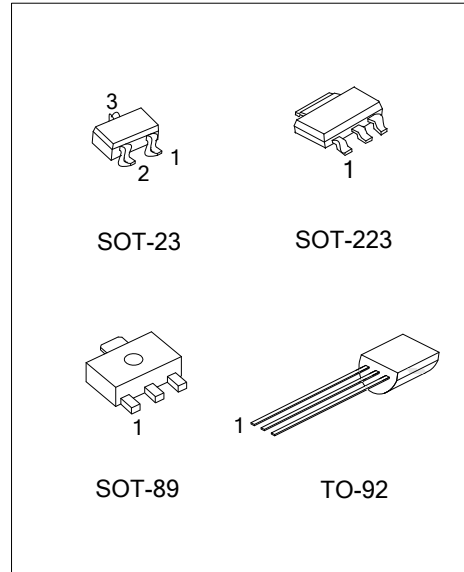




**MCR100**

**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 |           |
| MCR100L-4-x-AA3-R | MCR100G-4-x-AA3-R | SOT-223 | K              | A | G | Tape Reel |
| MCR100L-4-x-AB3-R | MCR100G-4-x-AB3-R | SOT-89  | G              | A | K | Tape Reel |
| MCR100L-4-x-AE3-R | 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      |
| MCR100L-6-x-AA3-R | MCR100G-6-x-AA3-R | SOT-223 | K              | A | G | Tape Reel |
| MCR100L-6-x-AB3-R | MCR100G-6-x-AB3-R | SOT-89  | G              | A | K | Tape Reel |
| MCR100L-6-x-AE3-R | 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      |
| MCR100L-8-x-AA3-R | MCR100G-8-x-AA3-R | SOT-223 | K              | A | G | Tape Reel |
| MCR100L-8-x-AB3-R | MCR100G-8-x-AB3-R | SOT-89  | G              | A | K | Tape Reel |
| MCR100L-8-x-AE3-R | 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>MCR100G-4-x-AA3-R</p> <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Rank<br/>(4) Green Package</p> | <p>(1) B: Tape Box, K: Bulk, R: Tape Reel<br/>(2) AB3: SOT-89, AE3: SOT-23, T92: TO-92<br/>(3) x: Refer to CLASSIFICATION OF <math>I_{GT}</math><br/>(4) G: Halogen Free and Lead Free, L: Lead Free</p> |
|--|--|

## MARKING

| Package | MCR100-4   | MCR100-6   | MCR100-8   |
|---------|--|--|--|
| SOT-223 | <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p>  | <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p>  | <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p>  |
| SOT-89  | <p>Date Code<br/>L: Lead Free<br/>G: Halogen Free</p>  | <p>Date Code<br/>L: Lead Free<br/>G: Halogen Free</p>  | <p>Date Code<br/>L: Lead Free<br/>G: Halogen Free</p>  |
| SOT-23  | <p>L: Lead Free<br/>G: Halogen Free</p>  | <p>L: Lead Free<br/>G: Halogen Free</p>  | <p>L: Lead Free<br/>G: Halogen Free</p>  |
| TO-92   | <p>UTC<br/>MCR100<br/>-4<br/>Date Code</p> <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p> | <p>UTC<br/>MCR100<br/>-6<br/>Date Code</p> <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p> | <p>UTC<br/>MCR100<br/>-8<br/>Date Code</p> <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p> |

## ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER   |          | SYMBOL                           | RATINGS    | UNIT                 |
|---|----------|----------------------------------|------------|----------------------|
| Peak Repetitive Off-State Voltage(Note 1)<br>( $T_J=-40 \sim 110^\circ\text{C}$ , Sine Wave, 50 ~ 60Hz;<br>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<br>(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 ( $T_A=25^\circ\text{C}$ , $t=8.3\text{ms}$ )  |          | $P_{\text{G(AV)}}$               | 0.01       | 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<br>(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     | $T_C=25^\circ\text{C}$  | $I_{\text{DRM}}, I_{\text{RRM}}$  | $V_D=\text{Rated } V_{\text{DRM}} \text{ and } V_{\text{RRM}};$<br>$R_{\text{GK}}=1\text{k}\Omega$ |     | 10   | $\mu\text{A}$    |    |
|  | $T_C=110^\circ\text{C}$ |   |  |     | 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<br>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<br>(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<br>Waveform, $R_{\text{GK}}=1000\Omega$ ,<br>$T_J=110^\circ\text{C}$ | 20   | 35  |      | V/ $\mu\text{s}$ |    |
| Critical Rate of Rise of On-State Current    | $di/dt$                 | $I_{\text{PK}}=20\text{A}; P_w=10\mu\text{sec};$<br>$di/dt=1\text{A}/\mu\text{sec}, I_{\text{gt}}=20\text{mA}$        |  |     | 50   | A/ $\mu\text{s}$ |    |

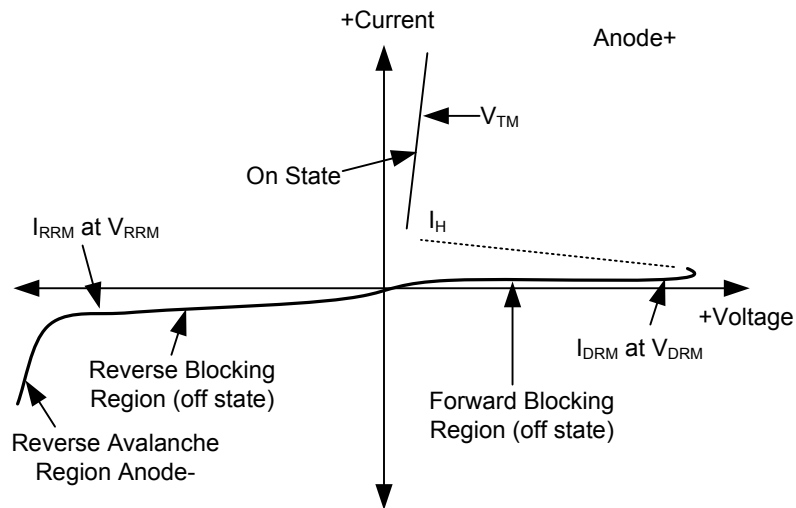
Notes: 1.  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant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

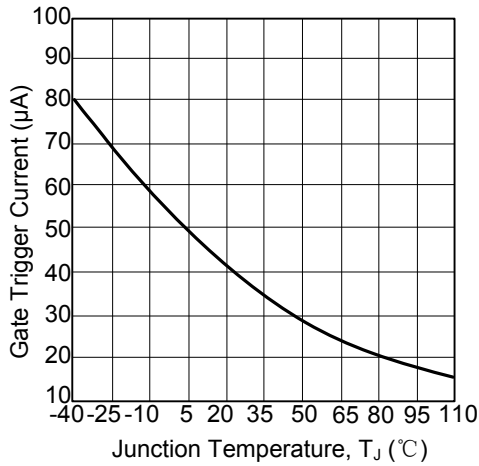


## ■ CLASSIFICATION OF $I_{GT}$

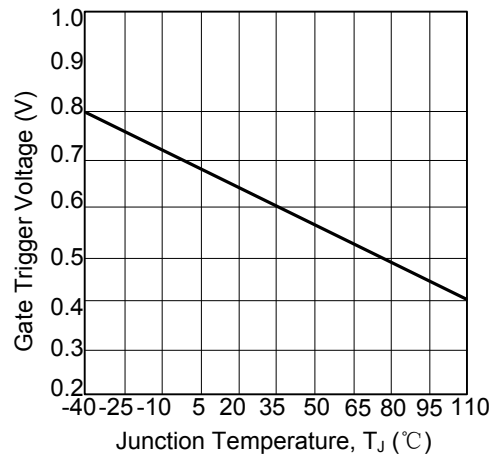
| RANK  | B              | C              | AA           | AB            | AC            | AD            |
|-------|----------------|----------------|--------------|---------------|---------------|---------------|
| RANGE | 48~105 $\mu$ A | 95~200 $\mu$ A | 8~16 $\mu$ A | 14~21 $\mu$ A | 19~25 $\mu$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

## TYPICAL CHARACTERISTICS

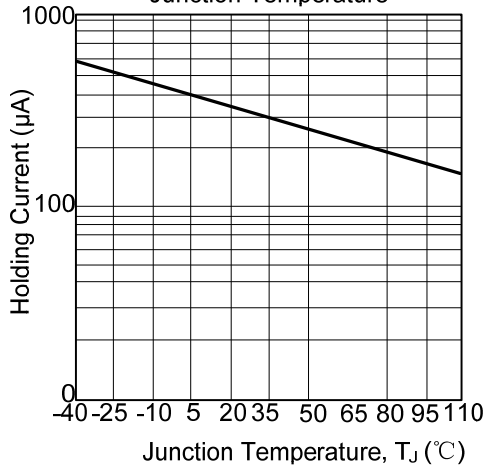
Typical Gate Trigger Current vs. Junction Temperature



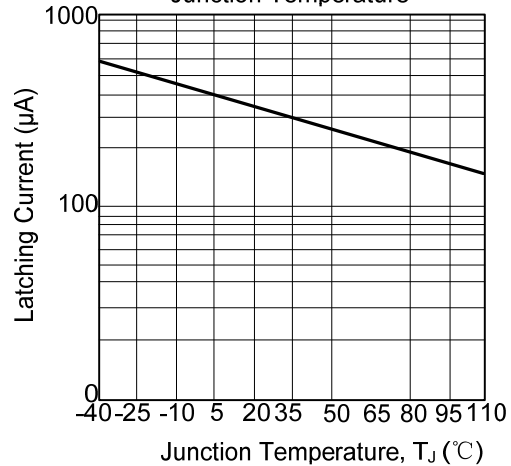
Typical Gate Trigger Voltage vs. Junction Temperature



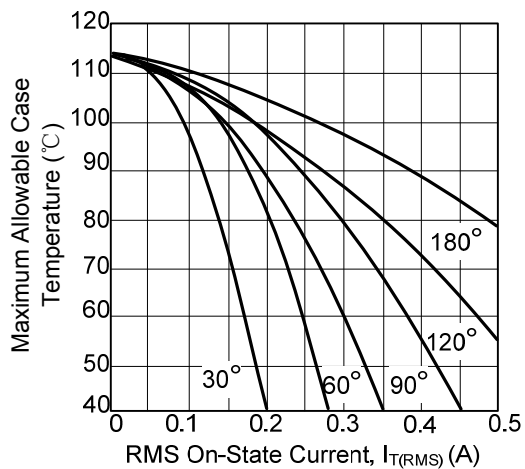
Typical Holding Current vs. Junction Temperature



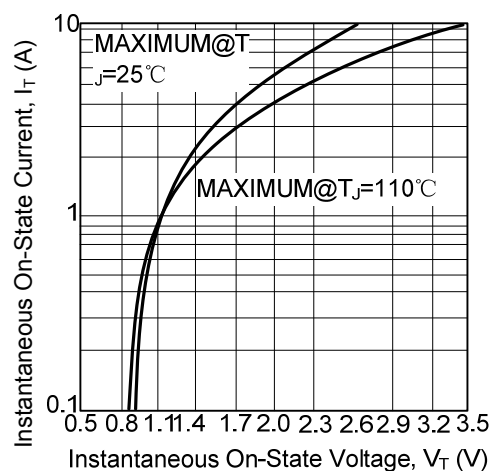
Typical Latching Current vs. Junction Temperature



Typical RMS Current Derating



Typical On-State Characteristics



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