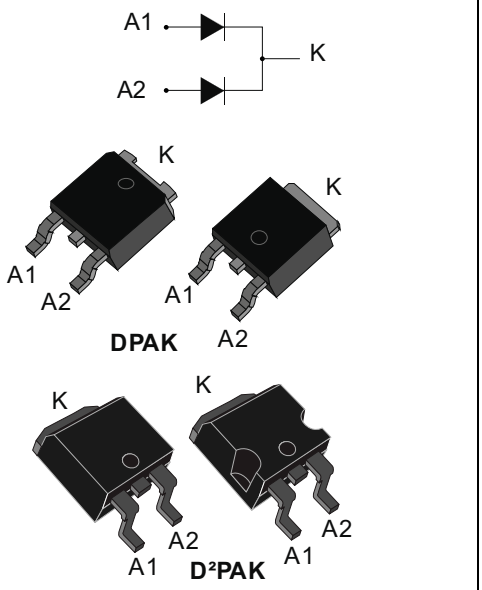
# STPS10170C

## 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 D²PAK on demand

# 1 Characteristics

**Table 2. Absolute ratings (limiting values per diode at $T_{amb}$ = 25 °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, δ = 0.5, square wave | $T_c$ = 155 °C | Per diode | 5 | A |
| | | | Total | 10 | |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | | 75 | A |
| $P_{ARM}$(1) | Repetitive peak avalanche power | $t_p$ = 10 µs, $T_j$ = 125 °C | | 220 | W |
| $T_{stg}$ | Storage temperature range | | | -65 to + 175 | °C |
| $T_j$ | Maximum operating junction temperature(2) | | | 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. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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:
$\Delta Tj$(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

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

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$(1) | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | - | - | 10 | µA |
| | | $T_j$ = 125 °C | | - | - | 10 | mA |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 5 A | - | - | 0.92 | V |
| | | $T_j$ = 125 °C | | - | 0.69 | 0.75 | |
| | | $T_j$ = 25 °C | $I_F$ = 10 A | - | - | 1.0 | |
| | | $T_j$ = 125 °C | | - | 0.79 | 0.85 | |

1. Pulse test: $t_p$ = 5 ms, δ < 2%
2. Pulse test: $t_p$ = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.65x\ I_{F(AV)} + 0.02\ x\ I_F{}^2{}_{(RMS)}$

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

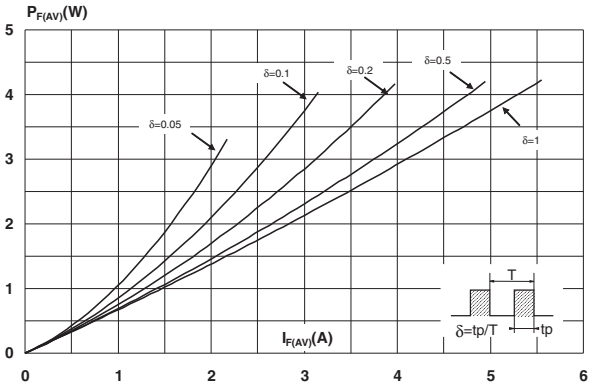



**Figure 2. Average forward current per diode versus ambient temperature (δ = 0.5)**

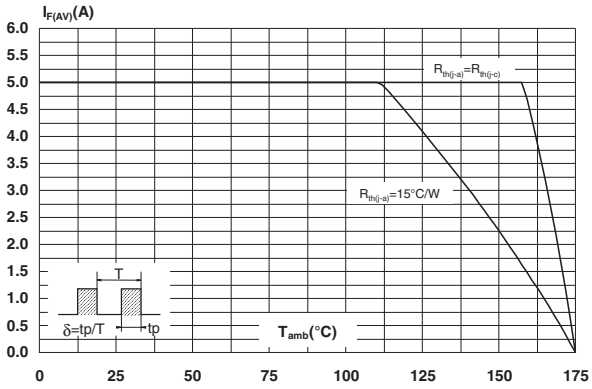



**Figure 3. Normalized avalanche power derating versus pulse duration at $T_j$ = 125 °C**

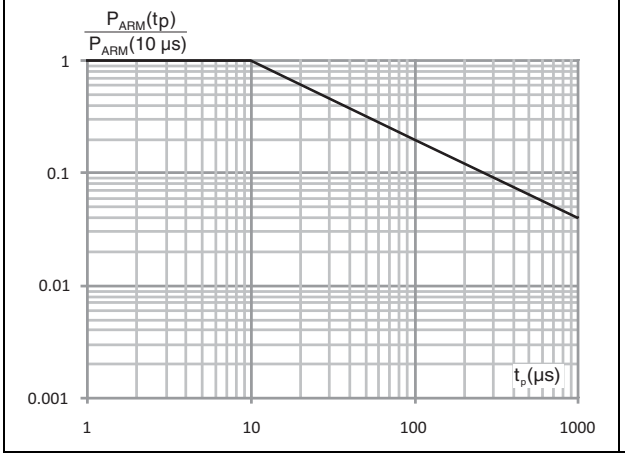



**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**

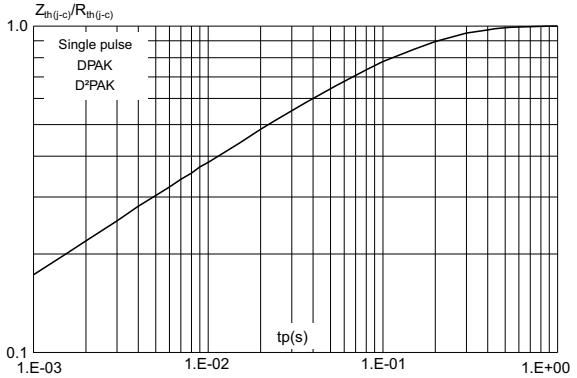



**Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)**

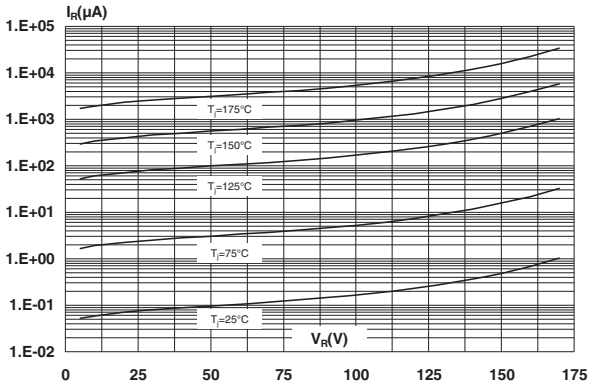



**Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)**

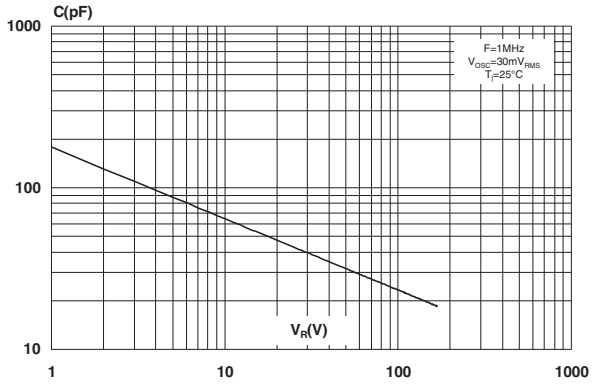


**Figure 7. Forward voltage drop vs. forward current (per diode)**

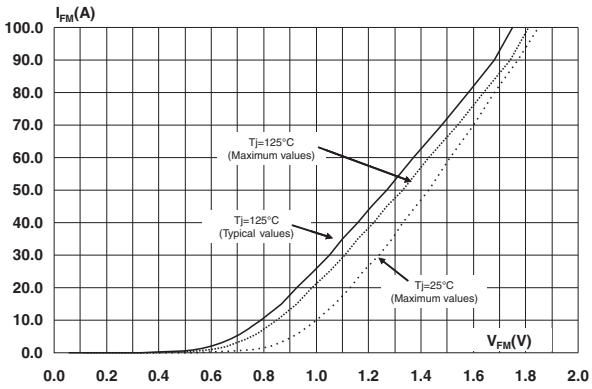



**Figure 8. Thermal resistance junction to ambient versus copper surface under tab (DPAK)**

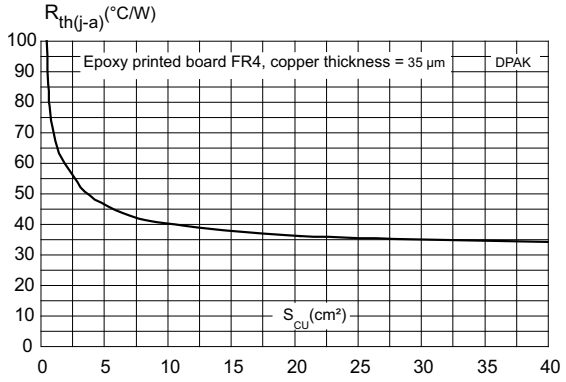
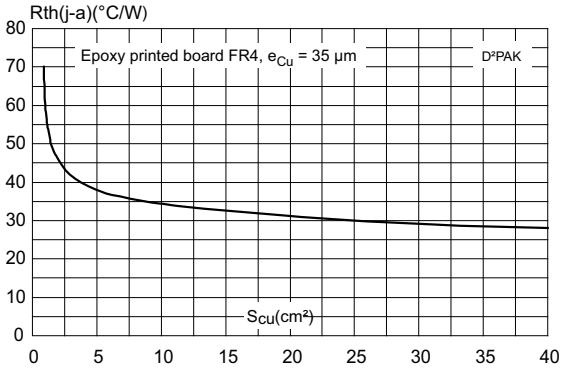



**Figure 9. Thermal resistance junction to ambient versus copper surface under tab (D²PAK)**



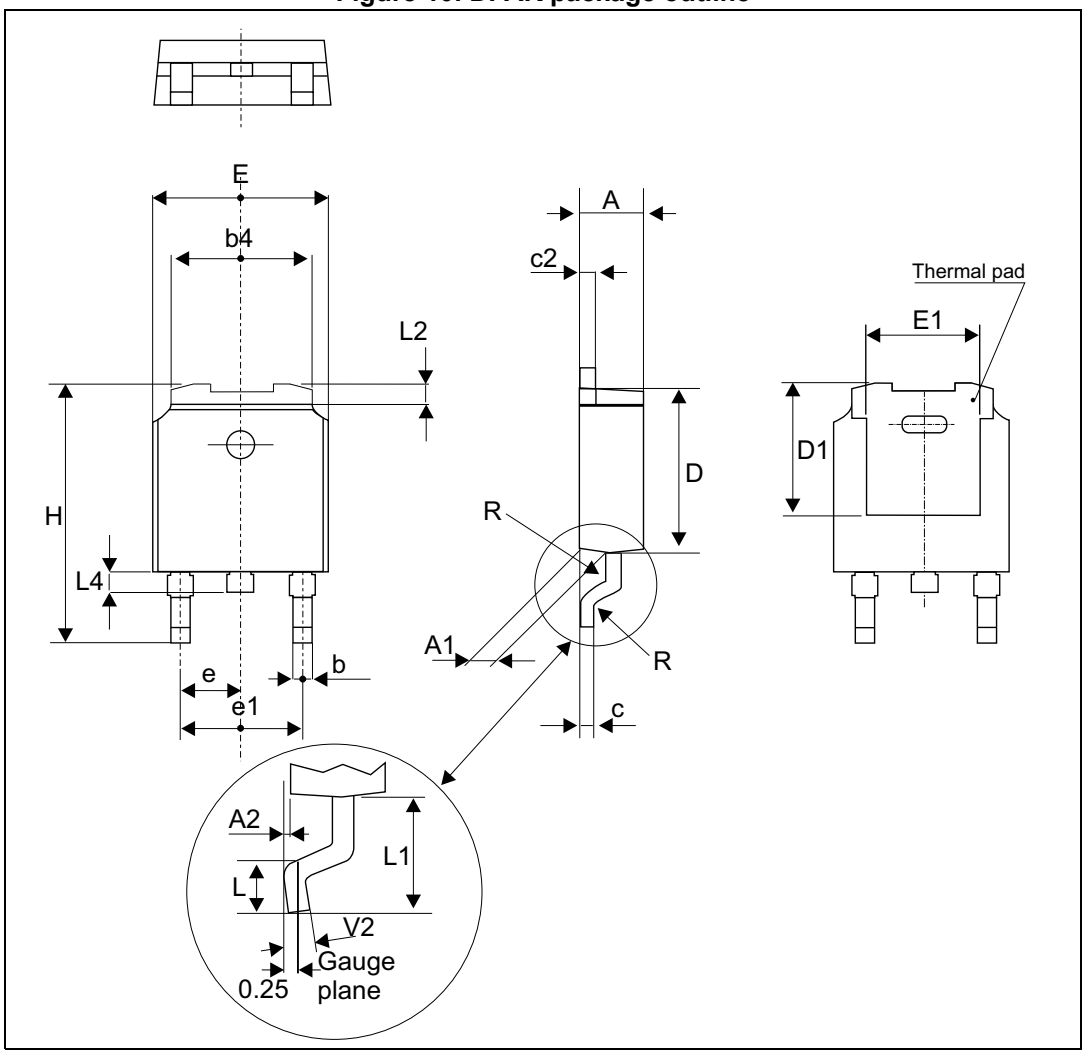
# 2 Package Information

- 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*. ECOPACK® is an ST trademark.

## 2.1 DPAK package information

**Figure 10. DPAK package outline**

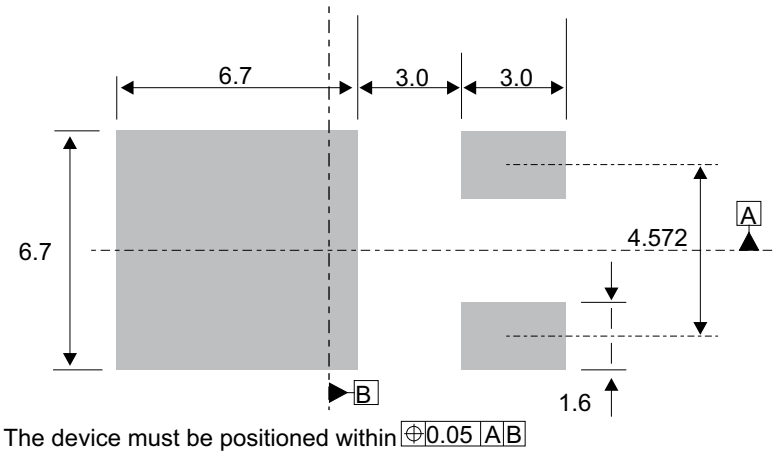



*Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

**Table 5. DPAK package mechanical data**

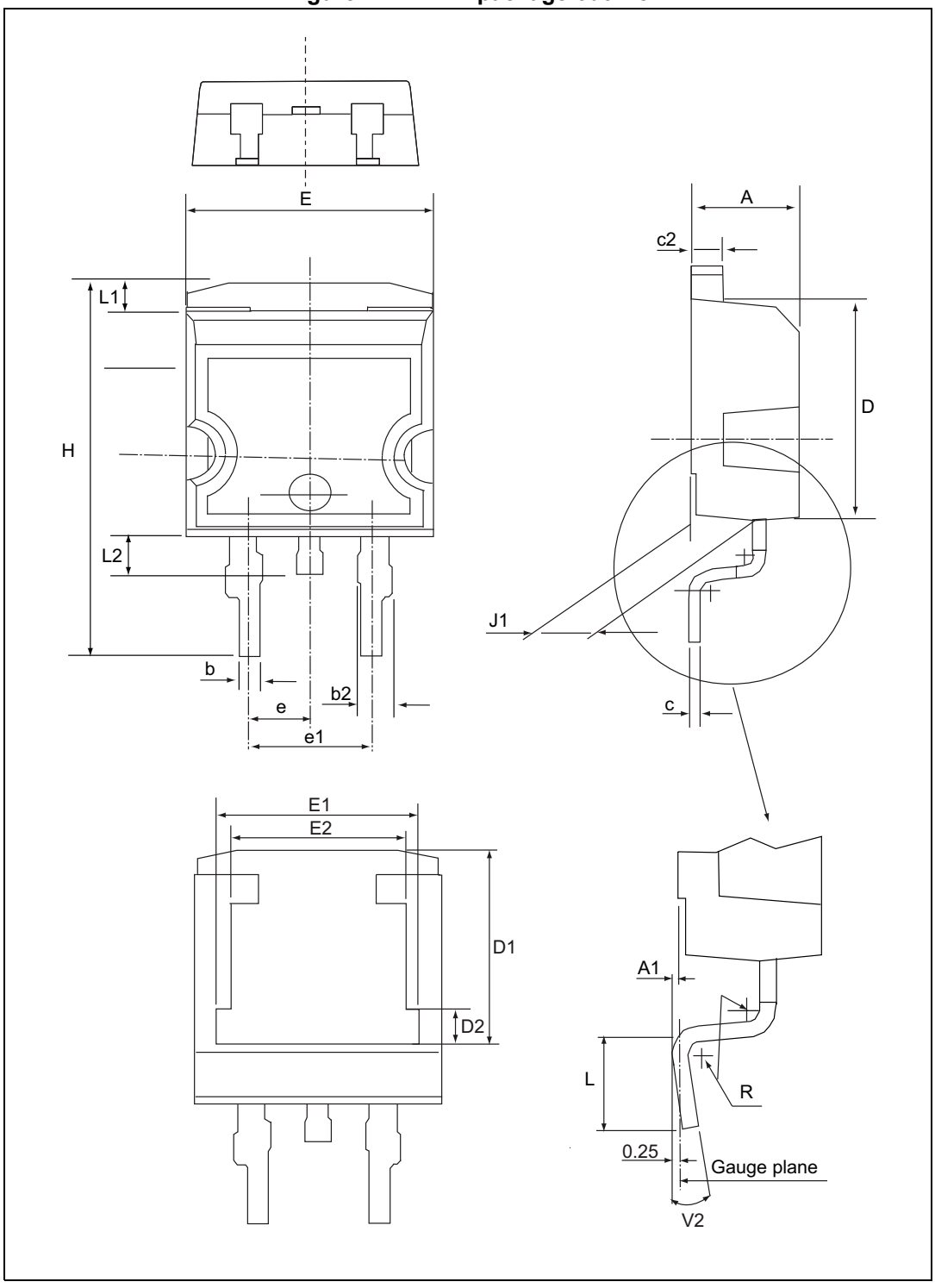
| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.18 | | 2.40 | 0.085 | | 0.094 |
| A1 | 0.90 | | 1.10 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| b | 0.64 | | 0.90 | 0.025 | | 0.035 |
| 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 D²PAK package information

Figure 12. D²PAK package outline

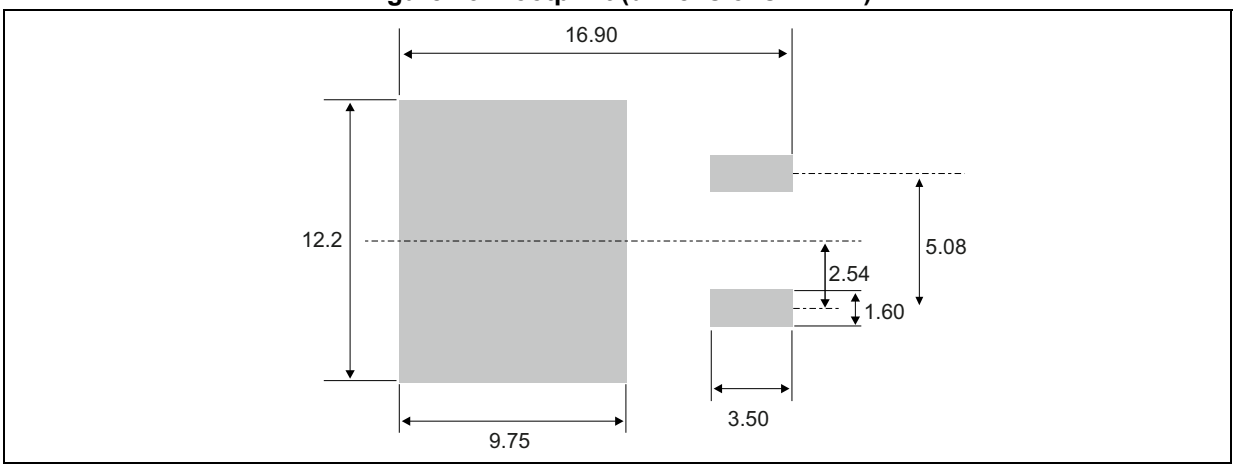



*Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

Table 6. $D^2PAK$ 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 | D²PAK | 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 D²PAK 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. |