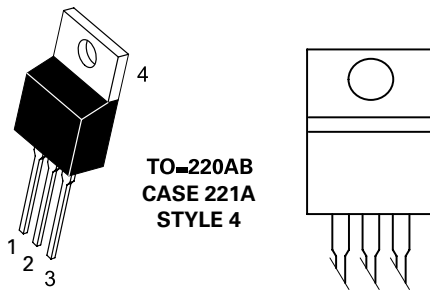


**MCR25DG, MCR25MG, MCR25NG**



**Pin Out**



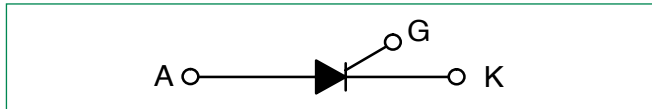
**Description**

Designed primarily for half-wave ac control applications, such as motor controls, heating controls, and power supplies; or wherever half-wave, silicon gate-controlled 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/sec Minimum at 125°C
- These are Pb-Free Devices

**Functional Diagram**



**Additional Information**



**Datasheet**



**Resources**



**Samples**

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (– 40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open)	$V_{\text{DRM}}$ $V_{\text{RRM}}$	400 600 800	V
On-State RMS Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$ )	$I_{\text{T (RMS)}}$	25	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 125^\circ\text{C}$ )	$I_{\text{TSM}}$	300	A
Circuit Fusing Consideration ( $t = 8.3$ ms)	$I^2t$	373	A <sup>2</sup> sec
Forward Peak Gate Power (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )	$P_{\text{GM}}$	20.0	W
Forward Average Gate Power ( $t = 8.3$ msec, $T_C = 80^\circ\text{C}$ )	$P_{\text{GM (AV)}}$	0.5	W
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )	$I_{\text{GM}}$	2.0	A
Operating Junction Temperature Range	$T_J$	–40 to 125	°C
Storage Temperature Range	$T_{\text{stg}}$	–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.

- $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  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	$R_{\theta\text{JC}}$	1.5	°C/W
Thermal Resistance, 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	°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 ( $V_{\text{AK}} = \text{Rated } V_{\text{DRM}}$ or $V_{\text{RRM}}$ , Gate Open)	$I_{\text{DRM}}$ $I_{\text{RRM}}$	$T_J = 25^\circ\text{C}$	–	–	0.01	$\mu\text{A}$
		$T_J = 125^\circ\text{C}$	–	–	2.0	

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

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward On-State Voltage (Note 2) ( $I_{\text{TM}} = 32$ A)	$V_{\text{TM}}$	–	–	1.8	V
Gate Trigger Current (Continuous dc) ( $V_D = 12$ V; $R_L = 100$ $\Omega$ )	$I_{\text{GT}}$	4.0	12	30	mA
Holding Current (Anode Voltage = 12 V, Initiating Current = 200 mA)	$I_{\text{H}}$	5.0	13	40	mA
Latch Current ( $V_D = 12$ V, $I_G = 30$ mA)	$I_{\text{L}}$	–	35	80	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 12$ V, $R_L = 100$ $\Omega$ )	$V_{\text{GT}}$	0.5	0.67	1.0	V

### Dynamic Characteristics

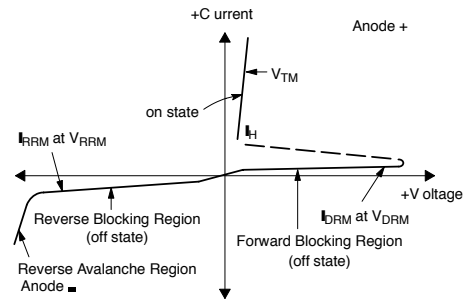
Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{\text{DRM}}$ , Exponential Waveform, Gate Open, $T_J = 125^\circ\text{C}$ )	$dv/dt$	100	250	–	V/ $\mu\text{s}$
Critical Rate of Rise of On-State Current ( $I_{\text{PK}} = 50$ A, $P_w = 30$ $\mu\text{sec}$ , $di/dt = 1$ A/ $\mu\text{sec}$ , $I_{\text{gt}} = 50$ mA)	$di/dt$	–	–	50	A/ $\mu\text{s}$

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.

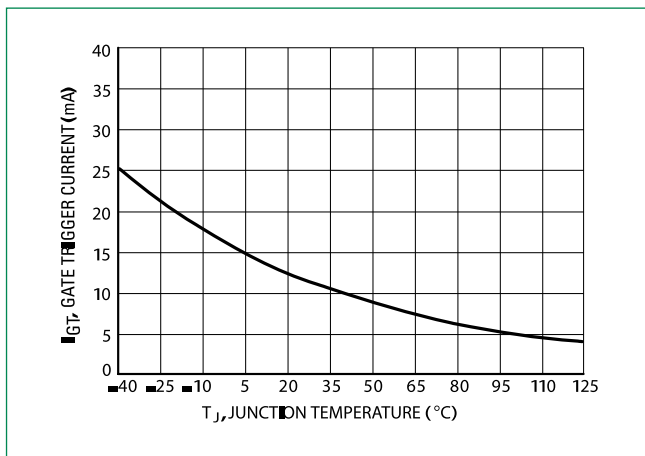
- Pulse Test; Pulse Width  $\leq 2.0$  msec, Duty Cycle  $\leq 2\%$ .

**Voltage Current Characteristic of SCR**

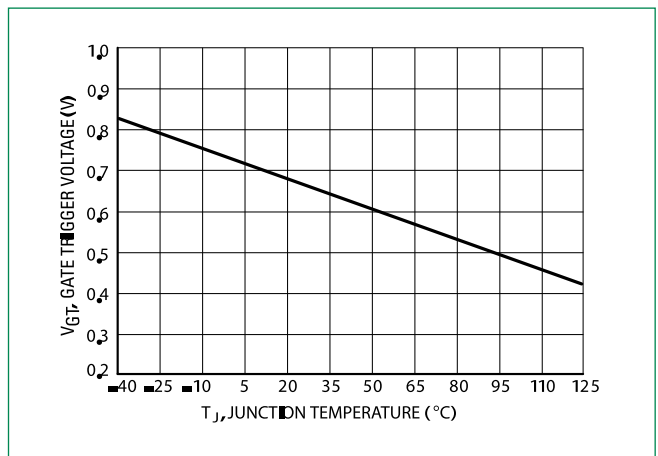
Symbol	Parameter
$V_{DRM}$	Peak Repetitive Forward Off State Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Reverse Off State Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Maximum On State Voltage
$I_H$	Holding Current



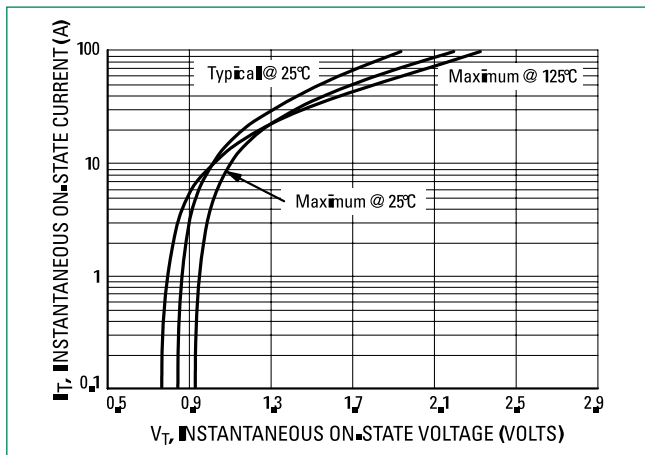
**Figure 1. Typical Gate Trigger Current vs Junction Temperature**



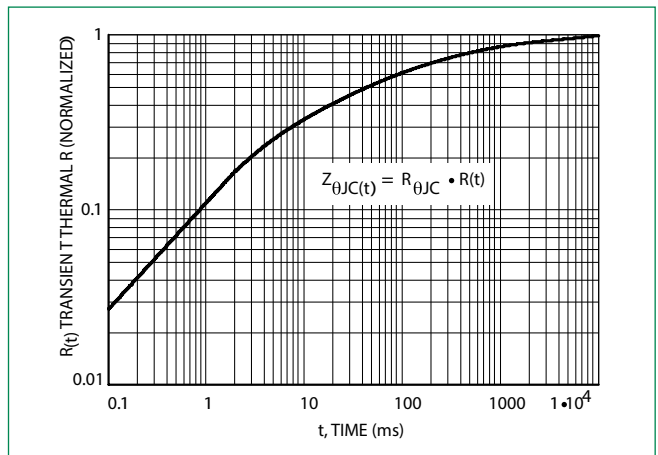
**Figure 2. Typical Gate Trigger Voltage vs Junction Temperature**



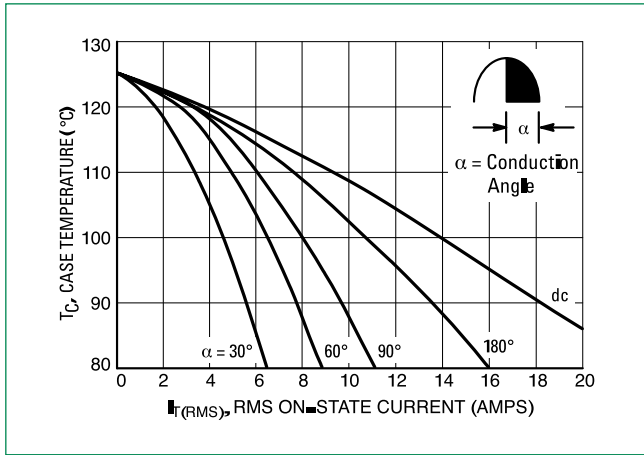
**Figure 3. Typical On-State Characteristics**



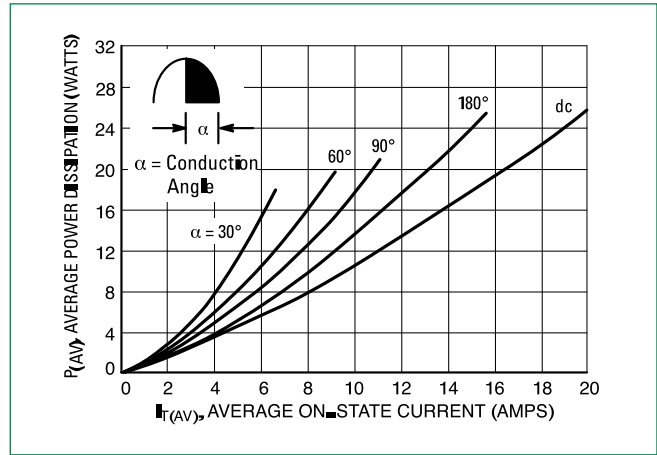
**Figure 4. Transient Thermal Response**



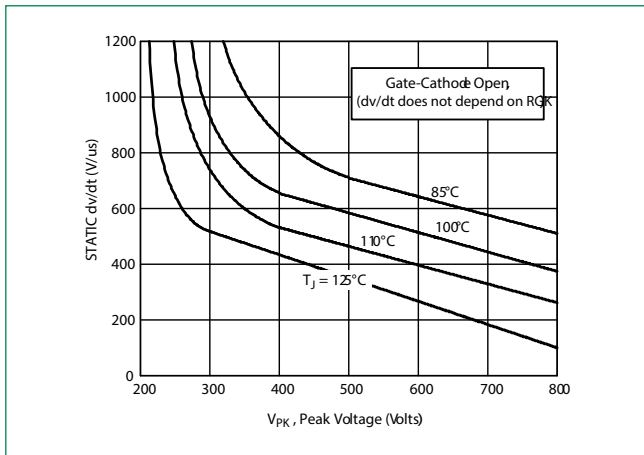
**Figure 7. Typical RMS Current Derating**



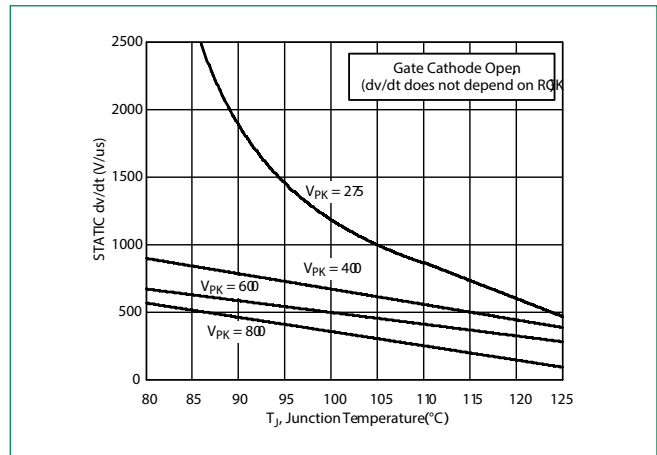
**Figure 8. On State Power Dissipation**



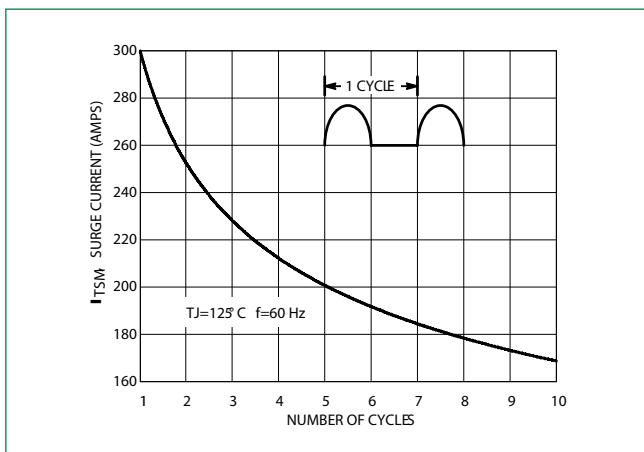
**Figure 9. Typical Exponential Static dv/dt Versus Peak Voltage**



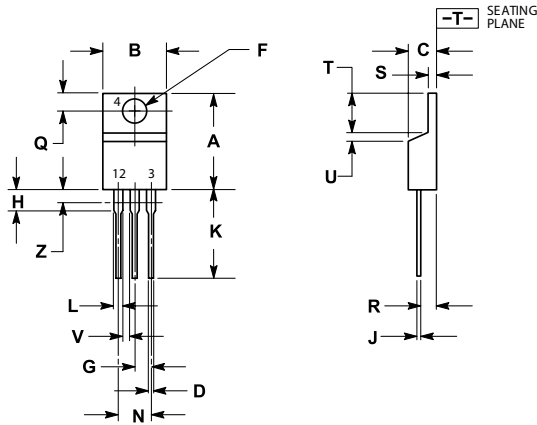
**Figure 10. Typical Exponential Static dv/dt Vs Junction Temperature**



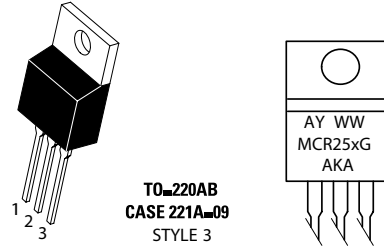
**Figure 11. Maximum Non-Repetitive Surge Current**



### Dimensions



### Part Marking System



**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

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

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.

### Ordering Information

Device	Package	Shipping
MCR25DG	TO-220AB (Pb-Free)	500 Units / Box
MCR25MG		
MCR25NG		

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