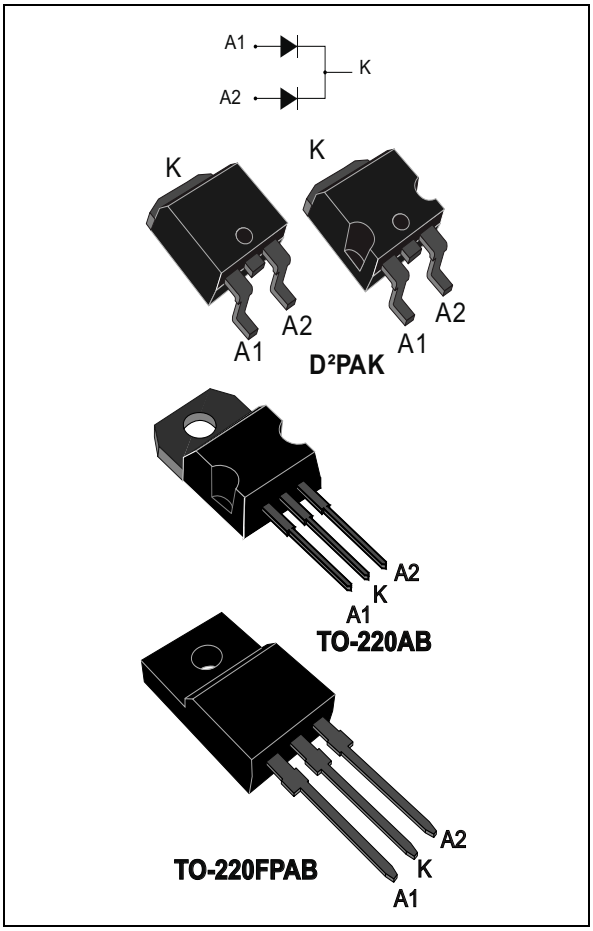
# STPS10150C

## 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 5A |
| $V_{RRM}$ | 150 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
- Insulated package:
  - TO-220FPAB insulating voltage = $2000V_{RMS}$ sine
- ECOPACK®2 compliant component for D²PAK on demand



This is information on a product in full production. www.st.com

# 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 | | | | 150 | V |
| $I_{F(RMS)}$ | Forward rms current | | | | 10 | A |
| $I_{F(AV)}$ | Average forward current, δ = 0.5, square wave | TO-220AB, D²PAK | $T_c$ = 155 °C | Per diode | 5 | A |
| | | TO-220FPAB | $T_c$ = 145 °C | | | |
| | | TO-220AB, D²PAK | $T_c$ = 150 °C | Per device | 10 | |
| | | TO-220FPAB | $T_c$ = 130 °C | | | |
| $I_{FSM}$ | Surge non repetitive forward current | | $t_p$ = 10 ms sinusoidal | | 120 | 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 | TO-220AB, D²PAK | Per diode | 4 | °C/W |
| | | TO-220FPAB | | 7 | |
| | | TO-220AB, D²PAK | Total | 2.4 | |
| | | TO-220FPAB | | 5.3 | |
| $R_{th(c)}$ | Coupling | TO-220AB, D²PAK | | 0.7 | |
| | | TO-220FPAB | | 3.7 | |

When the diodes 1 and 2 are used simultaneously:
$\Delta Tj(diode\ 1) = P(diode1) \times R_{th(j-c)}(Per\ diode) + P(diode\ 2) \times R_{th(c)}$

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

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$(1) | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | - | - | 2.0 | µA |
| | | $T_j$ = 125 °C | | - | 0.40 | 2.0 | mA |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 5A | - | - | 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:
$P = 0.65 \times I_{F(AV)} + 0.02 \times I_F^2{}_{(RMS)}$

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

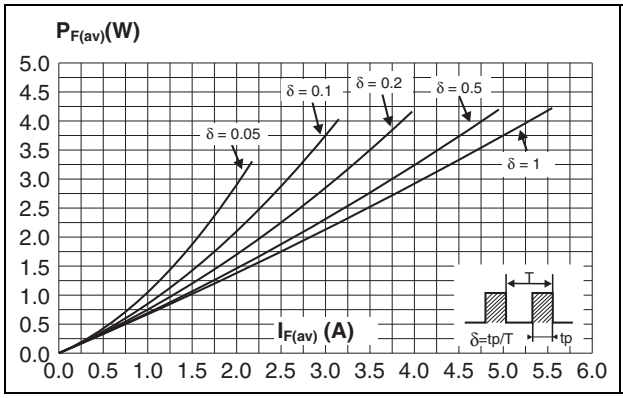



**Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)**

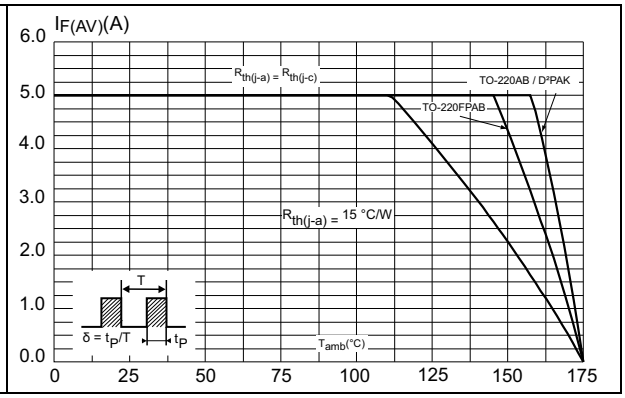



**Figure 3. Normalized avalanche power derating versus pulse duration ($T_j$ = 125 °C)**

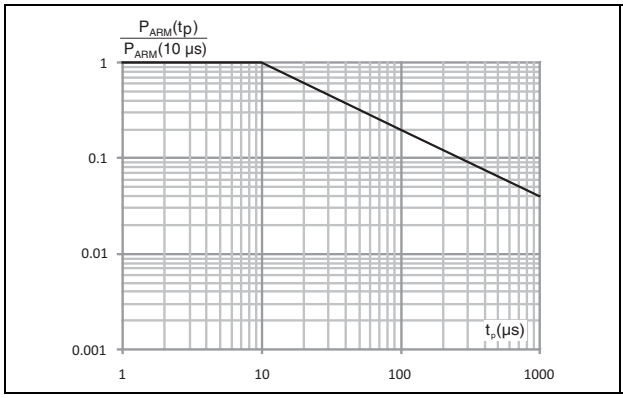



**Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)**

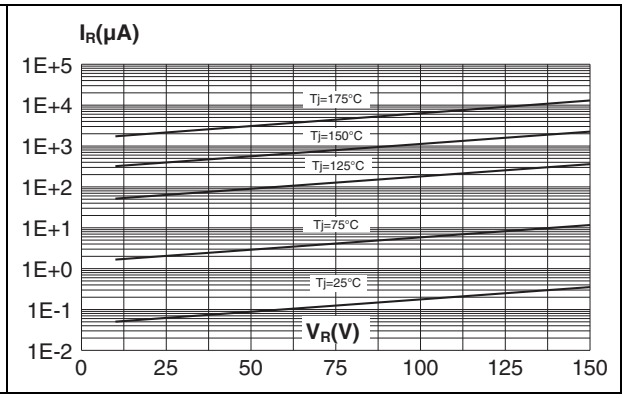



**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK)**

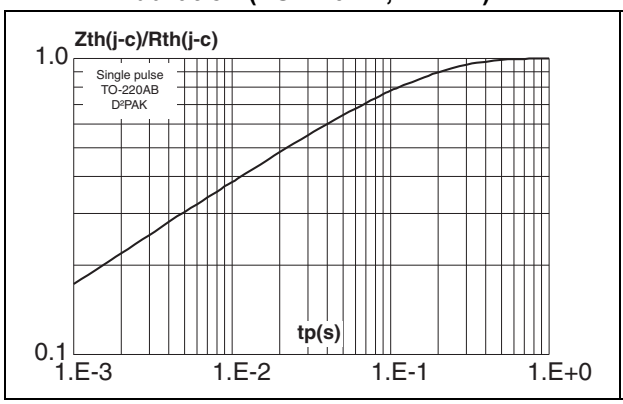



**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**

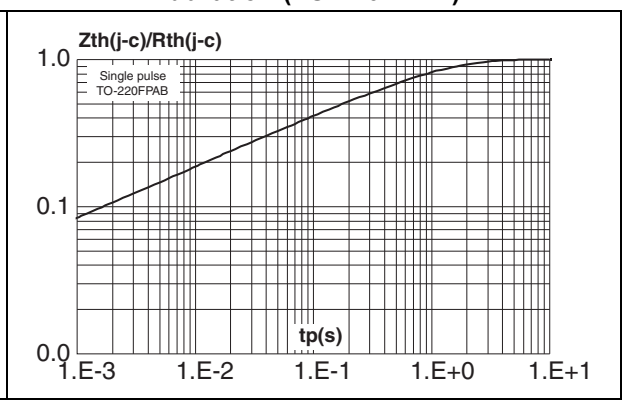


**Figure 7. Forward voltage drop vs. forward current (per diode)**

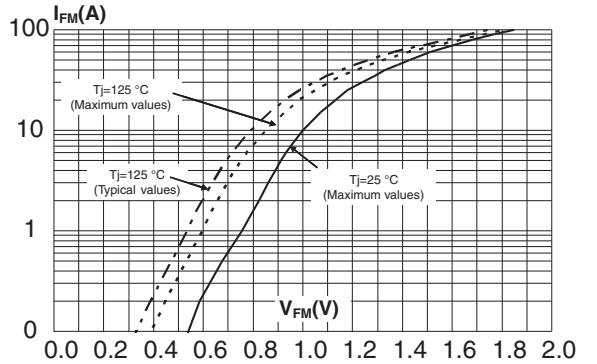



**Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)**

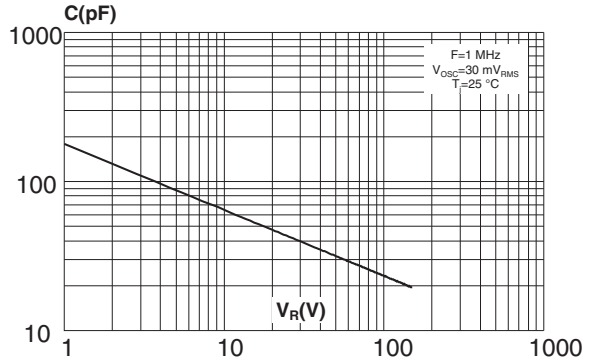
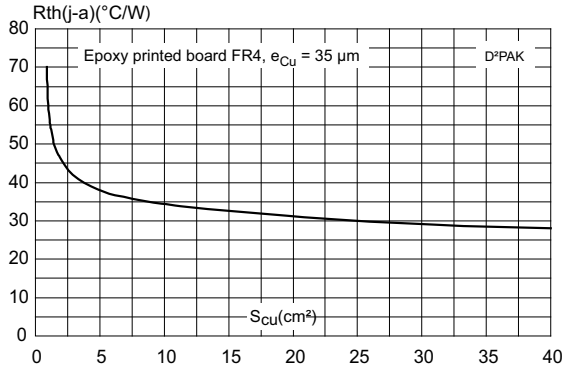



**Figure 9. Thermal resistance junction to ambient versus copper surface under tab (D²PAK)**



# 2 Package Information

- Epoxy meets UL94,V0
- Recommended torque value: 0.55 N·m (TO-220AB, TO-220FPAB)
- Maximum torque value: 0.7 N·m (TO-220AB, TO-220FPAB)

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 TO-220FPAB package information

**Figure 10. TO-220FPAB package outline**

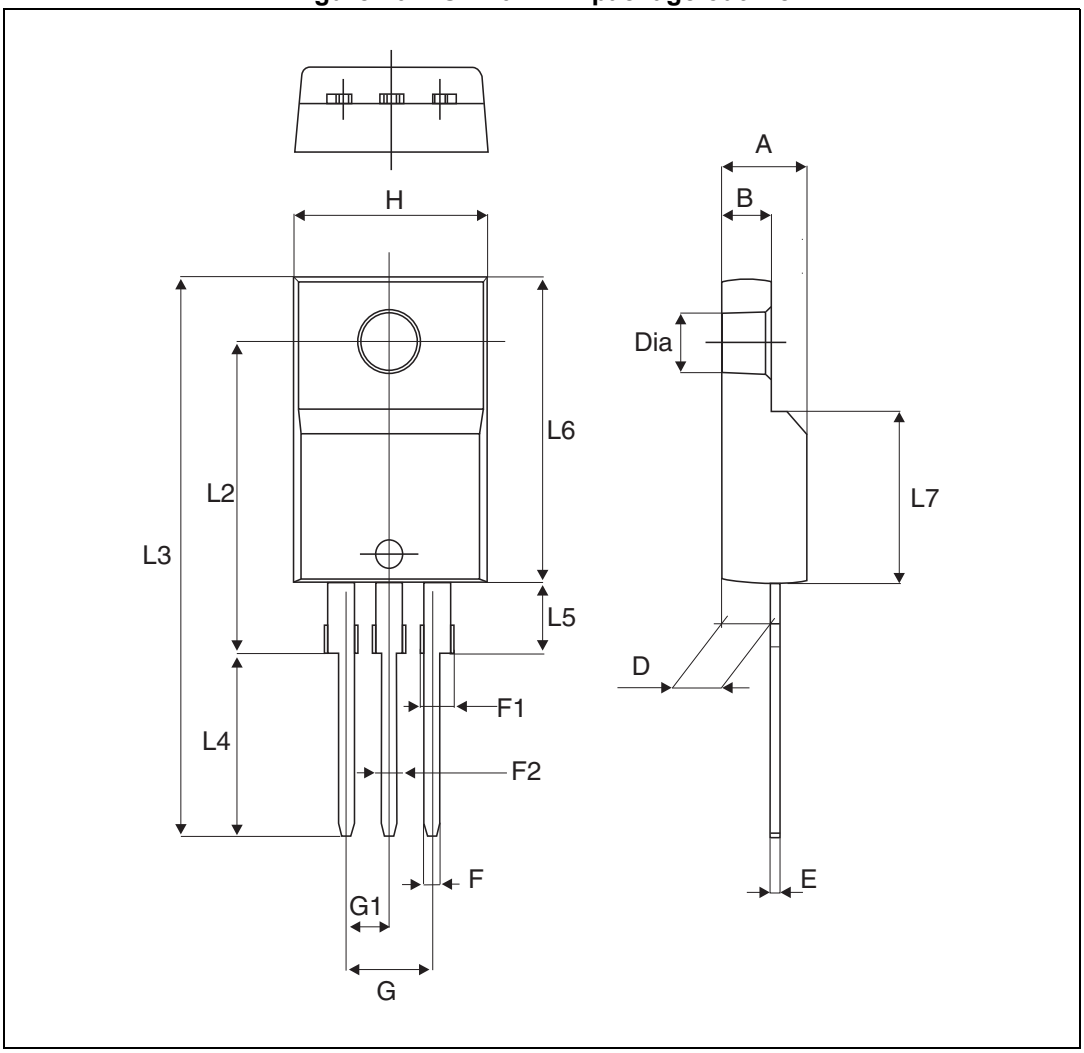


**Table 5. TO-220FPAB package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| B | 2.5 | | 2.7 | 0.098 | | 0.106 |
| D | 2.5 | | 2.75 | 0.098 | | 0.108 |
| E | 0.45 | | 0.70 | 0.018 | | 0.027 |
| F | 0.75 | | 1 | 0.030 | | 0.039 |
| F1 | 1.15 | | 1.70 | 0.045 | | 0.067 |
| F2 | 1.15 | | 1.70 | 0.045 | | 0.067 |
| G | 4.95 | | 5.20 | 0.195 | | 0.205 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H | 10 | | 10.4 | 0.393 | | 0.409 |
| L2 | | 16 Typ. | | | 0.63 Typ. | |
| L3 | 28.6 | | 30.6 | 1.126 | | 1.205 |
| L4 | 9.8 | | 10.6 | 0.386 | | 0.417 |
| L5 | 2.9 | | 3.6 | 0.114 | | 0.142 |
| L6 | 15.9 | | 16.4 | 0.626 | | 0.646 |
| L7 | 9.00 | | 9.30 | 0.354 | | 0.366 |
| Dia. | 3.00 | | 3.20 | 0.118 | | 0.126 |

## 2.2 TO-220AB package information

**Figure 11. TO-220AB package outline**

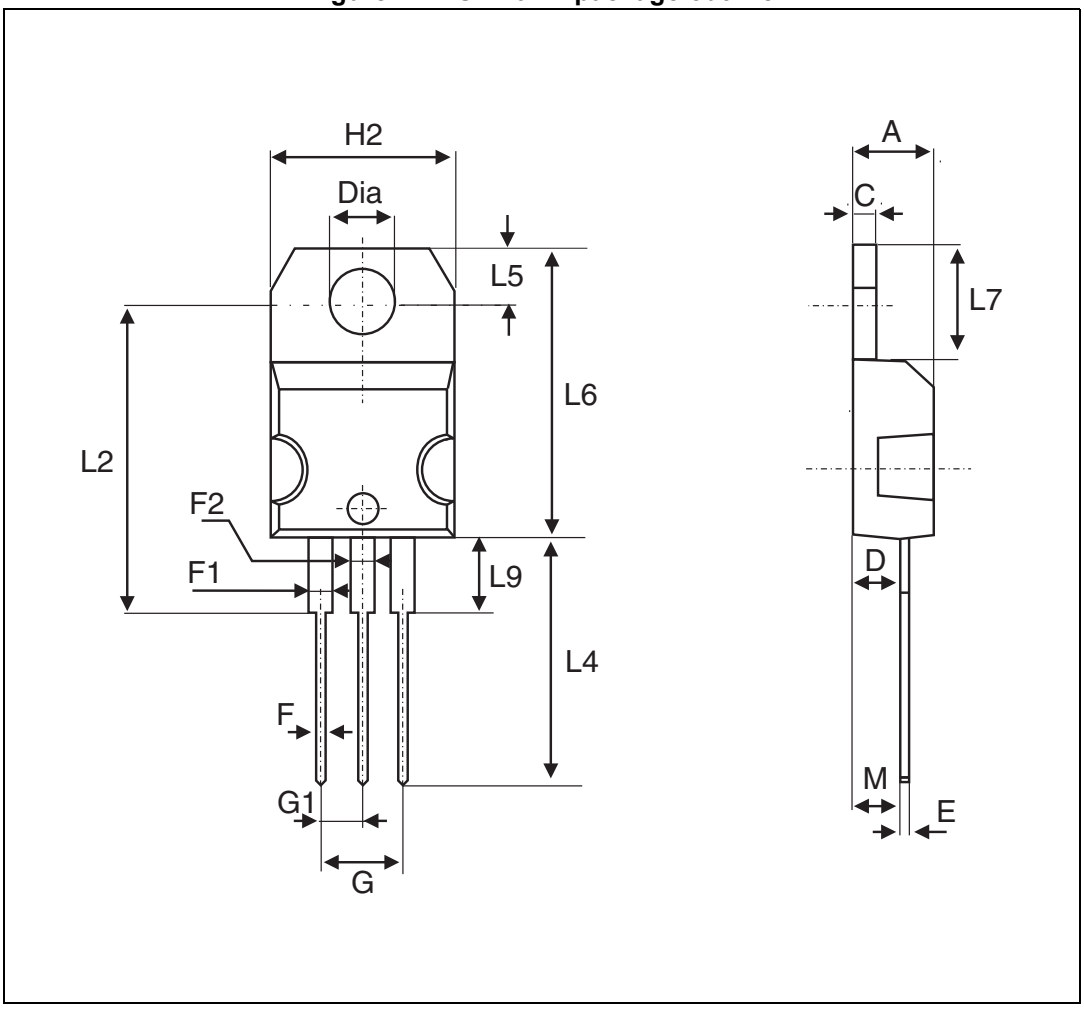
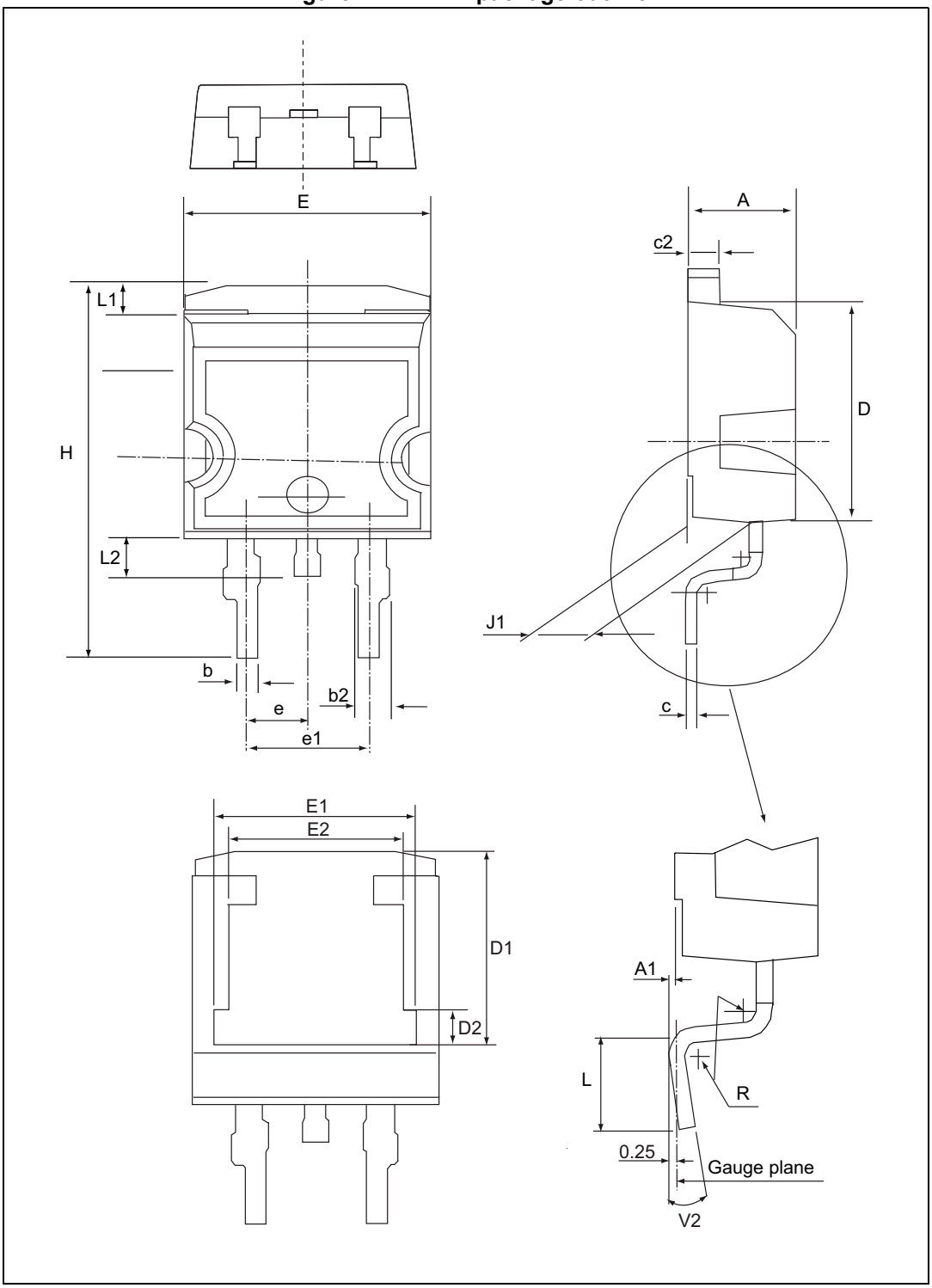


**Table 6. TO-220AB package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| C | 1.23 | | 1.32 | 0.048 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| E | 0.49 | | 0.70 | 0.019 | | 0.027 |
| F | 0.61 | | 0.88 | 0.024 | | 0.034 |
| F1 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| F2 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| G | 4.95 | | 5.15 | 0.194 | | 0.202 |
| G1 | 2.40 | | 2.70 | 0.094 | | 0.106 |
| H2 | 10 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 typ. | | | 0.645 typ. | |
| L4 | 13 | | 14 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.20 | | 6.60 | 0.244 | | 0.259 |
| L9 | 3.50 | | 3.93 | 0.137 | | 0.154 |
| M | | 2.6 typ. | | | 0.102 typ. | |
| Diam. | 3.75 | | 3.85 | 0.147 | | 0.151 |

## 2.3 D²PAK package information

**Figure 12. D²PAK package outline**

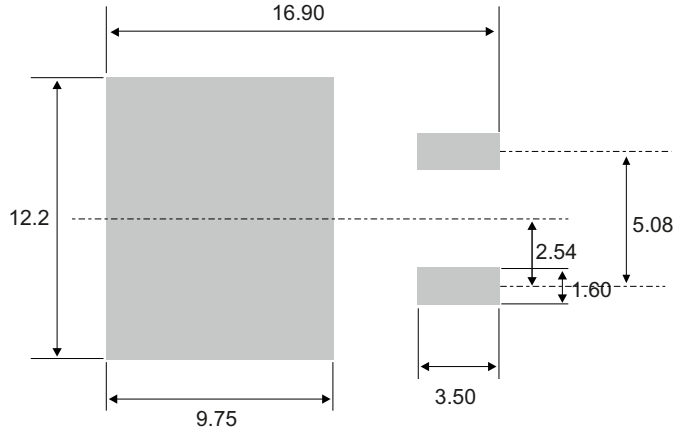



*Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

**Table 7. D²PAK 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 | | 8.0 | 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 | 1.9 | | 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 8. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STPS10150CT | STPS10150CT | TO-220AB | 1.95 g | 50 | Tube |
| STPS10150CFP | STPS10150CFP | TO-220FPAB | 1.90 g | 50 | |
| STPS10150CG-TR | STPS10150CG | $D^2PAK$ | 1.38 g | 1000 | Tape and reel |

# 4 Revision history

**Table 9. Revision history**

| Date | Revision | Changes |
|---|---|---|
| Jul-2003 | 5B | Last update. |
| 19-Jun-2006 | 6 | Reformatted to current standard. Added ECOPACK statement. Added TO220FPAB. |
| 23-Apr-2015 | 7 | Updated $D^2PAK$ and reformatted to current standard. |

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