



## MCR100

SCR

### SENSITIVE GATE SILICON CONTROLLED RECTIFIERS REVERSE BLOCKING THYRISTORS

#### DESCRIPTION

PNPN devices designed for high volume, line-powered consumer applications such as relay and lamp drivers, small motor controls, gate drivers for larger thyristors, and sensing and detection circuits.

#### FEATURES

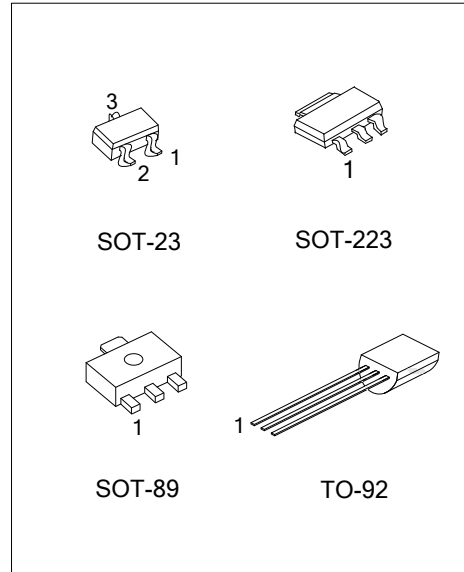
- \* Sensitive gate allows triggering by micro controllers and other logic circuits
- \* Blocking voltage to 600V
- \* On-state current rating of 0.8A RMS at 80°C
- \* High surge current capability – 10A
- \* Minimum and maximum values of  $I_{GT}$ ,  $V_{GT}$  and  $I_H$  specified for ease of design
- \* Immunity to  $dV/dt$  – 20V/ $\mu$ sec minimum at 110°C
- \* Glass-passivated surface for reliability and uniformity

#### ORDERING INFORMATION

Ordering Number		Package	Pin assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	MCR100G-4-x-AA3-R	SOT-223	K	A	G	Tape Reel
-	MCR100G-4-x-AB3-R	SOT-89	G	A	K	Tape Reel
-	MCR100G-4-x-AE3-R	SOT-23	G	K	A	Tape Reel
MCR100L-4-x-T92-B	MCR100G-4-x-T92-B	TO-92	K	G	A	Tape Box
MCR100L-4-x-T92-K	MCR100G-4-x-T92-K	TO-92	K	G	A	Bulk
-	MCR100G-6-x-AA3-R	SOT-223	K	A	G	Tape Reel
-	MCR100G-6-x-AB3-R	SOT-89	G	A	K	Tape Reel
-	MCR100G-6-x-AE3-R	SOT-23	G	K	A	Tape Reel
MCR100L-6-x-T92-B	MCR100G-6-x-T92-B	TO-92	K	G	A	Tape Box
MCR100L-6-x-T92-K	MCR100G-6-x-T92-K	TO-92	K	G	A	Bulk
-	MCR100G-8-x-AA3-R	SOT-223	K	A	G	Tape Reel
-	MCR100G-8-x-AB3-R	SOT-89	G	A	K	Tape Reel
-	MCR100G-8-x-AE3-R	SOT-23	G	K	A	Tape Reel
MCR100L-8-x-T92-B	MCR100G-8-x-T92-B	TO-92	K	G	A	Tape Box
MCR100L-8-x-T92-K	MCR100G-8-x-T92-K	TO-92	K	G	A	Bulk

Note: Pin assignment: G: Gate K: Cathode A: Anode

<p>MCR100L-4-x-AB3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Rank</p> <p>(4) Green Package</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel</p> <p>(2) AB3: SOT-89, AE3: SOT-23, T92: TO-92</p> <p>(3) x: Refer to CLASSIFICATION OF <math>I_{GT}</math></p> <p>(4) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING

Package	MCR100-4	MCR100-6	MCR100-8
SOT-223	<p>MCR100G -4 □□□□ → Data Code 1</p>	<p>MCR100G -6 □□□□ → Data Code 1</p>	<p>MCR100G -8 □□□□ → Data Code 1</p>
SOT-89	<p>□□□□ → Data Code R4G</p>	<p>□□□□ → Data Code R6G</p>	<p>□□□□ → Data Code R8G</p>
SOT-23	<p>R4G</p>	<p>R6G</p>	<p>R8G</p>
TO-92	<p>UTC MCR100□ -4 □□□□ → Data Code 1</p> <p>L: Lead Free G: Halogen Free</p>	<p>UTC MCR100□ -6 □□□□ → Data Code 1</p> <p>L: Lead Free G: Halogen Free</p>	<p>UTC MCR100□ -8 □□□□ → Data Code 1</p> <p>L: Lead Free G: Halogen Free</p>

### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Peak Repetitive Off-State Voltage(Note 1) ( $T_J=-40 \sim 110^\circ\text{C}$ , Sine Wave, 50 ~ 60Hz; Gate Open)	MCR100-4	$V_{\text{DRM}}, V_{\text{RRM}}$	200	V
	MCR100-6		400	V
	MCR100-8		600	V
On-State RMS Current ( $T_c=80^\circ\text{C}$ ) 180°C Condition Angles		$I_{\text{T(RMS)}}$	0.8	A
Peak Non-Repetitive Surge Current (1/2 cycle, Sine Wave, 60Hz, $T_J=25^\circ\text{C}$ )		$I_{\text{TSM}}$	10	A
Circuit Fusing Considerations ( $t=8.3 \text{ ms}$ )		$I^2t$	0.415	$\text{A}^2\text{s}$
Forward Peak Gate Power ( $T_A=25^\circ\text{C}$ , Pulse Width $\leq 1.0\mu\text{s}$ )		$P_{\text{GM}}$	0.1	W
Forward Average Gate Power ( $T_A=25^\circ\text{C}$ , $t=8.3\text{ms}$ )		$P_{\text{G(AV)}}$	0.1	W
Peak Gate Current – Forward ( $T_A=25^\circ\text{C}$ , Pulse Width $\leq 1.0\mu\text{s}$ )		$I_{\text{GM}}$	1	A
Peak Gate Voltage – Reverse ( $T_A=25^\circ\text{C}$ , Pulse Width $\leq 1.0\mu\text{s}$ )		$V_{\text{GRM}}$	5	V
Operating Junction Temperature Range (Rated $V_{\text{RRM}}$ and $V_{\text{DRM}}$ )		$T_J$	-40 ~ +110	$^\circ\text{C}$
Storage Temperature Range		$T_{\text{STG}}$	-40 ~ +150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ THERMAL DATA

PARAMETER		SYMBOL	MAX	UNIT
Junction to Ambient	SOT-223	$\theta_{\text{JA}}$	180	$^\circ\text{C/W}$
	SOT-23/SOT-89		400	$^\circ\text{C/W}$
	TO-92		200	$^\circ\text{C/W}$

### ■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise stated)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Peak Forward or Reverse Blocking Current	$T_C=25^\circ\text{C}$	$I_{\text{DRM}}, I_{\text{RRM}}$	$V_D=\text{Rated } V_{\text{DRM}} \text{ and } V_{\text{RRM}};$ $R_{\text{GK}}=1\text{k}\Omega$		10	$\mu\text{A}$	
	$T_C=125^\circ\text{C}$				100	$\mu\text{A}$	
<b>ON CHARACTERISTICS</b>							
Peak Forward On-State Voltage (Note 2)	$V_{\text{TM}}$	$I_{\text{TM}}=1\text{A Peak @ } T_A=25^\circ\text{C}$			1.7	V	
Gate Trigger Current (Continuous DC) (Note3)	$I_{\text{GT}}$	$V_{\text{AK}}=7\text{Vdc}, R_L=100\Omega, T_C=25^\circ\text{C}$		40	200	$\mu\text{A}$	
Holding Current	$T_C=25^\circ\text{C}$	$I_{\text{H}}$	$V_{\text{AK}}=7\text{Vdc}$ , initiating current=20mA		0.5	5	mA
	$T_C=-40^\circ\text{C}$					10	mA
Latch Current	$T_C=25^\circ\text{C}$	$I_{\text{L}}$	$V_{\text{AK}}=7\text{V}, I_{\text{g}}=200\mu\text{A}$		0.6	10	mA
	$T_C=-40^\circ\text{C}$					15	mA
Gate Trigger Voltage (continuous dc)	$T_C=25^\circ\text{C}$	$V_{\text{GT}}$	$V_{\text{AK}}=7\text{Vdc}, R_L=100\Omega$		0.62	0.8	V
	$T_C=-40^\circ\text{C}$					1.2	V
<b>DYNAMIC CHARACTERISTICS</b>							
Critical Rate of Rise of Off-State Voltage	$d_v/dt$	$V_D=\text{Rated } V_{\text{DRM}}$ , Exponential Waveform, $R_{\text{GK}}=1000\Omega$ , $T_J=110^\circ\text{C}$	20	35		V/ $\mu\text{s}$	
Critical Rate of Rise of On-State Current	$di/dt$	$I_{\text{PK}}=20\text{A}; P_w=10\mu\text{sec};$ $di/dt=1\text{A}/\mu\text{sec}, I_{\text{gt}}=20\text{mA}$			50	A/ $\mu\text{s}$	

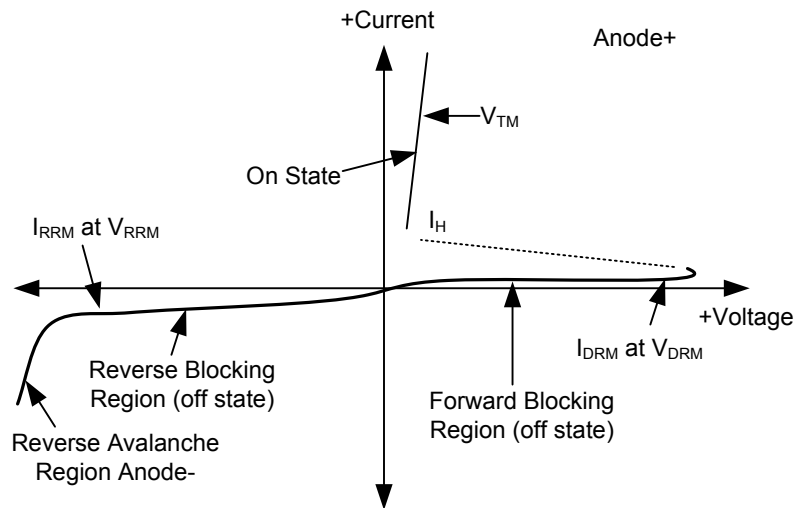
Notes: 1.  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant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

2. Indicates Pulse Test Width  $\leq 1.0\text{ms}$ , duty cycle  $\leq 1\%$ .

3. Does not include RGK in measurement.

## ■ VOLTAGE CURRENT CHARACTERISTIC OF SCR

PARAMETER	SYMBOL
Peak Repetitive Off Stat Forward Voltage	$V_{DRM}$
Peak Forward Blocking Current	$I_{DRM}$
Peak Repetitive Off State Reverse Voltage	$V_{RRM}$
Peak Reverse Blocking Current	$I_{RRM}$
Peak On State Voltage	$V_{TM}$
Holding Current	$I_H$

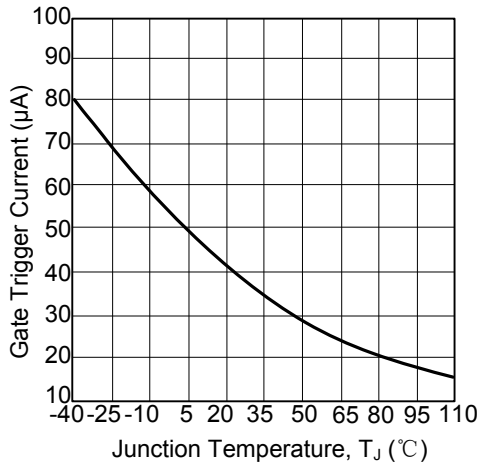


## ■ CLASSIFICATION OF $I_{GT}$

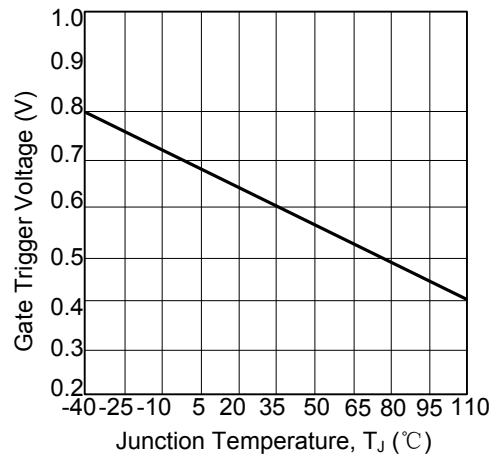
RANK	B	C	AA	AB	AC	AD
RANGE	48~105 $\mu$ A	95~200 $\mu$ A	8~16 $\mu$ A	14~21 $\mu$ A	19~25 $\mu$ A	23~52 $\mu$ A

## TYPICAL CHARACTERISTICS

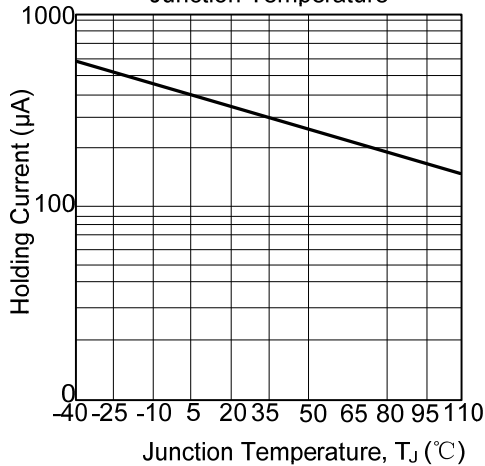
Typical Gate Trigger Current vs. Junction Temperature



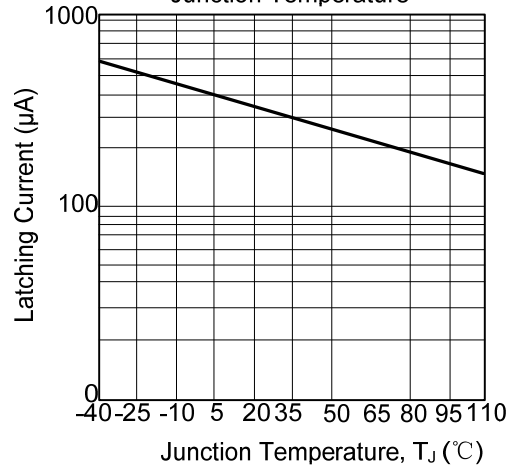
Typical Gate Trigger Voltage vs. Junction Temperature



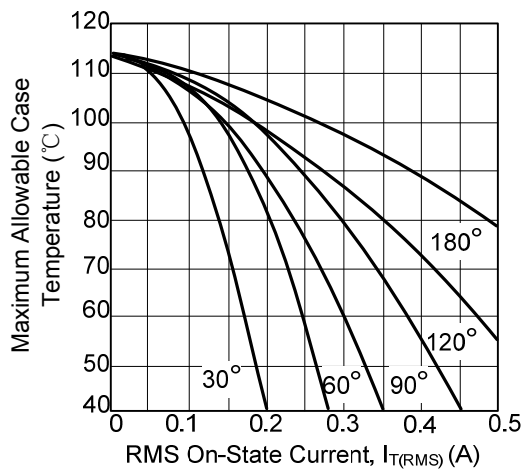
Typical Holding Current vs. Junction Temperature



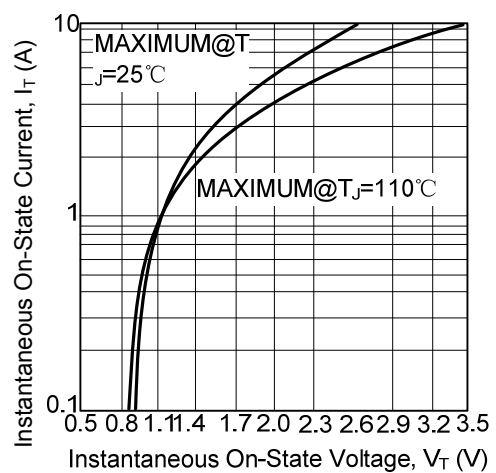
Typical Latching Current vs. Junction Temperature



Typical RMS Current Derating



Typical On-State Characteristics



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