

TURBO 2 ULTRAFast HIGH VOLTAGE RECTIFIER
Table 1: Main Product Characteristics

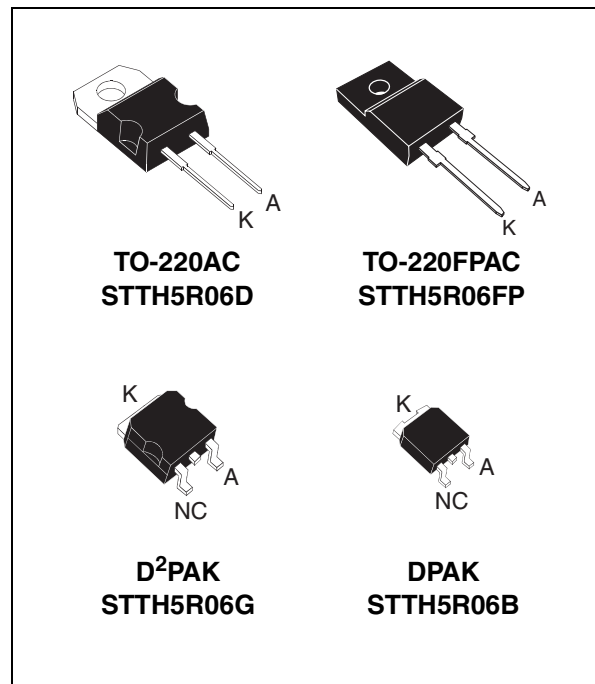
$I_{F(AV)}$	5 A
V_{RRM}	600 V
T_j	175°C
V_F (typ)	1.4 V
t_{rr} (max)	40 ns

FEATURES AND BENEFITS

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

DESCRIPTION

The STTH5R06, which is using ST Turbo 2 600V technology, is specially suited as boost diode 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 2: Order Codes

Part Number	Marking
STTH5R06D	STTH5R06D
STTH5R06FP	STTH5R06FP
STTH5R06B	STTH5R06B

Part Number	Marking
STTH5R06B-TR	STTH5R06B
STTH5R06G	STTH5R06G
STTH5R06G-TR	STTH5R06G

Table 3: 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 / D ² PAK	20	A	
		DPAK	10		
$I_{F(AV)}$	Average forward current	TO-220AC / DPAK / D ² PAK	$T_c = 135^\circ\text{C} \quad \delta = 0.5$	5	A
		TO-220FPAC	$T_c = 105^\circ\text{C} \quad \delta = 0.5$		
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	50	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 / DPA / D ² PAK	3.0	°C/W
		TO-220FPAC	5.5	

Table 5: Static Electrical Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R^*	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			20	μA
		$T_j = 125^\circ\text{C}$		25	250		
V_F^{**}	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 5\text{A}$			2.9	V
		$T_j = 125^\circ\text{C}$		1.4	1.8		

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: $P = 1.164 \times I_{F(AV)} + 0.128 I_F^2 (RMS)$

Table 6: Dynamic Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$ $I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$			25	ns
			$I_F = 1\text{A}$ $di_F/dt = -50\text{ A}/\mu\text{s}$ $V_R = 30\text{V}$			40	
I_{RM}	Reverse recovery current	$T_j = 125^\circ\text{C}$	$I_F = 5\text{A}$ $V_R = 400\text{V}$ $di_F/dt = -200\text{ A}/\mu\text{s}$		5.0	6.0	A
S factor	Softness factor				0.35		
Qrr	Reverse recovery charges				110		nC
t_{fr}	Forward recovery time	$T_j = 25^\circ\text{C}$	$I_F = 5\text{A}$ $di_F/dt = 40\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			150	ns
V_{FP}	Forward recovery voltage	$T_j = 25^\circ\text{C}$	$I_F = 5\text{A}$ $di_F/dt = 40\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			4.5	V

Figure 1: Conduction losses versus average current

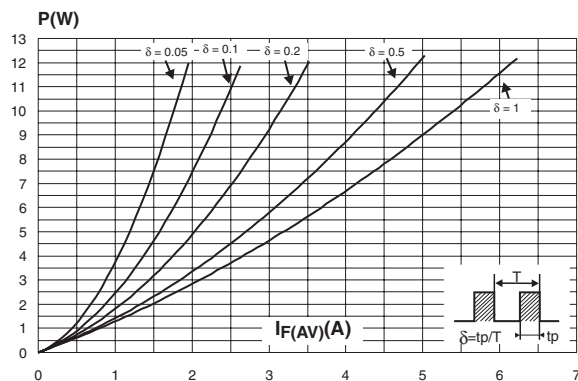


Figure 2: Forward voltage drop versus forward current

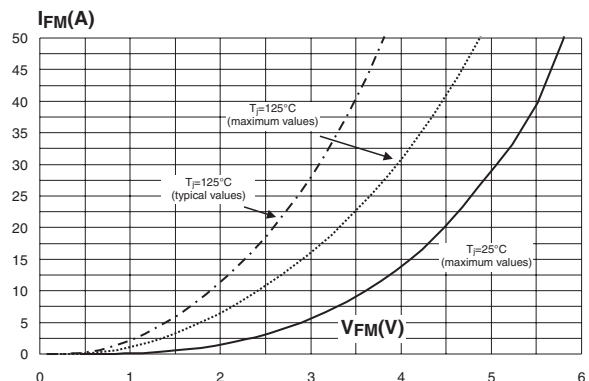


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, DPAK, D²PAK)

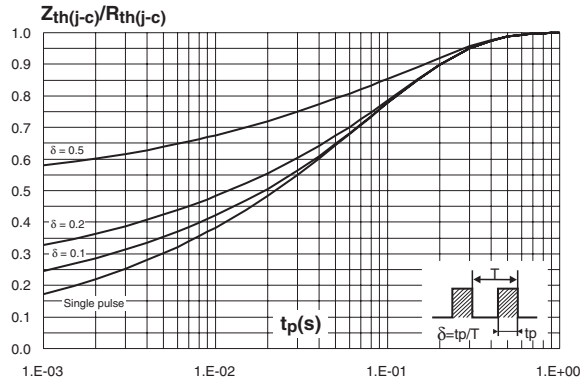


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

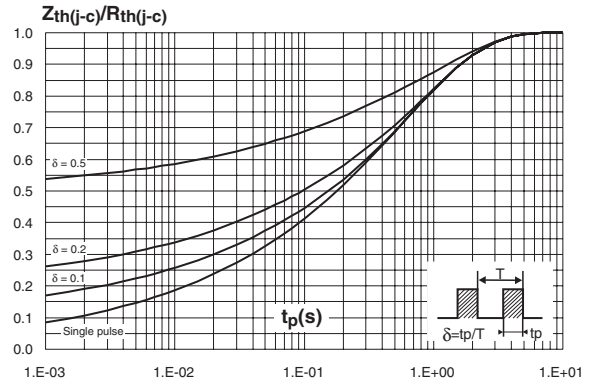


Figure 5: Peak reverse recovery current versus di_F/dt (90% confidence)

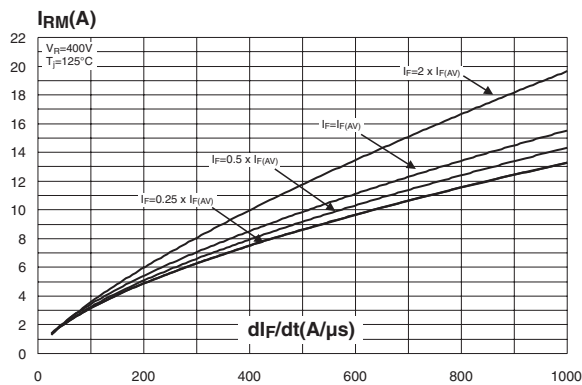


Figure 6: Reverse recovery time versus di_F/dt (90% confidence)

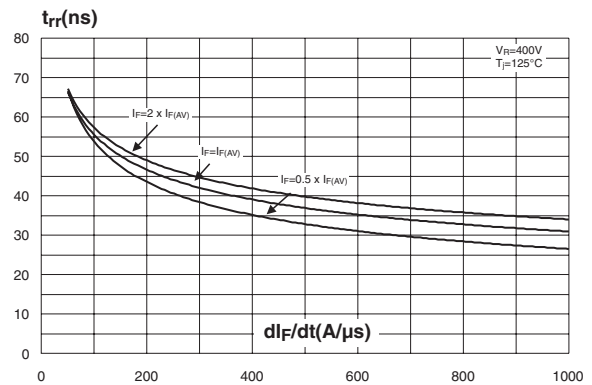


Figure 7: Reverse recovery charges versus di_F/dt (90% confidence)

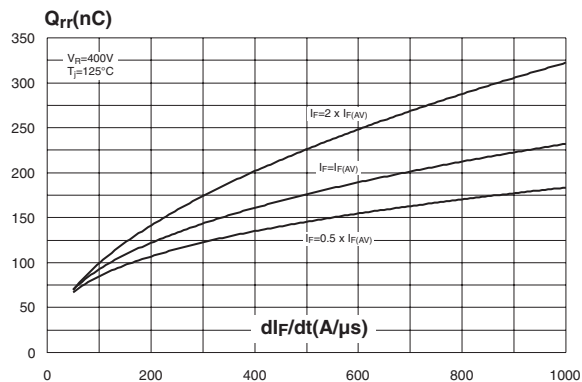


Figure 8: Softness factor versus di_F/dt (typical values)

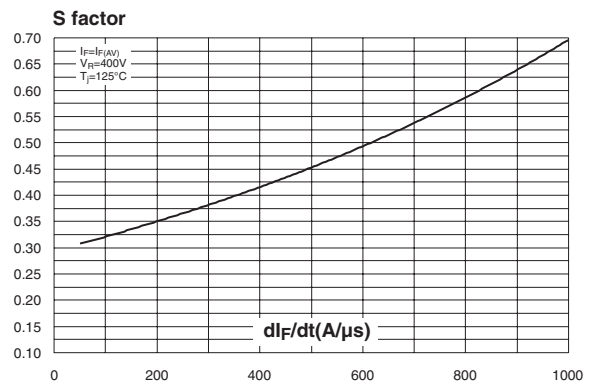


Figure 9: Relative variations of dynamic parameters versus junction temperature

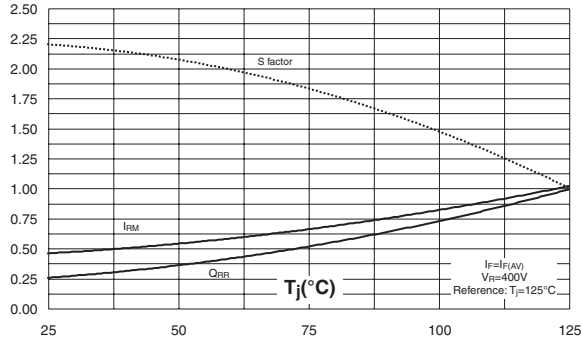


Figure 10: Transient peak forward voltage versus di_F/dt (90% confidence)

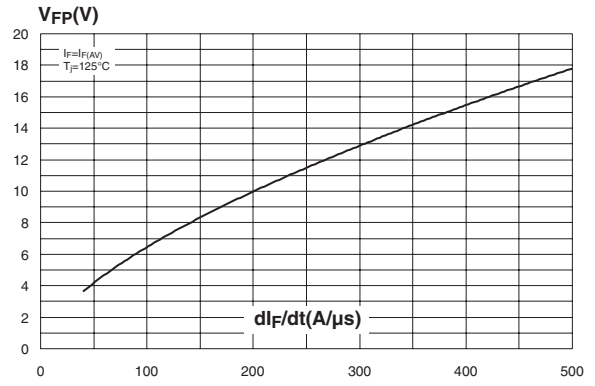


Figure 11: Forward recovery time versus di_F/dt (90% confidence)

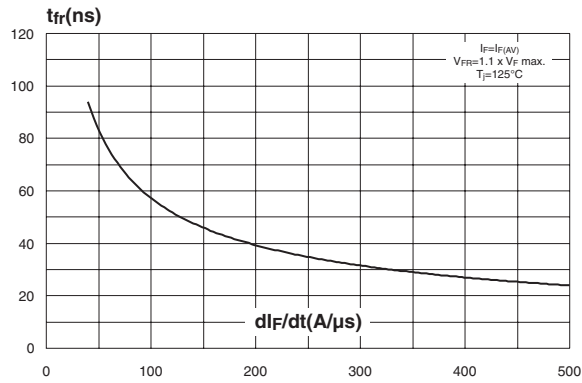


Figure 12: Junction capacitance versus reverse voltage applied (typical values)

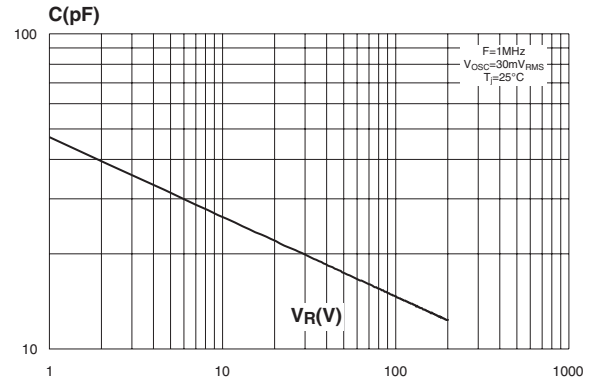


Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, $e_{Cu} = 35\mu\text{m}$) (DPAK and D²PAK)

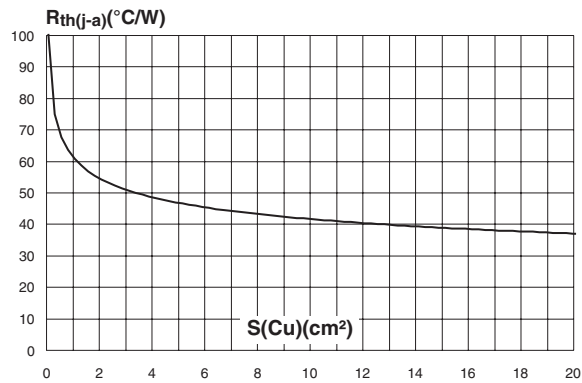


Figure 14: DPAK Package Mechanical Data

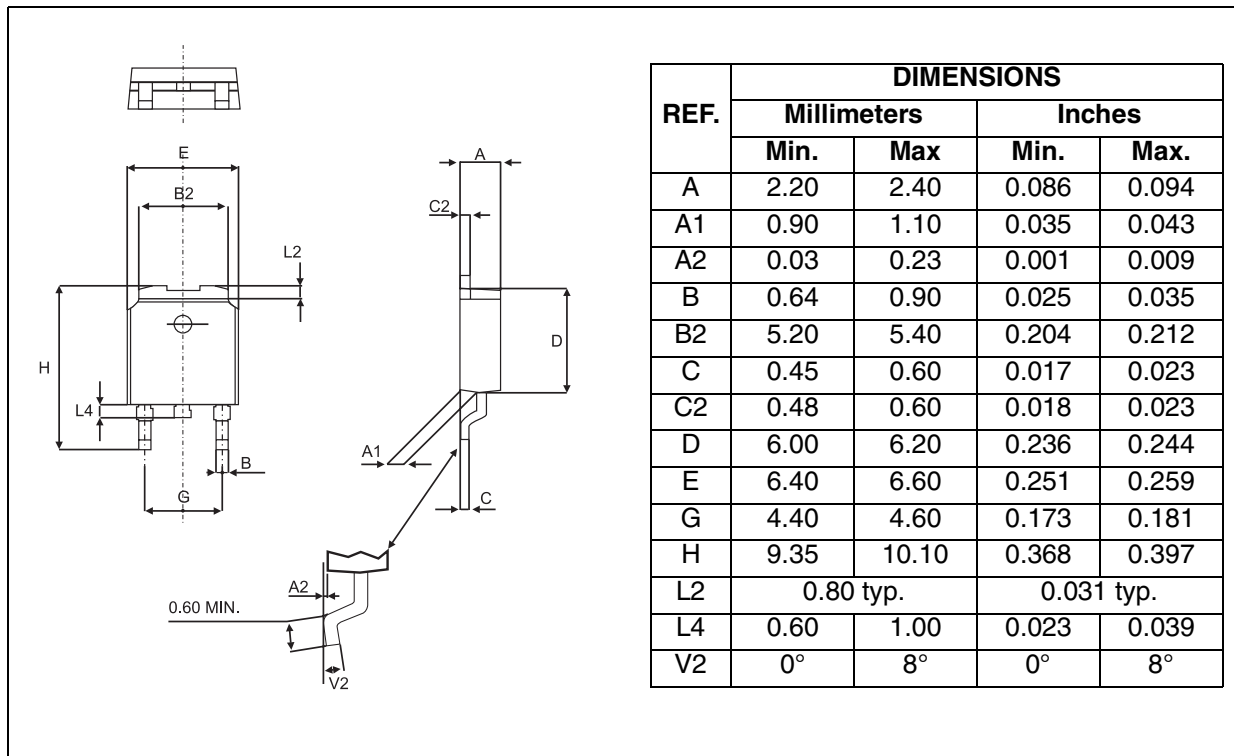


Figure 15: DPAK Foot Print Dimensions (in millimeters)

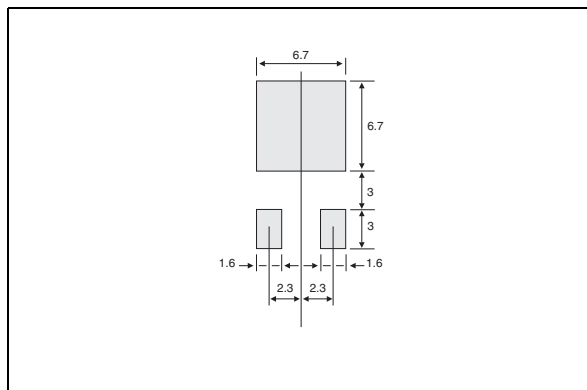


Figure 16: D²PAK Package Mechanical Data

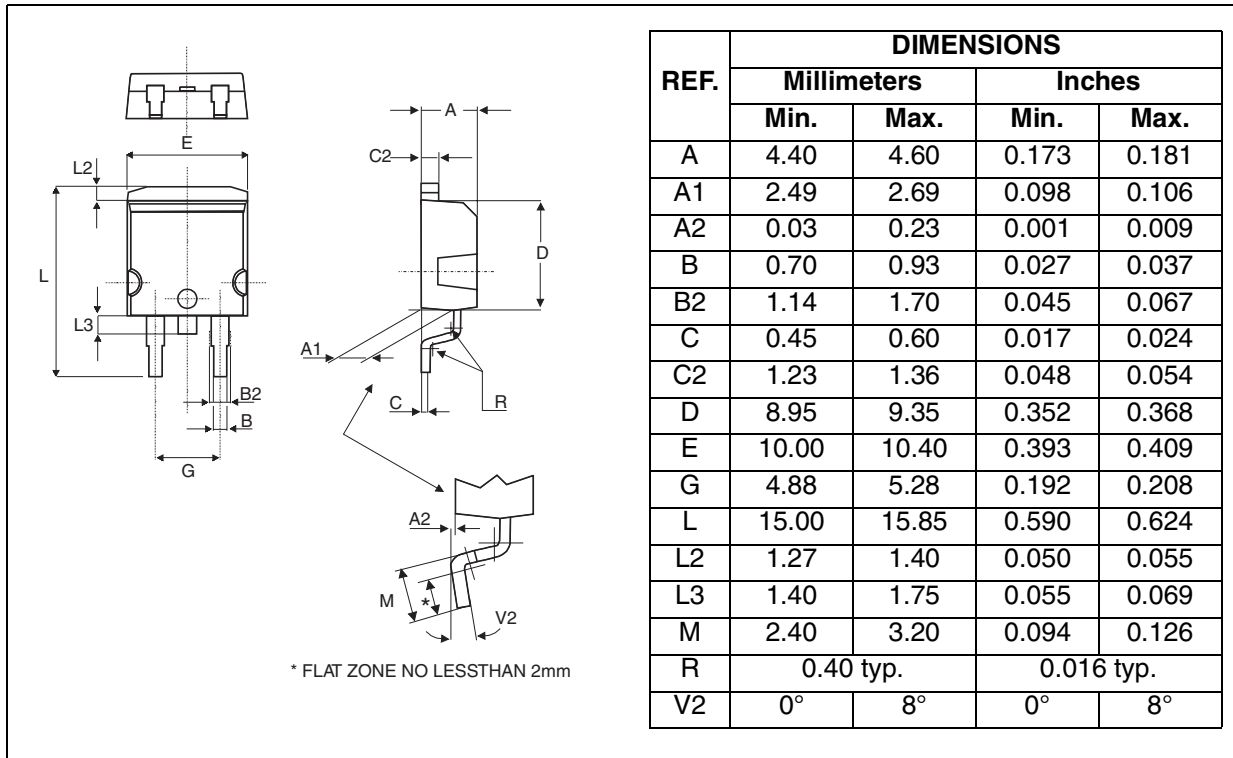


Figure 17: D²PAK Foot Print Dimensions (in millimeters)

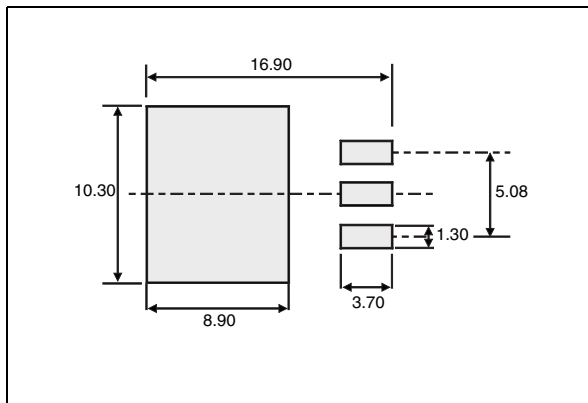


Figure 18: TO-220FPAC Package Mechanical Data

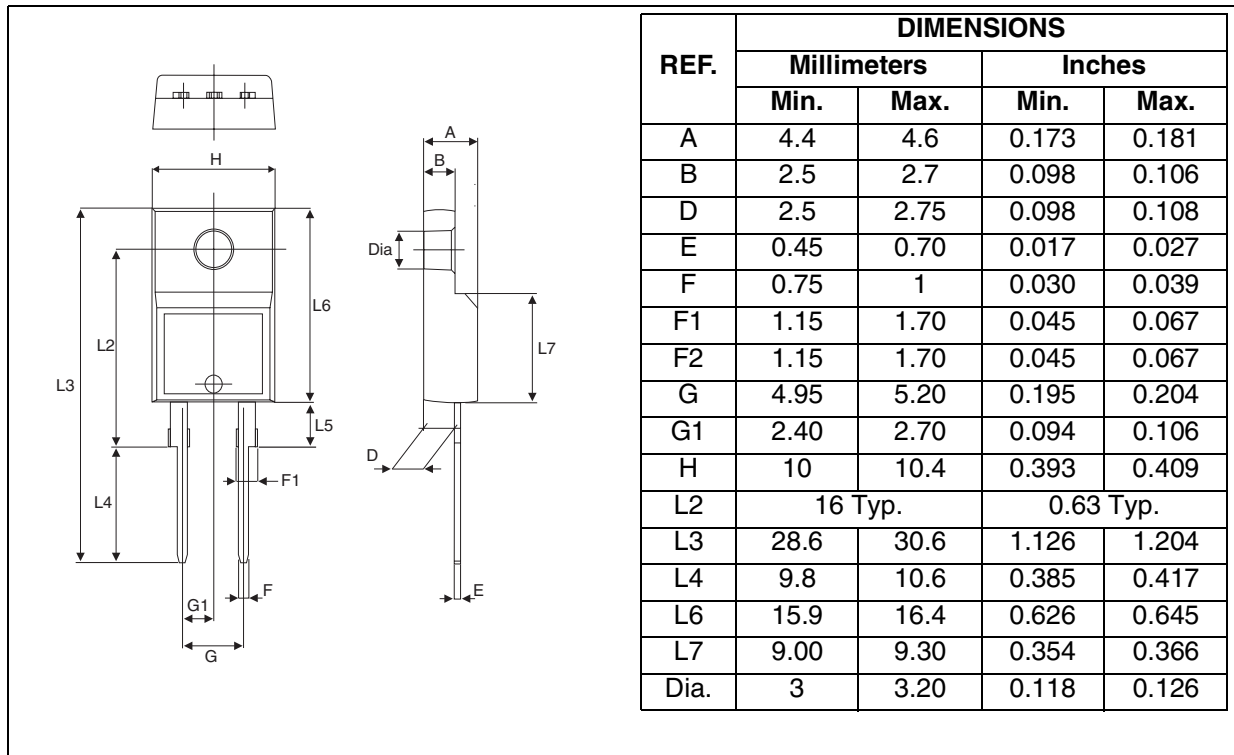
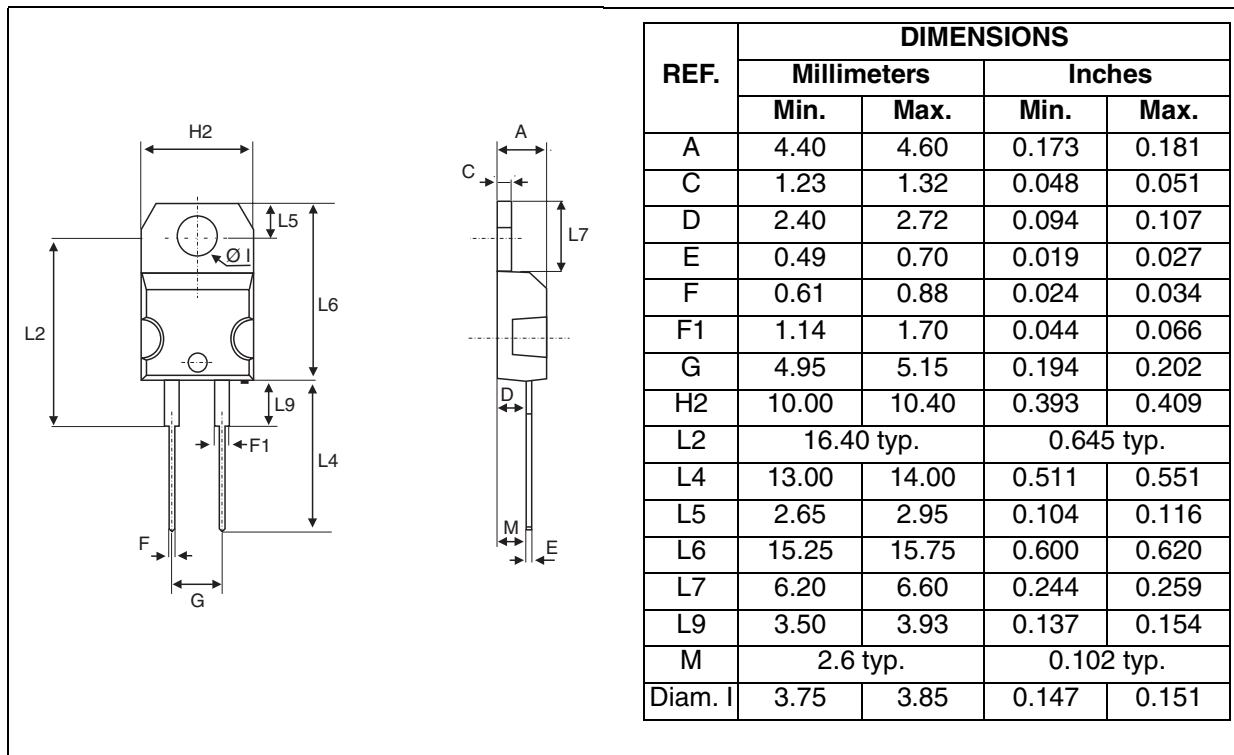


Figure 19: TO-220AC Package Mechanical Data



STTH5R06

Table 7: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH5R06D	STTH5R06D	TO-220AC	1.90 g	50	Tube
STTHR5R06G	STTH5R06G	D ² PAK	1.48 g	50	Tube
STTHR5R06G-TR	STTHR5R06G	D ² PAK	1.48 g	1000	Tape & reel
STTHR5R06FP	STTHR5R06FP	TO-220FPAC	1.70 g	50	Tube
STTHR5R06B	STTHR5R06B	DPAK	0.3 g	75	Tube
STTHR5R06B-TR	STTHR5R06B-TR	DPAK	0.3 g	2500	Tape & reel

- 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
Oct-2002	3	Last update
07-Sep-2004	4	Tcases values splitted for TO-220FPAC package

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