

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

$I_{F(AV)}$	12 A
$V_{RRM}$	600 V
$I_{RM}$ (typ)	7 A
$T_j$	175°C
$V_F$ (typ)	1.4 V
$t_{rr}$ (max)	25 ns

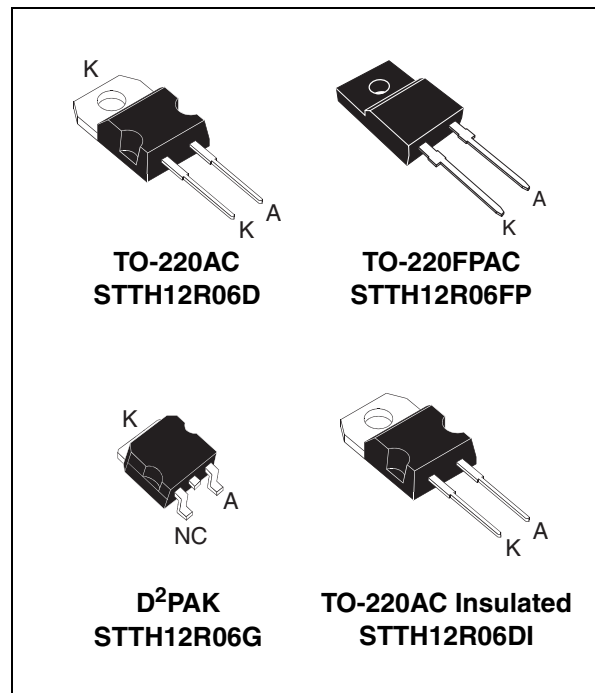
### FEATURES AND BENEFITS

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

### DESCRIPTION

The STTH12R06, 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
STTH12R06D	STTH12R06D
STTH12R06FP	STTH12R06FP
STTH12R06G	STTH12R06G
STTH12R06G-TR	STTH12R06G
STTH12R06DI	STTH12R06DI
STTH12R06DIRG	STTH12R06DI

## STTH12R06

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

Symbol	Parameter		Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage		600	V	
$I_{F(RMS)}$	RMS forward voltage	TO-220AC / TO-220FPAC / D <sup>2</sup> PAK	30	A	
		TO-220AC Ins.	24		
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AC / D <sup>2</sup> PAK	12	A	
		TO-220FPAC			$T_c = T_{125^\circ C}$
		TO-220AC Ins.			$T_c = 50^\circ C$
		TO-220AC Ins.	$T_c = 80^\circ C$		
$I_{FSM}$	Surge non repetitive forward current		tp = 10ms sinusoidal	100	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	4.4	
		TO-220AC Ins.	3.3	

**Table 5: Static Electrical Characteristics**

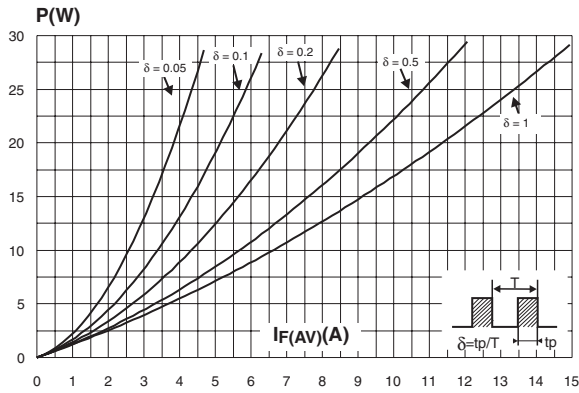
Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R$	Reverse leakage current	$T_j = 25^\circ C$	$V_R = V_{RRM}$			45	$\mu A$
		$T_j = 125^\circ C$			50	600	
$V_F$	Forward voltage drop	$T_j = 25^\circ C$	$I_F = 12A$			2.9	V
		$T_j = 125^\circ C$			1.4	1.8	

To evaluate the conduction losses use the following equation:  $P = 1.16 \times I_{F(AV)} + 0.053 I_{F(RMS)}^2$

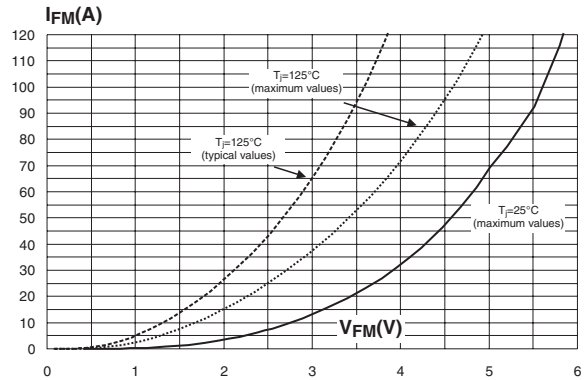
**Table 6: Dynamic Characteristics**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ C$	$I_F = 0.5A$ $I_{rr} = 0.25A$ $I_R = 1A$			25	ns
			$I_F = 1A$ $di_F/dt = -50 A/\mu s$ $V_R = 30V$			45	
$I_{RM}$	Reverse recovery current	$T_j = 125^\circ C$	$I_F = 12A$ $V_R = 400V$ $di_F/dt = -200 A/\mu s$		7.0	8.4	A
S factor	Softness factor				0.2		
Qrr	Reverse recovery charges				180		
$t_{fr}$	Forward recovery time	$T_j = 25^\circ C$	$I_F = 12A$ $di_F/dt = 96 A/\mu s$ $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
$V_{FP}$	Forward recovery voltage					5.5	V

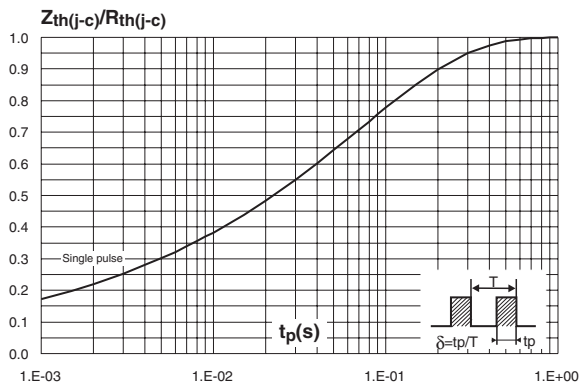
**Figure 1: Conduction losses versus average current**



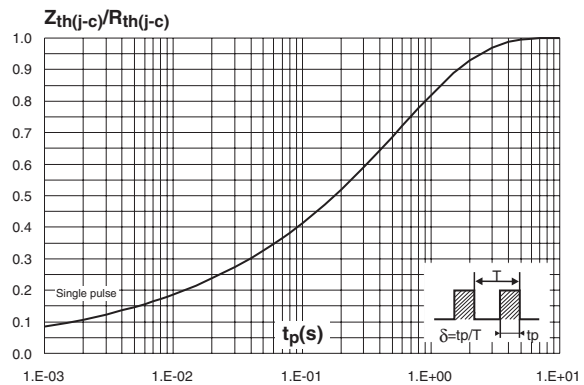
**Figure 2: Forward voltage drop versus forward current**



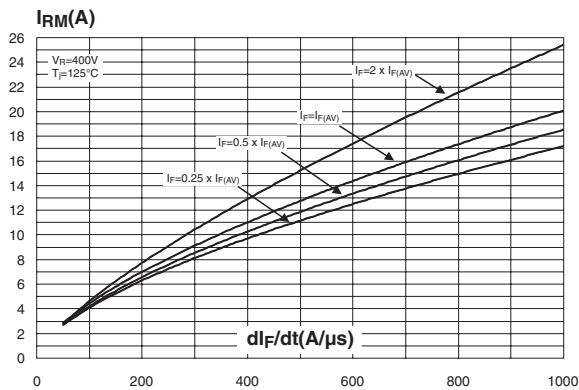
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, TO-220AC Ins., D<sup>2</sup>PAK)**



**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)**

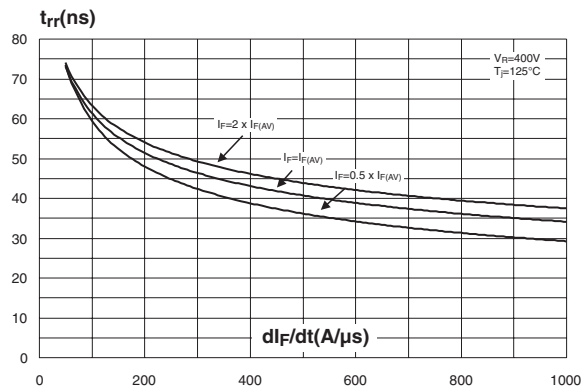


Figure 7: Reverse recovery charges versus  $di_F/dt$  (typical values)

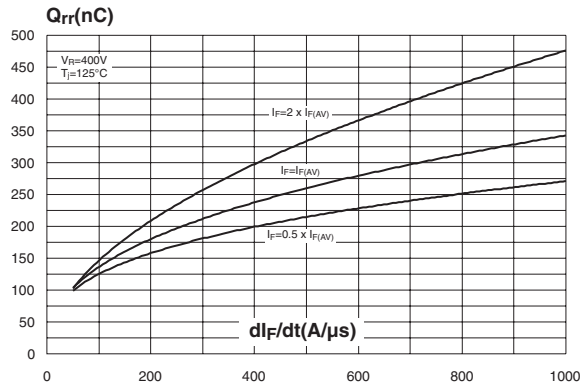


Figure 8: Softness factor versus  $di_F/dt$  (typical values)

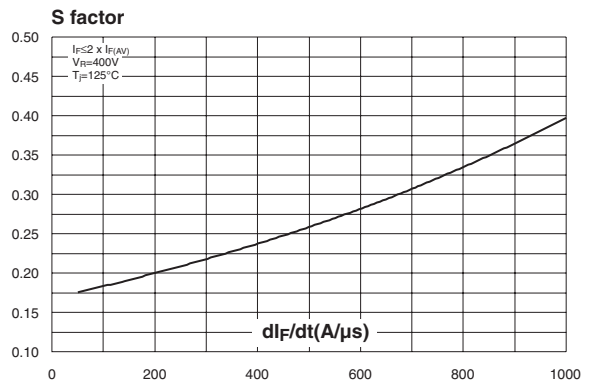


Figure 9: Relative variations of dynamic parameters versus junction temperature

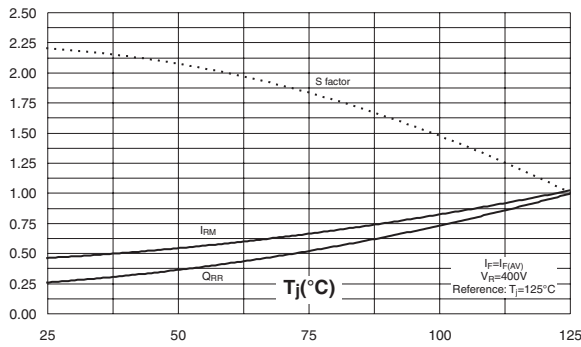


Figure 10: Transient peak forward voltage versus  $di_F/dt$  (typical values)

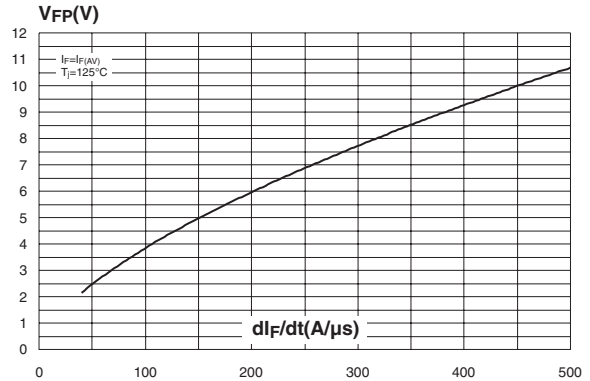


Figure 11: Forward recovery time versus  $di_F/dt$  (typical values)

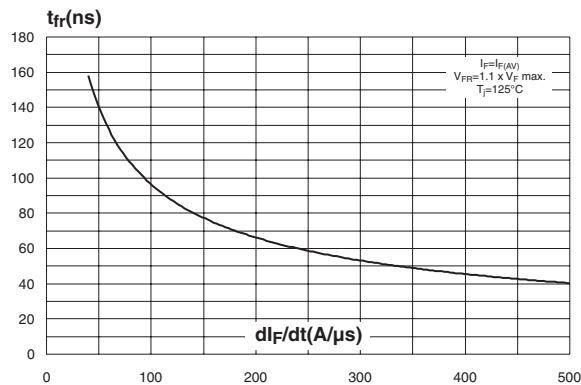
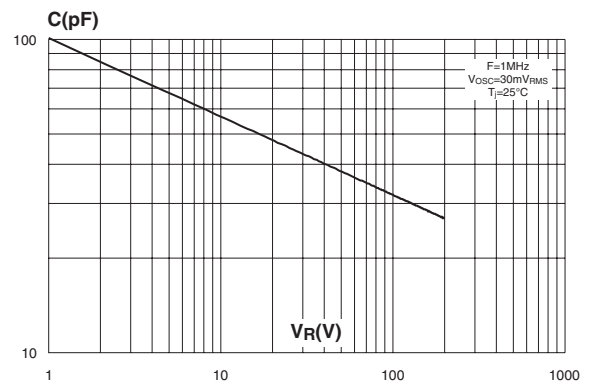
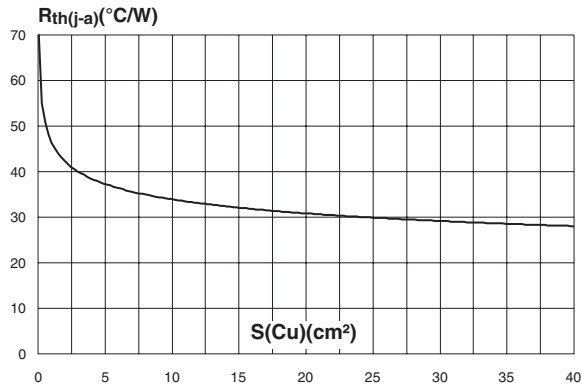


Figure 12: Junction capacitance versus reverse voltage applied (typical values)



**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: TO-220FPAC Package Mechanical Data**

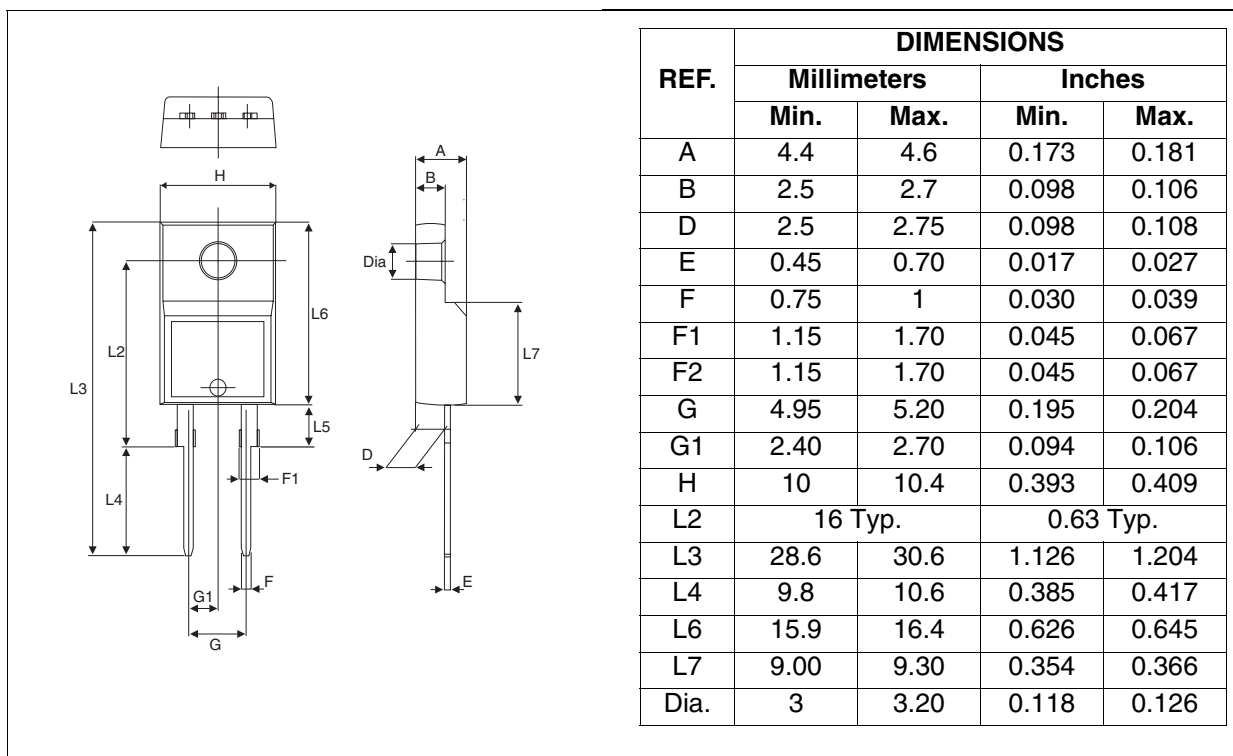


Figure 15: D<sup>2</sup>PAK Package Mechanical Data

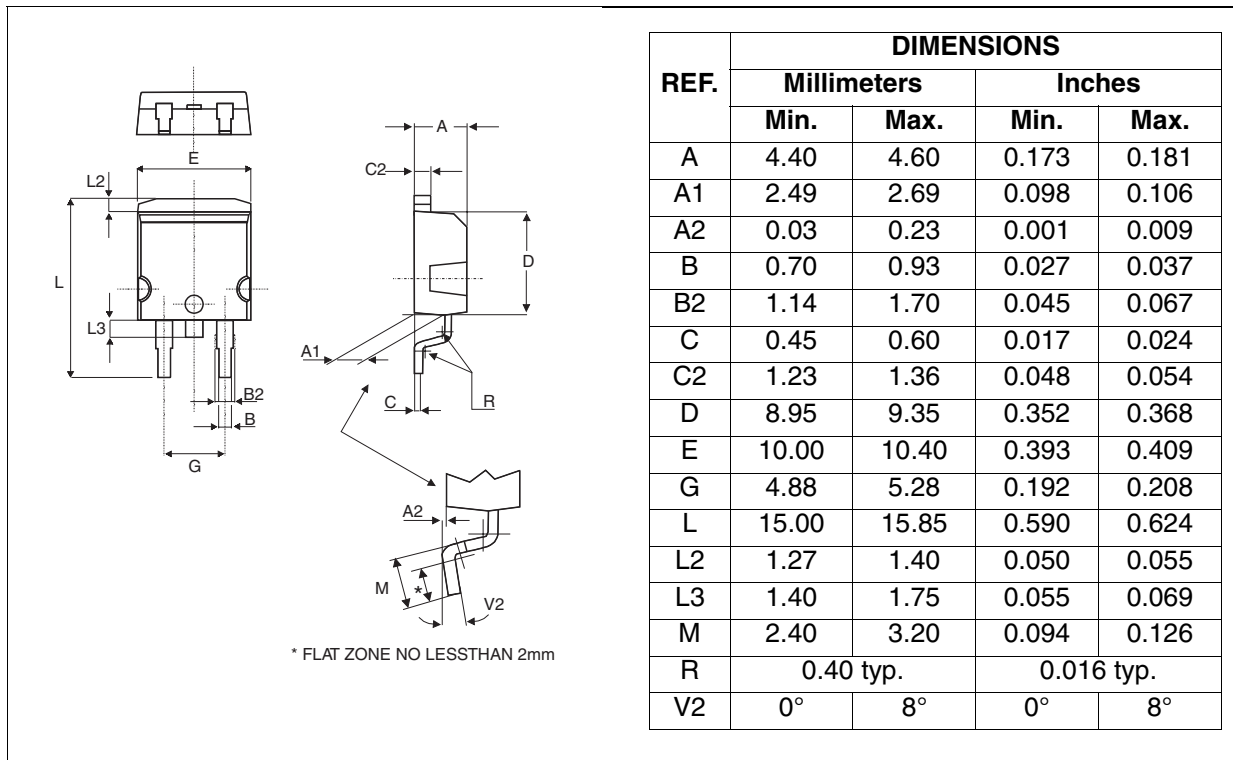


Figure 16: D<sup>2</sup>PAK Foot Print Dimensions (in millimeters)

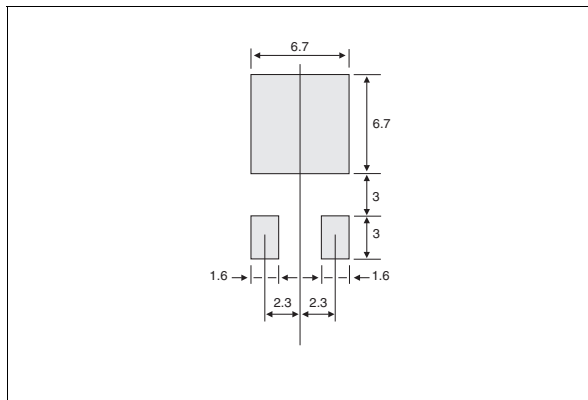


Figure 17: TO-220AC Package Mechanical Data

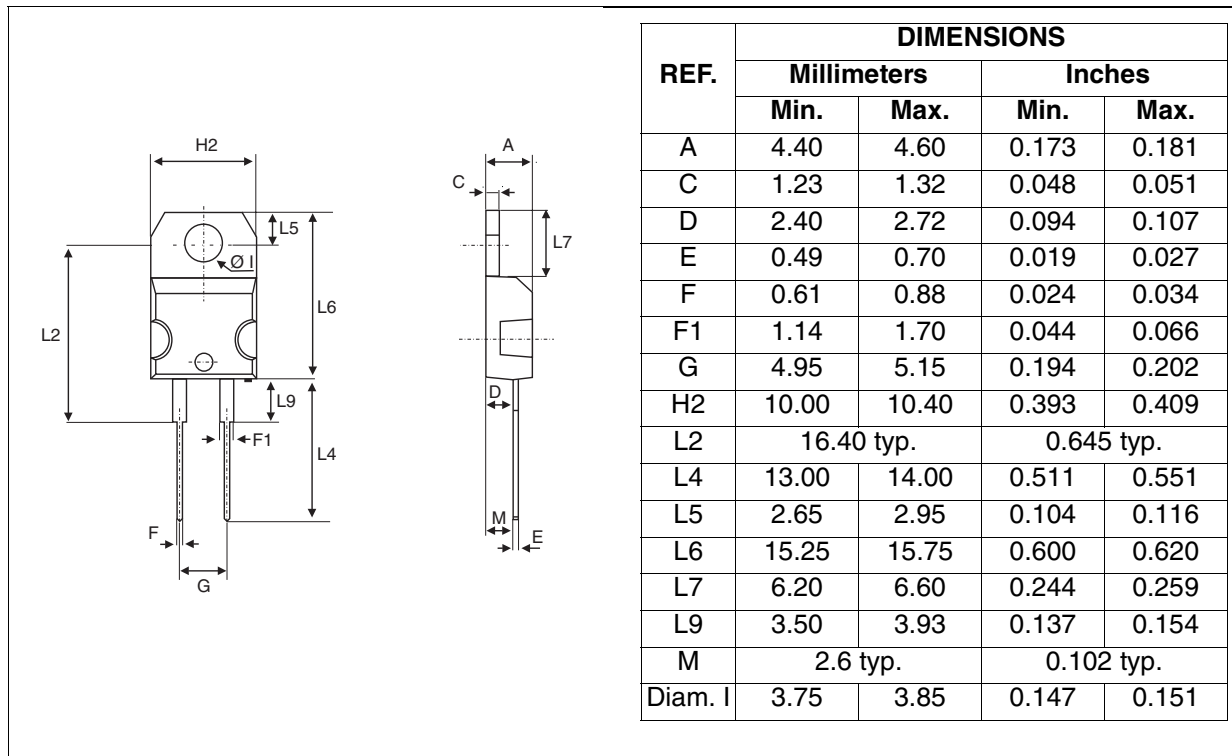
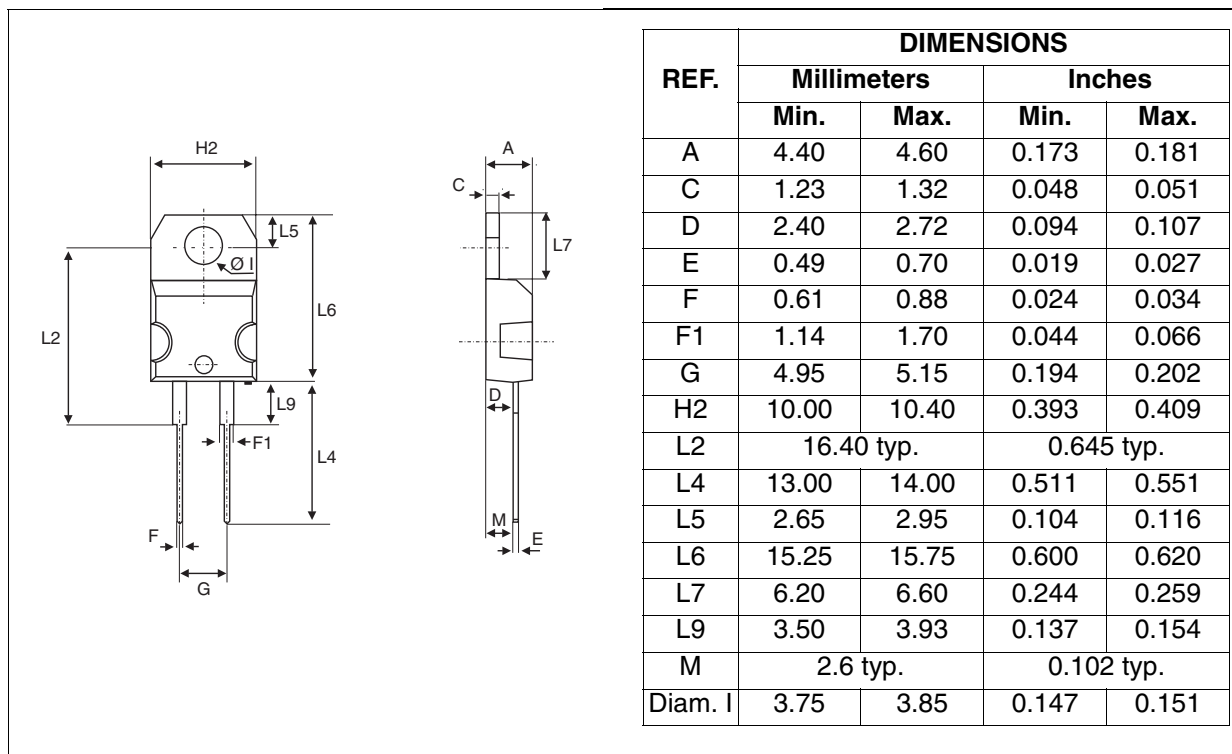


Figure 18: TO-220AC Insulated Package Mechanical Data



## STTH12R06

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**Table 7: Ordering Information**

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH12R06D	STTH12R06D	TO-220AC	1.90 g	50	Tube
STTH12R06G	STTH12R06G	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH12R066G-TR	STTH12R06G	D <sup>2</sup> PAK	1.48 g	1000	Tape & reel
STTH12R06FP	STTH12R06FP	TO-220FPAC	1.70 g	50	Tube
STTH12R06DI	STTH12R06DI	TO-220AC Ins.	1.86 g	250	Box
STTH12R06DIRG	STTH12R06DI	TO-220AC Ins.	1.86 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
January-2002	1	First issue
18-Oct-2004	2	D <sup>2</sup> PAK and TO-220AC Insulated packages added



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