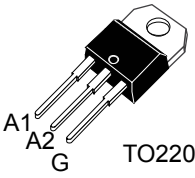
T1235T-8I

12 A Snubberless™ Triac

Datasheet -production data



TO220AB insulated

Features

- High static dV/dt
- High dynamic turn-off commutation (dI/dt)c
- 150 °C maximum T_j
- Three quadrants
- Built-in ceramic for tab insulation
- Compliance to UL1557 standard (ref : E81734)
- ECOPACK®2 compliant component
- Complies with UL94,V0
- Surge capability V_{DSM}, V_{RSM} = 900 V

Benefits

- High immunity to false turn-on thanks to high static dV/dt
- Better turn-off in high temperature environments thanks to (dI/dt)c
- Increase of thermal margin due to extended working T_j up to 150 °C
- Better thermal resistance due to the ceramic inside the package

Applications

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

Description

Available in through-hole package, the T1235T-8I 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 RC circuit when the limits defined are respected.

TO-220AB insulated provides tab insulation, UL1557 certified, rated at 2.5 kV RMS and UL-94, V0 resin compliance.

Package environmentally friendly Ecopack®2 graded (RoHS and Halogen Free compliance).

Snubberless™ is a trademark of STMicroelectronics.

Figure 1: Functional diagram

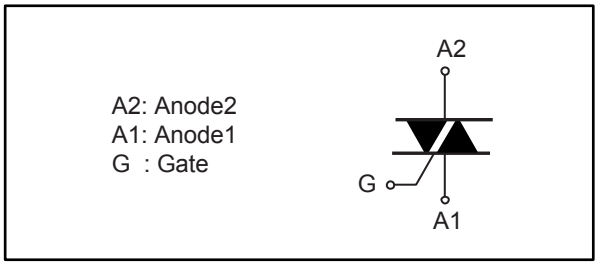


Table 1: Device summary

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	800	V
V_{DSM}/V_{RSM}	900	V
I_{GT}	35	mA

1 Characteristics

Table 2: Absolute maximum ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)		T_c = 114 °C	12	A
I_{TSM}	Non repetitive surge peak on-state current, T_j initial = 25 °C		t_p = 16.7 ms	95	A
			t_p = 20 ms	90	
I^2t	I^2t value for fusing		T_j initial = 25 °C	54	A^2s
dI/dt	Critical rate of rise of on-state current, I_G = 2 x I_{GT}, tr ≤ 100 ns		f = 100 Hz	100	A/µs
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage		T_j = 150 °C	600	V
			T_j = 125 °C	800	V
V_{DSM}/V_{RSM}	Non Repetitive peak off-state voltage		t_p = 10 ms	900	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 150 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 150 °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 for soldering during 10 s			260	°C
V_{ins}	Insulation RMS voltage, 1 minute, UL1557 certified (E81734)			2.5	kV

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

Symbol	Test conditions	Quadrants; T_j		Value	Unit
I_{GT}	V_D = 12 V, R_L = 33 Ω	I - II - III	Min.	1.75	mA
	V_D = 12 V, R_L = 33 Ω	I - II - III	Max.	35	mA
V_{GT}	V_D = 12 V, R_L = 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_L	I_G = 1.2 x I_{GT}	I - III	Max.	60	mA
	I_G = 1.2 x I_{GT}	II	Max.	80	mA
I_H (1)	I_T = 500 mA, gate open		Max.	40	mA
dV/dt (1)	V_D = 536 V, gate open	T_j = 125 °C	Min.	2000	V/µs
	V_D = 402 V, gate open	T_j = 150 °C	Min.	1000	V/µs
(dI/dt)c (1)	Without snubber, (dV/dt)c > 20 V/µs	T_j = 125 °C	Min.	12	A/ms
		T_j = 150 °C	Min.	6	A/ms

Notes:

(1)For both polarities of A2 referenced to A1.

Table 4: Static characteristics

Symbol	Test conditions	T_j		Value	Unit
V_{TM}(1)	I_T = 17 A, t_p = 380 µs	25 °C	Max.	1.60	V
V_{TO}(1)	Threshold on-state voltage	150 °C	Max.	0.85	V
R_D(1)	Dynamic resistance	150 °C	Max.	50	mΩ
I_{DRM}/I_{RRM}	V_{DRM} = V_{RRM} = 800 V	25 °C	Max.	5	µA
		125°C		1	mA
	V_{DRM} = V_{RRM} = 600 V	150 °C	Max.	3.1	mA

Notes:

(1)For both polarities of A2 referenced to A1.

Table 5: Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	Max.	2.6	°C/W
$R_{th(j-a)}$	Junction to ambient	Typ.	60	

1.1 Characteristics (curves)

Figure 2: Maximum power dissipation versus on-state RMS current

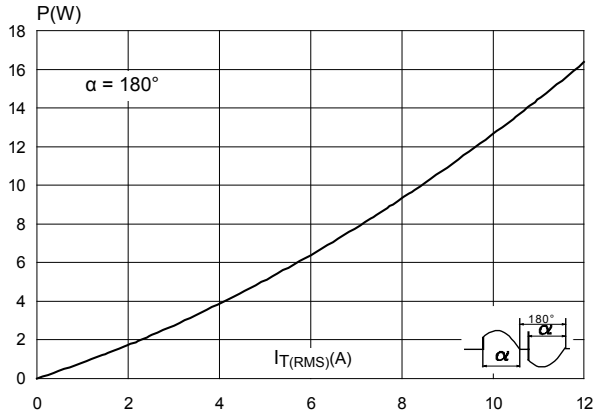


Figure 3: On-state RMS current versus case temperature

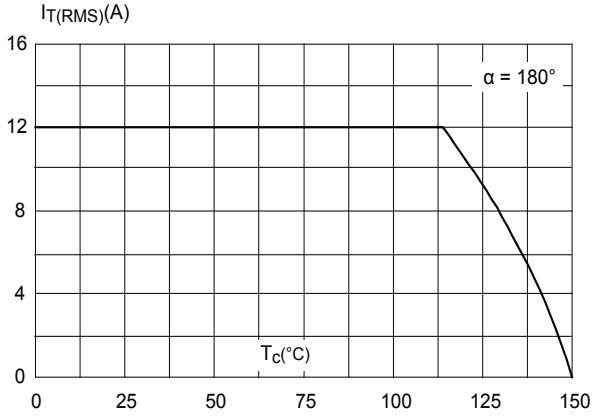


Figure 4: On-state RMS current versus ambient temperature (free air convection)

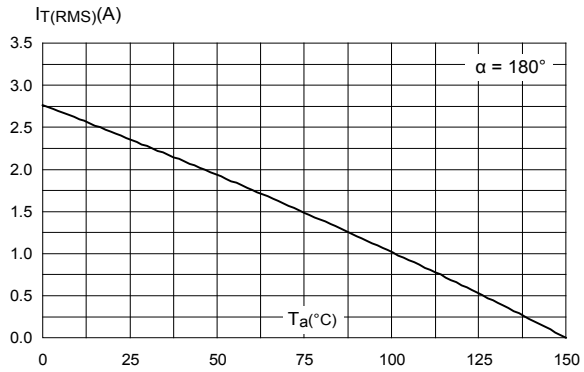


Figure 5: Relative variation of thermal impedance versus pulse duration

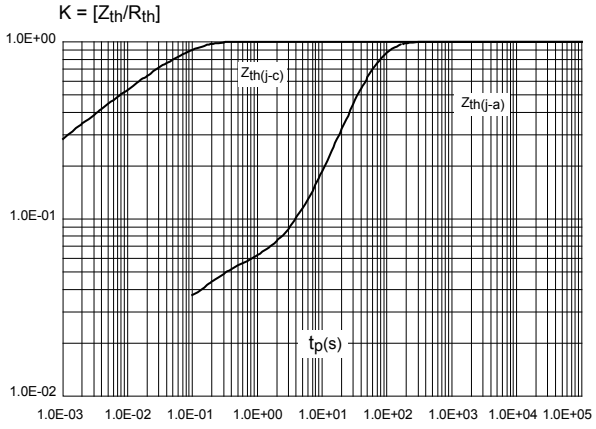


Figure 6: Relative variation of gate trigger voltage and current versus junction temperature (typical values)

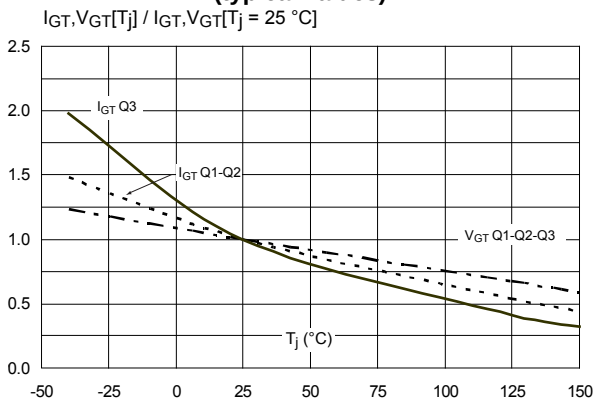


Figure 7: Relative variation of holding current and latching current versus junction temperature (typical values)

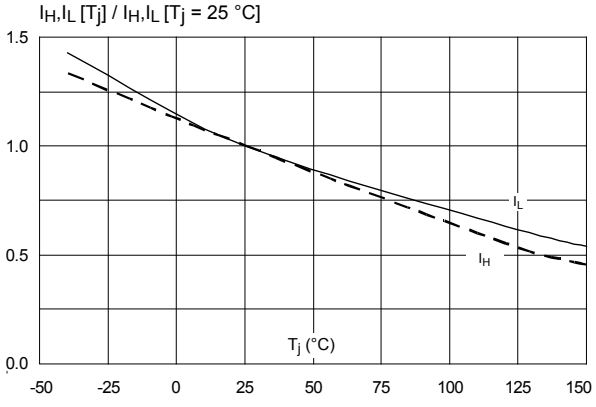


Figure 8: Surge peak on-state current versus number of cycles

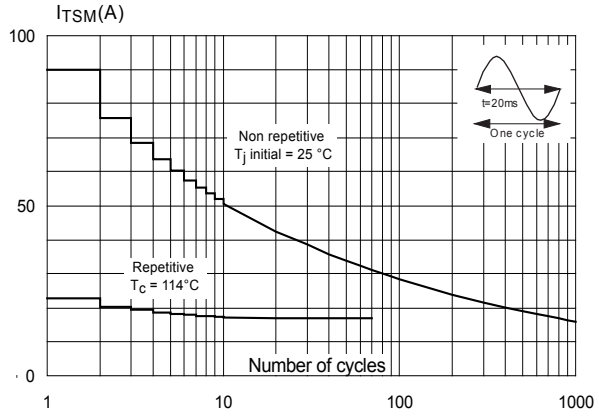


Figure 9: Non repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10 ms

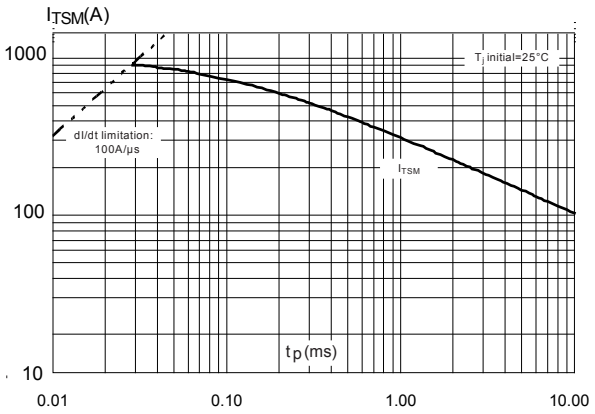


Figure 10: On-state characteristics (maximum values)

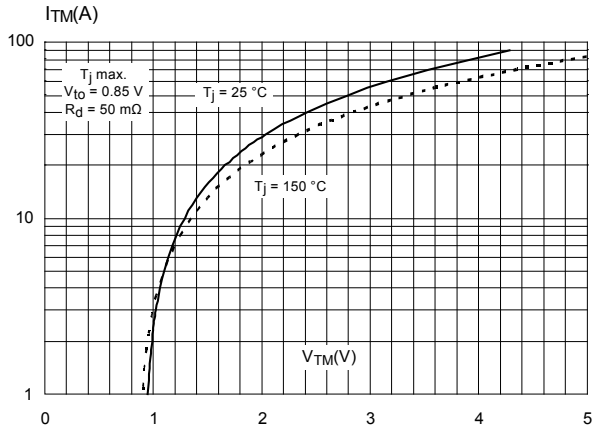


Figure 11: Relative variation of critical rate of decrease of main current versus junction temperature

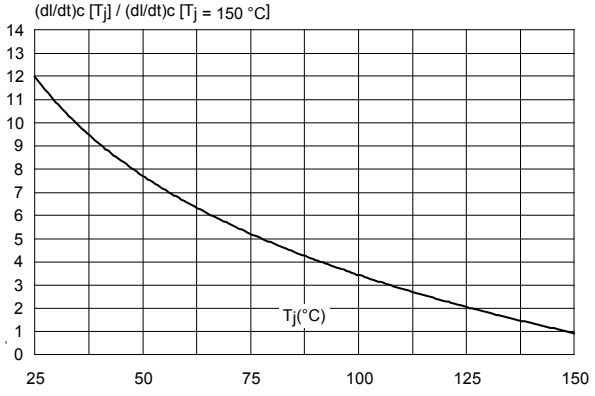


Figure 12: Relative variation of static dV/dt immunity versus junction temperature

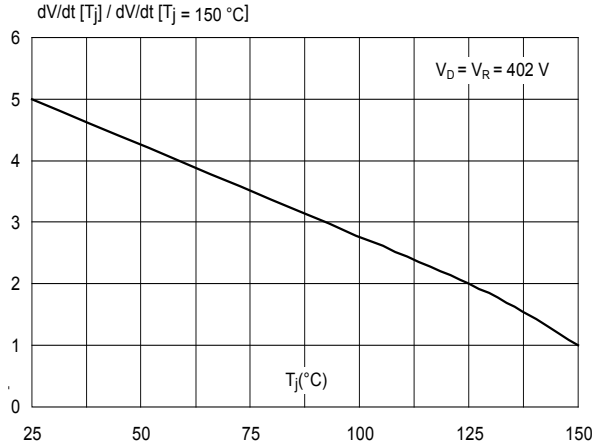
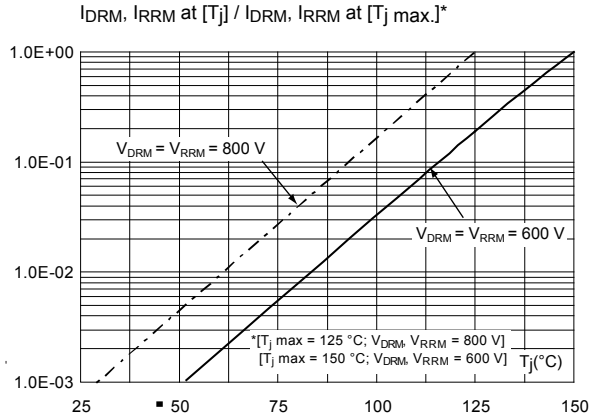


Figure 13: Relative variation of leakage current versus junction temperature for different values of blocking voltage



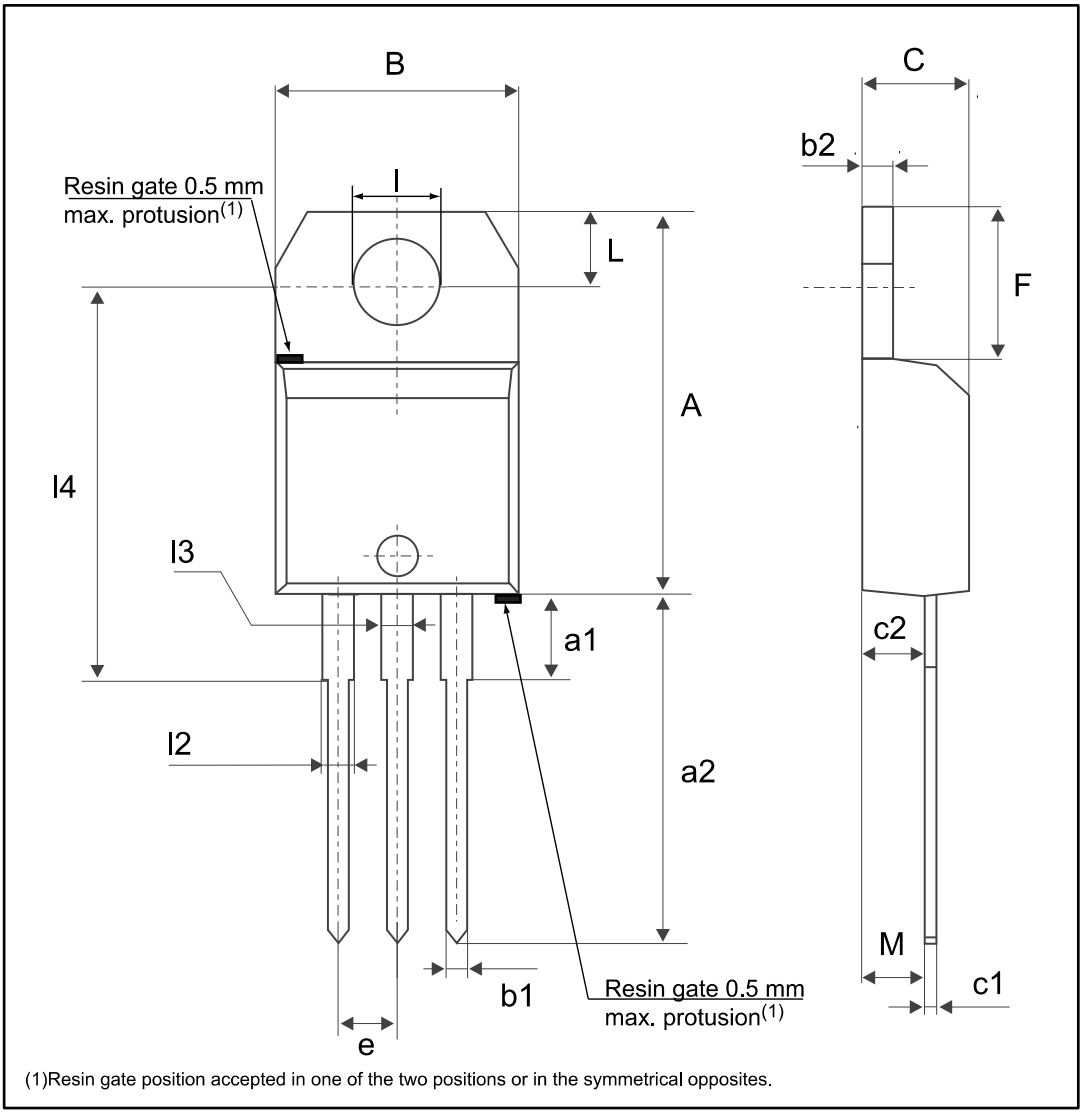
2 Package information

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***. ECOPACK® is an ST trademark.

- ECOPACK®2 (Lead-free plating and Halogen free package compliance)
- Lead-free package leads finishing
- Halogen-free molding compound resin meets UL94 standard level V0.
- Recommended torque (for package screwing assembly): 0.4 to 0.6 N·m

2.1 TO-220AB Insulated package information

Figure 14: TO-220AB Insulated package outline



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

Table 6: TO-220AB Insulated package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	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
l2	1.14		1.70	0.0449		0.0669
l3	1.14		1.70	0.0449		0.0669
l4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

Notes:

(1)Inch dimensions are for reference only.

3 Ordering information

Figure 15: Ordering information scheme

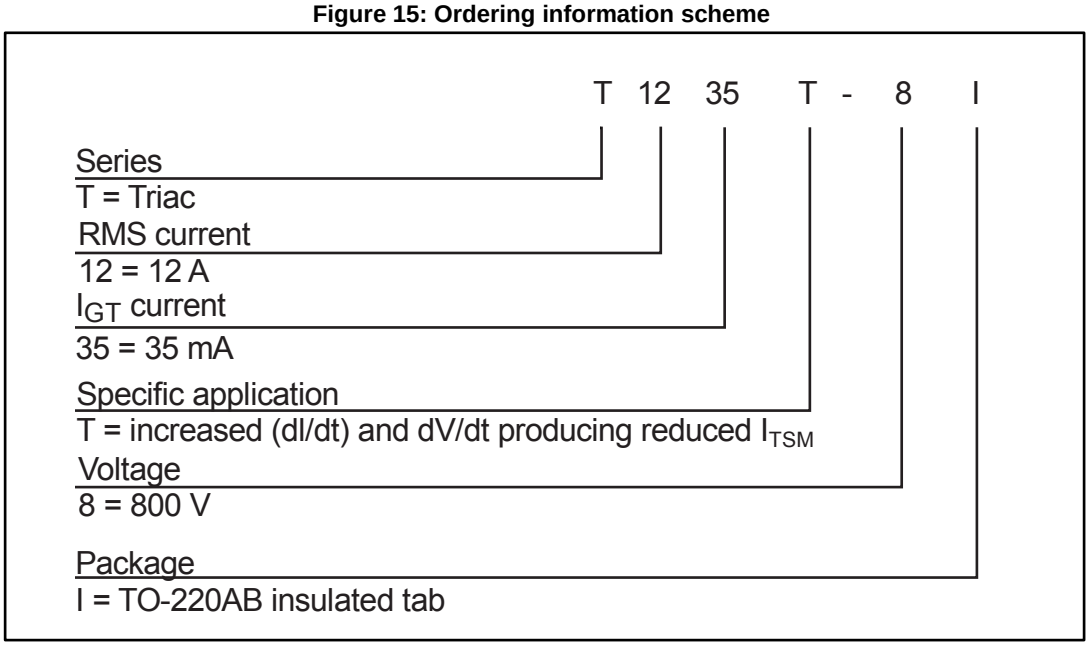


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T1235T-8I	T1235T-8I	TO-220AB insulated	2.3 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
17-Oct-2017	1	Initial release.
18-Dec-2017	2	Updated *Table 4: "Static characteristics"*.