# MCR72-3, MCR72-6, MCR72-8

# Sensitive Gate Silicon Controlled Rectifiers Reverse Blocking Thyristors

Designed for industrial and consumer applications such as temperature, light and speed control; process and remote controls; warning systems; capacitive discharge circuits and MPU interface.

#### Features

- Center Gate Geometry for Uniform Current Density
- All Diffused and Glass-Passivated Junctions for Parameter Uniformity and Stability
- Small, Rugged Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Low Trigger Currents, 200 µA Maximum for Direct Driving from Integrated Circuits
- These are Pb–Free Devices\*

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
$\begin{array}{l} \mbox{Peak Repetitive Off-State Voltage (Note 1)} \\ (T_J = -40 \ to \ 110^\circ C, \ Sine \ Wave, \\ 50 \ Hz \ to \ 60 \ Hz) & MCR72-3 \\ MCR72-6 \\ MCR72-8 \end{array}$	V <sub>DRM,</sub> V <sub>RRM</sub>	100 400 600	V
On-State RMS Current (180° Conduction Angles; T <sub>C</sub> = 83°C)	I <sub>T(RMS)</sub>	8.0	A
Peak Non-Repetitive Surge Current (1/2 Cycle, 60 Hz, T <sub>J</sub> = 110°C)	I <sub>TSM</sub>	100	A
Circuit Fusing Considerations (t = 8.3 ms)	l <sup>2</sup> t	40	A <sup>2</sup> s
Forward Peak Gate Voltage (t $\leq$ 10 µs, T <sub>C</sub> = 83°C)	V <sub>GM</sub>	±5.0	V
Forward Peak Gate Current (t $\leq$ 10 µs, T <sub>C</sub> = 83°C)	I <sub>GM</sub>	1.0	A
Forward Peak Gate Power (t $\leq$ 10 µs, T <sub>C</sub> = 83°C)	P <sub>GM</sub>	5.0	W
Average Gate Power (t = 8.3 ms, $T_C = 83^{\circ}C$ )	P <sub>G(AV)</sub>	0.75	W
Operating Junction Temperature Range	TJ	-40 to +110	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +150	°C
Mounting Torque	-	8.0	in. lb.

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.

 V<sub>DRM</sub> and V<sub>RRM</sub> 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.

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

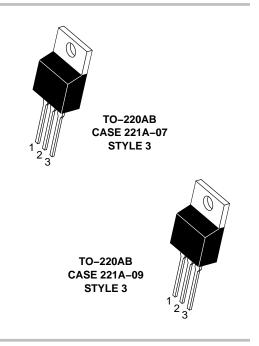


# **ON Semiconductor®**

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SCRs 8 AMPERES RMS 100 thru 600 VOLTS





	PIN ASSIGNMENT
1	Cathode
2	Anode
3	Gate
4	Anode

### MARKING AND ORDERING INFORMATION

See detailed marking, ordering, and shipping information in the package dimensions section on page 4 of this data sheet.

Semiconductor Components Industries, LLC, 2015 January, 2015 – Rev. 5

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### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{ extsf{ heta}JC}$	2.2	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\thetaJA}$	60	°C/W
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Secs	ΤL	260	°C

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

Characteristic		Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS						
Peak Repetitive Forward or Reverse Blocking Current (Note 2) $(V_{AK} = Rated V_{DRM} \text{ or } V_{RRM}; R_{GK} = 1 \text{ k}\Omega)$	$T_J = 25^{\circ}C$ $T_J = 110^{\circ}C$	I <sub>DRM</sub> , I <sub>RRM</sub>		-	10 500	μA μA
High Logic Level Supply Current from V <sub>CC</sub>		I <sub>CCH</sub>	4	4	μΑ	μA
ON CHARACTERISTICS						
Peak Forward On-State Voltage ( $I_{TM}$ = 16 A Peak, Pulse Width $\leq$ 1 ms, Duty Cycle $\leq$ 2%)		V <sub>TM</sub>	-	1.7	2.0	V
Gate Trigger Current (Continuous dc) (Note 3) $(V_D = 12 \text{ V}, \text{ R}_L = 100 \Omega)$		I <sub>GT</sub>	-	30	200	μΑ
Gate Trigger Voltage (Continuous dc) (Note 3) $(V_D = 12 \text{ V}, \text{ R}_L = 100 \Omega)$		V <sub>GT</sub>	-	0.5	1.5	V
Gate Non–Trigger Voltage ( $V_D = 12 \text{ Vdc}, R_L = 100 \Omega, T_J = 110^{\circ}\text{C}$ )		V <sub>GD</sub>	0.1	-	-	V
Holding Current ( $V_D = 12 V$ , Initiating Current = 200 mA, $R_{GK} = 1 k\Omega$ )		IH	-	-	6.0	mA
Gate Controlled Turn-On Time $(V_D = Rated V_{DRM}, I_{TM} = 16 \text{ A}, I_G = 2 \text{ mA})$		t <sub>gt</sub>	-	1.0	-	μs
DYNAMIC CHARACTERISTICS						

Critical Rate-of-Rise of Off-State Voltage	dv/dt	-	10	-	V/µs
(V <sub>D</sub> = Rated V <sub>DRM</sub> , R <sub>GK</sub> = 1 k $\Omega$ , T <sub>J</sub> = 110°C, Exponential Waveform)					

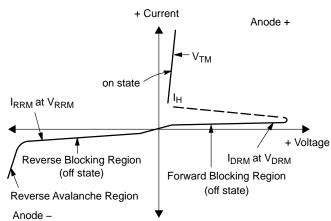
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Ratings apply for negative gate voltage or R<sub>GK</sub> = 1 kΩ. Devices shall not have a positive gate voltage concurrently with a negative voltage on the anode. Devices should not be tested with a constant current source for forward and reverse blocking capability such that the voltage applied exceeds the rated blocking voltage. 3. R<sub>GK</sub> current not included in measurement.

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## Voltage Current Characteristic of SCR

Symbol	Parameter
V <sub>DRM</sub>	Peak Repetitive Off State Forward Voltage
I <sub>DRM</sub>	Peak Forward Blocking Current
V <sub>RRM</sub>	Peak Repetitive Off State Reverse Voltage
I <sub>RRM</sub>	Peak Reverse Blocking Current
V <sub>TM</sub>	Peak On State Voltage
I <sub>H</sub>	Holding Current



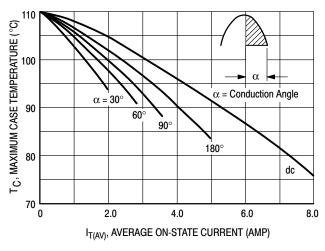


Figure 1. Average Current Derating

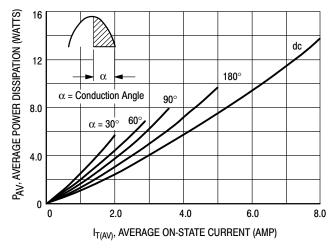
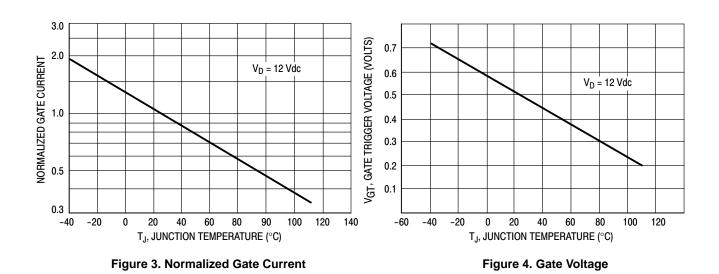
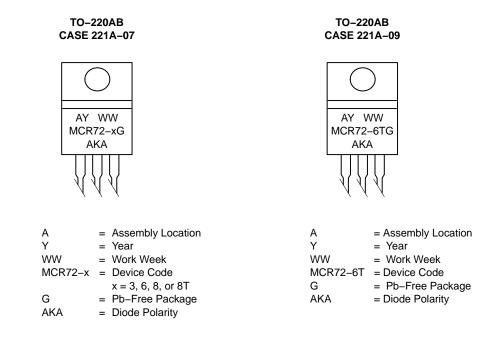


Figure 2. On-State Power Dissipation



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## MARKING DIAGRAMS



### **ORDERING INFORMATION**

Device	Package	Shipping
MCR72–3G	TO-220AB (Pb-Free)	500 Units / Box
MCR72–6G	TO-220AB (Pb-Free)	500 Units / Box
MCR72–6TG	TO-220AB (Pb-Free)	50 Units / Rail
MCR72–8G	TO-220AB (Pb-Free)	500 Units / Box
MCR72-8TG	TO-220AB (Pb-Free)	50 Units / Rail

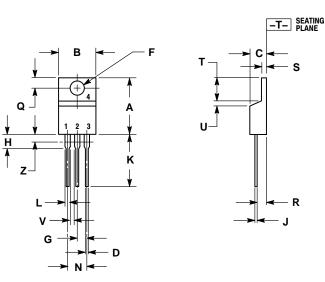
# PACKAGE DIMENSIONS

TO-220 CASE 221A-07 ISSUE O

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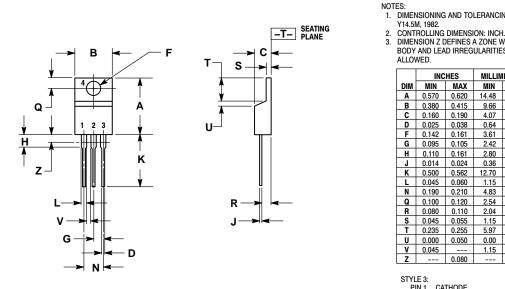
NOTES: 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: INCH. 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INC	HES	MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.570	0.620	14.48	15.75
В	0.380	0.405	9.66	10.28
С	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
Н	0.110	0.155	2.80	3.93
L	0.014	0.022	0.36	0.55
κ	0.500	0.562	12.70	14.27
Г	0.045	0.060	1.15	1.52
Ν	0.190	0.210	4.83	5.33
Ø	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
Т	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
۷	0.045		1.15	
Ζ		0.080		2.04

STYLE 3: PIN 1. CATHODE 2. ANODE 3. GATE 4. ANODE

#### PACKAGE DIMENSIONS

TO-220 CASE 221A-09 **ISSUE AH** 



	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
Α	0.570	0.620	14.48	15.75
В	0.380	0.415	9.66	10.53
С	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
Η	0.110	0.161	2.80	4.10
L	0.014	0.024	0.36	0.61
Κ	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
Ν	0.190	0.210	4.83	5.33
Ø	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
Т	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045		1.15	
Ζ		0.080		2.04

DIMENSIONING AND TOLERANCING PER ANSI

DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE

STYLE 3: PIN 1. CATHODE 2. ANODE GATE 3. 4. ANODE

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