

MCR703A Series

Preferred Device

Sensitive Gate Silicon Controlled Rectifiers Reverse Blocking Thyristors

PNPN 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
- Surface Mount Package — Case 369A
- Device Marking: Logo, Device Type, e.g., CR703A, Date Code

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

| Rating | Symbol | Value | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|----------------------|
| Peak Repetitive Off-State Voltage ⁽¹⁾ ($T_C = -40$ to $+110^\circ\text{C}$, Sine Wave, 50 to 60 Hz, Gate Open) MCR703A MCR704A MCR706A MCR708A | V_{DRM} , V_{RRM} | 100 200 400 600 | Volts |
| Peak Non-Repetitive Off-State Voltage (Sine Wave, 50 to 60 Hz, Gate Open, $T_C = -40$ to $+110^\circ\text{C}$) MCR703A MCR704A MCR706A MCR708A | V_{RSM} | 150 250 450 650 | Volts |
| On-State RMS Current (180° Conduction Angles, $T_C = 90^\circ\text{C}$) | $I_T(\text{RMS})$ | 4.0 | Amps |
| Average On-State Current (180° Conduction Angles) $T_C = -40$ to $+90^\circ\text{C}$ $T_C = +100^\circ\text{C}$ | $I_T(\text{AV})$ | 2.6 1.6 | Amps |
| Non-Repetitive Surge Current (1/2 Sine Wave, 60 Hz, $T_J = 110^\circ\text{C}$) (1/2 Sine Wave, 1.5 ms, $T_J = 110^\circ\text{C}$) | I_{TSM} | 25 35 | Amps |
| Circuit Fusing ($t = 8.3$ ms) | I^2t | 2.6 | A^2s |
| Forward Peak Gate Power (Pulse Width ≤ 10 μs , $T_C = 90^\circ\text{C}$) | P_{GM} | 0.5 | Watt |
| Forward Average Gate Power ($t = 8.3$ ms, $T_C = 90^\circ\text{C}$) | $P_{G(\text{AV})}$ | 0.1 | Watt |
| Forward Peak Gate Current (Pulse Width ≤ 10 μs , $T_C = 90^\circ\text{C}$) | I_{GM} | 0.2 | Amp |
| Operating Junction Temperature Range | T_J | -40 to $+110$ | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -40 to $+150$ | $^\circ\text{C}$ |

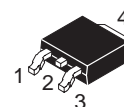
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that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



ON Semiconductor

<http://onsemi.com>

SCRs
4.0 AMPERES RMS
100 thru 600 VOLTS



D-PAK
CASE 369A
STYLE 5

PIN ASSIGNMENT

| 1 | Gate |
|---|---------|
| 2 | Anode |
| 3 | Cathode |
| 4 | Anode |

ORDERING INFORMATION

| Device | Package | Shipping |
|-----------|-----------|--------------------------------|
| MCR703AT4 | DPAK 369A | 16mm Tape and Reel (2.5K/Reel) |
| MCR704AT4 | DPAK 369A | 16mm Tape and Reel (2.5K/Reel) |
| MCR706AT4 | DPAK 369A | 16mm Tape and Reel (2.5K/Reel) |
| MCR708AT4 | DPAK 369A | 16mm Tape and Reel (2.5K/Reel) |

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

MCR703A Series

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|-------------------------------------------------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 8.33 | °C/W |
| Thermal Resistance, Junction to Ambient ⁽¹⁾ | $R_{\theta JA}$ | 80 | °C/W |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds | T_L | 260 | °C |

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

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

OFF CHARACTERISTICS

| | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------|--------|-----------|---------------|
| Peak Repetitive Forward or Reverse Blocking Current ($V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}; R_{GK} = 1 \text{ K}\Omega$) $T_C = 25^\circ\text{C}$ $T_C = 110^\circ\text{C}$ | I_{DRM}, I_{RRM} | — — | — — | 10 200 | μA |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------|--------|-----------|---------------|

ON CHARACTERISTICS

| | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------|---------|------------|---------------|
| Peak Forward "On" Voltage ($I_{TM} = 8.2 \text{ A Peak, Pulse Width} = 1 \text{ to } 2 \text{ ms, } 2\% \text{ Duty Cycle}$) | V_{TM} | — | — | 2.2 | Volts |
| Gate Trigger Current (Continuous dc) ⁽²⁾ ($V_{AK} = 12 \text{ Vdc, } R_L = 24 \text{ Ohms}$) $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ | I_{GT} | — — | 25 — | 75 300 | μA |
| Gate Trigger Voltage (Continuous dc) ⁽²⁾ ($V_{AK} = 12 \text{ Vdc, } R_L = 24 \text{ Ohms}$) $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ | V_{GT} | — — | — — | 0.8 1.0 | Volts |
| Gate Non-Trigger Voltage ⁽²⁾ ($V_{AK} = 12 \text{ Vdc, } R_L = 100 \text{ Ohms, } T_C = 110^\circ\text{C}$) | V_{GD} | 0.2 | — | — | Volts |
| Holding Current ($V_{AK} = 12 \text{ Vdc, Gate Open}$) (Initiating Current = 200 mA) $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ | I_H | — — | — — | 5.0 10 | mA |
| Peak Reverse Gate Blocking Voltage ($I_{GR} = 10 \mu\text{A}$) | V_{RGM} | 10 | 12.5 | 18 | Volts |
| Peak Reverse Gate Blocking Current ($V_{GR} = 10 \text{ V}$) | I_{RGM} | — | — | 1.2 | μA |
| Total Turn-On Time (Source Voltage = 12 V, $R_S = 6 \text{ k Ohms}$) ($I_{TM} = 8.2 \text{ A, } I_{GT} = 2 \text{ mA, Rated } V_{DRM}$) (Rise Time = 20 ns, Pulse Width = 10 μs) | t_{gt} | — | 2.0 | — | μs |

DYNAMIC CHARACTERISTICS

| | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---|----|-----|------------------|
| Critical Rate of Rise of Off-State Voltage ($V_D = \text{Rated } V_{DRM}, R_{GK} = 1 \text{ K}\Omega, \text{ Exponential Waveform, } T_C = 110^\circ\text{C}$) | dv/dt | — | 10 | — | V/ μs |
| Repetitive Critical Rate of Rise of On-State Current ($C_f = 60 \text{ Hz, } I_{PK} = 30 \text{ A, } PW = 100 \mu\text{s, } di/dt = 1 \text{ A}/\mu\text{s}$) | di/dt | — | — | 100 | A/ μs |

(1) Case 369A when surface mounted on minimum pad sizes recommended.

(2) R_{GK} current not included in measurement.

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Voltage Current Characteristic of SCR

| Symbol | Parameter |
|-----------|-------------------------------------------|
| V_{DRM} | Peak Repetitive Off State Forward Voltage |
| I_{DRM} | Peak Forward Blocking Current |
| V_{RRM} | Peak Repetitive Off State Reverse Voltage |
| I_{RRM} | Peak Reverse Blocking Current |
| V_{TM} | Peak On State Voltage |
| I_H | Holding Current |

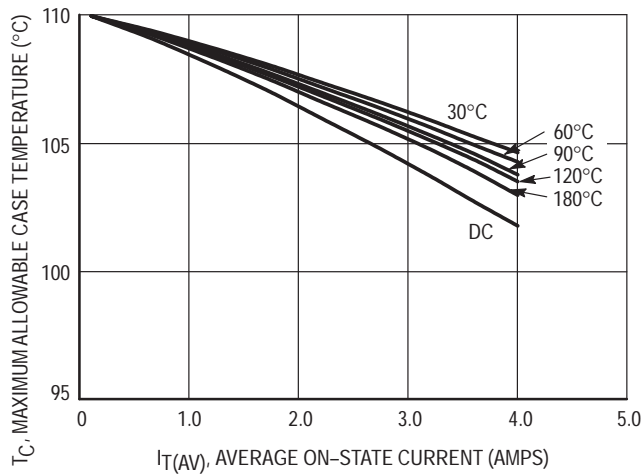
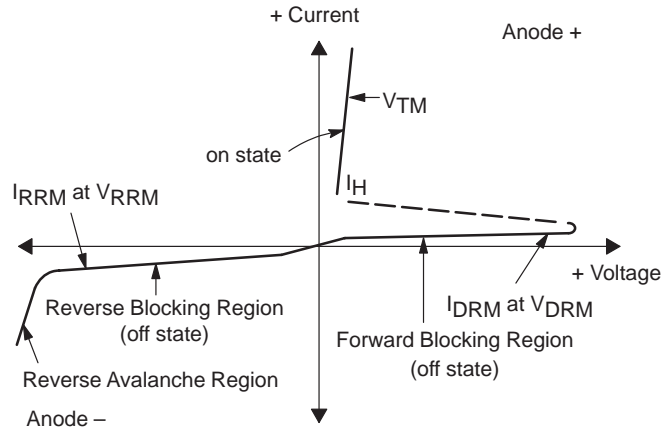


Figure 1. Average Current Derating

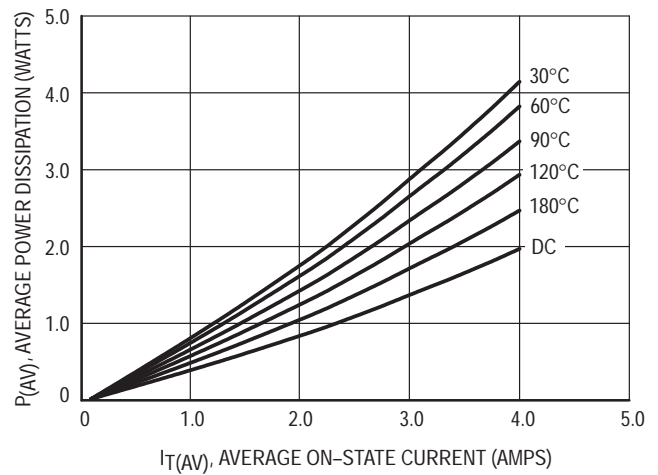


Figure 2. On-State Power Dissipation

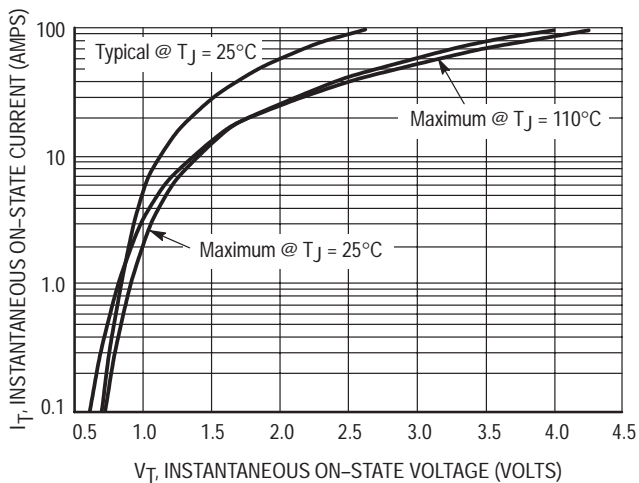


Figure 3. On-State Characteristics

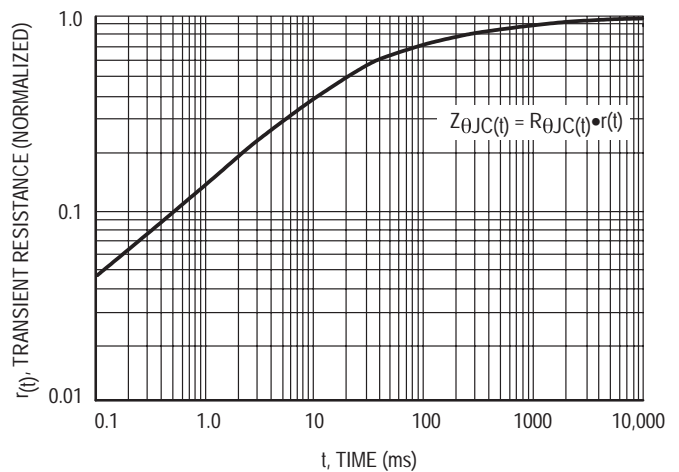


Figure 4. Transient Thermal Response

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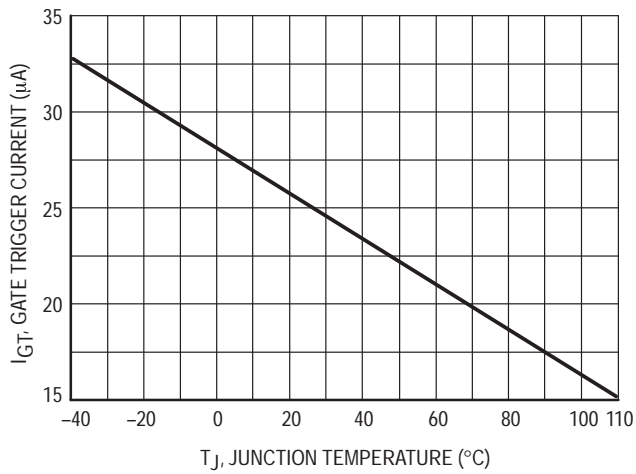


Figure 5. Typical Gate Trigger Current versus Junction Temperature

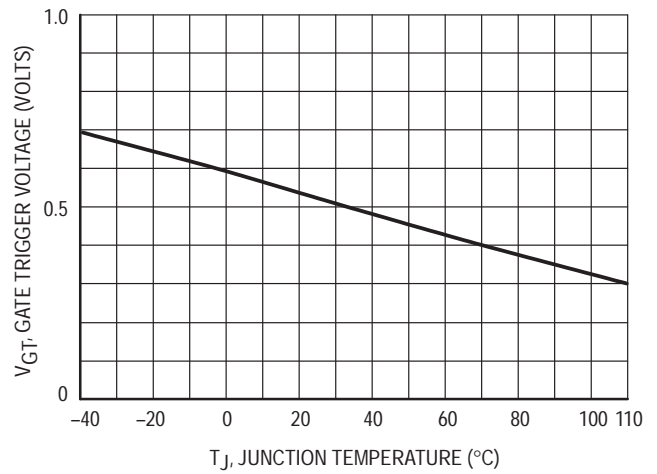


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

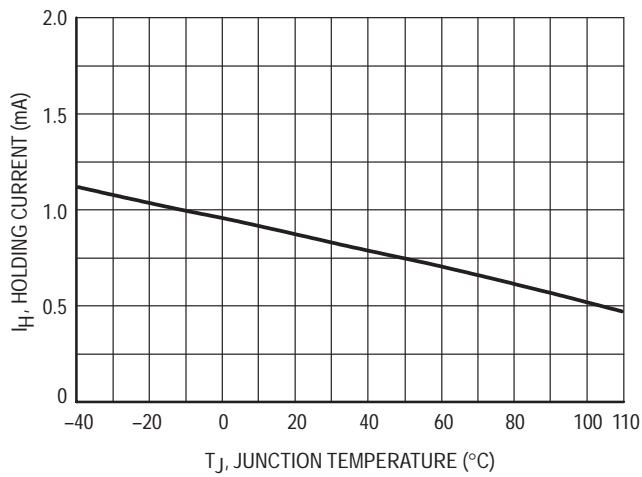


Figure 7. Typical Holding Current versus Junction Temperature

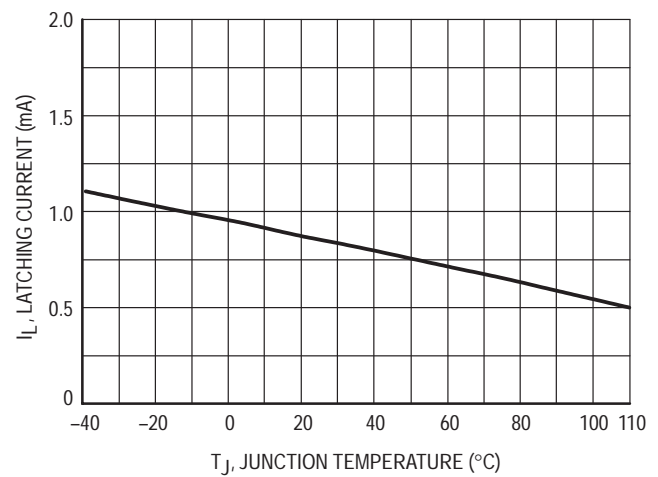


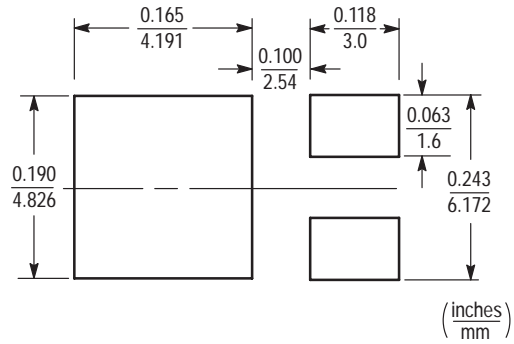
Figure 8. Typical Latching Current versus Junction Temperature

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MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection

interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.

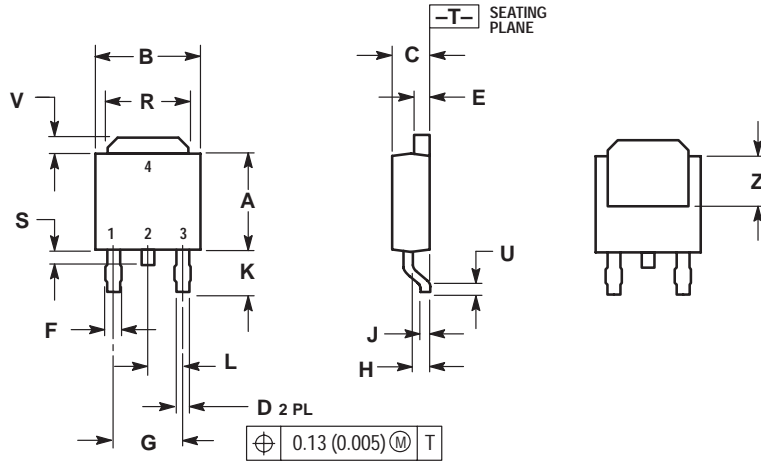


DPAK

MCR703A Series

PACKAGE DIMENSIONS

D-PAK CASE 369A-13 ISSUE Z



- 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

Notes

MCR703A Series

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Toll Free from Hong Kong & Singapore:
001-800-4422-3781
Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center
4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-8549
Phone: 81-3-5740-2745
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