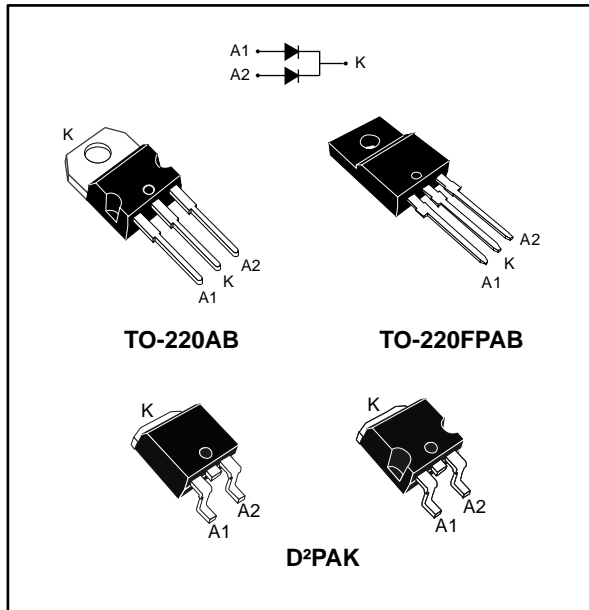


High voltage power Schottky rectifier

Datasheet - production data



Description

Dual center tap Schottky rectifier diode suited for high frequency switched mode power supplies.

Table 1: Device summary

| Symbol | Value |
|--------------|----------|
| $I_{F(AV)}$ | 2 x 10 A |
| V_{RRM} | 170 V |
| T_j (max.) | 175 °C |
| V_F (typ.) | 0.69 V |

Features

- High reverse voltage
- High junction temperature capability
- Avalanche specification with derating curves
- Insulated package TO-220FPAB
 - Insulating voltage: 2000 V_{RMS} sine
- ECOPACK[®]2 compliant component for D²PAK on demand

Benefits

- Can challenge bipolar ultrafast diodes with better dynamic characteristics

1 Characteristics

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

| Symbol | Parameter | | | | Value | Unit |
|---------------------|---|-------------------------------|-------------------------|--|-------------|------|
| V _{RRM} | Repetitive peak reverse voltage | | | | 170 | V |
| I _{F(RMS)} | Forward rms current | | | | 30 | A |
| I _{F(AV)} | Average forward current δ = 0.5, square wave | TO-220AB / D ² PAK | T _C = 155 °C | Per diode | 10 | A |
| | | | T _C = 150 °C | Total | 20 | |
| | | TO-220FPAB | T _C = 135 °C | Per diode | 10 | |
| | | | T _C = 115 °C | Total | 20 | |
| I _{FSM} | Surge non repetitive forward current | | | t _p = 10 ms sinusoidal | 180 | A |
| P _{ARM} | Repetitive peak avalanche power | | | t _p = 10 μs, T _j = 125 °C | 480 | W |
| T _{stg} | Storage temperature range | | | | -65 to +175 | °C |
| T _j | Maximum operating junction temperature ⁽¹⁾ | | | | 175 | |

Notes:

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

Table 3: Thermal parameters

| Symbol | Parameter | | | Max. value | Unit |
|----------------------|------------------|-------------------------------|-----------|------------|------|
| R _{th(j-c)} | Junction to case | TO-220AB / D ² PAK | Per diode | 2.2 | °C/W |
| | | | Total | 1.3 | |
| | | TO-220FPAB | Per diode | 4.5 | |
| | | | Total | 3.5 | |
| R _{th(c)} | Coupling | TO-220AB / D ² PAK | | 0.3 | |
| | | TO-220FPAB | | 2.5 | |

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j (\text{diode1}) = P_{(\text{diode1})} \times R_{\text{th(j-c)}} (\text{per diode}) + P_{(\text{diode2})} \times R_{\text{th(c)}}$$

Table 4: Static electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^\circ\text{C}$ | $V_R = V_{RRM}$ | - | | 15 | μA |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | - | | 15 | mA |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 10\text{ A}$ | - | | 0.90 | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | - | 0.69 | 0.75 | |
| | | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 20\text{ A}$ | - | | 0.99 | |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | - | 0.79 | 0.86 | |

Notes:

⁽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:

$$P = 0.64 \times I_{F(AV)} + 0.011 \times I_{F(RMS)}^2$$

1.1 Characteristics (curves)

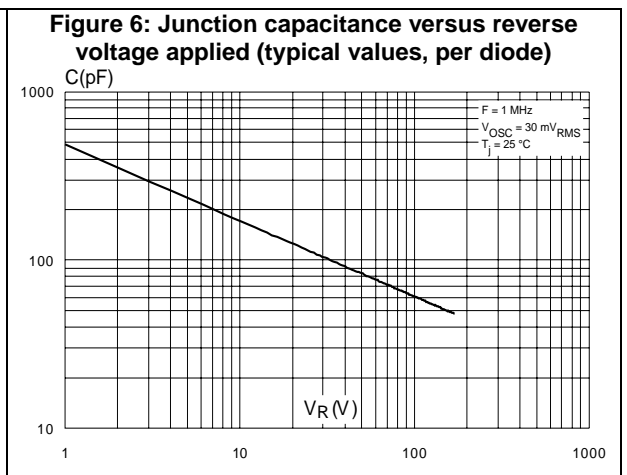
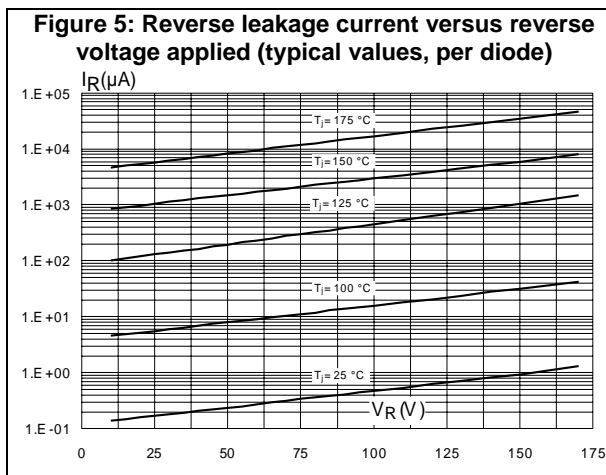
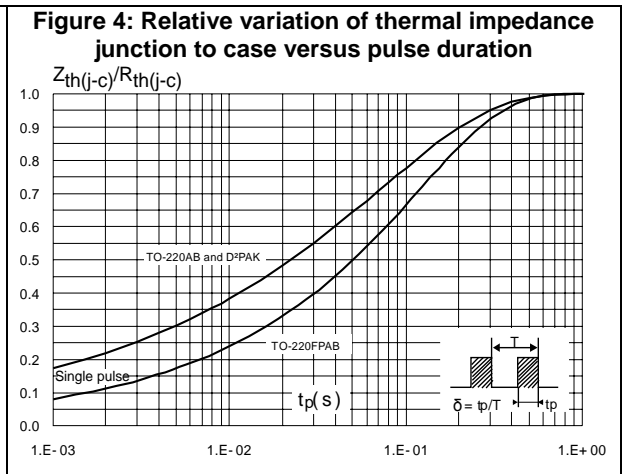
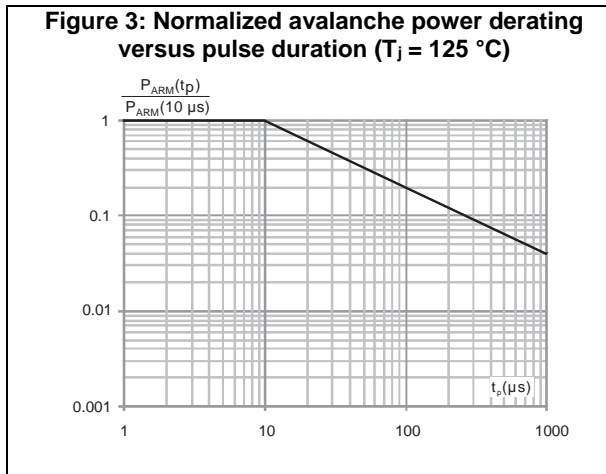
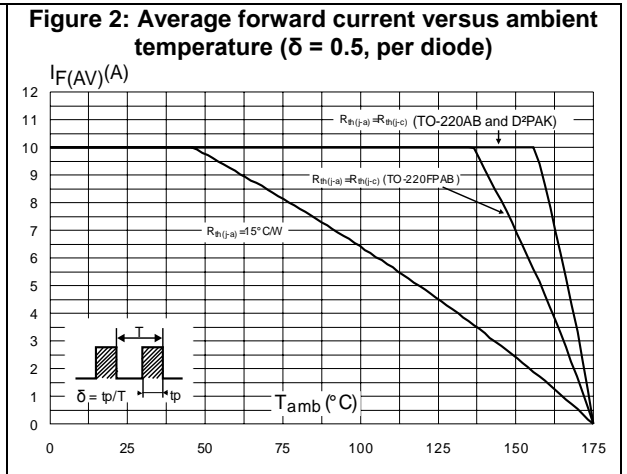
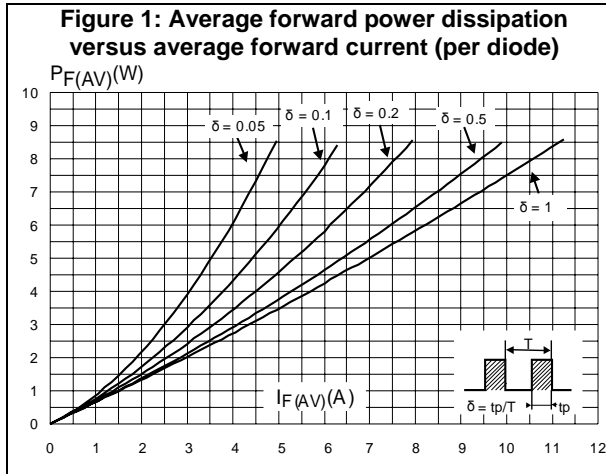


Figure 7: Forward voltage drop versus forward current (per diode)

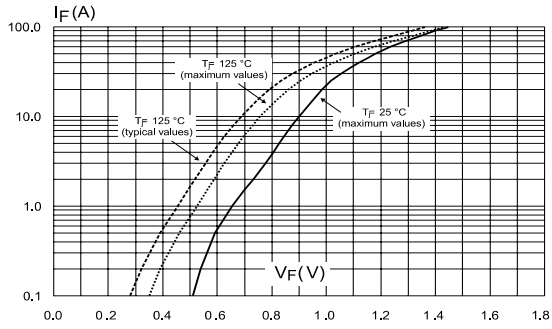
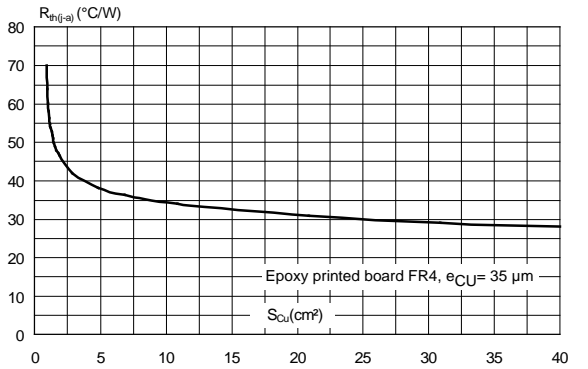


Figure 8: Thermal resistance junction to ambient versus copper surface under tab for D²PAK



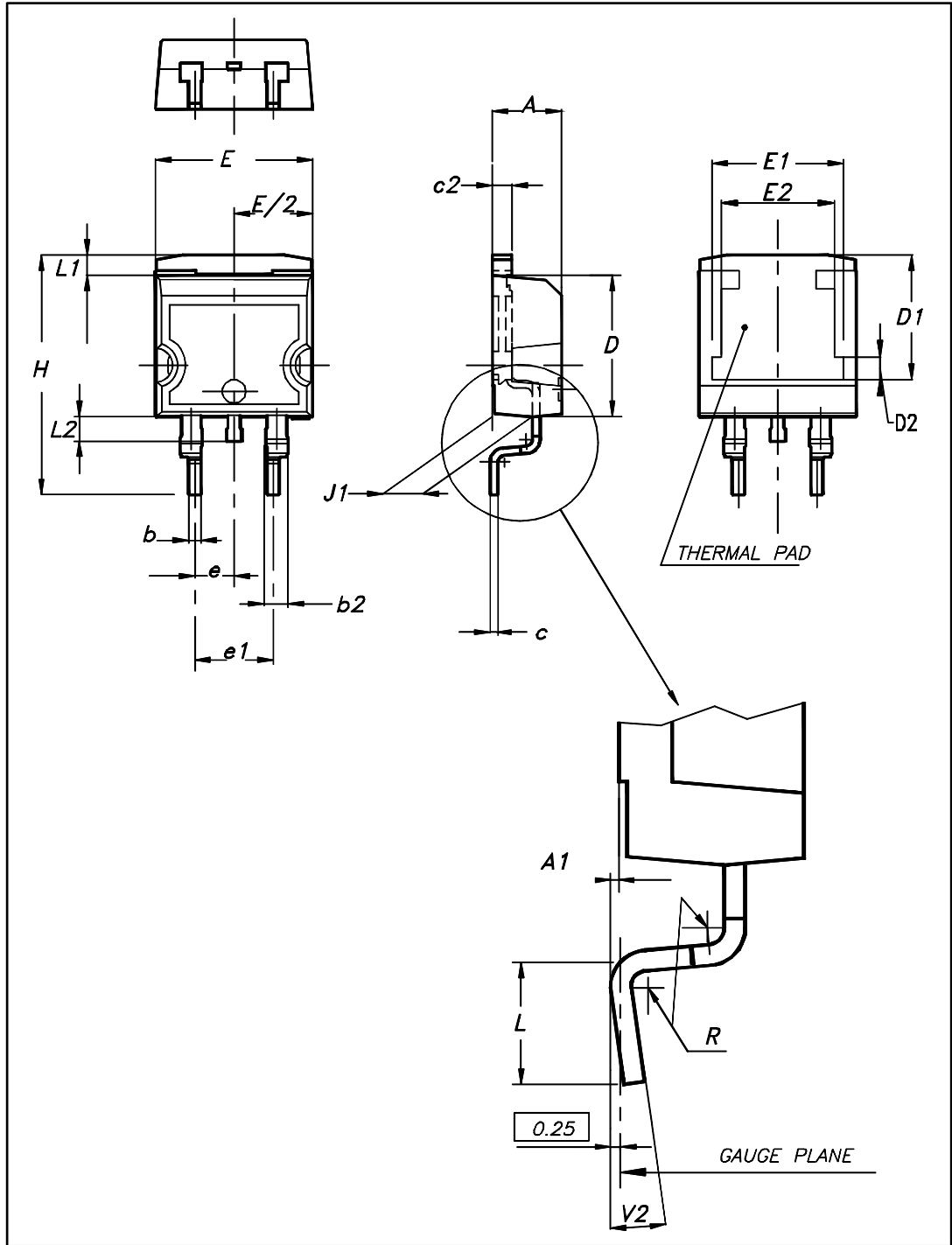
2 Package information

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. ECOPACK® is an ST trademark.

- Cooling method: by conduction (C)
- Epoxy meets UL 94, V0
- Recommended torque value: 0.55 N·m (for TO-220AB and TO-220FPAB)
- Maximum torque value: 0.7 N·m (for TO-220AB and TO-220FPAB)

2.1 D²PAK package information

Figure 9: D²PAK package outline

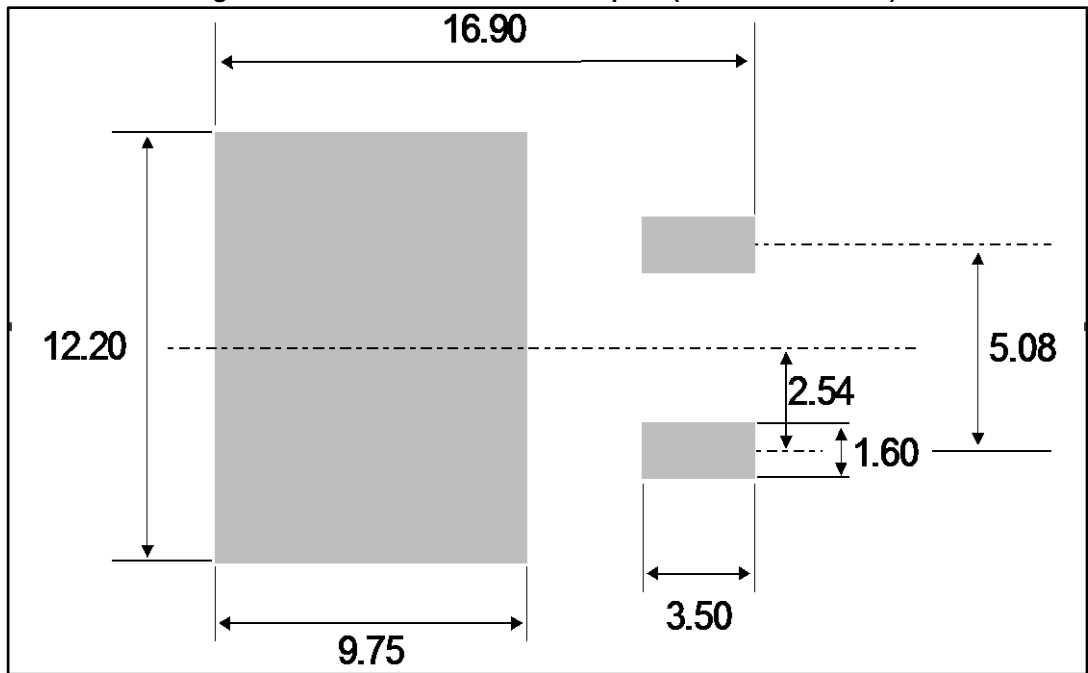


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5: D²PAK package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.36 | 4.60 | 0.172 | 0.181 |
| A1 | 0.00 | 0.25 | 0.000 | 0.010 |
| b | 0.70 | 0.93 | 0.028 | 0.037 |
| b2 | 1.14 | 1.70 | 0.045 | 0.067 |
| c | 0.38 | 0.69 | 0.015 | 0.027 |
| c2 | 1.19 | 1.36 | 0.047 | 0.053 |
| D | 8.60 | 9.35 | 0.339 | 0.368 |
| D1 | 6.90 | 8.00 | 0.272 | 0.311 |
| D2 | 1.10 | 1.50 | 0.043 | 0.060 |
| E | 10.00 | 10.55 | 0.394 | 0.415 |
| E1 | 8.10 | 8.90 | 0.319 | 0.346 |
| E2 | 6.85 | 7.25 | 0.266 | 0.282 |
| e | 2.54 typ. | | 0.100 | |
| e1 | 4.88 | 5.28 | 0.190 | 0.205 |
| H | 15.00 | 15.85 | 0.591 | 0.624 |
| J1 | 2.49 | 2.90 | 0.097 | 0.112 |
| L | 1.90 | 2.79 | 0.075 | 0.110 |
| L1 | 1.27 | 1.65 | 0.049 | 0.065 |
| L2 | 1.30 | 1.78 | 0.050 | 0.070 |
| R | 0.4 typ. | | 0.015 | |
| V2 | 0° | 8° | 0° | 8° |

Figure 10: D²PAK recommended footprint (dimensions in mm)



2.2 TO-220FPAB package information

Figure 11: TO-220FPAB package outline

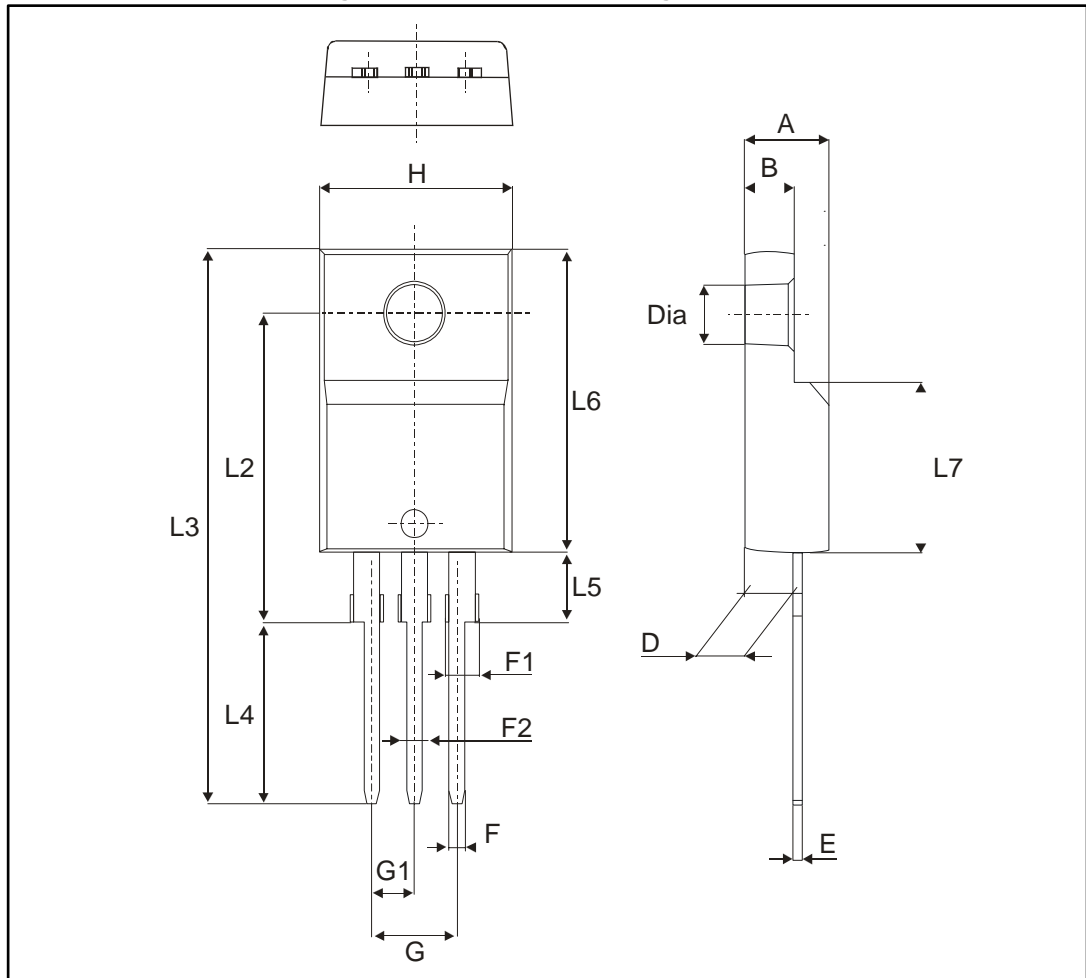


Table 6: TO-220FPAB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|-----------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.50 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1.0 | 0.03 | 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 | 2.40 | 2.70 | 0.094 | 0.106 |
| H | 10.00 | 10.40 | 0.393 | 0.409 |
| L2 | 16.00 typ. | | 0.63 typ. | |
| L3 | 28.60 | 30.60 | 1.126 | 1.205 |
| L4 | 9.80 | 10.6 | 0.386 | 0.417 |
| L5 | 2.90 | 3.60 | 0.114 | 0.142 |
| L6 | 15.90 | 16.40 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia | 3.0 | 3.20 | 0.118 | 0.126 |

2.3 TO-220AB package information

Figure 12: TO-220AB package outline

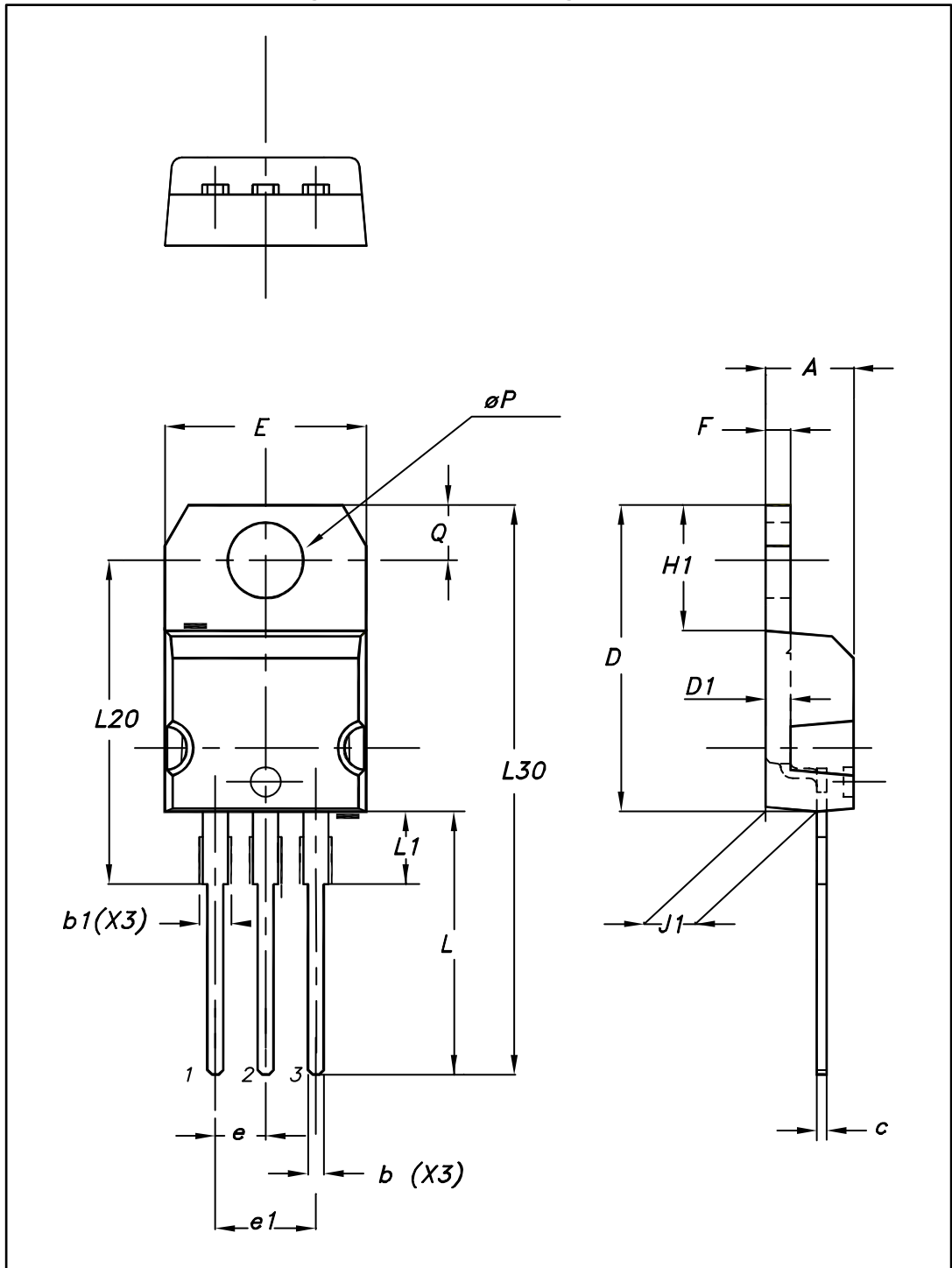


Table 7: TO-220AB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| b | 0.61 | 0.88 | 0.240 | 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 |
| D1 | 1.27 typ. | | 0.050 typ. | |
| 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 | 1.23 | 1.32 | 0.048 | 0.052 |
| H1 | 6.20 | 6.60 | 0.244 | 0.260 |
| J1 | 2.40 | 2.72 | 0.094 | 0.107 |
| 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 typ. | |
| θP | 3.75 | 3.85 | 0.148 | 0.152 |
| Q | 2.65 | 2.95 | 0.104 | 0.116 |

3 Ordering information

Table 8: Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|----------------|--------------|--------------------|--------|-----------|---------------|
| STPS20170CT | STPS20170CT | TO-220AB | 1.95 g | 50 | Tube |
| STPS20170CFP | STPS20170CFP | TO-220FPAB | 1.7 g | 50 | Tube |
| STPS20170CG-TR | STPS20170CG | D ² PAK | 1.38 g | 1000 | Tape and reel |

4 Revision history

Table 9: Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| Mar-2004 | 1 | First issue. |
| 28-Jul-2005 | 2 | TO-220FPAB, I ² PAK and D ² PAK packages added. |
| 14-Oct-2016 | 3 | Removed I ² PAK package. Updated features and packages silhouettes in cover page. Updated Section 5: "Characteristics" , Section 5.1: "Characteristics (curves)" , Table 8: "Ordering information" and Section 6.2: "D²PAK package information" . |

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