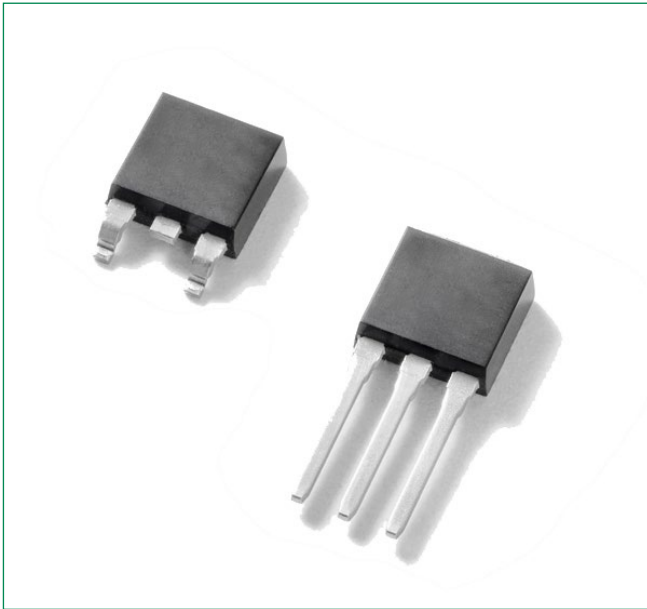


**MCR70xA Series**



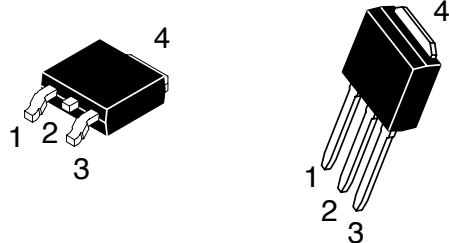
**Description**

PNPN Components 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.

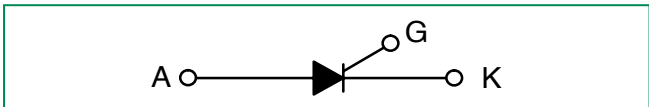
**Features**

- 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 Component Number, i.e., MCR706A1
- UL Recognized compound meeting flammability rating V-0.
- ESD Ratings: Human Body Model, 3B > 8000 V  
Machine Model, C > 400 V
- Pb-Free Packages are Available

**Pin Out**



**Functional Diagram**



**Additional Information**

<p><b>Datasheet</b></p>	<p><b>Resources</b></p>	<p><b>Samples</b></p>
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### Maximum Ratings ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit	
Peak Repetitive Off-State Voltage (Note 1) ( $T_C = -40$ to $+110^\circ\text{C}$ , Sine Wave, 50 to 60 Hz, $R_{GK} = 1\text{ k}\Omega$ )	MCR703A $V_{DRM}$	100	V	
	MCR706A $V_{RRM}$	400		
	MCR708A	600		
Peak Non-Repetitive Off-State Voltage ( $180^\circ$ Conduction Angles; $T_C = 85^\circ\text{C}$ )	MCR703A $V_{DSM}$	150	V	
	MCR706A	450		
	MCR708A	650		
On-State RMS Current ( $180^\circ$ Conduction Angles; $T_C = 90^\circ\text{C}$ )	$I_{T(RMS)}$	4.0	A	
Average On-State Current ( $180^\circ$ Conduction Angles)	$I_{T(AV)}$	$T_C = -40$ to $+90^\circ\text{C}$	2.6	A
		$T_C = +100^\circ\text{C}$	1.6	
Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 110^\circ\text{C}$ ) (1/2 Cycle, Sine Wave 1.5 ms, $T_J = 110^\circ\text{C}$ )	$I_{TSM}$		25	A
			35	
Circuit Fusing Consideration ( $t = 8.3\text{ ms}$ )	$I^2t$	2.6	$\text{A}^2\text{sec}$	
Forward Peak Gate Power (Pulse Width $\leq 1.0\ \mu\text{sec}$ , $T_C = 90^\circ\text{C}$ )	$I_{GM}$	0.5	W	
Forward Peak Gate Current (Pulse Width $\leq 1.0\ \mu\text{sec}$ , $T_C = 90^\circ\text{C}$ )	$P_{GM}$	0.2	A	
Forward Average Gate Power ( $t = 8.3\text{ ms}$ , $T_C = 90^\circ\text{C}$ )	$P_{G(AV)}$	0.1	W	
Operating Junction Temperature Range	$T_J$	-40 to +110	$^\circ\text{C}$	
Storage Temperature Range	$T_{stg}$	-40 to +150	$^\circ\text{C}$	

Stresses exceeding Maximum Ratings may damage the Component. 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 Component reliability.

- $V_{DRM}$  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 Components are exceeded.

### Thermal Characteristics\*

Rating	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.0	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	80	
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	$T_L$	260	$^\circ\text{C}$

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

### Electrical Characteristics - OFF ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Repetitive Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM}$ or $V_{RRM}$ , $R_{GK} = 1 \text{ k}\Omega$ )	$T_J = 25^\circ\text{C}$	$I_{DRM}$	-	-	10	$\mu\text{A}$
	$T_J = 110^\circ\text{C}$	$I_{RRM}$	-	-	200	

### Electrical Characteristics - ON ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Forward "On" Voltage ( $I_{TM} = 8.2 \text{ A Peak}$ , Pulse Width = 1 to 2 ms, 2% Duty Cycle)		$V_{TM}$	-	-	2.2	V
Gate Trigger Current (Continuous dc) (Note 3) ( $V_{AK} = 12 \text{ V}$ ; $R_L = 24 \Omega$ )	$T_J = 25^\circ\text{C}$	$I_{GT}$	-	25	75	$\mu\text{A}$
	$T_J = -40^\circ\text{C}$		-	-	300	
Gate Trigger Voltage (Continuous dc) (Note 3) ( $V_{AK} = 12 \text{ V}$ ; $R_L = 24 \Omega$ )	$T_J = 25^\circ\text{C}$	$V_{GT}$	-	-	0.8	V
	$T_J = -40^\circ\text{C}$		-	-	1.0	
Gate Non-Trigger Voltage (Note 3) ( $V_{AK} = 12 \text{ Vdc}$ ; $R_L = 100 \Omega$ , $T_C = 110^\circ$ )		$V_{GD}$	0.2	-	-	V
Holding Current ( $V_{AK} = 12 \text{ Vdc}$ , $R_{GK} = 1 \text{ k}\Omega$ ) $T_C = 25^\circ\text{C}$ (Initiating Current = 20 mA) $T_C = -40^\circ\text{C}$		$I_H$	-	-	5.0	mA
			-	-	10	
Peak Reverse Gate Blocking Voltage ( $I_{GR} = 10 \mu\text{A}$ )		$V_{RGM}$	10	12.5	18	V
Peak Reverse Gate Blocking Current ( $V_{GR} = 10 \text{ V}$ )		$I_{RGM}$	-	-	1.2	$\mu\text{A}$
Total Turn-On Time (Source Voltage = 12 V, $R_S = 6 \text{ k}\Omega$ ) ( $I_{TM} = 8.2 \text{ A}$ , $I_{GT} = 2 \text{ mA}$ , Rated $V_{DRM}$ ) (Rise Time = 20 ns, Pulse Width = 10 $\mu\text{s}$ )		$t_{gt}$	-	2.0	-	$\mu\text{s}$

### Dynamic Characteristics\*

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , $R_{GK} = 1 \text{ k}\Omega$ , Exponential Waveform, Gate Open, $T_C = 110^\circ\text{C}$ )	dv/dt	-	10	-	V/ $\mu\text{s}$
Repetitive Critical Rate of Rise of On-State Current ( $C_f = 60 \text{ Hz}$ , $I_{PK} = 30 \text{ A}$ , $PW = 100 \mu\text{s}$ , diG/dt = 1 A/ $\mu\text{s}$ )	di/dt	-	-	100	A/ $\mu\text{s}$

3. RGK current not included in measurement.

### Voltage Current Characteristic of SCR

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

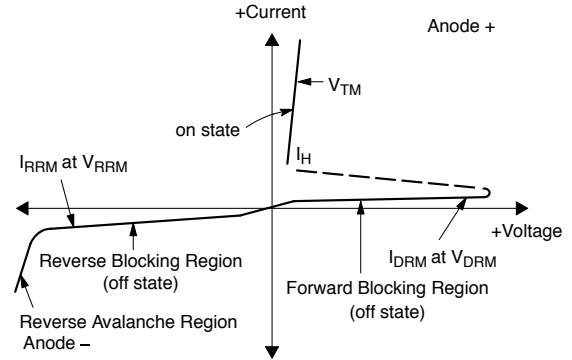


Figure 1. RMS Current Derating

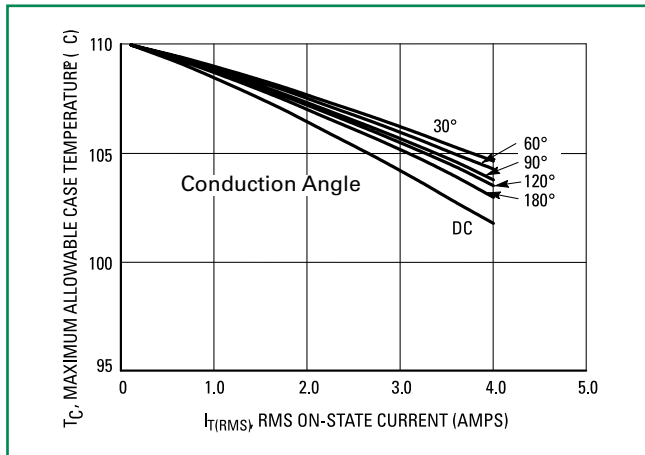


Figure 2. On-State Power Dissipation

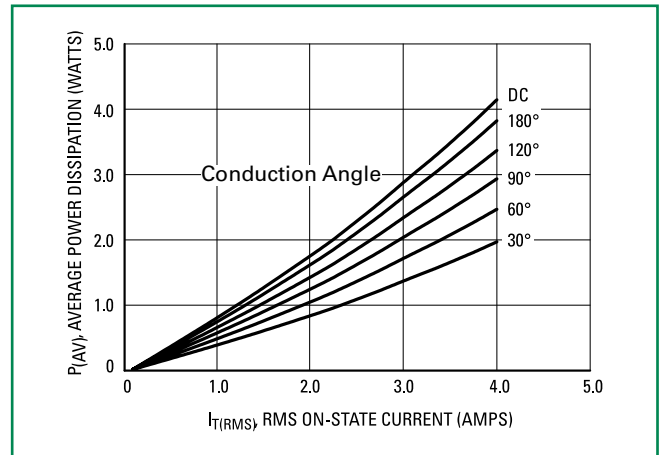


Figure 3. On-State Characteristics

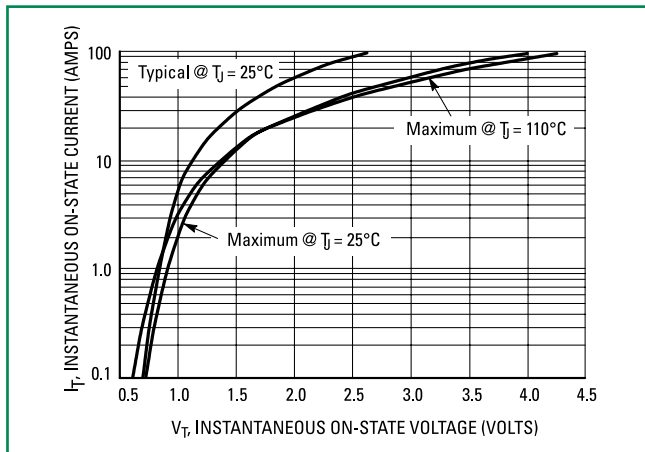
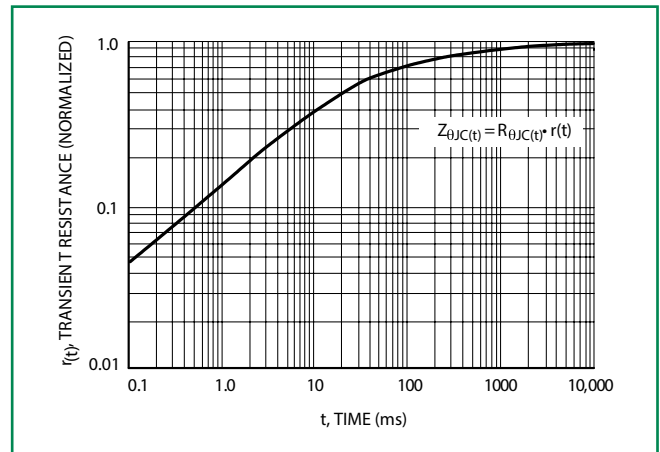
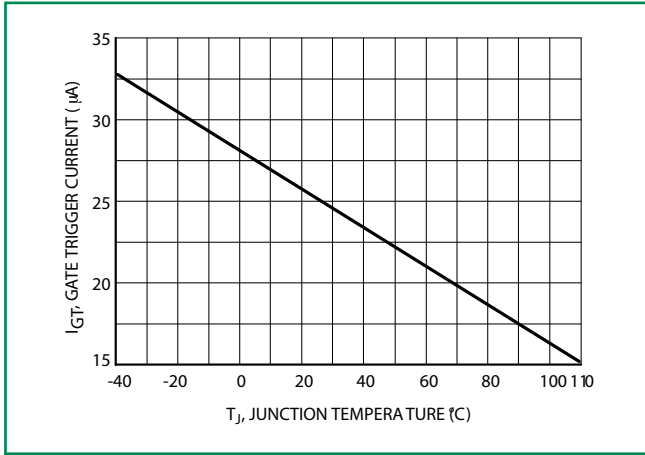


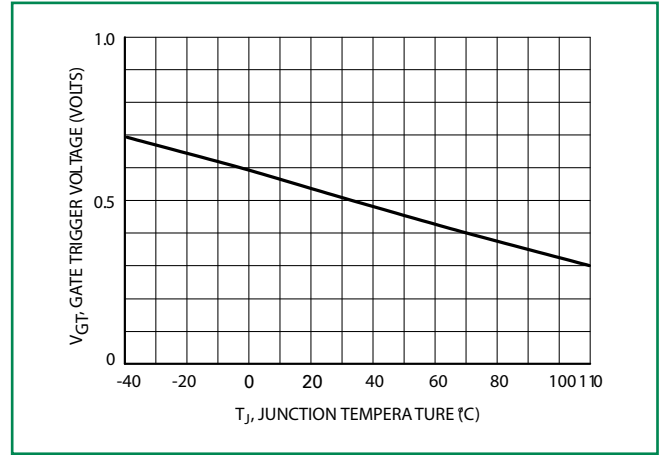
Figure 4. Transient Thermal Response



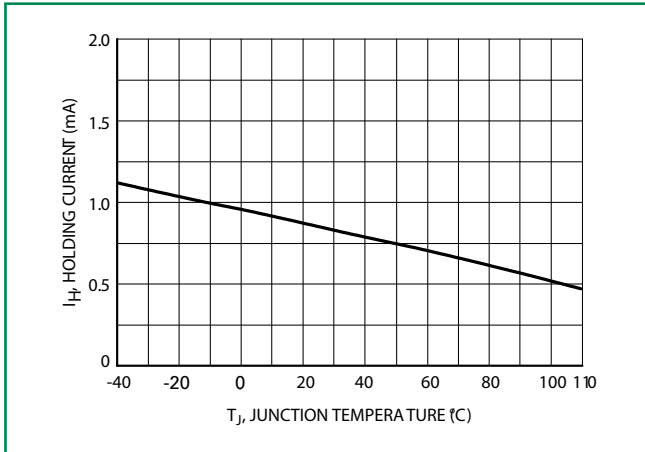
**Figure 5. Typical Gate Trigger Current vs Junction Temperature**



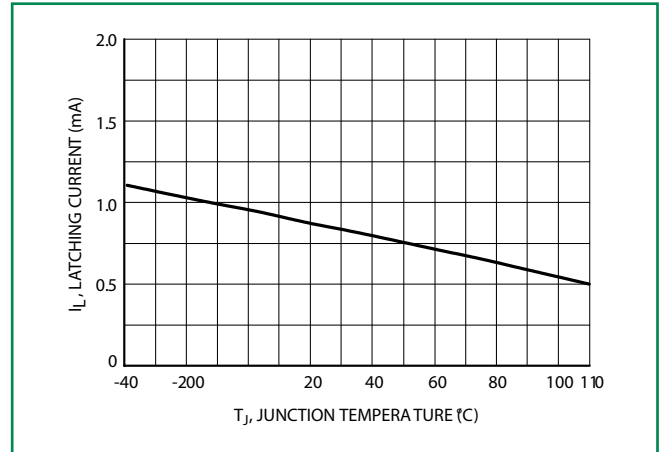
**Figure 6. Typical Gate Trigger Voltage vs Junction Temperature**



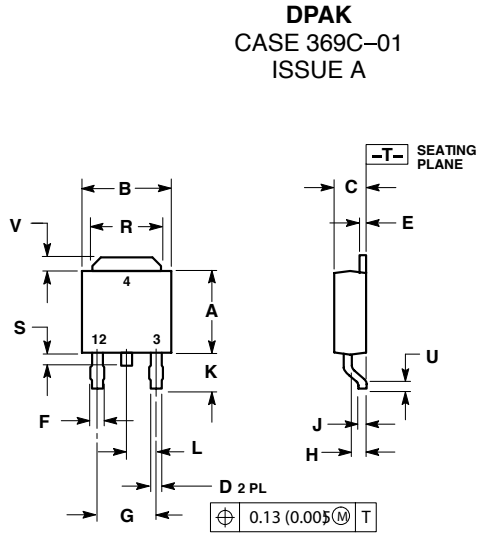
**Figure 7. Typical Holding Current vs Junction Temperature**



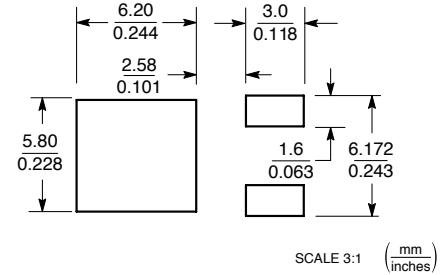
**Figure 8. Typical Latching Current vs Junction Temperature**



### Dimensions



### Soldering Footprint

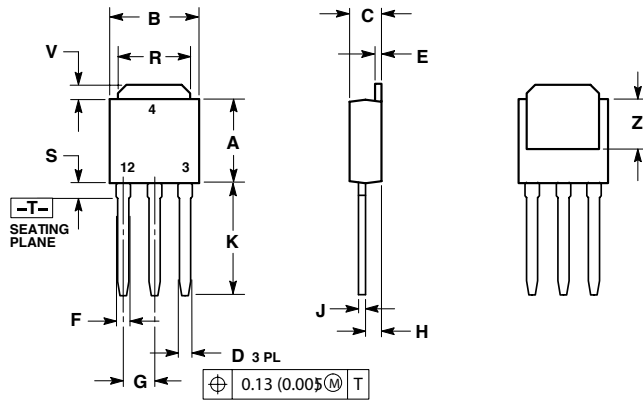


Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.030	0.045	0.76	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108 REF		2.74 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

### Dimensions

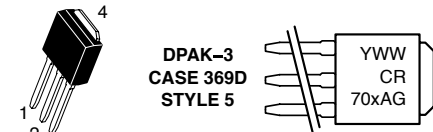
**DPAK-3**  
CASE 369D-01  
ISSUE B



Dim	Inches		Millimeters	
	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	---

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

### Part Marking System



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

### Pin Assignment

1	Gate
2	Anode
3	Cathode
4	Anode

### Ordering Information

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

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