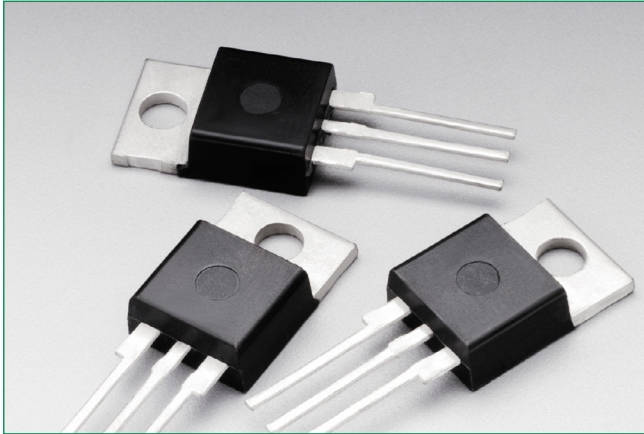


MCR12DG, MCR12MG, MCR12NG

Silicon Controlled Rectifiers — 400V - 800V



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 and IH Specified for Ease of Design
- High Immunity to dv/dt – 100 V/μsec Minimum at 125°C
- These are Pb-Free devices

Additional Information



Resources



Accessories

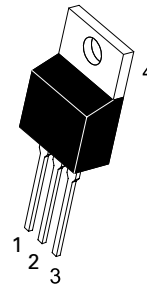


Samples

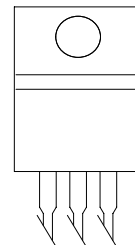
Functional Diagram



Pin Out



TO-220AB
CASE 221A
STYLE 4



MCR12DG, MCR12MG, MCR12NG

Silicon Controlled Rectifiers — 400V - 800V

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

Rating	Part Number	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) ($T_J = -40$ to 125°C , Sine Wave, 50 to 60 Hz, Gate Open)	MCR12DG	V_{DRM}	400	V
	MCR12MG	V_{DRM}	600	
	MCR12NG	V_{RRM}	800	
On-State RMS Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$)		$I_{\text{T (RMS)}}$	12	A
Peak Non-repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 125^\circ\text{C}$)		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 , $T_C = 80^\circ\text{C}$)		P_{GM}	5.0	W
Forward Average Gate Power ($t = 8.3$ ms, $T_C = 80^\circ\text{C}$)		$P_{\text{G (AV)}}$	0.5	W
Average On-State Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$)		$I_{\text{T(AV)}}$	7.8	A
Forward Peak Gate Current (Pulse Width ≤ 1.0 s, $T_C = 90^\circ\text{C}$)		I_{GM}	2.0	A
Operating Junction Temperature Range		T_J	-40 to +125	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-40 to +150	$^\circ\text{C}$

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.

- 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 (AC)	$R_{\theta\text{JC}}$	2.2	$^\circ\text{C}/\text{W}$
	Junction-to-Ambient	$R_{\theta\text{JA}}$	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds		T_L	260	$^\circ\text{C}$

Electrical Characteristics - OFF ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Repetitive Forward or Reverse Blocking Current ($V_D = \text{Rated } V_{\text{DRM}}$ and V_{RRM} ; Gate Open)	$T_J = 25^\circ\text{C}$	I_{DRM} I_{RRM}	-	-	0.01	mA
	$T_J = 125^\circ\text{C}$		-	-	2.0	

Electrical Characteristics - ON

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward On-State Voltage (Note 2) ($I_{\text{TM}} = 24$ A)	V_{TM}	-	-	2.2	V
Gate Trigger Current (Continuous dc) ($V_D = 12$ V, $R_L = 100$ Ω)	I_{GT}	2.0	8.0	20	mA
Holding Current ($V_D = 12$ V, Initiating Current = 200 mA, Gate Open)	I_{H}	4.0	20	40	mA
Latch Current ($V_D = 12$ V, $I_{\text{G}} = 20$ 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 ($V_D = \text{Rated } V_{\text{DRM}}$, Exponential Waveform, Gate Open, $T_J = 125^\circ\text{C}$)	dv/dt	100	250	-	$\text{V}/\mu\text{s}$
Repetitive Critical Rate of Rise of On-State Current IPK = 50 A, Pw = 40 μsec , $di/dt = 1$ A/ μsec , $I_{\text{gt}} = 50$ 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.

- Indicates Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle $\leq 2\%$.

MCR12DG, MCR12MG, MCR12NG

Silicon Controlled Rectifiers — 400V - 800V

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

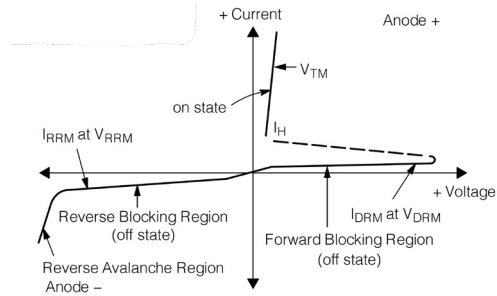


Figure 2.
On-State Power Dissipation

Figure 1.
Typical RMS Current Derating

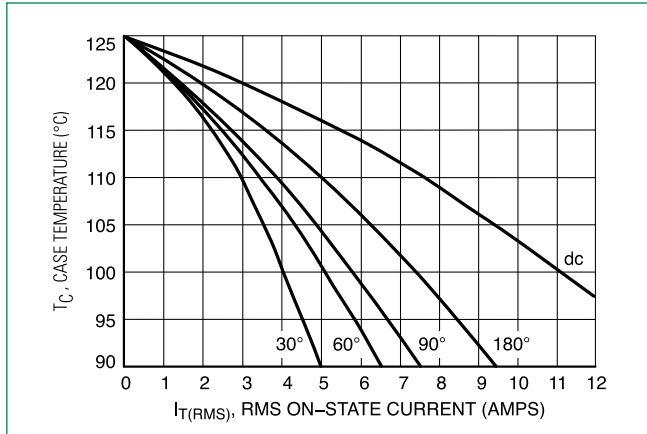


Figure 3.
Typical On-State Characteristics

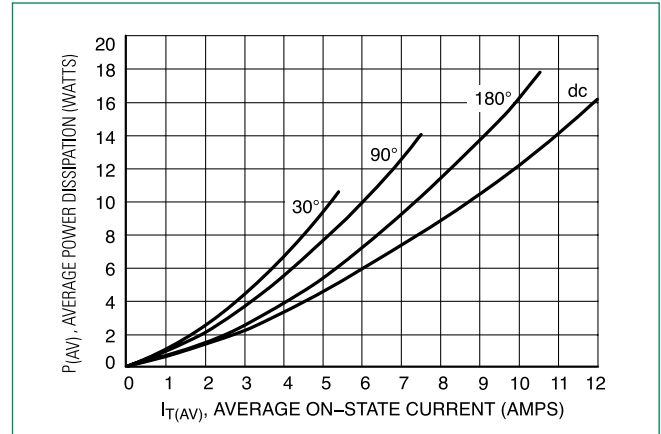
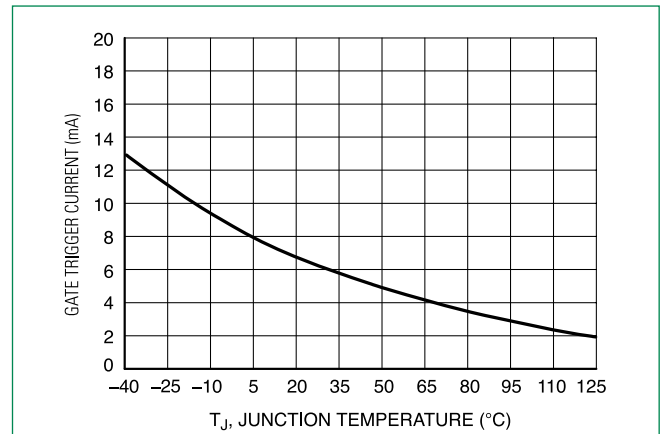
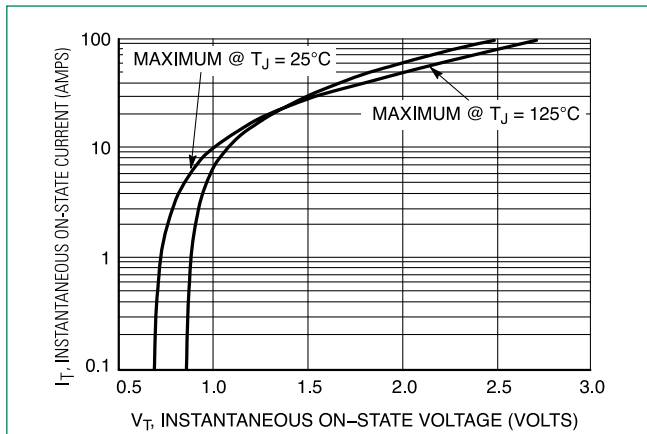


Figure 4.
Typical Gate Trigger Current vs Junction Temp



MCR12DG, MCR12MG, MCR12NG

Silicon Controlled Rectifiers — 400V - 800V

Figure 5.
Typical Holding Current vs Junction Temp

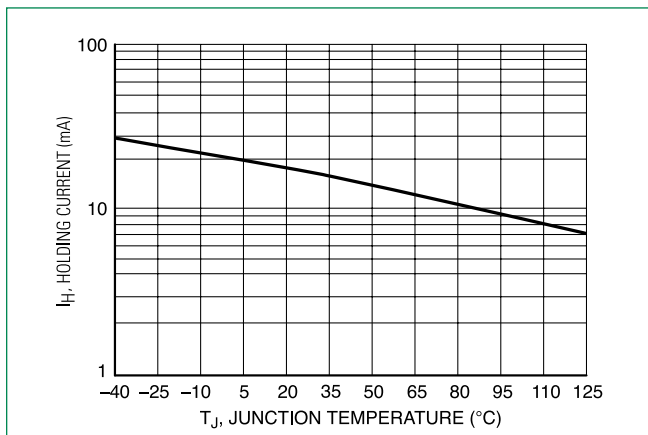


Figure 6.
Typical Gate Trigger Voltage vs Junction Temp

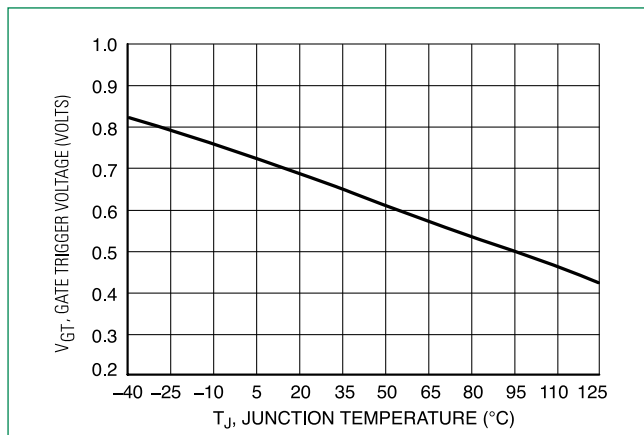
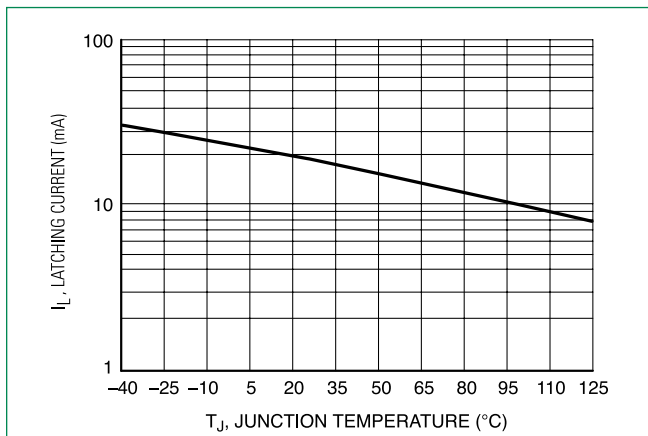


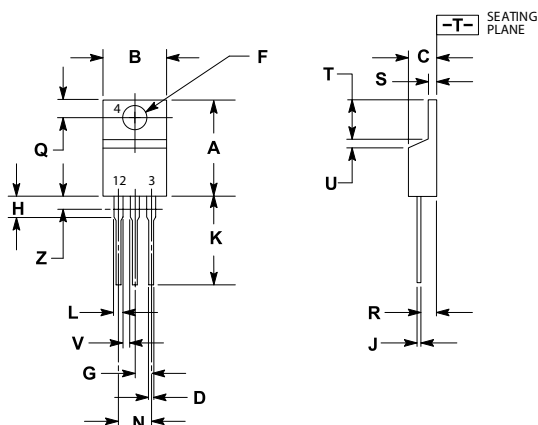
Figure 7.
Typical Latching Current vs Junction Temp



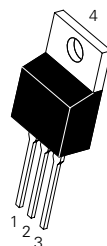
MCR12DG, MCR12MG, MCR12NG

Silicon Controlled Rectifiers — 400V - 800V

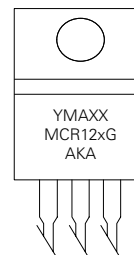
Dimensions



Part Marking System



TO-220AM



- x =D, M, or N
- Y =Year
- M =Month
- A =Assembly Site
- AKA =Diode Polarity
- G =Pb-Free Package

Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	0.590	0.620	14.99	15.75
B	0.380	0.420	9.65	10.67
C	0.178	0.188	4.52	4.78
D	0.025	0.035	0.64	0.89
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.41	2.67
H	0.110	0.130	2.79	3.30
J	0.018	0.024	0.46	0.61
K	0.540	0.575	13.72	14.61
L	0.060	0.075	1.52	1.91
N	0.195	0.205	4.95	5.21
Q	0.105	0.115	2.67	2.92
R	0.085	0.095	2.16	2.41
S	0.045	0.060	1.14	1.52
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

Pin Assignment	
1	Cathode
2	Anode
3	Gate
4	Anode

Ordering Information

Device	Package	Shipping
MCR12DG	TO-220AB (Pb-Free)	1000 Units / Box
MCR12MG		
MCR12NG		

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.

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