

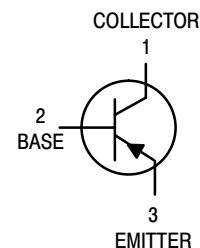
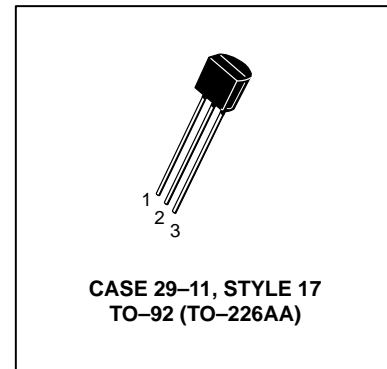
# Amplifier Transistor

## PNP Silicon

# P2N2907A

### 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	Watts 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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Max	Unit
Collector–Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = -10\text{ mAdc}, I_E = 0$ )	$V_{(BR)CEO}$	–60	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = -10\ \mu\text{Adc}, I_E = 0$ )	$V_{(BR)CBO}$	–60	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = -10\ \mu\text{Adc}, I_C = 0$ )	$V_{(BR)EBO}$	–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

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# P2N2907A

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

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS</b>				
DC Current Gain ( $I_C = -0.1\text{ mAdc}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -1.0\text{ mAdc}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -10\text{ mAdc}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -150\text{ mAdc}$ , $V_{CE} = -10\text{ Vdc}$ ) <sup>(1)</sup> ( $I_C = -500\text{ mAdc}$ , $V_{CE} = -10\text{ Vdc}$ ) <sup>(1)</sup>	$h_{FE}$	75 100 100 100 50	— — — 300 —	—
Collector–Emitter Saturation Voltage <sup>(1)</sup> ( $I_C = -150\text{ mAdc}$ , $I_B = -15\text{ mAdc}$ ) ( $I_C = -500\text{ mAdc}$ , $I_B = -50\text{ mAdc}$ )	$V_{CE(sat)}$	— —	-0.4 -1.6	Vdc
Base–Emitter Saturation Voltage <sup>(1)</sup> ( $I_C = -150\text{ mAdc}$ , $I_B = -15\text{ mAdc}$ ) ( $I_C = -500\text{ mAdc}$ , $I_B = -50\text{ mAdc}$ )	$V_{BE(sat)}$	— —	-1.3 -2.6	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product <sup>(1), (2)</sup> ( $I_C = -50\text{ mAdc}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	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	$(V_{CC} = -30\text{ Vdc}$ , $I_C = -150\text{ mAdc}$ , $I_{B1} = -15\text{ mAdc}$ ) (Figures 1 and 5)	$t_{on}$	—	50	ns
Delay Time		$t_d$	—	10	ns
Rise Time		$t_r$	—	40	ns
Turn-Off Time	$(V_{CC} = -6.0\text{ Vdc}$ , $I_C = -150\text{ mAdc}$ , $I_{B1} = I_{B2} = -15\text{ mAdc}$ ) (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.

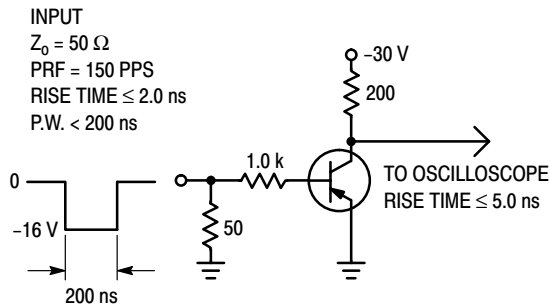


Figure 1. Delay and Rise Time Test Circuit

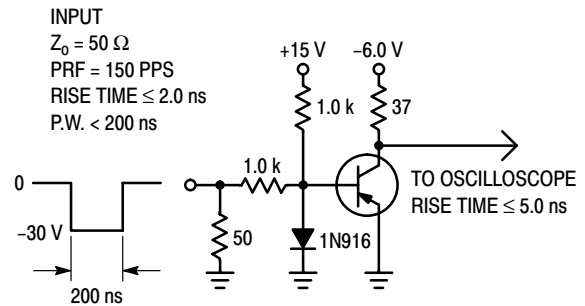


Figure 2. Storage and Fall Time Test Circuit

# P2N2907A

## TYPICAL CHARACTERISTICS

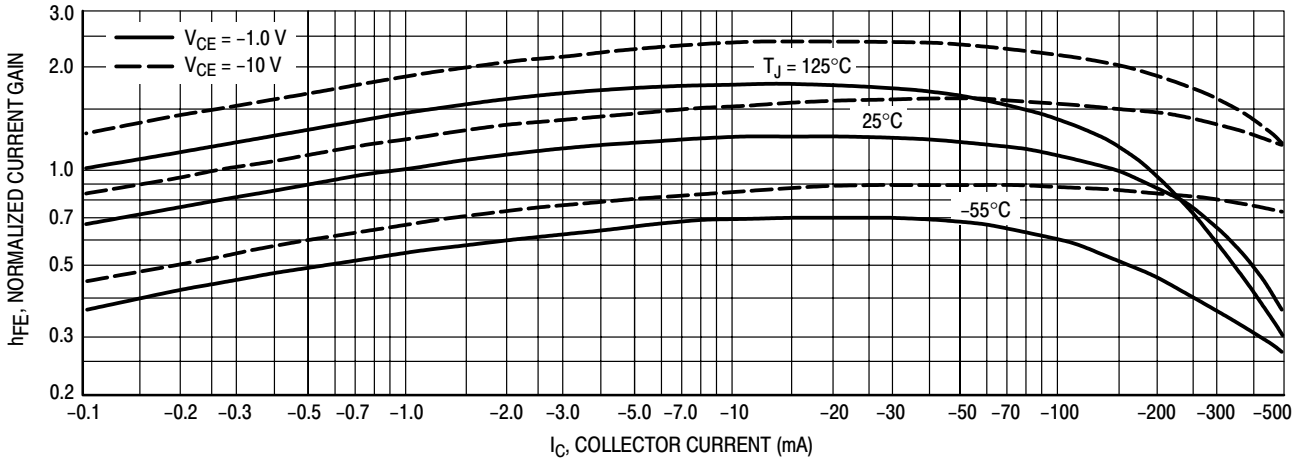


Figure 3. DC Current Gain

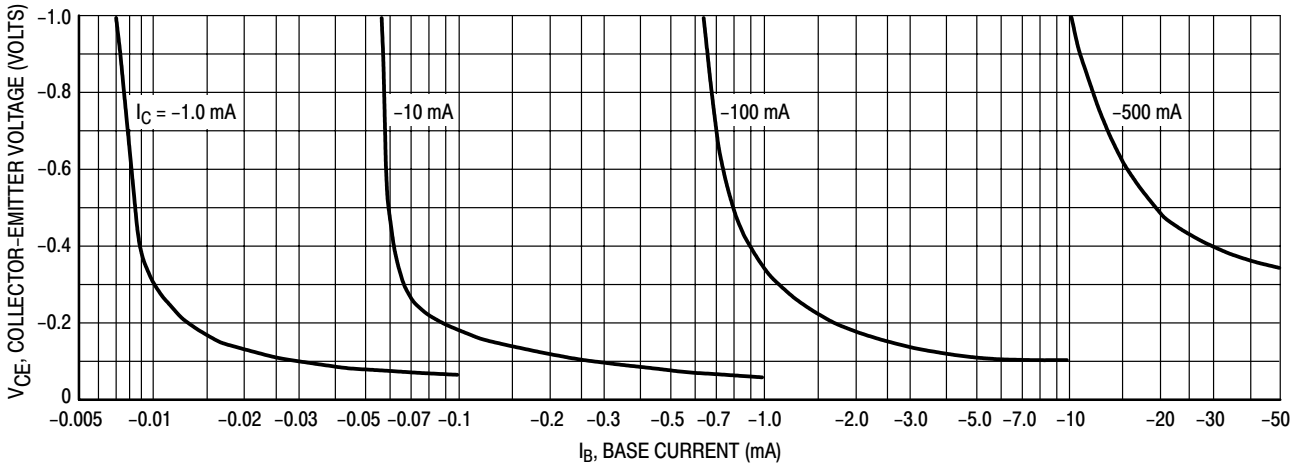


Figure 4. Collector Saturation Region

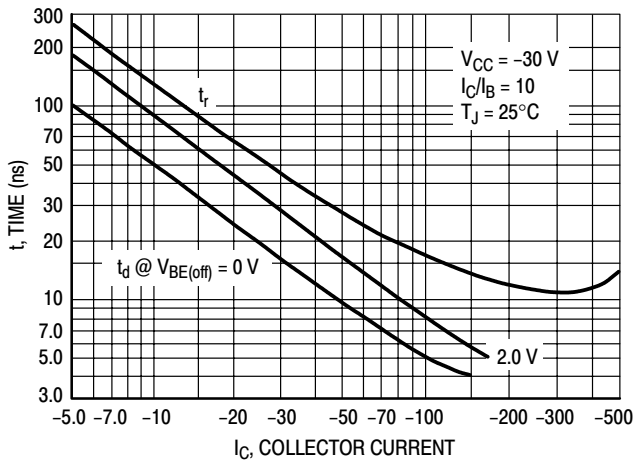


Figure 5. Turn-On Time

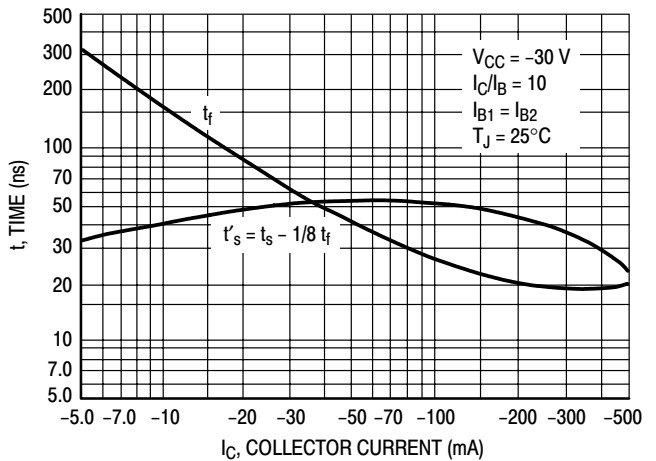


Figure 6. Turn-Off Time

# P2N2907A

## TYPICAL SMALL-SIGNAL CHARACTERISTICS

### NOISE FIGURE

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

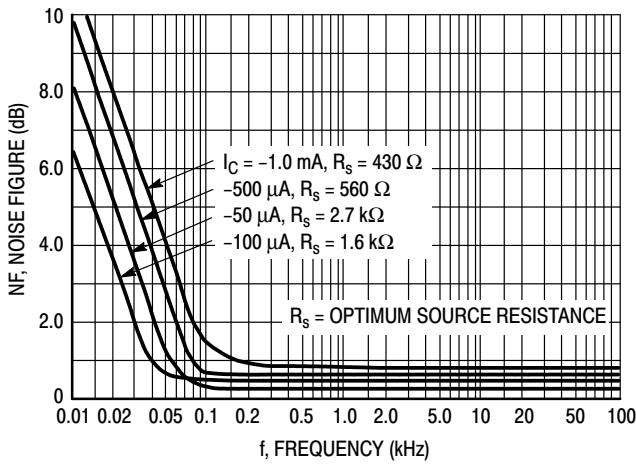


Figure 7. Frequency Effects

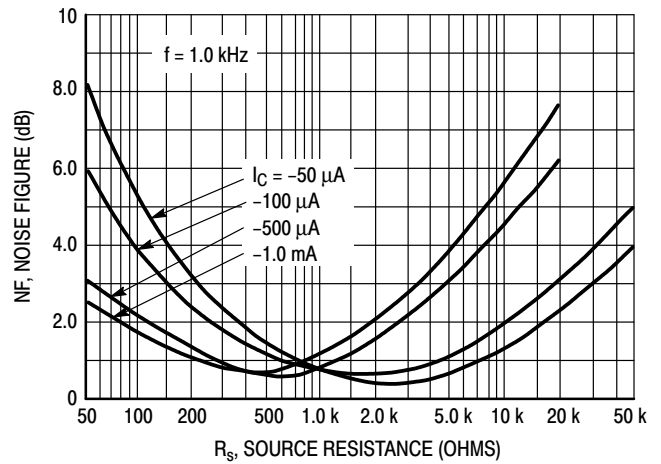


Figure 8. Source Resistance Effects

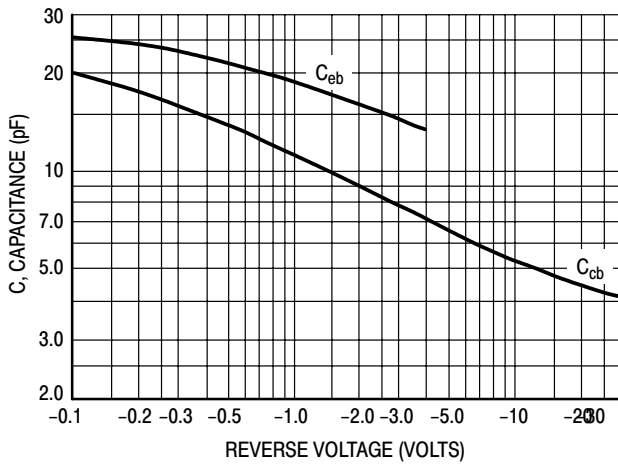


Figure 9. Capacitances

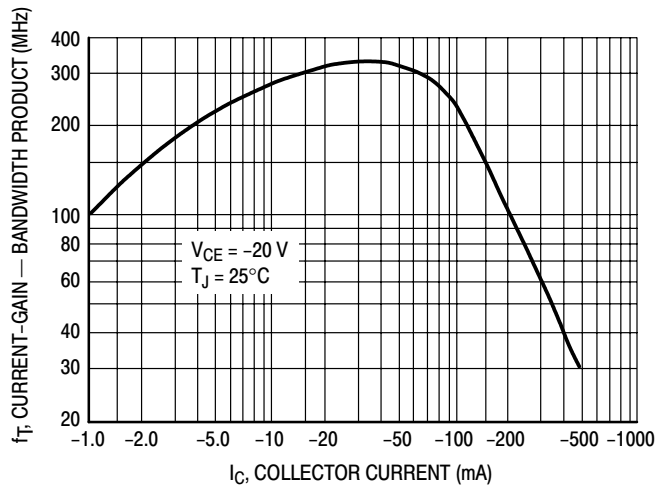


Figure 10. Current-Gain — Bandwidth Product

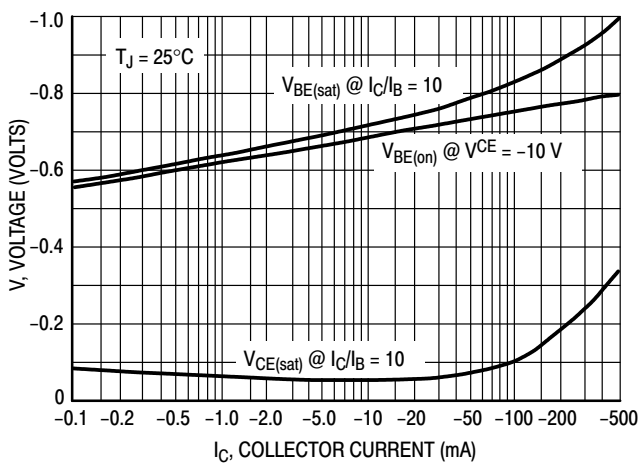


Figure 11. "On" Voltage

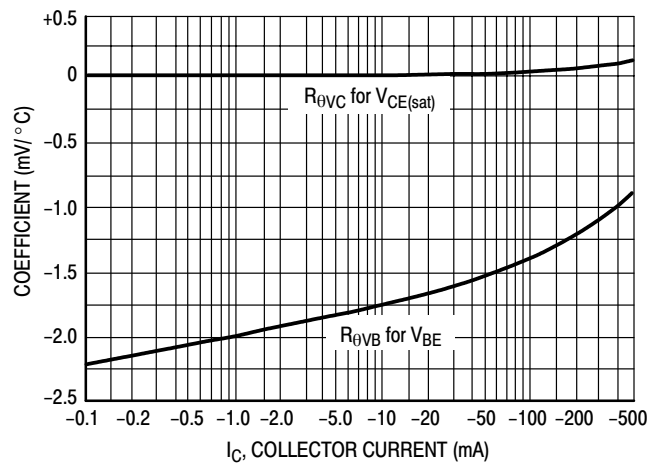
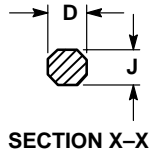
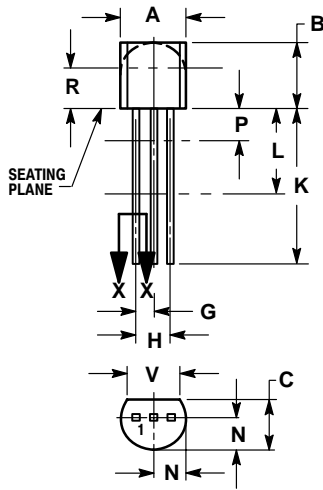


Figure 12. Temperature Coefficients

# 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 1:

- PIN 1. EMITTER
2. BASE
3. COLLECTOR

## Notes

## Notes

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