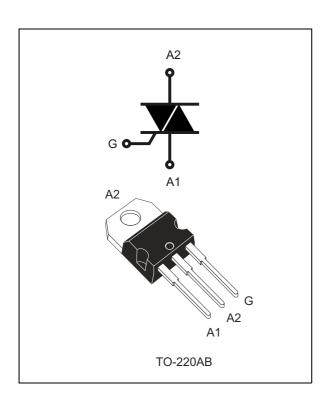


## 6 A logic level Triac

Datasheet - production data



### **Description**

Available in through-hole package, the T610T-8T Triac can be used for the on/off or phase angle control function in general purpose AC switching. This device can be directly driven by a microcontroller due to its 10 mA gate current requirement.

**Table 1. Device summary** 

Symbol	Value	Unit
I <sub>T(rms)</sub>	6	А
V <sub>DRM</sub> , V <sub>RRM</sub>	800	V
V <sub>DSM</sub> , V <sub>RSM</sub>	900	V
I <sub>GT</sub>	10	mA

#### **Features**

- Medium current Triac
- Three quadrants
- ECOPACK®2 compliant component

## **Applications**

- · General purpose AC line load switching
- Motor control circuits
- Small home appliances
- Lighting
- Inrush current limiting circuits
- Overvoltage crowbar protection

Characteristics T610T-8T

## 1 Characteristics

Table 2. Absolute ratings (limiting values,  $T_j = 25$  °C unless otherwise stated)

Symbol	Parameter			Value	Unit
I <sub>T(rms)</sub>	On-state rms current (full sine wave	)	T <sub>C</sub> = 135 °C	6	Α
l	Non repetitive surge peak on-state	f = 50 Hz	t = 20 ms	45	Α
I <sub>TSM</sub>	current (full cycle, T <sub>j</sub> initial = 25 °C)	f = 60 Hz	t = 16.7 ms	47	^
l <sup>2</sup> t	I <sup>2</sup> t value for fusing, T <sub>j</sub> initial = 25 °C		$t_p = 10 \text{ ms}$	13	A <sup>2</sup> s
V <sub>DRM</sub> ,	Repetitive surge peak off-state volta	nge	T <sub>j</sub> = 150 °C	600	V
$V_{RRM}$	Nepetitive surge peak oil-state voita	T <sub>j</sub> = 125 °C	800	V	
V <sub>DSM</sub> , V <sub>RSM</sub>	Non repetitive surge peak off-state v	t <sub>p</sub> = 10 ms	900	٧	
dl/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \le 100 \text{ ns}$	F = 100 Hz	100	A/µs	
I <sub>GM</sub>	Peak gate current $t_p = 20 \mu s$		T <sub>j</sub> = 150 °C	4	Α
P <sub>G(AV)</sub>	Average gate power dissipation	T <sub>j</sub> = 150 °C	1	W	
T <sub>stg</sub>	Storage junction temperature range			- 40 to + 150	°C
Tj	Operating junction temperature range			- 40 to + 150	
$T_L$	Maximum lead temperature for sold	ering during	10 s	260	°C

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

Symbol	Test conditions Quadrant			Value	Unit
	$V_D = 12 \text{ V}, R_1 = 30 \Omega$	1 - 11 - 111	Min.	0.5	^
I <sub>GT</sub>	VB = 12 V, NL = 30 32	1 - 11 - 111	Max.	10	mA mA
V <sub>GT</sub>	$V_D = 12 \text{ V}, R_L = 30 \Omega$	1 - 11 - 111	Max.	1.3	V
V <sub>GD</sub>	$V_D = V_{DRM}, R_L = 3.3 \text{ k}\Omega, T_j = 150 \text{ °C}$	1 - 11 - 111	Min.	0.2	V
I <sub>H</sub> <sup>(1)</sup>	I <sub>T</sub> = 500 mA		Max.	15	mA
	I <sub>G</sub> = 1.2 I <sub>GT</sub>	1 - 111	Max.	20	- mA
I <sub>L</sub>		II		25	
dV/dt <sup>(1)</sup>	$V_D = V_R = 536 \text{ V, gate open}$	T <sub>j</sub> = 125 °C	Min.	250	V/µs
u v/ui、	$V_D = V_R = 402 \text{ V, gate open}$	T <sub>j</sub> = 150 °C	IVIIII.	170	V/µs
(dl/dt)c <sup>(1)</sup>	(dV/dt)c = 0.1 V/μs	T <sub>j</sub> = 125 °C	Min.	5.2	A/ms
(ui/ut)C <sup>(*/</sup>		T <sub>j</sub> = 150 °C		3.7	
(dl/dt)c <sup>(1)</sup>	(dV/dt)c = 10 V/µs	T <sub>j</sub> = 125 °C	Min	2.7	- A/ms
(al/at)c <sup>v</sup>		T <sub>j</sub> = 150 °C	Min.	1.2	

<sup>1.</sup> For both polarities of A2 referenced to A1

T610T-8T Characteristics

Table	4	Static	charac	teristics

Symbol	Test conditions			Value	Unit
V <sub>T</sub> <sup>(1)</sup>	$I_{TM} = 8.5 \text{ A}, t_p = 380  \mu\text{s}$	T <sub>j</sub> = 25 °C	Max.	1.55	V
V <sub>t0</sub> (1)	Threshold voltage	T <sub>j</sub> = 150 °C	Max.	0.85	V
R <sub>d</sub> <sup>(1)</sup>	Dynamic resistance	T <sub>j</sub> = 150 °C	Max.	75	mΩ
	V <sub>DRM</sub> = V <sub>RRM</sub> = 800 V	T <sub>j</sub> = 25 °C	Max.	5	μΑ
I <sub>DRM</sub> I <sub>RRM</sub>	V <sub>DRM</sub> = V <sub>RRM</sub> = 600 V	T <sub>j</sub> = 125 °C	iviax.	0.6	mA
'KKIVI	V <sub>DRM</sub> = V <sub>RRM</sub> = 600 V	T <sub>j</sub> = 150 °C	Max.	2.0	IIIA

<sup>1.</sup> For both polarities of A2 referenced to A1

Table 5. Thermal resistance

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

Figure 1. Maximum power dissipation versus on-state rms current

P(W)
8

a = 180°

180°

17(RMS)(A)

0

1 2 3 4 5 6

Figure 2. On-state rms current versus case temperature

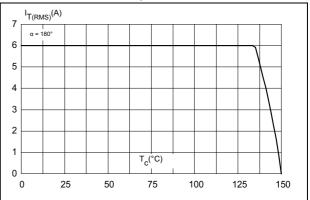


Figure 3. On-state rms current versus ambient temperature (free air convection)

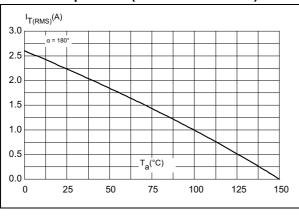
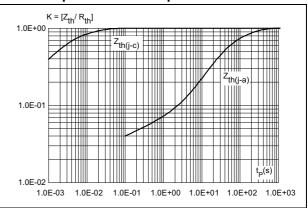


Figure 4. Relative variation of thermal impedance versus pulse duration



Characteristics T610T-8T

Figure 5. On-state characteristics (maximum values)

 $I_{TM}(A)$ 

= 150 °C

1.0

1.5

0.5

100

0.0

Values)

T<sub>1</sub> max:
V<sub>1</sub> = 0.85 V
R<sub>0</sub> = 75 mΩ

T<sub>3</sub> = 25 °C

V<sub>TM</sub>(V)

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

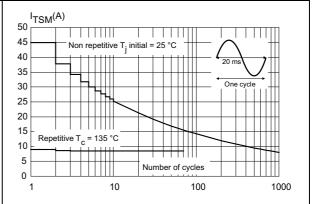


Figure 7. Non repetitive surge peak on-state current

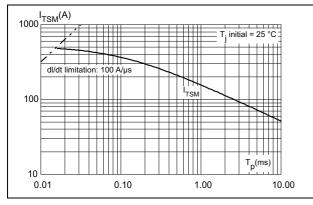
2.0

2.5

3.0

3.5

Figure 8. Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)



 $I_{GT, V_{GT}}[T_j]/I_{GT, V_{GT}}[T_j = 25 \degree C]$ 2.0 I) GT Q1-Q2 1.5 1.0 0.5 T<sub>i</sub>(°C) 0.0 -50 -25 0 25 75 100 125 150 50

Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature (typical values)

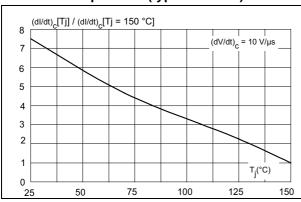
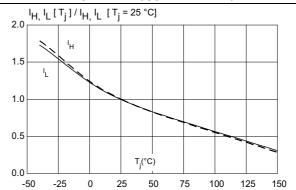


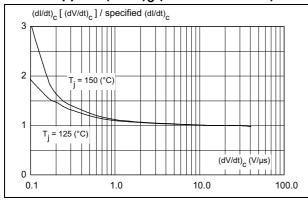
Figure 10. Relative variation of holding current and latching current versus junction temperature (typical values)



T610T-8T Characteristics

Figure 11. Relative variation of critical rate of decrease of main current (dl/dt)<sub>C</sub> versus reapplied (dV/dt)<sub>C</sub> (maximum values)

Figure 12. Relative variation of static dV/dt immunity versus junction temperature (typical values)



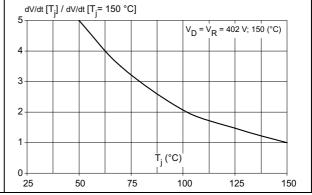
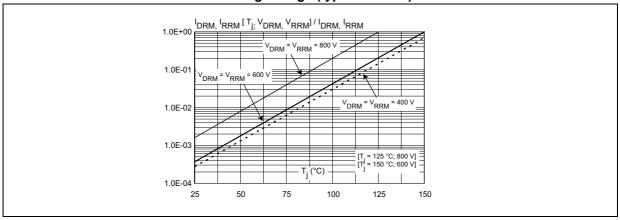


Figure 13. Relative variation of leakage current versus junction temperature for different values of blocking voltage (typical values)



Package information T610T-8T

## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Recommended torque: 0.4 to 0.6 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: <a href="https://www.st.com">www.st.com</a>. ECOPACK<sup>®</sup> is an ST trademark.

Ε  $\emptyset P$ Resin gate 0.5 mm max. protrusion<sup>(1)</sup> Q H1 D **D1 L30 L20** J1 L1 b1 b Resin gate C 0.5 mm max. protrusion<sup>(1)</sup> (1) Resin gate position accepted in each of the two position shown as well as the symmetrical opposites

Figure 14. TO-220AB dimension definitions

T610T-8T Package information

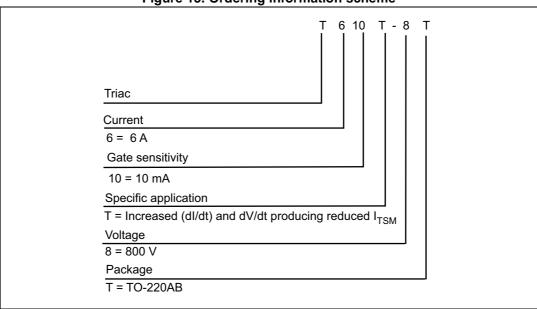
Table 6. TO-220AB dimension values

		Dimer	nsions	
Ref.	Millim	Millimeters		hes
	Min.	Max.	Min.	Max.
А	4.40	4.60	0.17	0.18
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.045	0.067
С	0.48	0.70	0.019	0.027
D	15.25	15.75	0.60	0.62
D1	1.27 typ.		0.05	typ.
E	10	10 10.40		0.41
е	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.19	0.20
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.24	0.26
J1	2.40	2.72	0.094	0.107
L	13	14	0.51	0.55
L1	3.50	3.93	0.137	0.154
L20	16.40 typ.		0.64	typ.
L30	28.90 typ.		1.13	typ.
ØP	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

Ordering information T610T-8T

# 3 Ordering information

Figure 15. Ordering information scheme



**Table 7. Ordering information** 

Order code	Marking	Package	Weight	Base qty	Delivery mode
T610T-8T	T610T-8T	TO-220AB	2.0 g	50	Tube

## 4 Revision history

**Table 8. Document revision history** 

Date	Revision	Changes
07-Nov-2014	1	Initial release.

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