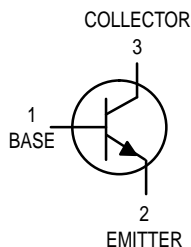
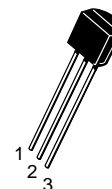


# VHF Transistor

## NPN Silicon



**MPSH24**



CASE 29-04, STYLE 2  
TO-92 (TO-226AA)

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	30	Vdc
Collector–Base Voltage	$V_{CBO}$	40	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.0	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/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +135	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	357	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ( $I_C = 1.0 \text{ mAdc}, I_B = 0$ )	$V_{(BR)CEO}$	30	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 100 \mu\text{Adc}, I_E = 0$ )	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10 \mu\text{Adc}, I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 15 \text{ Vdc}, I_E = 0$ )	$I_{CBO}$	—	—	50	nAdc

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 8.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ )	$h_{FE}$	30	—	—	—
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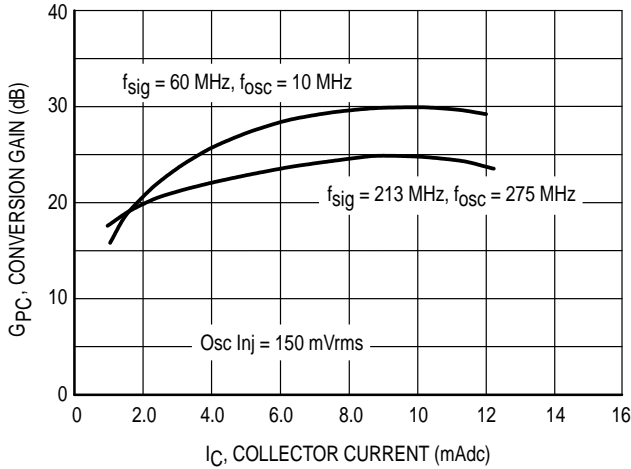
### SMALL-SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ( $I_C = 8.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 100 \text{ MHz}$ )	$f_T$	400	620	—	MHz
Collector–Base Capacitance ( $V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$ )	$C_{cb}$	—	0.25	0.36	pF
Conversion Gain (213 MHz to 45 MHz) ( $I_C = 8.0 \text{ mAdc}, V_{CC} = 20 \text{ Vdc}, \text{Oscillator Injection} = 150 \text{ mVrms}$ ) (60 MHz to 45 MHz) ( $I_C = 8.0 \text{ mAdc}, V_{CC} = 20 \text{ Vdc}, \text{Oscillator Injection} = 150 \text{ mVrms}$ )	$G_C$	19 24	24 29	—	dB

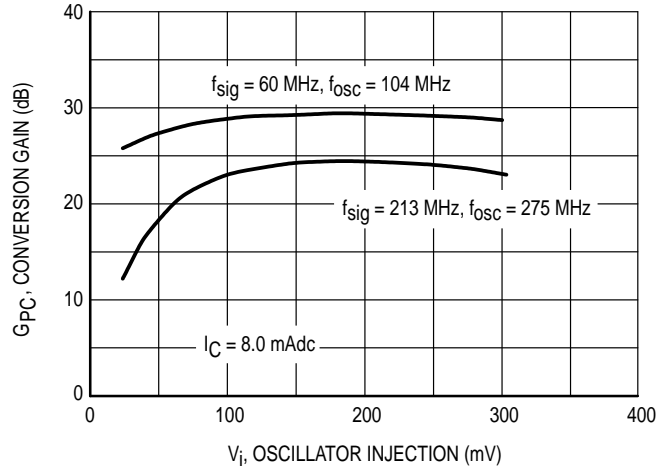
**CONVERSION GAIN CHARACTERISTICS**

(TEST CIRCUIT FIGURE 7)

( $V_{CC} = 20$  Vdc,  $R_S = R_L = 50$  Ohms,  $f_{if} = 44$  MHz, B.W. = 6.0 MHz)



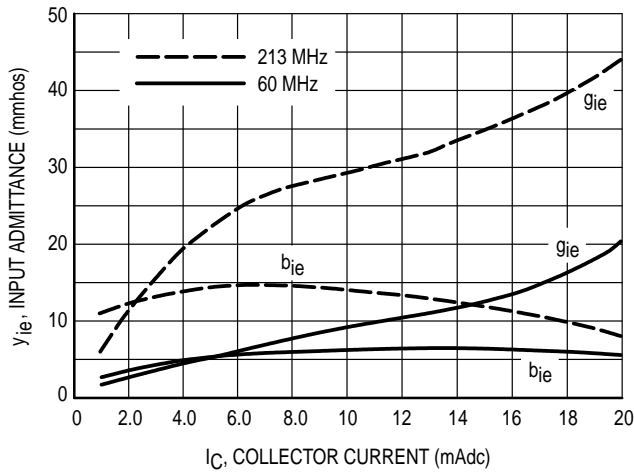
**Figure 1. Conversion Gain versus Collector Current**



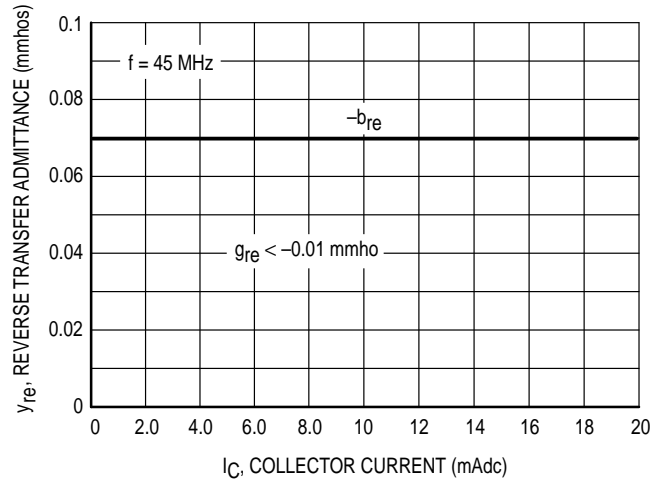
**Figure 2. Conversion Gain versus Injection Level**

**COMMON-EMITTER y PARAMETERS**

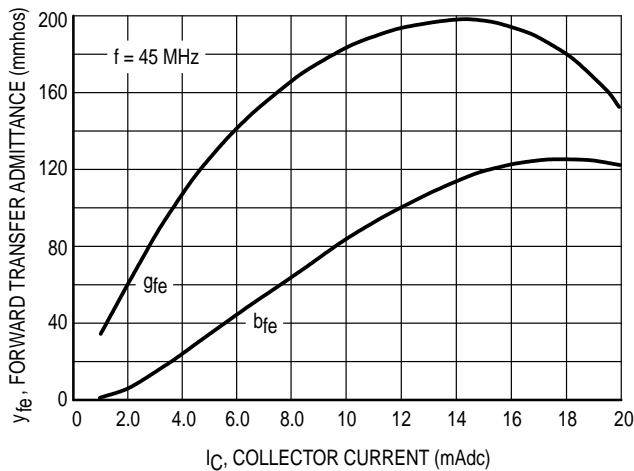
( $V_{CE} = 15$  Vdc,  $T_A = 25^\circ\text{C}$ )



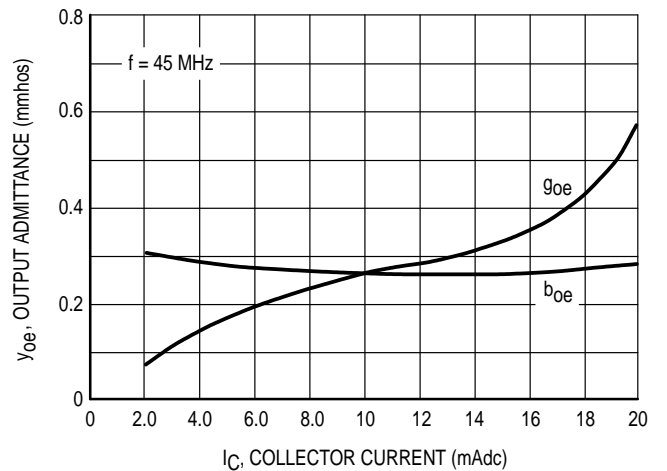
**Figure 3. Input Admittance**



**Figure 4. Reverse Transfer Admittance**

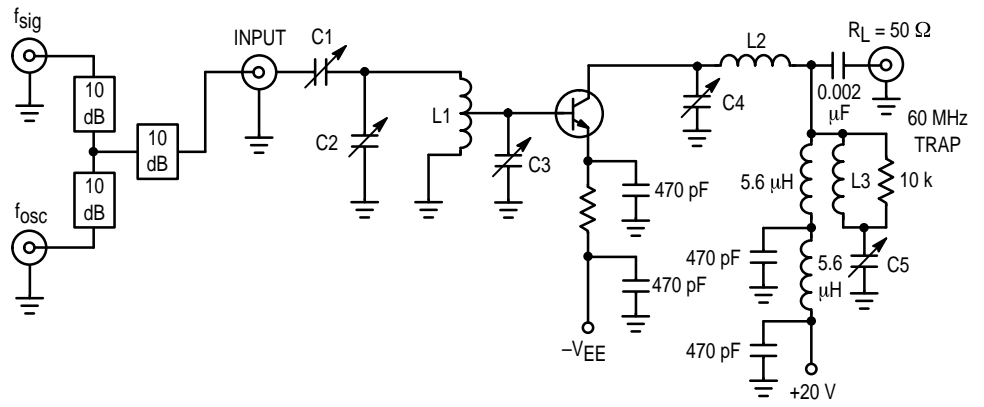


**Figure 5. Forward Transfer Admittance**



**Figure 6. Output Admittance**

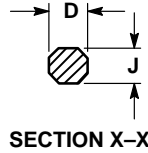
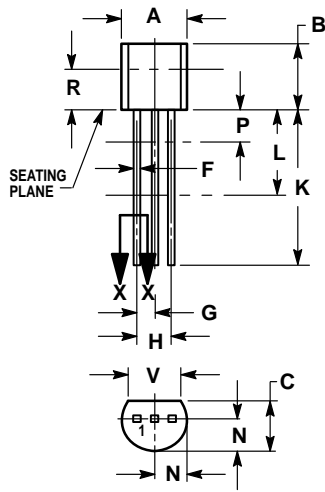
$f_{sig}$	60 MHz	213 MHz
$f_{osc}$	105 MHz	258 MHz
C1	1.5–20 pF	1.5–20 pF
C2	8.0–60 pF	6.0–12 pF
C3	8.0–60 pF	1.5–20 pF
C4	3.0–35 pF	—
C5	1.5–20 pF	—
L1	5 Turns #26 Air, Tap 1 Turn	3 Turns #16 Air, Tap $\frac{1}{2}$ Turn
L2	10 Turns #26 Air	10 Turns #26 Arnold A1–10 Core
L3	Ohmite Z235	—



**Figure 7. VHF Mixer Test Circuit**

( $f_{if} = 44$  MHz, B.W. = 6.0 MHz)

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 2:

- PIN 1. BASE
2. EMITTER
3. COLLECTOR

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