

25 A standard and Snubberless triacs

Features

- High current triac
- Low thermal resistance with clip bonding
- High commutation (4 quadrant) or very high commutation (3 quadrant) capability
- Packages are RoHS (2011/65/EU) compliant

Applications

Applications include the ON/OFF function in applications such as static relays, heating regulation, induction motor starting circuits, etc., or for phase control operation in light dimmers, motor speed controllers, and similar.

The snubberless versions (BTA/BTB...W and T25 series) are especially recommended for use on inductive loads, due to their high commutation performances. The BTA series provides an insulated tab (rated at 2500 V_{RMS}).

Description

Available either in through-hole or surface-mount packages, the **BTA24, BTB24, BTA25, BTA26, BTB26** and **T25** triac series is suitable for general purpose mains power AC switching.

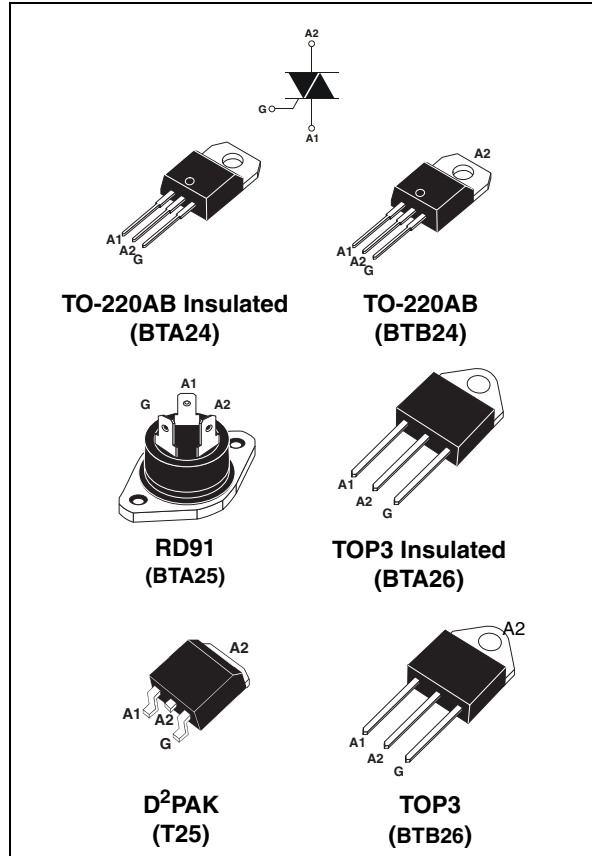
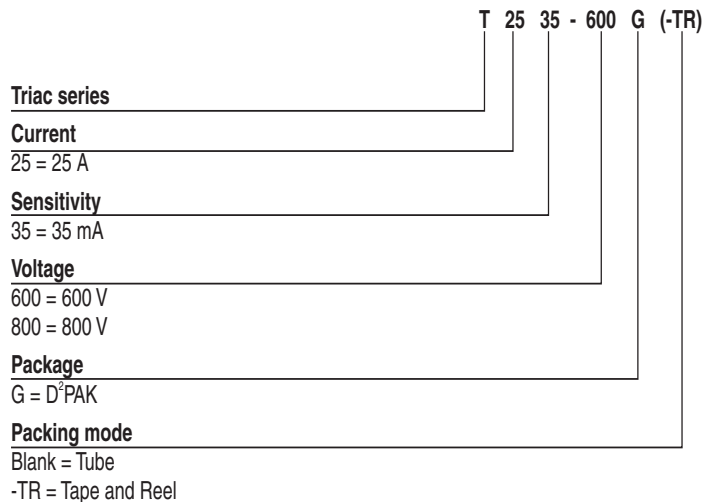
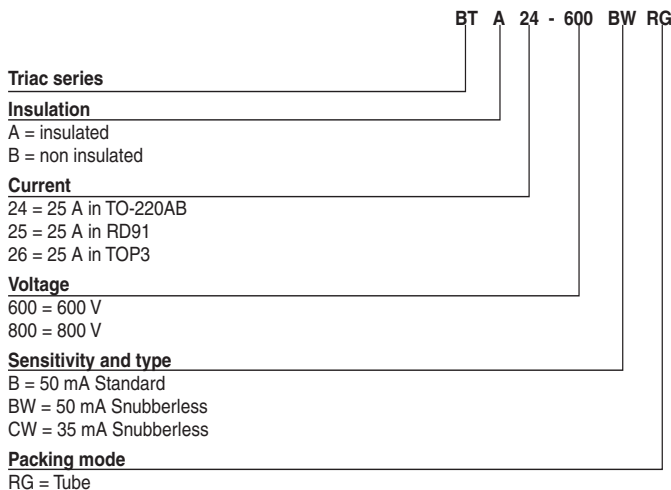


Figure 2. T25 series

Figure 1. BTA and BTB series



1 Characteristics

Table 1. Device summary

Symbol	Parameter	BTA24 ⁽¹⁾	BTB24	BTA25 ⁽¹⁾	BTA26 ⁽¹⁾	BTB26	T25	Unit
$I_{T(RMS)}$	RMS on-state current	25	25	25	25	25	25	A
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage	600 / 800	600 / 800	600 / 800	600 ⁽²⁾ / 800	600	600 / 800	V
I_{GT} (Snubberless)	Triggering gate current	35 / 50	35 / 50	50	35 / 50	-	35	mA
I_{GT} (Standard)	Triggering gate current	-	50	50	50	50	-	mA

1. Insulated packages

 2. 600 V version available only with $I_{GT} = 50$ mA (Snubberless and Standard)

TM: Snubberless is a trademark of STMicroelectronics

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	TOP3 $T_c = 105^\circ\text{C}$	25 A
		D ² PAK / TO-220AB $T_c = 100^\circ\text{C}$	
		RD91 Ins / TOP3 Ins. $T_c = 100^\circ\text{C}$	
		TO-220AB Ins. $T_c = 75^\circ\text{C}$	
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25°C)	F = 50 Hz t = 20 ms	250 A
		F = 60 Hz t = 16.7 ms	260
I^2t	I^2t Value for fusing	$t_p = 10$ ms	340 A ² 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 A/ μ s
V_{DSM}/V_{RSM}	Non repetitive surge peak off-state voltage	$t_p = 10$ ms $T_j = 25^\circ\text{C}$	$V_{DRM}/V_{RRM} + 100$ V
I_{GM}	Peak gate current	$t_p = 20$ μ 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 $^\circ\text{C}$

Table 3. Electrical characteristics ($T_j = 25^\circ\text{C}$, unless otherwise specified), Snubberless and logic level (3 quadrants) T25, BTA/BTB24...W, BTA25...W, BTA26...W

Symbol	Test Conditions	Quadrant		T25	BTA/BTB		Unit
				T2535	CW	BW	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 33\ \Omega$	I - II - III	MAX.	35	35	50	mA
V_{GT}		I - II - III	MAX.	1.3			V
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3\ \text{k}\Omega$ $T_j = 125^\circ\text{C}$	I - II - III	MIN.	0.2			V
$I_H^{(2)}$	$I_T = 500\ \text{mA}$		MAX.	50	50	75	mA
I_L	$I_G = 1.2 I_{GT}$	I - III	MAX.	70	70	80	mA
		II		80	80	100	
$dV/dt^{(2)}$	$V_D = 67\%V_{DRM}$ gate open	$T_j = 125^\circ\text{C}$	MIN.	500	500	1000	$\text{V}/\mu\text{s}$
$(dI/dt)_c^{(2)}$	Without snubber	$T_j = 125^\circ\text{C}$	MIN.	13	13	22	A/ms

1. minimum I_{GT} is guaranteed at 5% of I_{GT} max.
2. for both polarities of A2 referenced to A1.

Table 4. Electrical characteristics ($T_j = 25^\circ\text{C}$, unless otherwise specified), standard (4 quadrants), BTA24...B, BTA25...B, BTA26...B, BTB26...B

Symbol	Test Conditions	Quadrant		Value	Unit
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 33\ \Omega$	I - II - III	MAX.	50	mA
		IV		100	
V_{GT}		ALL	MAX.	1.3	V
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3\ \text{k}\Omega$ $T_j = 125^\circ\text{C}$	ALL	MIN.	0.2	V
$I_H^{(2)}$	$I_T = 500\ \text{mA}$		MAX.	80	mA
I_L	$I_G = 1.2 I_{GT}$	I - III - IV	MAX.	70	mA
		II		160	
$dV/dt^{(2)}$	$V_D = 67\%V_{DRM}$ gate open	$T_j = 125^\circ\text{C}$	MIN.	500	$\text{V}/\mu\text{s}$
$(dV/dt)_c^{(2)}$	$(dI/dt)_c = 13.3\ \text{A}/\text{ms}$	$T_j = 125^\circ\text{C}$	MIN.	10	$\text{V}/\mu\text{s}$

1. minimum I_{GT} is guaranteed at 5% of I_{GT} max.
2. for both polarities of A2 referenced to A1.

Table 5. Static characteristics

Symbol	Test Conditions			Value	Unit	
$V_{TM}^{(1)}$	$I_{TM} = 35\text{ A}$	$t_p = 380\ \mu\text{s}$	$T_j = 25^\circ\text{ C}$	MAX.	1.55	V
$V_{to}^{(1)}$	Threshold voltage		$T_j = 125^\circ\text{ C}$	MAX.	0.85	V
$R_d^{(1)}$	Dynamic resistance		$T_j = 125^\circ\text{ C}$	MAX.	16	m Ω
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$		$T_j = 25^\circ\text{ C}$	MAX.	5	μA
			$T_j = 125^\circ\text{ C}$		3	mA

1. for both polarities of A2 referenced to A1.

Table 6. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	TOP 3	0.6	$^\circ\text{ C/W}$
		D ² PAK / TO-220AB	0.8	
		RD91 Insulated / TOP3 Insulated	0.9	
		TO-220AB Insulated	1.7	
$R_{th(j-a)}$	Junction to ambient	⁽¹⁾ S = 1 cm ² D ² PAK	45	$^\circ\text{ C/W}$
		TOP3 / TOP3 Insulated	50	
		TO-220AB / TO-220AB Insulated	60	

1. S = Copper surface under tab.

Figure3. Maximum power dissipation versus RMS on-state current (full cycle)

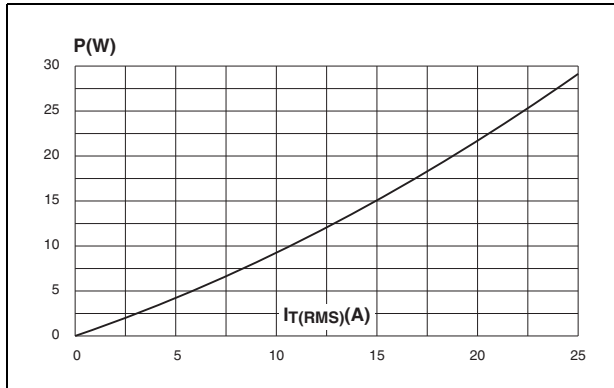


Figure4. RMS on-state current versus case temperature (full cycle)

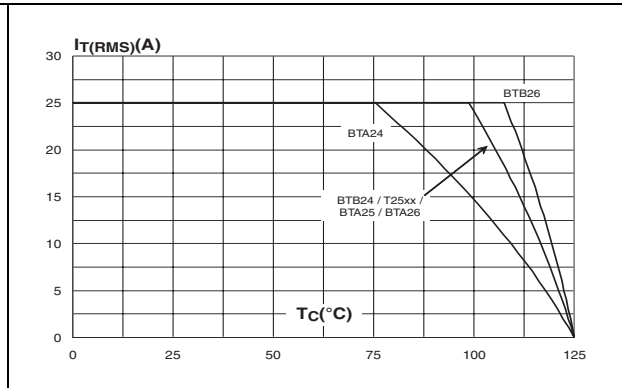


Figure5. D²PAK RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35µm) (full cycle)

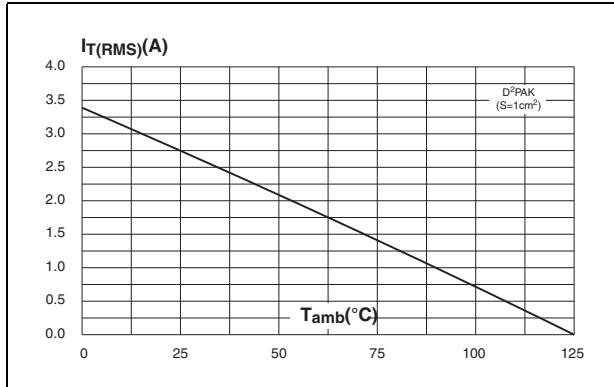


Figure6. Relative variation of thermal impedance versus pulse duration

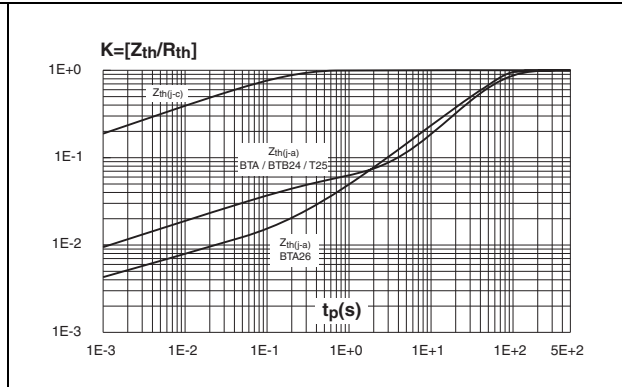


Figure7. On-state characteristics (maximum values)

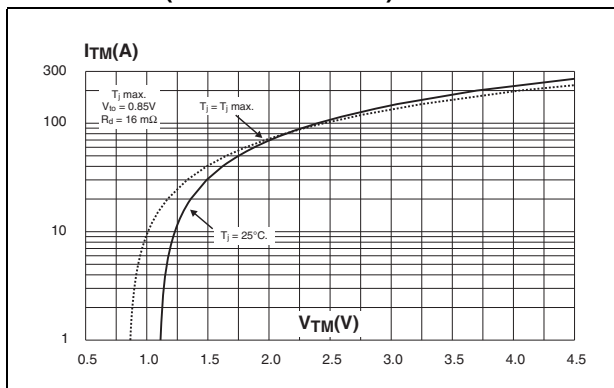


Figure8. Surge peak on-state current versus number of cycles

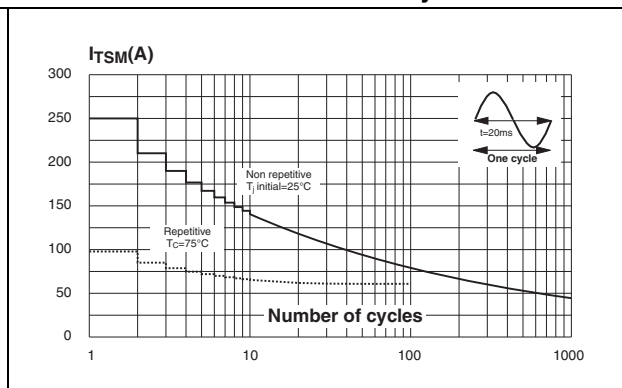


Figure9. Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms and corresponding value of I^2t

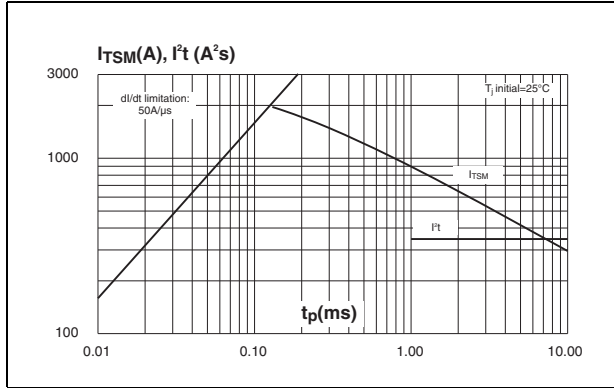


Figure10. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

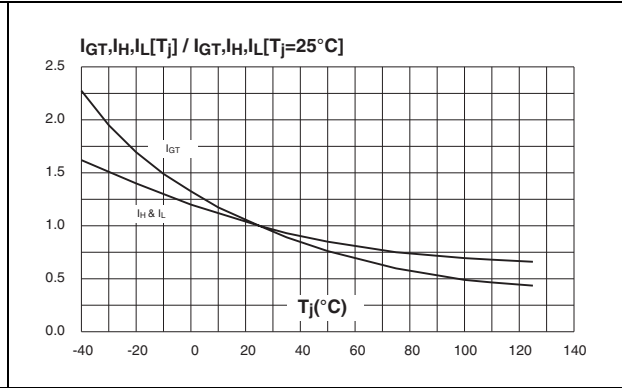


Figure11. Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values)

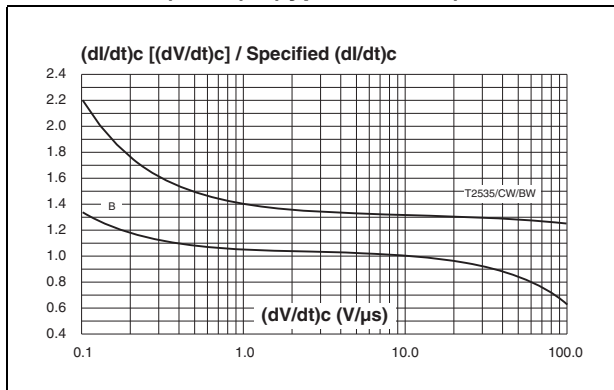


Figure12. Relative variation of critical rate of decrease of main current versus T_j

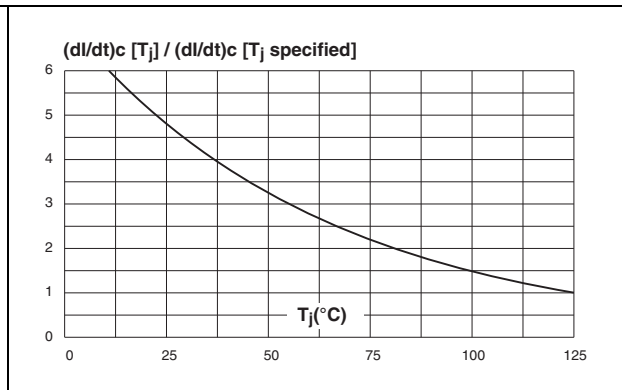


Figure13. D²PAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 μm)

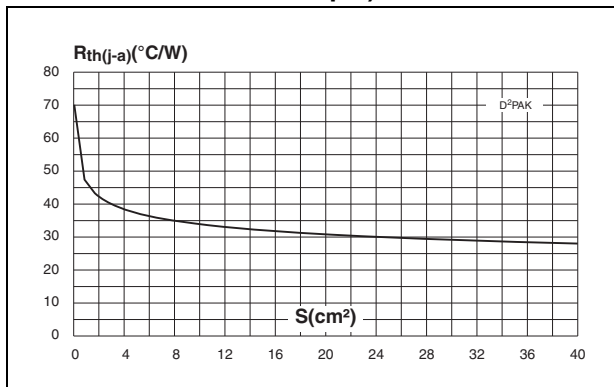


Table 7. D²PAK dimensions

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.40		1.75	0.055		0.069
R		0.40			0.016	
V2	0°		8°	0°		8°

Figure 14. D²PAK footprint dimensions (in millimeters)

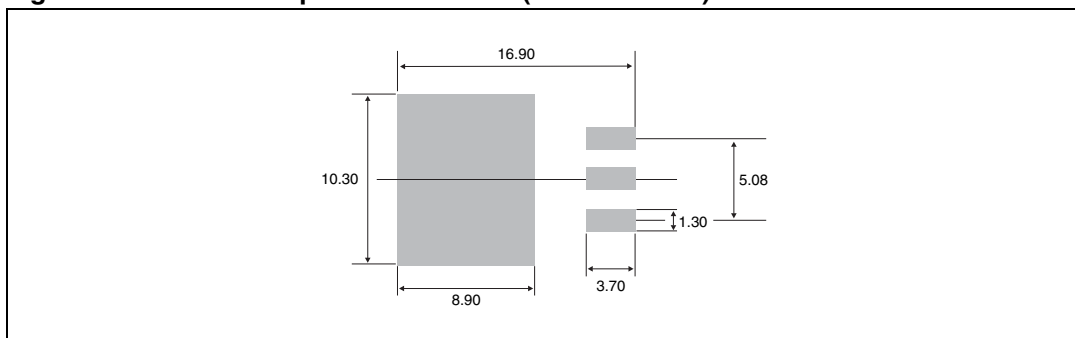


Table 8. RD91 dimensions

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		40.00		1.575
A1	29.90	30.30	1.177	1.193
A2		22.00		0.867
B		27.00		1.063
B1	13.50	16.50	0.531	0.650
B2		24.00		0.945
C		14.00		0.551
C1		3.50		0.138
C2	1.95	3.00	0.077	0.118
E3	0.70	0.90	0.027	0.035
F	4.00	4.50	0.157	0.177
I	11.20	13.60	0.441	0.535
L1	3.10	3.50	0.122	0.138
L2	1.70	1.90	0.067	0.075
N1	33°	43°	33°	43°
N2	28°	38°	28°	38°

Table 9. TOP3 (insulated and non_insulated) dimensions

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
B	1.45		1.55	0.057		0.061
C	14.35		15.60	0.565		0.614
D	0.5		0.7	0.020		0.028
E	2.7		2.9	0.106		0.114
F	15.8		16.5	0.622		0.650
G	20.4		21.1	0.815		0.831
H	15.1		15.5	0.594		0.610
J	5.4		5.65	0.213		0.222
K	3.4		3.65	0.134		0.144
ØL	4.08		4.17	0.161		0.164
P	1.20		1.40	0.047		0.055
R		4.60			0.181	

Table 10. TO-220AB (insulated and non-insulated) dimensions

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
I3	1.14		1.70	0.044		0.066
M		2.60			0.102	

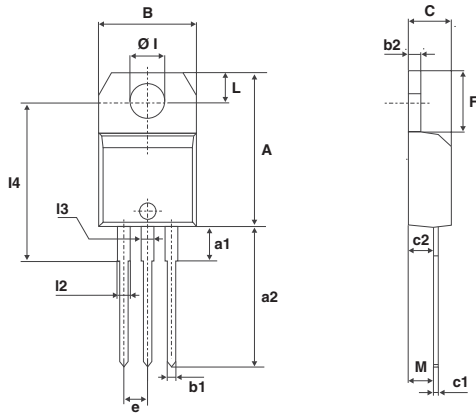
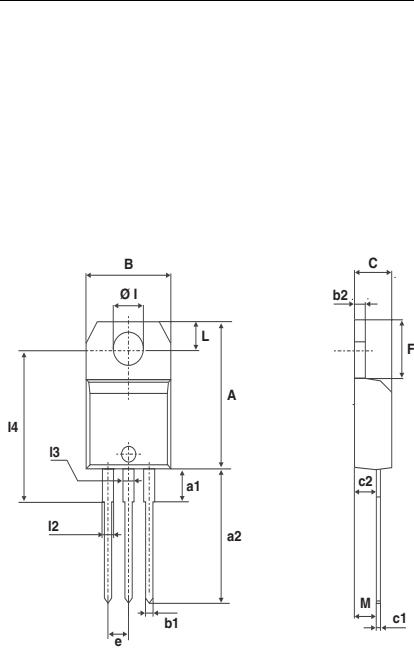


Table 10. TO-220AB (insulated and non-insulated) dimensions



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l3	1.14		1.70	0.044		0.066
M		2.60			0.102	

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