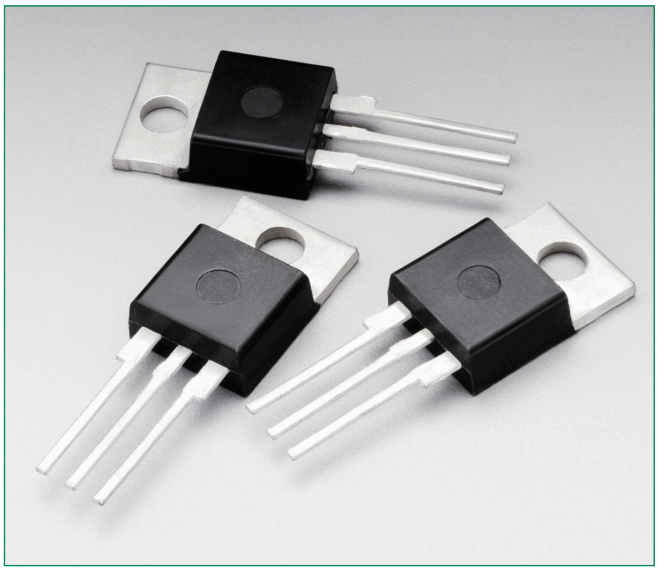
MCR12DG, MCR12MG, MCR12NG



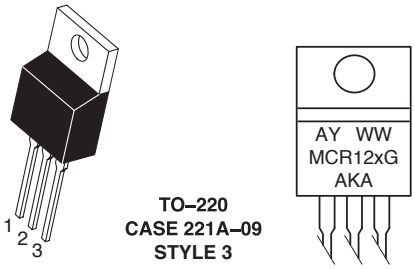
Description

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

Features

- Blocking Voltage to 800 Volts
- On–State Current Rating of 12 Amperes RMS at 80°C
- High Surge Current Capability – 100 Amperes
- Rugged, Economical TO–220AB Package
- Glass Passivated Junctions for Reliability and Uniformity
- Minimum and Maximum Values of IGT, VGT an Specified for Ease of Design
- High Immunity to dv/dt – 100 V/sec Minimum at 125°C
- These are Pb–Free devices

Pin Out



TO–220
CASE 221A–09
STYLE 3

Functional Diagram

Additional Information

Datasheet | **Resources** | **Samples**

Revised: 09/19/17

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

Rating	Part Number	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (T_J = -40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open)	MCR12DG	V_{DRM}, V_{RRM}	400	V
	MCR12MG		600	
	MCR12NG		800	
On-State RMS Current (180° Conduction Angles; T_C = 80°C)		$I_{T\ (RMS)}$	12	A
Peak Non-repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, T_J = 125°C)		I_{TSM}	100	A
Circuit Fusing Consideration (t = 8.3 ms)		I^2t	41	A^2sec
Forward Peak Gate Power (Pulse Width ≤ 1.0 µs, T_C = 80°C)		P_{GM}	5.0	W
Forward Average Gate Power (t = 8.3 ms, T_C = 80°C)		$P_{GM\ (AV)}$	0.5	W
Average On-State Current (180° Conduction Angles; T_C = 80°C)		$I_{T(AV)}$	7.8	A
Forward Peak Gate Current (Pulse Width ≤ 1.0 s, T_C = 90°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 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

Characterstic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\Theta JC}$	2.2	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\Theta JA}$	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	°C

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

Characteristic		Symbol	Min	Typ	Max	Unit
†Peak Repetitive Blocking Current ($V_{AK} = V_{DRM} = V_{RRM}$; Gate Open)	T_J = 25°C	I_{DRM}, I_{RRM}	-	-	0.01	°C/W
	T_J = 125°C		-	-	2.0	°C

Electrical Characteristics - ON

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward On–State Voltage (Note 2) (I_{TM} = 24 A)	V_{TM}	–	–	1.7	V
Gate Trigger Voltage (Continuous dc) (V_D = 12 V, R_L = 100 Ω)	I_{GT}	2.0	8.0	20	mA
Holding Current (V_D = 12 Vdc, Initiating Current = 200 mA, Gate Open)	I_H	–	18	40	mA
Latch Current (V_D = 12 V, I_G = 20 mA)	I_L	6.0	25	60	mA
Gate Trigger Voltage (Continuous dc) (V_D = 12 Vdc, R_L = 100 Ω)	V_{GT}	0.5	0.65	1.0	V

Dynamic Characteristics

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate–of–Rise of Off-State Voltage (V_D = Rated V_{DRM}, Exponential Waveform, Gate Open, T_J = 125°C)	dv/dt	100	250	–	V/µs
Repetitive Critical Rate of Rise of On–State Current IPK = 50 A, Pw = 40 µsec, diG/dt = 1 A/µsec, Igt = 50 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 ≤ 2.0 ms, Duty Cycle ≤ 2%.

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

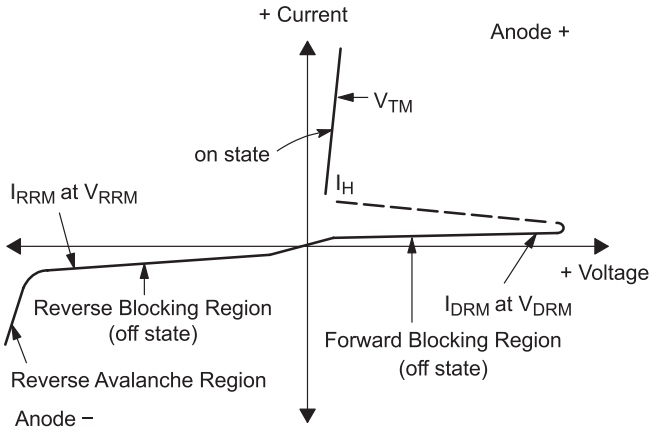


Figure 1. Typical RMS Current Derating

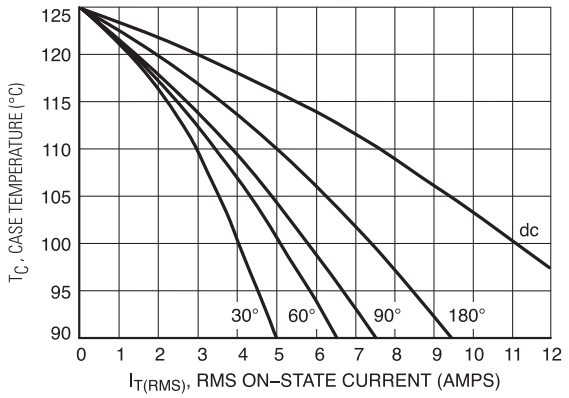


Figure 2. On-State Power Dissipation

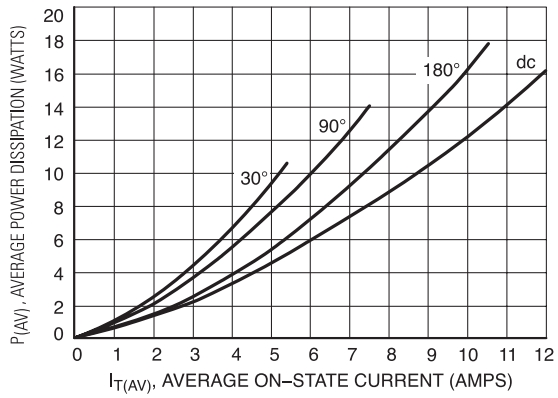


Figure 3. Typical On–State Characteristics

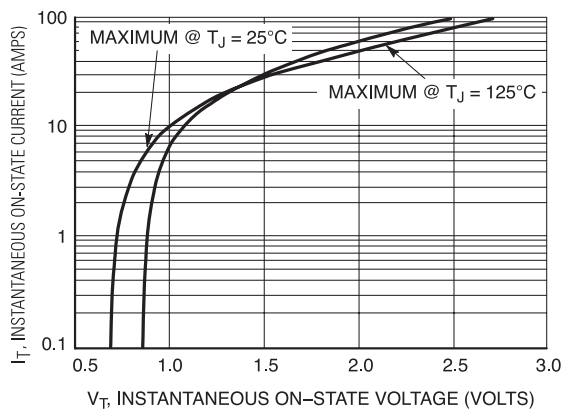
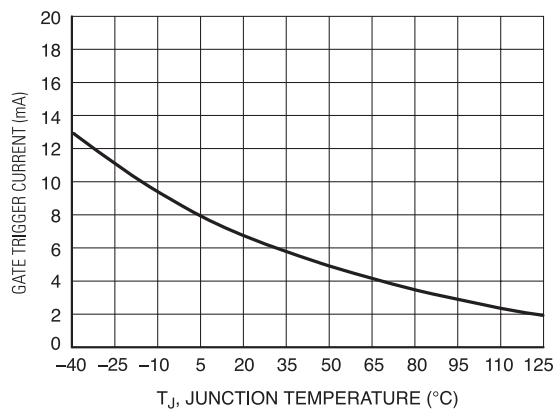


Figure 4. Typical Gate Trigger Current vs Junction Temp



Revised: 09/19/17

Figure 5. Typical Holding Current vs Junction Temp

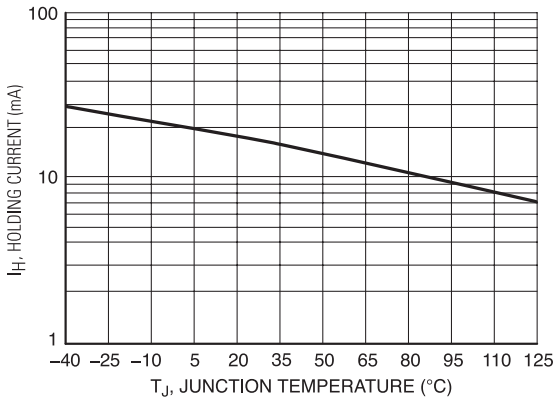


Figure 6. Typical Gate Trigger Voltage vs Junction Temp

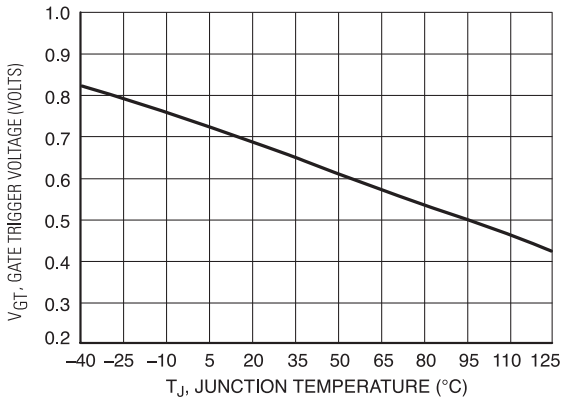
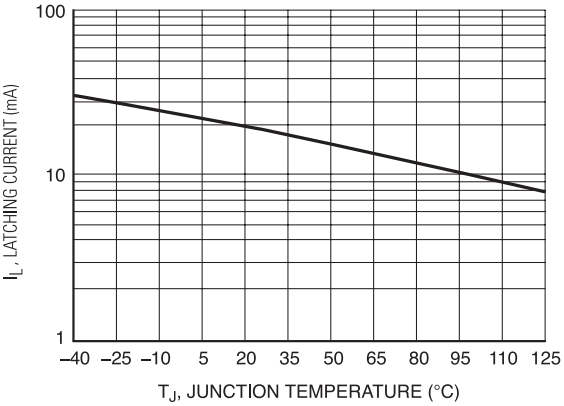


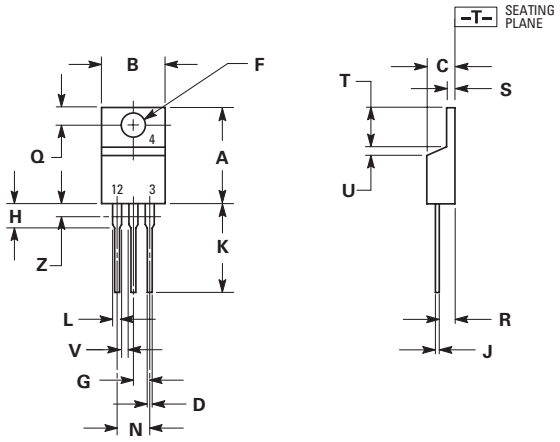
Figure 7. Typical Latching Current vs Junction Temp



Thyristors

Surface Mount – 400 - 800V > MCR12DG, MCR12MG, MCR12NG

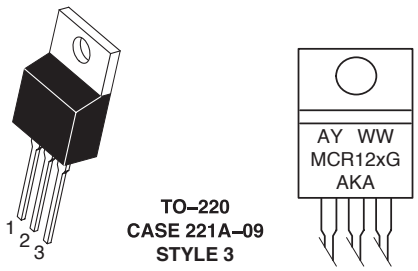
Dimensions



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	0.014	0.022	0.36	0.55
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

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.

Part Marking System



TO–220
CASE 221A–09
STYLE 3

A= Assembly Location
Y= Year
WW = Work Week
x= D, M, or N
G = Pb–Free Package
AKA= Diode Polarity

Pin Assignment

1	Cathode
2	Anode
3	Gate
4	Anode

Ordering Information

Device	Package	Shipping
MCR12DG	TO-220AB (Pb-Free)	50 Units / Rail
MCR12MG		
MCR12NG		