

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.

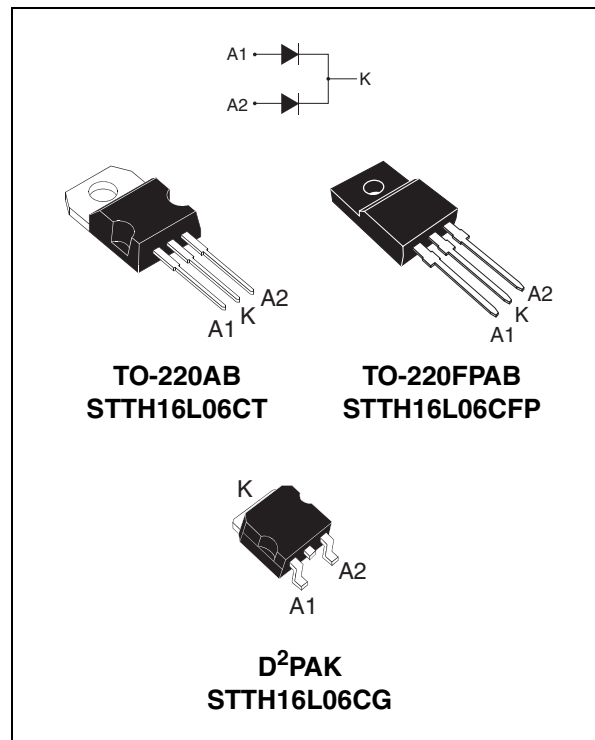


Table 2: Order Codes

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 ² 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 ² PAK	Per diode	2.5	°C/W
		TO-220FPAB	Per diode	5	
		TO-220AB / D ² PAK	Total	1.6	
		TO-220FPAB	Total	3.8	
$R_{th(c)}$	Coupling	TO-220AB / D ² 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	μA
		$T_j = 150^\circ\text{C}$			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: * $t_p = 5 \text{ ms}$, $\delta < 2\%$

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

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)

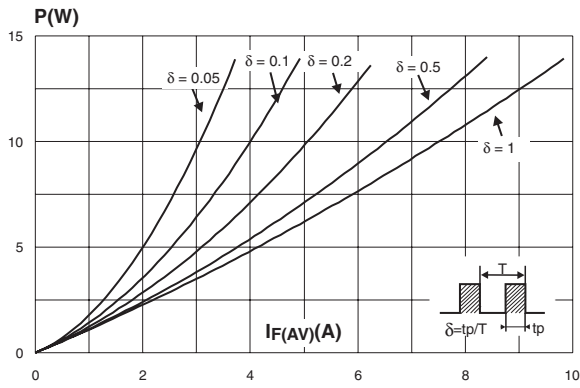


Figure 2: Forward voltage drop versus forward current (per diode)

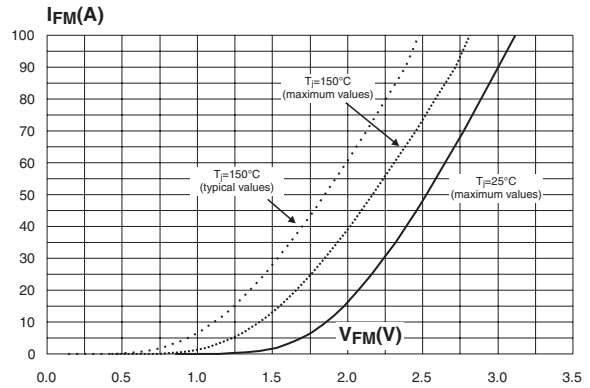


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB & D²PAK)

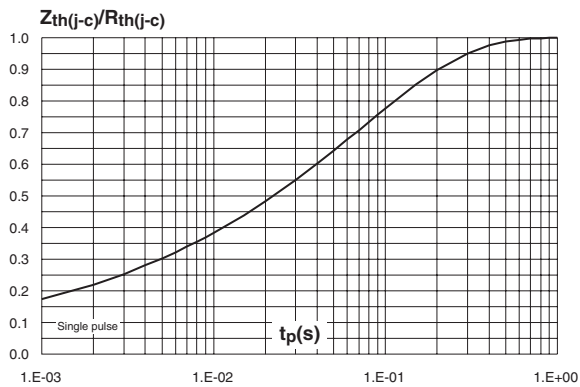


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

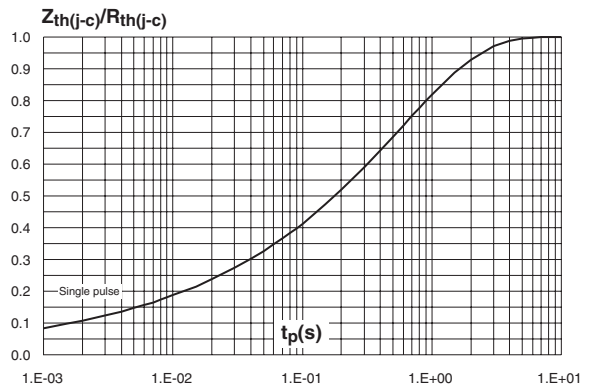


Figure 5: Peak reverse recovery current versus di_F/dt (typical values, per diode)

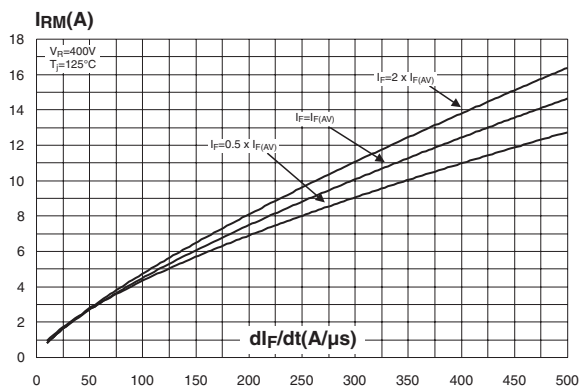


Figure 6: Reverse recovery time versus di_F/dt (typical values, per diode)

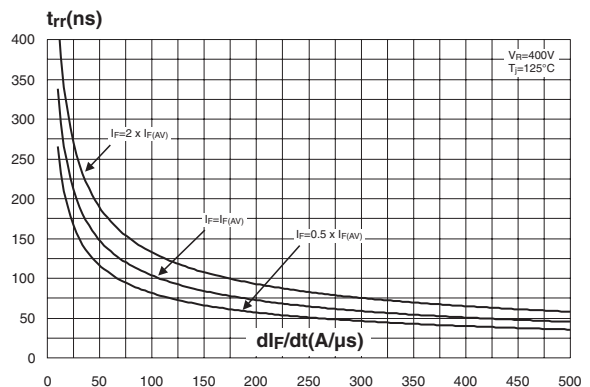


Figure 7: Reverse recovery charges versus di_F/dt (typical values, per diode)

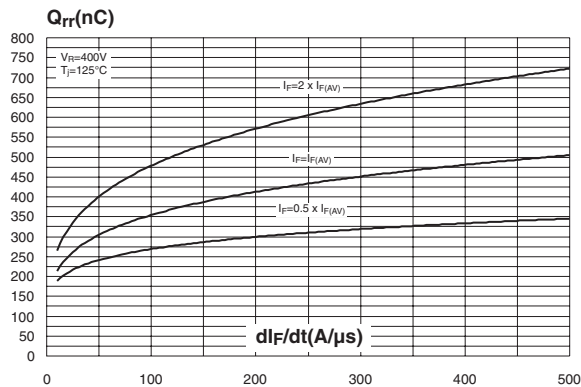


Figure 8: Reverse recovery softness factor versus di_F/dt (typical values, per diode)

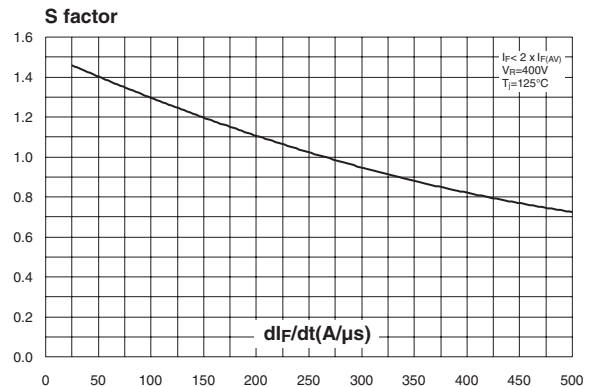


Figure 9: Relative variations of dynamic parameters versus junction temperature

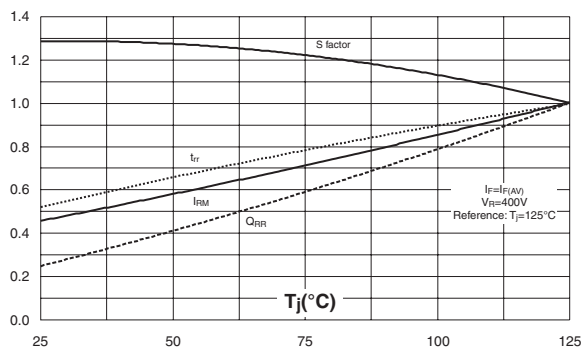


Figure 10: Transient peak forward voltage versus di_F/dt (typical values, per diode)

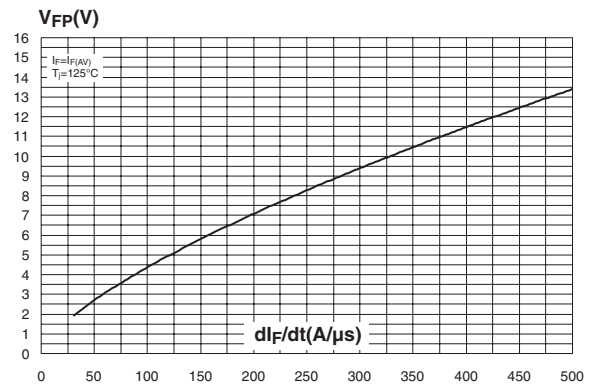


Figure 11: Forward recovery time versus di_F/dt (typical values, per diode)

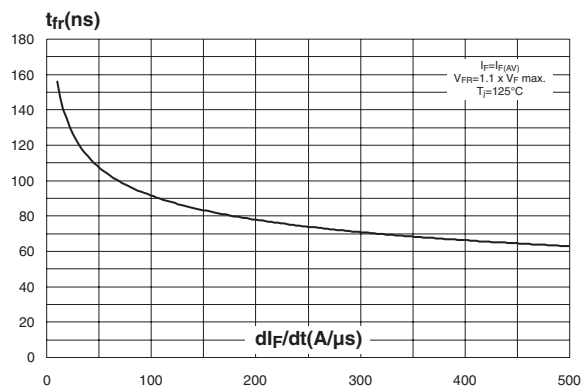


Figure 12: Junction capacitance versus reverse voltage applied (typical values, per diode)

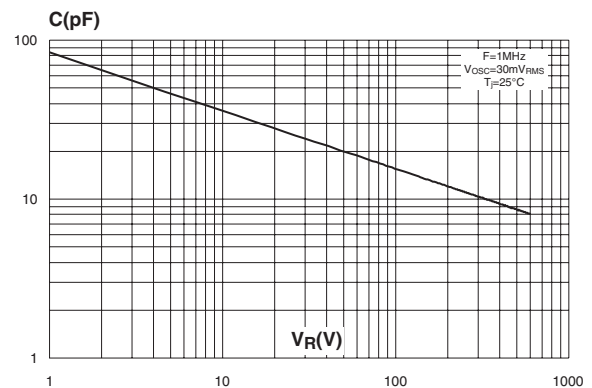


Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, $e_{CU}=35\mu\text{m}$) (D²PAK)

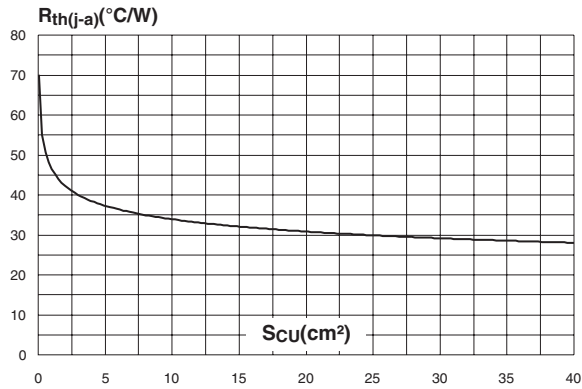


Figure 14: TO-220AB Package Mechanical Data

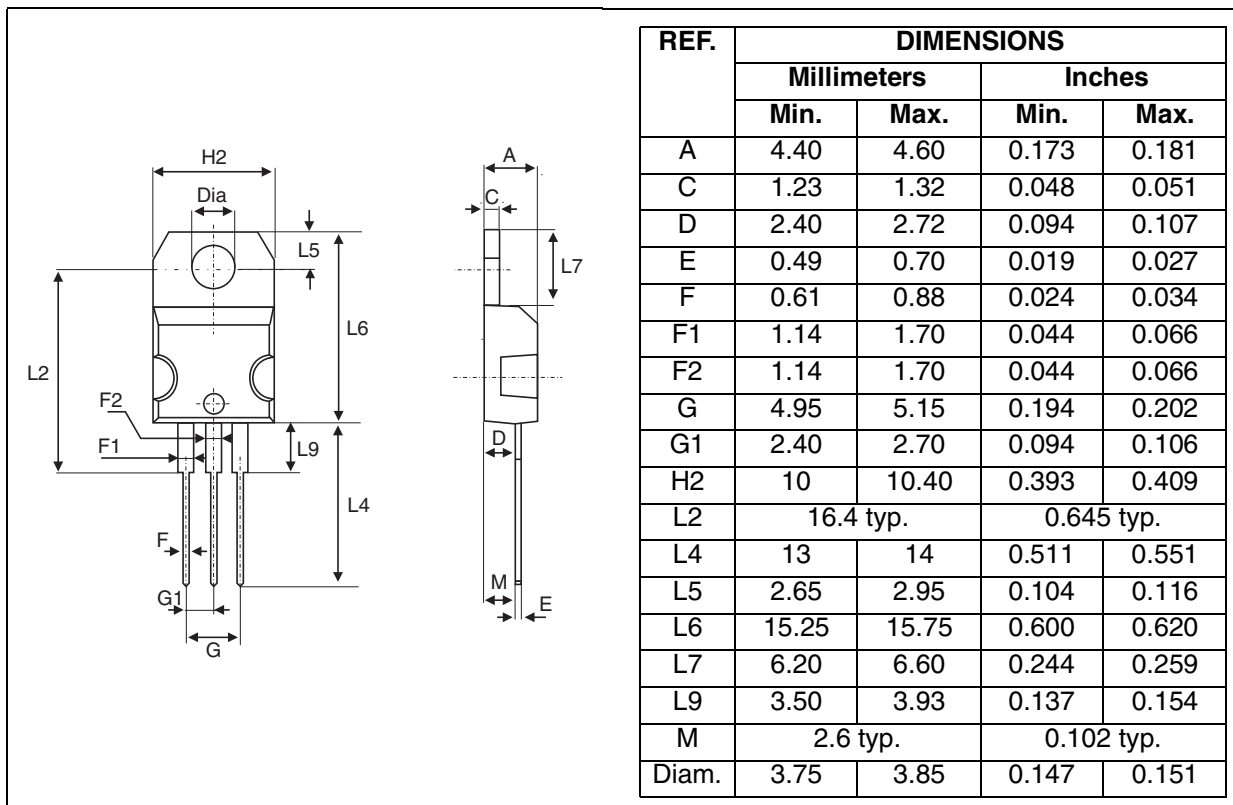


Figure 15: D²PAK Package Mechanical Data

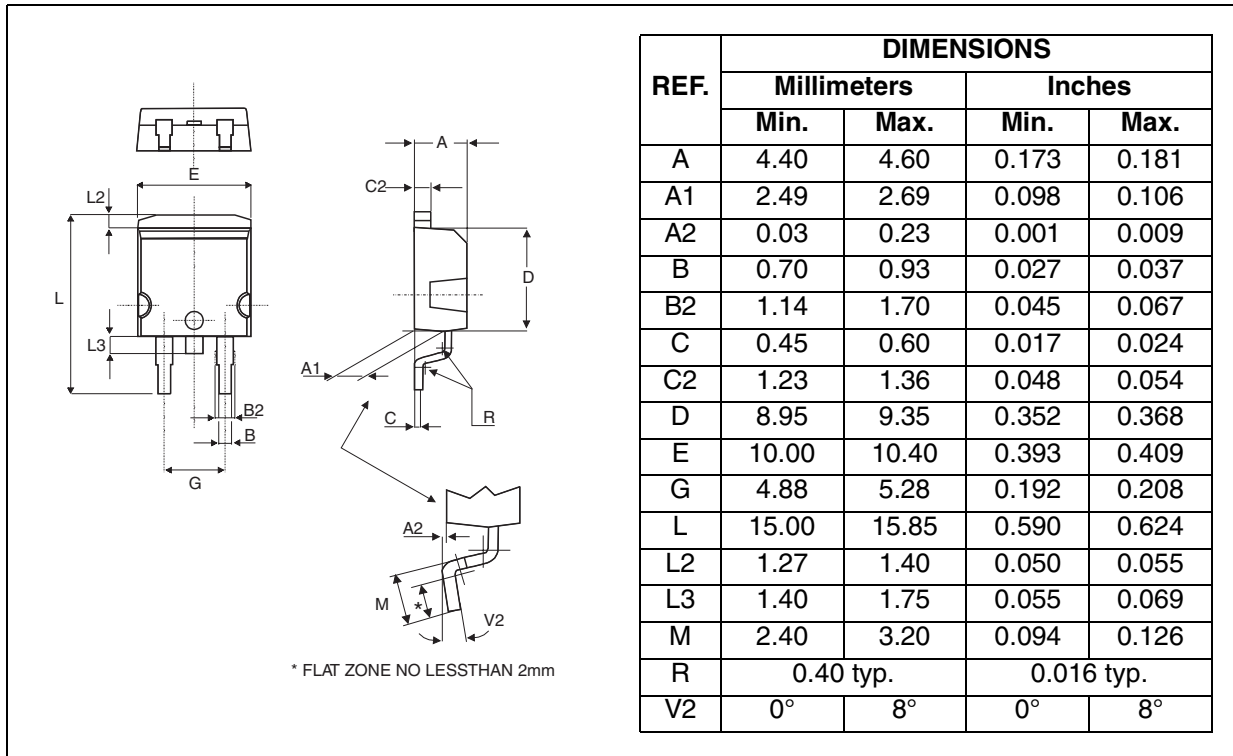


Figure 16: D²PAK Foot Print Dimensions (in millimeters)

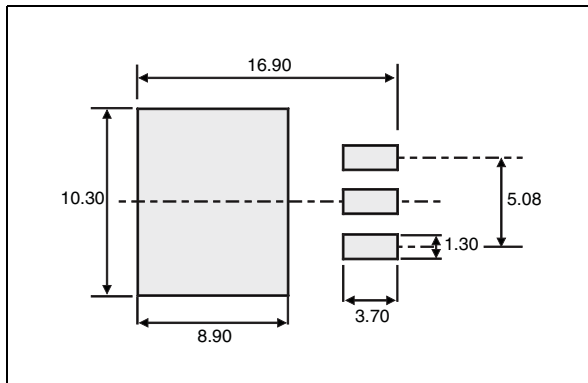


Figure 17: TO-220FPAB Package Mechanical Data

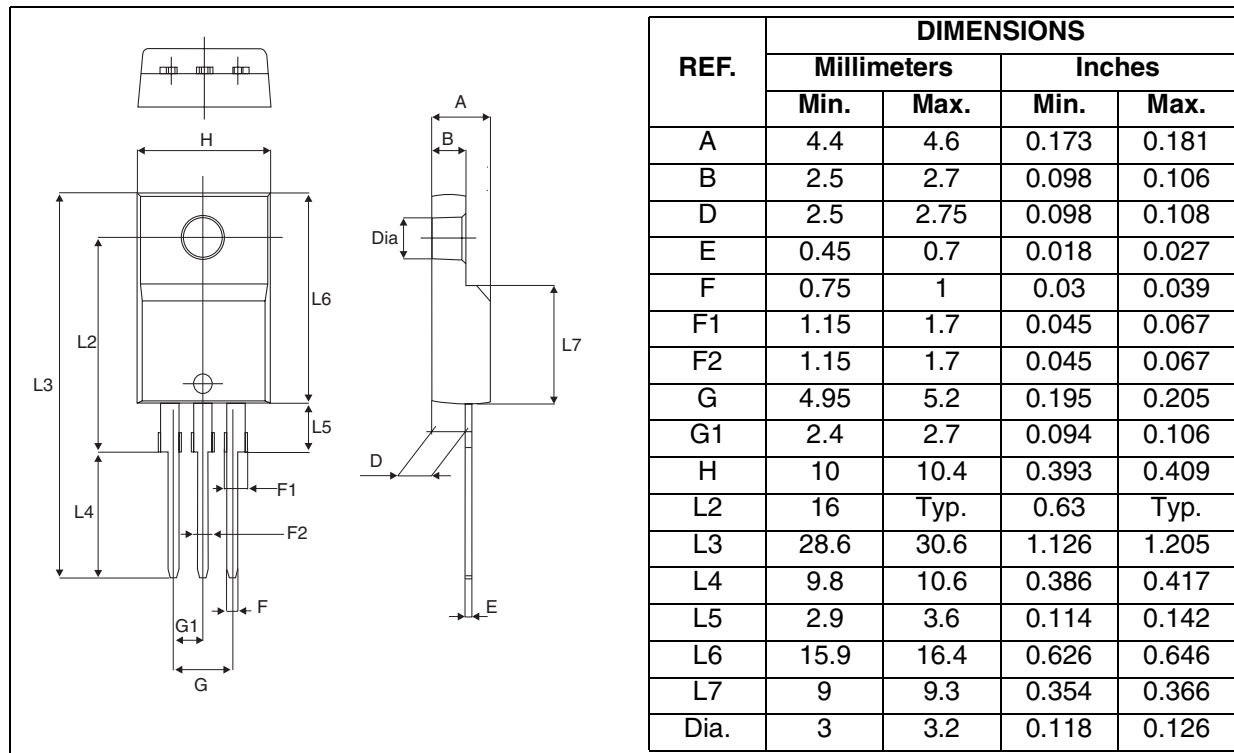


Table 7: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH16L06CT	STTH16L06CT	TO-220AB	2.23 g	50	Tube
STTH16L06CG	STTH16L06CG	D ² PAK	1.48 g	50	Tube
STTH16L06CG-TR	STTH16L06CG	D ² 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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