

## Features

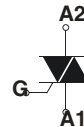
- Medium current Triac
- Low thermal resistance with clip bonding
- Low thermal resistance insulation ceramic for insulated BTA
- High commutation (4Q) or very high commutation (3Q) capability
- BTA series UL1557 certified (File ref: 81734)
- RoHS ( 2002/95/EC) compliant
- Insulated tab (BTA series, rated at 2500 V<sub>RMS</sub>)

## Applications

- Snubberless versions (BTA/BTB...W and T1635) especially recommended for use on inductive loads, because of their high commutation performances
- On/off or phase angle function in applications such as static relays, light dimmers and appliance motor speed controllers

 TO-220AB  
insulated  
BTA16

 TO-220AB  
BTB16

 D<sup>2</sup>PAK  
T1610G T1635G


## Description

Available either in through-hole or surface-mount packages, the BTA16, BTB16, T1610 and T1635 Triacs series are suitable for general purpose mains power AC switching.

**Table 1. Device summary**

Symbol	Parameter	BTA16 <sup>(1)</sup>	BTB16	T1610	T1635
I <sub>T(RMS)</sub>	On-state rms current	16	16	16	16
V <sub>DRM</sub> /V <sub>RRM</sub>	Repetitive peak off-state voltage	600/800	600/800	600/800	600/800
I <sub>GT</sub> (Snubberless)	Triggering gate current	35/50	35/50	-	35
I <sub>GT</sub> (logic level)	Triggering gate current	10	10	10	-
I <sub>GT</sub> (standard)	Triggering gate current	25/50	25/50	-	-

1. Insulated

**TM:** Snubberless is a trademark of STMicroelectronics

**Table 2. Absolute maximum ratings**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state rms current (full sine wave)	D <sup>2</sup> PAK / TO-220AB	$T_c = 100\text{ }^\circ\text{C}$	16	A
		TO-220AB insulated	$T_c = 86\text{ }^\circ\text{C}$		
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ }^\circ\text{C}$ )	F = 50 Hz	t = 20 ms	160	A
		F = 60 Hz	t = 16.7 ms	168	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$		144	A <sup>2</sup> s
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	F = 120 Hz	$T_j = 125\text{ }^\circ\text{C}$	50	A/ $\mu\text{s}$
$V_{DSM}/$ $V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$	$T_j = 25\text{ }^\circ\text{C}$	$V_{DRM}/V_{RRM}$ + 100	V
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$	4	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ }^\circ\text{C}$	1	W
$T_{stg}$	Storage temperature range			-40 to + 150	
$T_j$	Maximum operating junction temperature			-40 to + 125	

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

Symbol	Test conditions	Quadrant		T1610	T1635	BTA16 / BTB16			Unit
						SW	CW	BW	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 33\text{ }\Omega$	I - II - III	Max.	10	35	10	35	50	mA
$V_{GT}$		I - II - III	Max.	1.3					V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_j = 125\text{ }^\circ\text{C}$	I - II - III	Min.	0.2					V
$I_H^{(2)}$	$I_T = 500\text{ mA}$		Max.	15	35	15	35	50	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - III	Max.	25	50	25	50	70	mA
		II		30	60	30	60	80	
dV/dt (2)	$V_D = 67\% V_{DRM}$ gate open	$T_j = 125\text{ }^\circ\text{C}$	Min.	40	500	40	500	1000	V/ $\mu\text{s}$
(dI/dt) <sub>c</sub> (2)	(dV/dt) <sub>c</sub> = 0.1 V/ $\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$	Min.	8.5	-	8.5	-	-	A/ms
	(dV/dt) <sub>c</sub> = 10 V/ $\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$		3.0	-	3.0	-	-	
	Without snubber	$T_j = 125\text{ }^\circ\text{C}$		-	8.5	-	8.5	14	

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 ( $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified) standard (4 quadrants)**

Symbol	Test conditions	Quadrant		BTA16 / BTB16		Unit
				C	B	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 33\ \Omega$	I - II - III IV	Max.	25 50	50 100	mA
$V_{GT}$		ALL	Max.	1.3		V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_j = 125\text{ }^\circ\text{C}$	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	60	mA
		II		80	120	
$dV/dt^{(2)}$	$V_D = 67\ \%V_{DRM}$ gate open	$T_j = 125\text{ }^\circ\text{C}$	Min.	200	400	V/ $\mu\text{s}$
$(dV/dt)_c^{(2)}$	$(dI/dt)_c = 7\text{ A/ms}$	$T_j = 125\text{ }^\circ\text{C}$	Min.	5	10	V/ $\mu\text{s}$

1. Minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT\text{ max}}$
2. For both polarities of A2 referenced to A1

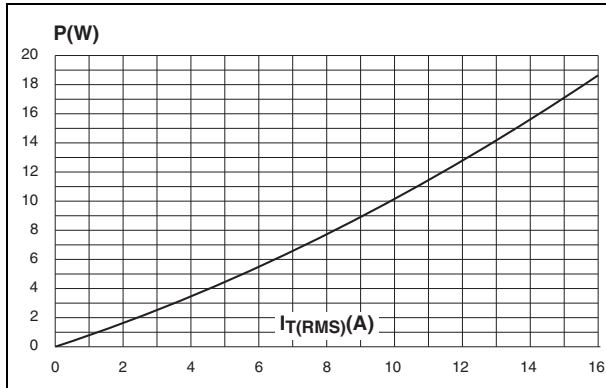
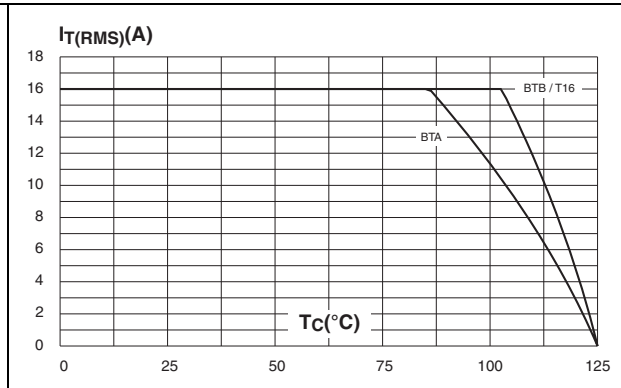
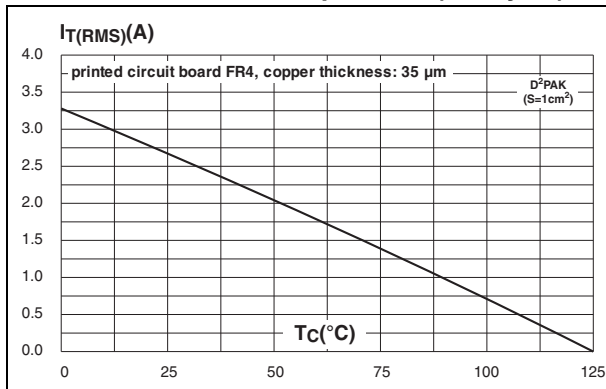
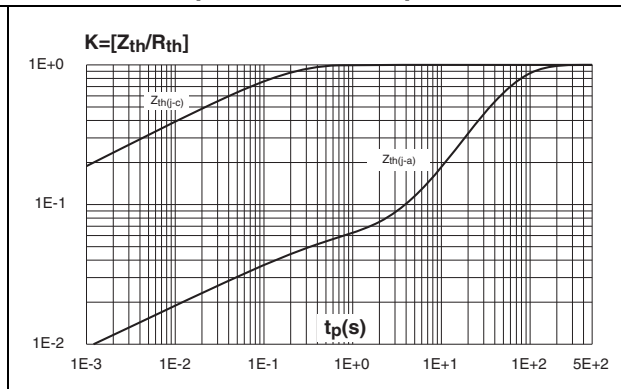
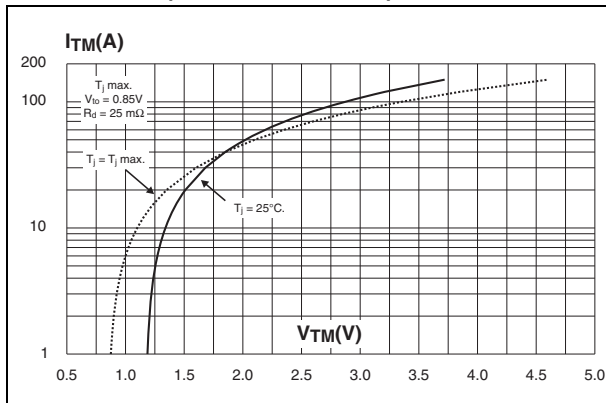
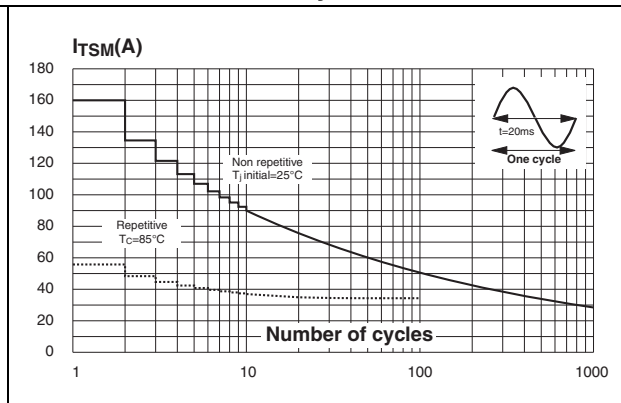
**Table 5. Static characteristics**

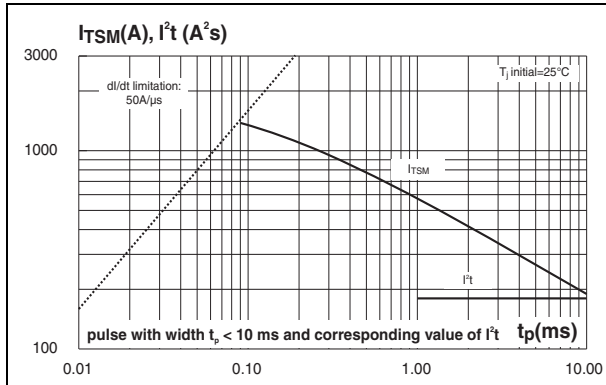
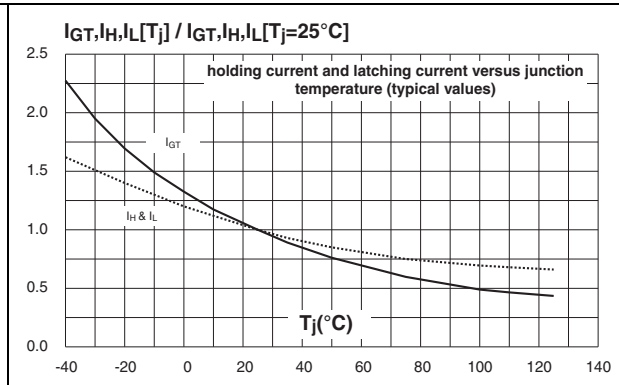
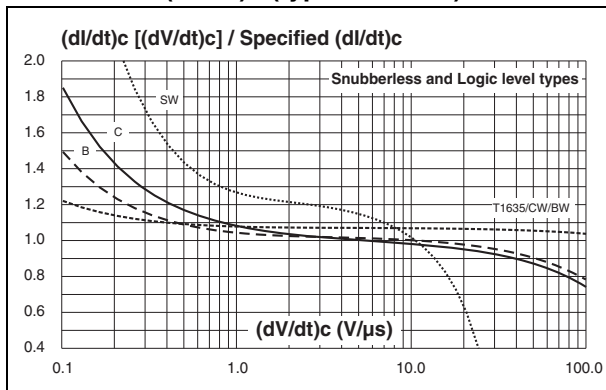
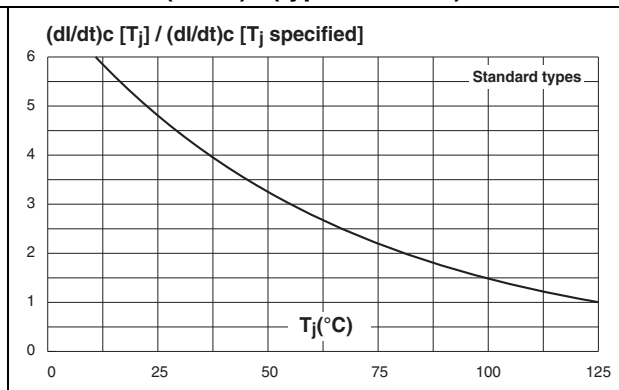
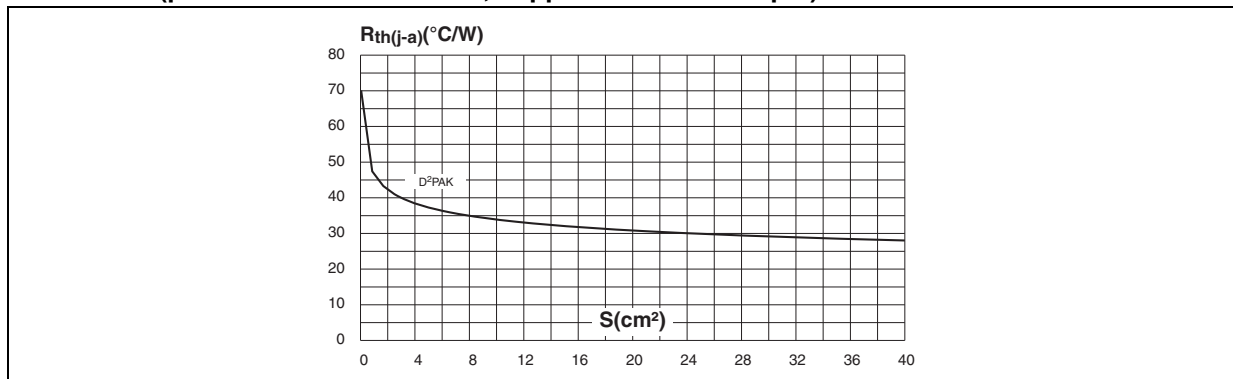
Symbol	Test conditions		Value	Unit	
$V_T^{(2)}$	$I_{TM} = 22.5\text{ A}$ $t_p = 380\ \mu\text{s}$	$T_j = 25\text{ }^\circ\text{C}$	Max.	1.55	V
$V_{to}^{(2)}$	Threshold voltage	$T_j = 125\text{ }^\circ\text{C}$	Max.	0.85	V
$R_d^{(2)}$	Dynamic resistance	$T_j = 125\text{ }^\circ\text{C}$	Max.	25	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ }^\circ\text{C}$	Max.	5	$\mu\text{A}$
		$T_j = 125\text{ }^\circ\text{C}$		2	mA

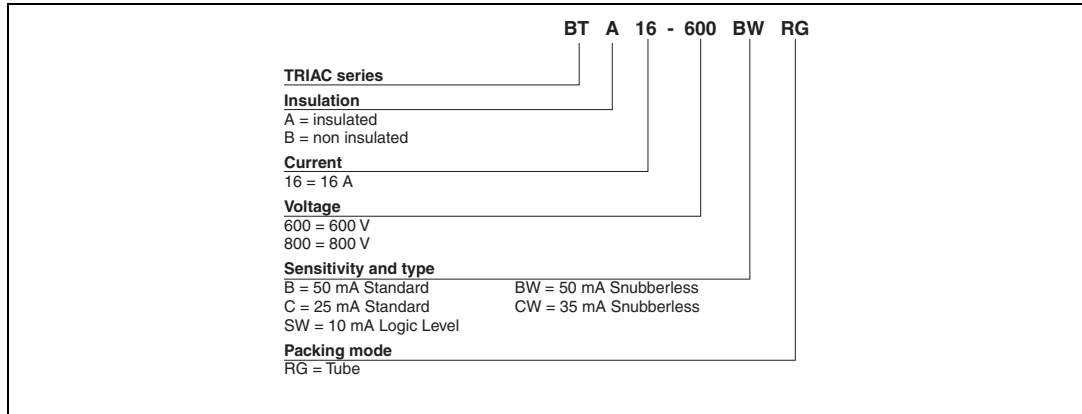
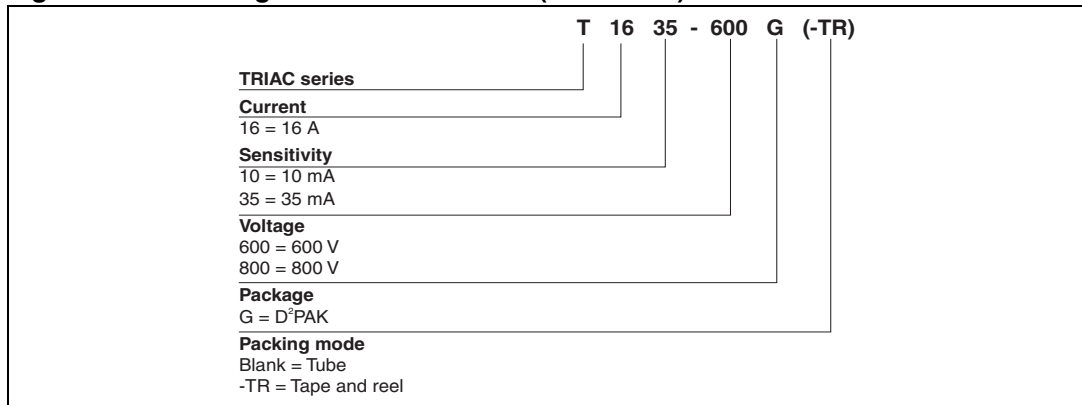
**Table 6. Thermal resistance**

Symbol	Parameter	Value	Unit	
$R_{th(j-c)}$	Junction to case (AC)	D <sup>2</sup> PAK / TO-220AB	1.2	$^\circ\text{C/W}$
		TO-220AB insulated	2.1	
$R_{th(j-a)}$	Junction to ambient	$S^{(1)} = 1\text{ cm}^2$ D <sup>2</sup> PAK	45	$^\circ\text{C/W}$
		TO-220AB / TO-220AB insulated	60	

1. S = Copper surface under tab

**Figure 1. Maximum power dissipation versus on-state rms current (full cycle)**

**Figure 2. On-state rms current versus case temperature (full cycle)**

**Figure 3. On-state rms current versus ambient temperature (full cycle)**

**Figure 4. Relative variation of thermal impedance versus pulse duration**

**Figure 5. On-state characteristics (maximum values)**

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


**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal**

**Figure 8. Relative variation of gate trigger current**

**Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)**

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

**Figure 11. D<sup>2</sup>PAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 μm)**


**Figure 12. Ordering information scheme (BTA16 and BTB16 series)**

**Figure 13. Ordering information scheme (T16 series)**

**Table 7. Product selector**

Device <sup>(1)</sup>	Voltage (xxx)		Sensitivity	Type	Package
	600 V	800 V			
BTA/BTB16-xxxB	X	X	50 mA	Standard	TO-220AB
BTA/BTB16-xxxBW	X	X	50 mA	Snubberless	TO-220AB
BTA/BTB16-xxxC	X		25 mA	Standard	TO-220AB
BTA/BTB16-xxxCW	X	X	35 mA	Snubberless	TO-220AB
BTA/BTB16-xxxSW	X	X	10 mA	Logic level	TO-220AB
T1610-xxxG	X	X	10 mA	Logic level	D <sup>2</sup> PAK
T1635-xxxG	X	X	35 mA	Snubberless	D <sup>2</sup> PAK

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