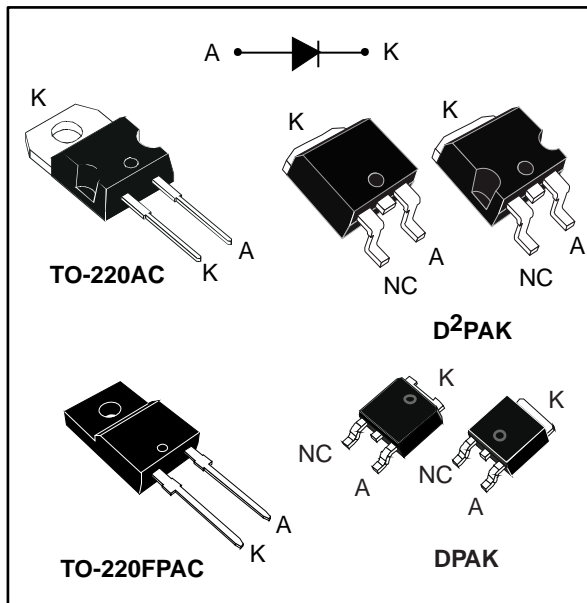


Ultrafast recovery diode

Datasheet - production data



Description

This device uses ST's 200 V planar Pt doping technology, and is especially suited for switching mode base drive and transistor circuits.

Packaged in TO-220AC, TO-220FPAC, DPAK, and D²PAK this device is intended for use in low voltage, high frequency inverters, freewheeling and polarity protection.

Table 1: Device summary

| Symbol | Value |
|-----------------|--------|
| $I_{F(AV)}$ | 8 A |
| V_{RRM} | 200 V |
| T_j (max.) | 175 °C |
| V_F (typ.) | 0.8 V |
| t_{rr} (typ.) | 17 ns |

Features

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery time
- High junction temperature
- ECOPACK®2 compliant component for DPAK and D²PAK on demand
- Insulated package: TO-220FPAC
 - Insulating voltage: 2000 V_{RMS} sine

1 Characteristics

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

| Symbol | Parameter | | | Value | Unit |
|---------------------|---|---------------------------------------|-------------------------|-------------|------|
| V _{RRM} | Repetitive peak reverse voltage | | | 200 | V |
| I _{F(RMS)} | Forward rms current | | | 16 | A |
| I _{F(AV)} | Average forward current δ = 0.5, square wave | TO-220AC, DPAK, D ² PAK | T _C = 145 °C | 8 | A |
| | | TO-220FPAC | T _C = 125 °C | | |
| I _{FSM} | Surge non repetitive forward current | tp = 10 ms sinusoidal | | 100 | A |
| T _{stg} | Storage temperature range | | | -65 to +175 | °C |
| T _j | Maximum operating junction temperature | | | 175 | °C |

Table 3: Thermal parameter

| Symbol | Parameter | | Max. value | Unit |
|---------------|------------------|------------------------------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AC, DPAK, D ² PAK | 3.2 | °C/W |
| | | TO-220FPAC | 5.5 | |

Table 4: Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | | 6 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 6 | 60 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 8\text{ A}$ | - | 0.95 | 1.05 | V |
| | | $T_j = 150\text{ °C}$ | | - | 0.80 | 0.90 | |

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:

$$P = 0.73 \times I_{F(AV)} + 0.021 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------|---|------|------|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$, $di_F/dt = -50\text{ A/}\mu\text{s}$, $V_R = 30\text{ V}$ | - | 25 | 30 | ns |
| | | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$, $di_F/dt = -100\text{ A/}\mu\text{s}$, $V_R = 30\text{ V}$ | - | 17 | 22 | ns |
| I_{RM} | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 8\text{ A}$, $di_F/dt = -200\text{ A/}\mu\text{s}$, $V_R = 160\text{ V}$ | - | 5.5 | 7.0 | A |
| t_{fr} | Forward recovery time | $T_j = 25\text{ °C}$ | $I_F = 8\text{ A}$, $di_F/dt = 50\text{ A/}\mu\text{s}$, $V_{FR} = 1.1 \times V_{Fmax}$ | - | 150 | | ns |
| V_{FP} | Forward recovery voltage | $T_j = 25\text{ °C}$ | $I_F = 8\text{ A}$, $di_F/dt = 50\text{ A/}\mu\text{s}$ | - | 1.5 | | V |

1.1 Characteristics (curves)

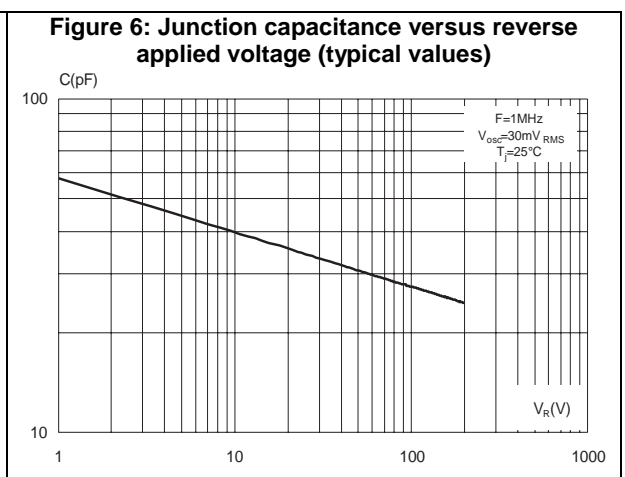
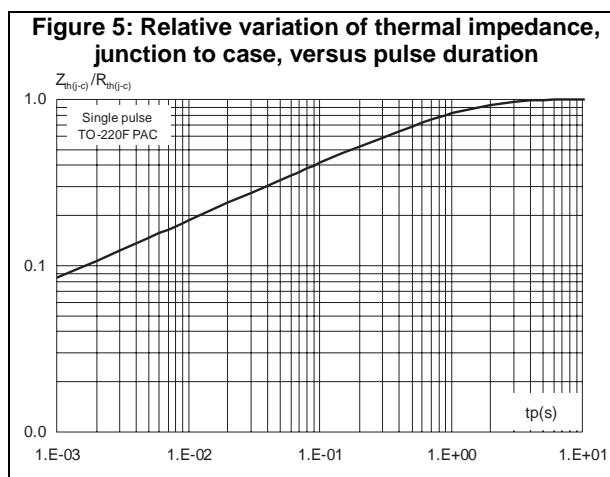
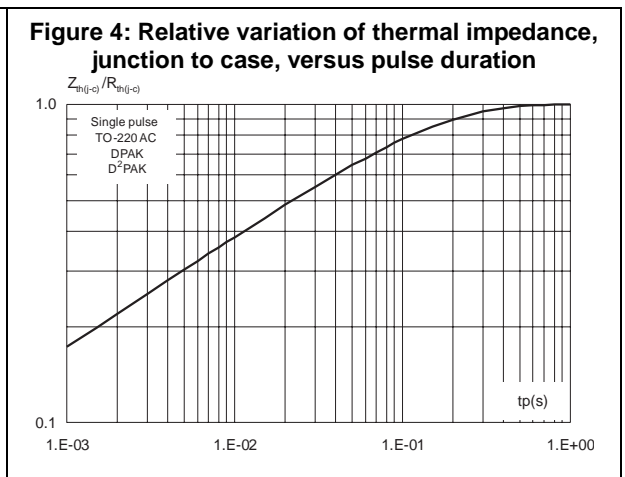
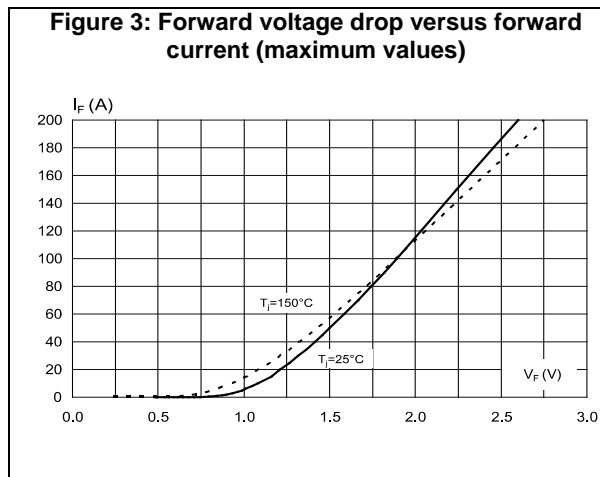
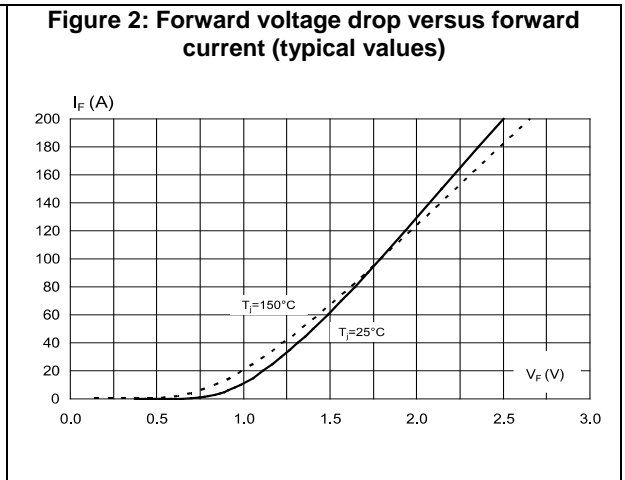
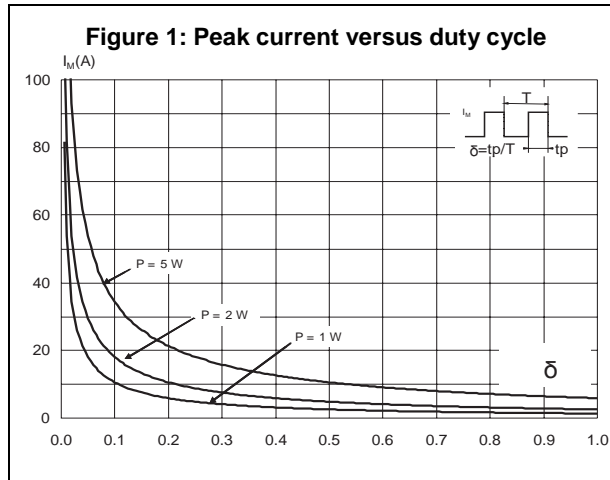
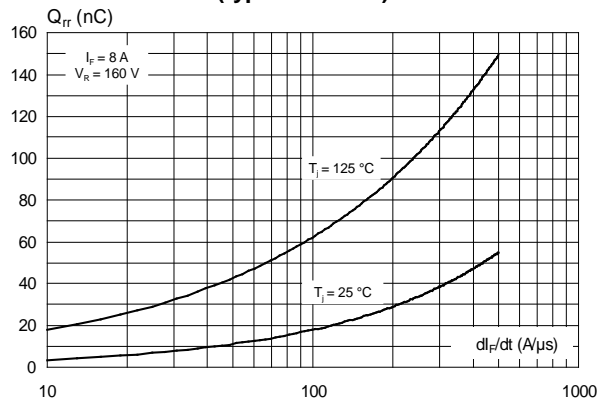
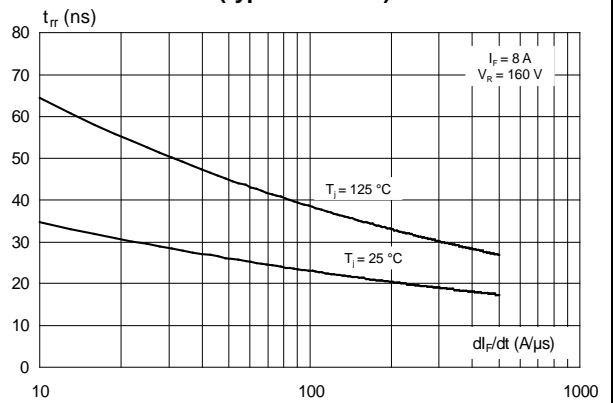
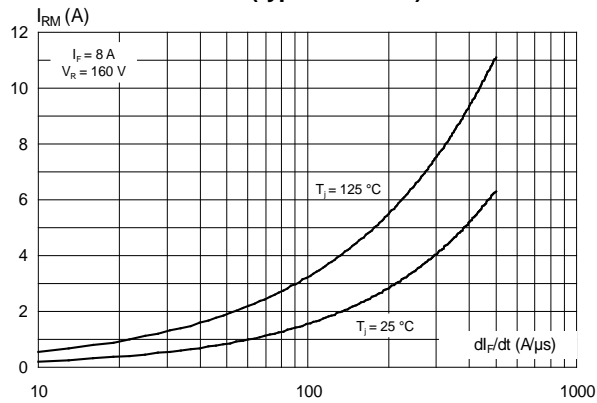
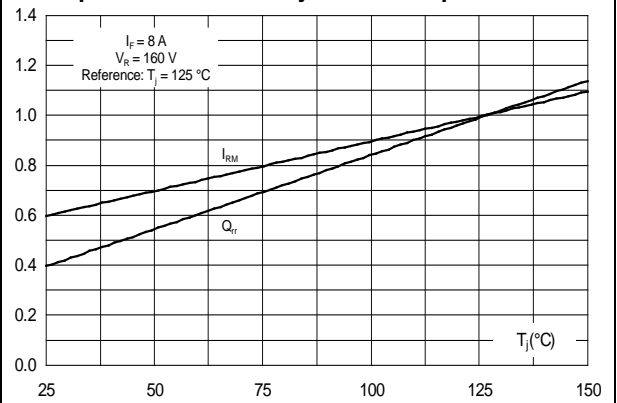
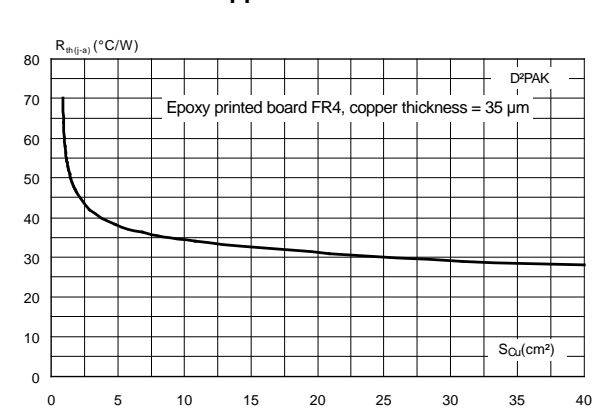
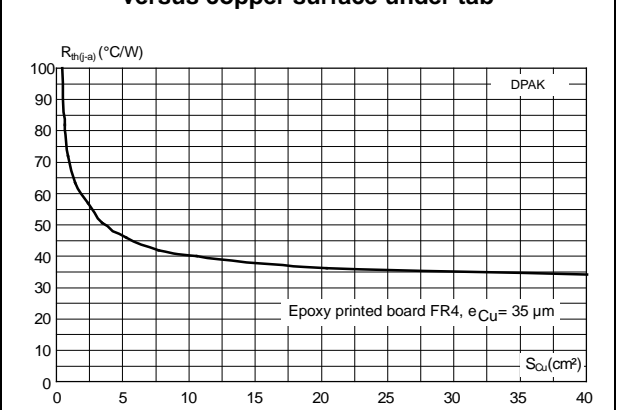


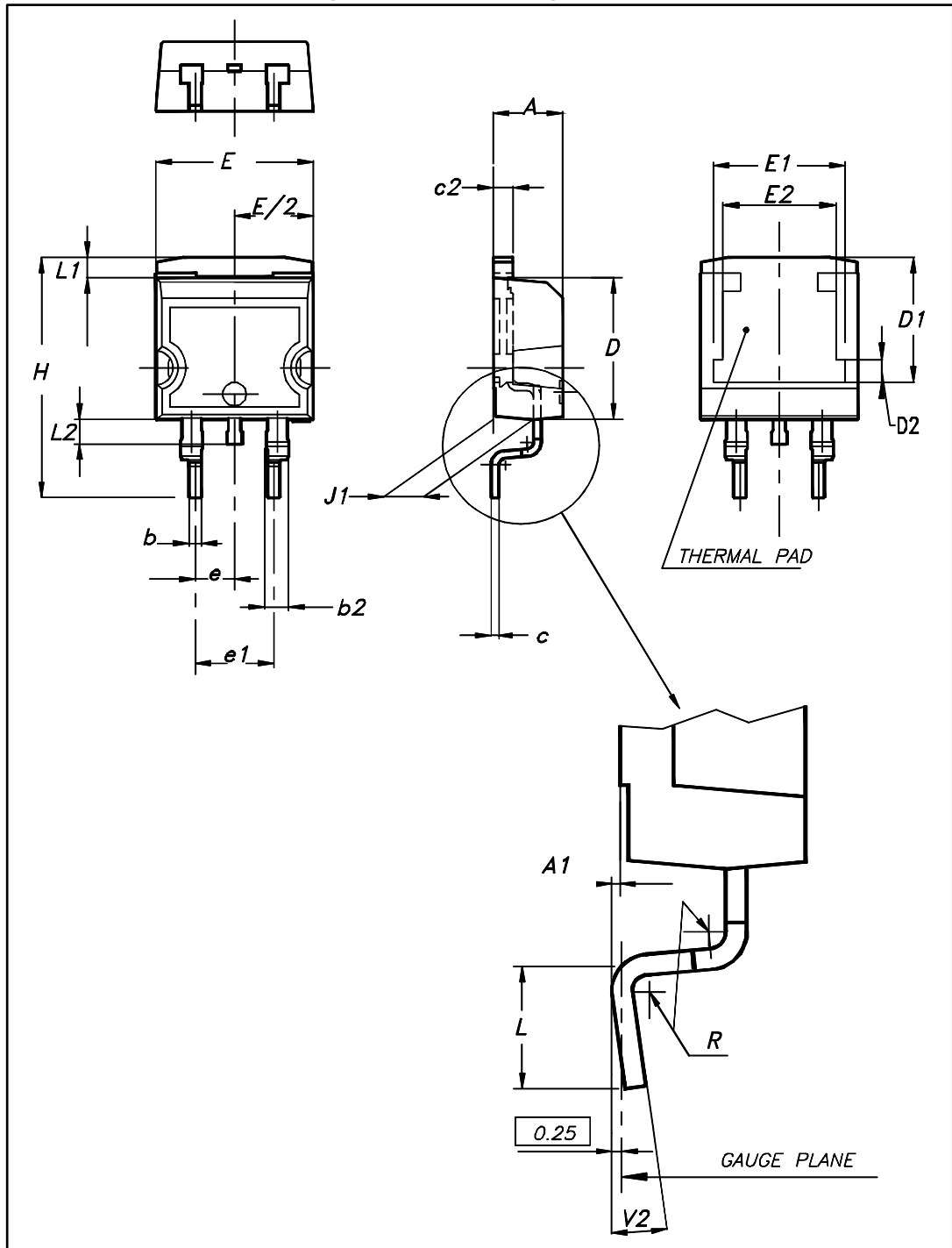
Figure 7: Reverse recovery charges versus di_F/dt (typical values)**Figure 8: Reverse recovery time versus di_F/dt (typical values)****Figure 9: Peak reverse recovery current versus di_F/dt (typical values)****Figure 10: Relative variation of dynamic parameters versus junction temperature****Figure 11: Thermal resistance, junction to ambient, versus copper surface under tab****Figure 12: Thermal resistance, junction to ambient, versus copper surface under tab**

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-220AC and TO-220FPAC)
- Maximum torque value: 0.7 N·m (for TO-220AC and TO-220FPAC)

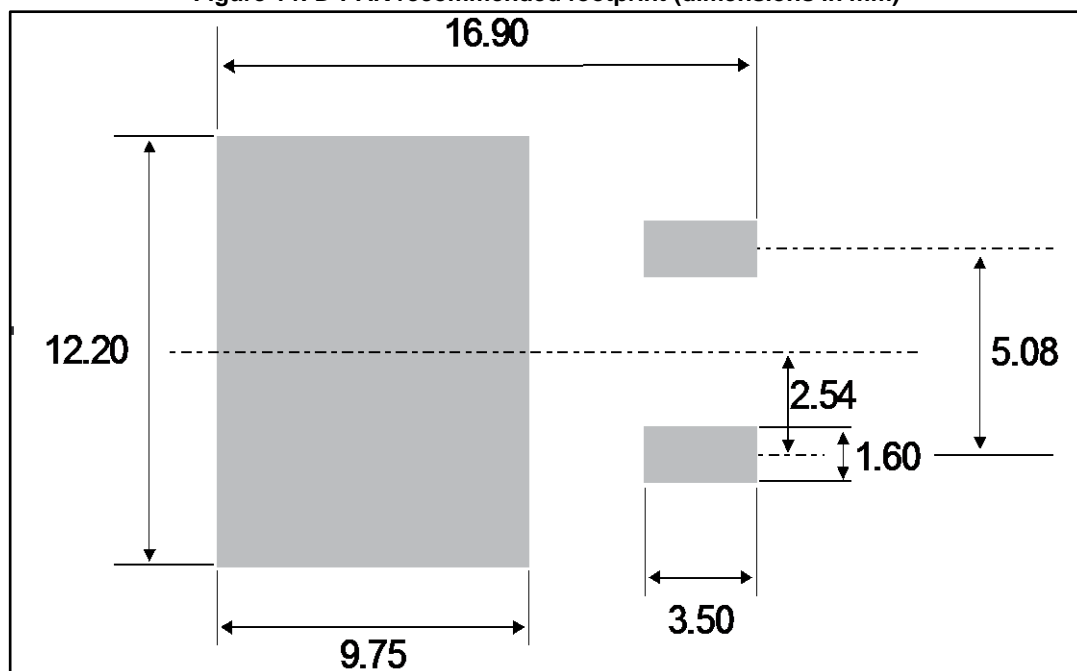
2.1 D²PAK package information

Figure 13: D²PAK package outline

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

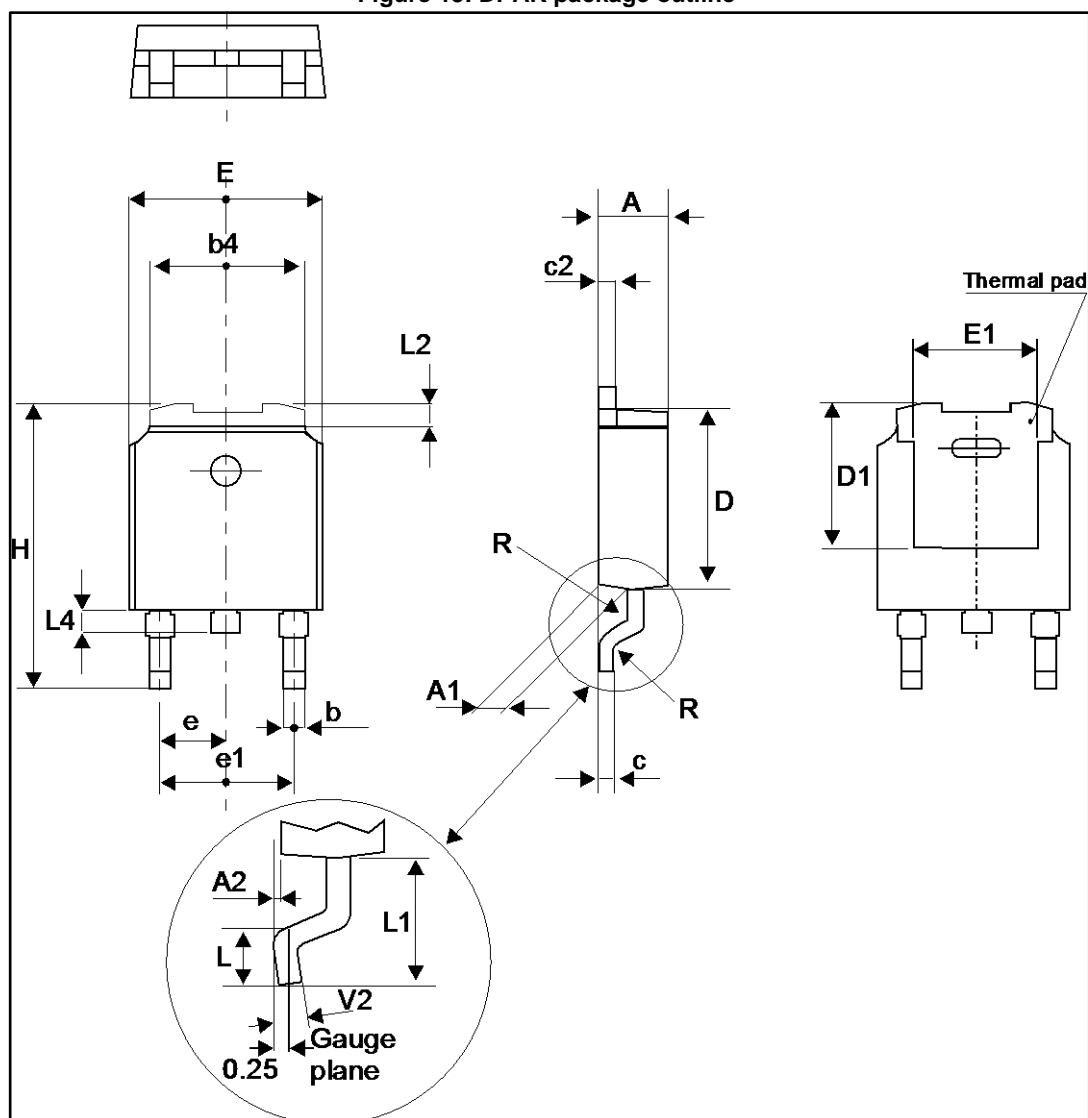
Table 6: D²PAK package mechanical data

| 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 14: D²PAK recommended footprint (dimensions in mm)

2.2 DPAK package information

Figure 15: DPAK package outline

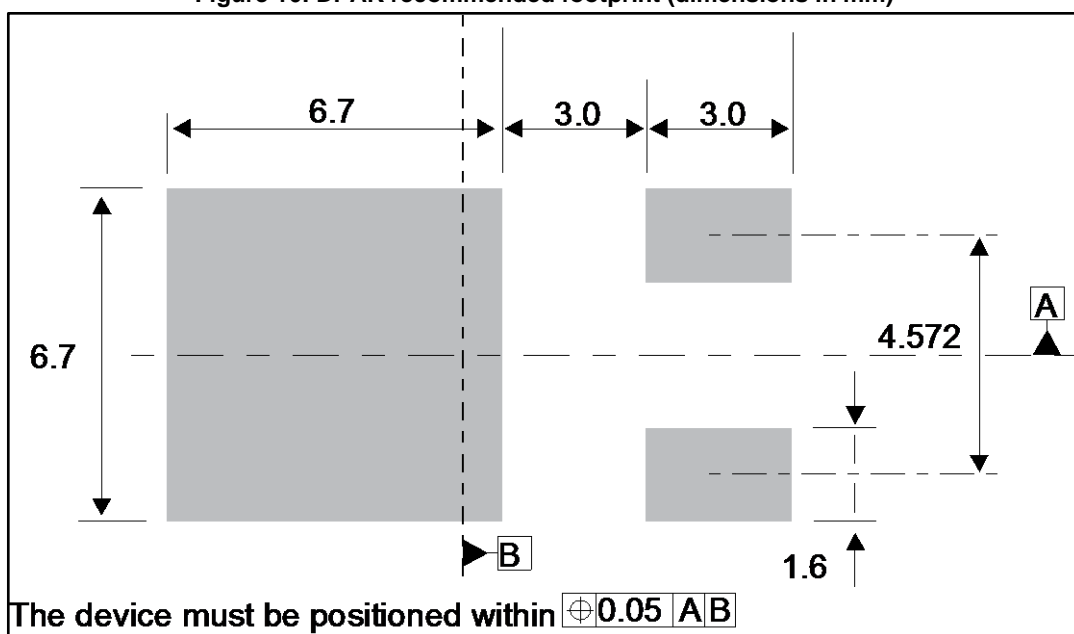


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 7: DPAK package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | 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 | 0.215 |
| 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 | 0.265 |
| E1 | 4.32 | 5.50 | 0.170 | 0.216 |
| e | 2.286 typ. | | 0.090 typ. | |
| e1 | 4.40 | 4.70 | 0.173 | 0.185 |
| H | 9.35 | 10.40 | 0.368 | 0.409 |
| L | 1.0 | 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 16: DPAK recommended footprint (dimensions in mm)



2.3 TO-220AC package information

Figure 17: TO-220AC package outline

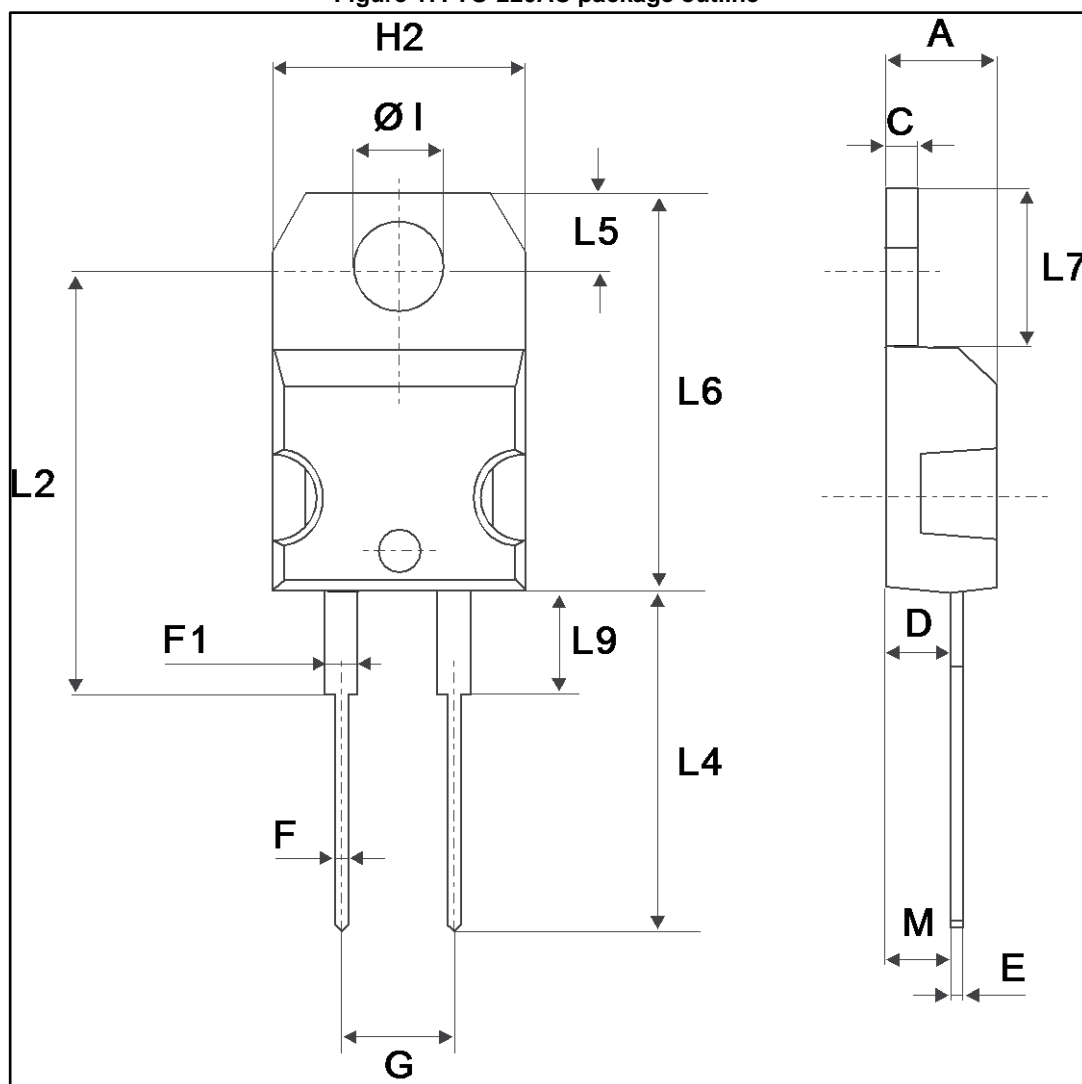


Table 8: TO-220AC package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | 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 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| H2 | 10.00 | 10.40 | 0.393 | 0.409 |
| L2 | 16.40 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. | |
| ØI | 3.75 | 3.85 | 0.147 | 0.151 |

2.4 TO-220FPAC package information

Figure 18: TO-220FPAC package outline

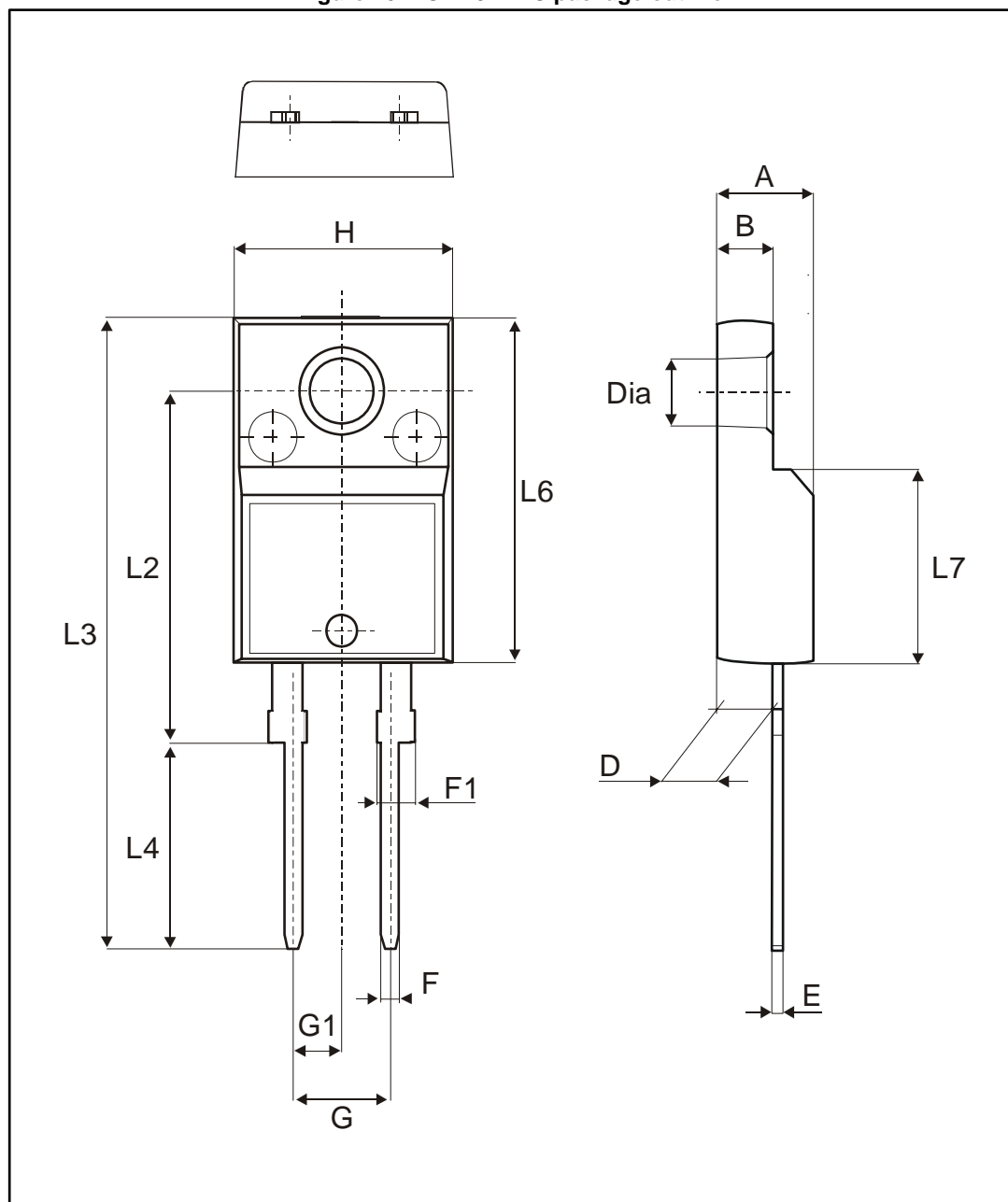


Table 9: TO-220FPAC package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| B | 2.50 | 2.70 | 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 | 1.00 | 0.030 | 0.039 |
| F1 | 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. | | 0.630 typ. | |
| L3 | 28.60 | 30.60 | 0.126 | 1.205 |
| L4 | 9.80 | 10.60 | 0.386 | 0.417 |
| L6 | 15.90 | 16.40 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

3 Ordering information

Table 10: Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-------------|----------|--------------------|--------|----------|---------------|
| STTH802D | STTH802 | TO-220AC | 1.86g | 50 | Tube |
| STTH802FP | STTH802 | TO-220FPAC | 1.9g | 50 | Tube |
| STTH802B-TR | STTH 802 | DPAK | 0.32g | 2500 | Tape and reel |
| STTH802G | STTH802 | D ² PAK | 1.38g | 50 | Tube |
| STTH802G-TR | STTH802 | D ² PAK | 1.38g | 1000 | Tape and reel |

4 Revision history

Table 11: Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 03-may-2006 | 1 | First issue. |
| 22-Sep-2006 | 2 | Added D ² PAK package. |
| 07-Aug-2017 | 3 | Updated features and image in cover page. Updated Section 1.1: "Characteristics (curves)" . Updated Section 2: "Package information" . Minor text changes. |

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