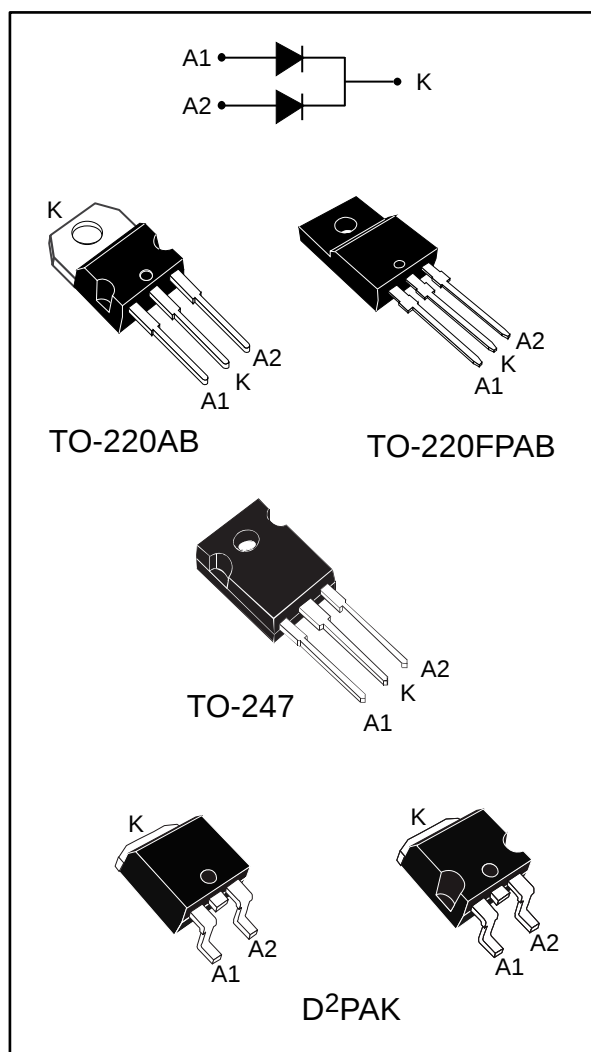


## High voltage power Schottky rectifier

Datasheet - production data



### 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 = 2000 V<sub>RMS</sub> sine
- ECOPACK®2 compliant component for D<sup>2</sup>PAK on demand

### Description

Dual center tap Schottky rectifier designed for high frequency switch mode power supply.

Table 1: Device summary

| Symbol      | Value    |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 15 A |
| $V_{RRM}$   | 150 V    |
| $T_j$ (max) | 175 °C   |
| $V_F$ (typ) | 0.69 V   |

# 1 Characteristics

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

| Symbol<br>I         | Parameter                                             |                                      |                         |            | Value       | Unit |
|---------------------|-------------------------------------------------------|--------------------------------------|-------------------------|------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                      |                         |            | 150         | V    |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                      |                         |            | 30          | A    |
| I <sub>F(AV)</sub>  | Average forward current δ = 0.5, square wave          | TO-220FPAB                           | T <sub>C</sub> = 120 °C | Per diode  | 15          | A    |
|                     |                                                       |                                      | T <sub>C</sub> = 90 °C  | Per device | 30          |      |
|                     |                                                       | TO-220AB, D <sup>2</sup> PAK, TO-247 | T <sub>C</sub> = 155 °C | Per diode  | 15          |      |
|                     |                                                       |                                      | T <sub>C</sub> = 150 °C | Per device | 30          |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | tp = 10 ms sinusoidal                |                         |            | 220         | A    |
| P <sub>ARM</sub>    | Repetitive peak avalanche power                       | tp = 10 μs, Tj = 125 °C              |                         |            | 750         | W    |
| T <sub>stg</sub>    | Storage temperature range                             |                                      |                         |            | -65 to +175 | °C   |
| Tj                  | Maximum operating junction temperature <sup>(1)</sup> |                                      |                         |            | +175        | °C   |

**Notes:**

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

**Table 3: Thermal parameter**

| Symbol        | Parameter        |                                      |           | Max. value | Unit |
|---------------|------------------|--------------------------------------|-----------|------------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AB, D <sup>2</sup> PAK         | Per diode | 1.6        | °C/W |
|               |                  | TO-220FPAB                           |           | 4          |      |
|               |                  | TO-247                               |           | 1.5        |      |
|               |                  | TO-220AB, D <sup>2</sup> PAK         | Total     | 0.85       |      |
|               |                  | TO-220FPAB                           |           | 3.3        |      |
|               |                  | TO-247                               |           | 0.8        |      |
| $R_{th(c)}$   | Coupling         | TO-220AB, D <sup>2</sup> PAK, TO-247 | -         | 0.1        | °C/W |
|               |                  | TO-220FPAB                           |           | 2.6        |      |

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 | $T_J = 25\text{ }^{\circ}\text{C}$  | $V_R = V_{RRM}$     | -    |      | 6.5  | $\mu\text{A}$ |
|             |                         | $T_J = 125\text{ }^{\circ}\text{C}$ |                     | -    |      | 8.0  | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_J = 25\text{ }^{\circ}\text{C}$  | $I_F = 15\text{ A}$ | -    |      | 0.92 | V             |
|             |                         | $T_J = 125\text{ }^{\circ}\text{C}$ |                     | -    | 0.69 | 0.75 |               |
|             |                         | $T_J = 25\text{ }^{\circ}\text{C}$  | $I_F = 30\text{ A}$ | -    |      | 1    |               |
|             |                         | $T_J = 125\text{ }^{\circ}\text{C}$ |                     | -    | 0.8  | 0.86 |               |

**Notes:**

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

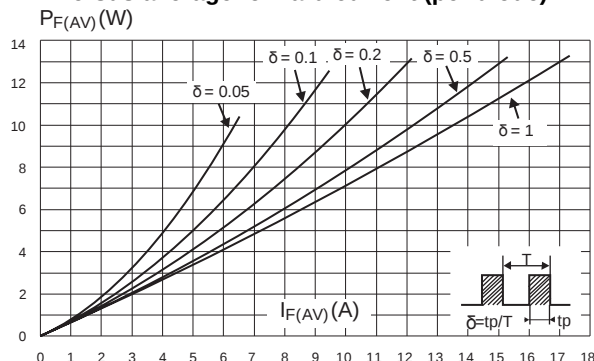
<sup>(2)</sup>Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

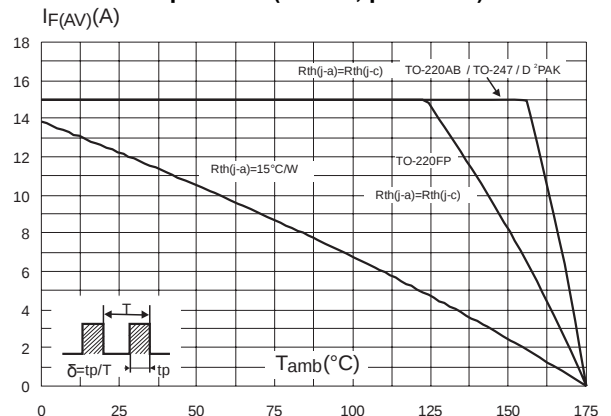
$$P = 0.64 \times I_{F(AV)} + 0.0073 I_{F(RMS)}^2$$

## 1.1 Characteristics (curves)

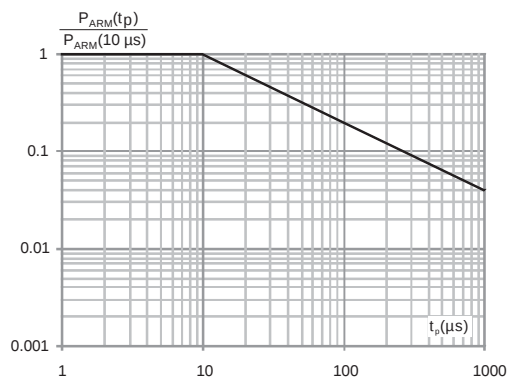
**Figure 1: Average forward power dissipation versus average forward current (per diode)**



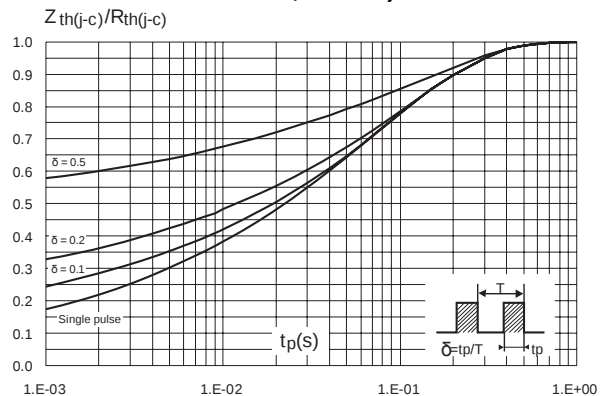
**Figure 2: Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



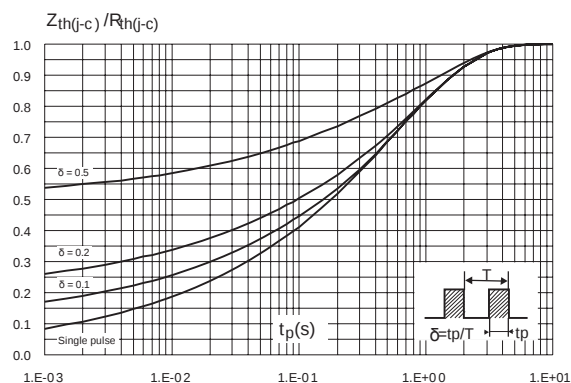
**Figure 3: Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



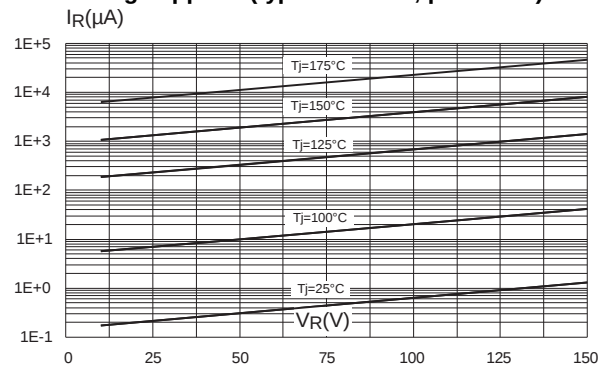
**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK, TO-247)**



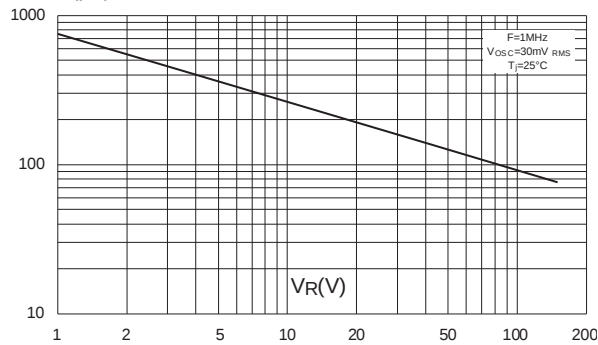
**Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**



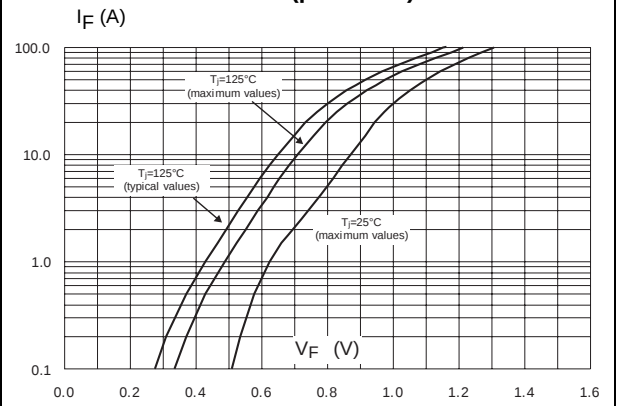
**Figure 6: Reverse leakage current versus reverse voltage applied (typical values, per diode)**



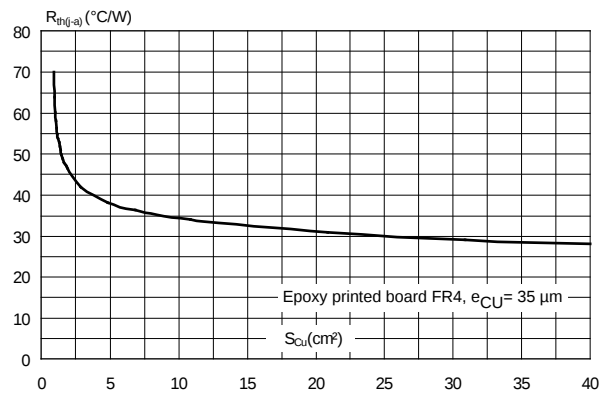
**Figure 7: Junction capacitance versus reverse voltage applied (typical values, per diode)**  
C(pF)



**Figure 8: Forward voltage drop versus forward current (per diode)**



**Figure 9: Thermal resistance junction to ambient versus copper surface under tab for D<sup>2</sup>PAK (typical values)**

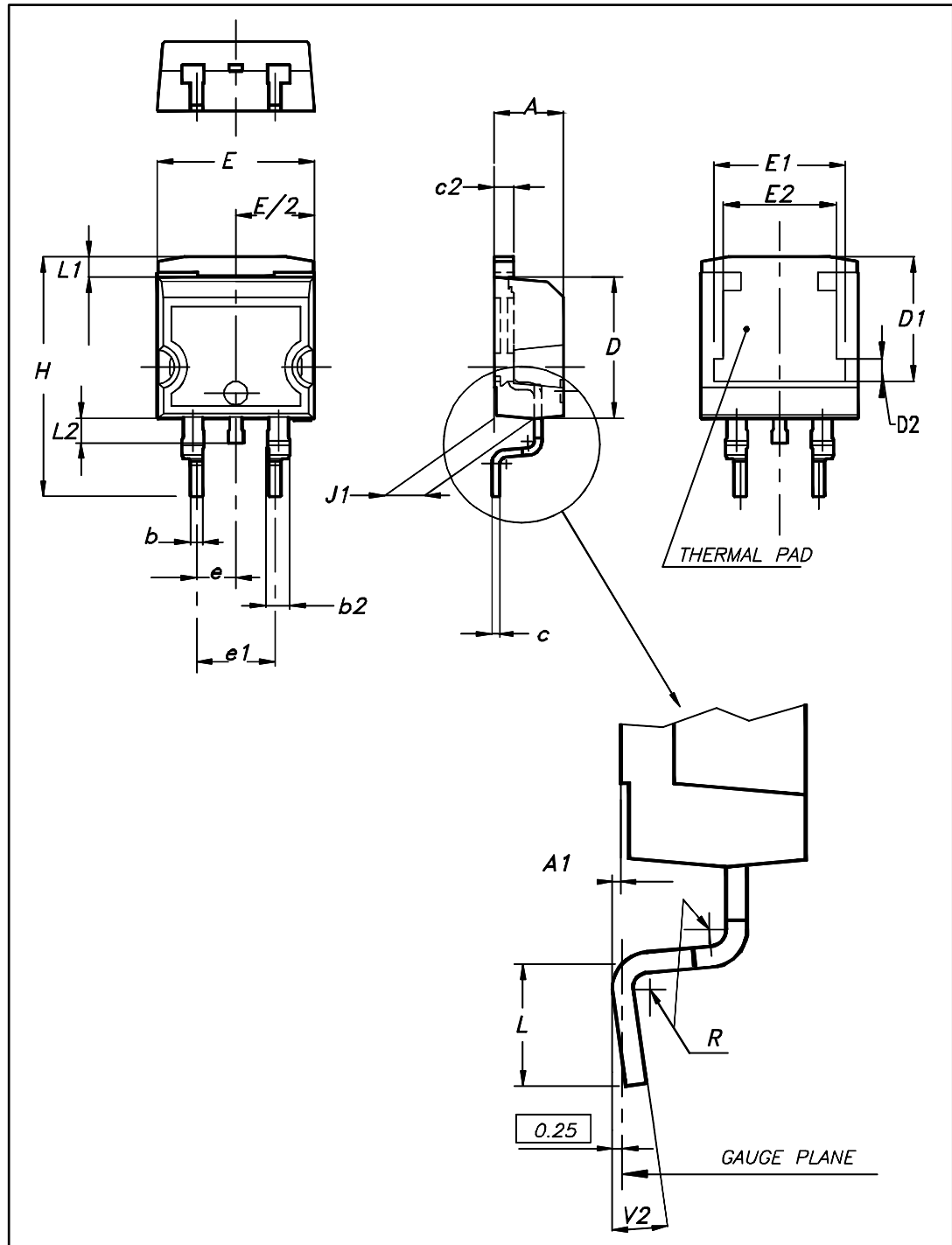


## 2 Package information

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
- Torque values (TO-220AB and TO-220FPAB): 0.55 N·m recommended; 0.7 N·m maximum
- Torque values (TO-247): 0.55 N·m recommended; 1.0 N·m maximum

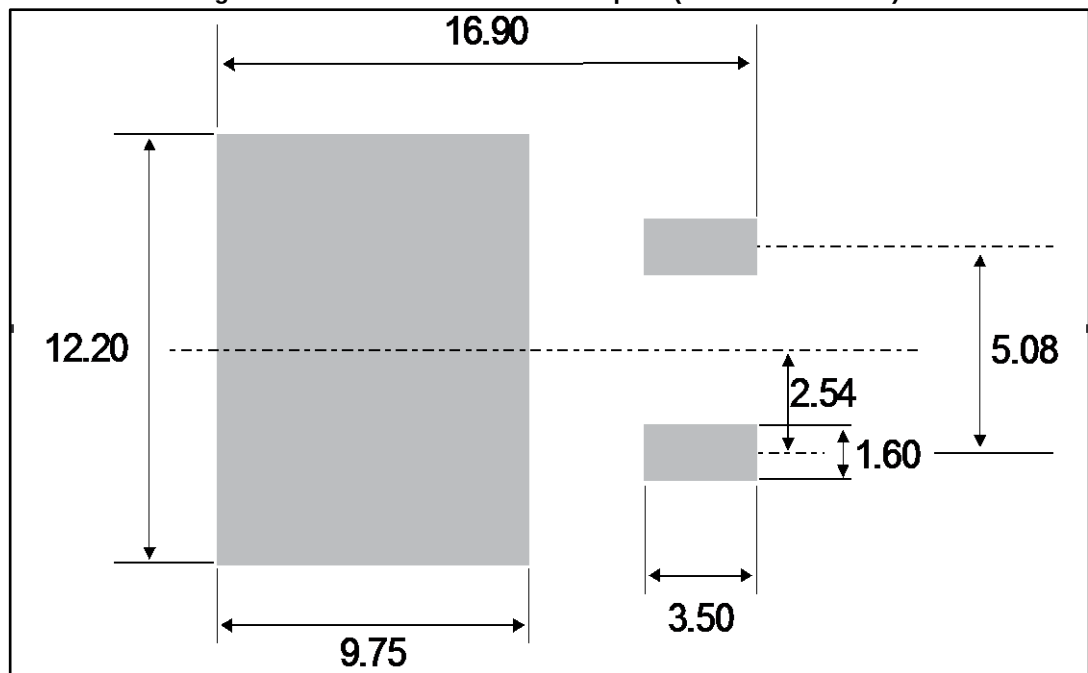
## 2.1 D<sup>2</sup>PAK package information

Figure 10: 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 11: D<sup>2</sup>PAK recommended footprint (dimensions in mm)

## 2.2 TO-220AB package information

Figure 12: TO-220AB package outline

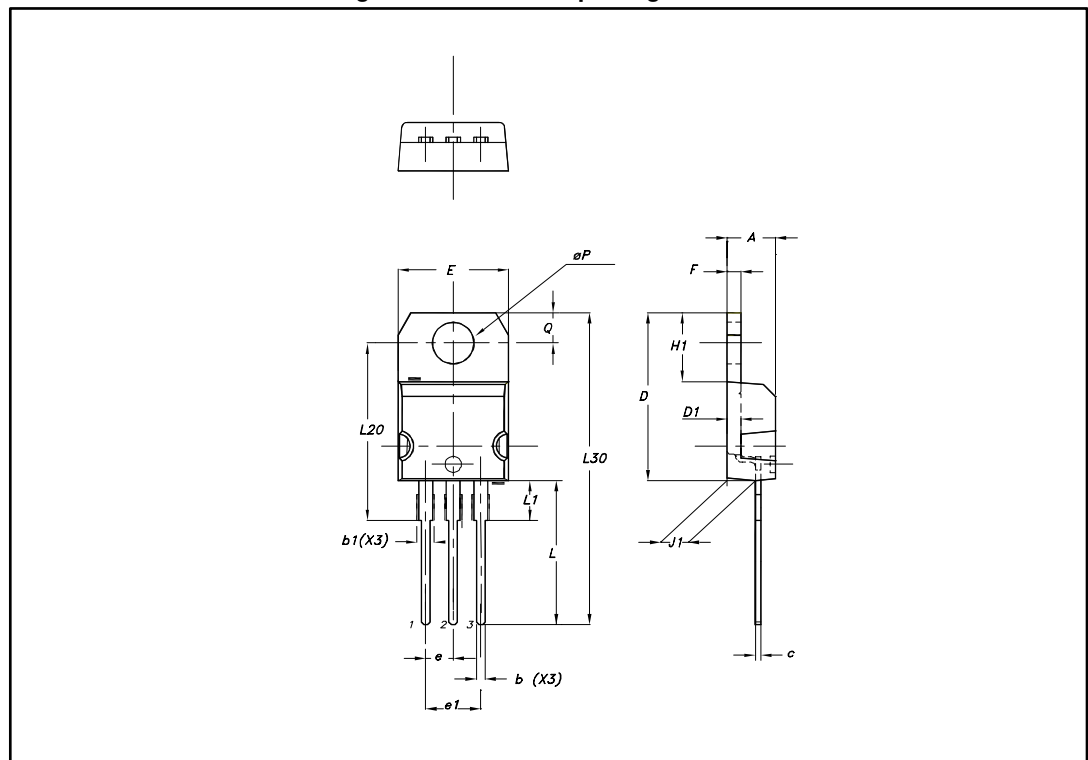


Table 6: TO-220AB package mechanical data

| Ref. | Dimensions  |       |                       |        |
|------|-------------|-------|-----------------------|--------|
|      | Millimeters |       | Inches <sup>(1)</sup> |        |
|      | Min.        | Max.  | Min.                  | Max.   |
| A    | 4.40        | 4.60  | 0.1732                | 0.1811 |
| b    | 0.61        | 0.88  | 0.0240                | 0.0346 |
| b1   | 1.14        | 1.70  | 0.0449                | 0.0669 |
| c    | 0.48        | 0.70  | 0.0189                | 0.0276 |
| D    | 15.25       | 15.75 | 0.6004                | 0.6201 |
| D1   | 1.27 typ.   |       | 0.0500 typ.           |        |
| E    | 10.00       | 10.40 | 0.3937                | 0.4094 |
| e    | 2.40        | 2.70  | 0.0945                | 0.1063 |
| e1   | 4.95        | 5.15  | 0.1949                | 0.2028 |
| F    | 1.23        | 1.32  | 0.0484                | 0.0520 |
| H1   | 6.20        | 6.60  | 0.2441                | 0.2598 |
| J1   | 2.40        | 2.72  | 0.0945                | 0.1071 |
| L    | 13.00       | 14.00 | 0.5118                | 0.5512 |
| L1   | 3.50        | 3.93  | 0.1378                | 0.1547 |
| L20  | 16.40 typ.  |       | 0.6457 typ.           |        |
| L30  | 28.90 typ.  |       | 1.1378 typ.           |        |
| ØP   | 3.75        | 3.85  | 0.1476                | 0.1516 |
| Q    | 2.65        | 2.95  | 0.1043                | 0.1161 |

**Notes:**<sup>(1)</sup>Inch dimensions are for reference only.

## 2.3 TO-220FPAB package information

Figure 13: TO-220FPAB package outline

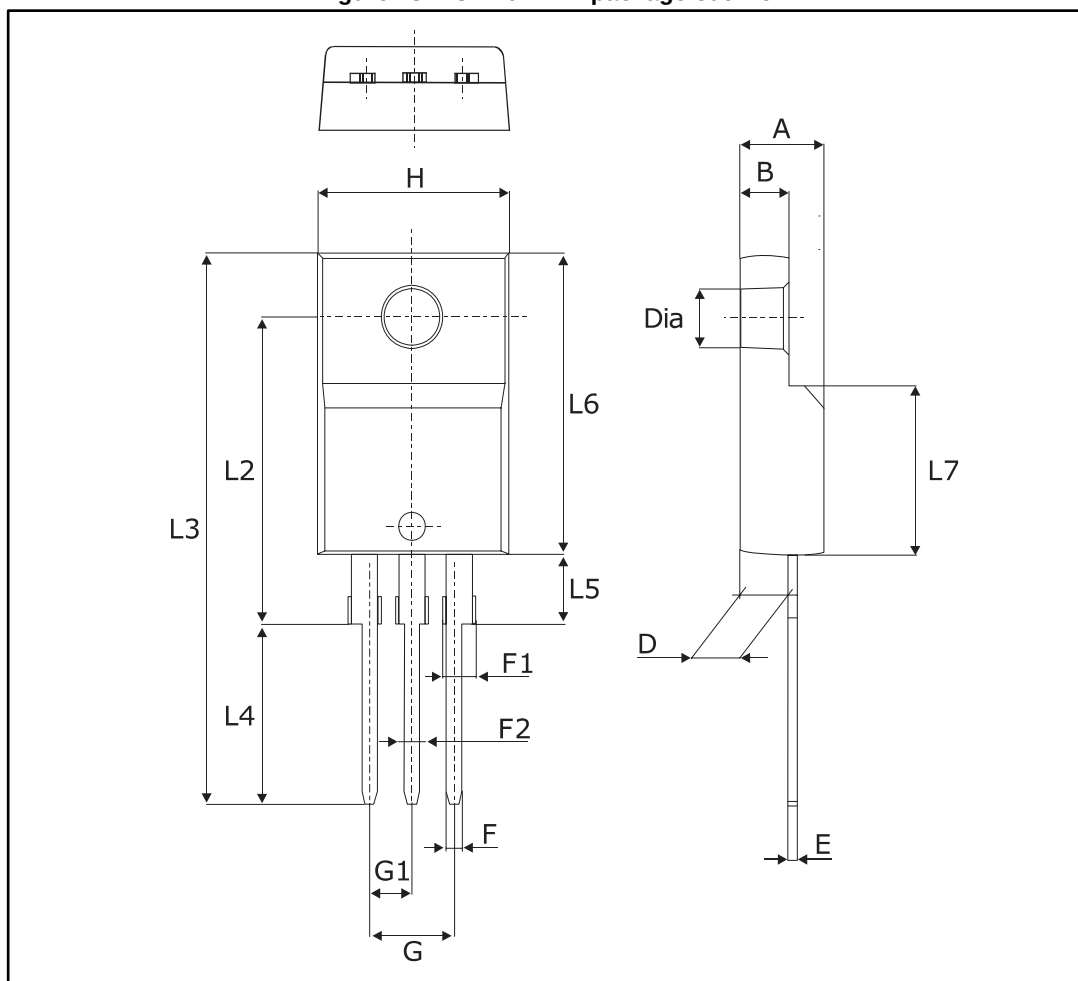


Table 7: TO-220FPAB package mechanical data

| Ref. | Dimensions  |       |             |        |
|------|-------------|-------|-------------|--------|
|      | Millimeters |       | Inches      |        |
|      | Min.        | Max.  | Min.        | Max.   |
| A    | 4.40        | 4.60  | 0.1739      | 0.1818 |
| B    | 2.5         | 2.7   | 0.0988      | 0.1067 |
| D    | 2.50        | 2.75  | 0.0988      | 0.1087 |
| E    | 0.45        | 0.70  | 0.0178      | 0.0277 |
| F    | 0.75        | 1.0   | 0.0296      | 0.0395 |
| F1   | 1.15        | 1.70  | 0.0455      | 0.0672 |
| F2   | 1.15        | 1.70  | 0.0455      | 0.0672 |
| G    | 4.95        | 5.20  | 0.1957      | 0.2055 |
| G1   | 2.40        | 2.70  | 0.0949      | 0.1067 |
| H    | 10.00       | 10.40 | 0.3953      | 0.4111 |
| L2   | 16.00 typ.  |       | 0.6324 typ. |        |
| L3   | 28.60       | 30.60 | 1.1304      | 1.2095 |
| L4   | 9.80        | 10.6  | 0.3874      | 0.4190 |
| L5   | 2.90        | 3.60  | 0.1146      | 0.1423 |
| L6   | 15.90       | 16.40 | 0.6285      | 0.6482 |
| L7   | 9.00        | 9.30  | 0.3557      | 0.3676 |
| Dia  | 3.0         | 3.20  | 0.1186      | 0.1265 |

## 2.4 TO-247 package information

Figure 14: TO-247 package outline

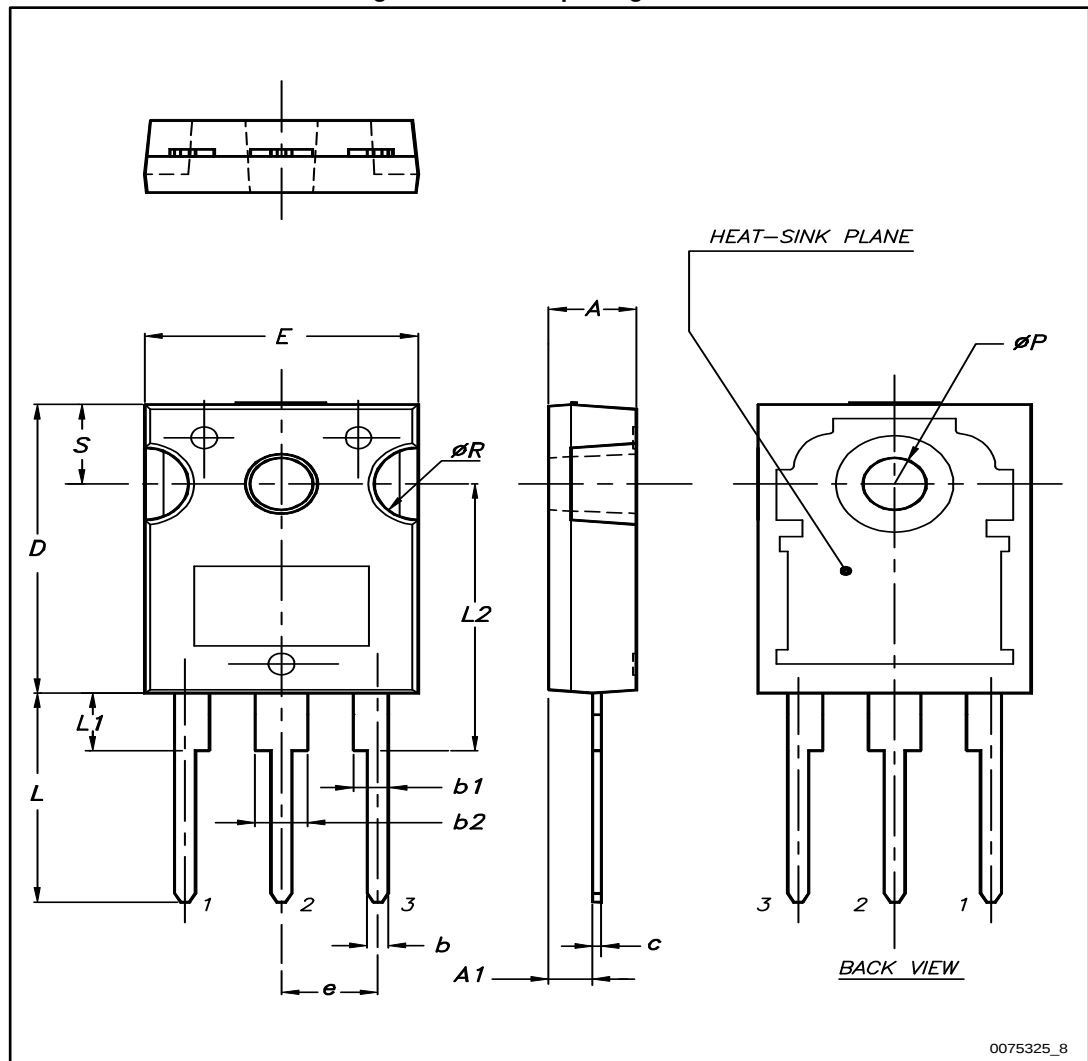


Table 8: TO-247 package mechanical data

| Ref.              | Dimensions  |       |       |        |       |       |
|-------------------|-------------|-------|-------|--------|-------|-------|
|                   | Millimeters |       |       | Inches |       |       |
|                   | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A                 | 4.85        |       | 5.15  | 0.191  |       | 0.203 |
| A1                | 2.20        |       | 2.60  | 0.086  |       | 0.102 |
| b                 | 1.00        |       | 1.40  | 0.039  |       | 0.055 |
| b1                | 2.00        |       | 2.40  | 0.078  |       | 0.094 |
| b2                | 3.00        |       | 3.40  | 0.118  |       | 0.133 |
| c                 | 0.40        |       | 0.80  | 0.015  |       | 0.031 |
| D <sup>(1)</sup>  | 19.85       |       | 20.15 | 0.781  |       | 0.793 |
| E                 | 15.45       |       | 15.75 | 0.608  |       | 0.620 |
| e                 | 5.30        | 5.45  | 5.60  | 0.209  | 0.215 | 0.220 |
| L                 | 14.20       |       | 14.80 | 0.559  |       | 0.582 |
| L1                | 3.70        |       | 4.30  | 0.145  |       | 0.169 |
| L2                |             | 18.50 |       |        | 0.728 |       |
| ØP <sup>(2)</sup> | 3.55        |       | 3.65  | 0.139  |       | 0.143 |
| ØR                | 4.50        |       | 5.50  | 0.177  |       | 0.217 |
| S                 | 5.30        | 5.50  | 5.70  | 0.209  | 0.216 | 0.224 |

**Notes:**

<sup>(1)</sup>Dimension D plus gate protusion does not exceed 20.5 mm

<sup>(2)</sup>Resin thickness around the mounting hole is not less than 0.9 mm.

### 3 Ordering information

Table 9: Ordering information

| Order code     | Marking      | Package            | Weight | Base qty | Delivery mode |
|----------------|--------------|--------------------|--------|----------|---------------|
| STPS30150CT    | STPS30150CT  | TO-220AB           | 1.95g  | 50       | Tube          |
| STPS30150CFP   | STPS30150CFP | TO-220FPAB         | 1.9g   | 50       | Tube          |
| STPS30150CW    | STPS30150CW  | TO-247             | 4.4g   | 30       | Tube          |
| STPS30150CG-TR | STPS30150CG  | D <sup>2</sup> PAK | 1.38g  | 1000     | Tape and reel |

### 4 Revision history

Table 10: Document revision history

| Date        | Revision | Changes                                                                                                                                                                                                                                                                                                     |
|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feb-2004    | 7        | Previous release                                                                                                                                                                                                                                                                                            |
| 26-Nov-2010 | 8        | Added ECOPACK statement. Corrected package name in <i>Figure 12</i> .                                                                                                                                                                                                                                       |
| 16-May-2017 | 9        | Updated features and package silhouettes in cover page.<br>Updated <a href="#">Section 1: "Characteristics"</a> , <a href="#">Section 1.1: "Characteristics (curves)"</a> , <a href="#">Section 2: "Package information"</a> and <a href="#">Section 3: "Ordering information"</a> .<br>Minor text changes. |

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