

# MPS2907A Series

## General Purpose Transistors

### PNP Silicon

#### Features

- These are Pb-Free Devices\*

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

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.

#### DEVICE MARKING

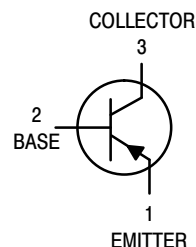
| Device        | Line 1 | Line 2 |
|---------------|--------|--------|
| MPS2907AG     | MPS    | 2907A  |
| MPS2907ARLG   | MPS2   | 907A   |
| MPS2907ARLRAG | MPS    | 2907   |
| MPS2907ARLRPG | MPS    | 2907   |

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

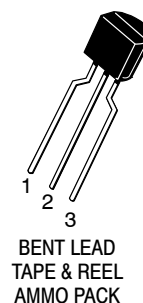
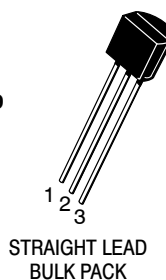


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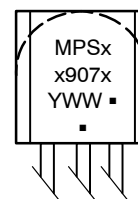
<http://onsemi.com>



TO-92  
CASE 29  
STYLE 1



#### MARKING DIAGRAM



Y = Year  
WW = Work Week  
■ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# MPS2907A Series

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

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

### OFF CHARACTERISTICS

|                                                                                                                                                |               |        |              |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|--------------|-----------------|
| Collector – Emitter Breakdown Voltage (Note 1) ( $I_C = -10\text{ mAdc}$ , $I_B = 0$ )                                                         | $V_{(BR)CEO}$ | -60    | –            | Vdc             |
| Collector – Base Breakdown Voltage ( $I_C = -10\text{ }\mu\text{Adc}$ , $I_E = 0$ )                                                            | $V_{(BR)CBO}$ | -60    | –            | Vdc             |
| Emitter – Base Breakdown Voltage ( $I_E = -10\text{ }\mu\text{Adc}$ , $I_C = 0$ )                                                              | $V_{(BR)EBO}$ | -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<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 | $\mu\text{Adc}$ |
| Base Current ( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )                                                                   | $I_B$         | –      | -50          | nAdc            |

### ON CHARACTERISTICS

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

### SMALL-SIGNAL CHARACTERISTICS

|                                                                                                                                       |           |     |     |     |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|-----|-----|
| Current – Gain – Bandwidth Product (Notes 1 and 2),<br>( $I_C = -50\text{ mAdc}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 100\text{ MHz}$ ) | $f_T$     | 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  | $(V_{CC} = -30\text{ Vdc}$ , $I_C = -150\text{ mAdc}$ ,<br>$I_{B1} = -15\text{ mAdc}$ ) (Figures 1 and 5)   | $t_{on}$  | – | 45  | ns |
| Delay Time    |                                                                                                             | $t_d$     | – | 10  | ns |
| Rise Time     |                                                                                                             | $t_r$     | – | 40  | ns |
| Turn-Off Time | $(V_{CC} = -6.0\text{ Vdc}$ , $I_C = -150\text{ mAdc}$ ,<br>$I_{B1} = I_{B2} = 15\text{ mAdc}$ ) (Figure 2) | $t_{off}$ | – | 100 | ns |
| Storage Time  |                                                                                                             | $t_s$     | – | 80  | ns |
| Fall Time     |                                                                                                             | $t_f$     | – | 30  | ns |

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

## MPS2907A Series

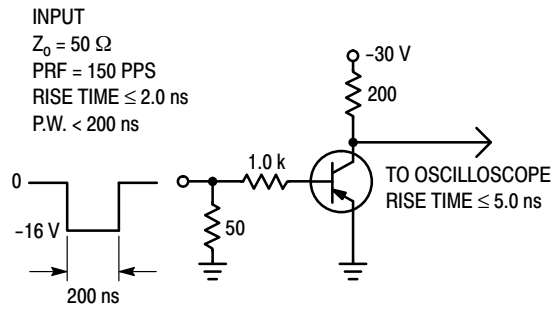


Figure 1. Delay and Rise Time Test Circuit

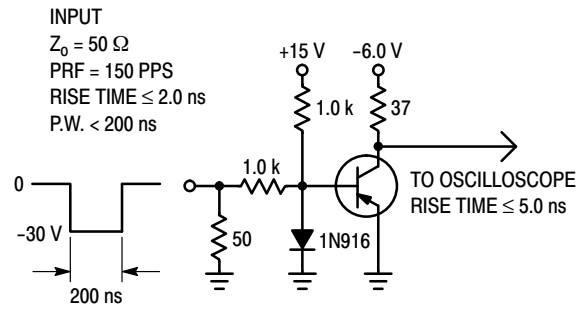


Figure 2. Storage and Fall Time Test Circuit

## TYPICAL CHARACTERISTICS

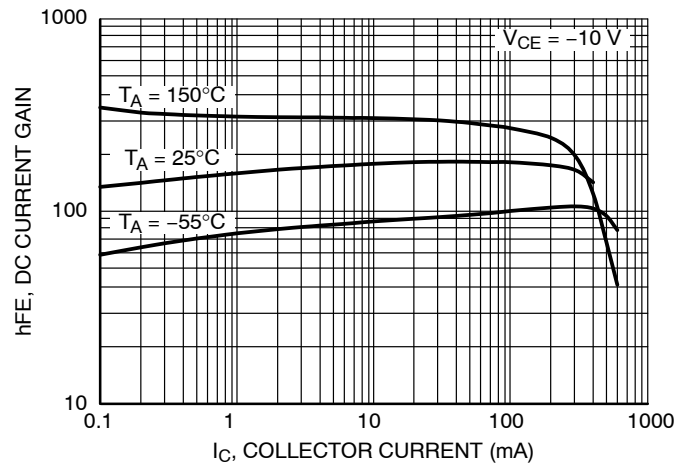


Figure 3. DC Current Gain

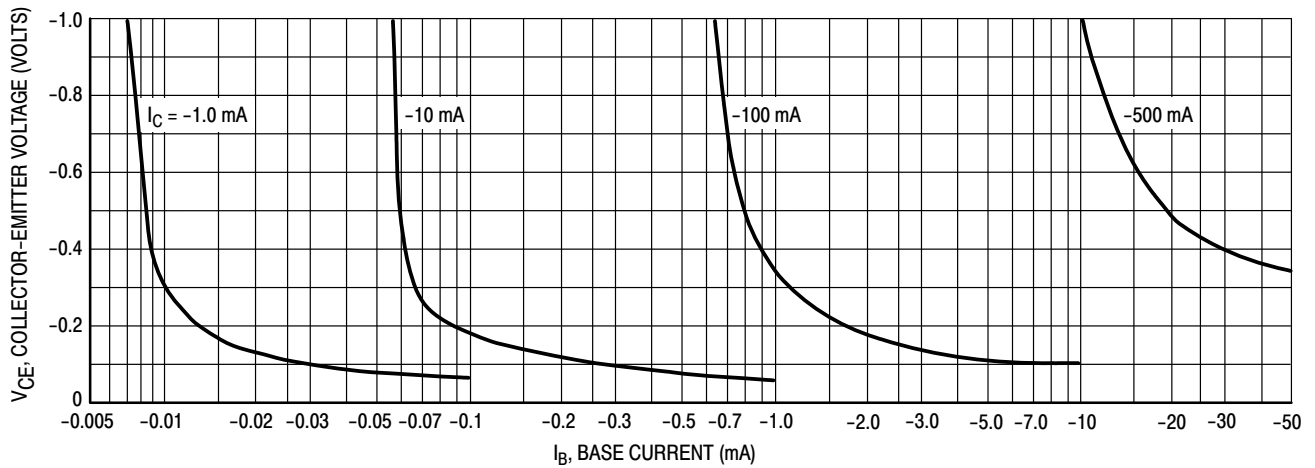


Figure 4. Collector Saturation Region

# MPS2907A Series

## ORDERING INFORMATION

| Device        | Package            | Shipping <sup>†</sup> |
|---------------|--------------------|-----------------------|
| MPS2907AG     | TO-92<br>(Pb-Free) | 5000 Units / Bulk     |
| MPS2907ARLG   | TO-92<br>(Pb-Free) | 2000 / Tape & Reel    |
| MPS2907ARLRAG | TO-92<br>(Pb-Free) |                       |
| MPS2907ARLRPG | TO-92<br>(Pb-Free) | 2000 / Ammo Pack      |

<sup>†</sup>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.

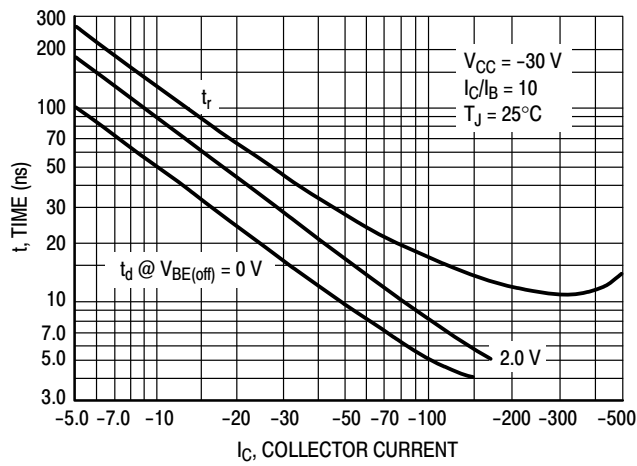


Figure 5. Turn-On Time

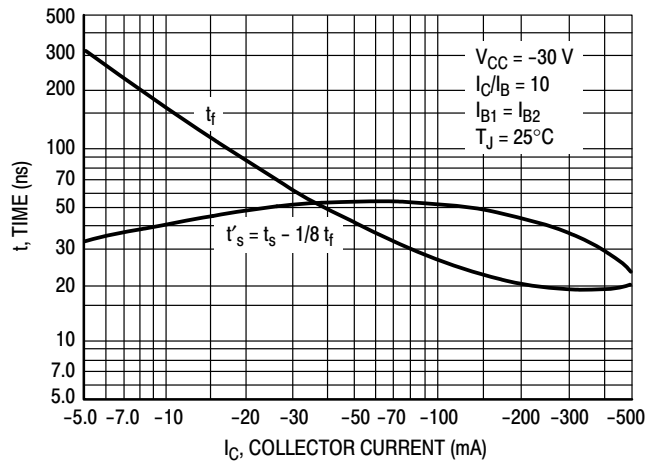


Figure 6. Turn-Off Time

# MPS2907A Series

## TYPICAL SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE

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

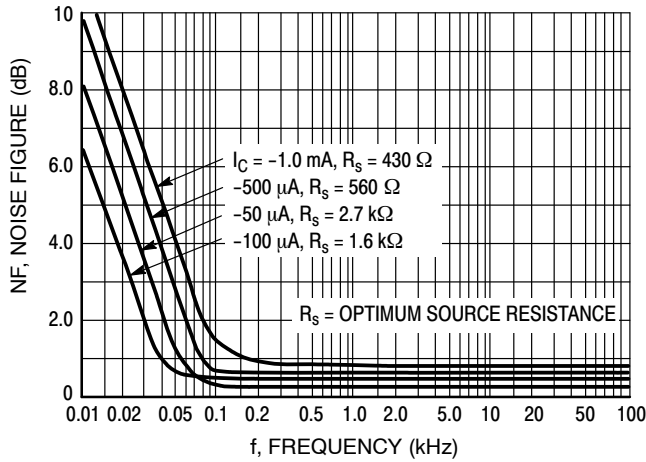


Figure 7. Frequency Effects

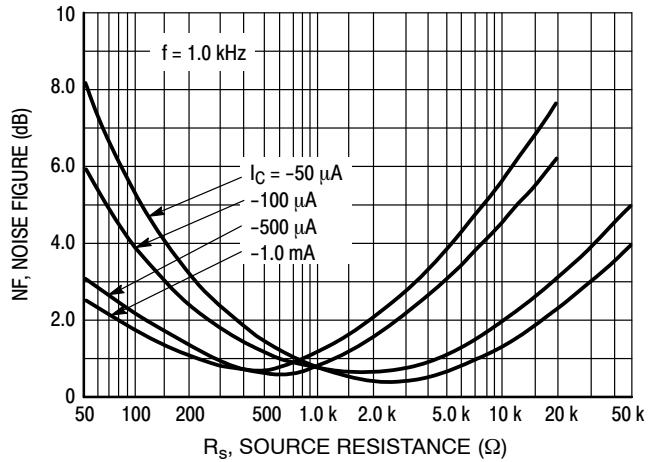


Figure 8. Source Resistance Effects

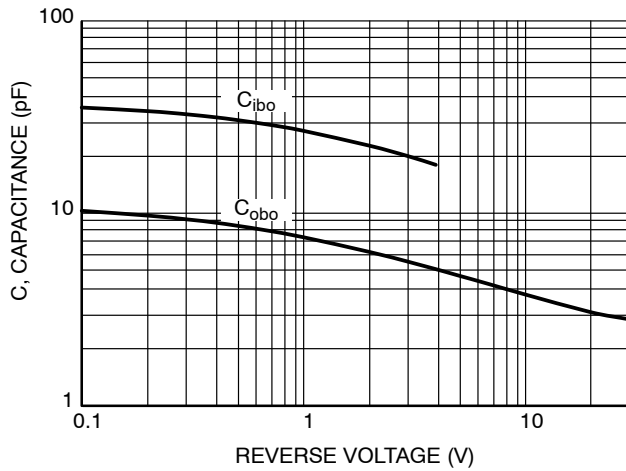


Figure 9. Capacitances

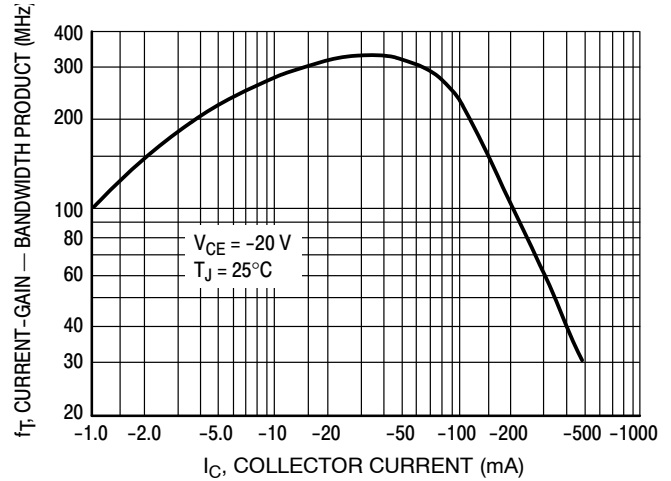


Figure 10. Current-Gain - Bandwidth Product

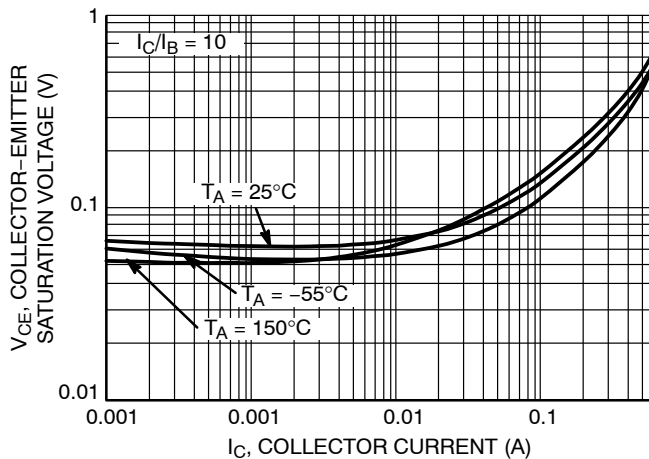


Figure 11. Collector-Emitter Saturation Voltage vs. Collector Current

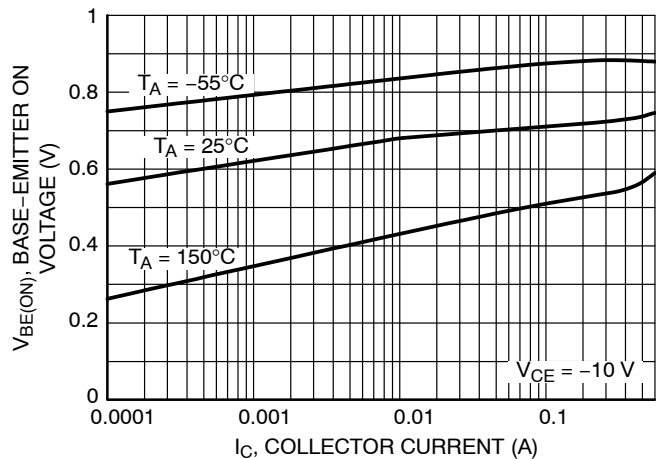
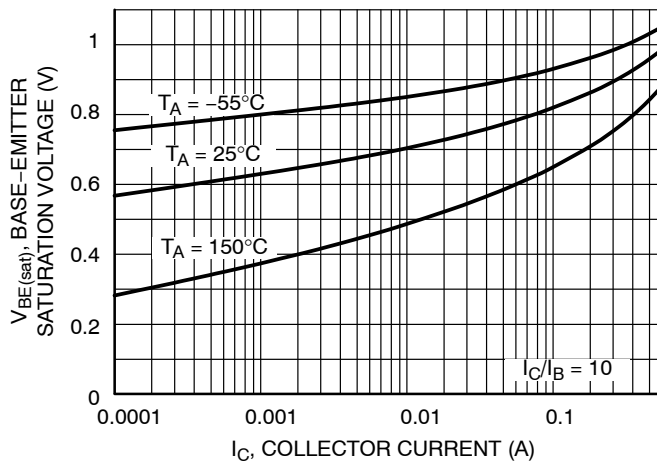
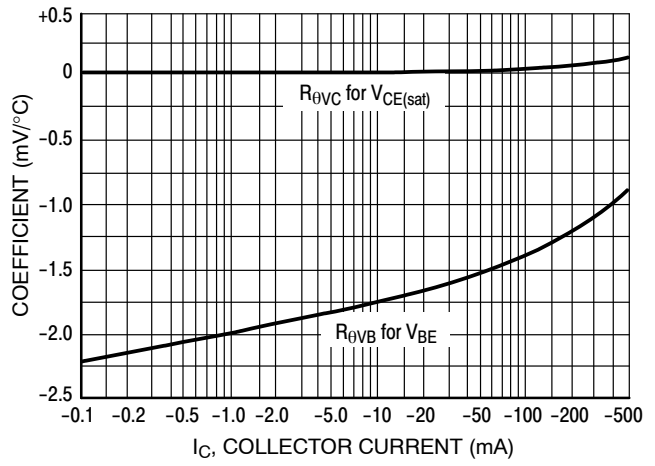


Figure 12. Base-Emitter Turn-ON Voltage vs. Collector Current

## MPS2907A Series



**Figure 13. Base Emitter Saturation Voltage vs. Collector Current**

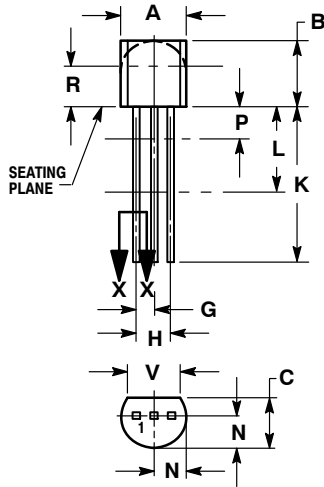


**Figure 14. Temperature Coefficients**

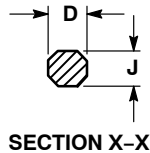
# MPS2907A Series

## PACKAGE DIMENSIONS

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



STRAIGHT LEAD  
BULK PACK

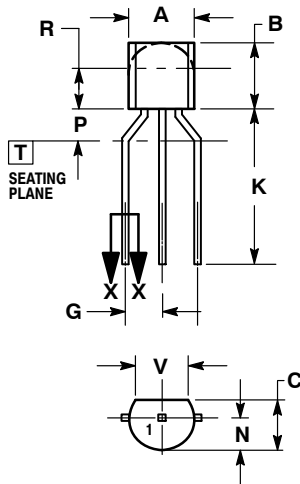


SECTION X-X

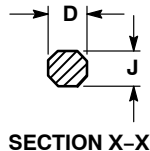
#### NOTES:

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. PIN 1. EMITTER
2. BASE
3. COLLECTOR

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