

LM301A, LM201A, LM201AV

Non Compensated Single Operational Amplifiers

A general purpose operational amplifier that allows the user to choose the compensation capacitor best suited to his needs. With proper compensation, summing amplifier slew rates to 10 V/ μ s can be obtained.

Features

- Low Input Offset Current: 20 nA Maximum Over Temperature Range
- External Frequency Compensation for Flexibility
- Class AB Output Provides Excellent Linearity
- Output Short Circuit Protection
- Guaranteed Drift Characteristics
- Pb-Free Packages are Available

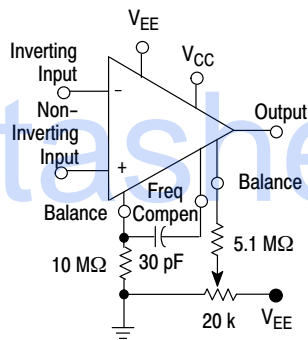


Figure 1. Standard Compensation and Offset Balancing Circuit

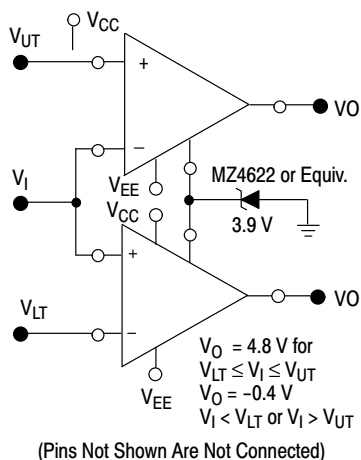


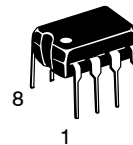
Figure 2. Double-Ended Limit Detector



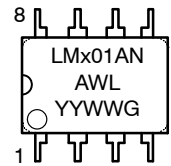
ON Semiconductor®

<http://onsemi.com>

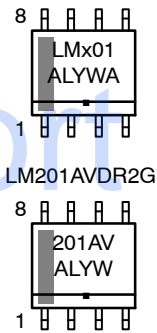
MARKING DIAGRAMS



PDIP-8
N SUFFIX
CASE 626

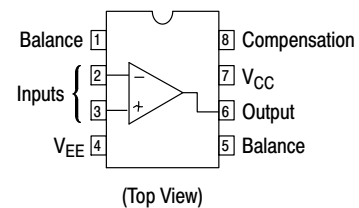


SOIC-8
D SUFFIX
CASE 751



x = 2 or 3
 A = Assembly Location
 WL, L = Wafer Lot
 YY, Y = Year
 WW, W = Work Week
 G = Pb-Free Package
 ■ = Pb-Free Package

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

LM301A, LM201A, LM201AV



Figure 3. Representative Circuit Schematic

ORDERING INFORMATION

Device	Package	Shipping [†]
LM301ADG	SOIC-8 (Pb-Free)	98 Units/Rail
LM301ADR2G	SOIC-8 (Pb-Free)	2500 Tape & Reel
LM301AN	PDIP-8	50 Units/Rail
LM301ANG	PDIP-8 (Pb-Free)	50 Units/Rail
LM201ADG	SOIC-8 (Pb-Free)	98 Units/Rail
LM201ADR2G	SOIC-8 (Pb-Free)	2500 Tape & Reel
LM201AN	PDIP-8	50 Units/Rail
LM201ANG	PDIP-8 (Pb-Free)	50 Units/Rail
LM201AVDR2G	SOIC-8 (Pb-Free)	2500 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.

LM301A, LM201A, LM201AV

MAXIMUM RATINGS

Rating	Symbol	Value			Unit
		LM201A	LM201AV	LM301A	
Power Supply Voltage	V_{CC}, V_{EE}	± 22	± 22	± 18	Vdc
Input Differential Voltage	V_{ID}	← ± 30 →			V
Input Common Mode Range (Note 1)	V_{ICR}	← ± 15 →			V
Output Short Circuit Duration	t_{SC}	← Continuous →			
Power Dissipation (Package Limitation)	P_D				
Plastic Dual-In-Line Package		625	625	625	mW
Derate above $T_A = +25^\circ\text{C}$		5.0	5.0	5.0	mW/ $^\circ\text{C}$
Operating Ambient Temperature Range	T_A	-25 to +85	-40 to +105	0 to +70	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	← -65 to +150 →			$^\circ\text{C}$

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.

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted.) Unless otherwise specified, these specifications apply for supply voltages from $\pm 5.0\text{ V}$ to $\pm 20\text{ V}$ for the LM201A and LM201AV, and from $\pm 5.0\text{ V}$ to $\pm 15\text{ V}$ for the LM301A.

Characteristic	Symbol	LM201A / LM201AV			LM301A			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage ($R_S \leq 50\text{ k}\Omega$)	V_{IO}	-	0.7	2.0	-	2.0	7.5	mV
Input Offset Current	I_{IO}	-	1.5	10	-	3.0	50	nA
Input Bias Current	I_{IB}	-	30	75	-	70	250	nA
Input Resistance	r_i	1.5	4.0	-	0.5	2.0	-	$M\Omega$
Supply Current	I_{CC}, I_{EE}							mA
$V_{CC}/V_{EE} = \pm 20\text{ V}$		-	1.8	3.0	-	-	-	
$V_{CC}/V_{EE} = \pm 15\text{ V}$		-	-	-	-	1.8	3.0	
Large Signal Voltage Gain ($V_{CC}/V_{EE} = \pm 15\text{ V}, V_O = \pm 10\text{ V}, R_L > 2.0\text{ k}\Omega$)	A_V	50	160	-	25	160	-	V/mV

The following specifications apply over the operating temperature range.

Input Offset Voltage ($R_S \leq 50\text{ k}\Omega$)	V_{IO}	-	-	3.0	-	-	10	mV
Input Offset Current	I_{IO}	-	-	20	-	-	70	nA
Avg Temperature Coefficient of Input Offset Voltage (Note 2) $T_A(\text{min}) \leq T_A \leq T_A(\text{max})$	$\Delta V_{IO}/\Delta T$	-	3.0	15	-	6.0	30	$\mu\text{V}/^\circ\text{C}$
Avg Temperature Coefficient of Input Offset Current (Note 2) $+25^\circ\text{C} \leq T_A \leq T_A(\text{max})$ $T_A(\text{min}) \leq T_A \leq 25^\circ\text{C}$	$\Delta I_{IO}/\Delta T$							nA/ $^\circ\text{C}$
$+25^\circ\text{C} \leq T_A \leq T_A(\text{max})$		-	0.01	0.1	-	0.01	0.3	
$T_A(\text{min}) \leq T_A \leq 25^\circ\text{C}$		-	0.02	0.2	-	0.02	0.6	
Input Bias Current	I_{IB}	-	-	100	-	-	300	nA
Large Signal Voltage Gain ($V_{CC}/V_{EE} = \pm 15\text{ V}, V_O = \pm 10\text{ V}, R_L > 2.0\text{ k}\Omega$)	A_{VOL}	25	-	-	15	-	-	V/mV
Input Voltage Range $V_{CC}/V_{EE} = \pm 20\text{ V}$ $V_{CC}/V_{EE} = \pm 15\text{ V}$	V_{ICR}	-15	-	+15	-	-	-	V
$V_{CC}/V_{EE} = \pm 15\text{ V}$		-	-	-	-12	-	+12	
Common Mode Rejection ($R_S \leq 50\text{ k}\Omega$)	CMR	80	96	-	70	90	-	dB
Supply Voltage Rejection ($R_S \leq 50\text{ k}\Omega$)	PSR	80	96	-	70	96	-	dB
Output Voltage Swing ($V_{CC}/V_{EE} = \pm 15\text{ V}, R_L = \pm 10\text{ k}\Omega, R_L > 2.0\text{ k}\Omega$)	V_O	± 12 ± 10	± 14 ± 13	-	± 12 ± 10	± 14 ± 13	-	V
Supply Currents ($T_A = T_A(\text{max}), V_{CC}/V_{EE} = \pm 20\text{ V}$)	I_{CC}, I_{EE}	-	1.2	2.5	-	-	-	mA

- For supply voltages less than $\pm 15\text{ V}$, the absolute maximum input voltage is equal to the supply voltage.
- Guaranteed by design.

LM301A, LM201A, LM201AV

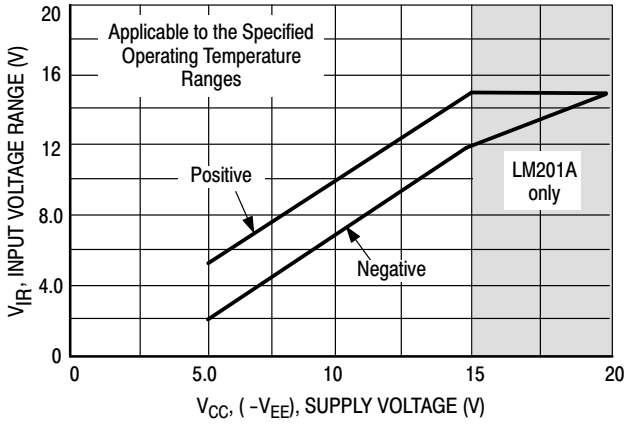


Figure 4. Minimum Input Voltage Range

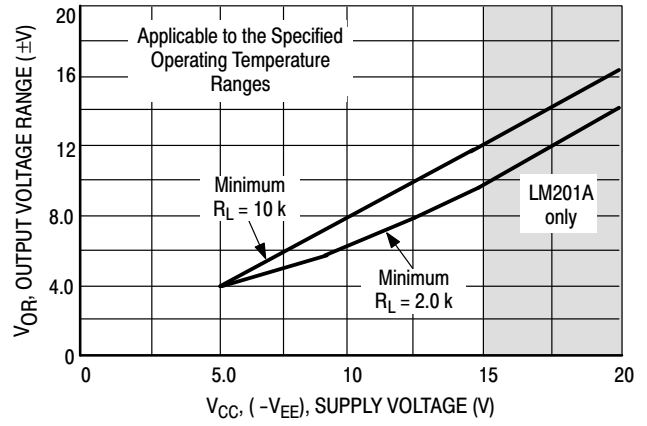


Figure 5. Minimum Output Voltage Swing

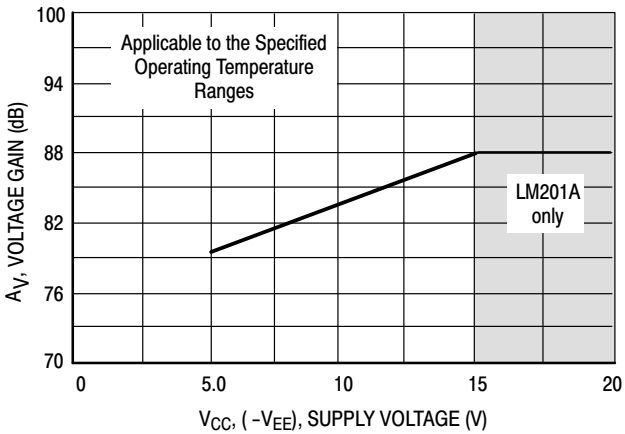


Figure 6. Minimum Voltage Gain

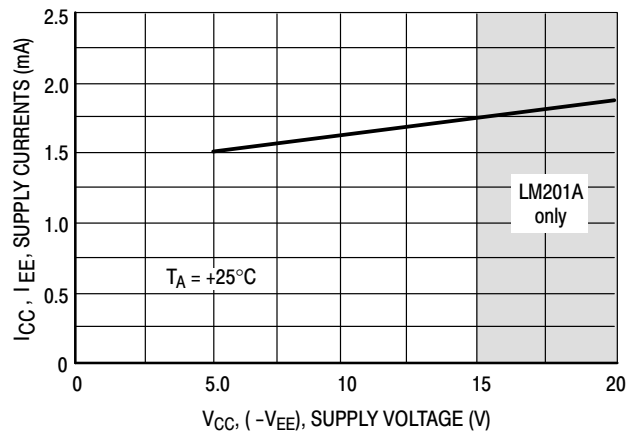


Figure 7. Typical Supply Currents

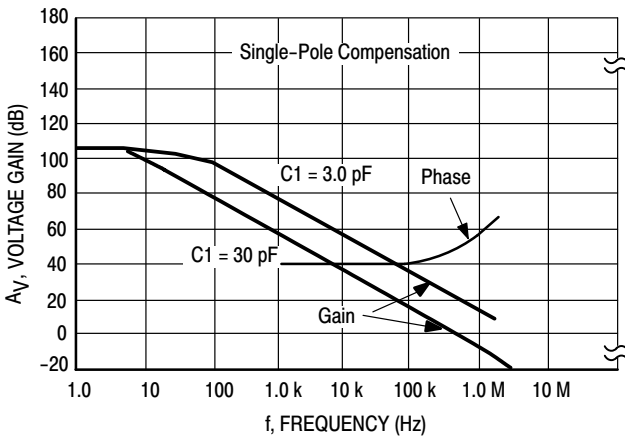


Figure 8. Open Loop Frequency Response

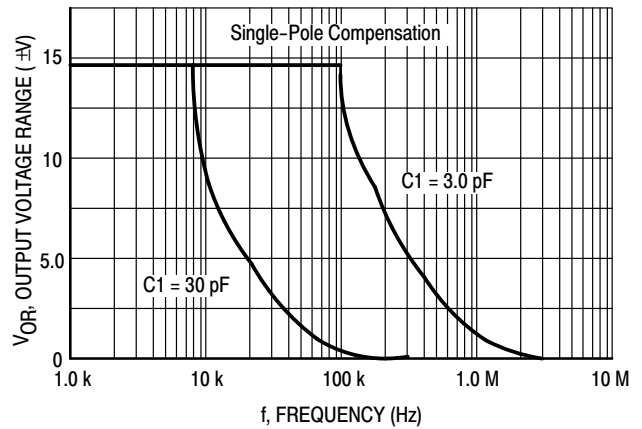


Figure 9. Large Signal Frequency Response

LM301A, LM201A, LM201AV



Figure 10. Voltage Follower Pulse Response

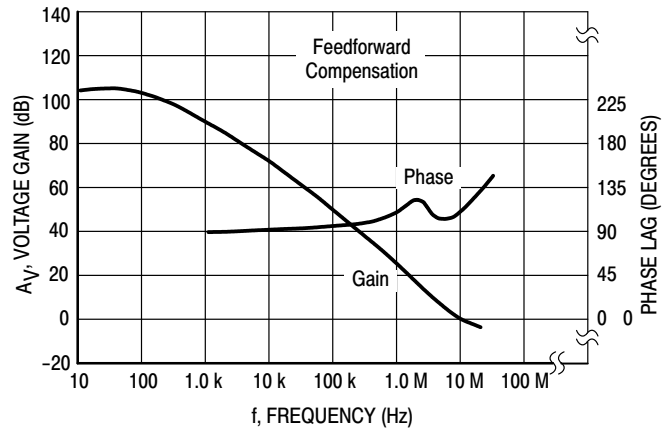


Figure 11. Open Loop Frequency Response

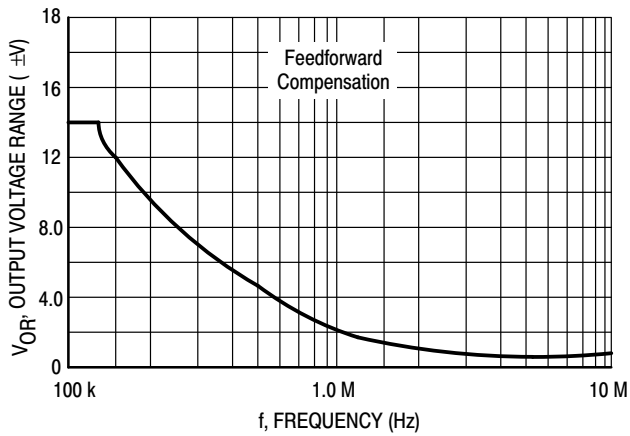


Figure 12. Large Signal Frequency Response

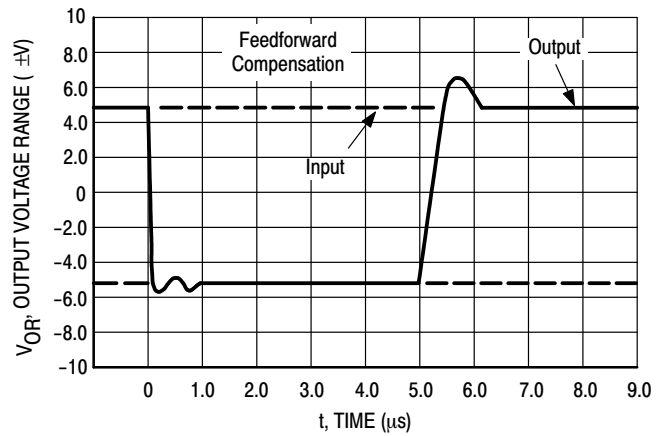


Figure 13. Inverter Pulse Response



Figure 14. Single-Pole Compensation

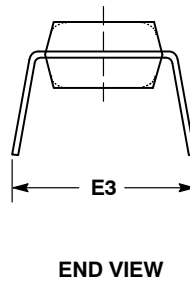
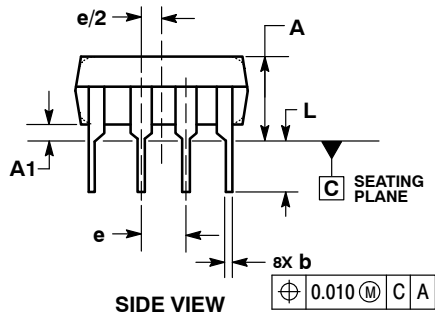
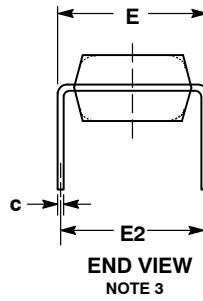
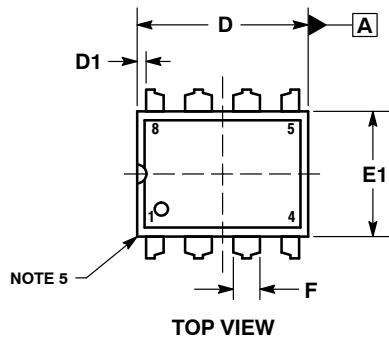


Figure 15. Feedforward Compensation

LM301A, LM201A, LM201AV

PACKAGE DIMENSIONS

8 LEAD PDIP CASE 626-05 ISSUE M



NOTES:

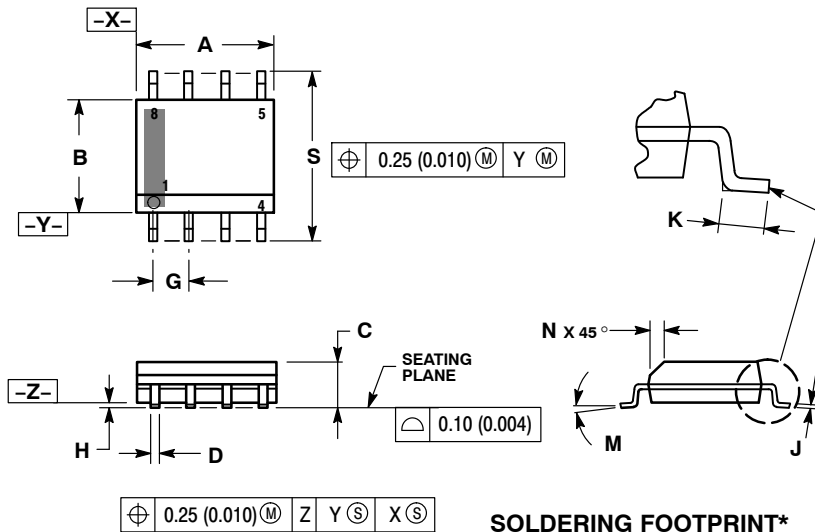
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION E IS MEASURED WITH THE LEADS RESTRAINED PARALLEL AT WIDTH E2.
4. DIMENSION E1 DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	----	----	0.210	----	----	5.33
A1	0.015	----	----	0.38	----	----
b	0.014	0.018	0.022	0.35	0.46	0.56
C	0.008	0.010	0.014	0.20	0.25	0.36
D	0.355	0.365	0.400	9.02	9.27	10.02
D1	0.005	----	----	0.13	----	----
E	0.300	0.310	0.325	7.62	7.87	8.26
E1	0.240	0.250	0.280	6.10	6.35	7.11
E2	0.300 BSC			7.62 BSC		
E3	----	----	0.430	----	----	10.92
e	0.100 BSC			2.54 BSC		
L	0.115	0.130	0.150	2.92	3.30	3.81

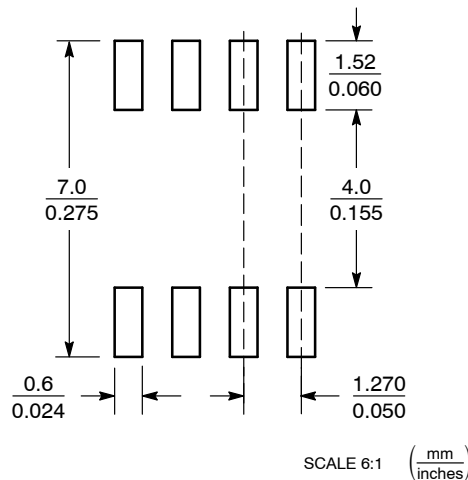
LM301A, LM201A, LM201AV

PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AK



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.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

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