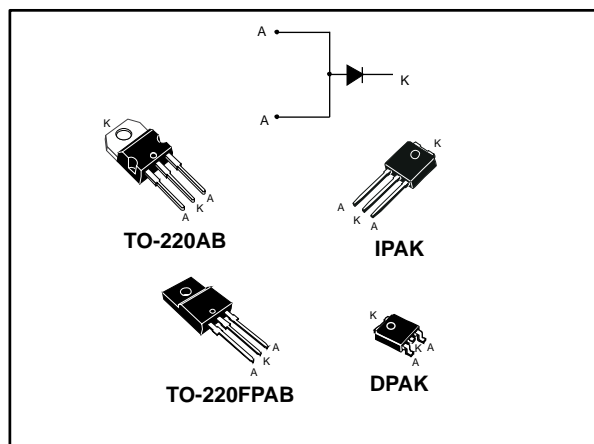


## 100 V field-effect rectifier diode

Datasheet - production data



### Description

The device is based on a proprietary technology that achieves the best in class  $V_F/I_R$  trade-off for a given silicon surface. This 100 V rectifier has been optimized for use in confined applications where both efficiency and thermal performance are key. With a lower dependency of leakage current ( $I_R$ ) and forward voltage ( $V_F$ ) in function of temperature, the thermal runaway risk is reduced. It is highly recommended to be used in adapters and chargers.

Table 1: Device summary

| Symbol       | Value       |
|--------------|-------------|
| $I_{F(AV)}$  | 20 A        |
| $V_{RRM}$    | 100 V       |
| $V_F$ (max.) | 0.415 V     |
| $I_R$ (max.) | 140 $\mu$ A |
| $T_j$ (max.) | 175 °C      |

### 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 :
  - Insulated voltage : 2000  $V_{RMS}$  sine

# 1 Characteristics

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

| Symbol              | Parameter   |                      | Value                             | Unit |   |
|---------------------|---|----------------------|-----------------------------------|------|---|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                      | 100                               | V    |   |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                      | 40                                | A    |   |
| I <sub>F(AV)</sub>  | Average forward current $\delta = 0.5$ , square wave  | TO-220AB, DPAK, IPAK | T <sub>C</sub> = 155 °C           | 20   | A |
|                     |   | TO-220FPAB           | T <sub>C</sub> = 110 °C           |      | A |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | TO-220AB, TO-220FPAB | t <sub>p</sub> = 10 ms sinusoidal | 250  | A |
|                     |   | DPAK, IPAK           |                                   | 150  | A |
| T <sub>stg</sub>    | Storage temperature range                             |                      | -65 to +175                       | °C   |   |
| T <sub>j</sub>      | Maximum operating junction temperature <sup>(1)</sup> |                      | +175                              | °C   |   |

**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 resistance parameters**

| Symbol               | Parameter        |                      | Value | Unit |
|----------------------|------------------|----------------------|-------|------|
| R <sub>th(j-c)</sub> | Junction to case | TO-220AB, DPAK, IPAK | 1     | °C/W |
|                      |                  | TO-220FPAB           | 3.8   |      |

**Table 4: Static electrical characteristics, anode terminals short circuited**

| Symbol                        | Parameter               | Test conditions         |                                   | Min.                  | Typ.  | Max.  | Unit |
|-------------------------------|-------------------------|-------------------------|-----------------------------------|-----------------------|-------|-------|------|
|                               |                         | T <sub>j</sub>          | V <sub>R</sub>                    |                       |       |       |      |
| I <sub>R</sub> <sup>(1)</sup> | Reverse leakage current | T <sub>j</sub> = 25 °C  | V <sub>R</sub> = V <sub>RRM</sub> | -                     |       | 140   | μA   |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 8     | 16    | mA   |
|                               |                         | T <sub>j</sub> = 125 °C | V <sub>R</sub> = 70 V             | -                     | 4     | 7     |      |
| V <sub>F</sub> <sup>(2)</sup> | Forward voltage drop    | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 2 A              | -                     | 0.370 | 0.415 | V    |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 0.315 | 0.365 |      |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 5 A              | -                     | 0.455 | 0.515 |      |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 0.450 | 0.510 |      |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 10 A             | -                     | 0.580 | 0.655 |      |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 0.550 | 0.605 |      |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | I <sub>F</sub> = 20 A | -     | 0.640 |      |

**Notes:**

<sup>(1)</sup>Pulse test: t<sub>p</sub> = 5 ms,  $\delta < 2\%$

<sup>(2)</sup>Pulse test: t<sub>p</sub> = 380 μs,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.415 \times I_{F(AV)} + 0.019 I_{F(RMS)}^2$$

# 1.1 Characteristics (curves)

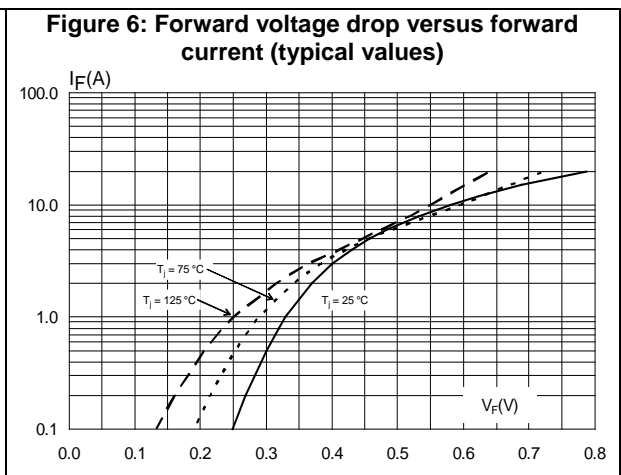
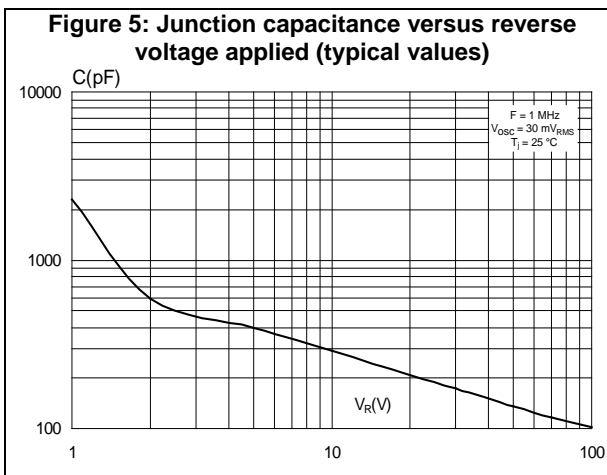
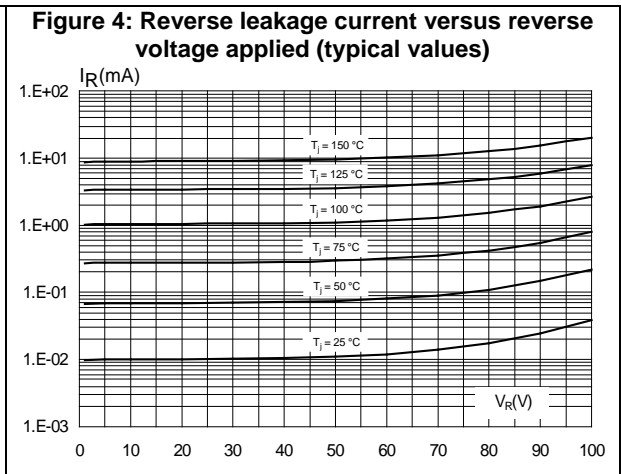
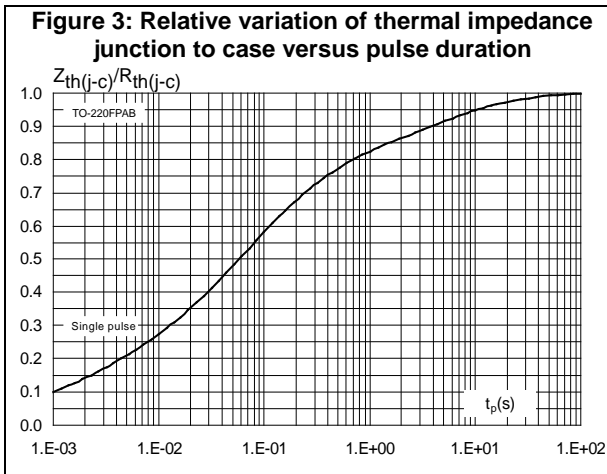
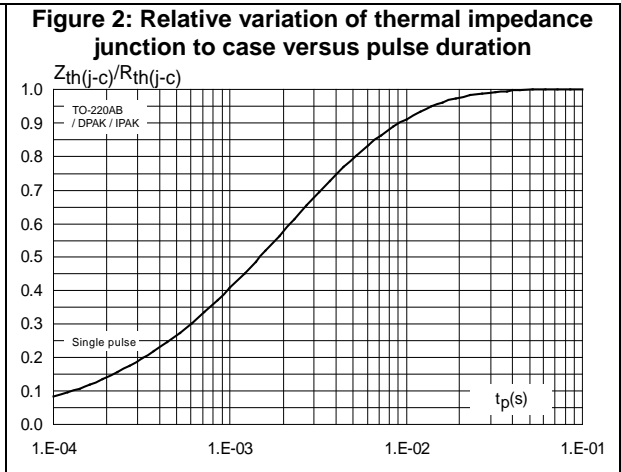
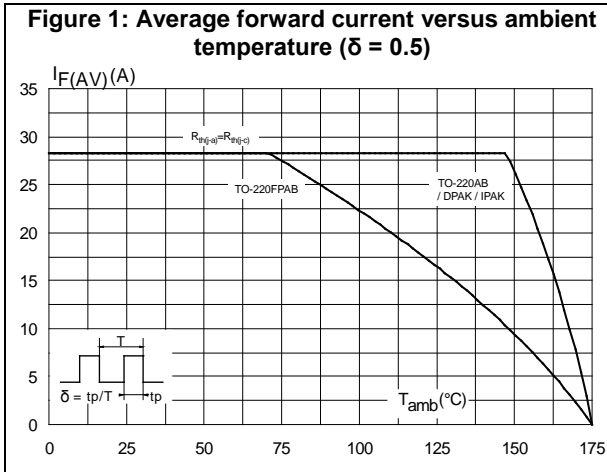


Figure 7: Forward voltage drop versus forward current (typical values)

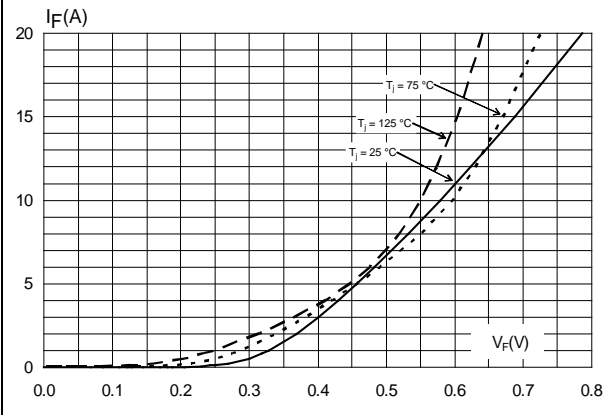
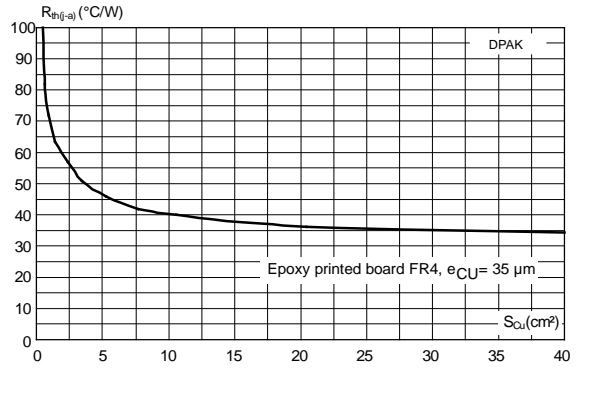


Figure 8: Thermal resistance junction to ambient versus copper surface under tab for DPAK (typical values)



## 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
- Recommended torque value: 0.55 N·m (for TO-220AB and TO-220FPAB)
- Maximum torque value: 0.6 N·m (for TO-220AB and TO-220FPAB)

### 2.1 IPAK package information

Figure 9: IPAK package outline

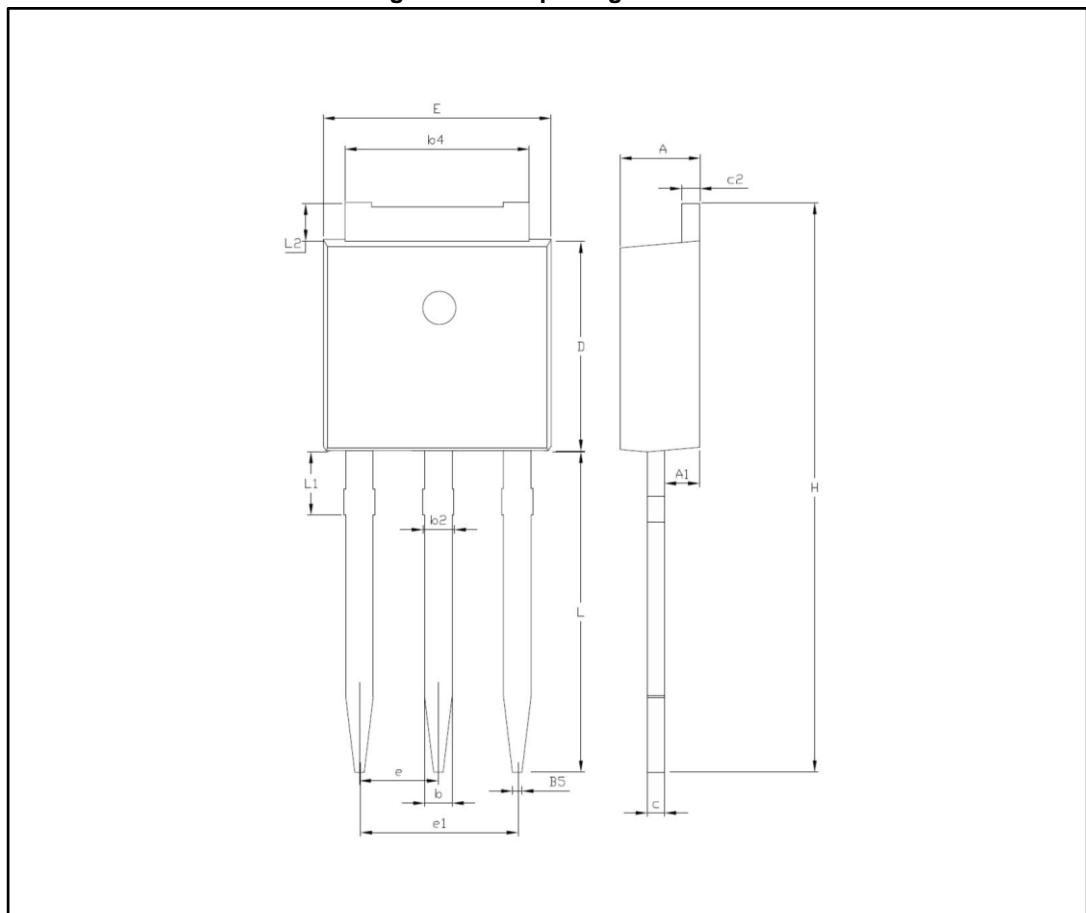
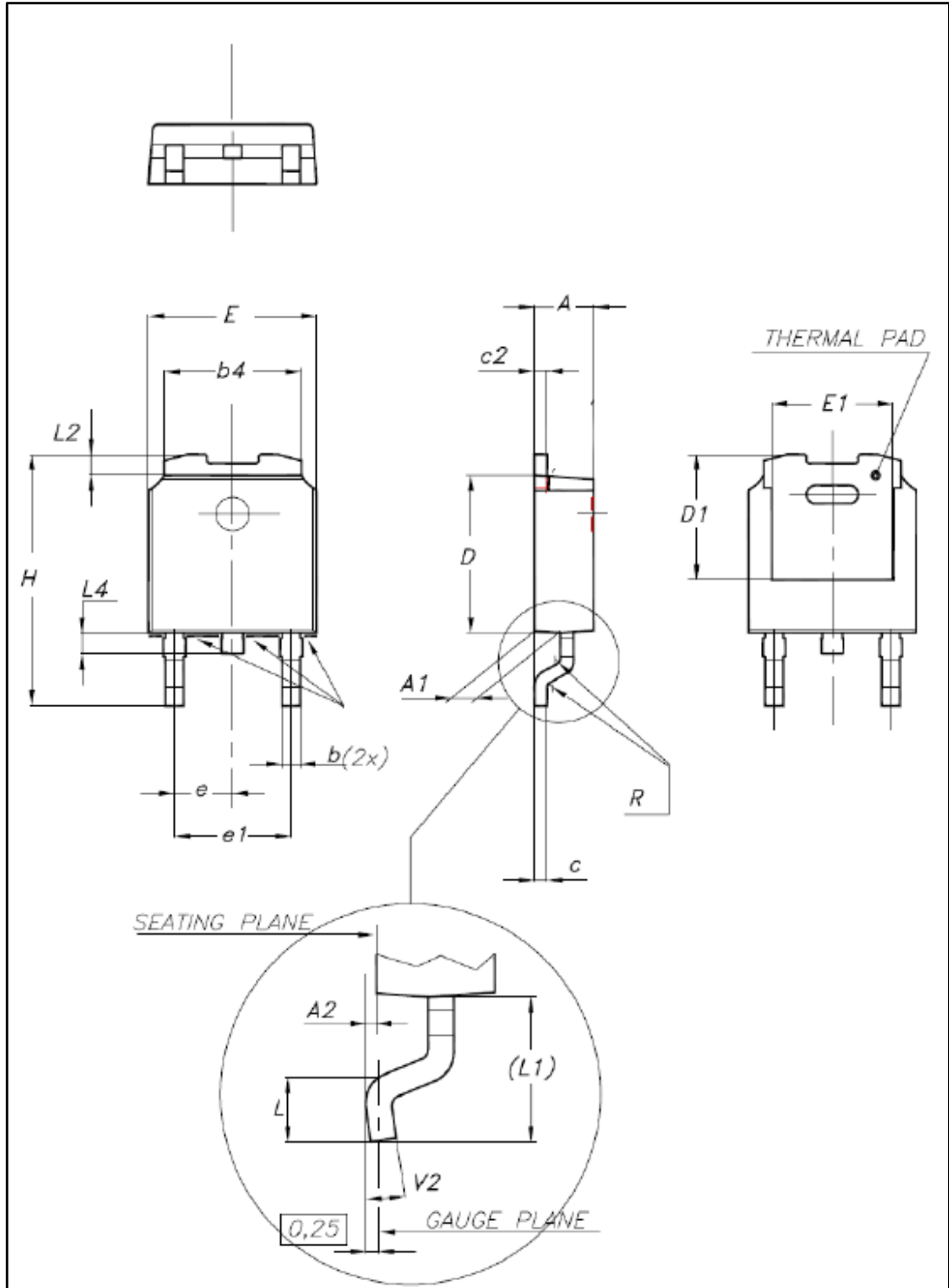


Table 5: IPAK package mechanical data

| Ref. | Dimensions  |      |            |       |
|------|-------------|------|------------|-------|
|      | Millimeters |      | Inches     |       |
|      | Min.        | Max. | Min.       | Max.  |
| A    | 2.20        | 2.40 | 0.087      | 0.094 |
| A1   | 0.90        | 1.10 | 0.035      | 0.043 |
| b    | 0.64        | 0.90 | 0.025      | 0.035 |
| b2   |             | 0.95 |            | 0.037 |
| b4   | 5.20        | 5.43 | 0.205      | 0.214 |
| B5   | 0.30 typ.   |      | 0.012 typ. |       |
| c    | 0.45        | 0.60 | 0.018      | 0.024 |
| c2   | 0.46        | 0.60 | 0.018      | 0.024 |
| D    | 6.00        | 6.20 | 0.236      | 0.244 |
| E    | 6.40        | 6.65 | 0.252      | 0.261 |
| e    | 2.28 typ.   |      | typ.0.090  |       |
| e1   | 4.40        | 4.60 | 0.173      | 0.181 |
| H    | 16.10 typ.  |      | 0.634 typ. |       |
| L    | 9.0         | 9.60 | 0.354      | 0.378 |
| L1   | 0.80        | 1.20 | 0.031      | 0.047 |
| L2   | 0.80 typ.   | 1.25 | 0.031 typ. | 0.049 |
| V1   | +10°        |      | +10        |       |

## 2.2 DPAK package information

Figure 10: DPAK package outline



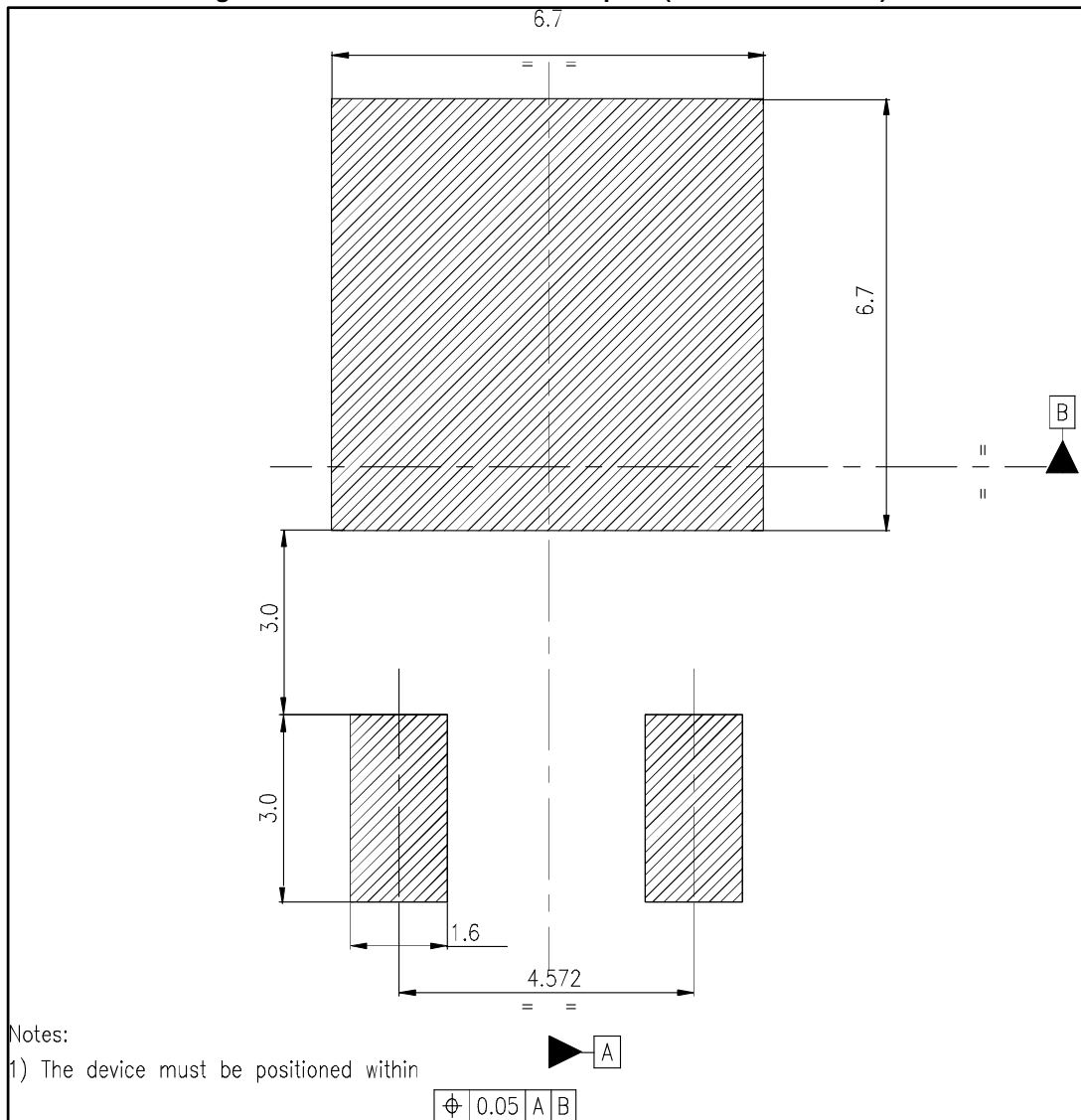
This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6: DPAK package mechanical data

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 2.18        | 2.40  | 0.085      | 0.094 |
| A1   | 0.90        | 1.10  | 0.035      | 0.043 |
| A2   | 0.03        | 0.23  | 0.001      | 0.009 |
| b    | 0.64        | 0.90  | 0.025      | 0.035 |
| b4   | 4.95        | 5.46  | 0.194      | 0.215 |
| c    | 0.46        | 0.61  | 0.018      | 0.024 |
| c2   | 0.46        | 0.60  | 0.018      | 0.023 |
| D    | 5.97        | 6.22  | 0.235      | 0.244 |
| D1   | 4.95        | 5.60  | 0.194      | 0.220 |
| E    | 6.35        | 6.73  | 0.250      | 0.265 |
| E1   | 4.32        | 5.50  | 0.170      | 0.216 |
| e    | 2.286 typ.  |       | 0.090 typ. |       |
| e1   | 4.40        | 4.70  | 0.173      | 0.185 |
| H    | 9.35        | 10.40 | 0.368      | 0.409 |
| L    | 1.0         | 1.78  | 0.039      | 0.070 |
| L2   |             | 1.27  |            | 0.050 |
| L4   | 0.60        | 1.02  | 0.023      | 0.040 |
| V2   | -8°         | +8°   | -8°        | +8°   |



Figure 11: DPAK recommended footprint (dimensions in mm)



### 2.3 TO-220FPAB package information

Figure 12: TO-220FPAB package outline

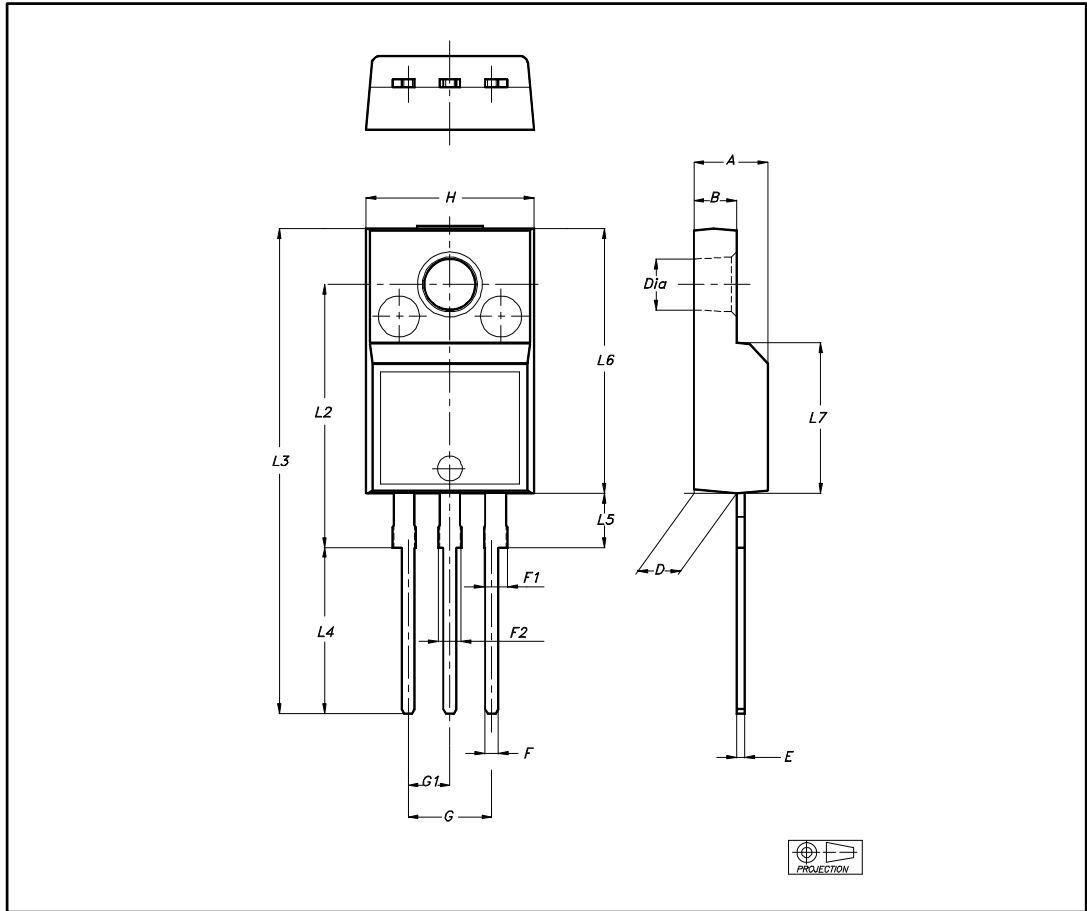


Table 7: TO-220FPAB package mechanical data

| Ref. | Dimensions  |      |           |       |
|------|-------------|------|-----------|-------|
|      | Millimeters |      | Inches    |       |
|      | Min.        | Max. | Min.      | Max.  |
| A    | 4.40        | 4.60 | 0.173     | 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     | 0.028 |
| 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        | 5.2  | 0.195     | 0.205 |
| G1   | 2.4         | 2.7  | 0.094     | 0.106 |
| H    | 10          | 10.4 | 0.394     | 0.409 |
| L2   | 16 typ.     |      | 0.63 typ. |       |
| L3   | 28.60       | 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           | 9.3  | 0.354     | 0.366 |
| Dia  | 3           | 3.2  | 0.118     | 0.126 |

### 2.4 TO-220AB package information

Figure 13: TO-220AB package outline

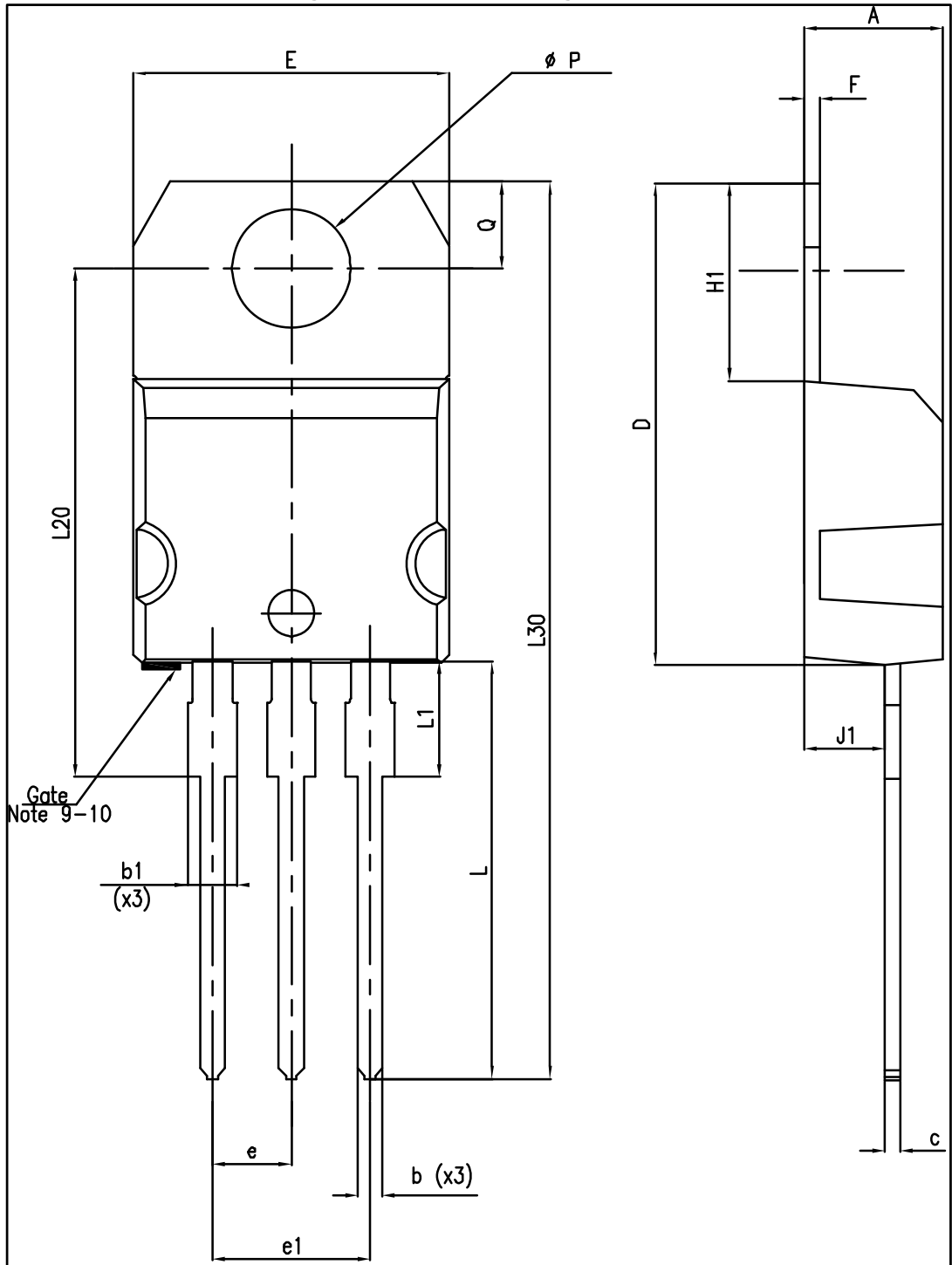


Table 8: TO-220AB package mechanical data

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 4.40        | 4.60  | 0.173      | 0.181 |
| b    | 0.61        | 0.88  | 0.024      | 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 |
| 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    | 0.51        | 0.60  | 0.020      | 0.024 |
| J1   | 2.40        | 2.72  | 0.094      | 0.107 |
| H1   | 6.20        | 6.60  | 0.244      | 0.256 |
| 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      |       |
| Ø P  | 3.75        | 3.85  | 0.148      | 0.156 |
| Q    | 2.65        | 2.95  | 0.104      | 0.116 |

### 3 Ordering information

Table 9: Ordering information

| Order code      | Marking     | Package    | Weight | Base qty. | Delivery mode |
|-----------------|-------------|------------|--------|-----------|---------------|
| FERD20H100STS   | FD20H100STS | TO-220AB   | 1.38 g | 50        | Tube          |
| FERD20H100SFP   | FD20H100SFP | TO-220FPAB | 1.7 g  | 50        | Tube          |
| FERD20H100SB-TR | FD20 H100S  | DPAK       | 0.35 g | 75        | Tape and reel |
| FERD20H100SH    | FD20 H100S  | IPAK       | 0.32 g | 2500      | Tube          |

### 4 Revision history

Table 10: Document revision history

| Date        | Revision | Changes                   |
|-------------|----------|---------------------------|
| 08-Mar-2016 | 1        | Initial release.          |
| 09-May-2016 | 2        | Update of document title. |

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