

MAC15A6FP, MAC15A8FP, MAC15A10FP

Preferred Device



ON Semiconductor

<http://onsemi.com>

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 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
- Indicates UL Registered — File #E69369
- Device Marking: Logo, Device Type, e.g., MAC15A6FP, Date Code

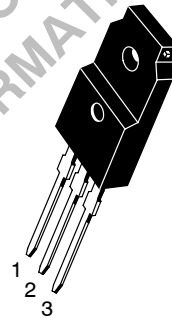
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage ⁽¹⁾ (T _J = -40 to +125°C, Sine Wave 50 to 60 Hz, Gate Open)	V _{DRM} , V _{RRM}	400 600 800	Volts
On-State RMS Current (T _C = +80°C) ⁽²⁾ Full Cycle Sine Wave 50 to 60 Hz (T _C = +95°C)	I _{T(RMS)}	15 12	Amps
Peak Nonrepetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T _C = +80°C) Preceded and followed by rated current	I _{TSM}	150	Amps
Circuit Fusing (t = 8.3 ms)	I ² t	93	A ² s
Peak Gate Power (T _C = +80°C, Pulse Width = 2.0 μs)	P _{GM}	20	Watts
Average Gate Power (T _C = +80°C, t = 8.3 ms)	P _{G(AV)}	0.5	Watt
Peak Gate Current (Pulse Width ≤ 1.0 μsec; T _C = 80°C)	I _{GM}	2.0	Amps
Peak Gate Voltage (Pulse Width ≤ 1.0 μsec; T _C = 80°C)	V _{GM}	10	Volts
RMS Isolation Voltage (T _A = 25°C, Relative Humidity ≤ 20%)	V _(ISO)	1500	Volts
Operating Junction Temperature	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.

(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.

ISOLATED TRIAC
15 AMPERES RMS
400 thru 800 VOLTS



ISOLATED TO-220 Full Pack
CASE 221C
STYLE 3

PIN ASSIGNMENT

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

ORDERING INFORMATION

Device	Package	Shipping
MAC15A6FP	ISOLATED TO220FP	500/Box
MAC15A8FP	ISOLATED TO220FP	500/Box
MAC15A10FP	ISOLATED TO220FP	500/Box

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

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THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Case to Sink	$R_{\theta CS}$	2.2 (typ)	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^{\circ}\text{C}/\text{W}$
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
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OFF CHARACTERISTICS

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

ON CHARACTERISTICS

Peak On-State Voltage ⁽¹⁾ ($I_{TM} = \pm 21 \text{ A Peak}$)	V_{TM}	—	1.3	1.6	Volts
Gate Trigger Current (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)	I_{GT}	—	—	50	mA
		—	—	50	
		—	—	50	
		—	—	75	
		—	—	75	
Gate Trigger Voltage (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)	V_{GT}	—	0.9	2.0	Volts
		—	0.9	2.0	
		—	1.1	2.0	
		—	1.4	2.5	
		—	1.4	2.5	
Gate Non-Trigger Voltage (Main Terminal Voltage = Rated V_{DRM} , $R_L = 100 \Omega$, $T_J = +110^{\circ}\text{C}$) All 4 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 ($V_D = \text{Rated } V_{DRM}$, $I_{TM} = 17 \text{ A}$, $I_{GT} = 120 \text{ mA}$, Rise Time = $0.1 \mu\text{s}$, Pulse Width = $2 \mu\text{s}$)	t_{gt}	—	1.5	—	μs

DYNAMIC CHARACTERISTICS

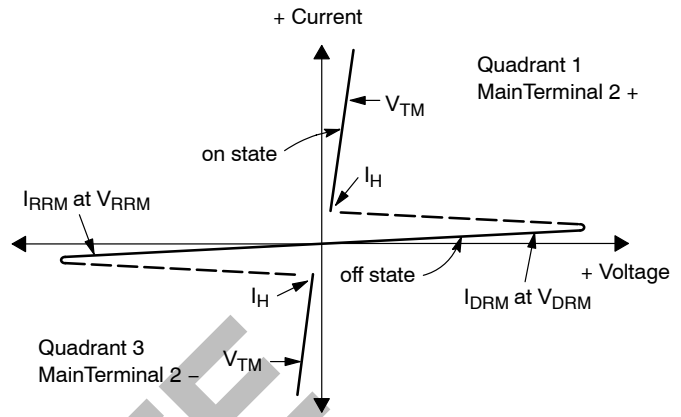
Critical Rate of Rise of Commutation Voltage ($V_D = \text{Rated } V_{DRM}$, V_{RRM} , $I_{TM} = 21 \text{ A}$, Commutating $di/dt = 7.6 \text{ A/ms}$, Gate Unenergized, $T_C = 80^{\circ}\text{C}$)	$dv/dt(c)$	—	5.0	—	$\text{V}/\mu\text{s}$
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(1) Pulse Test: Pulse Width $\leq 2.0 \text{ ms}$, Duty Cycle $\leq 2\%$.

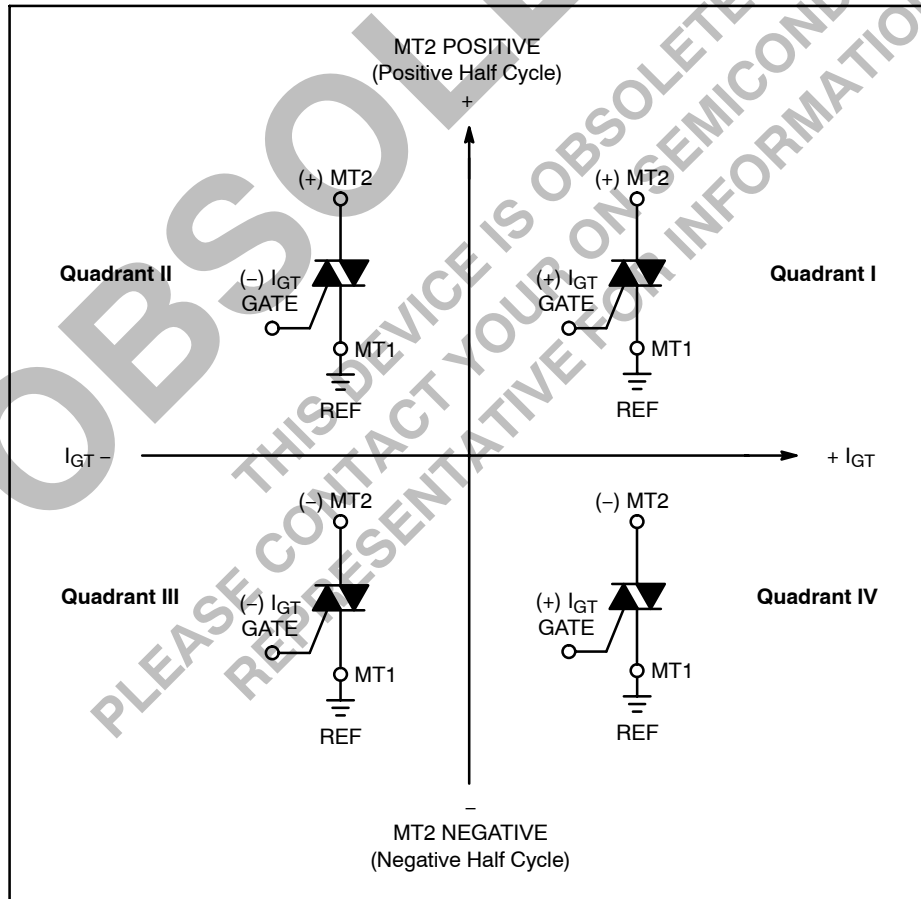
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Voltage Current Characteristic of Triacs (Bidirectional Device)

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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TYPICAL CHARACTERISTICS

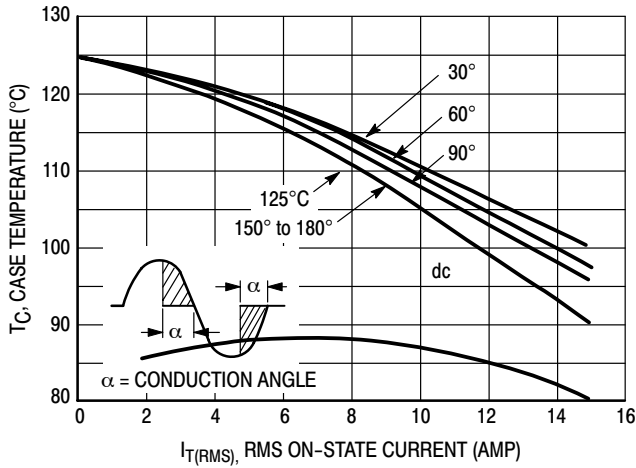


Figure 1. RMS Current Derating

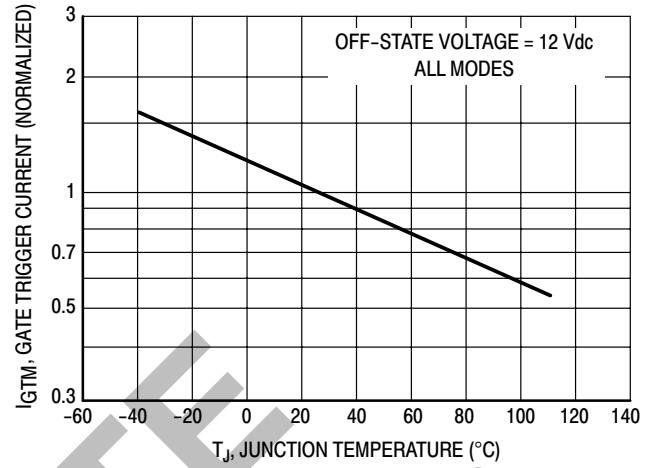


Figure 4. Typical Gate Trigger Current

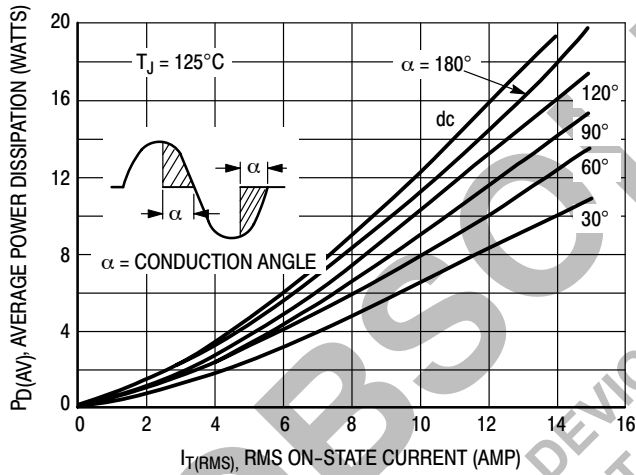


Figure 2. On-State Power Dissipation

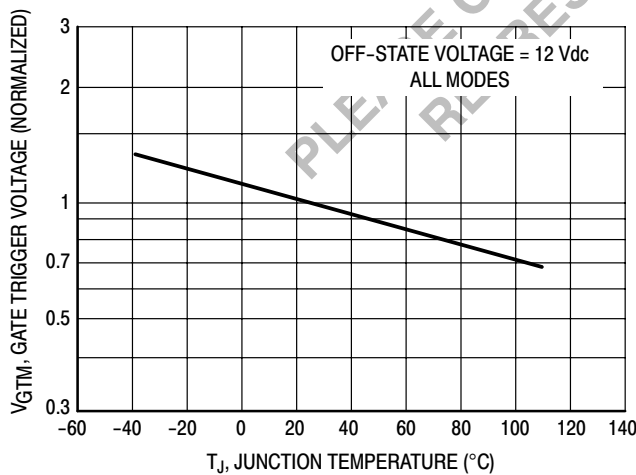


Figure 3. Typical Gate Trigger Voltage

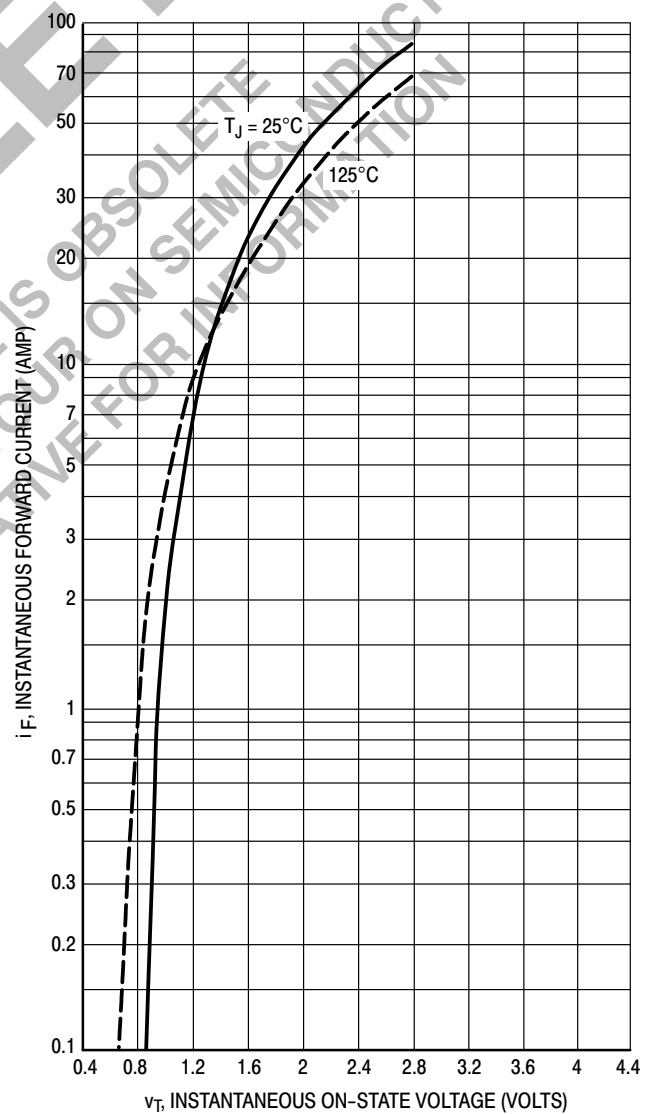


Figure 5. Maximum On-State Characteristics

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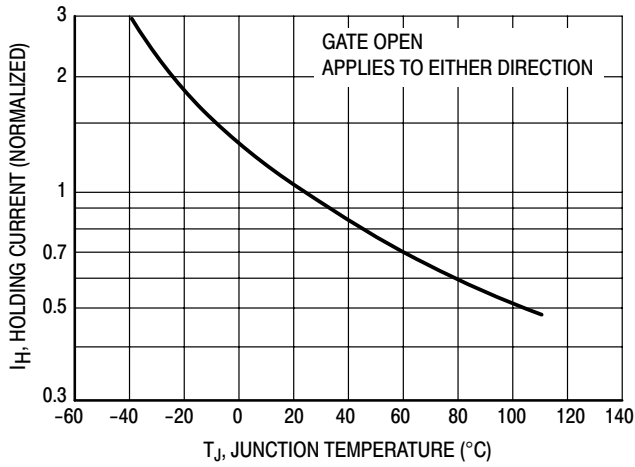


Figure 6. Typical Holding Current

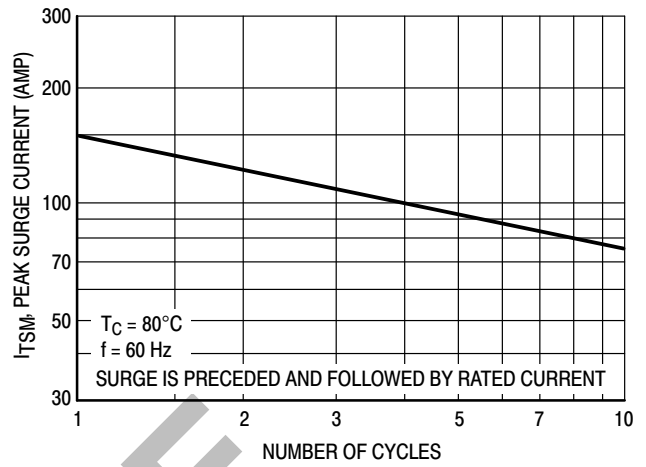


Figure 7. Maximum Nonrepetitive Surge Current

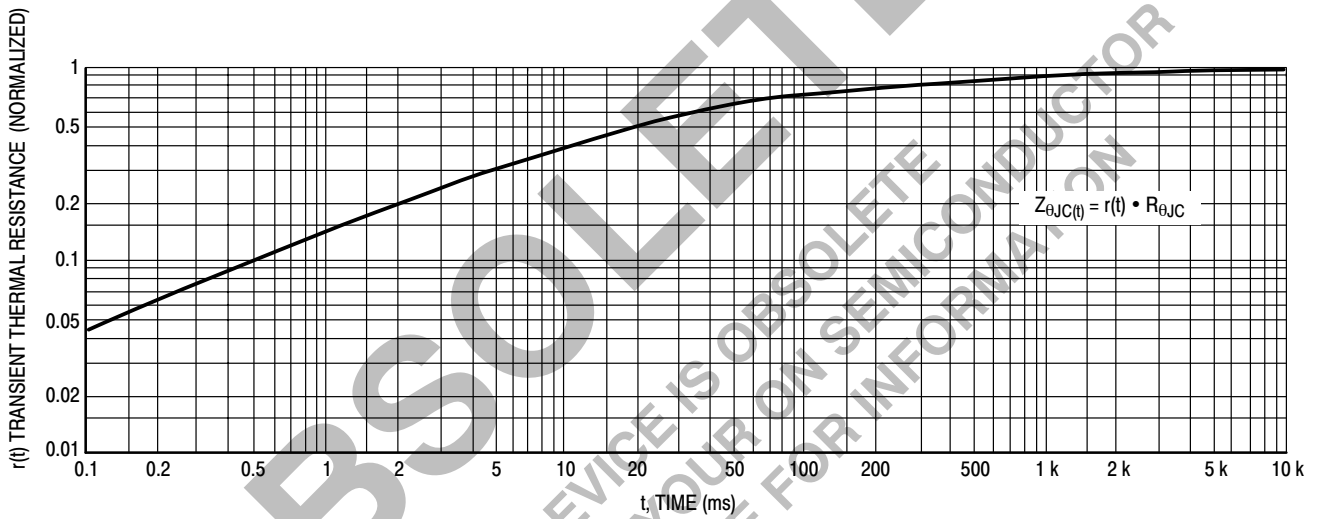
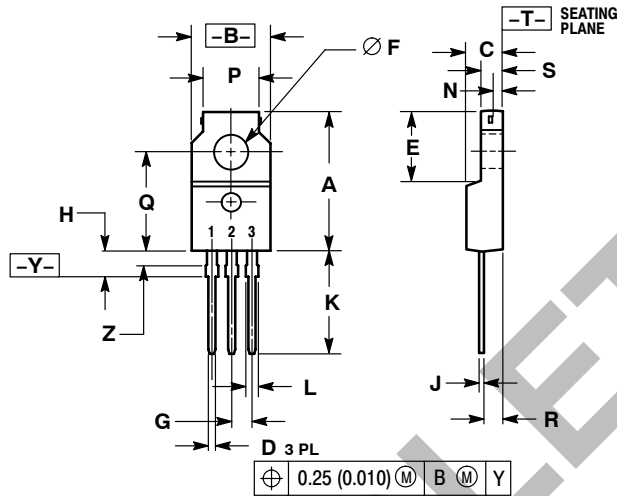


Figure 8. Thermal Response

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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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