



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



MAC12SM, MAC12SN

Sensitive Gate Triacs

Silicon Bidirectional Thyristors

Designed for industrial and consumer applications for full wave control of AC loads such as appliance controls, heater controls, motor controls, and other power switching applications.

Features

- Sensitive Gate Allows Triggering by Microcontrollers and other Logic Circuits
- Blocking Voltage to 800 Volts
- On-State Current Rating of 12 Amperes RMS at 70°C
- High Surge Current Capability – 90 Amperes
- Rugged, Economical TO-220AB Package
- Glass Passivated Junctions for Reliability and Uniformity
- Maximum Values of I_{GT} , V_{GT} and I_H Specified for Ease of Design
- High Commutating di/dt – 8.0 A/ms Minimum at 110°C
- Immunity to dV/dt – 15 V/ μ sec Minimum at 110°C
- Operational in Three Quadrants: Q1, Q2, and Q3
- These Devices are Pb-Free and are RoHS Compliant

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) ($T_J = -40$ to 110°C , Sine Wave, 50 to 60 Hz, Gate Open)	V_{DRM} , V_{RRM}	600 800	V
On-State RMS Current (All Conduction Angles; $T_C = 70^\circ\text{C}$)	$I_{T(RMS)}$	12	A
Peak Non-Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, $T_J = 110^\circ\text{C}$)	I_{TSM}	90	A
Circuit Fusing Consideration ($t = 8.33$ ms)	I^2t	33	A^2sec
Peak Gate Power (Pulse Width = 1.0 μ sec, $T_C = 70^\circ\text{C}$)	P_{GM}	16	W
Average Gate Power ($t = 8.3$ msec, $T_C = 70^\circ\text{C}$)	$P_{G(AV)}$	0.35	W
Operating Junction Temperature Range	T_J	-40 to 110	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to 150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

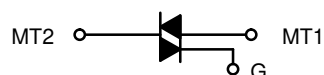
1. (V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



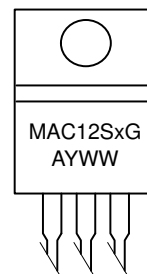
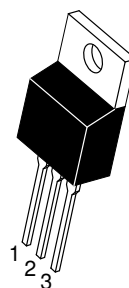
Expertise Applied | Answers Delivered

Littelfuse.com

TRIACS 12 AMPERES RMS 600 thru 800 VOLTS



MARKING DIAGRAM



TO-220 CASE 221A STYLE 4

- x = M, or N
- A = Assembly Location
- Y = Year
- WW = Work Week
- G = Pb-Free Package

PIN ASSIGNMENT

1	Main Terminal 1
2	Main Terminal 2
3	Gate
4	Main Terminal 2

ORDERING INFORMATION

Device	Package	Shipping
MAC12SMG	TO-220 (Pb-Free)	50 Units / Rail
MAC12SNG	TO-220 (Pb-Free)	50 Units / Rail

MAC12SM, MAC12SN

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.2	$^{\circ}\text{C}/\text{W}$
Junction-to-Ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T_L	260	$^{\circ}\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Peak Repetitive Blocking Current ($V_D = \text{Rated } V_{DRM}, V_{RRM}; \text{ Gate Open}$)	I_{DRM}, I_{RRM}	-	-	0.01 2.0	mA
		-	-		

$T_J = 25^{\circ}\text{C}$
 $T_J = 110^{\circ}\text{C}$

ON CHARACTERISTICS

Peak On-State Voltage (Note 2) ($I_{TM} = \pm 17 \text{ A}$)	V_{TM}	-	-	1.85	V
Gate Trigger Current (Continuous dc) ($V_D = 12 \text{ V}, R_L = 100 \Omega$) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-)	I_{GT}	-	1.5 2.5 2.7	5.0 5.0 5.0	mA
Holding Current ($V_D = 12 \text{ V}, \text{ Gate Open}, \text{ Initiating Current} = \pm 200 \text{ mA}$)	I_H	-	2.5	10	mA
Latching Current ($V_D = 12 \text{ V}, I_G = 5 \text{ mA}$) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-)	I_L	-	3.0 5.0 3.0	15 20 15	mA
Gate Trigger Voltage (Continuous dc) ($V_D = 12 \text{ V}, R_L = 100 \Omega$) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-)	V_{GT}	0.45 0.45 0.45	0.68 0.62 0.67	1.5 1.5 1.5	V

DYNAMIC CHARACTERISTICS

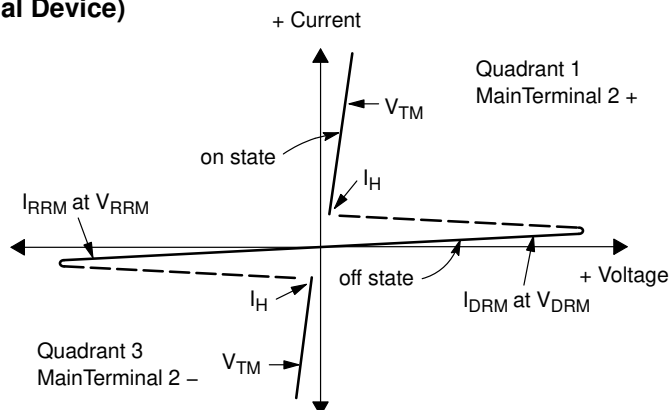
Critical Rate of Change of Commutating Current ($V_D = 400 \text{ V}, I_{TM} = 3.5 \text{ A}, \text{ Commutating } dV/dt = 10 \text{ V}/\mu\text{s}, \text{ Gate Open}, T_J = 110^{\circ}\text{C}, f = 500 \text{ Hz}, \text{ Snubber: } C_s = 0.01 \mu\text{f}, R_s = 15 \Omega$)	$(di/dt)_c$	8.0	10	-	A/ms
Critical Rate of Rise of Off-State Voltage ($V_D = 67\% V_{DRM}, \text{ Exponential Waveform}, R_{GK} = 1 \text{ K}\Omega, T_J = 110^{\circ}\text{C}$)	dV/dt	15	40	-	V/ μs
Repetitive Critical Rate of Rise of On-State Current IPK = 50 A; PW = 40 μsec ; $di/dt = 1 \text{ A}/\mu\text{sec}$; $I_{gt} = 100 \text{ mA}$; $f = 60 \text{ Hz}$	di/dt	-	-	10	A/ μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width $\leq 2.0 \text{ ms}$, Duty Cycle $\leq 2\%$.

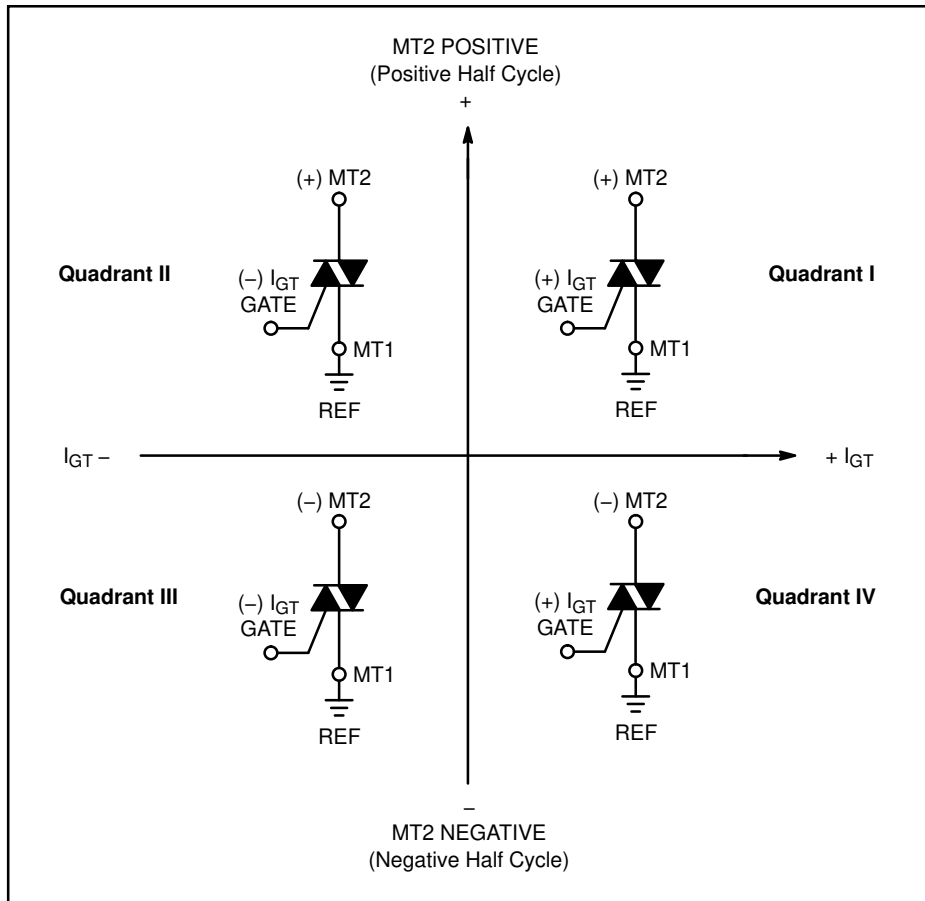
Voltage Current Characteristic of Triacs (Bidirectional Device)

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



MAC12SM, MAC12SN

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.

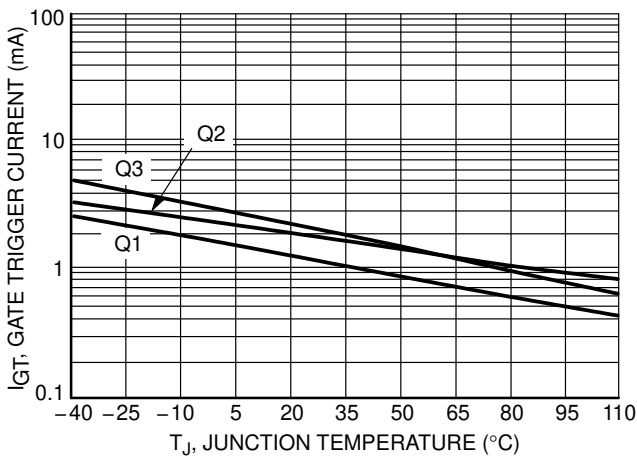


Figure 1. Typical Gate Trigger Current versus Junction Temperature

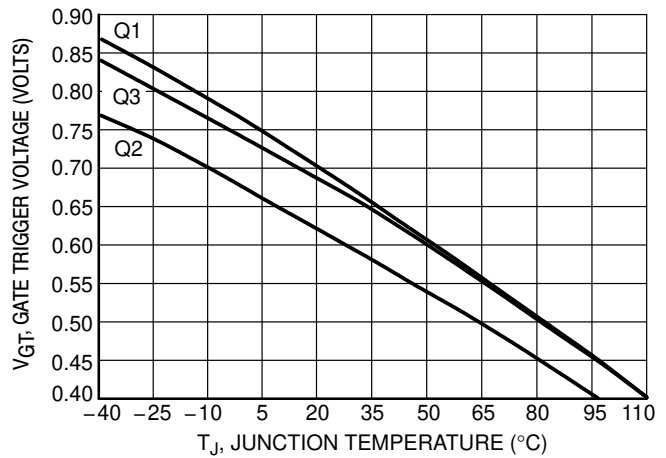


Figure 2. Typical Gate Trigger Voltage versus Junction Temperature

MAC12SM, MAC12SN

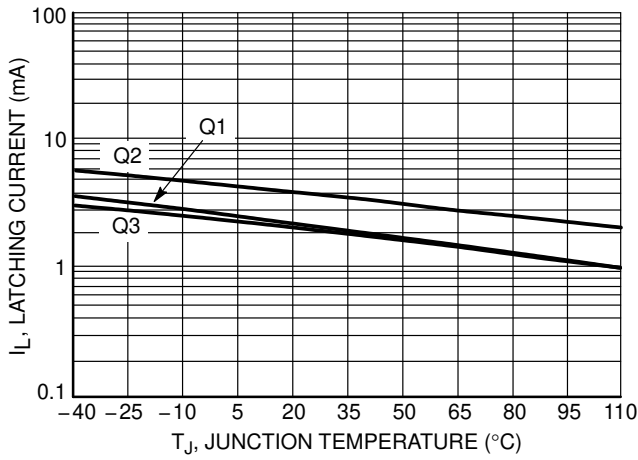


Figure 3. Typical Latching Current versus Junction Temperature

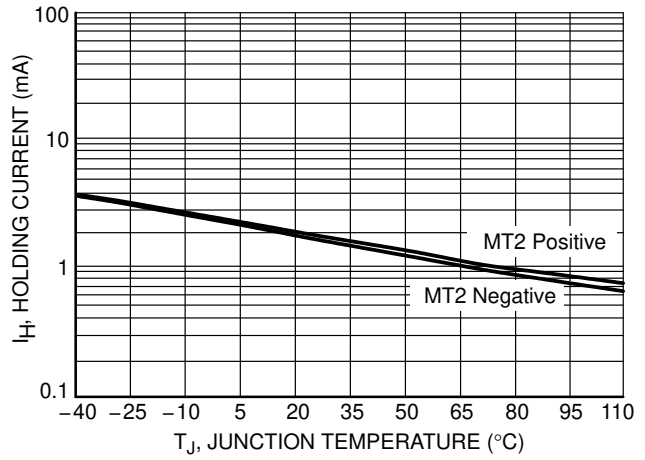


Figure 4. Typical Holding Current versus Junction Temperature

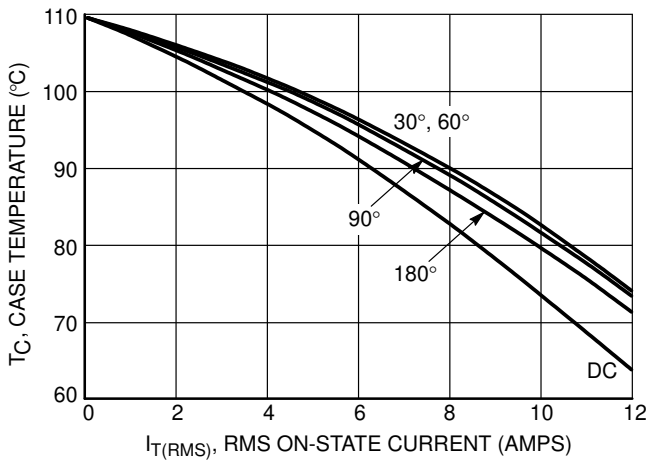


Figure 5. Typical RMS Current Derating

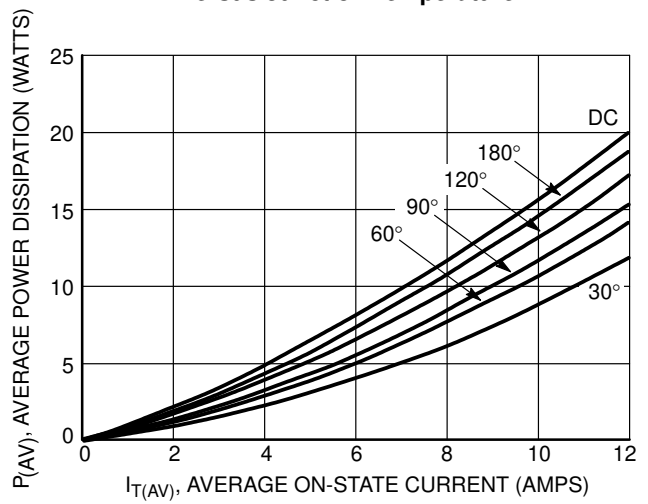


Figure 6. On-State Power Dissipation

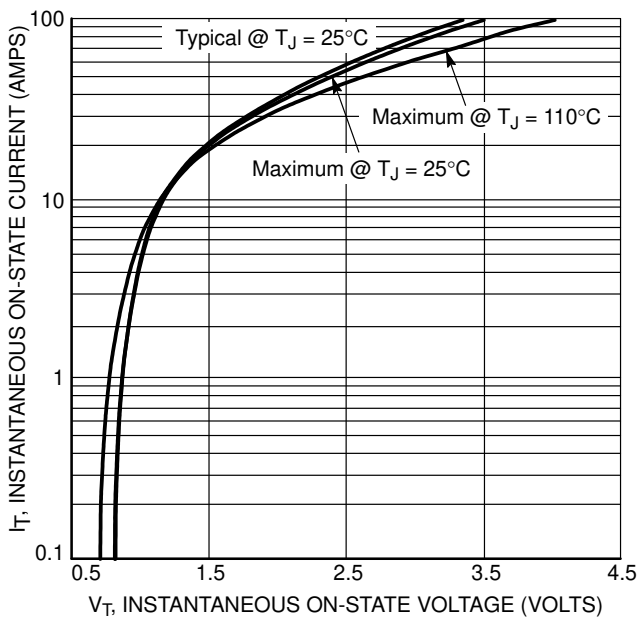


Figure 7. Typical On-State Characteristics

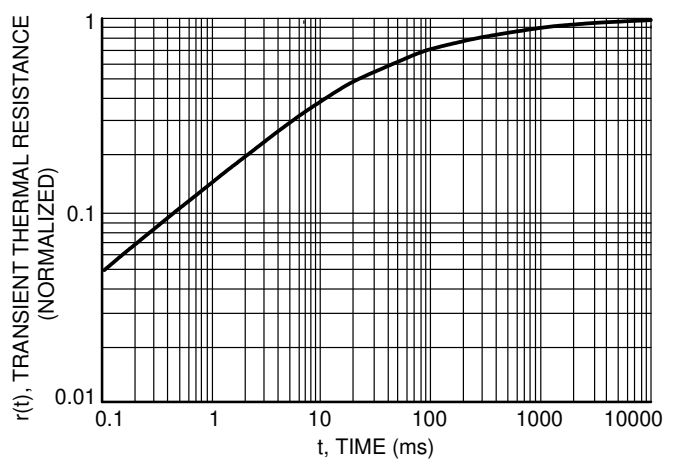
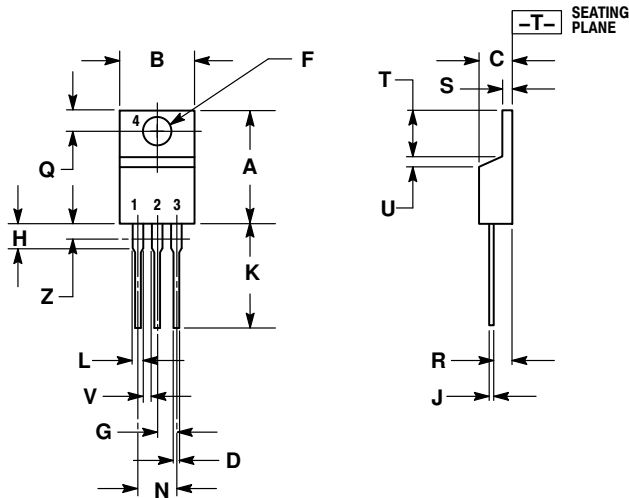


Figure 8. Typical Thermal Response

MAC12SM, MAC12SN

PACKAGE DIMENSIONS

TO-220
CASE 221A-09
ISSUE AH



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	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
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
Q	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
- MAIN TERMINAL 2
- GATE
- MAIN TERMINAL 2

Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse.

Littelfuse.com