

MAC212A6FP, MAC212A8FP, MAC212A10FP

Preferred Device



ON Semiconductor

<http://onsemi.com>

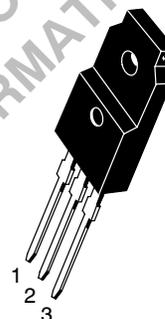
Triacs

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 800 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
- UL Indicates UL Registered — File #E69369
- Device Marking: Logo, Device Type, e.g., MAC212A6FP, Date Code

ISOLATED TRIAC (UL)
12 AMPERES RMS
400 thru 800 VOLTS



ISOLATED TO-220 Full Pack
CASE 221C
STYLE 3

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}	400 600 800	Volts
On-State RMS Current ($T_C = +85^\circ\text{C}$) ⁽²⁾ Full Cycle Sine Wave 50 to 60 Hz	$I_T(\text{RMS})$	12	Amps
Peak Non-repetitive Surge Current (One Full Cycle, Sine Wave, 60 Hz, $T_C = +85^\circ\text{C}$) Preceded and followed by rated current	I_{TSM}	100	Amps
Circuit Fusing Consideration ($t = 8.3$ ms)	I^2t	40	A^2s
Peak Gate Power ($T_C = +85^\circ\text{C}$, Pulse Width = 10 μs)	P_{GM}	20	Watts
Average Gate Power ($T_C = +85^\circ\text{C}$, $t = 8.3$ ms)	$P_{G(AV)}$	0.35	Watt
Peak Gate Current ($T_C = +85^\circ\text{C}$, Pulse Width = 10 μs)	I_{GM}	2.0	Amps
RMS Isolation Voltage ($T_A = 25^\circ\text{C}$, Relative Humidity $\leq 20\%$) (UL)	$V_{(ISO)}$	1500	Volts
Operating Junction Temperature Range	T_J	-40 to +125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +150	$^\circ\text{C}$

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

ORDERING INFORMATION

Device	Package	Shipping
MAC212A6FP	ISOLATED TO220FP	500/Box
MAC212A8FP	ISOLATED TO220FP	500/Box
MAC212A10FP	ISOLATED TO220FP	500/Box

Preferred devices are recommended choices for future use and best overall value.

(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.

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Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.1	$^{\circ}C/W$
Thermal Resistance, Case to Sink	$R_{\theta CS}$	2.2 (typ)	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^{\circ}C/W$
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	μA
$T_J = 25^{\circ}C$		—	—	2.0	$m A$
$T_J = +125^{\circ}C$		—	—		

ON CHARACTERISTICS

Peak On-State Voltage ($I_{TM} = \pm 17 A \text{ Peak}; \text{ Pulse Width} = 1 \text{ to } 2 \text{ ms}, \text{ Duty Cycle} \leq 2\%$)	V_{TM}	—	1.3	1.75	Volts
Gate Trigger Current (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$)	I_{GT}	—	12	50	$m A$
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}	—	0.9	2.0	Volts
MT2(+), G(+)		—	0.9	2.0	
MT2(+), G(-)		—	1.1	2.0	
MT2(-), G(-)		—	1.4	2.5	
MT2(-), G(+)		—			
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 = $\pm 200 \text{ mA}$)	I_H	—	6.0	50	$m A$
Turn-On Time ($V_D = \text{Rated } V_{DRM}, I_{TM} = 17 A, I_{GT} = 120 \text{ mA},$ Rise Time = $0.1 \mu s, \text{ Pulse Width} = 2 \mu s$)	t_{gt}	—	1.5	—	μs

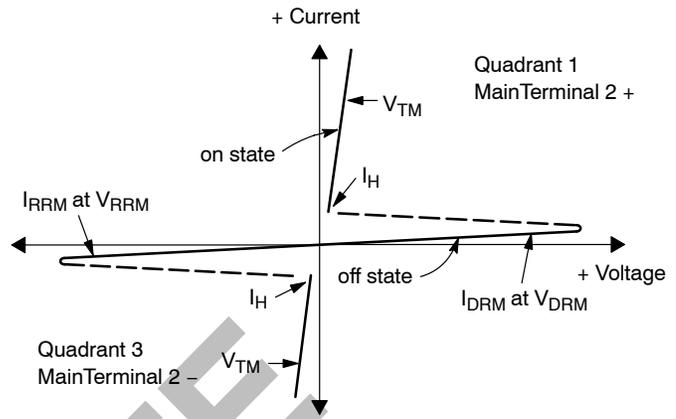
DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Commutation Voltage ($V_D = \text{Rated } V_{DRM}, I_{TM} = 17 A, \text{ Commutating } di/dt = 6.1 A/ms,$ Gate Unenergized, $T_C = +85^{\circ}C$)	$dv/dt_{(c)}$	—	5.0	—	$V/\mu s$
Critical Rate of Rise of Off-State Voltage ($V_D = \text{Rated } V_{DRM}, \text{ Exponential Voltage Rise, Gate Open,}$ $T_C = +85^{\circ}C$)	dv/dt	—	100	—	$V/\mu s$

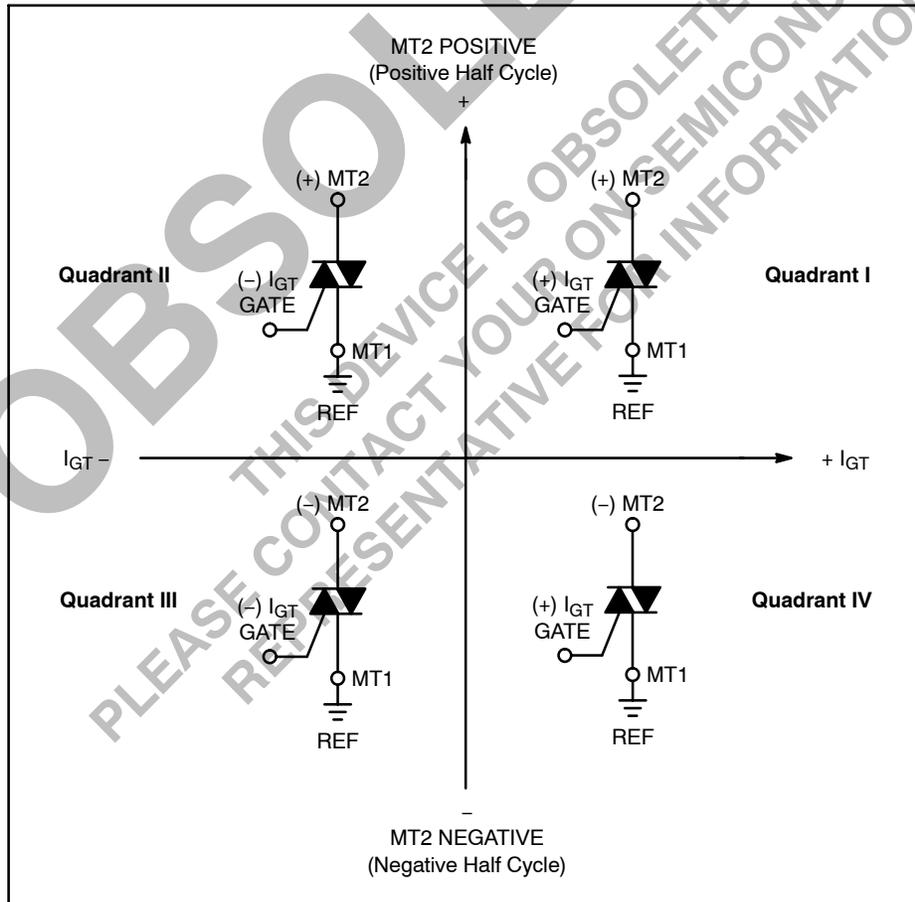
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Voltage Current Characteristic of Triacs (Bidirectional Device)

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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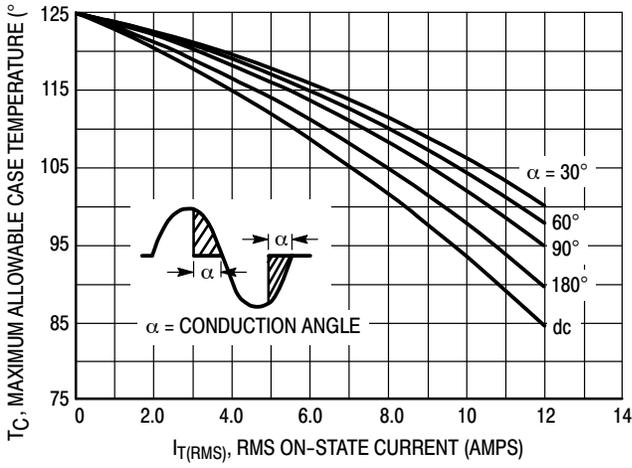


Figure 1. Current Derating

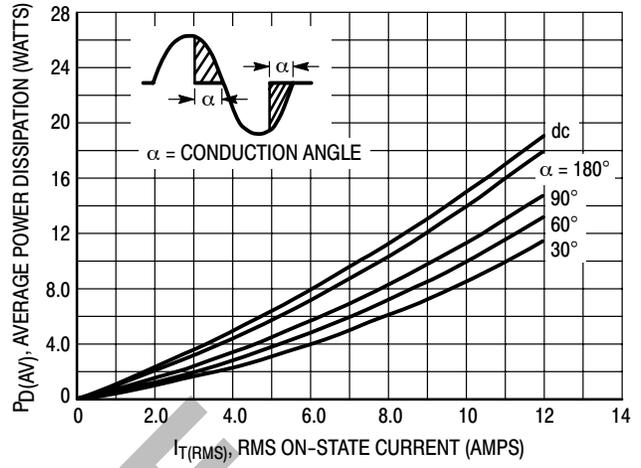


Figure 2. Power Dissipation

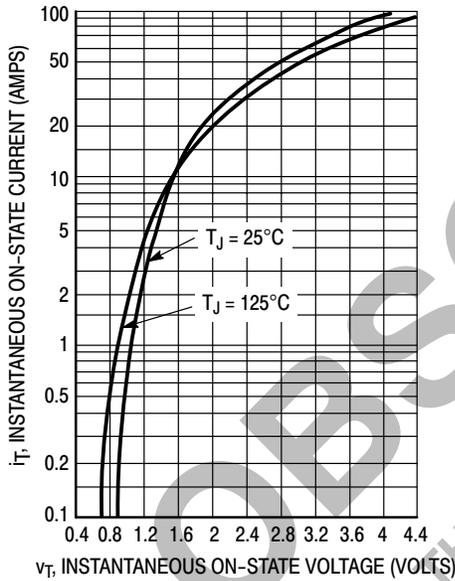


Figure 3. Maximum On-State Characteristics

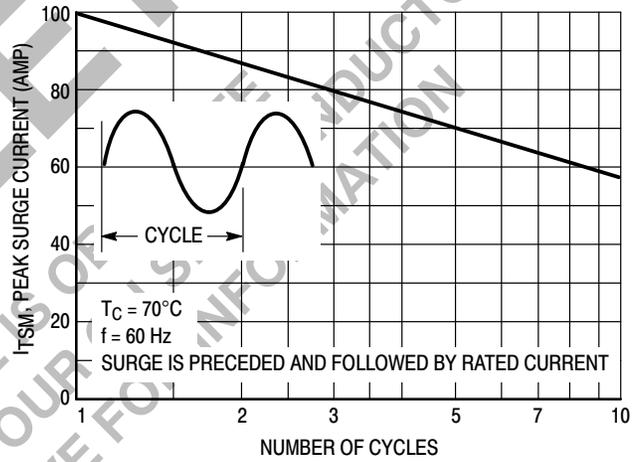


Figure 4. Maximum Nonrepetitive Surge Current

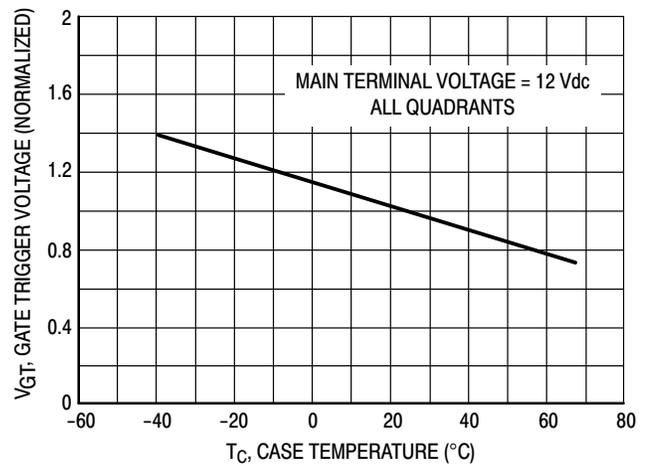


Figure 5. Typical Gate Trigger Voltage

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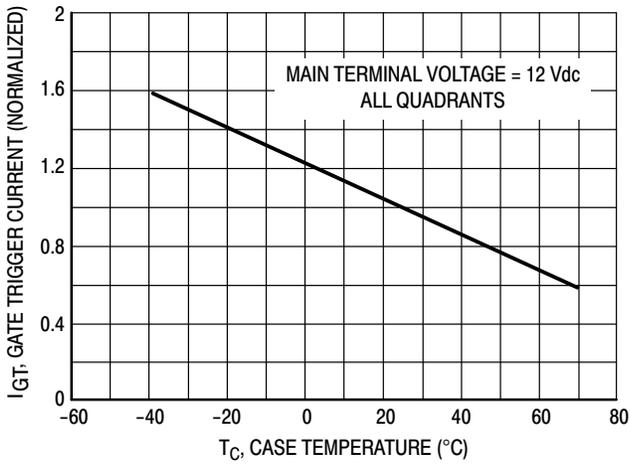


Figure 6. Typical Gate Trigger Current

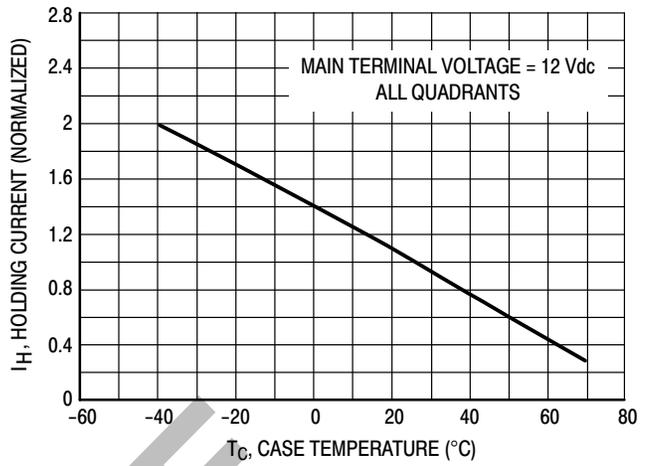


Figure 7. Typical Holding Current

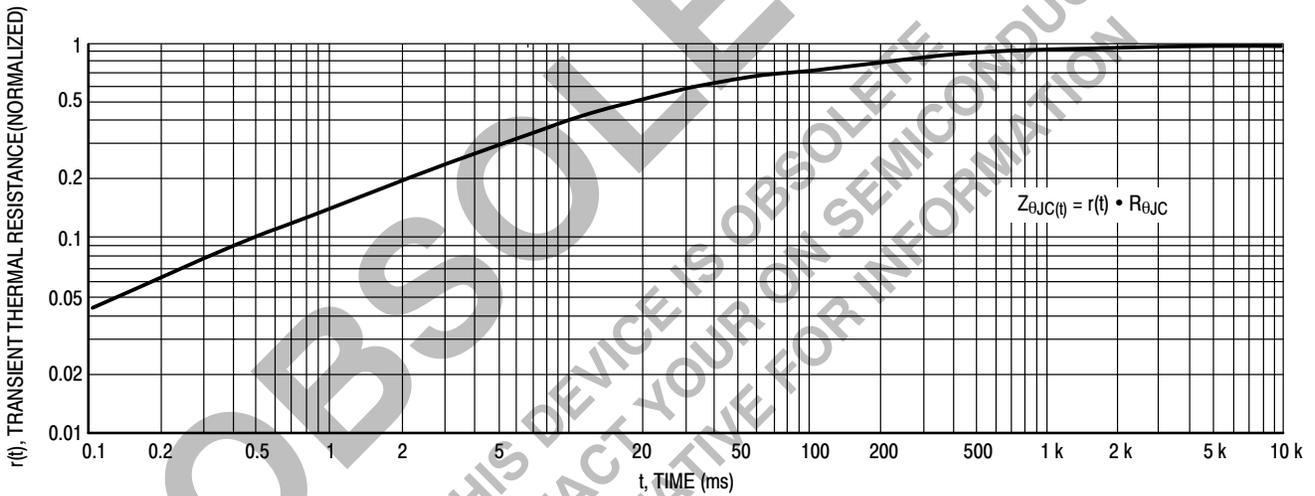
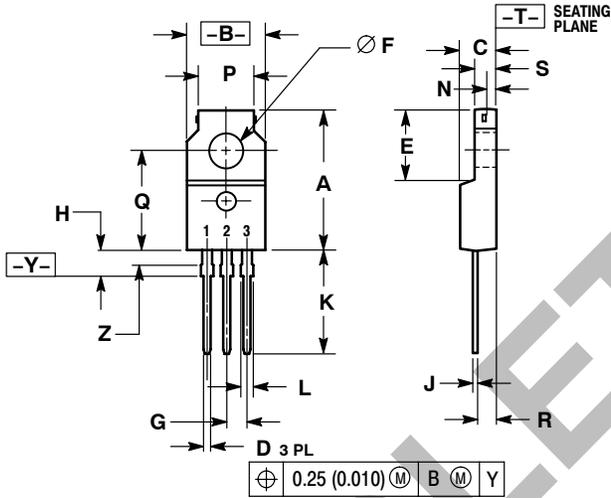


Figure 8. Thermal Response

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PACKAGE DIMENSIONS

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
2: MT 2
3: GATE

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