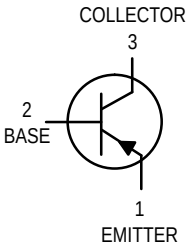
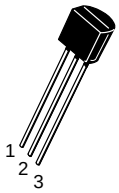
# General Purpose Transistors
## PNP Silicon

**MPS2907**
**MPS2907A***

***Motorola Preferred Device**




**CASE 29–04, STYLE 1**
**TO–92 (TO–226AA)**

### MAXIMUM RATINGS

| Rating | Symbol | MPS2907 | MPS2907A | Unit |
|---|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO}$ | –40 | –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<br>@ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | <br>625<br>5.0 | | <br>mW<br>mW/°C |
| Total Device Dissipation<br>@ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | <br>1.5<br>12 | | <br>Watts<br>mW/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | –500 to +150 | | °C |

### THERMAL CHARACTERISTICS

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

### ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector–Emitter Breakdown Voltage(1)<br>($I_C$ = –10 mAdc, $I_B$ = 0) | MPS2907<br>MPS2907A | $V_{(BR)CEO}$ | –40<br>–60 | —<br>— | Vdc |
| Collector–Base Breakdown Voltage<br>($I_C$ = –10 μAdc, $I_E$ = 0) | | $V_{(BR)CBO}$ | –60 | — | Vdc |
| Emitter–Base Breakdown Voltage<br>($I_E$ = –10 μAdc, $I_C$ = 0) | | $V_{(BR)EBO}$ | –5.0 | — | Vdc |
| Collector Cutoff Current<br>($V_{CE}$ = –30 Vdc, $V_{EB(off)}$ = –0.5 Vdc) | | $I_{CEX}$ | — | –50 | nAdc |
| Collector Cutoff Current<br>($V_{CB}$ = –50 Vdc, $I_E$ = 0)<br><br>($V_{CB}$ = –50 Vdc, $I_E$ = 0, $T_A$ = 150°C) | <br>MPS2907<br>MPS2907A<br><br>MPS2907<br>MPS2907A | $I_{CBO}$ | <br>—<br>—<br><br>—<br>— | <br>–0.02<br>–0.01<br><br>–20<br>–10 | μAdc |
| Base Current<br>($V_{CE}$ = –30 Vdc, $V_{EB(off)}$ = –0.5 Vdc) | | $I_B$ | — | –50 | nAdc |

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

**Preferred** devices are Motorola recommended choices for future use and best overall value.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted) (Continued)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain | | $h_{FE}$ | | | — |
| ($I_C$ = –0.1 mAdc, $V_{CE}$ = –10 Vdc) | MPS2907 | | 35 | — | |
| | MPS2907A | | 75 | — | |
| ($I_C$ = –1.0 mAdc, $V_{CE}$ = –10 Vdc) | MPS2907 | | 50 | — | |
| | MPS2907A | | 100 | — | |
| ($I_C$ = –10 mAdc, $V_{CE}$ = –10 Vdc) | MPS2907 | | 75 | — | |
| | MPS2907A | | 100 | — | |
| ($I_C$ = –150 mAdc, $V_{CE}$ = –10 Vdc)(1) | MPS2907, MPS2907A | | 100 | 300 | |
| ($I_C$ = –500 mAdc, $V_{CE}$ = –10 Vdc)(1) | MPS2907 | | 30 | — | |
| | MPS2907A | | 50 | — | |
| Collector–Emitter Saturation Voltage(1) | | $V_{CE(sat)}$ | | | Vdc |
| ($I_C$ = –150 mAdc, $I_B$ = –15 mAdc) | | | — | –0.4 | |
| ($I_C$ = –500 mAdc, $I_B$ = –50 mAdc) | | | — | –1.6 | |
| Base–Emitter Saturation Voltage(1) | | $V_{BE(sat)}$ | | | Vdc |
| ($I_C$ = –150 mAdc, $I_B$ = –15 mAdc) | | | — | –1.3 | |
| ($I_C$ = –500 mAdc, $I_B$ = –50 mAdc) | | | — | –2.6 | |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | | |
| Current–Gain — Bandwidth Product(1), (2) ($I_C$ = –50 mAdc, $V_{CE}$ = –20 Vdc, f = 100 MHz) | | $f_T$ | 200 | — | MHz |
| Output Capacitance ($V_{CB}$ = –10 Vdc, $I_E$ = 0, f = 1.0 MHz) | | $C_{obo}$ | — | 8.0 | pF |
| Input Capacitance ($V_{EB}$ = –2.0 Vdc, $I_C$ = 0, f = 1.0 MHz) | | $C_{ibo}$ | — | 30 | pF |
| **SWITCHING CHARACTERISTICS** | | | | | |
| Turn–On Time | ($V_{CC}$ = –30 Vdc, $I_C$ = –150 mAdc, $I_{B1}$ = –15 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 Vdc, $I_C$ = –150 mAdc, $I_{B1}$ = $I_{B2}$ = 15 mAdc) (Figure 2) | $t_{off}$ | — | 100 | ns |
| Storage Time | | $t_s$ | — | 80 | ns |
| Fall Time | | $t_f$ | — | 30 | ns |

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
2. $f_T$ is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

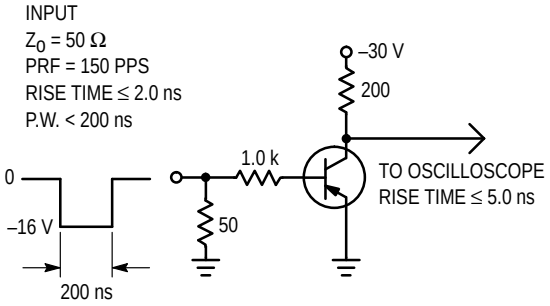



**Figure 1. Delay and Rise Time Test Circuit**

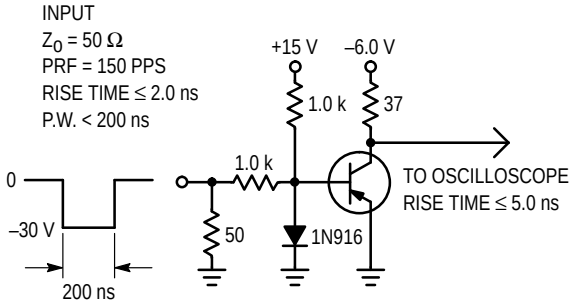



**Figure 2. Storage and Fall Time Test Circuit**

## TYPICAL CHARACTERISTICS

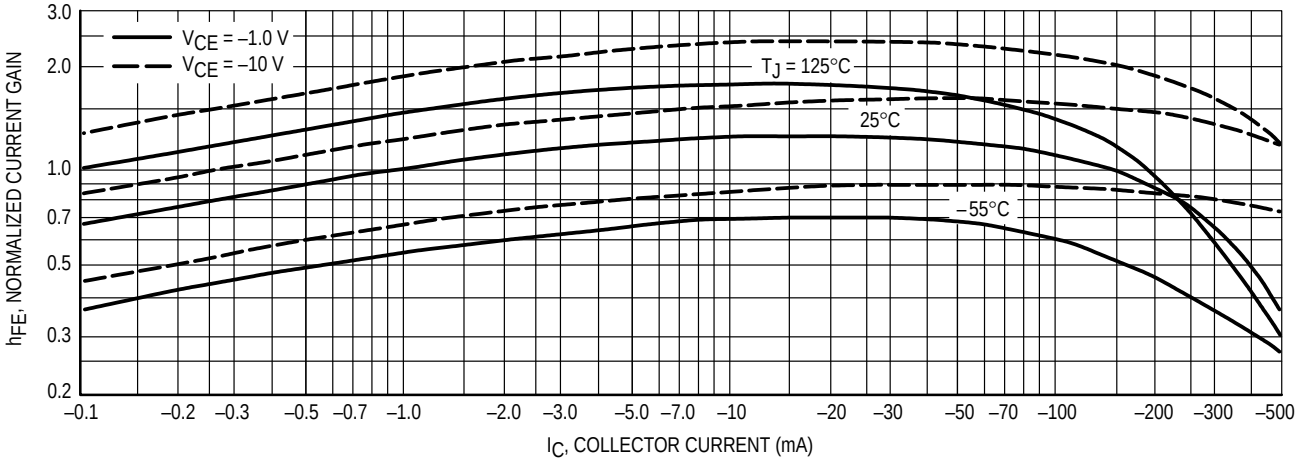



**Figure 3. DC Current Gain**

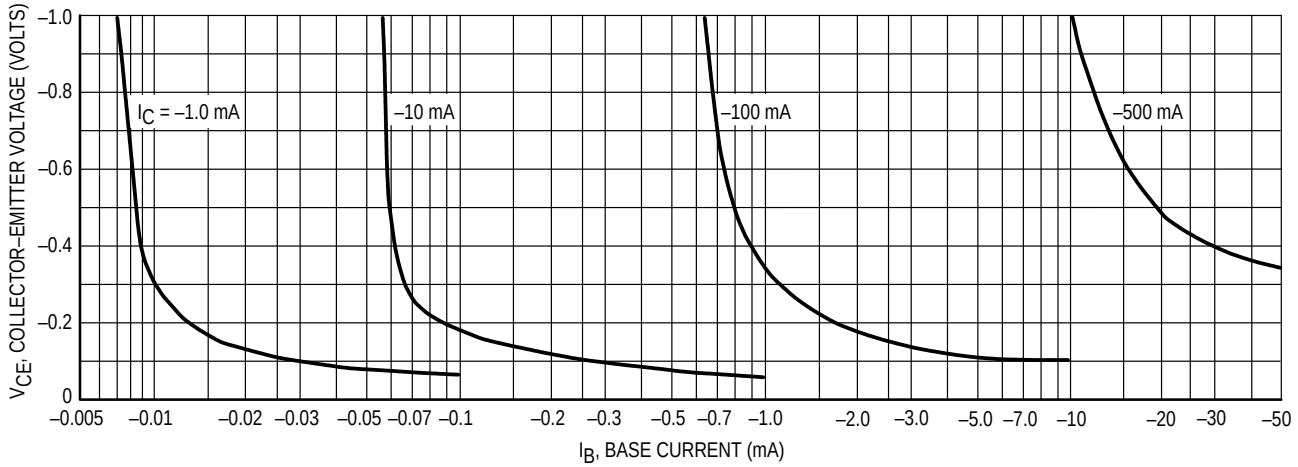



**Figure 4. Collector Saturation Region**

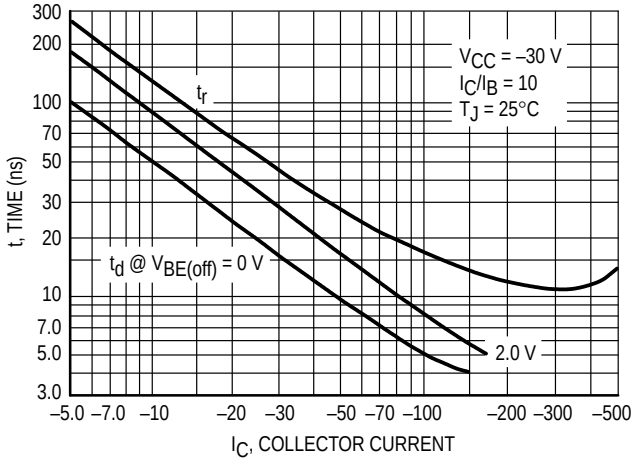



**Figure 5. Turn–On Time**

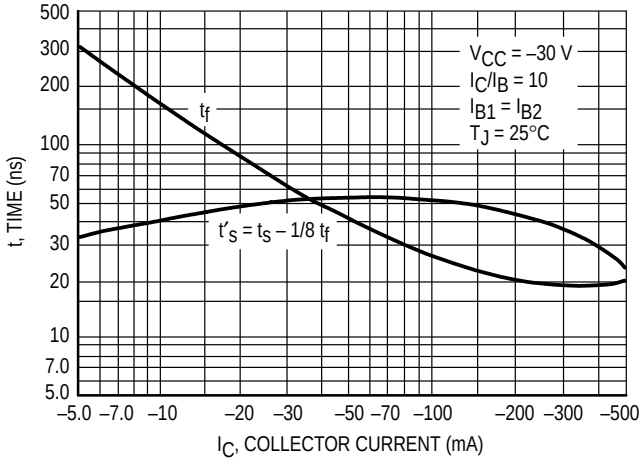



**Figure 6. Turn–Off Time**

## TYPICAL SMALL–SIGNAL CHARACTERISTICS

### NOISE FIGURE

$V_{CE}$ = 10 Vdc, $T_A$ = 25°C

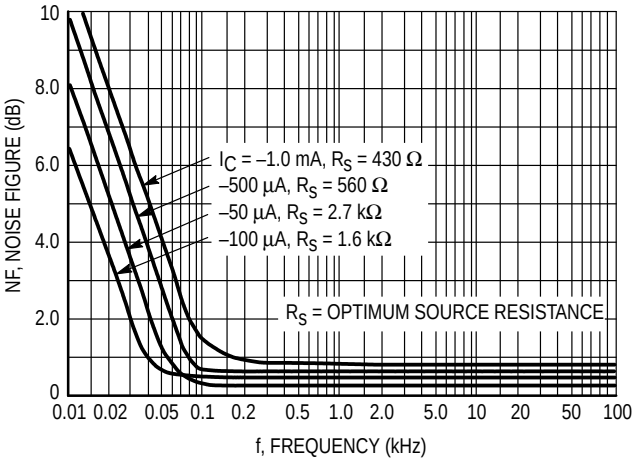



**Figure 7. Frequency Effects**

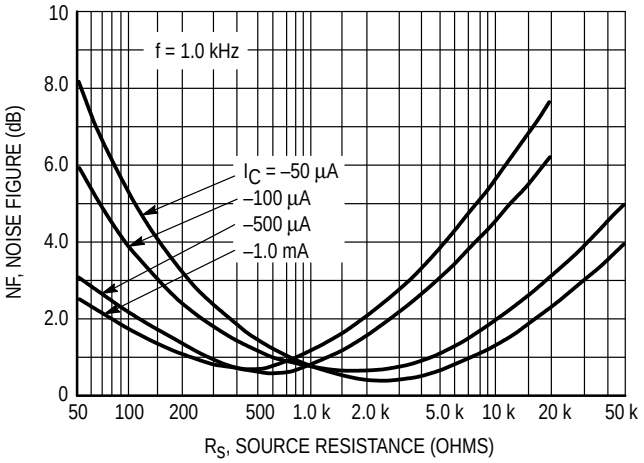



**Figure 8. Source Resistance Effects**

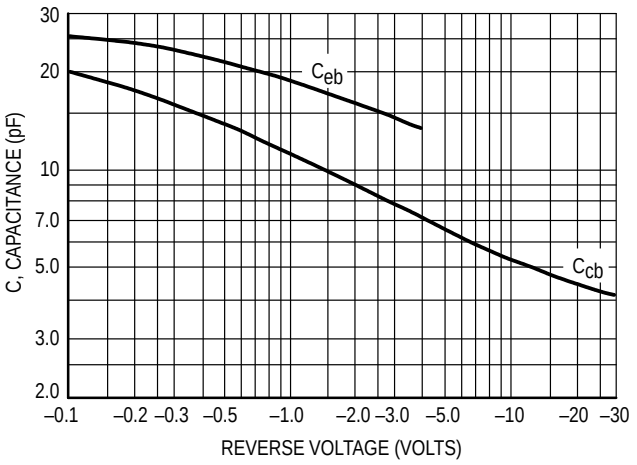



**Figure 9. Capacitances**

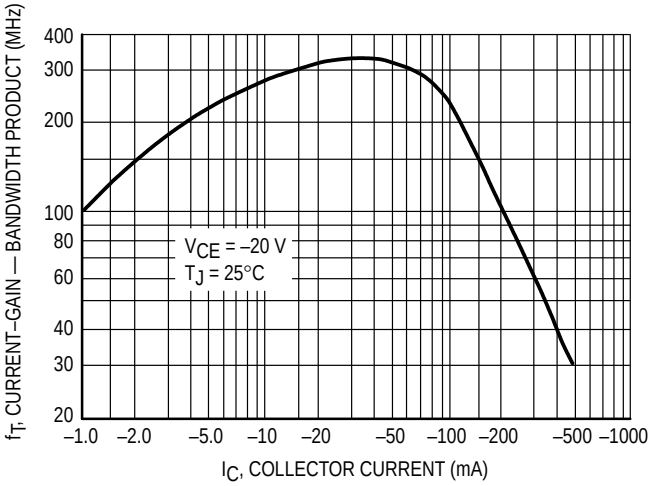



**Figure 10. Current–Gain — Bandwidth Product**

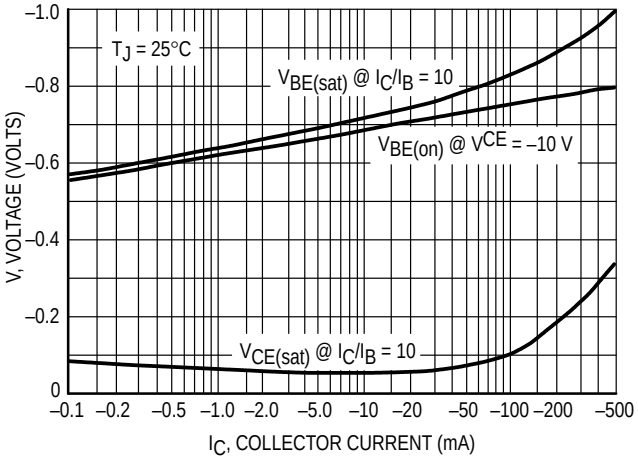



**Figure 11. “On” Voltage**

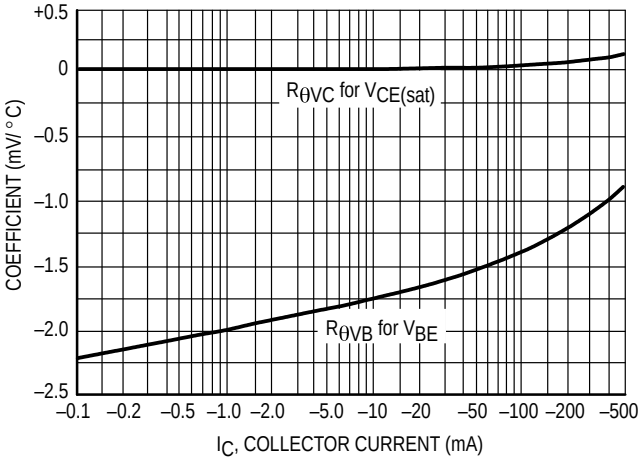
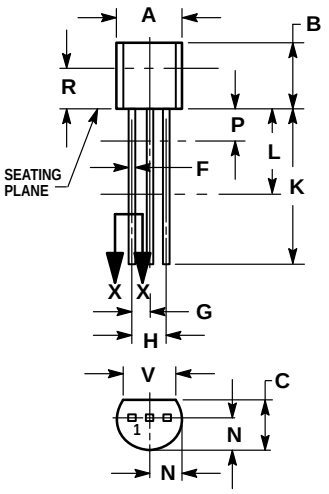
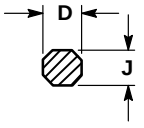



**Figure 12. Temperature Coefficients**

## PACKAGE DIMENSIONS




SECTION X–X

**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.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | 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 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

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