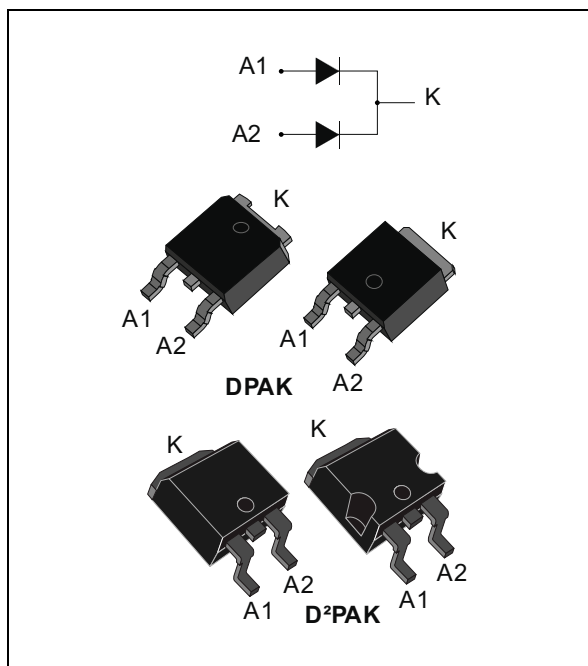


## High voltage power Schottky rectifier

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 5 A |
| $V_{RRM}$    | 170 V   |
| $T_{J(max)}$ | 175 °C  |
| $V_F (Typ)$  | 0.69 V  |

### Features

- High junction temperature capability
- Good trade off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- ECOPACK®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                                   |                                                       |           | 10           | A    |
| $I_{F(AV)}$     | Average forward current, $\delta = 0.5$ , square wave | $T_C = 155\text{ °C}$                                 | Per diode | 5            | A    |
|                 |                                                       |                                                       | Total     | 10           |      |
| $I_{FSM}$       | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$ sinusoidal                       |           | 75           | A    |
| $P_{ARM}^{(1)}$ | Repetitive peak avalanche power                       | $t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$ |           | 220          | 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 | 4     | °C/W |
|               |                  | Total     | 2.4   |      |
| $R_{th(c)}$   | Coupling         |           | 0.7   |      |

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 | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     | -    | -    | 10   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | -    | 10   | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 5\text{ A}$  | -    | -    | 0.92 | V             |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.69 | 0.75 |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 10\text{ A}$ | -    | -    | 1.0  |               |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 0.79 | 0.85 |               |

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:

$$P = 0.65 \times I_{F(AV)} + 0.02 \times I_{F(RMS)}^2$$

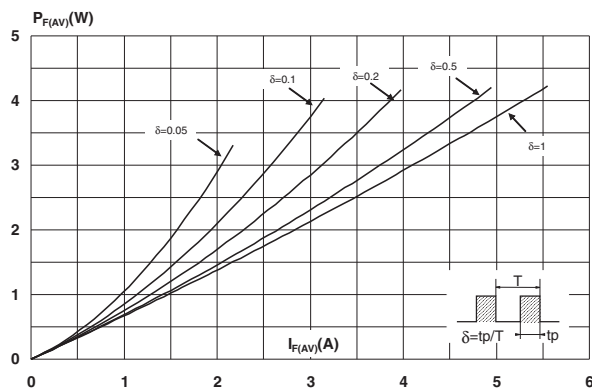
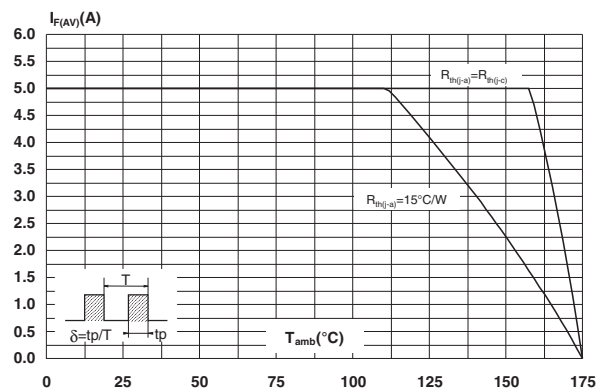
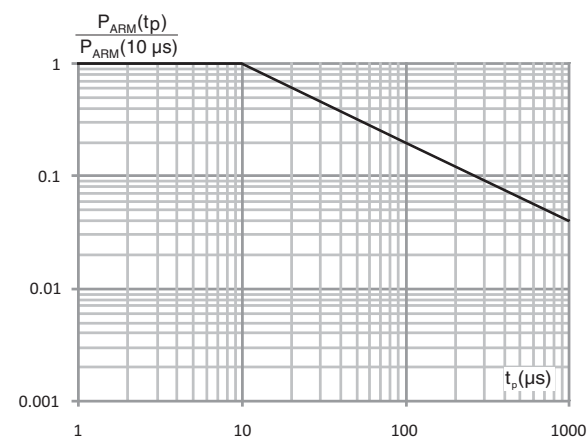
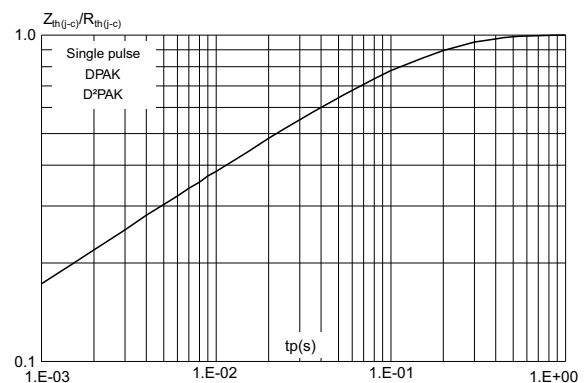
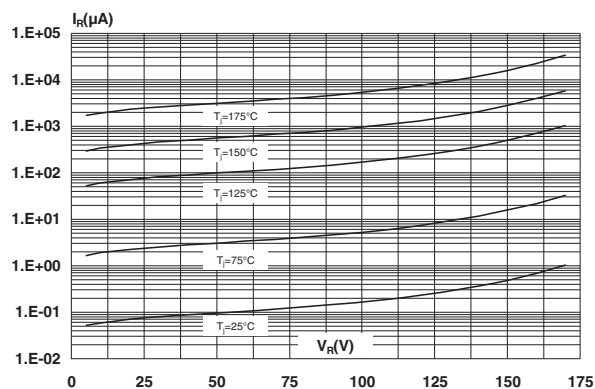
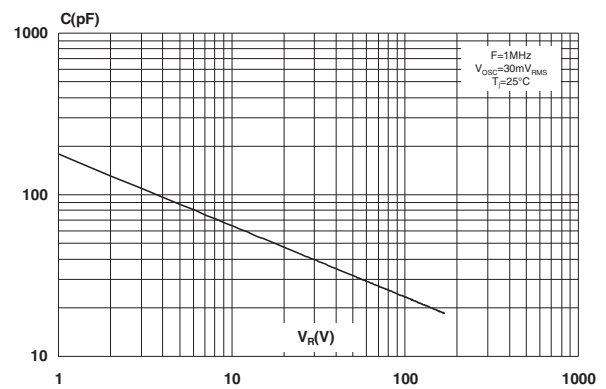
**Figure 1. Average forward power dissipation versus average forward current (per diode)****Figure 2. Average forward current per diode versus ambient temperature ( $\delta = 0.5$ )****Figure 3. Normalized avalanche power derating versus pulse duration at  $T_j = 125^\circ\text{C}$** **Figure 4. Relative 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)

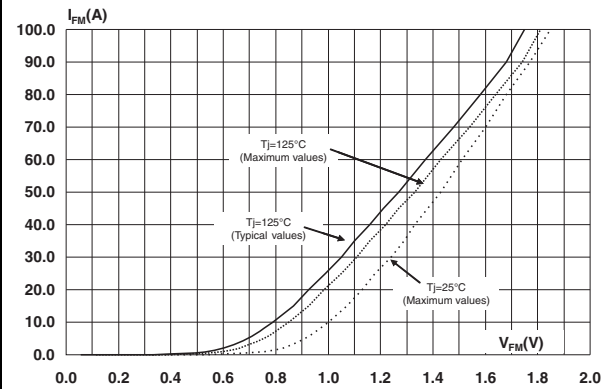


Figure 8. Thermal resistance junction to ambient versus copper surface under tab (DPAK)

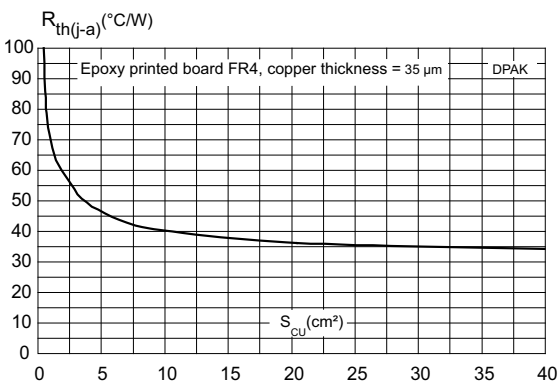
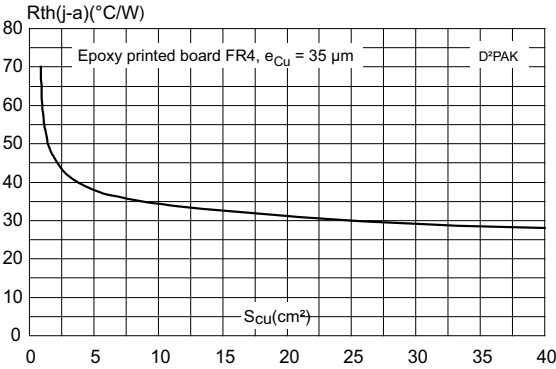


Figure 9. Thermal resistance junction to ambient versus copper surface under tab (D<sup>2</sup>PAK)



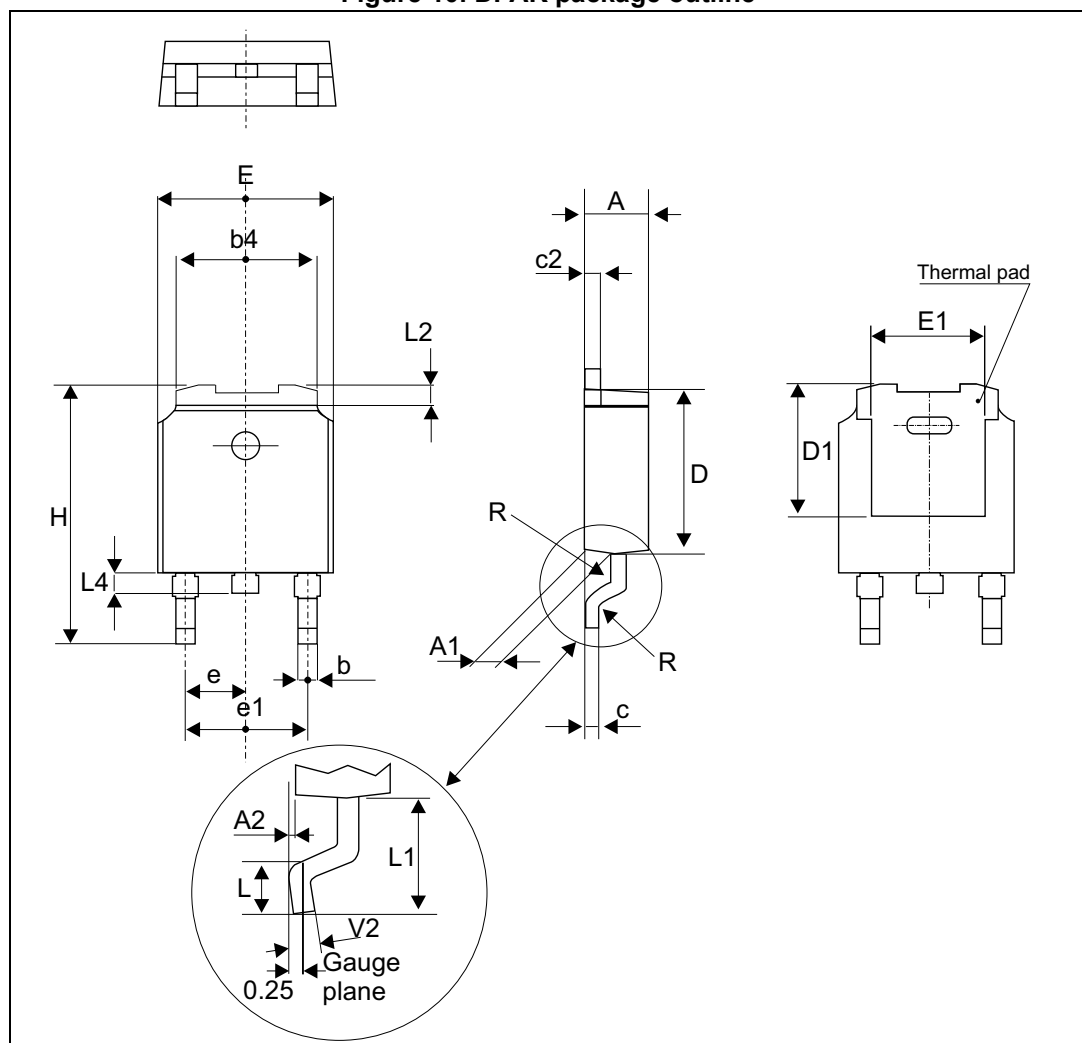
## 2 Package Information

- 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

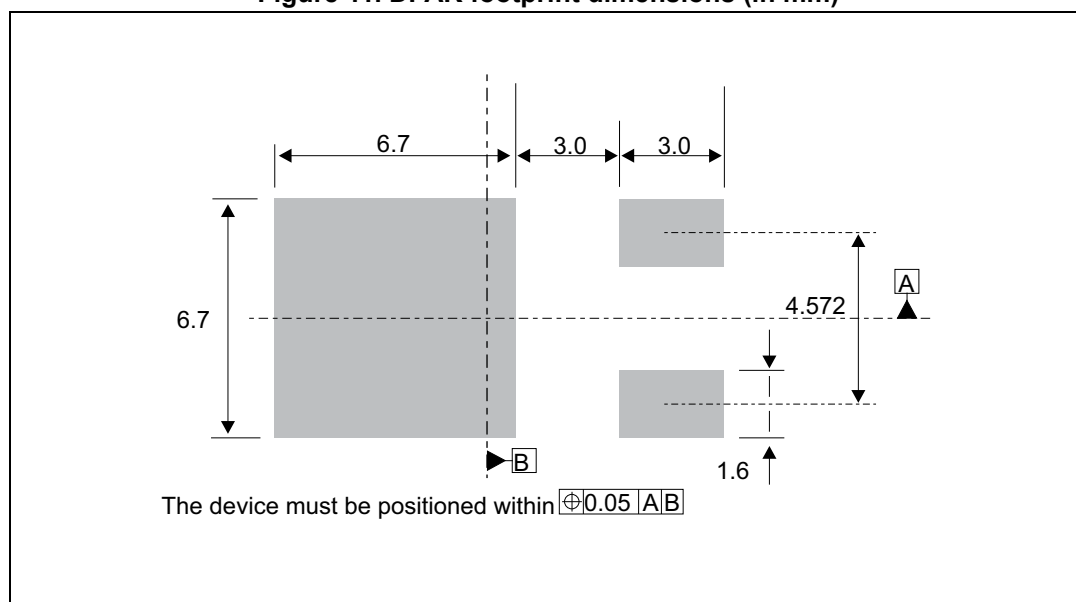


*Note:* This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

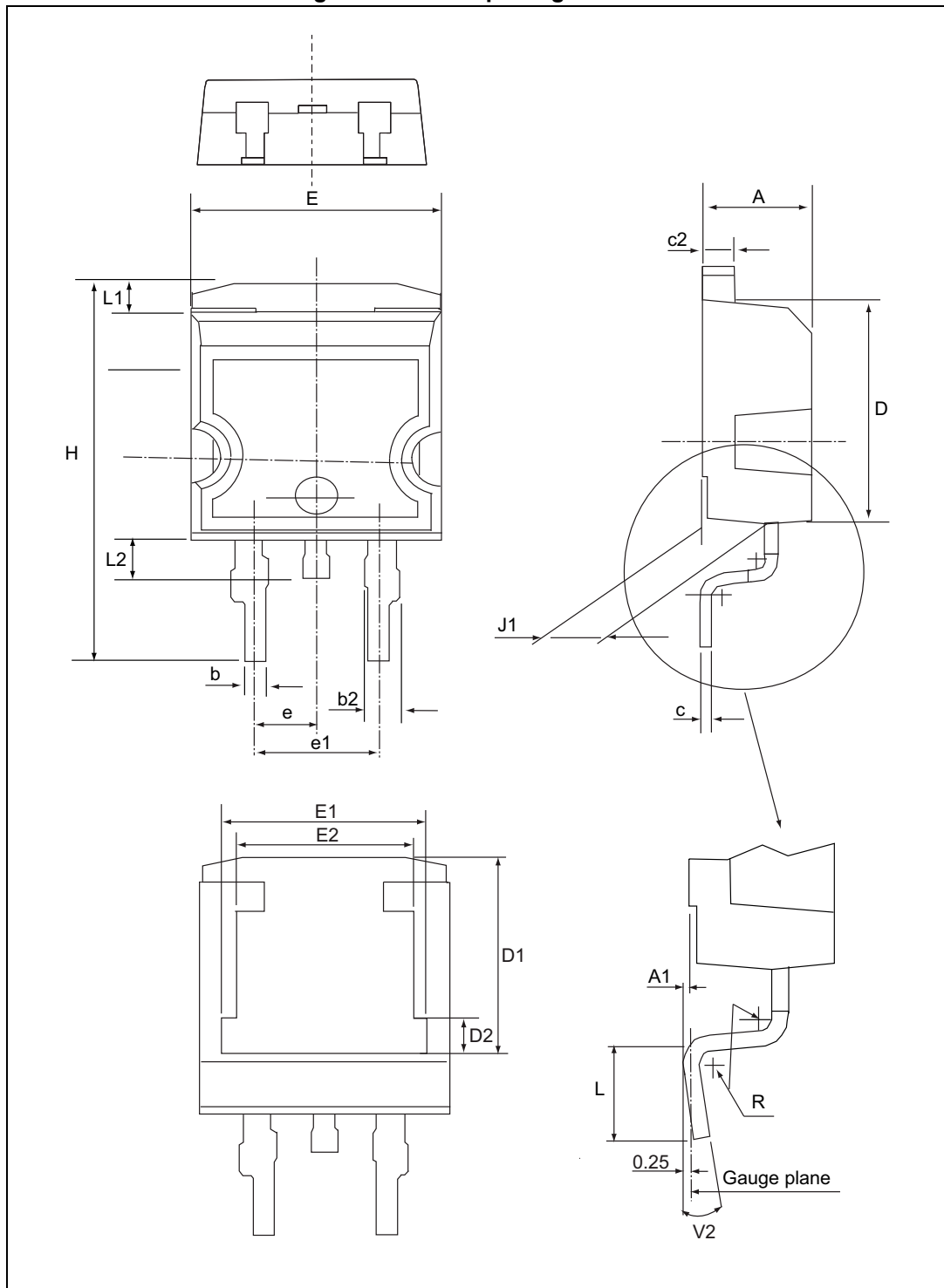
| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 2.18        |      | 2.40  | 0.085  |       | 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 D<sup>2</sup>PAK package information

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

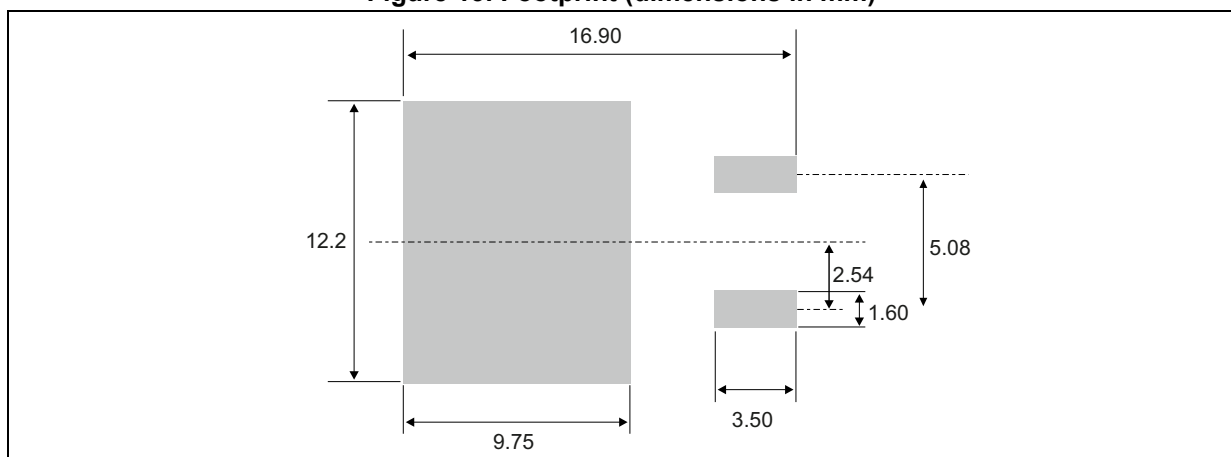


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. 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 13. Footprint (dimensions in mm)





### 3 Ordering information

Table 7. Ordering information

| Order code     | Marking     | Package            | Weight | Base qty | Delivery mode |
|----------------|-------------|--------------------|--------|----------|---------------|
| STPS10170CG-TR | STPS10170CG | D <sup>2</sup> PAK | 1.38 g | 1000     | Tape and reel |
| STPS10170CB-TR | PS10170CB   | DPAK               | 0.32 g | 2500     |               |

### 4 Revision history

Table 8. Revision history

| Date        | Revision | Changes                                                                  |
|-------------|----------|--------------------------------------------------------------------------|
| 13-Jul-2006 | 1        | First issue.                                                             |
| 09-Jan-2015 | 2        | Updated DPAK and D <sup>2</sup> PAK and reformatted to current standard. |
| 23-Apr-2015 | 3        | Updated Figure 12 and reformatted to current standard.                   |
| 18-Dec-2015 | 4        | Updated DPAK package information and reformatted to current standard.    |

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics – All rights reserved