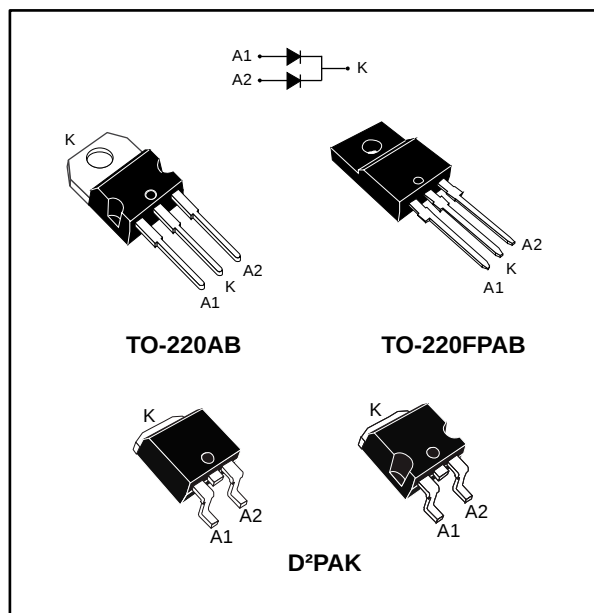


## High voltage power Schottky rectifier

Datasheet - production data



### Description

Dual center tap Schottky rectifier diode suited for high frequency switched mode power supplies.

Table 1: Device summary

| Symbol       | Value    |
|--------------|----------|
| $I_{F(AV)}$  | 2 x 10 A |
| $V_{RRM}$    | 170 V    |
| $T_j$ (max.) | 175 °C   |
| $V_F$ (typ.) | 0.69 V   |

### Features

- High reverse voltage
- High junction temperature capability
- Avalanche specification with derating curves
- Insulated package TO-220FPAB
  - Insulating voltage: 2000  $V_{RMS}$  sine
- ECOPACK®2 compliant component for D²PAK on demand

### Benefits

- Can challenge bipolar ultrafast diodes with better dynamic characteristics

# 1 Characteristics

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

| Symbol              | Parameter                                             |                                  |                         |                                                    | Value       | Unit |
|---------------------|-------------------------------------------------------|----------------------------------|-------------------------|----------------------------------------------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                  |                         |                                                    | 170         | V    |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                  |                         |                                                    | 30          | A    |
| I <sub>F(AV)</sub>  | Average forward current<br>δ = 0.5, square wave       | TO-220AB /<br>D <sup>2</sup> PAK | T <sub>C</sub> = 155 °C | Per diode                                          | 10          | A    |
|                     |                                                       |                                  | T <sub>C</sub> = 150 °C | Total                                              | 20          |      |
|                     |                                                       | TO-220FPAB                       | T <sub>C</sub> = 135 °C | Per diode                                          | 10          |      |
|                     |                                                       |                                  | T <sub>C</sub> = 115 °C | Total                                              | 20          |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  |                                  |                         | t <sub>p</sub> = 10 ms<br>sinusoidal               | 180         | A    |
| P <sub>ARM</sub>    | Repetitive peak avalanche power                       |                                  |                         | t <sub>p</sub> = 10 μs,<br>T <sub>j</sub> = 125 °C | 480         | W    |
| T <sub>stg</sub>    | Storage temperature range                             |                                  |                         |                                                    | -65 to +175 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature <sup>(1)</sup> |                                  |                         |                                                    | 175         |      |

**Notes:**

<sup>(1)</sup>(dP<sub>tot</sub>/dT<sub>j</sub>) < (1/R<sub>th(j-a)</sub>) condition to avoid thermal runaway for a diode on its own heatsink.

**Table 3: Thermal parameters**

| Symbol               | Parameter        |                               |           | Max. value | Unit |
|----------------------|------------------|-------------------------------|-----------|------------|------|
| R <sub>th(j-c)</sub> | Junction to case | TO-220AB / D <sup>2</sup> PAK | Per diode | 2.2        | °C/W |
|                      |                  |                               | Total     | 1.3        |      |
|                      |                  | TO-220FPAB                    | Per diode | 4.5        |      |
|                      |                  |                               | Total     | 3.5        |      |
| R <sub>th(c)</sub>   | Coupling         | TO-220AB / D <sup>2</sup> PAK |           | 0.3        |      |
|                      |                  | TO-220FPAB                    |           | 2.5        |      |

When the diodes 1 and 2 are used simultaneously:

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

Table 4: Static electrical characteristics (per diode)

| Symbol      | Parameter               | Test conditions                     |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-------------------------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_J = 25\text{ }^{\circ}\text{C}$  | $V_R = V_{RRM}$     | -    |      | 15   | $\mu\text{A}$ |
|             |                         | $T_J = 125\text{ }^{\circ}\text{C}$ |                     | -    |      | 15   | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_J = 25\text{ }^{\circ}\text{C}$  | $I_F = 10\text{ A}$ | -    |      | 0.90 | V             |
|             |                         | $T_J = 125\text{ }^{\circ}\text{C}$ |                     | -    | 0.69 | 0.75 |               |
|             |                         | $T_J = 25\text{ }^{\circ}\text{C}$  | $I_F = 20\text{ A}$ | -    |      | 0.99 |               |
|             |                         | $T_J = 125\text{ }^{\circ}\text{C}$ |                     | -    | 0.79 | 0.86 |               |

**Notes:**

<sup>(1)</sup>Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

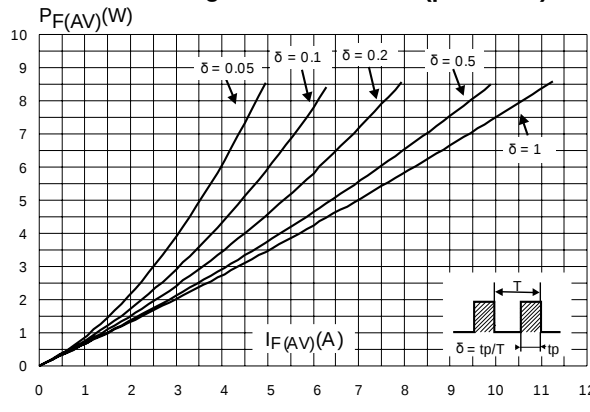
<sup>(2)</sup>Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

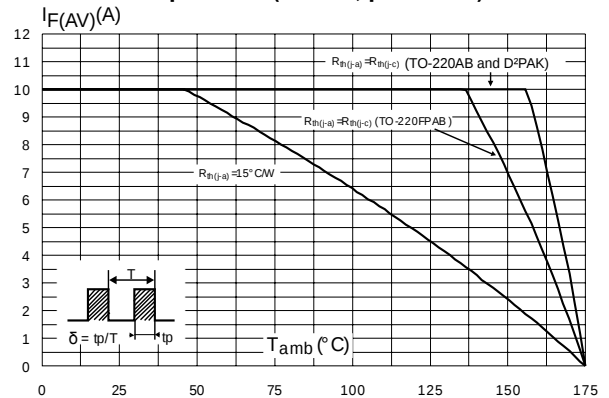
$$P = 0.64 \times I_{F(AV)} + 0.011 \times I_{F(RMS)}^2$$

## 1.1 Characteristics (curves)

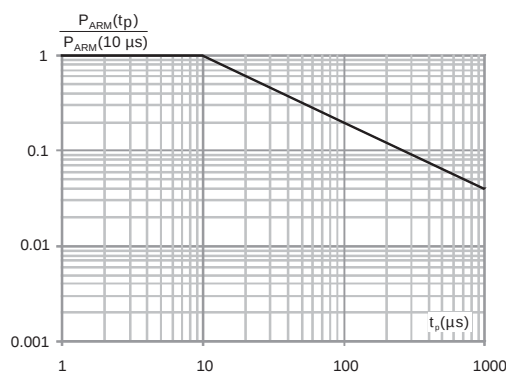
**Figure 1: Average forward power dissipation versus average forward current (per diode)**



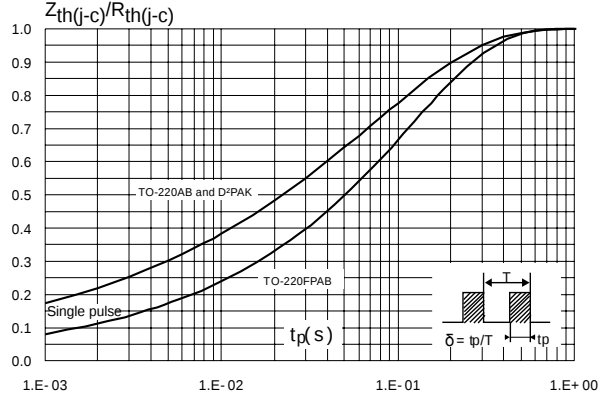
**Figure 2: Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



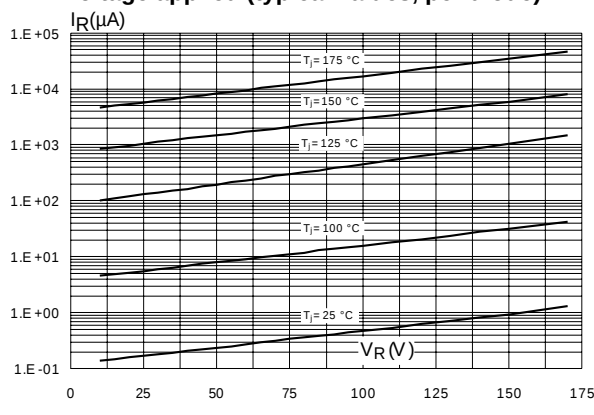
**Figure 3: Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration**



**Figure 5: Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 6: Junction capacitance versus reverse voltage applied (typical values, per diode)**

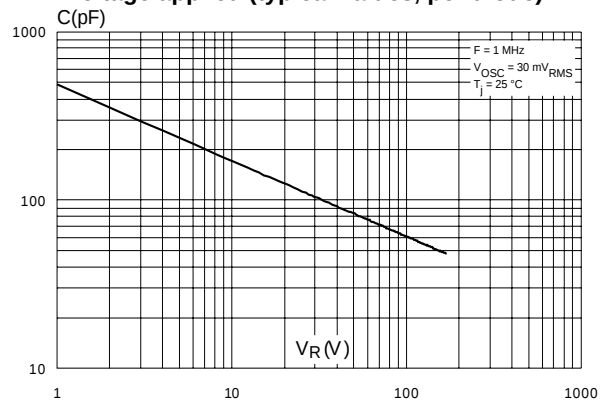


Figure 7: Forward voltage drop versus forward current (per diode)

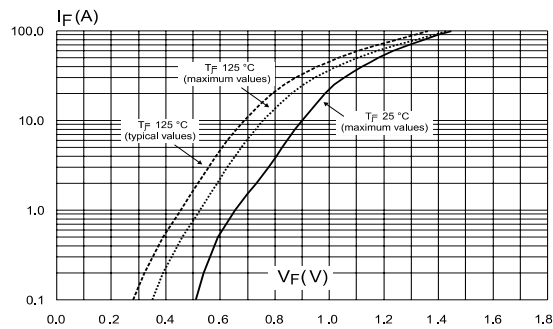
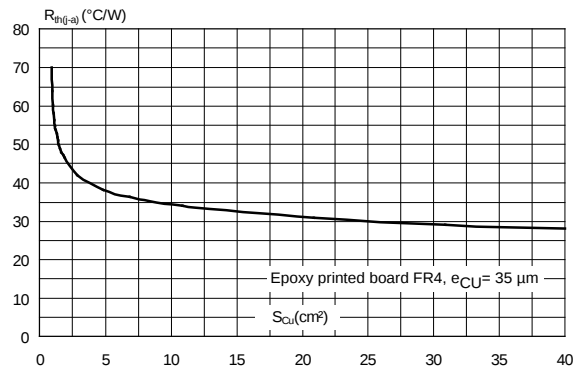


Figure 8: Thermal resistance junction to ambient versus copper surface under tab for D<sup>2</sup>PAK

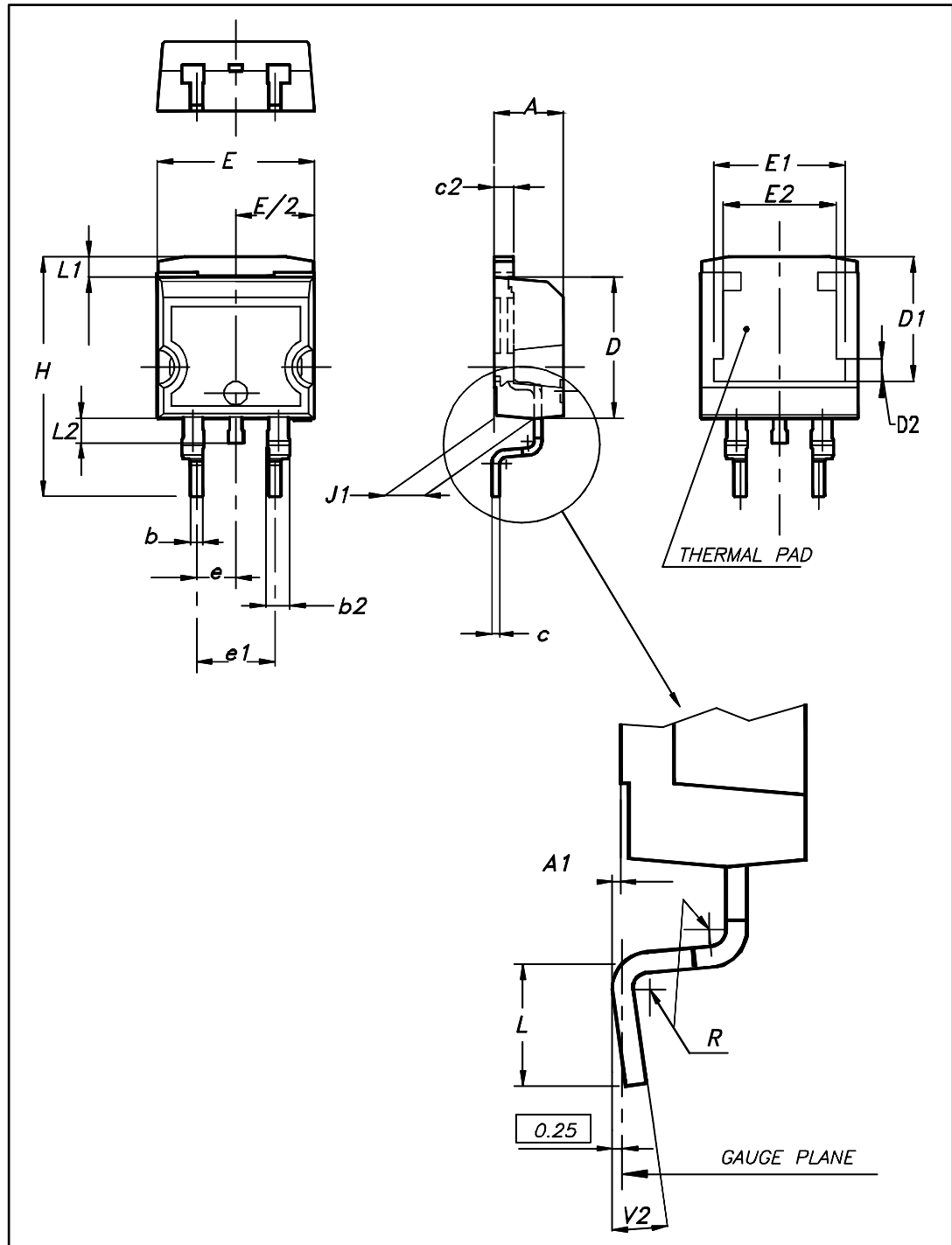


## 2 Package information

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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220AB and TO-220FPAB)
- Maximum torque value: 0.7 N·m (for TO-220AB and TO-220FPAB)

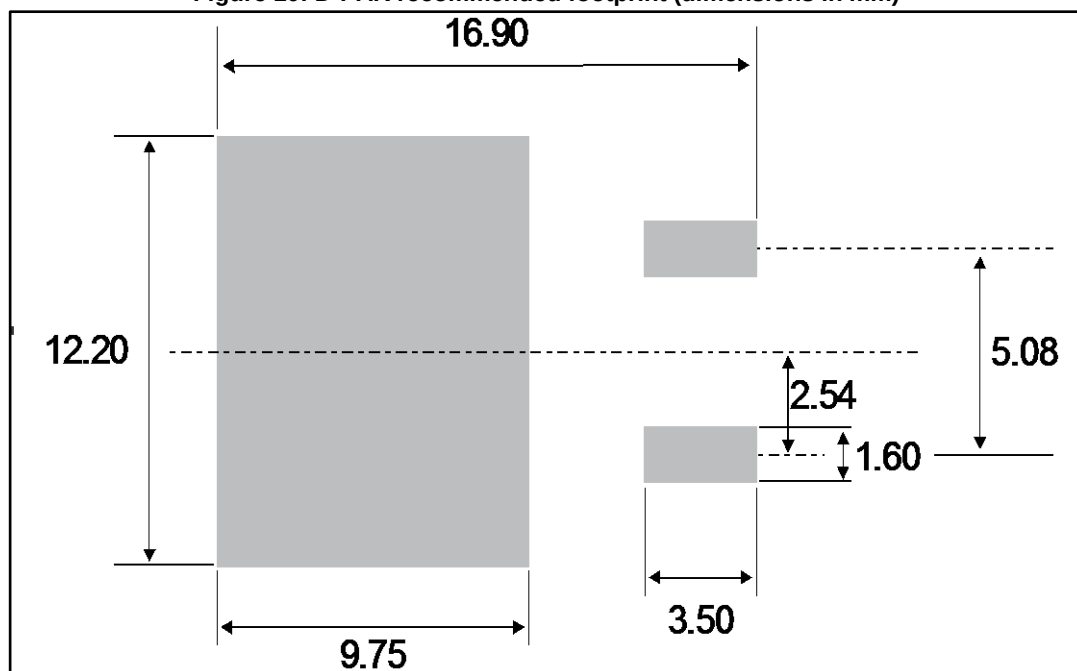
## 2.1 D<sup>2</sup>PAK package information

Figure 9: D<sup>2</sup>PAK package outline

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

Table 5: D<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 4.36        | 4.60  | 0.172  | 0.181 |
| A1   | 0.00        | 0.25  | 0.000  | 0.010 |
| b    | 0.70        | 0.93  | 0.028  | 0.037 |
| b2   | 1.14        | 1.70  | 0.045  | 0.067 |
| c    | 0.38        | 0.69  | 0.015  | 0.027 |
| c2   | 1.19        | 1.36  | 0.047  | 0.053 |
| D    | 8.60        | 9.35  | 0.339  | 0.368 |
| D1   | 6.90        | 8.00  | 0.272  | 0.311 |
| D2   | 1.10        | 1.50  | 0.043  | 0.060 |
| E    | 10.00       | 10.55 | 0.394  | 0.415 |
| E1   | 8.10        | 8.90  | 0.319  | 0.346 |
| E2   | 6.85        | 7.25  | 0.266  | 0.282 |
| e    | 2.54 typ.   |       | 0.100  |       |
| e1   | 4.88        | 5.28  | 0.190  | 0.205 |
| H    | 15.00       | 15.85 | 0.591  | 0.624 |
| J1   | 2.49        | 2.90  | 0.097  | 0.112 |
| L    | 1.90        | 2.79  | 0.075  | 0.110 |
| L1   | 1.27        | 1.65  | 0.049  | 0.065 |
| L2   | 1.30        | 1.78  | 0.050  | 0.070 |
| R    | 0.4 typ.    |       | 0.015  |       |
| V2   | 0°          | 8°    | 0°     | 8°    |

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

## 2.2 TO-220FPAB package information

Figure 11: TO-220FPAB package outline

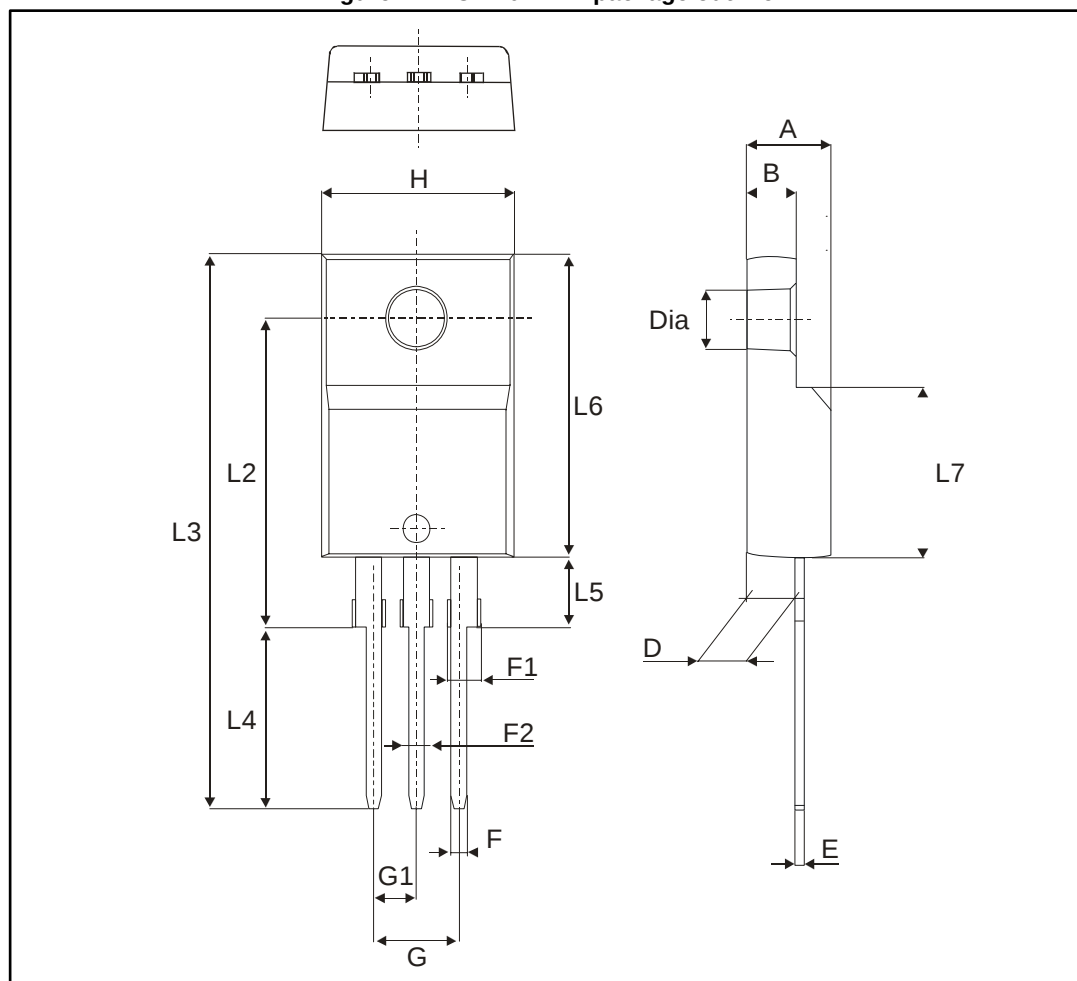


Table 6: TO-220FPAB package mechanical data

| Ref. | Dimensions  |       |           |       |
|------|-------------|-------|-----------|-------|
|      | Millimeters |       | Inches    |       |
|      | Min.        | Max.  | Min.      | Max.  |
| A    | 4.40        | 4.60  | 0.173     | 0.181 |
| B    | 2.5         | 2.7   | 0.098     | 0.106 |
| D    | 2.50        | 2.75  | 0.098     | 0.108 |
| E    | 0.45        | 0.70  | 0.018     | 0.027 |
| F    | 0.75        | 1.0   | 0.03      | 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   | 2.40        | 2.70  | 0.094     | 0.106 |
| H    | 10.00       | 10.40 | 0.393     | 0.409 |
| L2   | 16.00 typ.  |       | 0.63 typ. |       |
| L3   | 28.60       | 30.60 | 1.126     | 1.205 |
| L4   | 9.80        | 10.6  | 0.386     | 0.417 |
| L5   | 2.90        | 3.60  | 0.114     | 0.142 |
| L6   | 15.90       | 16.40 | 0.626     | 0.646 |
| L7   | 9.00        | 9.30  | 0.354     | 0.366 |
| Dia  | 3.0         | 3.20  | 0.118     | 0.126 |

## 2.3 TO-220AB package information

Figure 12: TO-220AB package outline

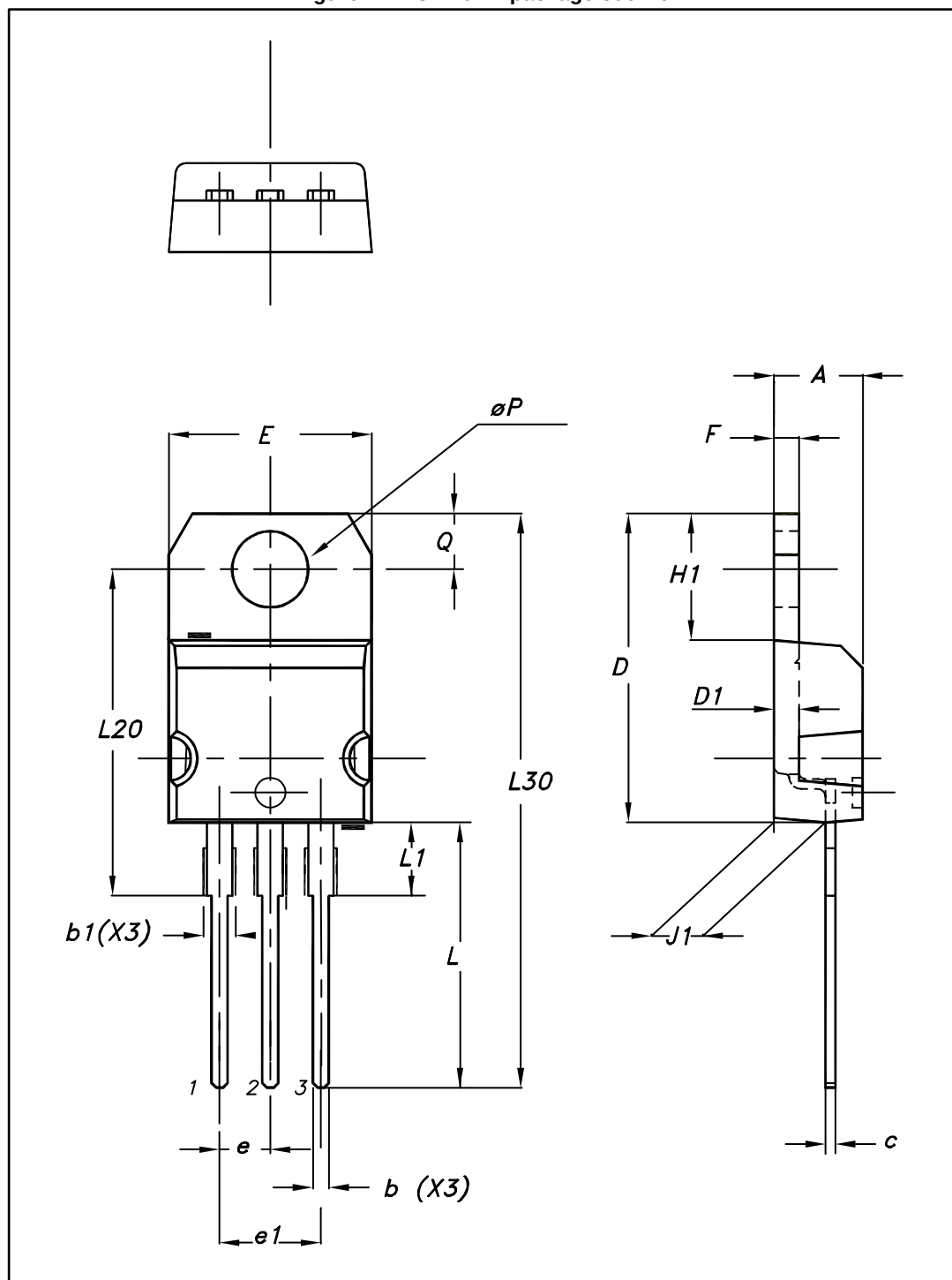


Table 7: TO-220AB package mechanical data

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 4.40        | 4.60  | 0.173      | 0.181 |
| b    | 0.61        | 0.88  | 0.240      | 0.035 |
| b1   | 1.14        | 1.70  | 0.045      | 0.067 |
| c    | 0.48        | 0.70  | 0.019      | 0.028 |
| D    | 15.25       | 15.75 | 0.600      | 0.620 |
| D1   | 1.27 typ.   |       | 0.050 typ. |       |
| E    | 10.00       | 10.40 | 0.394      | 0.409 |
| e    | 2.40        | 2.70  | 0.094      | 0.106 |
| e1   | 4.95        | 5.15  | 0.195      | 0.203 |
| F    | 1.23        | 1.32  | 0.048      | 0.052 |
| H1   | 6.20        | 6.60  | 0.244      | 0.260 |
| J1   | 2.40        | 2.72  | 0.094      | 0.107 |
| L    | 13.00       | 14.00 | 0.512      | 0.551 |
| L1   | 3.50        | 3.93  | 0.138      | 0.155 |
| L20  | 16.40 typ.  |       | 0.646 typ. |       |
| L30  | 28.90 typ.  |       | 1.138 typ. |       |
| θP   | 3.75        | 3.85  | 0.148      | 0.152 |
| Q    | 2.65        | 2.95  | 0.104      | 0.116 |

### 3 Ordering information

Table 8: Ordering information

| Order code     | Marking      | Package            | Weight | Base qty. | Delivery mode |
|----------------|--------------|--------------------|--------|-----------|---------------|
| STPS20170CT    | STPS20170CT  | TO-220AB           | 1.95 g | 50        | Tube          |
| STPS20170CFP   | STPS20170CFP | TO-220FPAB         | 1.7 g  | 50        | Tube          |
| STPS20170CG-TR | STPS20170CG  | D <sup>2</sup> PAK | 1.38 g | 1000      | Tape and reel |

### 4 Revision history

Table 9: Document revision history

| Date        | Revision | Changes                                                                                                                                                                                                                                                                                                                                       |
|-------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mar-2004    | 1        | First issue.                                                                                                                                                                                                                                                                                                                                  |
| 28-Jul-2005 | 2        | TO-220FPAB, I <sup>2</sup> PAK and D <sup>2</sup> PAK packages added.                                                                                                                                                                                                                                                                         |
| 14-Oct-2016 | 3        | Removed I <sup>2</sup> PAK package.<br>Updated features and packages silhouettes in cover page.<br>Updated <a href="#">Section 5: "Characteristics"</a> , <a href="#">Section 5.1: "Characteristics (curves)"</a> , <a href="#">Table 8: "Ordering information"</a> and <a href="#">Section 6.2: "D<sup>2</sup>PAK package information"</a> . |

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