

## BTA12, BTB12, T12xx

12 A Snubberless™, logic level and standard triacs

### Features

- Medium current triac
- Low thermal resistance with clip bonding
- Low thermal resistance insulation ceramic for insulated BTA
- High commutation (4Q) or very high commutation (3Q) capability

### Applications

ON/OFF or phase angle function in applications such as static relays, light dimmers and appliance motors speed controllers.

The snubberless versions (BTA/BTB...W and T12 series) are especially recommended for use on inductive loads, because of 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 **BTA12**, **BTB12** and **T12xx** triac series is suitable for general purpose mains power AC switching.

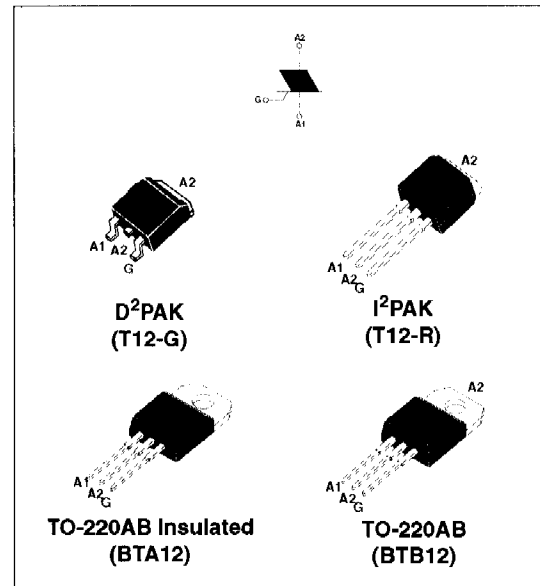


Table 1. Device summary

Symbol	Parameter	T12xx	BTA12 <sup>(1)</sup>	BTB12
$I_{T(RMS)}$	RMS on-state current	12	12	12
$V_{DRM}/V_{RRM}$	Repetitive peak off-state voltage	600/800	600/800	600/800
$I_{GT}$ (Snubberless)	Triggering gate current	10/35/50	5/10/35/50	5/10/35/50
$I_{GT}$ (Standard)	Triggering gate current	-	35/50	35/50

1. Insulated



# Characteristics

**Table 2. Absolute maximum ratings**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	RMS on-state current (full sine wave)	I <sup>2</sup> PAK / D <sup>2</sup> PAK / TO-220AB	$T_c = 105^\circ C$	12	A
		TO-220AB Ins.	$T_c = 90^\circ C$		
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25^\circ C$ )	F = 50 Hz	t = 20 ms	120	A
		F = 60 Hz	t = 16.7 ms	126	
$I^2t$	$I^2t$ Value for fusing	$t_p = 10$ ms		78	A <sup>2</sup> 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	$T_j = 125^\circ C$	50	A/ $\mu$ s
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10$ ms	$T_j = 25^\circ C$	$V_{DRM}/V_{RRM}$ + 100	V
$I_{GM}$	Peak gate current	$t_p = 20$ $\mu$ s	$T_j = 125^\circ C$	4	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 125^\circ C$		1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	$^\circ C$

**Table 3. Electrical characteristics ( $T_j = 25^\circ C$ , unless otherwise specified)  
Snubberless and logic level (3 quadrants)**

Symbol	Test conditions	Quadrant		T12xx			BTA12 / BTB12				Unit
				T1210	T1235	T1250	TW	SW	CW	BW	
$I_{GT}^{(1)}$	$V_D = 12$ V	I - II - III	MAX.	10	35	50	5	10	35	50	mA
$V_{GT}$	$R_L = 30$ $\Omega$	I - II - III	MAX.	1.3							V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3$ k $\Omega$ $T_j = 125^\circ C$	I - II - III	MIN.	0.2							V
$I_H^{(2)}$	$I_T = 100$ mA		MAX.	15	35	50	10	15	35	50	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - III	MAX.	25	50	70	10	25	50	70	mA
		II		30	60	80	15	30	60	80	
dV/dt (2)	$V_D = 67\% V_{DRM}$ gate open $T_j = 125^\circ C$		MIN.	40	500	1000	20	40	500	1000	V/ $\mu$ s
(di/dt) <sub>c</sub> (2)	(dV/dt) <sub>c</sub> = 0.1 V/ $\mu$ s $T_j = 125^\circ C$		MIN.	6.5			3.5	6.5			A/ms
	(dV/dt) <sub>c</sub> = 10 V/ $\mu$ s $T_j = 125^\circ C$			2.9			1	2.9			
	Without snubber $T_j = 125^\circ C$				6.5	12			6.5	12	

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)**

Symbol	Test Conditions	Quadrant		BTA12 / BTB12		Unit
				C	B	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 30\ \Omega$	I - II - III IV	MAX.	25 50	50 100	mA
$V_{GT}$		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.	25	50	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - III - IV	MAX.	40	50	mA
		II		80	100	
$dV/dt^{(2)}$	$V_D = 67\% V_{DRM}$ gate open $T_j = 125^\circ\text{C}$		MIN.	200	400	V/ $\mu\text{s}$
$(dV/dt)_c^{(2)}$	$(dI/dt)_c = 5.3\ \text{A/ms}$ $T_j = 125^\circ\text{C}$		MIN.	5	10	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
$V_T^{(1)}$	$I_{TM} = 17\ \text{A}$ $t_p = 380\ \mu\text{s}$	$T_j = 25^\circ\text{C}$	MAX.	1.55	V
$V_{th}^{(1)}$	Threshold voltage	$T_j = 125^\circ\text{C}$	MAX.	0.85	V
$R_d^{(1)}$	Dynamic resistance	$T_j = 125^\circ\text{C}$	MAX.	35	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

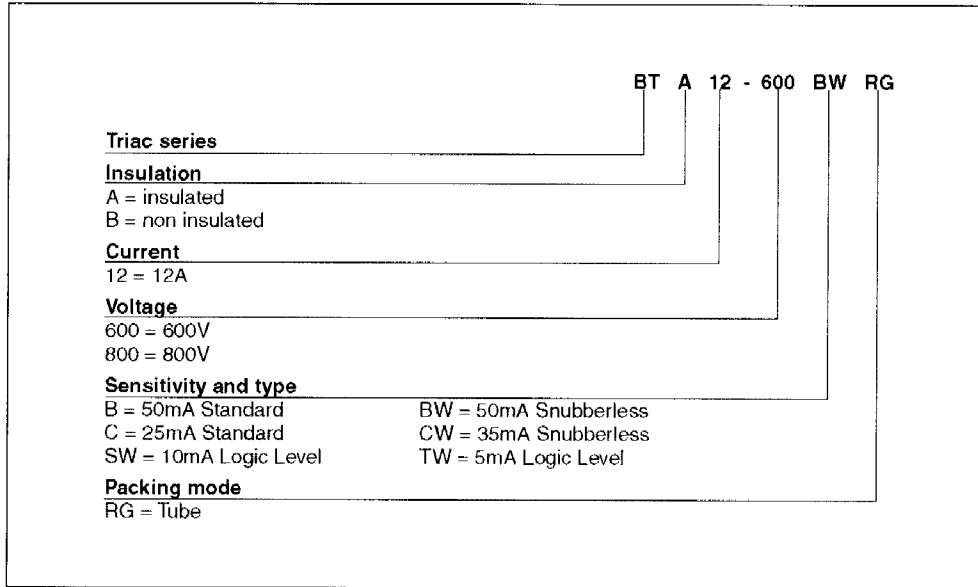
1. for both polarities of A2 referenced to A1

**Table 6. Thermal resistance**

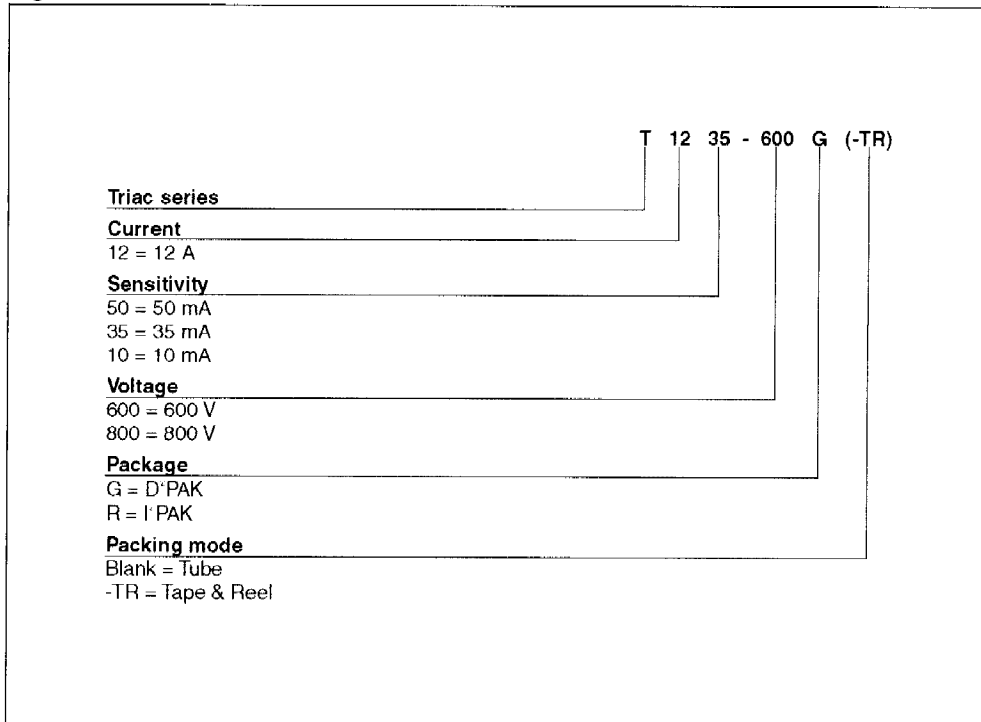
Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	$I^2\text{PAK} / D^2\text{PAK} / \text{TO-220AB}$	1.4	$^\circ\text{C/W}$
		TO-220AB insulated	2.3	
$R_{th(j-a)}$	Junction to ambient	$S^{(1)} = 1\ \text{cm}^2$ $D^2\text{PAK}$	45	$^\circ\text{C/W}$
		TO-220AB / $I^2\text{PAK}$ TO-220AB insulated	60	

1. Copper surface under tab.

**Figure 13. BTA12 and BTB12 series**



**Figure 14. T12xx series**



Product selector

Order code <sup>(1)</sup>	Voltage (xxx)		Sensitivity	Type	Package
	600 V	800 V			
BTA/BTB12-xxxBRG	X	X	50 mA	Standard	TO-220AB
BTA/BTB12-xxxBWRG	X	X	50 mA	Snubberless	TO-220AB
BTA/BTB12-xxxCRG	X	X	25 mA	Standard	TO-220AB
BTA/BTB12-xxxCWRG	X	X	35 mA	Snubberless	TO-220AB
BTA/BTB12-xxxSWRG	X	X	10 mA	Logic Level	TO-220AB
BTA/BTB12-xxxTWRG	X	X	5 mA	Logic Level	TO-220AB
T1210-800G	-	X	10 mA	Logic Level	D <sup>2</sup> PAK
T1235-xxxG	X	X	35 mA	Snubberless	D <sup>2</sup> PAK
T1235-xxxR	X	X	35 mA	Snubberless	I <sup>2</sup> PAK
T1250-600G	X	-	50 mA	Snubberless	D <sup>2</sup> PAK

1. BTB: non insulated TO-220AB package

D<sup>2</sup>PAK dimensions

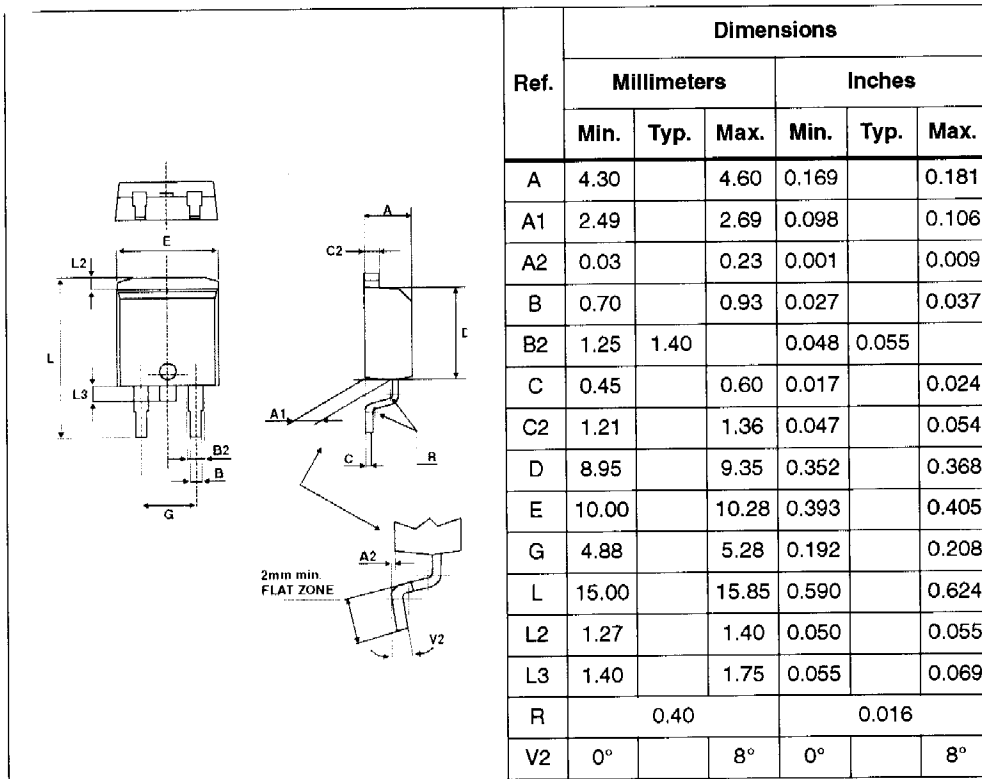


Figure 15. Footprint (dimensions in mm)

