

MMQA, SZMMQA Quad Common Anode Series

SC-74 Quad Monolithic Common Anode

Transient Voltage Suppressors for ESD Protection

This quad monolithic silicon voltage suppressor is designed for applications requiring transient overvoltage protection capability. It is intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment, and other applications. Its quad junction common anode design protects four separate lines using only one package. These devices are ideal for situations where board space is at a premium.

Features

- SC-74 Package Allows Four Separate Unidirectional Configurations
- Peak Power – Min. 24 W @ 1.0 ms (Unidirectional), per Figure 5 Waveform
- Peak Power – Min. 150 W @ 20 μ s (Unidirectional), per Figure 6 Waveform
- Maximum Clamping Voltage @ Peak Pulse Current
- Low Leakage < 2.0 μ A
- ESD Rating of Class 3B (exceeding 16 kV) per the Human Body Model
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant*



ON Semiconductor®

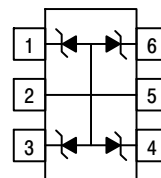
www.onsemi.com

SC-74 QUAD TRANSIENT VOLTAGE SUPPRESSOR 24 WATTS PEAK POWER 5.6 – 33 VOLTS



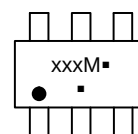
SC-74
CASE 318F
STYLE 1

PIN ASSIGNMENT



- PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

MARKING DIAGRAM



- xxx = Specific Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

DEVICE MARKING & ORDERING INFORMATION

See specific marking and ordering information in the device marking and ordering information table on page 6 of this data sheet.

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

MMQA, SZMMQA Quad Common Anode Series

THERMAL CHARACTERISTICS (T_A = 25°C Unless Otherwise Noted)

Characteristic	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1) @ T _A ≤ 25°C	P _{pk}	24	W
Peak Power Dissipation @ 20 μs (Note 2) @ T _A ≤ 25°C	P _{pk}	150	W
Total Power Dissipation on FR-5 Board (Note 3) @ T _A = 25°C	P _D	225 1.8	MW mW/°C
Thermal Resistance from Junction-to-Ambient	R _{θJA}	556	°C/W
Total Power Dissipation on Alumina Substrate (Note 4) @ T _A = 25°C Derate above 25°C	P _D	300 2.4	MW mW/°C
Thermal Resistance from Junction-to-Ambient	R _{θJA}	417	°C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C
Lead Solder Temperature – Maximum (10 Second Duration)	T _L	260	°C

1. Non-repetitive current pulse per Figure 5 and derate above T_A = 25°C per Figure 4.
2. Non-repetitive current pulse per Figure 6 and derate above T_A = 25°C per Figure 4.
3. FR-5 = 1.0 x 0.75 x 0.62 in.
4. Alumina = 0.4 x 0.3 x 0.024 in., 99.5% alumina

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless Otherwise Noted)

UNIDIRECTIONAL

(Circuit tied to pins 1, 2, and 5; Pins 2, 3, and 5; Pins 2, 4, and 5; or Pins 2, 5, and 6) (V_F = 0.9 V Max @ I_F = 10 mA)

Device (Note 5)	Breakdown Voltage				Max Reverse Leakage Current		Max Zener Impedance (Note 7)	Max Reverse Surge Current	Max Reverse Voltage @ I _{RSM} (Note 8) (Clamping Voltage)	Maximum Temperature Coefficient of V _Z	Capacitance @ 0 Volt Bias, 1 MHz	
		V _{ZT} (Note 6) (V)		@ I _{ZT}	I _R	V _R					(pF)	
	Min	Nom	Max	(mA)	(nA)	(V)					Min	Max
MMQA5V6T1G	5.32	5.6	5.88	1.0	2000	3.0	400	3.0	8.0	1.26	–	–
MMQA6V2T1G/T3G	5.89	6.2	6.51	1.0	700	4.0	300	2.66	9.0	10.6	–	–
MMQA6V8T1G	6.46	6.8	7.14	1.0	500	4.3	300	2.45	9.8	10.9	100	250
MMQA12VT1G	11.4	12	12.6	1.0	75	9.1	80	1.39	17.3	14	–	–
MMQA13VT1G	12.4	13	13.7	1.0	75	9.8	80	1.29	18.6	15	–	–
MMQA15VT1G	14.3	15	15.8	1.0	75	11	80	1.1	21.7	16	–	–
MMQA18VT1G	17.1	18	18.9	1.0	75	14	80	0.923	26	19	–	–
MMQA20VT1G/T3G	19	20	21	1.0	75	15	80	0.84	28.6	20.1	–	–
MMQA22VT1G	20.9	22	23.1	1.0	75	17	80	0.758	31.7	22	–	–
MMQA24VT1G	22.8	24	25.2	1.0	75	18	100	0.694	34.6	25	–	–
MMQA27VT1G	25.7	27	28.4	1.0	75	21	125	0.615	39	28	–	–
MMQA33VT1G	31.4	33	34.7	1.0	75	25	200	0.504	48.6	37	–	–

5. Includes SZ-prefix devices where applicable.
6. V_Z measured at pulse test current I_T at an ambient temperature of 25°C.
7. Z_{ZT} is measured by dividing the AC voltage drop across the device by the AC current supplied. The specified limits are I_{Z(AC)} = 0.1 I_{Z(DC)}, with AC frequency = 1 kHz.
8. Surge current waveform per Figure 5 and derate per Figure 4.

MMQA, SZMMQA Quad Common Anode Series

TYPICAL CHARACTERISTICS

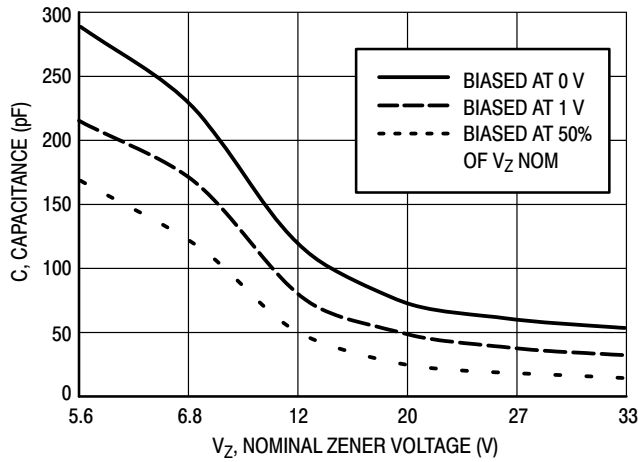


Figure 1. Typical Capacitance

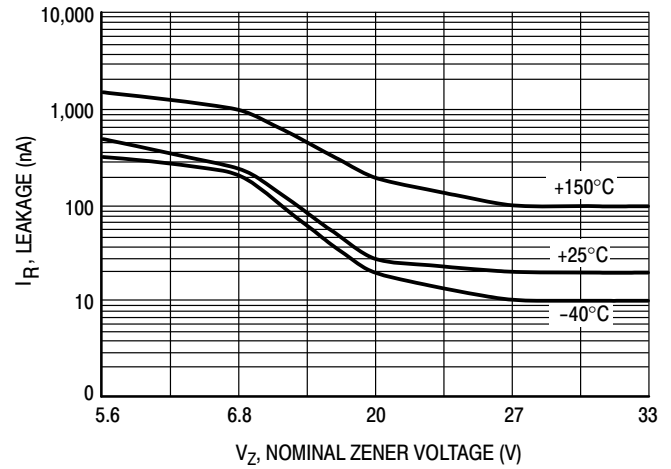


Figure 2. Typical Leakage Current

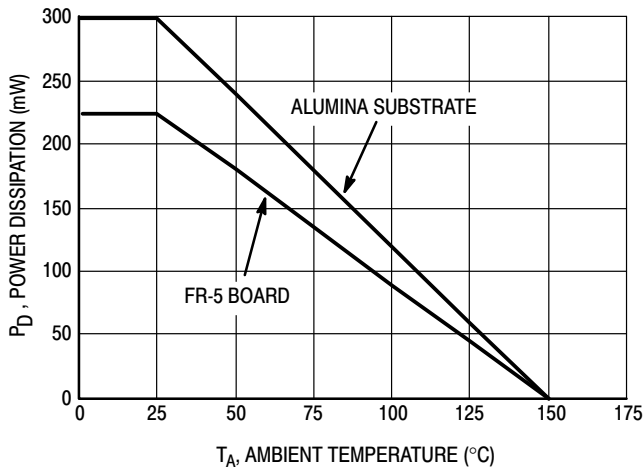


Figure 3. Steady State Power Derating Curve

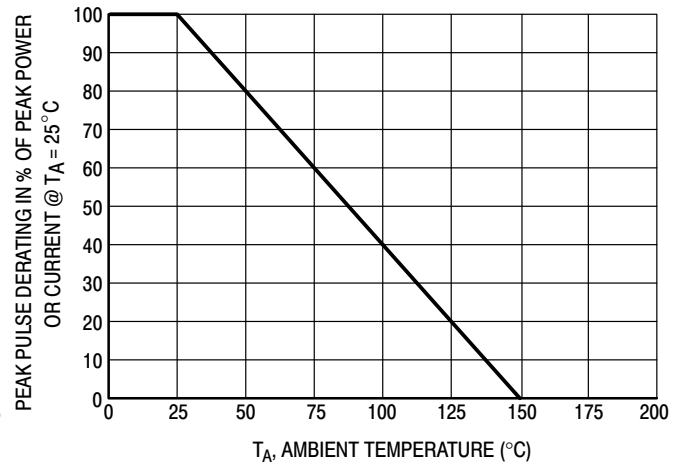


Figure 4. Pulse Derating Curve

MMQA, SZMMQA Quad Common Anode Series

TYPICAL CHARACTERISTICS

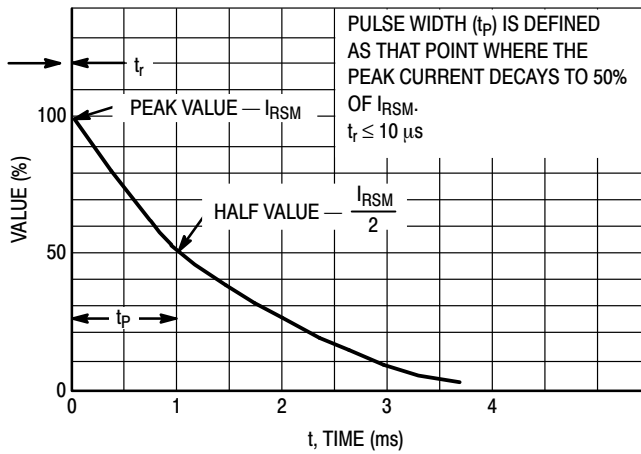


Figure 5. 10 × 1000 μs Pulse Waveform

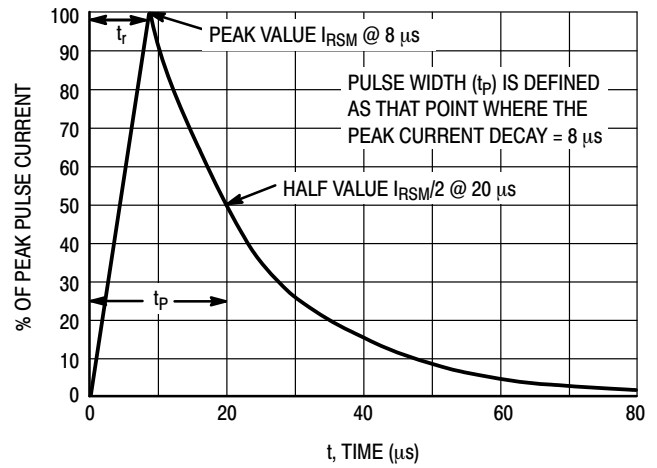


Figure 6. 8 × 20 μs Pulse Waveform

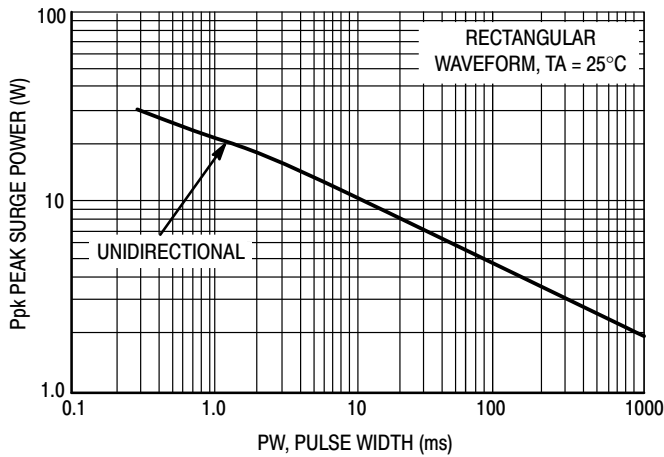


Figure 7. Maximum Non-Repetitive Surge Power, P_{pk} versus PW

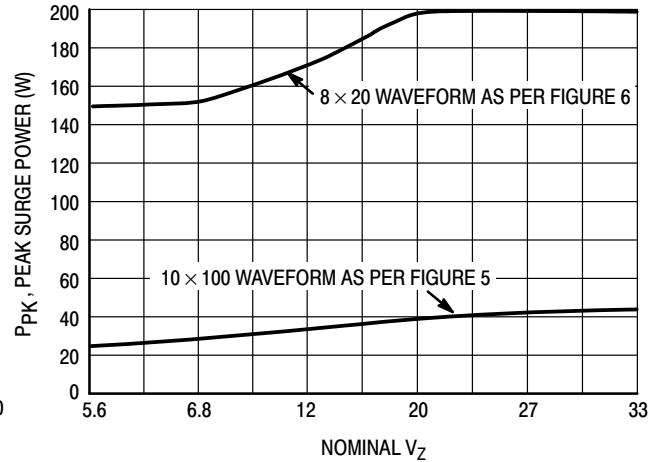


Figure 8. Typical Maximum Non-Repetitive Surge Power, P_{pk} versus V_Z

Power is defined as $V_{RSM} \times I_Z(pk)$ where V_{RSM} is the clamping voltage at $I_Z(pk)$.

MMQA, SZMMQA Quad Common Anode Series

TYPICAL COMMON ANODE APPLICATIONS

A quad junction common anode design in a SC-74 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially

when board space is at a premium. A simplified example of MMQA/SZMMQA Series Device applications is illustrated below.

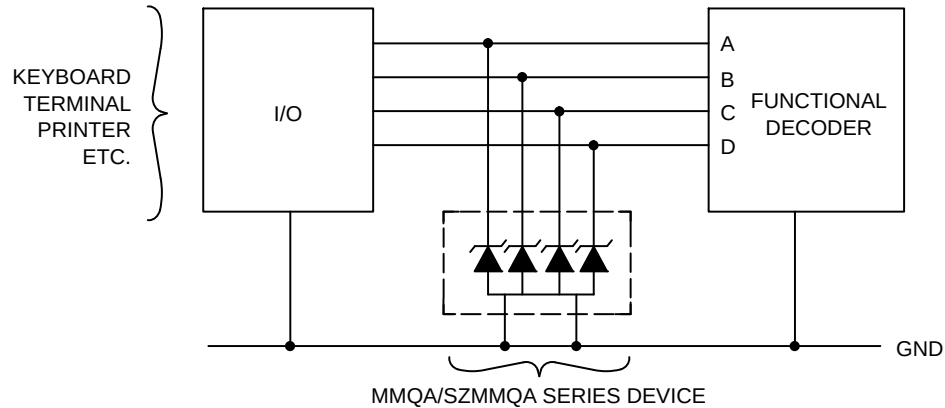


Figure 9. Computer Interface Protection

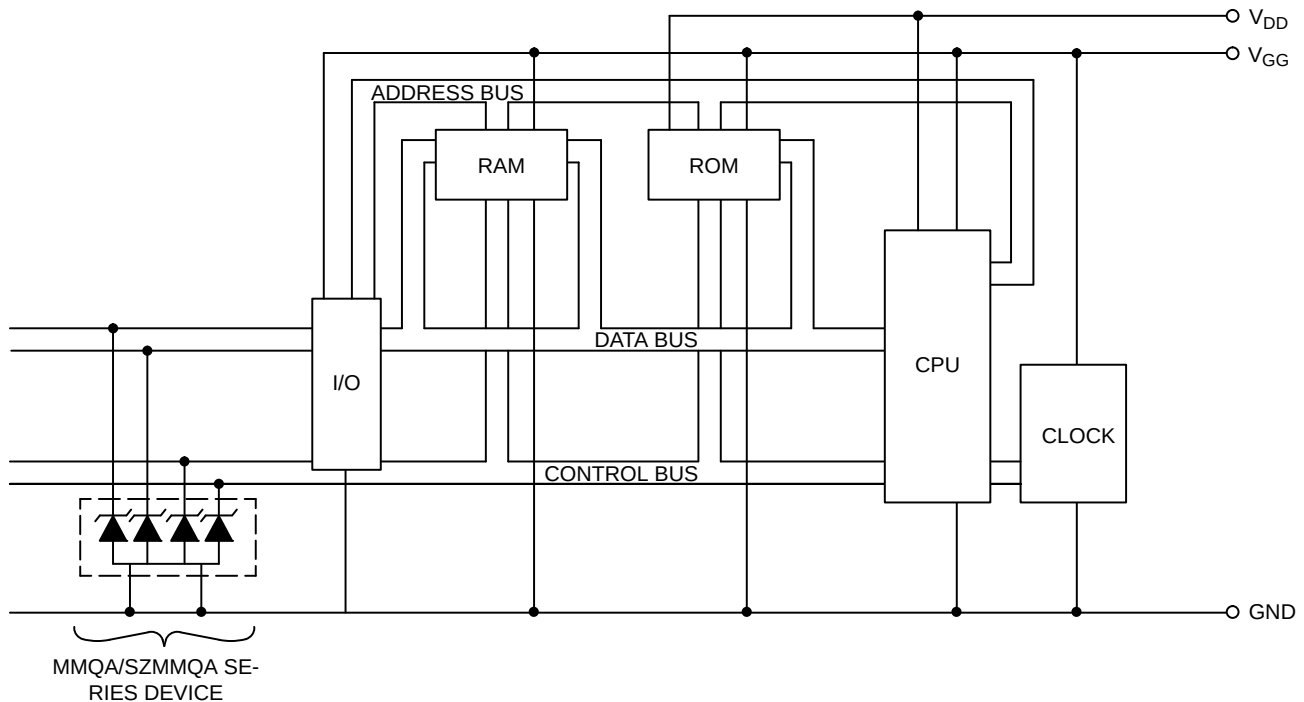


Figure 10. Microprocessor Protection

MMQA, SZMMQA Quad Common Anode Series

DEVICE MARKING AND ORDERING INFORMATION

Device*	Device Marking	Package	Shipping
MMQA5V6T1G	5A6	SC-74 (Pb-Free)	3,000/Tape & Reel
MMQA6V2T1G	6A2		3,000/Tape & Reel
MMQA6V2T3G	6A2		10,000/Tape & Reel
MMQA6V8T1G	6A8		3,000/Tape & Reel
MMQA12VT1G	12A		3,000/Tape & Reel
MMQA13VT1G	13A		3,000/Tape & Reel
MMQA15VT1G	15A		3,000/Tape & Reel
MMQA18VT1G	18A		3,000/Tape & Reel
MMQA20VT1G	20A		3,000/Tape & Reel
MMQA20VT3G	20A		10,000/Tape & Reel
MMQA22VT1G	22A		3,000/Tape & Reel
MMQA24VT1G	24A		3,000/Tape & Reel
MMQA27VT1G	27A		3,000/Tape & Reel
MMQA27VT3G	27A		10,000/Tape & Reel
MMQA33VT1G	33A		3,000/Tape & Reel

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

*IncludeS SZ-prefix devices where applicable.

Mechanical Characteristics:

CASE: Void-free, Transfer-molded, Thermosetting Plastic Case.

FINISH: Corrosion resistant finish, easily solderable.

Package designed for optimal automated board assembly.

Small package size for high density applications.

Available in 8 mm Tape and Reel.

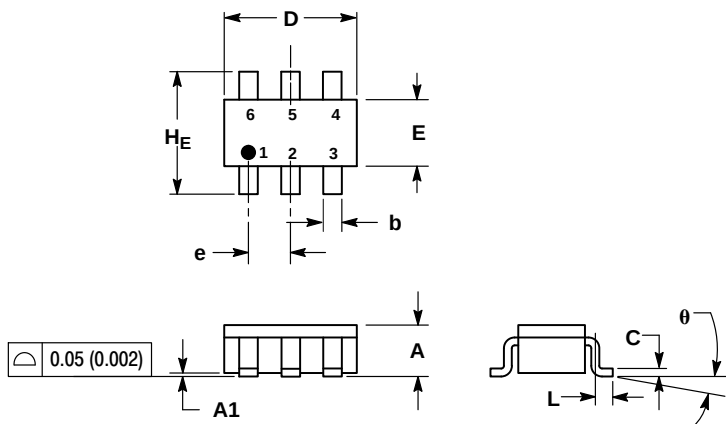
Use the Device Number to order the 7 inch/3,000 unit reel.

Replace the “T1” with “T3” in the Device Number to order the 13 inch/10,000 unit reel.

MMQA, SZMMQA Quad Common Anode Series

PACKAGE DIMENSIONS

SC-74 CASE 318F-05 ISSUE N



NOTES:

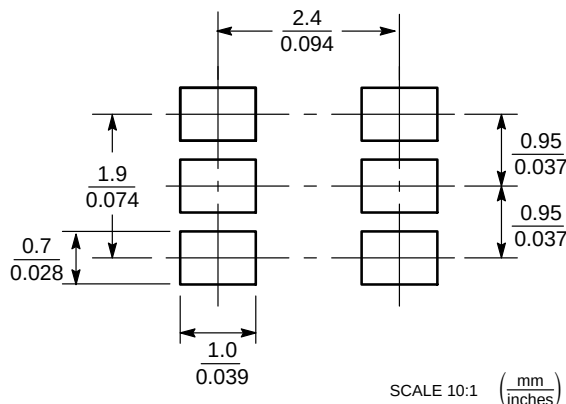
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318F-01, -02, -03, -04 OBSOLETE. NEW STANDARD 318F-05.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
H _E	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	—	10°	0°	—	10°

STYLE 1:

- PIN 1: CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

SOLDERING FOOTPRINT*



*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 and are registered 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. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

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: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative