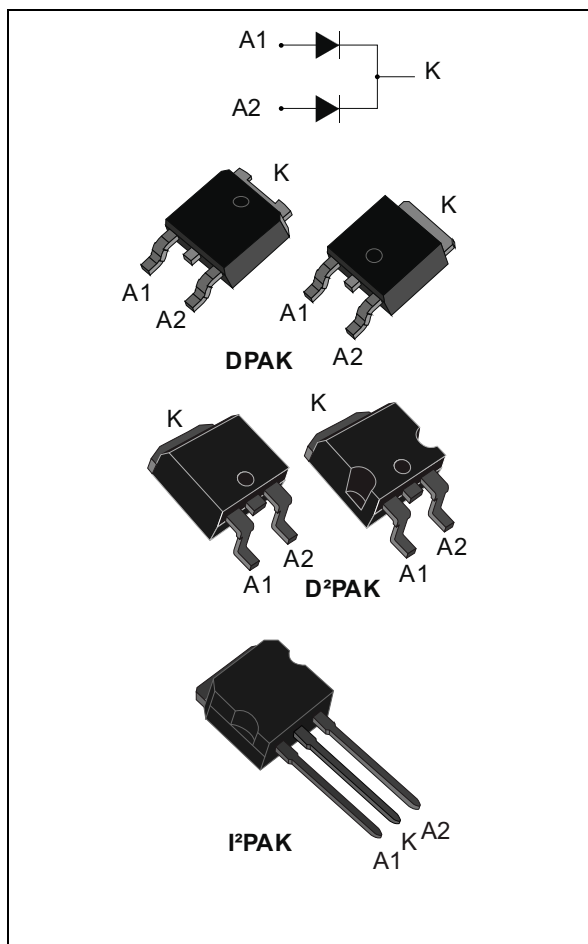


## High voltage power Schottky rectifier

Datasheet – production data



### Description

This dual center tab Schottky rectifier is suited for high frequency switched mode power supplies.

Table 1. Device summary

| Symbol       | Value   |
|--------------|---------|
| $I_{F(AV)}$  | 2 x 8 A |
| $V_{RRM}$    | 170 V   |
| $T_{J(max)}$ | 175 °C  |
| $V_F (Typ)$  | 0.70 V  |

### Features

- High junction temperature capability
- Good trade off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- ECOPACK<sup>®</sup>2 compliant component for DPAK and D<sup>2</sup>PAK on demand

# 1 Characteristics

**Table 2. Absolute ratings (limiting values per diode at  $T_{amb} = 25\text{ °C}$  unless otherwise stated)**

| Symbol          | Parameter                                             |                                                       |           | Value        | Unit |
|-----------------|-------------------------------------------------------|-------------------------------------------------------|-----------|--------------|------|
| $V_{RRM}$       | Repetitive peak reverse voltage                       |                                                       |           | 170          | V    |
| $I_{F(RMS)}$    | Forward rms current                                   |                                                       |           | 20           | A    |
| $I_{F(AV)}$     | Average forward current, $\delta = 0.5$ , square wave | $T_C = 150\text{ °C}$                                 | Per diode | 8            | A    |
|                 |                                                       |                                                       | Total     | 16           |      |
| $I_{FSM}$       | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$ sinusoidal                       |           | 75           | A    |
| $P_{ARM}^{(1)}$ | Repetitive peak avalanche power                       | $t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$ |           | 335          | W    |
| $T_{stg}$       | Storage temperature range                             |                                                       |           | -65 to + 175 | °C   |
| $T_j$           | Maximum operating junction temperature <sup>(2)</sup> |                                                       |           | 175          | °C   |

1. For pulse time duration derating, please refer to [Figure 3](#). More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.

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

**Table 3. Thermal parameters**

| Symbol        | Parameter        |           | Value | Unit |
|---------------|------------------|-----------|-------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 3     | °C/W |
|               |                  | Total     | 1.8   |      |
| $R_{th(c)}$   | Coupling         |           | 0.6   |      |

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode } 2) \times R_{th(c)}$$

**Table 4. Static electrical characteristics (per diode)**

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ  | Max. | Unit          |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     | -    | -    | 15   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | -    | 15   | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 8\text{ A}$  | -    | -    | 0.92 | V             |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.70 | 0.75 |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 16\text{ A}$ | -    | -    | 1.0  |               |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.80 | 0.86 |               |

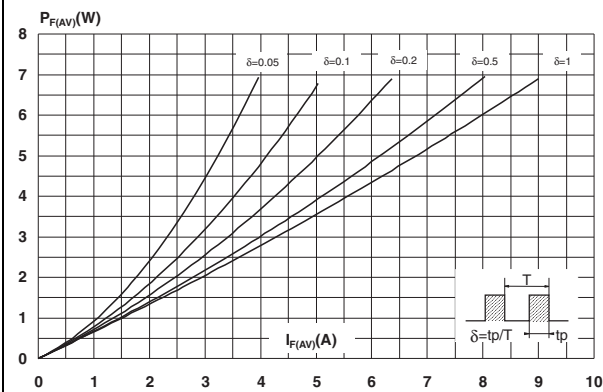
1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

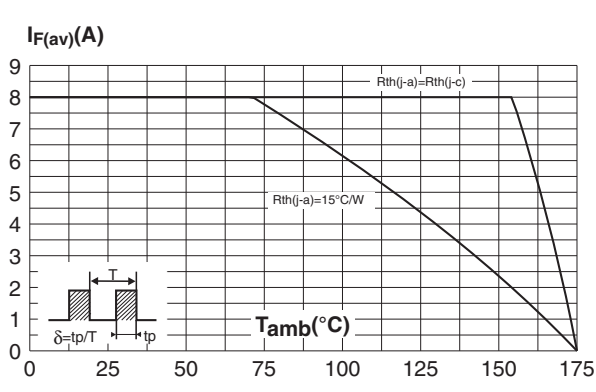
To evaluate the conduction losses use the following equation:

$$P = 0.64 \times I_{F(AV)} + 0.014 \times I_{F(RMS)}^2$$

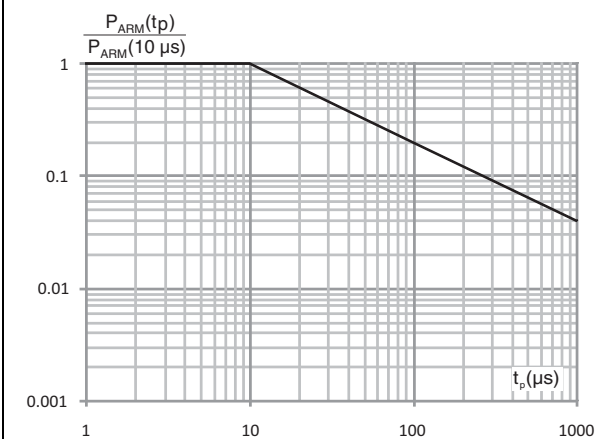
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



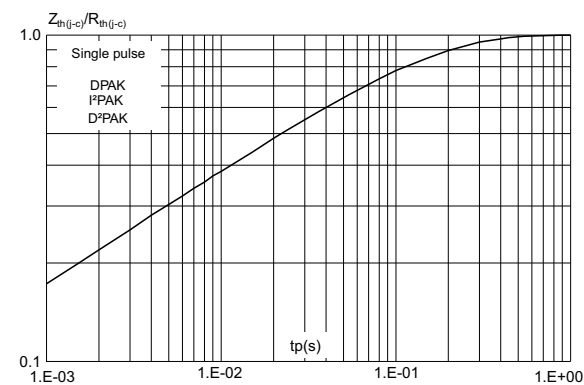
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



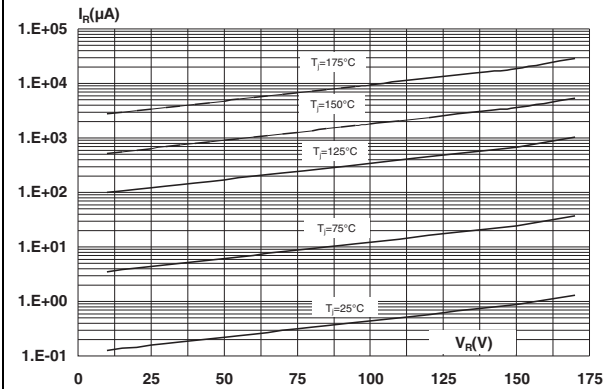
**Figure 3. Normalized avalanche power derating versus pulse duration at  $T_j = 125^\circ\text{C}$**



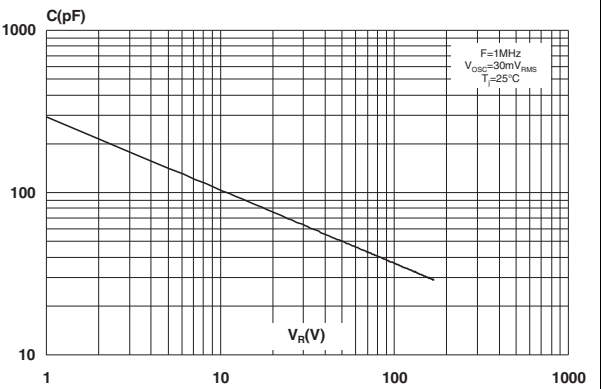
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



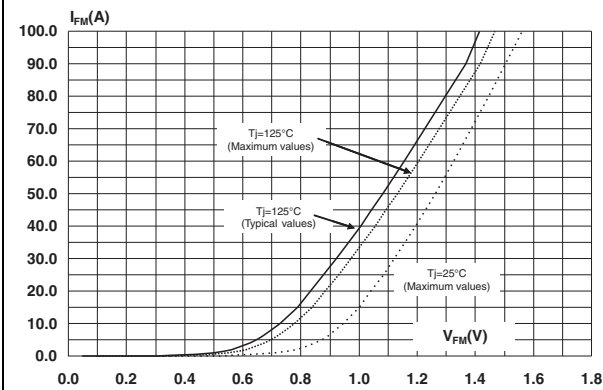
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



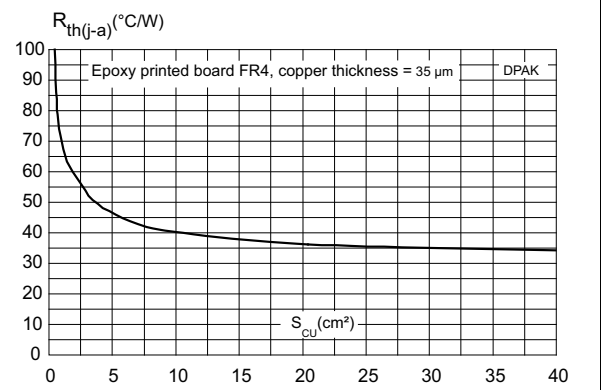
**Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)**



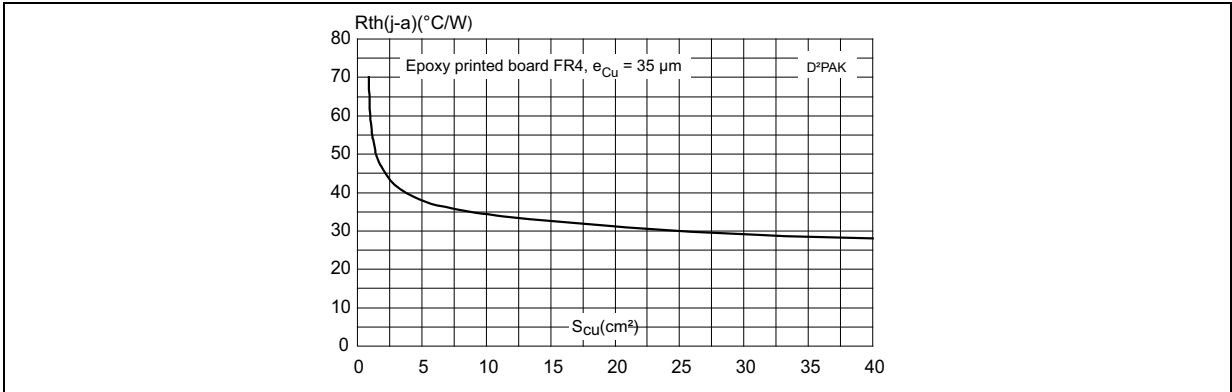
**Figure 7. Forward voltage drop vs. forward current (per diode)**



**Figure 8. Thermal resistance junction to ambient versus copper surface under tab (DPAK)**



**Figure 9. Thermal resistance junction to ambient versus copper surface under tab (D²PAK)**



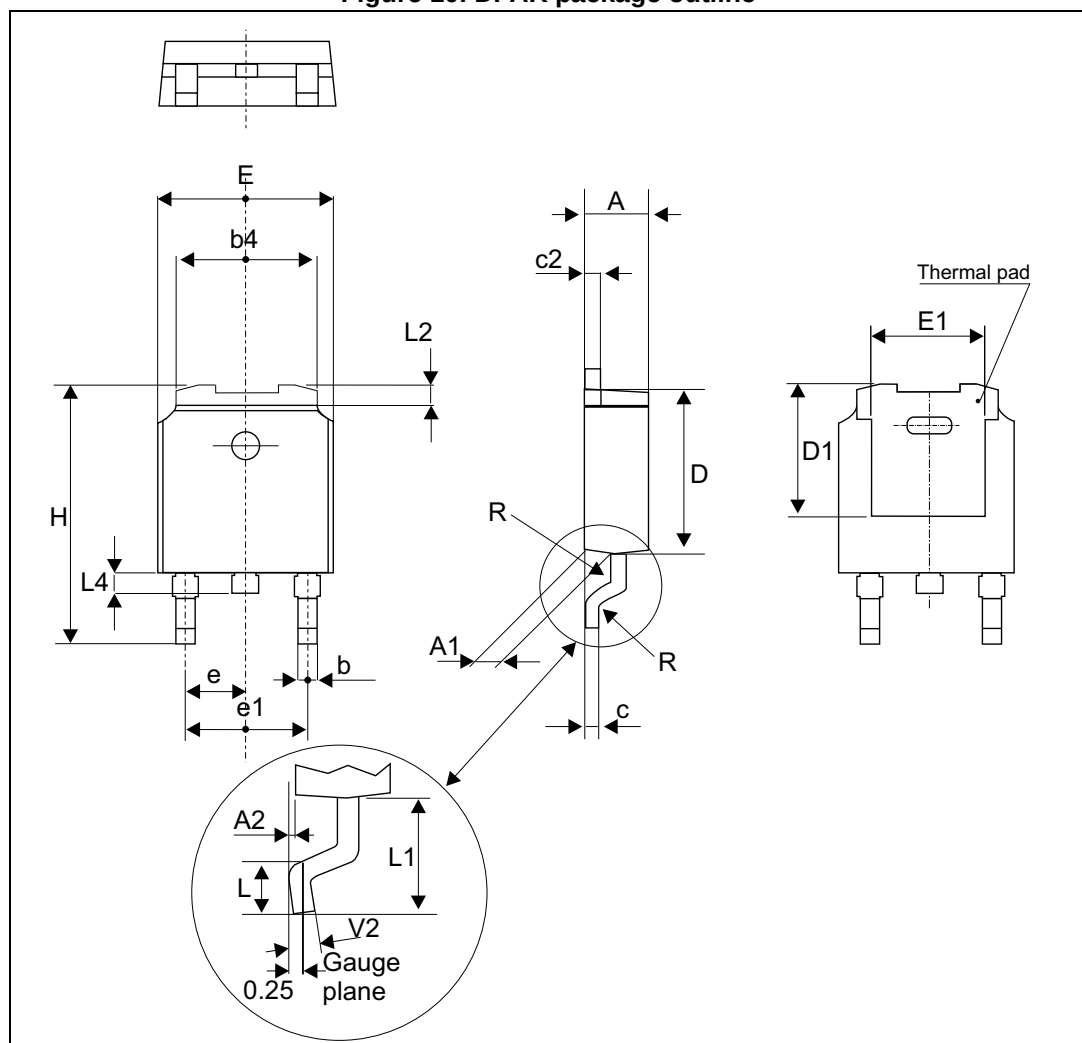
## 2 Package Information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)

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.

### 2.1 DPAK package information

Figure 10. DPAK package outline

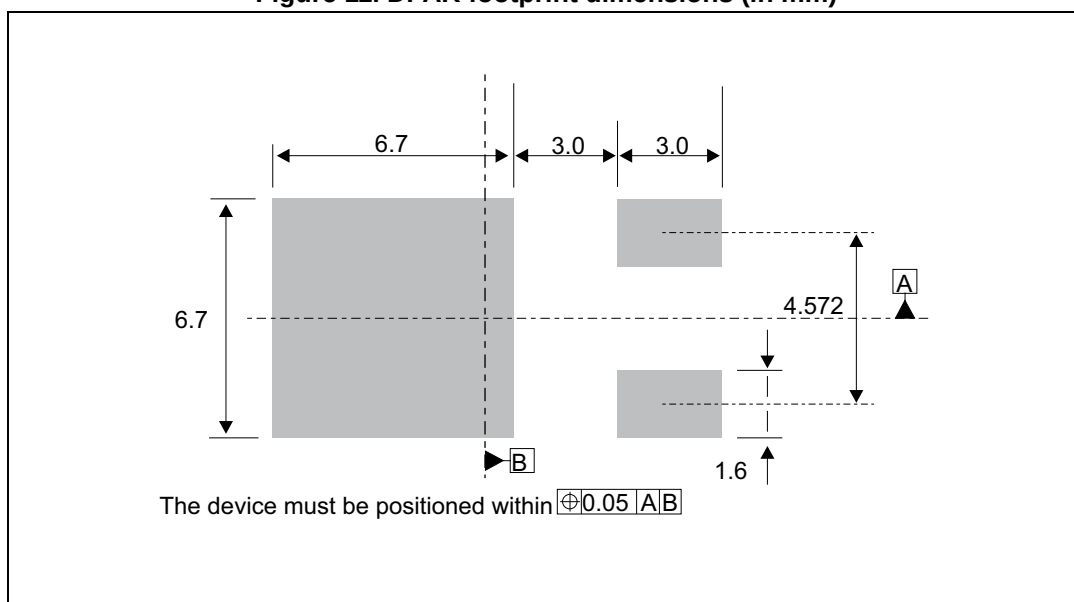


*Note:* This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | 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  |       | 0.214 |
| 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  |       | 0.264 |
| E1   | 4.32        |      | 5.50  | 0.170  |       | 0.216 |
| e    |             | 2.28 |       |        | 0.090 |       |
| e1   | 4.40        |      | 4.70  | 0.173  |       | 0.185 |
| H    | 9.35        |      | 10.40 | 0.368  |       | 0.409 |
| L    | 1.00        |      | 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 footprint dimensions (in mm)



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

Figure 12. I<sup>2</sup>PAK package outline

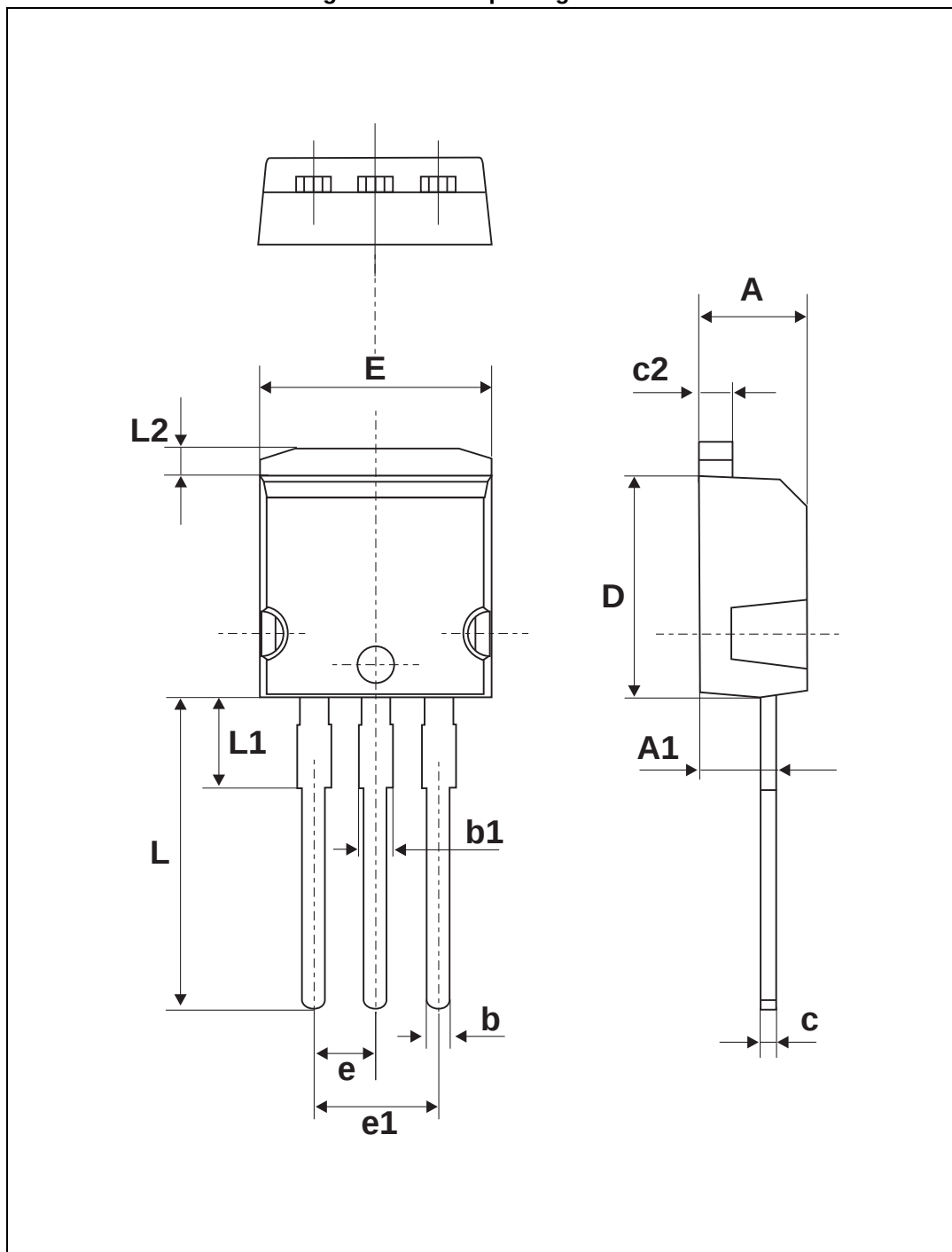
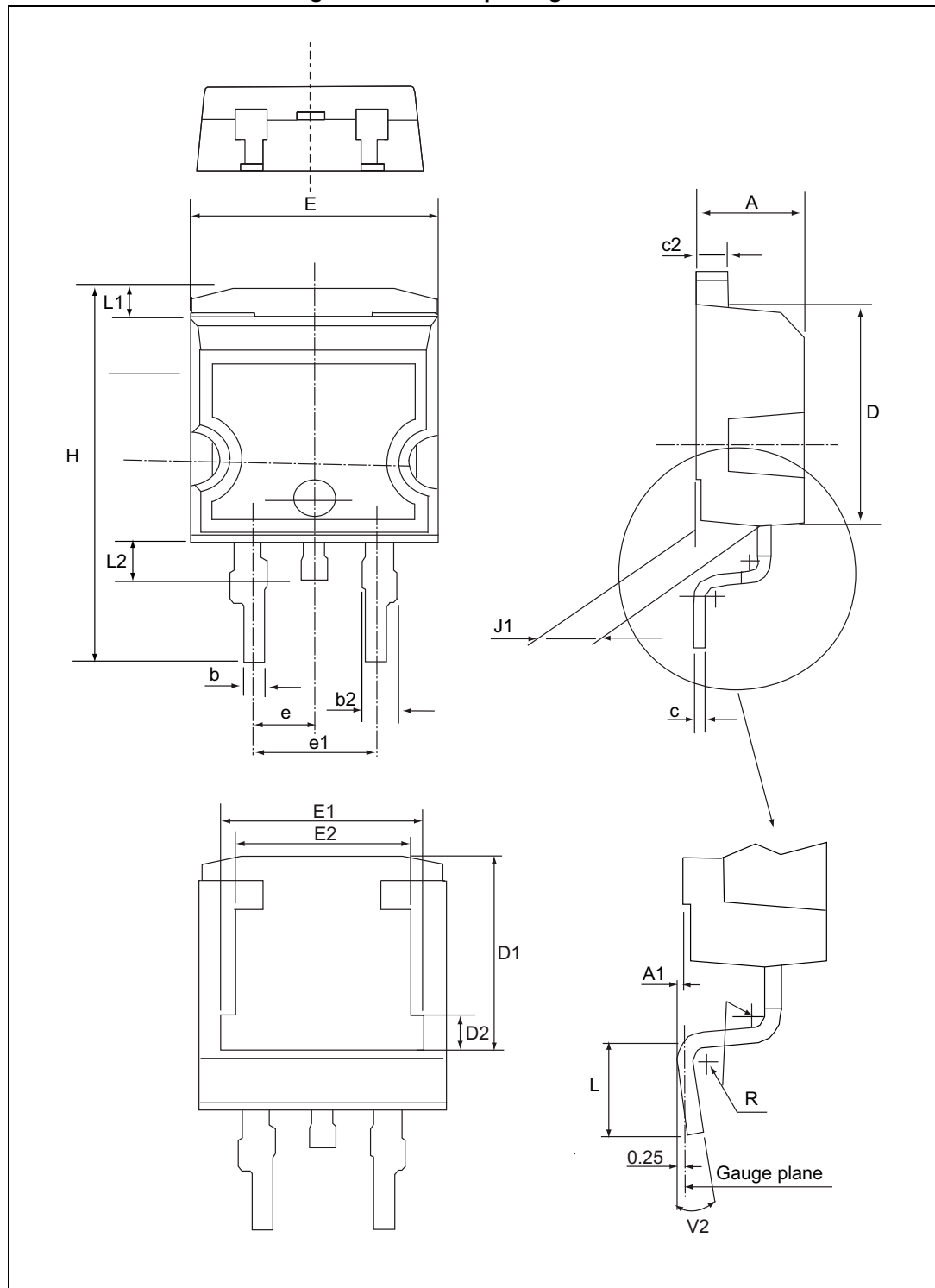


Table 6. I<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |      |       |        |      |       |
|------|-------------|------|-------|--------|------|-------|
|      | Millimeters |      |       | Inches |      |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ. | Max.  |
| A    | 4.40        |      | 4.60  | 0.173  |      | 0.181 |
| A1   | 2.40        |      | 2.72  | 0.094  |      | 0.107 |
| b    | 0.61        |      | 0.88  | 0.024  |      | 0.035 |
| b1   | 1.14        |      | 1.70  | 0.044  |      | 0.067 |
| c    | 0.49        |      | 0.70  | 0.019  |      | 0.028 |
| c2   | 1.23        |      | 1.32  | 0.048  |      | 0.052 |
| D    | 8.95        |      | 9.35  | 0.352  |      | 0.368 |
| e    | 2.40        |      | 2.70  | 0.094  |      | 0.106 |
| e1   | 4.95        |      | 5.15  | 0.195  |      | 0.303 |
| E    | 10          |      | 10.40 | 0.394  |      | 0.409 |
| L    | 13          |      | 14    | 0.512  |      | 0.551 |
| L1   | 3.50        |      | 3.93  | 0.138  |      | 0.155 |
| L2   | 1.27        |      | 1.40  | 0.050  |      | 0.055 |

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

Figure 13. D<sup>2</sup>PAK package outline

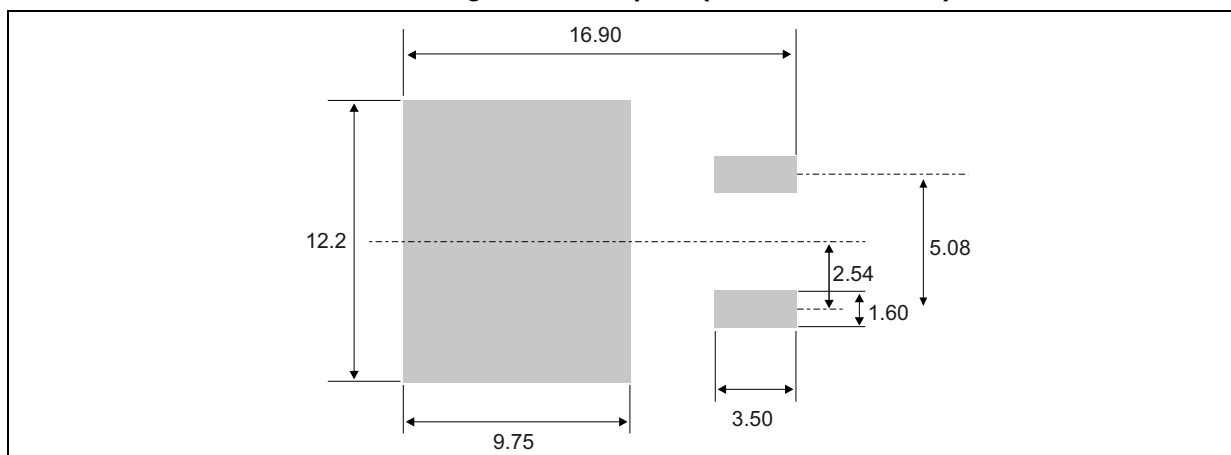


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 7. D<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |           |       |            |      |       |
|------|-------------|-----------|-------|------------|------|-------|
|      | Millimeters |           |       | Inches     |      |       |
|      | Min.        | Typ.      | Max.  | Min.       | Typ. | Max.  |
| A    | 4.36        |           | 4.60  | 0.171      |      | 0.181 |
| A1   | 0           |           | 0.25  |            |      | 0.010 |
| b    | 0.70        |           | 0.93  | 0.027      |      | 0.037 |
| b2   | 1.14        |           | 1.70  | 0.045      |      | 0.067 |
| c    | 0.38        |           | 0.69  | 0.014      |      | 0.027 |
| c2   | 1.19        |           | 1.36  | 0.046      |      | 0.053 |
| D    | 8.60        |           | 9.35  | 0.338      |      | 0.368 |
| D1   | 6.90        |           | 8.00  | 0.271      |      | 0.315 |
| D2   | 1.10        |           | 1.50  | 0.043      |      | 0.060 |
| E    | 10.00       |           | 10.55 | 0.393      |      | 0.415 |
| E1   | 8.10        |           | 8.90  | 0.318      |      | 0.350 |
| E2   | 6.85        |           | 7.25  | 0.269      |      | 0.285 |
| e    |             | 2.54      |       |            | 0.1  |       |
| e1   | 4.88        |           | 5.28  | 0.192      |      | 0.208 |
| H    | 15.00       |           | 15.85 | 0.590      |      | 0.624 |
| J1   | 2.49        |           | 2.90  | 0.098      |      | 0.114 |
| L    | 1.90        |           | 2.79  | 0.074      |      | 0.110 |
| L1   | 1.27        |           | 1.65  | 0.050      |      | 0.065 |
| L2   | 1.30        |           | 1.78  | 0.051      |      | 0.070 |
| R    |             | 0.40 typ. |       | 0.016 typ. |      |       |
| V2   | 0°          |           | 8°    | 0°         |      | 8°    |

Figure 14. Footprint (dimensions in mm)



### 3 Ordering information

**Table 8. Ordering information**

| Order code     | Marking     | Package            | Weight | Base qty | Delivery mode |
|----------------|-------------|--------------------|--------|----------|---------------|
| STPS16170CG-TR | STPS16170CG | D <sup>2</sup> PAK | 1.38 g | 1000     | Tape and reel |
| STPS16170CB-TR | PS16170CB   | DPAK               | 0.32 g | 2500     |               |
| STPS16170CR    | STPS16170CR | I <sup>2</sup> PAK | 1.5 g  | 50       | Tube          |

### 4 Revision history

**Table 9. Revision history**

| Date        | Revision | Changes                                                                  |
|-------------|----------|--------------------------------------------------------------------------|
| 13-Jul-2006 | 1        | First issue.                                                             |
| 20-Mar-2015 | 2        | Updated DPAK and D <sup>2</sup> PAK and reformatted to current standard. |
| 23-Apr-2015 | 3        | Updated <a href="#">Figure 13</a> .                                      |
| 18-Dec-2015 | 4        | Updated DPAK package information and reformatted to current standard.    |

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