NEC

THYRISTORS

AC12DSMA,AC12FSMA

12 A RESIN INSULATION TYPE TRIAC

DESCRIPTION

The AC12DSMA and AC12FSMA are resin insulation type TRIACs with an effective current of 12 A (T_C = 74°C).

These products are covered with resin mold on the entire case and are electrically insulated with electrodes, giving them a considerable advantage over conventional TRIACs when mounting on a heatsink board or performing high-density mounting.

These products features ratings and electrical characteristics equal to TO-220AB package TRIAC and a high reliability design.

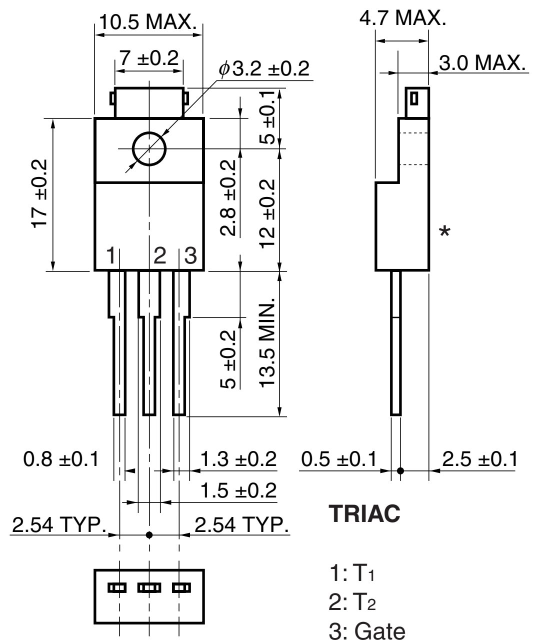
FEATURES

- Insulation type TRIAC fully covered with resin on the entire case other than electrode leads
- Insulation voltage and conduction equal to conventional mica and polyester film
- Can be replaced with TO-220AB package
- High allowable on-current when using a single unit

APPLICATIONS

Non-contact switches of motor speed control, heater temperature control, lamp light control

★ PACKAGE DRAWING (Unit: mm)



TRIAC

1: T_1
2: T_2
3: Gate

*: T_C test bench-mark

Standard weight: 2 g

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The mark ★ shows major revised points.

MAXIMUM RATINGS

Parameter	Symbol	AC12DSMA	AC12FSMA	Unit	Remarks
Non-repetitive Peak Off-state Voltage	V_{DSM}	500	700	V	–
Repetitive Peak Off-state Voltage	V_{DRM}	400	600	V	–
Effective On-state Current	$I_{T(RMS)}$	12 (T_C = 74°C)		A	Refer to **Figure 11** and **12**.
Surge On-state Current	I_{TSM}	100 (50 Hz 1 cycle) 110 (60 Hz 1 cycle)		A	Refer to **Figure 2**.
Fusing Current	$\int i_T^2 dt$	45 (1 ms ≤ t ≤ 10 ms)		A^2s	–
Critical Rate Rise of On-state Current	dI_T/dt	50		A/μs	–
Peak Gate Power Dissipation	P_{GM}	5.0 (f ≥ 50 Hz, Duty ≤ 10%)		W	–
Average Gate Power Dissipation	$P_{G(AV)}$	0.5		W	–
Peak Gate Current	I_{GM}	±3 (f ≥ 50 Hz, Duty ≤ 10%)		A	–
Junction Temperature	T_j	–40～+125		°C	–
Storage Temperature	T_{stg}	–55～+150		°C	–

ELECTRICAL CHARACTERISTICS (T_j = 25°C)

Parameter		Symbol	Conditions		MIN.	TYP.	MAX.	Unit	Remarks
Repetitive Peak Off-state Current		I_{DRM}	$V_{DM} = V_{DRM}$	T_j = 25°C	–	–	100	μA	–
				T_j = 125°C	–	–	2	mA	–
On-state Voltage		V_{TM}	I_{TM} = 10 A		–	–	1.3	V	Refer to **Figure 1**.
Gate Trigger Current	Mode I	I_{GT}	V_{DM} = 12 V,	T_2+, G+	–	–	20	mA	Refer to **Figure 4**.
	II		R_L = 30 Ω	T_2–, G+	–	–	–		
	III			T_2–, G–	–	–	20		
	IV			T_2+, G–	–	–	20		
Gate Trigger Voltage	Mode I	V_{GT}	V_{DM} = 12 V,	T_2+, G+	–	–	1.5	V	Refer to **Figure 4**.
	II		R_L = 30 Ω	T_2–, G+	–	–	–		
	III			T_2–, G–	–	–	1.5		
	IV			T_2+, G–	–	–	1.5		
Gate Non-trigger Voltage		V_{GD}	T_j = 125°C, $V_{DM} = \frac{1}{2} V_{DRM}$		0.3	–	–	V	–
Holding Current		I_H	V_{DM} = 24 V, I_{TM} = 10 A		–	30	–	mA	–
Critical Rate Rise of Off-state Voltage		dv/dt	T_j = 125°C, $V_{DM} = \frac{2}{3} V_{DRM}$		–	100	–	V/μs	–
Commutating Critical Rate Rise of Off-state Voltage		(dv/dt)c	T_j = 125°C, $(di_T/dt)c$ = –6 A/ms, V_D = 400 V		10	–	–	V/μs	–
Thermal Resistance Note		$R_{th(j-c)}$	Junction-to-case AC		–	–	3.5	°C/W	Refer to **Figure 13**.

Note The thermal resistance with a 50 Hz or 60 Hz sine wave current, as shown in the following expression:

$$R_{th(j-c)} = \frac{T_{j(max)} - T_C}{P_{T(AV)}}$$

$T_{j(max)}$: Maximum junction temperature

T_C: Case temperature

$P_{T(AV)}$: Average on-dissipation

TYPICAL CHARACTERISTICS

Figure 1. i_T vs. v_T CHARACTERISTIC

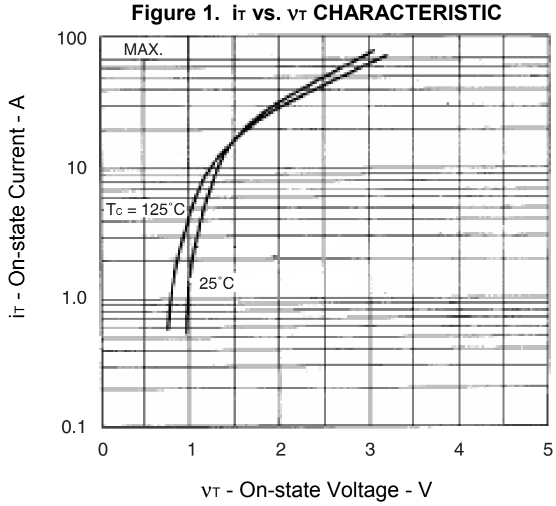


Figure 2. I_{TSM} RATING

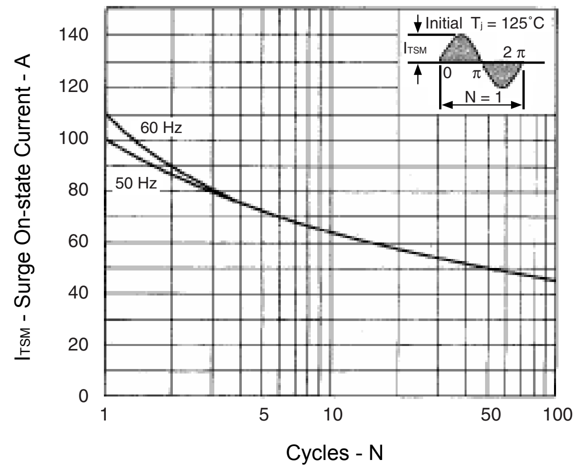


Figure 3. GATE RATING

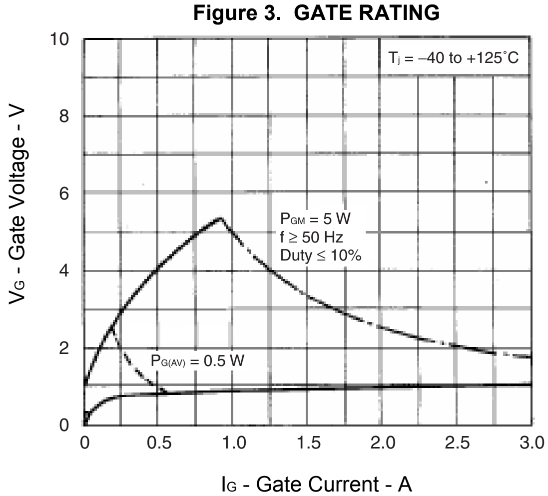


Figure 4. GATE CHARACTERISTIC

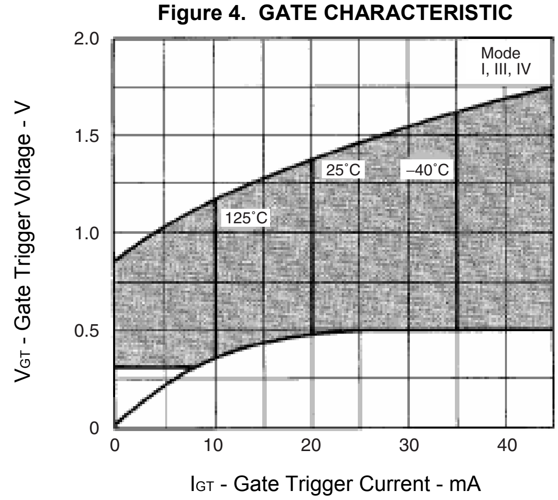


Figure 5. I_{GT} vs. T_A CHARACTERISTIC

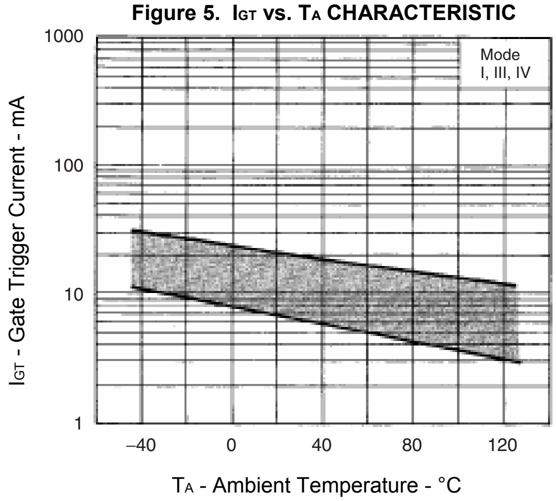
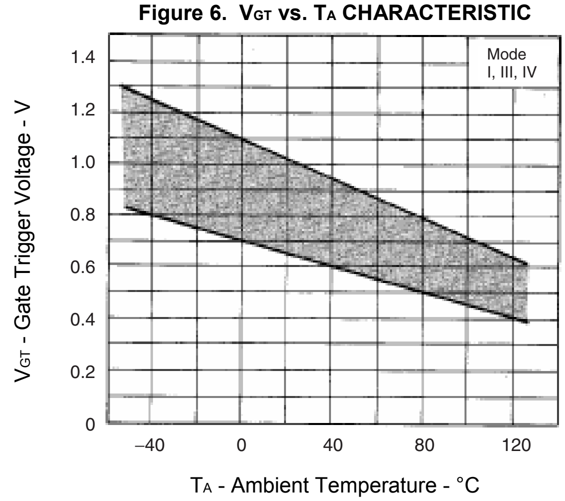


Figure 6. V_{GT} vs. T_A CHARACTERISTIC



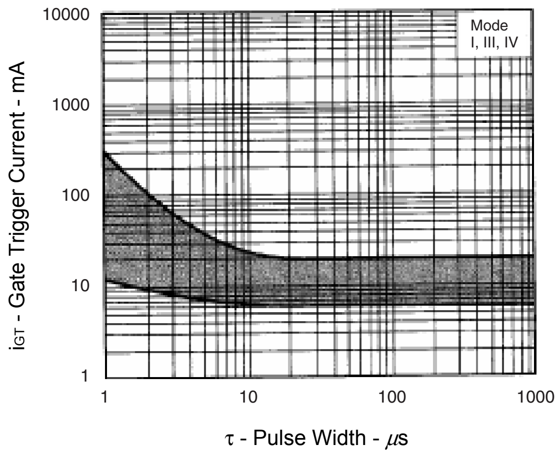


Figure 7. i_{GT} vs. τ CHARACTERISTIC

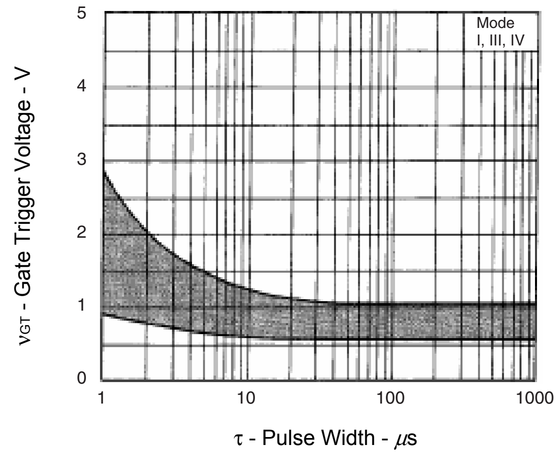


Figure 8. V_{GT} vs. τ CHARACTERISTIC

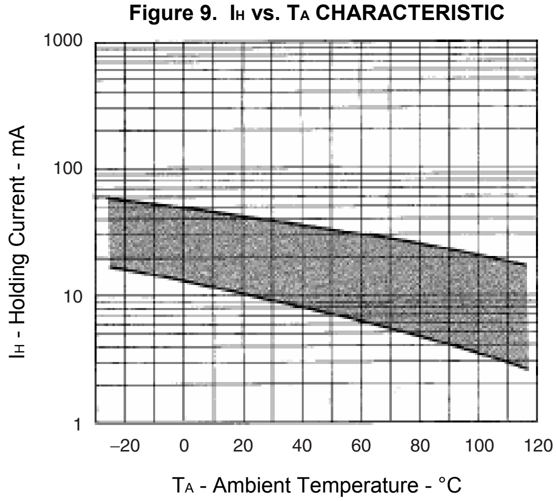


Figure 9. I_H vs. T_A CHARACTERISTIC

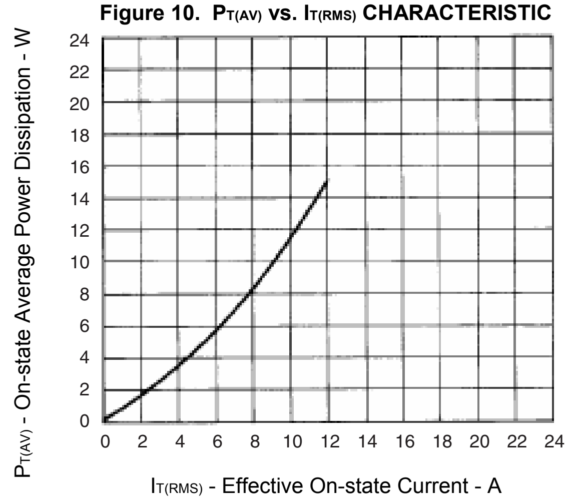


Figure 10. $P_{T(AV)}$ vs. $I_{T(RMS)}$ CHARACTERISTIC

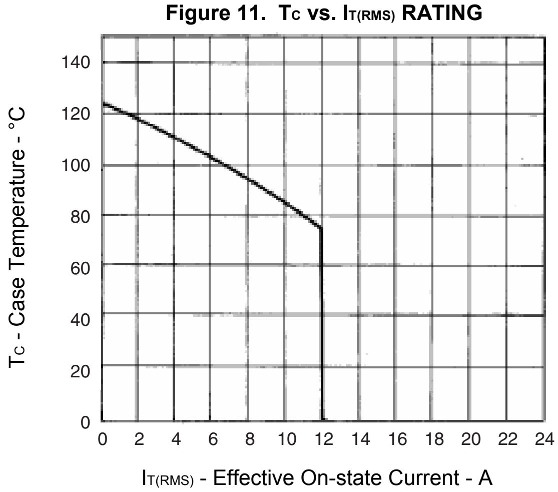


Figure 11. T_C vs. $I_{T(RMS)}$ RATING

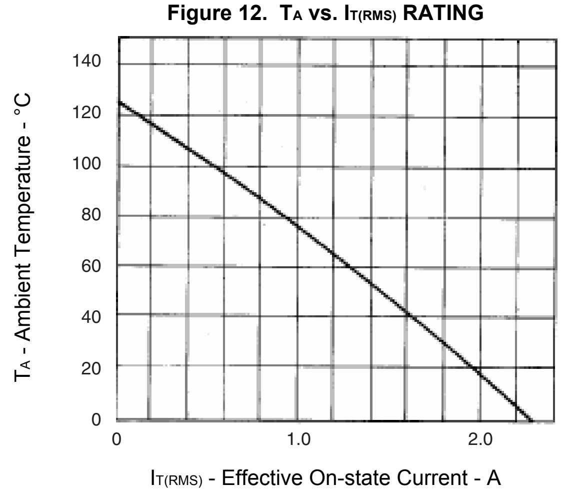


Figure 12. T_A vs. $I_{T(RMS)}$ RATING

Figure 13. Z_{th} CHARACTERISTIC