

MCR12D, MCR12M, MCR12N

Preferred Device

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.

- Blocking Voltage to 800 Volts
- On-State Current Rating of 12 Amperes RMS at 80°C
- High Surge Current Capability — 100 Amperes
- Rugged, Economical TO220AB 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/ μ sec Minimum at 125°C
- Device Marking: Logo, Device Type, e.g., MCR12D, Date Code

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage ⁽¹⁾ ($T_J = -40$ to 125°C , Sine Wave, 50 to 60 Hz, Gate Open)	V_{DRM} , V_{RRM}		Volts
MCR12D		400	
MCR12M		600	
MCR12N		800	
On-State RMS Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$)	$I_T(\text{RMS})$	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 ($t = 8.33$ ms)	I^2t	41	A ² sec
Forward Peak Gate Power (Pulse Width ≤ 1.0 μ s, $T_C = 80^\circ\text{C}$)	P_{GM}	5.0	Watts
Forward Average Gate Power ($t = 8.3$ ms, $T_C = 80^\circ\text{C}$)	$P_{G(AV)}$	0.5	Watts
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

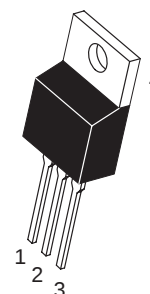
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage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



ON Semiconductor

<http://onsemi.com>

SCRs
12 AMPERES RMS
400 thru 800 VOLTS



TO-220AB
CASE 221A
STYLE 3

PIN ASSIGNMENT

1	Cathode
2	Anode
3	Gate
4	Anode

ORDERING INFORMATION

Device	Package	Shipping
MCR12D	TO220AB	50 Units/Rail
MCR12M	TO220AB	50 Units/Rail
MCR12N	TO220AB	50 Units/Rail

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

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THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.2 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T_L	260	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

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

ON CHARACTERISTICS

Peak Forward On-State Voltage* ($I_{TM} = 24 \text{ A}$)	V_{TM}	—	—	2.2	Volts
Gate Trigger Current (Continuous dc) ($V_D = 12 \text{ V}$; $R_L = 100 \Omega$)	I_{GT}	2.0	8.0	20	mA
Holding Current ($V_D = 12 \text{ V}$, Gate Open, Initiating Current = 200 mA)	I_H	4.0	20	40	mA
Latch Current ($V_D = 12 \text{ V}$, $I_G = 20 \text{ mA}$)	I_L	6.0	25	60	mA
Gate Trigger Voltage (Continuous dc) ($V_D = 12 \text{ V}$; $R_L = 100 \Omega$)	V_{GT}	0.5	0.65	1.0	Volts

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	250	—	V/ μs
Repetitive Critical Rate of Rise of On-State Current $I_{PK} = 50 \text{ A}$, $P_w = 40 \mu\text{sec}$, $di_G/dt = 1 \text{ A}/\mu\text{sec}$, $I_{gt} = 50 \text{ mA}$	di/dt	—	—	50	A/ μs

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

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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

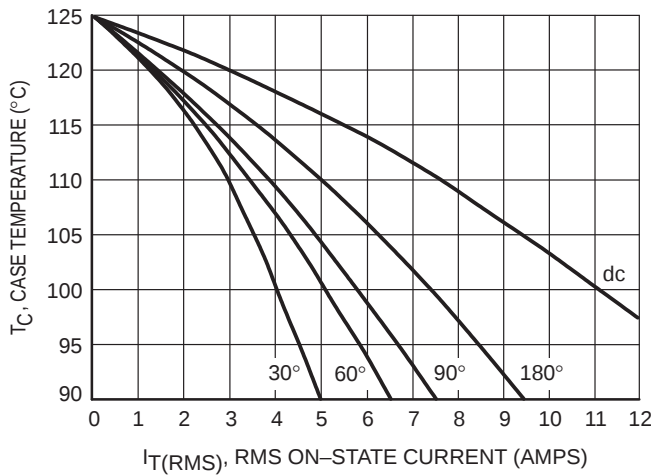
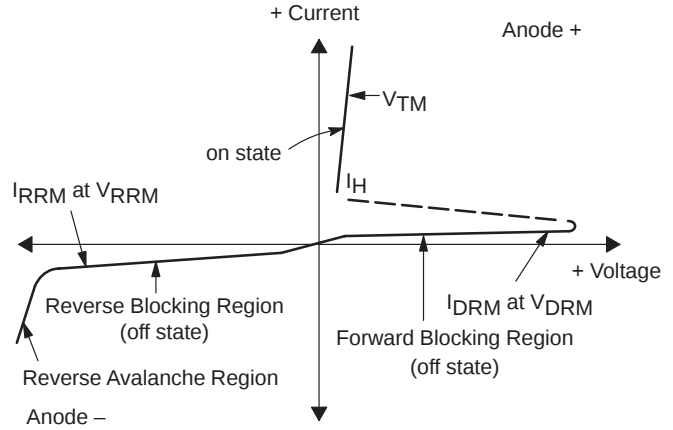


Figure 1. Typical RMS Current Derating

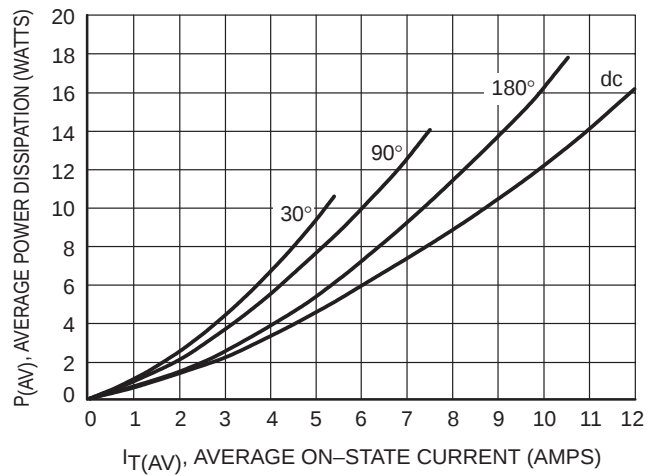


Figure 2. On-State Power Dissipation

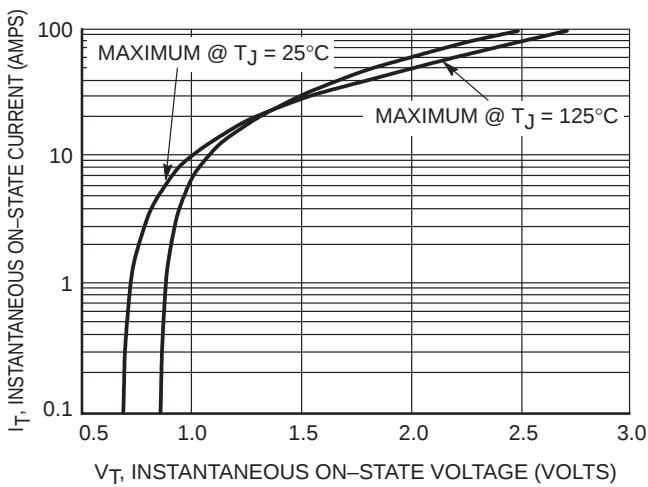


Figure 3. Typical On-State Characteristics

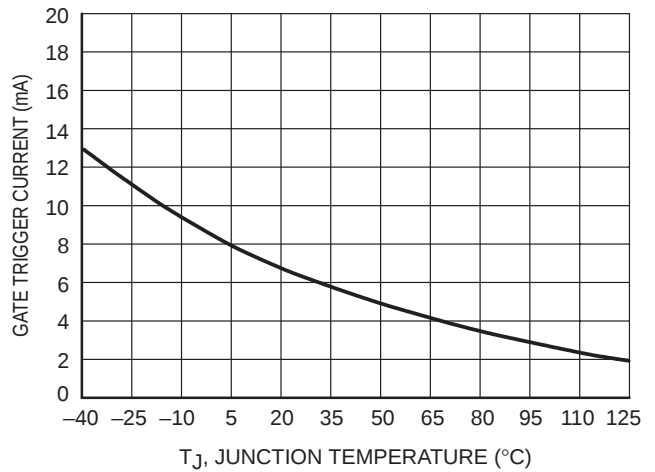


Figure 4. Typical Gate Trigger Current versus Junction Temperature

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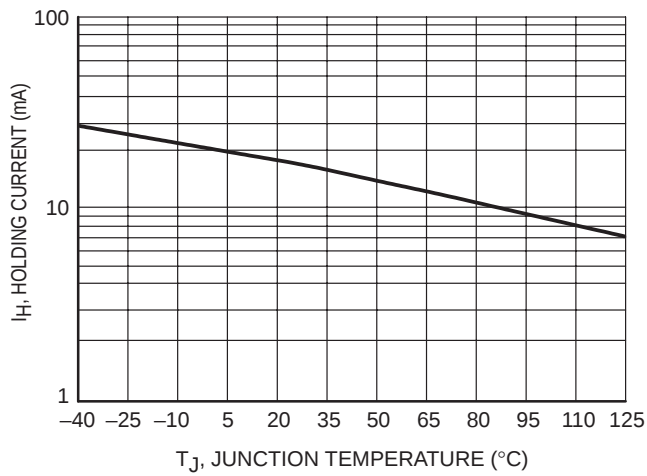


Figure 5. Typical Holding Current versus Junction Temperature

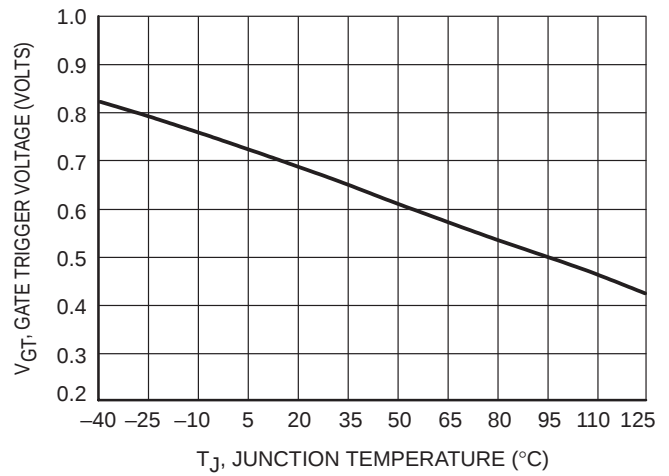


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

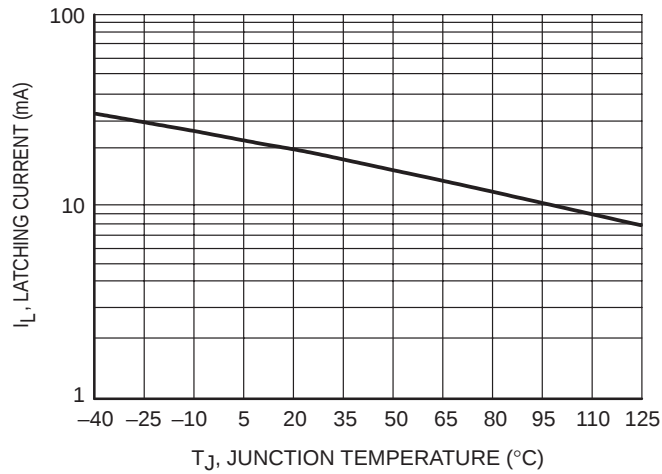
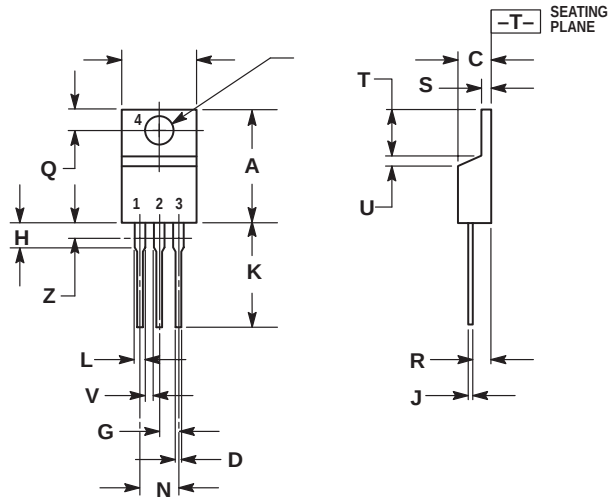


Figure 7. Typical Latching Current versus Junction Temperature

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PACKAGE DIMENSIONS

TO-220AB CASE 221A-09 ISSUE Z



- 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
2. ANODE
3. GATE
4. ANODE

Notes

Notes

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