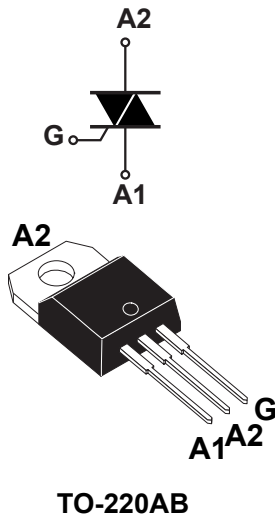


## 12 A 800 V Snubberless Triac in TO-220AB package



### Features

- Medium current Triac
- High static and dynamic commutation
- Three quadrants
- **ECOPACK2** compliant

### Applications

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

### Description

Available in through-hole package, the **T1235T-8T** Triac can be used for the on/off or phase angle control function in general purpose AC switching where high commutation capability is required.

This device can be used without a snubber circuit when the limits defined in this datasheet are respected.

#### Product status link

[T1235T-8T](#)

#### Product summary

<b>Order code</b>	T1235T-8T
<b>Package</b>	TO-220AB
<b><math>I_{T(RMS)}</math></b>	12 A
<b><math>V_{DRM}/V_{RRM}</math></b>	800 V
<b><math>V_{DSM}/V_{RSM}</math></b>	900 V
<b><math>I_{GT}</math></b>	35 mA

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values)**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state RMS current (full sine wave)		$T_c = 131\text{ °C}$	12	A
$I_{TSM}$	Non repetitive surge peak on-state current ( $T_j$ initial = 25 °C)	F = 50 Hz	t = 20 ms	90	A
		F = 60 Hz	t = 16.7 ms	95	
$I^2t$	$I^2t$ value for fusing, ( $T_j$ initial = 25 °C)		$t_p = 10\text{ ms}$	54	A <sup>2</sup> s
$V_{DRM}/V_{RRM}$	Repetitive surge peak off-state voltage		$T_j = 150\text{ °C}$	600	V
			$T_j = 125\text{ °C}$	800	
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage		$t_p = 10\text{ ms}$	900	V
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , tr ≤ 100 ns		F = 100 Hz	100	A/μs
$I_{GM}$	Peak gate current	$t_p = 20\text{ μs}$	$T_j = 150\text{ °C}$	4	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 150\text{ °C}$	1	W
$T_{stg}$	Storage junction temperature range			-40 to +150	°C
$T_j$	Operating junction temperature range			-40 to +150	°C
$T_L$	Maximum lead temperature soldering during 10 s			260	°C

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$  unless otherwise specified)**

Symbol	Test conditions		Value	Unit		
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ , $R_L = 30\text{ Ω}$	I - II - III	Min.	1.75	mA	
			Max.	35		
$V_{GT}$	$V_D = 12\text{ V}$ , $R_L = 30\text{ Ω}$	I - II - III	Max.	1.3	V	
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ kΩ}$ , $T_j = 150\text{ °C}$	I - II - III	Min.	0.2	V	
$I_H$	$I_T = 500\text{ mA}$		Max.	40	mA	
$I_L$	$I_G = 1.2 \times I_{GT}$	I - III	Max.	60	mA	
		II		65		
dV/dt <sup>(2)</sup>	$V_D = 536\text{ V}$ , gate open	$T_j = 125\text{ °C}$	Min.	2000	V/μs	
	$V_D = 402\text{ V}$ , gate open	$T_j = 150\text{ °C}$		1000		
(dI/dt) <sup>(2)</sup>	Without snubber (dV/dt) <sub>c</sub> > 20 V/μs		Min.	$T_j = 125\text{ °C}$	12	A/ms
				$T_j = 150\text{ °C}$	6	

1. Minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max.

2. For both polarities of A2 referenced to A1

**Table 3. Static characteristics**

Symbol	Test conditions			Value	Unit
$V_T^{(1)}$	$I_{TM} = 17 \text{ A}$ , $t_p = 380 \mu\text{s}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	1.55	V
$V_{TO}^{(1)}$	Threshold voltage	$T_j = 150 \text{ }^\circ\text{C}$	Max.	0.85	
$R_d^{(1)}$	Dynamic resistance	$T_j = 150 \text{ }^\circ\text{C}$	Max.	37	m $\Omega$
$I_{DRM}$ , $I_{RRM}$	$V_D = V_R = 800 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	7.5	$\mu\text{A}$
		$T_j = 125 \text{ }^\circ\text{C}$		1.0	mA
	$V_D = V_R = 600 \text{ V}$	$T_j = 150 \text{ }^\circ\text{C}$	Max.	2.7	

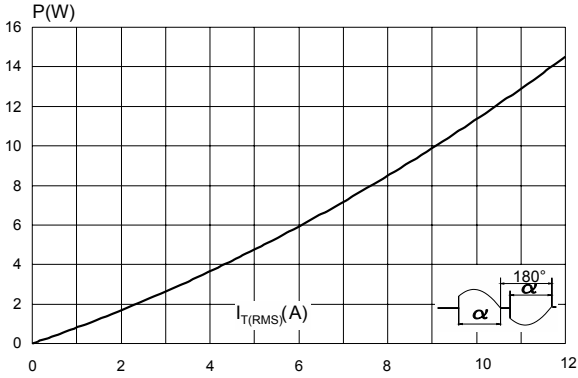
1. For both polarities of A2 referenced to A1

**Table 4. Thermal parameters**

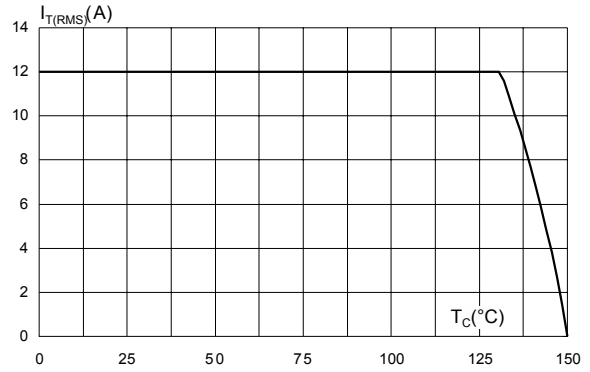
Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	1.3	$^\circ\text{C/W}$
$R_{th(j-a)}$	Junction to ambient	60	$^\circ\text{C/W}$

### 1.1 Characteristics curves

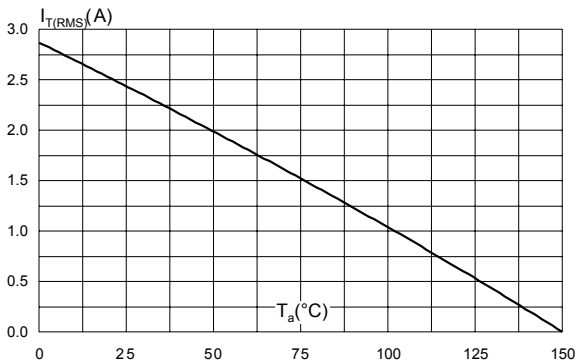
**Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)**



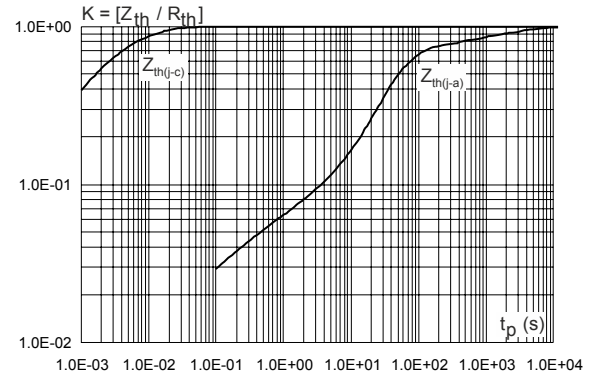
**Figure 2. On-state RMS current versus case temperature (full cycle)**



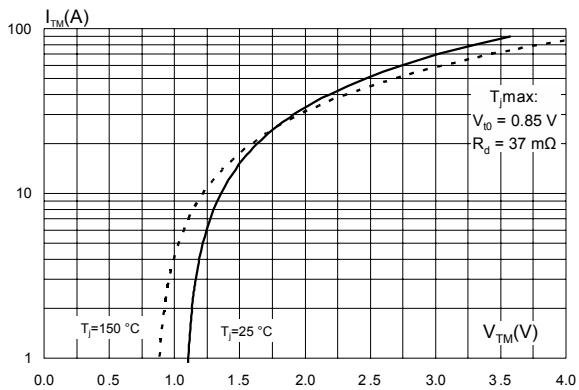
**Figure 3. On-state RMS current versus ambient temperature (free air convection)**



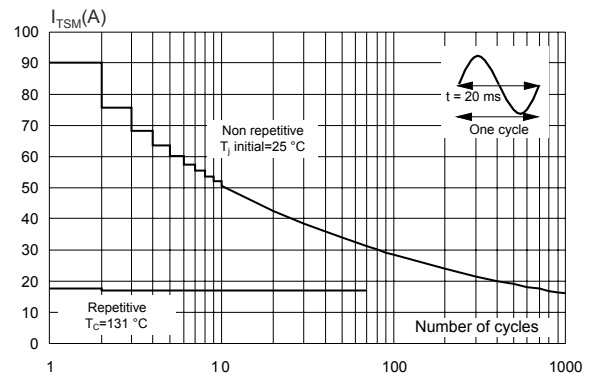
**Figure 4. Relative variation of thermal impedance versus pulse duration**



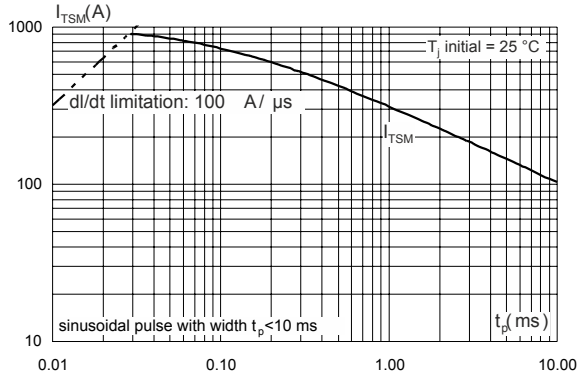
**Figure 5. On-state characteristics (maximum values)**



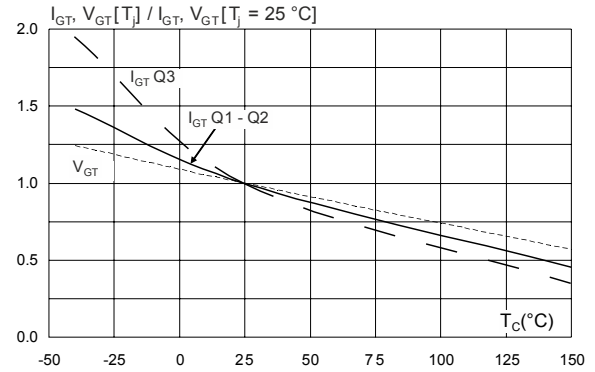
**Figure 6. Surge peak on-state current versus number of cycles**



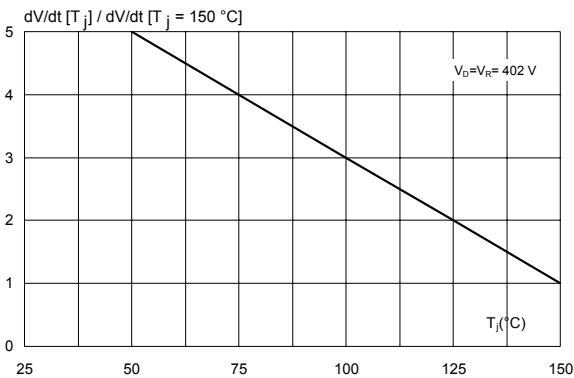
**Figure 7. Non repetitive surge peak on-state current**



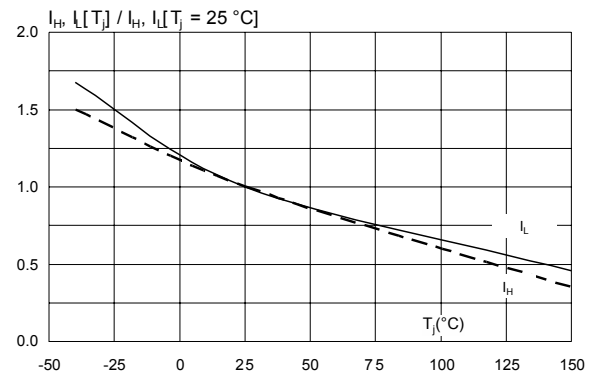
**Figure 8. Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)**



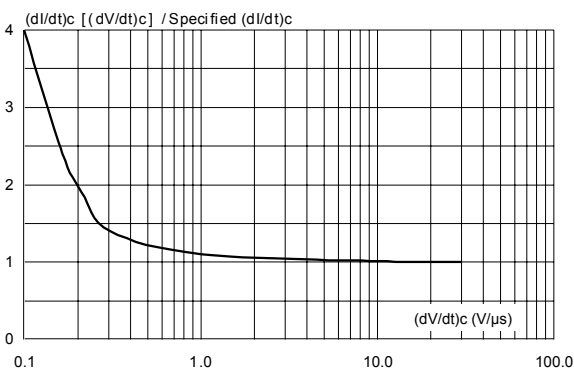
**Figure 9. Relative variation of static dV/dt immunity versus junction temperature (typical values)**



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



**Figure 11. Relative variation of critical rate of decrease of main current (di/dt)c versus reapplied (dV/dt)c (typical values)**



**Figure 12. Relative variation of critical rate of decrease of main current (di/dt)c versus junction temperature (typical values)**

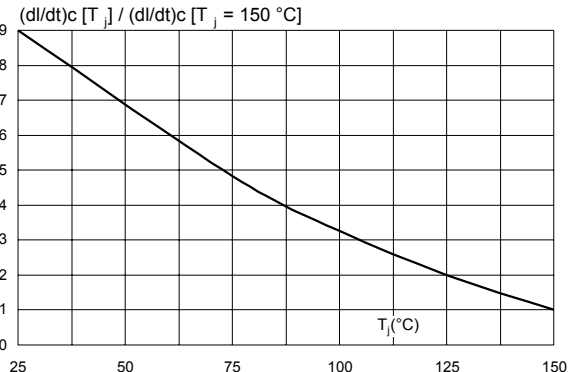
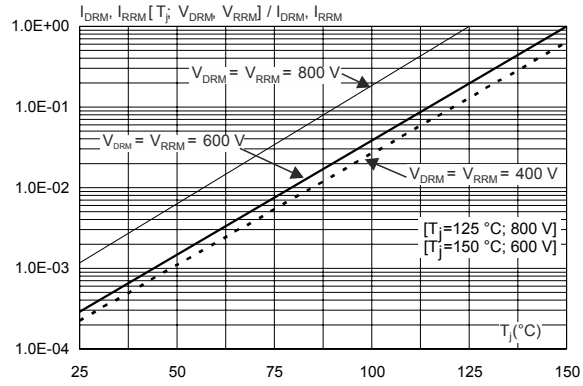


Figure 13. Relative variation of leakage current versus junction temperature for  $V_D = V_{DRM} / V_R = V_{RRM}$  blocking voltage (typical values)



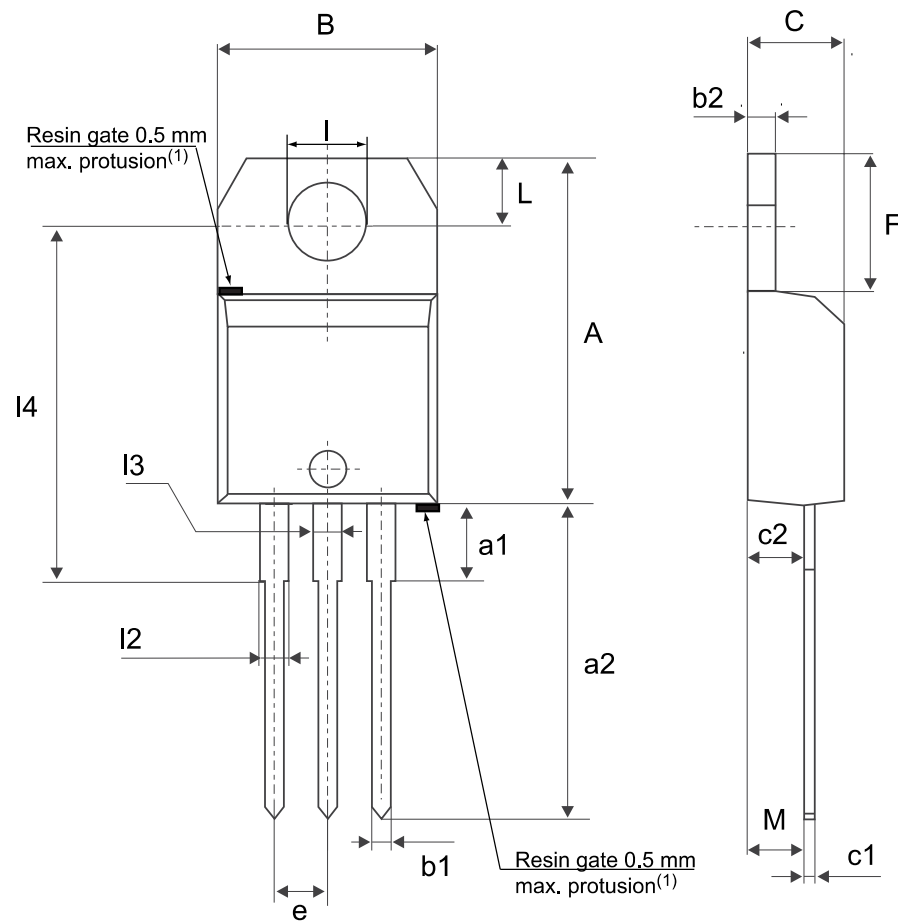
## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 TO-220AB package information

- Epoxy resin is halogen free and meets UL94 flammability standard, level V0
- Lead-free plating package leads
- Recommended torque: 0.4 to 0.6 N·m

Figure 14. TO-220AB package outline



(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites.

**Table 5. TO-220AB package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.5984		0.6260
a1		3.75			0.1476	
a2	13.00		14.00	0.5118		0.5512
B	10.00		10.40	0.3937		0.4094
b1	0.61		0.88	0.0240		0.0346
b2	1.23		1.32	0.0484		0.0520
C	4.40		4.60	0.1732		0.1811
c1	0.49		0.70	0.0193		0.0276
c2	2.40		2.72	0.0945		0.1071
e	2.40		2.70	0.0945		0.1063
F	6.20		6.60	0.2441		0.2598
I	3.73		3.88	0.1469		0.1528
L	2.65		2.95	0.1043		0.1161
I2	1.14		1.70	0.0449		0.0669
I3	1.14		1.70	0.0449		0.0669
I4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

1. Inch dimensions are for reference only.



### 3 Ordering information

Figure 15. Ordering information scheme

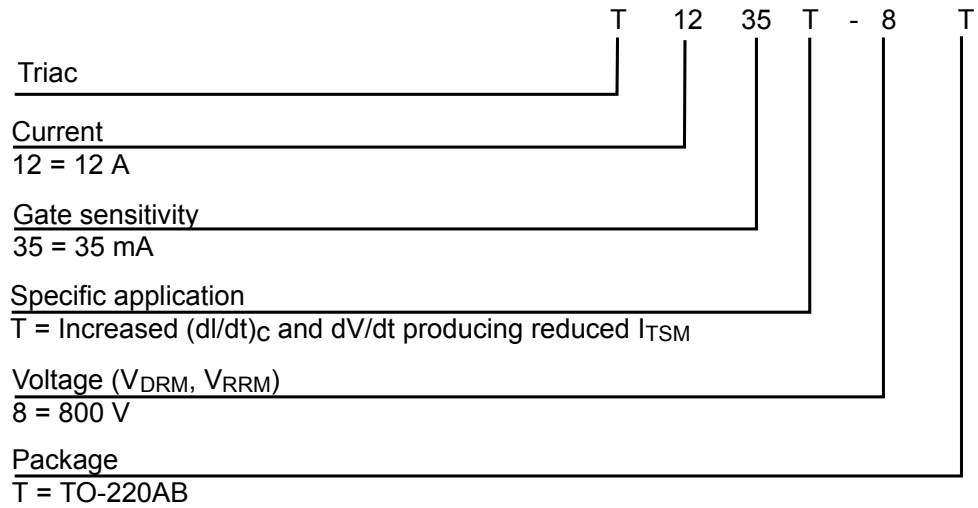


Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T1235T-8T	T1235T-8T	TO-220AB	2.0 g	50	Tube

## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
05-Aug-2013	1	Initial release.
01-Jul-2014	2	Updated Table 2.
28-Jul-2014	3	Updated Table 5.
13-Sep-2019	4	Updated <a href="#">Figure 14</a> and <a href="#">Table 5</a> .

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Тел: +7 (812) 336 43 04 (многоканальный)  
Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)