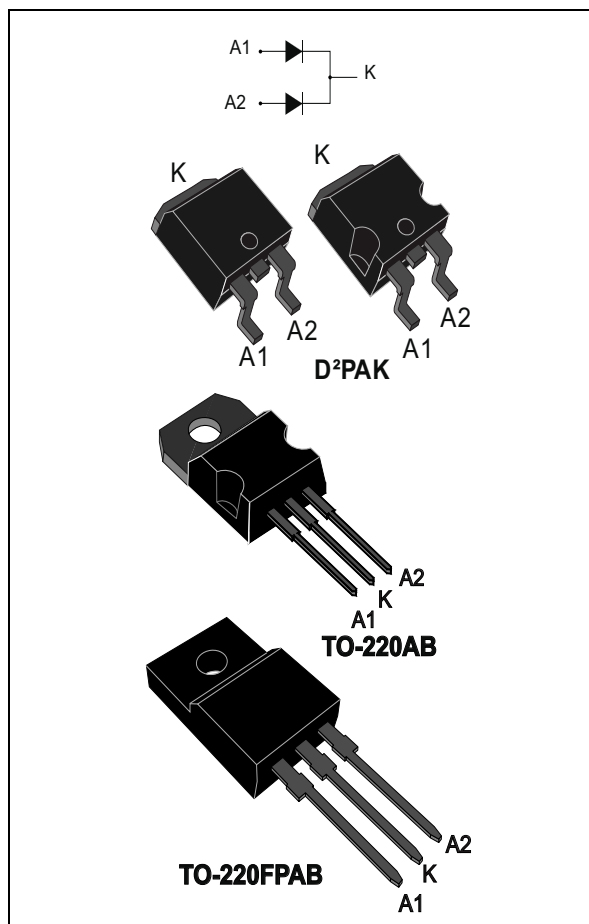


## High voltage power Schottky rectifier

Datasheet — production data



### Description

This dual center tab Schottky rectifier is suited for high frequency switched mode power supplies.

Table 1. Device summary

| Symbol       | Value  |
|--------------|--------|
| $I_{F(AV)}$  | 2 x 5A |
| $V_{RRM}$    | 150 V  |
| $T_{J(max)}$ | 175 °C |
| $V_F (Typ)$  | 0.69 V |

### Features

- High junction temperature capability
- Good trade off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- Insulated package:
  - TO-220FPAB insulating voltage = 2000V<sub>RMS</sub> sine
- ECOPACK<sup>®</sup>2 compliant component for D<sup>2</sup>PAK on demand

# 1 Characteristics

**Table 2. Absolute ratings (limiting values per diode at  $T_{amb} = 25\text{ °C}$  unless otherwise stated)**

| Symbol                          | Parameter                                             |                              |                                                 |            | Value        | Unit |
|---------------------------------|-------------------------------------------------------|------------------------------|-------------------------------------------------|------------|--------------|------|
| V <sub>RRM</sub>                | Repetitive peak reverse voltage                       |                              |                                                 |            | 150          | V    |
| I <sub>F(RMS)</sub>             | Forward rms current                                   |                              |                                                 |            | 10           | A    |
| I <sub>F(AV)</sub>              | Average forward current, δ = 0.5, square wave         | TO-220AB, D <sup>2</sup> PAK | T <sub>c</sub> = 155 °C                         | Per diode  | 5            | A    |
|                                 |                                                       | TO-220FPAB                   | T <sub>c</sub> = 145 °C                         |            |              |      |
|                                 |                                                       | TO-220AB, D <sup>2</sup> PAK | T <sub>c</sub> = 150 °C                         | Per device | 10           |      |
|                                 |                                                       | TO-220FPAB                   | T <sub>c</sub> = 130 °C                         |            |              |      |
| I <sub>FSM</sub>                | Surge non repetitive forward current                  |                              | t <sub>p</sub> = 10 ms sinusoidal               |            | 120          | A    |
| P <sub>ARM</sub> <sup>(1)</sup> | Repetitive peak avalanche power                       |                              | t <sub>p</sub> = 10 μs, T <sub>j</sub> = 125 °C |            | 220          | W    |
| T <sub>stg</sub>                | Storage temperature range                             |                              |                                                 |            | -65 to + 175 | °C   |
| T <sub>j</sub>                  | Maximum operating junction temperature <sup>(2)</sup> |                              |                                                 |            | 175          | °C   |

1. For pulse time duration derating, please refer to [Figure 3](#). More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.

2.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

**Table 3. Thermal parameters**

| Symbol        | Parameter        |                              |           |  | Value | Unit |
|---------------|------------------|------------------------------|-----------|--|-------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AB, D <sup>2</sup> PAK | Per diode |  | 4     | °C/W |
|               |                  | TO-220FPAB                   |           |  | 7     |      |
|               |                  | TO-220AB, D <sup>2</sup> PAK | Total     |  | 2.4   |      |
|               |                  | TO-220FPAB                   |           |  | 5.3   |      |
| $R_{th(c)}$   | Coupling         | TO-220AB, D <sup>2</sup> PAK |           |  | 0.7   |      |
|               |                  | TO-220FPAB                   |           |  | 3.7   |      |

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

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

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ  | Max. | Unit          |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     | -    | -    | 2.0  | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.40 | 2.0  | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 5\text{ A}$  | -    | -    | 0.92 | V             |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.69 | 0.75 |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 10\text{ A}$ | -    | -    | 1.0  |               |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.79 | 0.85 |               |

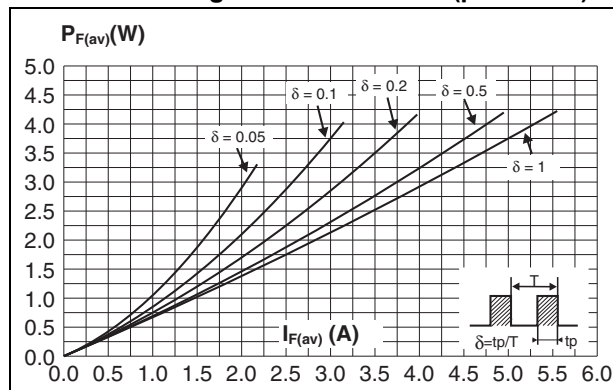
1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

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

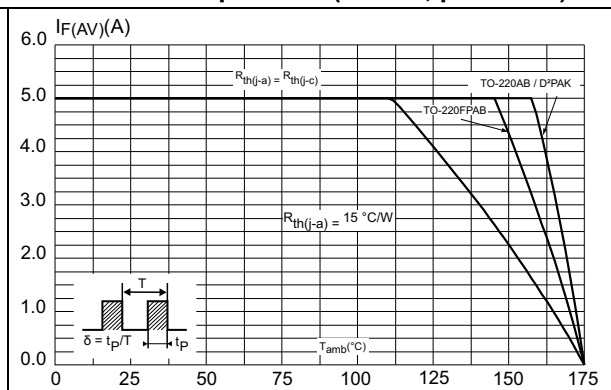
To evaluate the conduction losses use the following equation:

$$P = 0.65 \times I_{F(AV)} + 0.02 \times I_{F(RMS)}^2$$

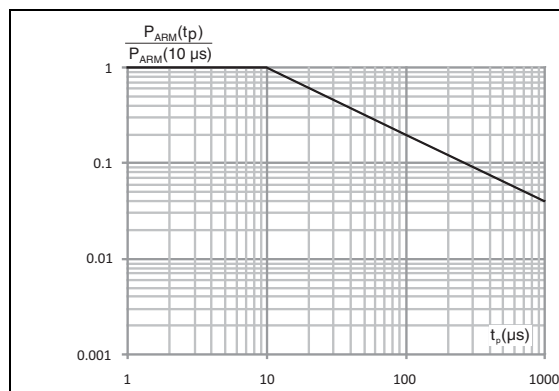
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



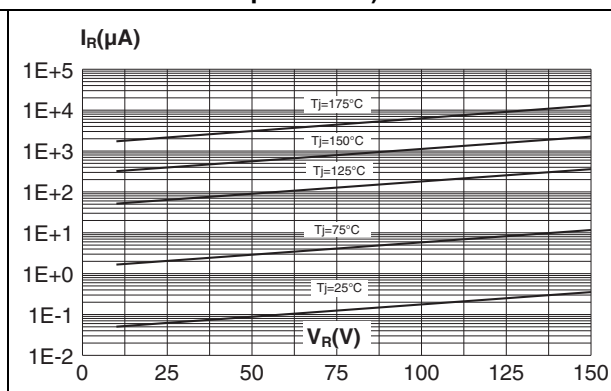
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



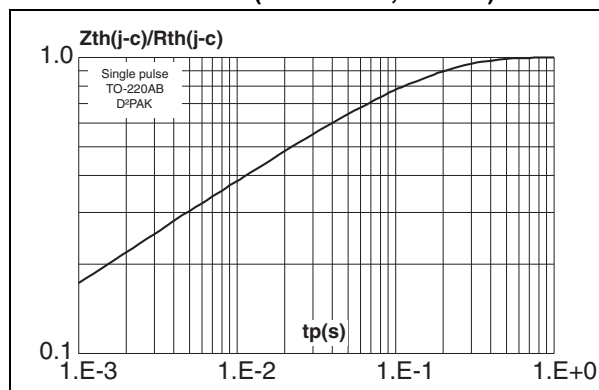
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_J = 125^\circ\text{C}$ )**



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



**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK)**



**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**

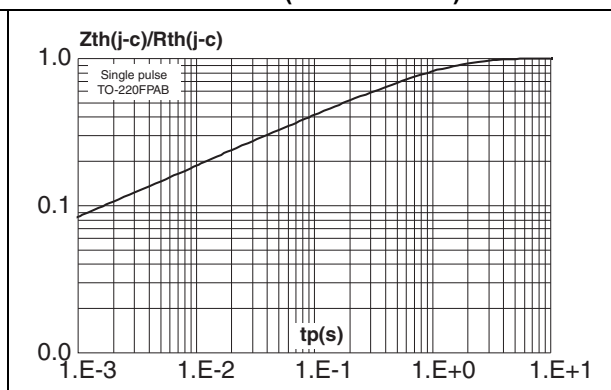


Figure 7. Forward voltage drop vs. forward current (per diode)

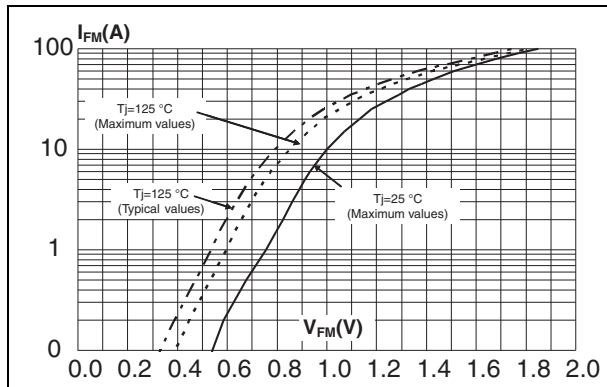


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

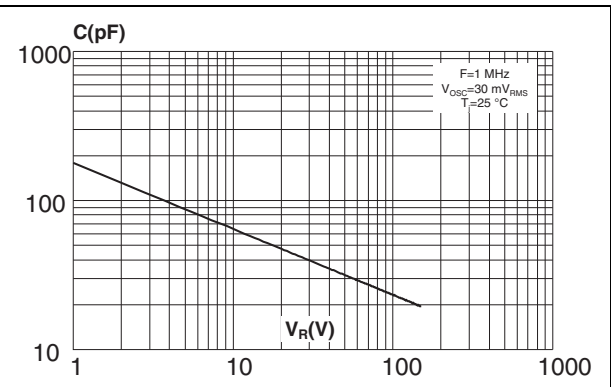
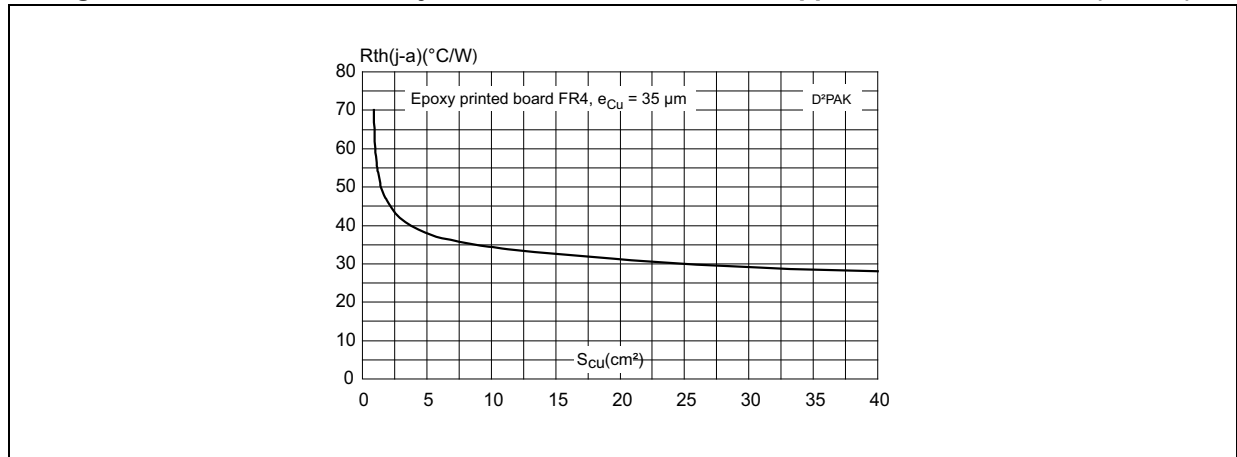


Figure 9. Thermal resistance junction to ambient versus copper surface under tab (D<sup>2</sup>PAK)



## 2 Package Information

- Epoxy meets UL94,V0
- Recommended torque value: 0.55 N·m (TO-220AB, TO-220FPAB)
- Maximum torque value: 0.7 N·m (TO-220AB, TO-220FPAB)

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.

### 2.1 TO-220FPAB package information

Figure 10. TO-220FPAB package outline

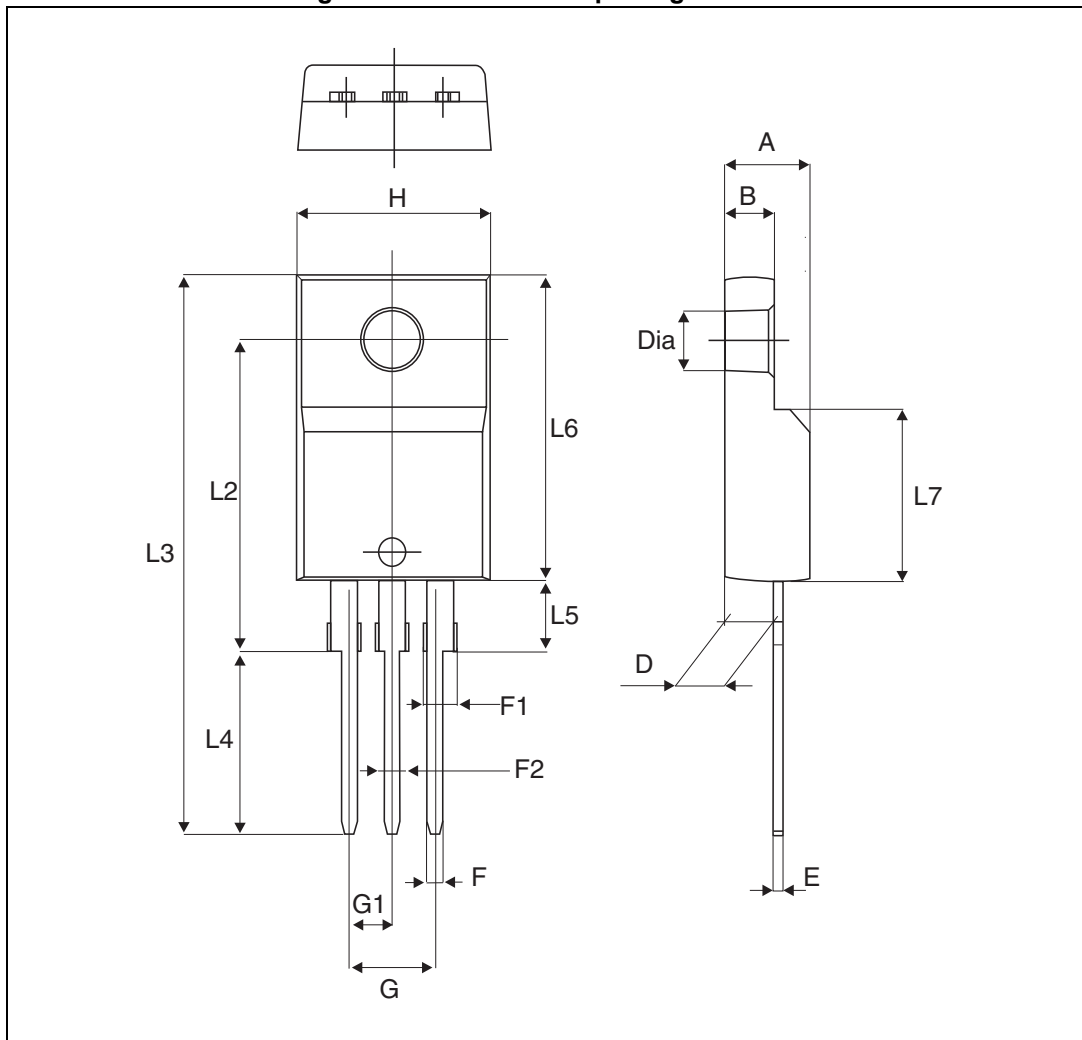


Table 5. TO-220FPAB package mechanical data

| 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 |

## 2.2 TO-220AB package information

Figure 11. TO-220AB package outline

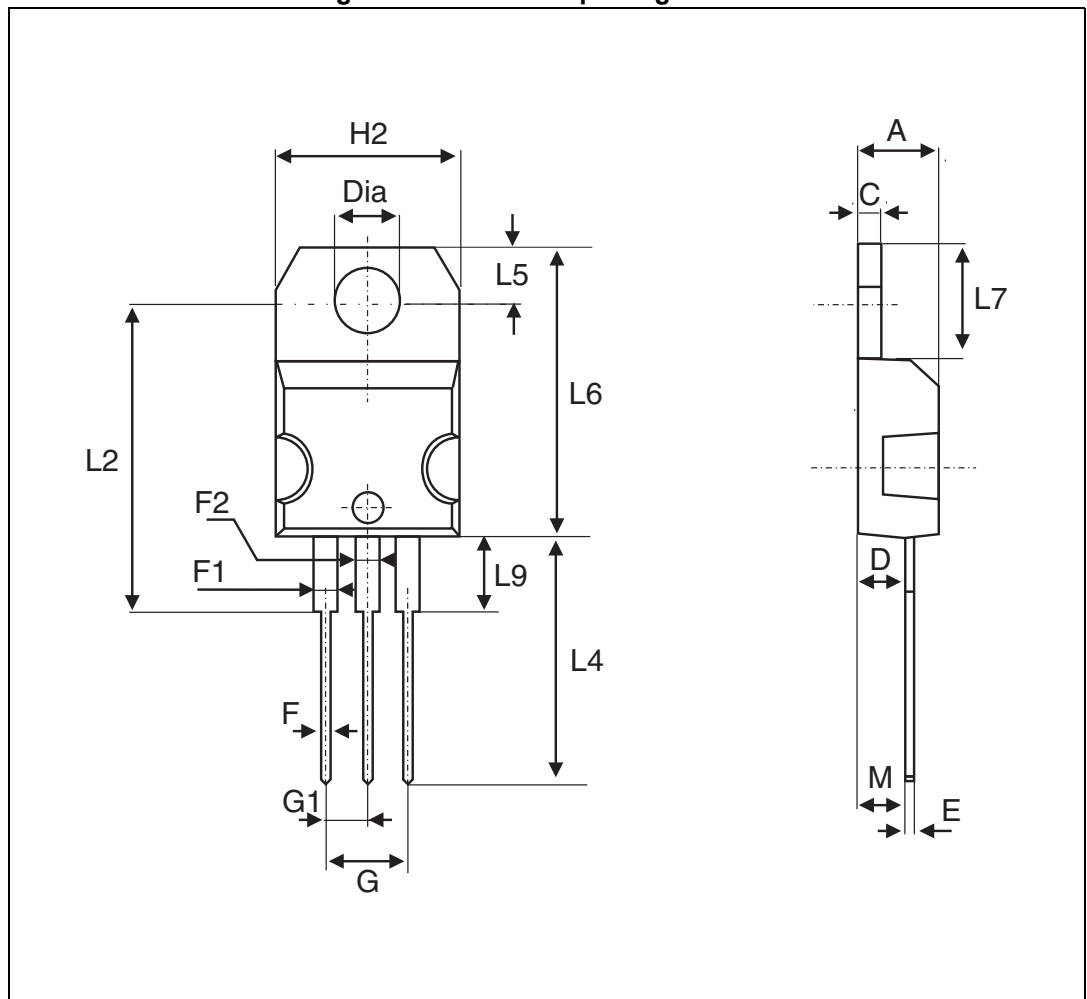
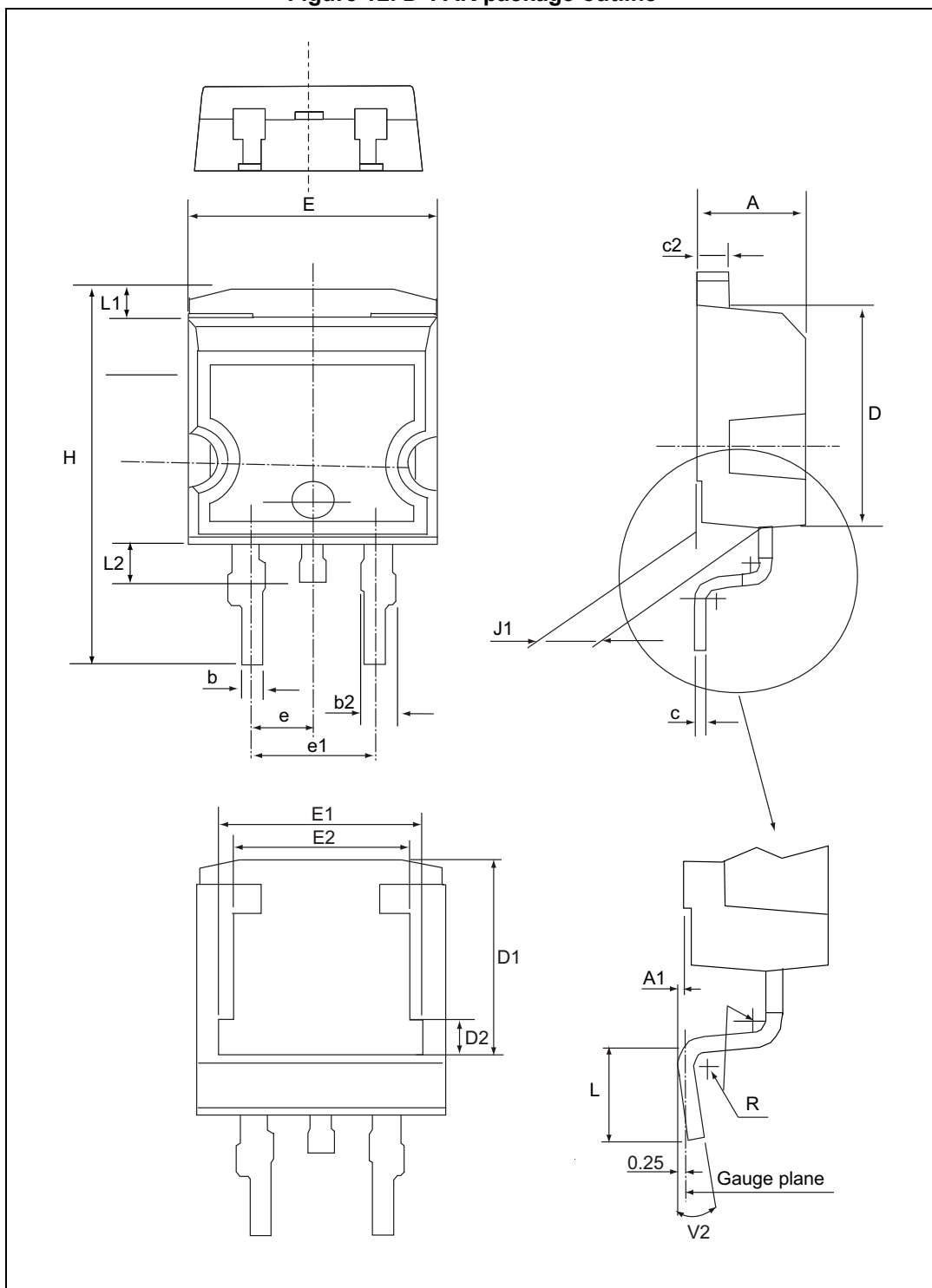


Table 6. TO-220AB package mechanical data

| Ref.  | Dimensions  |           |       |        |            |       |
|-------|-------------|-----------|-------|--------|------------|-------|
|       | Millimeters |           |       | Inches |            |       |
|       | Min.        | Typ.      | Max.  | Min.   | Typ.       | 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 |

## 2.3 D<sup>2</sup>PAK package information

Figure 12. D<sup>2</sup>PAK package outline

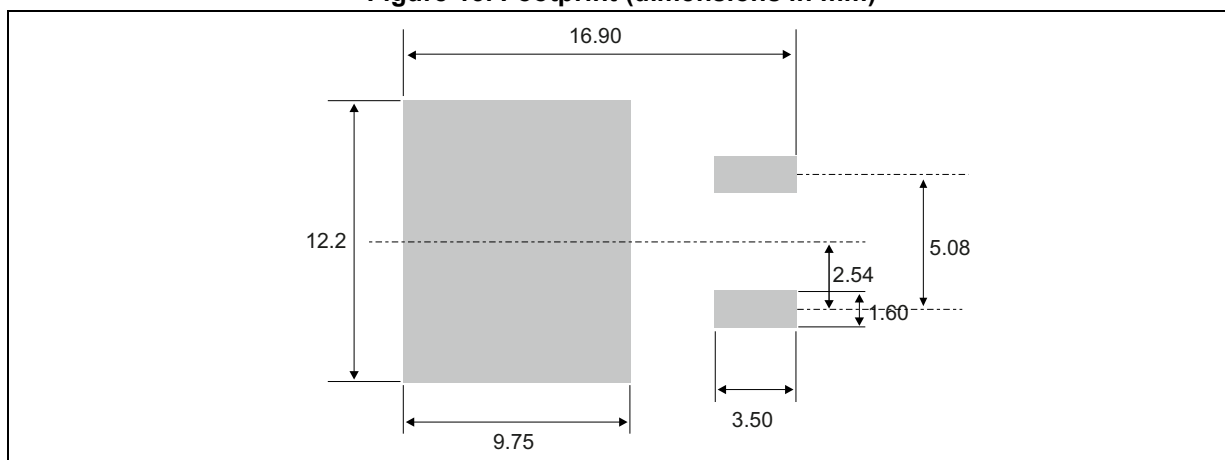


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 7. D<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |           |       |            |      |       |
|------|-------------|-----------|-------|------------|------|-------|
|      | Millimeters |           |       | Inches     |      |       |
|      | Min.        | Typ.      | Max.  | Min.       | Typ. | Max.  |
| A    | 4.36        |           | 4.60  | 0.171      |      | 0.181 |
| A1   | 0           |           | 0.25  |            |      | 0.010 |
| b    | 0.70        |           | 0.93  | 0.027      |      | 0.037 |
| b2   | 1.14        |           | 1.70  | 0.045      |      | 0.067 |
| c    | 0.38        |           | 0.69  | 0.014      |      | 0.027 |
| c2   | 1.19        |           | 1.36  | 0.046      |      | 0.053 |
| D    | 8.60        |           | 9.35  | 0.338      |      | 0.368 |
| D1   | 6.90        |           | 8.0   | 0.271      |      | 0.315 |
| D2   | 1.10        |           | 1.50  | 0.043      |      | 0.060 |
| E    | 10.00       |           | 10.55 | 0.393      |      | 0.415 |
| E1   | 8.10        |           | 8.90  | 0.318      |      | 0.350 |
| E2   | 6.85        |           | 7.25  | 0.269      |      | 0.285 |
| e    |             | 2.54      |       |            | 0.1  |       |
| e1   | 4.88        |           | 5.28  | 0.192      |      | 0.208 |
| H    | 15.00       |           | 15.85 | 0.590      |      | 0.624 |
| J1   | 2.49        |           | 2.90  | 0.098      |      | 0.114 |
| L    | 1.9         |           | 2.79  | 0.074      |      | 0.110 |
| L1   | 1.27        |           | 1.65  | 0.050      |      | 0.065 |
| L2   | 1.30        |           | 1.78  | 0.051      |      | 0.070 |
| R    |             | 0.40 typ. |       | 0.016 typ. |      |       |
| V2   | 0°          |           | 8°    | 0°         |      | 8°    |

Figure 13. Footprint (dimensions in mm)



### 3 Ordering information

**Table 8. Ordering information**

| Order code     | Marking      | Package            | Weight | Base qty | Delivery mode |
|----------------|--------------|--------------------|--------|----------|---------------|
| STPS10150CT    | STPS10150CT  | TO-220AB           | 1.95 g | 50       | Tube          |
| STPS10150CFP   | STPS10150CFP | TO-220FPAB         | 1.90 g | 50       |               |
| STPS10150CG-TR | STPS10150CG  | D <sup>2</sup> PAK | 1.38 g | 1000     | Tape and reel |

### 4 Revision history

**Table 9. Revision history**

| Date        | Revision | Changes                                                                    |
|-------------|----------|----------------------------------------------------------------------------|
| Jul-2003    | 5B       | Last update.                                                               |
| 19-Jun-2006 | 6        | Reformatted to current standard. Added ECOPACK statement. Added TO220FPAB. |
| 23-Apr-2015 | 7        | Updated D <sup>2</sup> PAK and reformatted to current standard.            |

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**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331