

## Advance Information

# Silicon Controlled Rectifiers

## Reverse Blocking Thyristors

Designed for high volume, low cost, industrial and consumer applications such as motor control, process control, temperature, light and speed control.

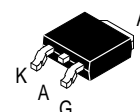
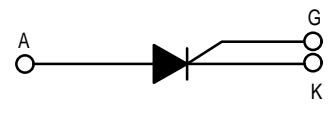
- Small Size
- Passivated Die for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Available in Surface Mount Lead Form — Case 369A

### ORDERING INFORMATION

- To Obtain "DPAK" in Surface Mount Leadform (Case 369A):  
Shipped in 16 mm Tape and Reel — Add "T4" Suffix to Device Number,  
i.e., MCR718T4

**MCR716**  
**MCR718**

**SCRs**  
**4.0 AMPERES RMS**  
**400 thru 600 VOLTS**



**CASE 369A-13**  
**STYLE 4**

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

Characteristic	Symbol	Value	Unit
Peak Repetitive Off-State Voltage <sup>1</sup> Peak Repetitive Reverse Voltage ( $T_J = -40$ to $+110^\circ\text{C}$ , $R_{GK} = 1\text{ K}\Omega$ )	$V_{\text{DRM}}$ $V_{\text{RRM}}$	400 600	Volts
On-State RMS Current (All conduction Angles; $T_C = 90^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	4.0	Amps
Average On-State Current (All conduction Angles; $T_C = 90^\circ\text{C}$ )	$I_{\text{T(AV)}}$	2.6	Amps
Peak Non-Repetitive Surge Current (One Half Cycle, 60 Hz, $T_J = 110^\circ\text{C}$ )	$I_{\text{TSM}}$	25	Amps
Circuit Fusing Consideration ( $t = 8.3\text{ msec}$ )	$I^2t$	2.6	$\text{A}^2\text{sec}$
Peak Gate Power (Pulse Width $\leq 10\text{ }\mu\text{s}$ , $T_C = 90^\circ\text{C}$ )	$P_{\text{GM}}$	0.5	Watt
Average Gate Power ( $t = 8.3\text{ msec}$ , $T_C = 90^\circ\text{C}$ )	$P_{\text{G(AV)}}$	0.1	Watt
Peak Gate Current (Pulse Width $\leq 10\text{ }\mu\text{s}$ , $T_C = 90^\circ\text{C}$ )	$I_{\text{GM}}$	0.2	Amp
Operating Junction Temperature Range	$T_J$	$-40$ to $+110$	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	$-40$ to $+150$	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta\text{JC}}$	3.0	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Case 369A) <sup>(2)</sup>	$R_{\theta\text{JA}}$	80	$^\circ\text{C/W}$

1..  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; 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.

2. Case 369A, when surface mounted on minimum recommended pad size.

**MCR716 MCR718****ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  and  $R_{GK} = 1\text{ K}\Omega$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Reverse Gate Blocking Voltage ( $I_{GR} = 10\text{ }\mu\text{A}$ )	$V_{GRM}$	10	12.5	18	Volts
Peak Forward Blocking Current <sup>1</sup> Peak Reverse Blocking Current <sup>3</sup> ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ ) $T_C = 25^\circ\text{C}$ $T_C = 110^\circ\text{C}$	$I_{DRM}$ $I_{RRM}$	— —	— —	10 200	$\mu\text{A}$
Peak Reverse Gate Blocking Current ( $V_{GR} = 10\text{ V}$ )	$I_{RGM}$	—	—	1.2	$\mu\text{A}$
Peak On-State Voltage <sup>2</sup> ( $I_{TM} = 5.0\text{ A Peak}$ ) ( $I_{TM} = 8.2\text{ A Peak}$ )	$V_{TM}$	— —	1.3 1.5	1.5 2.2	Volts
Gate Trigger Current (Continuous dc) <sup>3</sup> ( $V_D = 12\text{ Vdc}$ , $R_L = 30\text{ Ohms}$ , $T_C = 25^\circ\text{C}$ ) ( $V_D = 12\text{ Vdc}$ , $R_L = 30\text{ Ohms}$ , $T_C = -40^\circ\text{C}$ )	$I_{GT}$	1.0 —	25 —	75 300	$\mu\text{A}$
Gate Trigger Voltage (Continuous dc) <sup>3</sup> ( $V_D = 12\text{ Vdc}$ , $R_L = 30\text{ Ohms}$ , $T_C = 25^\circ\text{C}$ ) ( $V_D = 12\text{ Vdc}$ , $R_L = 30\text{ Ohms}$ , $T_C = -40^\circ\text{C}$ ) ( $V_D = 12\text{ Vdc}$ , $R_L = 30\text{ Ohms}$ , $T_C = 110^\circ\text{C}$ )	$V_{GT}$	0.3 — 0.2	0.55 — —	0.8 1 —	Volts
Holding Current <sup>1</sup> ( $V_D = 12\text{ Vdc}$ , $I_G = 2.0\text{ mA}$ , $I_{T(\text{init})} = 200\text{ mA}$ , $T_C = 25^\circ\text{C}$ ) ( $V_D = 12\text{ Vdc}$ , $I_G = 2.0\text{ mA}$ , $I_{T(\text{init})} = 200\text{ mA}$ , $T_C = -40^\circ\text{C}$ )	$I_H$	0.4 —	1.0 —	5.0 10	mA
Latching Current <sup>1</sup> ( $V_D = 12\text{ Vdc}$ , $I_G = 2.0\text{ mA}$ , $T_C = 25^\circ\text{C}$ ) ( $V_D = 12\text{ Vdc}$ , $I_G = 2.0\text{ mA}$ , $T_C = -40^\circ\text{C}$ )	$I_L$	— —	— —	5.0 10	mA

**DYNAMIC CHARACTERISTICS**

Total Turn-On Time (Source Voltage = 12 V, $R_S = 6\text{ K}\Omega$ , $I_T = 8\text{ A(pk)}$ , $R_{GK} = 1\text{ K}\Omega$ ) ( $V_D = \text{Rated } V_{DRM}$ , Rise Time = 20 ns, Pulse Width = 10 $\mu\text{s}$ )	$t_{gt}$	—	2.0	5.0	$\mu\text{s}$
Critical Rate of Rise of Off-State Voltage ( $V_D = 0.67 \times \text{Rated } V_{DRM}$ , Exponential Waveform, $T_J = 110^\circ\text{C}$ )	$dv/dt$	5.0	10	—	V/ $\mu\text{s}$
Repetitive Critical Rate of Rise of On-State Current ( $f = 60\text{ Hz}$ , $I_{PK} = 30\text{ A}$ , $PW = 100\text{ }\mu\text{s}$ , $dI_G/dt = 1\text{ A}/\mu\text{s}$ )	$di/dt$	—	—	100	A/ $\mu\text{s}$

- 1.. Ratings apply for negative gate voltage or  $R_{GK} = 1\text{ K}\Omega$ . Devices shall not have a positive gate voltage concurrently with a negative voltage on the anode. Devices should not be tested with a constant current source for forward and reverse blocking capability such that the voltage applied exceeds the rated blocking voltage.
- 2.. Pulse Test: Pulse Width  $\leq 2\text{ ms}$ , Duty Cycle  $\leq 2\%$ .
- 3.. Does not include  $R_{GK}$  current.

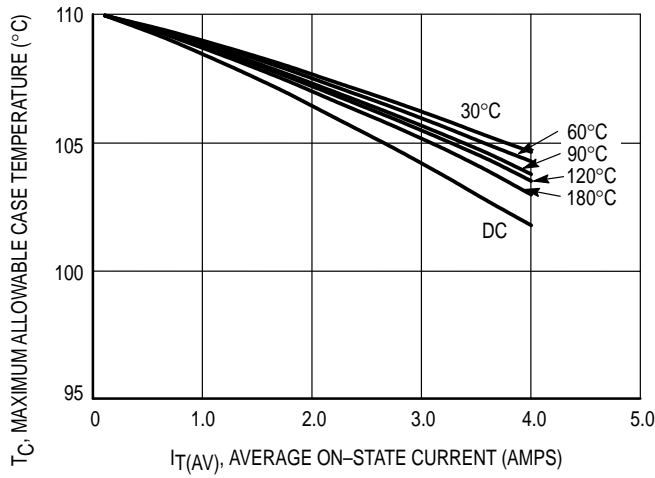


Figure 1. Average Current Derating

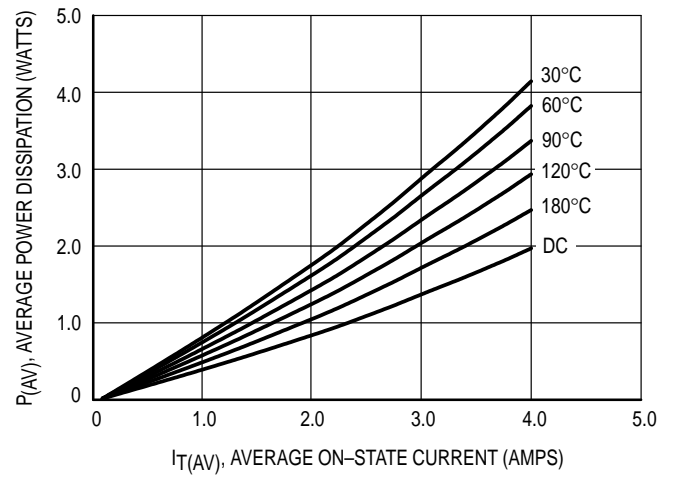


Figure 2. On-State Power Dissipation

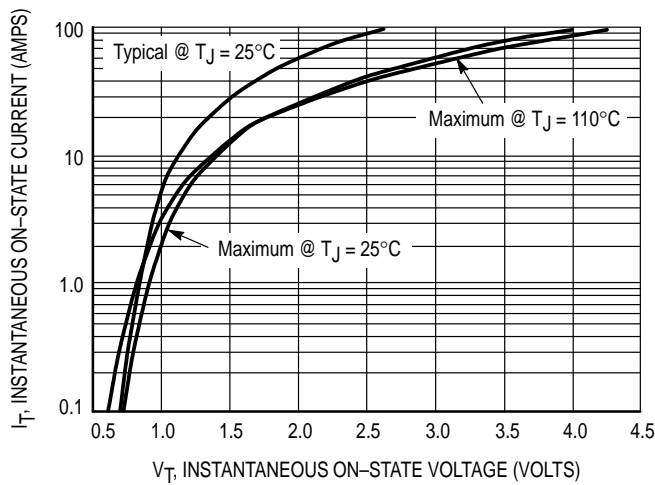


Figure 3. On-State Characteristics

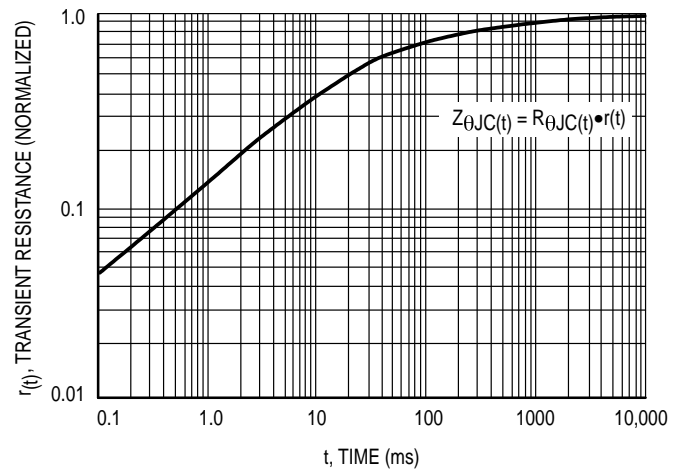


Figure 4. Transient Thermal Response

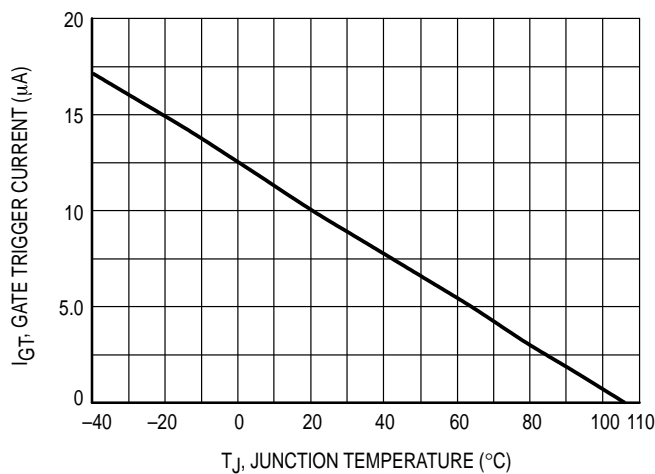


Figure 5. Typical Gate Trigger Current versus Junction Temperature

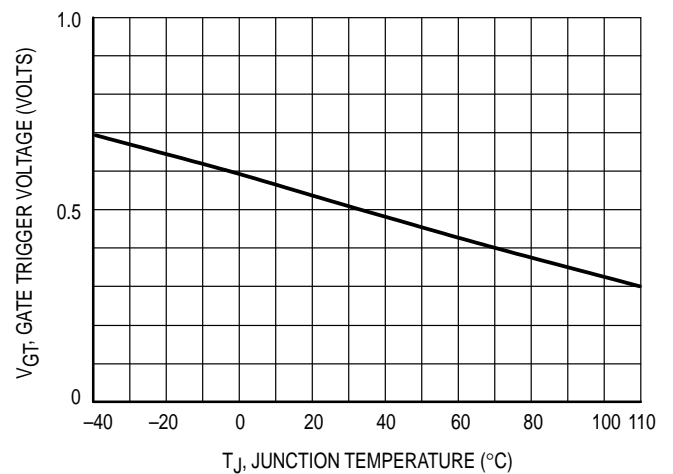


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

## MCR716 MCR718

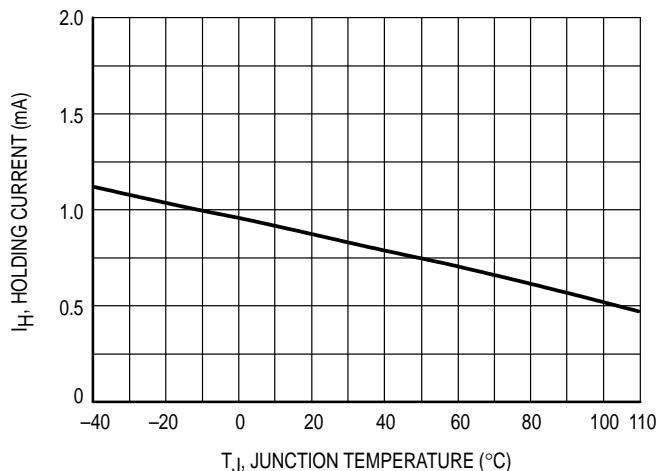


Figure 7. Typical Holding Current versus Junction Temperature

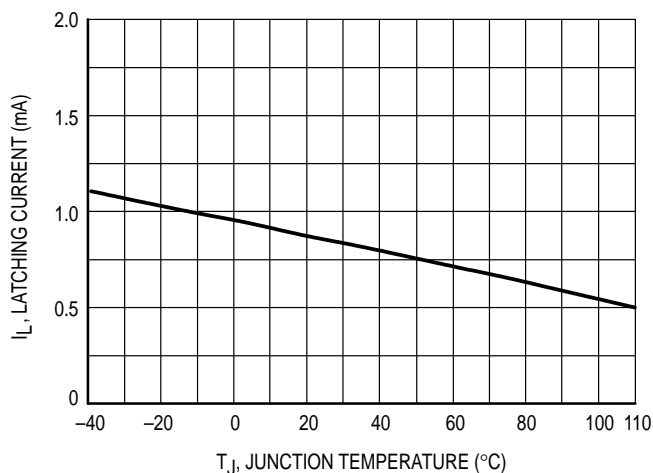
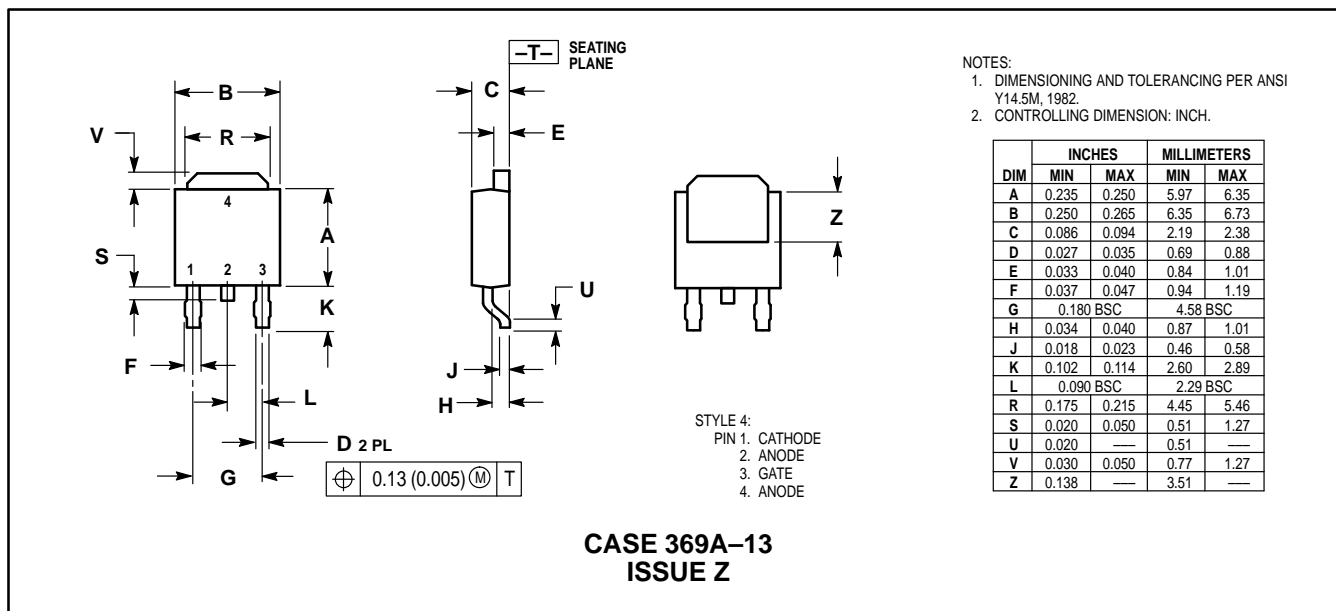



Figure 8. Typical Latching Current versus Junction Temperature

## PACKAGE DIMENSIONS



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