



# THE DATASHEET OF MPS2907ARLG

# 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  | $^\circ\text{C}/\text{W}$ |
| 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.

#### DEVICE MARKING

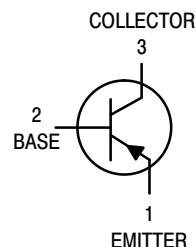
| Device        | Line 1 | Line 2 |
|---------------|--------|--------|
| MPS2907AG     | MPS    | 2907A  |
| MPS2907ARLG   | MPS2   | 907A   |
| MPS2907ARLRAG | MPS    | 2907   |
| MPS2907ARLRPG | MPS    | 2907   |

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

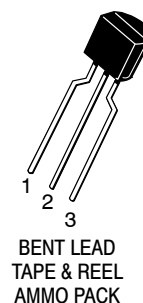
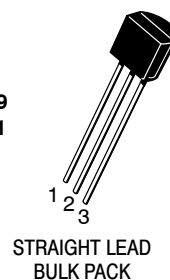


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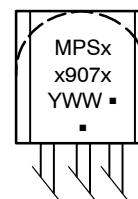
<http://onsemi.com>



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<sub>A</sub> = 25°C unless otherwise noted)

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

### OFF CHARACTERISTICS

|                                                                                                                                                        |                      |        |              |      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------|--------------|------|
| 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<br>(V <sub>CB</sub> = –50 Vdc, I <sub>E</sub> = 0)<br>(V <sub>CB</sub> = –50 Vdc, I <sub>E</sub> = 0, T <sub>A</sub> = 150°C) | I <sub>CBO</sub>     | –<br>– | –0.01<br>–10 | μAdc |
| Base Current (V <sub>CE</sub> = –30 Vdc, V <sub>EB(off)</sub> = –0.5 Vdc)                                                                              | I <sub>B</sub>       | –      | –50          | nAdc |

### ON CHARACTERISTICS

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

### SMALL – SIGNAL CHARACTERISTICS

|                                                                                                                            |                  |     |     |     |
|----------------------------------------------------------------------------------------------------------------------------|------------------|-----|-----|-----|
| Current – Gain – Bandwidth Product (Notes 1 and 2),<br>(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,<br>I <sub>B1</sub> = –15 mAdc) (Figures 1 and 5)            | t <sub>on</sub>  | – | 45  | 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,<br>I <sub>B1</sub> = I <sub>B2</sub> = 15 mAdc) (Figure 2) | t <sub>off</sub> | – | 100 | 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%.
2. f<sub>T</sub> is defined as the frequency at which |h<sub>fe</sub>| extrapolates to unity.

## MPS2907A Series

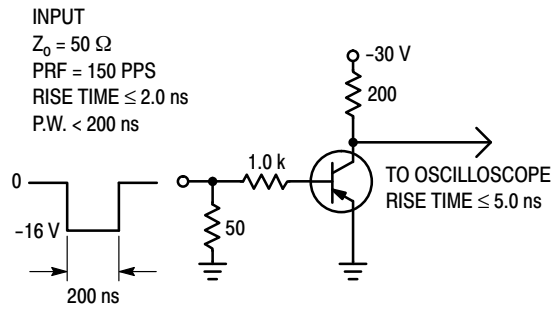


Figure 1. Delay and Rise Time Test Circuit

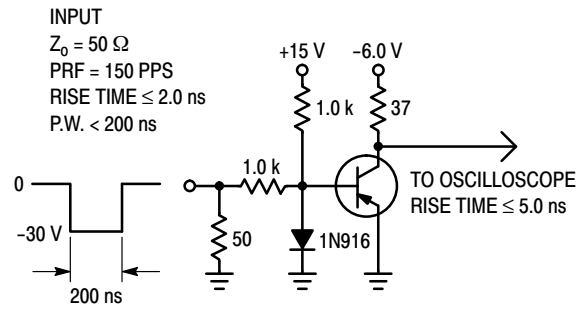


Figure 2. Storage and Fall Time Test Circuit

## TYPICAL CHARACTERISTICS

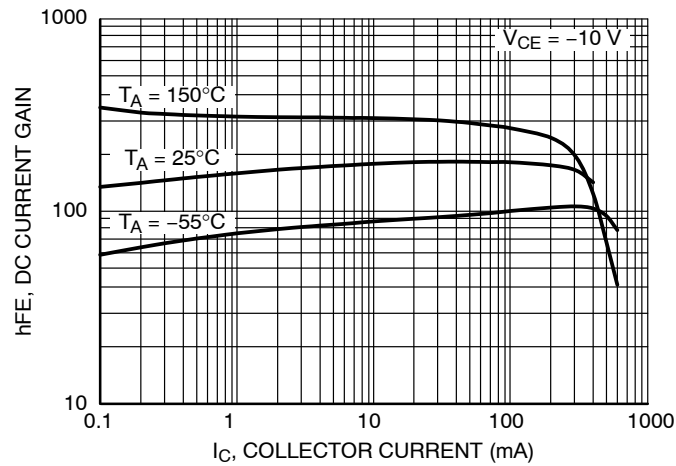


Figure 3. DC Current Gain

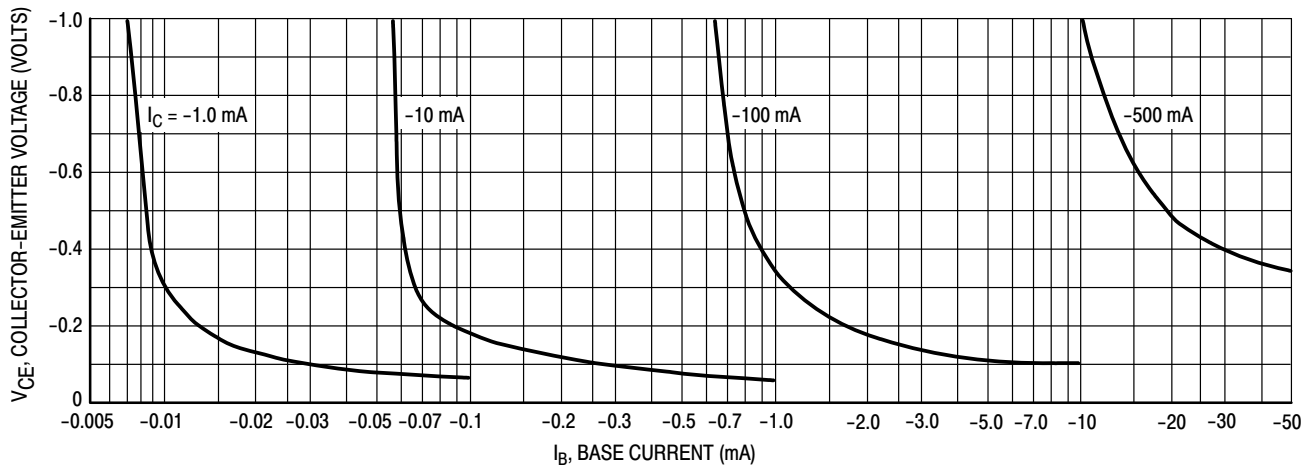


Figure 4. Collector Saturation Region

# 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.

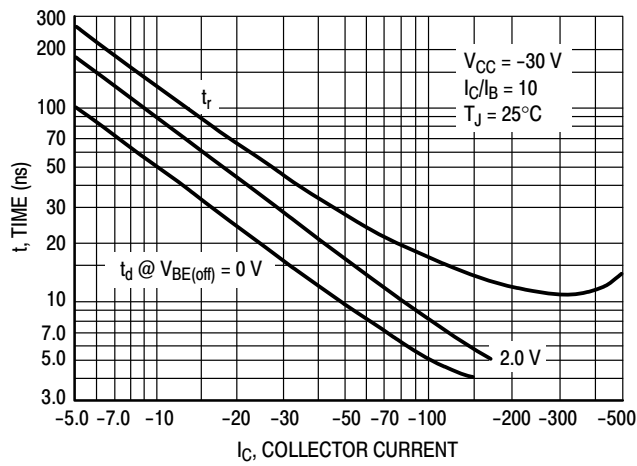


Figure 5. Turn-On Time

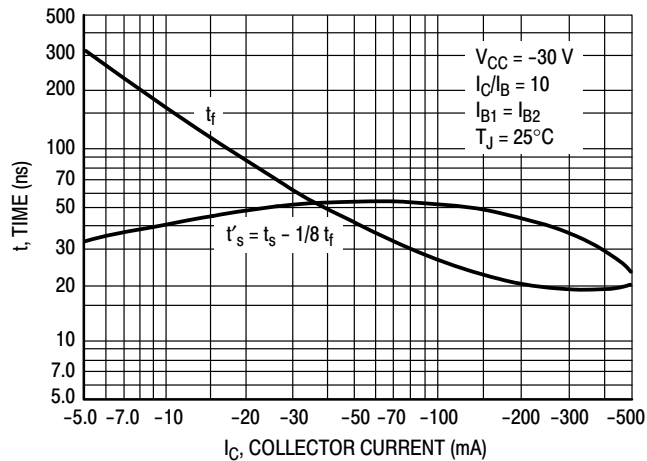


Figure 6. Turn-Off Time

# MPS2907A Series

## TYPICAL SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE

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

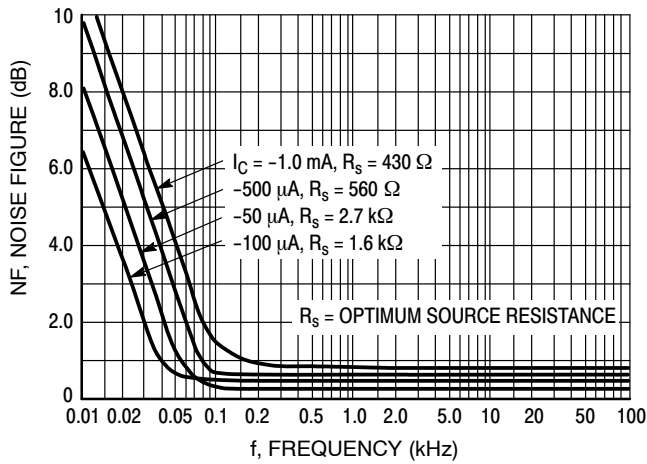


Figure 7. Frequency Effects

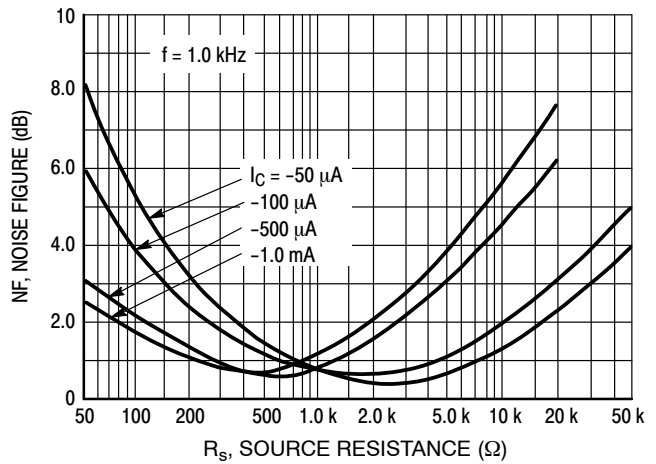


Figure 8. Source Resistance Effects

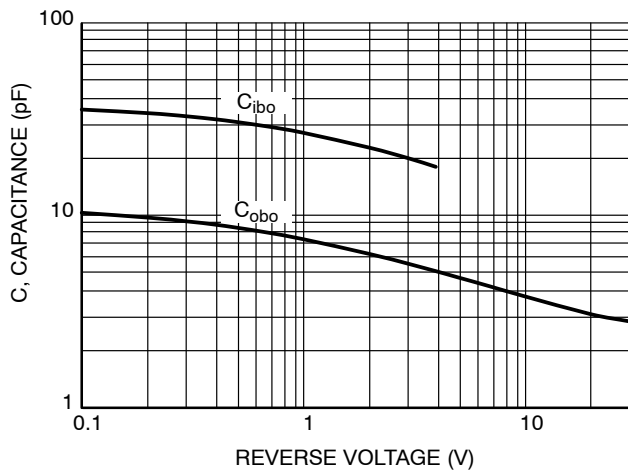


Figure 9. Capacitances

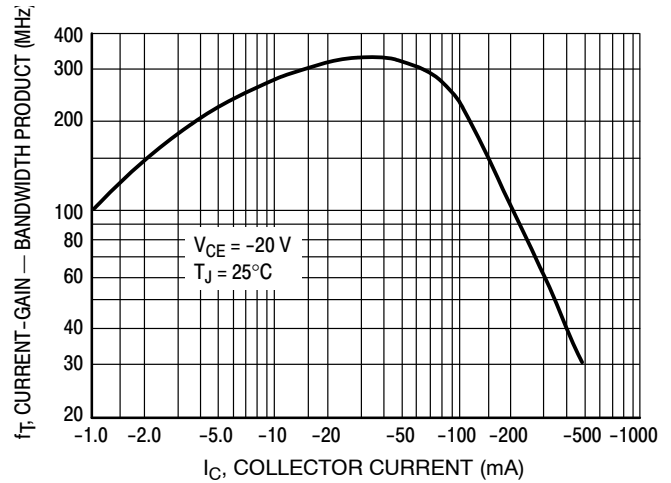


Figure 10. Current-Gain - Bandwidth Product

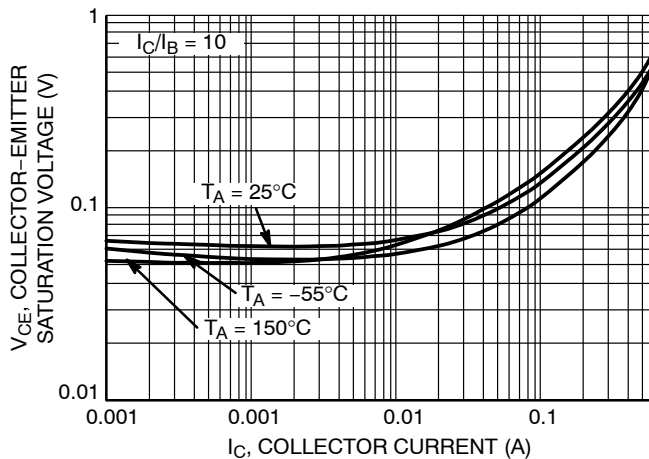


Figure 11. Collector-Emitter Saturation Voltage vs. Collector Current

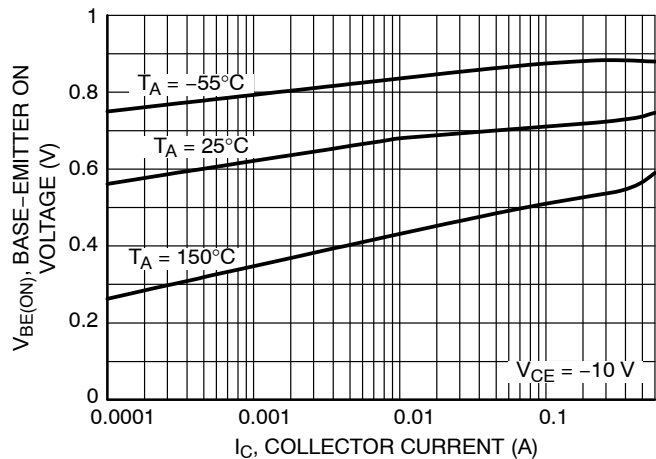
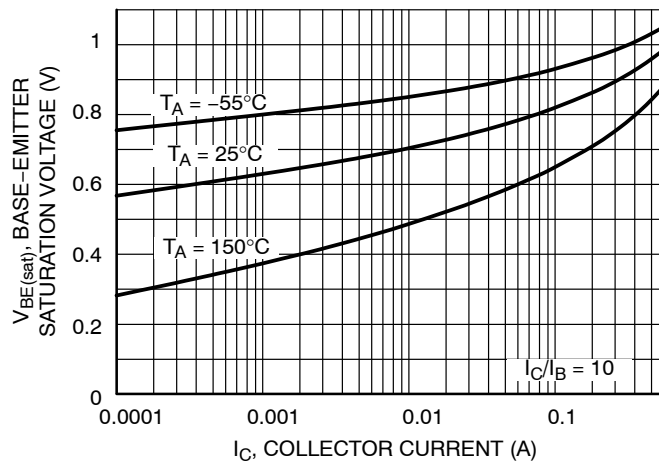
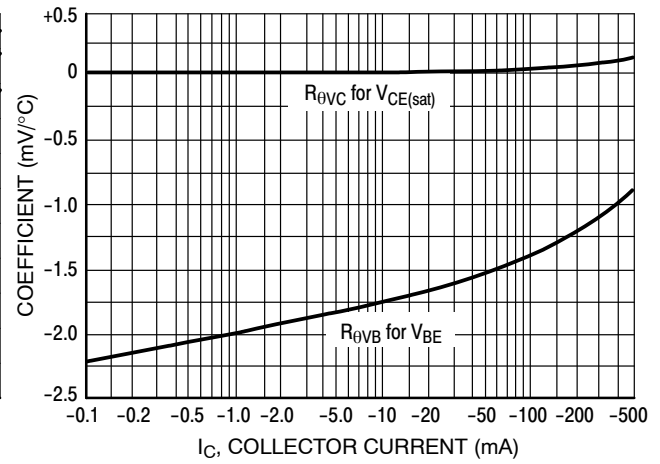


Figure 12. Base-Emitter Turn-ON Voltage vs. Collector Current

## MPS2907A Series



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



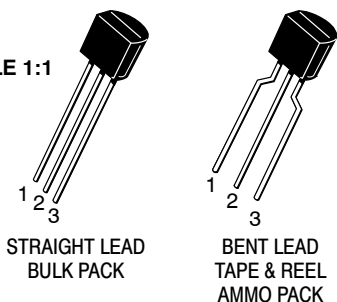
**Figure 14. Temperature Coefficients**

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®

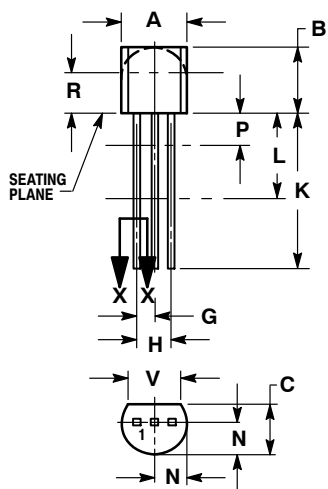
ON

SCALE 1:1

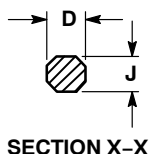


TO-92 (TO-226)  
CASE 29-11  
ISSUE AM

DATE 09 MAR 2007



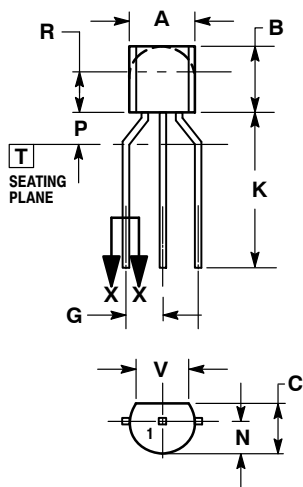
STRAIGHT LEAD  
BULK PACK



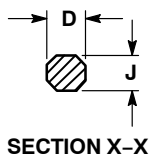
NOTES:

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



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        | ---  |

STYLES ON PAGE 2

|                  |                           |                                                                                                                                                                                  |
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| DESCRIPTION:     | TO-92 (TO-226)            |                                                                                                                                                                                  |
|                  |                           | PAGE 1 OF 3                                                                                                                                                                      |



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

DATE 09 MAR 2007

|                                                               |                                                                      |                                                              |                                                                 |                                                             |
|---------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------|
| STYLE 1:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR         | STYLE 2:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR                | STYLE 3:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE           | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE            | STYLE 5:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE            |
| STYLE 6:<br>PIN 1. GATE<br>2. SOURCE & SUBSTRATE<br>3. DRAIN  | STYLE 7:<br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE                     | STYLE 8:<br>PIN 1. DRAIN<br>2. GATE<br>3. SOURCE & SUBSTRATE | STYLE 9:<br>PIN 1. BASE 1<br>2. EMITTER<br>3. BASE 2            | STYLE 10:<br>PIN 1. CATHODE<br>2. GATE<br>3. ANODE          |
| STYLE 11:<br>PIN 1. ANODE<br>2. CATHODE & ANODE<br>3. CATHODE | STYLE 12:<br>PIN 1. MAIN TERMINAL 1<br>2. GATE<br>3. MAIN TERMINAL 2 | STYLE 13:<br>PIN 1. ANODE 1<br>2. GATE<br>3. CATHODE 2       | STYLE 14:<br>PIN 1. EMITTER<br>2. COLLECTOR<br>3. BASE          | STYLE 15:<br>PIN 1. ANODE 1<br>2. CATHODE<br>3. ANODE 2     |
| STYLE 16:<br>PIN 1. ANODE<br>2. GATE<br>3. CATHODE            | STYLE 17:<br>PIN 1. COLLECTOR<br>2. BASE<br>3. EMITTER               | STYLE 18:<br>PIN 1. ANODE<br>2. CATHODE<br>3. NOT CONNECTED  | STYLE 19:<br>PIN 1. GATE<br>2. ANODE<br>3. CATHODE              | STYLE 20:<br>PIN 1. NOT CONNECTED<br>2. CATHODE<br>3. ANODE |
| STYLE 21:<br>PIN 1. COLLECTOR<br>2. EMITTER<br>3. BASE        | STYLE 22:<br>PIN 1. SOURCE<br>2. GATE<br>3. DRAIN                    | STYLE 23:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN            | STYLE 24:<br>PIN 1. EMITTER<br>2. COLLECTOR/ANODE<br>3. CATHODE | STYLE 25:<br>PIN 1. MT 1<br>2. GATE<br>3. MT 2              |
| STYLE 26:<br>PIN 1. $V_{CC}$<br>2. GROUND 2<br>3. OUTPUT      | STYLE 27:<br>PIN 1. MT<br>2. SUBSTRATE<br>3. MT                      | STYLE 28:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE           | STYLE 29:<br>PIN 1. NOT CONNECTED<br>2. ANODE<br>3. CATHODE     | STYLE 30:<br>PIN 1. DRAIN<br>2. GATE<br>3. SOURCE           |
| STYLE 31:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE             | STYLE 32:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER               | STYLE 33:<br>PIN 1. RETURN<br>2. INPUT<br>3. OUTPUT          | STYLE 34:<br>PIN 1. INPUT<br>2. GROUND<br>3. LOGIC              | STYLE 35:<br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER      |

|                         |                                  |                                                                                                                                                                                  |
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| <b>NEW STANDARD:</b>    |                                  |                                                                                                                                                                                  |
| <b>DESCRIPTION:</b>     | <b>TO-92 (TO-226)</b>            | <b>PAGE 2 OF 3</b>                                                                                                                                                               |

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