MCR100 Series

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/μsec Minimum at 110°C
- Glass-Passivated Surface for Reliability and Uniformity
- Pb−Free Packages are Available*

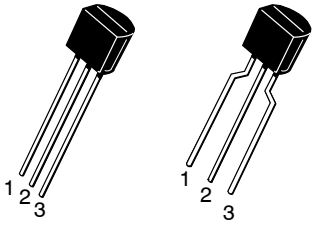
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor®

http://onsemi.com

SCRs
0.8 A RMS
100 thru 600 V

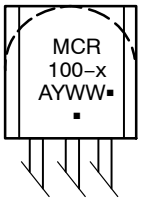
TO−92
CASE 29
STYLE 10



STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK

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.

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off−State Voltage (Notes 1 and 2) (T_J = −40 to 110°C, Sine Wave, 50 to 60 Hz; R_{GK} = 1 kΩ) MCR100−3 MCR100−4 MCR100−6 MCR100−8	V_{DRM}, V_{RRM}	 100 200 400 600	V
On-State RMS Current, (T_C = 80°C) 180° Conduction Angles	$I_{T(RMS)}$	0.8	A
Peak Non-Repetitive Surge Current, (1/2 Cycle, Sine Wave, 60 Hz, T_J = 25°C)	I_{TSM}	10	A
Circuit Fusing Consideration, (t = 8.3 ms)	I^2t	0.415	A^2s
Forward Peak Gate Power, (T_A = 25°C, Pulse Width ≤ 1.0 μs)	P_{GM}	0.1	W
Forward Average Gate Power, (T_A = 25°C, t = 8.3 ms)	$P_{G(AV)}$	0.01	W
Forward Peak Gate Current, (T_A = 25°C, Pulse Width ≤ 1.0 μs)	I_{GM}	1.0	A
Reverse Peak Gate Voltage, (T_A = 25°C, Pulse Width ≤ 1.0 μs)	V_{GRM}	5.0	V
Operating Junction Temperature Range @ Rate V_{RRM} and V_{DRM}	T_J	−40 to 110	°C
Storage Temperature Range	T_{stg}	−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.

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.
2. See ordering information for exact device number options.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case Junction−to−Ambient	$R_{\theta JC}$ $R_{\theta JA}$	75 200	°C/W
Lead Solder Temperature (< 1/16″ from case, 10 secs max)	T_L	260	°C

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

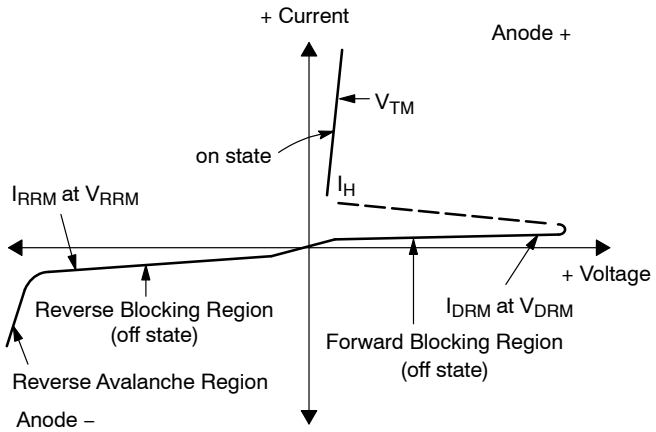
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Peak Repetitive Forward or Reverse Blocking Current (Note 3) T_C = 25°C (V_D = Rated V_{DRM} and V_{RRM}; R_{GK} = 1 kΩ) T_C = 110°C	I_{DRM}, I_{RRM}	 − −	 − −	 10 100	μA
ON CHARACTERISTICS					
Peak Forward On−State Voltage* (I_{TM} = 1.0 A Peak @ T_A = 25°C)	V_{TM}	−	−	1.7	V
Gate Trigger Current (Note 4) T_C = 25°C (V_{AK} = 7.0 Vdc, R_L = 100 Ω)	I_{GT}	−	40	200	μA
Holding Current (Note 3) T_C = 25°C (V_{AK} = 7.0 Vdc, Initiating Current = 20 mA, R_{GK} = 1 kΩ) T_C = −40°C	I_H	− −	0.5 −	5.0 10	mA
Latch Current (Note 4) T_C = 25°C (V_{AK} = 7.0 V, Ig = 200 μA) T_C = −40°C	I_L	− −	0.6 −	10 15	mA
Gate Trigger Voltage (Note 4) T_C = 25°C (V_{AK} = 7.0 Vdc, R_L = 100 Ω) T_C = −40°C	V_{GT}	− −	0.62 −	0.8 1.2	V
DYNAMIC CHARACTERISTICS					
Critical Rate of Rise of Off−State Voltage (V_D = Rated V_{DRM}, Exponential Waveform, R_{GK} = 1 kΩ, T_J = 110°C)	dV/dt	20	35	−	V/μs
Critical Rate of Rise of On−State Current (I_{PK} = 20 A; Pw = 10 μsec; diG/dt = 1 A/μsec, Igt = 20 mA)	di/dt	−	−	50	A/μs

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

3. R_{GK} = 1000 Ω included in measurement.
4. Does not include R_{GK} in measurement.

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



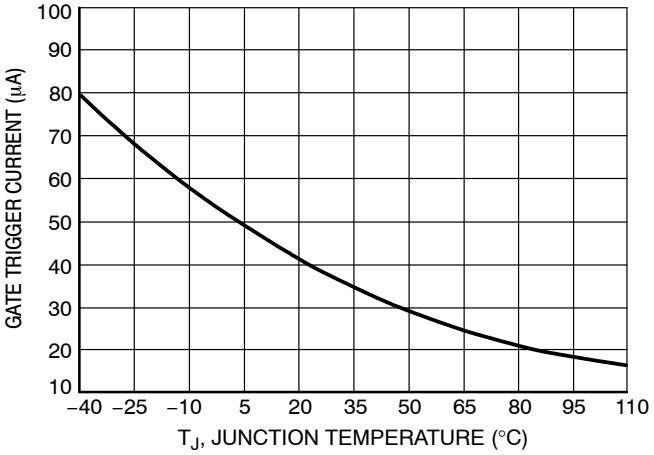


Figure 1. Typical Gate Trigger Current versus Junction Temperature

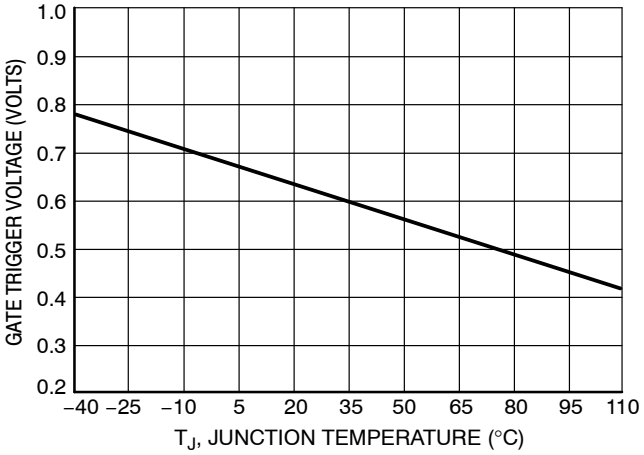


Figure 2. Typical Gate Trigger Voltage versus Junction Temperature

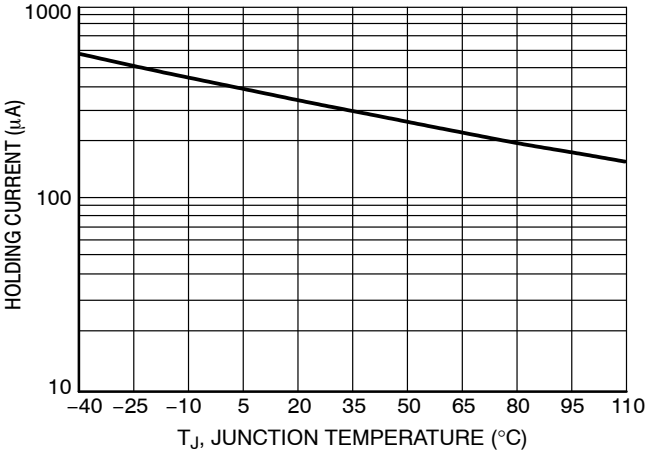


Figure 3. Typical Holding Current versus Junction Temperature

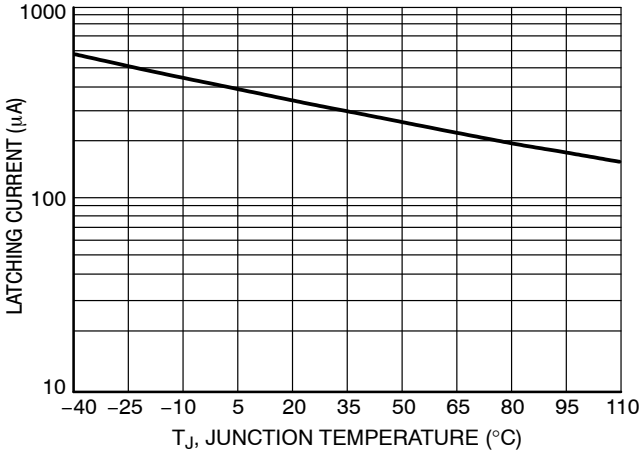


Figure 4. Typical Latching Current versus Junction Temperature

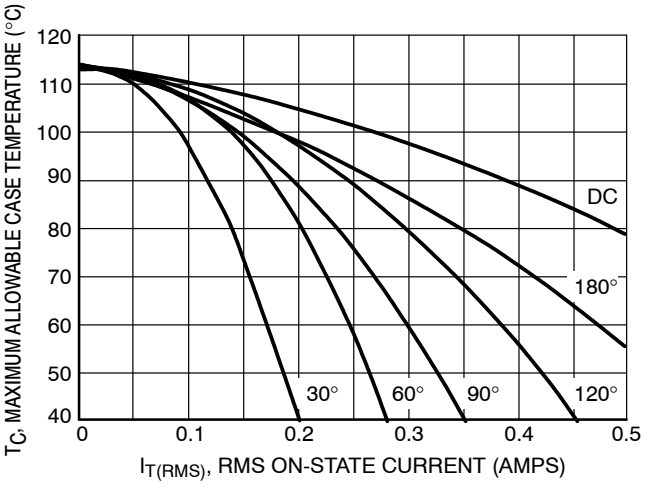


Figure 5. Typical RMS Current Derating

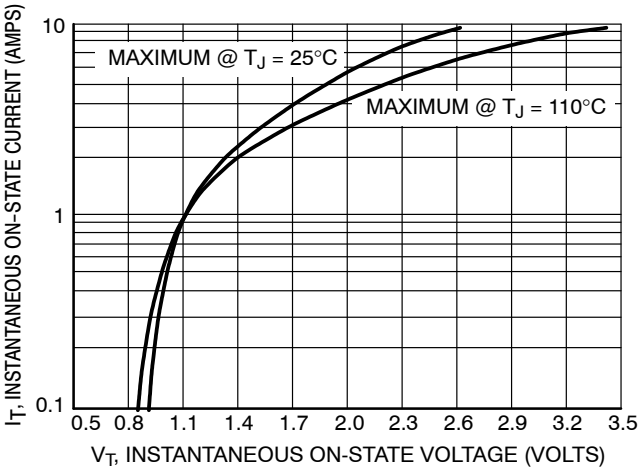


Figure 6. Typical On−State Characteristics

ORDERING INFORMATION

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

TO−92 EIA RADIAL TAPE IN BOX OR ON REEL

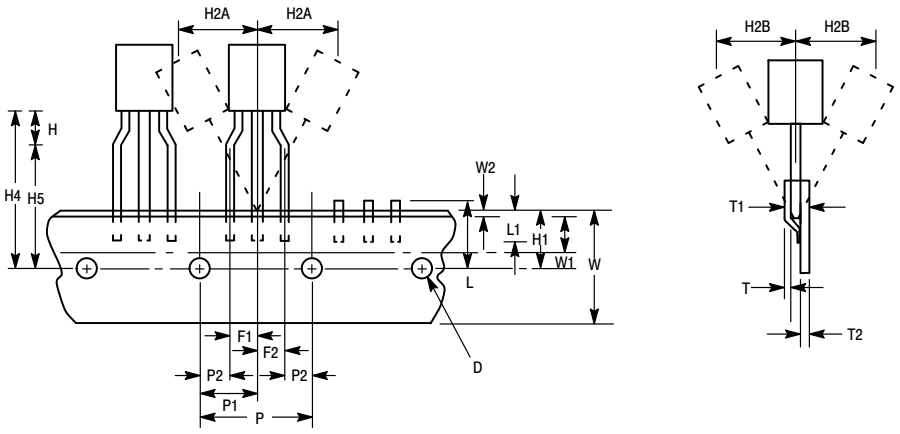


Figure 7. Device Positioning on Tape

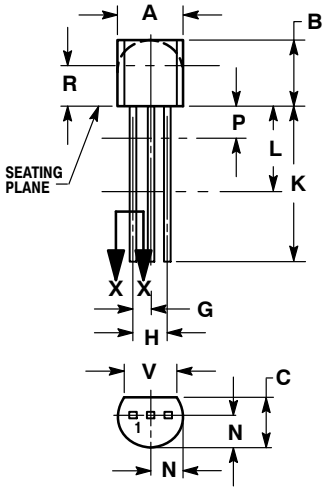
Symbol	Item	Specification			
		Inches		Millimeter	
		Min	Max	Min	Max
D	Tape Feedhole Diameter	0.1496	0.1653	3.8	4.2
D2	Component Lead Thickness Dimension	0.015	0.020	0.38	0.51
F1, F2	Component Lead Pitch	0.0945	0.110	2.4	2.8
H	Bottom of Component to Seating Plane	.059	.156	1.5	4.0
H1	Feedhole Location	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:

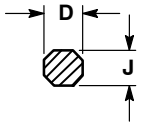
1. Maximum alignment deviation between leads not to be greater than 0.2 mm.
2. Defective components shall be clipped from the carrier tape such that the remaining protrusion (L) does not exceed a maximum of 11 mm.
3. Component lead to tape adhesion must meet the pull test requirements.
4. Maximum non−cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches.
5. Hold down 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.

PACKAGE DIMENSIONS

TO−92 (TO−226)
CASE 29−11
ISSUE AM



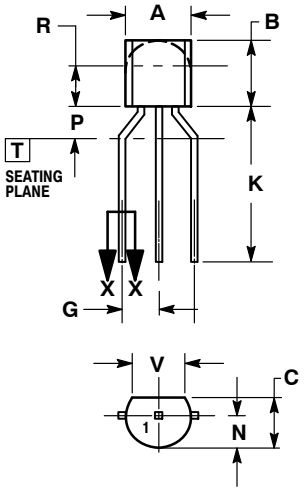
STRAIGHT LEAD
BULK PACK



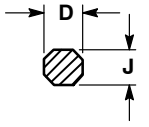
SECTION X−X

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.

	INCHES		MILLIMETERS	
DIM	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.

	MILLIMETERS	
DIM	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:
PIN 1. CATHODE
2. GATE
3. ANODE

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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MCR100/D