

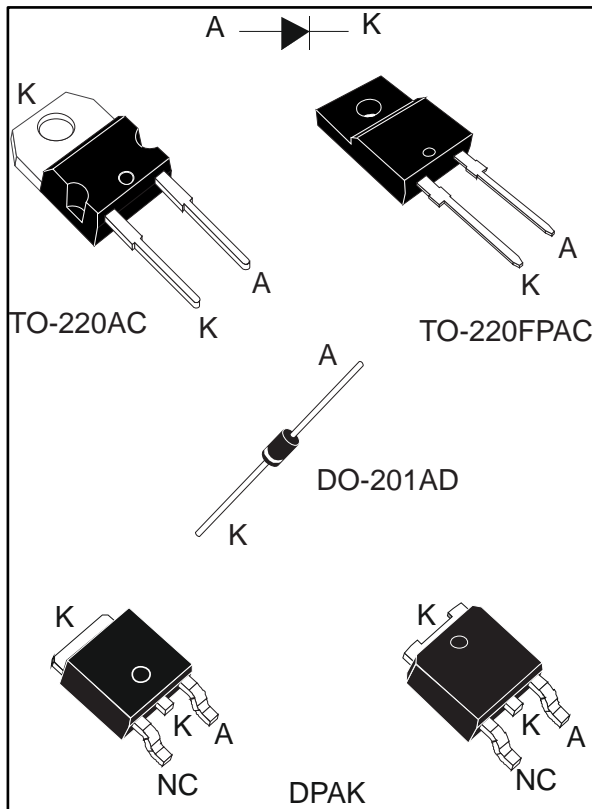


THE DATASHEET OF STTH5L06FP



Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



Description

The device is developed using ST's Turbo 2 600 V technology. It is well-suited as a boost diode, especially for use in continuous mode power factor corrections and hard switching conditions.

This device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

Table 1: Device summary

| Symbol | Value |
|----------------|---------------------------|
| $I_{F(AV)}$ | 5 A |
| V_{RRM} | 600 V |
| I_R (max) | 125 μ A / 150 μ A |
| T_j (max) | 175 °C |
| V_F (typ) | 0.85 V |
| t_{rr} (typ) | 65 ns |

Features

- Ultrafast switching
- Low reverse recovery current
- Reduces switching losses
- Low thermal resistance
- Insulated package: TO-220FPAC
 - Insulation voltage: 2000 V_{RMS} sine
- ECOPACK®2 compliant component for DPAK on demand

1 Characteristics

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

| Symbol | Parameter | | Value | Unit | |
|---------------------|---|---|-------------------------|------|---|
| V _{RRM} | Repetitive peak reverse voltage | | 600 | V | |
| I _{F(RMS)} | Forward rms current | TO-220AC TO-220FPAC DO-201AD | 20 | A | |
| | | DPAK | 10 | | |
| I _{F(AV)} | Average forward current $\delta = 0.5$, square wave | TO-220AC, DPAK | T _C = 150 °C | A | |
| | | DO-201AD | T _I = 50 °C | | |
| | | TO-220FPAC | T _C = 135 °C | | |
| I _{FRM} | Repetitive peak forward current | t _p = 5 μs, F = 5 kHz square | 65 | A | |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | TO-220AC TO-220FPAC | 90 | A |
| | | | DO-201AD | 110 | |
| | | | DPAK | 60 | |
| 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 | 3.5 | °C/W |
| | | TO-220FPAC | 6 | |
| R _{th(j-l)} | Junction to lead | L = 10 mm, DO-201AD | 20 | °C/W |
| R _{th(j-a)} | Junction to ambient | | 75 | |

Table 4: Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|----------------------|--|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = 600\text{ V}$ | - | | 5 | μA |
| | | $T_j = 150\text{ °C}$ | $V_R = 600\text{ V}$ | | 10 | 125 | |
| | | | | TO-220AC TO-220FPAC DPAK DO-201AD | - | 25 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 5\text{ A}$ | - | | 1.30 | V |
| | | $T_j = 150\text{ °C}$ | | - | 0.85 | 1.05 | |

Notes:(1)Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$ (2)Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

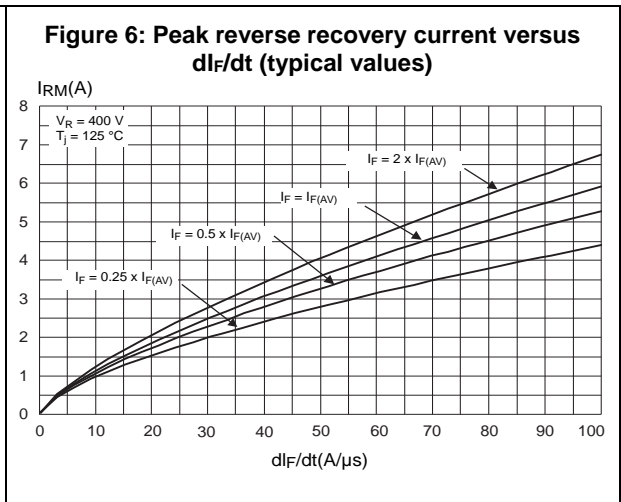
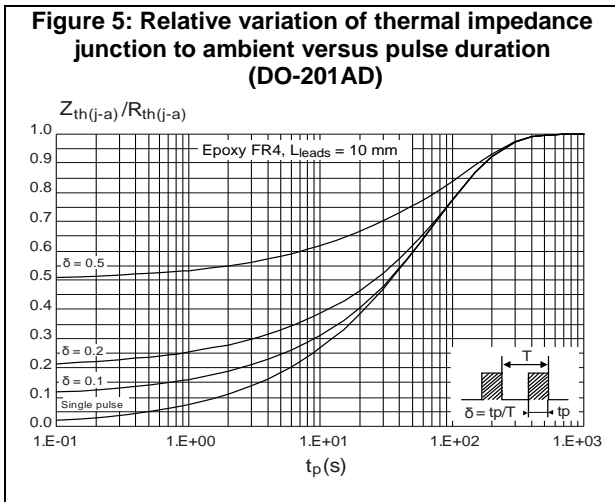
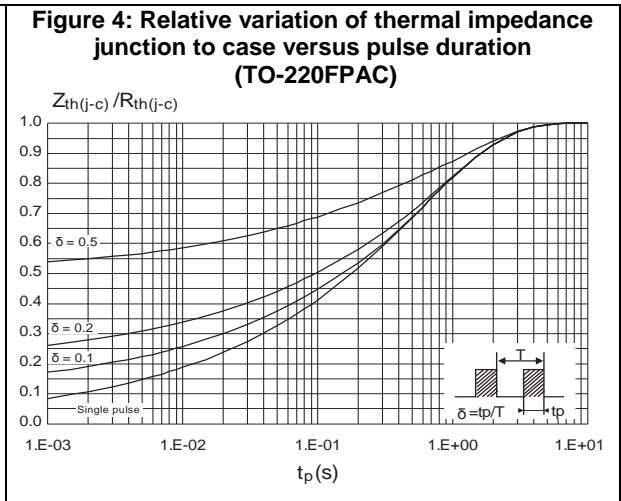
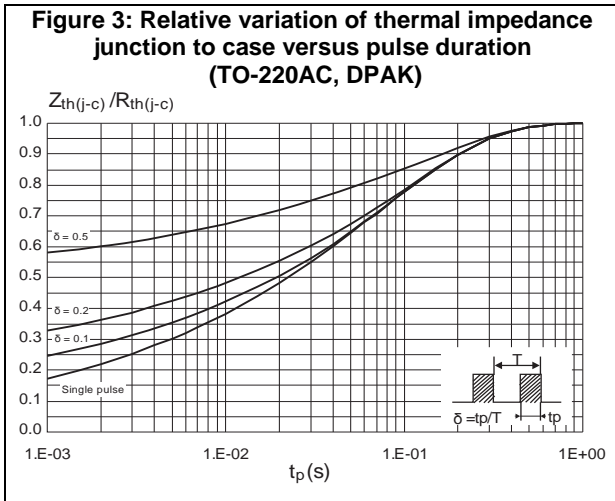
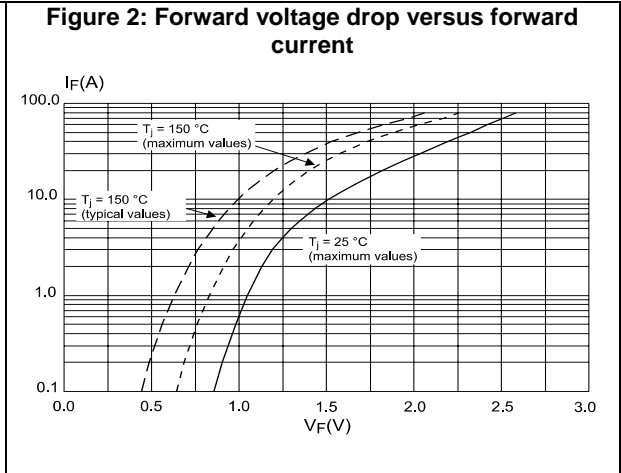
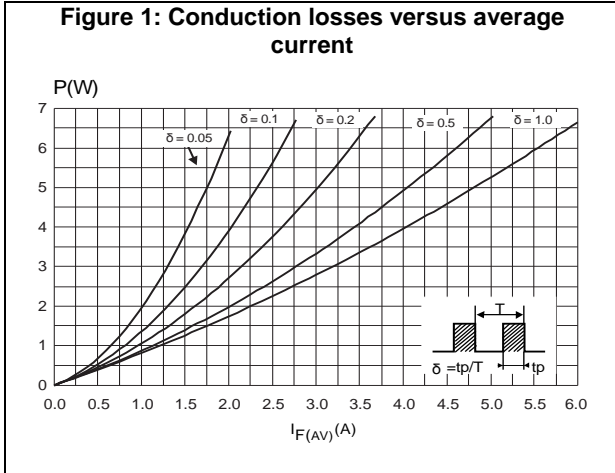
To evaluate the conduction losses, use the following equation:

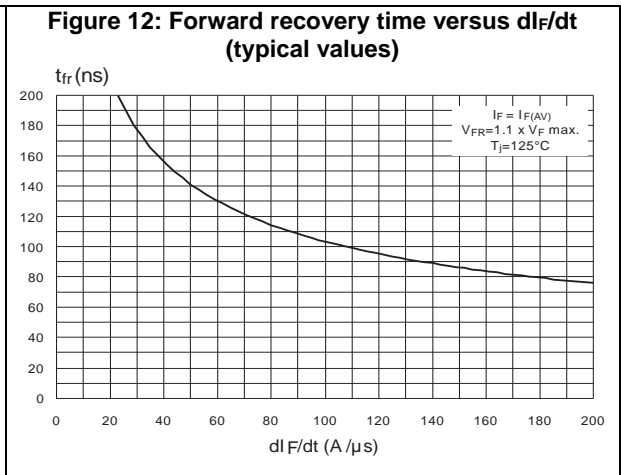
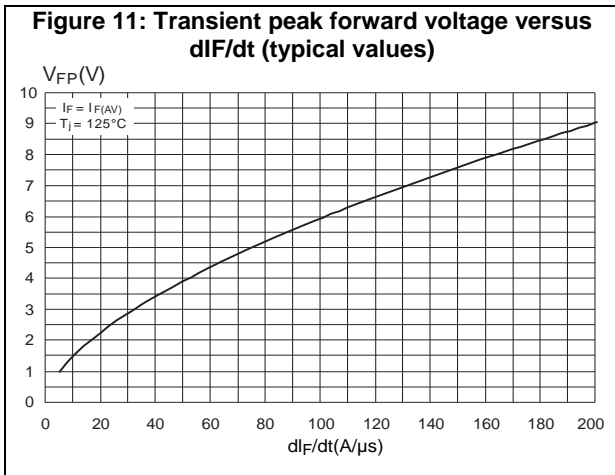
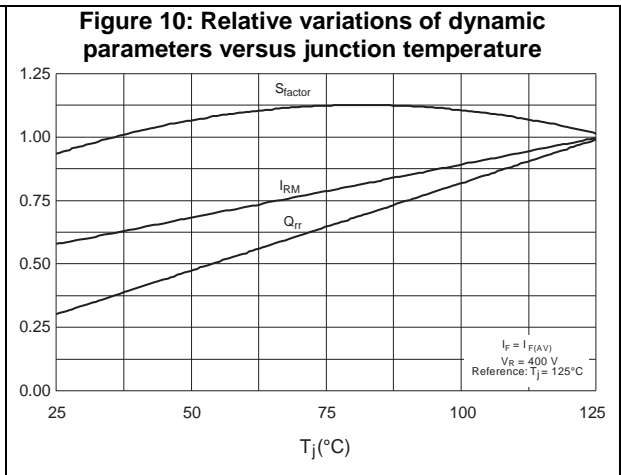
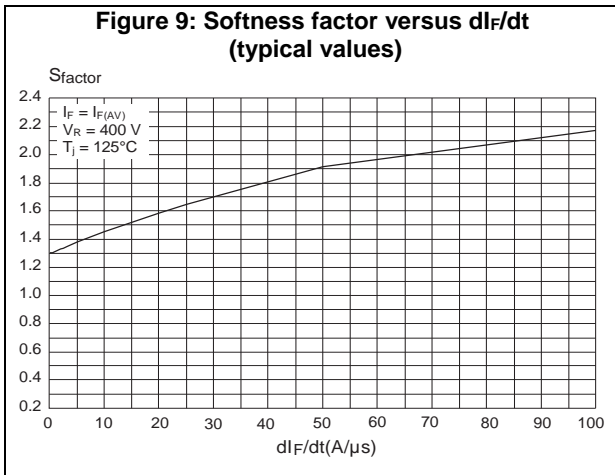
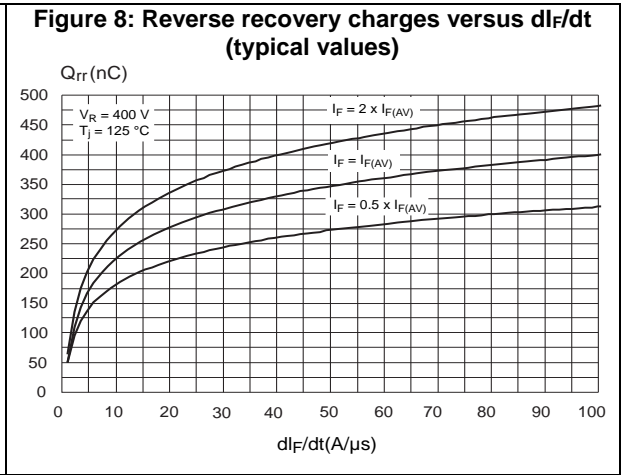
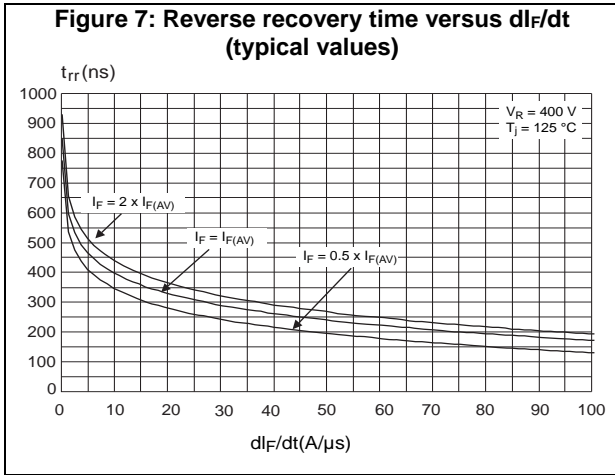
$$P = 0.89 \times I_{F(AV)} + 0.033 \times I_F^2(RMS)$$

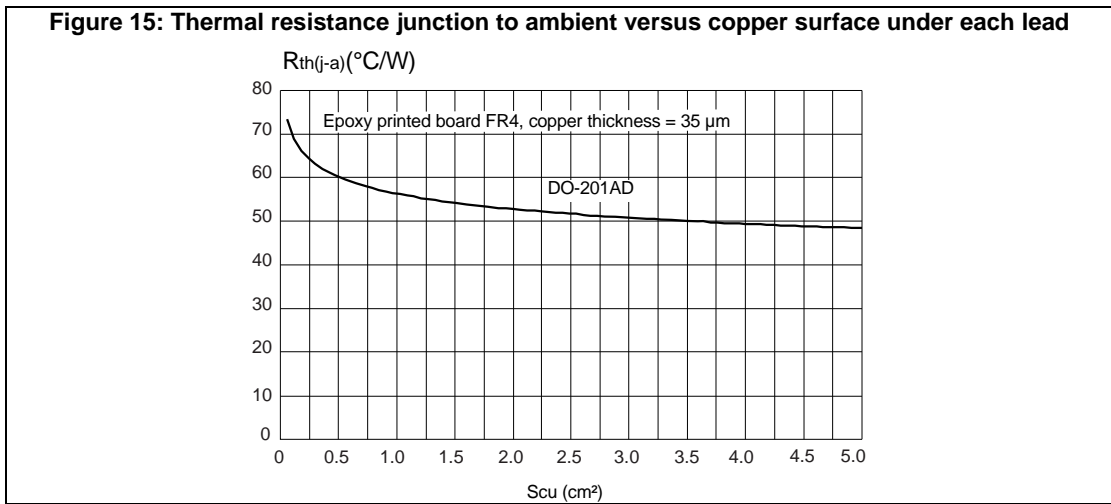
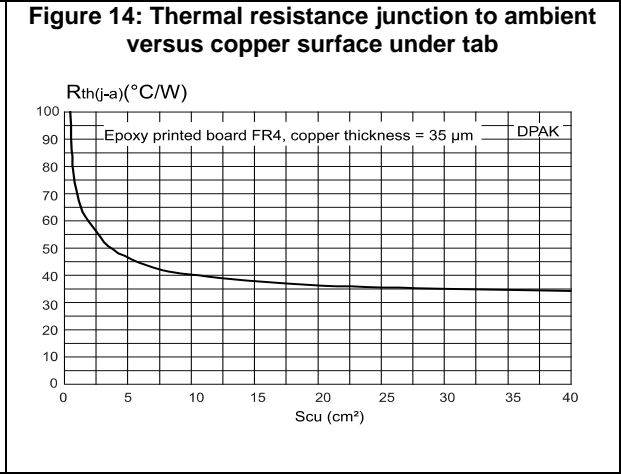
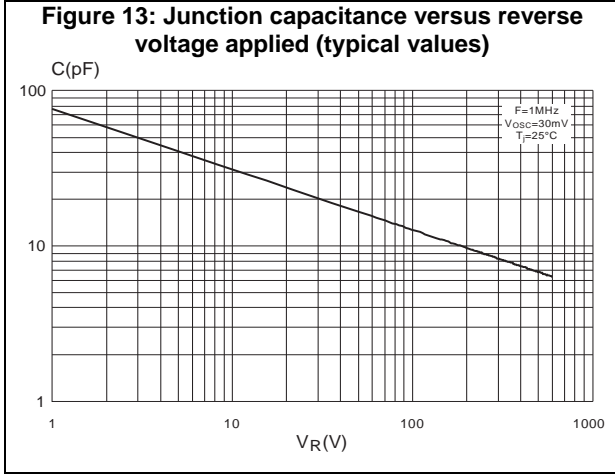
Table 5: Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------|--------------------------|----------------------|--|------|------|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $dI_F/dt = -50\text{ A}/\mu\text{s}$ | - | 65 | 95 | ns |
| t_{fr} | Forward recovery time | $T_j = 25\text{ °C}$ | $I_F = 5\text{ A}$ $V_{FR} = 1.1 \times V_{Fmax}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ | - | | 150 | ns |
| V_{FP} | Forward recovery voltage | | $I_F = 5\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ | - | | 7 | V |

1.1 Characteristics (curves)







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

2.1 TO-220AC package information

Figure 16: TO-220AC package outline

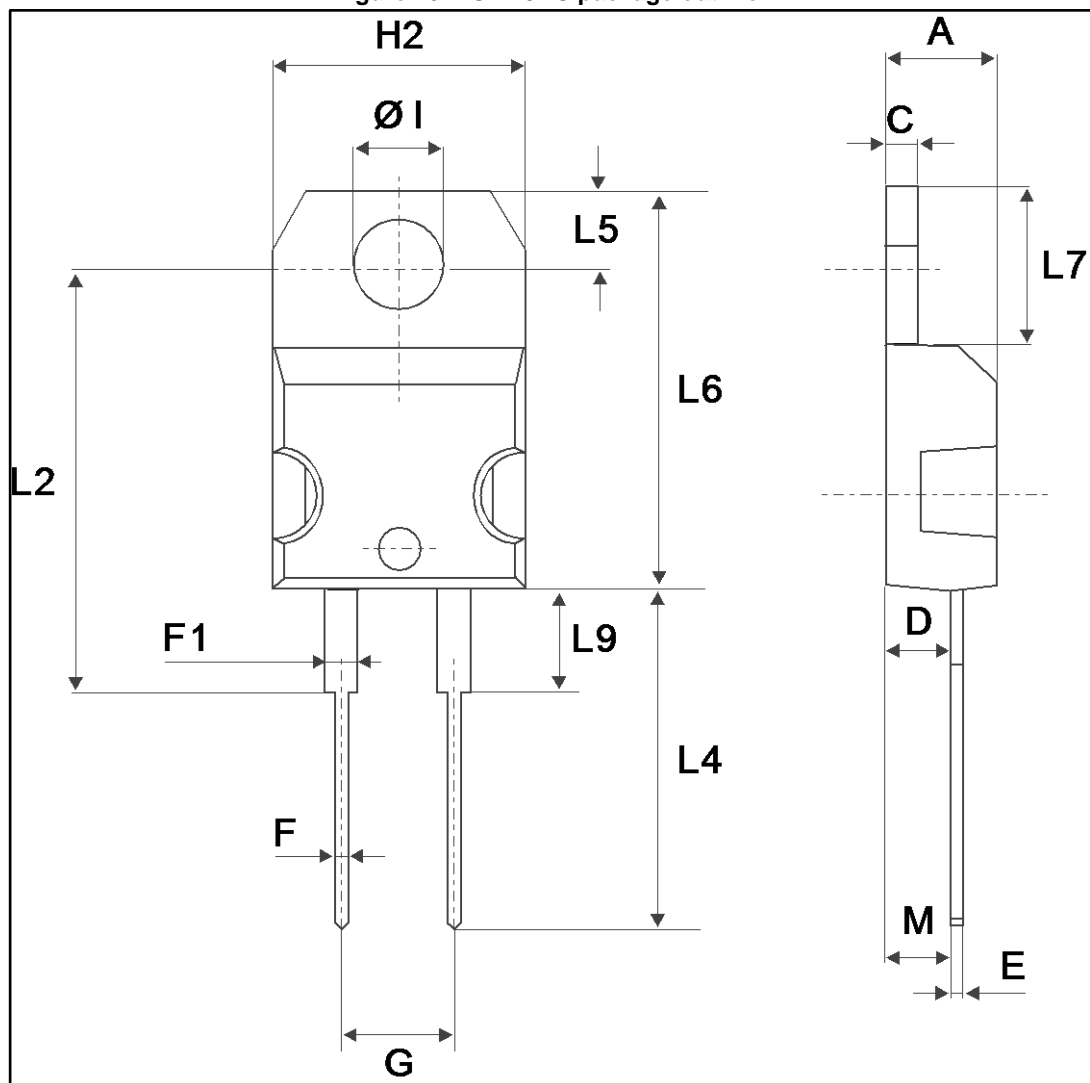


Table 6: TO-220AC package mechanical data

| 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 |

2.2 TO-220FPAC package information

Figure 17: TO-220FPAC package outline

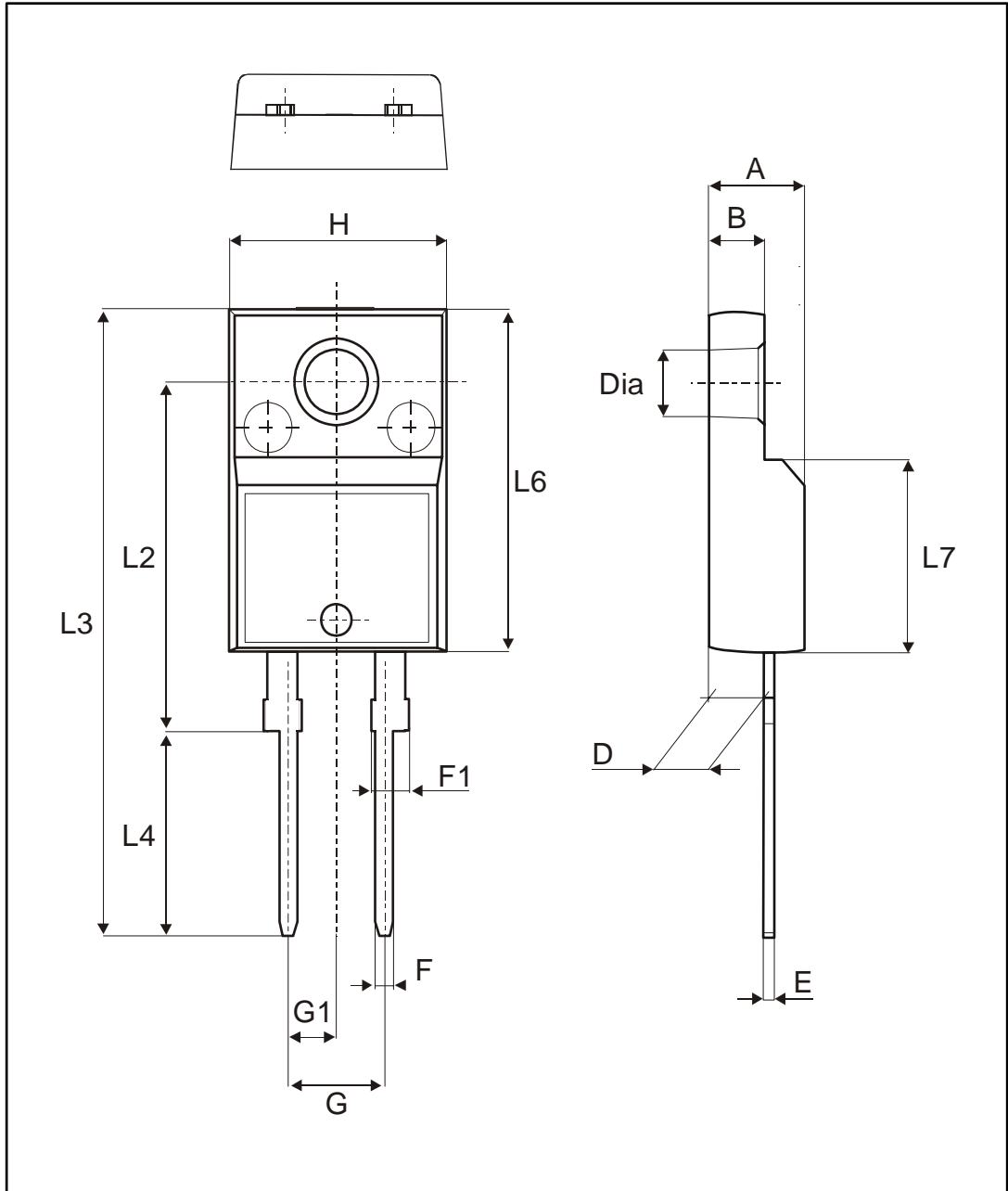


Table 7: TO-220FPAC package mechanical data

| 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 |

2.3 DO-201AD package information

Figure 18: DO-201AD package outline

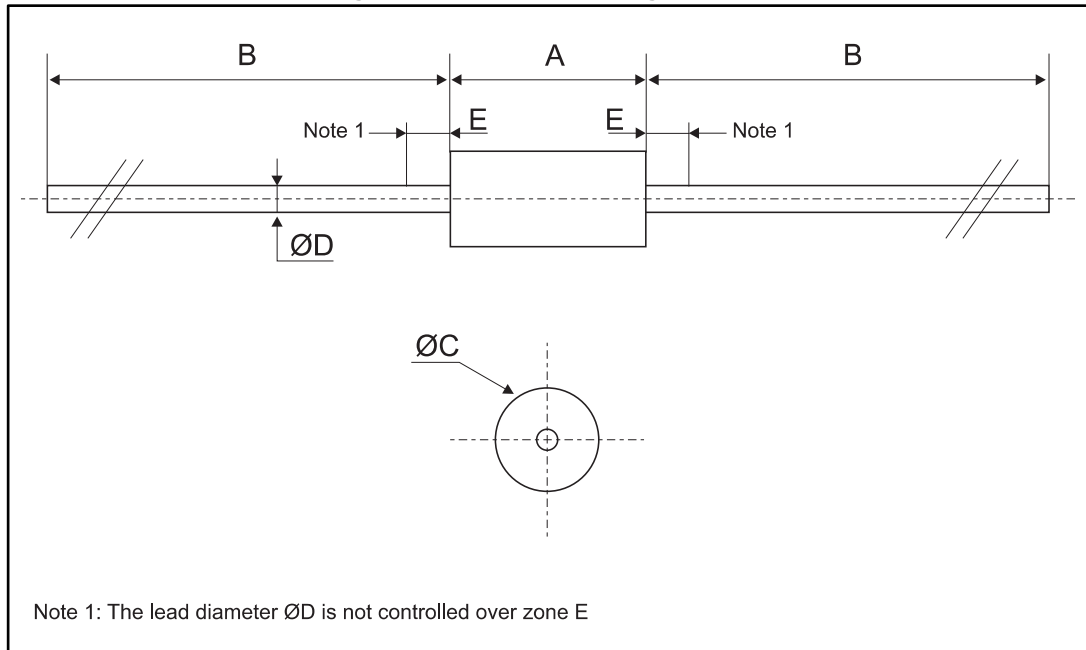
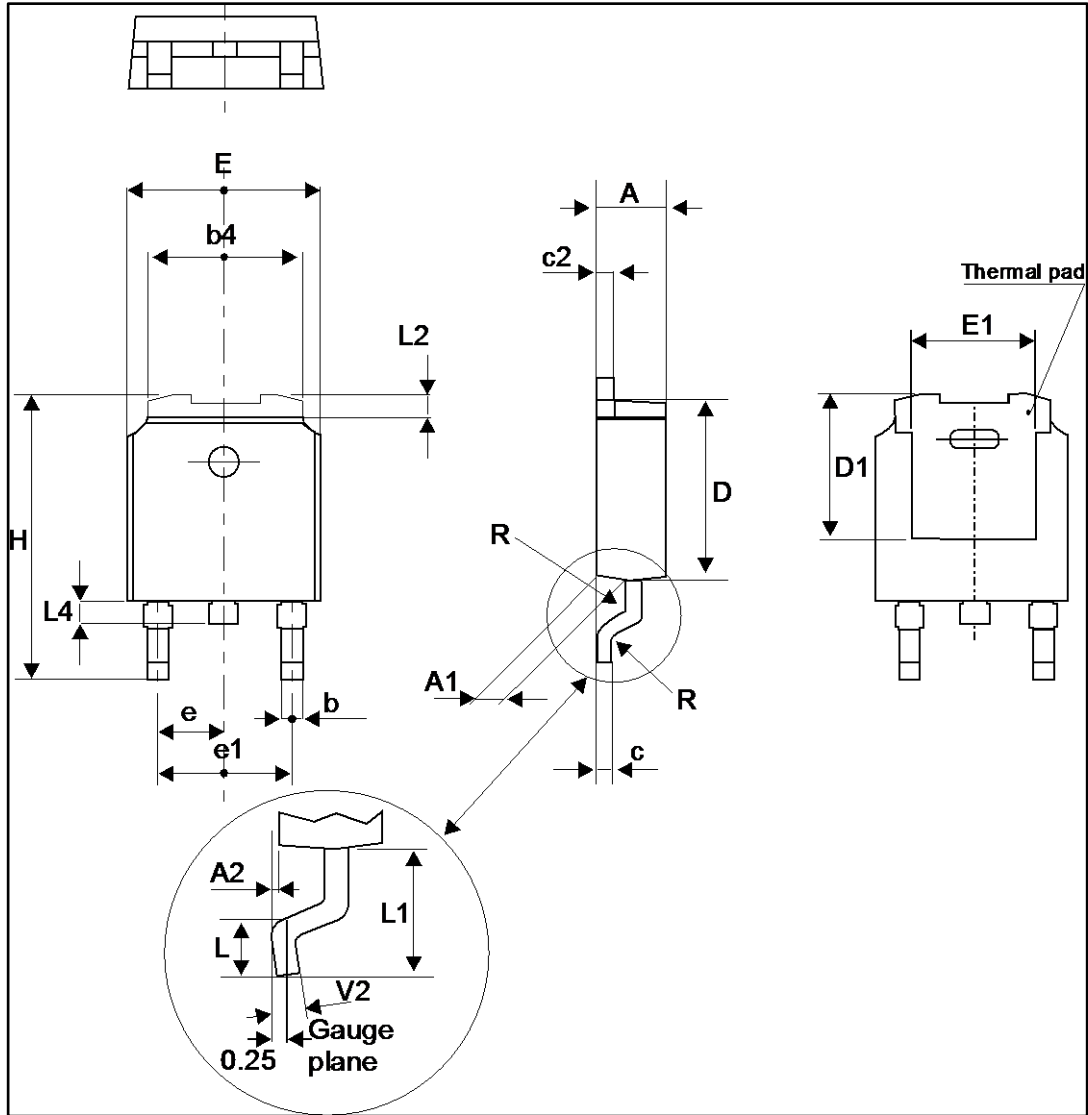


Table 8: DO-201AD package mechanical data

| Ref. | Dimensions | | | |
|-----------------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | | 9.50 | | 0.374 |
| B | 25.40 | | 1.000 | |
| $\varnothing C$ | | 5.30 | | 0.209 |
| $\varnothing D$ | | 1.30 | | 0.051 |
| E | | 1.25 | | 0.049 |

2.4 DPAK package information

Figure 19: DPAK package outline

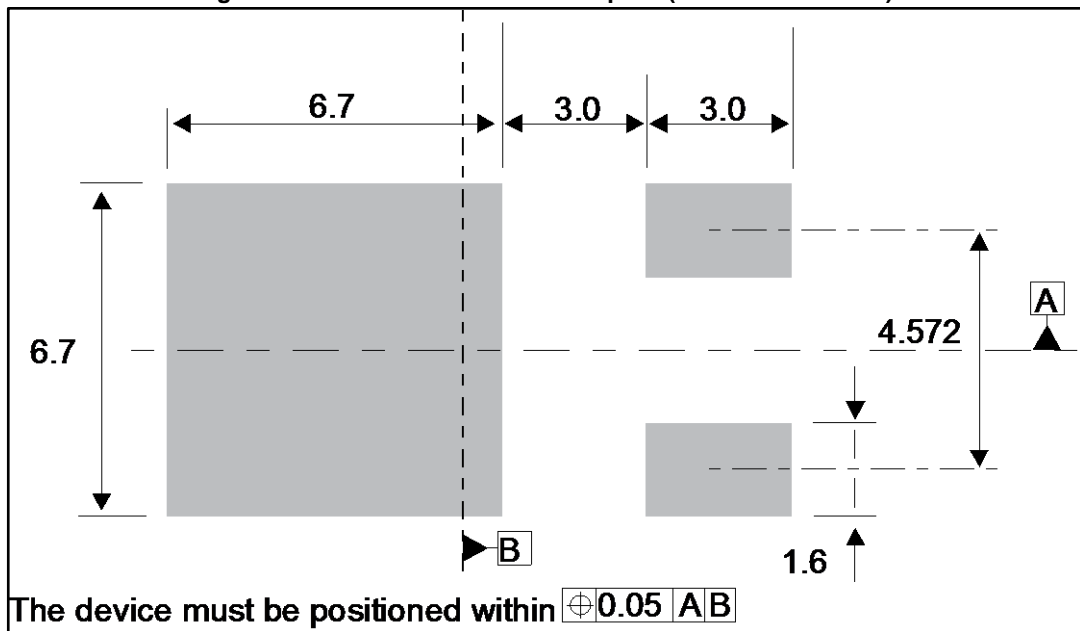


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 9: 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 20: DPAK recommended footprint (dimensions in mm)



3 Ordering information

Table 10: Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|--------------|------------|------------|--------|----------|---------------|
| STTH5L06 | STTH5L06 | DO-201AD | 1.12 g | 600 | Ammopack |
| STTH5L06RL | STTH5L06 | | | 1900 | Tape and reel |
| STTH5L06D | STTH5L06D | TO-220AC | 1.9 g | 50 | Tube |
| STTH5L06B-TR | STTH5 L06B | DPAK | 0.32 g | 2500 | Tape and reel |
| STTH5L06FP | STTH5L06FP | TO-220FPAC | 1.9 g | 50 | Tube |

4 Revision history

Table 11: Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 16-Nov-2001 | 1 | First issue. |
| 31-Mar-2007 | 2 | Merged with TO-220AC, TO-220FPAC and DPAK version. |
| 26-Nov-2014 | 3 | Updated DPAK and reformatted to current standard. |
| 05-Dec-2014 | 4 | Updated Features. |
| 17-May-2017 | 5 | Updated DPAK package information and reformatted to current standard. |

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