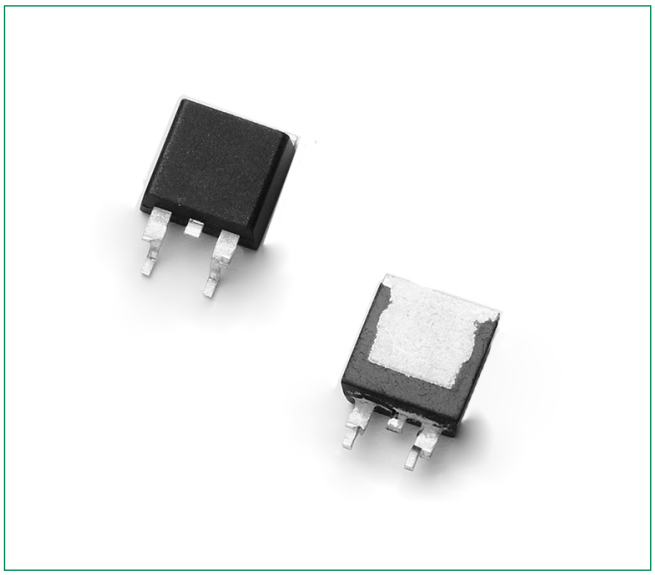
Thyristors

Surface Mount – 400V - 600V > MCR716, MCR718

MCR716, MCR718



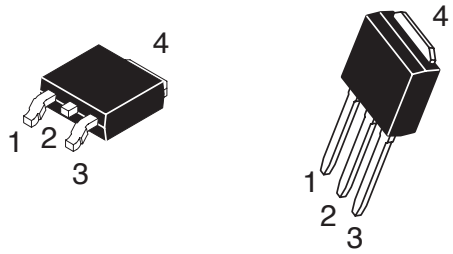
Description

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

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Maximum Ratings (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off–State Voltage (Note 1) (T_J =– 40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open) MCR716 MCR718	V_{DRM}, V_{RRM}	400 600	V
On-State RMS Current (All Conduction Angles; T_C = 90°C)	$I_{T\ (RMS)}$	4.0	A
Average On–State Current (180° Conduction Angles; T_C = 90°C)	$I_{T(AV)}$	2.6	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, T_J = 110°C)	I_{TSM}	25	A
Circuit Fusing Consideration (t = 8.3 ms)	I^2t	2.6	A^2sec
Forward Peak Gate Power (Pulse Width ≤ 10. µsec, T_C = 90°C)	P_{GM}	0.5	W
Forward Average Gate Power (t = 8.3 msec, T_C = 90°C)	$P_{GM\ (AV)}$	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

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_{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

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

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Electrical Characteristics - OFF (T_J = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Repetitive Forward or Reverse Blocking Current (Note 3) (V_{AK} = Rated V_{DRM} or V_{RRM}, R_{GK} = 1.0 kΩ	T_J = 25°C	I_{DRM}, I_{RRM}	-	-	10	µA
	T_J = 110°C		-	-	200	

Electrical Characteristics - ON (T_J = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Reverse Gate Blocking Voltage (I_{GR} = 10 µA)		V_{GRM}	10	12.5	18	V
Peak Reverse Gate Blocking Current (V_{GR} = 10 V)		I_{RGM}	–	–	1.2	µA
Peak Forward On–State Voltage (Note 4)	(I_{TM} = 5.0 A Peak)	V_{TM}	–	1.3	1.5	V
	(I_{TM} = 8.2 A Peak)		–	1.5	2.2	
Gate Trigger Current (Continuous dc) (Note 5) (V_{AK} = 12 Vdc, R_L = 30 Ω)	(T_J = 25°C)	I_{GT}	1.0	25	75	µA
	(T_J = –40°C)		–	–	300	
Gate Trigger Voltage (Continuous dc) (V_D = 12 V_{DC}, R_L = 30 Ω) (Note 5)	(T_J = 25°C)	V_{GT}	0.3	0.55	0.8	V
	(T_J = –40°C)		–	–	1.0	
	(T_J = 110°C)		0.2	–	–	
Holding Current (V_D = 12 V, Initiating Current = 200 mA, R_{GK} = 1 kΩ)	(T_J = 25°C)	I_H	0.4	1.0	5.0	mA
	(T_J = –40°C)		–	–	10	
Latching Current	(V_D = 12 V_{DC}, I_G = 2.0 mA, T_C = 25°C)	I_L	–	–	5.0	mA
	(V_D = 12 V_{DC}, I_G = 2.0 mA, T_C = -40°C)		–	–	10	
Total Turn–On Time (Source Voltage = 12 V, R_S = 6.0 kΩ, I_T = 8 A(pk), R_{GK} = 1.0 kΩ) (VD = Rated V_{DRM}, Rise Time = 20 ns, Pulse Width = 10 µs)		tgt	–	2.0	5.0	µs

Dynamic Characteristics

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Off–State Voltage (V_D = 0.67 X Rated V_{DRM}, Exponential Waveform, R_{GK} = 1.0 kΩ, TJ = 110°C)	dv/dt	5.0	10	–	V/µs
Critical Rate of Rise of On–State Current (IPK = 50 A, Pw = 40 sec, diG/dt = 1 A/sec, Igt = 50 mA	di/dt	–	–	100	Aµs

2. Case 369C, when surface mounted on minimum recommended pad size.
3. Ratings apply for negative gate voltage or RGK = 1.0 kΩ. 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 ≤ 2.0 msec, Duty Cycle ≤ 2%.
5. RGK current not included in measurements.

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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

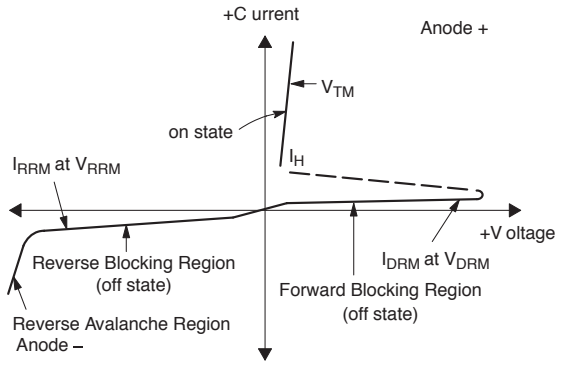

Figure 1. RMS Current Derating

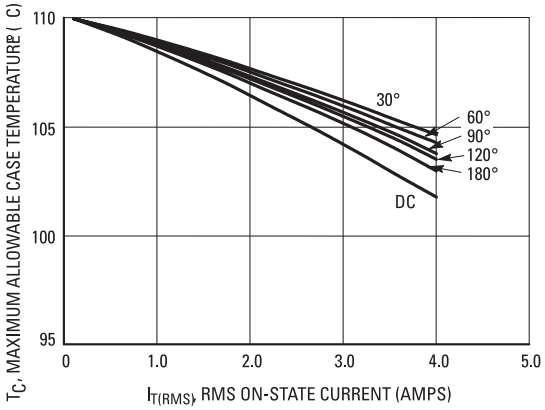

Figure 2. On–State Power Dissipation

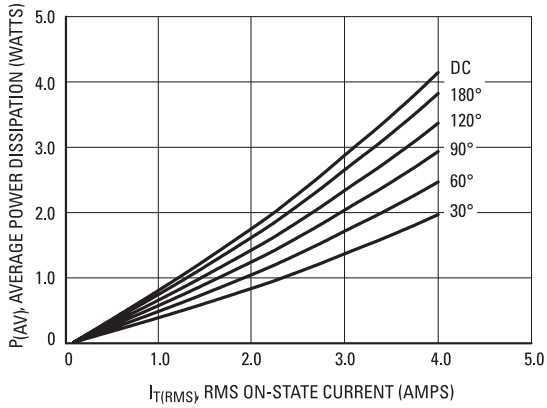

Figure 3. On–State Characteristics

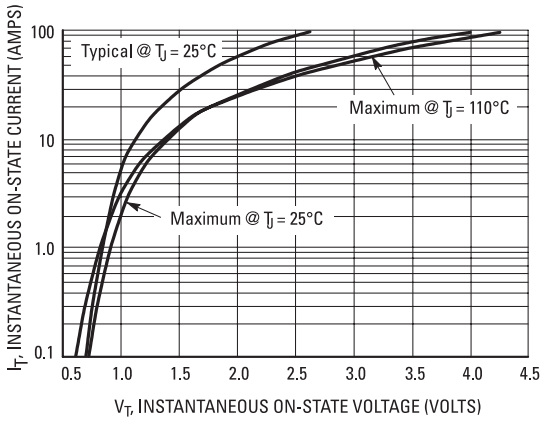

Figure 4. Transient Thermal Response

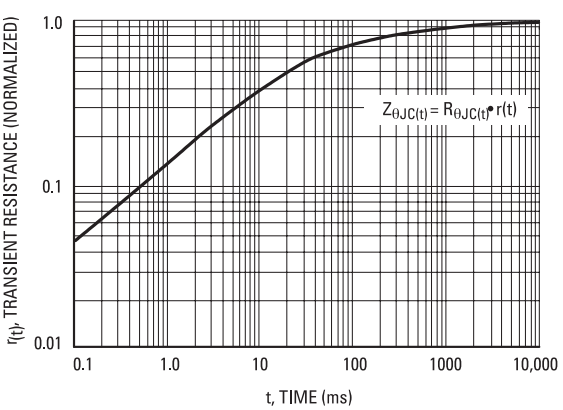

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Figure 5. Typical Gate Trigger Current vs Junction Temperature

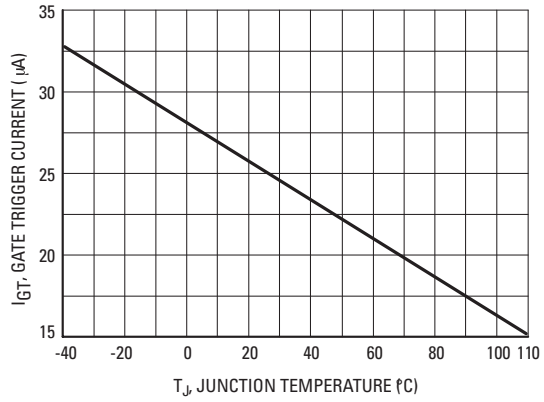


Figure 6. Typical Gate Trigger Voltage vs Junction Temperature

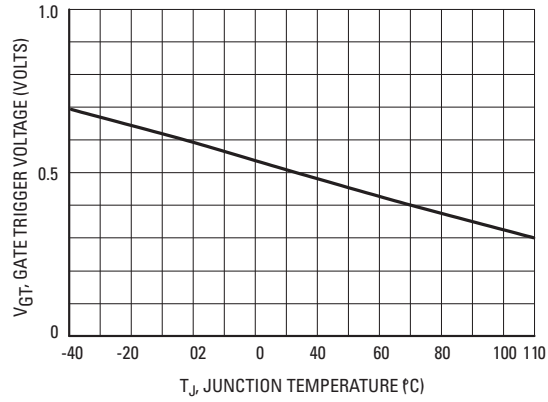


Figure 7. Typical Holding Current vs Junction Temperature

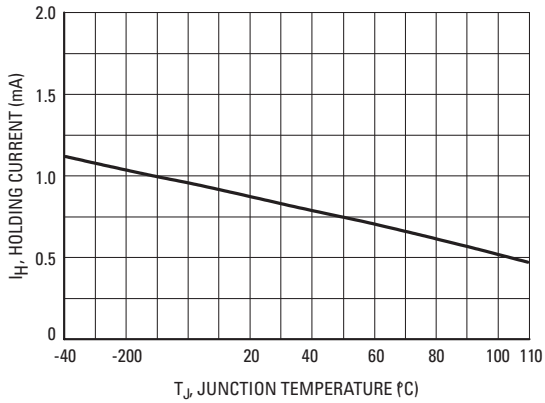
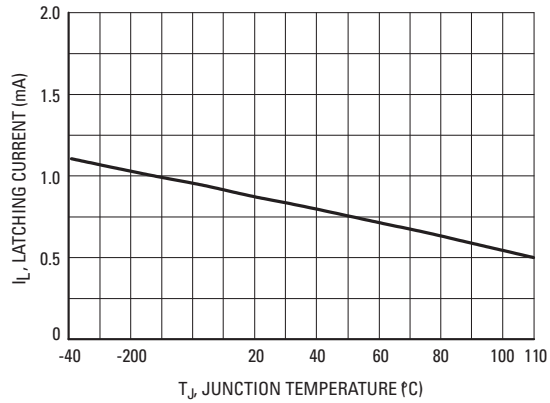


Figure 8. Typical Latching Current vs Junction Temperature



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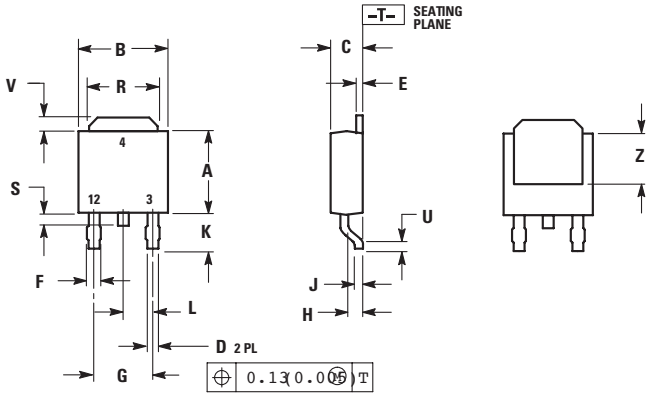
Surface Mount – 400V - 600V > MCR716, MCR718

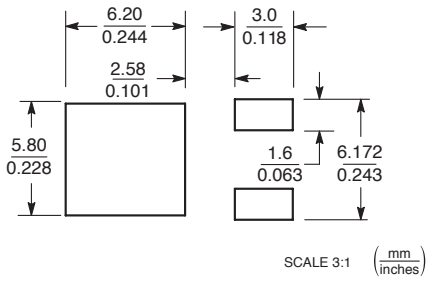
Dimensions



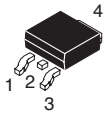
Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
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.

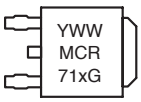
Soldering Footprint



Part Marking System



DPAK
CASE 369C
STYLE 4



Y= Year
WW = Work Week
MCR71x = Device Code
x= 6 or 8
G= Pb–Free Package

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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