

# MCR100 Series

Preferred Device

## Sensitive Gate Silicon Controlled Rectifiers

### Reverse Blocking Thyristors

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. Supplied in an inexpensive plastic TO-226AA package which is readily adaptable for use in automatic insertion equipment.

#### Features

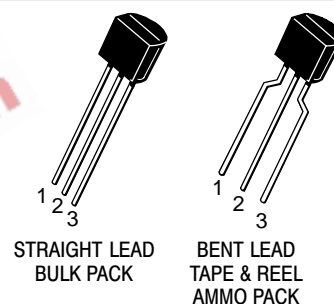
- Sensitive Gate Allows Triggering by Microcontrollers and Other Logic Circuits
- Blocking Voltage to 600 V
- On-State Current Rating of 0.8 A RMS at 80°C
- High Surge Current Capability – 10 A
- Minimum and Maximum Values of IGT, VGT and IH Specified for Ease of Design
- Immunity to  $dV/dt$  – 20 V/ $\mu$ sec Minimum at 110°C
- Glass-Passivated Surface for Reliability and Uniformity
- Pb-Free Packages are Available\*



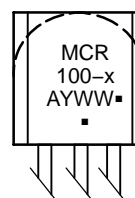
ON Semiconductor®

<http://onsemi.com>

SCRs  
0.8 A RMS  
100 thru 600 V



#### MARKING DIAGRAM



- x = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

#### PIN ASSIGNMENT

|   |         |
|---|---------|
| 1 | Cathode |
| 2 | Gate    |
| 3 | Anode   |

#### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

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

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

## MCR100 Series

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

| Rating  | Symbol                                 | Value  | Unit             |
|---|--|--|------------------|
| Peak Repetitive Off-State Voltage (Notes 1 and 2)<br>(T <sub>J</sub> = -40 to 110°C, Sine Wave, 50 to 60 Hz; Gate Open) | V <sub>DRM</sub> ,<br>V <sub>RRM</sub> | MCR100-3<br>100<br>MCR100-4<br>200<br>MCR100-6<br>400<br>MCR100-8<br>600 | V                |
| On-State RMS Current, (T <sub>C</sub> = 80°C) 180° Conduction Angles  | I <sub>T(RMS)</sub>                    | 0.8  | A                |
| Peak Non-Repetitive Surge Current, (1/2 Cycle, Sine Wave, 60 Hz, T <sub>J</sub> = 25°C)                                 | I <sub>TSM</sub>                       | 10   | A                |
| Circuit Fusing Consideration, (t = 8.3 ms)  | I <sup>2</sup> t                       | 0.415  | A <sup>2</sup> s |
| Forward Peak Gate Power, (T <sub>A</sub> = 25°C, Pulse Width ≤ 1.0 μs)  | P <sub>GM</sub>                        | 0.1  | W                |
| Forward Average Gate Power, (T <sub>A</sub> = 25°C, t = 8.3 ms)   | P <sub>G(AV)</sub>                     | 0.10   | W                |
| Forward Peak Gate Current, (T <sub>A</sub> = 25°C, Pulse Width ≤ 1.0 μs)  | I <sub>GM</sub>                        | 1.0  | A                |
| Reverse Peak Gate Voltage, (T <sub>A</sub> = 25°C, Pulse Width ≤ 1.0 μs)  | V <sub>G(RM)</sub>                     | 5.0  | V                |
| Operating Junction Temperature Range @ Rate V <sub>RRM</sub> and V <sub>DRM</sub>                                       | T <sub>J</sub>                         | -40 to 110   | °C               |
| Storage Temperature Range   | T <sub>stg</sub>                       | -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<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.
- See ordering information for exact device number options.

### THERMAL CHARACTERISTICS

| Characteristic  | Symbol           | Max | Unit |
|---|------------------|-----|------|
| Thermal Resistance, Junction-to-Case                        | R <sub>θJC</sub> | 75  | °C/W |
| Junction-to-Ambient   | R <sub>θJA</sub> | 200 | °C/W |
| Lead Solder Temperature<br>(< 1/16" from case, 10 secs max) | T <sub>L</sub>   | 260 | °C   |

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|   |                                     |   |   |           |    |
|---|-------------------------------------|---|---|-----------|----|
| Peak Repetitive Forward or Reverse Blocking Current (Note 2)<br>(V <sub>D</sub> = Rated V <sub>DRM</sub> and V <sub>RRM</sub> ; R <sub>GK</sub> = 1 kΩ) | I <sub>DRM</sub> , I <sub>RRM</sub> | - | - | 10<br>100 | μA |
|   |                                     |   |   |           |    |
|   |                                     |   |   |           |    |

### ON CHARACTERISTICS

|  |                 |   |      |            |    |
|--|-----------------|---|------|------------|----|
| Peak Forward On-State Voltage*<br>(I <sub>TM</sub> = 1.0 A Peak @ T <sub>A</sub> = 25°C)             | V <sub>TM</sub> | - | -    | 1.7        | V  |
| Gate Trigger Current (Continuous dc) (Note 3)<br>(V <sub>AK</sub> = 7.0 Vdc, R <sub>L</sub> = 100 Ω) | I <sub>GT</sub> | - | 40   | 200        | μA |
| Holding Current <sup>(2)</sup><br>(V <sub>AK</sub> = 7.0 Vdc, Initiating Current = 20 mA)            | I <sub>H</sub>  | - | 0.5  | 5.0<br>10  | mA |
| Latch Current<br>(V <sub>AK</sub> = 7.0 V, I <sub>g</sub> = 200 μA)                                  | I <sub>L</sub>  | - | 0.6  | 10<br>15   | mA |
| Gate Trigger Voltage (Continuous dc) (Note 3)<br>(V <sub>AK</sub> = 7.0 Vdc, R <sub>L</sub> = 100 Ω) | V <sub>GT</sub> | - | 0.62 | 0.8<br>1.2 | V  |

### DYNAMIC CHARACTERISTICS

|  |       |    |    |    |      |
|--|-------|----|----|----|------|
| Critical Rate of Rise of Off-State Voltage<br>(V <sub>D</sub> = Rated V <sub>DRM</sub> , Exponential Waveform, R <sub>GK</sub> = 1000 Ω, T <sub>J</sub> = 110°C) | dV/dt | 20 | 35 | -  | V/μs |
| Critical Rate of Rise of On-State Current<br>(I <sub>PK</sub> = 20 A; P <sub>w</sub> = 10 μsec; diG/dt = 1 A/μsec, I <sub>gt</sub> = 20 mA)                      | di/dt | -  | -  | 50 | A/μs |

\*Indicates Pulse Test: Pulse Width ≤ 1.0 ms, Duty Cycle ≤ 1%.

3. R<sub>GK</sub> = 1000 Ω included in measurement.

4. Does not include R<sub>GK</sub> in measurement.

# MCR100 Series

## 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                           |

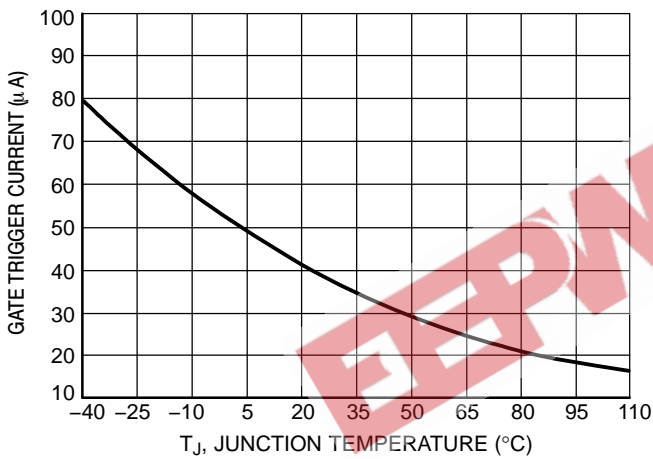
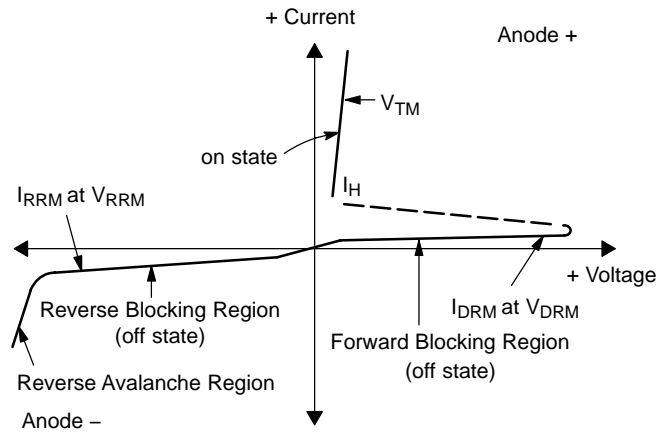


Figure 1. Typical Gate Trigger Current versus Junction Temperature

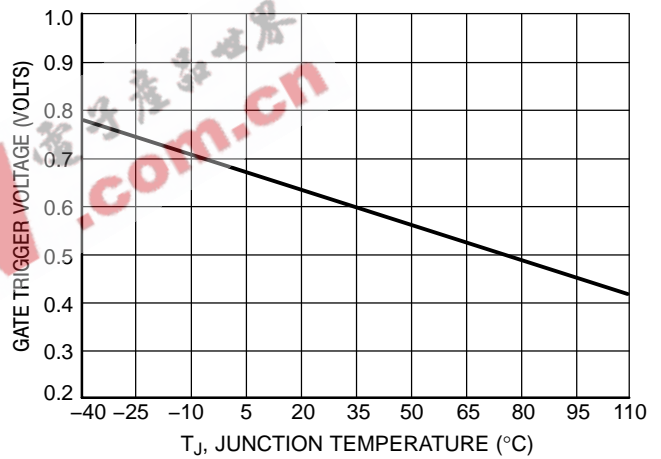


Figure 2. Typical Gate Trigger Voltage versus Junction Temperature

## MCR100 Series

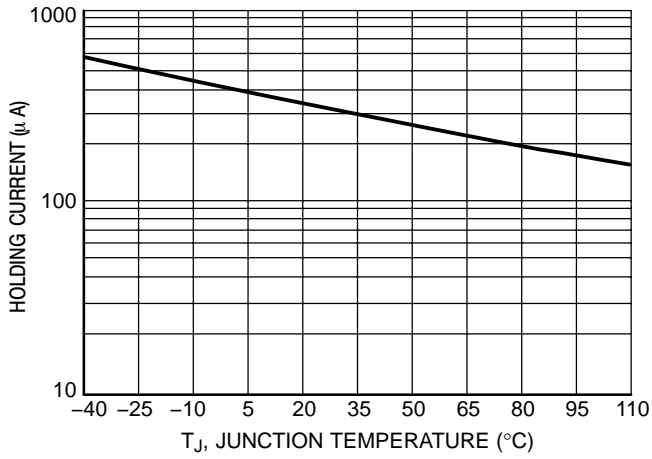


Figure 3. Typical Holding Current versus Junction Temperature

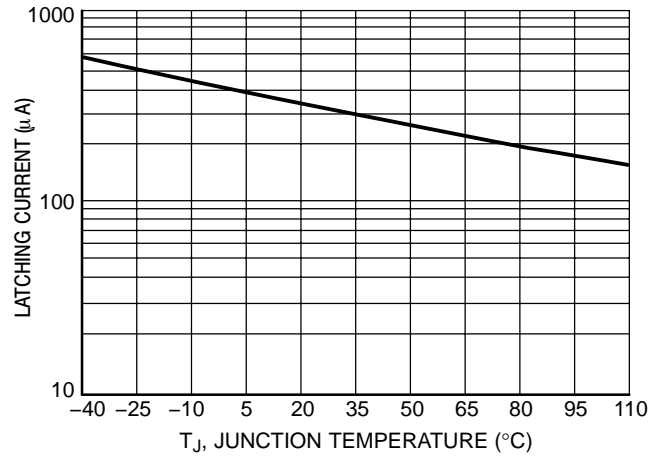


Figure 4. Typical Latching Current versus Junction Temperature

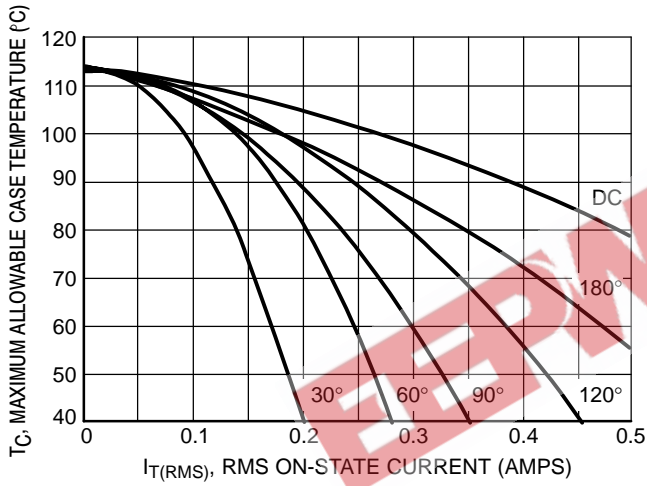


Figure 5. Typical RMS Current Derating

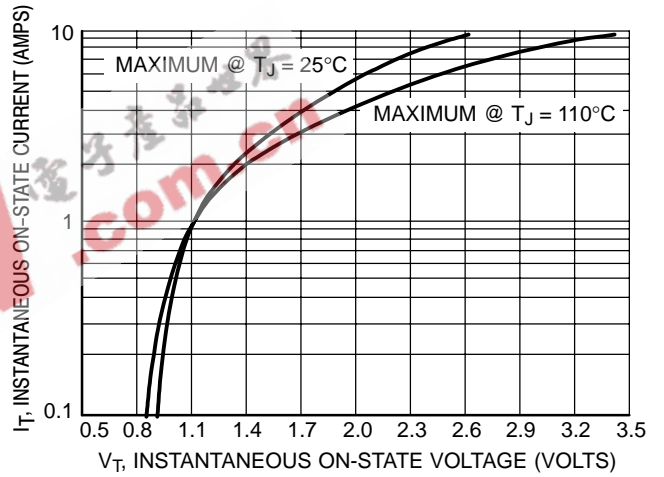


Figure 6. Typical On-State Characteristics

## MCR100 Series

### ORDERING INFORMATION

| Device        | Package Code            | Shipping†                   |                    |
|---------------|-------------------------|-----------------------------|--------------------|
| MCR100-003    | TO-92 (TO-226)          | 5000 Units / Box            |                    |
| MCR100-004    |                         |                             |                    |
| MCR100-006    |                         |                             |                    |
| MCR100-008    |                         |                             |                    |
| MCR100-3RL    |                         |                             |                    |
| MCR100-6RL    |                         | 2000 / Tape & Reel          |                    |
| MCR100-6RLRA  |                         | 2000 / Tape & Ammo Pack     |                    |
| MCR100-6RLRM  |                         |                             |                    |
| MCR100-6ZL1   |                         | TO-92 (TO-226)<br>(Pb-Free) | 2000 / Tape & Reel |
| MCR100-8RL    |                         |                             |                    |
| MCR100-3G     | 5000 Units / Box        |                             |                    |
| MCR100-4G     |                         |                             |                    |
| MCR100-6G     |                         |                             |                    |
| MCR100-8G     |                         |                             |                    |
| MCR100-3RLG   |                         |                             |                    |
| MCR100-6RLG   | 2000 / Tape & Reel      |                             |                    |
| MCR100-6RLRAG | 2000 / Tape & Ammo Pack |                             |                    |
| MCR100-6RLRMG |                         |                             |                    |
| MCR100-6ZL1G  |                         |                             |                    |
| MCR100-8RLG   | 2000 / Tape & Reel      |                             |                    |

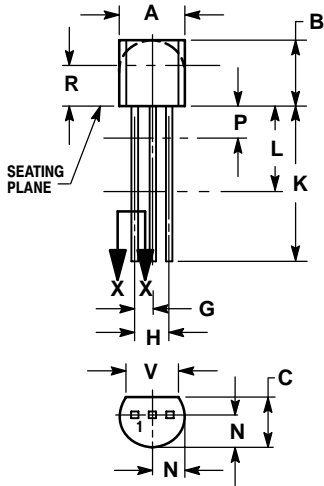
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



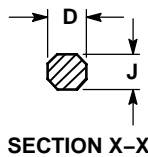
# MCR100 Series

## PACKAGE DIMENSIONS

### TO-92 (TO-226) CASE 29-11 ISSUE AM



STRAIGHT LEAD  
BULK PACK

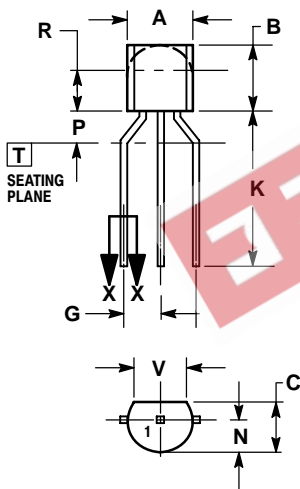


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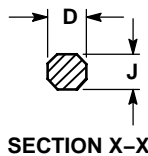
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.175  | 0.205 | 4.45        | 5.20  |
| B   | 0.170  | 0.210 | 4.32        | 5.33  |
| C   | 0.125  | 0.165 | 3.18        | 4.19  |
| D   | 0.016  | 0.021 | 0.407       | 0.533 |
| G   | 0.045  | 0.055 | 1.15        | 1.39  |
| H   | 0.095  | 0.105 | 2.42        | 2.66  |
| J   | 0.015  | 0.020 | 0.39        | 0.50  |
| K   | 0.500  | ---   | 12.70       | ---   |
| L   | 0.250  | ---   | 6.35        | ---   |
| N   | 0.080  | 0.105 | 2.04        | 2.66  |
| P   | ---    | 0.100 | ---         | 2.54  |
| R   | 0.115  | ---   | 2.93        | ---   |
| V   | 0.135  | ---   | 3.43        | ---   |



BENT LEAD  
TAPE & REEL  
AMMO PACK



SECTION X-X


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 4.45        | 5.20 |
| B   | 4.32        | 5.33 |
| C   | 3.18        | 4.19 |
| D   | 0.40        | 0.54 |
| G   | 2.40        | 2.80 |
| J   | 0.39        | 0.50 |
| K   | 12.70       | ---  |
| N   | 2.04        | 2.66 |
| P   | 1.50        | 4.00 |
| R   | 2.93        | ---  |
| V   | 3.43        | ---  |

STYLE 10:

1. CATHODE
2. GATE
3. ANODE

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