

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

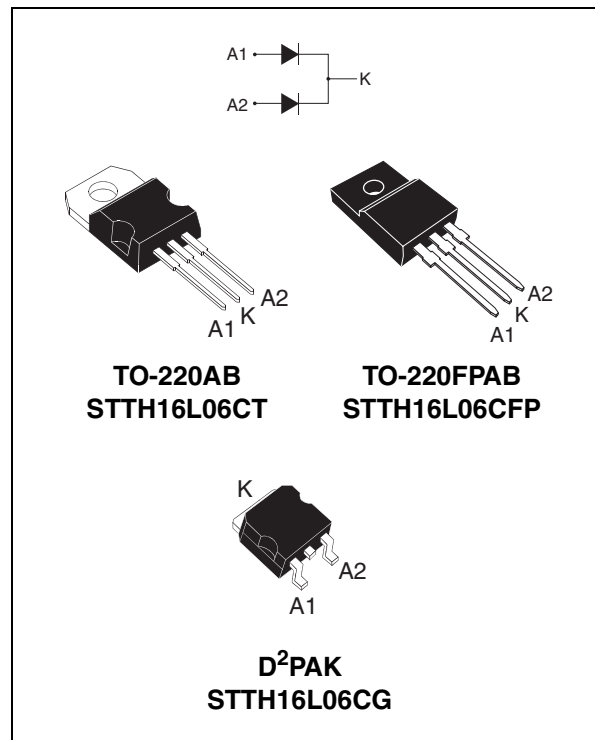
$I_{F(AV)}$	Up to 2 x 10 A
$V_{RRM}$	600 V
$T_j$	175°C
$V_F$ (typ)	1.05 V
$t_{rr}$ (max)	35 ns

### FEATURES AND BENEFITS

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

### DESCRIPTION

The STTH16L06, 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
STTH16L06CT	STTH16L06CT
STTH16L06CFP	STTH16L06CFP

Part Number	Marking
STTH16L06CG	STTH16L06CG
STTH16L06GG-TR	STTH16L06CG

**Table 3: Absolute Ratings** (limiting values, per diode)

Symbol	Parameter			Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage			600	V	
$I_{F(RMS)}$	RMS forward current			30	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / D <sup>2</sup> PAK	$T_c = 140^\circ\text{C}$	Per diode	8	A
			$T_c = 135^\circ\text{C}$	Per device	16	
			$T_c = 130^\circ\text{C}$	Per diode	10	
			$T_c = 120^\circ\text{C}$	Per device	20	
		TO-220FPAB	$T_c = 110^\circ\text{C}$	Per diode	8	
			$T_c = 80^\circ\text{C}$	Per device	16	
$I_{FSM}$	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	90	A	
$T_{stg}$	Storage temperature range			-65 to + 175	°C	
$T_j$	Maximum operating junction temperature			175	°C	

## STTH16L06C

**Table 4: Thermal Resistance**

Symbol	Parameter		Value (max).	Unit	
$R_{th(j-c)}$	Junction to case	TO-220AB / D <sup>2</sup> PAK	Per diode	2.5	°C/W
		TO-220FPAB	Per diode	5	
		TO-220AB / D <sup>2</sup> PAK	Total	1.6	
		TO-220FPAB	Total	3.8	
$R_{th(c)}$	Coupling	TO-220AB / D <sup>2</sup> PAK		0.7	°C/W
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

**Table 5: Static Electrical Characteristics**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R^*$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			8	$\mu\text{A}$
		$T_j = 150^\circ\text{C}$			25	240	
$V_F^{**}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 8\text{A}$			1.8	V
		$T_j = 150^\circ\text{C}$			1.05	1.35	
		$T_j = 25^\circ\text{C}$	$I_F = 16\text{A}$			2.08	
		$T_j = 150^\circ\text{C}$			1.28	1.64	

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:  $P = 1.06 \times I_{F(AV)} + 0.036 I_F^2(\text{RMS})$

**Table 6: Dynamic Characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$ $I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$			35	ns
			$I_F = 1\text{A}$ $di_F/dt = 50\text{ A}/\mu\text{s}$ $V_R = 30\text{V}$		40	55	
$I_{RM}$	Reverse recovery current	$T_j = 125^\circ\text{C}$	$I_F = 8\text{A}$ $V_R = 400\text{V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$		4.5	6.5	A
$t_{fr}$	Forward recovery time	$T_j = 25^\circ\text{C}$	$I_F = 8\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25^\circ\text{C}$	$I_F = 8\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$		3.5		V

Figure 1: Conduction losses versus average forward current (per diode)

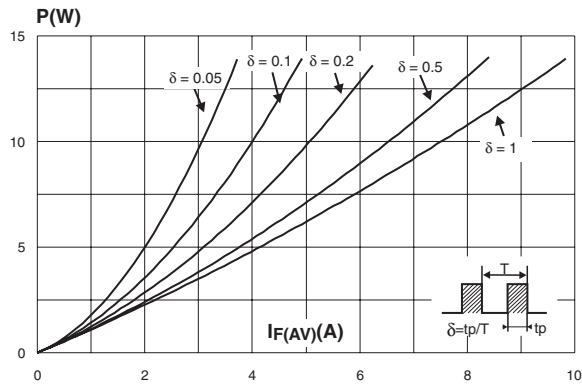


Figure 2: Forward voltage drop versus forward current (per diode)

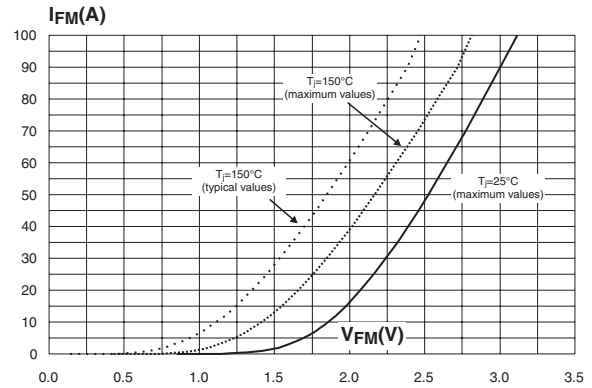


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB & D<sup>2</sup>PAK)

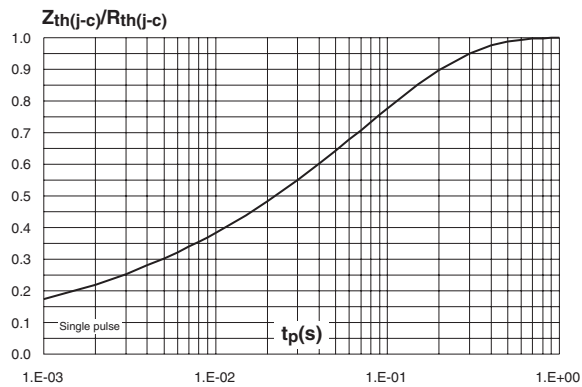


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

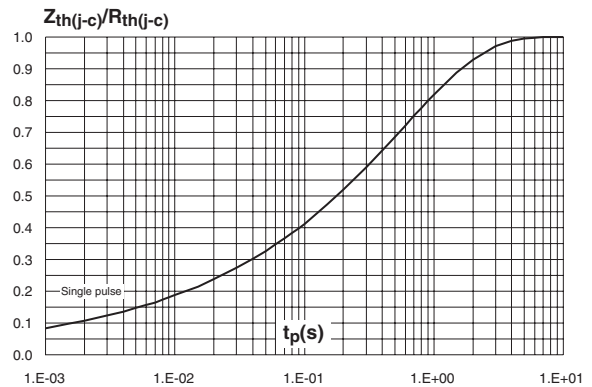


Figure 5: Peak reverse recovery current versus dI<sub>F</sub>/dt (typical values, per diode)

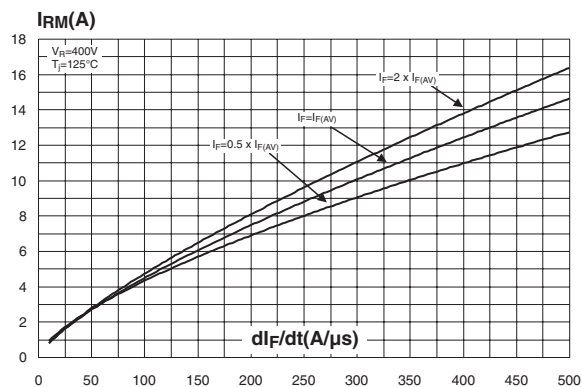


Figure 6: Reverse recovery time versus dI<sub>F</sub>/dt (typical values, per diode)

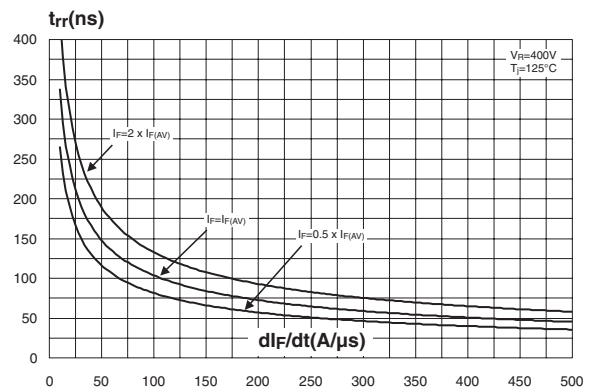


Figure 7: Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)

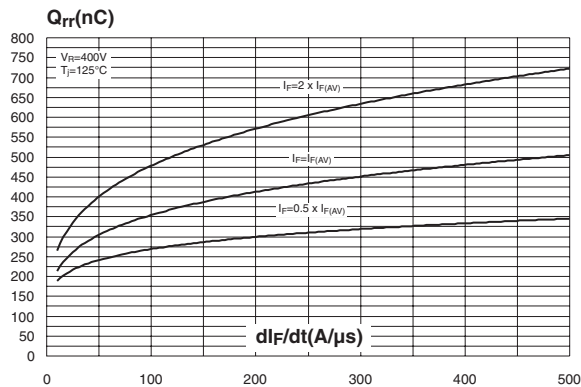


Figure 8: Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)

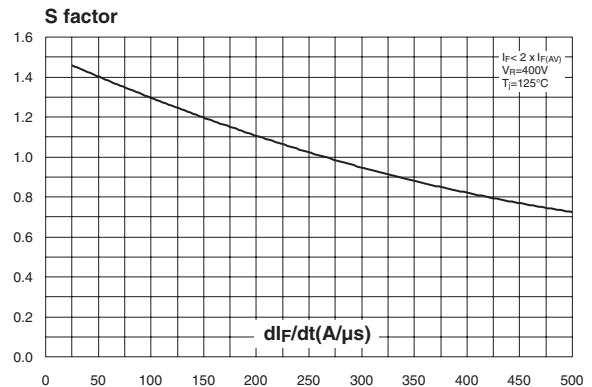


Figure 9: Relative variations of dynamic parameters versus junction temperature

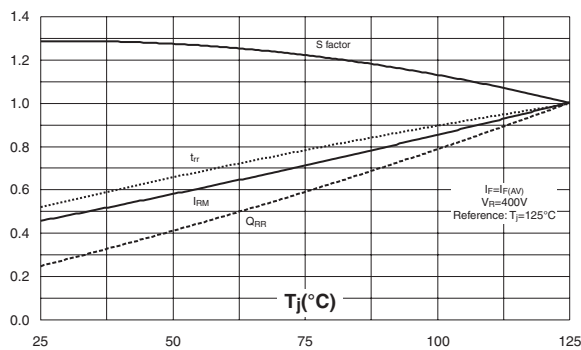


Figure 10: Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)

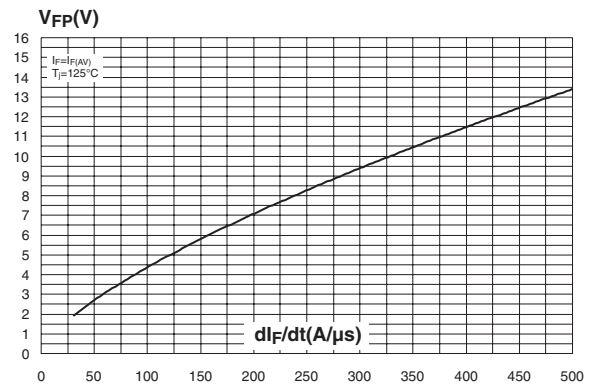


Figure 11: Forward recovery time versus  $di_F/dt$  (typical values, per diode)

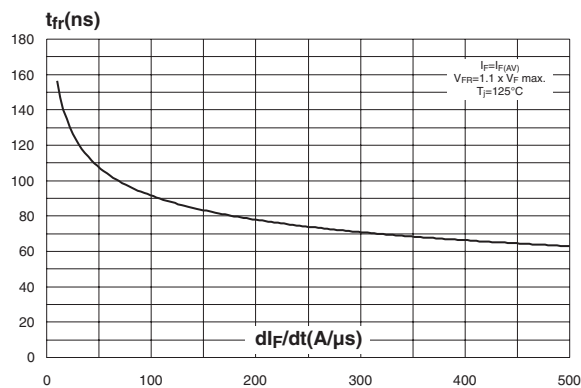


Figure 12: Junction capacitance versus reverse voltage applied (typical values, per diode)

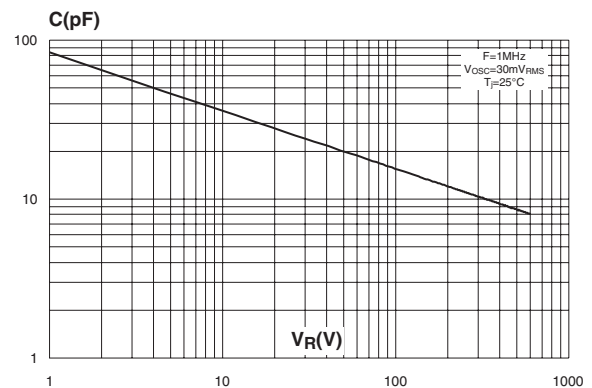


Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4,  $e_{CU}=35\mu\text{m}$ ) (D<sup>2</sup>PAK)

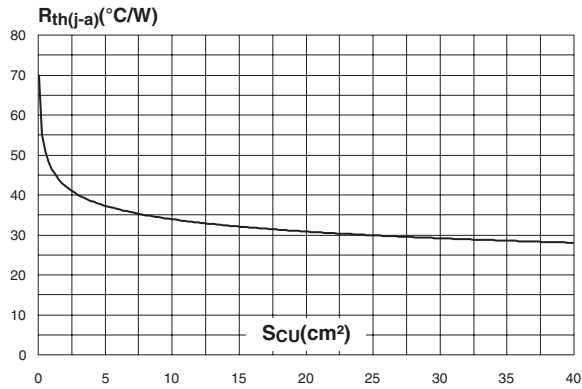


Figure 14: TO-220AB Package Mechanical Data

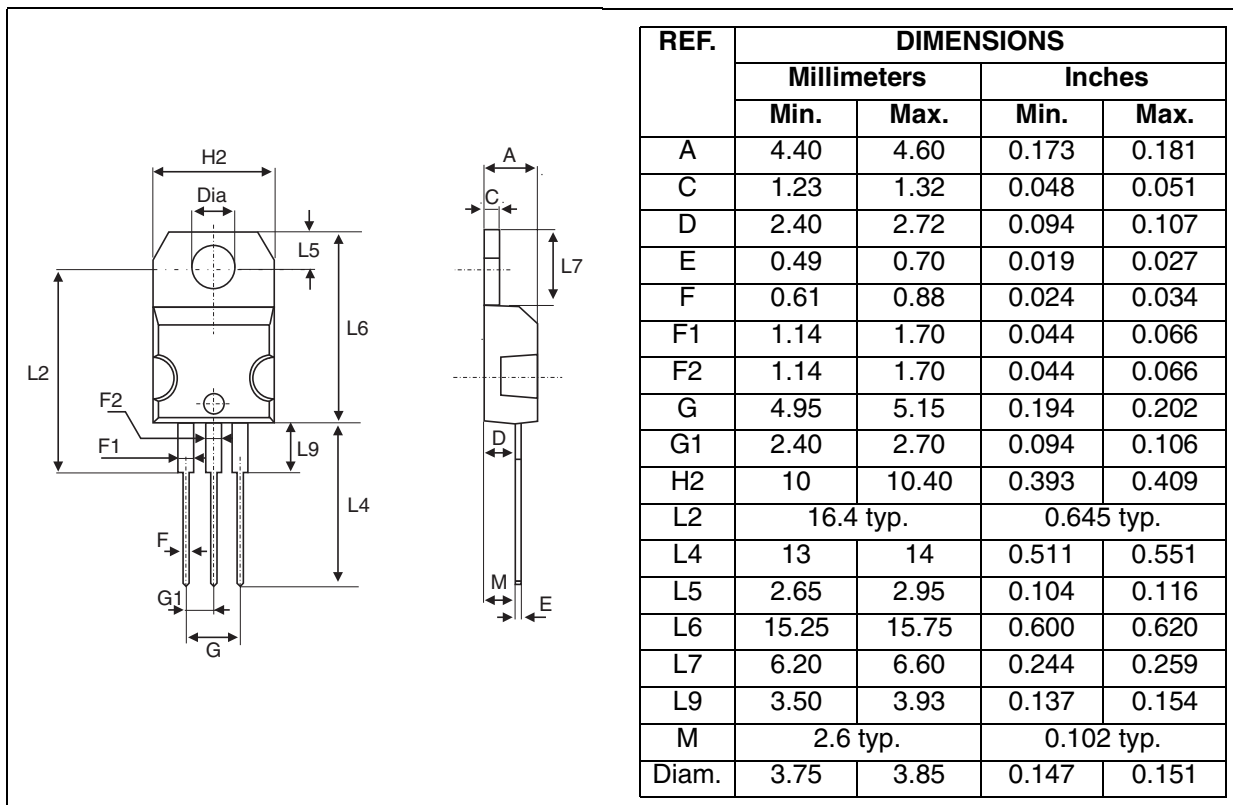


Figure 15: D<sup>2</sup>PAK Package Mechanical Data

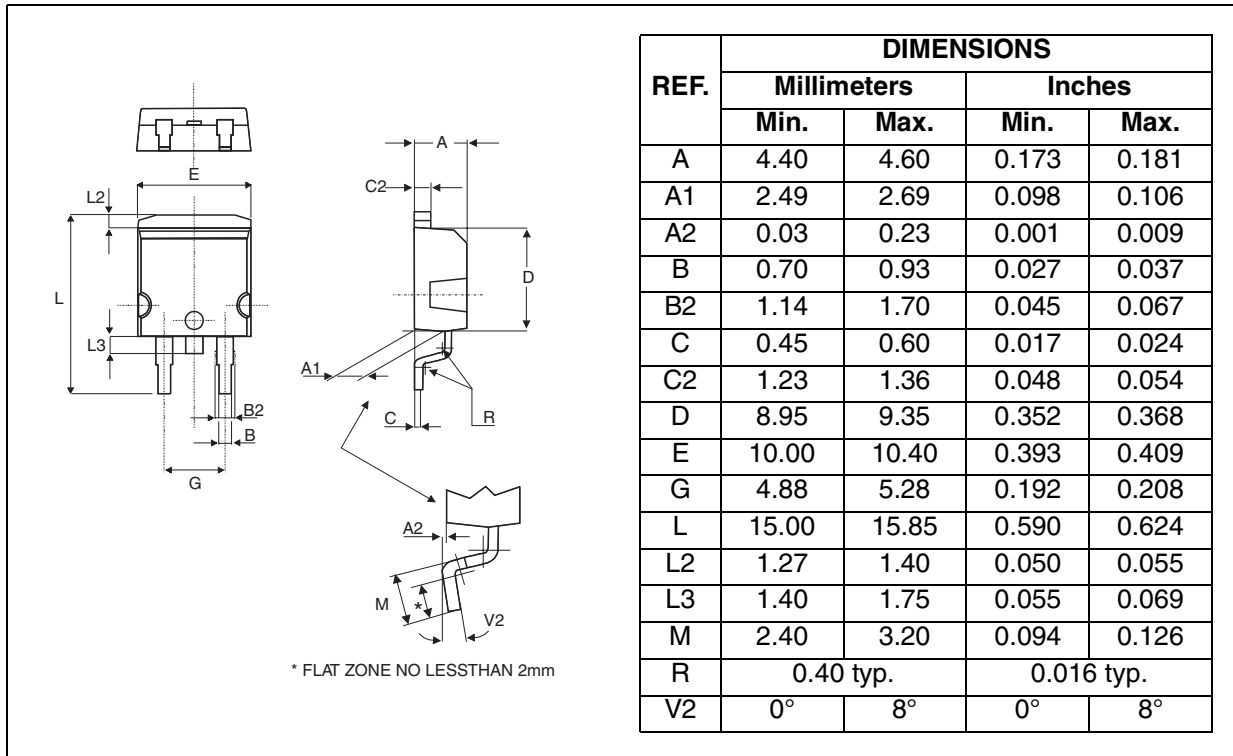


Figure 16: D<sup>2</sup>PAK Foot Print Dimensions (in millimeters)

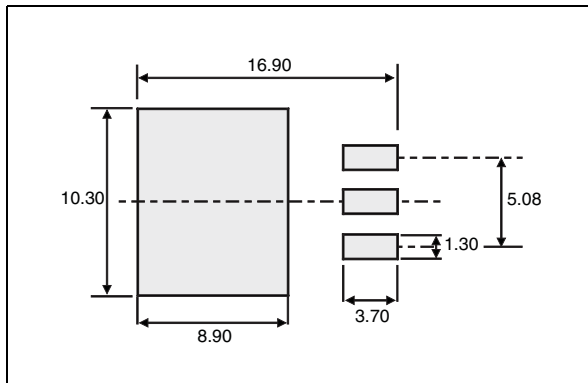


Figure 17: TO-220FPAB Package Mechanical Data

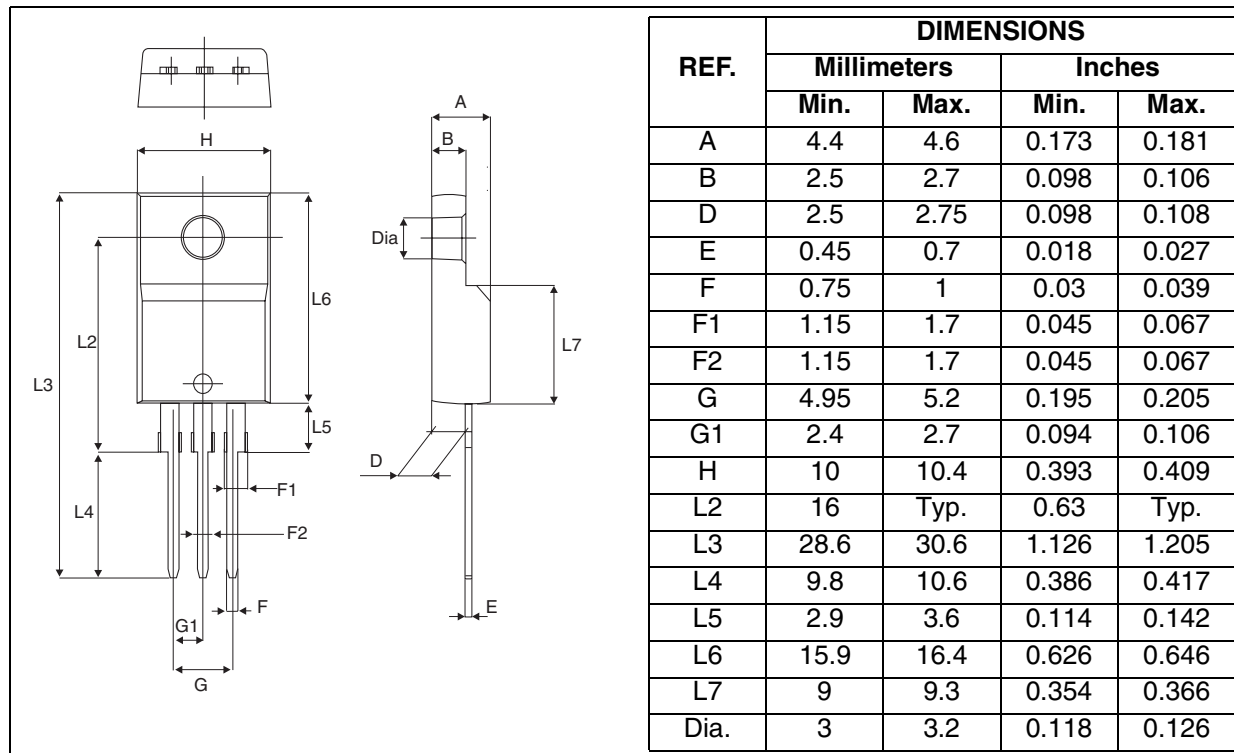


Table 7: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH16L06CT	STTH16L06CT	TO-220AB	2.23 g	50	Tube
STTH16L06CG	STTH16L06CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH16L06CG-TR	STTH16L06CG	D <sup>2</sup> PAK	1.48 g	1000	Tape & eel
STTH16L06CFP	STTH16L06CFP	TO-220FPAB	1.70 g	50	Tube

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

Table 8: Revision History

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

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