

# Sensitive Gate TRIACS

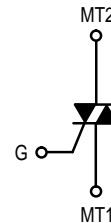
## Silicon Bidirectional Thyristors

Designed for high volume, low cost, industrial and consumer applications such as motor control; process control; temperature, light and speed control.

- Small Size Surface Mount DPAK Package
- Passivated Die for Reliability and Uniformity
- Four-Quadrant Triggering
- Blocking Voltage to 600 V
- On-State Current Rating of 4.0 Amperes RMS at 93°C
- Low Level Triggering and Holding Characteristics

### ORDERING INFORMATION

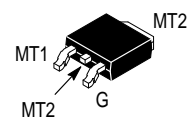
- To Obtain "DPAK" in Surface Mount Leadform (Case 369A)  
Shipped in Sleeves — No Suffix, i.e. MAC4DHM  
Shipped in 16 mm Tape and Reel — Add "T4" Suffix to Device Number, i.e. MAC4DHMT4
- To Obtain "DPAK" in Straight Lead Version (Case 369) Shipped in Sleeves — Add "-1" Suffix to Device Number, i.e. MAC4DHM-1



**MAC4DHM**  
**MAC4DLM**

Motorola Preferred Devices

**TRIACS**  
**4.0 AMPERES RMS**  
**600 VOLTS**



**CASE 369A-13**  
**STYLE 6**

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (1) (T <sub>J</sub> = -40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open)	V <sub>DRM</sub>	600 600	Volts
On-State RMS Current (Full Cycle Sine Wave, 60 Hz, T <sub>C</sub> = 93°C)	I <sub>T(RMS)</sub>	4.0	Amps
Peak Non-Repetitive Surge Current (One Full Cycle, 60 Hz, T <sub>J</sub> = 110°C)	I <sub>TSM</sub>	40	
Circuit Fusing Consideration (t = 8.3 msec)	I <sup>2</sup> t	6.6	A <sup>2</sup> sec
Peak Gate Power (Pulse Width ≤ 10 μsec, T <sub>C</sub> = 93°C)	P <sub>GM</sub>	0.5	Watts
Average Gate Power (t = 8.3 msec, T <sub>C</sub> = 93°C)	P <sub>G(AV)</sub>	0.1	
Peak Gate Current (Pulse Width ≤ 10 μsec, T <sub>C</sub> = 93°C)	I <sub>GM</sub>	0.2	Amps
Peak Gate Voltage (Pulse Width ≤ 10 μsec, T <sub>C</sub> = 93°C)	V <sub>GM</sub>	5.0	Volts
Operating Junction Temperature Range	T <sub>J</sub>	-40 to 110	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to 150	

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance — Junction to Case	R <sub>θJC</sub>	3.5	°C/W
— Junction to Ambient	R <sub>θJA</sub>	88	
— Junction to Ambient (2)	R <sub>θJA</sub>	80	
Maximum Lead Temperature for Soldering Purposes (3)	T <sub>L</sub>	260	°C

(1) V<sub>DRM</sub> for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the device are exceeded.

(2) Surface mounted on minimum recommended pad size.

(3) 1/8" from case for 10 seconds.

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

## MAC4DHM MAC4DLM

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

Characteristics	Symbol	Min	Typ	Max	Unit
Peak Repetitive Blocking Current (V <sub>D</sub> = Rated V <sub>DRM</sub> , Gate Open) T <sub>J</sub> = 25°C T <sub>J</sub> = 110°C	I <sub>DRM</sub>	— —	— —	0.01 2.0	mA
Peak On-State Voltage (1) (I <sub>TM</sub> = ±6.0 A)	V <sub>TM</sub>	—	1.3	1.6	Volts
Gate Trigger Current (Continuous dc) (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100 Ω) MT2(+), G(+) MAC4DLM MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)  MT2(+), G(+) MAC4DHM MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)	I <sub>GT</sub>	— — — —  — — — —	1.8 2.1 2.4 4.2  1.8 2.1 2.4 4.2	3.0 3.0 3.0 5.0  5.0 5.0 5.0 10	mA
Gate Trigger Voltage (Continuous dc) (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100 Ω) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+) (V <sub>D</sub> = 12 V, R <sub>L</sub> = 10 K Ω, T <sub>J</sub> = 110°C) MT2(+), G(+); MT2(+), G(-); MT2(-), G(-); MT2(-), G(+)	V <sub>GT</sub>	0.5 0.5 0.5 0.5  0.1	0.62 0.57 0.65 0.74  0.4	1.3 1.3 1.3 1.3  —	Volts
Holding Current (V <sub>D</sub> = 12 V, Gate Open, I <sub>T</sub> = ±200 mA)	I <sub>H</sub>	—	1.5	15	mA
Latching Current MT2(+), G(+) (V <sub>D</sub> = 12 V, I <sub>G</sub> = 5.0 mA) MT2(+), G(-) (V <sub>D</sub> = 12 V, I <sub>G</sub> = 5.0 mA) MT2(-), G(-) (V <sub>D</sub> = 12 V, I <sub>G</sub> = 5.0 mA) MT2(-), G(+) (V <sub>D</sub> = 12 V, I <sub>G</sub> = 10 mA)	I <sub>L</sub>	— — — —	1.75 5.2 2.1 2.2	10 10 10 10	mA

### DYNAMIC CHARACTERISTICS

Characteristics	Symbol	Min	Typ	Max	Unit
Rate of Change of Commutating Current (1) (V <sub>D</sub> = 200 V, I <sub>TM</sub> = 1.8 A, Commutating dv/dt = 1.0 V/μsec, T <sub>J</sub> = 110°C, f = 250 Hz, CL = 5.0 μfd, LL = 80 mH, RS = 56 Ω, CS = 0.03 μfd) See Figure 10	di/dt(c)	—	3.0	—	A/ms
Critical Rate of Rise of Off-State Voltage (V <sub>D</sub> = 0.67 X Rated V <sub>DRM</sub> , Exponential Waveform, Gate Open, T <sub>J</sub> = 110°C)	dv/dt	—	10	—	V/μs

(1) Pulse test: Pulse Width ≤ 2.0 msec, Duty Cycle ≤ 2%.

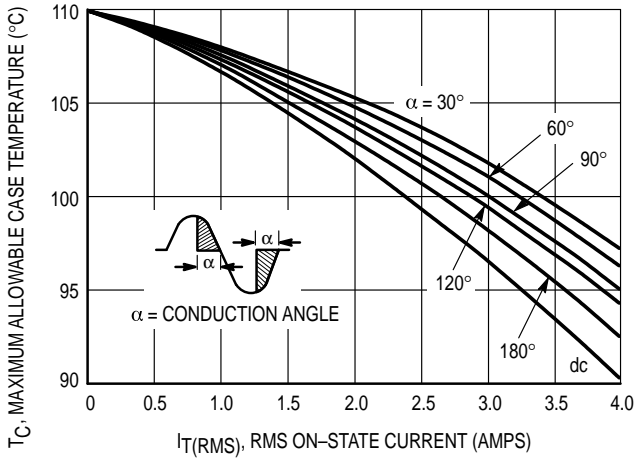


Figure 1. RMS Current Derating

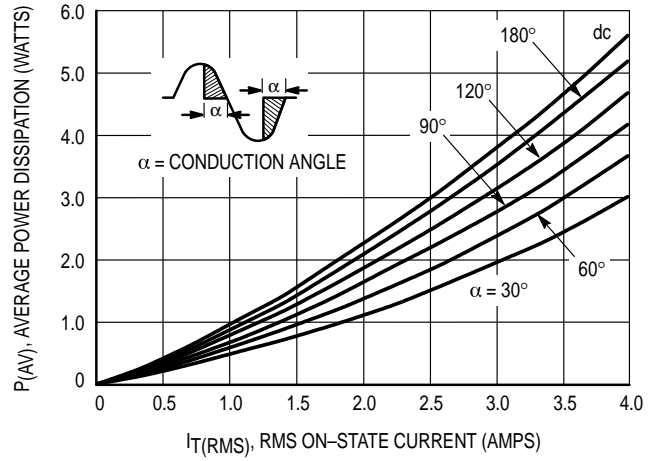


Figure 2. On-State Power Dissipation

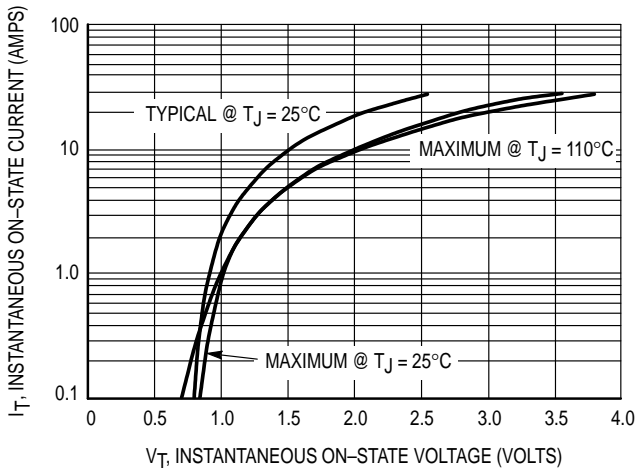


Figure 3. On-State Characteristics

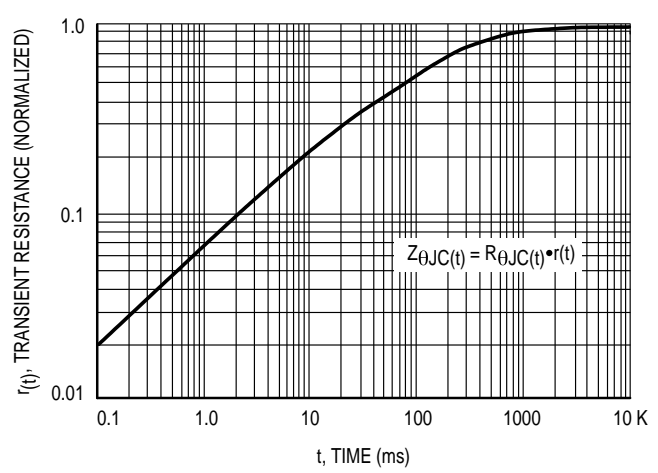


Figure 4. Transient Thermal Response

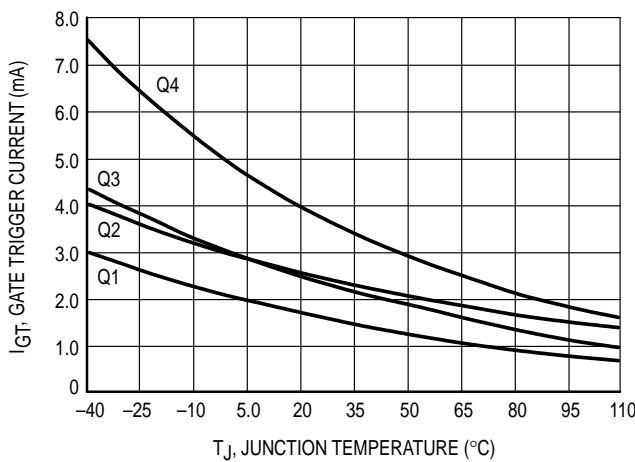


Figure 5. Typical Gate Trigger Current versus Junction Temperature

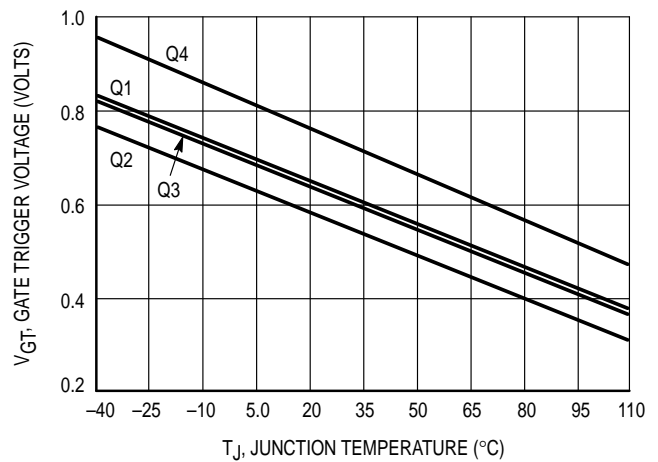
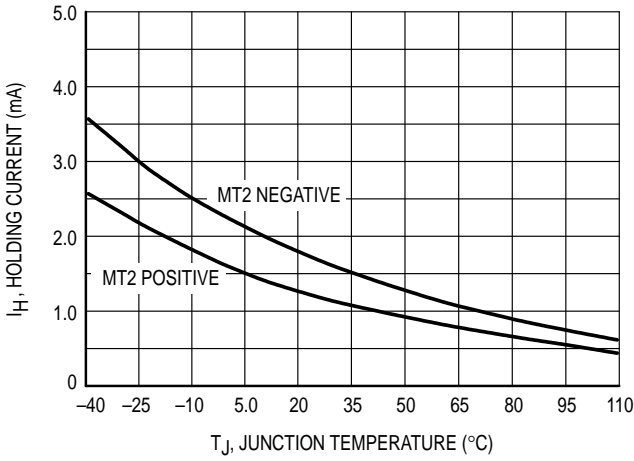
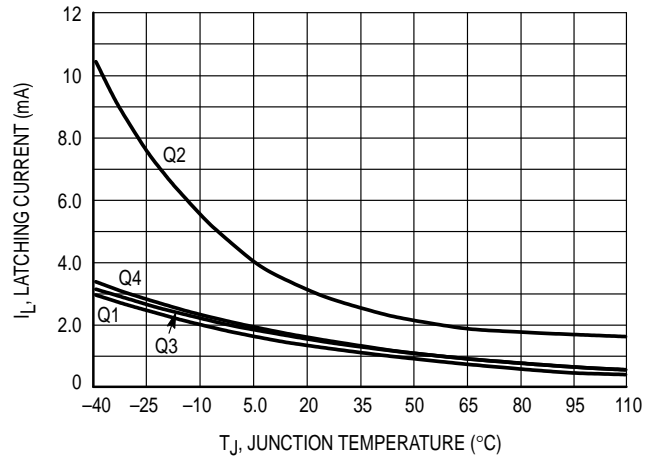


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

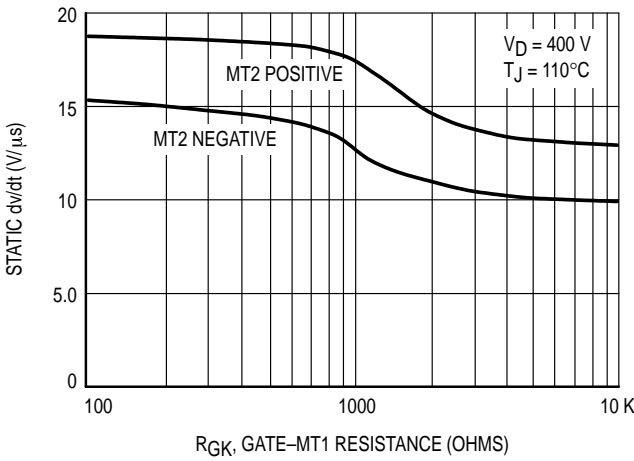
**MAC4DHM MAC4DLM**



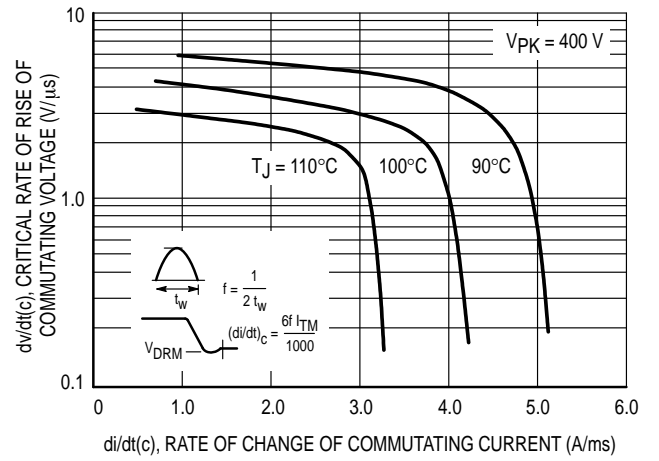
**Figure 7. Typical Holding Current versus Junction Temperature**



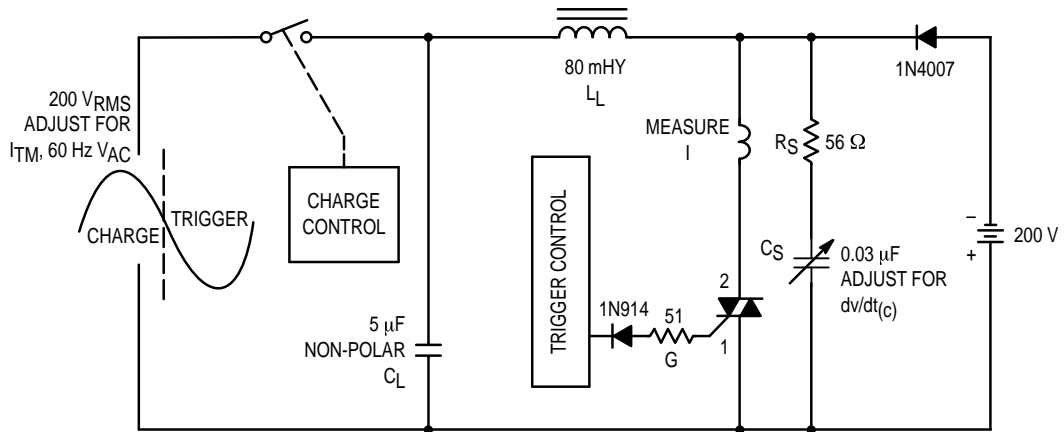
**Figure 8. Typical Latching Current versus Junction Temperature**



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



**Figure 10. Critical Rate of Rise of Commutating Voltage**

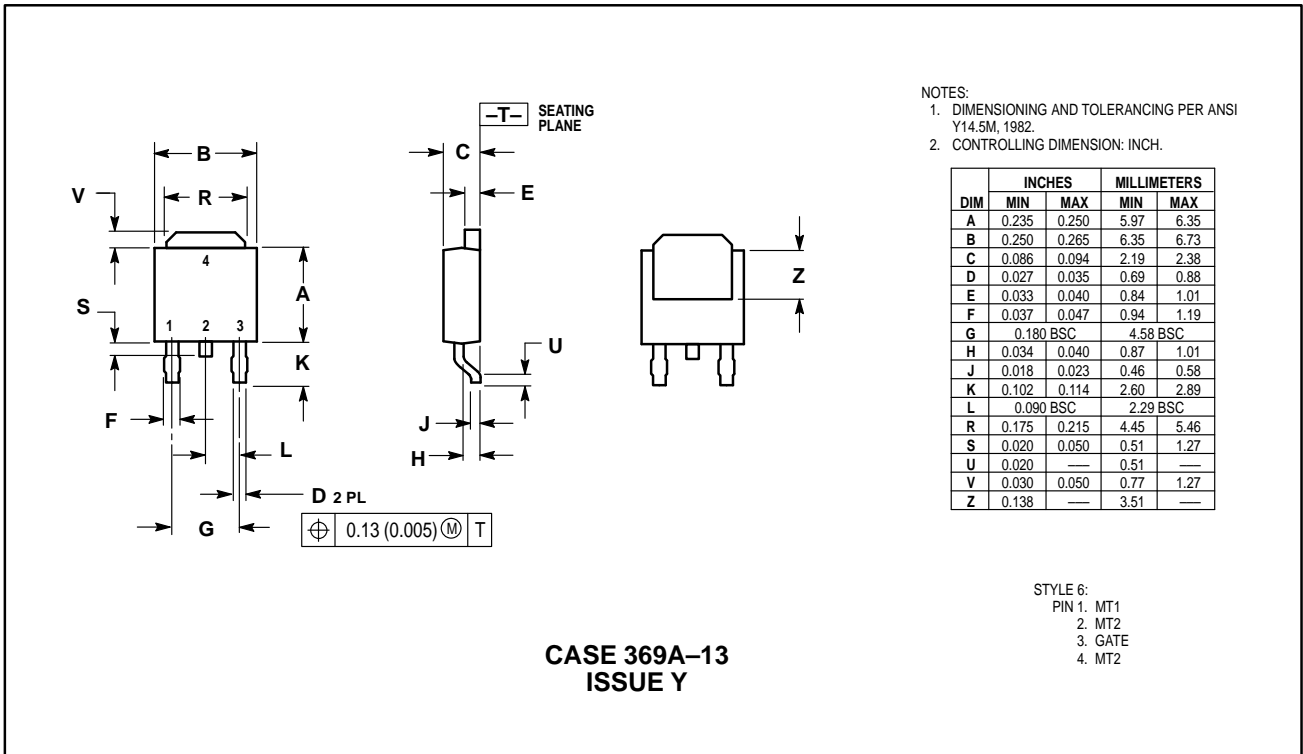


Note: Component values are for verification of rated  $(dv/dt)_C$ . See AN1048 for additional information.

Figure 11. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Voltage

**MAC4DHM MAC4DLM**

**PACKAGE DIMENSIONS**



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**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
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**JAPAN:** Nippon Motorola Ltd.: SPD, Strategic Planning Office, 4-32-1,  
 Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan. 81-3-5487-8488

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
 – US & Canada ONLY 1-800-774-1848

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

**INTERNET:** <http://motorola.com/sps>

