

2N4123, 2N4124

General Purpose Transistors

NPN Silicon

Features

- Pb-Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage 2N4123 2N4124	V_{CEO}	30 25	Vdc
Collector-Base Voltage 2N4123 2N4124	V_{CBO}	40 30	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current - Continuous	I_C	200	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12	W mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

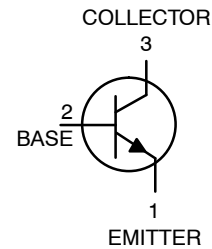
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

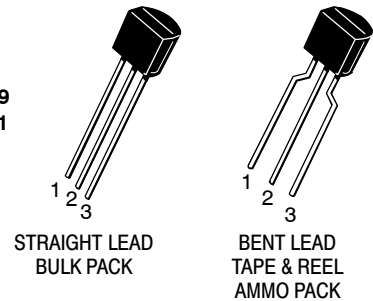


ON Semiconductor®

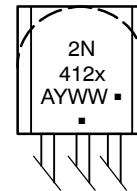
<http://onsemi.com>



TO-92
CASE 29
STYLE 1



MARKING DIAGRAM



x = 3 or 4

A = Assembly Location

Y = Year

WW = Work Week

■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
2N4123RLRM	TO-92	2000 / Tape & Ammo
2N4124G	TO-92 (Pb-Free)	5000 Units / Bulk

†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.

2N4123, 2N4124

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

Characteristic	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (Note 1) (I _C = 1.0 mA _{dc} , I _E = 0)	2N4123 2N4124	V _{(BR)CEO}	30 25	– –	V _{dc}
Collector–Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)	2N4123 2N4124	V _{(BR)CBO}	40 30	– –	V _{dc}
Emitter–Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)		V _{(BR)EBO}	5.0	–	V _{dc}
Collector Cutoff Current (V _{CB} = 20 V _{dc} , I _E = 0)		I _{CBO}	–	50	nA _{dc}
Emitter Cutoff Current (V _{EB} = 3.0 V _{dc} , I _C = 0)		I _{EBO}	–	50	nA _{dc}
ON CHARACTERISTICS					
DC Current Gain (Note 1) (I _C = 2.0 mA _{dc} , V _{CE} = 1.0 V _{dc})	2N4123 2N4124	h _{FE}	50 120	150 360	–
(I _C = 50 mA _{dc} , V _{CE} = 1.0 V _{dc})	2N4123 2N4124		25 60	– –	
Collector–Emitter Saturation Voltage (Note 1) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})		V _{CE(sat)}	–	0.3	V _{dc}
Base–Emitter Saturation Voltage (Note 1) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})		V _{BE(sat)}	–	0.95	V _{dc}
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain – Bandwidth Product (I _C = 10 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100 MHz)	2N4123 2N4124	f _T	250 300	– –	MHz
Input Capacitance (V _{EB} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz)		C _{ibo}	–	8.0	pF
Collector–Base Capacitance (I _E = 0, V _{CB} = 5.0 V, f = 1.0 MHz)		C _{cb}	–	4.0	pF
Small–Signal Current Gain (I _C = 2.0 mA _{dc} , V _{CE} = 10 V _{dc} , R _S = 10 k Ω, f = 1.0 kHz)	2N4123 2N4124	h _{fe}	50 120	200 480	–
Current Gain – High Frequency (I _C = 10 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100 MHz)	2N4123 2N4124	h _{fe}	2.5 3.0	– –	–
(I _C = 2.0 mA _{dc} , V _{CE} = 10 V, f = 1.0 kHz)	2N4123		50	200	
(I _C = 2.0 mA _{dc} , V _{CE} = 10 V, f = 1.0 kHz)	2N4124		120	480	
Noise Figure (I _C = 100 μA _{dc} , V _{CE} = 5.0 V _{dc} , R _S = 1.0 k Ω, f = 1.0 kHz)	2N4123 2N4124	NF	– –	6.0 5.0	dB

1. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

2N4123, 2N4124

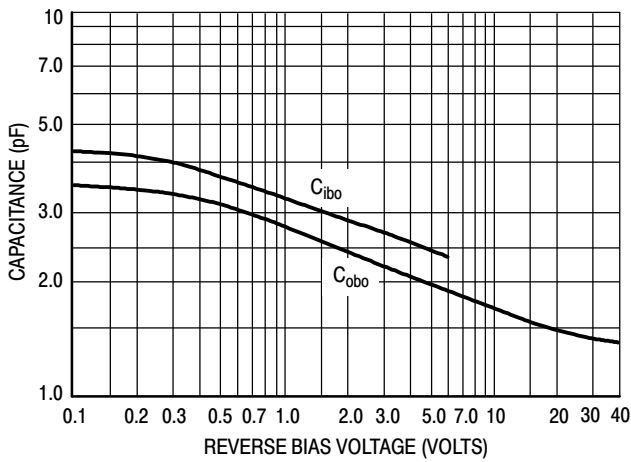


Figure 1. Capacitance

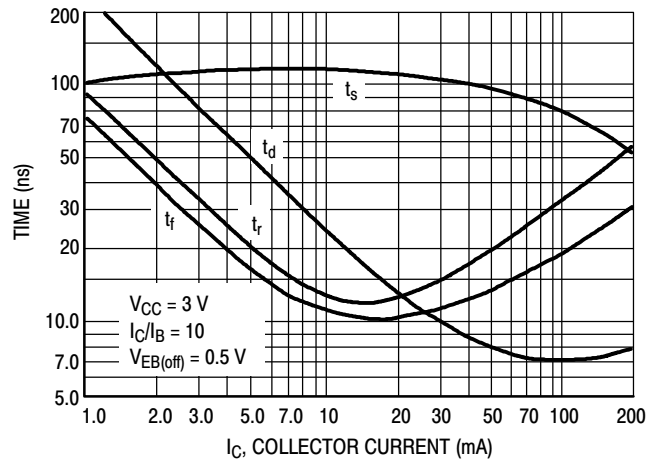


Figure 2. Switching Times

AUDIO SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

($V_{CE} = 5V_{dc}$, $T_A = 25^\circ C$)

Bandwidth = 1.0 Hz

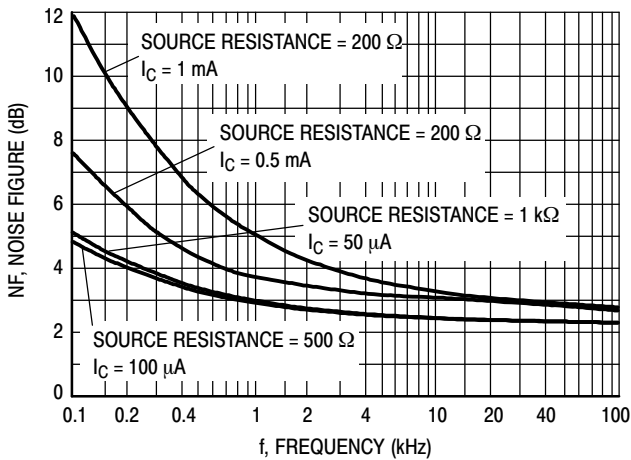


Figure 3. Frequency Variations

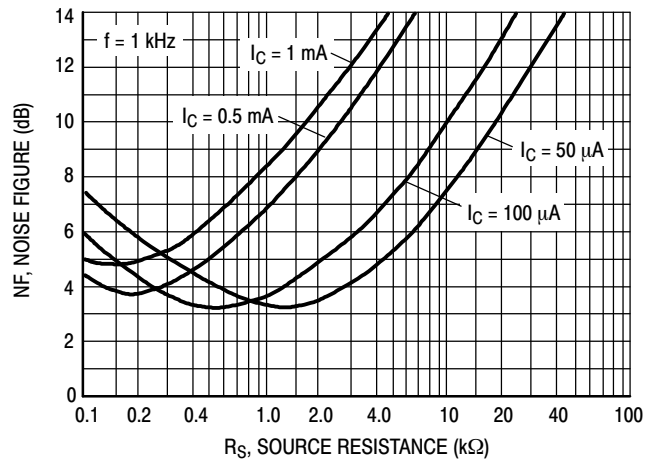


Figure 4. Source Resistance

2N4123, 2N4124

h PARAMETERS

($V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$, $T_A = 25^\circ\text{C}$)

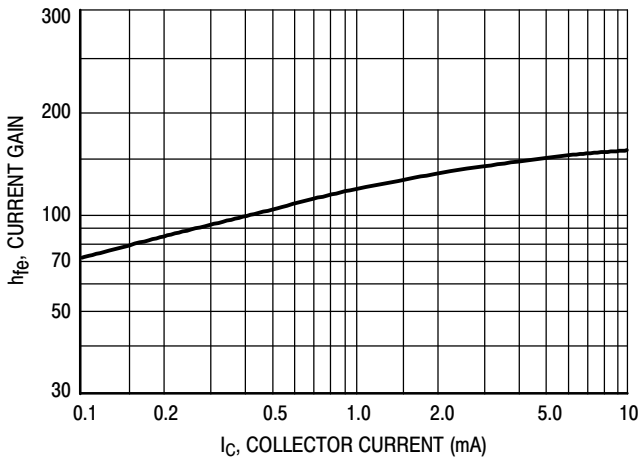


Figure 5. Current Gain

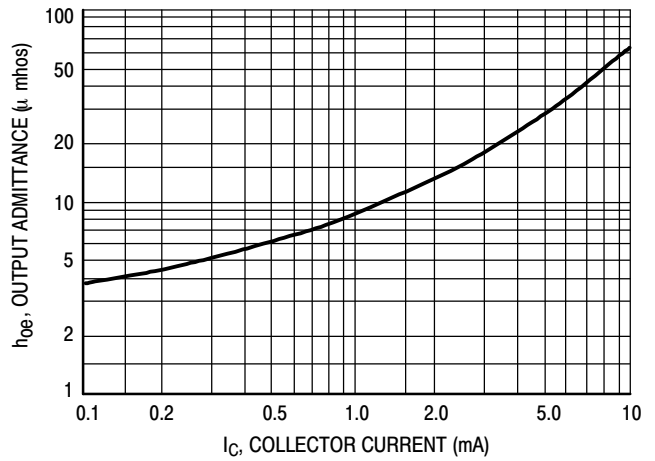


Figure 6. Output Admittance

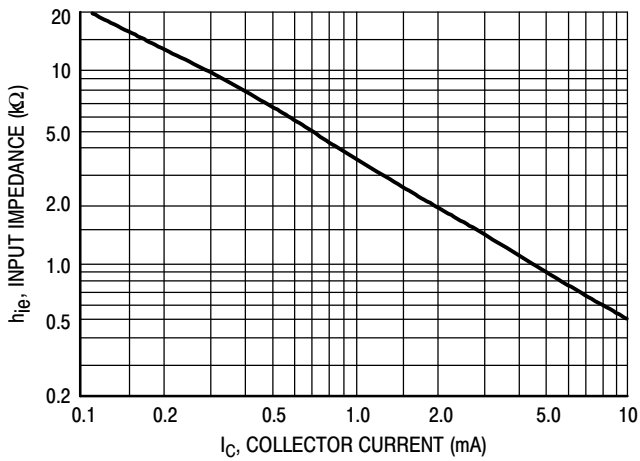


Figure 7. Input Impedance

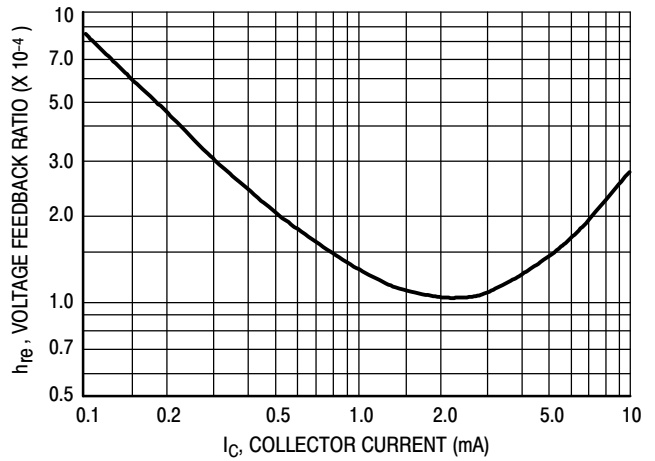


Figure 8. Voltage Feedback Ratio

STATIC CHARACTERISTICS

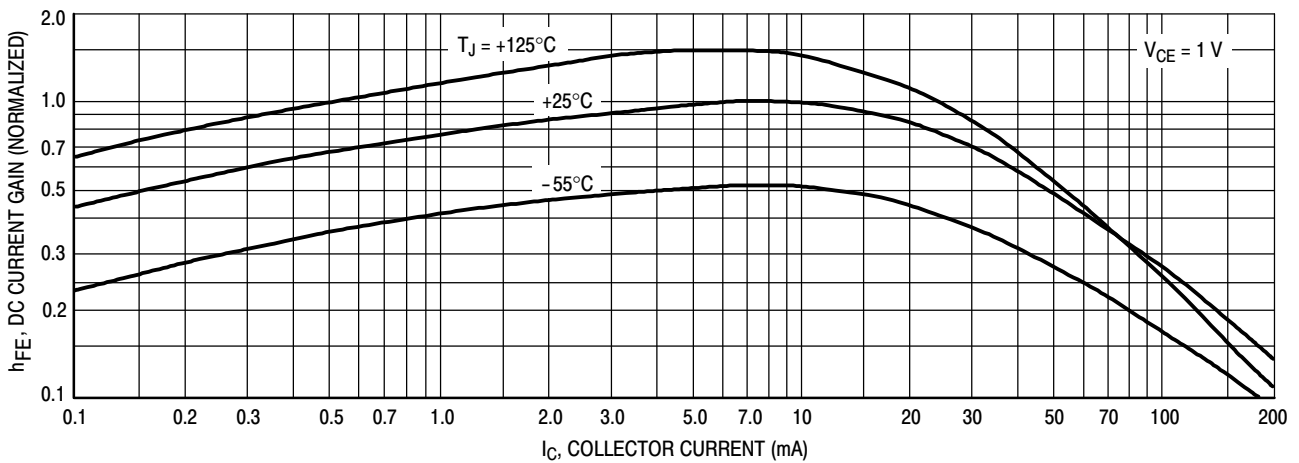


Figure 9. DC Current Gain

2N4123, 2N4124

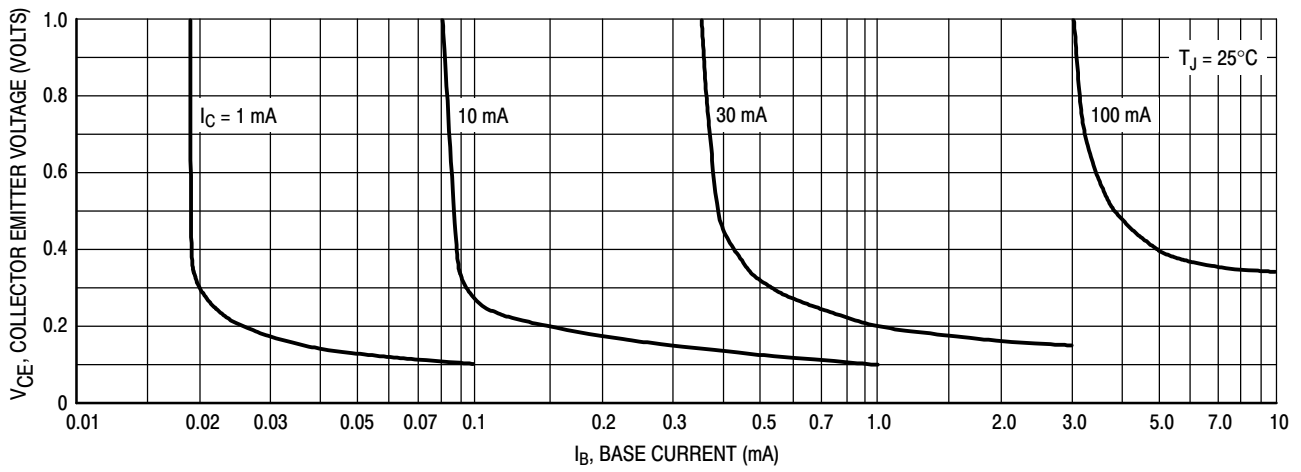


Figure 10. Collector Saturation Region

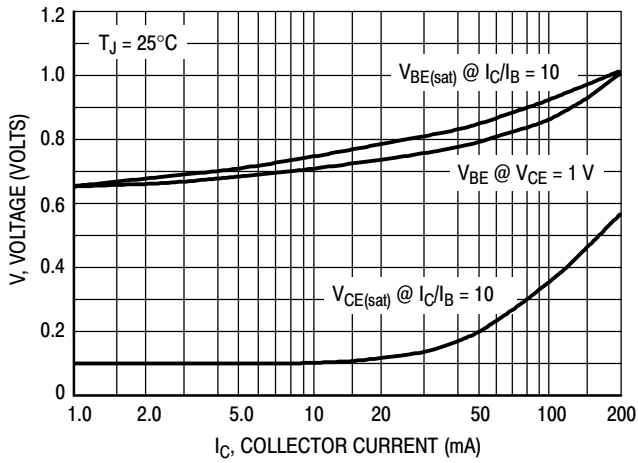


Figure 11. "On" Voltages

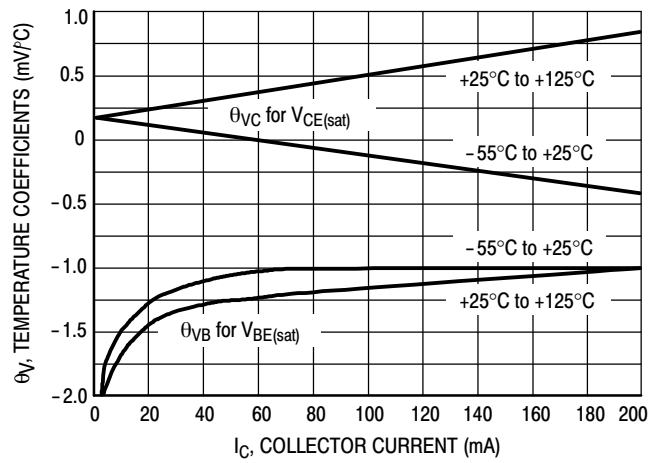
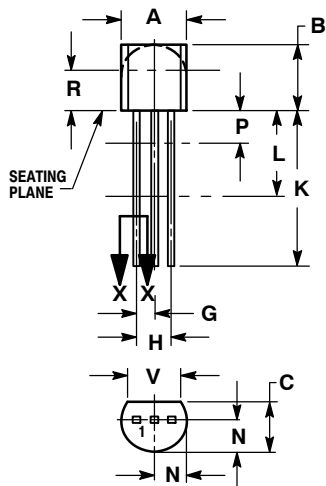


Figure 12. Temperature Coefficients

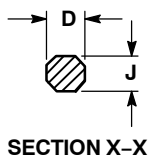
2N4123, 2N4124

PACKAGE DIMENSIONS

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



STRAIGHT LEAD
BULK PACK

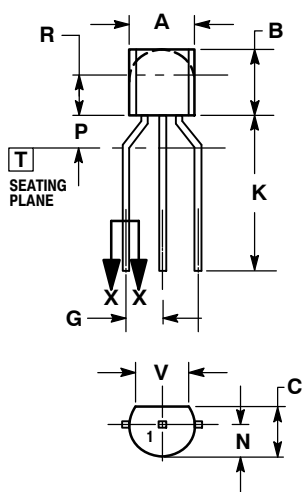


SECTION X-X

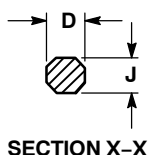
NOTES:

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.

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 1:

1. EMITTER
2. BASE
3. COLLECTOR

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: 81-3-5773-3850

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

For additional information, please contact your local Sales Representative