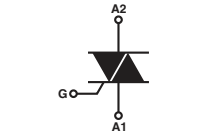
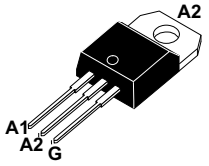
T1610H

16 A Triac, high temperature and logic level

Datasheet – production data





TO-220AB
(T1610H-6T)

Features

- Junction temperature up to 150 °C max.
- Logic level gate current: 10 mA
- Repetitive peak off-state voltage: 600 V
- High I_{TSM}
- High thermal cycling performance

Applications

- Electric heater
- Water heater, room heater
- Coffee machine
- Hand dryer
- Thermostat

Description

This clip technology Triac has very high thermal cycling performance, and the design structure presents a higher I_{TSM}. The 150 °C maximum junction temperature of this device offers easier thermal management. Its 10 mA gate current offers direct drive from a microcontroller, mainly for resistive load control.

Table 1. Device summary

Order code	Package	V_{DRM}, V_{RRM}	I_{GT}	$I_{T(RMS)}$
T1610H-6T	TO-220AB	600 V	10 mA	16 A

1 Characteristics

Table 2. Absolute maximum rating (T_j = 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	On-state rms current (180° conduction angle)	T_c = 133 °C	16	A
I_{TSM}	Non repetitive surge peak on-state current, T_j initial = 25 °C	t_p = 16.7 ms	168	A
		t_p = 20ms	160	
I^2t	I^2t Value for fusing	t_p = 10 ms	169	A^2s
dI/dt	Critical rate of rise of on-state current, I_G = 2 x I_{GT}, tr ≤ 100 ns	F = 60 Hz	100	A/µs
V_{DRM}, V_{RRM}	Repetitive peak off-state voltage	T_j = 150 °C	600	V
V_{DSM}, V_{RSM}	Non repetitive peak off-state voltage	t_p = 10 ms	700	V
I_{GM}	Peak gate current	t_p = 20 µs	4	A
P_{GM}	Peak gate power dissipation	t_p = 20 µs	10	W
$P_{G(AV)}$	Average gate power dissipation		1	W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range		-40 to +150	°C
T_L	Lead temperature for soldering during 10 s		260	°C

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

Symbol	Test conditions		Quadrant		Value	Unit
I_{GT}	V_D = 12 V, R_L = 33 Ω		I - II - III	MIN.	0.5	mA
				MAX.	10	mA
V_{GT}	V_D = 12 V, RL = 33 Ω		I - II - III	MAX.	1.3	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ, T_j = 150 °C		I - II - III	MIN.	0.2	V
I_H	I_T = 500 mA, gate open		–	MAX.	15	mA
I_L	I_G = 1.2 I_{GT}		I - II - III	MAX.	30	mA
dV/dt	V_D = 67% x V_{DRM}, V_{RRM}, gate open	T_j = 150 °C	–	MIN.	100	V/µs
(dI/dt)c	(dV/dt)c = 0.1 V/µs	T_j = 150 °C	–	MIN.	8.5	A/ms
	(dV/dt)c = 10 V/µs		–		3	
t_{gt}	I_{TM} = 13 A, V_D = 400 V, I_G = 100 mA, dI_G/dt = 100 mA/µs, R_L = 30 Ω		–	TYP.	2	µs

Table 4. Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 22.5 A, t_p = 380 µs	T_j = 25 °C	MAX.	1.55	V
V_{to}	Threshold voltage	T_j = 150 °C		0.80	V
R_d	Dynamic resistance	T_j = 150 °C		22	mΩ
I_{DRM}, I_{RRM}	$V_D = V_{DRM}$, $V_R = V_{RRM}$	T_j = 25 °C		5	µA
		T_j = 150 °C		2	mA

Table 5. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	1.0	°C/W
$R_{th(j-a)}$	Junction to ambient (AC)	60	°C/W

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

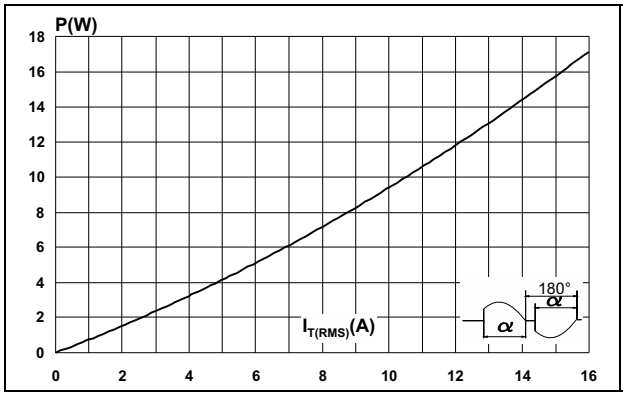


Figure 2. On-state rms current versus case temperature (full cycle)

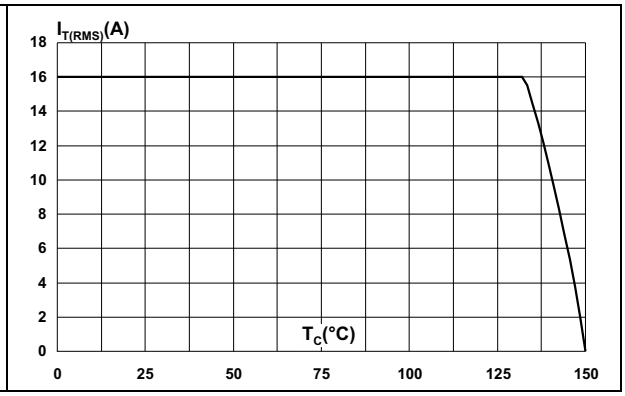


Figure 3. On-state rms current versus ambient temperature (free air convection)

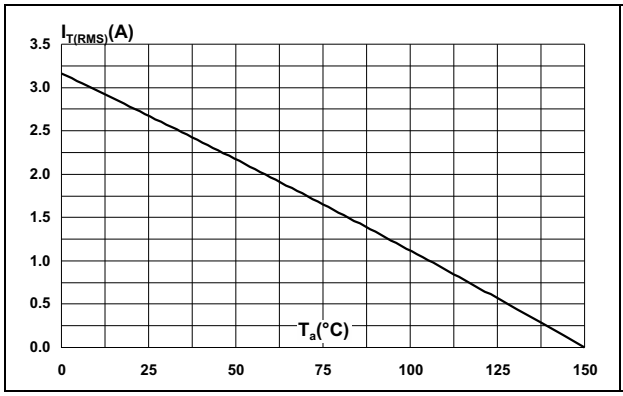


Figure 4. Relative variation of thermal impedance versus pulse duration

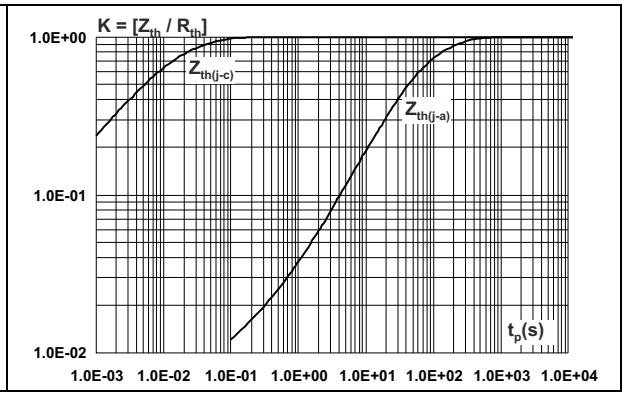


Figure 5. Relative variation of gate trigger current and voltage versus junction temperature (typical values)

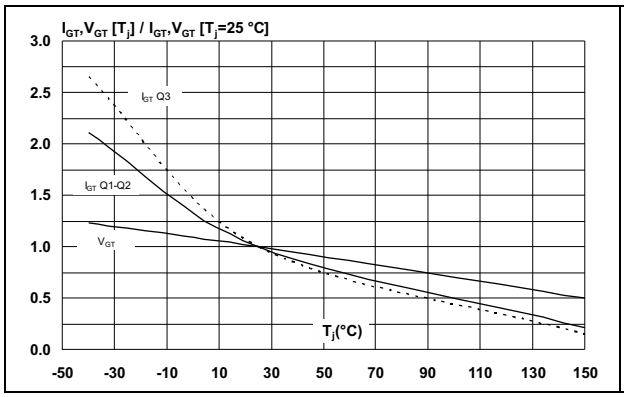


Figure 6. Relative variation of holding and latching current versus junction temperature (typical values)

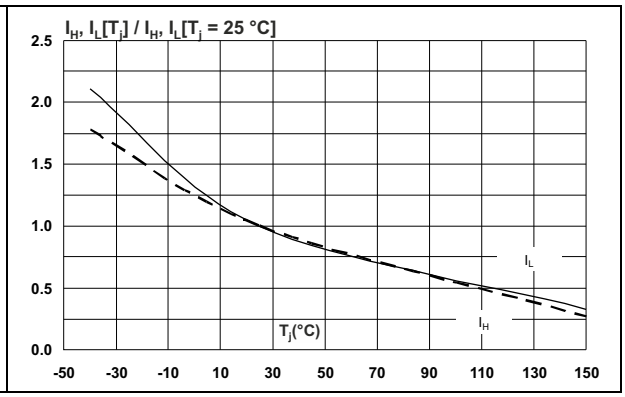


Figure 7. Relative variation of dV/dt immunity versus junction temperature (typical values)

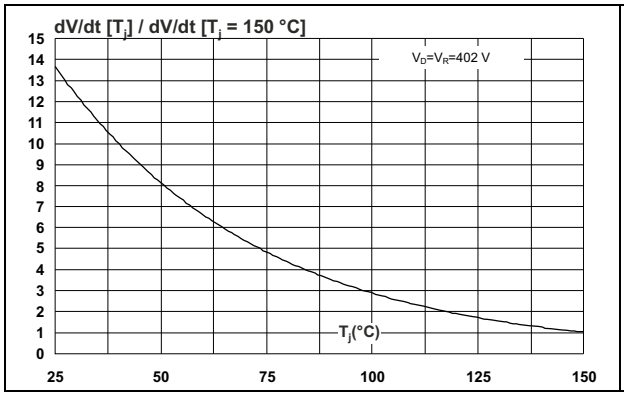


Figure 8. Relative variation of critical rate of decrease of main current (di/dt)c versus junction temperature (typical values)

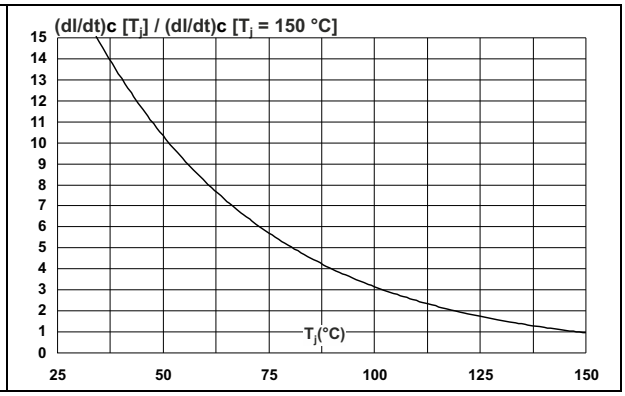


Figure 9. Relative variation of critical rate of decrease of main current (di/dt)c versus reapplied (dV/dt)c

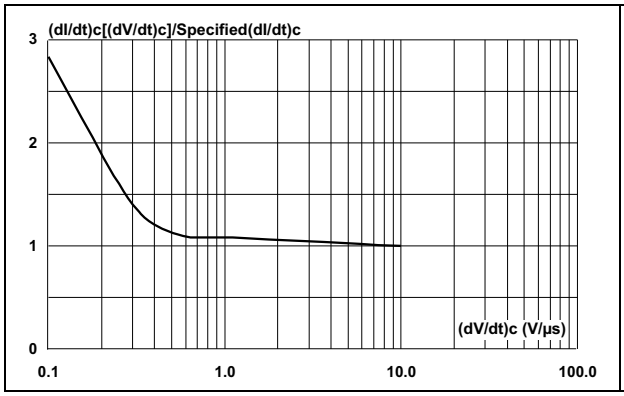


Figure 10. Surge peak on-state current versus number of cycles

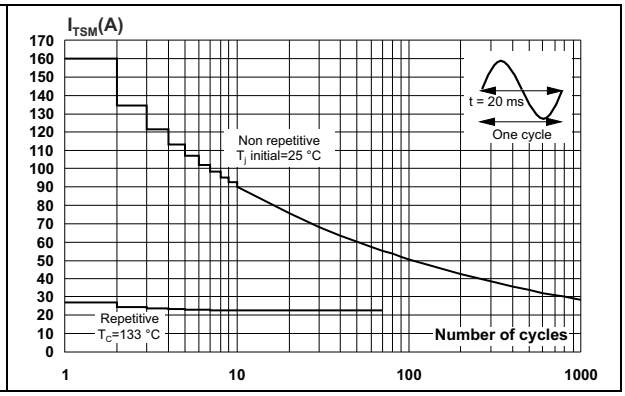


Figure 11. Non repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10 ms, and corresponding value of I²t

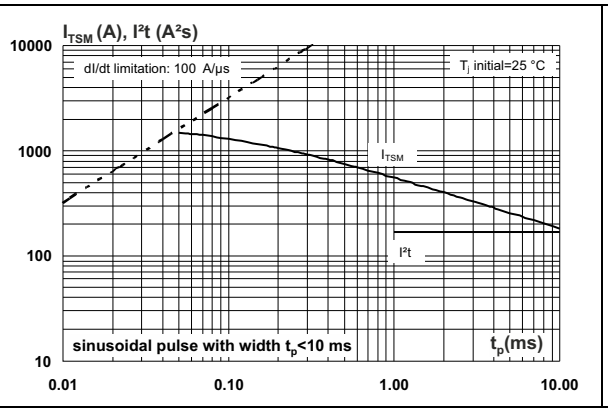


Figure 12. On-state characteristics (maximum values)

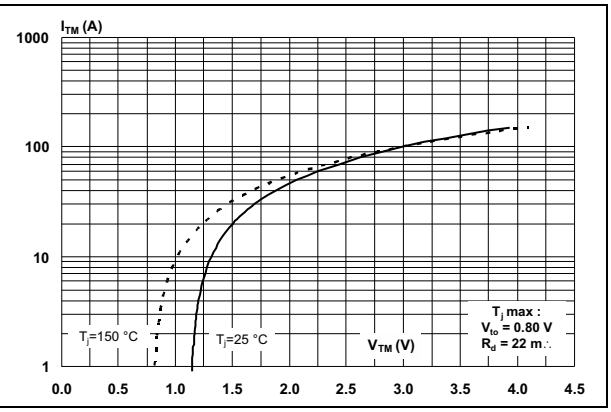
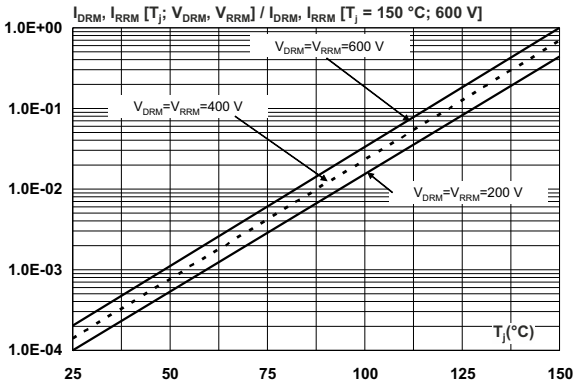


Figure 13. Relative variation of leakage current versus junction temperature for different values of blocking voltage (typical values)



2 Package information

- Epoxy meets UL94, V0
- Recommended torque value: 0.4 to 0.6 N·m

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Figure 14. TO-220AB dimension definitions

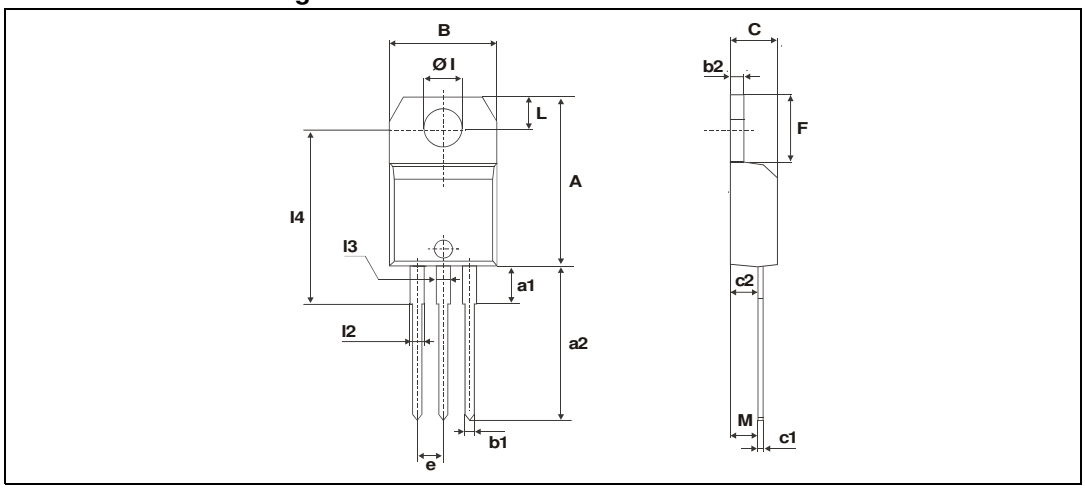

Table 6. TO-220AB dimension values

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
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	

3 Ordering information

Figure 15. Ordering information scheme

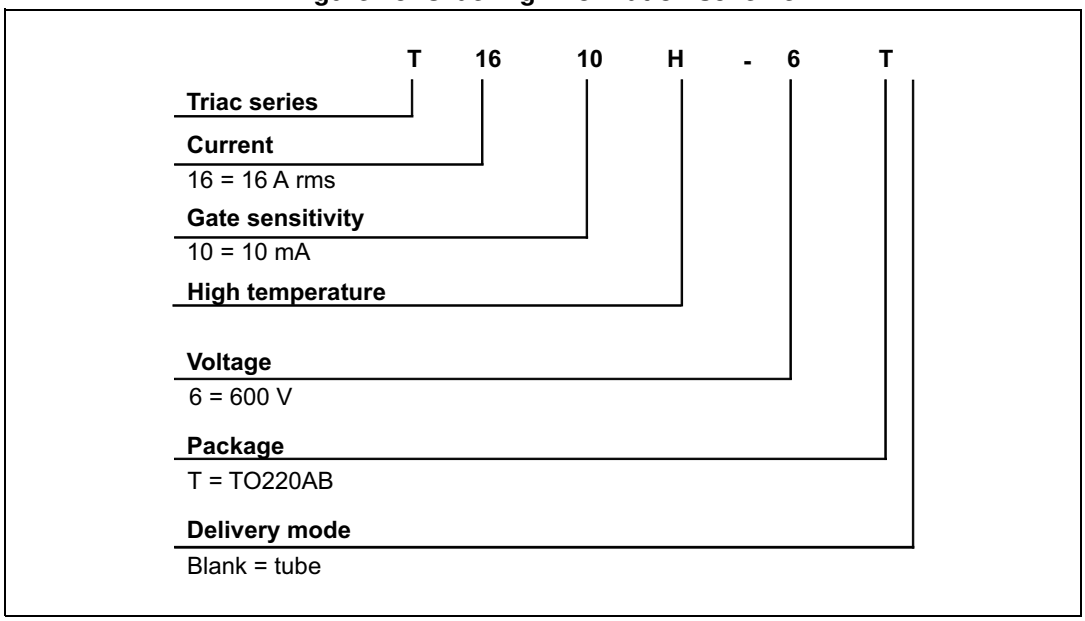

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
T1610H-6T	T1610H-6T	TO-220AB	2.3	50	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
31-May-2013	1	First issue.

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