T12T

Snubberless™, logic level and standard 12 A Triacs

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}

Applications

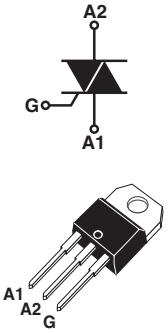
- Value sensitive application
- General purpose ac line load switching
- Motor control circuits in power tools
- Small home appliances, lighting
- Inrush current limiting circuits
- Overvoltage crowbar protection

Description

Available in through-hole, the T12T 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).



TO-220AB insulated (T12xxT-6I)

Table 1. Device summary

Order code	Symbol	Value
T1220T-6I T1235T-6I	I_{GT} 3Q Snubberless	20 / 35 mA
T1225T-6I	I_{GT} 4Q standard	25 mA
T1210T-6I	I_{GT} 3Q logic level	10 mA

TM: Snubberless is a trademark of STMicroelectronics

1 Characteristics

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 = 88 °C	12	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C)	F = 50 Hz	t_p = 20 ms	90	A
		F = 60 Hz	t_p = 16.7 ms	95	
I^2t	I^2t Value for fusing	t_p = 10 ms		54	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT} $t_r \leq$ 100 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 ms	T_j = 25 °C	V_{DRM}/V_{RRM} + 100	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	1	W
T_{stg}	Storage junction temperature range			- 40 to + 150	°C
T_j	Operating junction temperature range			- 40 to + 125	°C

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

Symbol	Test conditions	Quadrant		T12xxT				Unit
				T1210T	T1220T	T1225T	T1235T	
I_{GT} (1)	V_D = 12 V R_L = 30 Ω	I - II - III	MAX.	10	20	25	35	mA
		IV				40		
V_{GT}	$V_D = V_{DRM}$, R_L = 3.3 kΩ, T_j = 25 °C	ALL	MAX.	1.3				V
V_{GD}	$V_D = V_{DRM}$, R_L = 3.3 kΩ, T_j = 125 °C	ALL	MIN.	0.2				V
I_H (2)	I_T = 500 mA		MAX.	10	15	20	30	mA
I_L	I_G = 1.2 I_{GT}	I - III	MAX.	20	35	40	50	mA
		IV				40		
		II		30	40	60	80	
dV/dt (2)	V_D = 67% V_{DRM}, gate open	T_j = 125 °C	MIN.	100	1000	100	2000	V/µs
		T_j = 150 °C(3)		50	500	50	1000	
(di/dt)c (2)	(dV/dt)c = 0.1 V/µs	T_j = 125 °C	MIN.	7		7		A/ms
	(dV/dt)c = 10 V/µs			3		3		
	Without snubber				6		12	
	(dV/dt)c = 0.1 V/µs	T_j = 150 °C(3)		3		3		
	(dV/dt)c = 10 V/µs			1		1		
	Without snubber				3		10	

1. minimum I_{GT} is guaranted at 5% of I_{GT} max.
2. for both polarities of A2 referenced to A1.
3. derating information for excess temperature above T_j max.

Table 4. Static characteristics

Symbol	Test conditions			Value	Unit
V_T (1)	I_{TM} = 17 A, t_p = 380 µs	T_j = 25 °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.	35	mΩ
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$	T_j = 25 °C	MAX.	5	µA
		T_j = 125 °C		1	mA
	V_D = 0.9 x V_{DRM}	T_j = 150 °C(2)	TYP.	1.9	

1. for both polarities of A2 referenced to A1.
2. derating information for excess temperature above T_j max.

Table 5. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	2.6	°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)

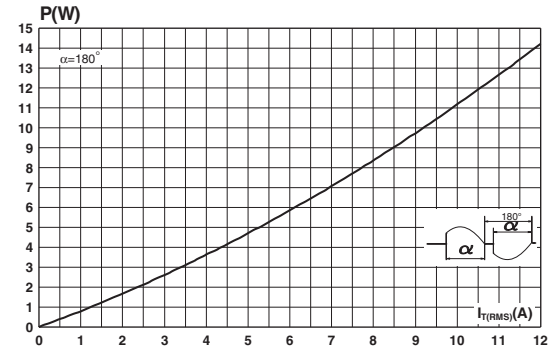


Figure 2. On-state rms current versus case temperature (full cycle)

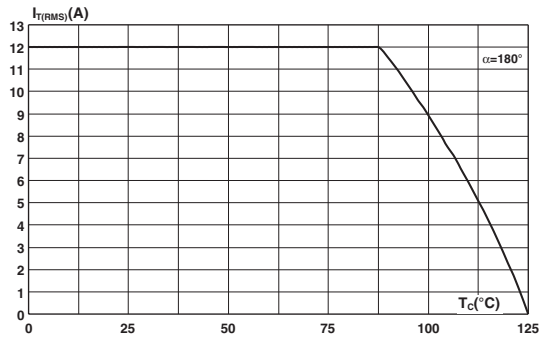


Figure 3. On-state rms current versus ambient temperature

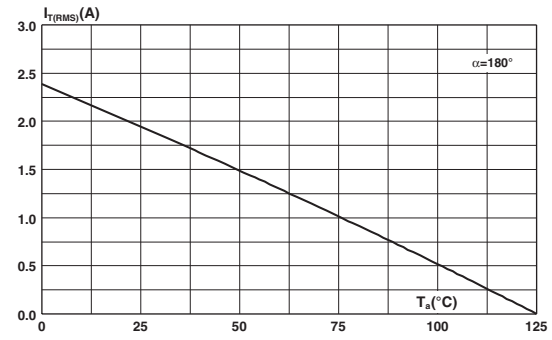


Figure 4. Relative variation of thermal impedance versus pulse duration

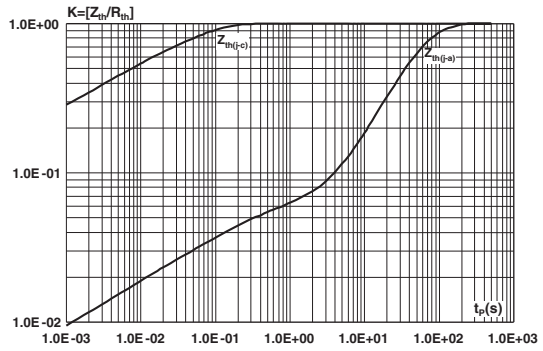


Figure 5. On state characteristics (maximum values)

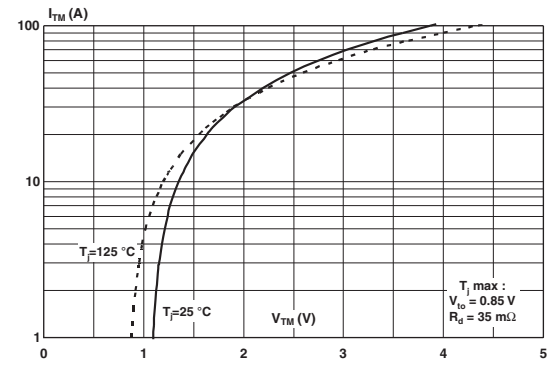


Figure 6. Surge peak on state current versus number of cycles

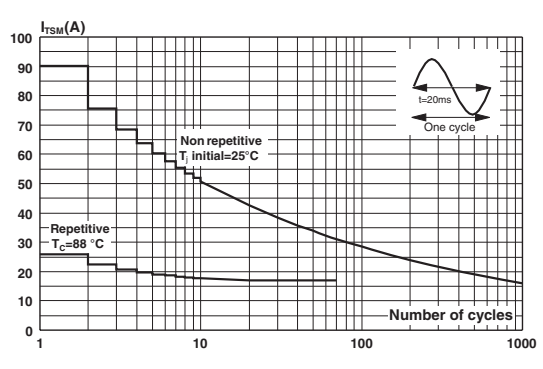


Figure 7. Non repetitive surge peak on state current for a sinusoidal

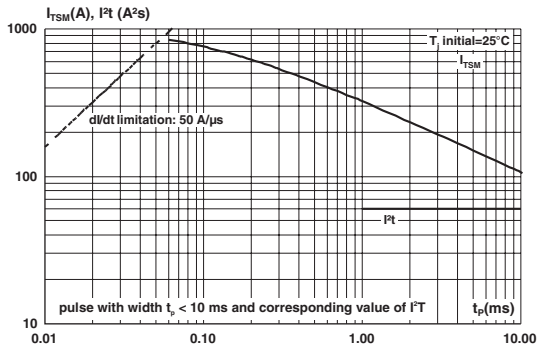


Figure 8. Relative variation of gate trigger current and gate trigger voltage versus junction temperature

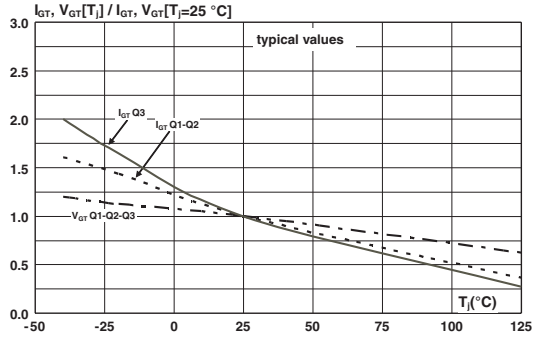


Figure 9. Relative variation of holding current and latching current versus junction temperature

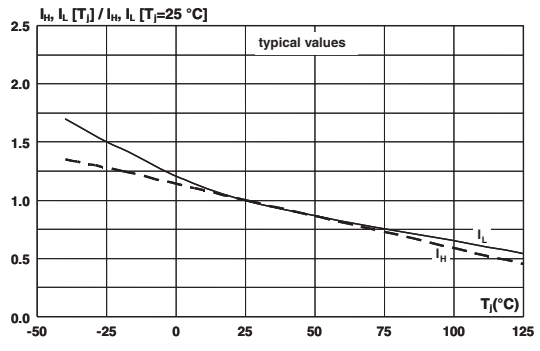


Figure 10. Relative variation of critical rate of decrease of main current versus (dV/dt)c

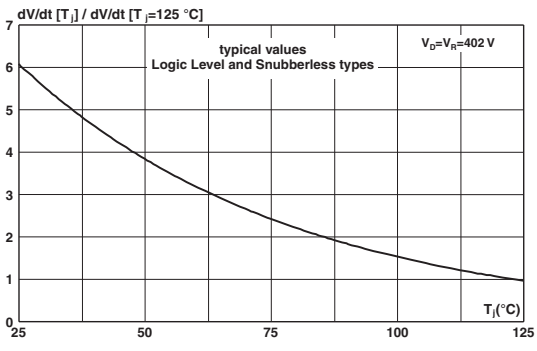


Figure 11. Relative variation of critical rate of decrease of main current versus junction temperature

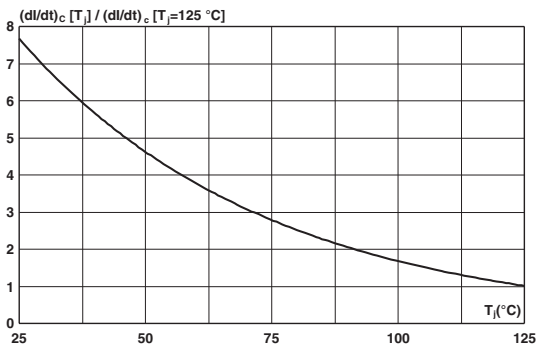
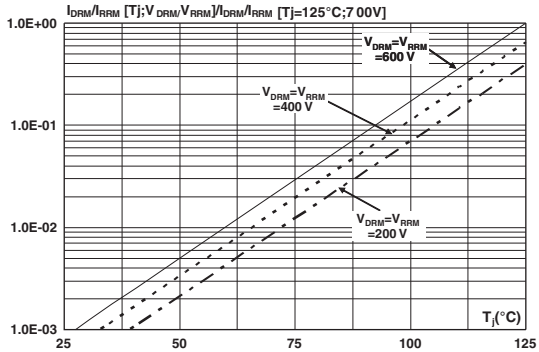
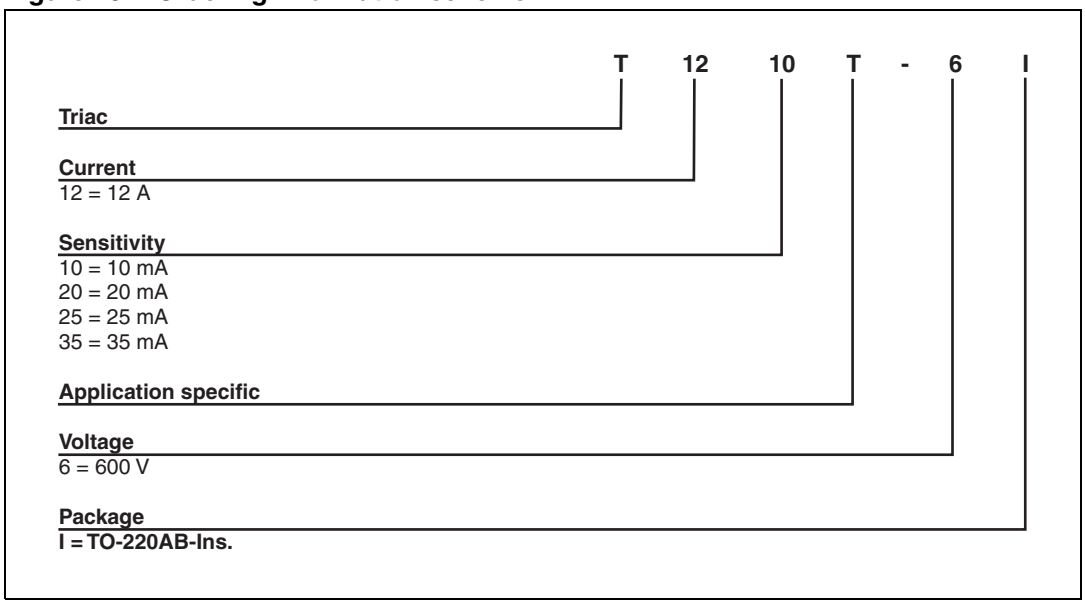


Figure 12. Leakage current versus junction temperature for different values of blocking voltage (typical values)



2 Ordering information scheme

Figure 13. Ordering information scheme

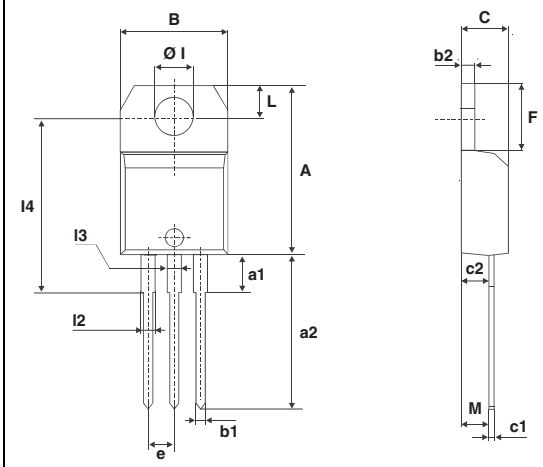


3 Package mechanical data

- 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.

Table 6. TO-220AB insulated dimensions



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
ØI	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l3	1.14		1.70	0.044		0.066
M		2.60			0.102	

4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
T1210T-6I	T1210T-6I	TO-220AB-ins.	2.3 g	50	Tube
T1220T-6I	T1220T-6I				
T1225T-6I	T1225T-6I				
T1235T-6I	T1235T-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.

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