



BTA/BTB12 and T12 Series

SNUBBERLESS™, LOGIC LEVEL & STANDARD

12A TRIACs

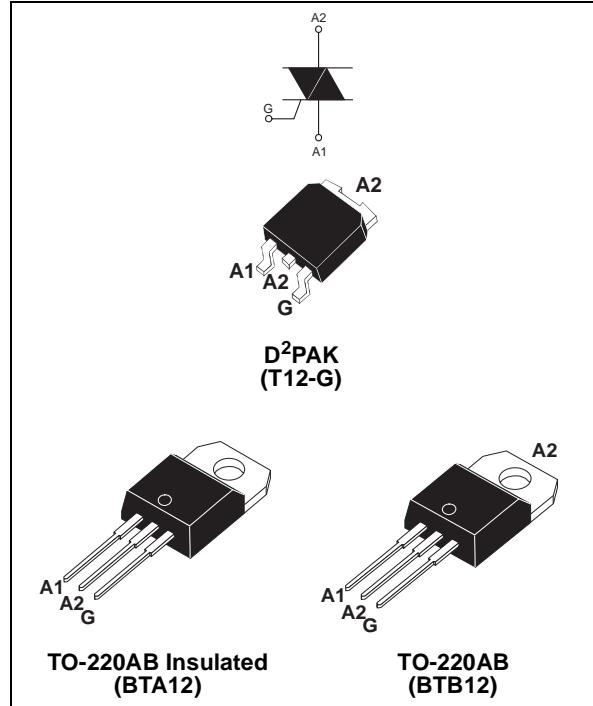
MAIN FEATURES:

Symbol	Value	Unit
$I_T(\text{RMS})$	12	A
$V_{\text{DRM}}/V_{\text{RRM}}$	600 and 800	V
$I_{\text{GT}}(Q_1)$	10 to 50	mA

DESCRIPTION

Available either in through-hole or surface-mount packages, the BTA/BTB12 and T12 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 T12 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)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
$I_T(\text{RMS})$	RMS on-state current (full sine wave)		D ² PAK/TO-220AB	12	A
	TO-220AB Ins.		$T_c = 105^\circ\text{C}$		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25°C)		$F = 50 \text{ Hz}$	$t = 20 \text{ ms}$	A
			$F = 60 \text{ Hz}$	$t = 16.7 \text{ ms}$	
I^2t	I^2t Value for fusing		$t_p = 10 \text{ ms}$		A^2s
dl/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{\text{GT}}$, $tr \leq 100 \text{ ns}$		$F = 120 \text{ Hz}$	$T_j = 125^\circ\text{C}$	$\text{A}/\mu\text{s}$
$V_{\text{DSM}}/V_{\text{RSM}}$	Non repetitive surge peak off-state voltage		$t_p = 10 \text{ ms}$	$T_j = 25^\circ\text{C}$	$V_{\text{DRM}}/V_{\text{RRM}} + 100$
I_{GM}	Peak gate current		$t_p = 20 \mu\text{s}$	$T_j = 125^\circ\text{C}$	A
$P_{\text{G(AV)}}$	Average gate power dissipation		$T_j = 125^\circ\text{C}$		W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C

BTA/BTB12 and T12 Series

ELECTRICAL CHARACTERISTICS ($T_j = 25^\circ\text{C}$, unless otherwise specified)

■ SNUBBERLESS™ and LOGIC LEVEL (3 Quadrants)

Symbol	Test Conditions	Quadrant		T12	BTA/BTB12			Unit
				T1235	SW	CW	BW	
I_{GT} (1)	$V_D = 12 \text{ V}$ $R_L = 30 \Omega$	I - II - III	MAX.	35	10	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)	$I_T = 100 \text{ mA}$		MAX.	35	15	35	50	mA
I_L	$I_G = 1.2 I_{GT}$	I - III	MAX.	50	25	50	70	mA
		II		60	30	60	80	
dV/dt (2)	$V_D = 67 \% V_{DRM}$ gate open $T_j = 125^\circ\text{C}$		MIN.	500	40	500	1000	V/ μs
$(dI/dt)c$ (2)	$(dV/dt)c = 0.1 \text{ V}/\mu\text{s}$ $T_j = 125^\circ\text{C}$		MIN.	-	6.5	-	-	A/ms
	$(dV/dt)c = 10 \text{ V}/\mu\text{s}$ $T_j = 125^\circ\text{C}$			-	2.9	-	-	
	Without snubber $T_j = 125^\circ\text{C}$			6.5	-	6.5	12	

■ STANDARD (4 Quadrants)

Symbol	Test Conditions	Quadrant		BTA/BTB06		Unit
				C	B	
I_{GT} (1)	$V_D = 12 \text{ V}$ $R_L = 30 \Omega$	I - II - III	MAX.	25	50	mA
V_{GT}		IV		50	100	
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/ μs
$(dV/dt)c$ (2)	$(dI/dt)c = 5.3 \text{ A/ms}$ $T_j = 125^\circ\text{C}$		MIN.	5	10	V/ μs

STATIC CHARACTERISTICS

Symbol	Test Conditions			Value	Unit
V_T (2)	$I_{TM} = 17 \text{ A}$ $t_p = 380 \mu\text{s}$	$T_j = 25^\circ\text{C}$	MAX.	1.55	V
V_{to} (2)	Threshold voltage	$T_j = 125^\circ\text{C}$	MAX.	0.85	V
R_d (2)	Dynamic resistance	$T_j = 125^\circ\text{C}$	MAX.	35	$\text{m}\Omega$
I_{DRM}	$V_{DRM} = V_{RRM}$	$T_j = 25^\circ\text{C}$	MAX.	5	μA
		$T_j = 125^\circ\text{C}$		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

THERMAL RESISTANCES

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

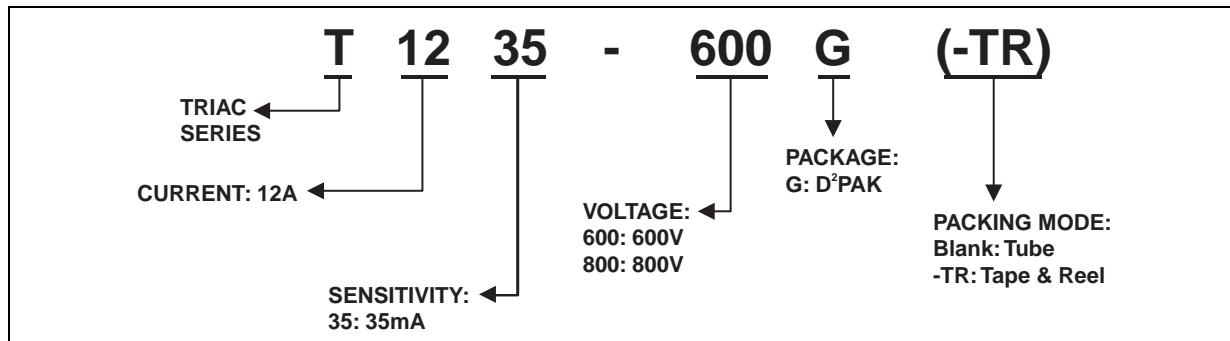
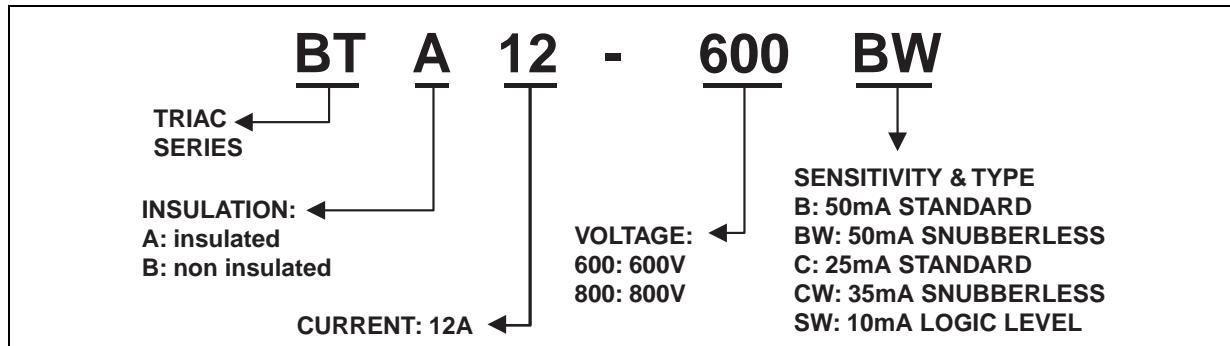
S = Copper surface under tab

PRODUCT SELECTOR

Part Number	Voltage (xxx)		Sensitivity	Type	Package
	600 V	800 V			
BTA/BTB12-xxxB	X	X	50 mA	Standard	TO-220AB
BTA/BTB12-xxxBW	X	X	50 mA	Snubberless	TO-220AB
BTA/BTB12-xxxC	X	X	25 mA	Standard	TO-220AB
BTA/BTB12-xxxCW	X	X	35 mA	Snubberless	TO-220AB
BTA/BTB12-xxxSW	X	X	10 mA	Logic level	TO-220AB
T1235-xxxG	X	X	35 mA	Snubberless	D^2PAK

BTB: non insulated TO-220AB package

ORDERING INFORMATION



BTA/BTB12 and T12 Series

OTHER INFORMATION

Part Number	Marking	Weight	Base quantity	Packing mode
BTA/BTB12-xxxyz	BTA/BTB12-xxxyz	2.3 g	250	Bulk
T1235-xxG	T1235xxG	1.5 g	50	Tube
T1235-xxG-TR	T1235xxG	1.5 g	1000	Tape & reel

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

Fig. 1: Maximum power dissipation versus RMS on-state current (full cycle).

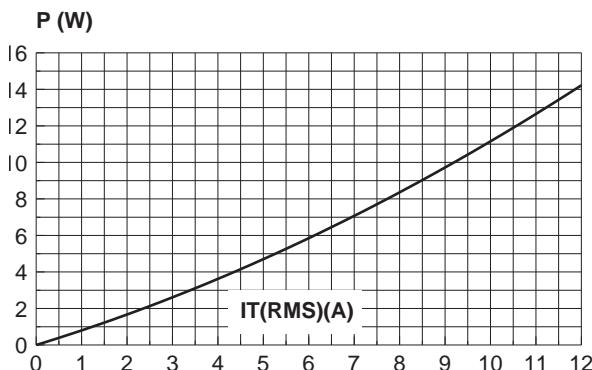


Fig. 2-2: RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35 μ m), full cycle.

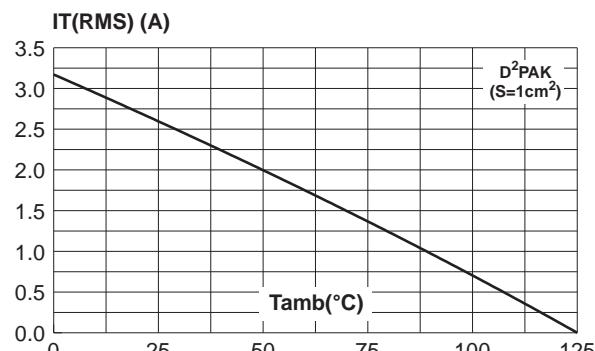


Fig. 2-1: RMS on-state current versus case temperature (full cycle).

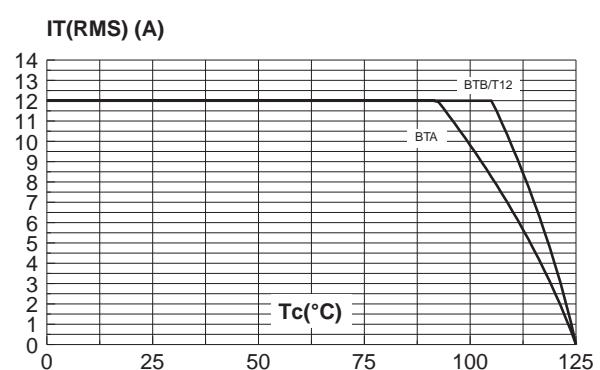


Fig. 3: Relative variation of thermal impedance versus pulse duration.

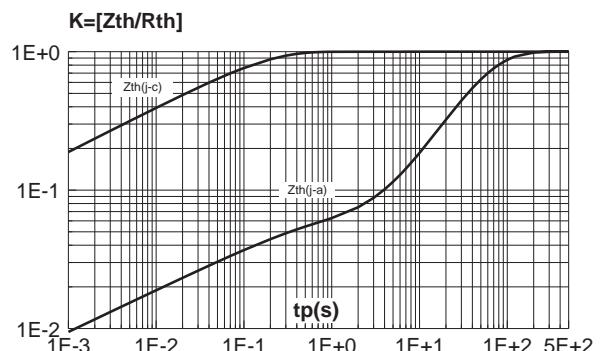


Fig. 4: On-state characteristics (maximum values).

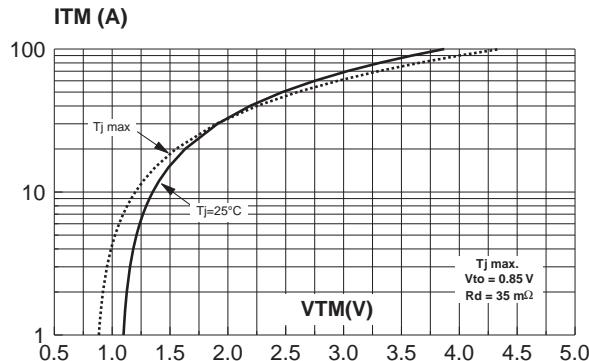


Fig. 6: Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10\text{ms}$, and corresponding value of I^2t .

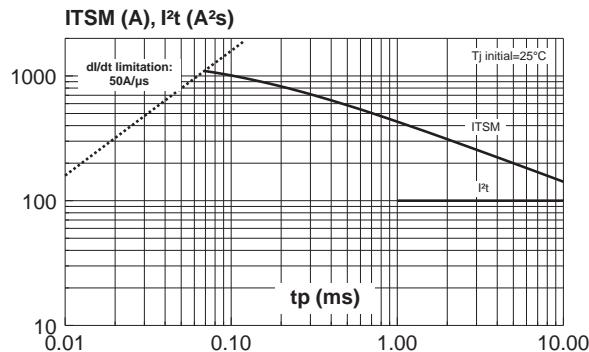


Fig. 8: Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values).

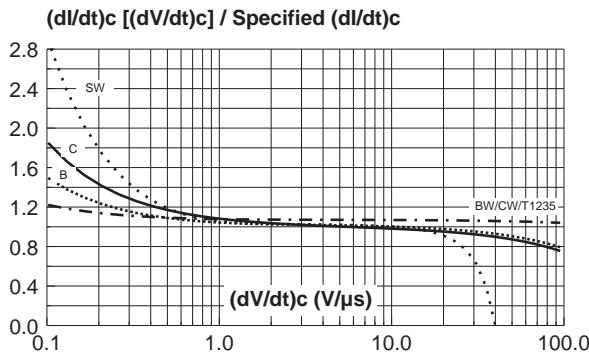


Fig. 5: Surge peak on-state current versus number of cycles.

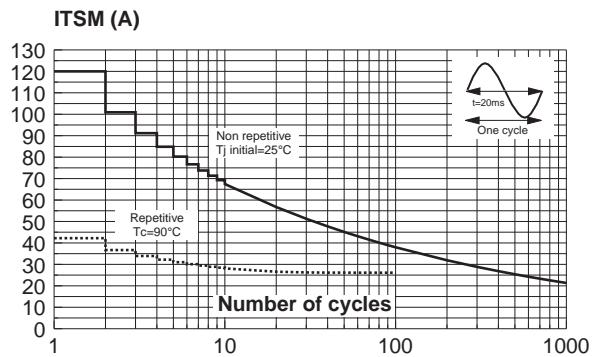


Fig. 7: Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).

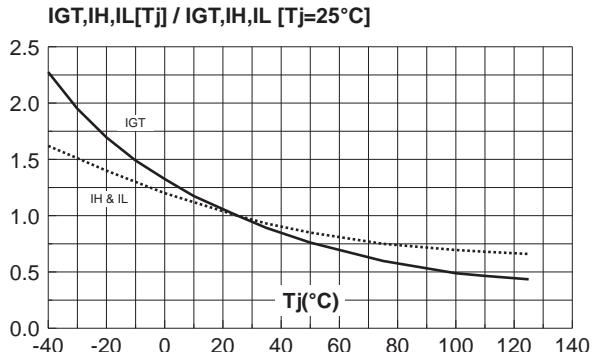
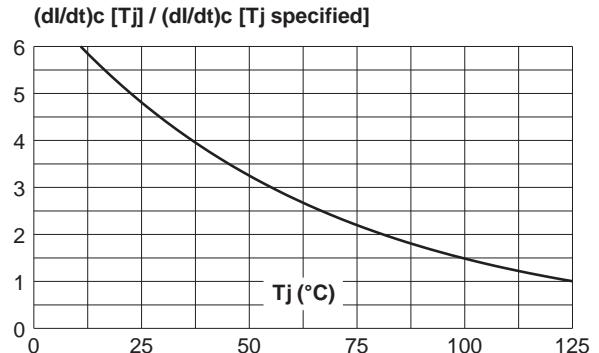
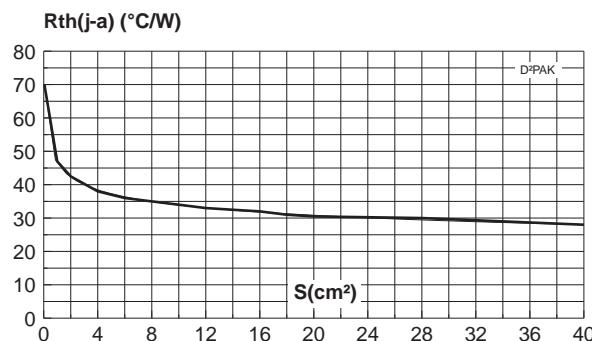


Fig. 9: Relative variation of critical rate of decrease of main current versus junction temperature.



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Fig. 10: D²PAK Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 μ m).



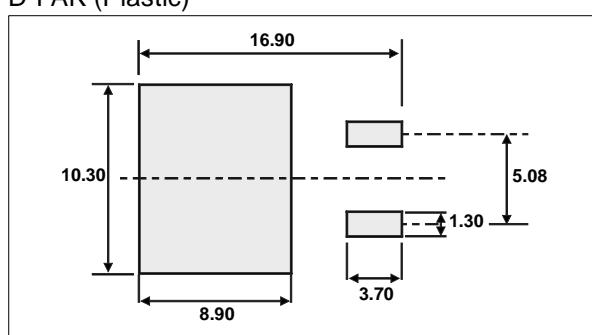
PACKAGE MECHANICAL DATA

D²PAK (Plastic)

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°

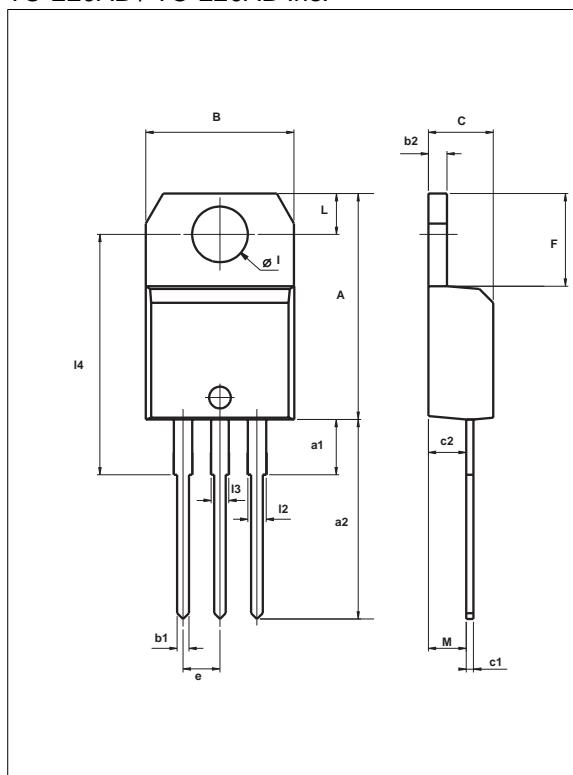
FOOTPRINT DIMENSIONS (in millimeters)

D²PAK (Plastic)



PACKAGE MECHANICAL DATA

TO-220AB / TO-220AB Ins.



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
I	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	

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