2N6370 (SILICON)

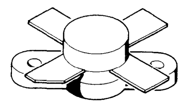
The RF Line

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily as a driver for high-power linear amplifier stages operating from 2.0 to 30 MHz with a 28-Volt supply.

- Power Output @ 28 Vdc, 30 MHz — 10 W (PEP)
- Intermodulation Distortion at Rated Power Output — IMD = -30 dB (Max)

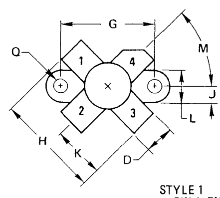
10 W (PEP) — 30 MHz
RF POWER TRANSISTOR
NPN SILICON



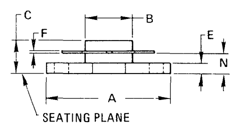
*MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	1.5	Adc
Total Device Dissipation @ $T_C = 25^oC$ Derate above 25^oC	P_D	20 0.114	Watts $W/^oC$
Storage Temperature Range	T_{stg}	-65 to +200	^oC

*Indicates JEDEC Registered Data



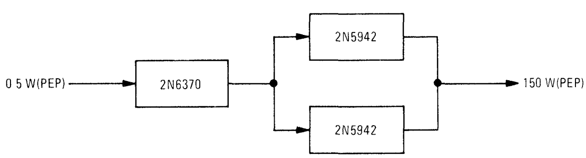
STYLE 1
PIN 1. EMITTER
2. BASE
3. EMITTER
4 COLLECTOR



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	24.64	24.89	0.970	0.980
B	9.47	9.73	0.373	0.383
C	6.07	7.14	0.239	0.281
D	5.59	5 84	0.220	0.230
E	2.16	2.67	0.085	0.105
F	0 10	0.15	0.004	0.006
G	18.29	18.54	0.720	0.730
H	21.59	22.10	0.850	0.870
J	3.12	3.23	0.123	0.127
K	10.80	11.05	0.425	0.435
L	6.22	6.48	0.245	0.255
M	40^0	50^0	40^0	50^0
N	3.81	4.57	0.150	0.180
Q	2.97	3.12	0.117	0.123

CASE 211-01

TYPICAL DRIVER APPLICATION

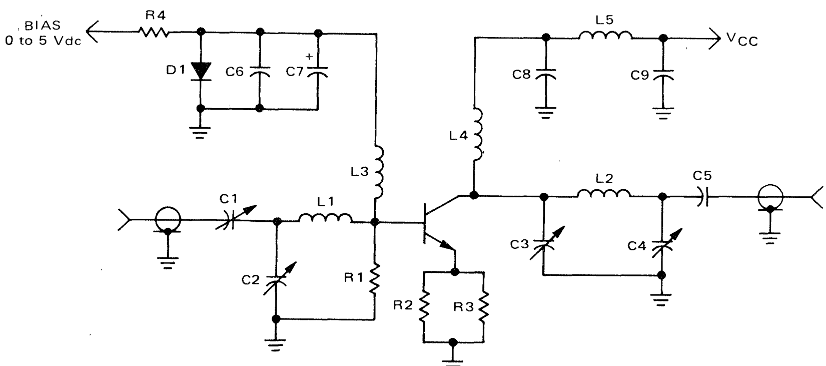


***ELECTRICAL CHARACTERISTICS** (T_C = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, I_B = 0)	BV_{CEO}	35	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	BV_{CES}	65	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	BV_{EBO}	4.0	–	Vdc
Collector Cutoff Current (V_{CE} = 28 Vdc, V_{BE} = 0, T_C = +55°C)	I_{CES}	–	10	mAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	5.0	50	–
DYNAMIC CHARACTERISTICS				
Current-Gain – Bandwidth Product (I_C = 0.5 Adc, V_{CE} = 15 Vdc, f = 50 MHz)	f_T	50	–	MHz
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	40	pF
FUNCTIONAL TEST				
Common-Emitter Amplifier Power Gain (Figure 1) (P_{out} = 10 W(PEP), I_C = 470 mAdc Max, V_{CC} = 28 Vdc, f_1 = 30 MHz, f_2 = 30.001 MHz)	G_{PE}	12	–	dB
Intermodulation Distortion Ratio (Figure 1) (P_{out} = 10 W(PEP), I_C = 470 mAdc Max, V_{CC} = 28 Vdc, f_1 = 30 MHz, f_2 = 30.001 MHz)	IMD	–	-30	dB
Collector Efficiency (P_{out} = 10 W(PEP), I_C = 470 mAdc Max, V_{CC} = 28 Vdc, f_1 = 30 MHz, f_2 = 30.001 MHz)	η	38	–	%

*Indicates JEDEC Registered Data.

FIGURE 1 – 30 MHz TEST CIRCUIT



C1	80 – 480 pF	ARCO 466 or equivalent	L2	5 Turns, #18 AWG, 1/4" I.D., 5/16" Long (0.13 μH)
C2,C3,C4	170 – 780 pF	ARCO 469 or equivalent	L3	10 μH
C5	0.1 μF		L4	1.0 μH
C6,C9	0.01 μF		L5	RFC VK200 FERROXCUBE
C7	500 μF	TANTALUM or equivalent	R1	10 OHMS 1/2 W ALLEN BRADLEY or equivalent
C8	2000 pF	UNELCO or equivalent	R2,R3	1.5 OHMS 1/2 W ALLEN BRADLEY or equivalent
D1	1N4001		R4	50 OHMS 1/2 W ALLEN BRADLEY or equivalent
L1	4 Turns, #18 AWG, 1/2" I.D., 1/4" Long (0.1 μH)		ADJUST BIAS FOR I_{CQ} = 10 mA	

FIGURE 2 – LINEAR OUTPUT POWER versus FREQUENCY

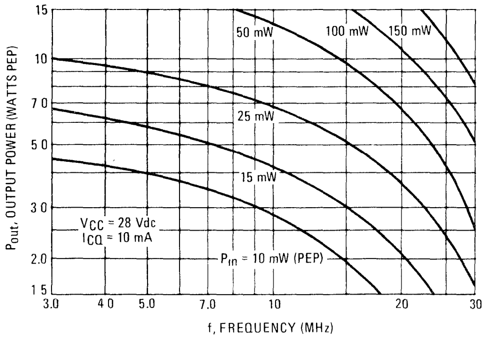


FIGURE 3 – OUTPUT POWER versus INPUT POWER

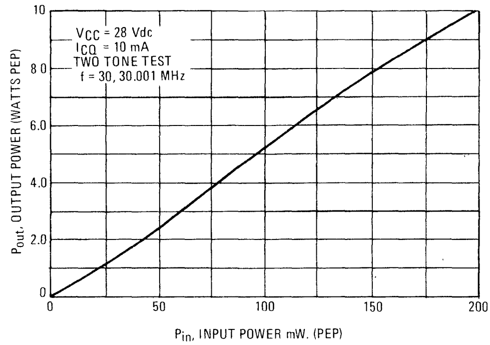


FIGURE 4 – OUTPUT POWER versus INPUT POWER

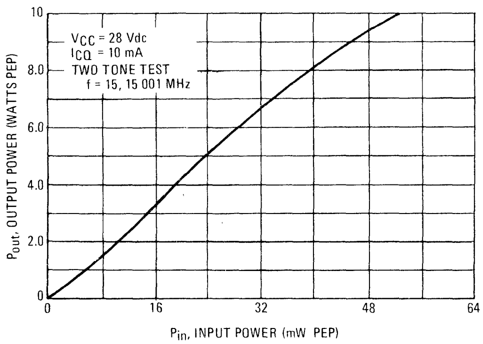


FIGURE 5 – OUTPUT POWER versus INPUT POWER

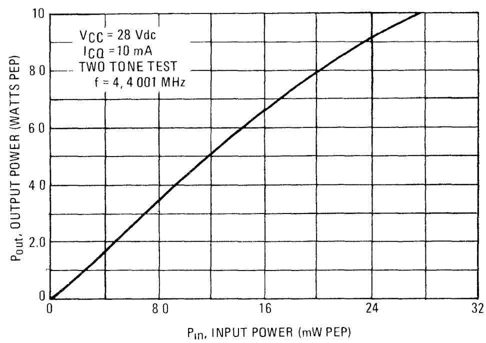


FIGURE 6 – INTERMODULATION DISTORTION versus OUTPUT POWER

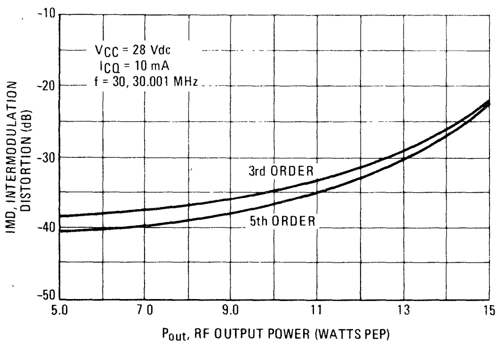


FIGURE 7 – LINEAR OUTPUT POWER versus SUPPLY VOLTAGE

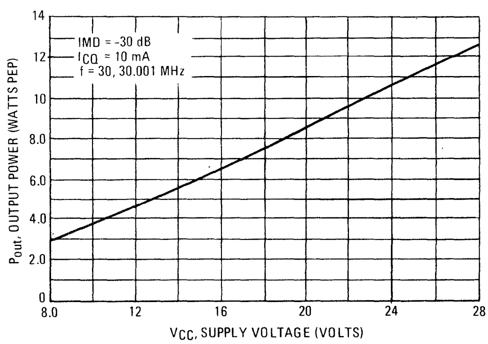


FIGURE 8 – PARALLEL EQUIVALENT INPUT RESISTANCE versus FREQUENCY

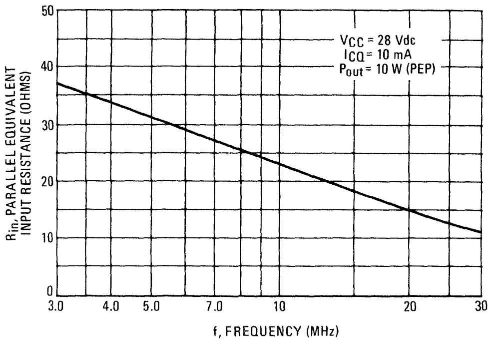


FIGURE 9 – PARALLEL EQUIVALENT INPUT CAPACITANCE versus FREQUENCY

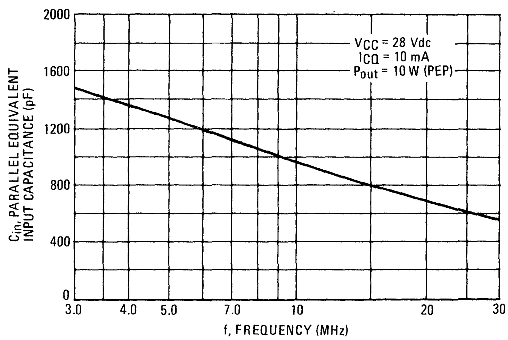


FIGURE 10 – PARALLEL EQUIVALENT OUTPUT CAPACITANCE versus FREQUENCY

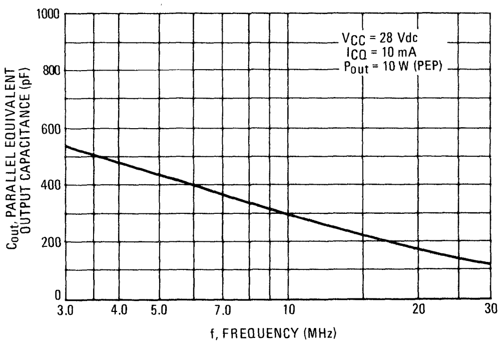


FIGURE 11 – CURRENT GAIN – BANDWIDTH PRODUCT

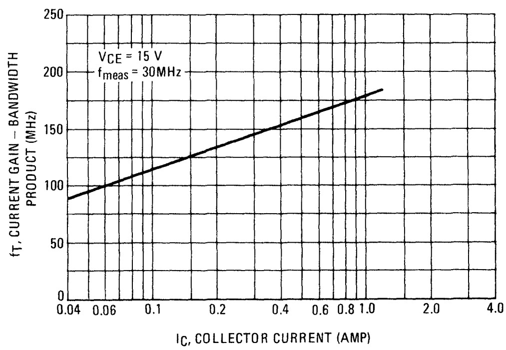


FIGURE 12 – INPUT CAPACITANCE versus EMITTER-BASE VOLTAGE

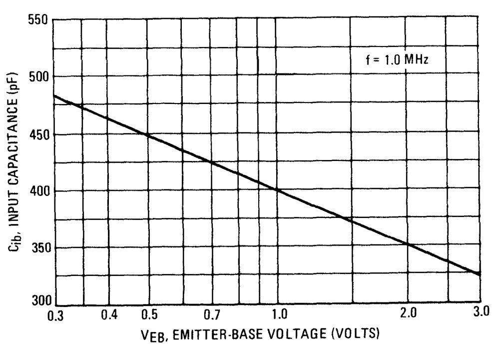


FIGURE 13 – OUTPUT CAPACITANCE versus COLLECTOR-BASE VOLTAGE

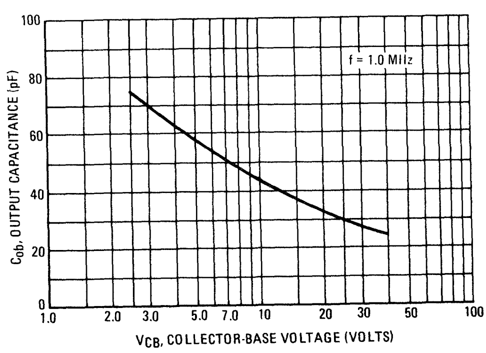


FIGURE 14 – COLLECTOR CURRENT versus BASE-EMITTER VOLTAGE

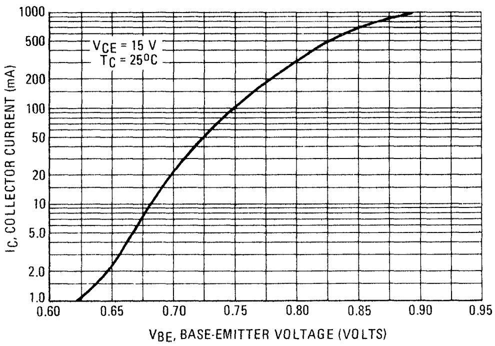


FIGURE 15 – RF POWER DERATING

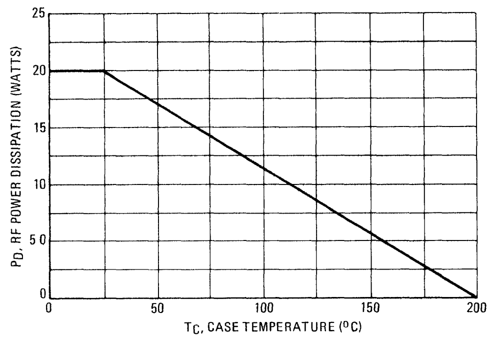
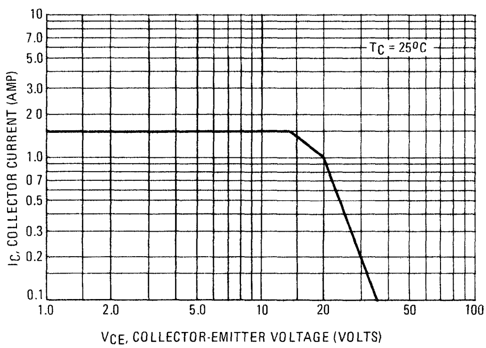


FIGURE 16 – DC SAFE OPERATING AREA



APPLICATIONS INFORMATION

The 2N6370 transistor is designed for linear power amplifier service in the driver or lower level stages of HF (2-30 MHz) single sideband (SSB) transmitters. It may also be used in amplitude modulated (AM) transmitters employing low level modulation in the exciter, or in any application requiring a linear amplifier. The device also has adequate gain for many VHF applications below 100 MHz.

Designed primarily for lower level stages and not the output stage of SSB transmitters, the 2N6370 does not employ internal emitter resistors. Therefore, for linear power amplifier applications which normally require forward bias for improved linearity, it is suggested that external emitter resistance be employed for improved DC operating point stability over the full temperature range. Typical resistor values for HF operation are illustrated in the test amplifier shown in Figure 1. The 2N6370 has more than adequate gain at HF, so the designer may wish to utilize unbypassed emitter resistance as shown in the circuit of Figure 1. Of course, bypassing may be included if more gain is desired.

The linear amplifier characterization data in Figures 2 through 10 were measured with the unbypassed emitter resistor configuration shown in Figure 1. For a more detailed discussion of linear power amplifier specifications and design, see Reference 1.

REFERENCES

1. "Solid-State Linear Power Amplifier Design", Motorola Semiconductor Products, Inc. Application Note AN-546
2. Pappenfus, Bruene, and Schoenike, "Single Sideband Principles and Circuits", McGraw – Hill.