

## Advance Information

# Sensitive Gate Triacs

## Silicon Bidirectional Thyristors

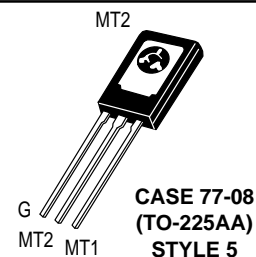
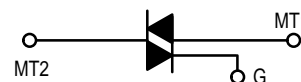
... designed primarily for full-wave ac control applications, such as light dimmers, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity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

- Sensitive Gate Triggering (A and B versions) Uniquely Compatible for Direct Coupling to TTL, HTL, CMOS and Operational Amplifier Integrated Circuit Logic Functions
- Gate Triggering 4 Mode — MAC6071A,B, MAC6073A,B, MAC6075A,B
- Blocking Voltages to 600 Volts
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermopad Construction for Low Thermal Resistance, High Heat Dissipation and Durability

**MAC6071A,B\***  
**MAC6073A,B\***  
**MAC6075A,B\***

\*Motorola preferred devices

**TRIACs**  
**4 AMPERES RMS**  
**200 thru 600 VOLTS**



### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage <sup>(1)</sup> (Gate Open, T <sub>J</sub> = 25 to 110°C)	V <sub>DRM</sub>	200 400 600	Volts
On-State Current RMS (T <sub>C</sub> = 85°C)	I <sub>T(RMS)</sub>	4	Amps
Peak Surge Current (One Full cycle, 60 Hz, T <sub>J</sub> = -40 to +110°C)	I <sub>TSM</sub>	30	Amps
Circuit Fusing Considerations (t = 8.3 ms)	I <sup>2</sup> t	3.7	A <sup>2</sup> s
Peak Gate Power	P <sub>GM</sub>	10	Watts
Average Gate Power	P <sub>G(AV)</sub>	0.5	Watt
Peak Gate Voltage	V <sub>GM</sub>	5	Volts
Operating Junction Temperature Range	T <sub>J</sub>	-40 to +110	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +150	°C
Mounting Torque (6-32 Screw) <sup>(2)</sup>	—	8	in. lb.

1. V<sub>DRM</sub> 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. Torque rating applies with use of compression washer (B52200F006). Mounting torque in excess of 6 in. lb. does not appreciably lower case-to-sink thermal resistance. Main terminal 2 and heatsink contact pad are common.

For soldering purposes (either terminal connection or device mounting), soldering temperatures shall not exceed +200°C, for 10 seconds. Consult factory for lead bending options.

This document contains information on a new product. Specifications and information herein are subject to change without notice.

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

# MAC6071A,B MAC6073A,B MAC6075A,B

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.5	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	75	$^{\circ}C/W$

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Blocking Current ( $V_D = \text{Rated } V_{DRM}$ , gate open) ( $T_J = 25^{\circ}C$ ) ( $T_J = 110^{\circ}C$ )	$I_{DRM}$	— —	— —	10 2.0	$\mu A$ mA
On-State Voltage (Either Direction) ( $I_{TM} = 6 A$ Peak)	$V_{TM}$	—	1.3	2.0	Volts
Peak Gate Trigger Voltage (Continuous dc) ( $T_J = -40^{\circ}C$ ) (Main Terminal Voltage = 12 Vdc, $R_L = 100$ Ohms) MT2(+), G(+); MT2(-), G(-) MT2(+), G(-); MT2(-), G(+) ( $T_J = 110^{\circ}C$ ) MT2(+), G(+); MT2(-), G(-) MT2(+), G(-); MT2(-), G(+) ( $T_J = 25^{\circ}C$ ) MT2(+), G(+); MT2(-), G(-) MT2(+), G(-); MT2(-), G(+)	$V_{GT}$				Volts
Holding Current (Either Direction) ( $T_J = -40^{\circ}C$ ) (Main Terminal Voltage = 12 Vdc, Gate Open) (Initiating Current = 150 mA) ( $T_J = 25^{\circ}C$ )	$I_H$				mA
Latching Current ( $V_D = 6 V$ ) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)	$I_L$				mA
Gate Trigger Current (Continuous dc) ( $V_D = 12 Vdc$ , $R_L = 100$ Ohms) MAC6071A, MAC6073A, MAC6075A MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)  MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)	$I_{GT}$				mA

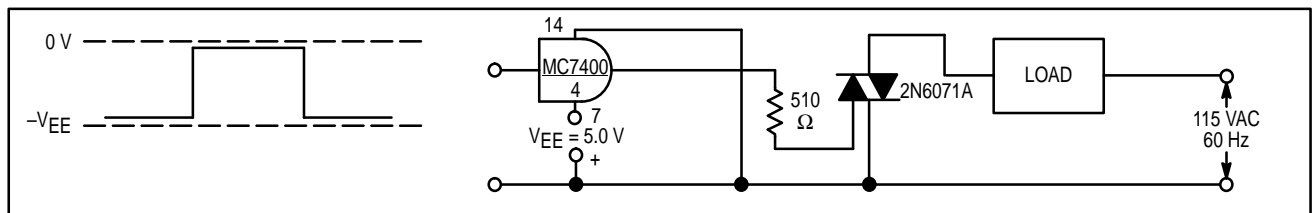
**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Gate Trigger Current (Continuous dc) ( $V_D = 12\text{ Vdc}$ , $R_L = 100\text{ Ohms}$ ) MAC6071B, MAC6073B, MAC6075B	$I_{GT}$				mA
MT2(+), G(+) $T_J = 25^\circ\text{C}$		0.4	1.5	3.0	
MT2(+), G(-)		0.4	2.5	3.0	
MT2(-), G(-)		0.4	2.5	3.0	
MT2(-), G(+)		0.8	3.5	5.0	
MT2(+), G(+) $T_J = -40^\circ\text{C}$		0.8	3.0	8.0	
MT2(+), G(-)		0.8	4.0	8.0	
MT2(-), G(-)		0.8	4.5	8.0	
MT2(-), G(+)		1.6	7.5	15	
Turn-On Time (Either Direction) ( $I_{TM} = 14\text{ Adc}$ , $I_{GT} = 100\text{ mAdc}$ )	$t_{gt}$	—	1.5	—	$\mu\text{s}$

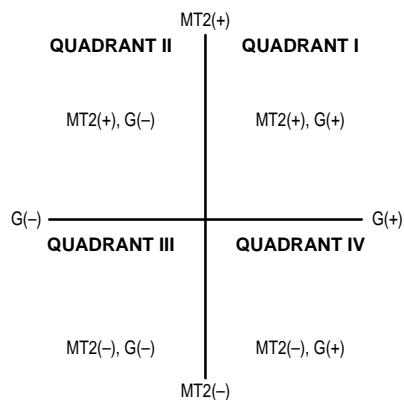
**DYNAMIC CHARACTERISTICS**

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Off-State Voltage ( $V_D = 200\text{ V}$ , $I_{TM} = 1.4\text{ A}$ , Commutating $dv/dt = 0.5\text{ V}/\mu\text{sec}$ , Gate Open, $T_J = 110^\circ\text{C}$ , $f = 250\text{ Hz}$ , Snubber: $C_S = 0.1\text{ }\mu\text{F}$ , $R_S = 56\text{ }\Omega$ , see Figure 16)	$(di/dt)_c$	—	2.2	—	A/ms
Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rate } V_{DRM}$ , Exponential Waveform, $R_{GK} = \text{OPEN}$ , $T_J = 110^\circ\text{C}$ )	$dv/dt$	—	7.0	—	$\text{V}/\mu\text{s}$

**SAMPLE APPLICATION:  
TTL-SENSITIVE GATE 4 AMPERE TRIAC  
TRIGGERS IN MODES II AND III**



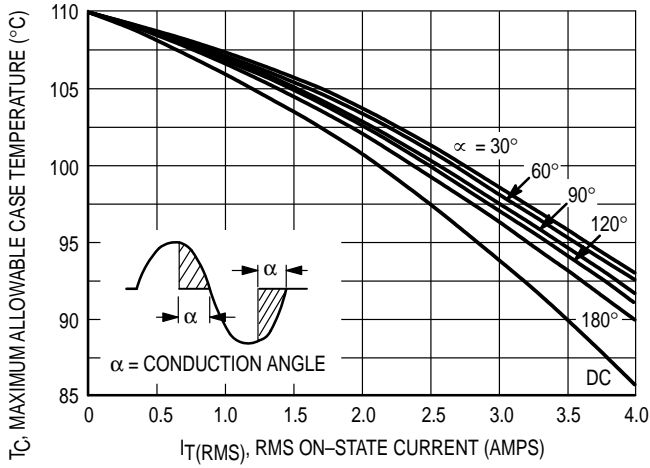
**QUADRANT DEFINITIONS**



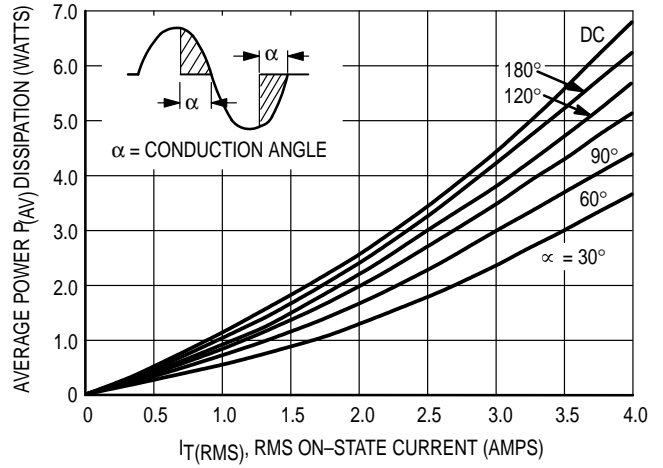
NOTES: For detail Digital Interfacing and Silicon Bilateral Switch (SBS) trigger application information, see the Motorola's Thyristor Data Book (DL137/D, Revision 6).

1. Interfacing Digital Circuits to Thyristor Controlled AC Loads, page 1.6–25.
2. Silicon Bilateral Switch (SBS) Applications, page 1.6–41.

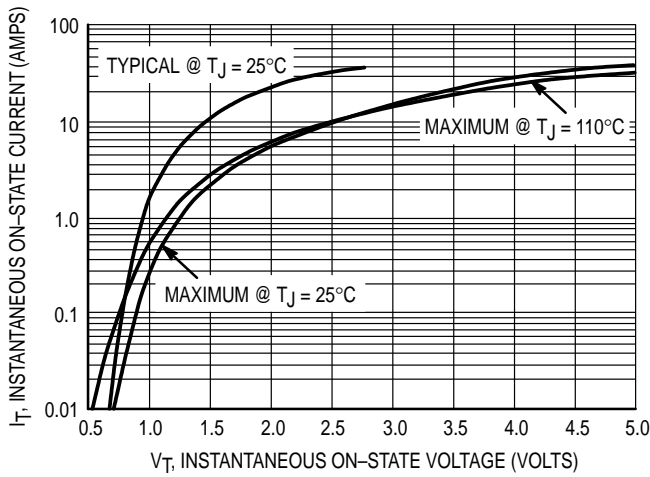
**MAC6071A,B MAC6073A,B MAC6075A,B**



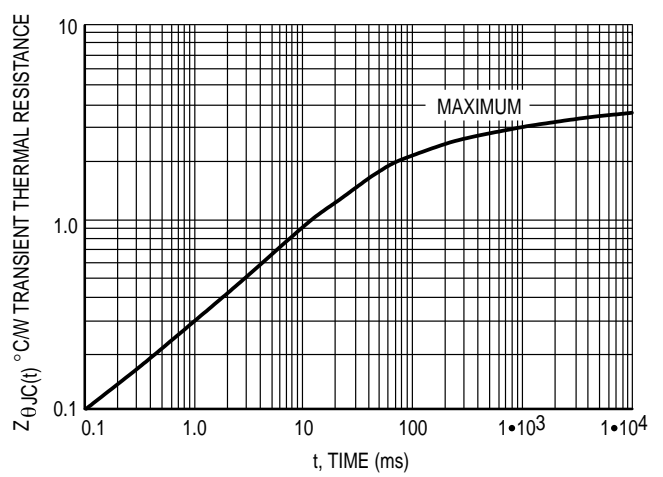
**Figure 1. RMS Current Derating**



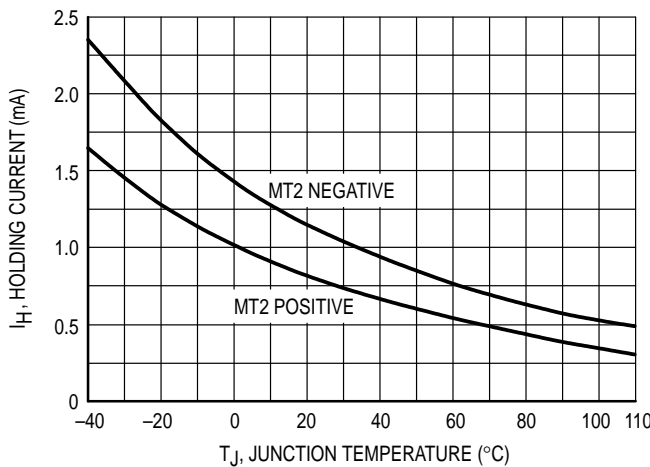
**Figure 2. Maximum On-State Power Dissipation**



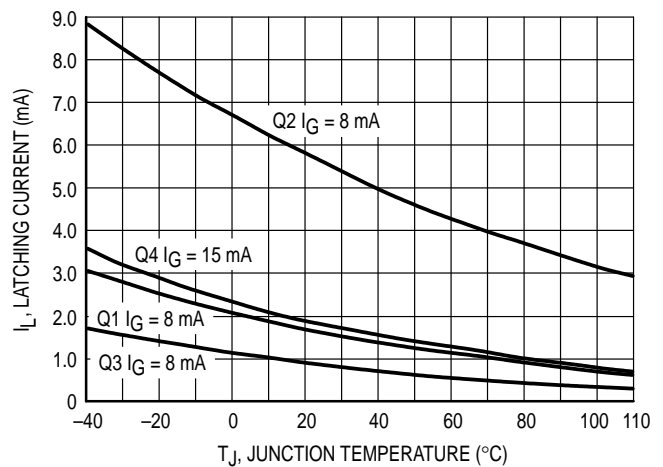
**Figure 3. On-State Characteristics**



**Figure 4. Transient Thermal Response**



**Figure 5. Typical Holding Current versus Junction Temperature**



**Figure 6. Typical Latching Current versus Junction Temperature (MAC6075B)**

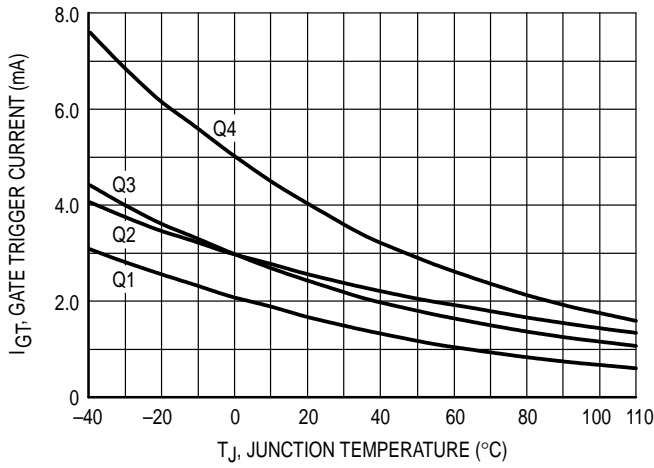


Figure 7. Typical Gate Trigger Current versus Junction Temperature

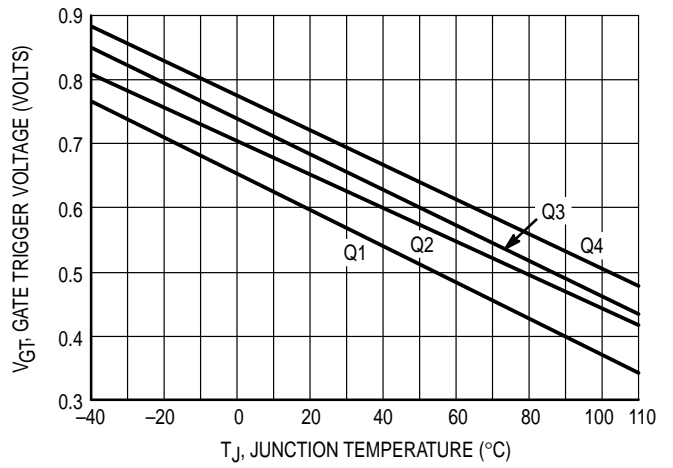


Figure 8. Typical Gate Trigger Voltage versus Junction Temperature

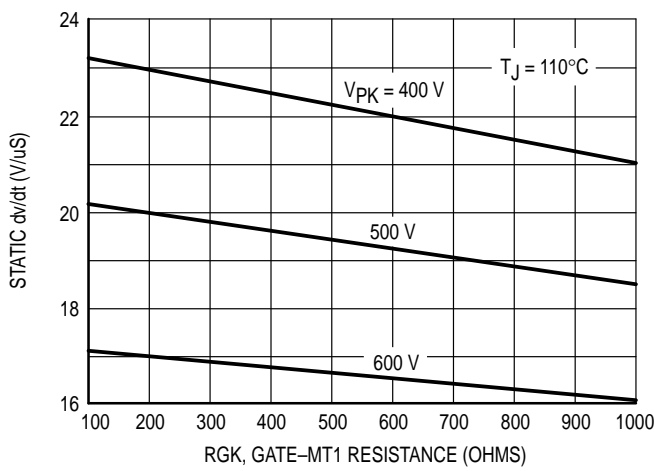


Figure 9. Typical Exponential Static dv/dt versus Gate-MT1 Resistance, MT2(+)

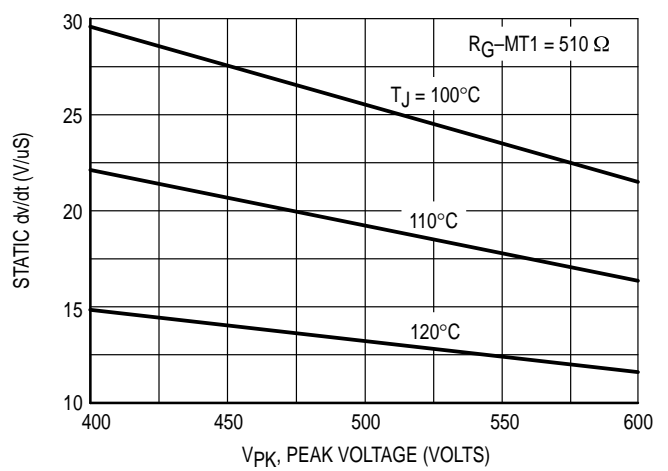


Figure 10. Typical Exponential Static dv/dt versus Peak Voltage, MT2(+)

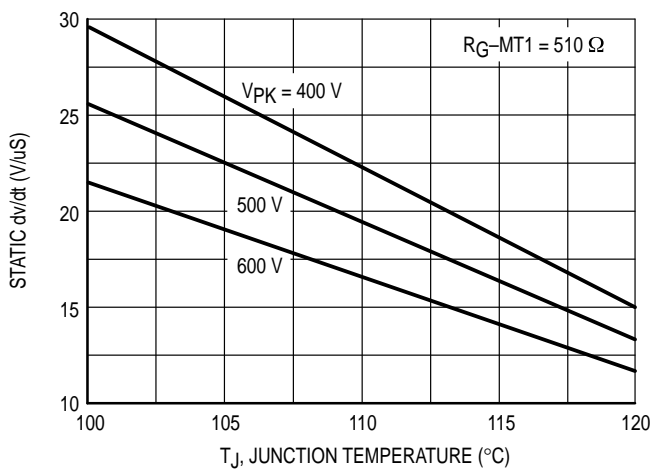


Figure 11. Typical Exponential Static dv/dt versus Junction Temperature, MT2(+)

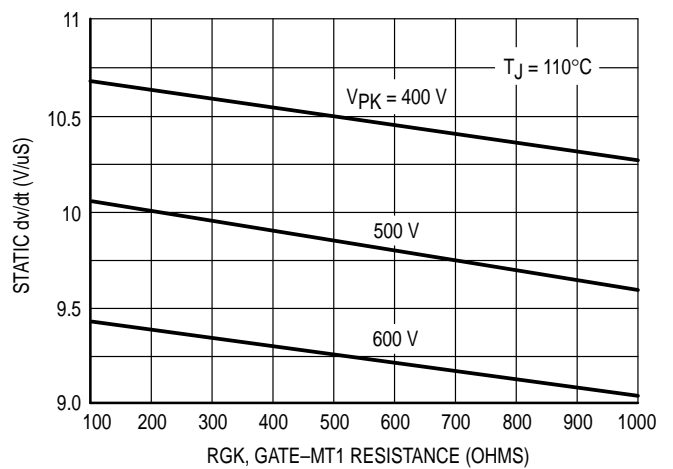
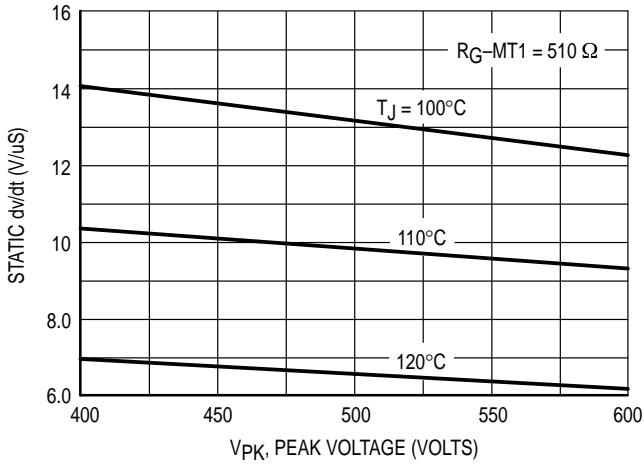
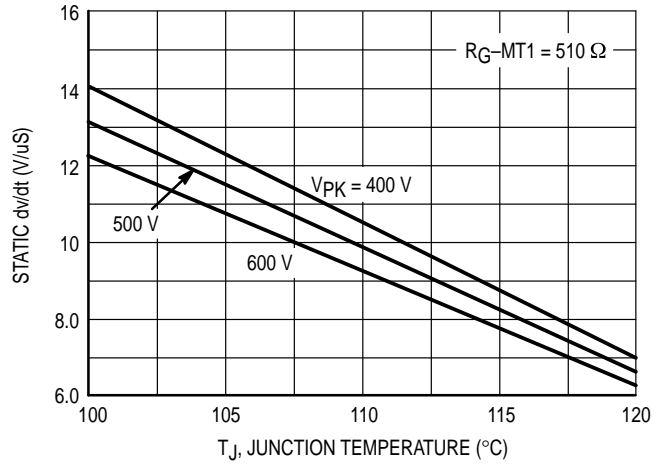


Figure 12. Typical Exponential Static dv/dt versus Gate-MT1 Resistance, MT2(-)

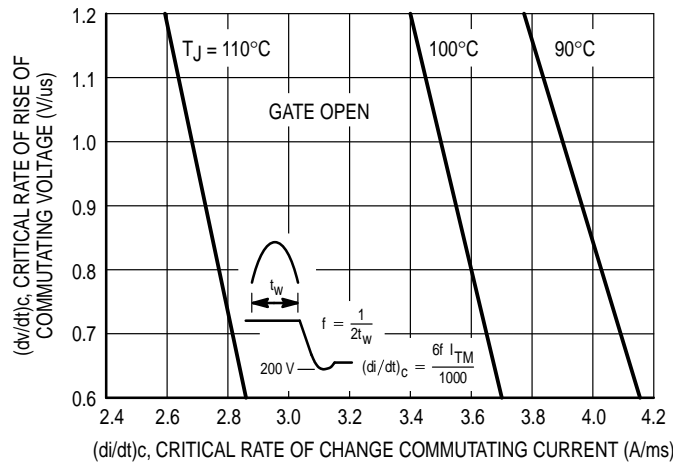
**MAC6071A,B MAC6073A,B MAC6075A,B**



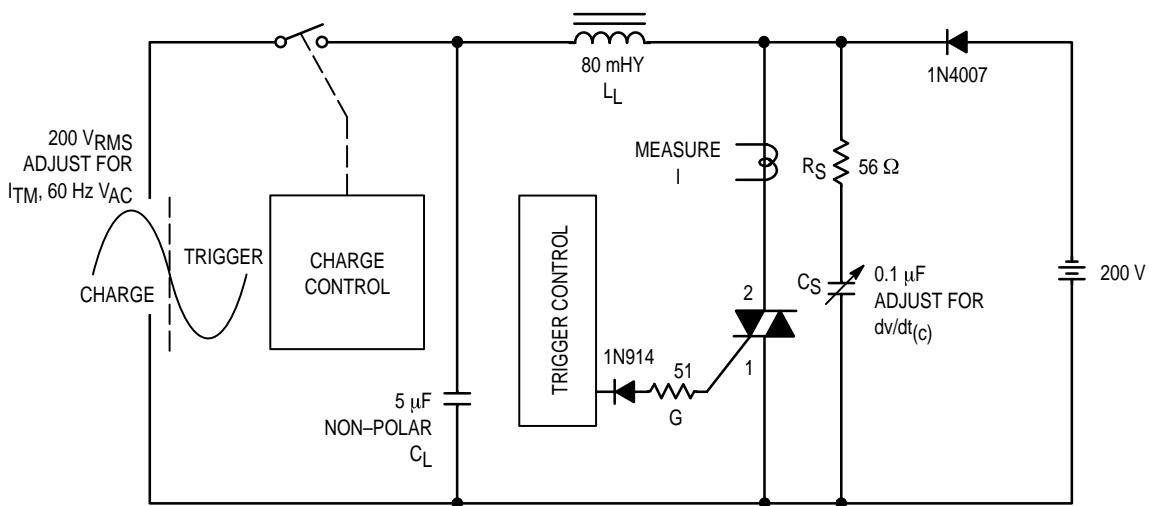
**Figure 13. Typical Exponential Static dv/dt versus Peak Voltage, MT2(-)**



**Figure 14. Typical Exponential Static dv/dt versus Junction Temperature, MT2(-)**



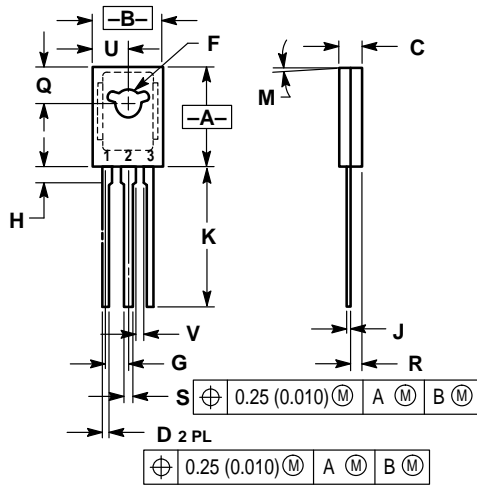
**Figure 15. Critical Rate of Rise of Commutating Voltage**



NOTE: Component values are for verification of rated  $(dv/dt)_C$ . See AN1048 for additional information.

**Figure 16. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Voltage**

PACKAGE DIMENSIONS




STYLE 5:  
PIN 1. MT 1  
2. MT 2  
3. GATE

- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.425	0.435	10.80	11.04
B	0.295	0.305	7.50	7.74
C	0.095	0.105	2.42	2.66
D	0.020	0.026	0.51	0.66
F	0.115	0.130	2.93	3.30
G	0.094 BSC		2.39 BSC	
H	0.050	0.095	1.27	2.41
J	0.015	0.025	0.39	0.63
K	0.575	0.655	14.61	16.63
M	5° TYP		5° TYP	
Q	0.148	0.158	3.76	4.01
R	0.045	0.055	1.15	1.39
S	0.025	0.035	0.64	0.88
U	0.145	0.155	3.69	3.93
V	0.040	—	1.02	—

CASE 77-08  
(TO-225AA)

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

**How to reach us:**

**USA / EUROPE:** Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,  
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

**MFAX:** RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244-6609  
**INTERNET:** <http://Design-NET.com>

**HONG KONG:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

