MCR8SD, MCR8SM, MCR8SN

Preferred Device

Sensitive Gate 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

- Sensitive Gate Allows Triggering by Microcontrollers and other Logic Circuits
- Blocking Voltage to 800 Volts
- On−State Current Rating of 8 Amperes RMS at 80°C
- High Surge Current Capability − 80 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
- Immunity to dv/dt − 5 V/μsec Minimum at 110°C
- Pb−Free Packages are Available*

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off−State Voltage (Note 1) (T_J = −40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open) MCR8SD MCR8SM MCR8SN	V_{DRM}, V_{RRM}	 400 600 800	V
On-State RMS Current (180° Conduction Angles; T_C = 80°C)	$I_{T(RMS)}$	8.0	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, T_J = 110°C)	I_{TSM}	80	A
Circuit Fusing Consideration (t = 8.33 ms)	I^2t	26.5	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)	$P_{G(AV)}$	0.5	W
Forward Peak Gate Current (Pulse Width ≤ 1.0 μs, T_C = 80°C)	I_{GM}	2.0	A
Operating Junction Temperature Range	T_J	−40 to 110	°C
Storage Temperature Range	T_{stg}	−40 to 150	°C

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; 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.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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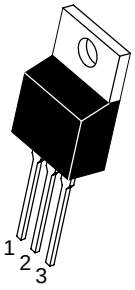
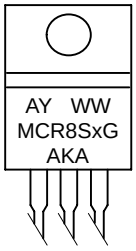
SCRs
8 AMPERES RMS
400 thru 800 VOLTS



TO−220AB
CASE 221A−09
STYLE 3

MARKING DIAGRAM



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
MCR8SD	TO−220AB	50 Units / Rail
MCR8SDG	TO−220AB (Pb−Free)	50 Units / Rail
MCR8SM	TO−220AB	50 Units / Rail
MCR8SMG	TO−220AB (Pb−Free)	50 Units / Rail
MCR8SN	TO−220AB	50 Units / Rail
MCR8SNG	TO−220AB (Pb−Free)	50 Units / Rail

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

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

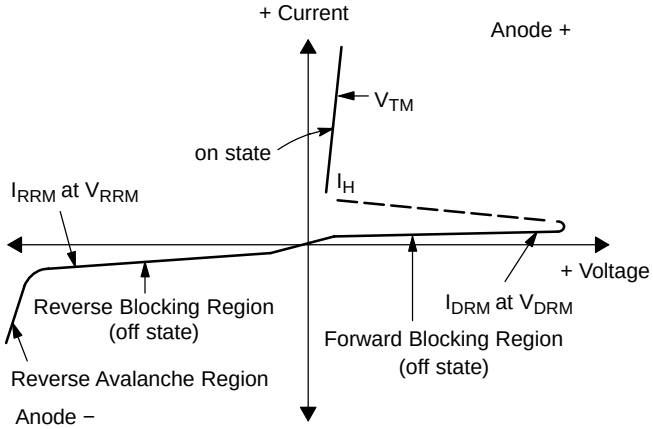
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Peak Repetitive Forward or Reverse Blocking Current (Note 3) (V_D = Rated V_{DRM} and V_{RRM}; R_{GK} = 1 kΩ)	 T_J = 25°C T_J = 110°C	I_{DRM}, I_{RRM}	 − −	 − −	 10 500	μA
ON CHARACTERISTICS						
Peak Forward On−State Voltage (Note 2) (I_{TM} = 16 A)		V_{TM}	−	−	1.8	V
Gate Trigger Current (Continuous dc) (Note 4) (V_D = 12 V; R_L = 100 Ω)		I_{GT}	5.0	25	200	μA
Holding Current (Note 4) (V_D = 12 V, Gate Open, Initiating Current = 200 mA)		I_H	−	0.5	6.0	mA
Latch Current (Note 4) (V_D = 12 V, I_G = 200 μA)		I_L	−	0.6	8.0	mA
Gate Trigger Voltage (Continuous dc) (Note 4) (V_D = 12 V; R_L = 100 Ω)	T_J = 25°C T_J = −40°C	V_{GT}	0.3 −	0.65 −	1.0 1.5	V
Gate Non−Trigger Voltage (V_D = 12 V, R_L = 100 Ω)	T_J = 110°C	V_{GD}	0.2	−	−	V
DYNAMIC CHARACTERISTICS						
Critical Rate of Rise of Off−State Voltage (V_D = 67% V_{DRM}, R_{GK} = 1 KΩ, C_{GK} = 0.1 μF, T_J = 110°C)		dv/dt	5.0	15	−	V/μs
Critical Rate of Rise of On−State Current IPK = 50 A, Pw = 40 μsec, diG/dt = 1 A/μsec, Igt = 10 mA		di/dt	−	−	100	A/μs

2. Indicates Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2%.
3. R_{GK} = 1000 Ohms included in measurement.
4. Does not include R_{GK} in measurement.

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



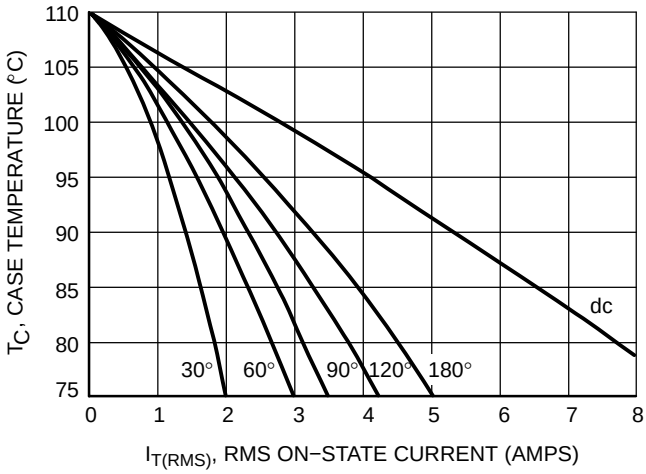


Figure 1. Typical RMS Current Derating

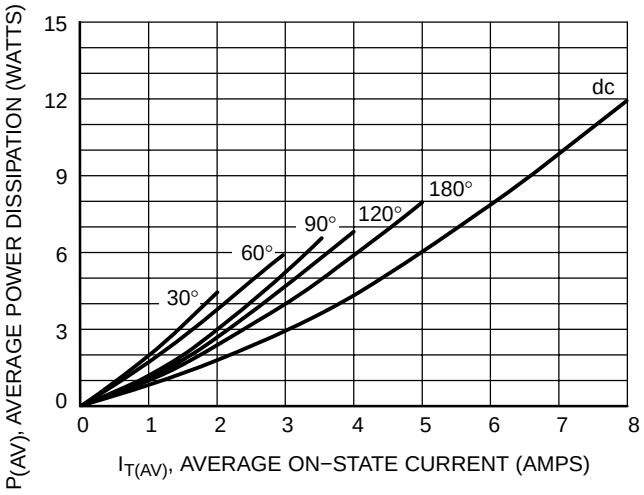


Figure 2. On−State Power Dissipation

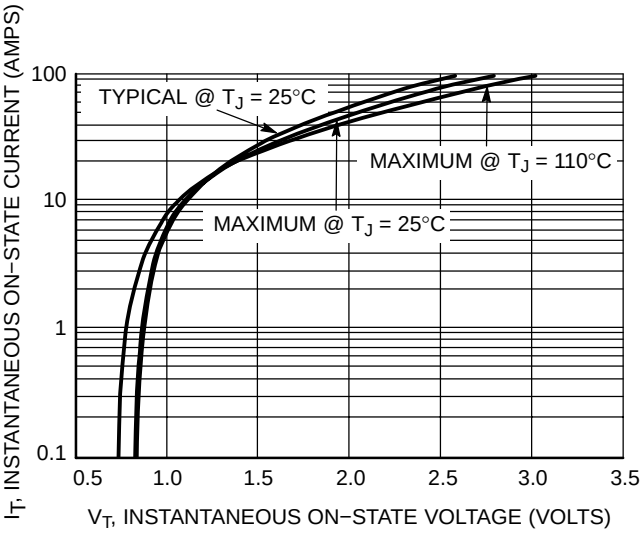


Figure 3. Typical On−State Characteristics

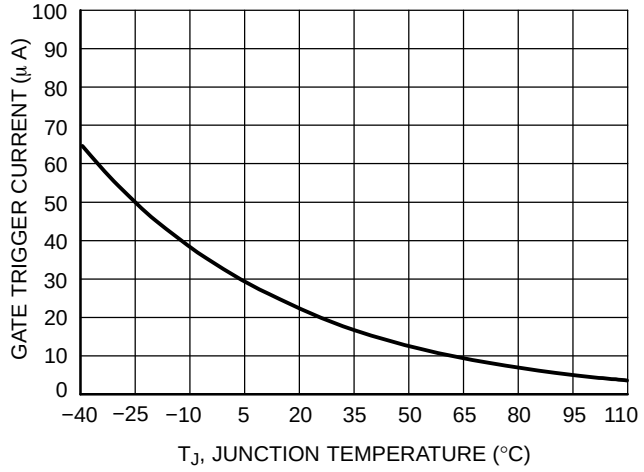


Figure 4. Typical Gate Trigger Current versus Junction Temperature

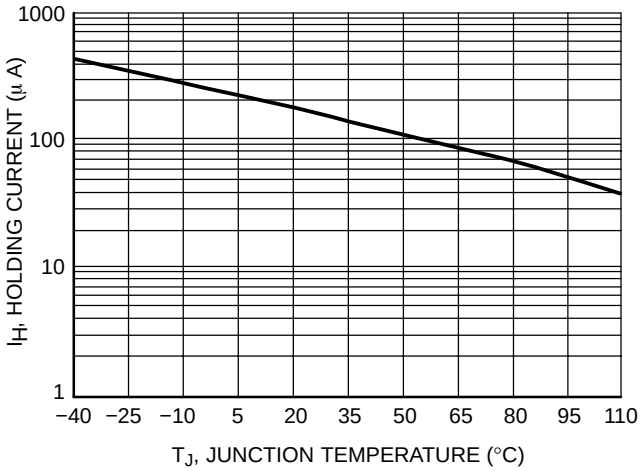


Figure 5. Typical Holding Current versus Junction Temperature

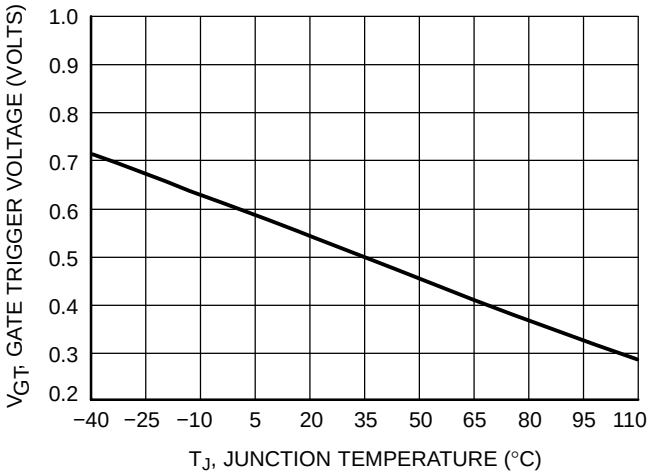


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

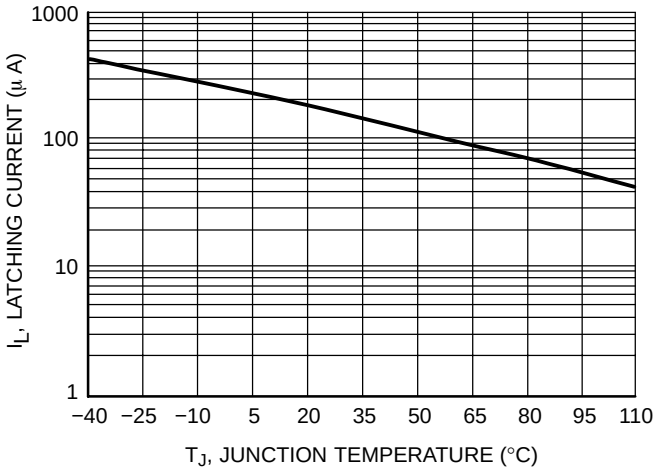
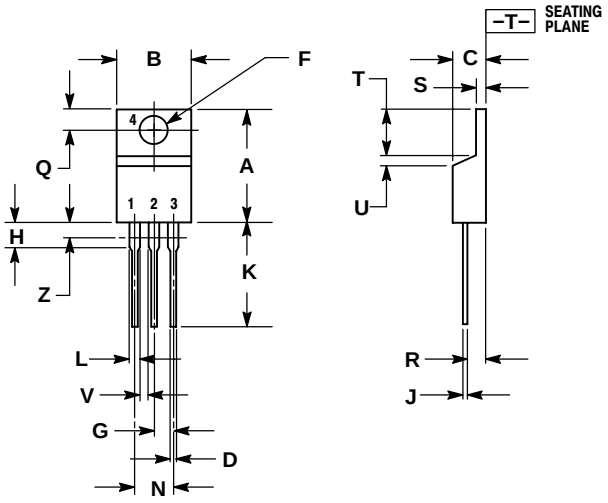


Figure 7. Typical Latching Current versus Junction Temperature

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.

	INCHES		MILLIMETERS	
DIM	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

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