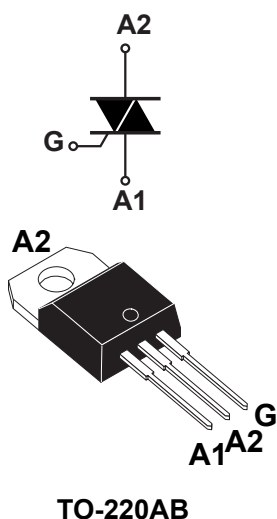


## 12 A 800 V Snubberless Triac in TO-220AB package



### 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	
<a href="#">T1235T-8T</a>	
Product summary	
Order code	T1235T-8T
Package	TO-220AB
$I_{T(RMS)}$	12 A
$V_{DRM}/V_{RRM}$	800 V
$V_{DSM}/V_{RSM}$	900 V
$I_{GT}$	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)			$T_c = 131\text{ }^{\circ}\text{C}$	12 A
$I_{TSM}$	Non repetitive surge peak on-state current ( $T_j$ initial = $25\text{ }^{\circ}\text{C}$ )	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 = $25\text{ }^{\circ}\text{C}$ )			$t_p = 10\text{ ms}$	54 $\text{A}^2\text{s}$
$V_{DRM}/V_{RRM}$	Repetitive surge peak off-state voltage			$T_j = 150\text{ }^{\circ}\text{C}$	600 V
				$T_j = 125\text{ }^{\circ}\text{C}$	800 V
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage			$t_p = 10\text{ ms}$	900 V
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $tr \leq 100\text{ ns}$			F = 100 Hz	100 $\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu\text{s}$	$T_j = 150\text{ }^{\circ}\text{C}$	4	A
$P_{G(AV)}$	Average gate power dissipation			$T_j = 150\text{ }^{\circ}\text{C}$	1 W
$T_{stg}$	Storage junction temperature range			-40 to +150	$^{\circ}\text{C}$
$T_j$	Operating junction temperature range			-40 to +150	$^{\circ}\text{C}$
$T_L$	Maximum lead temperature soldering during 10 s			260	$^{\circ}\text{C}$

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

Symbol	Test conditions			Value	Unit
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$	I - II - III	Min.	1.75	mA
			Max.	35	
$V_{GT}$	$V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$	I - II - III	Max.	1.3	V
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $T_j = 150\text{ }^{\circ}\text{C}$	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	
$dV/dt^{(2)}$	$V_D = 536\text{ V}$ , gate open	$T_j = 125\text{ }^{\circ}\text{C}$	Min.	2000	$\text{V}/\mu\text{s}$
	$V_D = 402\text{ V}$ , gate open	$T_j = 150\text{ }^{\circ}\text{C}$		1000	
$(di/dt)^c^{(2)}$	Without snubber ( $dV/dt$ ) $c > 20\text{ V}/\mu\text{s}$	$T_j = 125\text{ }^{\circ}\text{C}$	Min.	12	$\text{A}/\text{ms}$
		$T_j = 150\text{ }^{\circ}\text{C}$		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
$V_T^{(1)}$	$I_{TM} = 17\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$	$T_j = 25\text{ }^\circ\text{C}$	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	

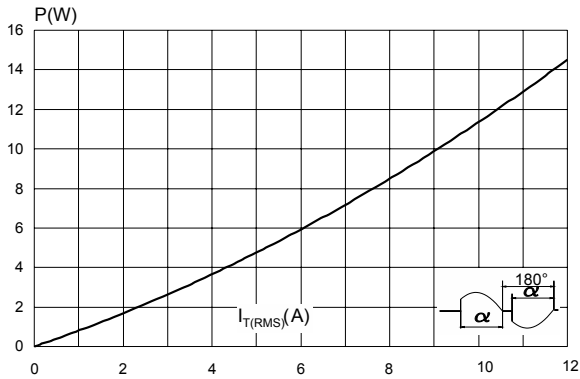
1. For both polarities of A2 referenced to A1

**Table 4. Thermal parameters**

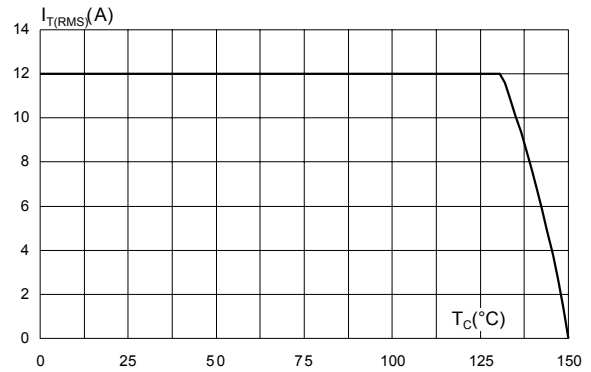
Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	1.3	$^\circ\text{C/W}$
$R_{th(j-a)}$	Junction to ambient	60	$^\circ\text{C/W}$

## 1.1 Characteristics curves

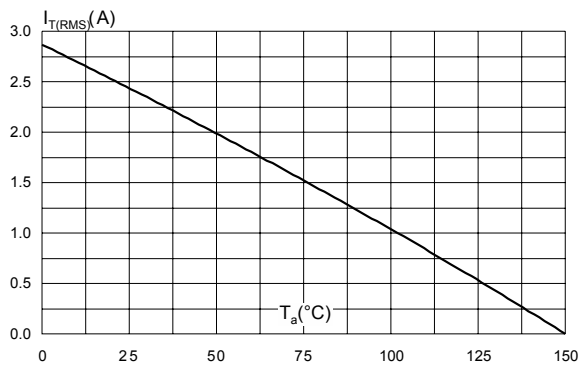
**Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)**



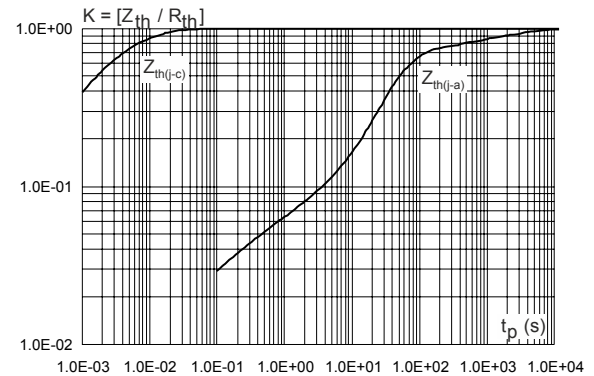
**Figure 2. On-state RMS current versus case temperature (full cycle)**



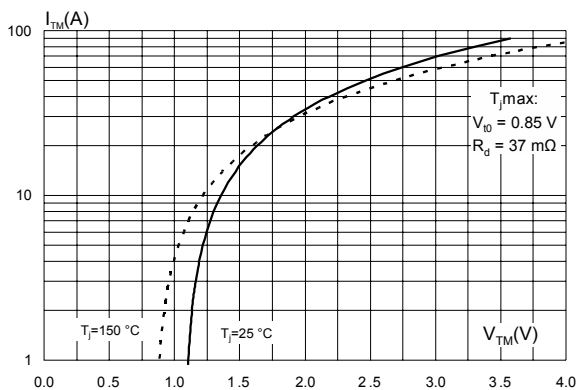
**Figure 3. On-state RMS current versus ambient temperature (free air convection)**



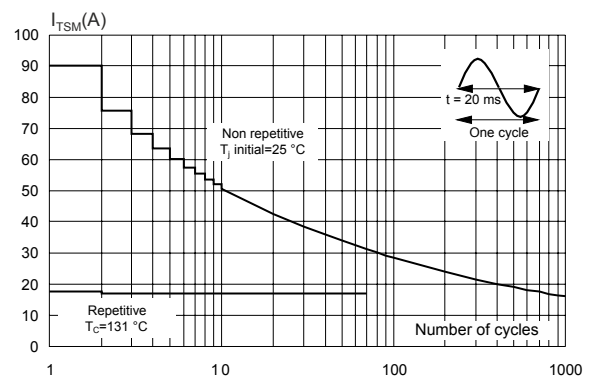
**Figure 4. Relative variation of thermal impedance versus pulse duration**



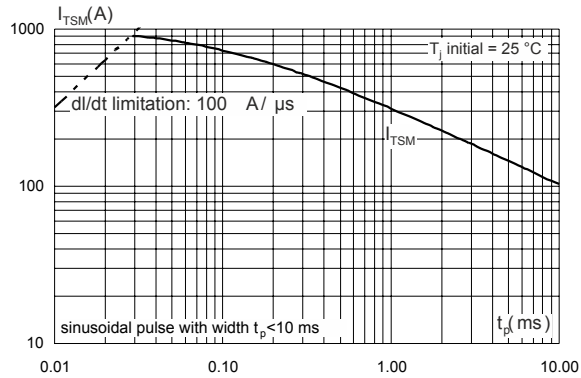
**Figure 5. On-state characteristics (maximum values)**



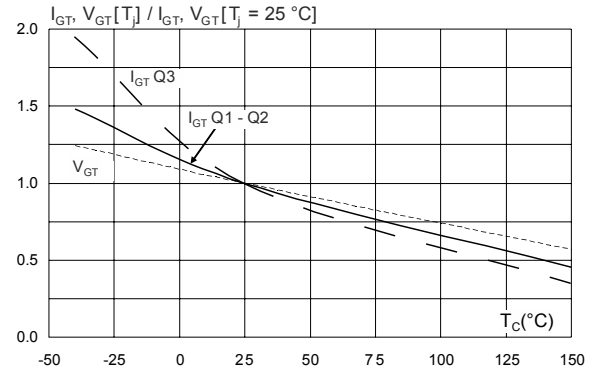
**Figure 6. Surge peak on-state current versus number of cycles**



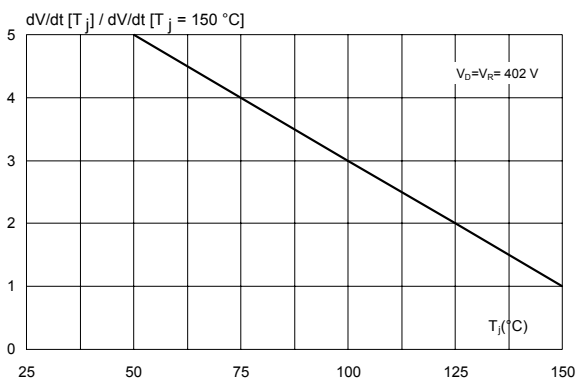
**Figure 7. Non repetitive surge peak on-state current**



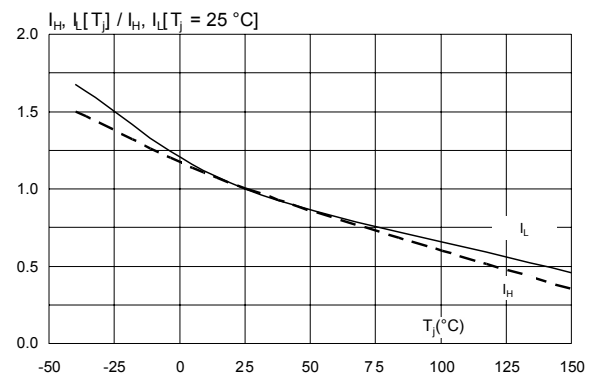
**Figure 8. Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)**



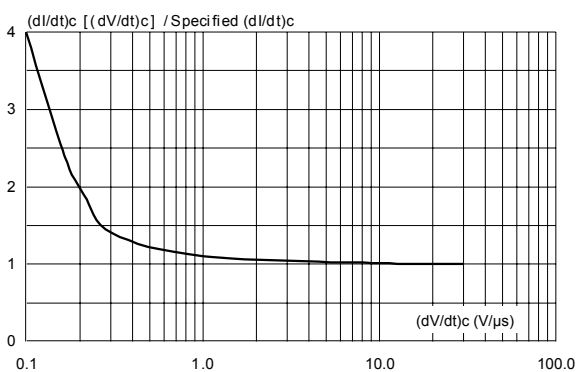
**Figure 9. Relative variation of static dV/dt immunity versus junction temperature (typical values)**



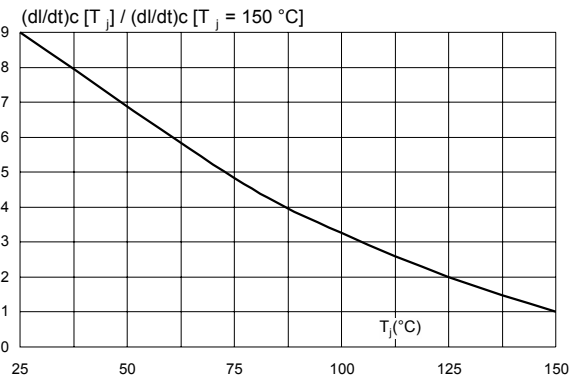
**Figure 10. Relative variation of holding current and latching current versus junction temperature (typical values)**



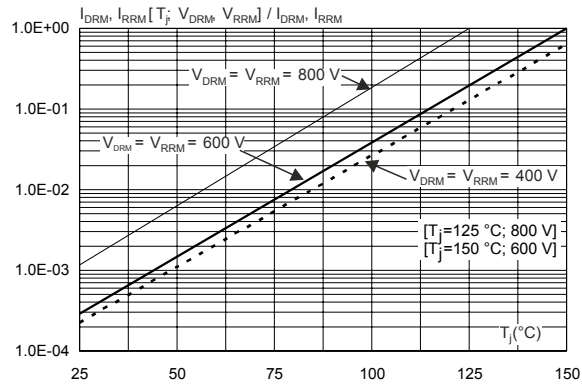
**Figure 11. Relative variation of critical rate of decrease of main current (di/dt)c versus reapplied (dV/dt)c (typical values)**



**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)**



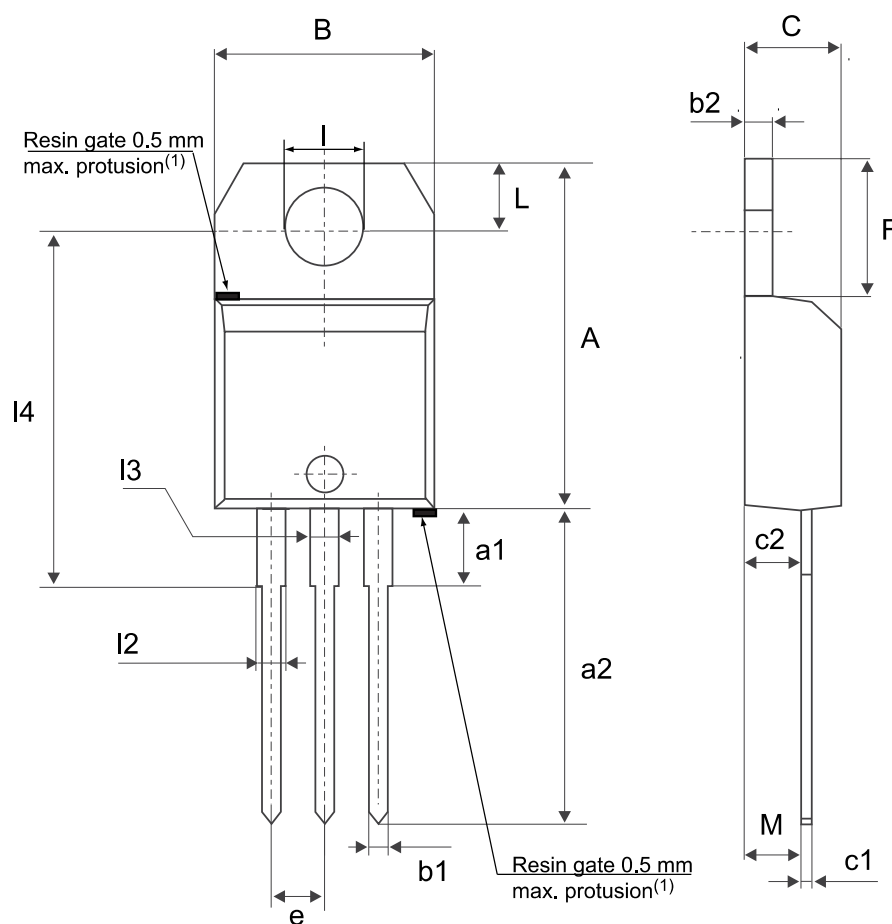
## 2 Package information

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**

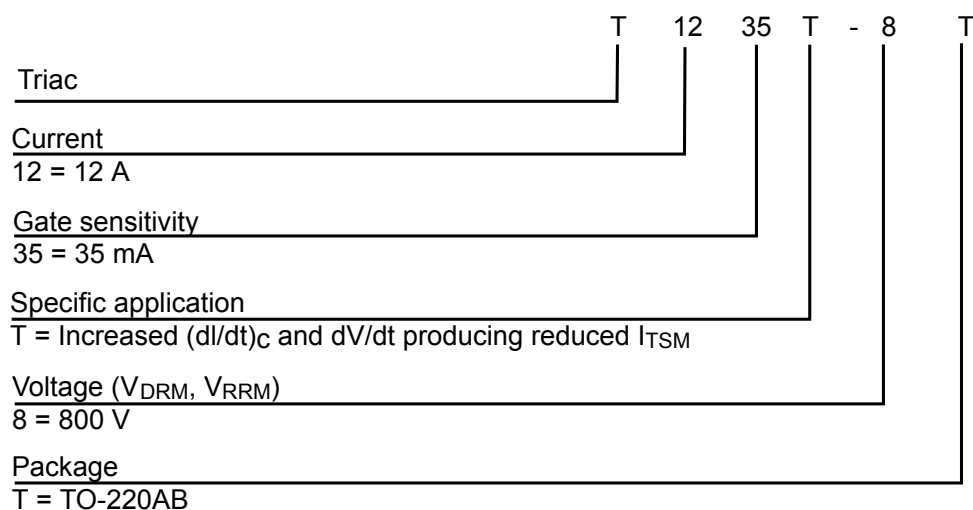
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.5984		0.6260
a1		3.75			0.1476	
a2	13.00		14.00	0.5118		0.5512
B	10.00		10.40	0.3937		0.4094
b1	0.61		0.88	0.0240		0.0346
b2	1.23		1.32	0.0484		0.0520
C	4.40		4.60	0.1732		0.1811
c1	0.49		0.70	0.0193		0.0276
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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