

## TURBO 2 ULTRAFast HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

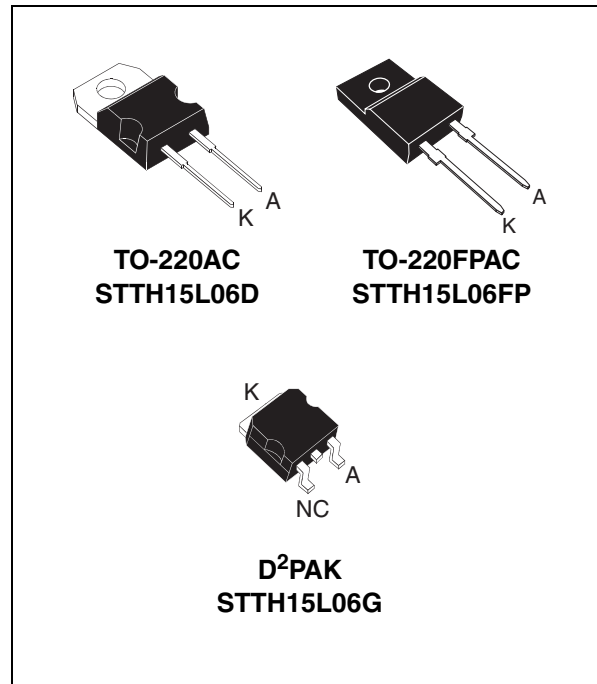
|                |            |
|----------------|------------|
| $I_{F(AV)}$    | Up to 20 A |
| $V_{RRM}$      | 600 V      |
| $T_j$          | 175°C      |
| $V_F$ (typ)    | 0.95 V     |
| $t_{rr}$ (max) | 55 ns      |

**FEATURES AND BENEFITS**

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching & conduction losses

**DESCRIPTION**

The STTH15L06, which is using ST Turbo 2 600V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.


**Table 2: Order Codes**

| Part Number   | Marking     |
|---------------|-------------|
| STTH15L06D    | STTH15L06D  |
| STTH15L06G    | STTH15L06G  |
| STTH15L06G-TR | STTH15L06G  |
| STTH15L06FP   | STTH15L06FP |

**Table 3: Absolute Ratings** (limiting values)

| Symbol       | Parameter                              |            |                                              | Value        | Unit |
|--------------|----------------------------------------|------------|----------------------------------------------|--------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |            |                                              | 600          | V    |
| $I_{F(RMS)}$ | RMS forward voltage                    |            |                                              | 30           | A    |
| $I_{F(AV)}$  | Average forward current                | TO-220AC / | $T_c = 140^\circ\text{C} \quad \delta = 0.5$ | 15           | A    |
|              |                                        | D²PAK      | $T_c = 120^\circ\text{C} \quad \delta = 0.5$ | 20           |      |
|              |                                        | TO-220FPAC | $T_c = 90^\circ\text{C} \quad \delta = 0.5$  | 15           |      |
| $I_{FSM}$    | Surge non repetitive forward current   |            | $t_p = 10\text{ms sinusoidal}$               | 130          | A    |
| $T_{stg}$    | Storage temperature range              |            |                                              | -65 to + 175 | °C   |
| $T_j$        | Maximum operating junction temperature |            |                                              | 175          | °C   |

Table 4: Thermal Resistance

| Symbol        | Parameter        |                               | Value (max). | Unit |
|---------------|------------------|-------------------------------|--------------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AC / D <sup>2</sup> PAK | 1.7          | °C/W |
|               |                  | TO-220FPAC                    | 4            |      |

Table 5: Static Electrical Characteristics (per diode)

| Symbol     | Parameter               | Test conditions           |                    | Min. | Typ  | Max. | Unit          |
|------------|-------------------------|---------------------------|--------------------|------|------|------|---------------|
| $I_R^*$    | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$    |      |      | 15   | $\mu\text{A}$ |
|            |                         | $T_j = 150^\circ\text{C}$ |                    |      | 40   | 400  |               |
| $V_F^{**}$ | Forward voltage drop    | $T_j = 25^\circ\text{C}$  | $I_F = 15\text{A}$ |      |      | 1.55 | V             |
|            |                         | $T_j = 150^\circ\text{C}$ |                    |      | 0.95 | 1.2  |               |

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

\*\*  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:  $P = 0.94 \times I_{F(AV)} + 0.017 I_F^2(\text{RMS})$

Table 6: Dynamic Characteristics

| Symbol   | Parameter                | Test conditions           |                                                                                           | Min. | Typ | Max. | Unit |
|----------|--------------------------|---------------------------|-------------------------------------------------------------------------------------------|------|-----|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25^\circ\text{C}$  | $I_F = 0.5\text{A}$ $I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$                             |      |     | 55   | ns   |
|          |                          |                           | $I_F = 1\text{A}$ $di_F/dt = 50\text{ A}/\mu\text{s}$ $V_R = 30\text{V}$                  |      | 60  | 85   |      |
| $I_{RM}$ | Reverse recovery current | $T_j = 125^\circ\text{C}$ | $I_F = 15\text{A}$ $V_R = 400\text{V}$<br>$di_F/dt = 100\text{ A}/\mu\text{s}$            |      | 8.5 | 12   | A    |
| $t_{fr}$ | Forward recovery time    | $T_j = 25^\circ\text{C}$  | $I_F = 15\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$<br>$V_{FR} = 1.1 \times V_{Fmax}$ |      |     | 300  | ns   |
| $V_{FP}$ | Forward recovery voltage | $T_j = 25^\circ\text{C}$  | $I_F = 15\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$<br>$V_{FR} = 1.1 \times V_{Fmax}$ |      | 3   |      | V    |

Figure 1: Conduction losses versus average forward current

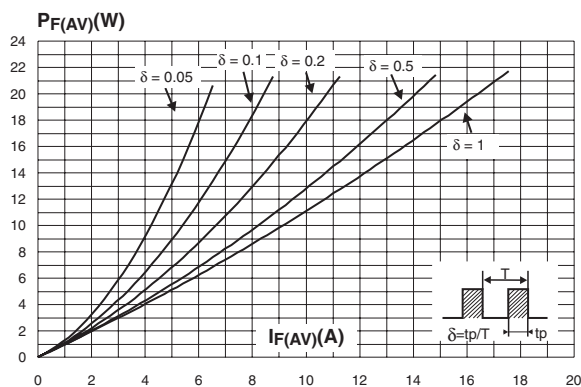
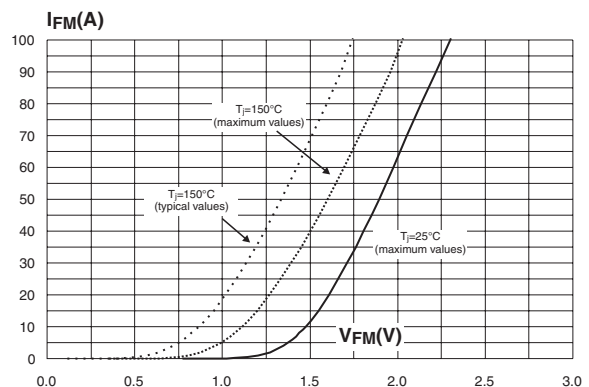
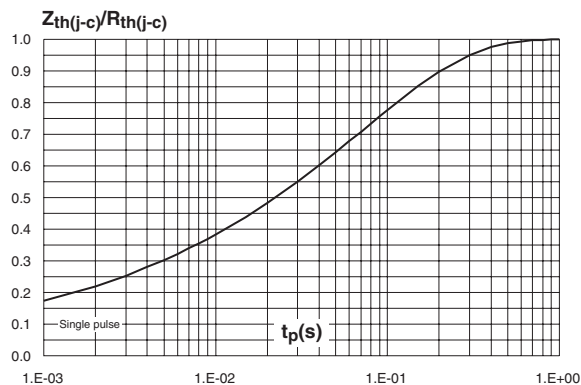


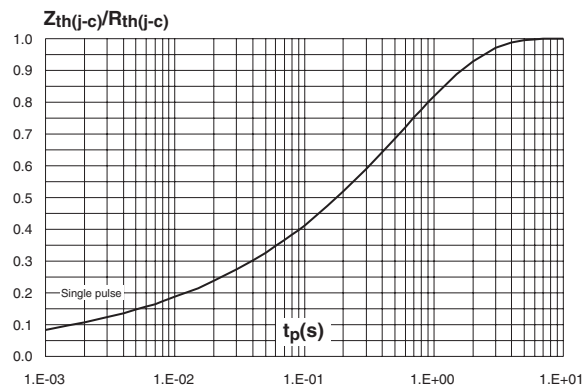
Figure 2: Forward voltage drop versus forward current



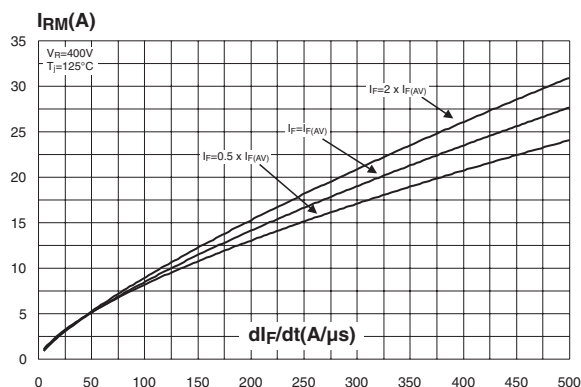
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC & D<sup>2</sup>PAK)**



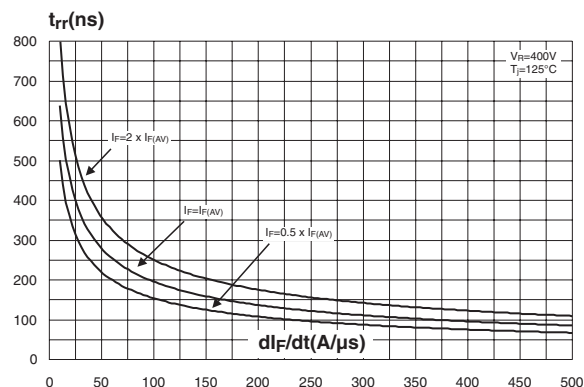
**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)**



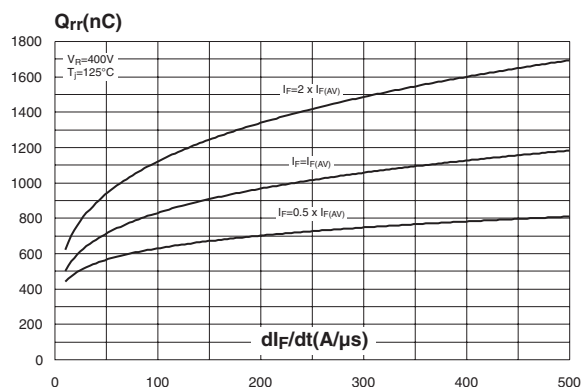
**Figure 5: Peak reverse recovery current versus  $di_F/dt$  (typical values)**



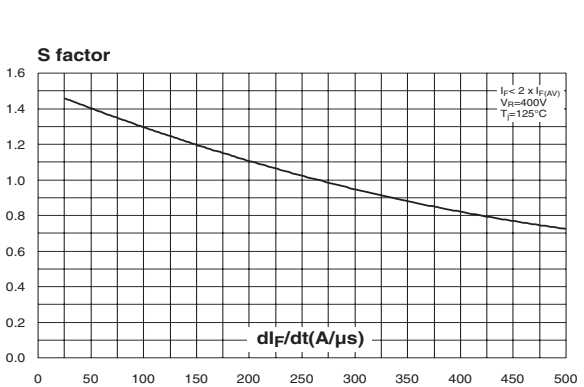
**Figure 6: Reverse recovery time versus  $di_F/dt$  (typical values)**



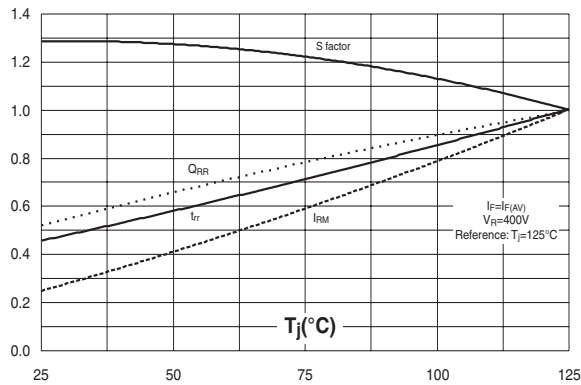
**Figure 7: Reverse recovery charges versus  $di_F/dt$  (typical values)**



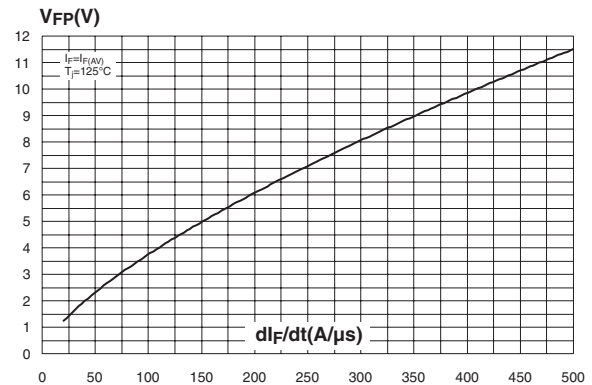
**Figure 8: Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



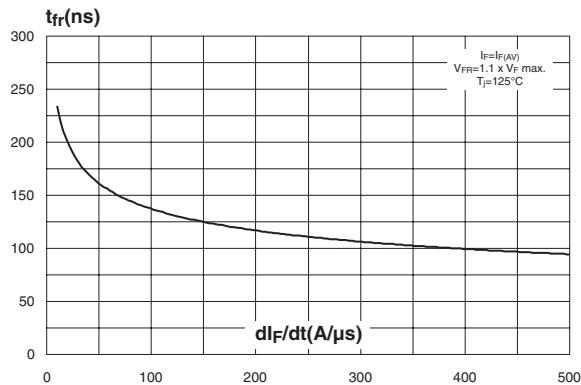
**Figure 9: Relative variations of dynamic parameters versus junction temperature**



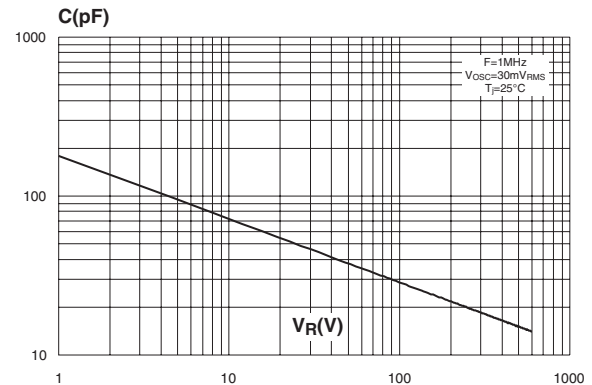
**Figure 10: Transient peak forward voltage versus  $di_F/dt$  (typical values)**



**Figure 11: Forward recovery time versus  $di_F/dt$  (typical values)**



**Figure 12: Junction capacitance versus reverse voltage applied (typical values)**



**Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4,  $e_{CU}=35\mu m$ ) (D<sup>2</sup>PAK)**

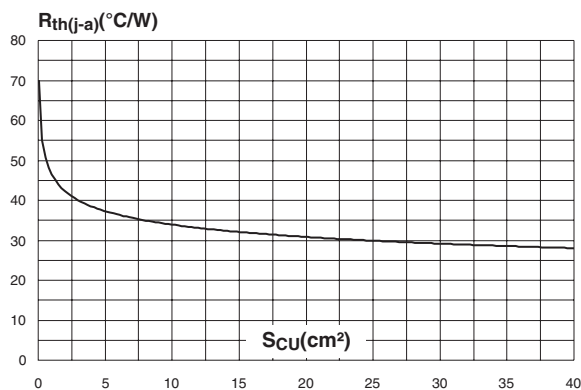


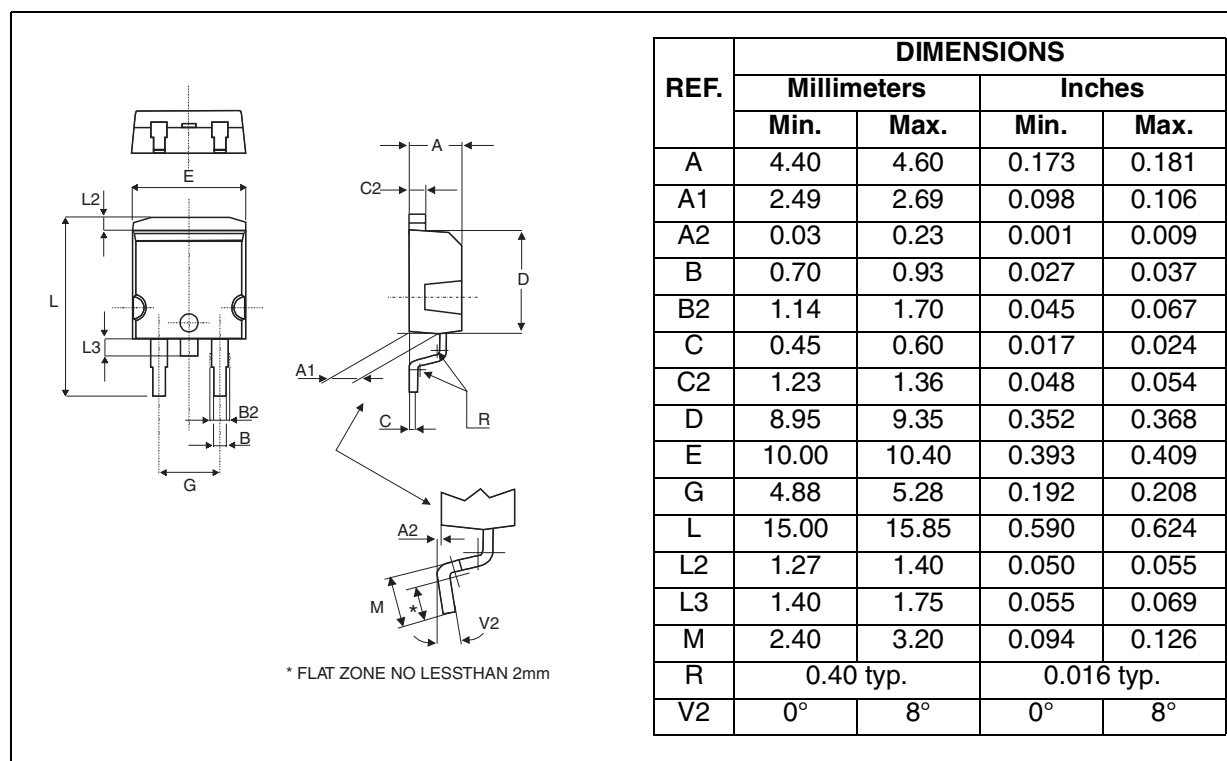
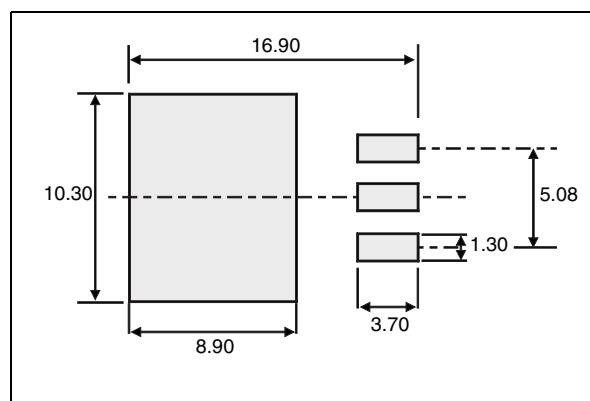
Figure 14: D<sup>2</sup>PAK Package Mechanical DataFigure 15: D<sup>2</sup>PAK Foot Print Dimensions  
(in millimeters)

Figure 16: TO-220FPAC Package Mechanical Data

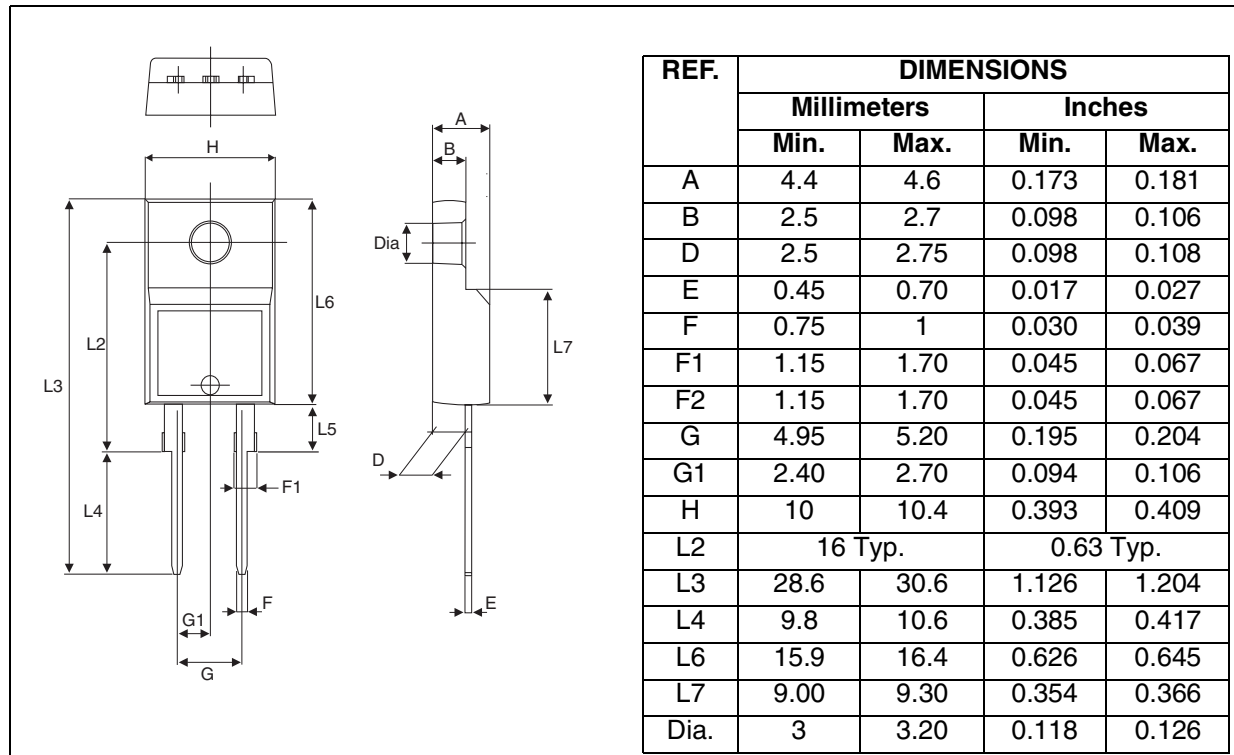


Figure 17: TO-220AC Package Mechanical Data

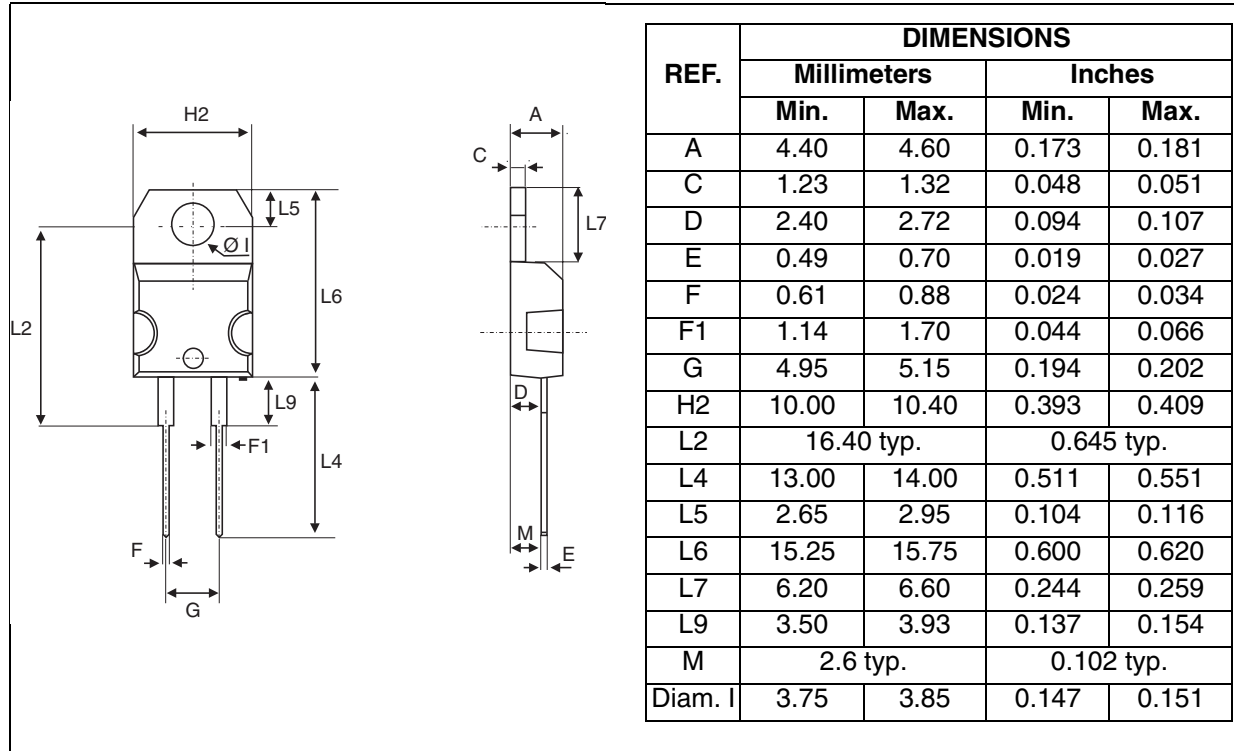


Table 7: Ordering Information

| Ordering type | Marking     | Package            | Weight | Base qty | Delivery mode |
|---------------|-------------|--------------------|--------|----------|---------------|
| STTH15L06D    | STTH15L06D  | TO-220AC           | 1.90 g | 50       | Tube          |
| STTH15L06G    | STTH15L06G  | D <sup>2</sup> PAK | 1.48 g | 50       | Tube          |
| STTH15L06G-TR | STTH15L06G  | D <sup>2</sup> PAK | 1.48 g | 1000     | Tape & reel   |
| STTH15L06FP   | STTH15L06FP | TO-220FPAC         | 1.70 g | 50       | Tube          |

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N. (TO-220FPAC) / 0.55 m.N. (TO-220AC)
- Maximum torque value: 1.0 m.N. (TO-220FPAC) / 0.70 m.N. (TO-220AC)

Table 8: Revision History

| Date        | Revision | Description of Changes |
|-------------|----------|------------------------|
| 07-Sep-2004 | 1        | First issue            |

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