

BTA16, BTB16 T1610, T1635



16 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
- BTA series UL1557 certified (File ref: 81734)
- RoHS (2002/95/EC) compliant
- Insulated tab (BTA series, rated at 2500 V_{RMS})

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

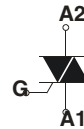
TO-220AB
insulated
BTA16



TO-220AB
BTB16



D²PAK
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 ⁽¹⁾	BTB16	T1610	T1635
I _{T(RMS)}	On-state rms current	16	16	16	16
V _{DRM} /V _{RRM}	Repetitive peak off-state voltage	600/800	600/800	600/800	600/800
I _{GT} (Snubberless)	Triggering gate current	35/50	35/50	-	35
I _{GT} (logic level)	Triggering gate current	10	10	10	-
I _{GT} (standard)	Triggering gate current	25/50	25/50	-	-

1. Insulated

TM: Snubberless is a trademark of STMicroelectronics

BTA16, BTB16 T1610, T1635

Table 2. Absolute maximum ratings

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state rms current (full sine wave)	D ² 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 ² 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/ μs
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	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$	I - II - III	Max.	10	35	10	35	50	mA
V_{GT}	$R_L = 33\text{ }\Omega$								
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/ μs
$(dI/dt)_c^{(2)}$	$(dV/dt)_c = 0.1\text{ V}/\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$	Min.	8.5	-	8.5	-	-	A/ms
	$(dV/dt)_c = 10\text{ V}/\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$		3.0	-	3.0	-	-	
	Without snubber	$T_j = 125\text{ }^\circ\text{C}$		-	8.5	-	8.5	14	

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

BTA16, BTB16

T1610, T1635

Table 4. Electrical characteristics ($T_j = 25\text{ °C}$, 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}	$V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_j = 125\text{ °C}$	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	$T_j = 125\text{ °C}$	Min.	200	400	V/ μ s
$(dV/dt)_c^{(2)}$	$(dI/dt)_c = 7\text{ A/ms}$	$T_j = 125\text{ °C}$	Min.	5	10	V/ μ 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	
$V_T^{(2)}$	$I_{TM} = 22.5\text{ A}$ $t_p = 380\ \mu\text{s}$	$T_j = 25\text{ °C}$	Max.	1.55	V
$V_{to}^{(2)}$	Threshold voltage	$T_j = 125\text{ °C}$	Max.	0.85	V
$R_d^{(2)}$	Dynamic resistance	$T_j = 125\text{ °C}$	Max.	25	m Ω
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ °C}$	Max.	5	μ A
		$T_j = 125\text{ °C}$		2	mA

Table 6. Thermal resistance

Symbol	Parameter	Value	Unit	
$R_{th(j-c)}$	Junction to case (AC)	D ² 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 ² PAK	45	$^{\circ}\text{C/W}$
		TO-220AB / TO-220AB insulated	60	

1. S = Copper surface under tab

BTA16, BTB16 T1610, T1635

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

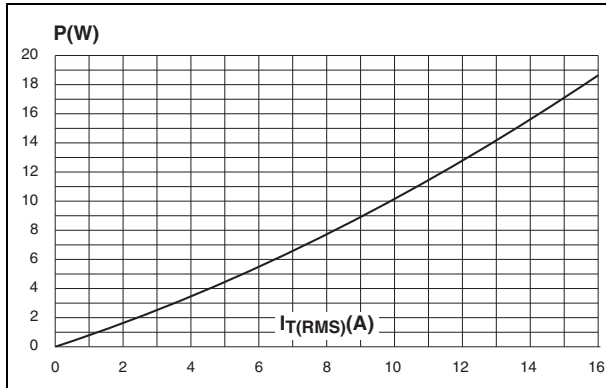


Figure 2. On-state rms current versus case temperature (full cycle)

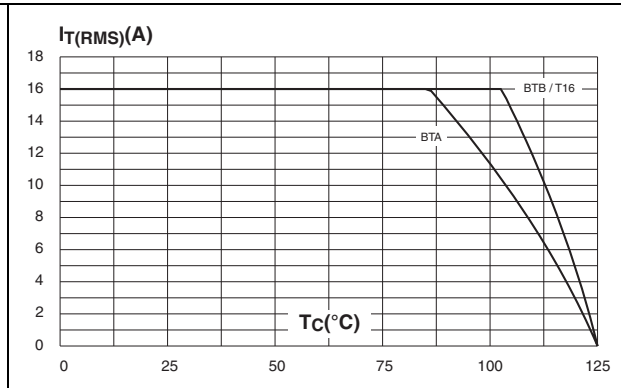


Figure 3. On-state rms current versus ambient temperature (full cycle)

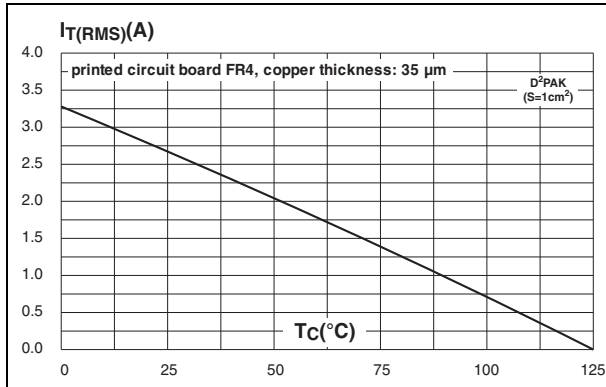


Figure 4. Relative variation of thermal impedance versus pulse duration

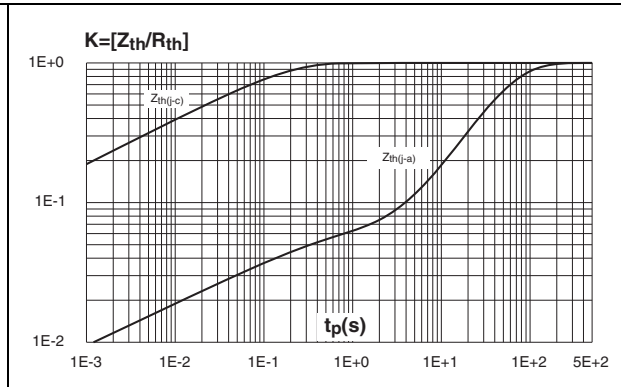


Figure 5. On-state characteristics (maximum values)

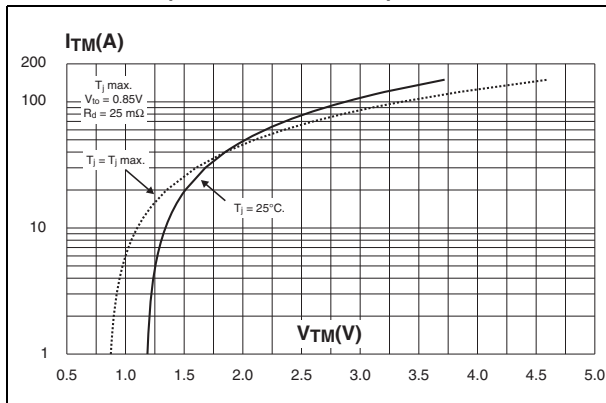
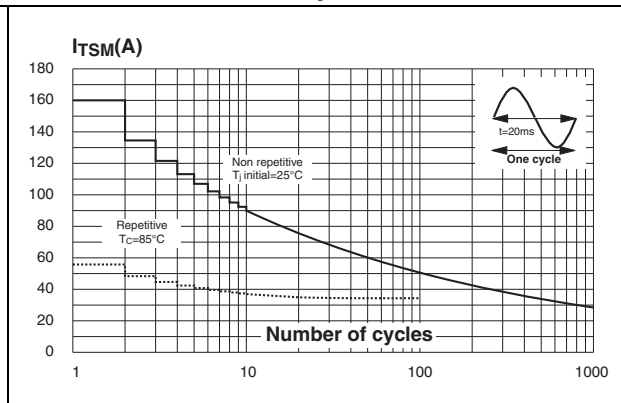


Figure 6. Surge peak on-state current versus number of cycles



BTA16, BTB16 T1610, T1635

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

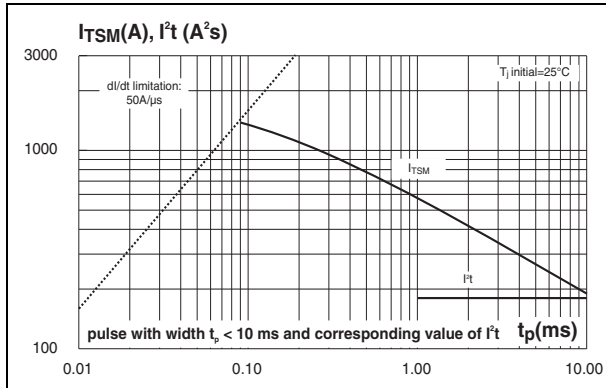


Figure 8. Relative variation of gate trigger current

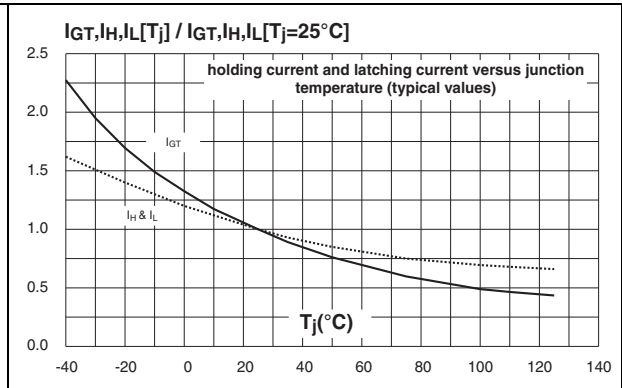


Figure 9. Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values)

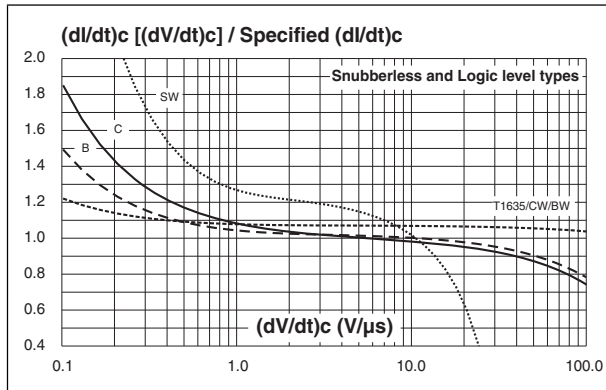


Figure 10. Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values)

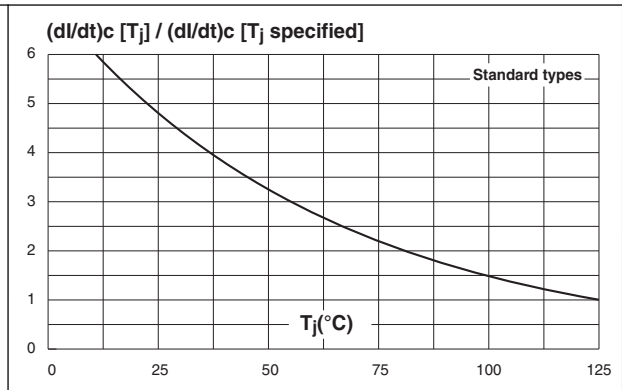
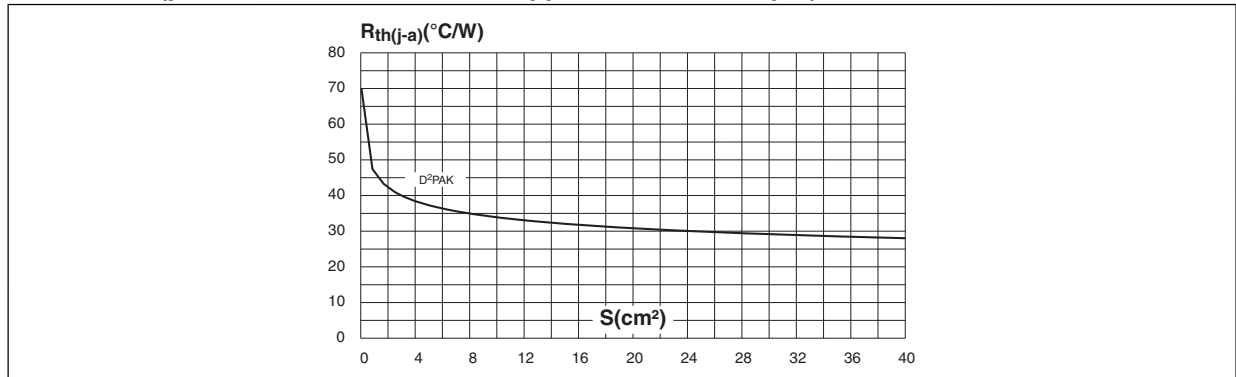


Figure 11. D²PAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 μm)



BTA16, BTB16 T1610, T1635

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

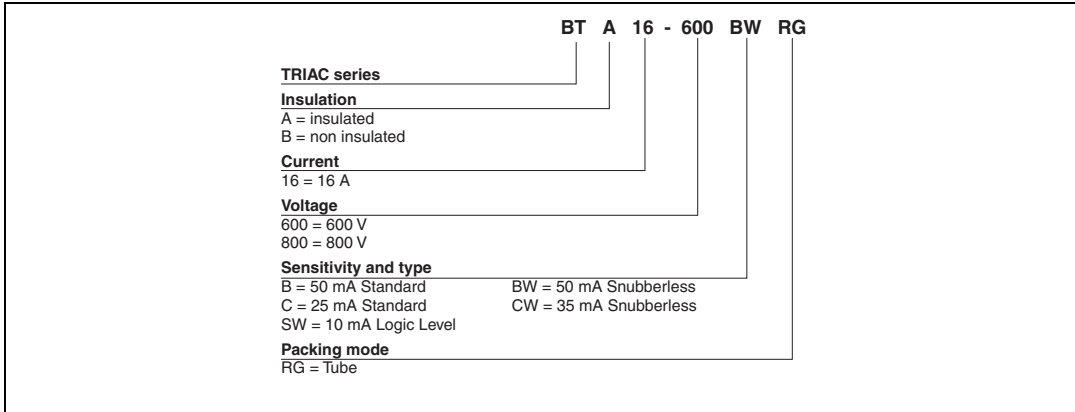


Figure 13. Ordering information scheme (T16 series)

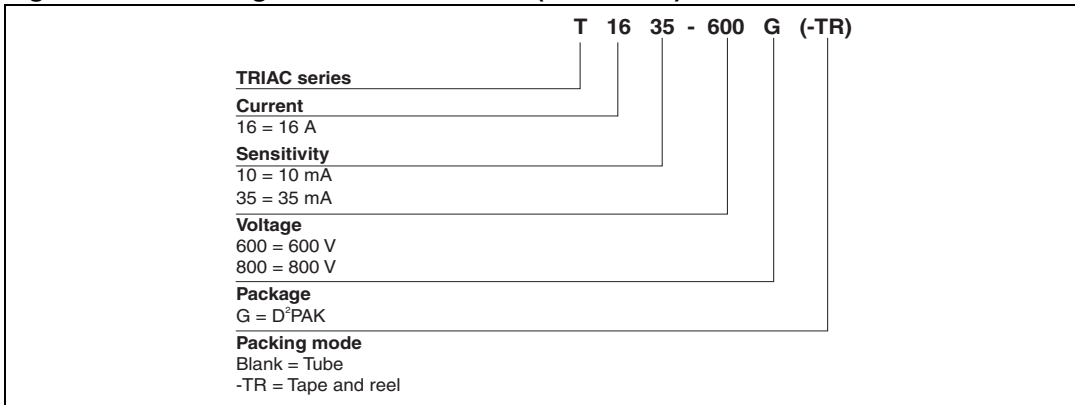


Table 7. Product selector

Device ⁽¹⁾	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 ² PAK
T1635-xxxG	X	X	35 mA	Snubberless	D ² PAK

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