

BTA24, BTB24, BTA25, BTA26 and T25 series

Snuberrless™ and Standard

25 A Triacs

Main features

Symbol	Value	Unit
I _{T(RMS)}	25	Α
V _{DRM} /V _{RRM}	600 and 800	V
I _{GT (Q₁)}	35 to 50	mA

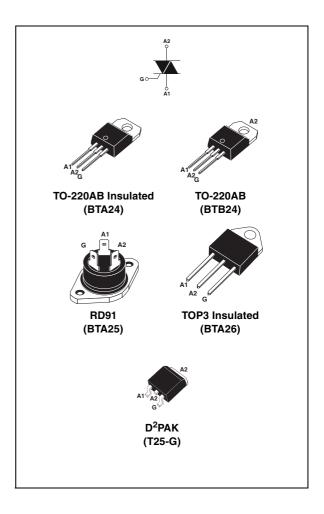
Description

Available either in through-hole or surface-mount packages, the BTA24, BTB24, BTA25, BTA26 and T25 triac series is suitable for general purpose AC switching. They can be used as an ON/OFF function in applications such as static relays, heating regulation, induction motor starting circuits... or for phase control operation in light dimmers, motor speed controllers, ...

The snubberless versions (BTA/BTB...W and T25 series) are specially recommended for use on inductive loads, thanks to their high commutation performances. By using an internal ceramic pad, the BTA series provides voltage insulated tab (rated at 2500V_{RMS}) complying with UL standards (File ref.: E81734).

Order codes

Part Number	Marking
BTA24-xxxxxRG	
BTB24-xxxxxRG	
BTA25-xxxxxRG	See <i>Table 6 on page 6</i>
BTA26-xxxxxRG	See Table 6 on page 6
T25xx-xxxG	
T25xx-xxxG-TR	



TM: Snubberless is a trademark of STMicroelectronics

1 Characteristics

Table 1. Absolute maximum ratings

Symbol	Parame	Parameter				
		D ² PAK / TO-220AB	T _c = 100° C			
I _{T(RMS)}	RMS on-state current (full sine wave)	RD91 / TOP3 Ins.	T _c = 90° C	25	Α	
		TO-220AB Ins.	T _c = 75° C			
	Non repetitive surge peak on-state	F = 50 Hz	t = 20 ms	250	Α	
I _{TSM}	current (full cycle, T_j initial = 25° C)	F = 60 Hz	t = 16.7 ms	260	A	
l ² t	I ² t Value for fusing	t _p = 10 ms		340	A ² s	
dl/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \le 100 \text{ ns}$	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 _{DSM} /V _{RSM} + 100	V	
I _{GM}	Peak gate current	t _p = 20 μs	T _j = 125° C	4	Α	
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	°C	

Table 2. Electrical characteristics (T_j = 25° C, unless otherwise specified), Snubberless™ and Logic Level (3 quadrants) T25-G, BTA/BTB24...W, BTA25...W, BTA26...W

Symbol	Test Conditions	Quadrant		T25	вта/втв		I I m i A
Syllibol	rest Conditions	Quaurant		T2535	CW	BW	Unit
I _{GT} ⁽¹⁾	V _D = 12 V R _I = 33 Ω	I - II - III	MAX.	35	35	50	mA
V _{GT}	$V_D = 12 V n_L = 33.52$	I - II - III	MAX.		1.3		V
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3 \text{ k}\Omega$ $I - II - III$		MIN.		0.2		V
I _H ⁽²⁾	I _T = 500 mA		MAX.	50	50	75	mA
IL	I _G = 1.2 I _{GT}	I - III	MAX.	70	70	80	mA
'L	IG = 1.2 IGT	II	IVIAA.	80	80	100	IIIA
dV/dt (2)	V _D = 67 %V _{DRM} gate open	T _j = 125° C	MIN.	500	500	1000	V/µs
(dl/dt)c (2)	Without snubber	T _j = 125° C	MIN.	13	13	22	A/ms

^{1.} minimum I_{GT} is guaranted at 5% of I_{GT} max.

^{2.} for both polarities of A2 referenced to A1.

Table 3. Electrical characteristics ($T_j = 25^{\circ}$ C, unless otherwise specified), Standard (4 quadrants), BTB24...B, BTA25...B, BTA26...B

Symbol	Test Conditions	Quadrant		Value	Unit
I _{GT} ⁽¹⁾	$V_D = 12 \text{ V}$ $R_L = 33 \Omega$	I - II - III - IV	MAX.	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 mA		MAX.	80	mA
	1 - 121	I - III - IV	MAX.	70	Λ
IL	$I_{G} = 1.2 I_{GT}$	II	IVIAA.	160	mA
dV/dt ⁽²⁾	V _D = 67 %V _{DRM} gate open	T _j = 125° C	MIN.	500	V/µs
(dV/dt)c (2)	(dl/dt)c = 13.3 A/ms	T _j = 125° C	MIN.	10	V/µs

^{1.} minimum I_{GT} is guaranted at 5% of I_{GT} max.

Table 4. Static characteristics

Symbol	Test Conditions			Value	Unit
V _T ⁽¹⁾	$I_{TM} = 35 \text{ A}$ $t_p = 380 \mu\text{s}$	T _j = 25° C	MAX.	1.55	٧
V _{t0} (1)	Threshold voltage	T _j = 125° C	MAX.	0.85	٧
R _d ⁽¹⁾	Dynamic resistance	T _j = 125° C	MAX.	16	mΩ
I _{DRM}	V - V	T _j = 25° C	MAX.	5	μA
I _{RRM}	$V_{DRM} = V_{RRM}$	T _j = 125° C	IVIAA.	3	mA

^{1.} for both polarities of A2 referenced to A1.

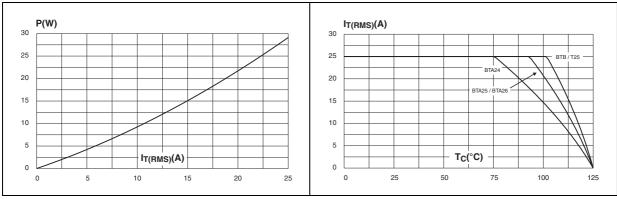
Table 5. Thermal resistance

Symbol		Parameter			Unit
			D ² PAK / TO-220AB	0.8	
R _{th(j-c)}	R _{th(j-c)} Junction to case (AC)		RD91 (Insulated) / TOP3 Insulated	1.1	° C/W
			TO-220AB Insulated	1.7	
		⁽¹⁾ S = 1 cm ²	D ² PAK	45	
R _{th(j-a)}	R _{th(j-a)} Junction to ambient		TOP3 Insulated	50	° C/W
			TO-220AB / TO-220AB Insulated	60	

^{1.} S = Copper surface under tab.

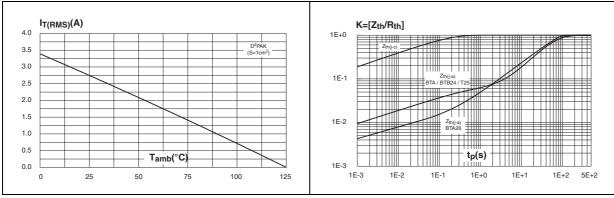
^{2.} for both polarities of A2 referenced to A1.

Maximum power dissipation versus Figure 2. Figure 1. RMS on-state current versus case RMS on-state current (full cycle) temperature (full cycle)



D²PAK RMS on-state current versus Figure 4. Figure 3. Relative variation of thermal ambient temperature (printed circuit board FR4, copper thickness: 35µm) (full cycle)

impedance versus pulse duration



On-state characteristics Figure 5. (maximum values)

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

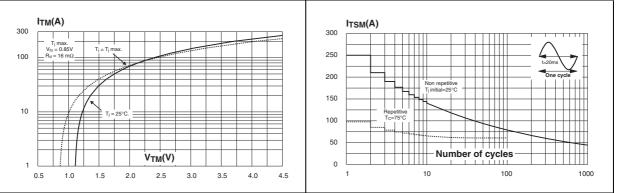
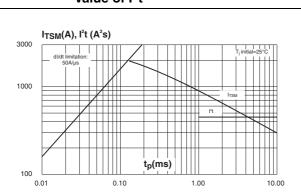


Figure 7. Non-repetitive surge peak on-state Figure 8. current for a sinusoidal pulse with width $t_p < 10$ ms and corresponding value of l²t



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

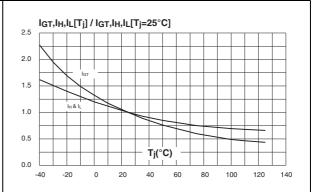
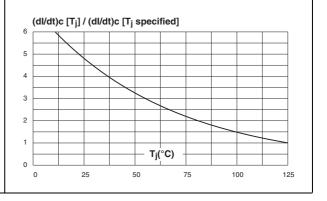


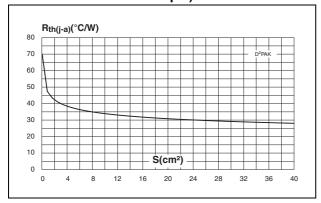
Figure 9. decrease of main current versus (dV/dt)c (typical values)

(dl/dt)c [(dV/dt)c] / Specified (dl/dt)c 2.4 2.2 2.0 1.8 1.4 1.2 1.0 0.8 0.6 (dV/dt)c (V/µs) 0.4 0.1 1.0 10.0

Relative variation of critical rate of Figure 10. Relative variation of critical rate of decrease of main current versus (dV/dt)c



D²PAK Thermal resistance junction to Figure 11. ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 µm)



2 Ordering information scheme

Figure 12. BTA and BTB series

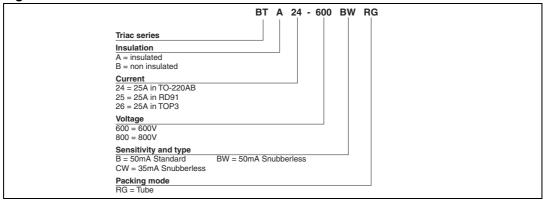


Figure 13. T25 series

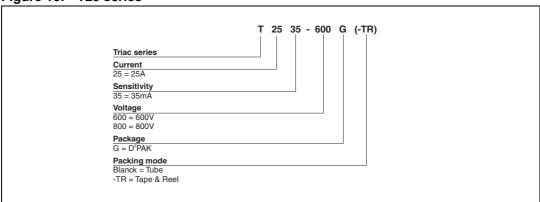


Table 6. Product Selector

Part Numbers	Voltage (xxx)		Sensitivity	Туре	Dookono
Part Numbers	600 V	800 V	Sensitivity	туре	Package
BTA24-xxxBRG	Х	Х	50 mA	Standard	TO-220AB
BTA/BTB ⁽¹⁾ 24-xxxBWRG	Х	Х	50 mA	Snubberless	TO-220AB
BTA/BTB ⁽¹⁾ 24-xxxCWRG	Х	Х	35 mA	Snubberless	TO-220AB
BTA25-xxxBRG	Х	Х	50 mA	Standard	RD91
BTA25-xxxBWRG	Х	Х	50 mA	Snubberless	RD91
BTA25-xxxCWRG	Х	Х	35 mA	Snubberless	RD91
BTA26-xxxBRG	Х	Х	50 mA	Standard	TOP3 Ins.
BTA26-xxxBWRG	Х	Х	50 mA	Snubberless	TOP3 Ins.
BTA26-xxxCWRG	Х	Х	35 mA	Snubberless	TOP3 Ins.
T2535-xxxG	Х	Х	35 mA	Snubberless	D ² PAK

^{1.} BTB: non insulated TO-220AB package

3 Package information

Table 7. D²PAK Package dimensions

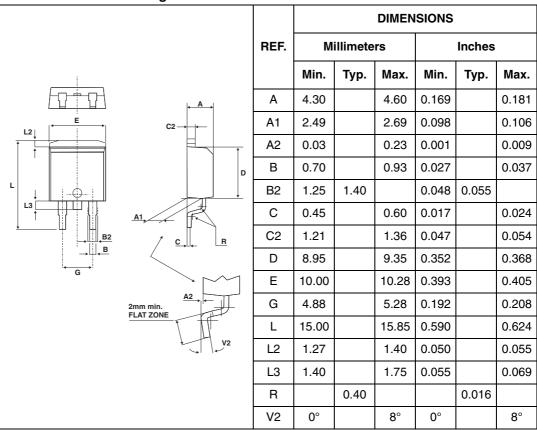


Figure 14. D²PAK Foot Print Dimensions (in millimeters)

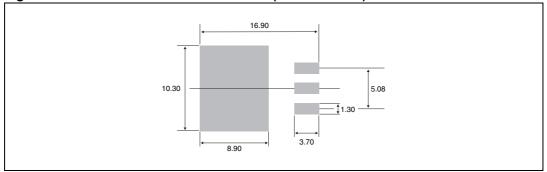
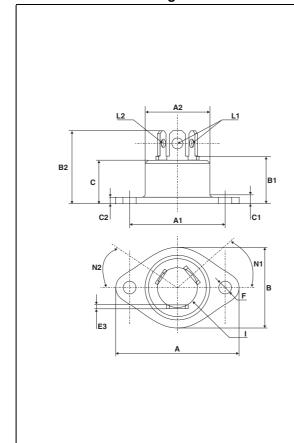
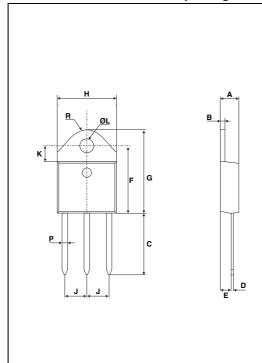


Table 8. RD91 Package dimensions



		DIMEN	ISIONS			
REF.	Millin	neters	Inc	hes		
	Min.	Max.	Min.	Max.		
Α		40.00		1.575		
A1	29.90	30.30	1.177	1.193		
A2		22.00		0.867		
В		27.00		1.063		
B1	13.50	16.50	0.531	0.650		
B2		24.00		0.945		
С		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 package dimensions



	DIMENSIONS					
REF.	Millimeters		ers	Inches		
•	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	4.4		4.6	0.173		0.181
В	1.45		1.55	0.057		0.061
С	14.35		15.60	0.565		0.614
D	0.5		0.7	0.020		0.028
Е	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
Н	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
Р	1.20		1.40	0.047		0.055
R		4.60			0.181	

DIMENSIONS REF. **Millimeters** Inches Min. Тур. Max. Min. Тур. Max. 15.20 15.90 0.598 0.625 Α 0.147 3.75 a1 13.00 14.00 0.511 0.551 a2 Ø١ В 10.00 10.40 0.393 0.409 0.88 0.024 0.034 b1 0.61 b2 1.23 1.32 0.048 0.051 С 4.40 4.60 0.173 0.181 c2 0.49 0.70 0.019 0.027 с1 2.72 0.107 c2 2.40 0.094 a2 2.40 2.70 0.094 0.106 е F 6.20 6.60 0.244 0.259 ØI 3.75 3.85 0.147 0.151 14 15.80 16.40 16.80 0.622 0.646 0.661 L 2.65 2.95 0.104 0.116 12 1.14 1.70 0.044 0.066 13 1.14 1.70 0.044 0.066 2.60 0.102

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

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

4 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
BTA/BTB24-xxxyyzRG	BTA/BTB24xxxyyz	TO-220AB	2.3 g	50	Tube
BTA25-xxxyyzRG	BTA25-xxxyyz	RD91	20 g	25	Bulk
BTA26-xxxyzRG	BTA26-xxxyyz	TOP3 Ins.	4.5 g	30	Tube
T2535-xxxG	T2535xxxG	D ² PAK	150	50	Tube
T2535-xxxG-TR	T2535xxxG	DPAK	1.5 g	1000	Tape and reel

Note: xxx = voltage, yy = sensitivity, z = type

5 Revision History

Date	Revision	Description of Changes
Oct-2002	6A	Previous update.
13-Feb-2006	7	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.
31-May-2006	8	Reformatted to current standard. T_c in figure 3 changed to T_{amb}
31-Jul-2006	9	Typing error corrected on page 1 (BTB124 instead of BTB24)

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