

DATA SHEET

MAC223A8X

Triacs

Product specification

September 2002



Triacs

MAC223A8X

GENERAL DESCRIPTION

Passivated triac in a full pack, plastic envelope, intended for use in applications requiring high bidirectional transient and blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

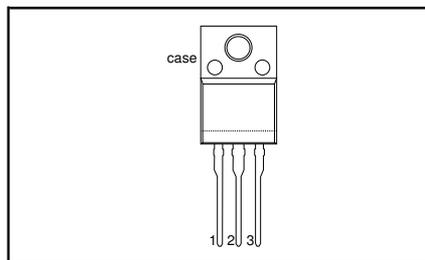
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DRM}	Repetitive peak off-state voltages	600	V
$I_{T(RMS)}$	RMS on-state current	20	A
I_{TSM}	Non-repetitive peak on-state current	230	A

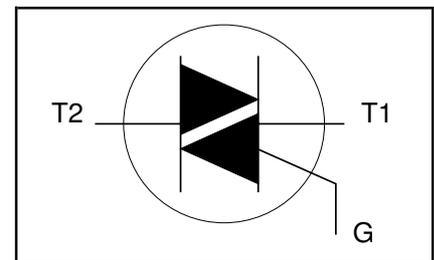
PINNING - SOT186A

PIN	DESCRIPTION
1	main terminal 1
2	main terminal 2
3	gate
case	isolated

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DRM}	Repetitive peak off-state voltages		-	600 ¹	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{hs} \leq 25\text{ °C}$	-	20	A
I_{TSM}	Non-repetitive peak on-state current	full sine wave; $T_j = 25\text{ °C}$ prior to surge $t = 16.7\text{ ms}$	-	230	A
I^2t	I^2t for fusing	$t = 10\text{ ms}$	-	180	A ² s
di_T/dt	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 30\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	-	-
		T2+ G+	-	50	A/ μs
		T2+ G-	-	50	A/ μs
		T2- G-	-	50	A/ μs
		T2- G+	-	10	A/ μs
I_{GM}	Peak gate current		-	2	A
V_{GM}	Peak gate voltage		-	5	V
P_{GM}	Peak gate power		-	5	W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	0.5	W
T_{stg}	Storage temperature		-40	150	°C
T_j	Operating junction temperature		-40	125	°C

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THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-hs}$	Thermal resistance junction heatsink	full or half cycle with heatsink compound	-	-	3.85	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	without heatsink compound in free air	-	55	5.5	K/W

ISOLATION LIMITING VALUE & CHARACTERISTIC

$T_{hs} = 25\text{ °C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	R.M.S. isolation voltage from all three terminals to external heatsink	$f = 50\text{-}60\text{ Hz}$; sinusoidal waveform; R.H. $\leq 65\%$; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	$f = 1\text{ MHz}$	-	10	-	pF

STATIC CHARACTERISTICS

$T_j = 25\text{ °C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{GT}	Gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$				
		T2+ G+	-	6	50	mA
		T2+ G-	-	10	50	mA
		T2- G-	-	11	50	mA
		T2- G+	-	23	75	mA
I_L	Latching current	$V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$				
		T2+ G+	-	8	40	mA
		T2+ G-	-	30	60	mA
		T2- G-	-	18	40	mA
		T2- G+	-	15	60	mA
I_H	Holding current	$V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$				
		T2+	-	7	30	mA
		T2-	-	12	30	mA
V_T	On-state voltage	$I_T = 30\text{ A}$	-	1.3	1.55	V
V_{GT}	Gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$	-	0.7	1.5	V
I_D	Off-state leakage current	$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$	0.25	0.4	-	V
		$V_D = V_{DRM(max)}$; $T_j = 125\text{ °C}$	-	0.1	0.5	mA

DYNAMIC CHARACTERISTICS

$T_j = 25\text{ °C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
dV_D/dt	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit	100	300	-	V/ μ s
dV_{com}/dt	Critical rate of change of commutating voltage	$V_{DM} = 400\text{ V}$; $T_j = 95\text{ °C}$; $I_{T(RMS)} = 25\text{ A}$; $dI_{com}/dt = 9\text{ A/ms}$; gate open circuit	-	10	-	V/ μ s
t_{gt}	Gate controlled turn-on time	$I_{TM} = 30\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu$ s	-	2	-	μ s

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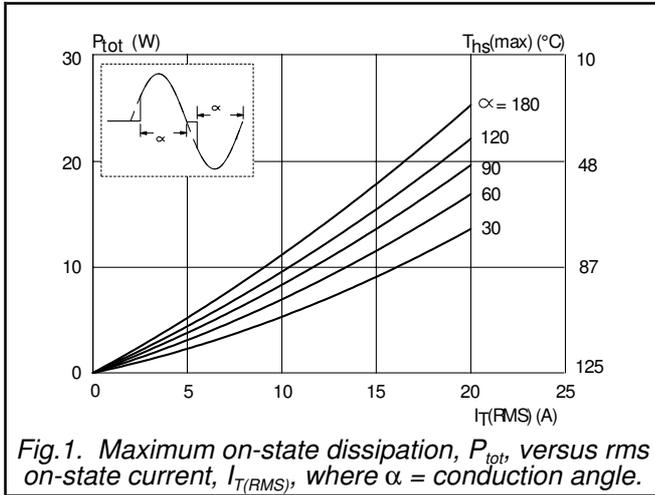


Fig. 1. Maximum on-state dissipation, P_{tot} , versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.

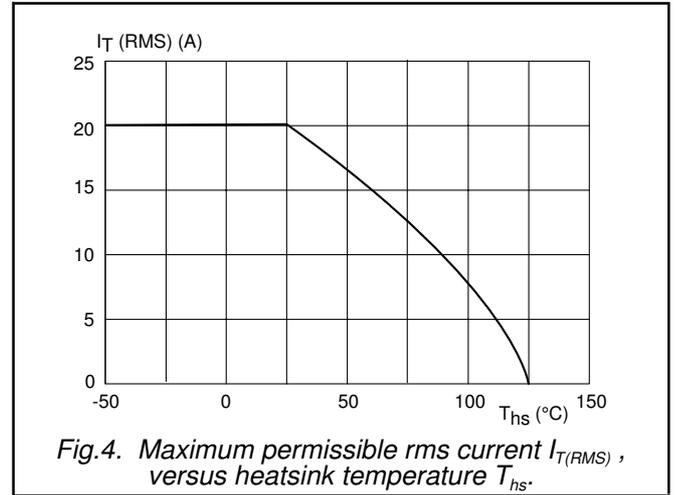


Fig. 4. Maximum permissible rms current $I_{T(RMS)}$, versus heatsink temperature T_{hs} .

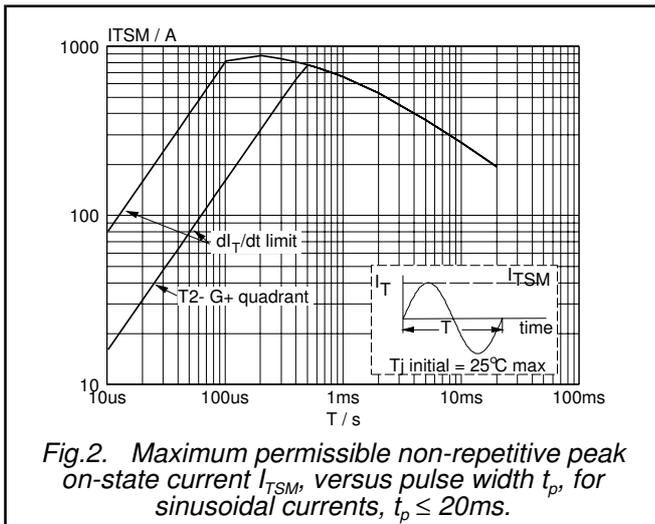


Fig. 2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 20$ ms.

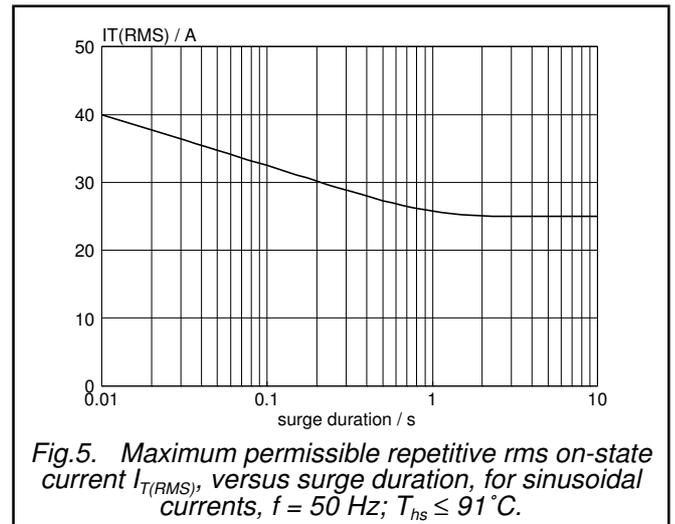


Fig. 5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50$ Hz; $T_{hs} \leq 91^\circ\text{C}$.

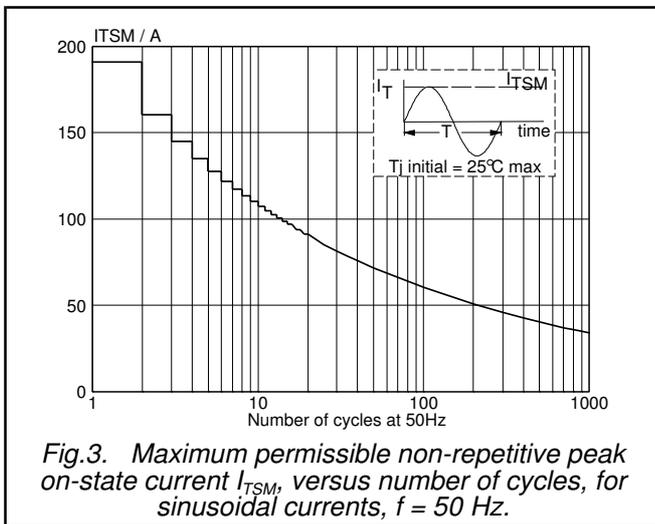


Fig. 3. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50$ Hz.

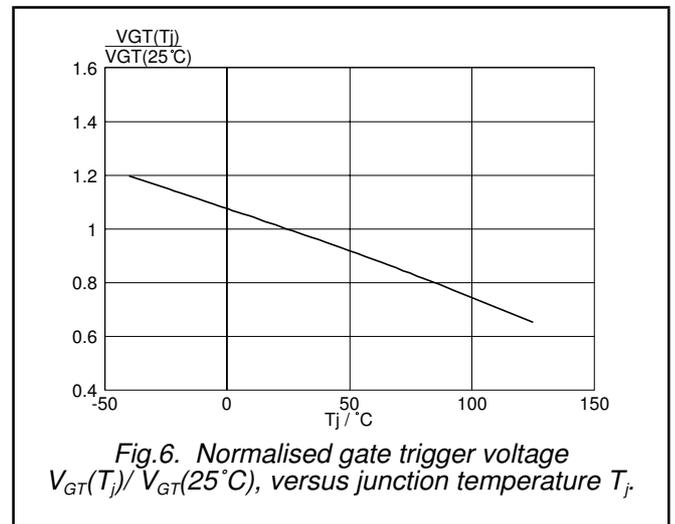
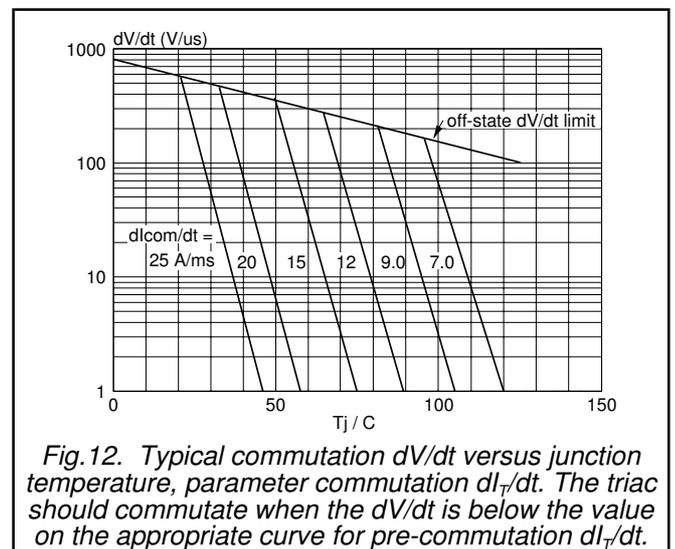
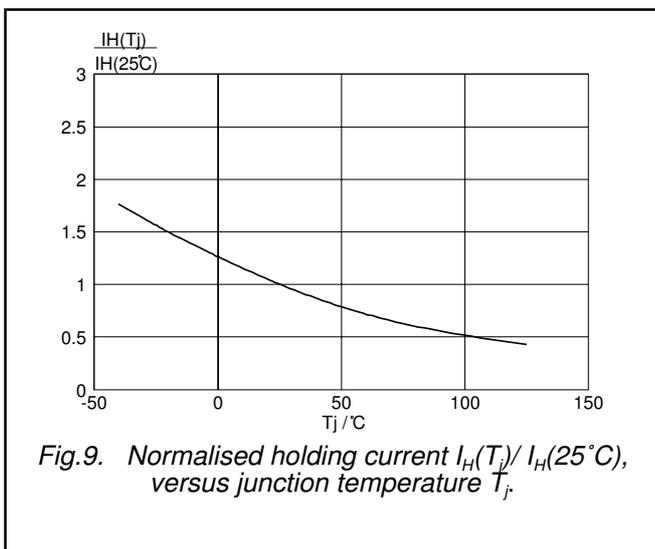
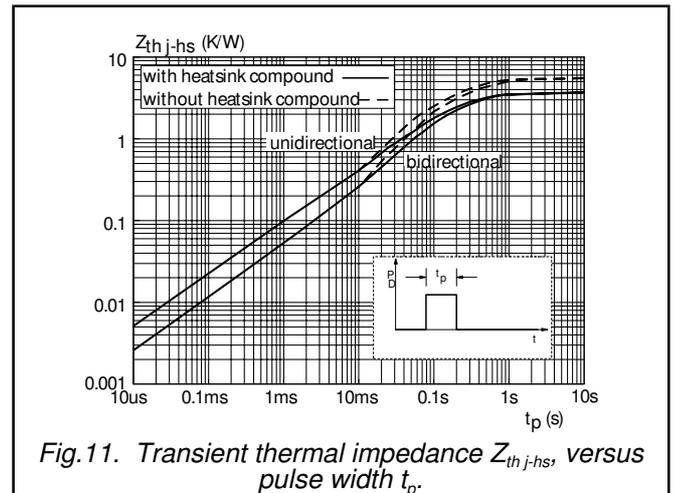
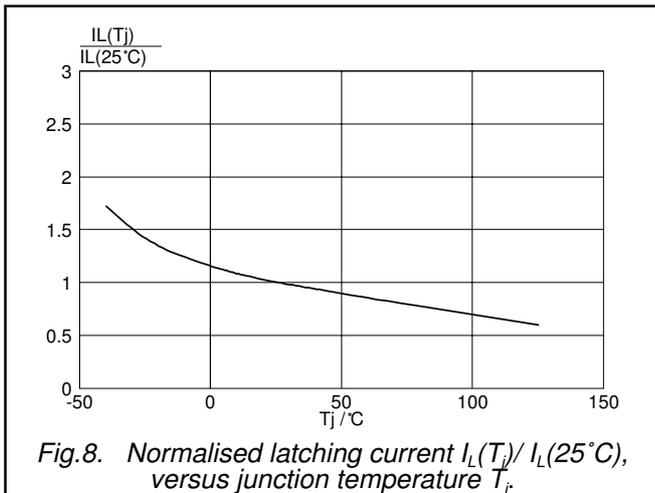
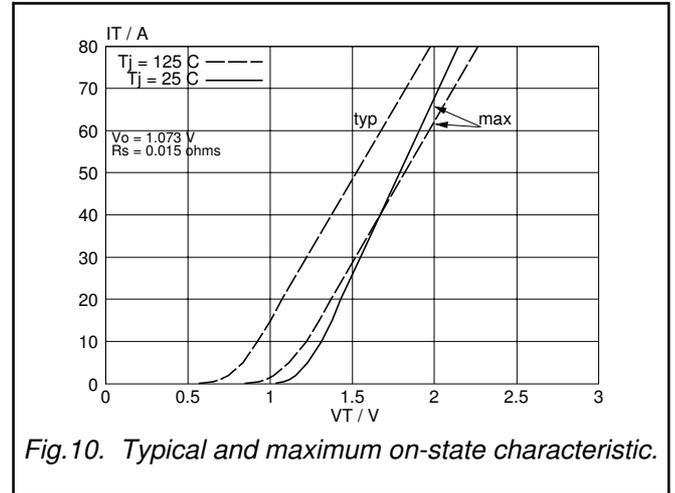
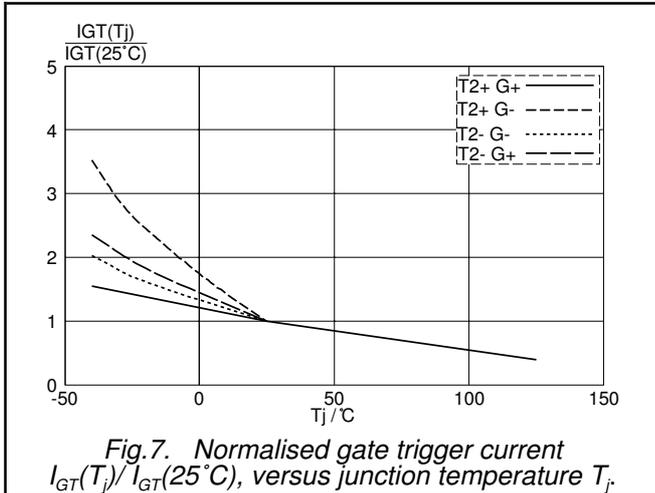


Fig. 6. Normalised gate trigger voltage $V_{GT}(T_j) / V_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

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MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

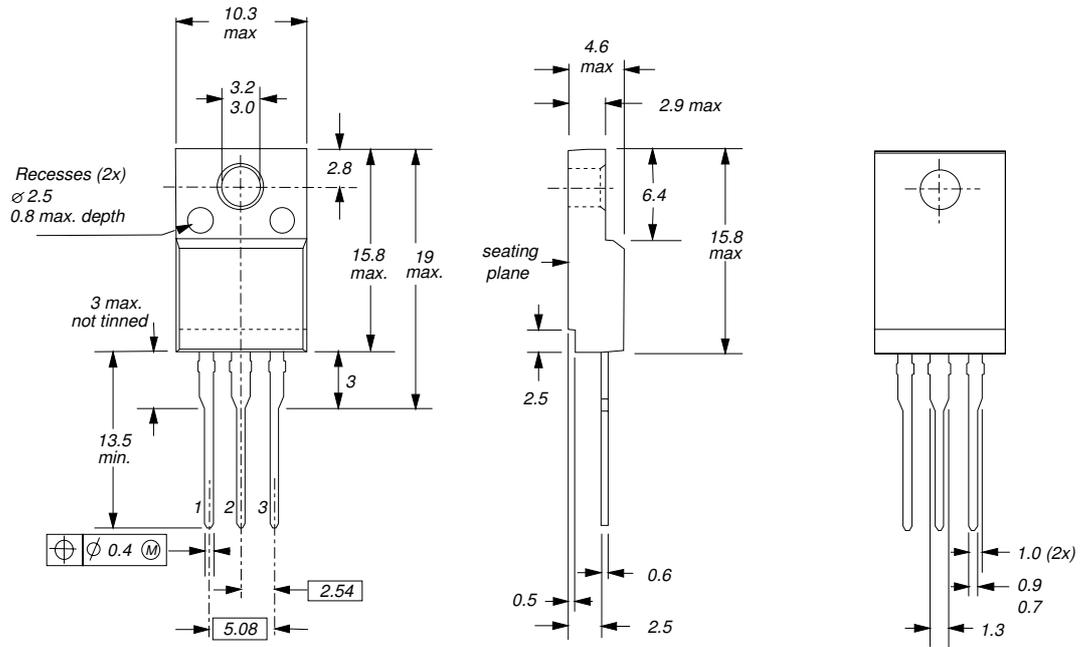


Fig.13. SOT186A; The seating plane is electrically isolated from all terminals.

Notes

1. Refer to mounting instructions for F-pack envelopes.
2. Epoxy meets UL94 V0 at 1/8".

Legal information

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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