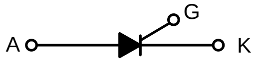
Toohong

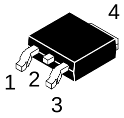
MCR716, MCR718

Sensitive Gate Silicon Controlled Rectifiers

Reverse Blocking Thyristors

SCRs
4.0 AMPERES RMS
400 − 600 VOLTS





DPAK
CASE 369C
STYLE 4

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
- Surface Mount Lead Form − Case 369C
- 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	Value	Unit
Peak Repetitive Off−State Voltage (Note 1) (T_J = −40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open) MCR716 MCR718	V_{DRM}, V_{RRM}	 400 600	V
On−State RMS Current (180° 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 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

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. V_{DRM} and V_{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.

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

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Peak Repetitive Forward or Reverse Blocking Current; R_{GK} = 1 kΩ (Note 3)		I_{DRM}				μA
(V_{AK} = Rated V_{DRM} or V_{RRM})	T_C = 25°C	I_{RRM}	–	–	10	
	T_C = 110°C		–	–	200	
ON CHARACTERISTICS						
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
Peak Forward On−State Voltage (Note 4)		V_{TM}				V
(I_{TM} = 5.0 A Peak)			–	1.3	1.5	
(I_{TM} = 8.2 A Peak)			–	1.5	2.2	
Gate Trigger Current (Continuous dc) (Note 5)		I_{GT}				μA
(V_D = 12 Vdc, R_L = 30 Ohms)	T_C = 25°C		1.0	25	75	
	T_C = −40°C		–	–	300	
Gate Trigger Voltage (Continuous dc) (Note 5)		V_{GT}				V
(V_D = 12 Vdc, R_L = 30 Ohms)	T_C = 25°C		0.3	0.55	0.8	
	T_C = −40°C		–	–	1.0	
	T_C = 110°C		0.2	–	–	
Holding Current (Note 3)		I_H				mA
(V_D = 12 Vdc, Initiating Current = 200 mA, Gate Open)	T_C = 25°C		0.4	1.0	5.0	
	T_C = −40°C		–	–	10	
Latching Current (Note 3)		I_L				mA
(V_D = 12 Vdc, I_G = 2.0 mA, T_C = 25°C)			–	–	5.0	
(V_D = 12 Vdc, I_G = 2.0 mA, T_C = −40°C)			–	–	10	
Total Turn-On Time (Source Voltage = 12 V, R_S = 6 kΩ, I_T = 8 A(pk), R_{GK} = 1 kΩ) (V_D = Rated V_{DRM}, Rise Time = 20 ns, Pulse Width = 10 μs)		t_{gt}	–	2.0	5.0	μs
DYNAMIC CHARACTERISTICS						
Critical Rate of Rise of Off−State Voltage (V_D = 0.67 x Rated V_{DRM}, R_{GK} = 1 kΩ, Exponential Waveform, T_J = 110°C)		dv/dt	5.0	10	–	V/μs
Repetitive Critical Rate of Rise of On−State Current (f = 60 Hz, I_{PK} = 30 A, PW = 100 μs, dIG/dt = 1 A/μs)		di/dt	–	–	100	A/μs

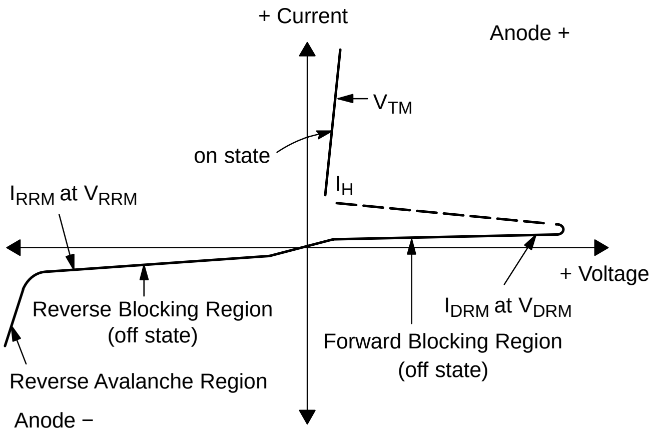
2. Case 369C, when surface mounted on minimum recommended pad size.
3. Ratings apply for negative gate voltage or R_{GK} = 1 kΩ. Devices shall not have a positive gate voltage concurrently with a negative voltage on the anode. Devices should not be tested with a constant current source for forward and reverse blocking capability such that the voltage applied exceeds the rated blocking voltage.
4. Pulse Test: Pulse Width ≤ 2 ms, Duty Cycle ≤ 2%.
5. R_{GK} current not included in measurements.

ORDERING INFORMATION

Device	Package	Shipping†
MCR716T4	DPAK	2500 / Tape and Reel
MCR716T4G	DPAK (Pb−Free)	
MCR718T4	DPAK	
MCR718T4G	DPAK (Pb−Free)	

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



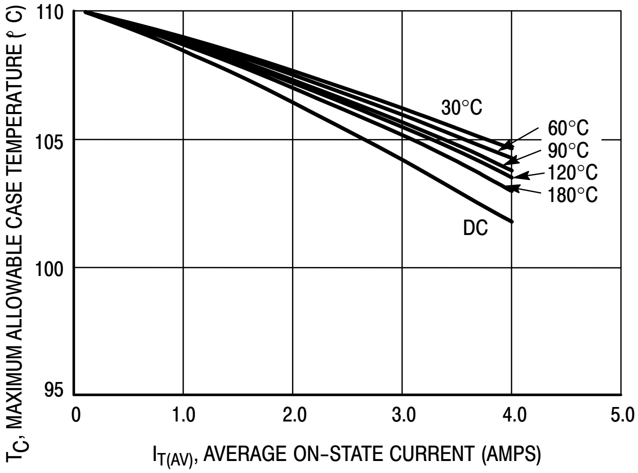


Figure 1. Average Current Derating

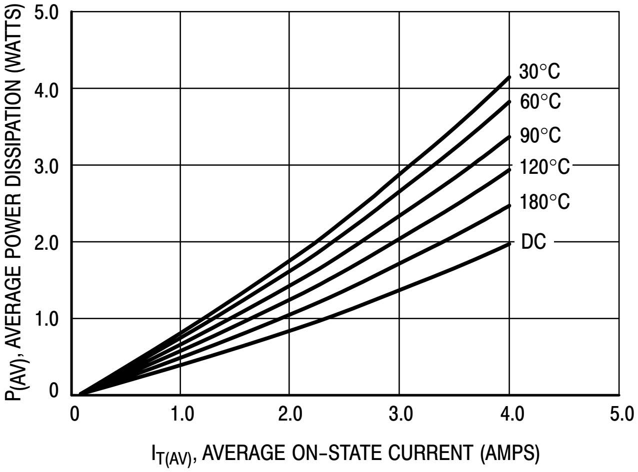


Figure 2. On−State Power Dissipation

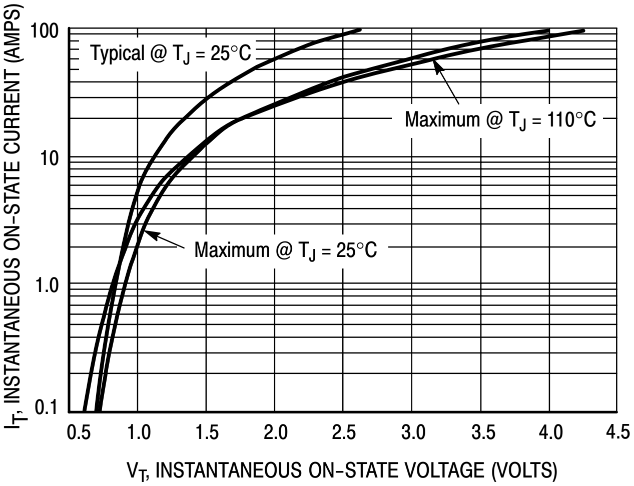


Figure 3. On−State Characteristics

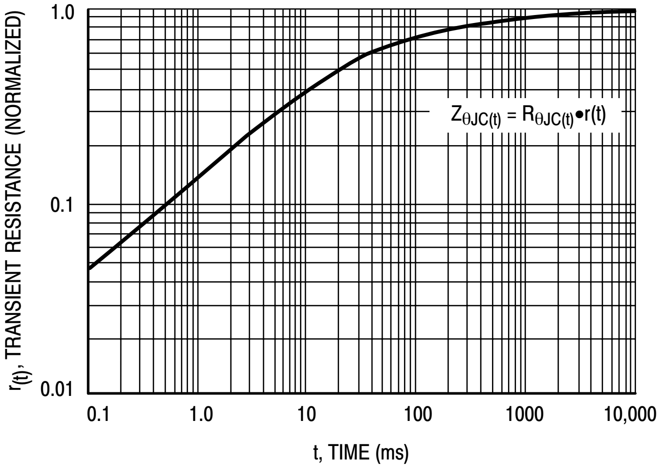


Figure 4. Transient Thermal Response

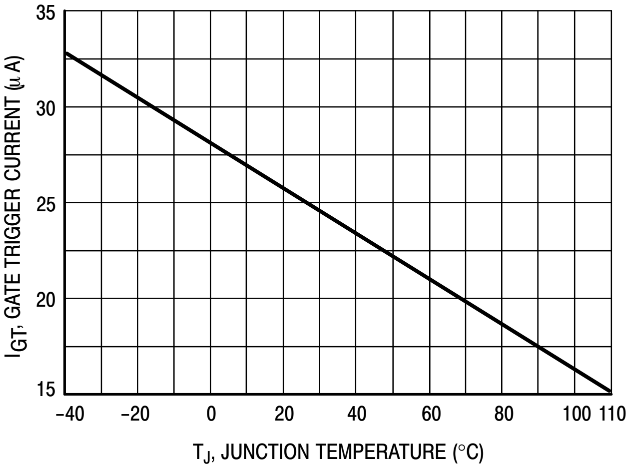


Figure 5. Typical Gate Trigger Current versus Junction Temperature

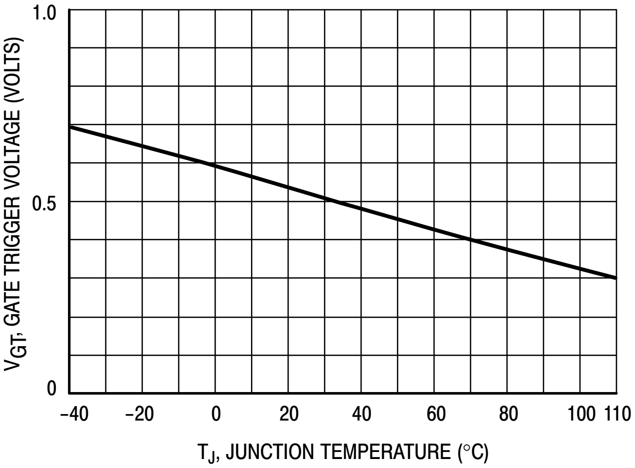


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

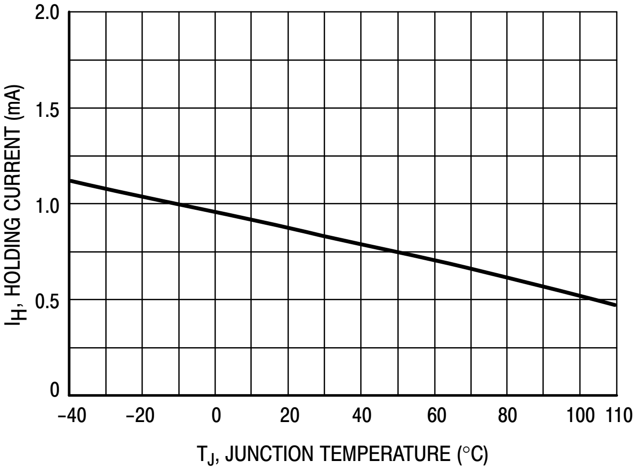


Figure 7. Typical Holding Current versus Junction Temperature

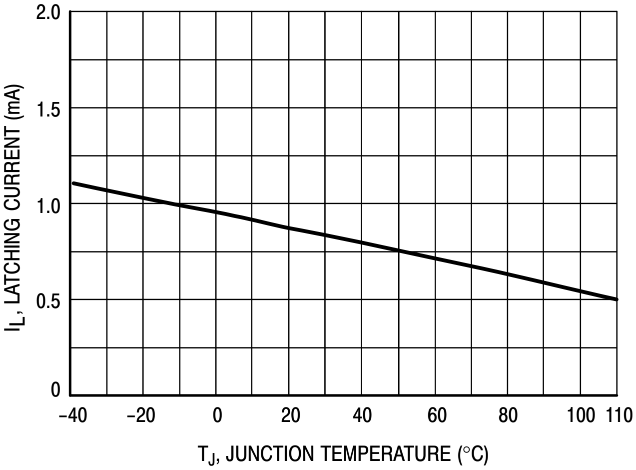


Figure 8. Typical Latching Current versus Junction Temperature