

Description

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

Packaged in DPAK, TO-220AB, TO-220AB narrow leads and I²PAK, this device is intended to be used in notebook and LCD adaptors, desktop SMPS, providing in these applications a margin between the remaining voltages applied on the diode and the voltage capability of the diode.

Table 1. Device summary

| Symbol | Value |
|-------------|----------|
| $I_{F(AV)}$ | 2 X 10 A |
| V_{RRM} | 120 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^{®2} compliant component for DPAK 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 | | 120 | V |
| $I_{F(RMS)}$ | Forward rms current | | 30 | A |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$, square wave | $T_c = 150\text{ °C}$ per diode | 10 | A |
| | | $T_c = 145\text{ °C}$ per device | 20 | |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | 150 | A |
| P_{ARM} | Repetitive peak avalanche power | $t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$ | 330 | W |
| T_{stg} | Storage temperature range | | -65 to +175 | °C |
| T_j | Maximum operating junction temperature ⁽¹⁾ | | 175 | °C |

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

Table 3. Thermal parameters

| Symbol | Parameter | | Max. 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 two diodes 1 and 2 are used simultaneously:

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

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 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 1.5 | 5 | mA |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 2.5\text{ A}$ | - | | 0.70 | V |
| | | $T_j = 125\text{ °C}$ | | - | 0.54 | 0.58 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 10\text{ A}$ | - | | 0.92 | |
| | | $T_j = 125\text{ °C}$ | | - | 0.70 | 0.74 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 20\text{ A}$ | - | | 1.02 | |
| | | $T_j = 125\text{ °C}$ | | - | 0.81 | 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:

$$P = 0.62 \times I_{F(AV)} + 0.012 \times I_{F(RMS)}^2$$



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

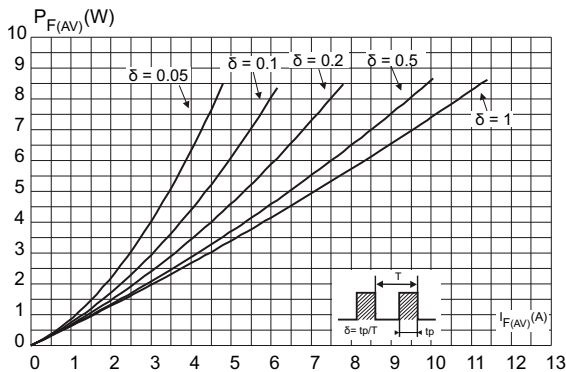


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

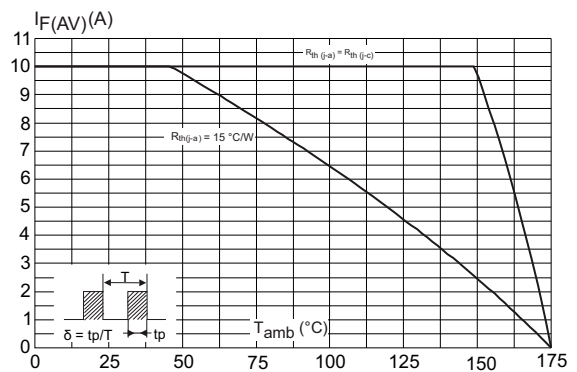


Figure 3. Normalized avalanche power derating versus pulse duration ($T_j = 125^\circ\text{C}$)

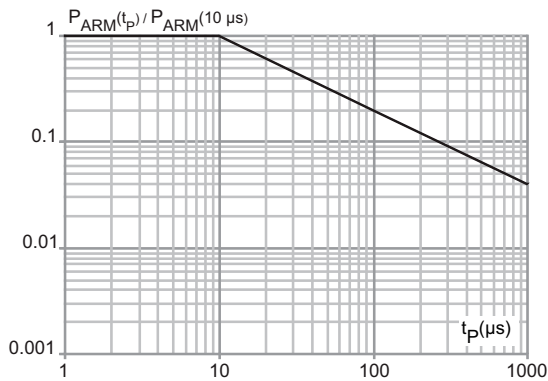


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

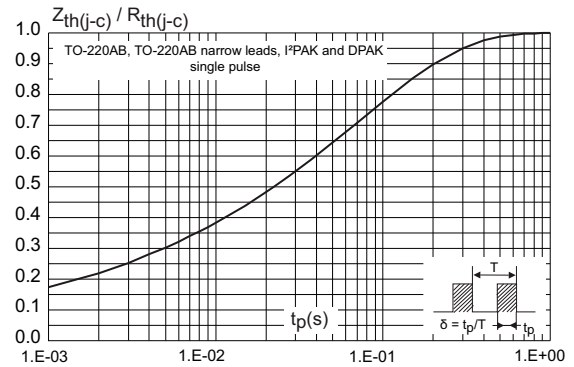


Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)

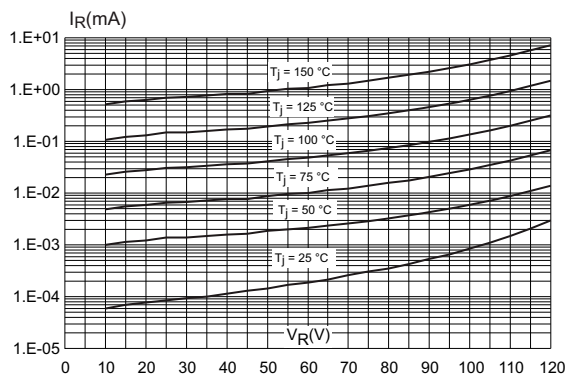


Figure 6. Junction capacitance vs. reverse voltage applied (typical values, per diode)

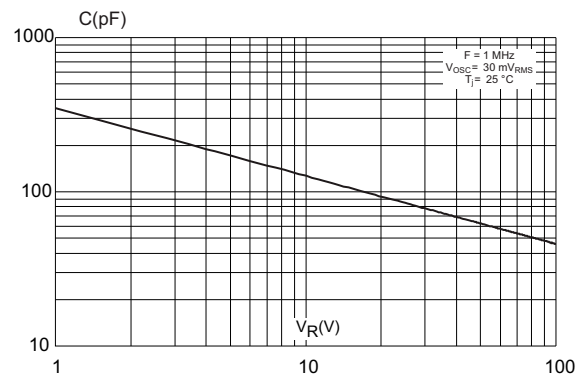


Figure 7. Forward voltage drop versus forward current (per diode)

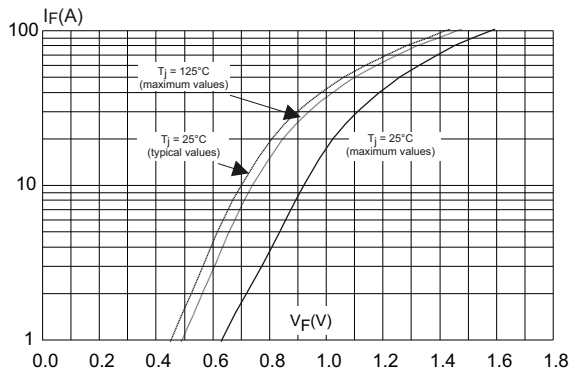
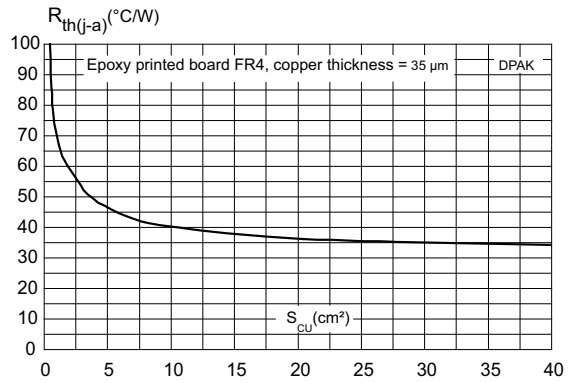


Figure 8. Thermal resistance junction to ambient versus copper surface under tab



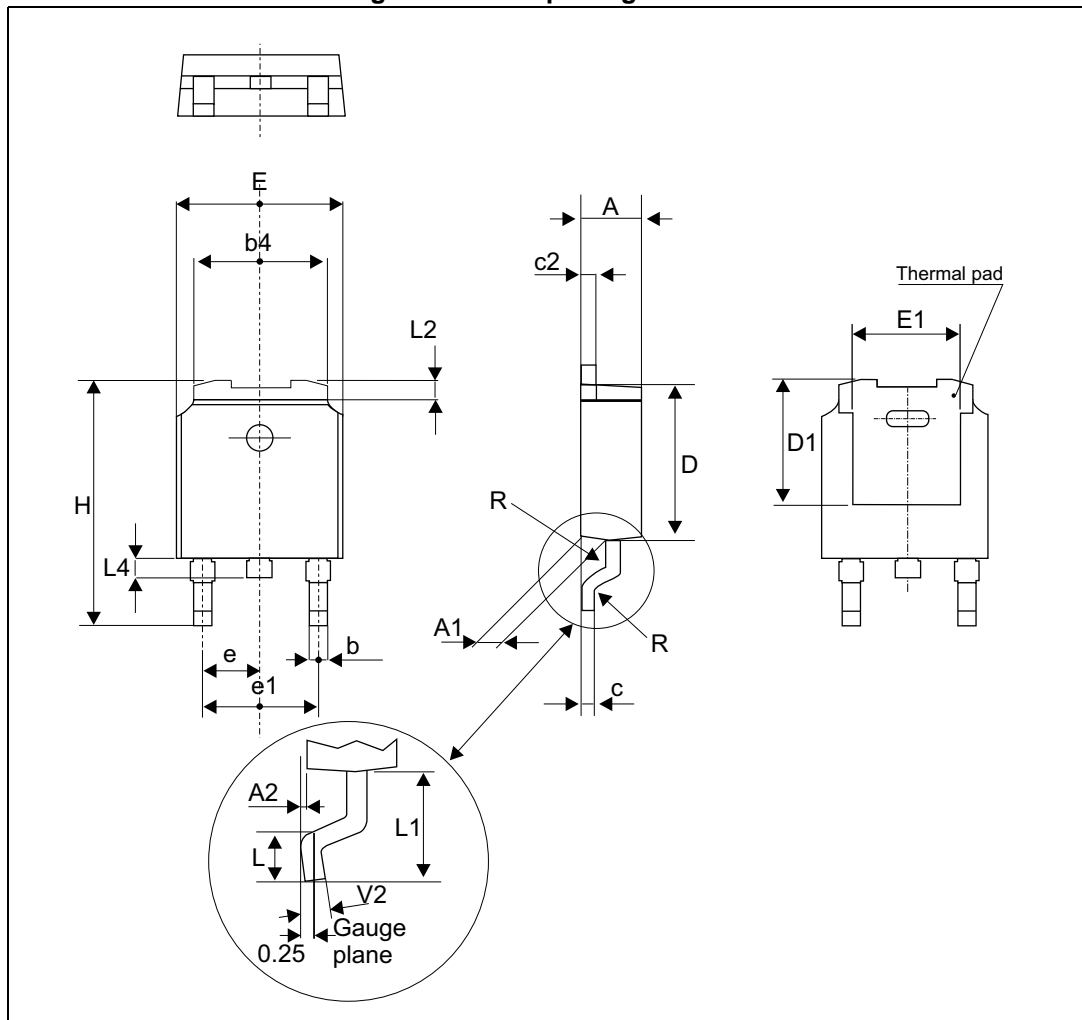
2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m (TO-220AB, TO-220AB narrow leads)
- Maximum torque value: 0.7 N·m (TO-220AB, TO-220AB narrow leads)

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 9. DPAK package outline

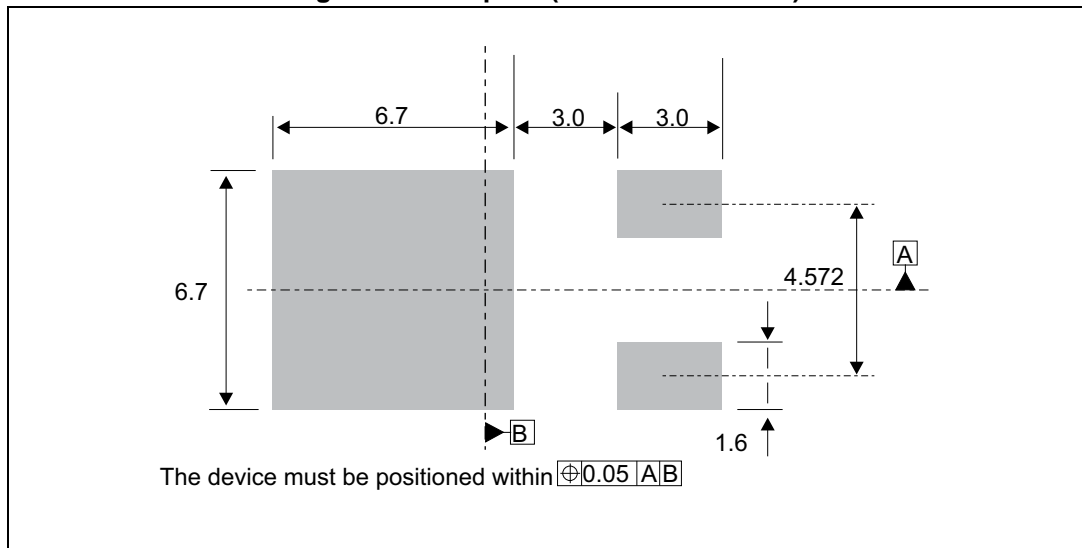


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

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 10. Footprint (dimensions in mm)



2.2 I²PAK package information

Figure 11. I²PAK package outline

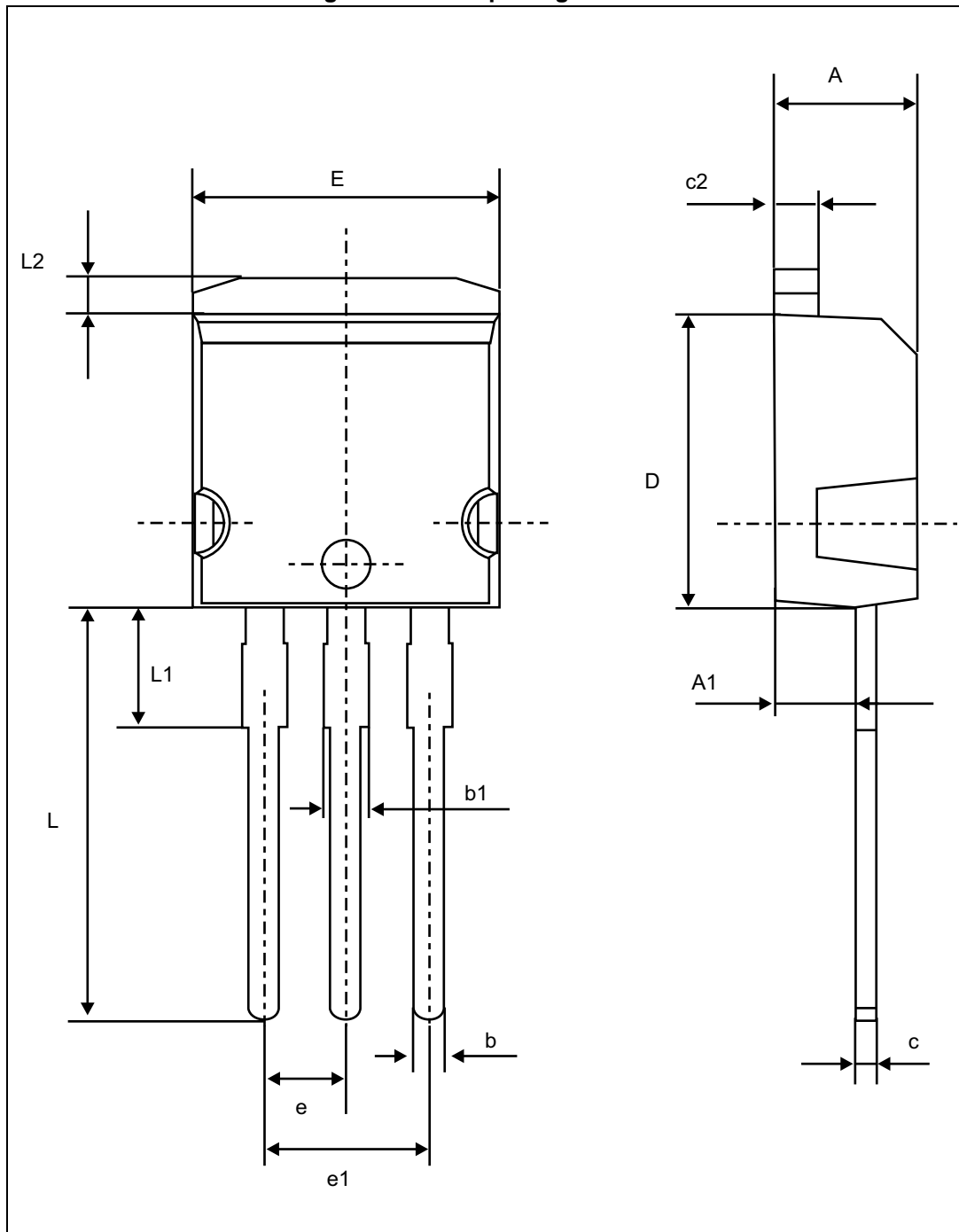


Table 6. I²PAK package mechanical data

| 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 | | 0.203 |
| E | 10.00 | | 10.40 | 0.394 | | 0.409 |
| L | 13.00 | | 14.00 | 0.512 | | 0.551 |
| L1 | 3.50 | | 3.93 | 0.138 | | 0.155 |
| L2 | 1.27 | | 1.40 | 0.050 | | 0.055 |

2.3 TO-220AB package information

Figure 12. TO-220AB package outline

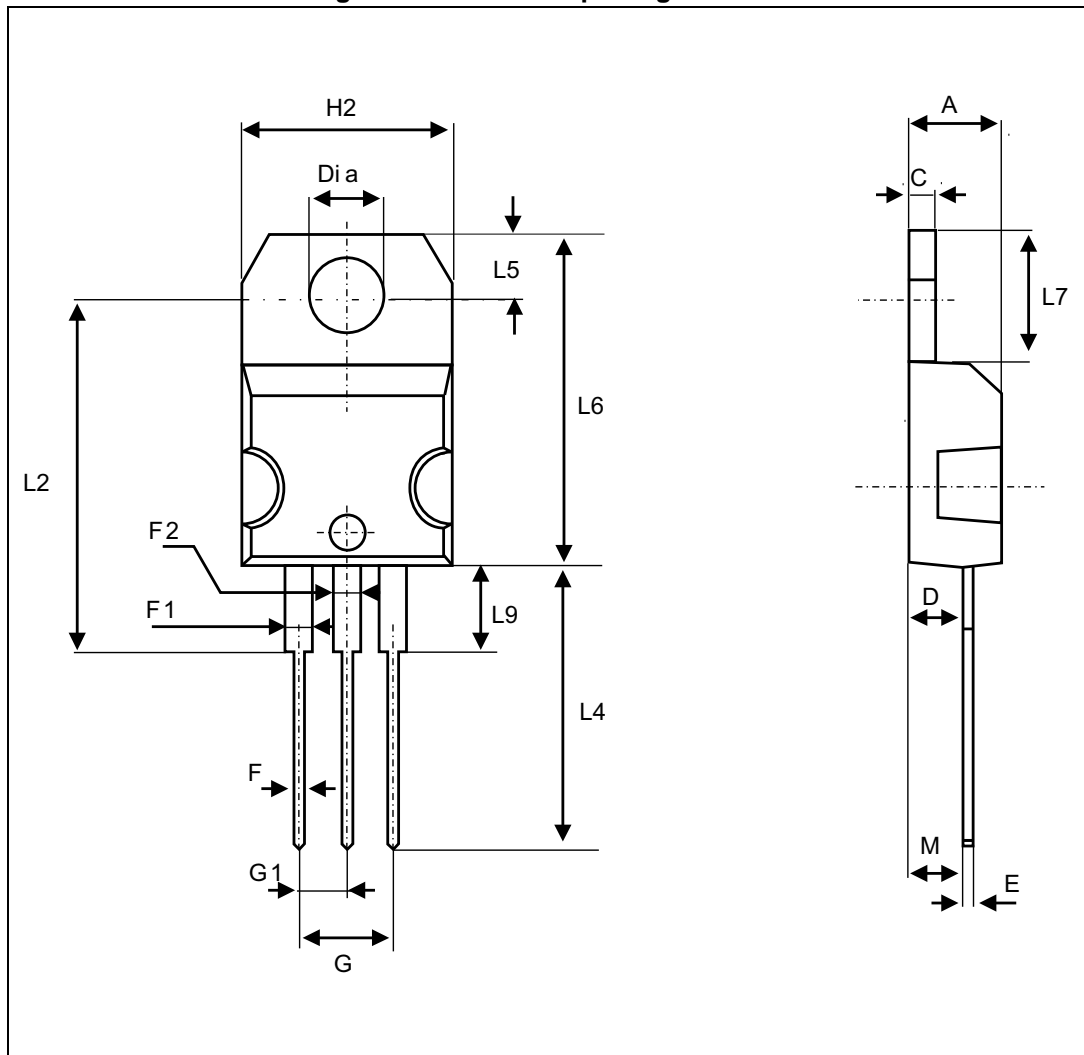


Table 7. TO-220AB package mechanical data

| 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 | 10.00 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 typ. | | | 0.645 typ. | |
| L4 | 13.00 | | 14.00 | 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 |

2.4 TO-220AB narrow leads package information

Figure 13. TO-220AB narrow leads package outline

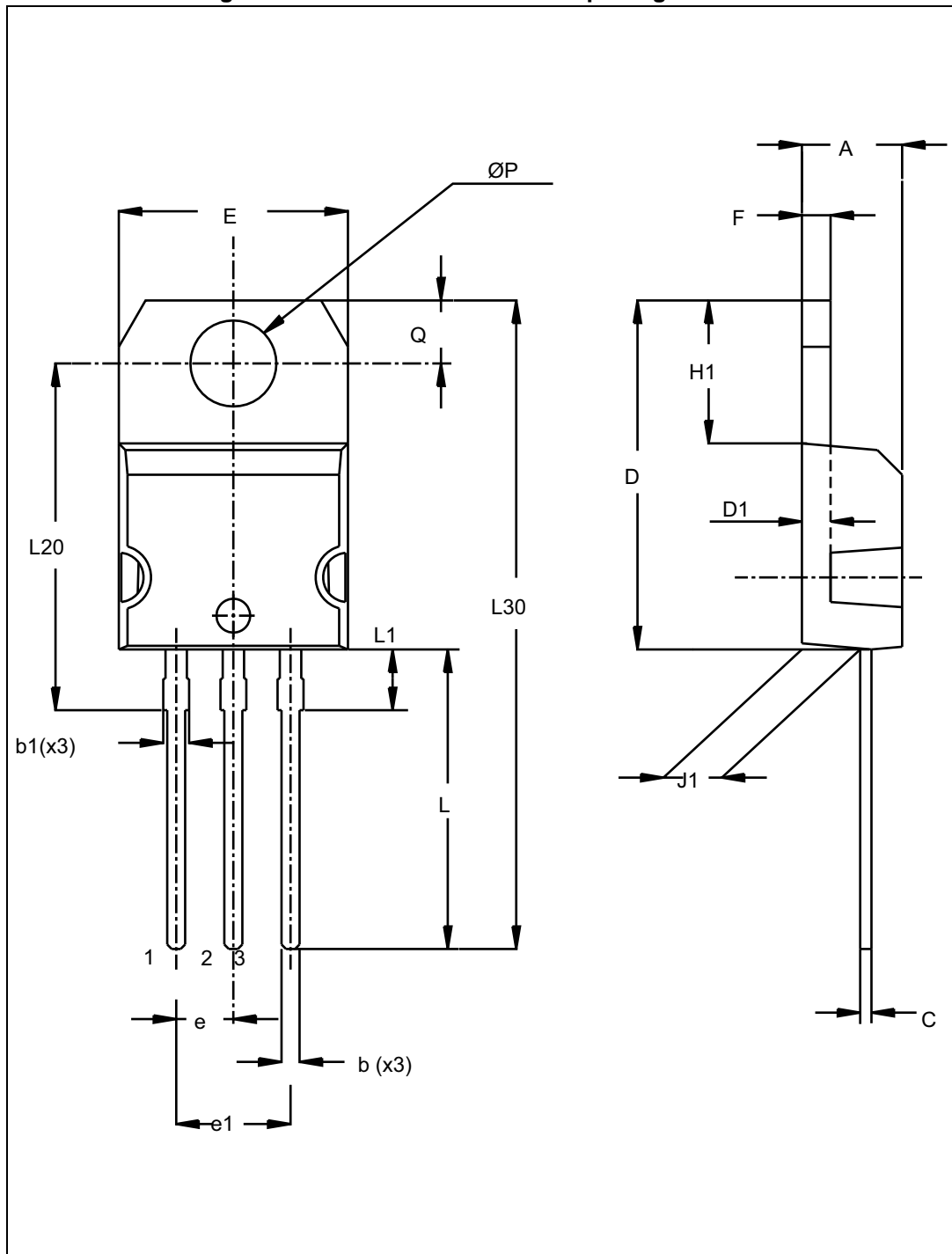


Table 8. TO-220AB narrow leads package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| b | 0.61 | | 0.88 | 0.024 | | 0.034 |
| b1 | 0.95 | | 1.20 | 0.037 | | 0.047 |
| c | 0.48 | | 0.70 | 0.019 | | 0.027 |
| D | 15.25 | | 15.75 | 0.600 | | 0.620 |
| D1 | | 1.27 | | | 0.050 | |
| E | 10.00 | | 10.40 | 0.393 | | 0.409 |
| e | 2.40 | | 2.70 | 0.094 | | 0.106 |
| e1 | 4.95 | | 5.15 | 0.194 | | 0.202 |
| F | 1.23 | | 1.32 | 0.048 | | 0.052 |
| H1 | 6.20 | | 6.60 | 0.244 | | 0.259 |
| J1 | 2.40 | | 2.72 | 0.095 | | 0.107 |
| L | 13.00 | | 14.00 | 0.511 | | 0.551 |
| L1 | 2.60 | | 2.90 | 0.102 | | 0.114 |
| L20 | | 15.40 | | | 0.606 | |
| L30 | | 28.90 | | | 1.137 | |
| ∅P | 3.75 | | 3.85 | 0.147 | | 0.151 |
| Q | 2.65 | | 2.95 | 0.104 | | 0.116 |

3 Ordering information

Table 9. Ordering information

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|--------------|--------------------------|--------|----------|---------------|
| STPS20120CT | STPS20120CT | TO-220AB | 1.9 g | 50 | Tube |
| STPS20120CR | STPS20120CR | I ² PAK | 1.5 g | 50 | Tube |
| STPS20120CB-TR | PS20 120CB | DPAK | 0.32 g | 2500 | Tape and reel |
| STPS20120CTN | STPS20120CTN | TO-220AB narrow leads | 1.9 g | 50 | Tube |

4 Revision history

Table 10. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 18-Feb-2005 | 1 | First issue |
| 03-May-2007 | 2 | Reformatted to current standards. Added TO-220FPAB package. |
| 15-Jun-2012 | 3 | Added TO-220 narrow leads package. |
| 02-Nov-2016 | 4 | Added DPAK package and removed TO-220FPAB package. Reformatted to current standard. |

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