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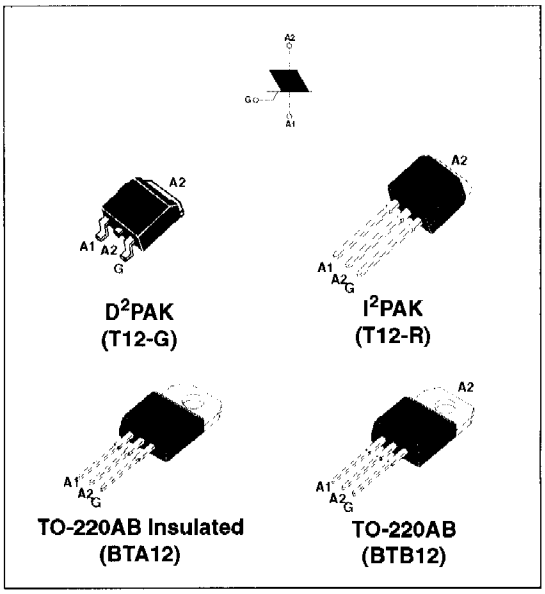
BTA12, BTB12, T12xx

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 (1)	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^2PAK / D^2PAK / TO-220AB	T_c = 105° C	12	A
		TO-220AB Ins.	T_c = 90° C		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25° 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^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT} , $t_r \leq$ 100 ns	F = 120 Hz	T_j = 125° C	50	A/µs
V_{DSM}/V_{RSM}	Non repetitive surge peak off-state voltage	t_p = 10 ms	T_j = 25° C	V_{DRM}/V_{RRM} + 100	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125° C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125° C	1	W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C

Table 3. Electrical characteristics (T_j = 25°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 R_L = 30 Ω	I - II - III	MAX.	10	35	50	5	10	35	50	mA
V_{GT}		I - II - III	MAX.	1.3							V
V_{GD}	V_D = V_{DRM} R_L = 3.3 kΩ T_j = 125° 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° C		MIN.	40	500	1000	20	40	500	1000	V/µs
(dI/dt)c (2)	(dV/dt)c = 0.1 V/µs T_j = 125° C		MIN.	6.5			3.5	6.5			A/ms
	(dV/dt)c = 10 V/µs T_j = 125° C			2.9			1	2.9			
	Without snubber T_j= 125° C				6.5	12			6.5	12	

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

Table 4. Electrical characteristics (T_j = 25°C, unless otherwise specified)
standard (4 quadrants)

Symbol	Test Conditions	Quadrant		BTA12 / BTB12		Unit
				C	B	
I_{GT} (1)	V_D = 12 V R_L = 30 Ω	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 kΩ T_j = 125° C	ALL	MIN.	0.2		V
I_H (2)	I_T = 500 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° C		MIN.	200	400	V/µs
(dV/dt)c (2)	(dI/dt)c = 5.3 A/ms T_j = 125° C		MIN.	5	10	V/µs

1. Minimum I_{GT} is guaranted 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 A t_p = 380 µs	T_j = 25° C	MAX.	1.55	V
V_{t0} (1)	Threshold voltage	T_j = 125° C	MAX.	0.85	V
R_d (1)	Dynamic resistance	T_j = 125° C	MAX.	35	mΩ
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$	T_j = 25° C	MAX.	5	µA
		T_j= 125° 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^2PAK / D^2PAK / TO-220AB	1.4	°C/W
			TO-220AB insulated	2.3	
$R_{th(j-a)}$	Junction to ambient	S(1) = 1 cm^2	D^2PAK	45	°C/W
			TO-220AB / I^2PAK TO-220AB insulated	60	

1. Copper surface under tab.

Figure 13. BTA12 and BTB12 series

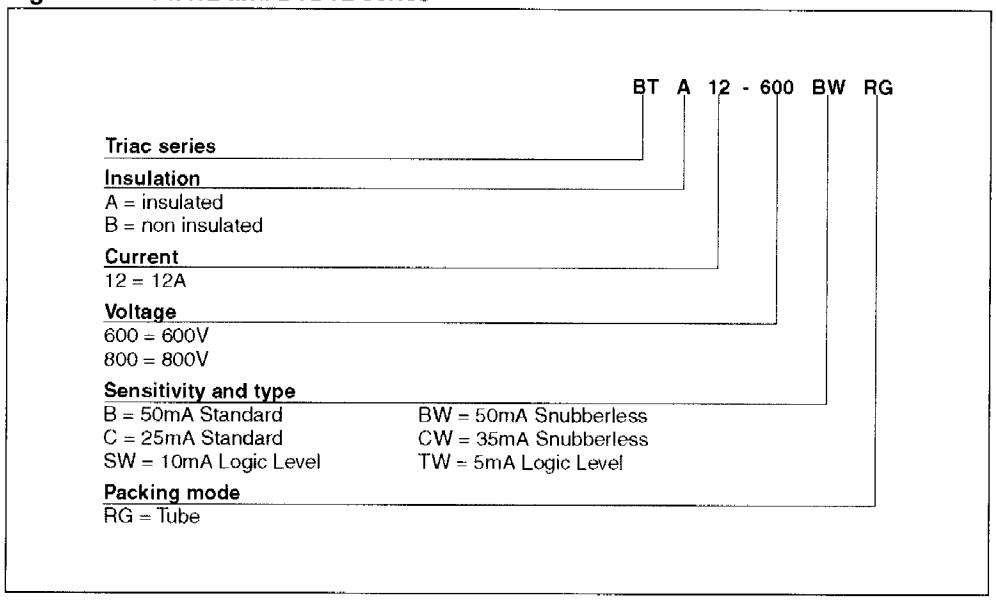
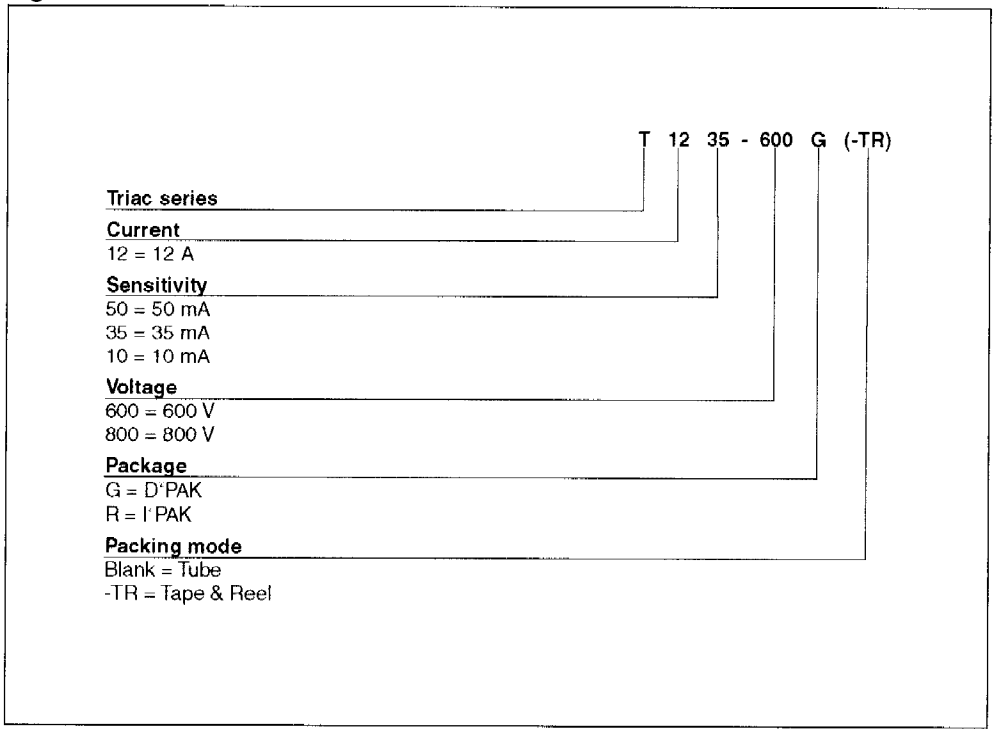


Figure 14. T12xx series

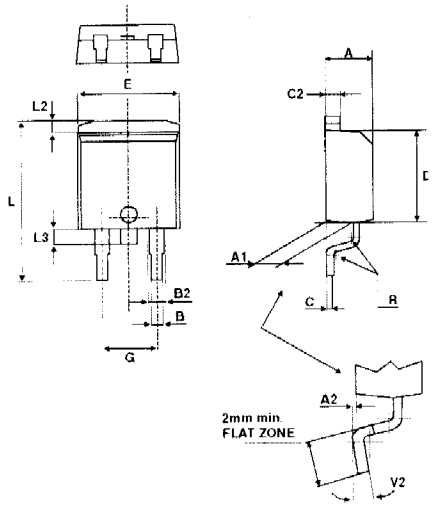


Product selector

Order code[1]	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^2PAK
T1235-xxxG	X	X	35 mA	Snubberless	D^2PAK
T1235-xxxR	X	X	35 mA	Snubberless	I^2PAK
T1250-600G	X	-	50 mA	Snubberless	D^2PAK

1. **BTB:** non insulated TO-220AB package

D^2PAK 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 15. Footprint (dimensions in mm)