

# MCR310 Series

Preferred Device

## Silicon Controlled Rectifiers

### Reverse Blocking Triode Thyristors

Designed for industrial and consumer applications such as temperature, light and speed control; process and remote controls; warning systems; capacitive discharge circuits and MPU interface.

- Center Gate Geometry for Uniform Current Density
- All Diffused and Glass-Passivated Junctions for Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Low Trigger Currents, 200  $\mu$ A Maximum for Direct Driving from Integrated Circuits
- Pb-Free Packages are Available

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

Rating	Symbol	Value	Unit
Peak Repetitive Forward and Reverse Blocking Voltage <sup>(1)</sup> ( $T_J = -40$ to $110^\circ\text{C}$ ) (1/2 Sine Wave, $R_{GK} = 1\text{ k}\Omega$ ) MCR310-6 MCR310-8 MCR310-10	$V_{DRM}$ or $V_{RRM}$	400 600 800	Volts
On-State RMS Current ( $T_C = 75^\circ\text{C}$ )	$I_{T(RMS)}$	10	Amps
Peak Non-repetitive Surge Current (1/2 Cycle, 60 Hz, $T_J = -40$ to $110^\circ\text{C}$ )	$I_{TSM}$	100	Amps
Circuit Fusing ( $t = 8.3\text{ ms}$ )	$I^2t$	40	$\text{A}^2\text{s}$
Peak Gate Voltage ( $t \leq 10\text{ }\mu\text{s}$ )	$V_{GM}$	$\pm 5$	Volts
Peak Gate Current ( $t \leq 10\text{ }\mu\text{s}$ )	$I_{GM}$	1	Amp
Peak Gate Power ( $t \leq 10\text{ }\mu\text{s}$ )	$P_{GM}$	5	Watts
Average Gate Power	$P_{G(AV)}$	0.75	Watt
Operating Junction Temperature Range	$T_J$	$-40$ to $+110$	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	$-40$ to $+150$	$^\circ\text{C}$
Mounting Torque	—	8	in.-lb.

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.2	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^\circ\text{C/W}$

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.

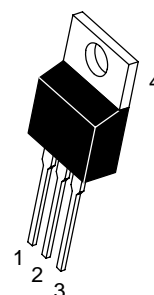
(1)  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



ON Semiconductor®

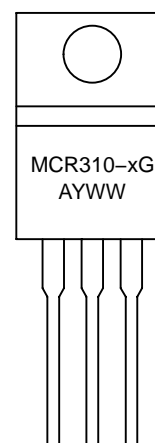
<http://onsemi.com>

SCRs  
10 AMPERES RMS  
400 thru 800 VOLTS



TO-220AB  
CASE 221A  
STYLE 3

#### MARKING DIAGRAM



x = 6, 8 or 10  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

#### ORDERING INFORMATION

Device	Package	Shipping
MCR310-6	TO220AB	500/Box
MCR310-6G	TO220AB (Pb-Free)	500/Box
MCR310-8	TO220AB	500/Box
MCR310-8G	TO220AB (Pb-Free)	500/Box
MCR310-10	TO220AB	500/Box
MCR310-10G	TO220AB (Pb-Free)	500/Box

Preferred devices are recommended choices for future use and best overall value.

# MCR310 Series

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , $R_{GK} = 1\text{ k}\Omega$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward Blocking Current <sup>(1)</sup> ( $T_J = 110^\circ\text{C}$ , $V_D = \text{Rated } V_{DRM}$ )	$I_{DRM}$	—	—	500	$\mu\text{A}$
Peak Reverse Blocking Current <sup>(1)</sup> ( $T_J = 110^\circ\text{C}$ , $V_R = \text{Rated } V_{RRM}$ )	$I_{RRM}$	—	—	500	$\mu\text{A}$
On-State Voltage ( $I_{TM} = 20\text{ A Peak}$ , Pulse Width $\leq 1\text{ ms}$ , Duty Cycle $\leq 2\%$ )	$V_{TM}$	—	1.7	2.2	Volts
Gate Trigger Current, Continuous dc <sup>(2)</sup> ( $V_D = 12\text{ V}$ , $R_L = 100\ \Omega$ )	$I_{GT}$	—	30	200	$\mu\text{A}$
Gate Trigger Voltage, Continuous dc ( $V_D = 12\text{ V}$ , $R_L = 100\ \Omega$ ) ( $V_D = \text{Rated } V_{DRM}$ , $R_L = 10\text{ k}\Omega$ , $T_J = 110^\circ\text{C}$ )	$V_{GT}$	— 0.1	0.5 —	1.5 —	Volts
Holding Current ( $V_D = 12\text{ V}$ , $I_{TM} = 100\text{ mA}$ )	$I_H$	—	—	6	mA
Critical Rate of Rise of Forward Blocking Voltage ( $V_D = \text{Rated } V_{DRM}$ , $T_J = 110^\circ\text{C}$ , Exponential Waveform)	$dv/dt$	—	10	—	$\text{V}/\mu\text{s}$
Gate Controlled Turn-On Time ( $V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 20\text{ A}$ , $I_G = 2\text{ mA}$ )	$t_{gt}$	—	1	—	$\mu\text{s}$

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. Does not include  $R_{GK}$  current.

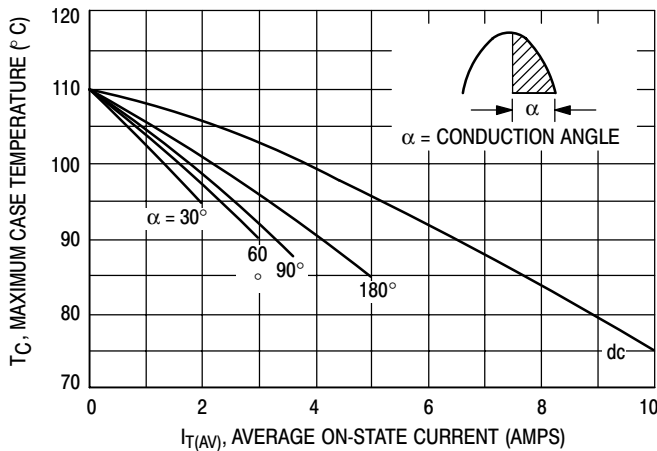


Figure 1. Average Current Derating

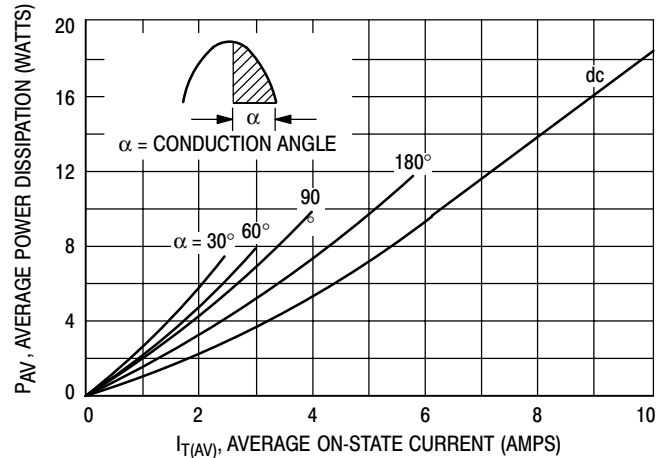


Figure 2. On-State Power Dissipation

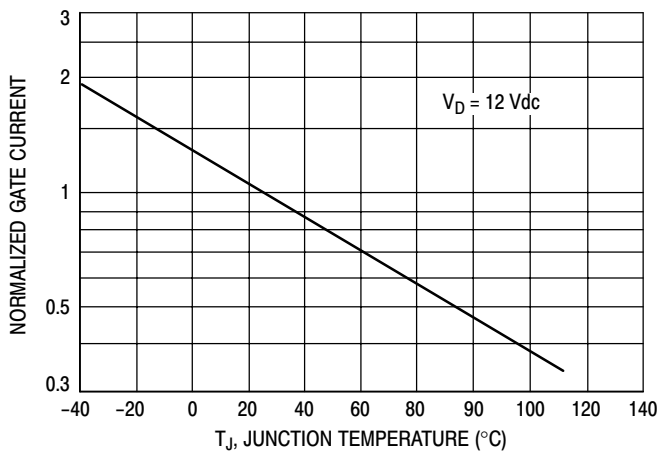


Figure 3. Normalized Gate Current

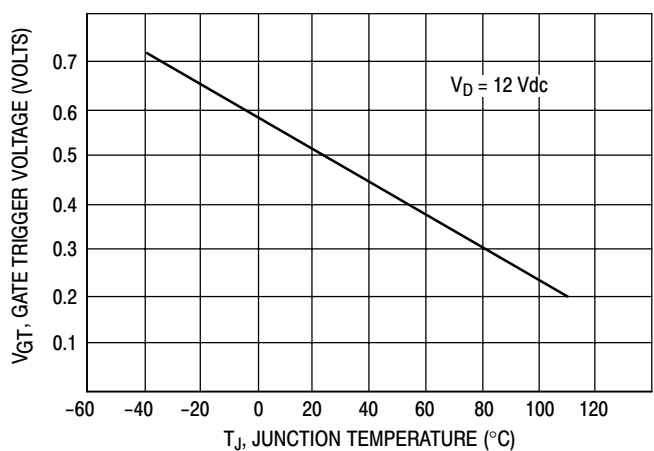
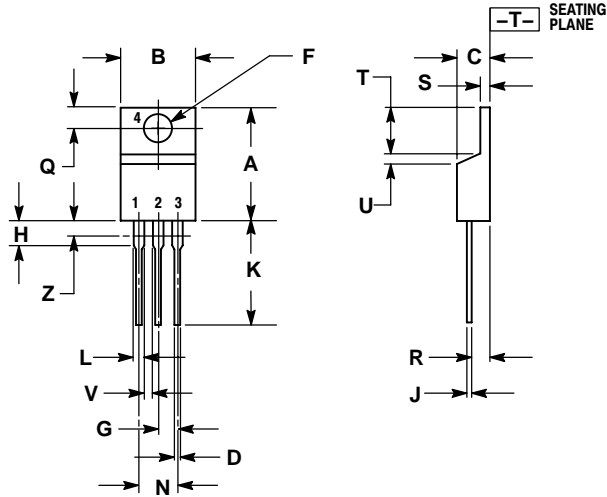


Figure 4. Gate Voltage

# MCR310 Series

## PACKAGE DIMENSIONS


TO-220AB  
CASE 221A-09  
ISSUE AA



- 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	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
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
  - ANODE
  - GATE
  - ANODE

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