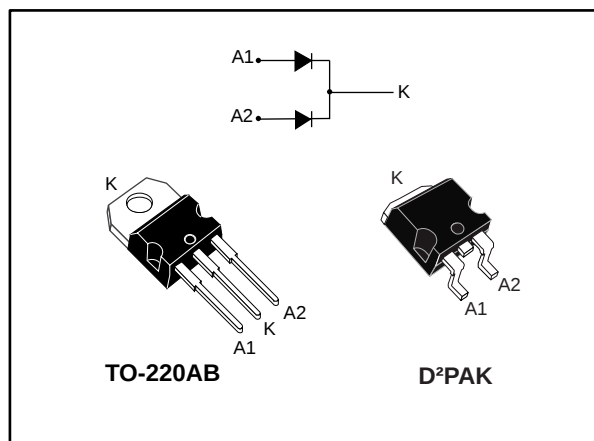


## 60 V field-effect rectifier diode

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 60 V rectifier has been optimized for use in confined applications where both efficiency and thermal performance are key.

This device is suitable for use in adapters and chargers.

Table 1: Device summary

| Symbol       | Value    |
|--------------|----------|
| $I_{F(AV)}$  | 2 x 10 A |
| $V_{RRM}$    | 60 V     |
| $V_F$ (typ.) | 0.39 V   |
| $T_j$ (max.) | 175 °C   |

### Features

- ST advanced rectifier process
- Stable leakage current over reverse voltage
- Reduced leakage current
- Low forward voltage drop
- High frequency operation

# 1 Characteristics

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

| Symbol              | Parameter                                             |                                   |            | Value       | Unit |
|---------------------|-------------------------------------------------------|-----------------------------------|------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                   |            | 60          | V    |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                   |            | 30          | A    |
| I <sub>F(AV)</sub>  | Average forward current δ = 0.5, square wave          | T <sub>C</sub> = 155 °C           | Per diode  | 10          | A    |
|                     |                                                       |                                   | Per device | 20          |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | t <sub>p</sub> = 10 ms sinusoidal |            | 130         | 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> $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 3: Thermal resistance parameters**

| Symbol        | Parameter        |            | Max. value | Unit |
|---------------|------------------|------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode  | 2.2        | °C/W |
|               |                  | Per device | 1.3        |      |
| $R_{th(c)}$   | Coupling         |            | 0.4        |      |

**Table 4: Static electrical characteristics, per diode**

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ.  | Max.  | Unit |
|-------------|-------------------------|-----------------------|---------------------|------|-------|-------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     | -    |       | 200   | μA   |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 10    | 20    | mA   |
|             |                         | $T_j = 125\text{ °C}$ | $V_R = 45\text{ V}$ | -    | 6     | 12    |      |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 2\text{ A}$  | -    | 0.34  | 0.38  | V    |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.28  | 0.315 |      |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 5\text{ A}$  | -    | 0.415 | 0.465 |      |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.39  | 0.435 |      |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 10\text{ A}$ | -    | 0.52  | 0.575 |      |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.525 | 0.585 |      |

**Notes:**

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

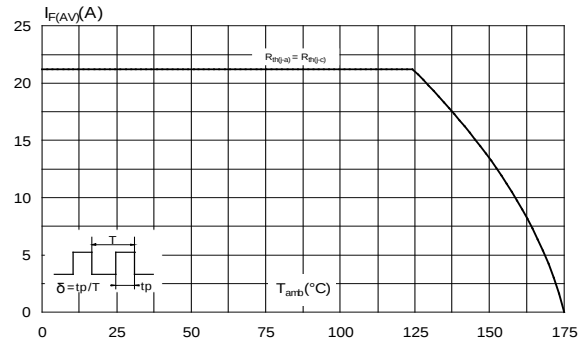
<sup>(2)</sup>Pulse test:  $t_p = 380\text{ μs}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

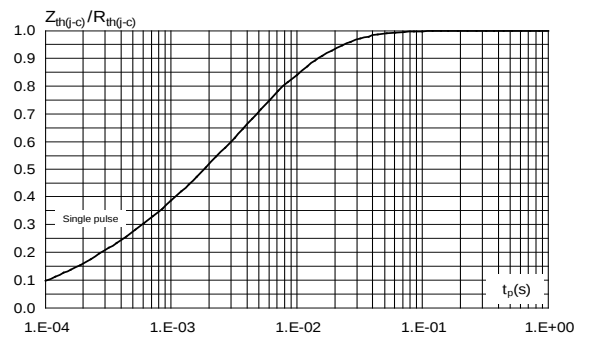
$$P = 0.285 \times I_{F(AV)} + 0.03 \times I_{F(RMS)}^2$$

## 1.1 Characteristics (curves)

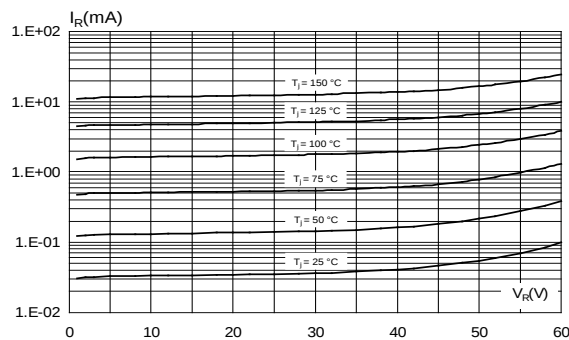
**Figure 1: Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



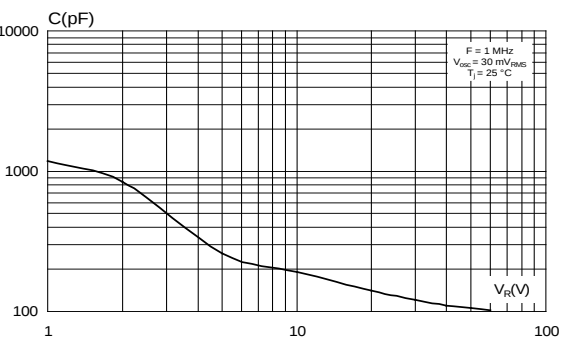
**Figure 2: Relative variation of thermal impedance junction to case versus pulse duration**



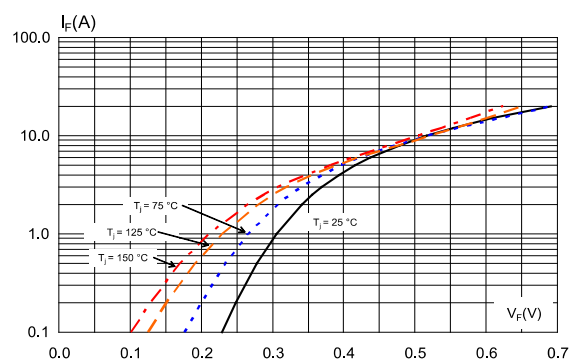
**Figure 3: Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 4: Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 5: Forward voltage drop versus forward current (typical values, per diode)**



**Figure 6: Forward voltage drop versus forward current (typical values, per diode)**

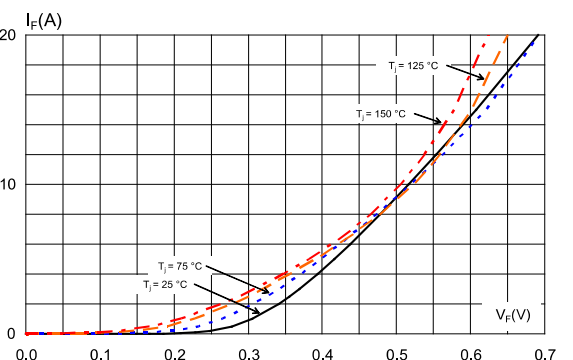
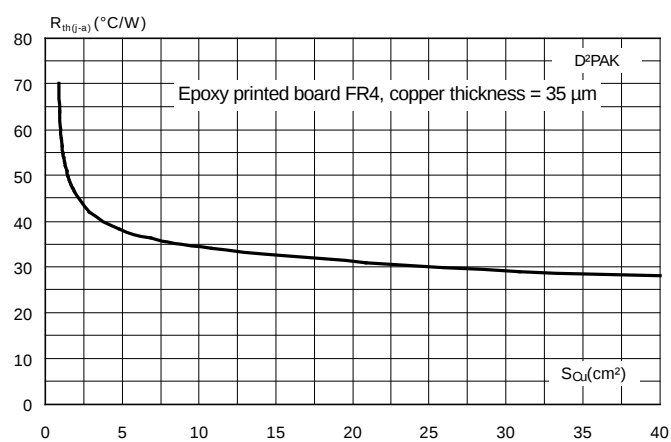


Figure 7: Thermal resistance junction to ambient versus copper surface under tab for D<sup>2</sup>PAK  
(typical values)



## 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 UL94,V0
- Recommended torque value: 0.55 N·m (for TO-220AB)
- Maximum torque value: 0.6 N·m (for TO-220AB)

## 2.1 TO-220AB package information

Figure 8: TO-220AB package outline

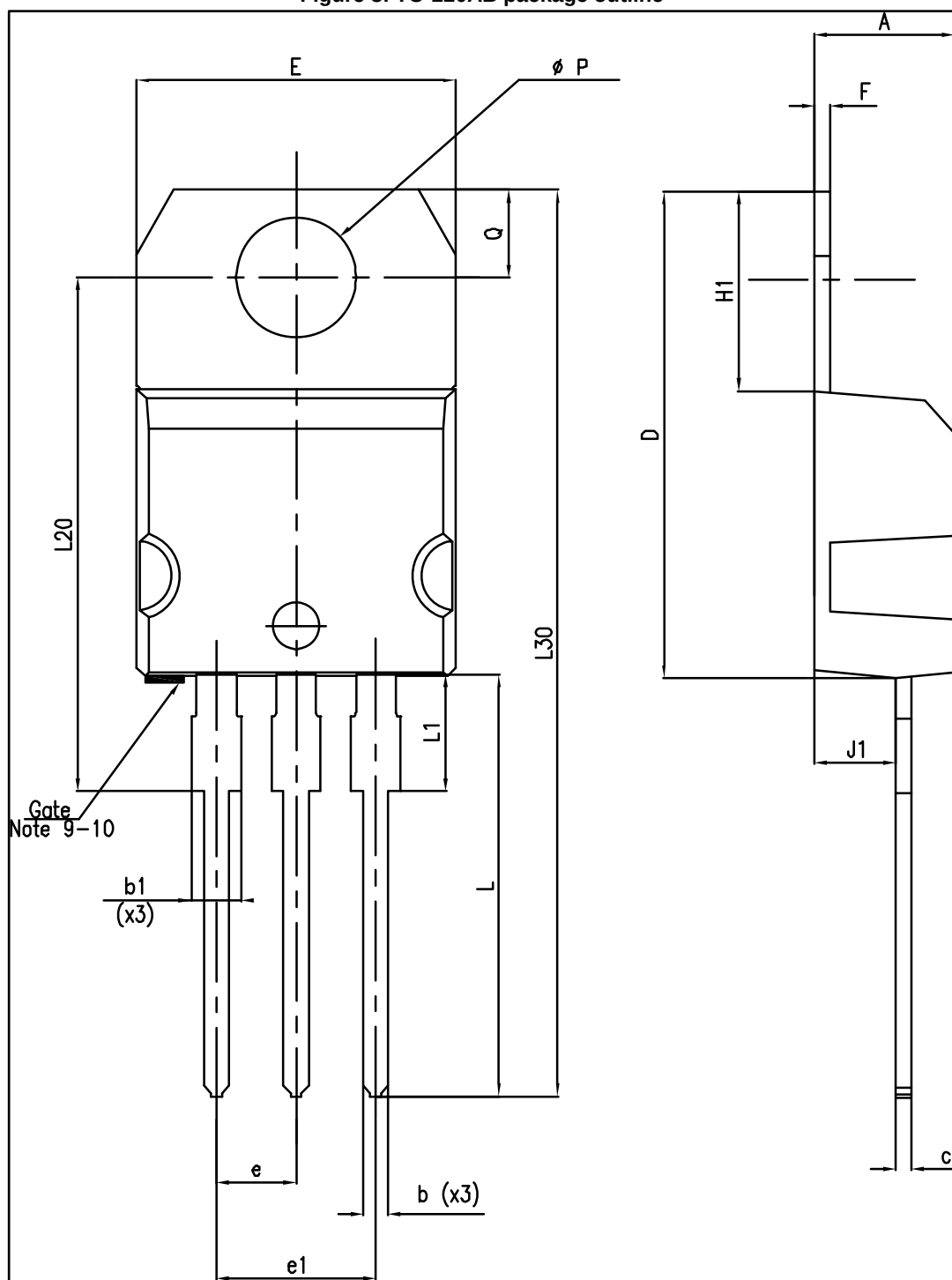


Table 5: TO-220AB package mechanical data

| 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 |

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

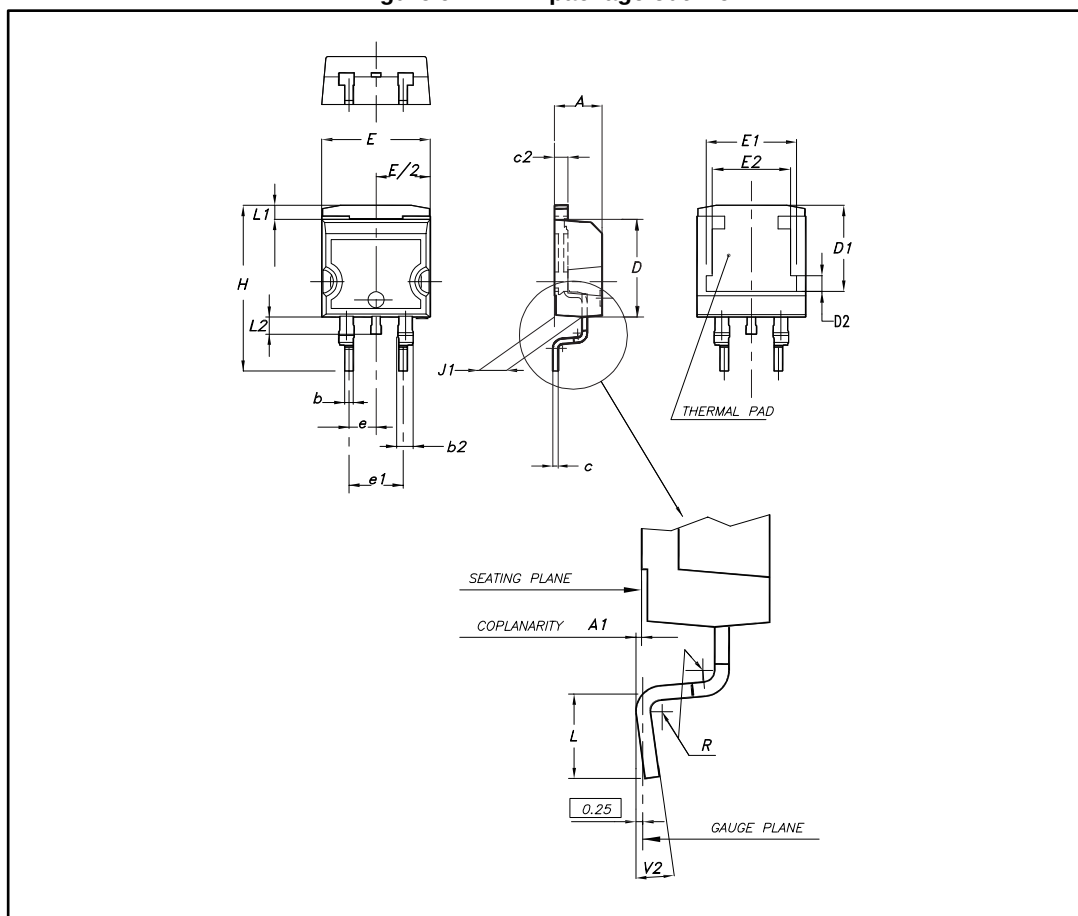
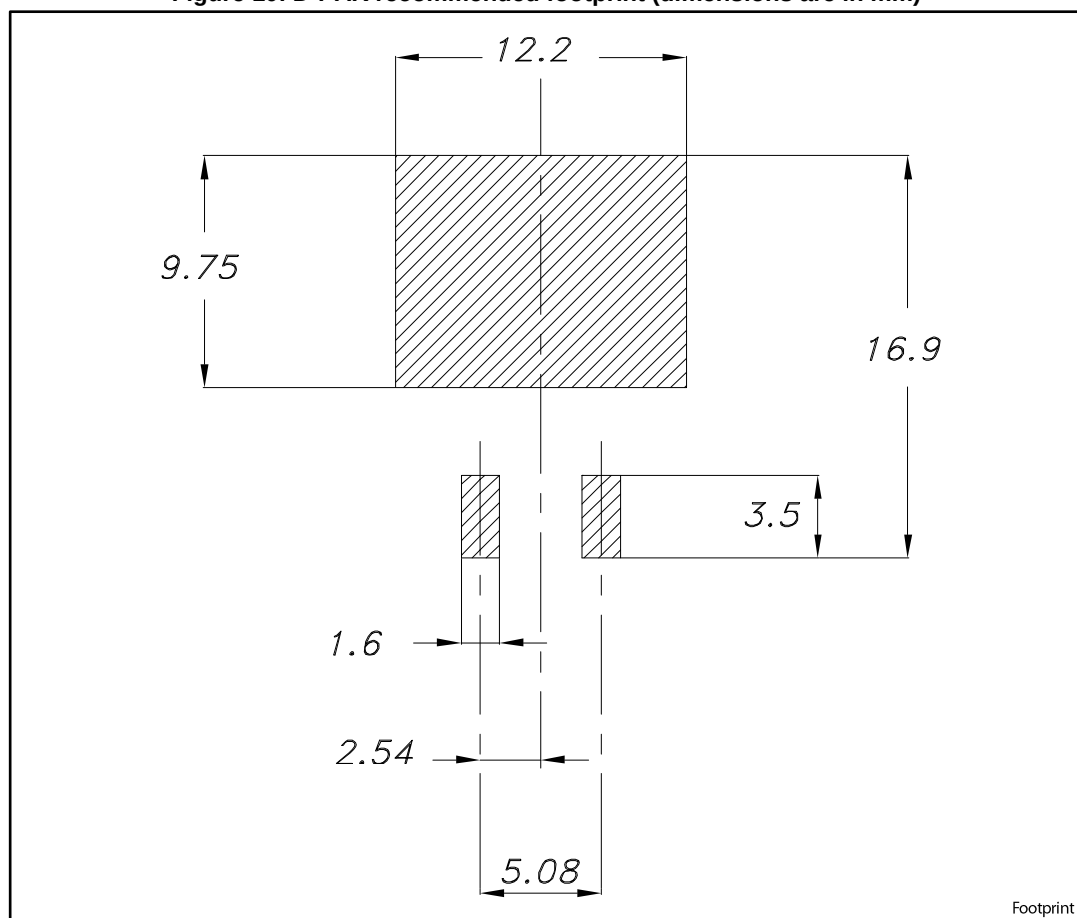
Figure 9: D<sup>2</sup>PAK package outline

Table 6: D<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 4.40        |      | 4.60  | 0.173  |       | 0.181 |
| A1   | 0.03        |      | 0.23  | 0.001  |       | 0.009 |
| b    | 0.70        |      | 0.93  | 0.028  |       | 0.037 |
| b2   | 1.14        |      | 1.70  | 0.045  |       | 0.067 |
| c    | 0.45        |      | 0.60  | 0.018  |       | 0.024 |
| c2   | 1.23        |      | 1.36  | 0.048  |       | 0.053 |
| D    | 8.95        |      | 9.35  | 0.352  |       | 0.368 |
| D1   | 7.50        | 7.75 | 8.00  | 0.295  | 0.305 | 0.315 |
| D2   | 1.10        | 1.30 | 1.50  | 0.043  | 0.051 | 0.060 |
| E    | 10          |      | 10.40 | 0.394  |       | 0.409 |
| E1   | 8.50        | 8.70 | 8.90  | 0.335  | 0.343 | 0.346 |
| E2   | 6.85        | 7.05 | 7.25  | 0.266  | 0.278 | 0.282 |
| e    |             | 2.54 |       |        | 0.100 |       |
| e1   | 4.88        |      | 5.28  | 0.190  |       | 0.205 |
| H    | 15          |      | 15.85 | 0.591  |       | 0.624 |
| J1   | 2.49        |      | 2.69  | 0.097  |       | 0.106 |
| L    | 2.29        |      | 2.79  | 0.090  |       | 0.110 |
| L1   | 1.27        |      | 1.40  | 0.049  |       | 0.055 |
| L2   | 1.30        |      | 1.75  | 0.050  |       | 0.069 |
| R    |             | 0.4  |       |        | 0.015 |       |
| V2   | 0°          |      | 8°    | 0°     |       | 8°    |

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

### 3 Ordering information

Table 7: Ordering information

| Order code     | Marking    | Package            | Weight | Base qty. | Delivery mode |
|----------------|------------|--------------------|--------|-----------|---------------|
| FERD20H60CTS   | FD20H60CTS | TO-220AB           | 1.38 g | 50        | Tube          |
| FERD20H60CG-TR | FD20H60CG  | D <sup>2</sup> PAK | 1.43 g | 1000      | Tape and reel |

### 4 Revision history

Table 8: Document revision history

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 01-Sep-2017 | 1        | Initial release. |

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