

# Silicon Controlled Rectifiers Reverse Blocking Triode Thyristors

... PNP devices designed for high volume, low cost consumer applications such as temperature, light and speed control; process and remote control; and warning systems where reliability of operation is critical.

- Small Size
- Passivated Die Surface for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Recommend Electrical Replacement for C106
- Available in Two Package Styles:  
Surface Mount Leadforms — Case 369A  
Miniature Plastic Package — Straight Leads — Case 369

## ORDERING INFORMATION

- To Obtain "DPAK" in Surface Mount Leadform (Case 369A):  
Shipped in 16 mm Tape and Reel — Add "T4" Suffix to Device Number, i.e., MCR706AT4
- To Obtain "DPAK" in Straight Lead Version:  
Shipped in Sleeves — Add '1' Suffix to Device Number, i.e., MCR706A1

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

| Characteristic  | Symbol                                     | Value                    | Unit             |
|---|--|--------------------------|------------------|
| Peak Repetitive Forward and Reverse Blocking Voltage (1)<br>(1/2 Sine Wave)<br>(R <sub>GK</sub> = 1000 Ohms,<br>T <sub>C</sub> = -40 to +110°C) | V <sub>DRM</sub><br>or<br>V <sub>RRM</sub> | 100<br>200<br>400<br>600 | Volts            |
| Peak Non-repetitive Reverse Blocking Voltage<br>(1/2 Sine Wave, R <sub>GK</sub> = 1000 Ohms,<br>T <sub>C</sub> = -40 to +110°C)                 | V <sub>RSM</sub>                           | 150<br>250<br>450<br>650 | Volts            |
| Average On-State Current (T <sub>C</sub> = -40 to +90°C)<br>(T <sub>C</sub> = +100°C)   | I <sub>T(AV)</sub>                         | 2.6<br>1.6               | Amps             |
| Surge On-State Current (1/2 Sine Wave, 60 Hz, T <sub>C</sub> = +90°C)<br>(1/2 Sine Wave, 1.5 ms T <sub>C</sub> = +90°C)                         | I <sub>TSM</sub>                           | 25<br>35                 | Amps             |
| Circuit Fusing (t = 8.3 ms)   | I <sup>2</sup> t                           | 2.6                      | A <sup>2</sup> s |
| Peak Gate Power (Pulse Width = 10 μs, T <sub>C</sub> = 90°C)  | P <sub>GM</sub>                            | 0.5                      | Watt             |
| Average Gate Power (t = 8.3 ms, T <sub>C</sub> = 90°C)  | P <sub>G(AV)</sub>                         | 0.1                      | Watt             |
| Peak Forward Gate Current   | I <sub>GM</sub>                            | 0.2                      | Amp              |
| Peak Reverse Gate Voltage   | V <sub>RGM</sub>                           | 6                        | Volts            |
| Operating Junction Temperature Range  | T <sub>J</sub>                             | -40 to +110              | °C               |
| Storage Temperature Range   | T <sub>stg</sub>                           | -40 to +150              | °C               |

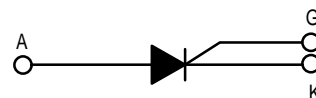
1. V<sub>DRM</sub> and V<sub>RRM</sub> for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current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

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

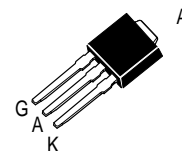
# MCR703A thru MCR708A\*

\*Motorola preferred devices

SCRs  
4.0 AMPERES RMS  
100 thru 600 VOLTS



CASE 369A  
STYLE 5



CASE 369  
STYLE 5

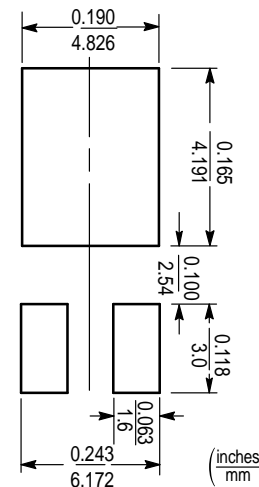


Figure 1. Minimum Pad  
Sizes for  
Surface Mounting

# MCR703A thru MCR708A

## THERMAL CHARACTERISTICS

| Characteristic  | Symbol          | Min | Max  | Unit                        |
|---|-----------------|-----|------|-----------------------------|
| Thermal Resistance, Junction to Case                      | $R_{\theta JC}$ | —   | 8.33 | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Ambient (Case 369A-04)(1) | $R_{\theta JA}$ | —   | 80   | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Ambient (Case 369-03)(2)  | $R_{\theta JA}$ | —   | 85   | $^{\circ}\text{C}/\text{W}$ |

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}\text{C}$ and $R_{GK} = 1000$ ohms unless otherwise noted.)

| Characteristic  | Symbol             | Min    | Typ     | Max       | Unit             |
|---|--------------------|--------|---------|-----------|------------------|
| Peak Forward or Reverse Blocking Current<br>( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ ) $T_C = 25^{\circ}\text{C}$<br>$T_C = 110^{\circ}\text{C}$                    | $I_{DRM}, I_{RRM}$ | —<br>— | —       | 10<br>200 | $\mu\text{A}$    |
| Peak Forward "On" Voltage<br>( $I_{TM} = 8.2$ A Peak, Pulse Width = 1 to 2 ms, 2% Duty Cycle)   | $V_{TM}$           | —      | —       | 2.2       | Volts            |
| Gate Trigger Current (Continuous dc)(3)<br>( $V_{AK} = 12$ Vdc, $R_L = 24$ Ohms)<br>( $V_{AK} = 12$ Vdc, $R_L = 24$ Ohms, $T_C = -40^{\circ}\text{C}$ )                           | $I_{GT}$           | —<br>— | 25<br>— | 75<br>300 | $\mu\text{A}$    |
| Gate Trigger Voltage (Continuous dc)<br>(Source Voltage = 12 V, $R_S = 50$ Ohms)<br>( $V_{AK} = 12$ Vdc, $R_L = 24$ Ohms, $T_C = -40^{\circ}\text{C}$ )                           | $V_{GT}$           | —      | —       | 1         | Volts            |
| Gate Non-Trigger Voltage<br>( $V_{AK} = \text{Rated } V_{DRM}$ , $R_L = 100$ Ohms, $T_C = 110^{\circ}\text{C}$ )  | $V_{GD}$           | 0.2    | —       | —         | Volts            |
| Holding Current<br>( $V_{AK} = 12$ Vdc, $I_{GT} = 2$ mA) $T_C = 25^{\circ}\text{C}$<br>(Initiating On-State Current = 200 mA) $T_C = -40^{\circ}\text{C}$                         | $I_H$              | —<br>— | —<br>—  | 5<br>10   | mA               |
| Total Turn-On Time<br>(Source Voltage = 12 V, $R_S = 6$ k Ohms)<br>( $I_{TM} = 8.2$ A, $I_{GT} = 2$ mA, Rated $V_{DRM}$ )<br>(Rise Time = 20 ns, Pulse Width = 10 $\mu\text{s}$ ) | $t_{gt}$           | —      | 2       | —         | $\mu\text{s}$    |
| Forward Voltage Application Rate<br>( $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, $T_C = 110^{\circ}\text{C}$ )   | $dv/dt$            | —      | 10      | —         | V/ $\mu\text{s}$ |

- Case 369A-04 when surface mounted on minimum pad sizes recommended.
- Case 369-03 standing in free air.
- $R_{GK}$  current not included in measurement.

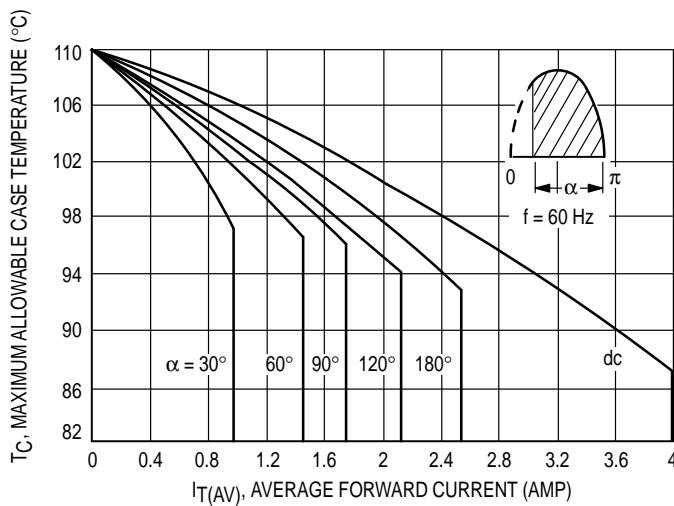


Figure 2. Maximum Case Temperature

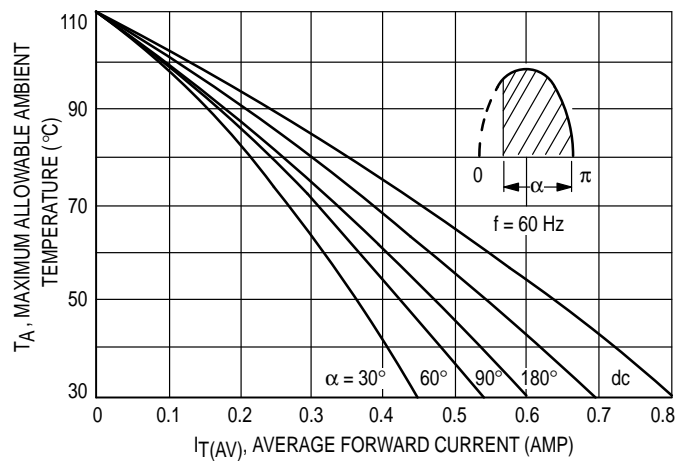
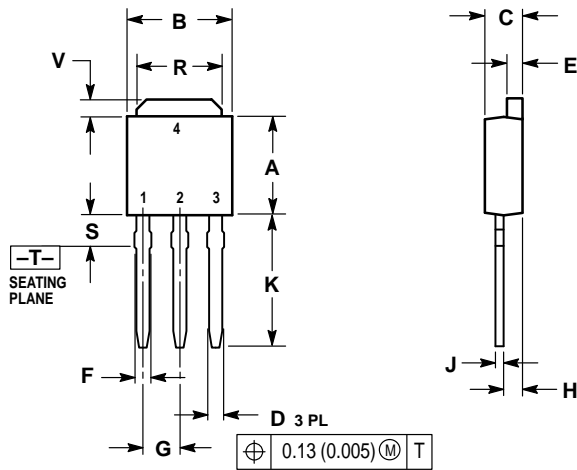


Figure 3. Maximum Ambient Temperature

## PACKAGE DIMENSIONS



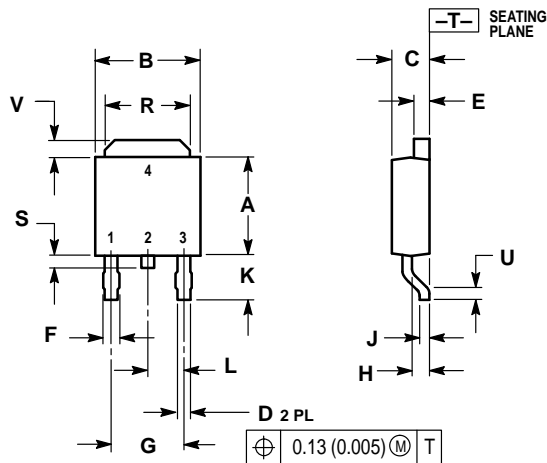
## NOTES:

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

| DIM | INCHES    |       | MILLIMETERS |      |
|-----|-----------|-------|-------------|------|
|     | MIN       | MAX   | MIN         | MAX  |
| A   | 0.235     | 0.250 | 5.97        | 6.35 |
| B   | 0.250     | 0.265 | 6.35        | 6.73 |
| C   | 0.086     | 0.094 | 2.19        | 2.38 |
| D   | 0.027     | 0.035 | 0.69        | 0.88 |
| E   | 0.033     | 0.040 | 0.84        | 1.01 |
| F   | 0.037     | 0.047 | 0.94        | 1.19 |
| G   | 0.090 BSC |       | 2.29 BSC    |      |
| H   | 0.034     | 0.040 | 0.87        | 1.01 |
| J   | 0.018     | 0.023 | 0.46        | 0.58 |
| K   | 0.350     | 0.380 | 8.89        | 9.65 |
| R   | 0.175     | 0.215 | 4.45        | 5.46 |
| S   | 0.050     | 0.090 | 1.27        | 2.28 |
| V   | 0.030     | 0.050 | 0.77        | 1.27 |

CASE 369

## PACKAGE DIMENSIONS




## NOTES:

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

| DIM | INCHES    |       | MILLIMETERS |      |
|-----|-----------|-------|-------------|------|
|     | MIN       | MAX   | MIN         | MAX  |
| A   | 0.235     | 0.250 | 5.97        | 6.35 |
| B   | 0.250     | 0.265 | 6.35        | 6.73 |
| C   | 0.086     | 0.094 | 2.19        | 2.38 |
| D   | 0.027     | 0.035 | 0.69        | 0.88 |
| E   | 0.033     | 0.040 | 0.84        | 1.01 |
| F   | 0.037     | 0.047 | 0.94        | 1.19 |
| G   | 0.180 BSC |       | 4.58 BSC    |      |
| H   | 0.034     | 0.040 | 0.87        | 1.01 |
| J   | 0.018     | 0.023 | 0.46        | 0.58 |
| K   | 0.102     | 0.114 | 2.60        | 2.89 |
| L   | 0.090 BSC |       | 2.29 BSC    |      |
| R   | 0.175     | 0.215 | 4.45        | 5.46 |
| S   | 0.020     | 0.050 | 0.51        | 1.27 |
| U   | 0.020     |       | 0.51        |      |
| V   | 0.030     | 0.050 | 0.77        | 1.27 |
| Z   | 0.138     |       | 3.51        |      |

STYLE 5:  
 PIN 1. GATE  
 2. ANODE  
 3. CATHODE  
 4. ANODE

## CASE 369A

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 which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. 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  registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

## How to reach us:

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
 P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

**JAPAN:** Motorola Japan Ltd.; SPD, Strategic Planning Office, 141,  
 4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan. 81-3-5487-8488

## Customer Focus Center: 1-800-521-6274

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 1-602-244-6609  
 Motorola Fax Back System – US & Canada ONLY 1-800-774-1848  
 – http://sps.motorola.com/mfax/

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre,  
 2, Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.  
 852-26629298

**HOME PAGE:** <http://motorola.com/sps/>



**MOTOROLA**



**MCR703A/D**