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.

Features

- Small Size
- Passivated Die Surface for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Recommend Electrical Replacement for C106
- Surface Mount Package − Case 369C
- To Obtain “DPAK” in Straight Lead Version (Shipped in Sleeves): Add ’1’ Suffix to Device Number, i.e., MCR706A1
- Epoxy Meets UL 94 V−0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V
  Machine Model, C > 400 V
- Pb−Free Packages are Available

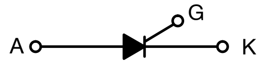
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Max	Unit
Peak Repetitive Off−State Voltage (Note 1) (T_C = −40 to +110°C, Sine Wave, 50 to 60 Hz, R_{GK} = 1 kΩ)	V_{DRM}, V_{RRM}		V
MCR703A		100	
MCR706A		400	
MCR708A		600	
Peak Non-Repetitive Off−State Voltage (Sine Wave, 50 to 60 Hz, R_{GK} = 1 kΩ, T_C = −40 to +110°C)	V_{RSM}		V
MCR703A		150	
MCR706A		450	
MCR708A		650	
On−State RMS Current (180° Conduction Angles; T_C = 90°C)	$I_{T(RMS)}$	4.0	A
Average On−State Current (180° Condition Angles)	$I_{T(AV)}$		A
T_C = −40 to +90°C		2.6	
T_C = +100°C		1.6	
Non-Repetitive Surge Current	I_{TSM}		A
(1/2 Sine Wave, 60 Hz, T_J = 110°C)		25	
(1/2 Sine Wave, 1.5 ms, T_J = 110°C)		35	
Circuit Fusing (t = 8.3 msec)	I^2t	2.6	A^2sec
Forward Peak Gate Power (Pulse Width ≤ 1.0 μsec, T_C = 90°C)	P_{GM}	0.5	W
Forward Average Gate Power (t = 8.3 msec, T_C = 90°C)	$P_{G(AV)}$	0.1	W
Forward Peak Gate Current (Pulse Width ≤ 1.0 μsec, T_C = 90°C)	I_{GM}	0.2	A
Operating Junction Temperature Range	T_J	−40 to +110	°C
Storage Temperature Range	T_{stg}	−40 to +150	°C

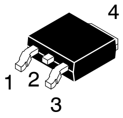
ON Semiconductor®

http://onsemi.com

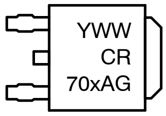
SCRs
4.0 AMPERES RMS
100 − 600 VOLTS

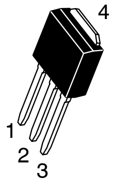


MARKING DIAGRAMS

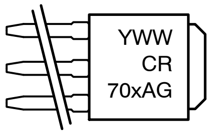


DPAK
CASE 369C
STYLE 5





DPAK−3
CASE 369D
STYLE 5



Y = Year
WW = Work Week
70xA = Device Code
x = 3, 6 or 8
G = Pb−Free Package

PIN ASSIGNMENT	
1	Gate
2	Anode
3	Cathode
4	Anode

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	3.0	°C/W
Thermal Resistance, Junction–to–Ambient (Note 2)	$R_{\theta JA}$	80	°C/W
Maximum Lead Temperature for Soldering Purposes 1/8″ from Case for 10 Seconds	T_L	260	°C

2. Case 369C when surface mounted on minimum pad sizes recommended.

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	V
Gate Trigger Current (Continuous dc) (Note 3) (V_{AK} = 12 Vdc, R_L = 24 Ω) T_C = 25°C T_C = –40°C	I_{GT}	– –	25 –	75 300	μA
Gate Trigger Voltage (Continuous dc) (Note 3) T_C = 25°C (V_{AK} = 12 Vdc, R_L = 24 Ω) T_C = –40°C	V_{GT}	– –	– –	0.8 1.0	V
Gate Non-Trigger Voltage (Note 3) (V_{AK} = 12 Vdc, R_L = 100 Ω, T_C = 110°C)	V_{GD}	0.2	–	–	V
Holding Current (V_{AK} = 12 Vdc, R_{GK} = 1 kΩ) T_C = 25°C (Initiating Current = 20 mA) 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	V
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 kΩ) (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

3. R_{GK} current not included in measurement.

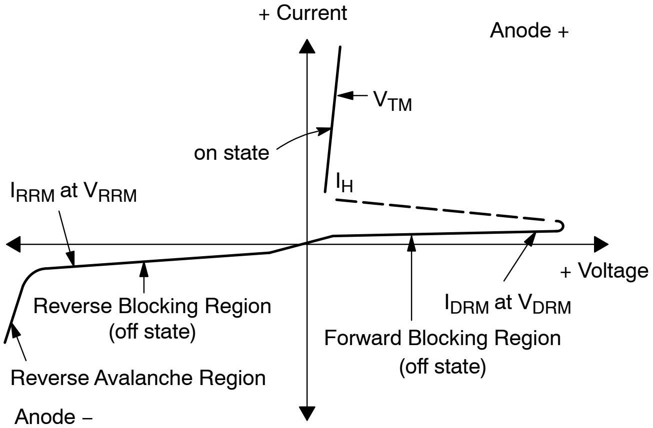
ORDERING INFORMATION

Device	Package Type	Package	Shipping†
MCR703AT4	DPAK	369C	2500 Tape & Reel
MCR703AT4G	DPAK	369C (Pb–Free)	2500 Tape & Reel
MCR706AT4	DPAK	369C	2500 Tape & Reel
MCR706AT4G	DPAK	369C (Pb–Free)	2500 Tape & Reel
MCR708A	DPAK	369C	75 Units / Rail
MCR708AG	DPAK	369C (Pb–Free)	75 Units / Rail
MCR708A1	DPAK–3	369D	75 Units / Rail
MCR708A1G	DPAK–3	369D (Pb–Free)	75 Units / Rail
MCR708AT4	DPAK	369C	2500 Tape & Reel
MCR708AT4G	DPAK	369C (Pb–Free)	2500 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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



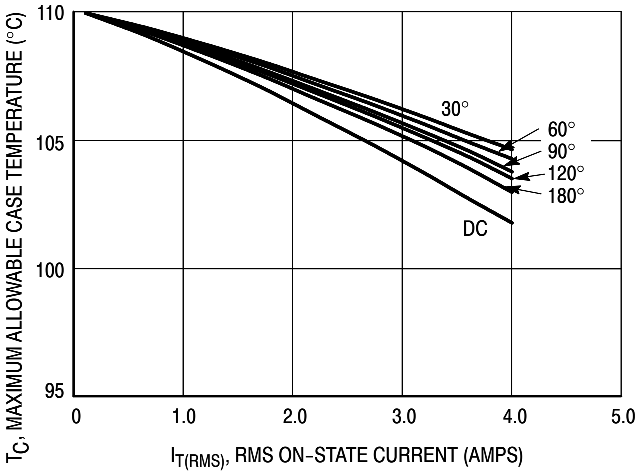


Figure 1. RMS Current Derating

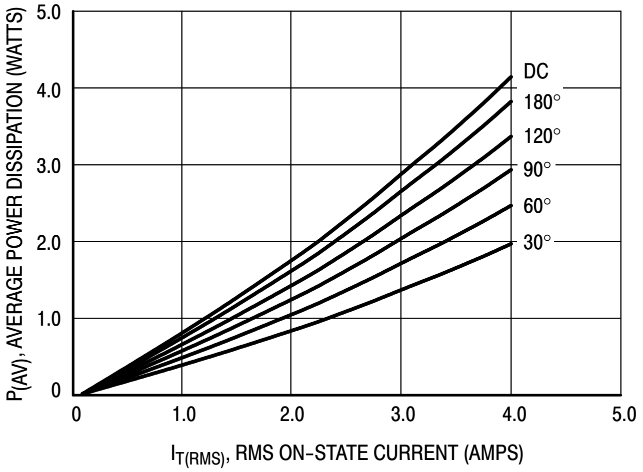


Figure 2. On−State Power Dissipation

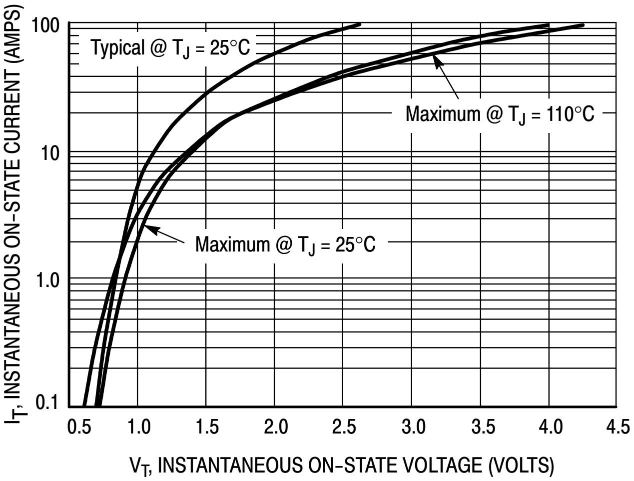


Figure 3. On−State Characteristics

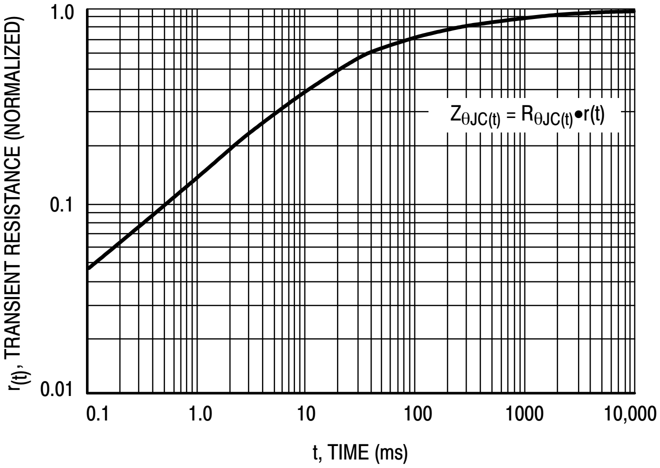


Figure 4. Transient Thermal Response

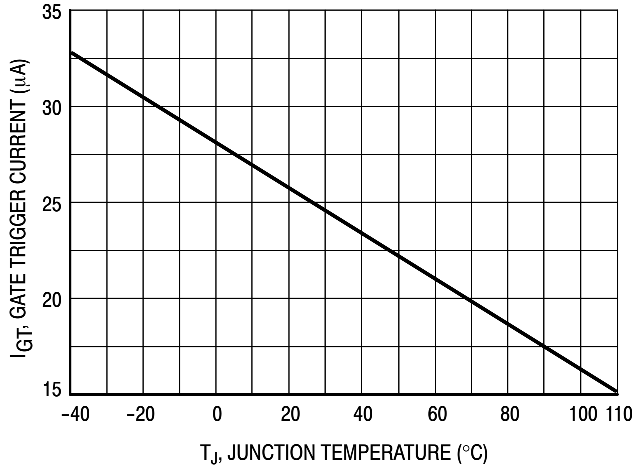


Figure 5. Typical Gate Trigger Current versus Junction Temperature

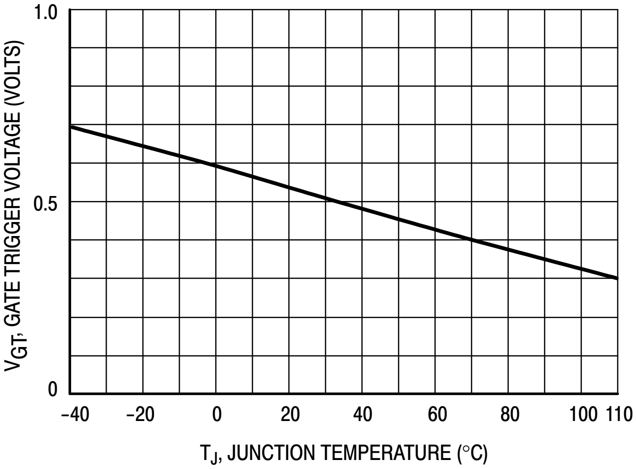


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

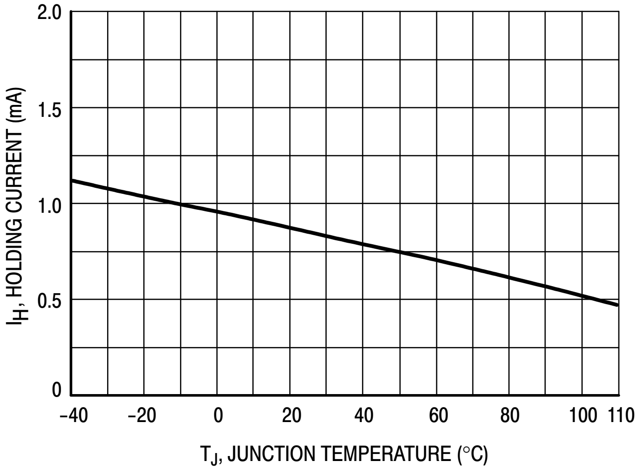


Figure 7. Typical Holding Current versus Junction Temperature

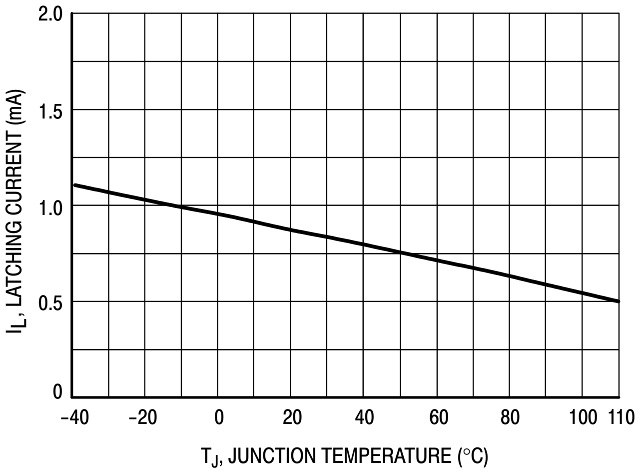
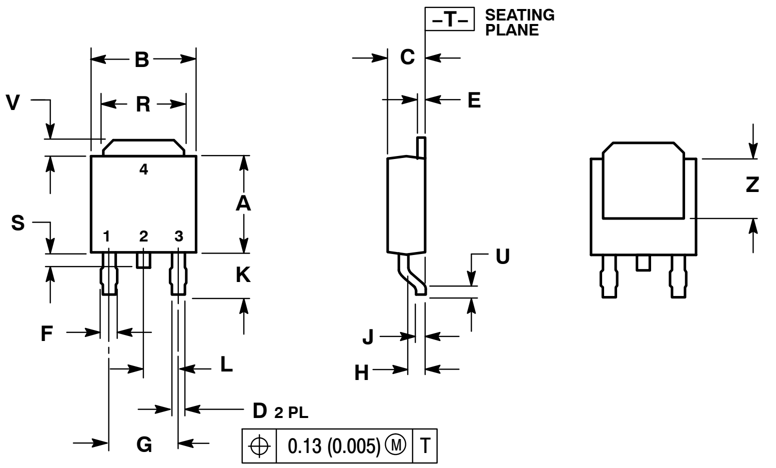


Figure 8. Typical Latching Current versus Junction Temperature

PACKAGE DIMENSIONS

DPAK
CASE 369C−01
ISSUE A

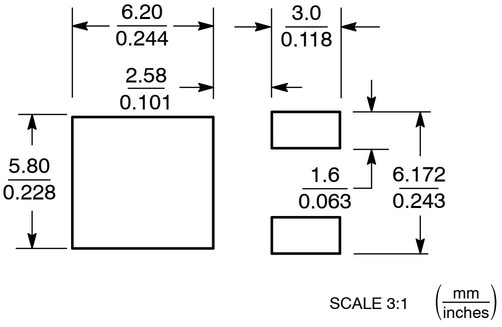


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	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 5:
PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

SOLDERING FOOTPRINT*

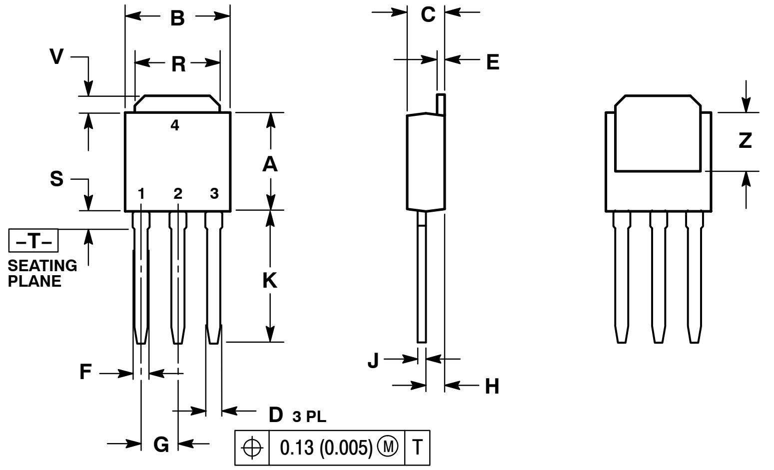


*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

DPAK−3

CASE 369D−01
ISSUE B



NOTES:
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2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	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 5:
PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

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