

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: Device Type, e.g., for MCR703A: 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 $+150$	$^\circ\text{C}$

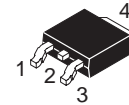
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that 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	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient ⁽¹⁾	$R_{\theta JA}$	80	$^{\circ}C/W$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T_L	260	$^{\circ}C$

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

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

OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current ($V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}; R_{GK} = 1 \text{ K}\Omega$) $T_C = 25^{\circ}C$ $T_C = 110^{\circ}C$	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⁾ ($V_{AK} = 12 \text{ Vdc, } R_L = 24 \text{ Ohms}$) $T_C = 25^{\circ}C$ $T_C = -40^{\circ}C$	I_{GT}	— —	25 —	75 300	μA
Gate Trigger Voltage (Continuous dc) ⁽²⁾ ($V_{AK} = 12 \text{ Vdc, } R_L = 24 \text{ Ohms}$) $T_C = 25^{\circ}C$ $T_C = -40^{\circ}C$	V_{GT}	— —	— —	0.8 1.0	Volts
Gate Non-Trigger Voltage ⁽²⁾ ($V_{AK} = 12 \text{ Vdc, } R_L = 100 \text{ Ohms, } T_C = 110^{\circ}C$)	V_{GD}	0.2	—	—	Volts
Holding Current ($V_{AK} = 12 \text{ Vdc, Gate Open}$) (Initiating Current = 200 mA) $T_C = 25^{\circ}C$ $T_C = -40^{\circ}C$	I_H	— —	— —	5.0 10	mA
Peak Reverse Gate Blocking Voltage ($I_{GR} = 10 \mu A$)	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 ($V_D = \text{Rated } V_{DRM}, R_{GK} = 1 \text{ K}\Omega, \text{ Exponential Waveform,}$ $T_C = 110^{\circ}C$)	dv/dt	—	10	—	$V/\mu s$
Repetitive Critical Rate of Rise of On-State Current ($C_f = 60 \text{ Hz, } I_{PK} = 30 \text{ A, } PW = 100 \mu s, diG/dt = 1 \text{ A}/\mu s$)	di/dt	—	—	100	$A/\mu s$

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

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

MCR703A Series

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

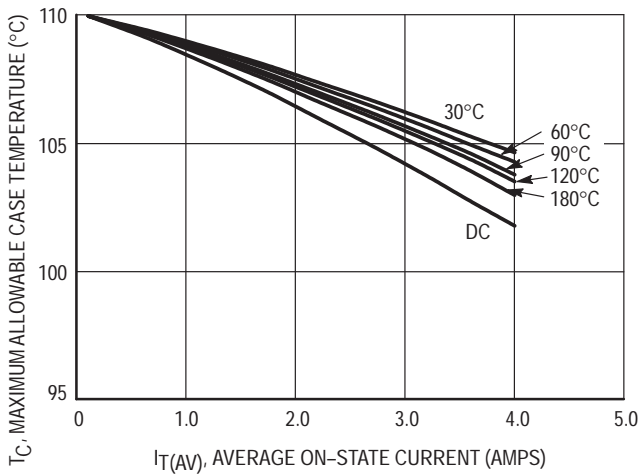
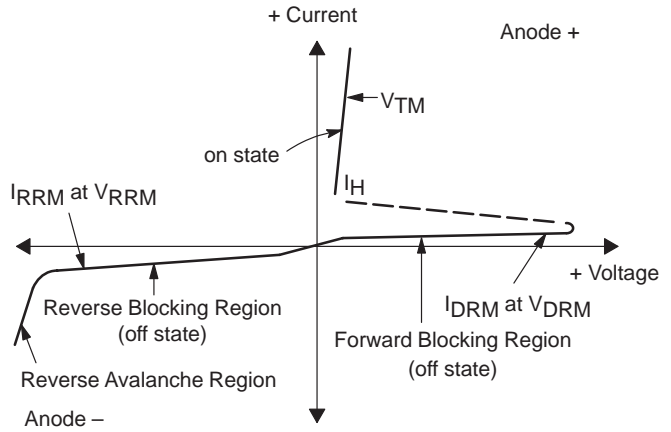


Figure 1. Average Current Derating

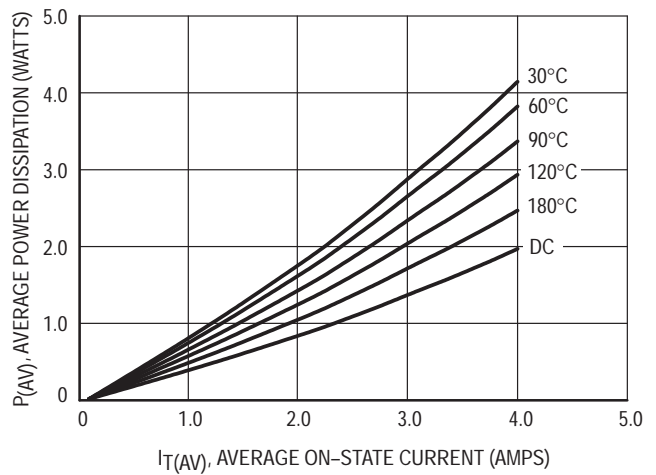


Figure 2. On-State Power Dissipation

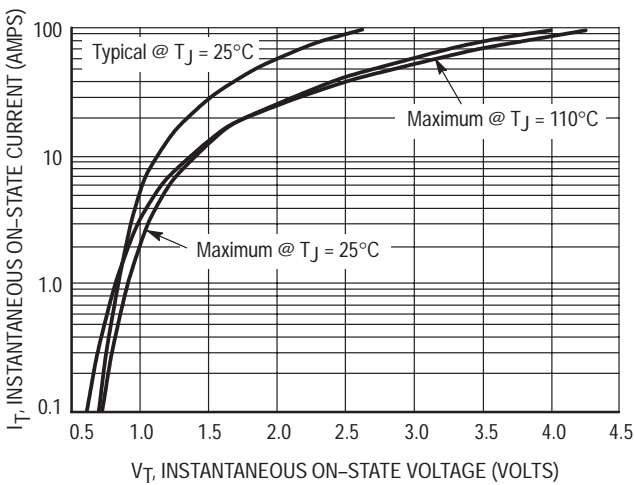


Figure 3. On-State Characteristics

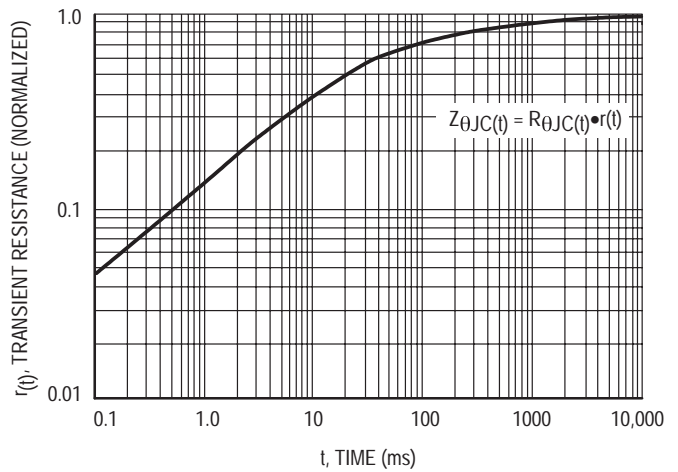


Figure 4. Transient Thermal Response

MCR703A Series

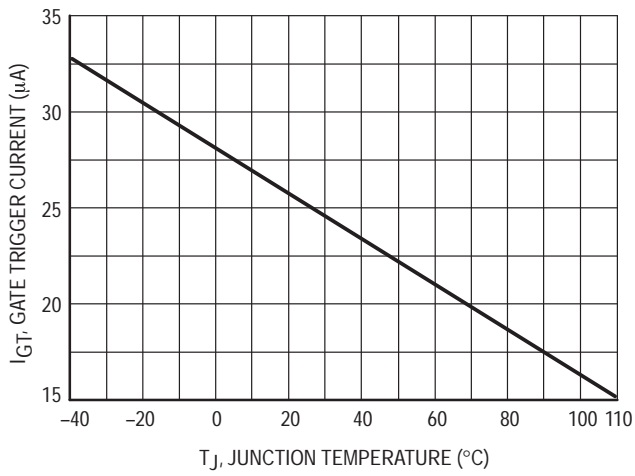


Figure 5. Typical Gate Trigger Current versus Junction Temperature

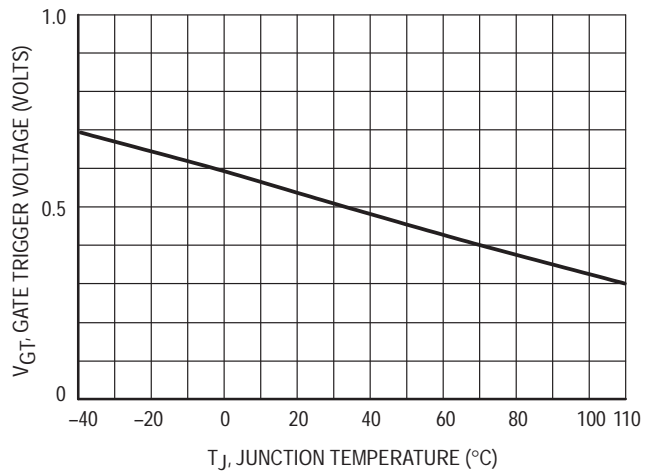


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

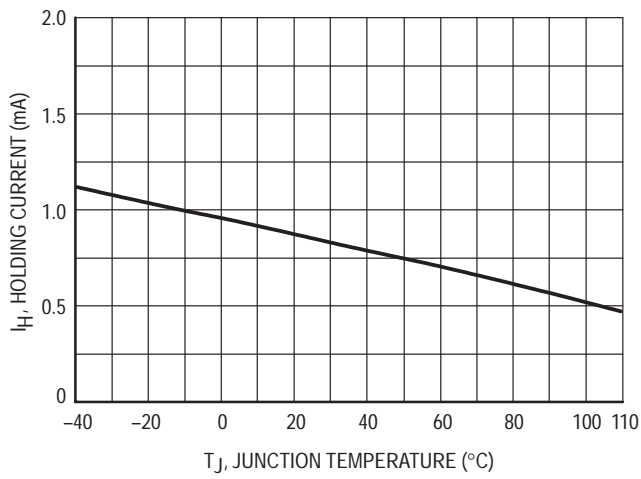


Figure 7. Typical Holding Current versus Junction Temperature

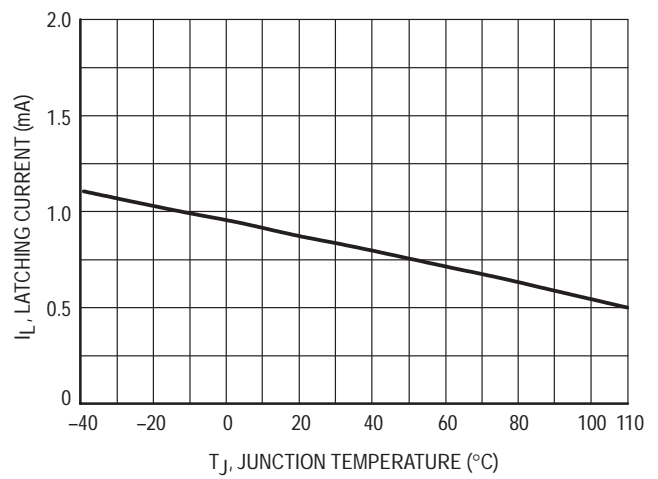


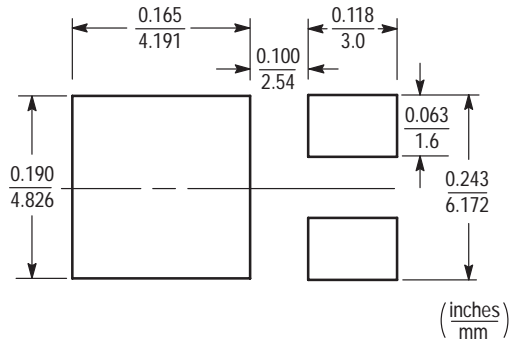
Figure 8. Typical Latching Current versus Junction Temperature

MCR703A Series

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.

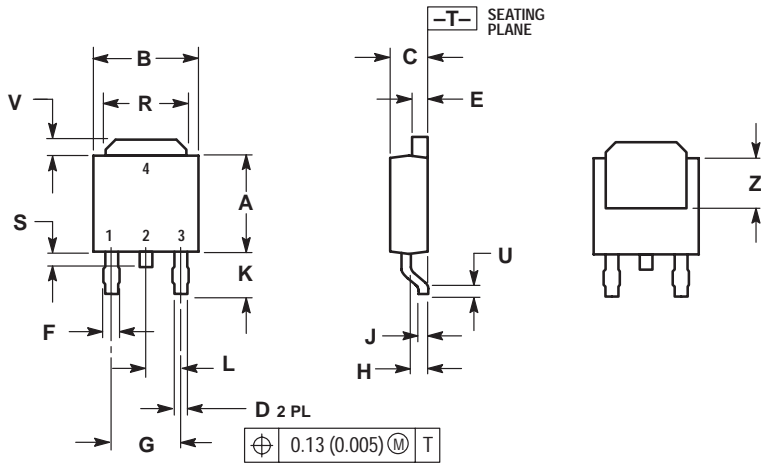


DPAK

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

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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 special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC 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 SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

NORTH AMERICA Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com
Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (M-F 1:00pm to 5:00pm Munich Time)
Email: ONlit-german@hibbertco.com
French Phone: (+1) 303-308-7141 (M-F 1:00pm to 5:00pm Toulouse Time)
Email: ONlit-french@hibbertco.com
English Phone: (+1) 303-308-7142 (M-F 12:00pm to 5:00pm UK Time)
Email: ONlit@hibbertco.com

EUROPEAN TOLL-FREE ACCESS*: 00-800-4422-3781

*Available from Germany, France, Italy, England, Ireland

CENTRAL/SOUTH AMERICA:

Spanish Phone: 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)
Email: ONlit-spanish@hibbertco.com

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)
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 141-0031
Phone: 81-3-5740-2745
Email: r14525@onsemi.com

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local Sales Representative.