

T1235H, T1250H Series

Snubberless™

High temperature 12 A Triacs

Main Characteristics

Symbol	Value	Unit
I _{T(RMS)}	12	Α
V _{DRM} /V _{RRM}	600	V
I _{GT}	35 or 50	mA

Features

- Medium current Triac
- 150° C max. T_i turn-off commutation
- Low thermal resistance with clip bonding
- Very high 3 quadrant commutation capability
- Packages are RoHS (2002/95/EC) compliant

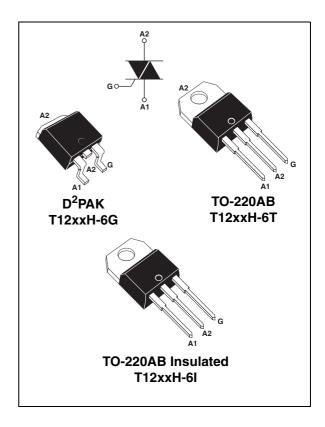
Applications

Especially designed to operate in high power density or universal motor applications such as vacuum cleaner and washing machine drum motor, these 12 A triacs provide a very high switching capability up to junction temperatures of 150° C.

The heatsink can be reduced, compared to traditional triacs, according to the high performance at given junction temperatures.

Description

Available in through-hole or surface mount packages, the T1235H and T1250H triac series are suitable for general purpose mains power AC switching.



Order codes

Part Numbers	Marking
T1235H-6G	T1235H 6G
T1250H-6G	T1250H 6G
T1235H-6G-TR	T1235H 6G
T1250H-6G-TR	T1250H 6G
T1235H-6T	T1235H 6T
T1250H-6T	T1250H 6T
T1235H-6I	T1235H 6I
T1250H-6I	T1250H 6I

TM: Snubberless is a trademark of STMicroelectronics

1 Characteristics

Table 1. Absolute Maximum Ratings

Symbol	Parameter			Value	Unit
	DMC on state current (full sine ways)	D^2 PAK, TO-220AB $T_c = 130^{\circ}$ C		12	Α
IT(RMS)	RMS on-state current (full sine wave)	TO-220AB Ins	T _c = 120° C	12	A
1.	Non repetitive surge peak on-state	F = 50 Hz	t = 20 ms	120	Α
I _{TSM}	current (full cycle, T _j initial = 25° C)	F = 60 Hz	t = 16.7 ms	126	Α
l ² t	I ² t Value for fusing	t _p = 10 ms		95	A ² s
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \le 100 \text{ ns}$	F = 120 Hz	T _j = 150° C	50	A/µs
V _{DSM} /V _{RSM}	Non repetitive surge peak off-state voltage	t _p = 10 ms	T _j = 25° C	V _{DRM} /V _{RRM} + 100	V
I _{GM}	Peak gate current	t _p = 20 μs	T _j = 150° C	4	Α
P _{G(AV)}	Average gate power dissipation $T_j = 150^{\circ} \text{ C}$			1	W
T _{stg} T _j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 150	°C

Table 2. Electrical Characteristics ($T_j = 25^{\circ}$ C, unless otherwise specified)

Symbol	Symbol Test Conditions	Quadrant		Value		Unit
Symbol	rest Conditions			T1235H	T1250H	Oille
I _{GT} ⁽¹⁾	V _D = 12 V R _I = 33 Ω	1 - 11 - 111	MAX.	35	50	mA
V _{GT}	AD = 15 A UE = 22.75	1 - 11 - 111	MAX.	1.0		V
V_{GD}	$V_D = V_{DRM}, R_L = 3.3 \text{ k}\Omega$ I - II - III		MIN.	0.15		V
I _H ⁽²⁾	I _T = 500 mA		MAX.	35	75	mA
1	1 101		MAX.	50	90	mA
lι	$I_G = 1.2 I_{GT}$	П	IVIAA.	80	110	ША
dV/dt (2)	$V_D = 67\% V_{DRM,}$ gate open, $T_j = 150^{\circ} C$		MIN.	1000	1500	V/µs
(dl/dt)c (2)	Without snubber, T _j = 150° C		MIN.	16	21	A/ms

^{1.} minimum $I_{\mbox{\scriptsize GT}}$ is guaranted at 20% of $I_{\mbox{\scriptsize GT}}$ max.

^{2.} for both polarities of A2 referenced to A1.

Table 3. Static Characteristics

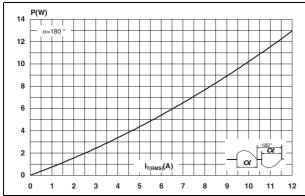
Symbol	Test Conditions			Value	Unit
V _T ⁽¹⁾	$I_{TM} = 17 \text{ A}, t_p = 380 \ \mu \text{s}$	T _j = 25° C	MAX.	1.5	٧
V _{t0} (1)	Threshold voltage	T _j = 150° C	MAX.	0.80	٧
R _d ⁽¹⁾	Dynamic resistance	T _j = 150° C	MAX.	30	mΩ
W	V - V	T _j = 25° C	MAX.	5	μA
I _{DRM}	$V_{DRM} = V_{RRM}$	T _j = 150° C	MAX.	3.9	
I _{RRM} ⁽²⁾	V _D /V _R = 400 V (at peak mains voltage)	T _j = 150° C	MAX.	3.2	mA
	V _D /V _R = 200 V (at peak mains voltage)	T _j = 150° C	MAX.	2.7	

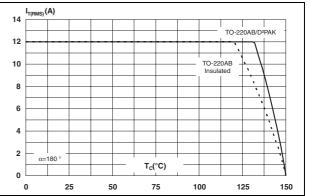
^{1.} for both polarities of A2 referenced to A1.

Table 4. Thermal resistance

Symbol	Parameter			Value	Unit
В	lunction to coco (AC)		D ² PAK / TO-220AB	1.4	
R _{th(j-c)}	Junction to case (AC)		TO-220AB Ins	3.3	° C/W
В	Junction to ambient $S = 1 \text{ cm}^2$		D ² PAK	45	C/VV
$R_{th(j-a)}$			TO-220AB / TO-220AB Ins	60	

Figure 1. Maximum power dissipation versus Figure 2. RMS on-state current versus case RMS on-state current (full cycle) temperature (full cycle)

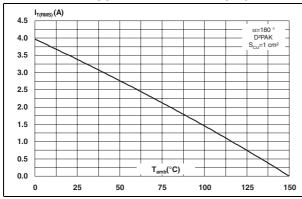




^{2.} $t_p = 380 \ \mu s$.

Figure 3. RMS on-state current versus ambient temperature (Epoxy printed circuit board FR4, copper thickness = 35 µm)

Figure 4. Variation of thermal impedance versus pulse duration



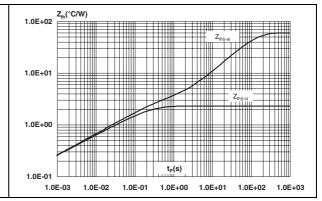
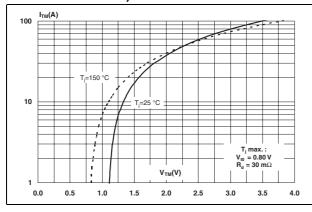


Figure 5. On-state characteristics (maximum Figure 6. values)

Surge peak on-state current versus number of cycles



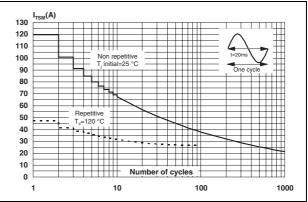
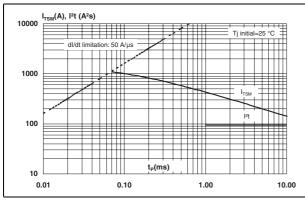


Figure 7. Non-repetitive surge peak on-state Figure 8. current for a sinusoidal pulse with width $t_p < 10 \text{ ms}$ and corresponding value of I^2t

 Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)



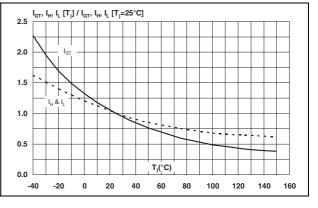
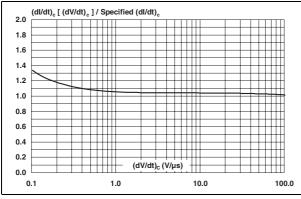


Figure 9. decrease of main current (dl/dt)c versus reapplied (dV/dt)c (typical values)

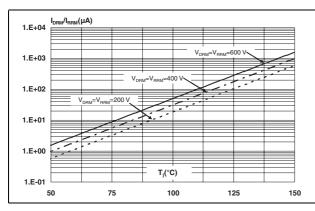
Relative variation of critical rate of Figure 10. Relative variation of critical rate of decrease of main current versus junction temperature

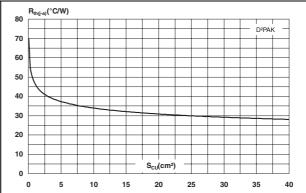


 $(dI/dt)_c [T_i] / (dI/dt)_c [T_i=150°C]$ $T_j(^{\circ}C)$

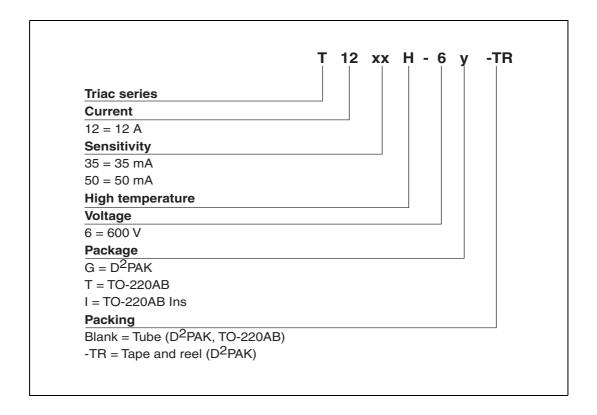
Figure 11. Leakage current versus junction temperature for different values of blocking voltage (typical values)

Figure 12. Variation of thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness = $35 \mu m$)





2 Ordering information



Max.

0.181

0.106

0.009

0.037

0.024

0.054

0.368

0.405

0.208

0.624

0.055

0.069

8°

3 Package mechanical data

- Epoxy meets UL94, V0
- Recommended torque 0.4 to 0.6 Nm

Table 5. D²PAK dimensions

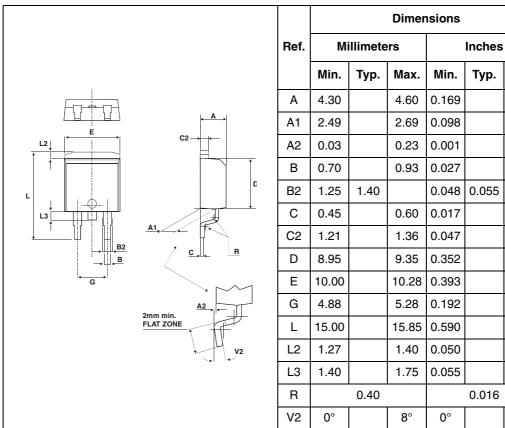
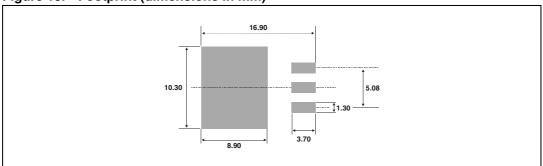


Figure 13. Footprint (dimensions in mm)



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Dimensions Millimeters Ref. Inches Min. Typ. Max. Min. Typ. Max. 15.20 15.90 0.598 0.625 a1 3.75 0.147 В 13.00 14.00 0.511 0.551 a2 В 10.40 10.00 0.393 0.409 0.88 0.034 b1 0.61 0.024 b2 1.23 1.32 0.048 0.051 14 С 4.40 4.60 0.173 0.181 0.49 0.70 0.019 0.027 с1 c2 2.40 2.72 0.094 0.107 c2 12 2.40 2.70 0.094 0.106 е F 6.20 0.244 0.259 6.60 ØΙ 3.75 3.85 0.147 0.151 14 15.80 16.40 16.80 0.622 0.646 0.661 L 2.65 2.95 0.104 0.116 12 1.14 0.044 0.066 1.70 13 1.14 1.70 0.044 0.066 Μ 2.60 0.102

Table 6. TO-220AB and TO-220AB Ins dimensions

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

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4 Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
T12xxH-6G	T12xxH 6G	D ² PAK	1.5 g	50	Tube
T12xxH-6G-TR	T12xxH 6G	D ² PAK	1.5 g	1000	Tape and reel
T12xxH-6T	T12xxH 6T	TO-220AB	2.3 g	50	Tube
T12xxH-6l	T12xxH 6l	TO-220AB Ins	2.3 g	50	Tube

5 Revision history

Date	Revision	Description of Changes
17-Apr-2007	1	First issue

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