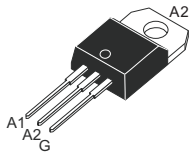
TRIACs, 12A

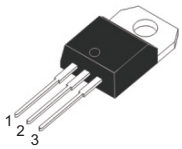
Snubberless, Logic Level and Standard

FEATURES

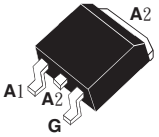
- Medium current triac
- Low thermal resistance with clip bonding
- Low thermal resistance insulation ceramic for insulated TO-220AB package
- High commutation (4Q) or very high commutation (3Q) capability
- 12T series are **UL** certified (File ref: E320098)
- Packages are RoHS compliant



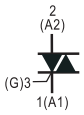
TO-220AB (**non-Insulated**)
(12TxxA)



TO-220AB **(Insulated)**
(12TxxAI)



TO-263 (**D²PAK**)
(12TxxH)



APPLICATIONS

ON/OFF or phase angle function in applications such as static relays, light dimmers and appliance motors speed controllers.

The snubberless versions (with suffix W) are especially recommended for use on inductive loads, because of their high commutation performances. The 12T series provides an insulated tab (rated at 2500V_{RMS}).

MAIN FEATURES

SYMBOL	VALUE	UNIT
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	600 to 1000	V
$I_{GT(Q1)}$	5 to 50	mA

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUE	UNIT
RMS on-state current (full sine wave)	$I_{T(RMS)}$	TO-263/TO-220AB	T_c = 105ºC	12	A
		TO-220AB insulated	T_c = 90ºC		
Non repetitive surge peak on-state current (full cycle, T_j initial = 25°C)	I_{TSM}	F =50 Hz	t = 20 ms	120	A
		F =60 Hz	t = 16.7 ms	126	
I^2t Value for fusing	I^2t	t_p = 10 ms		72	A^2s
Critical rate of rise of on-state current $I_G = 2xI_{GT}$, $t_r \leq 100ns$	dI/dt	F =100 Hz	T_j =125°C	50	A/µs
Peak gate current	I_{GM}	T_p =20 µs	T_j =125°C	4	A
Average gate power dissipation	$P_{G(AV)}$	T_j =125°C		1	W
Storage temperature range	T_{stg}			- 40 to + 150	ºC
Operating junction temperature range	T_j			- 40 to + 125	

◎ ELECTRICAL CHARACTERISTICS (T_J= 25 ºC unless otherwise specified)

SNUBBERLESS and Logic level (3 quadrants)								
SYMBOL	TEST CONDITIONS	QUADRANT		12Txxxx				Unit
				TW	SW	CW	BW	
I_{GT}(1)	V_D = 12 V, R_L = 30Ω	I - II - III	MAX.	05	10	35	50	mA
V_{GT}		I - II - III	MAX.	1.3				V
V_{GD}	V_D = V_{DRM}, R_L = 3.3KΩ T_j = 125°C	I - II - III	MIN.	0.2				V
I_H(2)	I_T = 500 mA		MAX.	10	15	40	60	mA
I_L	I_G = 1.2 I_{GT}	I - III	MAX.	15	20	50	70	mA
		II		25	35	60	80	
dV/dt(2)	V_D = 67% V_{DRM}, gate open ,T_j = 125°C		MIN.	20	40	500	1000	V/µs
(dI/dt)c(2)	(dV/dt)c = 0.1 V/µs	T_j = 125°C	MIN.	3.5	6.5	-	-	A/ms
	(dV/dt)c = 10 V/µs	T_j = 125°C		1	2.9	-	-	
	Without snubber	T_j = 125°C		-	-	6.5	12	

◎ ELECTRICAL CHARACTERISTICS (T_J= 25 ºC unless otherwise specified)

Standard (4 quadrants)						
SYMBOL	TEST CONDITIONS	QUADRANT		12Txxxx		UNIT
				C	B	
I_{GT}(1)	V_D = 12 V, R_L = 30Ω	I - II - III	MAX.	25	50	mA
		IV		50	100	
V_{GT}		ALL		1.3		V
V_{GD}	V_D = V_{DRM}, R_L = 3.3KΩ, T_j = 125°C	ALL		0.2		V
I_H(2)	I_T = 500 mA		MAX.	25	50	mA
I_L	I_G = 1.2 I_{GT}	I - III - IV	MAX.	40	50	mA
		II		80	80	
dV/d_t(2)	V_D = 67% V_{DRM}, gate open, T_j = 125°C		MIN.	200	400	V/µs
(dV/dt)c(2)	(dI/dt)c = 5.3 A/ms, T_j = 125°C		MIN.	5	10	V/µs

STATIC CHARACTERISTICS					
SYMBOL	TEST CONDITIONS			VALUE	UNIT
V_{TM}(2)	I_{TM} = 17 A, t_P = 380 µs	T_j = 25°C	MAX.	1.55	V
V_{t0}(2)	Threshold voltage	T_j = 125°C	MAX.	0.85	V
R_d(2)	Dynamic resistance	T_j = 125°C	MAX.	35	mΩ
I_{DRM} I_{RRM}	V_D = V_{DRM} V_R = V_{RRM}	T_j = 25°C	MAX.	5	µA
		T_j = 125°C		1	mA

Note 1: Minimum I_{GT} is guaranted at 5% of I_{GT} max.
Note 2: For both polarities of A2 referenced to A1.

THERMAL RESISTANCE

SYMBOL				VALUE	UNIT
$R_{th(j-c)}$	Junction to case (AC)		TO-220AB, TO-263	1.4	°C/W
			TO-220AB Insulated	2.3	
$R_{th(j-a)}$	Junction to ambient	S = 1 cm^2	TO-263	45	°C/W
			TO-220AB Insulated, TO-220AB	60	

S = Copper surface under tab.

PRODUCT SELECTOR

PART NUMBER	VOLTAGE (xx)			SENSITIVITY	TYPE	PACKAGE
	600 V	800 V	1000 V			
12TxxA-B/12TxxAI-B	V	V	V	50 mA	Standard	TO-220AB
12TxxA-BW/12TxxAI-BW	V	V	V	50 mA	Snubberless	TO-220AB
12TxxA-C/12TxxAI-C	V	V	V	25 mA	Standard	TO-220AB
12TxxA-CW/12TxxAI-CW	V	V	V	35 mA	Snubberless	TO-220AB
12TxxA-SW/12TxxAI-SW	V	V	V	10 mA	Logic level	TO-220AB
12TxxA-TW/12TxxAI-TW	V	V	V	5 mA	Logic level	TO-220AB
12TxxH-SW	V	V	V	10 mA	Logic level	D^2PAK
12TxxH-CW	V	V	V	35 mA	Snubberless	D^2PAK
12TxxH-BW	V	V	V	50 mA	Snubberless	D^2PAK

AI: Insulated TO-220AB package

ORDERING INFORMATION

ORDERING TYPE	MARKING	PACKAGE	WEIGHT	BASE Q'TY	DELIVERY MODE
12TxxA-yy	12TxxA-yy	TO-220AB	2.0g	50	Tube
12TxxAI-yy	12TxxAI-yy	TO-220AB (insulated)	2.3g	50	Tube
12TxxH-yy	12TxxH-yy	TO-236(D^2PAK)	2.0g	50	Tube

Note: xx = voltage, yy = sensitivity

ORDERING INFORMATION SCHEME

12 T 06 A - BW

Current

12 = 12A

Triac series

Voltage

06 = 600V
08 = 800V
10 = 1000V

Package type

A = TO-220AB (non-insulated)
AI = TO-220AB (insulated)
H = TO-263 (D^2PAK)

I_{GT} Sensitivity

B = 50mA Standard
C = 25mA Standard
SW = 10mA Logic Level
BW = 50mA Snubberless
CW = 35mA Snubberless
TW = 5mA Logic Level

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

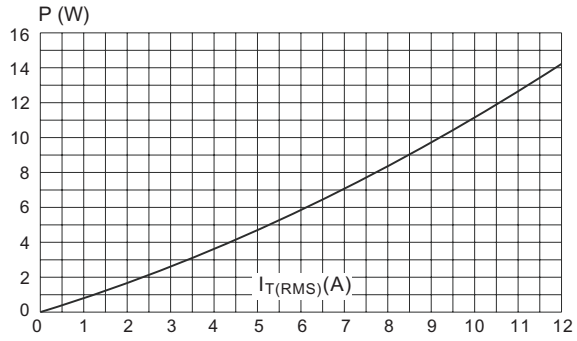


Fig.2 RMS on-state current versus case temperature (full cycle)

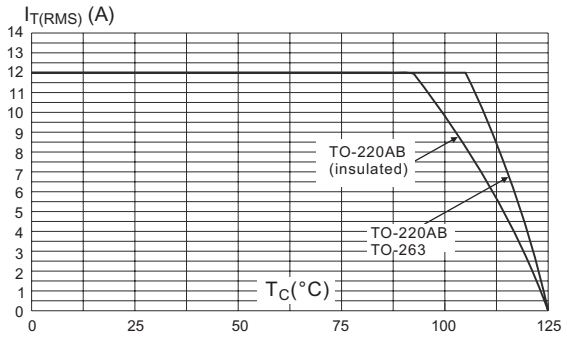


Fig.3 RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35µm)(full cycle)

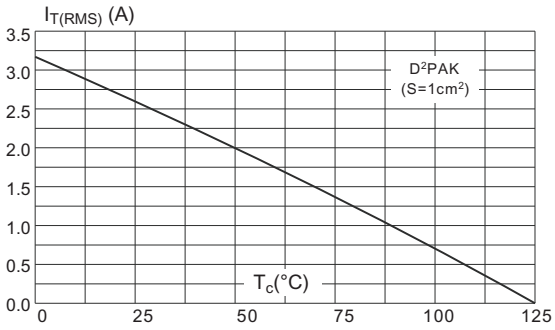


Fig.4 Relative variation of thermal impedance versus pulse duration.

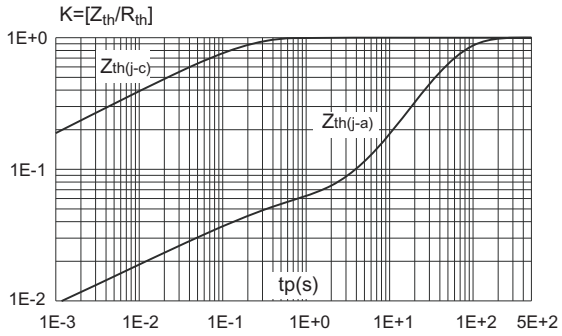


Fig.5 On-state characteristics (maximum values).

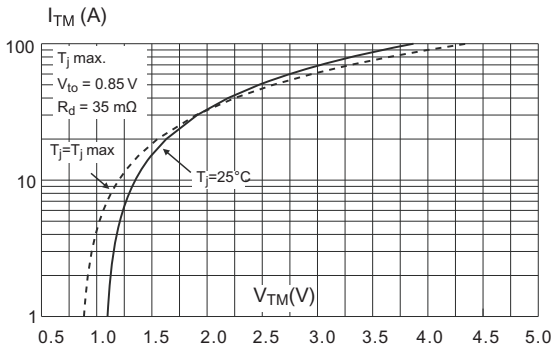


Fig.6 Surge peak on-state current versus number of cycles.

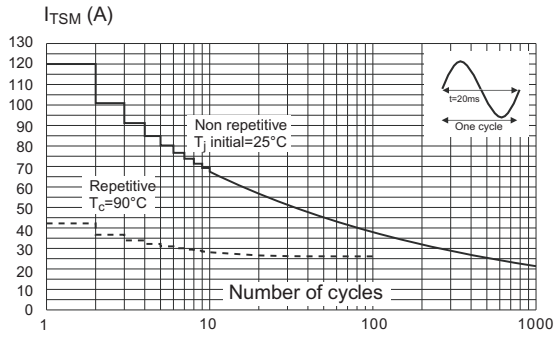


Fig.7 Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10ms. and corresponding value of I^2t.

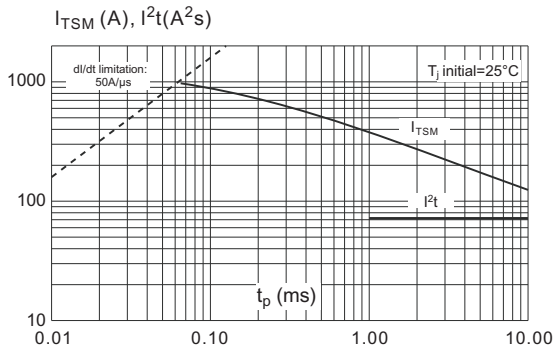


Fig.8 Relative variation of gate trigger current,holding current and latching current versus junction temperature (typical values).

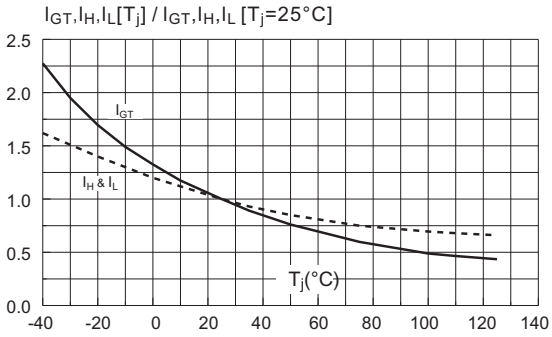


Fig.9 Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values).

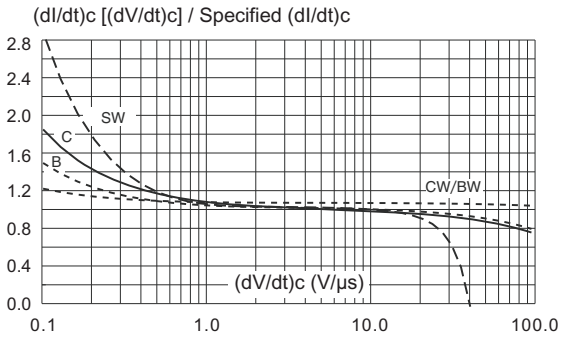


Fig.10 Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values).

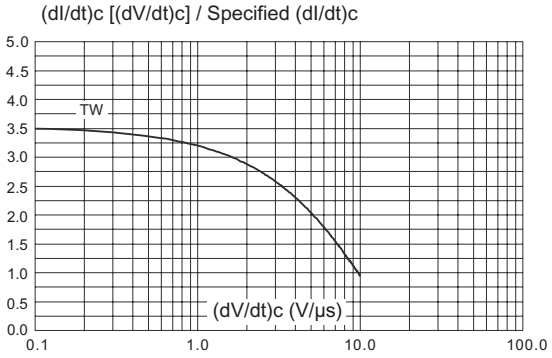


Fig.11 Relative variation of critical rate of decrease of main current versus junction temperature

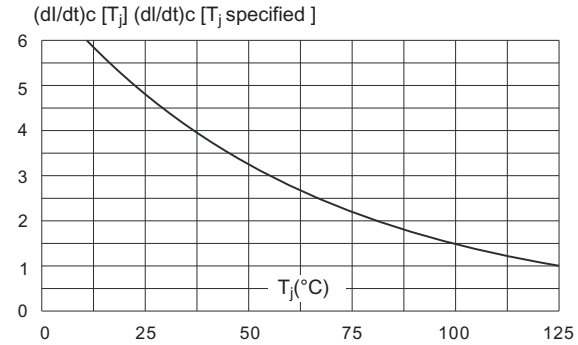
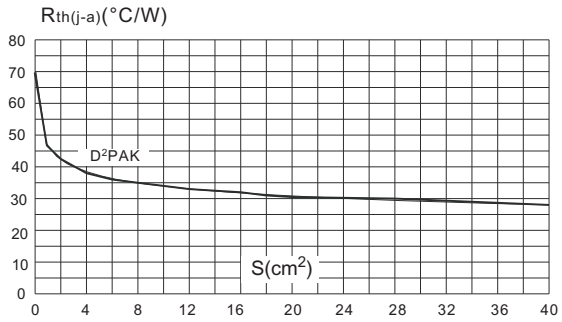
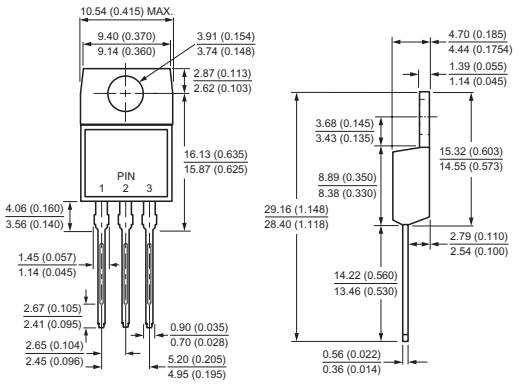


Fig.12 D^2PAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35µm)

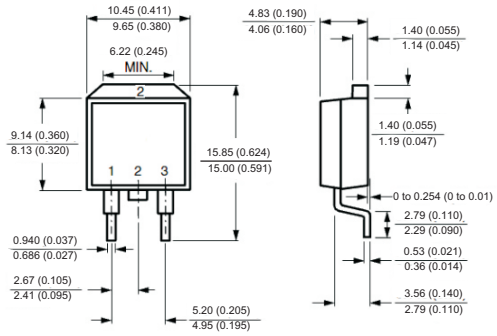


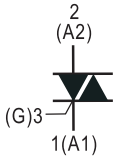
Case Style

TO-220AB



TO-263(D^2PAK)





All dimensions in millimeters(inches)