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
- To Obtain "DPAK" in Straight Lead Version (Shipped in Sleeves): − Add '1' Suffix to Device Number, i.e., MCR706A1

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

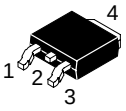
Rating	Symbol	Value	Unit
Peak Repetitive Off−State Voltage(1) (T_C = −40 to +110°C, Sine Wave, 50 to 60 Hz, Gate Open) MCR703A MCR704A MCR706A MCR708A	V_{DRM}, V_{RRM}	 100 200 400 600	Volts
Peak Non-Repetitive Off−State Voltage (Sine Wave, 50 to 60 Hz, Gate Open, T_C = −40 to +110°C) MCR703A MCR704A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

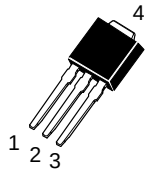
ON Semiconductor®

http://onsemi.com

SCRs
4.0 AMPERES RMS
100 thru 600 VOLTS



DPAK
CASE 369C
STYLE 2



DPAK
CASE 369D
STYLE 2

PIN ASSIGNMENT	
1	Gate
2	Anode
3	Cathode
4	Anode

ORDERING INFORMATION

Device	Package	Shipping
MCR703AT4 MCR704AT4 MCR706AT4 MCR708AT4	DPAK 369C	2500/Tape & Reel
MCR703AT4−1 MCR704AT4−1 MCR706AT4−1 MCR708AT4−1	DPAK Straight Lead 369D	75 Units / Rail

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

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

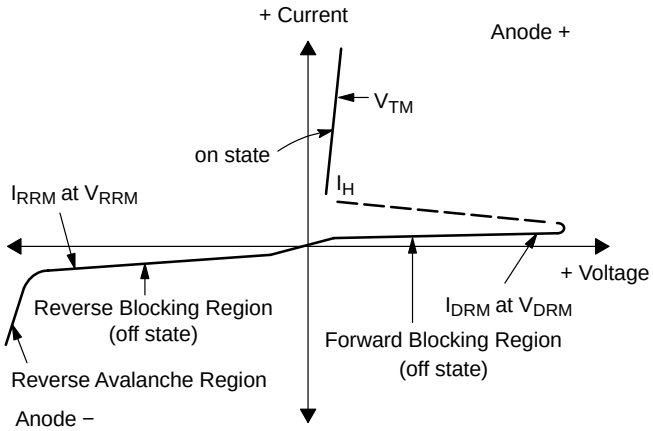
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Peak Repetitive Forward or Reverse Blocking Current (V_{AK} = Rated V_{DRM} or V_{RRM}; R_{GK} = 1 KΩ)	T_C = 25°C T_C = 110°C	I_{DRM}, I_{RRM}	— —	— —	10 200	μA
ON CHARACTERISTICS						
Peak Forward “On” Voltage (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)(2) (V_{AK} = 12 Vdc, R_L = 24 Ohms)	T_C = 25°C T_C = −40°C	I_{GT}	— —	25 —	75 300	μA
Gate Trigger Voltage (Continuous dc)(2) (V_{AK} = 12 Vdc, R_L = 24 Ohms)	T_C = 25°C T_C = −40°C	V_{GT}	— —	— —	0.8 1.0	Volts
Gate Non-Trigger Voltage(2) (V_{AK} = 12 Vdc, R_L = 100 Ohms, T_C = 110°C)		V_{GD}	0.2	—	—	Volts
Holding Current (V_{AK} = 12 Vdc, Gate Open) (Initiating Current = 200 mA)	T_C = 25°C T_C = −40°C	I_H	— —	— —	5.0 10	mA
Peak Reverse Gate Blocking Voltage (I_{GR} = 10 μA)		V_{RGM}	10	12.5	18	Volts
Peak Reverse Gate Blocking Current (V_{GR} = 10 V)		I_{RGM}	—	—	1.2	μA
Total Turn-On Time (Source Voltage = 12 V, R_S = 6 k Ohms) (I_{TM} = 8.2 A, I_{GT} = 2 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 = Rated V_{DRM}, R_{GK} = 1 KΩ, Exponential Waveform, T_C = 110°C)		dv/dt	—	10	—	V/μs
Repetitive Critical Rate of Rise of On−State Current (Cf = 60 Hz, I_{PK} = 30 A, PW = 100 μs, diG/dt = 1 A/μs)		di/dt	—	—	100	A/μs

(1) Case 369A when surface mounted on minimum pad sizes recommended.
(2) R_{GK} current not included in measurement.

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



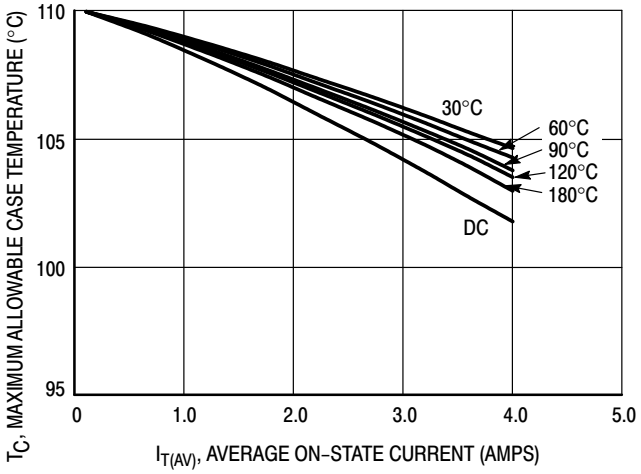


Figure 1. Average Current Derating

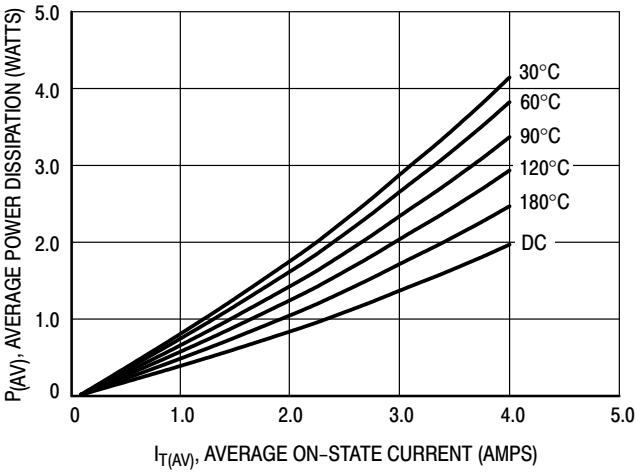


Figure 2. On−State Power Dissipation

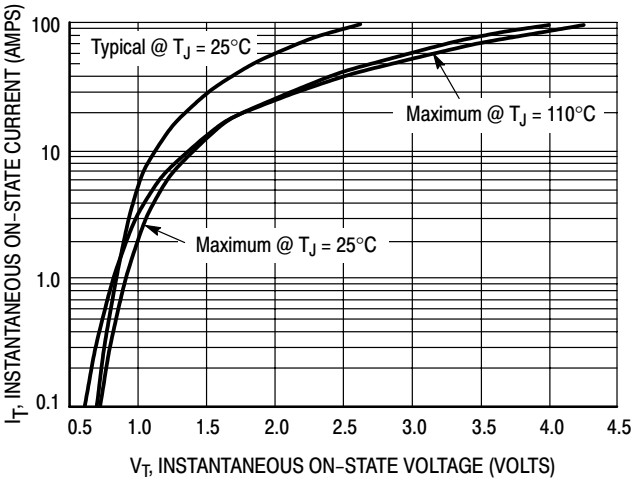


Figure 3. On−State Characteristics

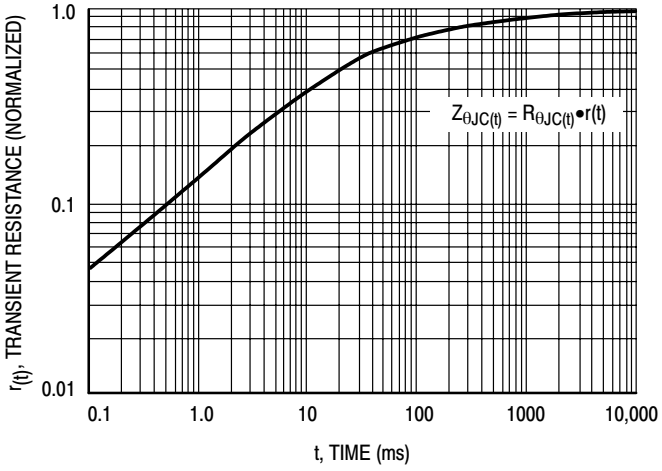


Figure 4. Transient Thermal Response

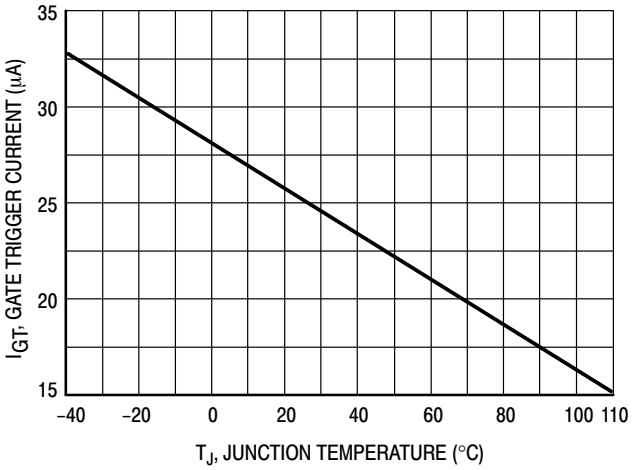


Figure 5. Typical Gate Trigger Current versus Junction Temperature

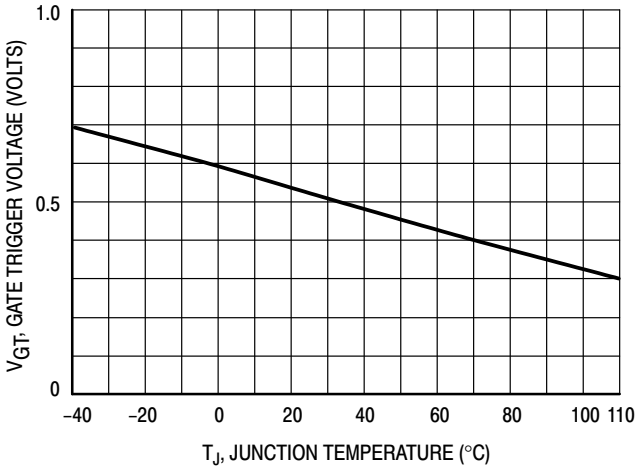


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

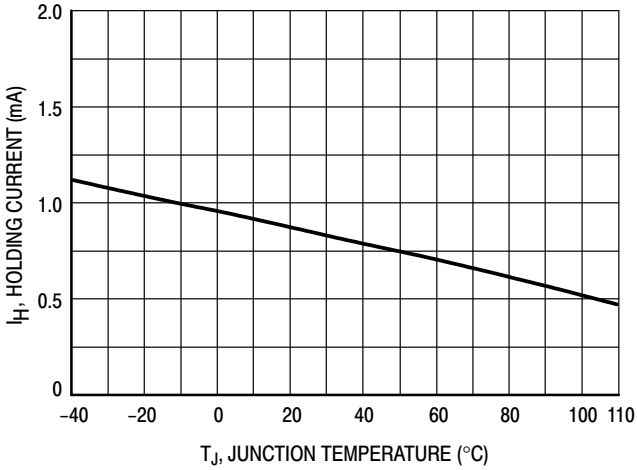


Figure 7. Typical Holding Current versus Junction Temperature

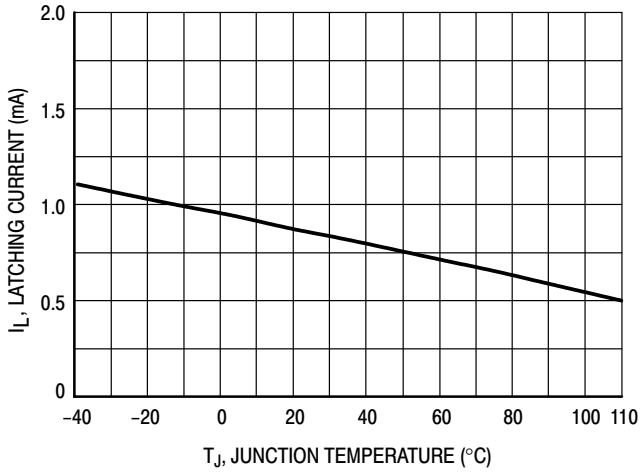
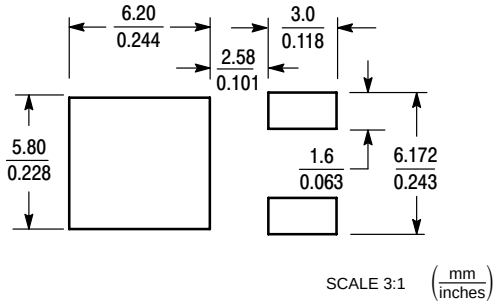


Figure 8. Typical Latching Current versus Junction Temperature

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

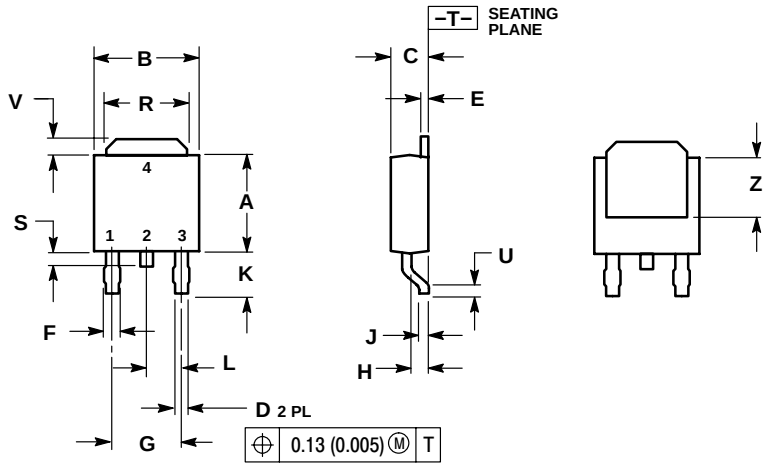
Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



DPAK

PACKAGE DIMENSIONS

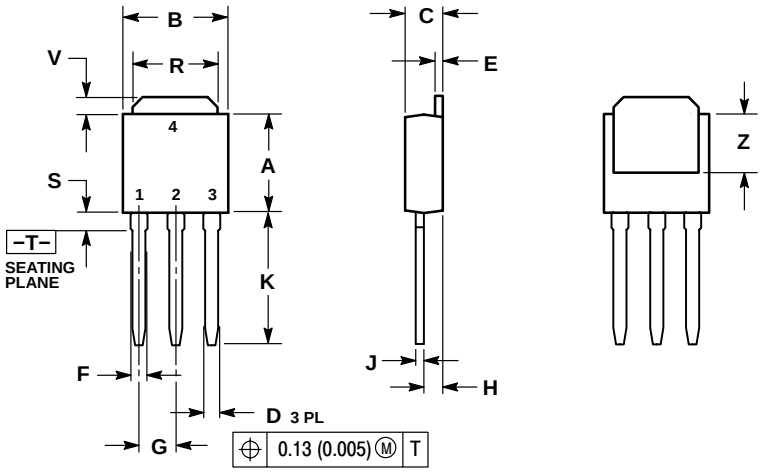
DPAK
CASE 369C−01
ISSUE O



DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.235	0.245	5.97	6.22
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	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
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	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	−−−	0.51	−−−
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

DPAK
CASE 369D−01
ISSUE O



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

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.235	0.245	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	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
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	0.180	0.215	4.45	5.45
S	0.025	0.040	0.63	1.01
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

PUBLICATION ORDERING INFORMATION

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: orderlit@onsemi.com

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

Japan: ON Semiconductor, Japan Customer Focus Center
2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
Phone: 81−3−5773−3850

ON Semiconductor Website: http://onsemi.com

Order Literature: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.