

MAC320A8FP

Triacs

Silicon Bidirectional Thyristors

Designed primarily for full-wave ac control applications, such as solid-state relays, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity of applied anode voltage with positive or negative gate triggering.

- Blocking Voltage to 600 Volts
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Gate Triggering Guaranteed in Four Modes
-  Indicates UL Registered — File #E69369
- Device Marking: Logo, Device Type, e.g., MAC320A8FP, Date Code

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage ⁽¹⁾ ($T_J = -40$ to $+125^\circ\text{C}$, Sine Wave 50 to 60 Hz, Gate Open)	V_{DRM} , V_{RRM}	600	Volts
On-State RMS Current ($T_C = +75^\circ\text{C}$, Full Cycle Sine Wave 50 to 60 Hz) ⁽²⁾	$I_T(\text{RMS})$	20	Amps
Peak Non-Repetitive Surge Current (One Full Cycle, 60 Hz, $T_C = +75^\circ\text{C}$, preceded and followed by rated current)	I_{TSM}	150	Amps
Peak Gate Power ($T_C = +75^\circ\text{C}$, Pulse Width = 2 μs)	P_{GM}	20	Watts
Peak Gate Voltage ($T_C = +75^\circ\text{C}$, Pulse Width = 2 μs)	V_{GM}	10	Volts
Average Gate Power ($T_C = +75^\circ\text{C}$, $t = 8.3$ ms)	$P_{G(AV)}$	0.5	Watt
Peak Gate Current ($T_C = +75^\circ\text{C}$, Pulse Width = 2 μs)	I_{GM}	2.0	Amps
RMS Isolation Voltage ($T_A = 25^\circ\text{C}$, Relative Humidity $\leq 20\%$) 	$V_{(ISO)}$	1500	Volts
Operating Junction Temperature Range	T_J	-40 to $+125$	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to $+150$	$^\circ\text{C}$

(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

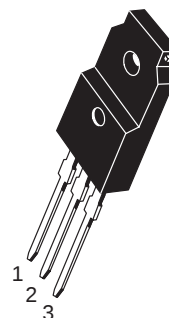
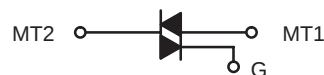
(2) The case temperature reference point for all T_C measurements is a point on the center lead of the package as close as possible to the plastic body.



ON Semiconductor

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ISOLATED TRIACs 
20 AMPERES RMS
600 VOLTS



ISOLATED TO-220 Full Pack
CASE 221C
STYLE 3

PIN ASSIGNMENT	
1	Main Terminal 1
2	Main Terminal 2
3	Gate

ORDERING INFORMATION

Device	Package	Shipping
MAC320A8FP	ISOLATED TO220FP	500/Box

MAC320A8FP

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.8	$^{\circ}\text{C/W}$
Thermal Resistance, Case to Sink	$R_{\theta CS}$	2.2	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^{\circ}\text{C/W}$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T_L	260	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^{\circ}\text{C}$ unless otherwise noted; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Repetitive Blocking Current ($V_D = \text{Rated } V_{DRM}, V_{RRM}$; Gate Open)	I_{DRM}, I_{RRM}	—	—	10	μA
		—	—	2.0	mA

OFF CHARACTERISTICS

Peak On-State Voltage ($I_{TM} = \pm 28 \text{ A Peak}$; Pulse Width = 1 to 2 ms, Duty Cycle $\leq 2\%$)	V_{TM}	—	1.4	1.7	Volts
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ON CHARACTERISTICS

Peak Gate Trigger Current (Main Terminal Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$) MT2(+), G(+) MT2(+), G(–) MT2(–), G(–) MT2(–), G(+)	I_{GT}	— — — —	— — — —	50 50 50 75	mA
Peak Gate Trigger Voltage (Main Terminal Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$) MT2(+), G(+) MT2(+), G(–) MT2(–), G(–) MT2(–), G(+)	V_{GT}	— — — —	0.9 0.9 1.1 1.4	2.0 2.0 2.0 2.5	Volts
Gate Non-Trigger Voltage (Main Terminal Voltage = 12 V, $R_L = 100 \Omega$, $T_J = +110^{\circ}\text{C}$) All Four Quadrants	V_{GD}	0.2	—	—	Volts
Holding Current (Main Terminal Voltage = 12 Vdc, Gate Open, Initiating Current = $\pm 200 \text{ mA}$)	I_H	—	6.0	40	mA
Turn-On Time ($V_D = \text{Rated } V_{DRM}$, $I_{TM} = 28 \text{ A}$, $I_{GT} = 120 \text{ mA}$, Rise Time = $0.1 \mu\text{s}$, Pulse Width = $2 \mu\text{s}$)	t_{gt}	—	1.5	10	μs

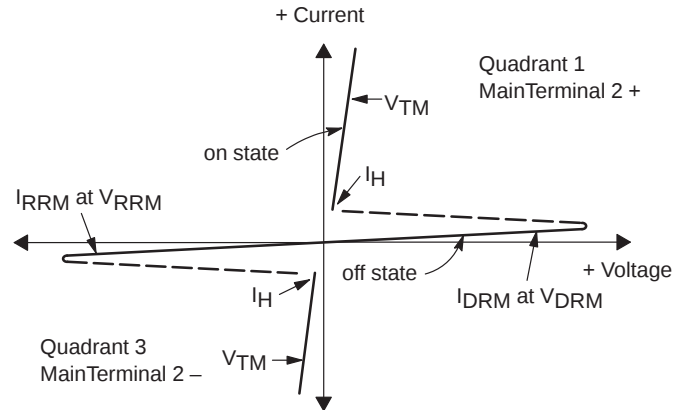
DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Commutation Voltage ($V_D = \text{Rated } V_{DRM}$, $I_{TM} = 28 \text{ A}$, Commutating $di/dt = 10 \text{ A/ms}$, Gate Unenergized, $T_C = +75^{\circ}\text{C}$)	$dv/dt(c)$	—	5.0	—	$\text{V}/\mu\text{s}$
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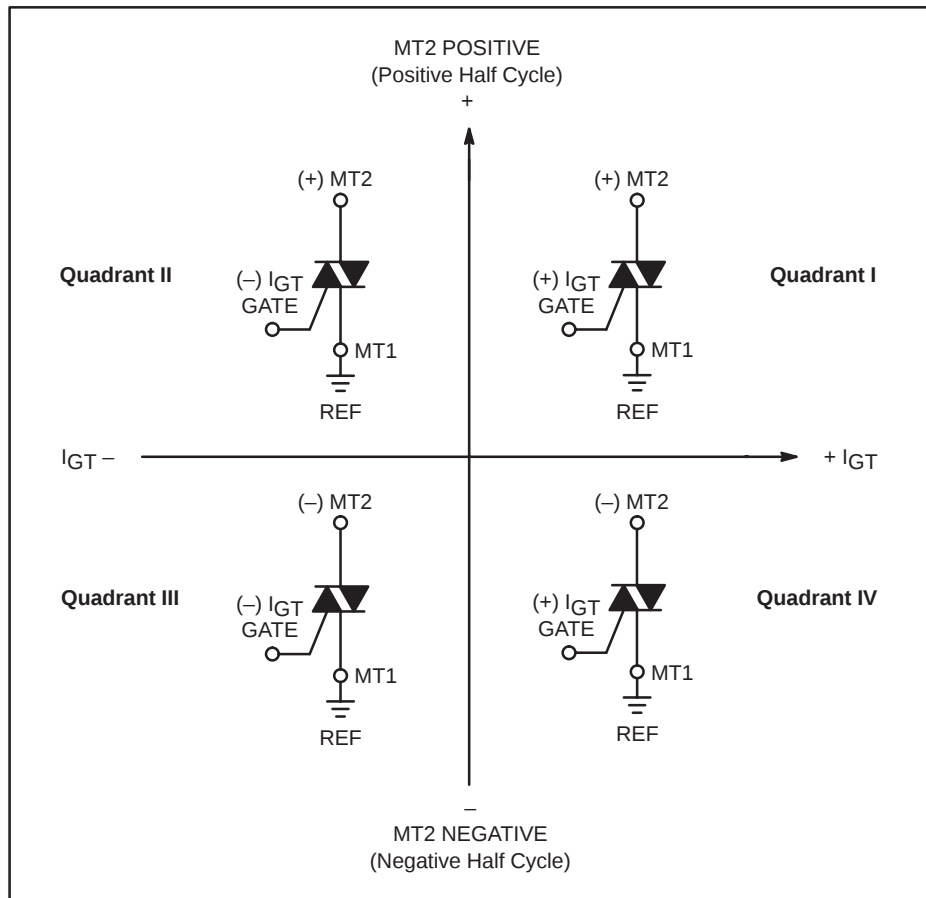
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Voltage Current Characteristic of Triacs (Bidirectional Device)

Symbol	Parameter
V_{DRM}	Peak Repetitive Forward Off State Voltage
I_{DRM}	Peak Forward Blocking Current
V_{RRM}	Peak Repetitive Reverse Off State Voltage
I_{RRM}	Peak Reverse Blocking Current
V_{TM}	Maximum On State Voltage
I_H	Holding Current



Quadrant Definitions for a Triac



All polarities are referenced to MT1.

With in-phase signals (using standard AC lines) quadrants I and III are used.

TYPICAL CHARACTERISTICS

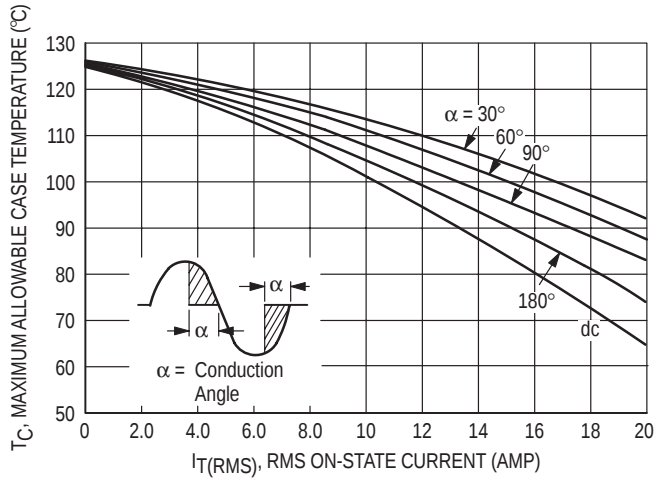


Figure 1. RMS Current Derating

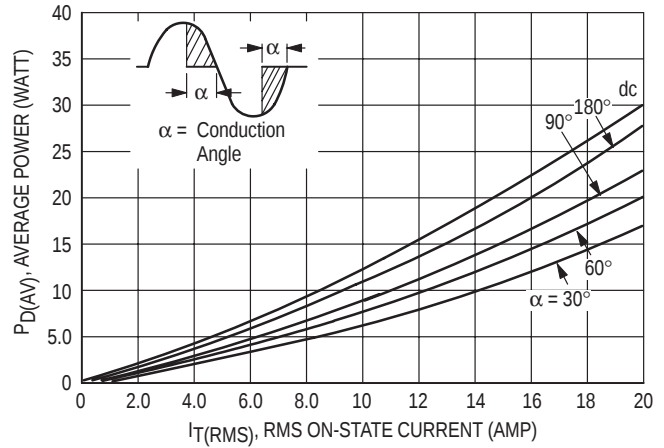


Figure 2. On-State Power Dissipation

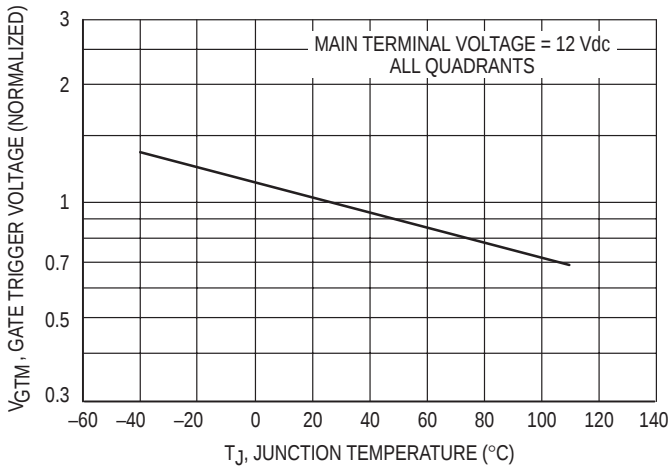


Figure 3. Typical Gate Trigger Voltage

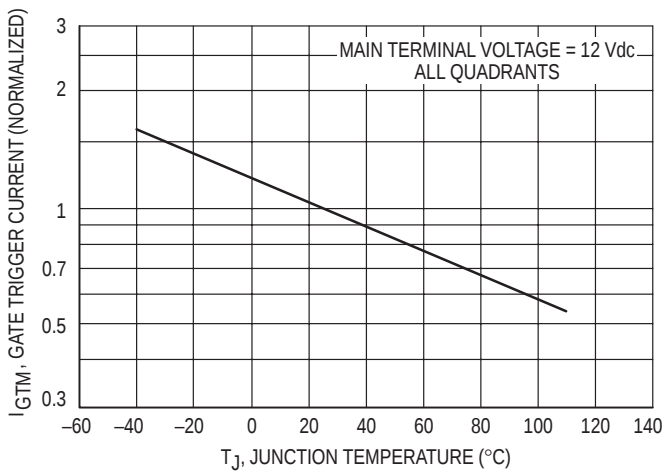


Figure 4. Typical Gate Trigger Current

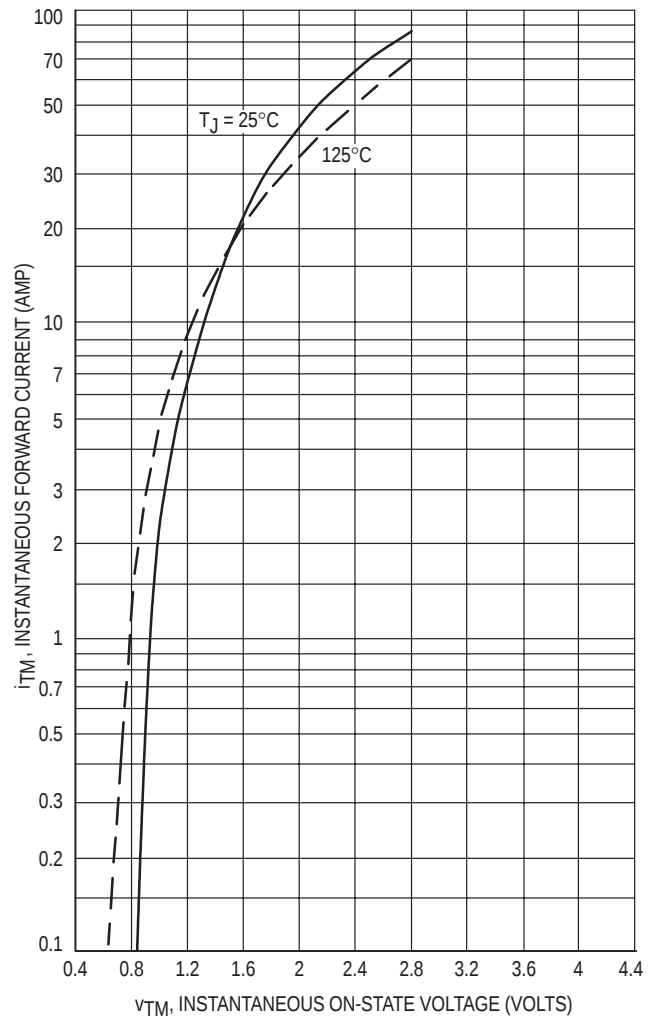


Figure 5. Maximum On-State Characteristics

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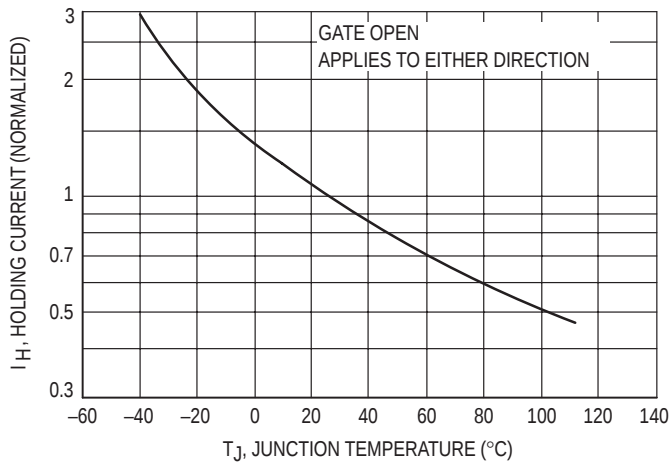


Figure 6. Typical Holding Current

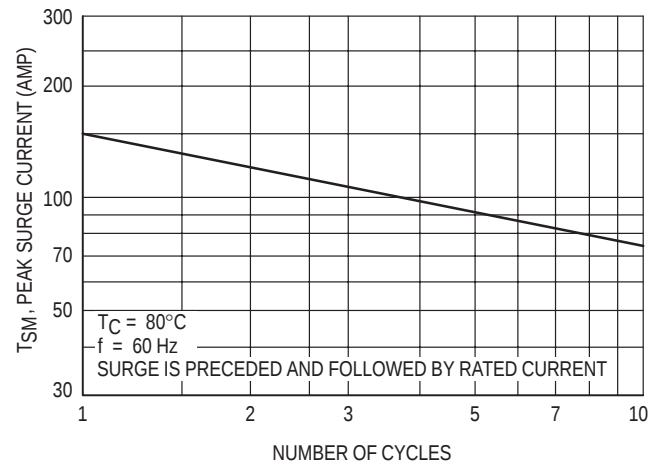


Figure 7. Maximum Nonrepetitive Surge Current

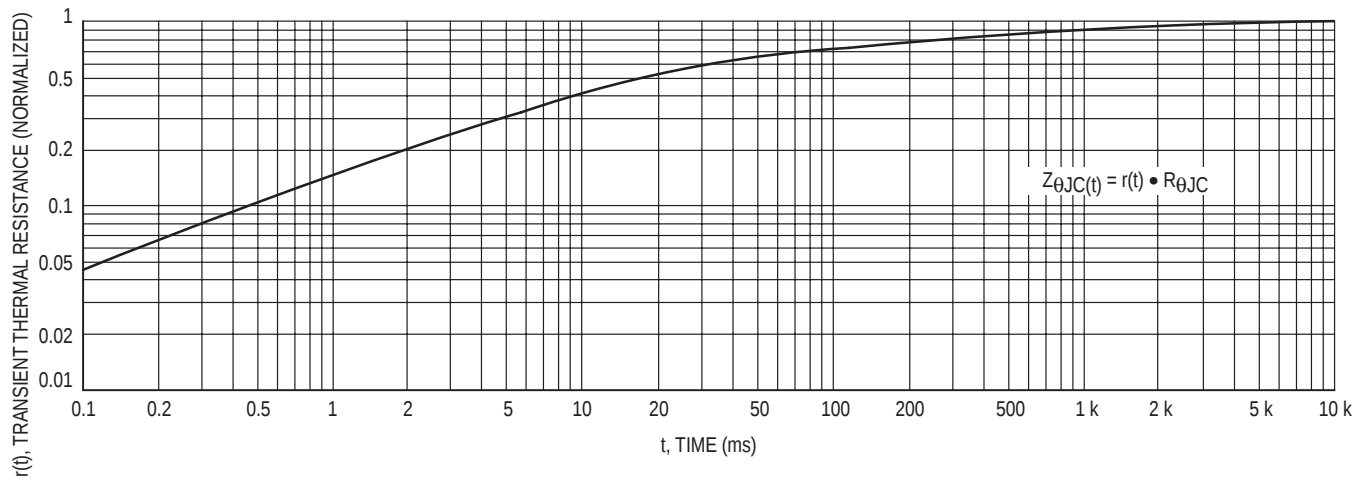
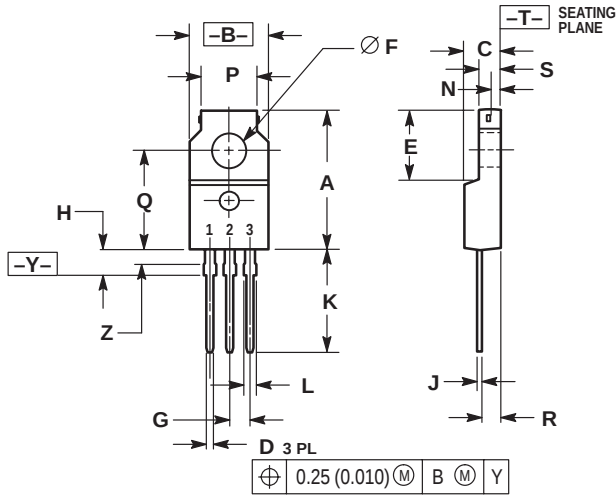


Figure 8. Thermal Response

MAC320A8FP

PACKAGE DIMENSIONS

ISOLATED TO-220 Full Pack CASE 221C-02 ISSUE C



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. LEAD DIMENSIONS UNCONTROLLED WITHIN DIMENSION Z.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.680	0.700	17.28	17.78
B	0.388	0.408	9.86	10.36
C	0.175	0.195	4.45	4.95
D	0.025	0.040	0.64	1.01
E	0.340	0.355	8.64	9.01
F	0.140	0.150	3.56	3.81
G	0.100	BSC	2.54	BSC
H	0.110	0.155	2.80	3.93
J	0.018	0.028	0.46	0.71
K	0.500	0.550	12.70	13.97
L	0.045	0.070	1.15	1.77
N	0.049	—	1.25	—
P	0.270	0.290	6.86	7.36
Q	0.480	0.500	12.20	12.70
R	0.090	0.120	2.29	3.04
S	0.105	0.115	2.67	2.92
Z	0.070	0.090	1.78	2.28

STYLE 3:

- PIN 1. MT 1
- MT 2
- GATE

Notes

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