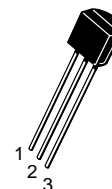
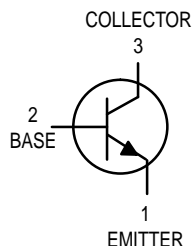


# Amplifier Transistors

## 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 @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	350	2.8	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	0.85	6.8	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction 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	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	147	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

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

- $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.
- Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ ; 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> ( $I_C = 3.0\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 8.0\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ )	MPS918 MPS3563	$h_{FE}$	20 20	— 200	—
Collector–Emitter Saturation Voltage ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ )	MPS918	$V_{CE(sat)}$	—	0.4	Vdc
Base–Emitter Saturation Voltage ( $I_C = 10\text{ mAdc}$ , $I_B = 1.0\text{ mAdc}$ )	MPS918	$V_{BE(sat)}$	—	1.0	Vdc

**SMALL–SIGNAL CHARACTERISTICS**

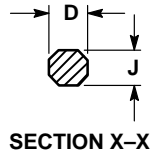
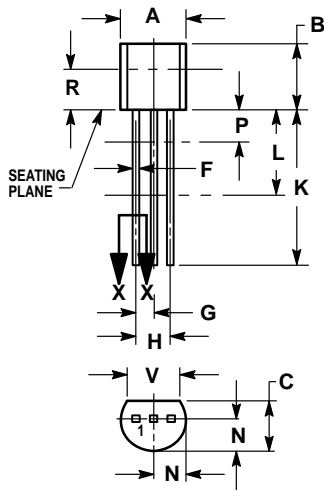
Current–Gain — Bandwidth Product <sup>(2)</sup> ( $I_C = 4.0\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ ) ( $I_C = 8.0\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )	MPS918 MPS3563	$f_T$	600 600	— 1500	MHz
Output Capacitance ( $V_{CB} = 0\text{ Vdc}$ , $I_E = 0$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

**FUNCTIONAL TEST**

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

2. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ ; 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. EMITTER
  2. BASE
  3. COLLECTOR

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