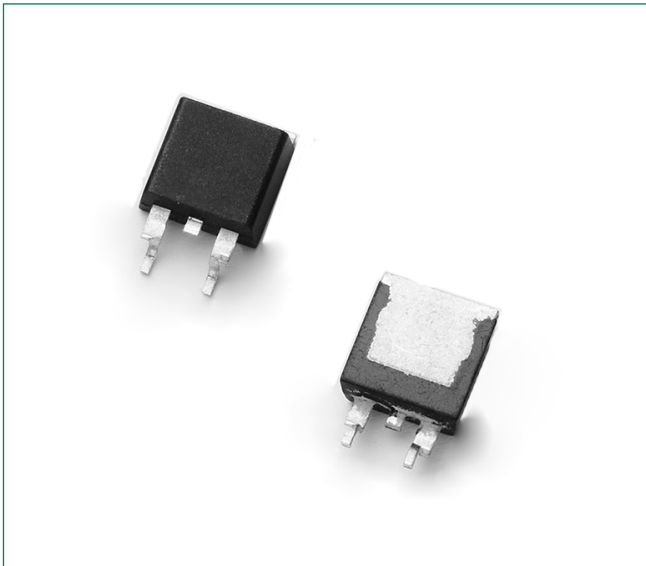


### MCR716, MCR718



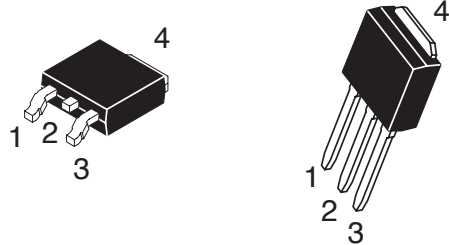
#### Description

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

#### Features

- Small Size
- Passivated Die for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- 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

#### Pin Out



#### Functional Diagram



#### Additional Information



[Datasheet](#)



[Resources](#)



[Samples](#)

### Maximum Ratings ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) ( $T_J = -40$ to $125^\circ\text{C}$ , Sine Wave, 50 to 60 Hz, Gate Open)	$V_{\text{DRM}}$ $V_{\text{RRM}}$	400 600	V
On-State RMS Current (All Conduction Angles; $T_C = 90^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	4.0	A
Average On-State Current (180° Conduction Angles; $T_C = 90^\circ\text{C}$ )	$I_{\text{T(AV)}}$	2.6	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 110^\circ\text{C}$ )	$I_{\text{TSM}}$	25	A
Circuit Fusing Consideration ( $t = 8.3$ ms)	$I^2t$	2.6	A <sup>2</sup> sec
Forward Peak Gate Power (Pulse Width $\leq 10$ $\mu\text{sec}$ , $T_C = 90^\circ\text{C}$ )	$P_{\text{GM}}$	0.5	W
Forward Average Gate Power ( $t = 8.3$ msec, $T_C = 90^\circ\text{C}$ )	$P_{\text{GM(AV)}}$	0.1	W
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 90^\circ\text{C}$ )	$I_{\text{GM}}$	0.2	A
Operating Junction Temperature Range	$T_J$	-40 to +110	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	-40 to +150	$^\circ\text{C}$

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.

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; 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

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

### 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 (Note 3) ( $V_{AK} = \text{Rated } V_{DRM}$ or $V_{RRM}$ , $R_{GK} = 1.0 \text{ k}\Omega$ )	$T_J = 25^\circ\text{C}$	$I_{DRM}$	-	-	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 Reverse Gate Blocking Voltage ( $I_{GR} = 10 \mu\text{A}$ )		$V_{GRM}$	10	12.5	18	V
Peak Reverse Gate Blocking Current ( $V_{GR} = 10 \text{ V}$ )		$I_{RGM}$	-	-	1.2	$\mu\text{A}$
Peak Forward On–State Voltage (Note 4)	( $I_{TM} = 5.0 \text{ A Peak}$ )	$V_{TM}$	-	1.3	1.5	V
	( $I_{TM} = 8.2 \text{ A Peak}$ )		-	1.5	2.2	
Gate Trigger Current (Continuous dc) (Note 5) ( $V_{AK} = 12 \text{ Vdc}$ , $R_L = 30 \Omega$ )	( $T_J = 25^\circ\text{C}$ )	$I_{GT}$	1.0	25	75	$\mu\text{A}$
	( $T_J = -40^\circ\text{C}$ )		-	-	300	
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}_{DC}$ , $R_L = 30 \Omega$ ) (Note 5)	( $T_J = 25^\circ\text{C}$ )	$V_{GT}$	0.3	0.55	0.8	V
	( $T_J = -40^\circ\text{C}$ )		-	-	1.0	
	( $T_J = 110^\circ\text{C}$ )		0.2	-	-	
Holding Current ( $V_D = 12 \text{ V}$ , Initiating Current = 200 mA, $R_{GK} = 1 \text{ k}\Omega$ )	( $T_J = 25^\circ\text{C}$ )	$I_H$	0.4	1.0	5.0	mA
	( $T_J = -40^\circ\text{C}$ )		-	-	10	
Latching Current ( $V_D = 12 \text{ V}_{DC}$ , $I_G = 2.0 \text{ mA}$ , $T_c = 25^\circ\text{C}$ ) ( $V_D = 12 \text{ V}_{DC}$ , $I_G = 2.0 \text{ mA}$ , $T_c = -40^\circ\text{C}$ )		$I_L$	-	-	5.0	mA
			-	-	10	
Total Turn–On Time (Source Voltage = 12 V, $R_S = 6.0 \text{ k}\Omega$ , $I_T = 8 \text{ A(pk)}$ , $R_{GK} = 1.0 \text{ k}\Omega$ ) ( $V_D = \text{Rated } V_{DRM}$ , Rise Time = 20 ns, Pulse Width = 10 $\mu\text{s}$ )		tgt	-	2.0	5.0	$\mu\text{s}$

### Dynamic Characteristics

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Off–State Voltage ( $V_D = 0.67 \times \text{Rated } V_{DRM}$ , Exponential Waveform, $R_{GK} = 1.0 \text{ k}\Omega$ , $T_J = 110^\circ\text{C}$ )	dv/dt	5.0	10	-	V/ $\mu\text{s}$
Critical Rate of Rise of On–State Current ( $I_{PK} = 50 \text{ A}$ , $P_w = 40 \text{ sec}$ , $diG/dt = 1 \text{ A/sec}$ , $I_{gt} = 50 \text{ mA}$ )	di/dt	-	-	100	A/ $\mu\text{s}$

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

3. Ratings apply for negative gate voltage or  $R_{GK} = 1.0 \text{ k}\Omega$ . 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.

4. Pulse Test; Pulse Width  $\leq 2.0 \text{ msec}$ , Duty Cycle  $\leq 2\%$ .

5.  $R_{GK}$  current not included in measurements.

### 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

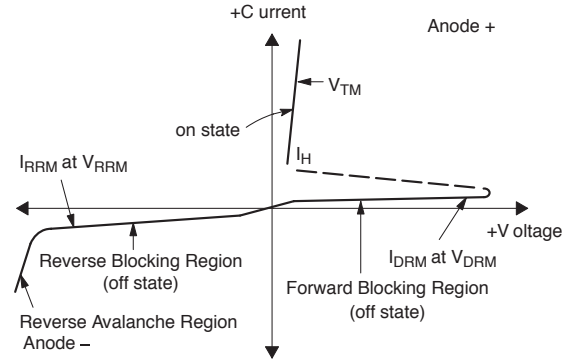


Figure 1. RMS Current Derating

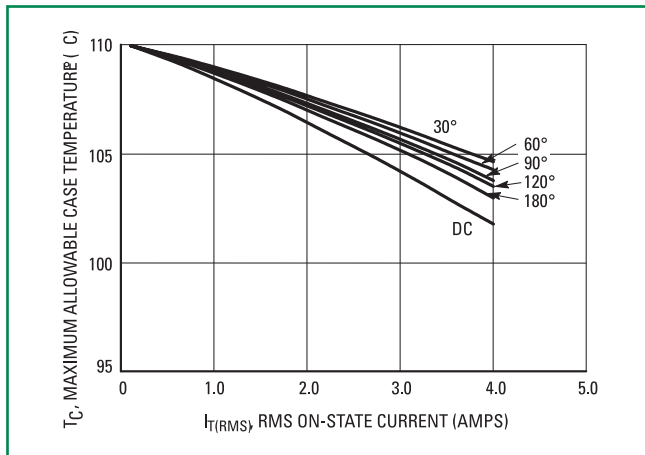


Figure 2. On-State Power Dissipation

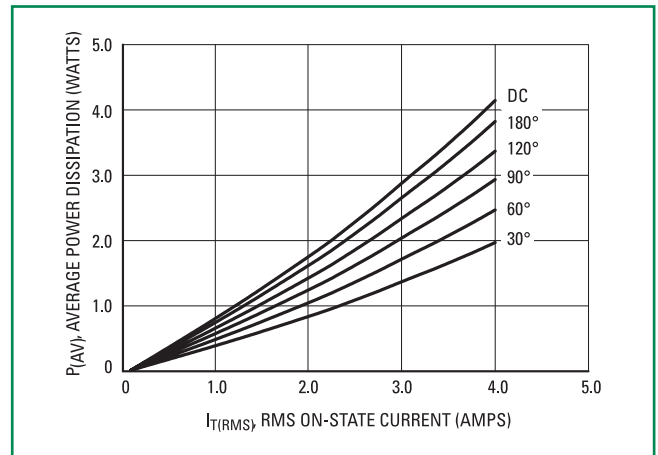


Figure 3. On-State Characteristics

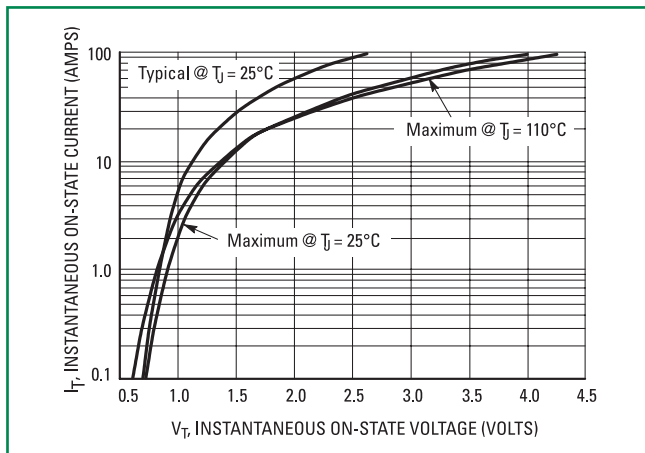
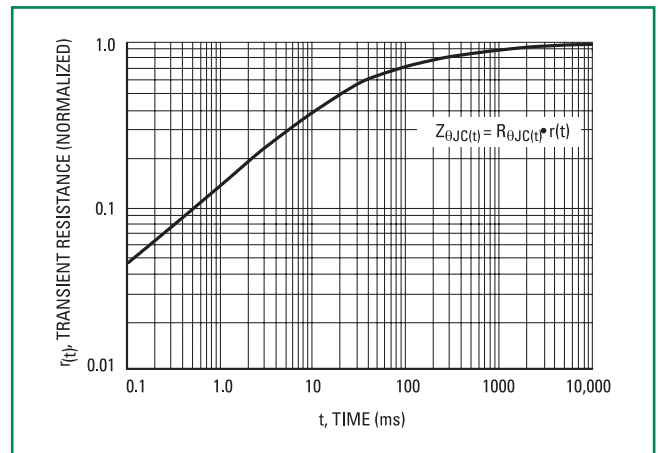
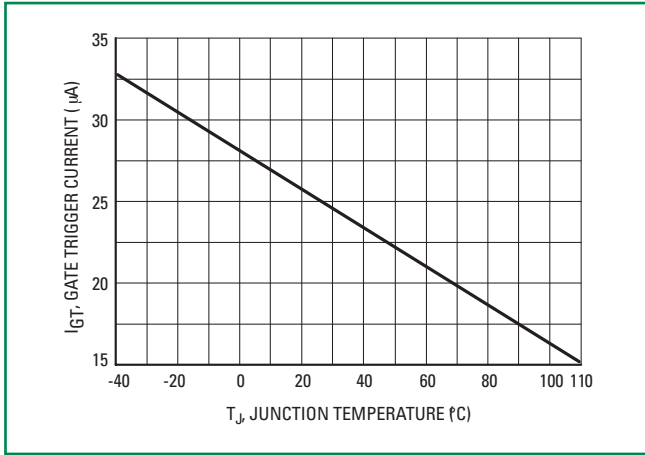


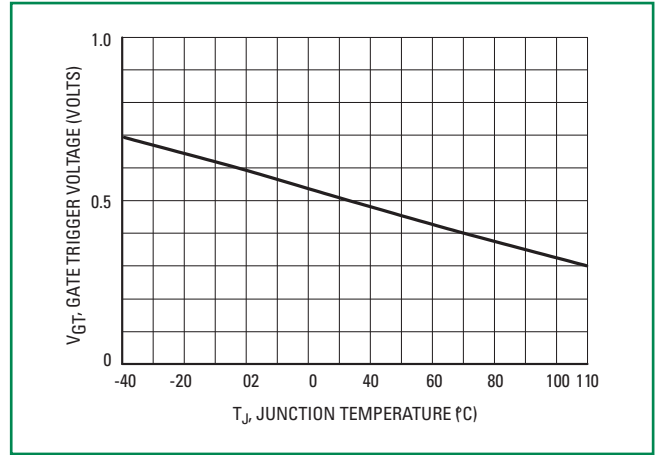
Figure 4. Transient Thermal Response



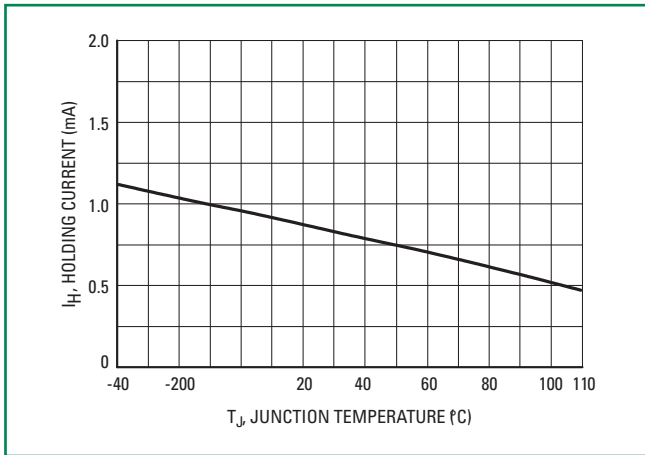
**Figure 5. Typical Gate Trigger Current vs Junction Temperature**



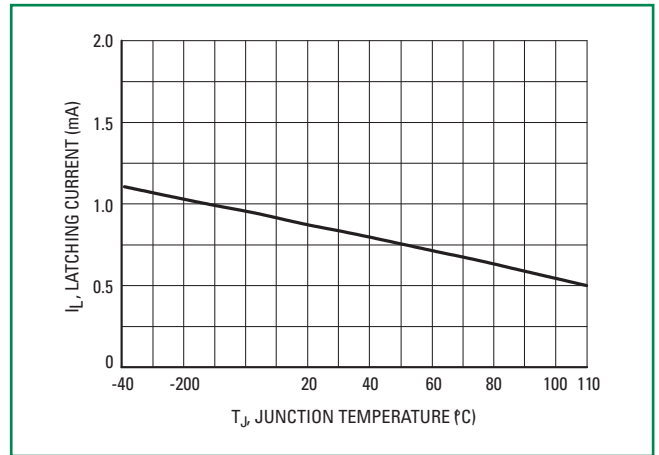
**Figure 6. Typical Gate Trigger Voltage vs Junction Temperature**



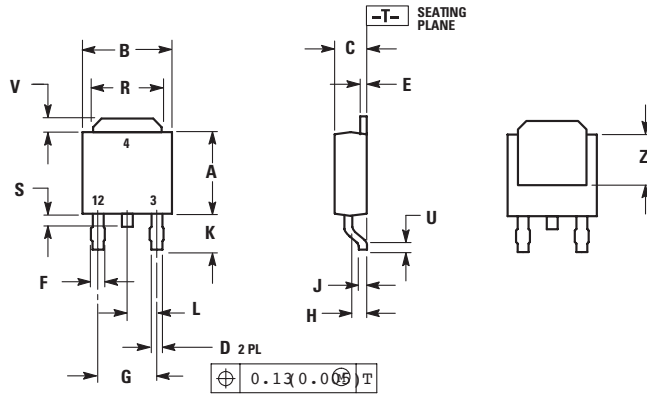
**Figure 7. Typical Holding Current vs Junction Temperature**



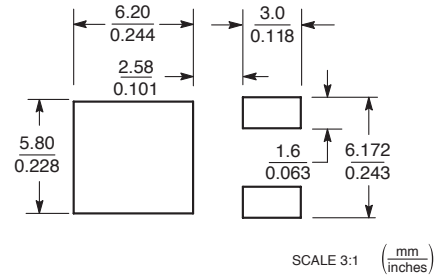
**Figure 8. Typical Latching Current vs Junction Temperature**



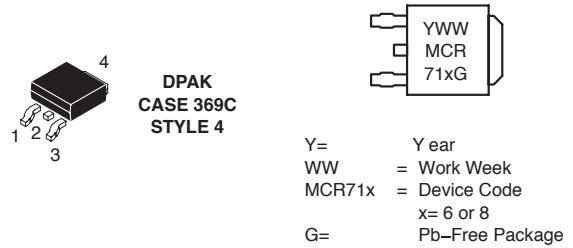
### Dimensions



### Soldering Footprint



### Part Marking System



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	---

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

### Pin Assignment

1	Cathode
2	Anode
3	Gate
4	Anode

### Ordering Information

Device	Package	Shipping
MCR716T4	DPAK	2500 / Tape & Reel
MCR716T4G	DPAK (Pb-Free)	
MCR718T4	DPAK	
MCR718T4G	DPAK (Pb-Free)	

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