MCR25DG, MCR25MG, MCR25NG

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

- Blocking Voltage to 800 Volts
- On-State Current Rating of 25 Amperes RMS
- High Surge Current Capability − 300 Amperes
- Rugged, Economical TO−220AB Package
- Glass Passivated Junctions for Reliability and Uniformity
- Minimum and Maximum Values of I_{GT}, V_{GT}, and I_H Specified for Ease of Design
- High Immunity to dv/dt − 100 V/μsec Minimum @ 125°C
- These are Pb−Free Devices*

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

Rating	Symbol	Value	Unit
Peak Repetitive Off−State Voltage (Note 1) (T_J = −40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open) MCR25DG MCR25MG MCR25NG	V_{DRM}, V_{RRM}	 400 600 800	V
On-State RMS Current (180° Conduction Angles; T_C = 80°C)	$I_{T(RMS)}$	25	A
Peak Non-repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, T_J = 125°C)	I_{TSM}	300	A
Circuit Fusing Consideration (t = 8.3 ms)	I^2t	373	A^2sec
Forward Peak Gate Power (Pulse Width ≤ 1.0 μs, T_C = 80°C)	P_{GM}	20.0	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 +125	°C
Storage Temperature Range	T_{stg}	−40 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, 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.

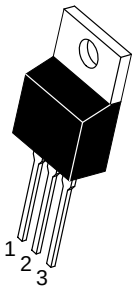
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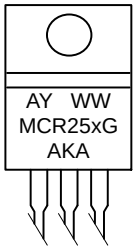
www.onsemi.com

SCRs
25 AMPERES RMS
400 thru 800 VOLTS



MARKING DIAGRAM





TO−220AB
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
MCR25DG	TO−220AB (Pb−Free)	50 Units / Rail
MCR25MG	TO−220AB (Pb−Free)	50 Units / Rail
MCR25NG	TO−220AB (Pb−Free)	50 Units / Rail

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THERMAL CHARACTERISTICS

Characteristic		Symbol	Value	Unit
Thermal Resistance,	Junction−to−Case Junction−to−Ambient	$R_{\theta JC}$ $R_{\theta JA}$	1.5 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)

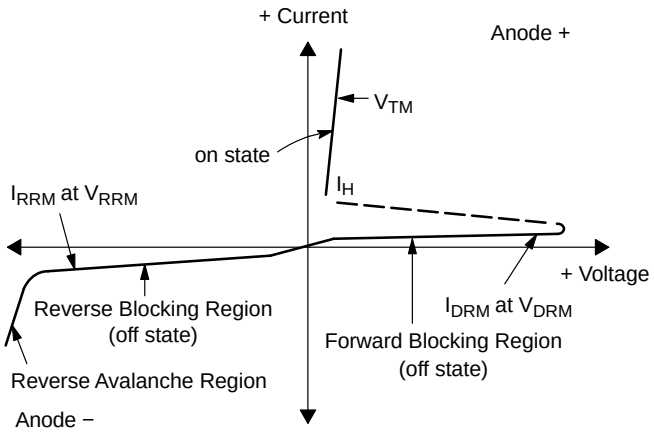
Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Peak Repetitive Forward or Reverse Blocking Current (V_{AK} = Rated V_{DRM} or V_{RRM}, Gate Open)	T_J = 25°C T_J = 125°C	I_{DRM} I_{RRM}	− −	− −	0.01 2.0	mA
ON CHARACTERISTICS						
Peak Forward On-State Voltage (Note 2) (I_{TM} = 50 A)		V_{TM}	−	−	1.8	V
Gate Trigger Current (Continuous dc) (V_D = 12 V, R_L = 100 Ω)		I_{GT}	4.0	12	30	mA
Gate Trigger Voltage (Continuous dc) (V_D = 12 V, R_L = 100 Ω)		V_{GT}	0.5	0.67	1.0	V
Holding Current (V_D =12 Vdc, Initiating Current = 200 mA, Gate Open)		I_H	5.0	13	40	mA
Latching Current (V_D = 12 V, I_G = 30 mA)		I_L	−	35	80	mA
DYNAMIC CHARACTERISTICS						
Critical Rate of Rise of Off−State Voltage (V_D = 67% of Rated V_{DRM}, Exponential Waveform, Gate Open, T_J = 125°C)		dv/dt	100	250	−	V/μs
Critical Rate of Rise of On−State Current (I_{PK} = 50 A, Pw = 30 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 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



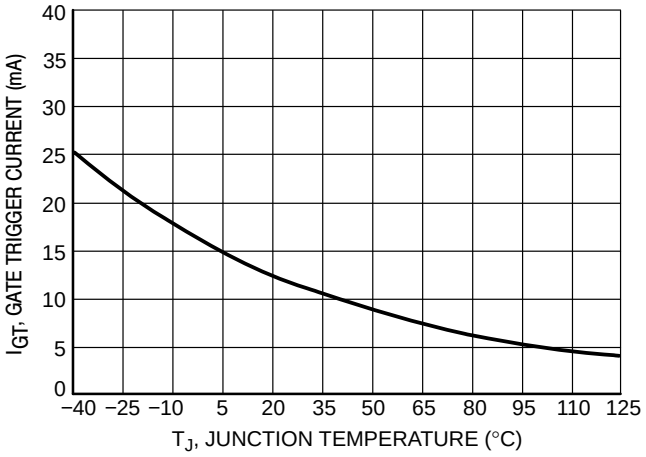


Figure 1. Typical Gate Trigger Current versus Junction Temperature

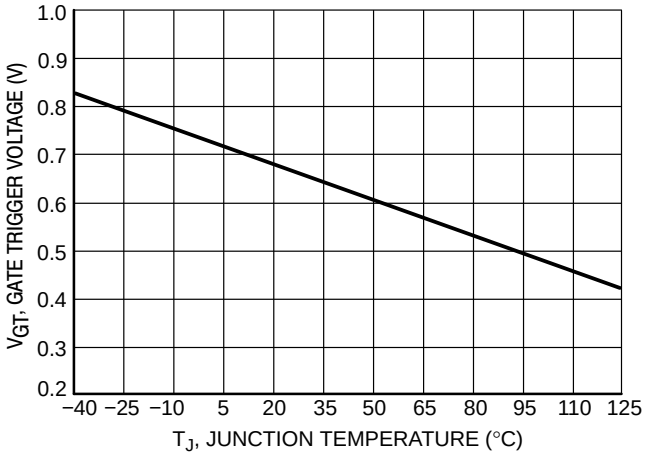


Figure 2. Typical Gate Trigger Voltage versus Junction Temperature

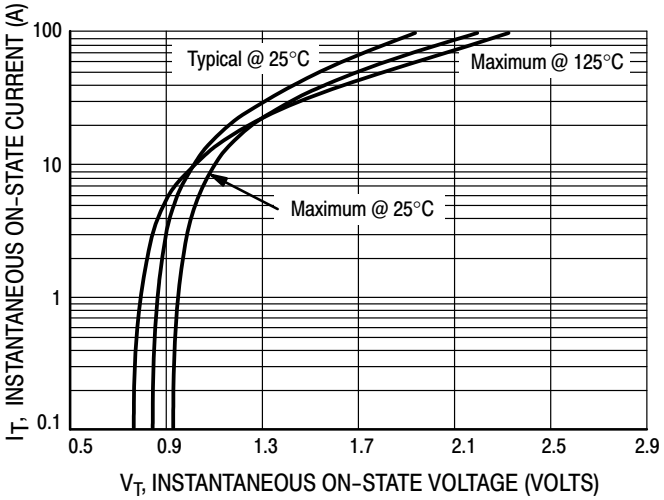


Figure 3. Typical On−State Characteristics

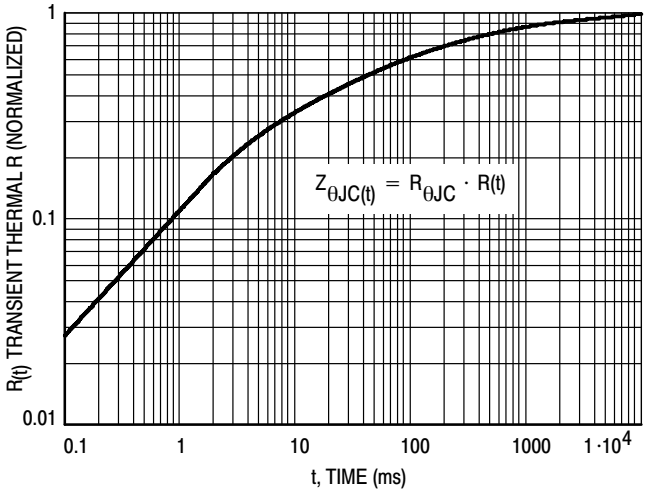


Figure 4. Transient Thermal Response

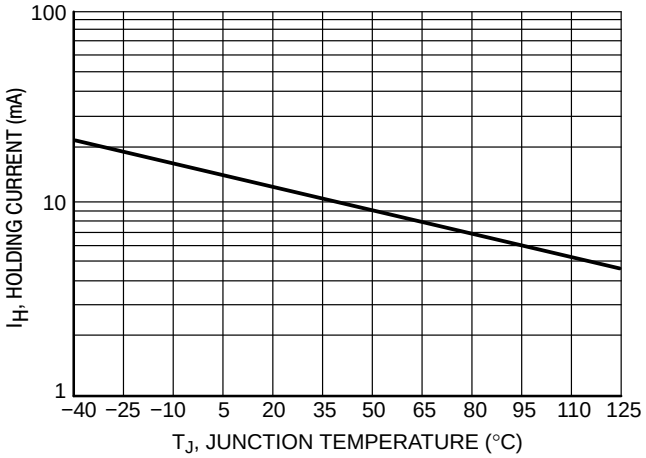


Figure 5. Typical Holding Current versus Junction Temperature

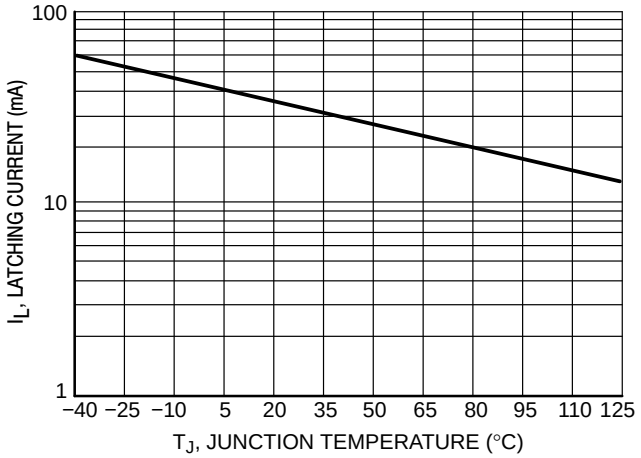


Figure 6. Typical Latching Current versus Junction Temperature

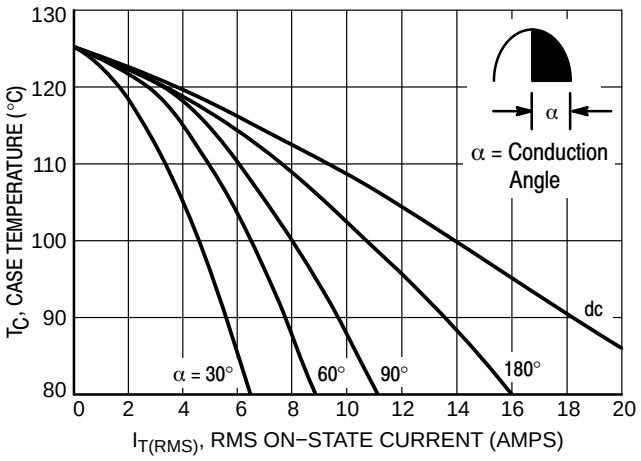


Figure 7. Typical RMS Current Derating

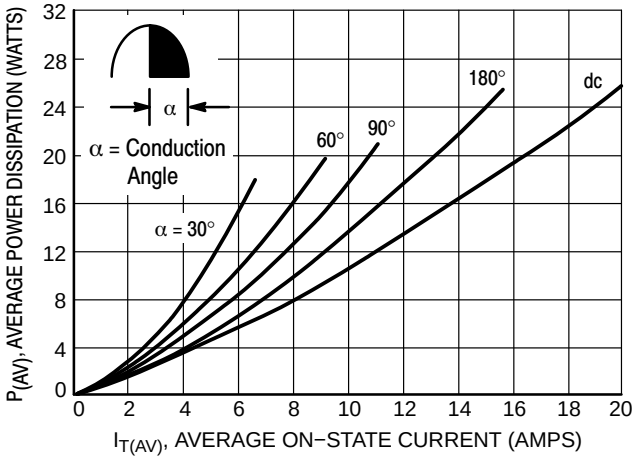


Figure 8. On State Power Dissipation

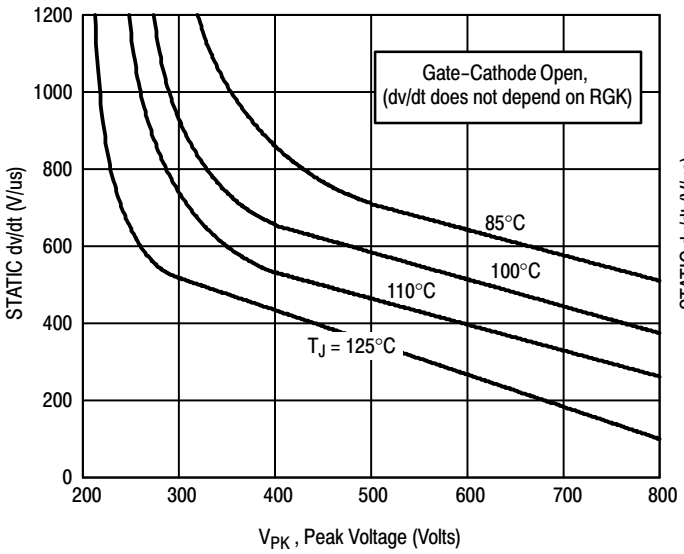


Figure 9. Typical Exponential Static dv/dt Versus Peak Voltage

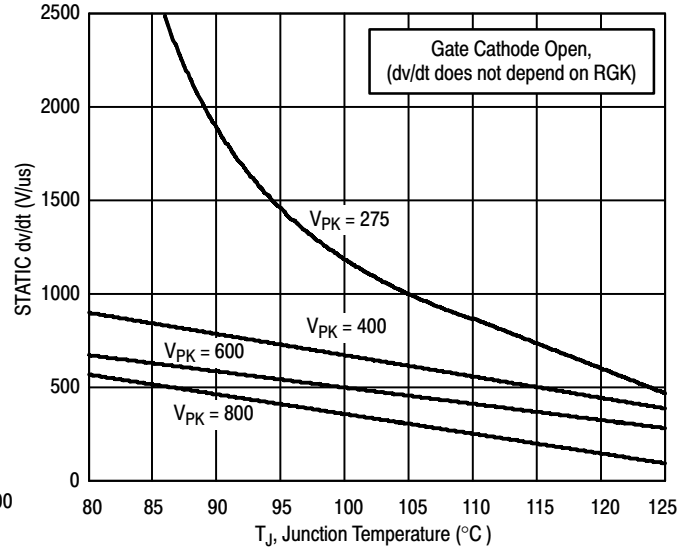


Figure 10. Typical Exponential Static dv/dt Versus Junction Temperature

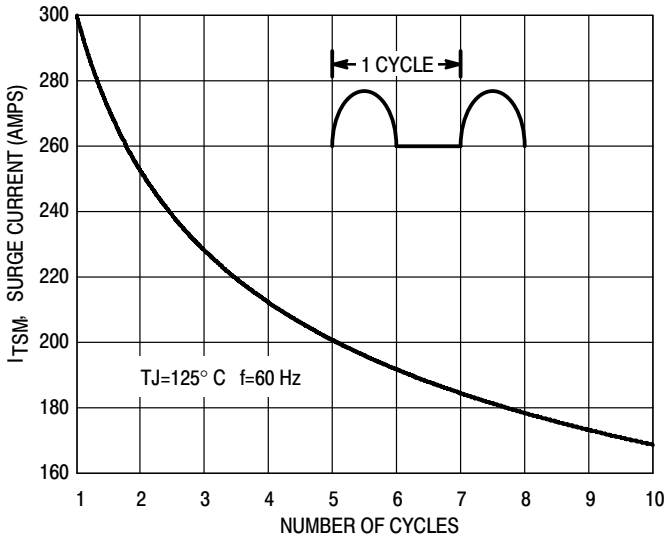
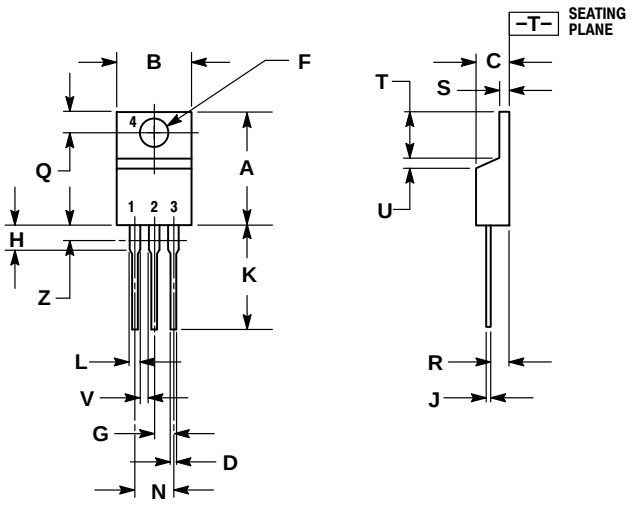


Figure 11. Maximum Non−Repetitive Surge Current

PACKAGE DIMENSIONS

TO−220
CASE 221A−09
ISSUE AH



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	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
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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