

# MCR22-6, MCR22-8

Preferred Device

## Sensitive Gate Silicon Controlled Rectifiers

### Reverse Blocking Thyristors

Designed and tested for repetitive peak operation required for CD ignition, fuel ignitors, flash circuits, motor controls and low-power switching applications.

- 150 Amperes for 2  $\mu$ s Safe Area
- High dv/dt
- Very Low Forward "On" Voltage at High Current
- Low-Cost TO-226AA (TO-92)
- Device Marking: Device Type, e.g., MCR22-6, Date Code

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage ( $R_{GK} = IK$ , $T_J = -40$ to $+110^\circ\text{C}$ , Sine Wave, 50 to 60 Hz, Gate Open) MCR22-6 MCR22-8	$V_{DRM}$ , $V_{RRM}$	400 600	Volts
On-State Current RMS ( $180^\circ$ Conduction Angles, $T_C = 80^\circ\text{C}$ )	$I_T(\text{RMS})$	1.5	Amps
Peak Non-repetitive Surge Current, $T_A = 25^\circ\text{C}$ (1/2 Cycle, Sine Wave, 60 Hz)	$I_{TSM}$	15	Amps
Circuit Fusing Considerations ( $t = 8.3$ ms)	$I^2t$	0.9	$\text{A}^2\text{s}$
Forward Peak Gate Power (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_A = 25^\circ\text{C}$ )	$P_{GM}$	0.5	Watt
Forward Average Gate Power ( $t = 8.3$ msec, $T_A = 25^\circ\text{C}$ )	$P_{G(AV)}$	0.1	Watt
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_A = 25^\circ\text{C}$ )	$I_{FGM}$	0.2	Amp
Reverse Peak Gate Voltage (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_A = 25^\circ\text{C}$ )	$V_{RGM}$	5.0	Volts
Operating Junction Temperature Range @ Rated $V_{RRM}$ and $V_{DRM}$	$T_J$	-40 to +110	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to +150	$^\circ\text{C}$

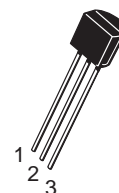
(1)  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source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



ON Semiconductor

<http://onsemi.com>

SCRs  
1.5 AMPERES RMS  
400 thru 600 VOLTS



TO-92 (TO-226AA)  
CASE 029  
STYLE 10

PIN ASSIGNMENT	
1	Cathode
2	Gate
3	Anode

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 549 of this data sheet.

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

## MCR22-6, MCR22-8

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	50	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	160	$^{\circ}C/W$
Lead Solder Temperature (Lead Length $\geq 1/16''$ from case, 10 s Max)	$T_L$	+260	$^{\circ}C$

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}; R_{GK} = 1000 \text{ Ohms}$ )	$I_{DRM}, I_{RRM}$	—	—	10	$\mu A$
$T_C = 25^{\circ}C$		—	—	200	$\mu A$
$T_C = 110^{\circ}C$		—	—		

### ON CHARACTERISTICS

Peak Forward On-State Voltage <sup>(1)</sup> ( $I_{TM} = 1 \text{ A Peak}$ )	$V_{TM}$	—	1.2	1.7	Volts
Gate Trigger Current (Continuous dc) <sup>(2)</sup> ( $V_{AK} = 6 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )	$I_{GT}$	—	30	200	$\mu A$
$T_C = 25^{\circ}C$		—	—	500	
$T_C = -40^{\circ}C$		—	—		
Gate Trigger Voltage (Continuous dc) <sup>(2)</sup> ( $V_{AK} = 7 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )	$V_{GT}$	—	—	0.8	Volts
$T_C = 25^{\circ}C$		—	—	1.2	
$T_C = -40^{\circ}C$		—	—		
Gate Non-Trigger Voltage <sup>(1)</sup> ( $V_{AK} = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )	$V_{GD}$	0.1	—	—	Volts
$T_C = 110^{\circ}C$					
Holding Current ( $V_{AK} = 12 \text{ Vdc}, \text{ Gate Open}$ )	$I_H$	—	2.0	5.0	mA
Initiating Current = 200 mA		—	—	10	
$T_C = 25^{\circ}C$					
$T_C = -40^{\circ}C$					

### DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Off-State Voltage ( $T_C = 110^{\circ}C$ )	dv/dt	—	25	—	V/ $\mu s$
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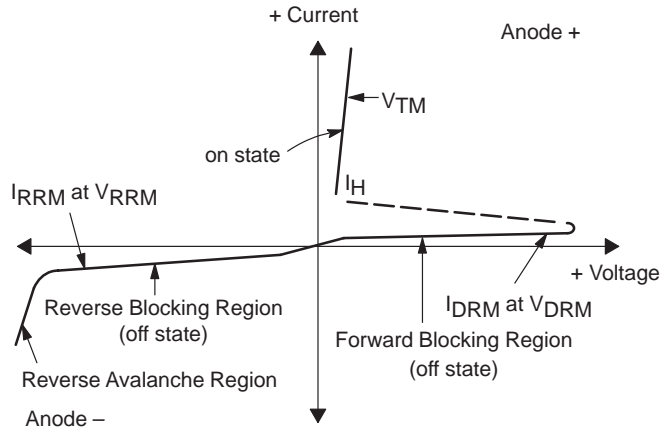
(1) Pulse Width = 1.0 ms, Duty Cycle  $\leq 1\%$ .

(2)  $R_{GK}$  Current not included in measurement.

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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



## CURRENT DERATING

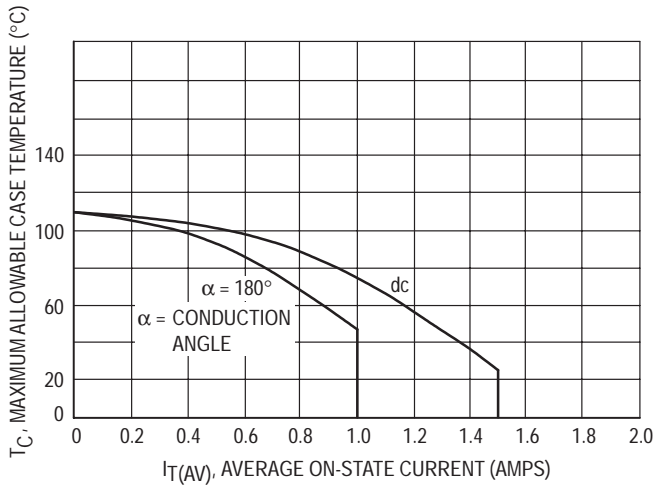


Figure 1. Maximum Case Temperature

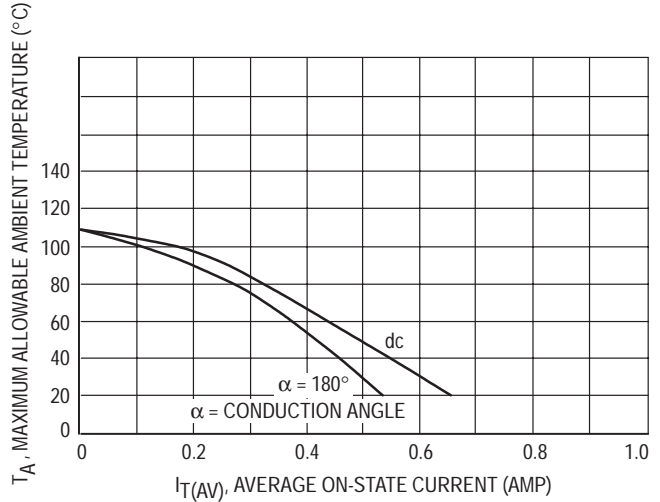


Figure 2. Maximum Ambient Temperature

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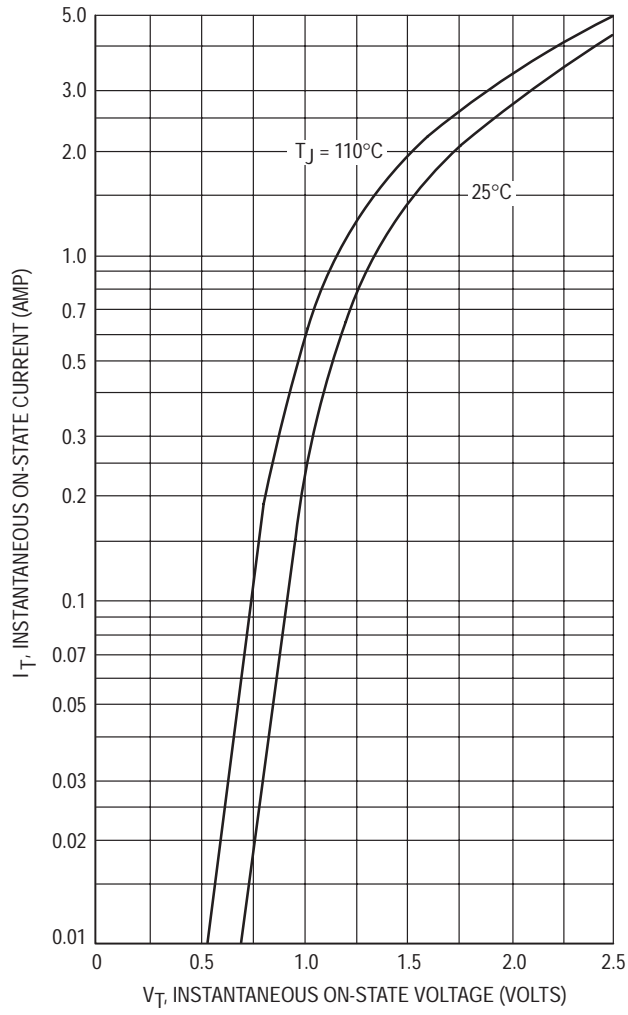


Figure 3. Typical Forward Voltage

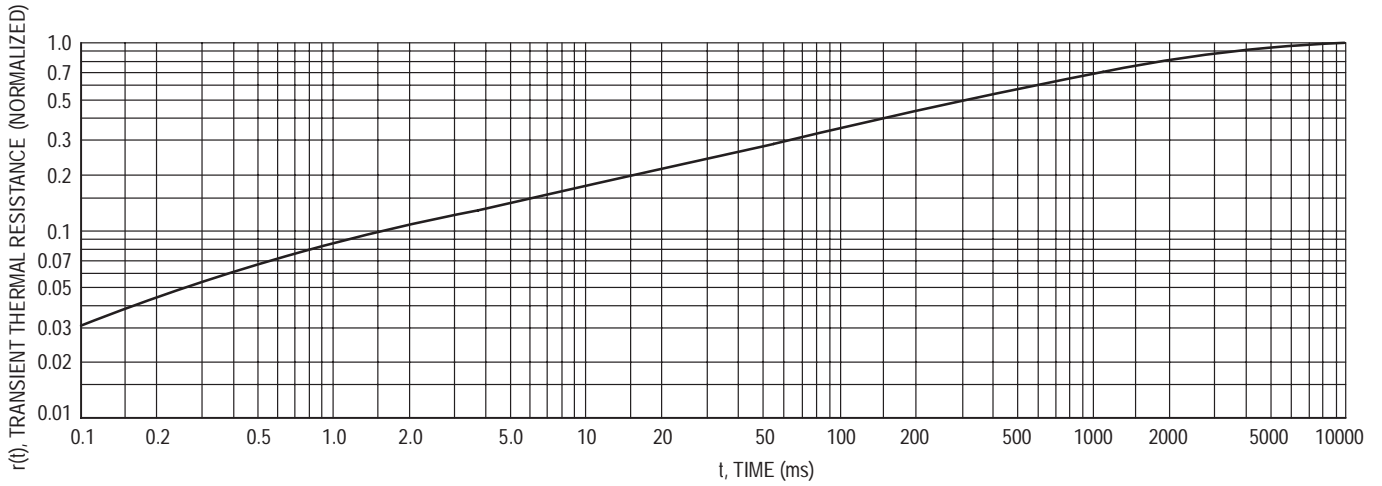


Figure 4. Thermal Response

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## TYPICAL CHARACTERISTICS

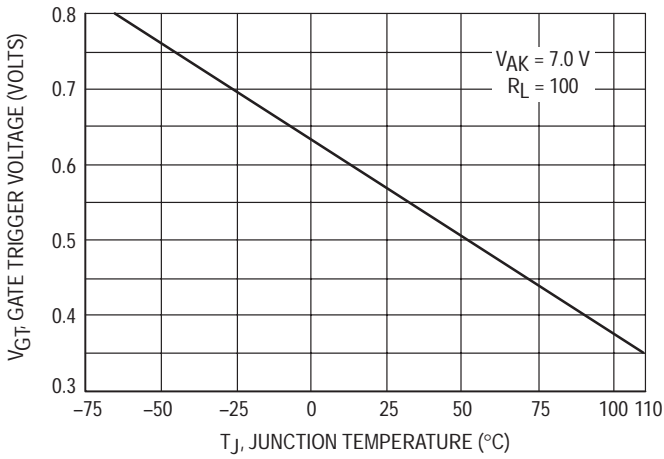


Figure 5. Typical Gate Trigger Voltage

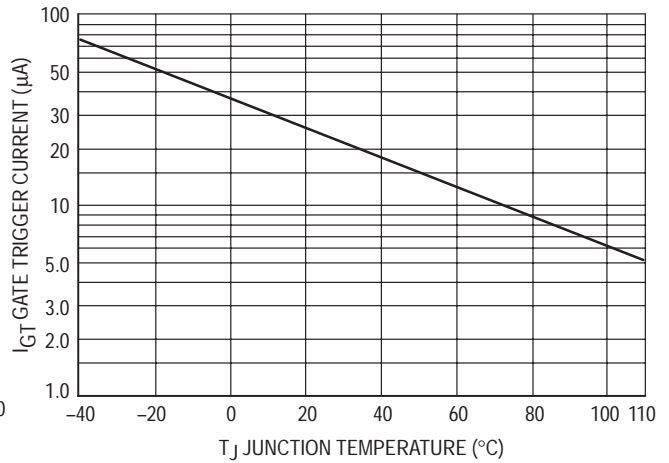


Figure 6. Typical Gate Trigger Current

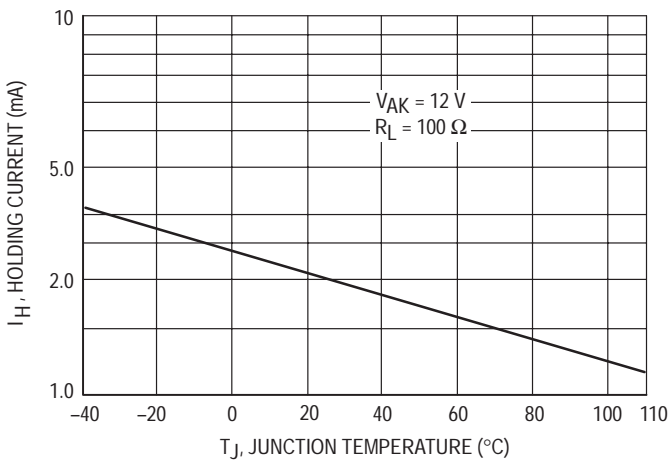


Figure 7. Typical Holding Current

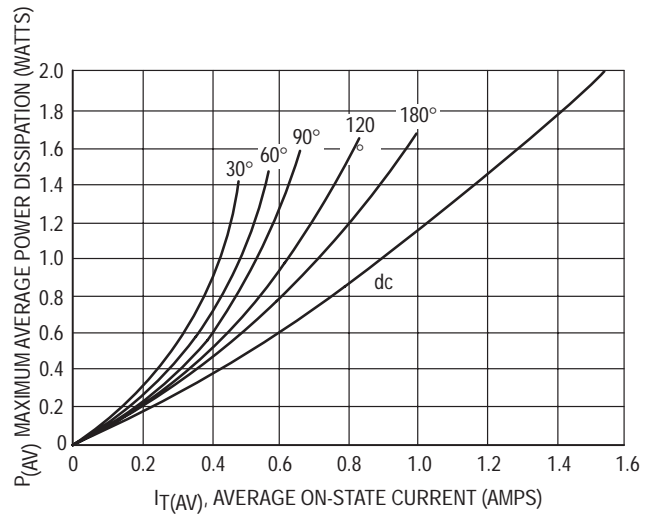


Figure 8. Power Dissipation

TO-92 EIA RADIAL TAPE IN FAN FOLD BOX OR ON REEL

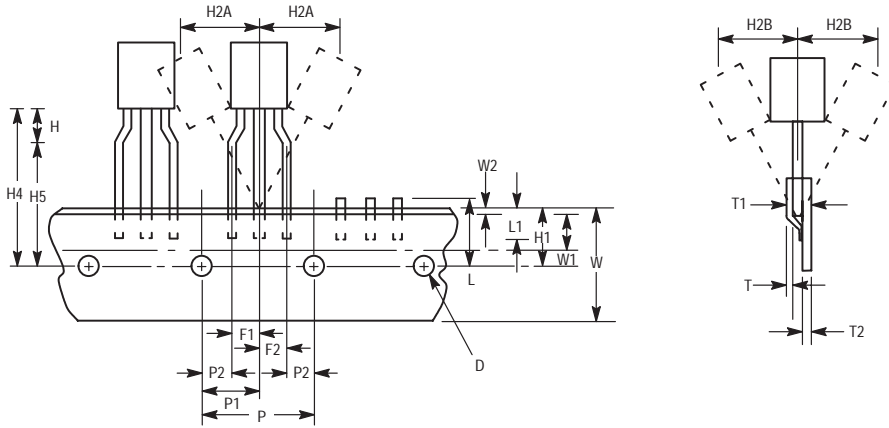


Figure 9. Device Positioning on Tape

Symbol	Item	Specification			
		Inches		Millimeter	
		Min	Max	Min	Max
D	Tape Feedhole Diameter	0.1496	0.1653	3.8	4.2
D2	Component Lead Thickness Dimension	0.015	0.020	0.38	0.51
F1, F2	Component Lead Pitch	0.0945	0.110	2.4	2.8
H	Bottom of Component to Seating Plane	.059	.156	1.5	4.0
H1	Feedhole Location	0.3346	0.3741	8.5	9.5
H2A	Deflection Left or Right	0	0.039	0	1.0
H2B	Deflection Front or Rear	0	0.051	0	1.0
H4	Feedhole to Bottom of Component	0.7086	0.768	18	19.5
H5	Feedhole to Seating Plane	0.610	0.649	15.5	16.5
L	Defective Unit Clipped Dimension	0.3346	0.433	8.5	11
L1	Lead Wire Enclosure	0.09842	—	2.5	—
P	Feedhole Pitch	0.4921	0.5079	12.5	12.9
P1	Feedhole Center to Center Lead	0.2342	0.2658	5.95	6.75
P2	First Lead Spacing Dimension	0.1397	0.1556	3.55	3.95
T	Adhesive Tape Thickness	0.06	0.08	0.15	0.20
T1	Overall Taped Package Thickness	—	0.0567	—	1.44
T2	Carrier Strip Thickness	0.014	0.027	0.35	0.65
W	Carrier Strip Width	0.6889	0.7481	17.5	19
W1	Adhesive Tape Width	0.2165	0.2841	5.5	6.3
W2	Adhesive Tape Position	.0059	0.01968	.15	0.5

NOTES:

1. Maximum alignment deviation between leads not to be greater than 0.2 mm.
2. Defective components shall be clipped from the carrier tape such that the remaining protrusion (L) does not exceed a maximum of 11 mm.
3. Component lead to tape adhesion must meet the pull test requirements.
4. Maximum non-cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches.
5. Holddown tape not to extend beyond the edge(s) of carrier tape and there shall be no exposure of adhesive.
6. No more than 1 consecutive missing component is permitted.
7. A tape trailer and leader, having at least three feed holes is required before the first and after the last component.
8. Splices will not interfere with the sprocket feed holes.

## MCR22-6, MCR22-8

### ORDERING & SHIPPING INFORMATION: MCR22 Series packaging options, Device Suffix

U.S.	Europe Equivalent	Shipping	Description of TO92 Tape Orientation
MCR22-6,8 MCR22-6RLRA MCR22-6RLRP	MCR22-8RL1  MCR22-8ZL1	Radial Tape and Reel (2K/Reel) Bulk in Box (5K/Box) Radial Tape and Reel (2K/Reel) Radial Tape and Fan Fold Box (2K/Box) Radial Tape and Fan Fold Box (2K/Box)	Flat side of TO92 and adhesive tape visible N/A, Bulk Round side of TO92 and adhesive tape visible Round side of TO92 and adhesive tape visible Flat side of TO92 and adhesive tape visible