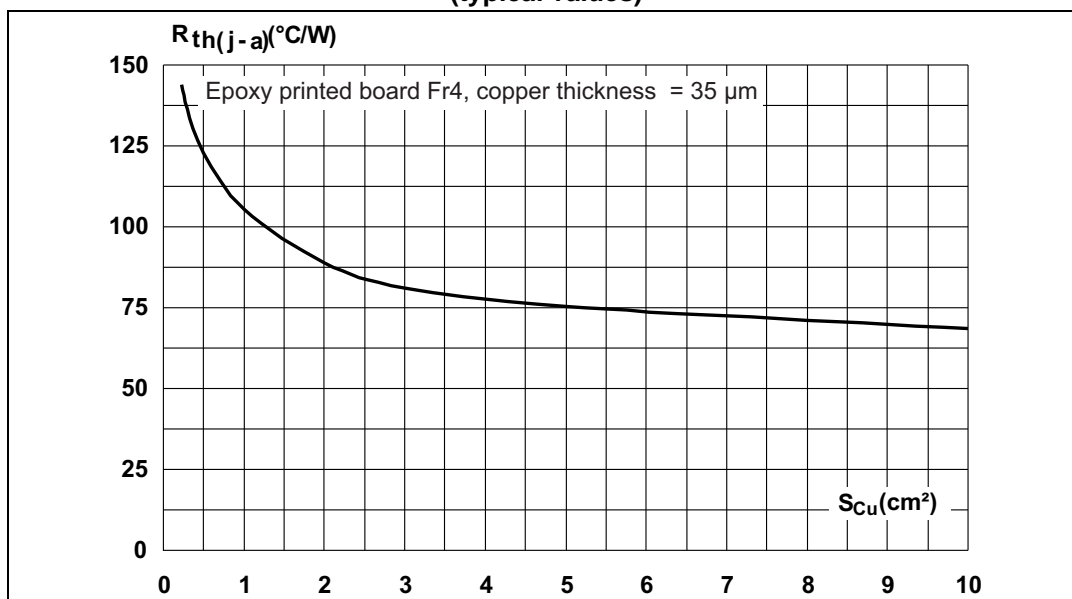


Figure 7. Thermal resistance junction to ambient versus copper surface under tab  
(typical values)

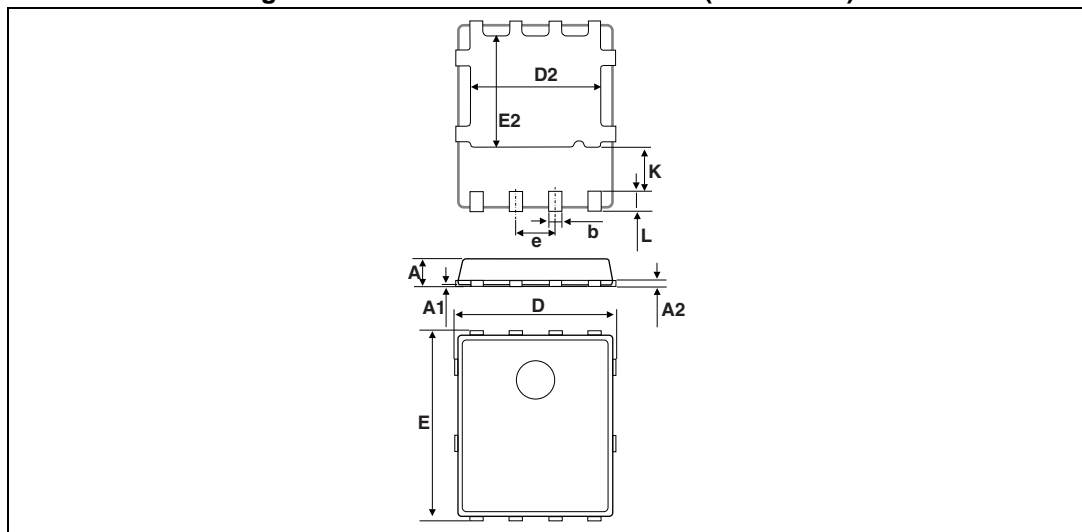


## 2 Package information

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

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.

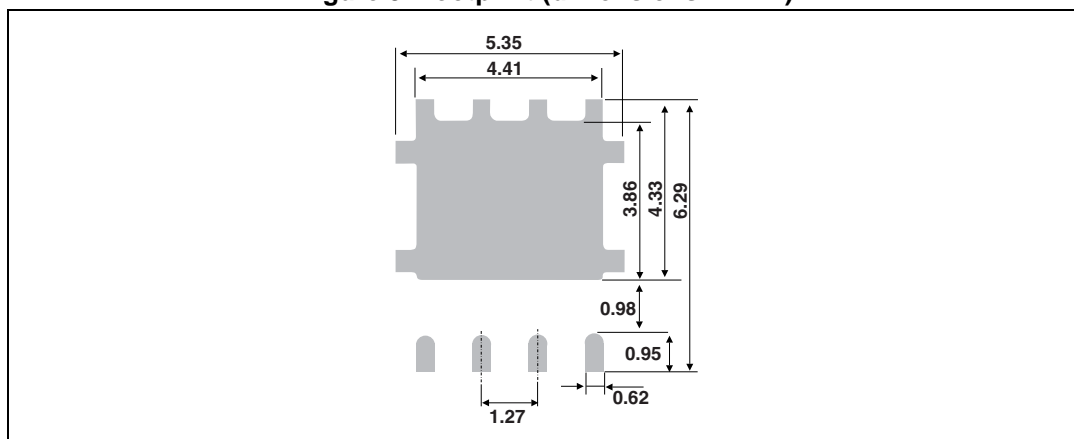
**Figure 8. PowerFLAT-8L dimensions (definitions)**



**Table 5. PowerFLAT-8L dimensions (values)**

| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 0.80        |      | 1.00  | 0.031  |       | 0.039 |
| A1   | 0.02        |      | 0.05  | 0.001  |       | 0.002 |
| A2   |             | 0.25 |       |        | 0.010 |       |
| b    | 0.30        |      | 0.50  | 0.012  |       | 0.020 |
| D    |             | 5.20 |       |        | 0.205 |       |
| D2   | 4.11        |      | 4.31  | 0.162  |       | 0.170 |
| e    |             | 1.27 |       |        | 0.050 |       |
| E    |             | 6.15 |       |        | 0.242 |       |
| E2   | 3.50        |      | 3.70  | 0.138  |       | 0.146 |
| L    | 0.50        |      | 0.80  | 0.020  |       | 0.031 |
| K    | 1.275       |      | 1.575 | 0.050  |       | 0.062 |

Figure 9. Footprint (dimensions in mm)



### 3 Ordering information

**Table 6. Ordering information**

| Order code   | Marking | Package       | Weight | Base qty | Delivery mode |
|--------------|---------|---------------|--------|----------|---------------|
| FERD30S50DJF | FD30S50 | PowerFLAT 5x6 | 95 mg  | 3000     | Tape and reel |

### 4 Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes   |
|-------------|----------|---|
| 28-Jun-2013 | 1        | Initial release.  |
| 18-Nov-2013 | 2        | Updated <a href="#">Table 1</a> and <a href="#">Table 4</a> . Inserted new <a href="#">Figure 1</a> , <a href="#">Figure 2</a> , <a href="#">Figure 4</a> and <a href="#">Figure 6</a> . Product name changed from FERD30S50DJF to FERD30S50. |

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