



**THE DATASHEET OF  
P2N2907ARL1**



# 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

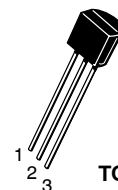
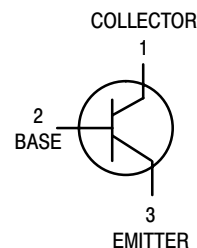
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

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.



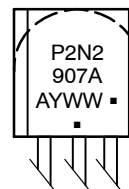
ON Semiconductor®

<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.

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## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector – Emitter Breakdown Voltage (Note 1) (I <sub>C</sub> = -10 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	-60	-	Vdc
Collector – Base Breakdown Voltage (I <sub>C</sub> = -10 μAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	-60	-	Vdc
Emitter – Base Breakdown Voltage (I <sub>E</sub> = -10 μAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	-5.0	-	Vdc
Collector Cutoff Current (V <sub>CE</sub> = -30 Vdc, V <sub>EB(off)</sub> = -0.5 Vdc)	I <sub>CEX</sub>	-	-50	nAdc
Collector Cutoff Current (V <sub>CB</sub> = -50 Vdc, I <sub>E</sub> = 0) (V <sub>CB</sub> = -50 Vdc, I <sub>E</sub> = 0, T <sub>A</sub> = 150°C)	I <sub>CBO</sub>	-	-0.01 -10	μAdc
Emitter Cutoff Current (V <sub>EB</sub> = -3.0 Vdc)	I <sub>EBO</sub>	-	-10	nAdc
Collector Cutoff Current (V <sub>CE</sub> = -10 V)	I <sub>CEO</sub>	-	-10	nAdc
Base Cutoff Current (V <sub>CE</sub> = -30 Vdc, V <sub>EB(off)</sub> = -0.5 Vdc)	I <sub>BEX</sub>	-	-50	nAdc

## ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = -0.1 mAdc, V <sub>CE</sub> = -10 Vdc) (I <sub>C</sub> = -1.0 mAdc, V <sub>CE</sub> = -10 Vdc) (I <sub>C</sub> = -10 mAdc, V <sub>CE</sub> = -10 Vdc) (I <sub>C</sub> = -150 mAdc, V <sub>CE</sub> = -10 Vdc) (Note 1) (I <sub>C</sub> = -500 mAdc, V <sub>CE</sub> = -10 Vdc) (Note 1)	h <sub>FE</sub>	75 100 100 100 50	- - - 300 -	-
Collector – Emitter Saturation Voltage (Note 1) (I <sub>C</sub> = -150 mAdc, I <sub>B</sub> = -15 mAdc) (I <sub>C</sub> = -500 mAdc, I <sub>B</sub> = -50 mAdc)	V <sub>CE(sat)</sub>	- -	-0.4 -1.6	Vdc
Base – Emitter Saturation Voltage (Note 1) (I <sub>C</sub> = -150 mAdc, I <sub>B</sub> = -15 mAdc) (I <sub>C</sub> = -500 mAdc, I <sub>B</sub> = -50 mAdc)	V <sub>BE(sat)</sub>	- -	-1.3 -2.6	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product (Notes 1 and 2) (I <sub>C</sub> = -50 mAdc, V <sub>CE</sub> = -20 Vdc, f = 100 MHz)	f <sub>T</sub>	200	-	MHz
Output Capacitance (V <sub>CB</sub> = -10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>obo</sub>	-	8.0	pF
Input Capacitance (V <sub>EB</sub> = -2.0 Vdc, I <sub>C</sub> = 0, f = 1.0 MHz)	C <sub>ibo</sub>	-	30	pF

## SWITCHING CHARACTERISTICS

Turn-On Time	(V <sub>CC</sub> = -30 Vdc, I <sub>C</sub> = -150 mAdc, I <sub>B1</sub> = -15 mAdc) (Figures 1 and 5)	t <sub>on</sub>	-	50	ns
Delay Time		t <sub>d</sub>	-	10	ns
Rise Time		t <sub>r</sub>	-	40	ns
Turn-Off Time	(V <sub>CC</sub> = -6.0 Vdc, I <sub>C</sub> = -150 mAdc, I <sub>B1</sub> = I <sub>B2</sub> = -15 mAdc) (Figure 2)	t <sub>off</sub>	-	110	ns
Storage Time		t <sub>s</sub>	-	80	ns
Fall Time		t <sub>f</sub>	-	30	ns

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
2. f<sub>T</sub> is defined as the frequency at which |h<sub>fe</sub>| extrapolates to unity.

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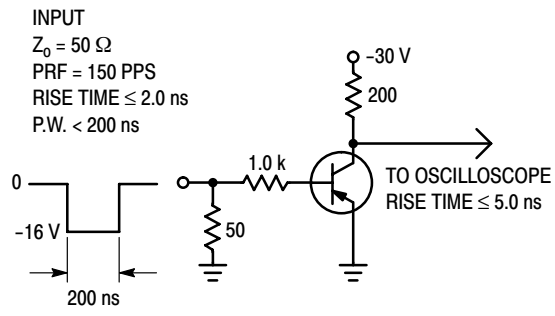


Figure 1. Delay and Rise Time Test Circuit

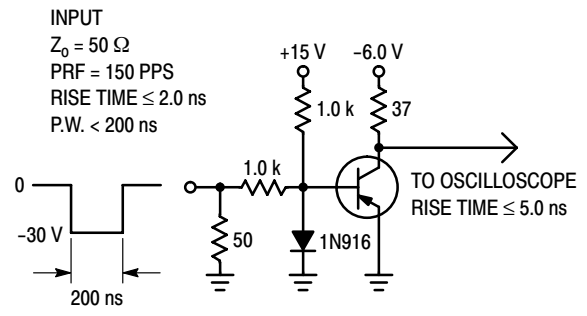


Figure 2. Storage and Fall Time Test Circuit

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## TYPICAL CHARACTERISTICS

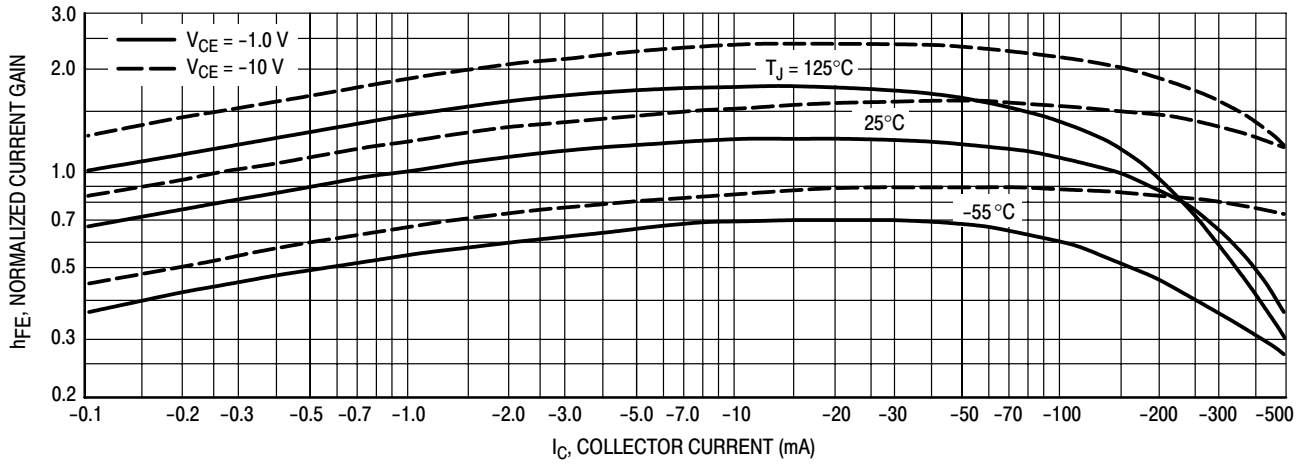


Figure 3. DC Current Gain

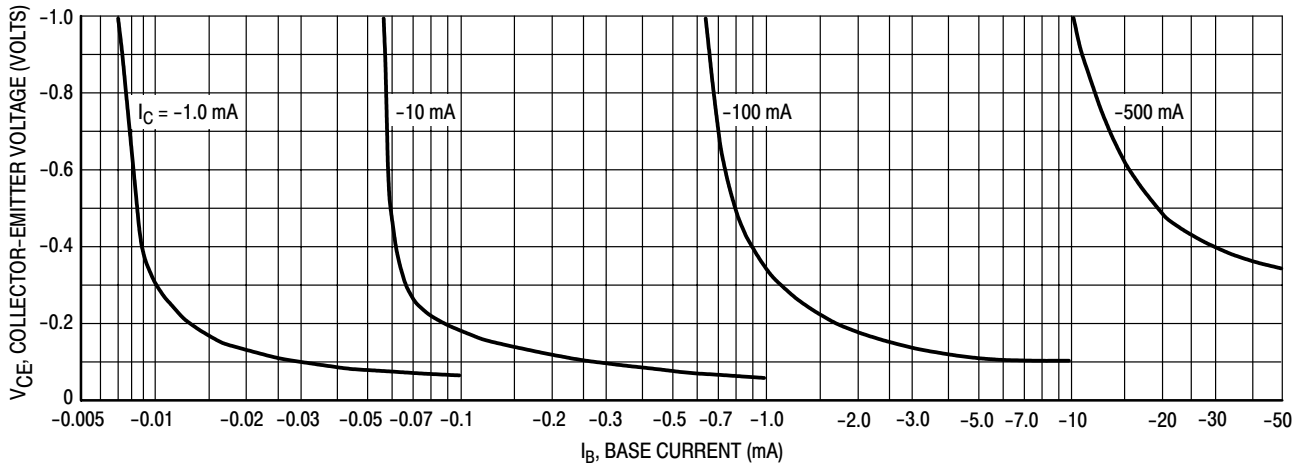


Figure 4. Collector Saturation Region

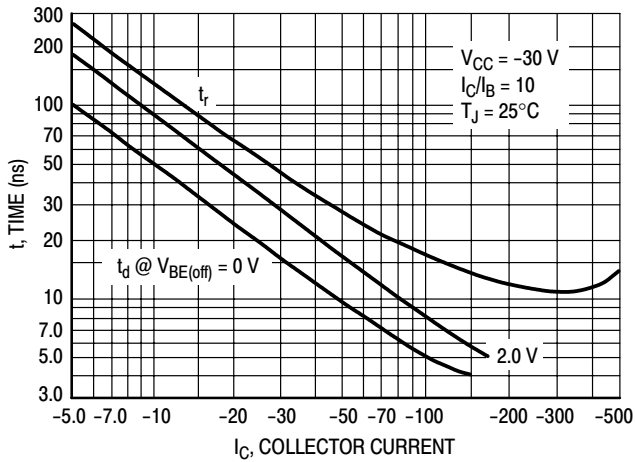


Figure 5. Turn-On Time

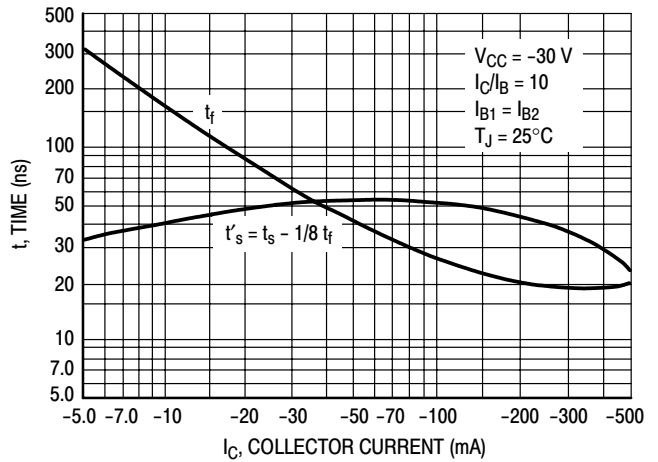


Figure 6. Turn-Off Time

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## TYPICAL SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE

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

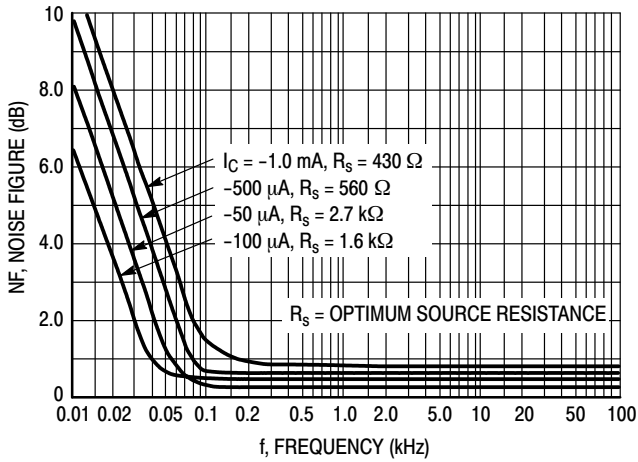


Figure 7. Frequency Effects

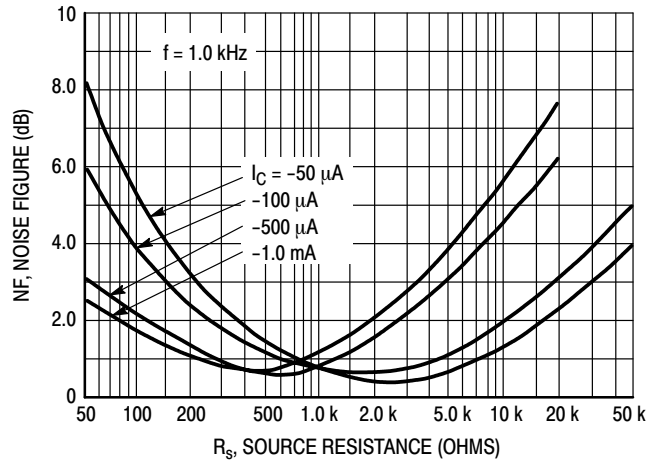


Figure 8. Source Resistance Effects

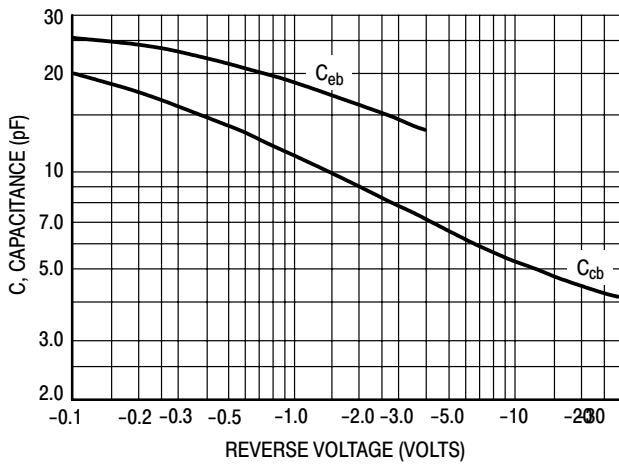


Figure 9. Capacitances

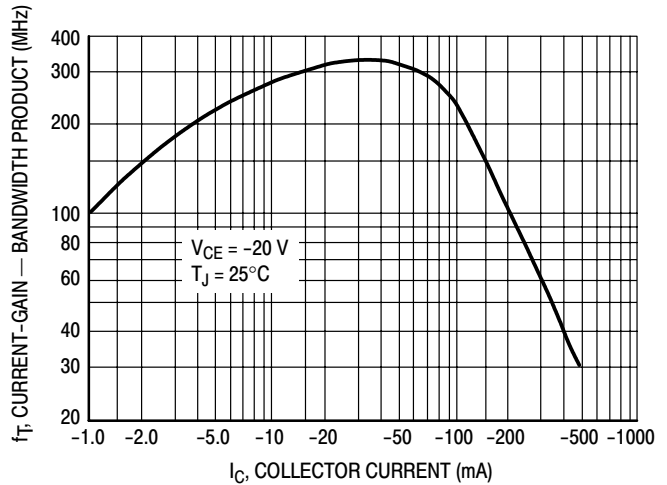


Figure 10. Current-Gain - Bandwidth Product

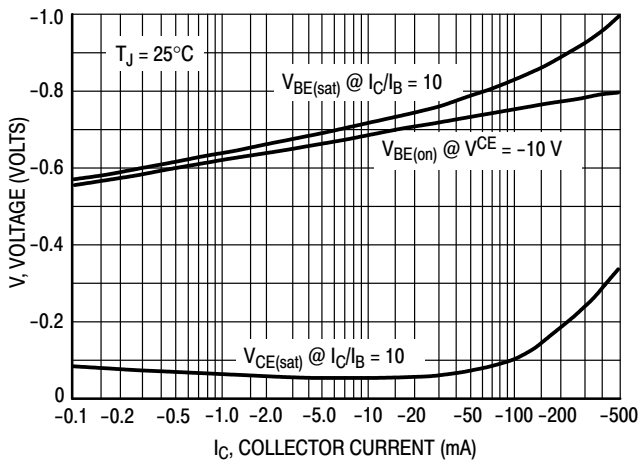


Figure 11. "On" Voltage

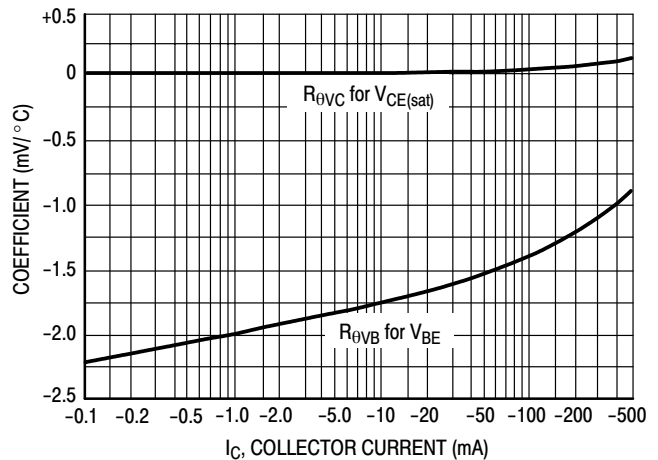
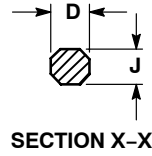
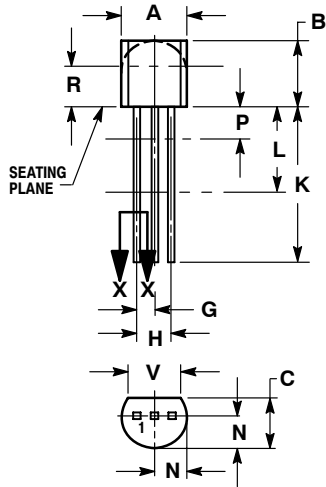


Figure 12. Temperature Coefficients

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## 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

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