

# P2N2907A

## Amplifier Transistor

### PNP Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	$V_{CEO}$	-60	Vdc
Collector - Base Voltage	$V_{CBO}$	-60	Vdc
Emitter - Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current - Continuous	$I_C$	-600	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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

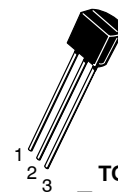
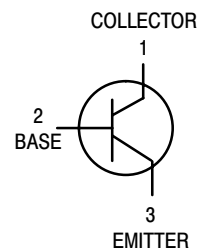
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

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.



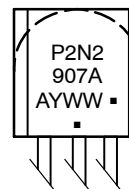
ON Semiconductor®

<http://onsemi.com>



TO-92  
(T0-226AA)  
CASE 29-11  
STYLE 17

#### MARKING DIAGRAM



P2N2 = Device Code  
907A = Specific Device  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
P2N2907A	TO-92	5000 Units / Bulk
P2N2907AG	TO-92 (Pb-Free)	5000 Units / Bulk
P2N2907ARL1	TO-92	2000 / Tape & Reel
P2N2907ARL1G	TO-92 (Pb-Free)	2000 / Tape & Reel
P2N2907AZL1	TO-92	2000 / Tape & Ammo
P2N2907AZL1G	TO-92 (Pb-Free)	2000 / Tape & Ammo

†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.

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

# P2N2907A

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector – Emitter Breakdown Voltage (Note 1) ( $I_C = -10\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	-60	-	Vdc
Collector – Base Breakdown Voltage ( $I_C = -10\ \mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	-60	-	Vdc
Emitter – Base Breakdown Voltage ( $I_E = -10\ \mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	-5.0	-	Vdc
Collector Cutoff Current ( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )	$I_{CEX}$	-	-50	nAdc
Collector Cutoff Current ( $V_{CB} = -50\text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = -50\text{ Vdc}$ , $I_E = 0$ , $T_A = 150^\circ\text{C}$ )	$I_{CBO}$	-	-0.01 -10	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = -3.0\text{ Vdc}$ )	$I_{EBO}$	-	-10	nAdc
Collector Cutoff Current ( $V_{CE} = -10\text{ V}$ )	$I_{CEO}$	-	-10	nAdc
Base Cutoff Current ( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )	$I_{BEX}$	-	-50	nAdc

## ON CHARACTERISTICS

DC Current Gain ( $I_C = -0.1\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -1.0\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -10\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -150\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) (Note 1) ( $I_C = -500\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) (Note 1)	$h_{FE}$	75 100 100 100 50	- - - 300 -	-
Collector – Emitter Saturation Voltage (Note 1) ( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ ) ( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )	$V_{CE(sat)}$	- -	-0.4 -1.6	Vdc
Base – Emitter Saturation Voltage (Note 1) ( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ ) ( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )	$V_{BE(sat)}$	- -	-1.3 -2.6	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product (Notes 1 and 2) ( $I_C = -50\text{ mA}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	200	-	MHz
Output Capacitance ( $V_{CB} = -10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	-	8.0	pF
Input Capacitance ( $V_{EB} = -2.0\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ibo}$	-	30	pF

## SWITCHING CHARACTERISTICS

Turn-On Time	$(V_{CC} = -30\text{ Vdc}$ , $I_C = -150\text{ mA}$ , $I_{B1} = -15\text{ mA}$ ) (Figures 1 and 5)	$t_{on}$	-	50	ns
Delay Time		$t_d$	-	10	ns
Rise Time		$t_r$	-	40	ns
Turn-Off Time	$(V_{CC} = -6.0\text{ Vdc}$ , $I_C = -150\text{ mA}$ , $I_{B1} = I_{B2} = -15\text{ mA}$ ) (Figure 2)	$t_{off}$	-	110	ns
Storage Time		$t_s$	-	80	ns
Fall Time		$t_f$	-	30	ns

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .
2.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

# P2N2907A

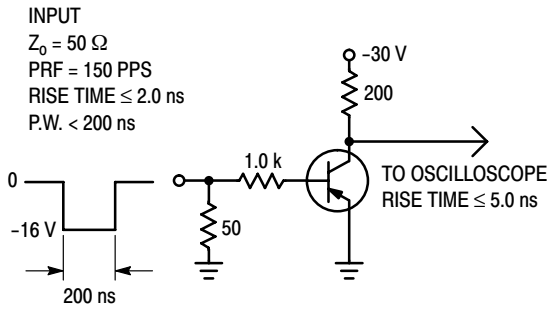


Figure 1. Delay and Rise Time Test Circuit

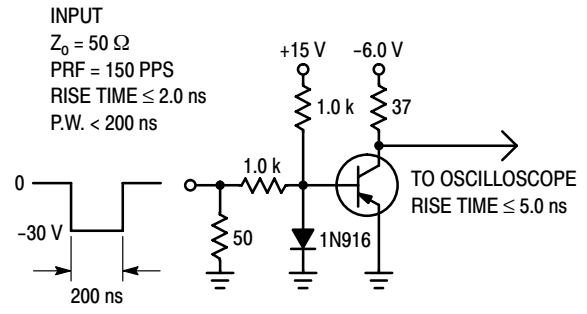


Figure 2. Storage and Fall Time Test Circuit

# P2N2907A

## TYPICAL CHARACTERISTICS

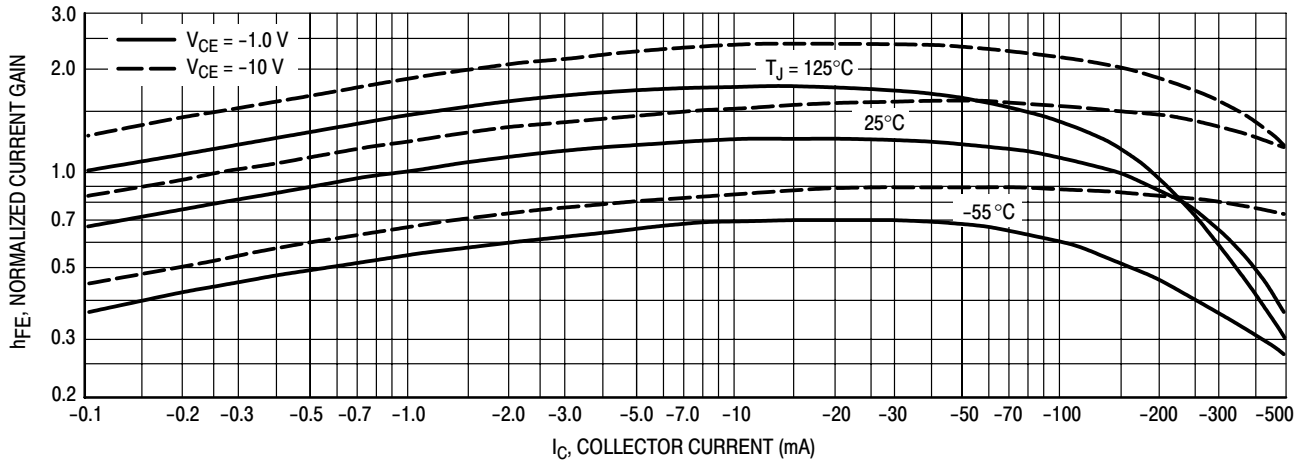


Figure 3. DC Current Gain

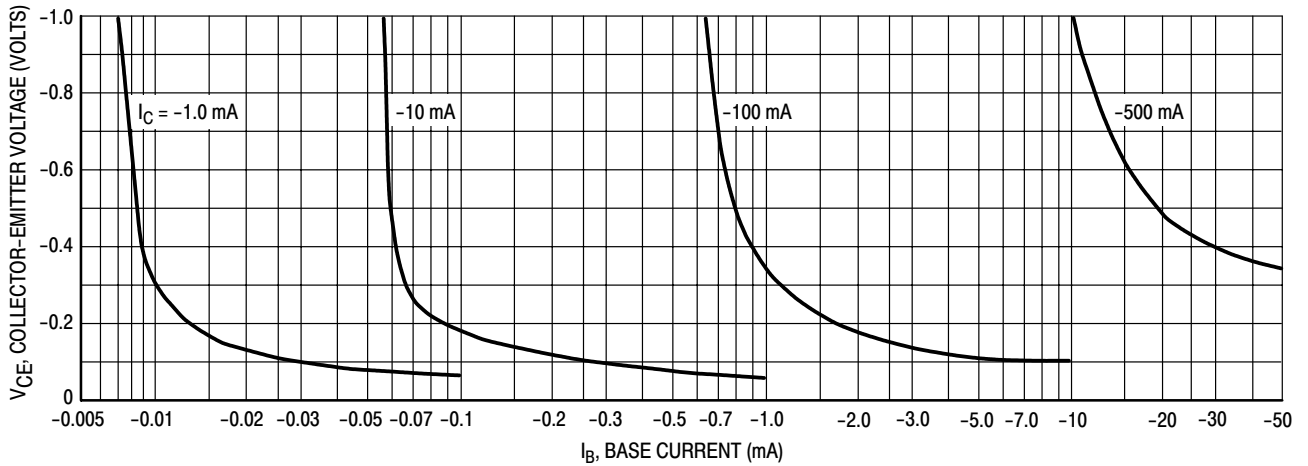


Figure 4. Collector Saturation Region

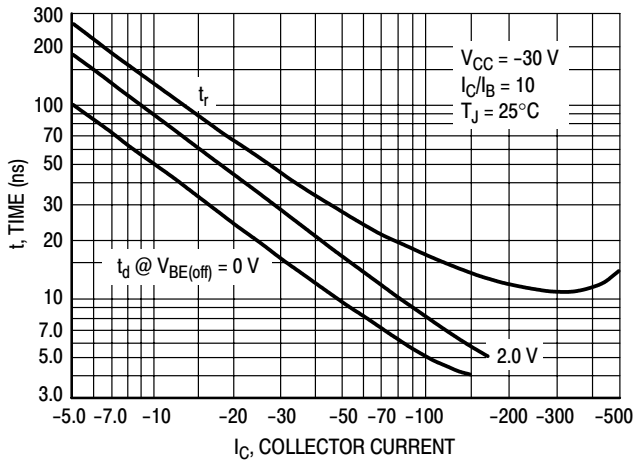


Figure 5. Turn-On Time

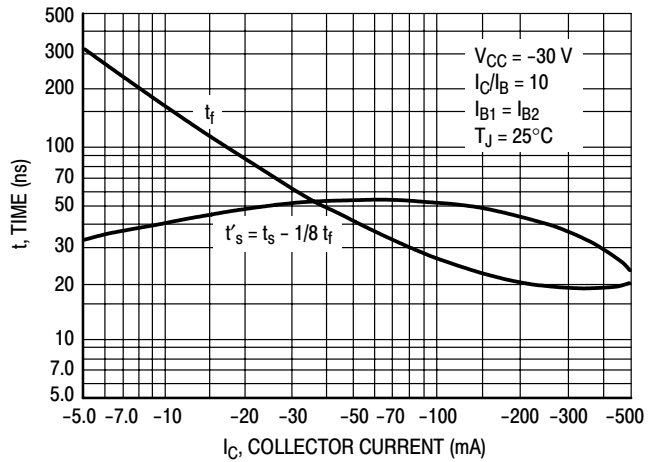


Figure 6. Turn-Off Time

# P2N2907A

## TYPICAL SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE

$V_{CE} = 10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$

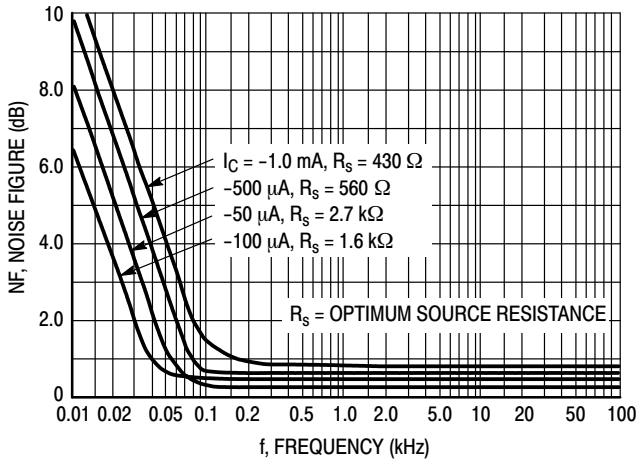


Figure 7. Frequency Effects

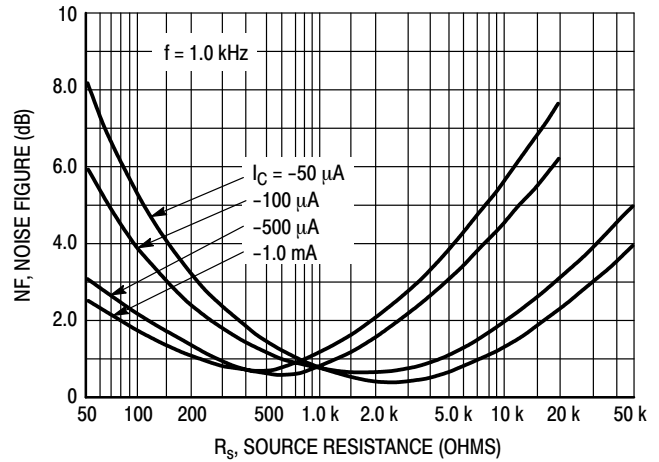


Figure 8. Source Resistance Effects

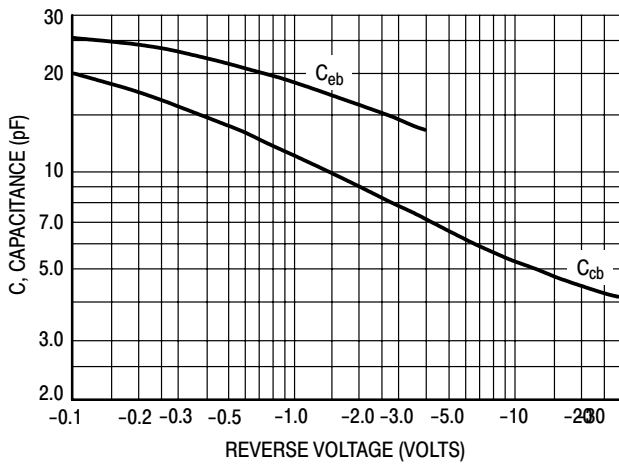


Figure 9. Capacitances

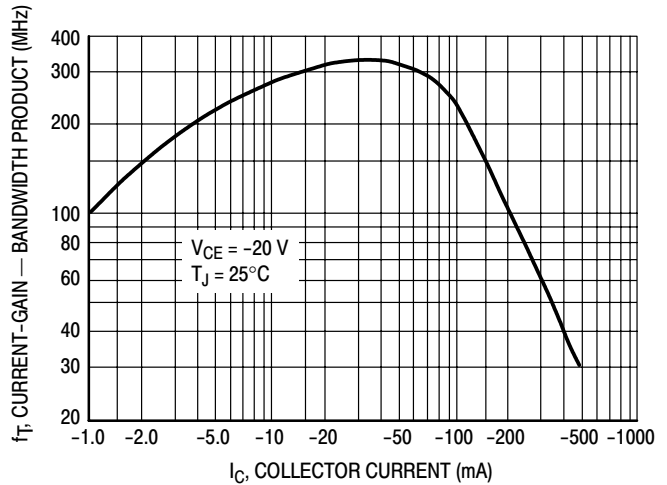


Figure 10. Current-Gain - Bandwidth Product

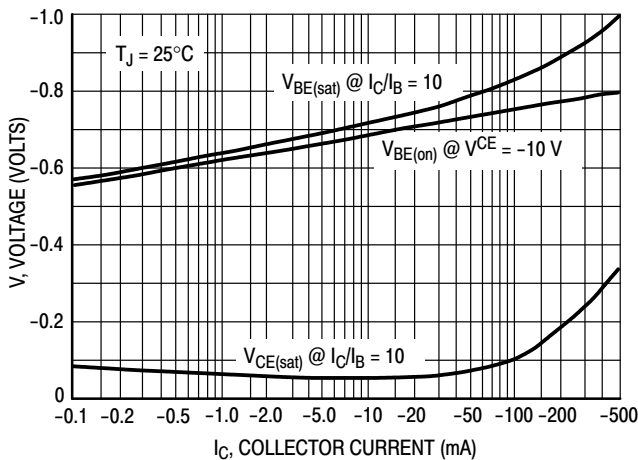


Figure 11. "On" Voltage

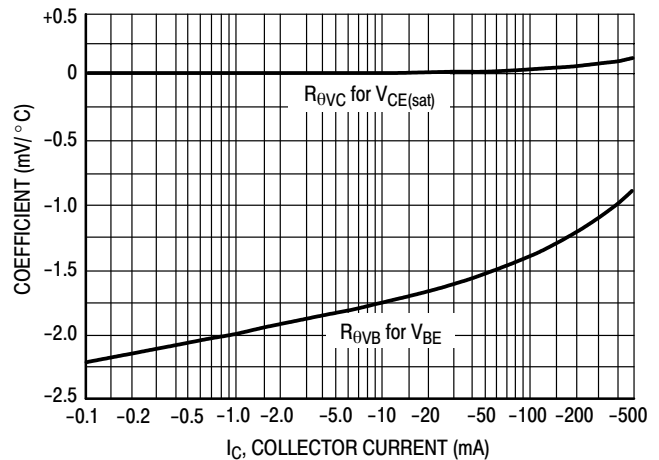
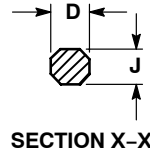
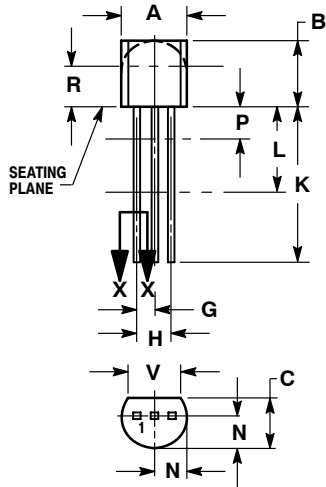


Figure 12. Temperature Coefficients

# P2N2907A

## PACKAGE DIMENSIONS

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



**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	---

**STYLE 17:**

1. COLLECTOR
2. BASE
3. EMITTER

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 61312, Phoenix, Arizona 85082-1312 USA  
**Phone:** 480-829-7710 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 480-829-7709 or 800-344-3867 Toll Free USA/Canada  
**Email:** orderlit@onsemi.com

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

**Japan:** ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
**Phone:** 81-3-5773-3850

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

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.