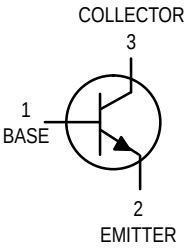
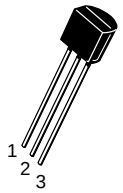
VHF Transistor

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°C Derate above 25°C	P_D	350 2.8	mW mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +135	°C

THERMAL CHARACTERISTICS

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

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	30	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 15 Vdc, I_E = 0)	I_{CBO}	—	—	50	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 8.0 mAdc, V_{CE} = 10 Vdc)	h_{FE}	30	—	—	—
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain — Bandwidth Product (I_C = 8.0 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	f_T	400	620	—	MHz
Collector–Base Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)	C_{cb}	—	0.25	0.36	pF
Conversion Gain (213 MHz to 45 MHz) (I_C = 8.0 mAdc, V_{CC} = 20 Vdc, Oscillator Injection = 150 mVrms) (60 MHz to 45 MHz) (I_C = 8.0 mAdc, V_{CC} = 20 Vdc, Oscillator Injection = 150 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)

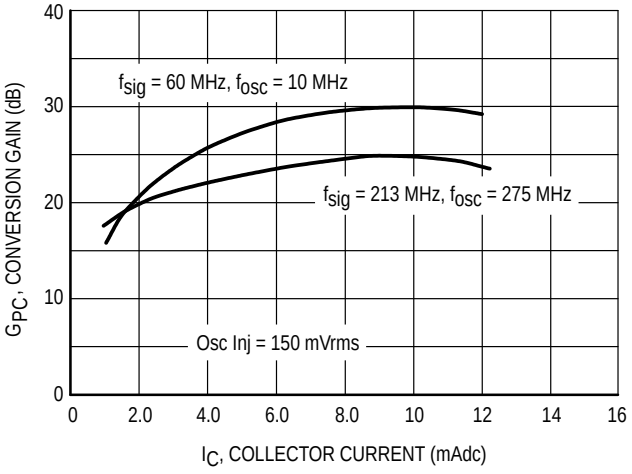


Figure 1. Conversion Gain versus Collector Current

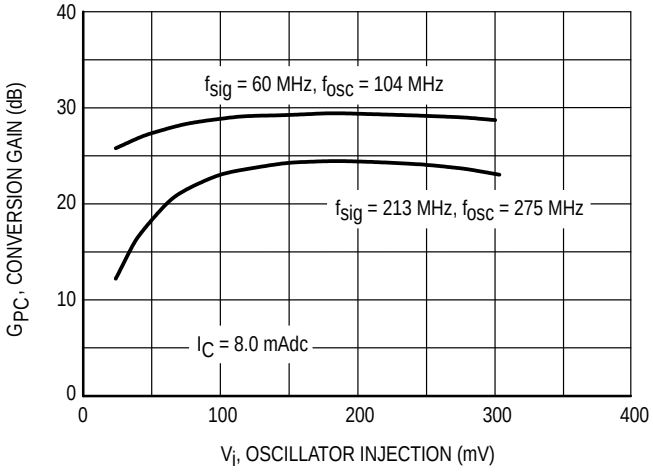


Figure 2. Conversion Gain versus Injection Level

COMMON–EMITTER y PARAMETERS

(V_{CE} = 15 Vdc, T_A = 25°C)

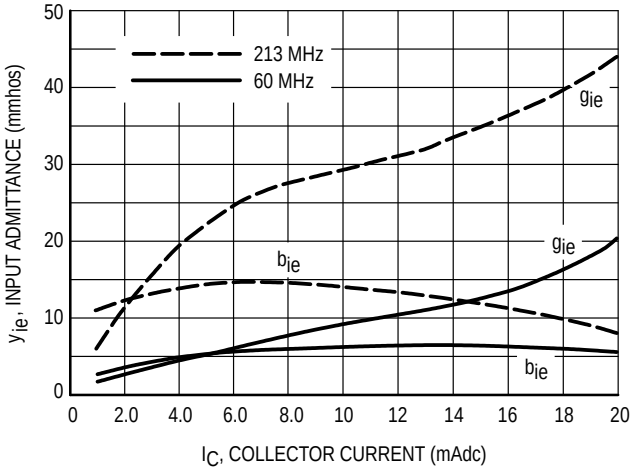


Figure 3. Input Admittance

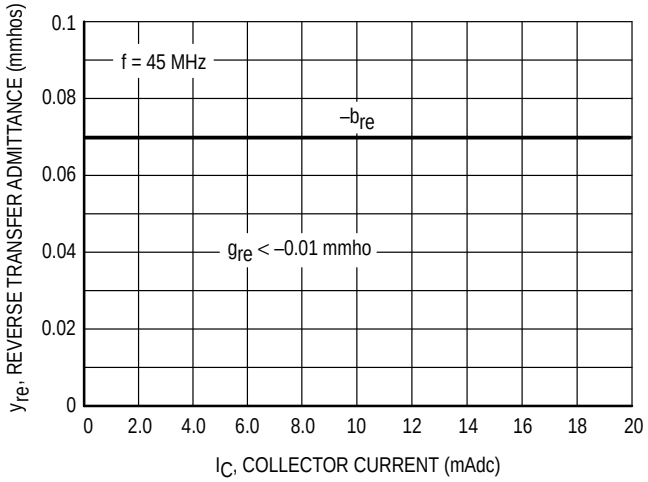


Figure 4. Reverse Transfer Admittance

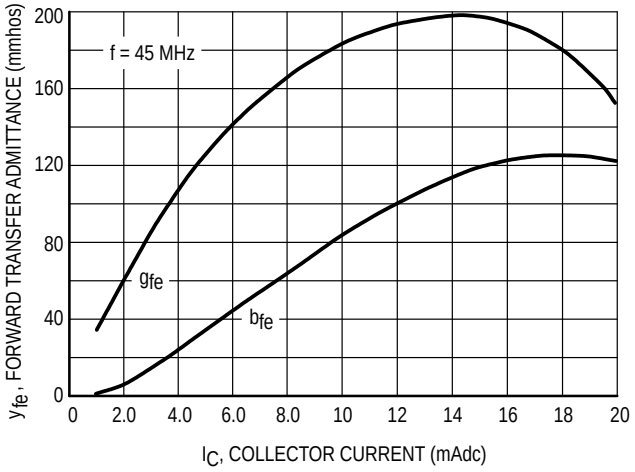


Figure 5. Forward Transfer Admittance

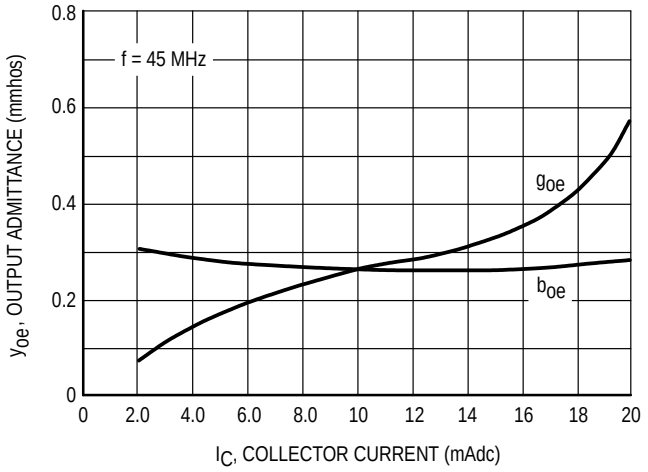


Figure 6. Output Admittance

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 $^1/_2$ Turn
L2	10 Turns #26 Air	10 Turns #26 Arnold A1–10 Core
L3	Ohmite Z235	—

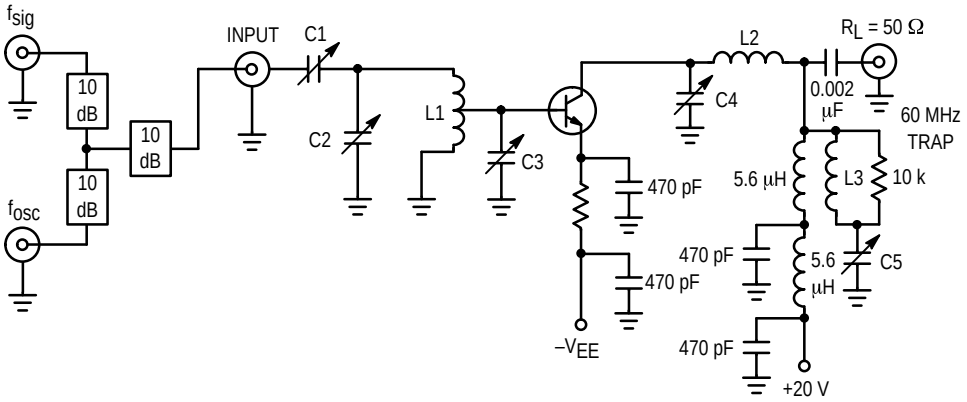
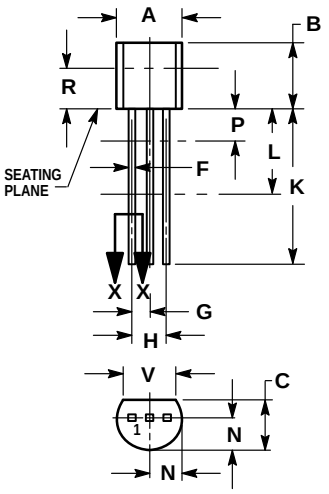
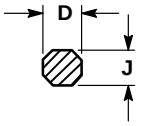


Figure 7. VHF Mixer Test Circuit
(f_{if} = 44 MHz, B.W. = 6.0 MHz)

PACKAGE DIMENSIONS





SECTION X–X

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	—

CASE 029–04
(TO–226AA)
ISSUE AD

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

How to reach us:
USA / EUROPE / Locations Not Listed: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447 or 602–303–5454

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE 602–244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, 6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–81–3521–8315

ASIA / PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298