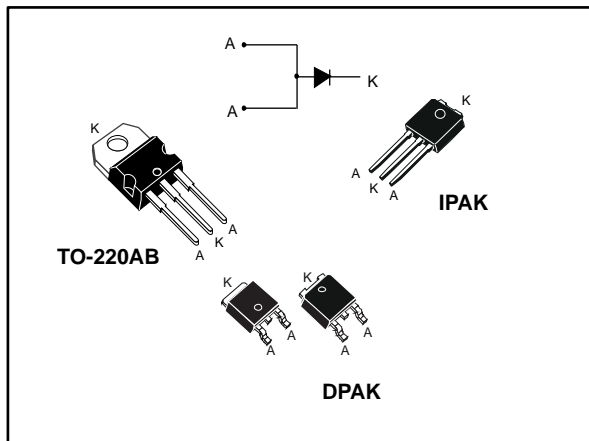


## 100 V field-effect rectifier diode

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 casing applications where both efficiency and thermal performance matter. With a lower dependency of leakage current ( $I_R$ ) and forward voltage ( $V_F$ ) in function of temperature, the thermal runaway risk is reduced. Therefore, it can advantageously replace 100 V Schottky diodes.

Table 1: Device summary

| Symbol      | Value       |
|-------------|-------------|
| $I_{F(AV)}$ | 20 A        |
| $V_{RRM}$   | 100 V       |
| $V_F(max.)$ | 0.415 V     |
| $I_R(max.)$ | 110 $\mu$ 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
- ECOPACK<sup>®</sup>2 compliant component

# 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  | T <sub>C</sub> = 150 °C           | 20          | A    |   |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | t <sub>p</sub> = 10 ms sinusoidal | TO-220AB    | 220  | 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 | 1.3   | °C/W |

**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> | -                     |       | 110   | μA   |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 6     | 12    | mA   |
|                               |                         | T <sub>j</sub> = 125 °C | V <sub>R</sub> = 70 V             | -                     | 3     | 6     |      |
| V <sub>F</sub> <sup>(2)</sup> | Forward voltage drop    | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 2 A              | -                     | 0.395 | 0.445 | V    |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 0.36  | 0.415 |      |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 5 A              | -                     | 0.520 | 0.585 |      |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 0.500 | 0.555 |      |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 10 A             | -                     | 0.680 | 0.780 |      |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -                     | 0.600 | 0.660 |      |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | I <sub>F</sub> = 20 A | -     | 0.690 |      |

**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:

$$P = 0.45 \times I_{F(AV)} + 0.021 \times I_{F(RMS)}^2$$

### 1.1 Characteristics (curves)

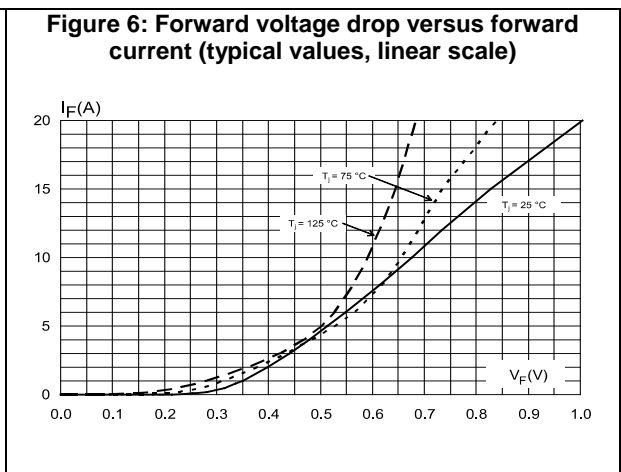
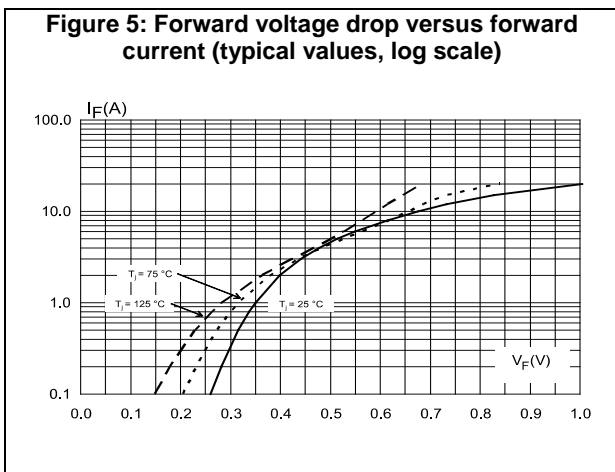
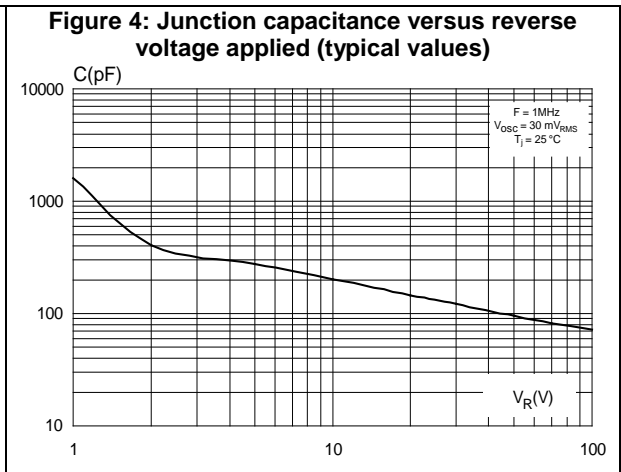
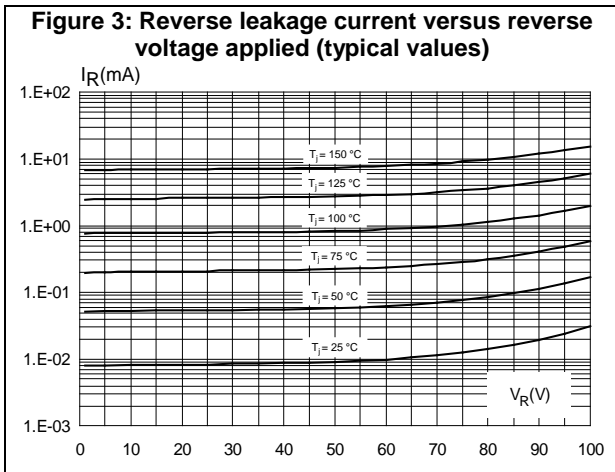
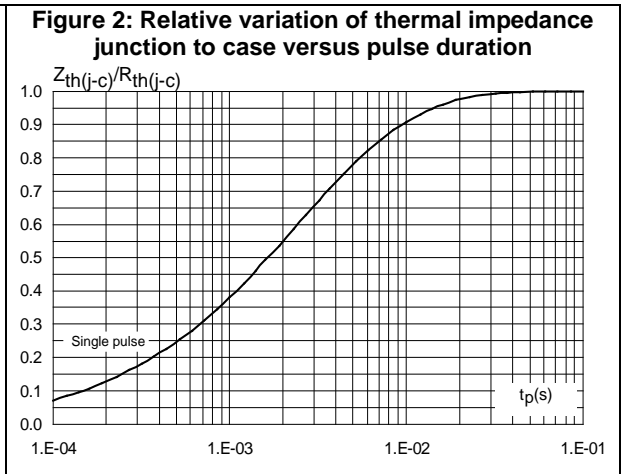
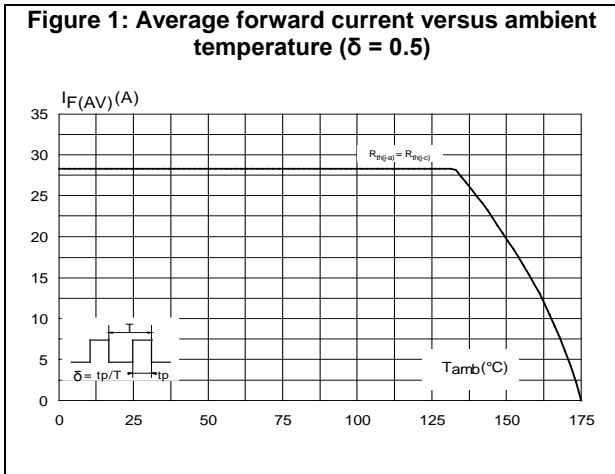
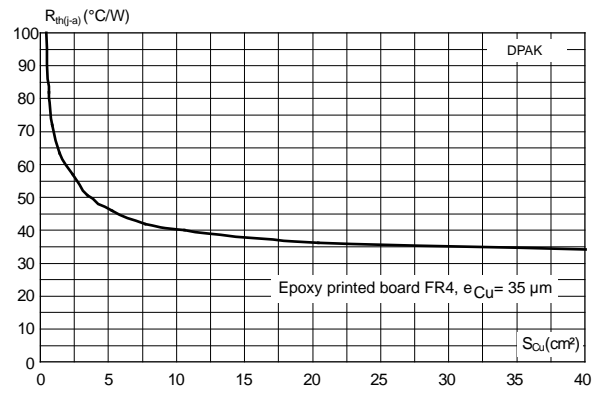


Figure 7: Thermal resistance junction to ambient versus copper surface under tab for DPAK (typical values)



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

### 2.1 IPAK package information

Figure 8: IPAK package outline

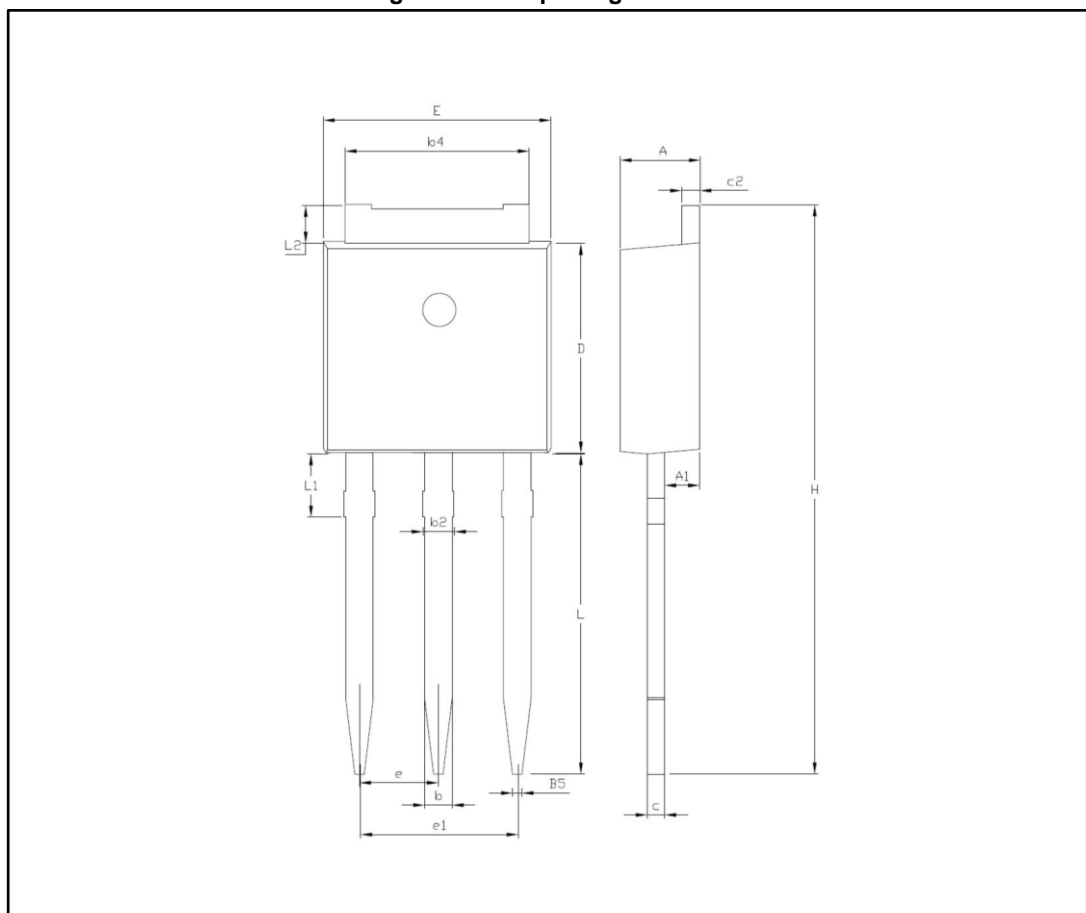
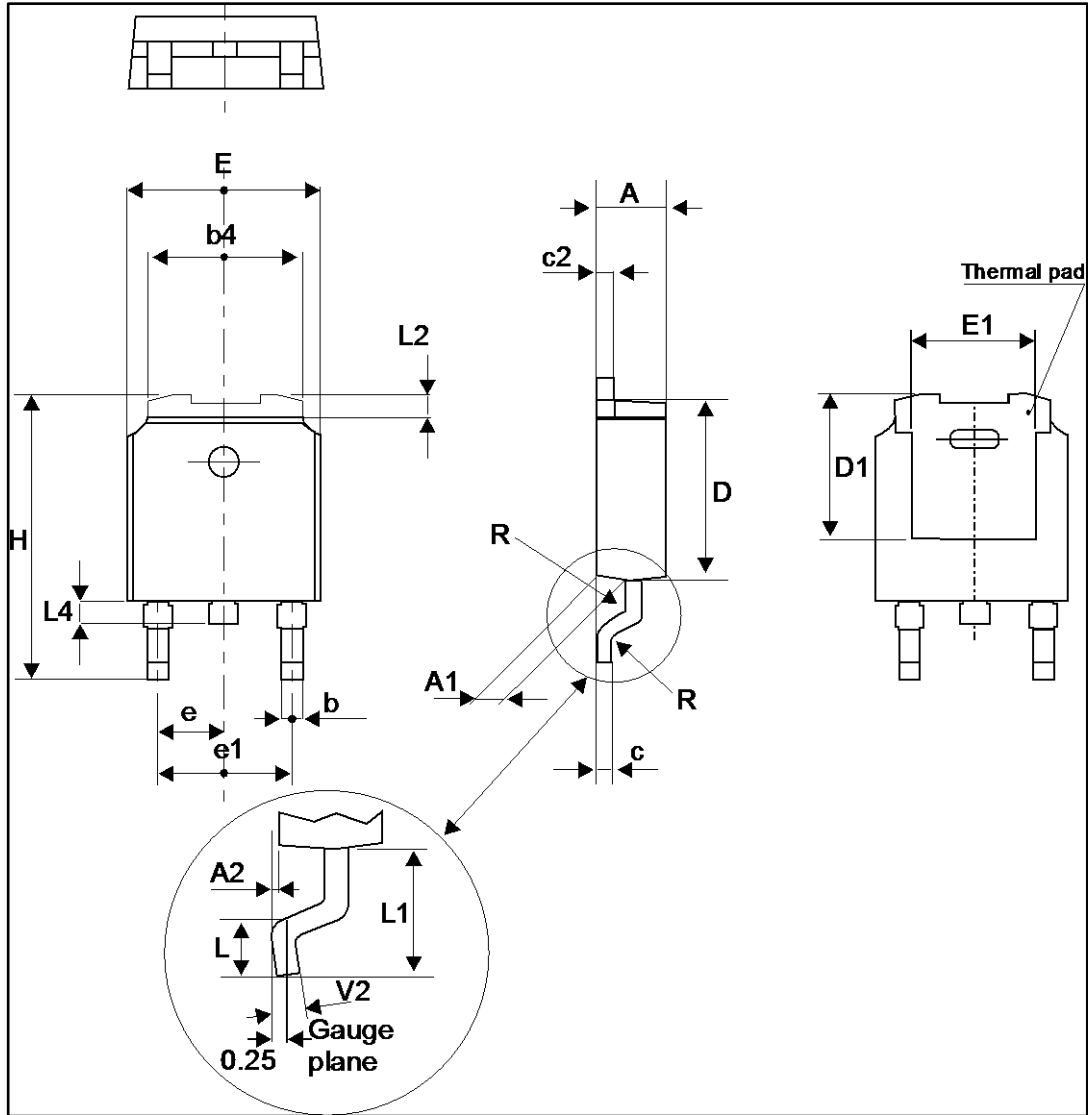


Table 5: IPAK package mechanical data

| 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 9: DPAK package outline

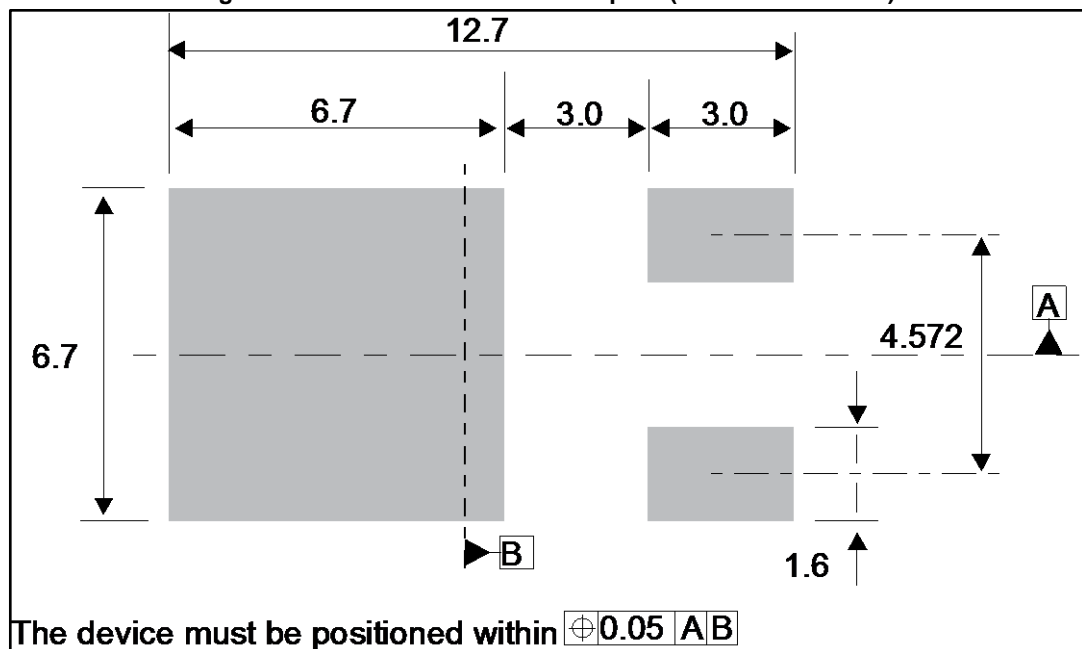


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

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 10: DPAK recommended footprint (dimensions in mm)





### 2.3 TO-220AB package information

Figure 11: TO-220AB package outline

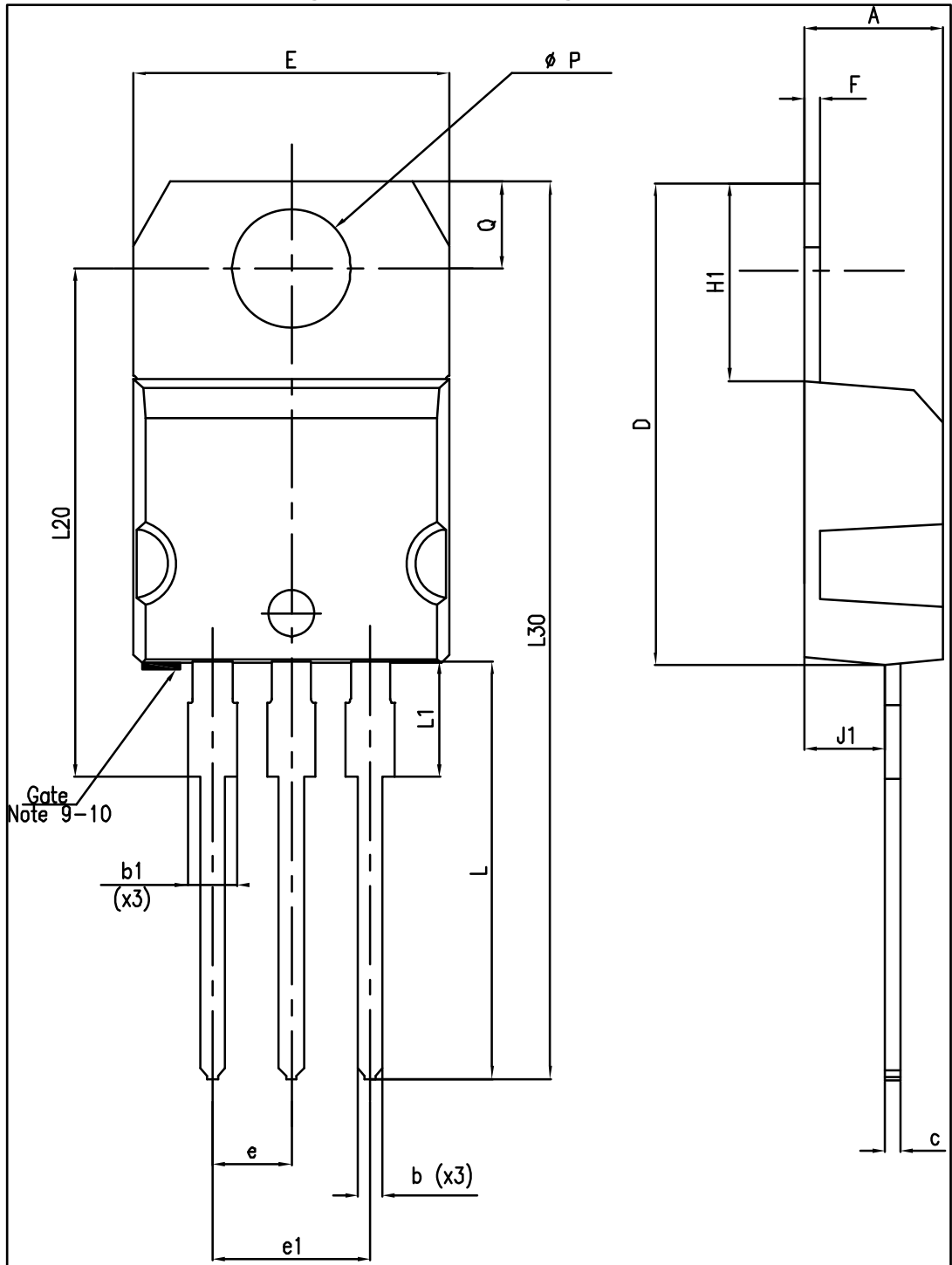


Table 7: TO-220AB package mechanical data

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 4.40        | 4.60  | 0.173      | 0.181 |
| b    | 0.61        | 0.88  | 0.024      | 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 8: Ordering information

| Order code      | Marking     | Package  | Weight | Base qty. | Delivery mode |
|-----------------|-------------|----------|--------|-----------|---------------|
| FERD20S100STS   | FD20S100STS | TO-220AB | 1.38 g | 50        | Tube          |
| FERD20S100SB-TR | FD20 S100S  | DPAK     | 0.35 g | 2500      | Tape and reel |
| FERD20S100SH    | FD20 S100S  | IPAK     | 0.32 g | 75        | Tube          |

### 4 Revision history

Table 9: Document revision history

| Date        | Revision | Changes             |
|-------------|----------|---------------------|
| 03-Jun-2016 | 1        | Initial release.    |
| 14-Nov-2017 | 2        | Updated cover page. |

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