

# MCR22-6, MCR22-8

Preferred Device

## Sensitive Gate Silicon Controlled Rectifiers

### Reverse Blocking Thyristors

Designed and tested for repetitive peak operation required for CD ignition, fuel ignitors, flash circuits, motor controls and low-power switching applications.

- 150 Amperes for 2  $\mu$ s Safe Area
- High dv/dt
- Very Low Forward "On" Voltage at High Current
- Low-Cost TO-226AA (TO-92)
- Device Marking: Device Type, e.g., MCR22-6, Date Code

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage ( $R_{GK} = 1\text{K}$ , $T_J = -40$ to $+110^\circ\text{C}$ , Sine Wave, 50 to 60 Hz, Gate Open) MCR22-6 MCR22-8	$V_{DRM}$ , $V_{RRM}$	400 600	Volts
On-State Current RMS ( $180^\circ$ Conduction Angles, $T_C = 80^\circ\text{C}$ )	$I_T(\text{RMS})$	1.5	Amps
Peak Non-repetitive Surge Current, $T_A = 25^\circ\text{C}$ (1/2 Cycle, Sine Wave, 60 Hz)	$I_{TSM}$	15	Amps
Circuit Fusing Considerations ( $t = 8.3$ ms)	$I^2t$	0.9	$\text{A}^2\text{s}$
Forward Peak Gate Power (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_A = 25^\circ\text{C}$ )	$P_{GM}$	0.5	Watt
Forward Average Gate Power ( $t = 8.3$ msec, $T_A = 25^\circ\text{C}$ )	$P_{G(AV)}$	0.1	Watt
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_A = 25^\circ\text{C}$ )	$I_{FGM}$	0.2	Amp
Reverse Peak Gate Voltage (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_A = 25^\circ\text{C}$ )	$V_{RGM}$	5.0	Volts
Operating Junction Temperature Range @ Rated $V_{RRM}$ and $V_{DRM}$	$T_J$	-40 to +110	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to +150	$^\circ\text{C}$

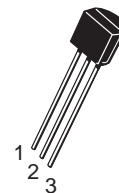
(1)  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source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



ON Semiconductor

<http://onsemi.com>

SCRs  
1.5 AMPERES RMS  
400 thru 600 VOLTS



TO-92 (TO-226AA)  
CASE 029  
STYLE 10

PIN ASSIGNMENT	
1	Cathode
2	Gate
3	Anode

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

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

## MCR22-6, MCR22-8

### Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	50	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	160	$^{\circ}C/W$
Lead Solder Temperature (Lead Length $\geq 1/16''$ from case, 10 s Max)	$T_L$	+260	$^{\circ}C$

### Electrical Characteristics ( $T_C = 25^{\circ}C$ unless otherwise noted.)

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

### Off Characteristics

Peak Repetitive Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}; R_{GK} = 1000 \text{ Ohms}$ )	$T_C = 25^{\circ}C$ $T_C = 110^{\circ}C$	$I_{DRM}, I_{RRM}$	—	—	10	$\mu A$
			—	—	200	$\mu A$

### On Characteristics

Peak Forward On-State Voltage <sup>(1)</sup> ( $I_{TM} = 1 \text{ A Peak}$ )		$V_{TM}$	—	1.2	1.7	Volts
Gate Trigger Current (Continuous dc) <sup>(2)</sup> ( $V_{AK} = 6 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )	$T_C = 25^{\circ}C$ $T_C = -40^{\circ}C$	$I_{GT}$	—	30	200	$\mu A$
Gate Trigger Voltage (Continuous dc) <sup>(2)</sup> ( $V_{AK} = 7 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )	$T_C = 25^{\circ}C$ $T_C = -40^{\circ}C$	$V_{GT}$	—	—	0.8	Volts
Gate Non-Trigger Voltage <sup>(1)</sup> ( $V_{AK} = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )	$T_C = 110^{\circ}C$	$V_{GD}$	0.1	—	—	Volts
Holding Current ( $V_{AK} = 12 \text{ Vdc}, \text{ Gate Open}$ ) Initiating Current = 200 mA	$T_C = 25^{\circ}C$ $T_C = -40^{\circ}C$	$I_H$	—	2.0	5.0	mA
			—	—	10	

### Dynamic Characteristics

Critical Rate of Rise of Off-State Voltage ( $T_C = 110^{\circ}C$ )	$dv/dt$	—	25	—	$V/\mu s$
--	---------	---	----	---	-----------

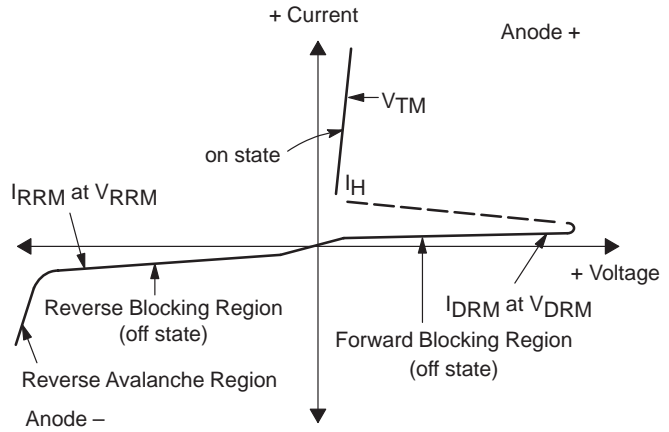
(1) Pulse Width = 1.0 ms, Duty Cycle  $\leq 1\%$ .

(2)  $R_{GK}$  Current not included in measurement.

# MCR22-6, MCR22-8

## 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



## CURRENT DERATING

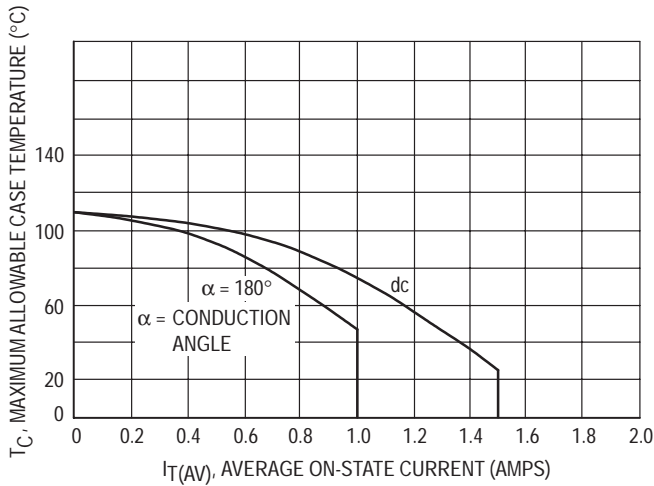


Figure 1. Maximum Case Temperature

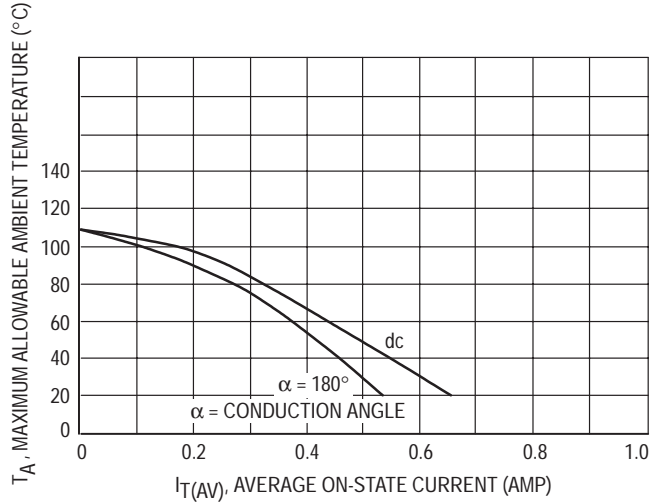


Figure 2. Maximum Ambient Temperature

MCR22-6, MCR22-8

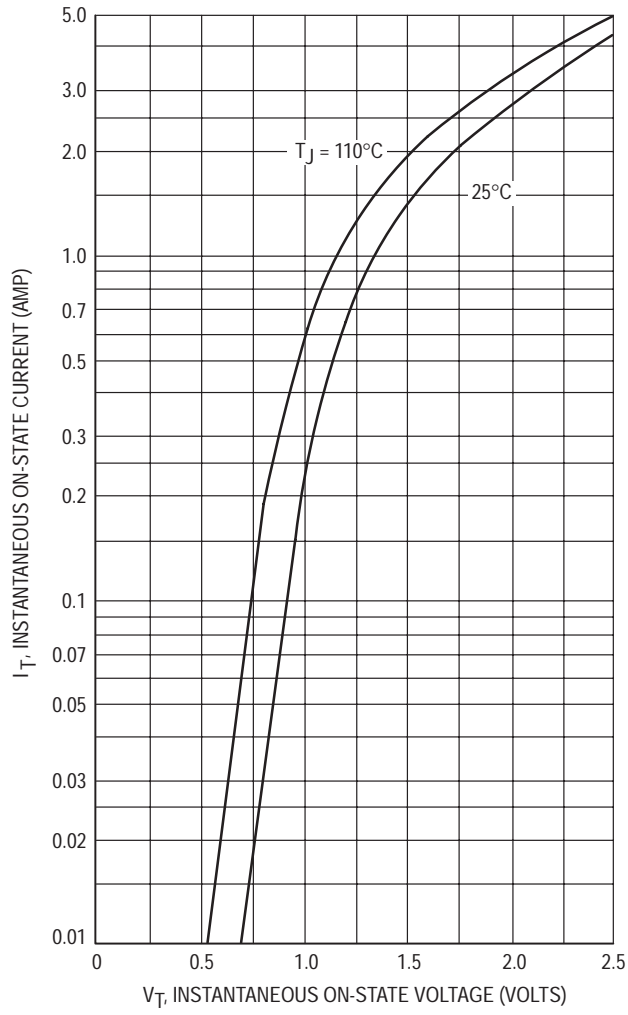


Figure 3. Typical Forward Voltage

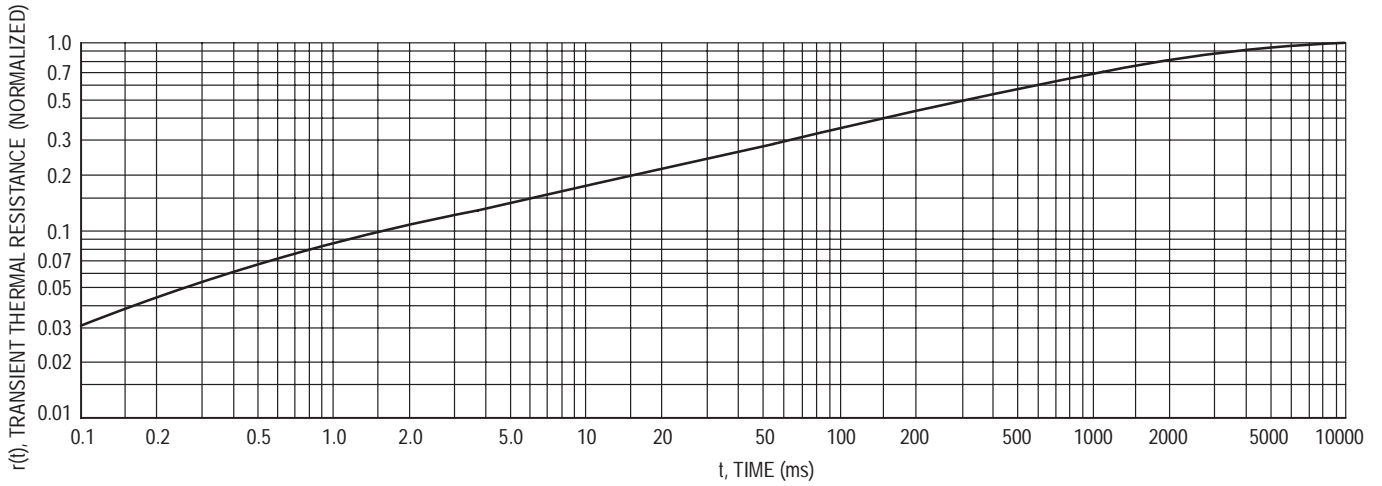


Figure 4. Thermal Response

# MCR22-6, MCR22-8

## TYPICAL CHARACTERISTICS

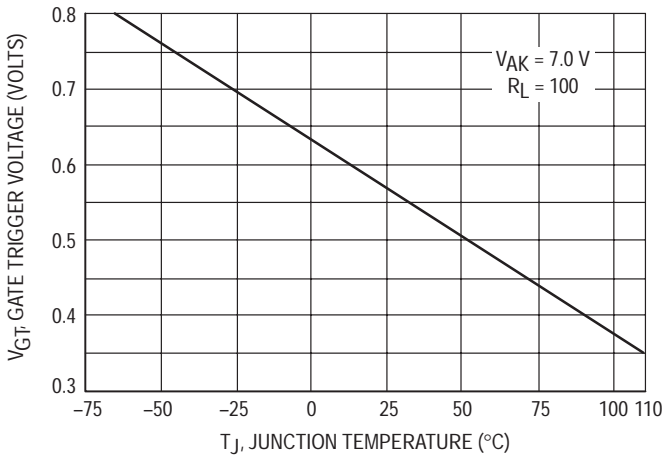


Figure 5. Typical Gate Trigger Voltage

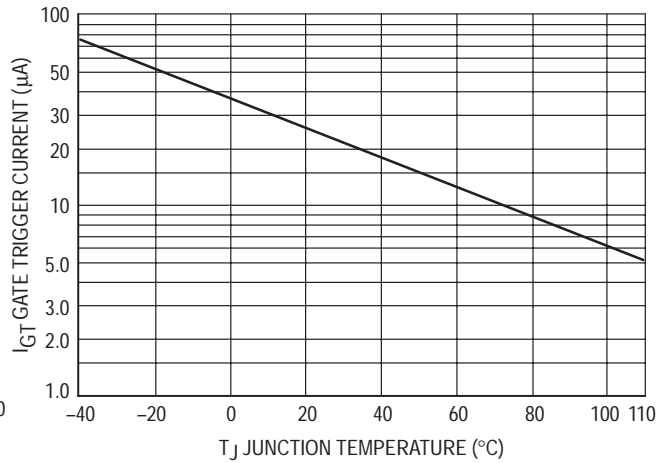


Figure 6. Typical Gate Trigger Current

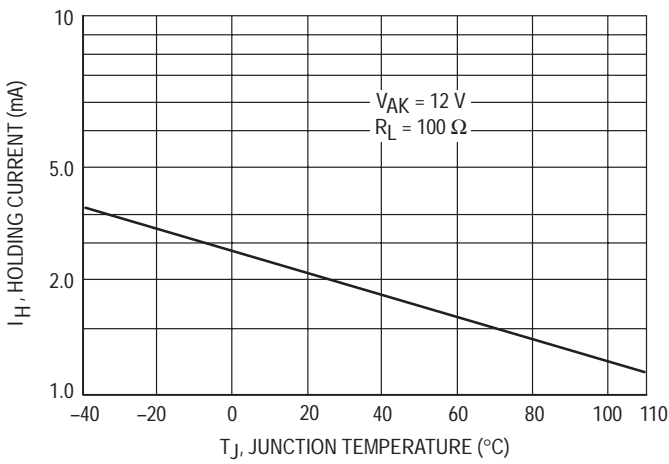


Figure 7. Typical Holding Current

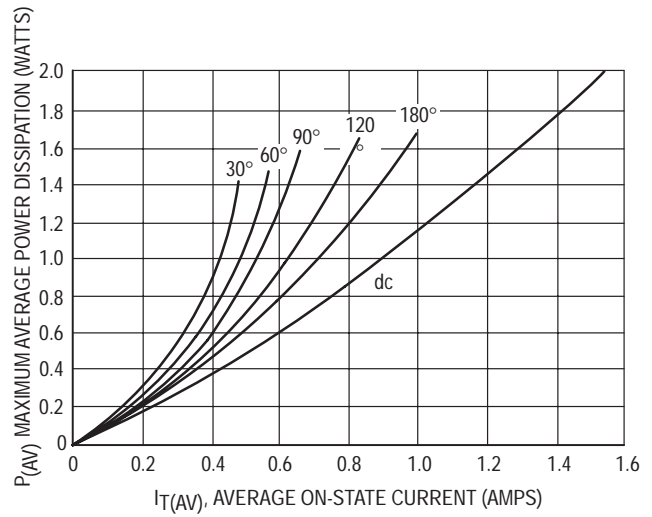


Figure 8. Power Dissipation

TO-92 EIA RADIAL TAPE IN FAN FOLD BOX OR ON REEL

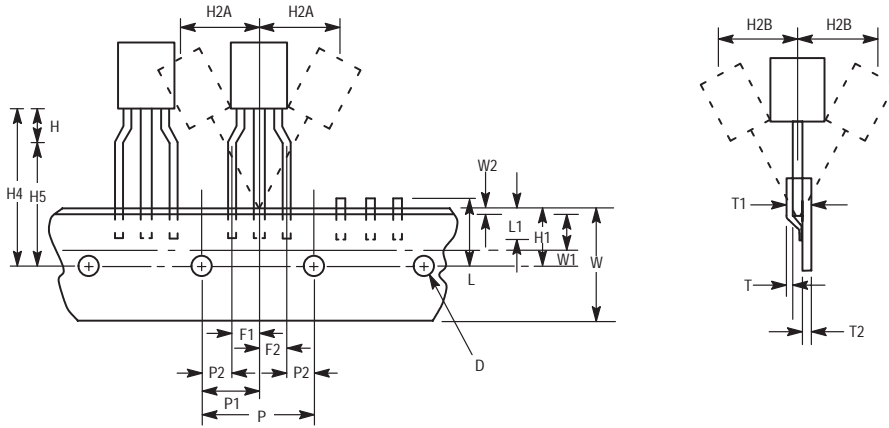


Figure 9. Device Positioning on Tape

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. Holddown 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.

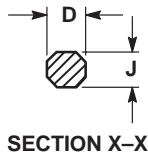
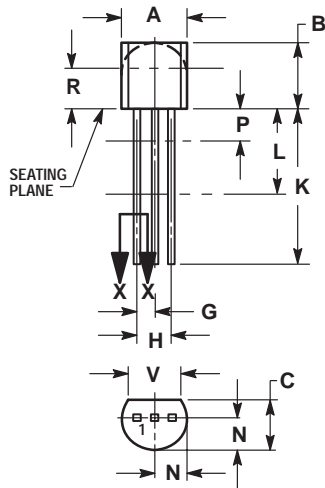
# MCR22-6, MCR22-8

## ORDERING & SHIPPING INFORMATION: MCR22 Series packaging options, Device Suffix

U.S.	Europe Equivalent	Shipping	Description of TO92 Tape Orientation
MCR22-6,8 MCR22-6RLRA MCR22-6RLRP	MCR22-8RL1	Radial Tape and Reel (2K/Reel) Bulk in Box (5K/Box)	Flat side of TO92 and adhesive tape visible N/A, Bulk
	MCR22-8ZL1	Radial Tape and Reel (2K/Reel) Radial Tape and Fan Fold Box (2K/Box) Radial Tape and Fan Fold Box (2K/Box)	Round side of TO92 and adhesive tape visible Round side of TO92 and adhesive tape visible Flat side of TO92 and adhesive tape visible

## PACKAGE DIMENSIONS

### TO-92 (TO-226AA) CASE 029-11 ISSUE AJ



#### NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
- 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	---

#### STYLE 10:

- PIN 1. CATHODE
- GATE
- ANODE

**ON Semiconductor** and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

## PUBLICATION ORDERING INFORMATION

### **NORTH AMERICA Literature Fulfillment:**

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** ONlit@hibbertco.com  
Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

**N. American Technical Support:** 800-282-9855 Toll Free USA/Canada

**EUROPE:** LDC for ON Semiconductor – European Support

**German Phone:** (+1) 303-308-7140 (M-F 1:00pm to 5:00pm Munich Time)  
**Email:** ONlit-german@hibbertco.com  
**French Phone:** (+1) 303-308-7141 (M-F 1:00pm to 5:00pm Toulouse Time)  
**Email:** ONlit-french@hibbertco.com  
**English Phone:** (+1) 303-308-7142 (M-F 12:00pm to 5:00pm UK Time)  
**Email:** ONlit@hibbertco.com

**EUROPEAN TOLL-FREE ACCESS\*: 00-800-4422-3781**

\*Available from Germany, France, Italy, England, Ireland

### **CENTRAL/SOUTH AMERICA:**

**Spanish Phone:** 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)  
**Email:** ONlit-spanish@hibbertco.com

**ASIA/PACIFIC:** LDC for ON Semiconductor – Asia Support

**Phone:** 303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)  
Toll Free from Hong Kong & Singapore:  
**001-800-4422-3781**  
**Email:** ONlit-asia@hibbertco.com

**JAPAN:** ON Semiconductor, Japan Customer Focus Center  
4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-0031

**Phone:** 81-3-5740-2745  
**Email:** r14525@onsemi.com

**ON Semiconductor Website:** <http://onsemi.com>

For additional information, please contact your local Sales Representative.