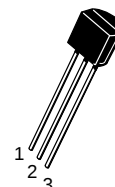
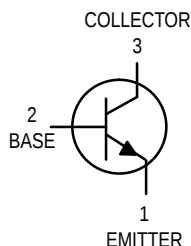


# Amplifier Transistors

## NPN Silicon

**MPS918\***  
**MPS3563**

\*Motorola Preferred Device



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

### MAXIMUM RATINGS

| Rating                                                                                 | Symbol         | MPS918      | MPS3563 | Unit                          |
|----------------------------------------------------------------------------------------|----------------|-------------|---------|-------------------------------|
| Collector–Emitter Voltage                                                              | $V_{CEO}$      | 15          | 12      | Vdc                           |
| Collector–Base Voltage                                                                 | $V_{CBO}$      | 30          | 30      | Vdc                           |
| Emitter–Base Voltage                                                                   | $V_{EBO}$      | 3.0         | 2.0     | Vdc                           |
| Collector Current — Continuous                                                         | $I_C$          | 50          |         | mAdc                          |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 350         | 2.8     | mW<br>mW/ $^\circ\text{C}$    |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 0.85        | 6.8     | 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 | $R_{\theta JA}^{(1)}$ | 357 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case    | $R_{\theta JC}$       | 147 | $^\circ\text{C/W}$ |

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

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

### OFF CHARACTERISTICS

|                                                                                                                                            |                   |               |            |          |      |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------|----------|------|
| Collector–Emitter Breakdown Voltage <sup>(2)</sup><br>( $I_C = 3.0 \text{ mAdc}$ , $I_E = 0$ )                                             | MPS918<br>MPS3563 | $V_{(BR)CEO}$ | 15<br>12   | —<br>—   | Vdc  |
| Collector–Base Breakdown Voltage<br>( $I_C = 1.0 \text{ }\mu\text{Adc}$ , $I_E = 0$ )<br>( $I_C = 100 \text{ }\mu\text{Adc}$ , $I_E = 0$ ) | MPS918<br>MPS3563 | $V_{(BR)CBO}$ | 30<br>30   | —<br>—   | Vdc  |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10 \text{ }\mu\text{Adc}$ , $I_C = 0$ )                                                         | MPS918<br>MPS3563 | $V_{(BR)EBO}$ | 3.0<br>2.0 | —<br>—   | Vdc  |
| Collector Cutoff Current<br>( $V_{CB} = 15 \text{ Vdc}$ , $I_E = 0$ )                                                                      | MPS918<br>MPS3563 | $I_{CBO}$     | —<br>—     | 10<br>50 | nAdc |

- $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.
- Pulse Test: Pulse Width  $\leq 300 \text{ }\mu\text{s}$ ; Duty Cycle  $\leq 1.0\%$ .

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



**MPS918 MPS3563****ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

| Characteristic                                                                                                                                  |                   | Symbol        | Min      | Max      | Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|----------|----------|------|
| <b>ON CHARACTERISTICS</b>                                                                                                                       |                   |               |          |          |      |
| DC Current Gain <sup>(2)</sup><br>( $I_C = 3.0\text{ mA}$ , $V_{CE} = 1.0\text{ Vdc}$ )<br>( $I_C = 8.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) | MPS918<br>MPS3563 | $h_{FE}$      | 20<br>20 | —<br>200 | —    |
| Collector–Emitter Saturation Voltage<br>( $I_C = 10\text{ mA}$ , $I_B = 1.0\text{ mA}$ )                                                        | MPS918            | $V_{CE(sat)}$ | —        | 0.4      | Vdc  |
| Base–Emitter Saturation Voltage<br>( $I_C = 10\text{ mA}$ , $I_B = 1.0\text{ mA}$ )                                                             | MPS918            | $V_{BE(sat)}$ | —        | 1.0      | Vdc  |

**SMALL–SIGNAL CHARACTERISTICS**

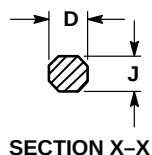
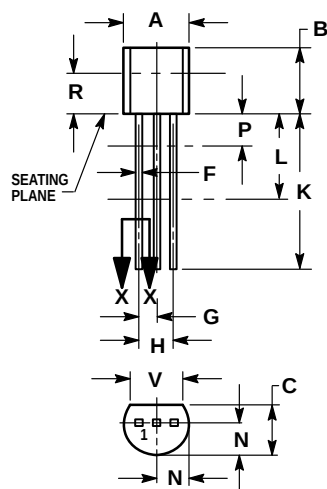
|                                                                                                                                                                                                                            |                             |           |             |                   |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------|-------------|-------------------|-----|
| Current–Gain — Bandwidth Product <sup>(2)</sup><br>( $I_C = 4.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )<br>( $I_C = 8.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )              | MPS918<br>MPS3563           | $f_T$     | 600<br>600  | —<br>1500         | MHz |
| Output Capacitance<br>( $V_{CB} = 0\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ ) | MPS918<br>MPS918<br>MPS3563 | $C_{obo}$ | —<br>—<br>— | 3.0<br>1.7<br>1.7 | pF  |
| Input Capacitance<br>( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )                                                                                                                                      | MPS918                      | $C_{ibo}$ | —           | 2.0               | pF  |
| Small–Signal Current Gain<br>( $I_C = 8.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )                                                                                                                   | MPS3563                     | $h_{fe}$  | 20          | 250               | —   |
| Noise Figure<br>( $I_C = 1.0\text{ mA}$ , $V_{CE} = 6.0\text{ Vdc}$ , $R_S = 400\text{ k}\Omega$ , $f = 60\text{ MHz}$ )                                                                                                   | MPS918                      | NF        | —           | 6.0               | dB  |

**FUNCTIONAL TEST**

|                                                                                                                                                                                                                                            |                   |           |          |        |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------|----------|--------|----|
| Common–Emitter Amplifier Power Gain<br>( $I_C = 6.0\text{ mA}$ , $V_{CB} = 12\text{ Vdc}$ , $f = 200\text{ MHz}$ )<br>( $I_C = 8.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 200\text{ MHz}$ )<br>( $G_{fd} + G_{re} < -20\text{ dB}$ ) | MPS918<br>MPS3563 | $G_{pe}$  | 15<br>14 | —<br>— | dB |
| Power Output<br>( $I_C = 8.0\text{ mA}$ , $V_{CB} = 15\text{ Vdc}$ , $f = 500\text{ MHz}$ )                                                                                                                                                | MPS918            | $P_{out}$ | 30       | —      | mW |
| Oscillator Collector Efficiency<br>( $I_C = 8.0\text{ mA}$ , $V_{CB} = 15\text{ Vdc}$ , $P_{out} = 30\text{ mW}$ , $f = 500\text{ MHz}$ )                                                                                                  | MPS918            | $\eta$    | 25       | —      | %  |

2. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ ; Duty Cycle  $\leq 1.0\%$ .

# 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 1:

1. PIN 1. EMITTER
2. BASE
3. COLLECTOR

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