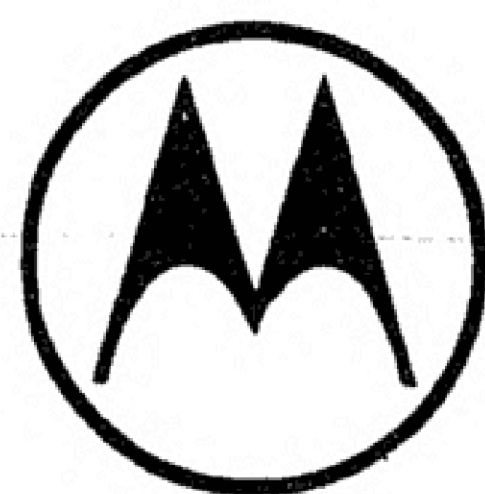




MOTOROLA
Semiconductors

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Advance Information

The RF Line

NPN SILICON RF POWER TRANSISTOR

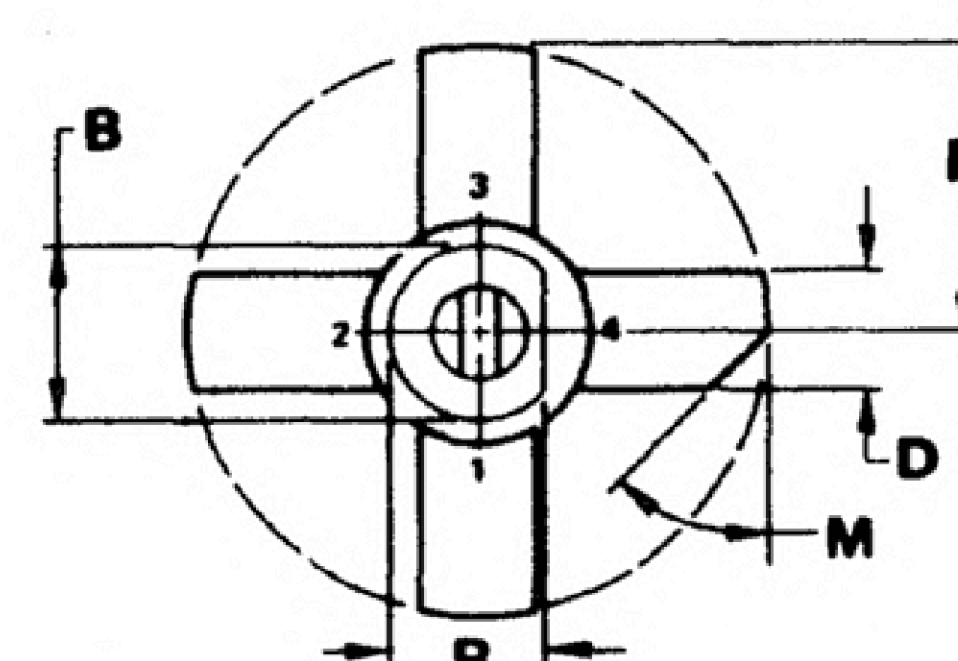
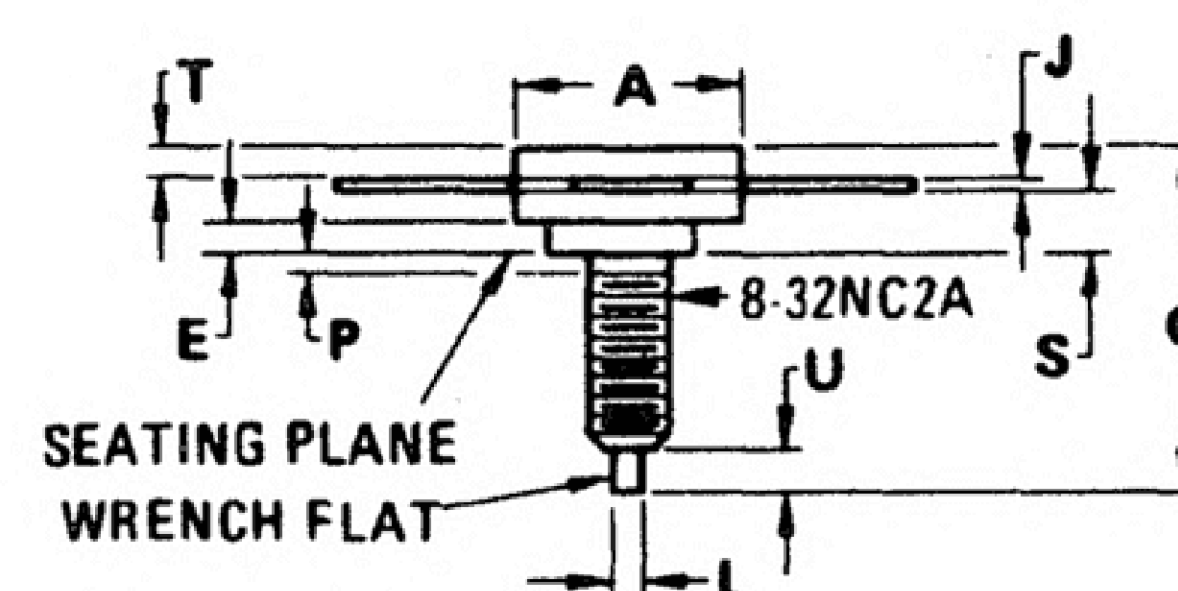
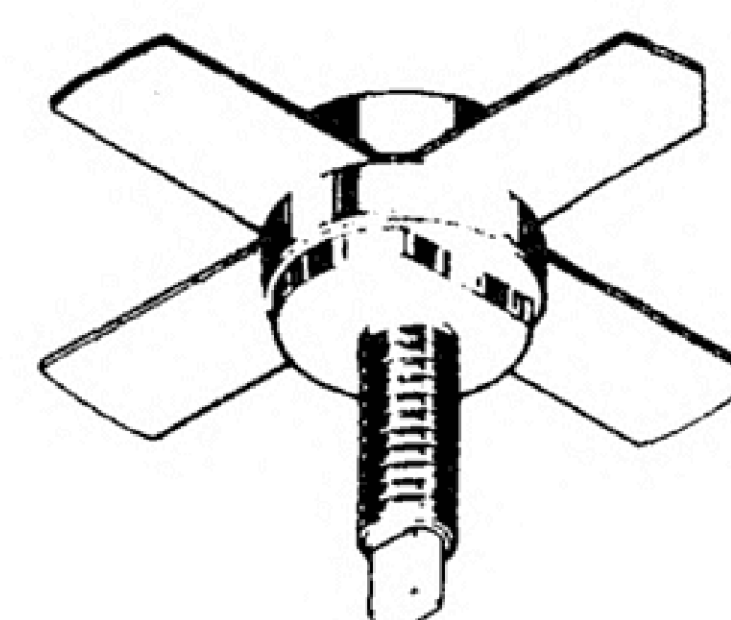
... designed for 13.6 Volt VHF large-signal amplifier applications in industrial and commercial FM equipment operating to 175 MHz. Ideally suited for marine radio applications.

- Specified 13.6 Volt, 160 MHz Characteristics —
Output Power = 30 Watts
Minimum Gain = 9.0 dB
Efficiency = 60%

www.datasheetcatalog.com

MRF238

30 W — 160 MHz
RF POWER
TRANSISTOR
NPN SILICON



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	5.46	5.97	0.215	0.235
E	1.78	—	0.070	—
J	0.08	0.18	0.003	0.007
K	12.45	—	0.490	—
L	1.40	1.78	0.055	0.070
M	45° NOM		45° NOM	
P	—	1.27	—	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

145A-09

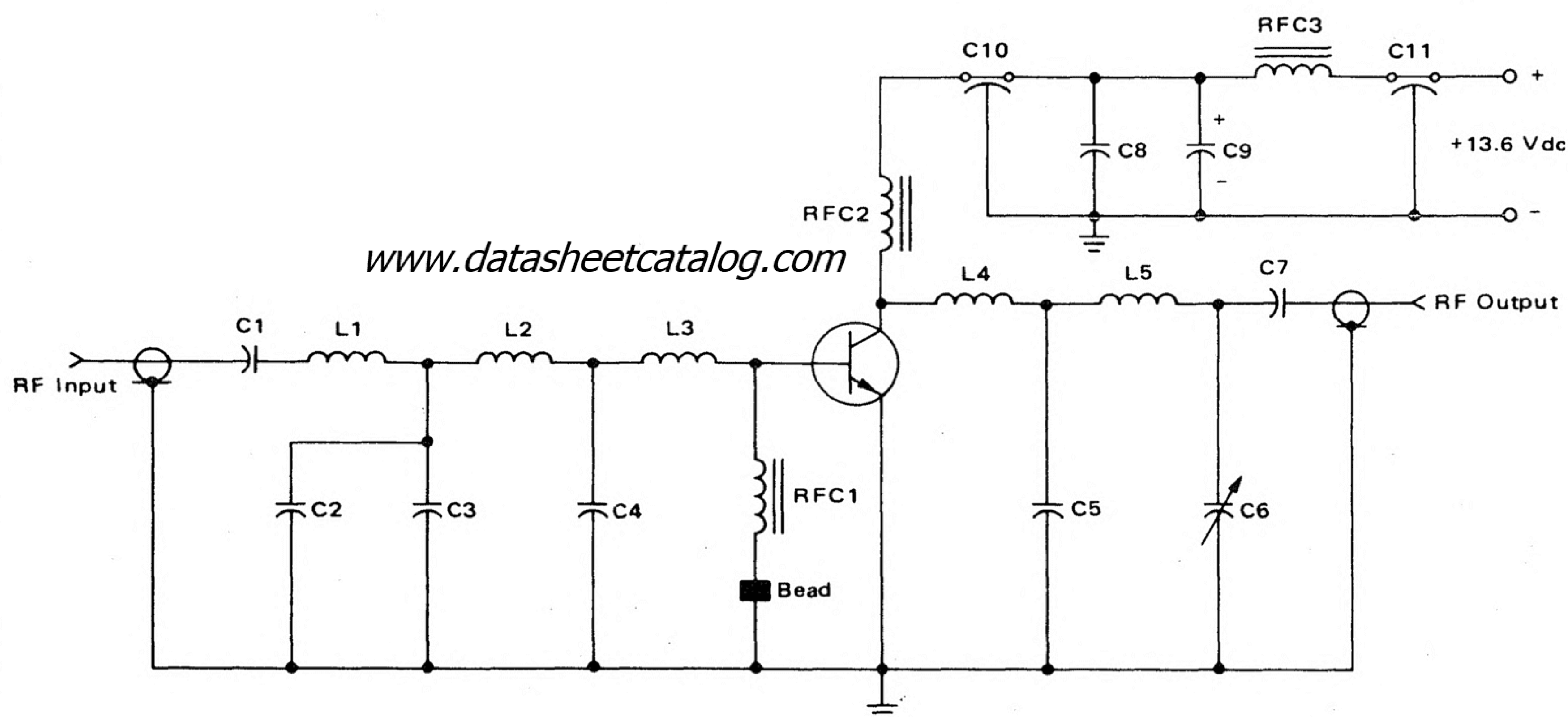
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	18	Vdc
Collector-Base Voltage	V_{CBO}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	4.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C	P_D	65 0.37	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +200	$^\circ\text{C}$
Stud Torque (1)	—	6.5	In. Lb.

(1) For Repeated Assembly use 5 In. Lb.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 100\text{ mAdc}$, $I_B = 0$)	BV_{CEO}	18	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 15\text{ mAdc}$, $I_E = 0$)	BV_{CBO}	36	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5.0\text{ mAdc}$, $I_C = 0$)	BV_{EBO}	4.0	—	—	Vdc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 1.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	5.0	—	—	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 15\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	110	130	pF
FUNCTIONAL TEST (Figure 1)					
Common-Emitter Amplifier Power Gain ($V_{CC} = 13.6\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_C(\text{max}) = 4.0\text{ Adc}$, $f = 160\text{ MHz}$)	G_{pe}	9.0	10	—	dB
Collector Efficiency ($V_{CC} = 13.6\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_C(\text{max}) = 4.0\text{ Adc}$, $f = 160\text{ MHz}$)	η	60	—	—	%

FIGURE 1 – 160 MHz TEST CIRCUIT SCHEMATIC

- C1 200 pF, 350 Vdc, UNELCO
 C2 100 pF, 350 Vdc, UNELCO
 C3 40 pF, 350 Vdc, UNELCO
 C4,C5 80 pF, 350 Vdc, UNELCO
 C6 1.0-20 pF, 4 oz. ARCO Trimmer
 C7 100 pF 350 Vdc, UNELCO
 C8 0.1 μF ERIE Disc Ceramic
 C9 0.1 μF TANTALUM
 C10,C11 680 pF ALLEN BRADLEY Feedthru
 RFC1 0.15 μH Molded Choke
 RFC2 10 Turns, #18 AWG on 470 Ohm, 1 Watt Resistor
 Bead FERROXCUBE Bead
 RFC3 FERROXCUBE Choke, VK200-4B

- L1 3.3 x 0.2 cm AIRLINE Inductor
 L2 1.0 x 0.2 cm AIRLINE Inductor
 L3 1.2 x 0.6 cm Brass Pad
 L4 1.2 x 0.6 cm Brass Pad and
 2.0 x 0.2 cm AIRLINE Inductor
 Board: G10, $\epsilon_r = 5$, $t = 62\text{ mils}$
 2 sided, 2 oz. Clad
 Connectors: Type N



MRF238

FIGURE 2 – OUTPUT POWER versus INPUT POWER

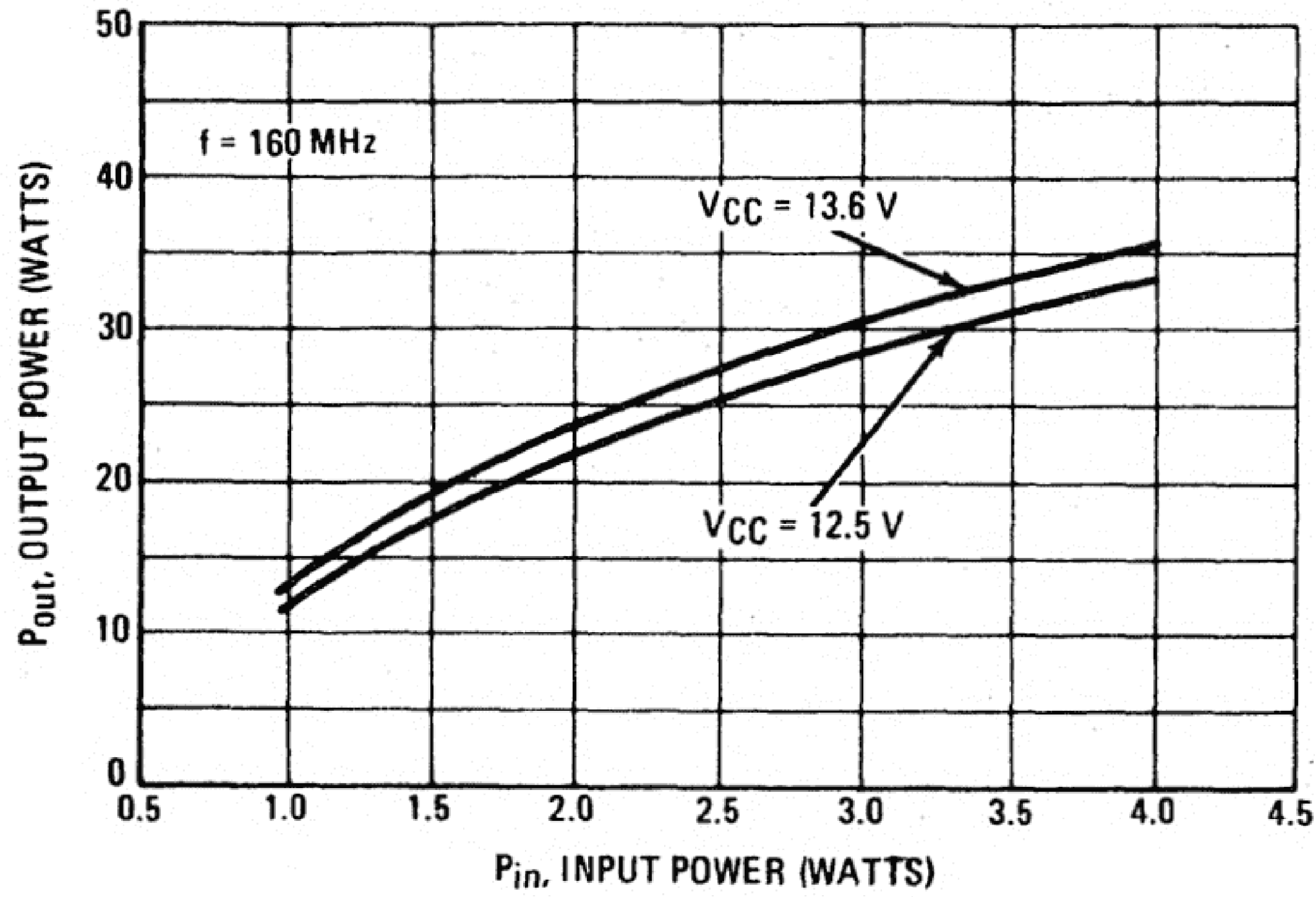


FIGURE 3 – OUTPUT POWER versus FREQUENCY

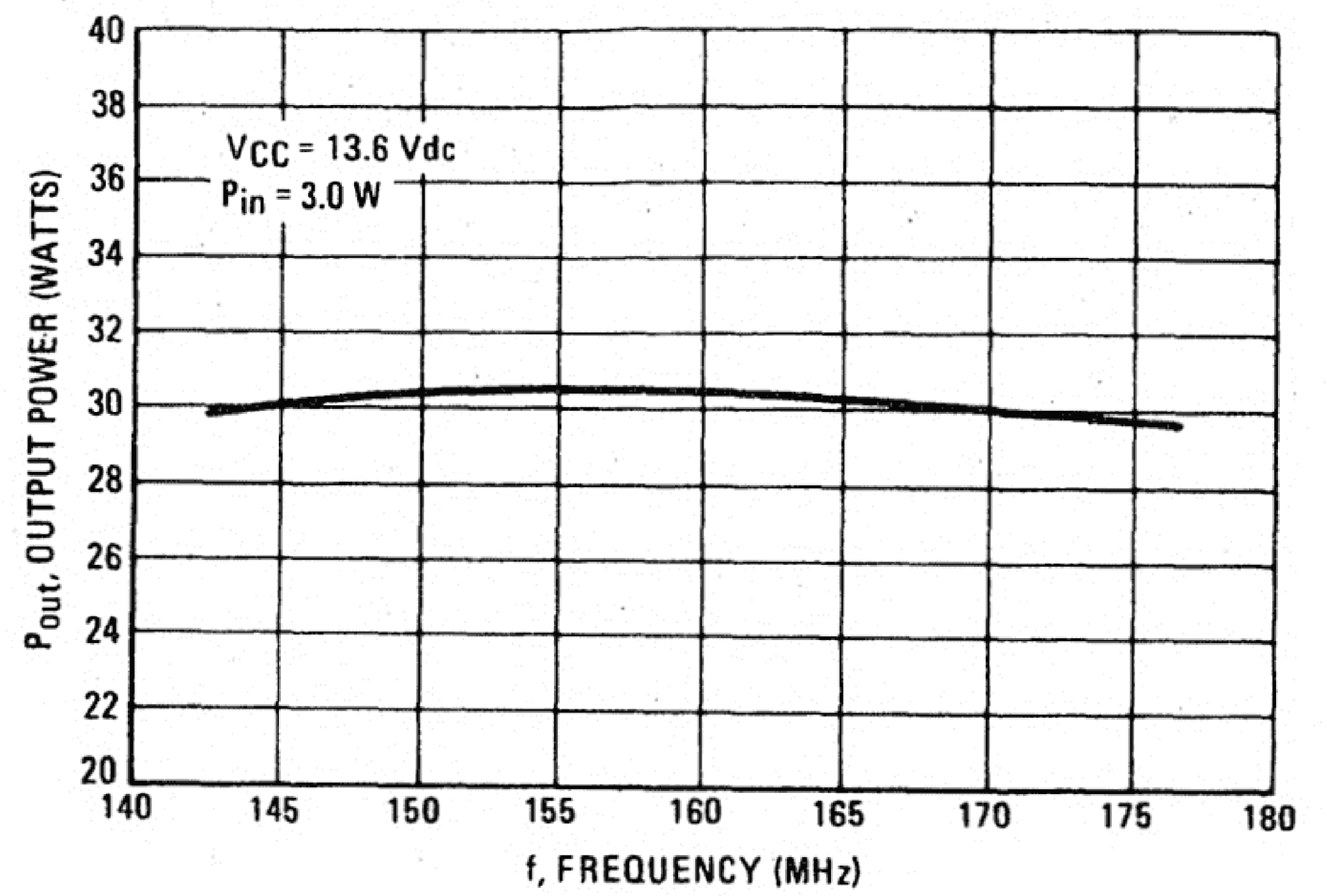


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

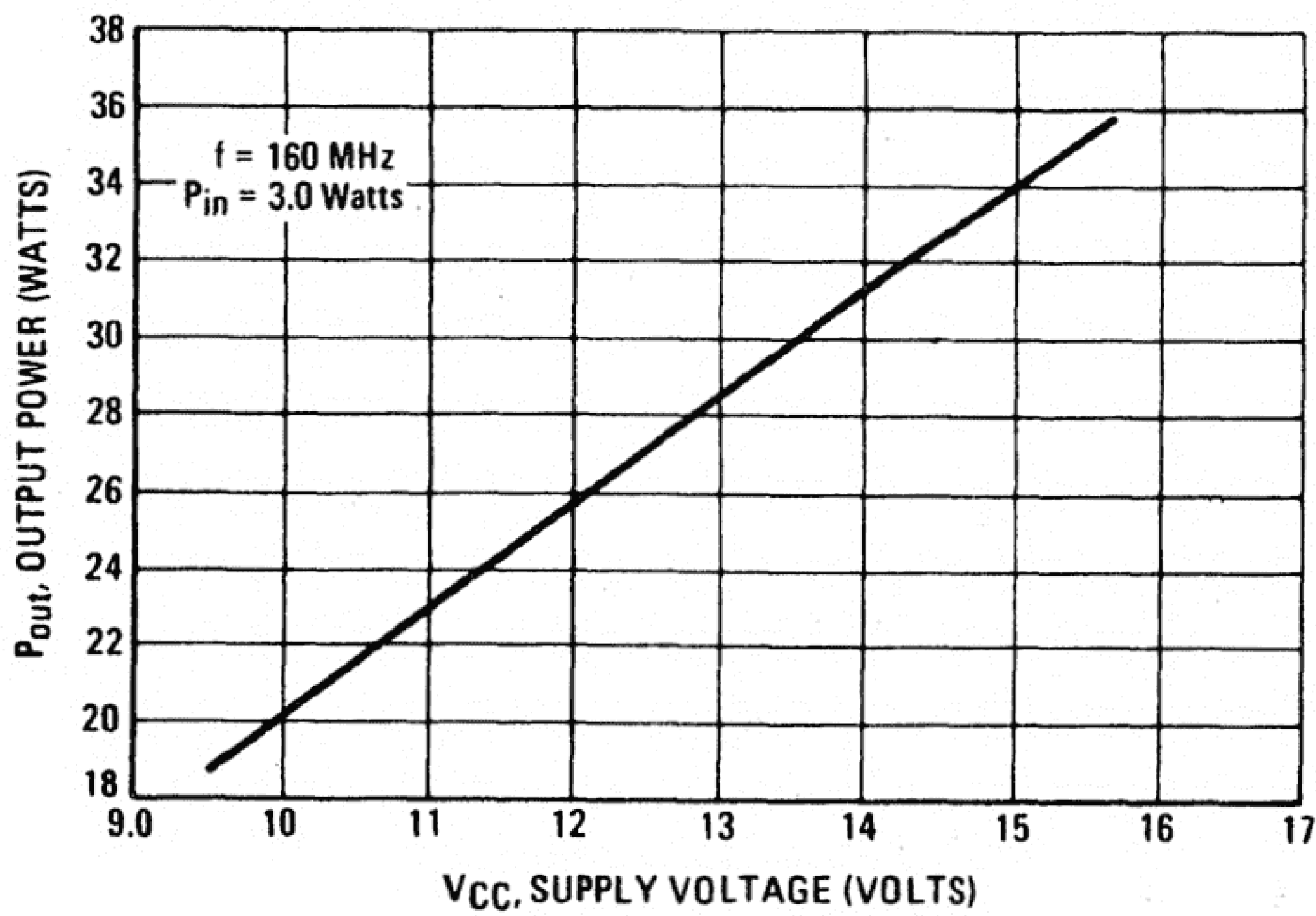
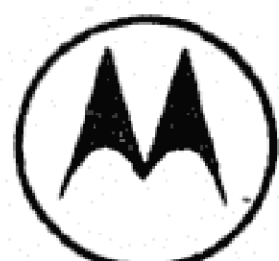
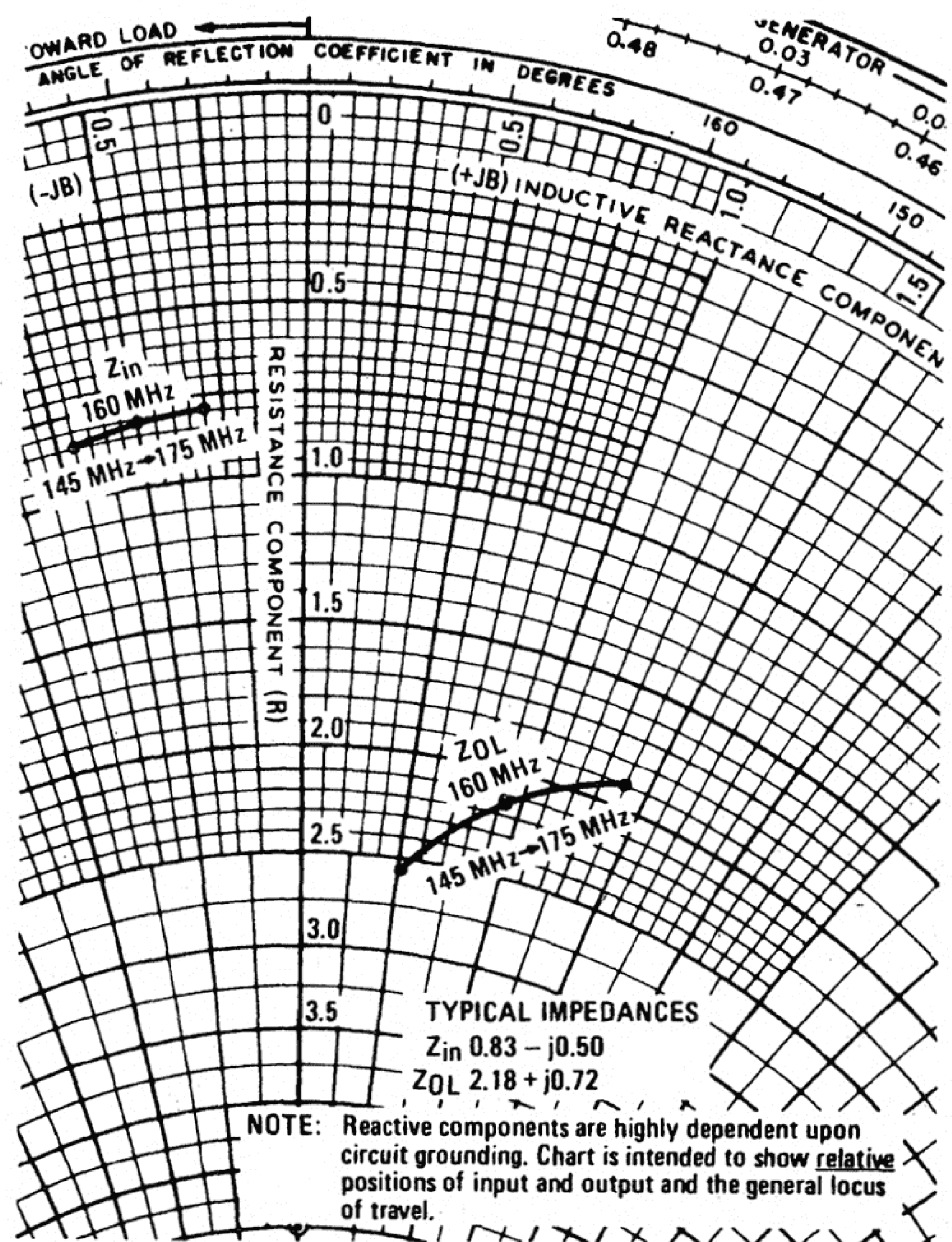


FIGURE 5 – SERIES EQUIVALENT IMPEDANCE



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