

MCR16NG

Silicon Controlled Rectifiers Reverse Blocking Thyristors

Designed primarily for half-wave ac control applications, such as motor controls, heating controls, and power supplies; or wherever half-wave, silicon gate-controlled devices are needed.

Features

- Blocking Voltage to 800 Volts
- On-State Current Rating of 16 Amperes RMS
- High Surge Current Capability – 160 Amperes
- Rugged Economical TO-220AB Package
- Glass Passivated Junctions for Reliability and Uniformity
- Minimum and Maximum Values of I_{GT} , V_{GT} , and I_H Specified for Ease of Design
- High Immunity to dv/dt – 100 V/ μ sec Minimum at 125°C
- These are Pb-Free Devices

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°C , Sine Wave, 50 to 60 Hz, Gate Open) MCR16NG	V_{DRM} , V_{RRM}	800	V
On-State RMS Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$)	$I_{T(RMS)}$	16	A
Peak Non-repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 125^\circ\text{C}$)	I_{TSM}	160	A
Circuit Fusing Consideration ($t = 8.3$ ms)	I^2t	106	A ² sec
Forward Peak Gate Power (Pulse Width ≤ 1.0 μ s, $T_C = 80^\circ\text{C}$)	P_{GM}	5.0	W
Forward Average Gate Power ($t = 8.3$ ms, $T_C = 80^\circ\text{C}$)	$P_{G(AV)}$	0.5	W
Forward Peak Gate Current (Pulse Width ≤ 1.0 μ s, $T_C = 80^\circ\text{C}$)	I_{GM}	2.0	A
Operating Junction Temperature Range	T_J	-40 to +125	°C
Storage Temperature Range	T_{stg}	-40 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, 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.



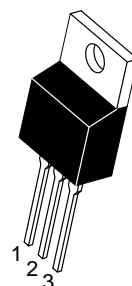
Expertise Applied | Answers Delivered

Littelfuse.com

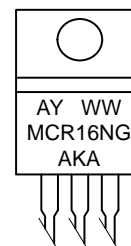
SCRs
16 AMPERES RMS
800 VOLTS



MARKING DIAGRAM



TO-220AB
CASE 221A-09
STYLE 3



A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package
AKA = Diode Polarity

PIN ASSIGNMENT

1	Cathode
2	Anode
3	Gate
4	Anode

ORDERING INFORMATION

Device	Package	Shipping
MCR16NG	TO-220AB (Pb-Free)	50 Units / Rail

MCR16NG

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.5	$^{\circ}\text{C/W}$
Junction-to-Ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T_L	260	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current ($V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$, Gate Open)	$T_J = 25^{\circ}\text{C}$ $T_J = 125^{\circ}\text{C}$	I_{DRM} , I_{RRM}	– –	– –	0.01 2.0	mA
--	---	--------------------------	--------	--------	-------------	----

ON CHARACTERISTICS

Peak Forward On-State Voltage (Note 2) ($I_{TM} = 32 \text{ A}$)	V_{TM}	–	–	1.7	V
Gate Trigger Current (Continuous dc) ($V_D = 12 \text{ V}$, $R_L = 100 \Omega$)	I_{GT}	2.0	10	20	mA
Gate Trigger Voltage (Continuous dc) ($V_D = 12 \text{ V}$, $R_L = 100 \Omega$)	V_{GT}	0.5	0.65	1.0	V
Hold Current (Anode Voltage = 12 V, Initiating Current = 200 mA, Gate Open)	I_H	4.0	25	40	mA
Latch Current ($V_D = 12 \text{ V}$, $I_g = 200 \text{ mA}$)	I_L	–	30	60	mA

DYNAMIC CHARACTERISTICS

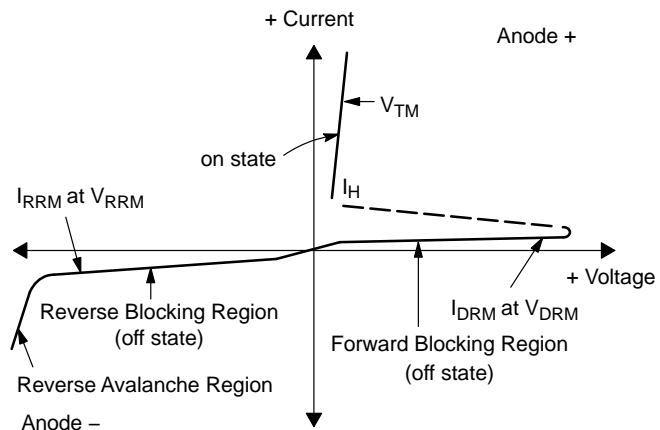
Critical Rate of Rise of Off-State Voltage ($V_D = \text{Rated } V_{DRM}$, Exponential Waveform, Gate Open, $T_J = 125^{\circ}\text{C}$)	dv/dt	100	300	–	V/ μs
Critical Rate of Rise of On-State Current ($I_{PK} = 50 \text{ A}$, $P_w = 30 \mu\text{s}$, $di/dt = 1 \text{ A}/\mu\text{sec}$, $I_{gt} = 50 \text{ mA}$)	di/dt	–	–	50	A/ μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Indicates Pulse Test: Pulse Width $\leq 2.0 \text{ ms}$, Duty Cycle $\leq 2\%$.

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



MCR16NG

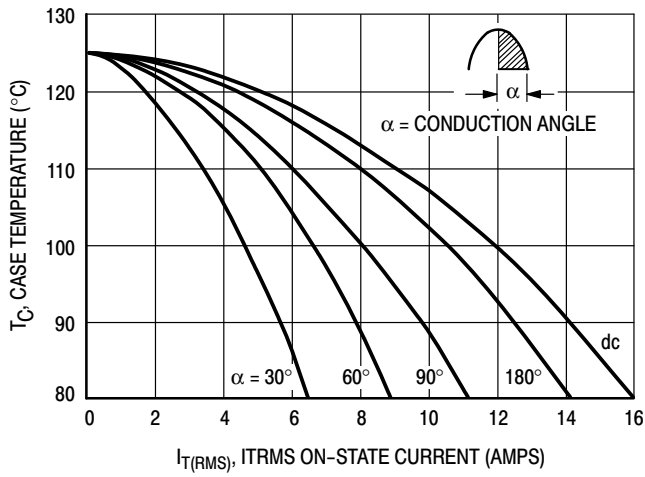


Figure 1. Typical RMS Current Derating

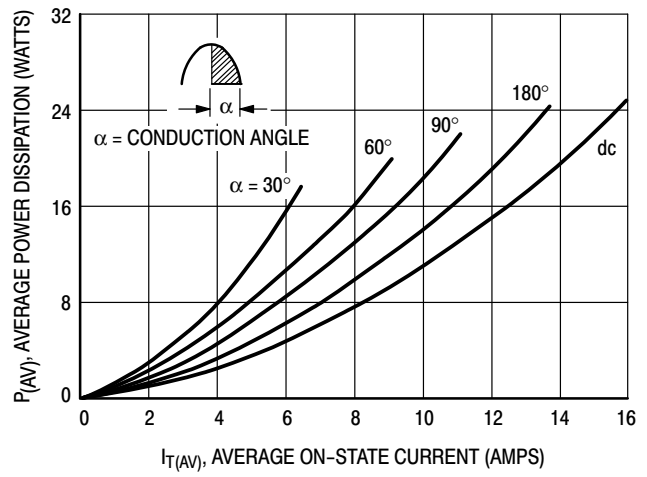


Figure 2. On State Power Dissipation

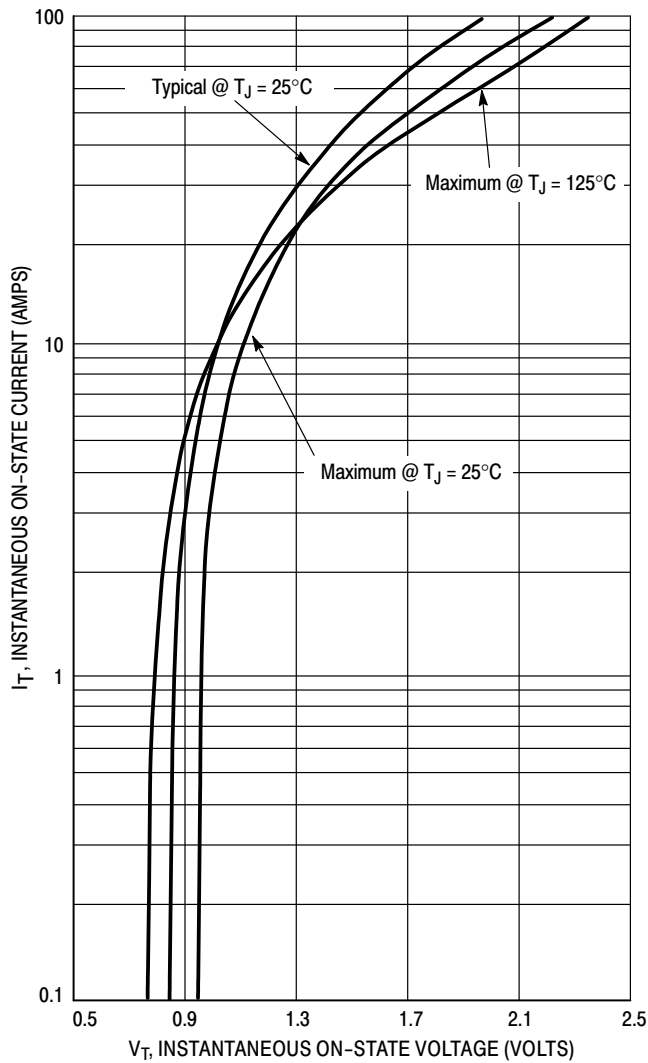


Figure 3. Typical On-State Characteristics

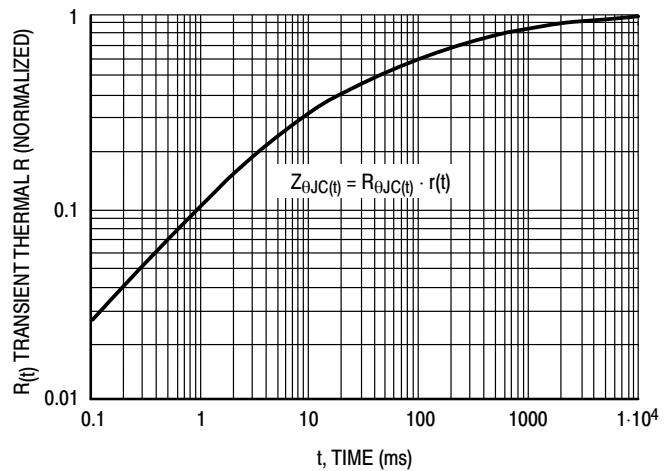


Figure 4. Transient Thermal Response

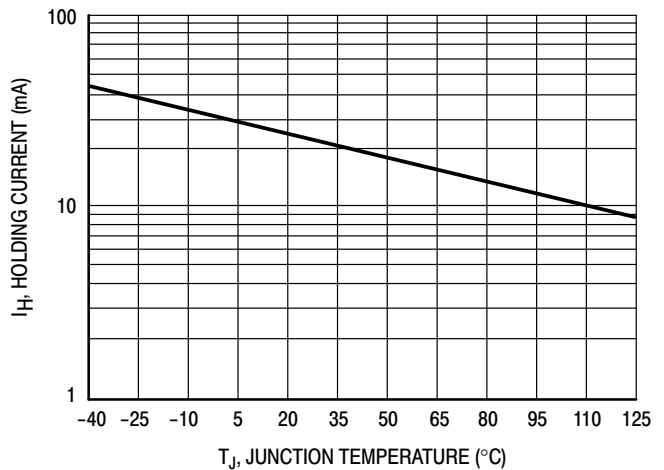


Figure 5. Typical Holding Current versus Junction Temperature

MCR16NG

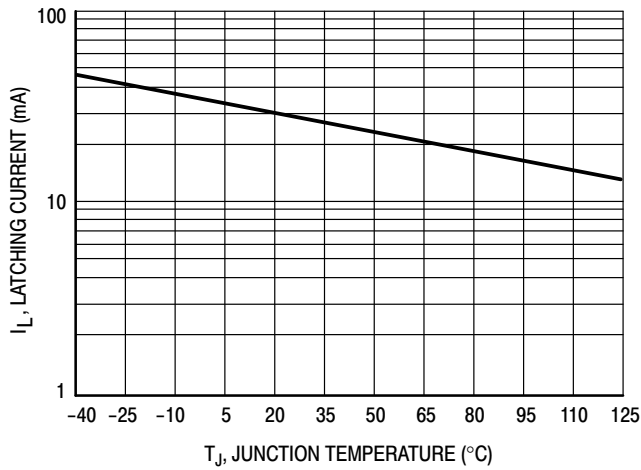


Figure 6. Typical Latching Current versus Junction Temperature

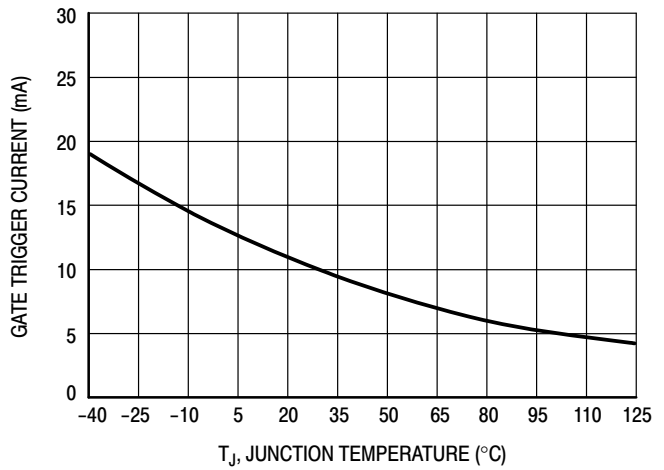


Figure 7. Typical Gate Trigger Current versus Junction Temperature

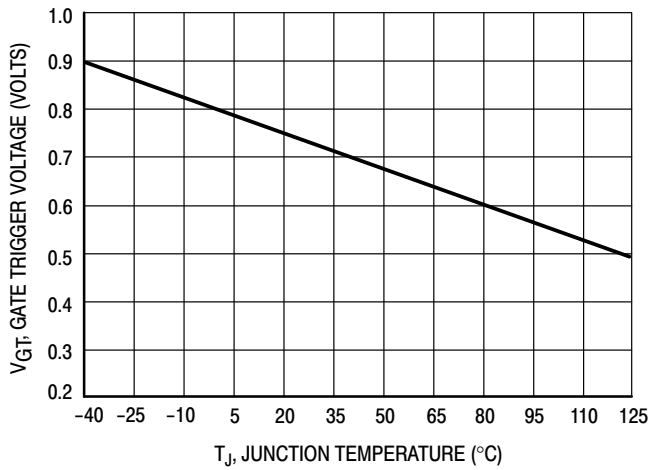


Figure 8. Typical Gate Trigger Voltage versus Junction Temperature

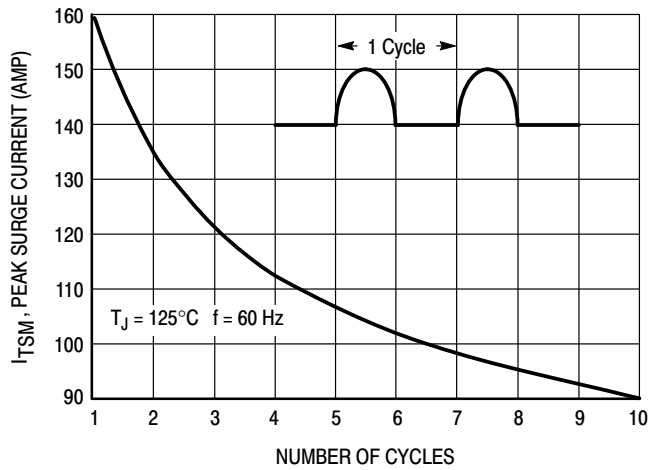
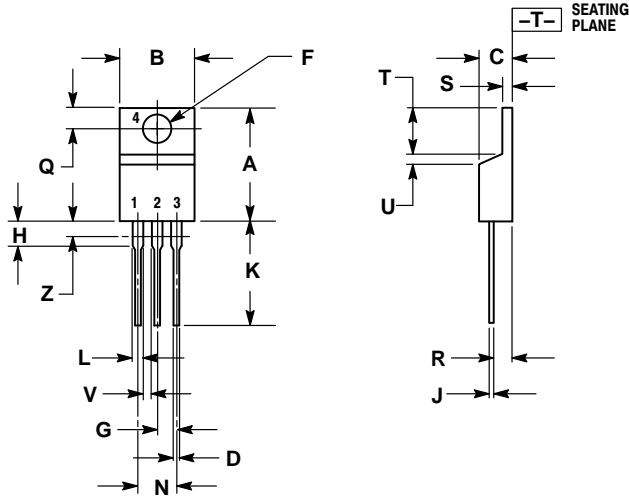


Figure 9. Maximum Non-Repetitive Surge Current

MCR16NG

PACKAGE DIMENSIONS

TO-220
CASE 221A-09
ISSUE AH



NOTES:

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.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

STYLE 3:

- PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse.

Littelfuse.com