



# T4 Series

SNUBBERLESSTM & LOGIC LEVEL

## 4A TRIACs

**Table 1: Main Features**

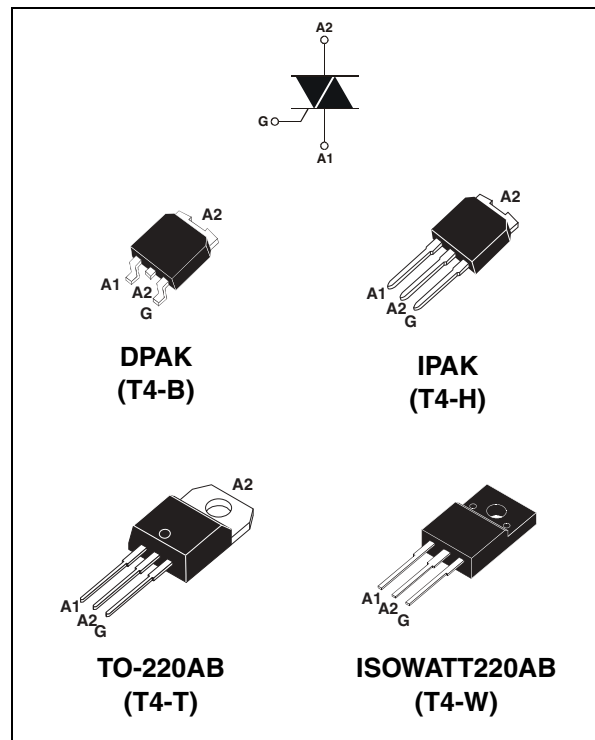
Symbol	Value	Unit
$I_{T(RMS)}$	4	A
$V_{DRM}/V_{RRM}$	600 to 800	V
$I_{GT} (Q_1)$	5 to 35	mA

### DESCRIPTION

Based on ST's Snubberless / Logic level technology providing high commutation performances, the **T4** series is suitable for use on AC inductive loads.

They are recommended for applications using universal motors, electrovalves.... such as kitchen aid equipments, power tools, dishwashers,...

Available in a fully insulated package, the T4...-...W version complies with UL standards (ref. E81734).



**Table 2: Order Codes**

Part Number	Marking
T405-xxxB	See page table 8 on page 9
T405-xxxB-TR	
T405-xxxH	
T405-xxxT	
T405-xxxW	
T410-xxxB	
T410-xxxB-TR	
T410-xxxH	
T4105-xxxT	
T410-xxxW	
T435-xxxB	
T435-xxxB-TR	
T435-xxxH	
T435-xxxT	
T435-xxxW	

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**Table 3: Absolute Maximum Ratings**

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	IPAK/DPAK/ TO-220AB	$T_c = 110^\circ\text{C}$	4	A
		ISOWATT220AB	$T_c = 105^\circ\text{C}$		
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25^\circ\text{C}$ )	F = 50 Hz	t = 20 ms	30	A
		F = 60 Hz	t = 16.7 ms	31	
$I^2t$	$I^2t$ Value for fusing	$t_p = 10$ ms		5.1	$\text{A}^2\text{s}$
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100$ ns	F = 120 Hz	$T_j = 125^\circ\text{C}$	50	$\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current	$t_p = 20$ $\mu\text{s}$	$T_j = 125^\circ\text{C}$	4	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125^\circ\text{C}$	1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	$^\circ\text{C}$

**Tables 4: Electrical Characteristics** ( $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Symbol	Test Conditions	Quadrant		T4			Unit
				T405	T410	T435	
$I_{GT}$ (1)	$V_D = 12$ V $R_L = 30$ $\Omega$	I - II - III	MAX.	5	10	35	mA
$V_{GT}$		I - II - III	MAX.	1.3			V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3$ k $\Omega$ $T_j = 125^\circ\text{C}$	I - II - III	MIN.	0.2			V
$I_H$ (2)	$I_T = 100$ mA		MAX.	10	15	35	mA
$I_L$	$I_G = 1.2$ $I_{GT}$	I - III	MAX.	10	25	50	mA
		II		15	30	60	
dV/dt (2)	$V_D = 67\%$ $V_{DRM}$ gate open $T_j = 125^\circ\text{C}$		MIN.	20	40	400	$\text{V}/\mu\text{s}$
(dI/dt)c (2)	(dV/dt)c = 0.1 $\text{V}/\mu\text{s}$ $T_j = 125^\circ\text{C}$		MIN.	1.8	2.7	-	A/ms
	(dV/dt)c = 10 $\text{V}/\mu\text{s}$ $T_j = 125^\circ\text{C}$			0.9	2.0	-	
	Without snubber $T_j = 125^\circ\text{C}$			-	-	2.5	

**Note 1:** minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max.

**Note 2:** for both polarities of A2 referenced to A1.

Table 5: Static Characteristics

Symbol	Test Conditions			Value	Unit	
$V_T(2)$	$I_{TM} = 5.5 \text{ A}$	$t_p = 380 \mu\text{s}$	$T_j = 25^\circ\text{C}$	MAX.	1.56	V
$V_{to}(2)$	Threshold voltage		$T_j = 125^\circ\text{C}$	MAX.	0.89	V
$R_d(2)$	Dynamic resistance		$T_j = 125^\circ\text{C}$	MAX.	120	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$		$T_j = 25^\circ\text{C}$	MAX.	5	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1	mA

**Note 1:** minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max.

**Note 2:** for both polarities of A2 referenced to A1.

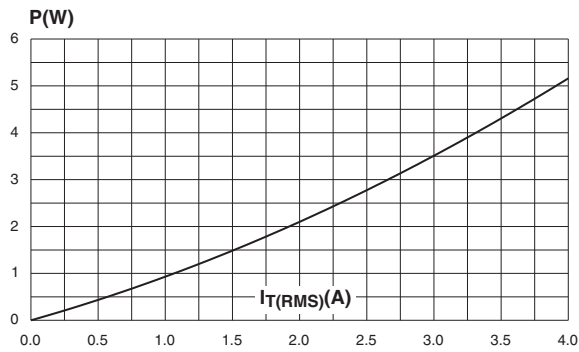
Table 6: Thermal resistance

Symbol	Parameter		Value	Unit	
$R_{th(j-c)}$	Junction to case (AC)		IPAK / DPAK / TO-220AB	2.6	$^\circ\text{C/W}$
			ISOWATT220AB	4.0	
$R_{th(j-a)}$	Junction to ambient	S = 0.5 cm <sup>2</sup>	DPAK	70	$^\circ\text{C/W}$
			TO-220AB / ISOWATT220AB	60	
			IPAK	100	

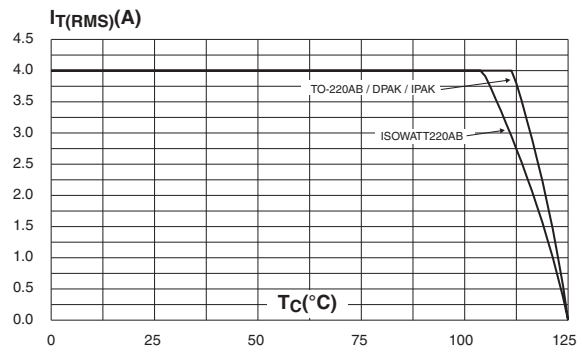
S = Copper surface under tab.

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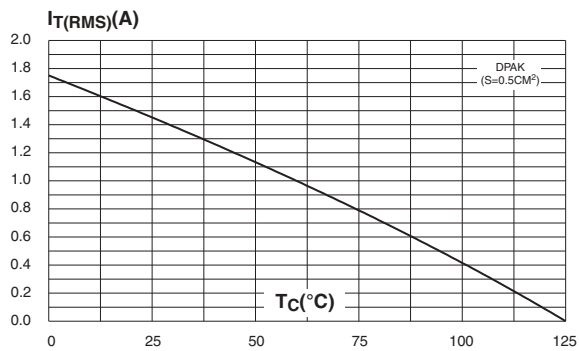
**Figure 1: Maximum power dissipation versus RMS on-state current (full cycle)**



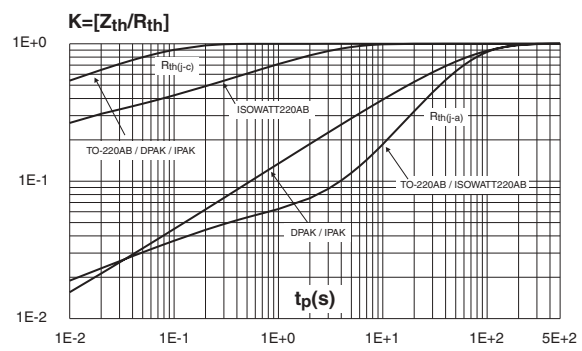
**Figure 2: RMS on-state current versus case temperature (full cycle)**



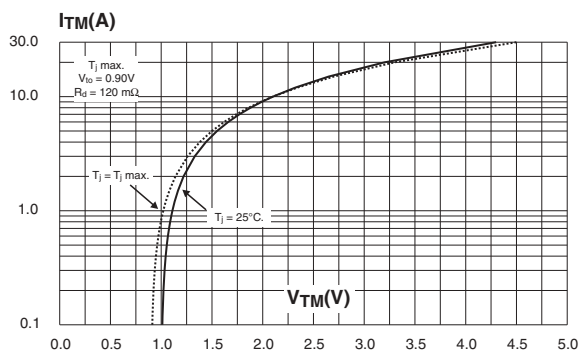
**Figure 3: RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35µm) (full cycle)**



**Figure 4: Relative variation of thermal impedance versus pulse duration**



**Figure 5: On-state characteristics (maximum values)**



**Figure 6: Surge peak on-state current versus number of cycles**

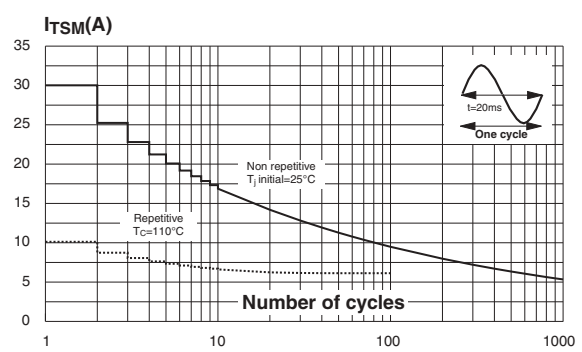


Figure 7: Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms and corresponding value of  $I^2t$

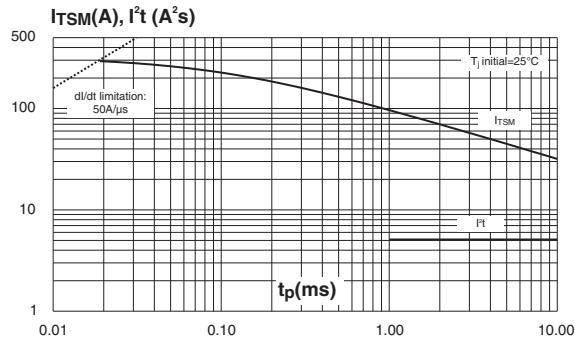


Figure 8: Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

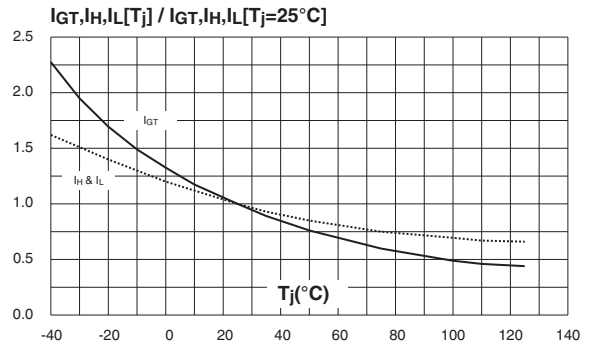


Figure 9: Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values)

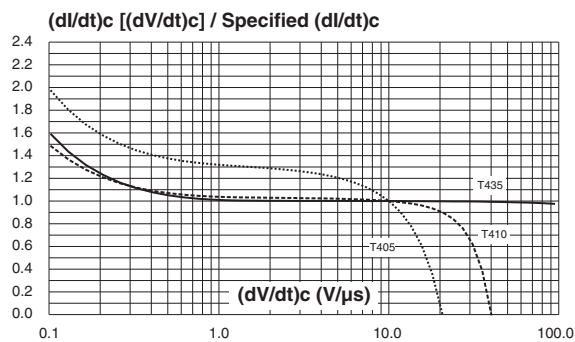


Figure 10: Relative variation of critical rate of decrease of main current versus junction temperature

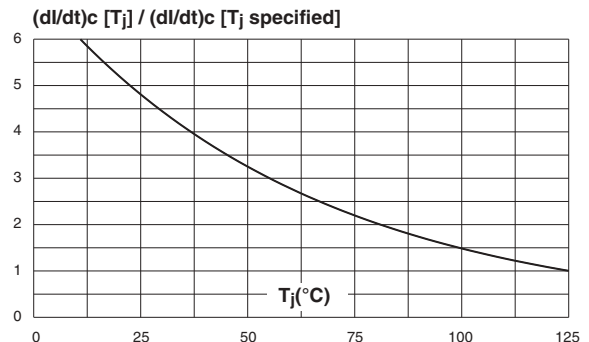
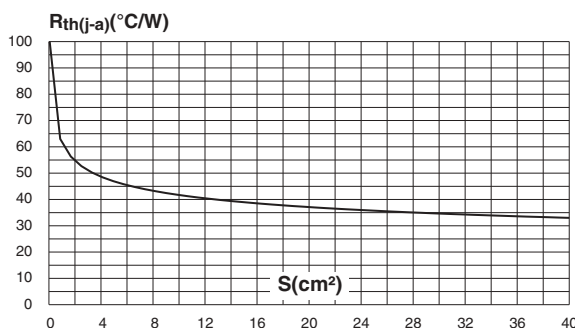


Figure 11: DPAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35  $\mu m$ )



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Figure 12: Ordering Information Scheme

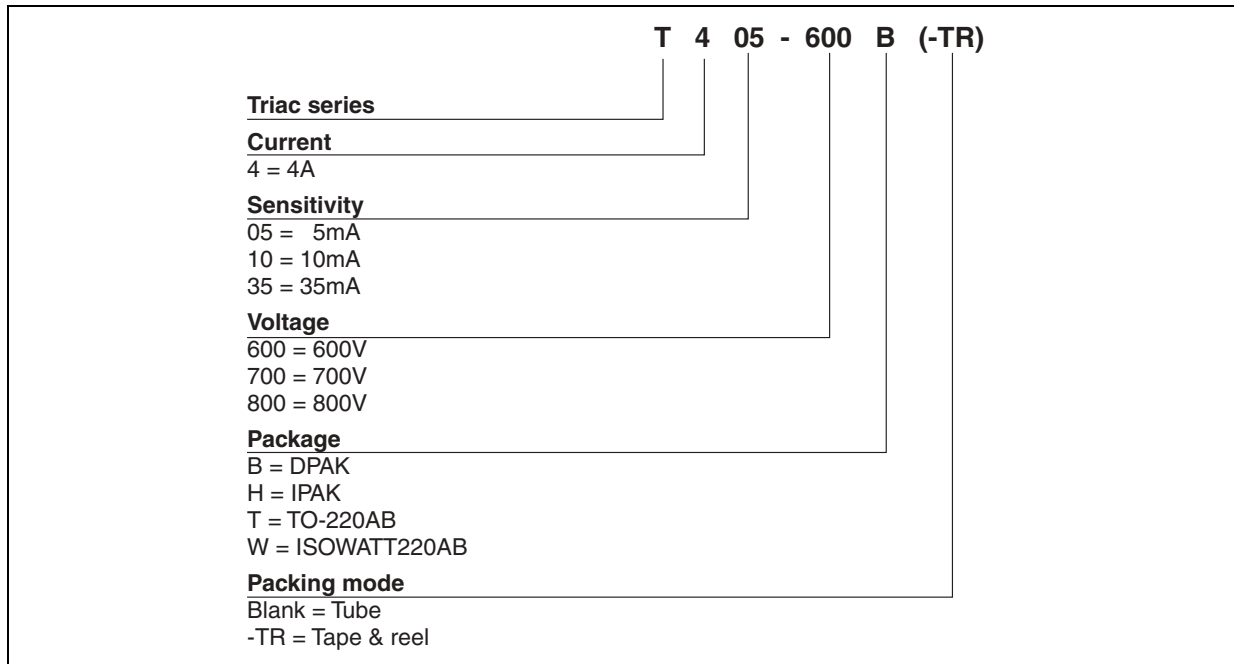


Table 7: Product Selector

Part Number	Voltage (xxx)			Sensitivity	Type	Package
	600 V	700 V	800 V			
T405-xxxB	X	X	X	5 mA	Logic level	DPAK
T405-xxxH	X	X	X	5 mA	Logic level	IPAK
T405-xxxT	X	X	X	5 mA	Logic level	TO-220AB
T405-xxxW	X	X	X	5 mA	Logic level	ISOWATT220AB
T410-xxxB	X	X	X	10 mA	Logic level	DPAK
T410-xxxH	X	X	X	10 mA	Logic Level	IPAK
T410-xxxT	X	X	X	10 mA	Logic Level	TO-220AB
T410-xxxW	X	X	X	10 mA	Logic Level	ISOWATT220AB
T435-xxxB	X	X	X	35 mA	Snubberless	DPAK
T435-xxxH	X	X	X	35 mA	Snubberless	IPAK
T435-xxxT	X	X	X	35 mA	Snubberless	TO-220AB
T435-xxxW	X	X	X	35 mA	Snubberless	ISOWATT220AB

Figure 13: DPAK Package Mechanical Data

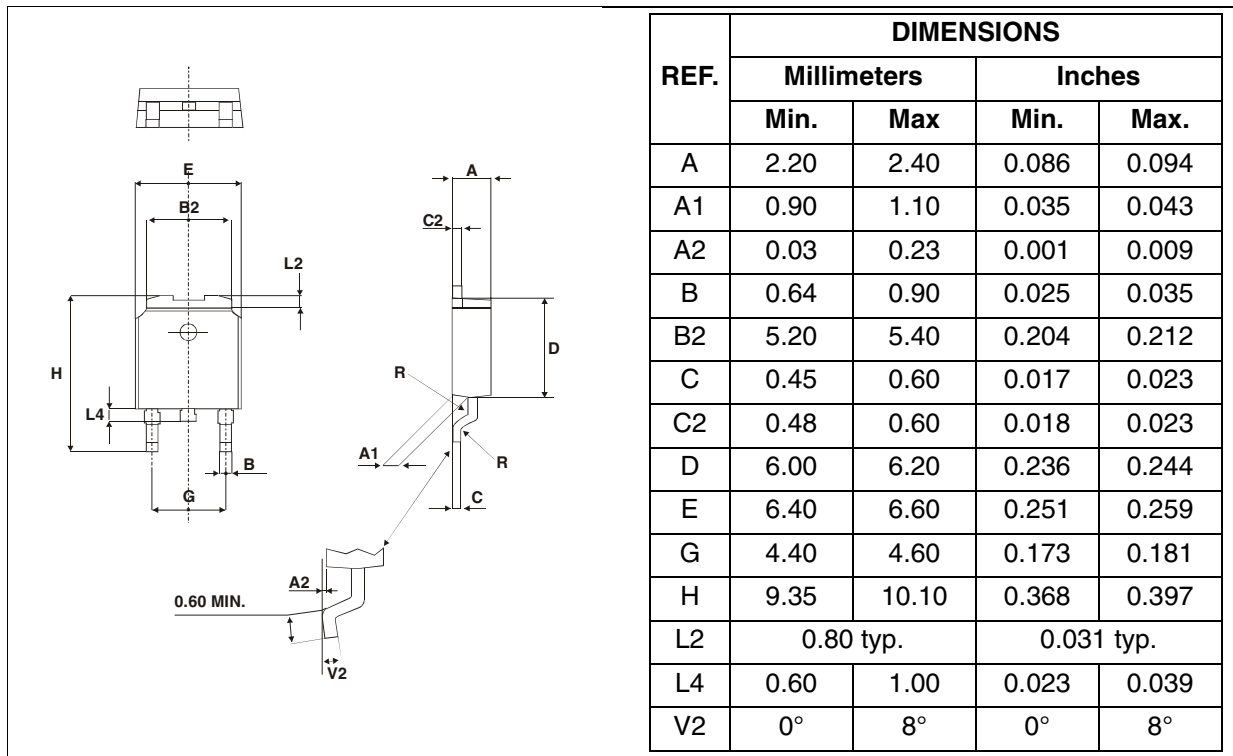
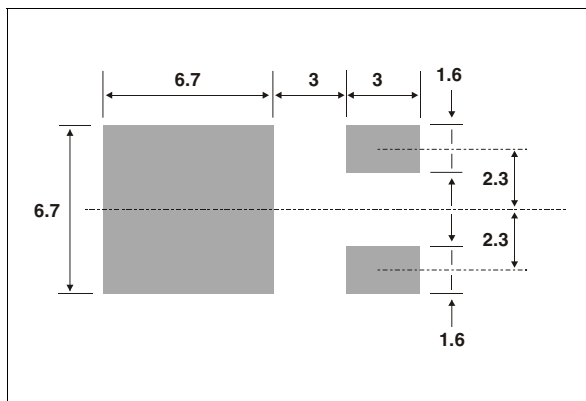


Figure 14: DPAK Foot Print Dimensions (in millimeters)



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Figure 15: ISOWATT220AB Package Mechanical Data

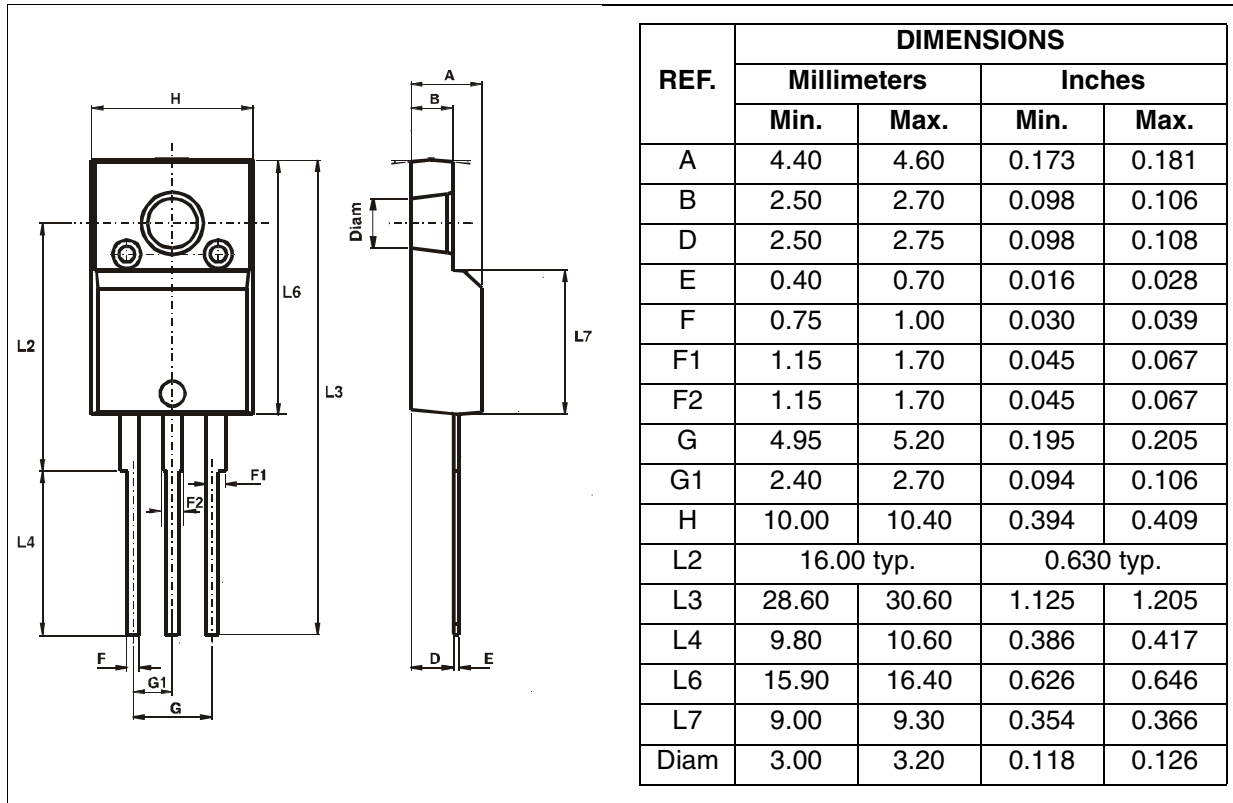


Figure 16: IPAK Package Mechanical Data

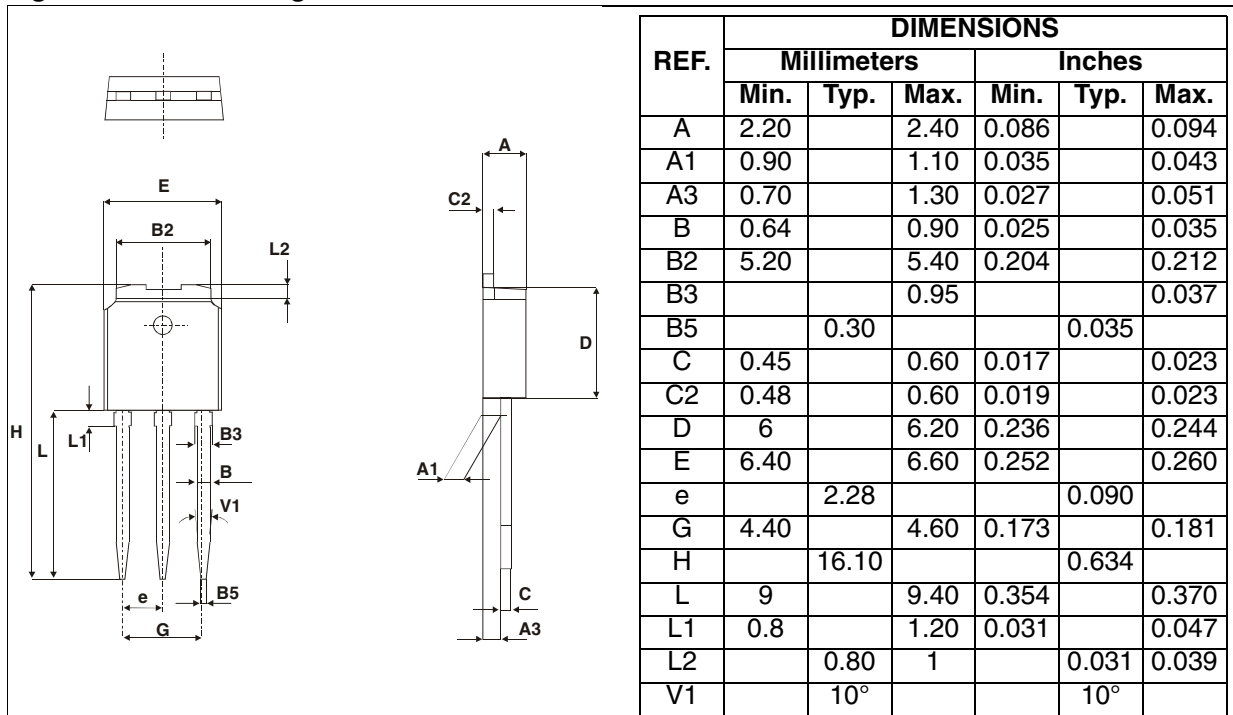




Figure 17: TO-220AB Package Mechanical Data

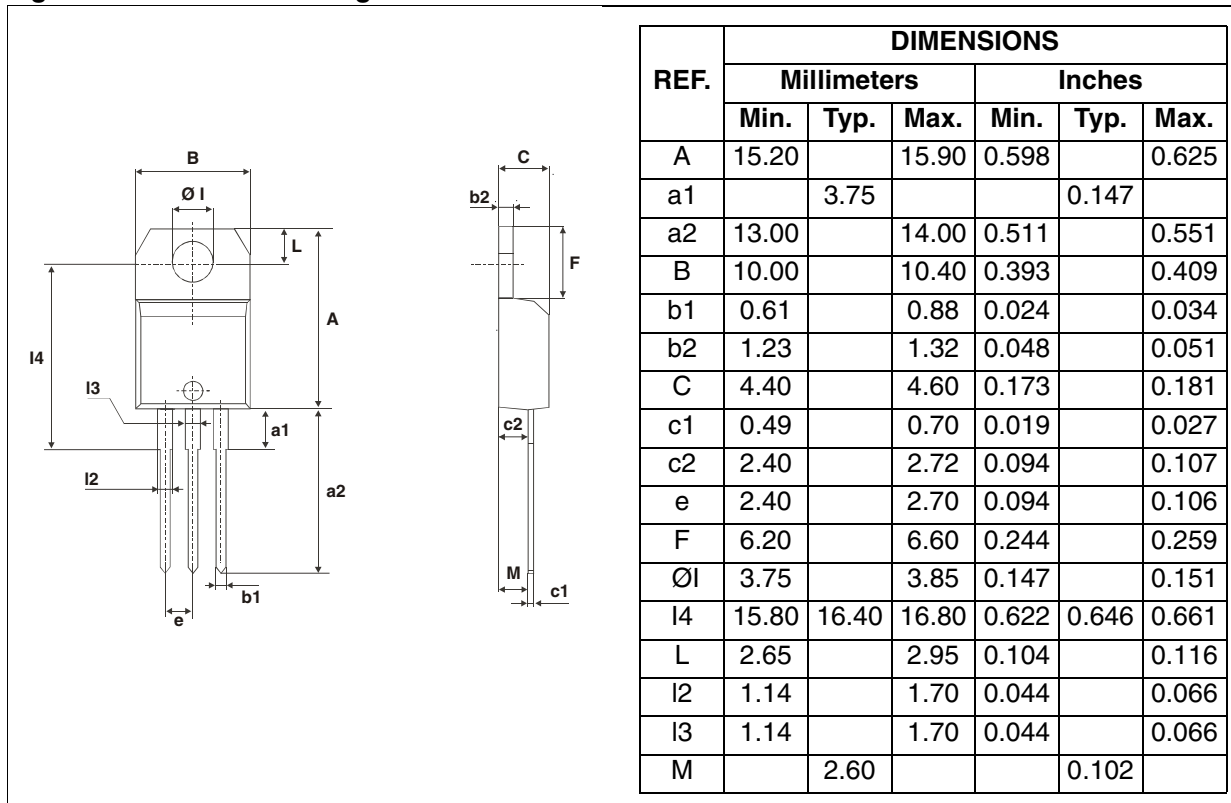


Table 8: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
T4xx-yyyB	T4 xxyy	DPAK	0.3 g	75	Tube
T4xx-yyyB-TR	T4 xxyy	DPAK	0.3 g	2500	Tape & reel
T4xx-yyyH	T4 xxyy	IPAK	0.4 g	75	Tube
T4xx-yyyT	T4xx yyyT	TO-220AB	2.3 g	50	Tube
T4xx-yyyB	T4xxyyyW	ISOWATT220AB	2.1 g	50	Tube

Note: xxx = voltage, yy = sensitivity

Table 9: Revision History

Date	Revision	Description of Changes
Jun-2003	5	Last update.
25-Mar-2005	6	Layout update. No content change.
25-Jan-2005	7	Markings changed in Table 8

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