

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

### MAIN PRODUCT CHARACTERISTICS

|                |             |
|----------------|-------------|
| $I_{F(AV)}$    | 5 A         |
| $V_{RRM}$      | 600 V       |
| $I_R (max)$    | 125 $\mu$ A |
| $T_j (max)$    | 175 °C      |
| $V_F (max)$    | 1.05 V      |
| $t_{rr} (max)$ | 95 ns       |

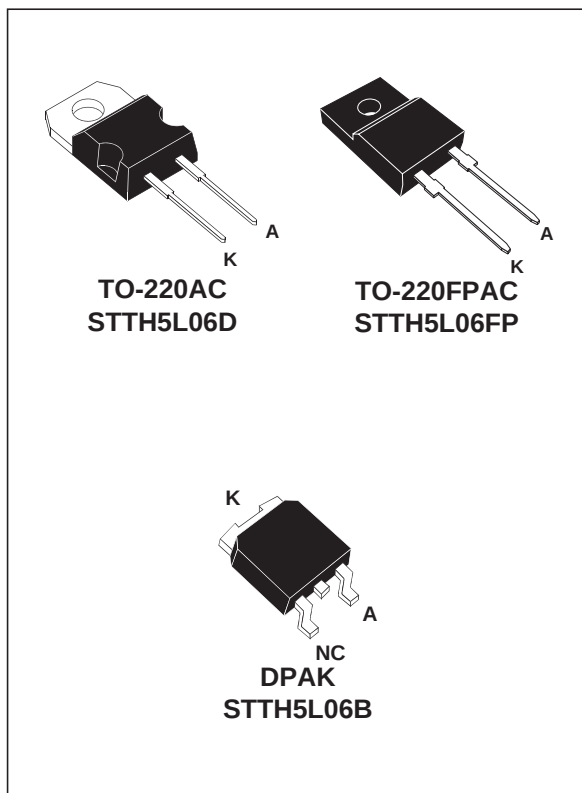
### FEATURES AND BENEFITS

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

### DESCRIPTION

The STTH5L06D/B/FP, which is using ST Turbo 2 600V technology, is specially suited as boost diode in discontinuous or critical mode power factor corrections.

The device, available in TO-220AC, TO-220FPAC and DPAK, is also intended for use as a free wheeling diode in power supplies and other power switching applications.



### ABSOLUTE RATINGS (limiting values)

| Symbol       | Parameter                              |                                                      |                                                | Value      | Unit |
|--------------|----------------------------------------|------------------------------------------------------|------------------------------------------------|------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                                                      |                                                | 600        | V    |
| $I_{F(RMS)}$ | RMS forward current                    |                                                      | TO-220AC/TO-220FPAC<br>DPAK                    | 20<br>10   | A    |
| $I_{F(AV)}$  | Average forward current                | TO-220AC / DPAK                                      | $T_c = 150^{\circ}\text{C} \quad \delta = 0.5$ | 5          | A    |
|              |                                        | TO-220FPAC                                           | $T_c = 135^{\circ}\text{C} \quad \delta = 0.5$ |            |      |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10$ ms Sinusoidal<br>$t_p = 10$ ms Sinusoidal | TO-220AC/TO-220FPAC<br>DPAK                    | 90<br>60   | A    |
| $T_{stg}$    | Storage temperature range              |                                                      |                                                | - 65 + 175 | °C   |
| $T_j$        | Maximum operating junction temperature |                                                      |                                                | + 175      | °C   |

## THERMAL PARAMETERS

| Symbol        | Parameter        |                 | Maximum | Unit                 |
|---------------|------------------|-----------------|---------|----------------------|
| $R_{th(j-c)}$ | Junction to case | TO-220AC / DPAK | 3.5     | $^{\circ}\text{C/W}$ |
|               |                  | TO-220FPAC      | 6.0     |                      |

## STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter               | Tests conditions    |                             | Min. | Typ. | Max. | Unit          |
|--------|-------------------------|---------------------|-----------------------------|------|------|------|---------------|
| $I_R$  | Reverse leakage current | $V_R = 600\text{V}$ | $T_j = 25^{\circ}\text{C}$  |      |      | 5    | $\mu\text{A}$ |
|        |                         |                     | $T_j = 150^{\circ}\text{C}$ |      | 10   | 125  |               |
| $V_F$  | Forward voltage drop    | $I_F = 5\text{ A}$  | $T_j = 25^{\circ}\text{C}$  |      |      | 1.3  | $\text{V}$    |
|        |                         |                     | $T_j = 150^{\circ}\text{C}$ |      | 0.85 | 1.05 |               |

To evaluate the maximum conduction losses use the following equation :

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

## DYNAMIC ELECTRICAL CHARACTERISTICS

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

Fig. 1: Conduction losses versus average current.

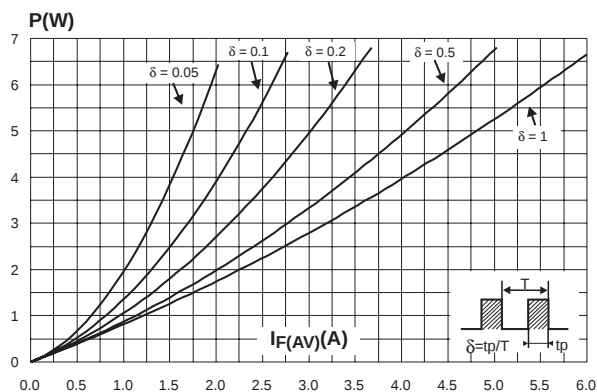
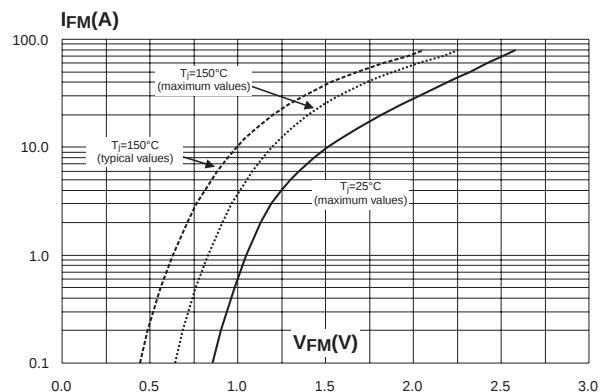
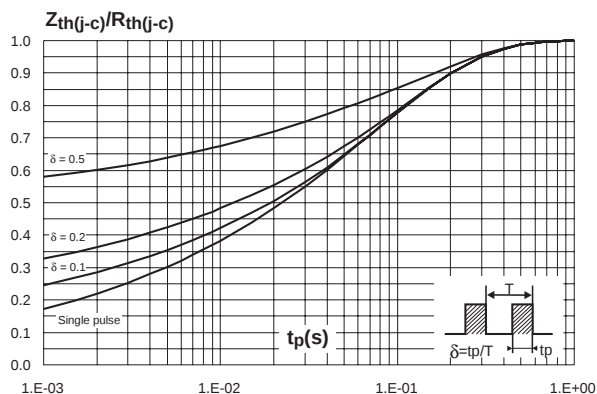


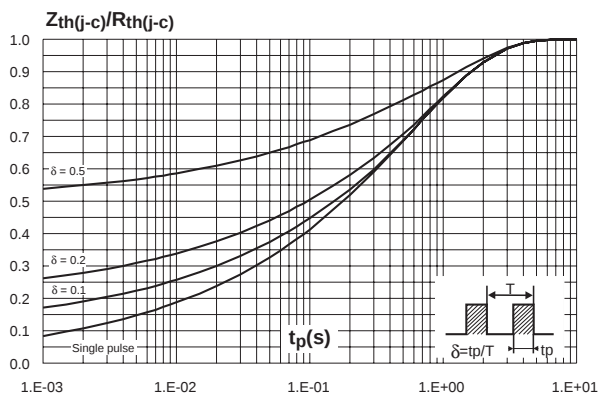
Fig. 2: Forward voltage drop versus forward current.



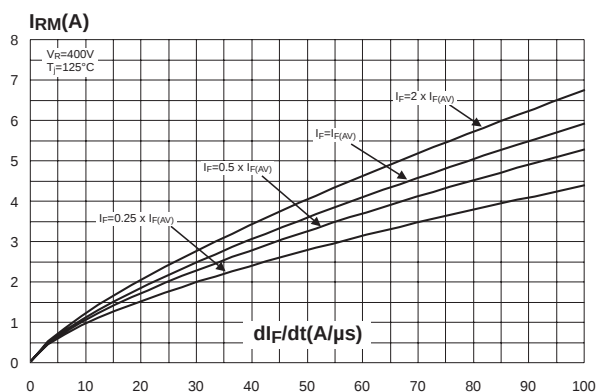
**Fig. 3-1:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, DPAK).



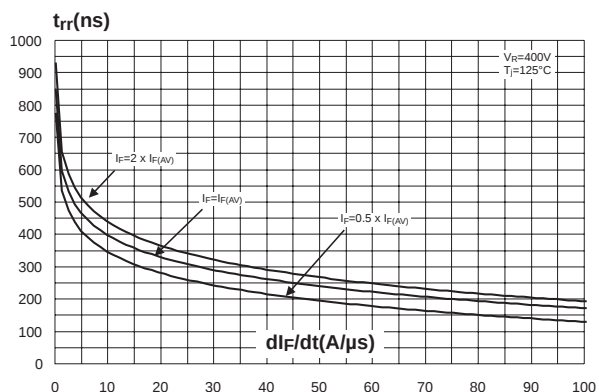
**Fig. 3-2:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC).



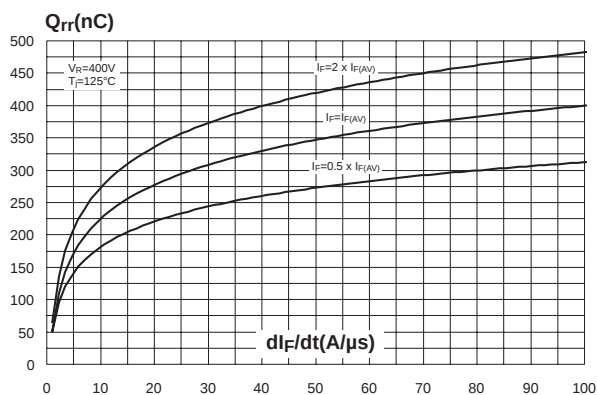
**Fig. 4:** Peak reverse recovery current versus  $di_F/dt$  (90% confidence).



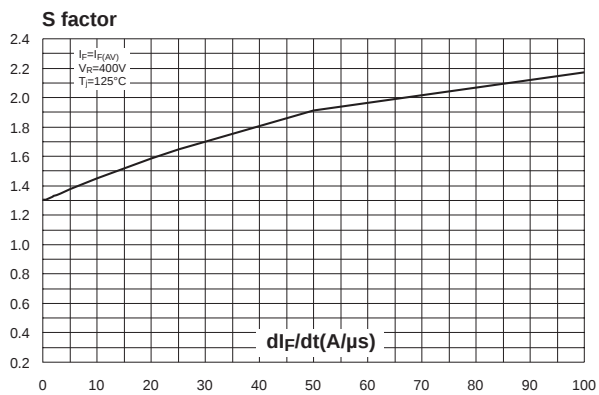
**Fig. 5:** Reverse recovery time versus  $di_F/dt$  (90% confidence).



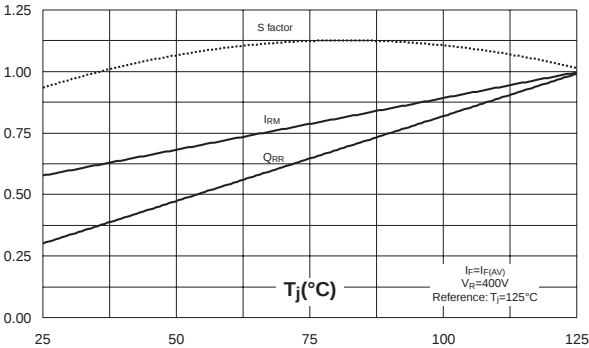
**Fig. 6:** Reverse recovery charges versus  $di_F/dt$  (90% confidence).



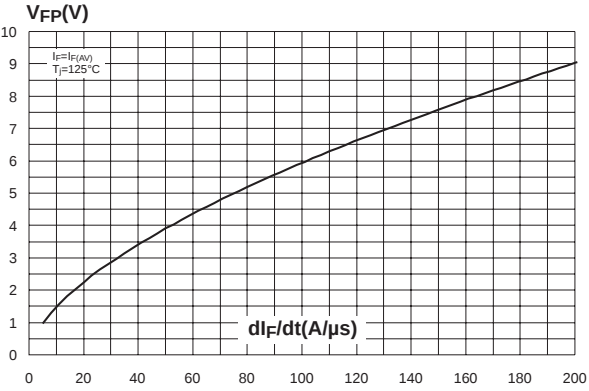
**Fig. 7:** Softness factor versus  $di_F/dt$  (typical values).



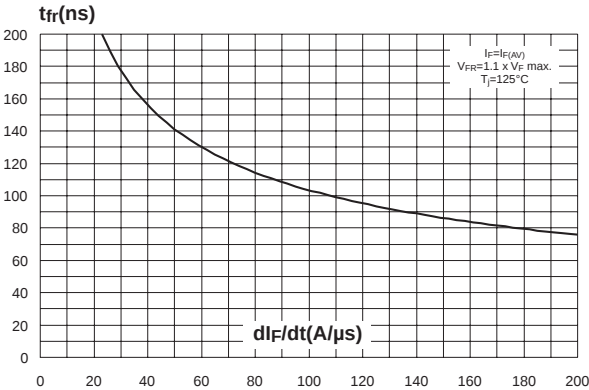
**Fig. 8:** Relative variations of dynamic parameters versus junction temperature.



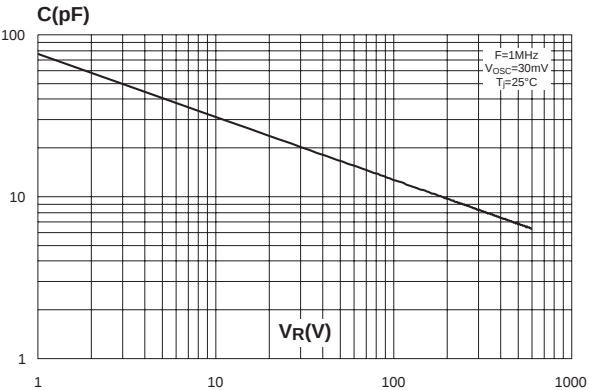
**Fig. 9:** Transient peak forward voltage versus  $di_F/dt$  (90% confidence).



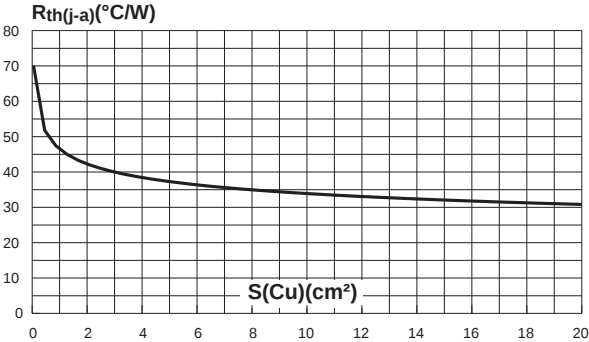
**Fig. 10:** Forward recovery time versus  $di_F/dt$  (90% confidence).



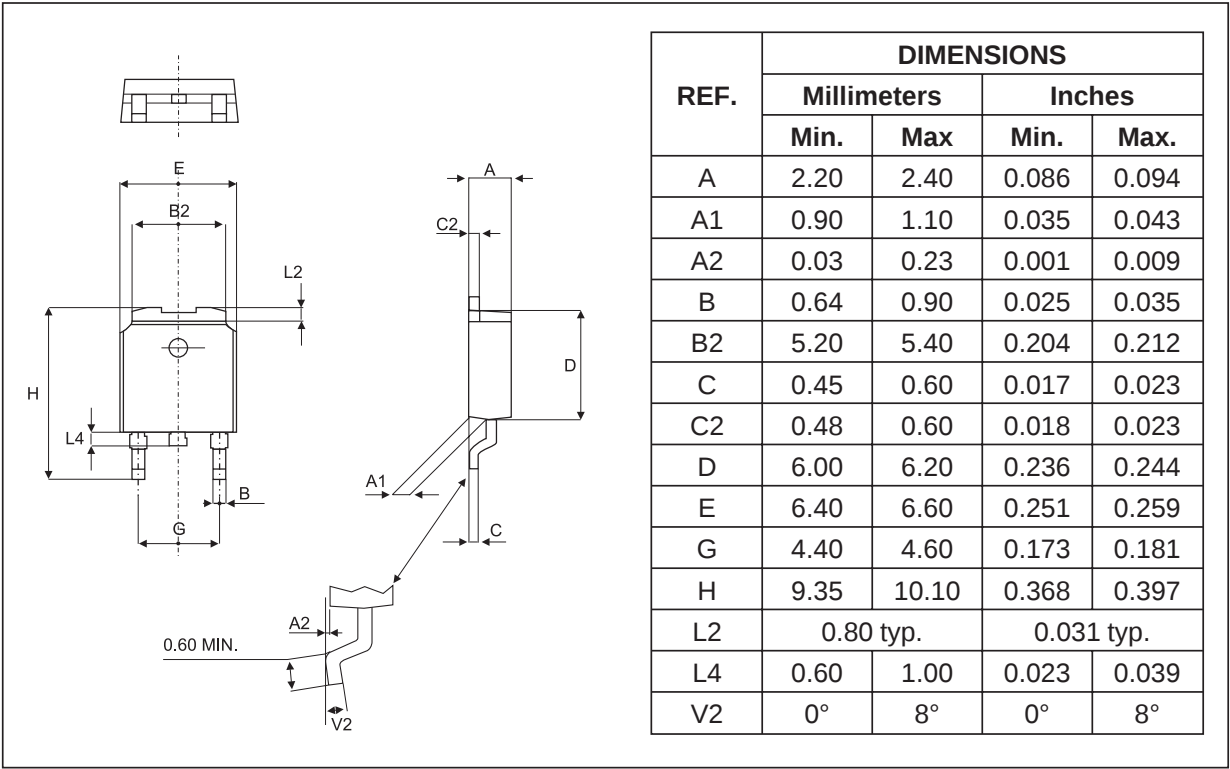
**Fig. 11:** Junction capacitance versus reverse voltage applied (typical values).



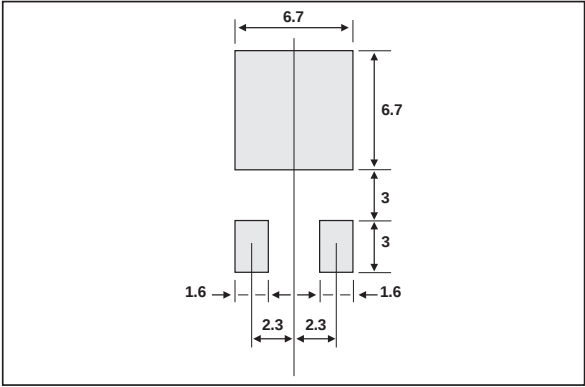
**Fig. 12:** Thermal resistance junction to ambient versus copper surface under tab (epoxy printed circuit board FR4, copper thickness: 35μm) (DPAK).



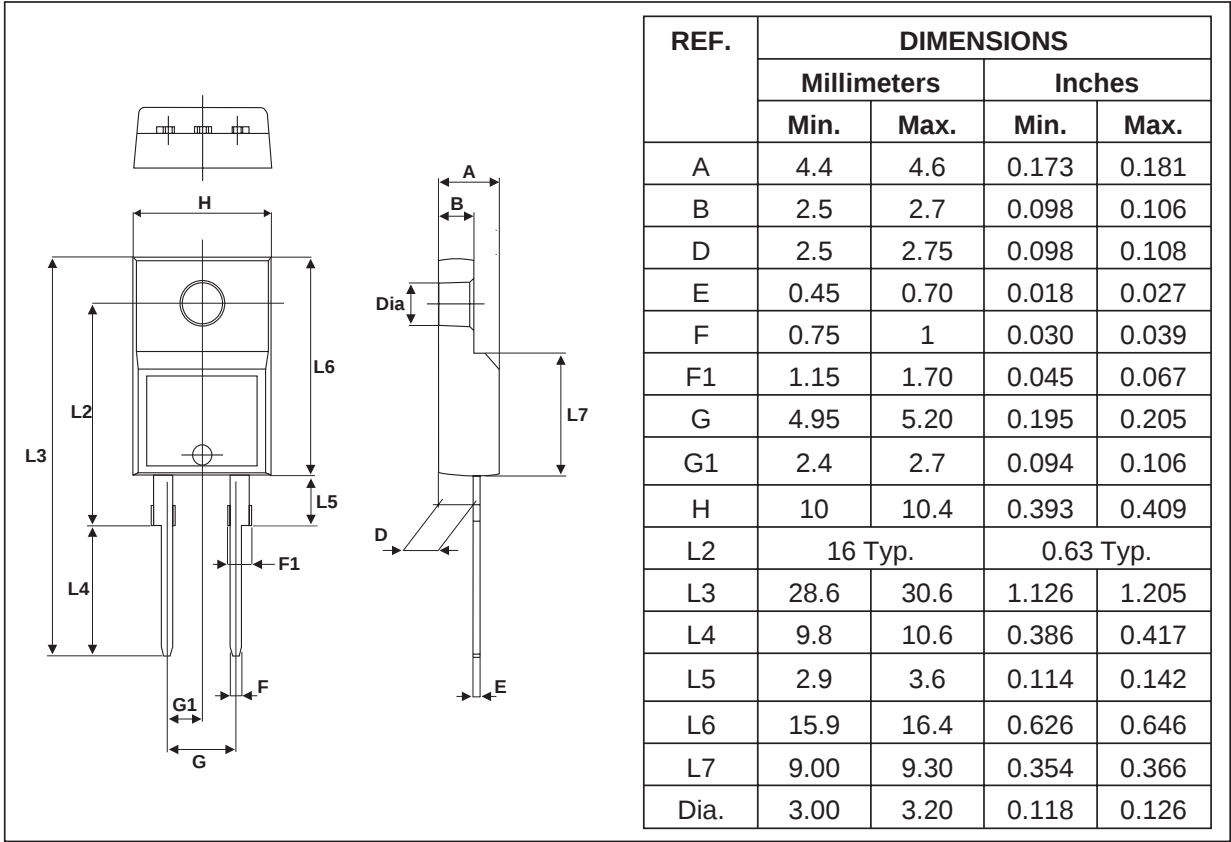
PACKAGE MECHANICAL DATA  
DPAK

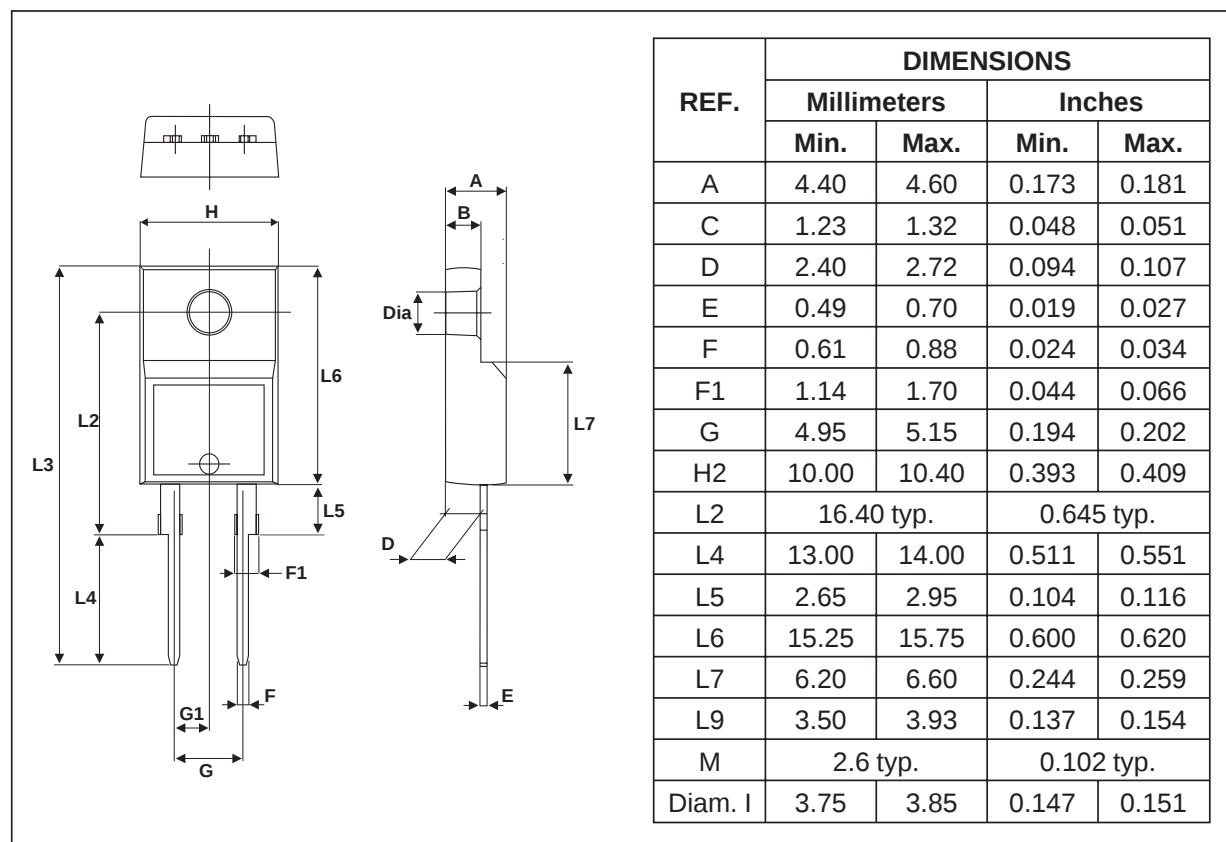


FOOTPRINT



PACKAGE MECHANICAL DATA  
TO-220FPAC



**PACKAGE MECHANICAL DATA**  
**TO-220AC**


| Ordering code | Marking    | Package    | Weight | Base qty | Delivery mode |
|---------------|------------|------------|--------|----------|---------------|
| STTH5L06D     | STTH5L06D  | TO-220AC   | 1.9 g  | 50       | Tube          |
| STTH5L06B     | STTH5L06B  | DPAK       | 0.3 g  | 75       | Tube          |
| STTH5L06B-TR  | STTH5L06B  | DPAK       | 0.3 g  | 2500     | Tape & reel   |
| STTH5L06FP    | STTH5L06FP | TO-220PFAC | 1.7 g  | 50       | Tube          |

- Epoxy meets UL 94,V0
- Recommended torque value (TO-220AC): 0.55 Nm
- Maximum torque value (TO-220AC / TO-220FPAC): 0.7 Nm

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 2002 STMicroelectronics - Printed in Italy - All rights reserved.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany  
 Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore  
 Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>