

# 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 ( $T_c = 74^\circ\text{C}$ ).

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.

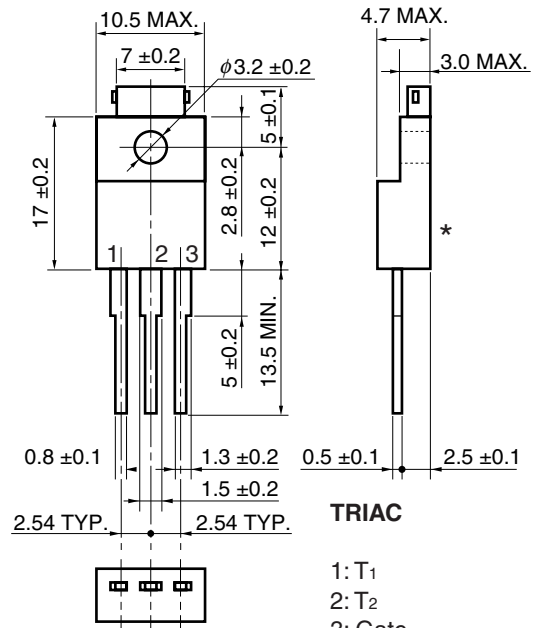
#### FEATURES

- 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<sub>1</sub>  
2: T<sub>2</sub>  
3: Gate

\*: T<sub>c</sub> test bench-mark

Standard weight: 2 g

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**MAXIMUM RATINGS**

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

**ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C)**

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

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

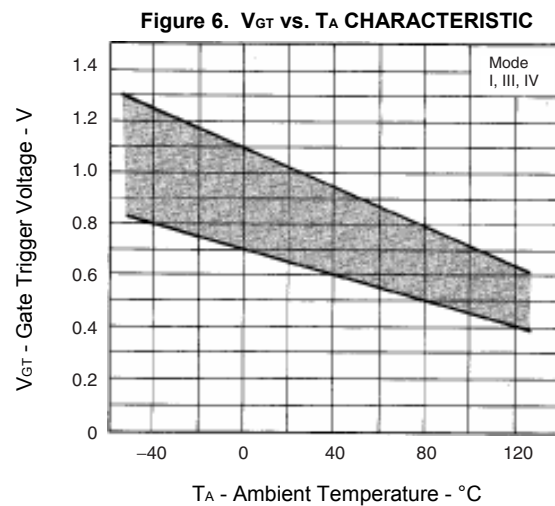
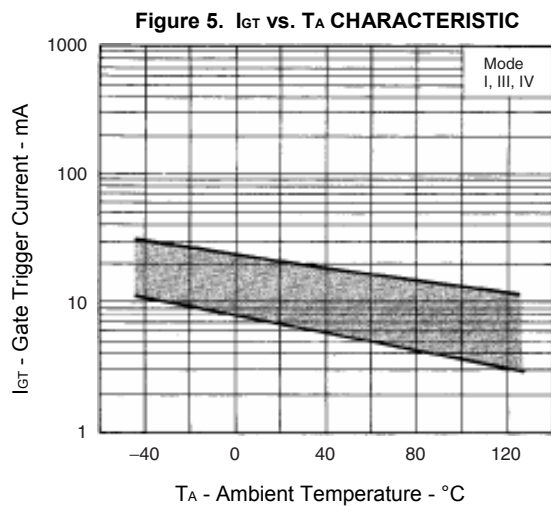
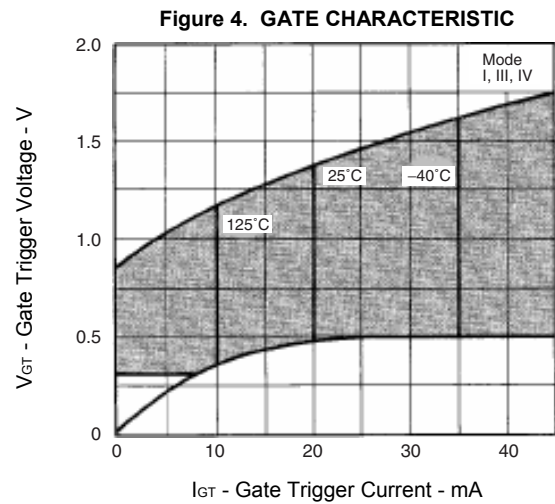
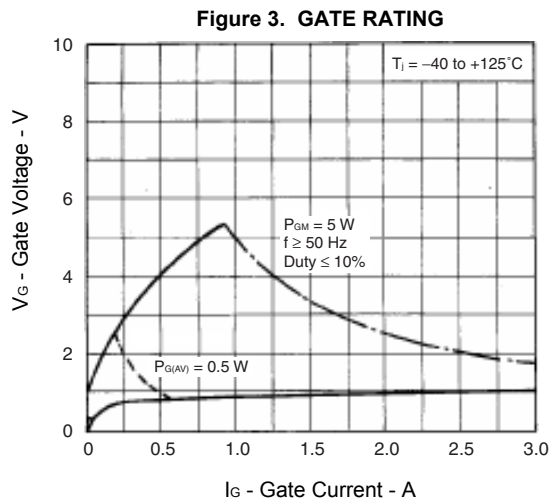
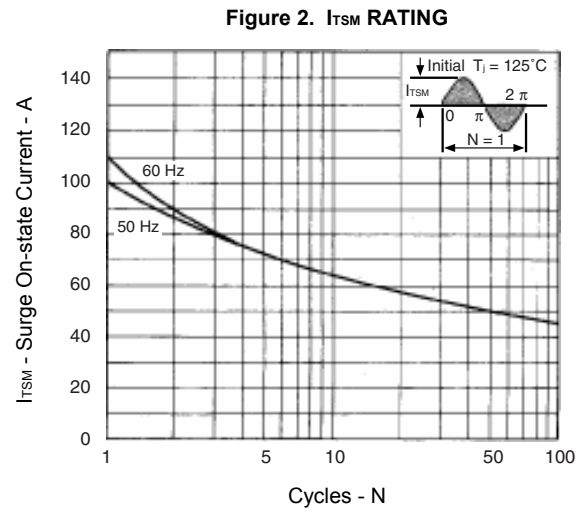
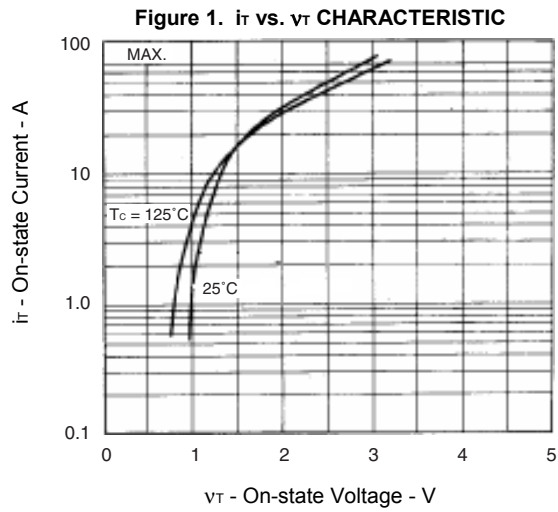
$$R_{th(j-c)} = \frac{T_{j(max)} - T_c}{P_{T(AV)}}$$

T<sub>j(max)</sub>: Maximum junction temperature

T<sub>c</sub>: Case temperature

P<sub>T(AV)</sub>: Average on-dissipation

TYPICAL CHARACTERISTICS



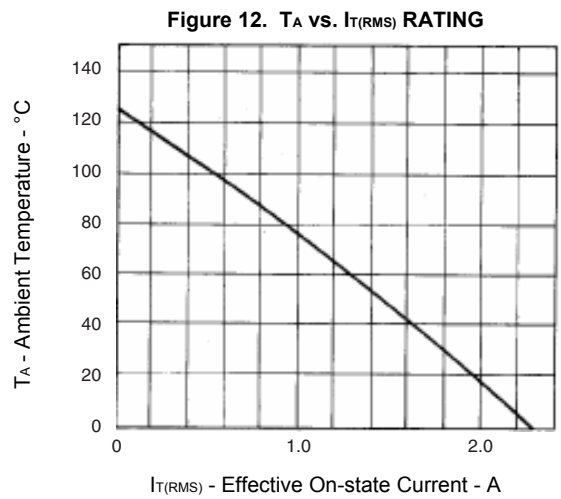
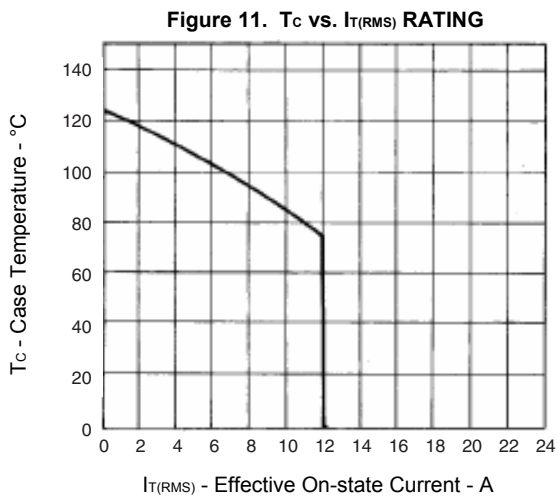
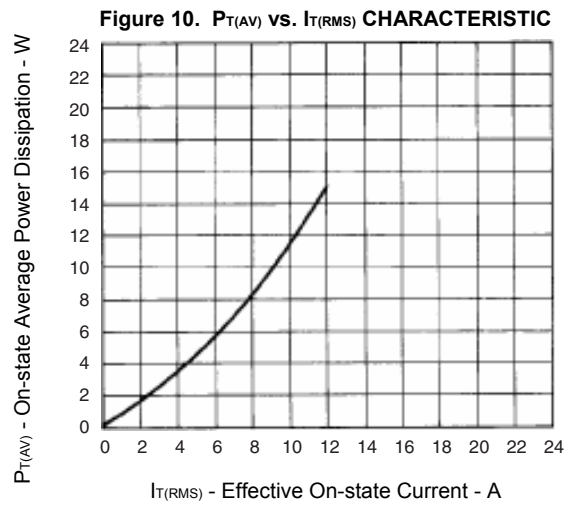
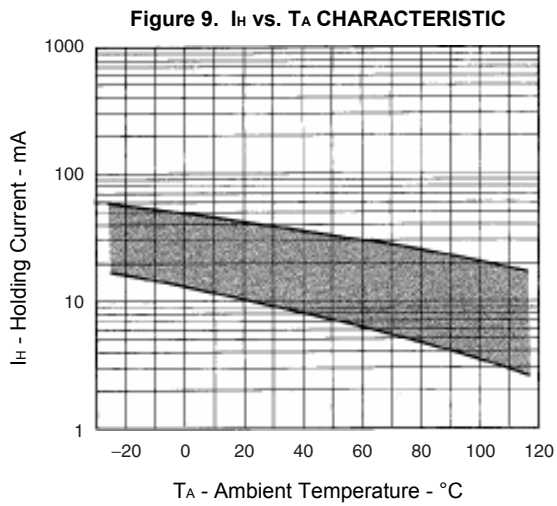
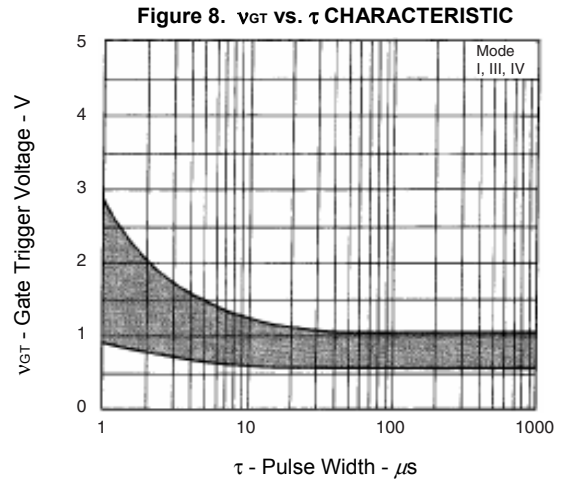
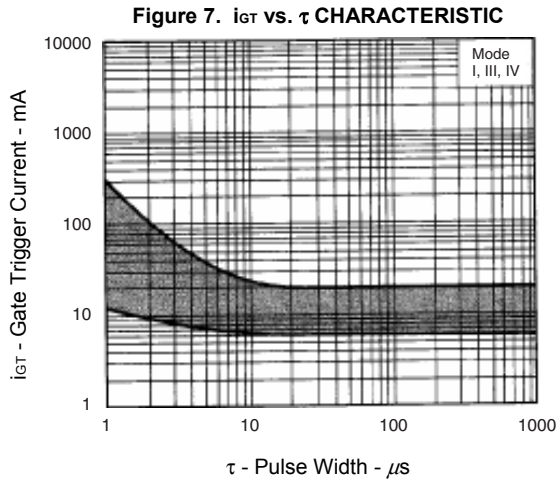
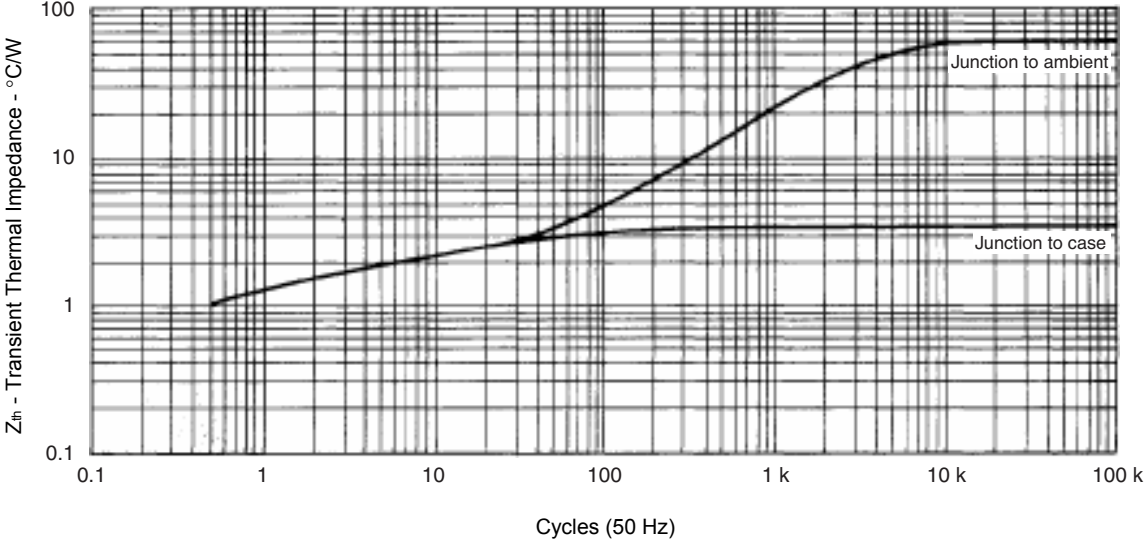


Figure 13.  $Z_{th}$  CHARACTERISTIC



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