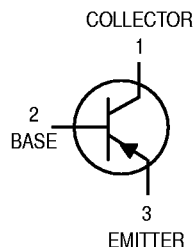
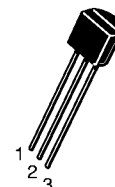


# Amplifier Transistor

## PNP Silicon



**P2N2907A**



CASE 29-04, STYLE 17  
TO-92 (TO-226AA)

### 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 @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 625<br>5.0  | mW<br>mW/ $^\circ\text{C}$    |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5<br>12   | Watts<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>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 | $^\circ\text{C}/\text{W}$ |

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

### OFF CHARACTERISTICS

|                                                                                                                                                  |               |        |              |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|--------------|-----------------|
| Collector–Emitter Breakdown Voltage <sup>(1)</sup><br>( $I_C = -10 \text{ mAdc}$ , $I_E = 0$ )                                                   | $V_{(BR)CEO}$ | –60    | —            | Vdc             |
| Collector–Base Breakdown Voltage<br>( $I_C = -10 \text{ } \mu\text{Adc}$ , $I_E = 0$ )                                                           | $V_{(BR)CBO}$ | –60    | —            | Vdc             |
| Emitter–Base Breakdown Voltage<br>( $I_E = -10 \text{ } \mu\text{Adc}$ , $I_C = 0$ )                                                             | $V_{(BR)EBO}$ | –5.0   | —            | Vdc             |
| Collector Cutoff Current<br>( $V_{CE} = -30 \text{ Vdc}$ , $V_{EB(off)} = -0.5 \text{ Vdc}$ )                                                    | $I_{CEX}$     | —      | –50          | nAdc            |
| Collector Cutoff Current<br>( $V_{CB} = -50 \text{ Vdc}$ , $I_E = 0$ )<br>( $V_{CB} = -50 \text{ Vdc}$ , $I_E = 0$ , $T_A = 150^\circ\text{C}$ ) | $I_{CBO}$     | —<br>— | –0.01<br>–10 | $\mu\text{Adc}$ |
| Emitter Cutoff Current<br>( $V_{EB} = -3.0 \text{ Vdc}$ )                                                                                        | $I_{EBO}$     | —      | –10          | nAdc            |
| Collector Cutoff Current<br>( $V_{CE} = -10 \text{ V}$ )                                                                                         | $I_{CEO}$     | —      | –10          | nAdc            |
| Base Cutoff Current<br>( $V_{CE} = -30 \text{ Vdc}$ , $V_{EB(off)} = -0.5 \text{ Vdc}$ )                                                         | $I_{BEX}$     | —      | –50          | nAdc            |

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

# P2N2907A

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

| Characteristic                                                                                                                                                                                                                                                                                                                                                                                                                                                | Symbol               | Min                           | Max                     | Unit            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------|-------------------------|-----------------|
| <b>ON CHARACTERISTICS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |                               |                         |                 |
| DC Current Gain<br>(I <sub>C</sub> = -0.1 mA <sub>dc</sub> , V <sub>CE</sub> = -10 V <sub>dc</sub> )<br>(I <sub>C</sub> = -1.0 mA <sub>dc</sub> , V <sub>CE</sub> = -10 V <sub>dc</sub> )<br>(I <sub>C</sub> = -10 mA <sub>dc</sub> , V <sub>CE</sub> = -10 V <sub>dc</sub> )<br>(I <sub>C</sub> = -150 mA <sub>dc</sub> , V <sub>CE</sub> = -10 V <sub>dc</sub> )(1)<br>(I <sub>C</sub> = -500 mA <sub>dc</sub> , V <sub>CE</sub> = -10 V <sub>dc</sub> )(1) | h <sub>FE</sub>      | 75<br>100<br>100<br>100<br>50 | —<br>—<br>—<br>300<br>— | —               |
| Collector–Emitter Saturation Voltage(1)<br>(I <sub>C</sub> = -150 mA <sub>dc</sub> , I <sub>B</sub> = -15 mA <sub>dc</sub> )<br>(I <sub>C</sub> = -500 mA <sub>dc</sub> , I <sub>B</sub> = -50 mA <sub>dc</sub> )                                                                                                                                                                                                                                             | V <sub>CE(sat)</sub> | —<br>—                        | -0.4<br>-1.6            | V <sub>dc</sub> |
| Base–Emitter Saturation Voltage(1)<br>(I <sub>C</sub> = -150 mA <sub>dc</sub> , I <sub>B</sub> = -15 mA <sub>dc</sub> )<br>(I <sub>C</sub> = -500 mA <sub>dc</sub> , I <sub>B</sub> = -50 mA <sub>dc</sub> )                                                                                                                                                                                                                                                  | V <sub>BE(sat)</sub> | —<br>—                        | -1.3<br>-2.6            | V <sub>dc</sub> |

## SMALL-SIGNAL CHARACTERISTICS

|                                                                                                                                           |                  |     |     |     |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----|-----|-----|
| Current–Gain — Bandwidth Product(1), (2)<br>(I <sub>C</sub> = -50 mA <sub>dc</sub> , V <sub>CE</sub> = -20 V <sub>dc</sub> , f = 100 MHz) | f <sub>T</sub>   | 200 | —   | MHz |
| Output Capacitance<br>(V <sub>CB</sub> = -10 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)                                           | C <sub>obo</sub> | —   | 8.0 | pF  |
| Input Capacitance<br>(V <sub>EB</sub> = -2.0 V <sub>dc</sub> , 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 V <sub>dc</sub> , I <sub>C</sub> = -150 mA <sub>dc</sub> ,<br>I <sub>B1</sub> = -15 mA <sub>dc</sub> ) (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 V <sub>dc</sub> , I <sub>C</sub> = -150 mA <sub>dc</sub> ,<br>I <sub>B1</sub> = I <sub>B2</sub> = -15 mA <sub>dc</sub> ) (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.

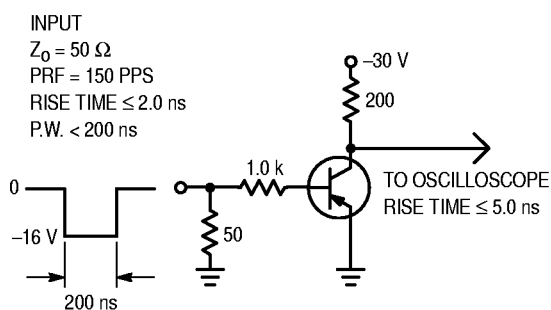


Figure 1. Delay and Rise Time Test Circuit

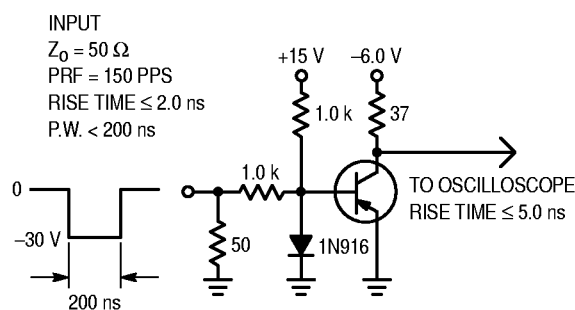


Figure 2. Storage and Fall Time Test Circuit

## TYPICAL CHARACTERISTICS

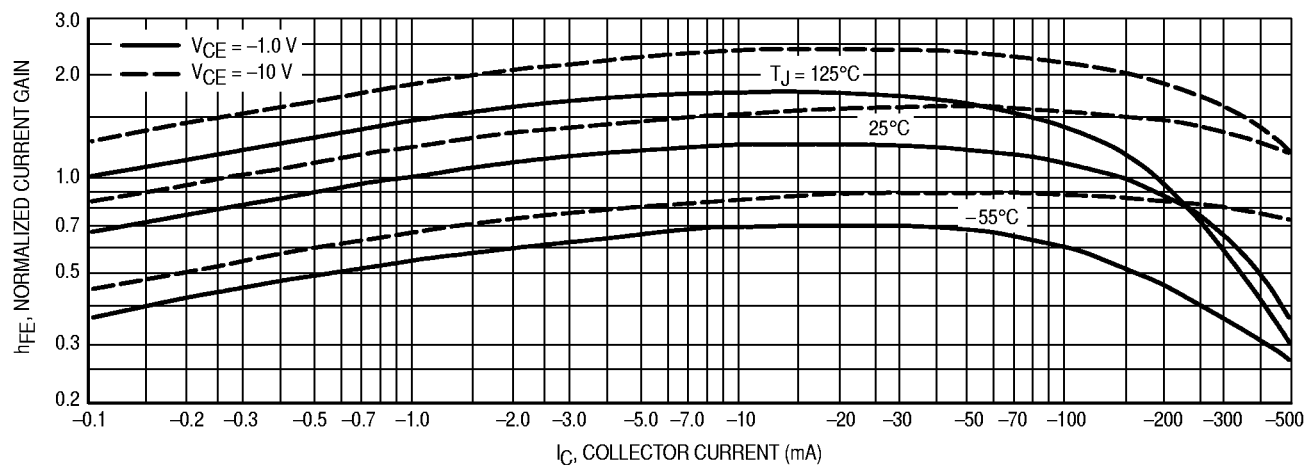


Figure 3. DC Current Gain

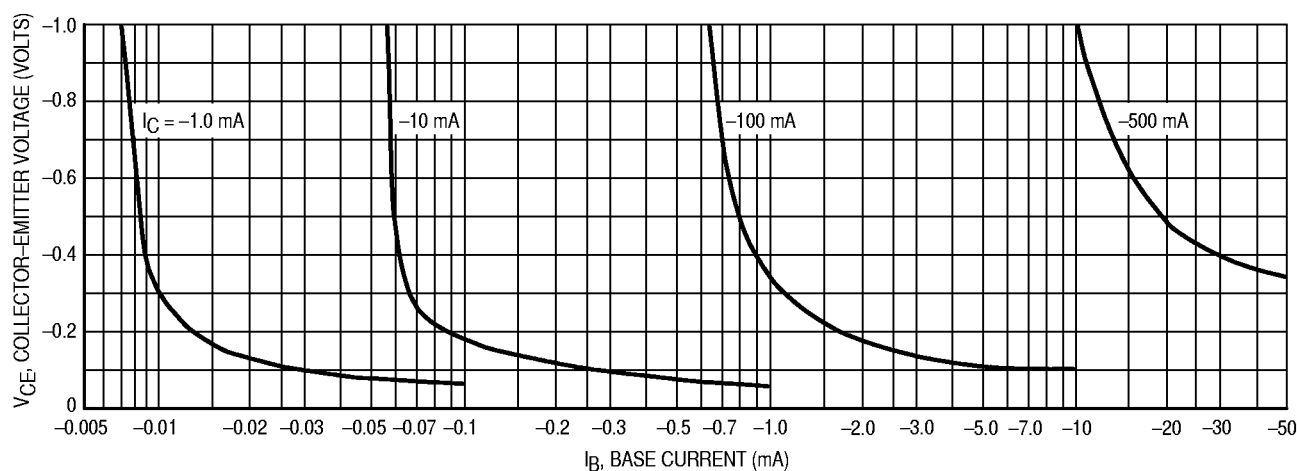


Figure 4. Collector Saturation Region

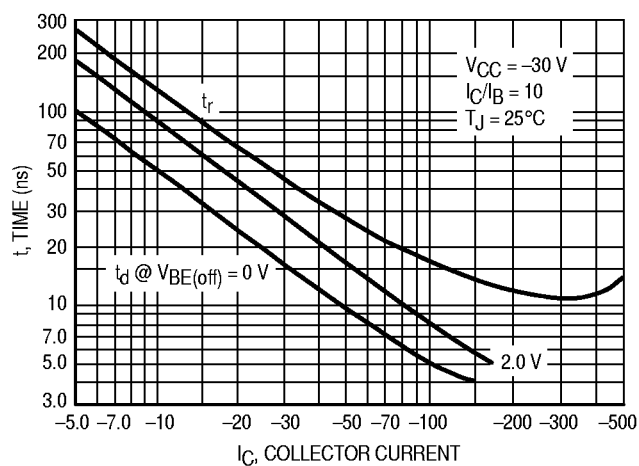


Figure 5. Turn-On Time

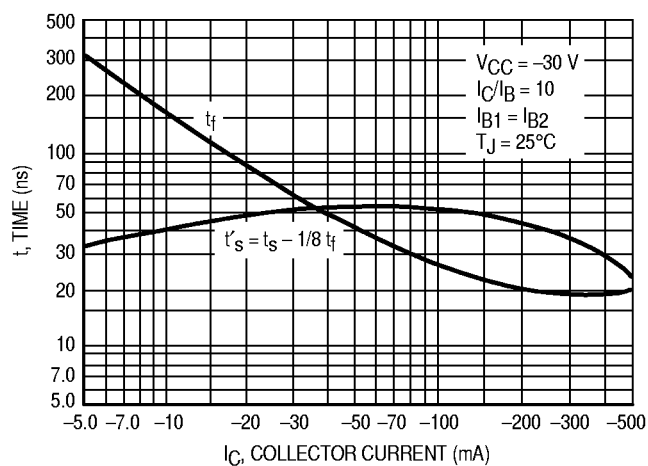


Figure 6. Turn-Off Time

## TYPICAL SMALL-SIGNAL CHARACTERISTICS

## NOISE FIGURE

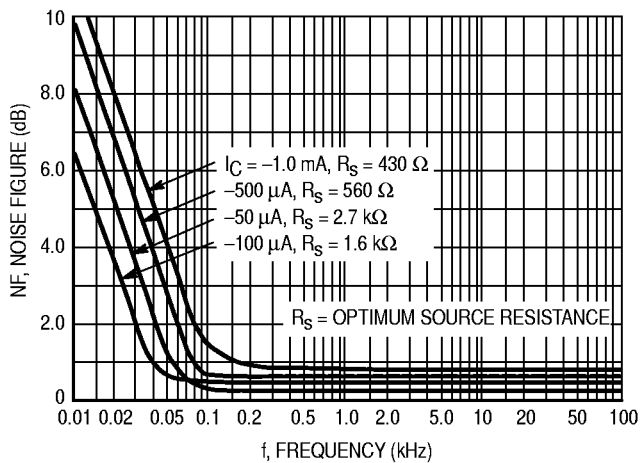
 $V_{CE} = 10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$ 

Figure 7. Frequency Effects

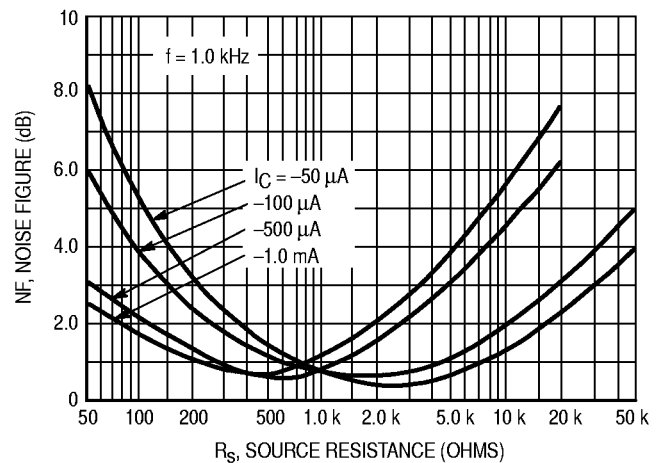


Figure 8. Source Resistance Effects

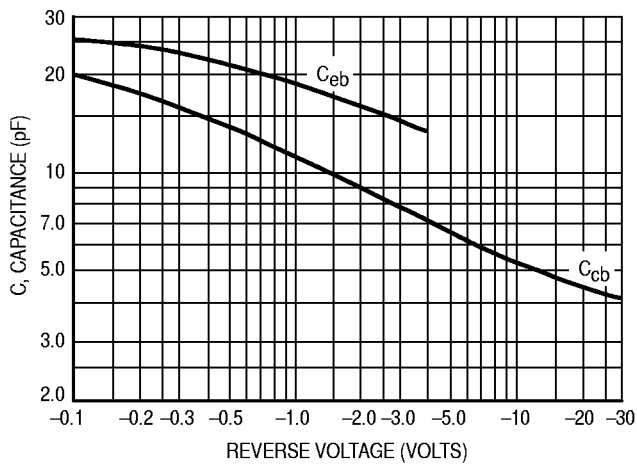


Figure 9. Capacitances

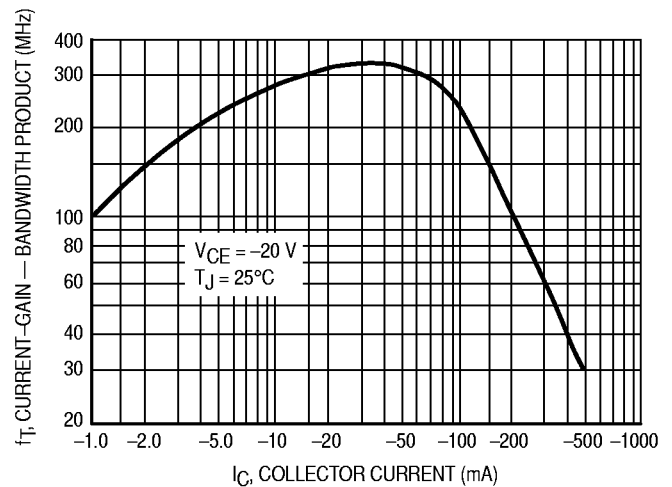


Figure 10. Current-Gain — Bandwidth Product

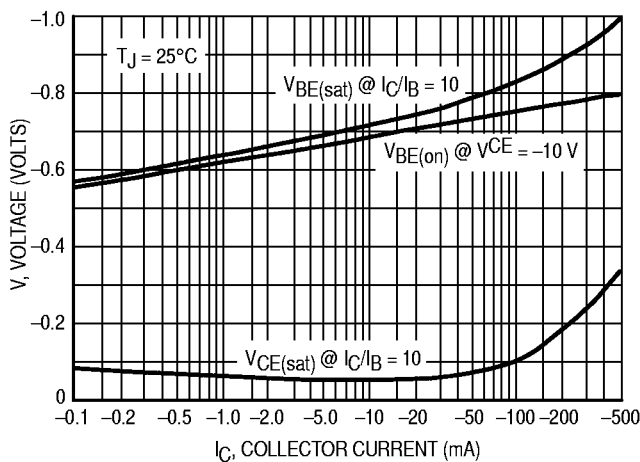


Figure 11. "On" Voltage

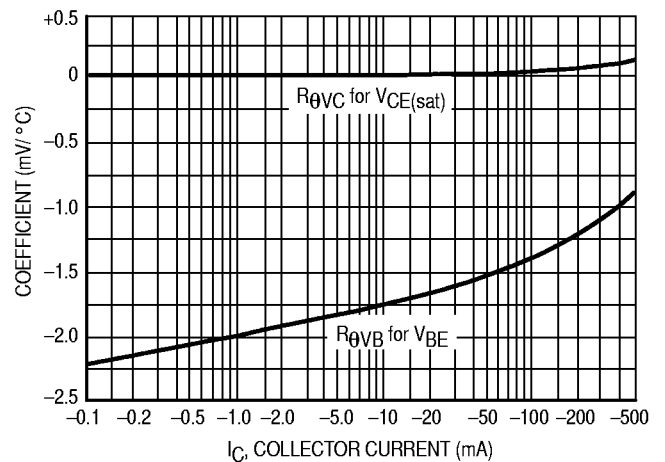
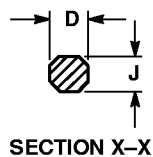
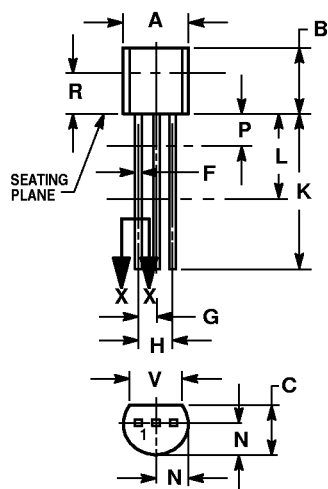


Figure 12. Temperature Coefficients

## PACKAGE DIMENSIONS



**CASE 029-04  
(TO-226AA)  
ISSUE AD**

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. 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  | 0.022 | 0.41        | 0.55 |
| F   | 0.016  | 0.019 | 0.41        | 0.48 |
| 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:

- PIN 1: COLLECTOR
- BASE
- EMITTER