

Features

- Low forward voltage drop meaning very small conduction losses
- Avalanche rated
- Low frequency operation
- Insulated package TO-220FPAB:
 - Insulating voltage = 2000 V_{RMS} sine
- ECOPACK^{®2} compliant component for D²PAK on demand

Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Adapter for notebook and game station

| Product status link | |
|----------------------------|--|
| STPS20M100 | |

| Product summary | |
|-----------------------------|--------|
| I_{F(AV)} | 20 A |
| V_{RRM} | 100 V |
| V_F (typ.) | 0.61 V |
| T_j (max.) | 150 °C |

1 Characteristics

Table 1. Absolute ratings (limiting values with anode terminals short circuited, at 25 °C unless otherwise specified)

| Symbol | Parameter | | Value | Unit | |
|--------------|---|--|---|------|---|
| V_{RRM} | Repetitive peak reverse voltage | | 100 | V | |
| $I_{F(RMS)}$ | Forward rms current | | 30 | A | |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$, square wave | TO-220AB D ² PAK I ² PAK | $T_C = 130\text{ °C}$ | 20 | A |
| | | TO-220FPAB | | | |
| I_{FSM} | Surge non repetitive forward current | | $t_p = 10\text{ ms}$ sinusoidal | 350 | A |
| P_{ARM} | Repetitive peak avalanche power | | $t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$ | 1150 | W |
| T_{stg} | Storage temperature range | | -65 to +175 | °C | |
| T_j | Maximum operating junction temperature ⁽¹⁾ | | +150 | °C | |

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

Table 2. Thermal resistance parameter

| Symbol | Parameter | | Value | Unit |
|---------------|------------------|--|-------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AB, D ² PAK, I ² PAK | 1.2 | °C/W |
| | | TO-220FPAB | 4 | |

Table 3. Static electrical characteristics (anode terminals short circuited)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------------------|-------------------------|-----------------------|----------------------|------|------|------|---------------|
| I_R ⁽¹⁾ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = 70\text{ V}$ | - | 5 | | μA |
| | | $T_j = 125\text{ °C}$ | | - | 5 | | mA |
| | | $T_j = 25\text{ °C}$ | $V_R = 100\text{ V}$ | - | 10 | 40 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 10 | 40 | mA |
| V_F ⁽²⁾ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 5\text{ A}$ | - | 550 | | mV |
| | | $T_j = 125\text{ °C}$ | | - | 455 | | |
| | | $T_j = 25\text{ °C}$ | $I_F = 10\text{ A}$ | - | 660 | 730 | |
| | | $T_j = 125\text{ °C}$ | | - | 530 | 600 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 20\text{ A}$ | - | 775 | 850 | |
| | | $T_j = 125\text{ °C}$ | | - | 610 | 690 | |

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current (anode terminals short circuited)

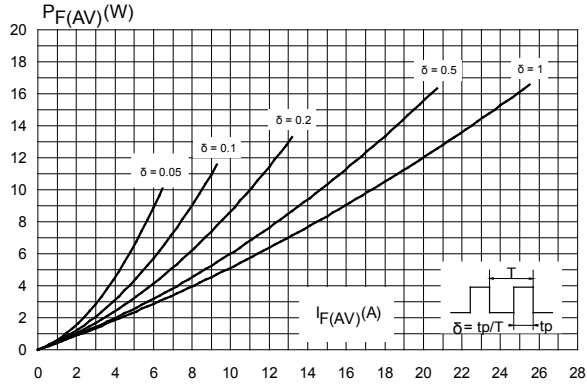


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, anode terminals short circuited)

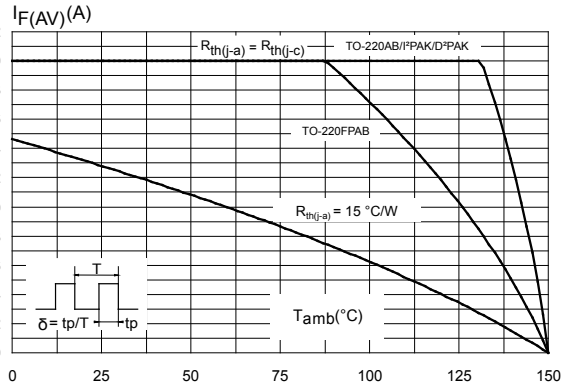


Figure 3. Normalized avalanche power derating versus pulse duration ($T_j = 125^{\circ}C$)

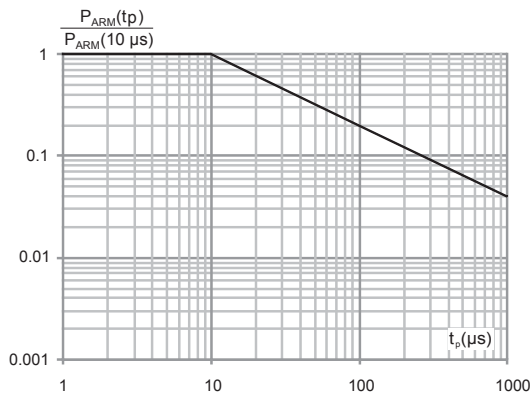


Figure 4. Reverse leakage current versus reverse voltage applied (typical values)

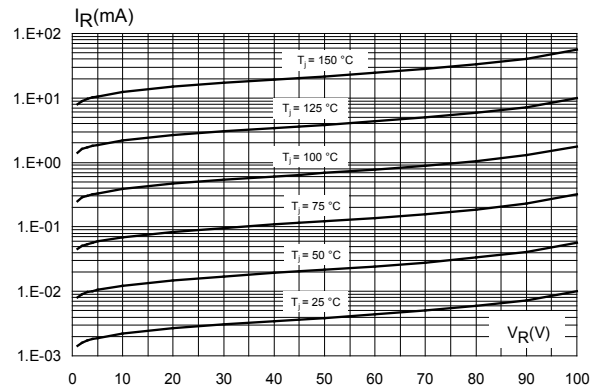


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK, I²PAK)

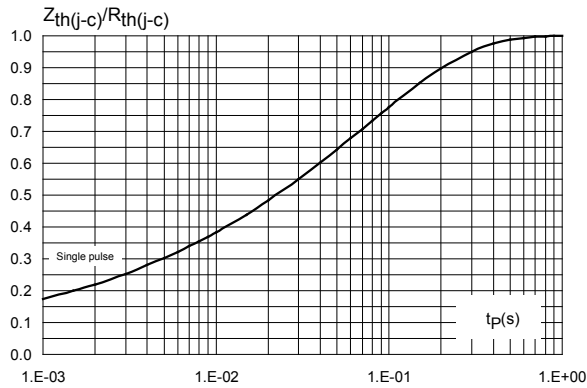


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

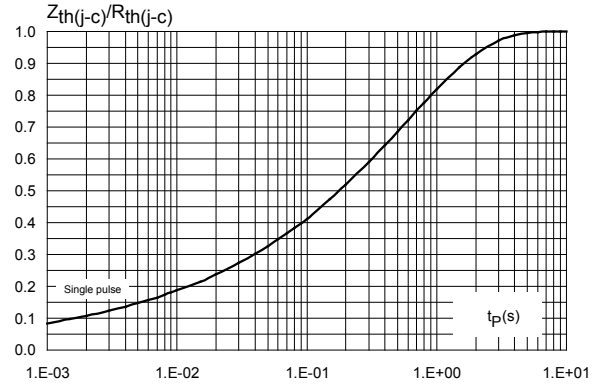


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

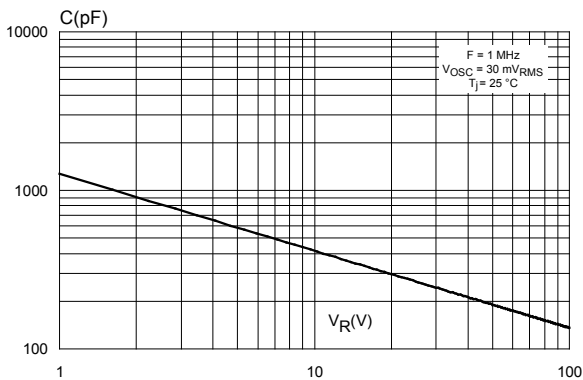


Figure 8. Forward voltage drop versus forward current (anode terminals short circuited)

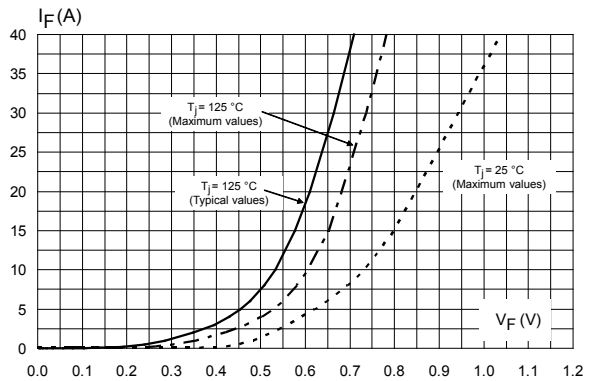
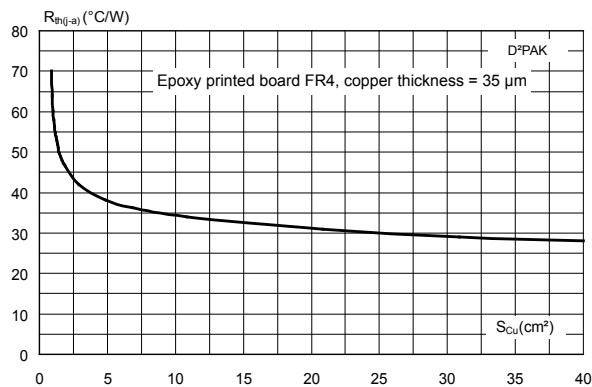


Figure 9. Thermal resistance junction to ambient versus copper surface under tab for D²PAK



2 Package information

2.1 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 10. TO-220AB package outline

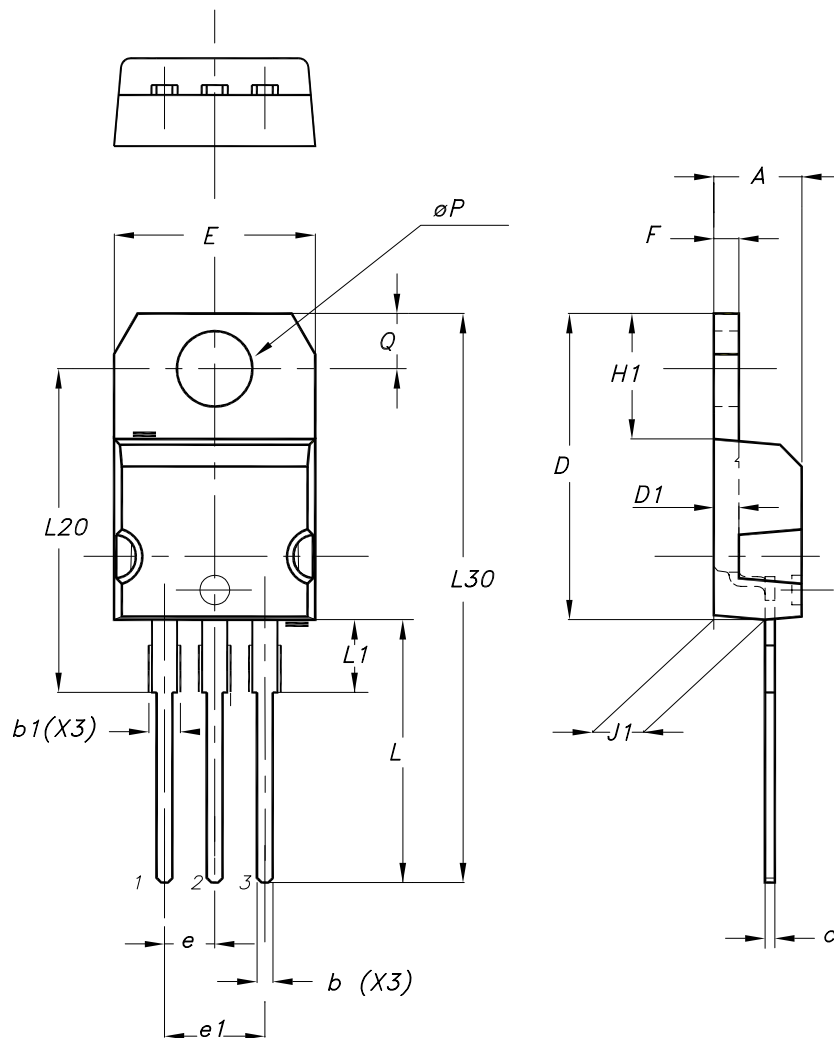


Table 4. TO-220AB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|-----------------------------|-------|
| | Millimeters | | Inches (for reference only) | |
| | 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 | 1.55 | 0.045 | 0.061 |
| 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 |

2.2 TO-220FPAB package information

- Epoxy meets UL 94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 11. TO-220FPAB package outline

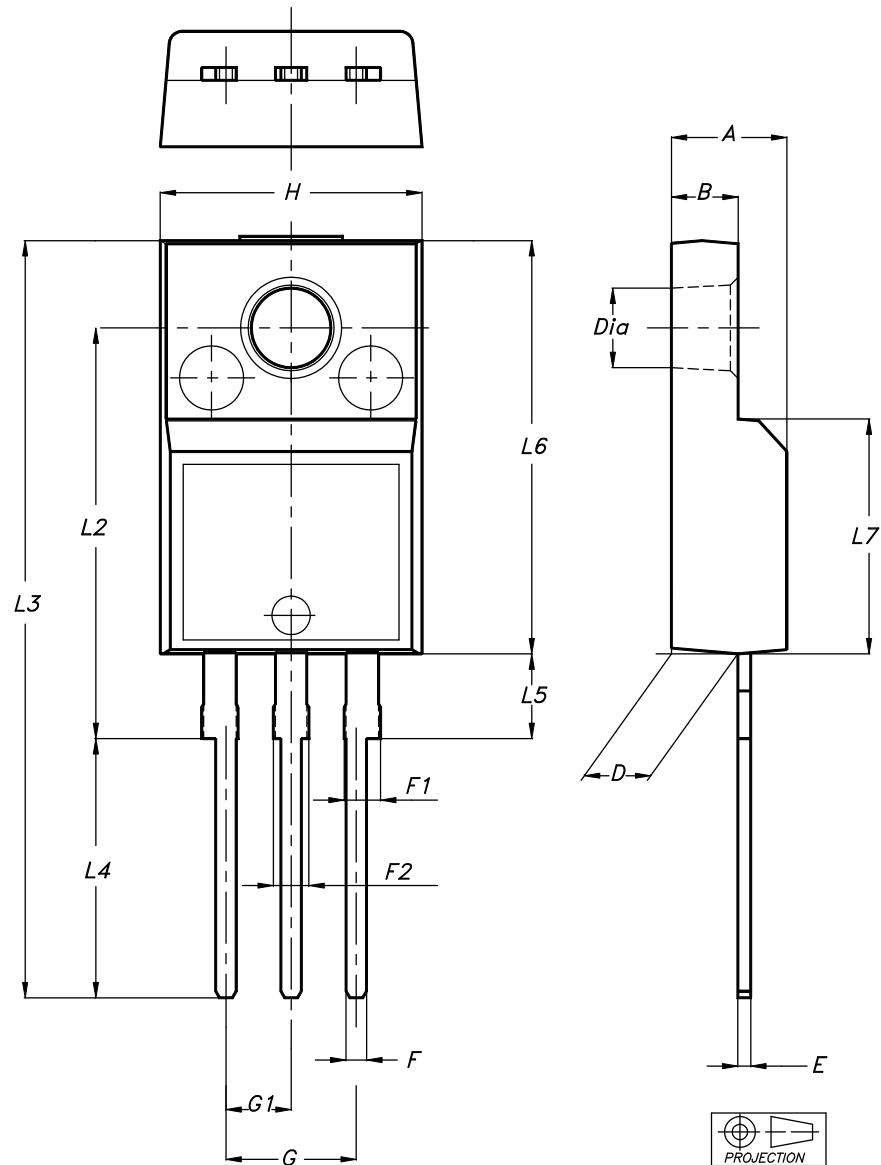


Table 5. TO-220FPAB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|-----------------------------|--------|
| | Millimeters | | Inches (for reference only) | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.1739 | 0.1818 |
| B | 2.50 | 2.70 | 0.0988 | 0.1067 |
| D | 2.50 | 2.75 | 0.0988 | 0.1087 |
| E | 0.45 | 0.70 | 0.0178 | 0.0277 |
| F | 0.75 | 1.00 | 0.0296 | 0.0395 |
| F1 | 1.15 | 1.70 | 0.0455 | 0.0672 |
| F2 | 1.15 | 1.70 | 0.0455 | 0.0672 |
| G | 4.95 | 5.20 | 0.1957 | 0.2055 |
| G1 | 2.40 | 2.70 | 0.0949 | 0.1067 |
| H | 10.00 | 10.40 | 0.3953 | 0.4111 |
| L2 | 16.00 typ. | | 0.6324 typ. | |
| L3 | 28.60 | 30.60 | 1.1304 | 1.2095 |
| L4 | 9.80 | 10.60 | 0.3874 | 0.4190 |
| L5 | 2.90 | 3.60 | 0.1146 | 0.1423 |
| L6 | 15.90 | 16.40 | 0.6285 | 0.6482 |
| L7 | 9.00 | 9.30 | 0.3557 | 0.3676 |
| Dia | 3.00 | 3.20 | 0.1186 | 0.1265 |

2.3 I²PAK package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

Figure 12. I²PAK package outline

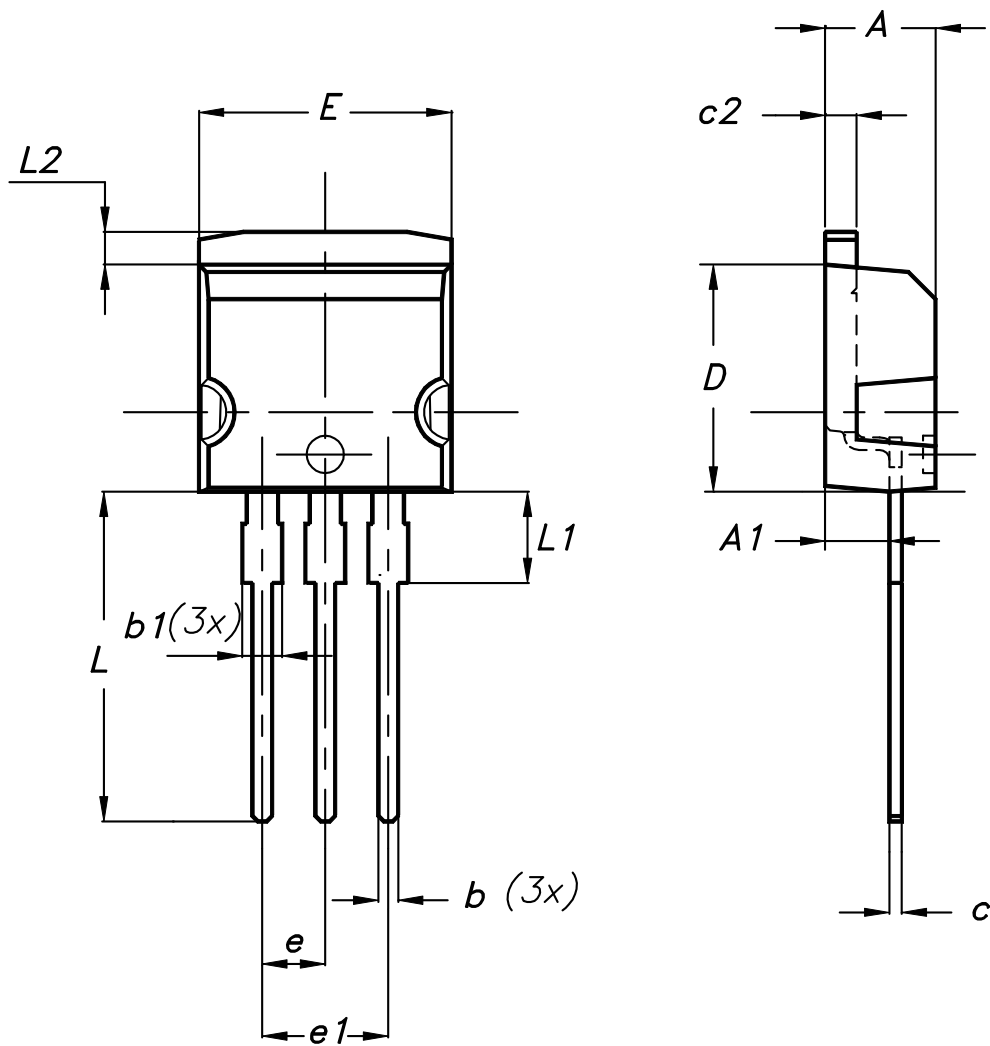


Table 6. I²PAK package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|-----------------------------|-------|
| | Millimeters | | Inches (for reference only) | |
| | Min. | Max. | Min. | 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 |

2.4 D²PAK package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

Figure 13. D²PAK package outline

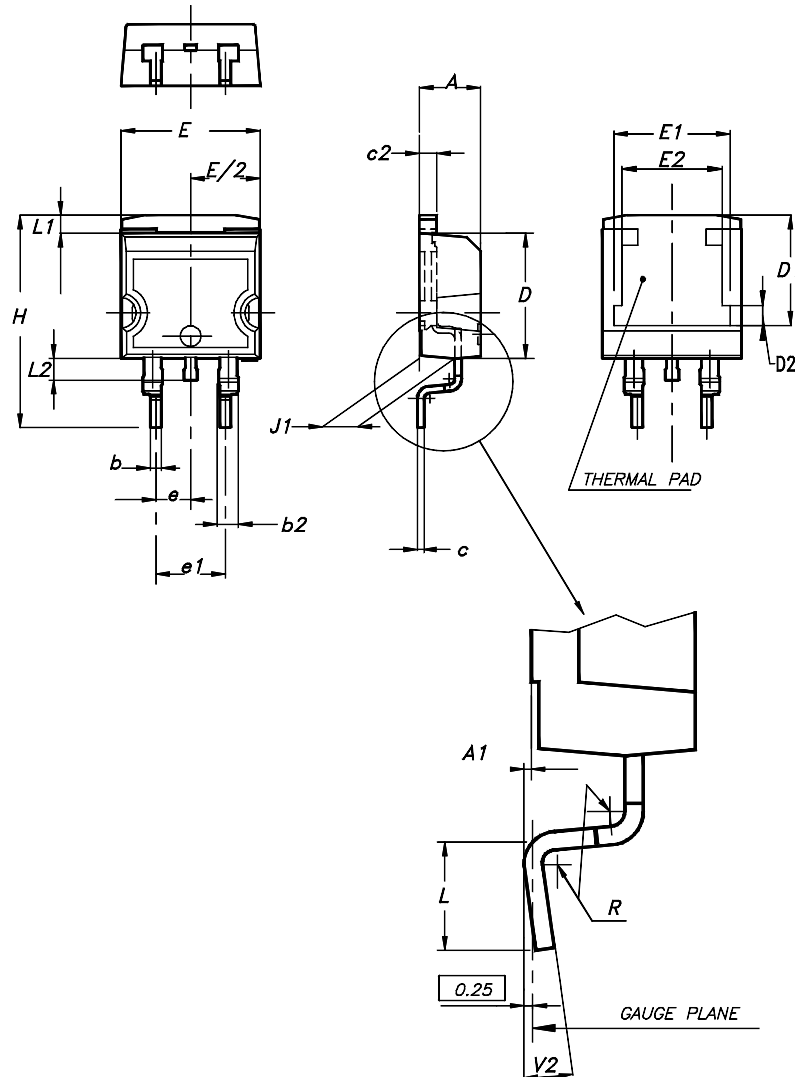
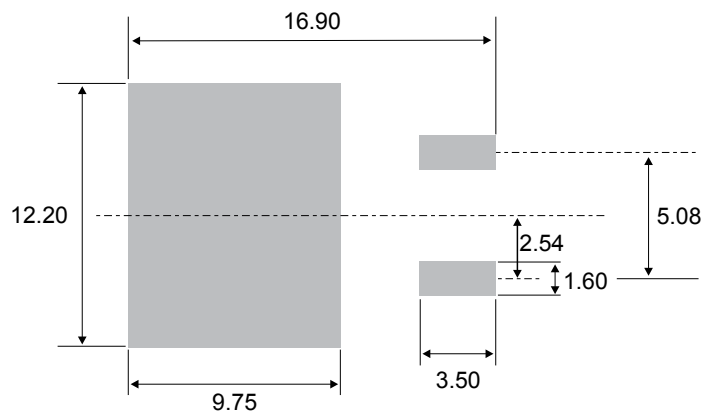


Table 7. D²PAK package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|-----------------------------|-------|
| | Millimeters | | Inches (for reference only) | |
| | 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 14. D²PAK recommended footprint (dimensions in mm)



3 Ordering information

Table 8. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|--------------|-----------|--------------------|--------|-----------|---------------|
| STPS20M100ST | PS20M100 | TO-220AB | 1.95 g | 50 | Tube |
| STPS20M100S | PS20M100S | TO-220FPAB | 1.90 g | 50 | Tube |
| STPS20M100SG | S20M100 | I ² PAK | 1.50 g | 50 | Tube |
| STPS20M100 | 20M100 | D ² PAK | 1.48 g | 1000 | Tape and reel |

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