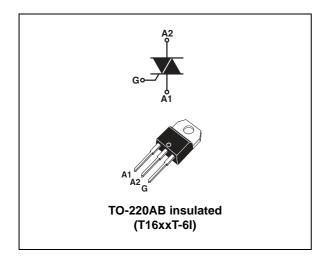


Snubberless™, logic level and standard 16 A Triacs

Datasheet - production data



Features

- Medium current Triac
- · High static and dynamic commutation
- · Low thermal resistance with clip bonding
- Packages is RoHS (2002/95/EC) compliant
- 600 V V_{RM}
- UL certified (ref. file E81734)

Applications

- · Value sensitive application
- General purpose ac line load switching
- Motor control circuits in power tools
- Small home appliances, lighting
- Inrush current limiting circuits
- Overvoltage crowbar protection

Description

Available in through-hole, the T16T series of Triacs can be used as on/off or phase angle control function in general purpose ac switching where high commutation capability is required.

This series can be designed-in in many value sensitive appliances thanks to the parameters guidance provided in the following pages.

Provides insulation rated at 2500 V rms (TO-220AB insulated package).

Table 1. Device summary

Order code	Symbol	Value
T1610T-6I	I _{GT} 3Q logic level	10 mA
T1620T-6I T1635T-6I	I _{GT} 3Q Snubberless	20 / 35 mA

TM: Snubberless is a trademark of STMicroelectronics

Characteristics T16T

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Table 2. Absolute maximum ratings (limiting values; T_j = 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
I _{T(RMS)}	On-state rms current (full sine wave)		$T_c = 86 ^{\circ}C$	16	Α
l	Non repetitive surge peak on-state current (full	F = 50 Hz	t _p = 20 ms	120	Α
I _{TSM}	cycle, T _j initial = 25 °C)	F = 60 Hz	$t_p = 16.7 \text{ ms}$	126	A
l ² t	I^2t Value for fusing $t_p = 10 \text{ ms}$			105	A ² s
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ $t_r \le 100 \text{ ns}$	F = 60 Hz	T _j = 125 °C	50	A/µs
V _{DSM} / V _{RSM}	Non repetitive surge peak off-state voltage $t_p = 10 \text{ ms} \qquad T_j = 25 \text{ °C}$		V _{DRM} /V _{RRM} + 100	V	
I _{GM}	Peak gate current $t_p = 20 \mu s$ $T_j = 125 °C$		4	Α	
P _{G(AV)}	Average gate power dissipation $T_j = 125 ^{\circ}\text{C}$			1	W
T _{stg}	Storage junction temperature range			- 40 to + 150	°C
Tj	Operating junction temperature range			- 40 to + 125	°C



T16T Characteristics

Table 3. Electrical characteristics ($T_j = 25$ °C, unless otherwise specified)

Obl	Test conditions	0		T16xxT			l lm!4	
Symbol		Quadrant		T1610T	T1620T	T1635T	Unit	
I _{GT} ⁽¹⁾	V 42 V D 20 W	1 - 11 - 111	MAX.	10	20	35	m 1	
'GT`′	$V_D = 12 \text{ V} R_L = 30 \text{ W}$	IV	WAX.				mA	
V _{GT}	$V_D = V_{DRM}, R_L = 3.3 \text{ kW},$ $T_j = 25 ^{\circ}\text{C}$ ALL MAX. 1.3			V				
V _{GD}	$V_D = V_{DRM}, R_L = 3.3 \text{ kW},$ $T_j = 125 \text{ °C}$	ALL	MIN.	0.2		V		
I _H ⁽²⁾	I _T = 500 mA		MAX.	12	25	40	mA	
		1 - 111		20	35	50		
Ι _L	I _G = 1.2 I _{GT}	IV	MAX.				mA	
		II		30	40	80		
dV/dt ⁽²⁾	V- = 67% V gate open	T _j = 125 °C	MIN.	100	1000	2000	V/µs	
u v/ui · ·	$V_D = 67\% V_{DRM,}$ gate open	$T_j = 150 ^{\circ}C^{(3)}$		20	500	1000		
	$(dV/dt)c = 0.1 V/\mu s$			8				
	$(dV/dt)c = 10 V/\mu s$	T _j = 125 °C		4				
(di/dt)c (2)	Without snubber		MIN.		6	16	A/ms	
(ui/ut)c · /	(dV/dt)c = 0.1 V/μs		IVIIIN.	3			7/1113	
	(dV/dt)c = 10 V/μs	$T_j = 150 ^{\circ}C^{(3)}$		1				
	Without snubber				3	12		

^{1.} minimum $I_{\mbox{\footnotesize GT}}$ is guaranted at 5% of $I_{\mbox{\footnotesize GT}}$ max.

Table 4. Static characteristics

Symbol	Test conditions			Value	Unit
V _T ⁽¹⁾	$I_{TM} = 22.6 \text{ A}, t_p = 380 \ \mu\text{s}$	$T_j = 25 ^{\circ}C$	MAX.	1.55	V
V _{TO} (1)	Threshold voltage	T _j = 125 °C	MAX.	0.85	V
R _D ⁽¹⁾	Dynamic resistance	T _j = 125 °C	MAX.	30	mΩ
	V - V	T _j = 25 °C	MAX.	5	μA
I _{DRM}	$V_{DRM} = V_{RRM}$	T _j = 125 °C		1	A
I _{RRM}	$V_D = 0.9 \times V_{DRM}$	$T_j = 150 ^{\circ}C^{(2)}$	TYP.	1.9	mA

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

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

^{3.} derating information for excess temperature above T_i max.

^{2.} derating information for excess temperature above $\mathbf{T}_{j}\,\text{max}.$

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Table 5. Thermal resistance

Symbol	Parameter	Value	Unit
R _{th(j-c)}	Junction to case (AC)	2.1	°C/W
R _{th(j-a)}	Junction to ambient (DC)	60	°C/W

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

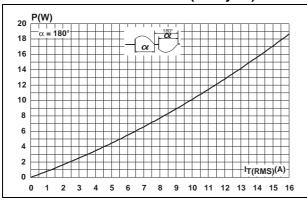


Figure 2. On-state rms current versus case temperature (full cycle)

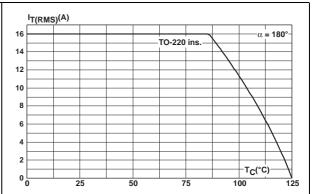


Figure 3. On-state rms current versus ambient temperature

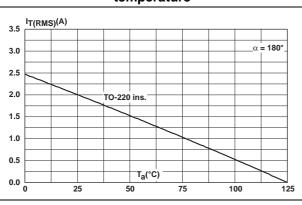


Figure 4. Relative variation of thermal impedance versus pulse duration

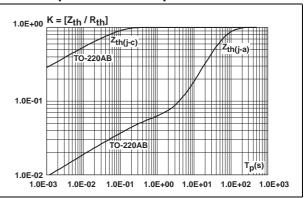


Figure 5. On state characteristics (maximum values)

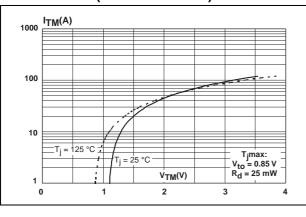
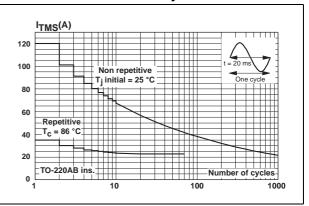


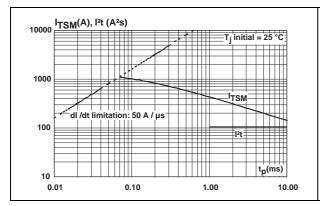
Figure 6. Surge peak on state current versus number of cycles



T16T Characteristics

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

Figure 8. Relative variation of gate trigger current and gate trigger voltage versus junction temperature



3.0 | GT, VGT[Tj] / IGT, VGT[Tj = 25 °C]

2.5 | IGT Q3 | IGT Q1-Q2 |

1.5 | IGT Q1-Q2 |

0.5 | IGT Q1-Q2-Q3 |

0.5 | IGT Q1-Q2-Q3 |

0.5 | IGT Q1-Q2-Q3 |

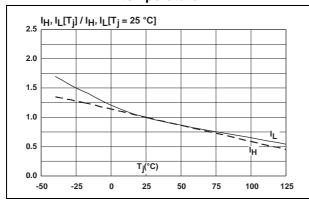
0.7 | IGT Q1-Q2-Q3 |

0.8 | IGT Q1-Q2-Q3 |

0.9 | IGT Q1-Q2-Q3 |

Figure 9. Relative variation of holding current and latching current versus junction temperature

Figure 10. Relative variation of critical rate of decrease of main current versus junction temperature



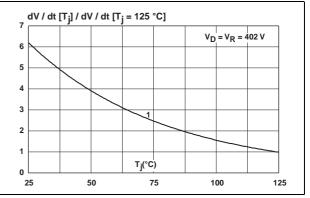
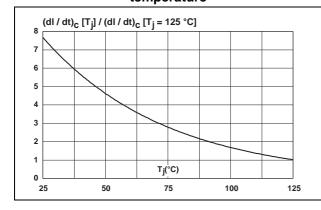
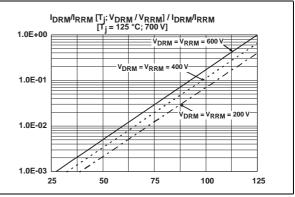


Figure 11. Relative variation of critical rate of decrease of main current versus junction temperature

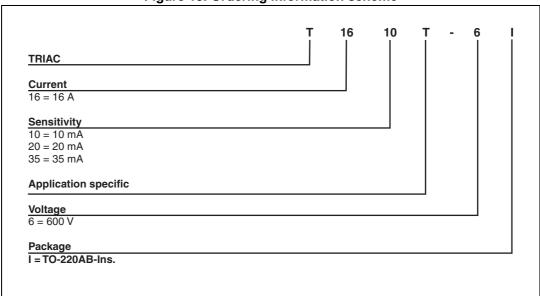
Figure 12. Leakage current versus junction temperature for different values of blocking voltage (typical values)





2 Ordering information scheme

Figure 13. Ordering information scheme



3 Package mechanical data

- Epoxy meets UL94, V0
- Lead-free packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Dimensions Ref. **Millimeters** Inches Min. Тур. Max. Min. Тур. Max. Α 15.20 15.90 0.598 0.625 a1 3.75 0.147 a2 13.00 14.00 0.511 0.551 Ø١ В 10.00 10.40 0.393 0.409 0.024 0.034 b1 0.61 0.88 1.23 1.32 0.048 0.051 b2 14 С 4.40 4.60 0.173 0.181 0.49 0.70 0.019 0.027 c1 c2 2.72 0.094 0.107 c2 2.40 2.40 2.70 0.094 0.106 е F 6.20 6.60 0.244 0.259 0.151 Ø١ 3.75 3.85 0.147 0.661 14 15.80 16.40 16.80 0.622 0.646 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 0.102 Μ 2.60

Table 6. TO-220AB insulated dimensions



Ordering information T16T

4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
T1610T-6I	T1610T-6I				
T1620T-6I	T1620T-6I	TO-220AB ins.	2.3 g	50	Tube
T1635T-6I	T1635T-6I				

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
03-Dec-2009	1	Initial release.
18-Jan-2010	2	Updated pag.1.
19-Jun-2014	3	Updated features in cover page.

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