

MAC210A8, MAC210A10

Triacs

Silicon Bidirectional Thyristors

Designed primarily for full-wave ac control applications, such as light dimmers, 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 main terminal 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 (Quadrants)
- Device Marking: Logo, Device Type, e.g., MAC210A8, Date Code

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage ⁽¹⁾ (T _J = -40 to +125°C, Sine Wave 50 to 60 Hz, Gate Open) MAC210A8 MAC210A10	V _{DRM} , V _{RRM}	600 800	Volts
On-State RMS Current (T _C = +70°C) Full Cycle Sine Wave 50 to 60 Hz	I _{T(RMS)}	10	Amps
Peak Non-Repetitive Surge Current (One Full Cycle, Sine Wave 60 Hz, T _C = +25°C) Preceded and followed by rated current	I _{TSM}	100	Amps
Circuit Fusing Considerations (t = 8.3 ms)	I ² t	40	A ² s
Peak Gate Power (T _C = +70°C, Pulse Width = 10 μs)	P _{GM}	20	Watts
Average Gate Power (T _C = +70°C, t = 8.3 ms)	P _{G(AV)}	0.35	Watt
Peak Gate Current (T _C = +70°C, Pulse Width = 10 μs)	I _{GM}	2.0	Amps
Operating Junction Temperature Range	T _J	-40 to +125	°C
Storage Temperature Range	T _{stg}	-40 to +150	°C

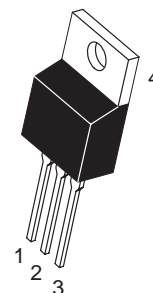
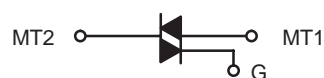
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



ON Semiconductor

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TRIACS
10 AMPERES RMS
600 thru 800 VOLTS



TO-220AB
CASE 221A
STYLE 4

PIN ASSIGNMENT

Pin	Assignment
1	Main Terminal 1
2	Main Terminal 2
3	Gate
4	Main Terminal 2

ORDERING INFORMATION

Device	Package	Shipping
MAC210A8	TO220AB	500/Box
MAC210A10	TO220AB	500/Box

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THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.0 62.5	$^{\circ}C/W$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T_L	260	$^{\circ}C$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Peak Repetitive Blocking Current ($V_D = \text{Rated } V_{DRM}, V_{RRM}; \text{ Gate Open}$)	$I_{DRM},$ I_{RRM}	— —	— —	10 2.0	μA mA
					$T_J = 25^{\circ}C$ $T_J = +125^{\circ}C$

ON CHARACTERISTICS

Peak On-State Voltage ($I_{TM} = \pm 14 \text{ A Peak}; \text{ Pulse Width} = 1 \text{ to } 2 \text{ ms}, \text{ Duty Cycle} \leq 2\%$)	V_{TM}	—	1.2	1.65	Volts
Gate Trigger Current (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$)	I_{GT}				mA
MT2(+), G(+)		—	12	50	
MT2(+), G(-)		—	12	50	
MT2(-), G(-)		—	20	50	
MT2(-), G(+)		—	35	75	
Gate Trigger Voltage (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$)	V_{GT}				Volts
MT2(+), G(+)		—	0.9	2.0	
MT2(+), G(-)		—	0.9	2.0	
MT2(-), G(-)		—	1.1	2.0	
MT2(-), G(+)		—	1.4	2.5	
Gate Non-Trigger Voltage (Continuous dc) (Main Terminal Voltage = 12 V, $R_L = 100 \Omega$, $T_J = +125^{\circ}C$) All Four Quadrants	V_{GD}	0.2	—	—	Volts
Holding Current (Main Terminal Voltage = 12 Vdc, Gate Open, Initiating Current = $\pm 200 \text{ mA}$, $T_C = +25^{\circ}C$)	I_H	—	6.0	50	mA
Turn-On Time (Rated V_{DRM} , $I_{TM} = 14 \text{ A}$) ($I_{GT} = 120 \text{ mA}$, Rise Time = 0.1 μs , Pulse Width = 2 μs)	t_{gt}	—	1.5	—	μs

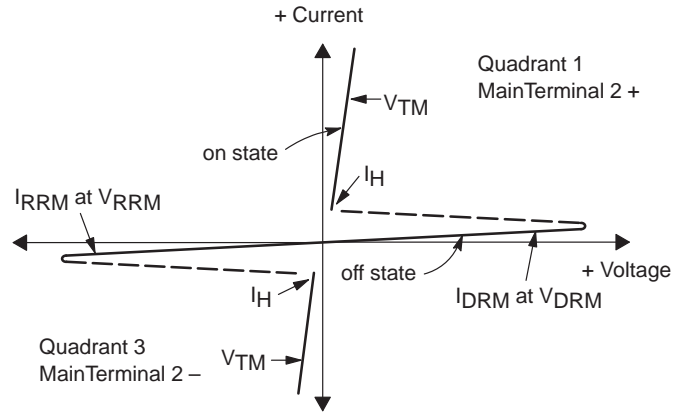
DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Commutation Voltage ($V_D = \text{Rated } V_{DRM}, I_{TM} = 14 \text{ A}$, Commutating $di/dt = 5.0 \text{ A/ms}$, Gate Unenergized, $T_C = 70^{\circ}C$)	$dv/dt(c)$	—	5.0	—	$V/\mu s$
Critical Rate of Rise of Off-State Voltage ($V_D = \text{Rated } V_{DRM}$, Exponential Voltage Rise, Gate Open, $T_C = +70^{\circ}C$)	dv/dt	—	100	—	$V/\mu s$

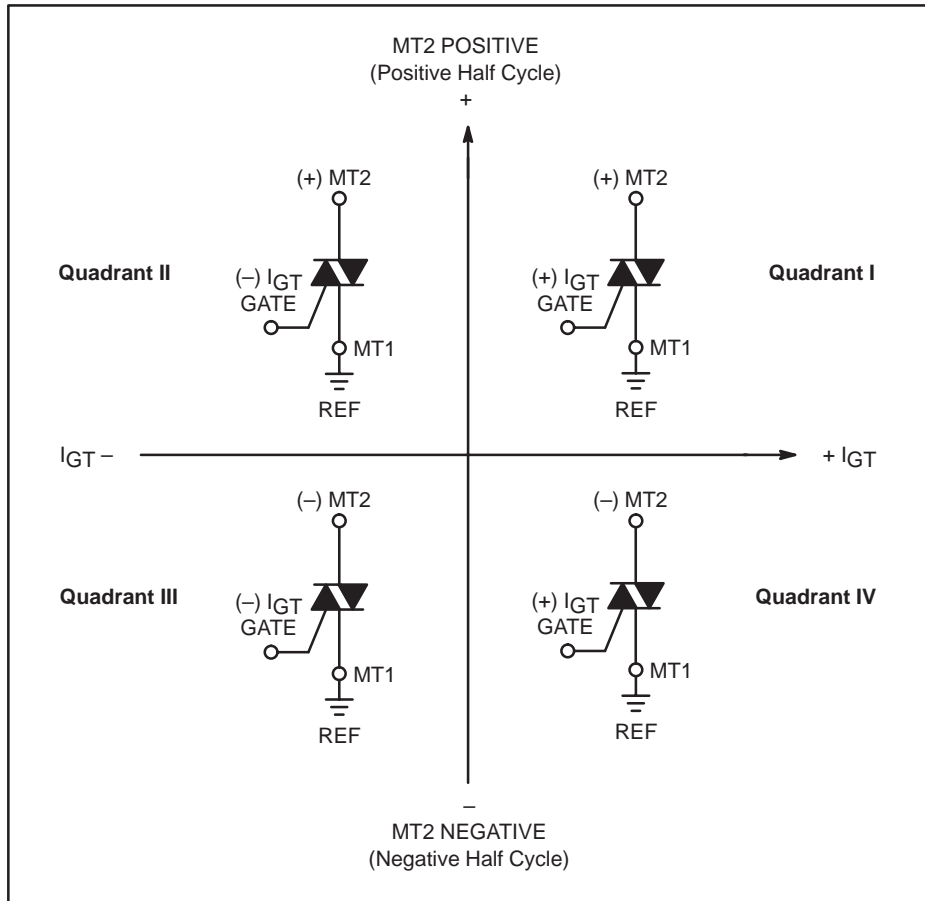
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Voltage Current Characteristic of Triacs (Bidirectional Device)

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.

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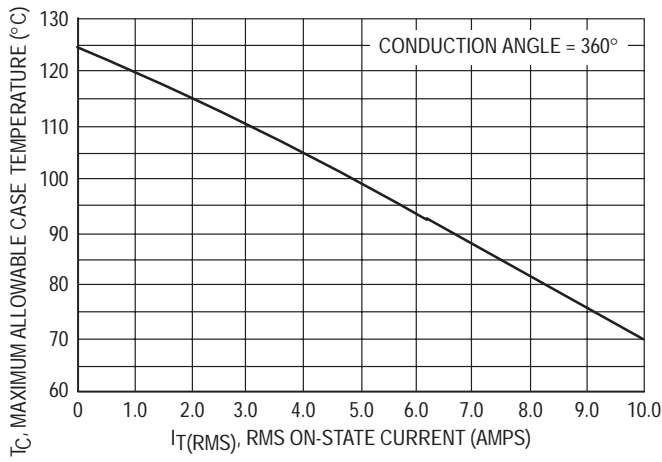


Figure 1. Current Derating

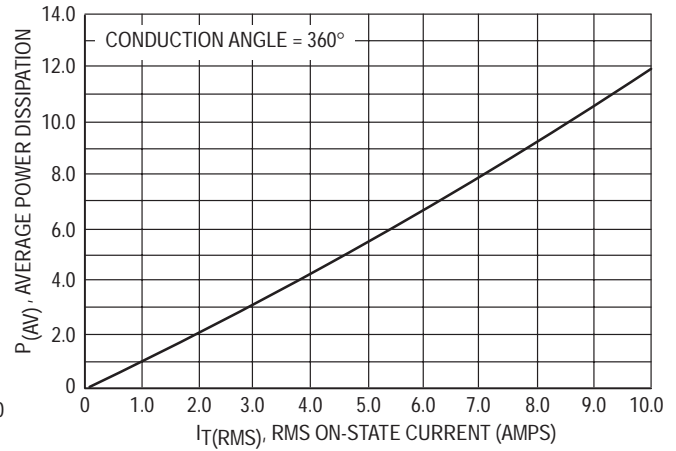


Figure 2. Power Dissipation

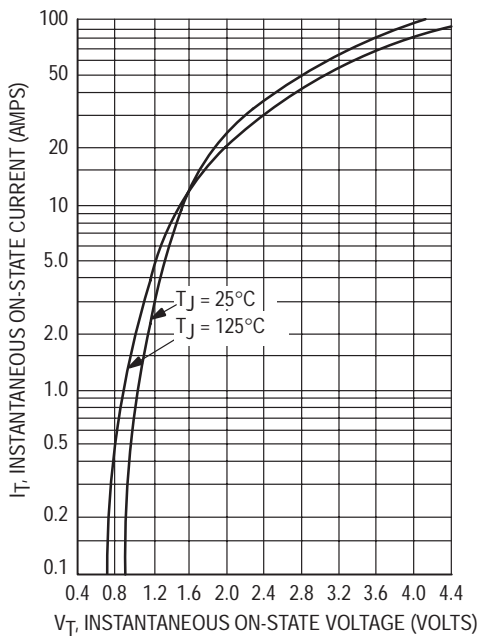


Figure 3. Maximum On-State Characteristics

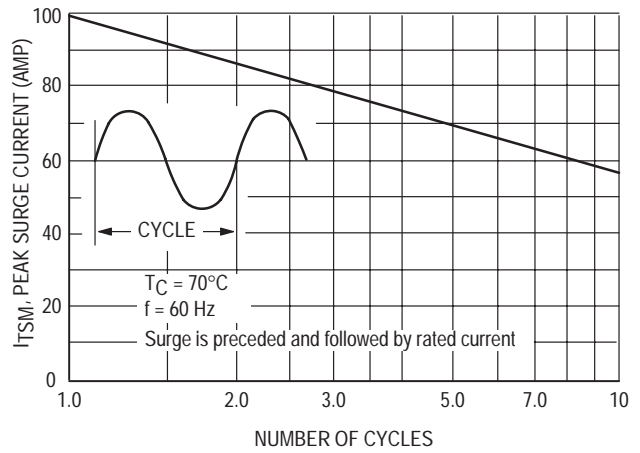


Figure 4. Maximum Non-Repetitive Surge Current

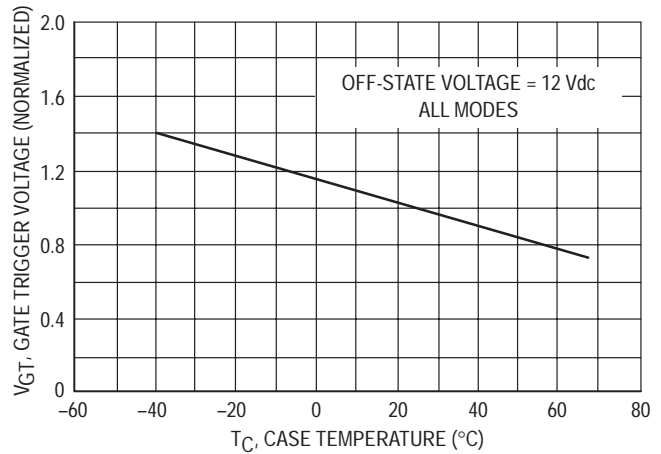


Figure 5. Typical Gate Trigger Voltage

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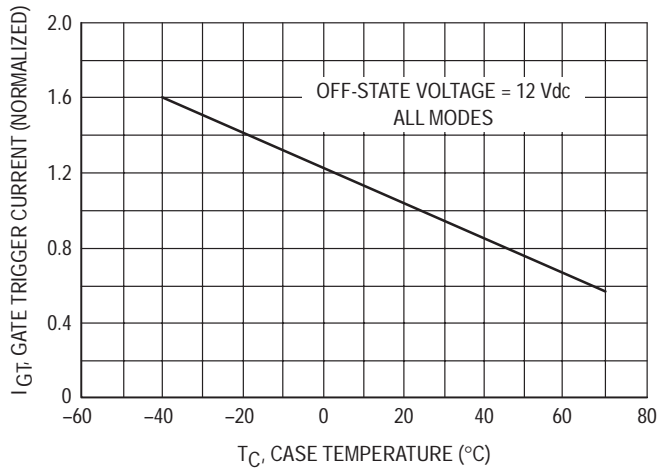


Figure 6. Typical Gate Trigger Current

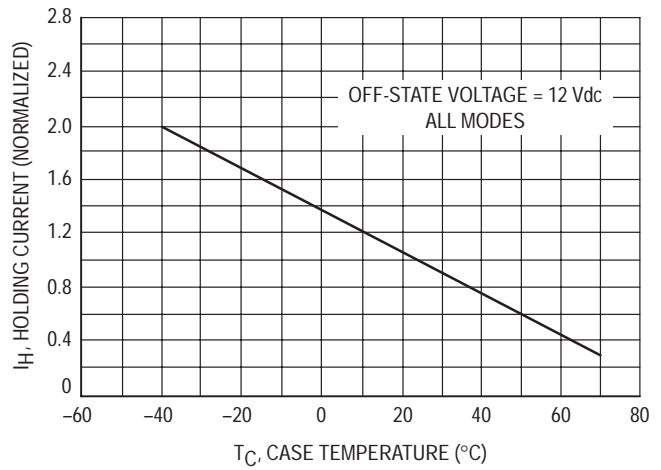


Figure 7. Typical Holding Current

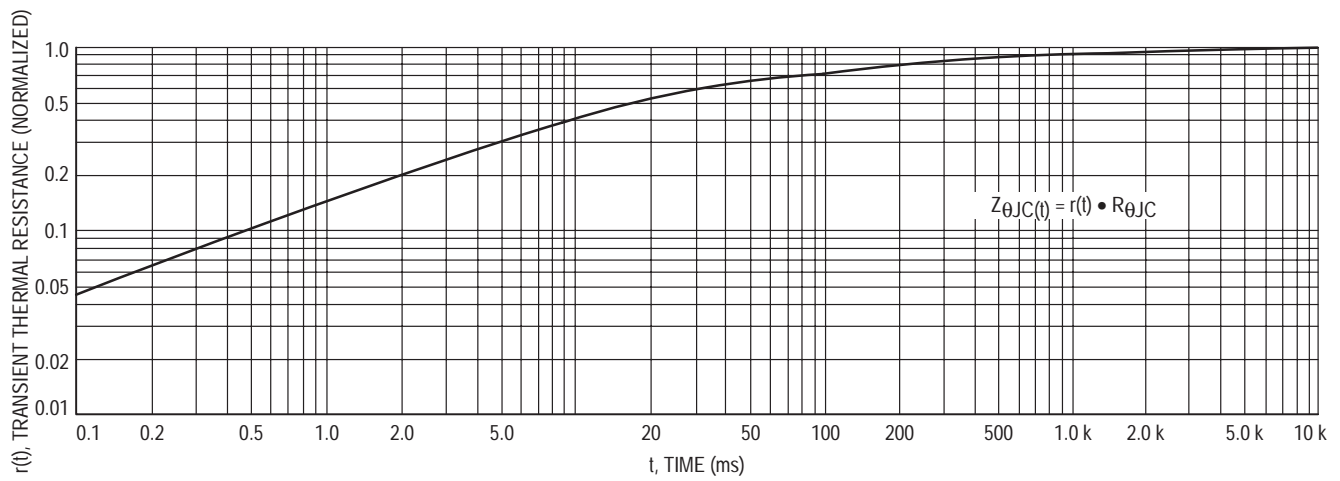
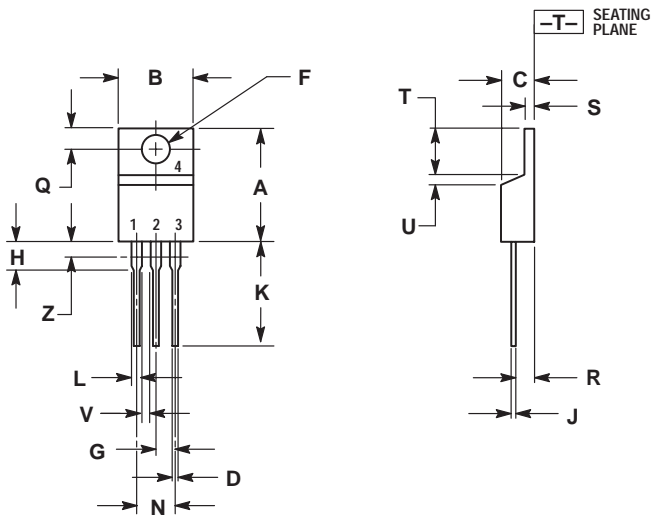


Figure 8. Thermal Response

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PACKAGE DIMENSIONS

TO-220AB
CASE 221A-07
ISSUE Z



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.022	0.36	0.55
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
O	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

STYLE 4:

- PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

Notes

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JAPAN: ON Semiconductor, Japan Customer Focus Center
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