MOTOROLA

MRF238

Advance Information

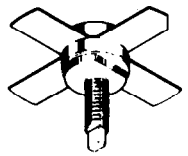
The RF Line

30 W – 160 MHz
RF POWER
TRANSISTOR
NPN SILICON

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.

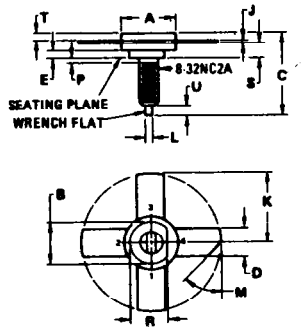
- Specified 13.6 Volt, 160 MHz Characteristics –
  Output Power = 30 Watts
  Minimum Gain = 9.0 dB
  Efficiency = 60%



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°C Derate Above 25°C	P_D	65 0.37	Watts W/°C
Storage Temperature Range	T_{stg}	-65 to +200	°C
Stud Torque (1)	–	6.5	In. Lb.

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



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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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	6.97	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	7.50	7.80	0.295	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

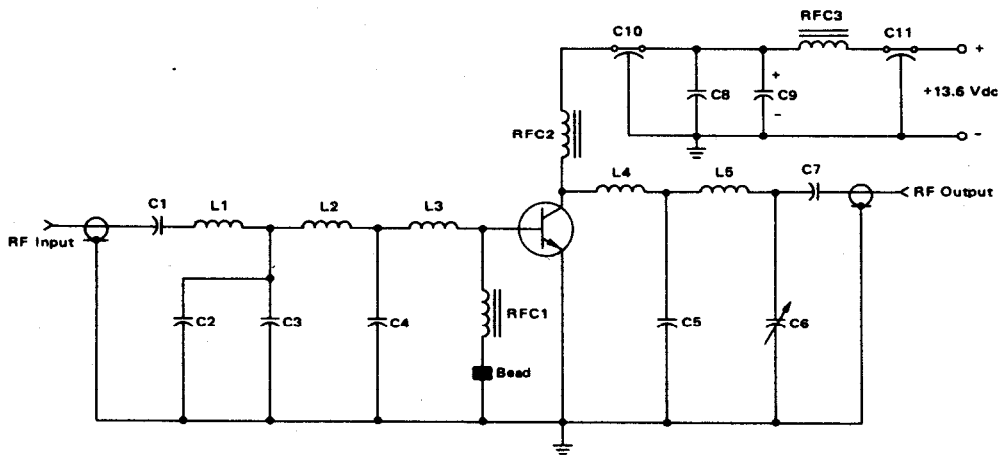
145A-00

This is advance information and specifications are subject to change without notice.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, I_B = 0)	BV_{CEO}	18	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 15 mAdc, I_E = 0)	BV_{CBO}	36	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	BV_{EBO}	4.0	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	5.0	–	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 15 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	110	130	pF
FUNCTIONAL TEST (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 13.6 Vdc, P_{out} = 30 W, I_C (max) = 4.0 Adc, f = 160 MHz)	G_{pe}	9.0	10	–	dB
Collector Efficiency (V_{CC} = 13.6 Vdc, P_{out} = 30 W, I_C (max) = 4.0 Adc, f = 160 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, VK200-48

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, ϵ_r = 5, t = 62 mils 2 sided, 2 oz. Clad

Connectors: Type N

FIGURE 2 – OUTPUT POWER versus INPUT POWER

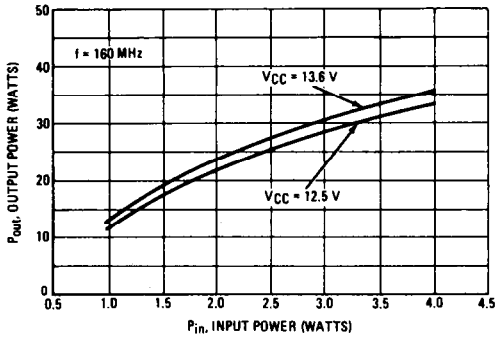


FIGURE 3 – OUTPUT POWER versus FREQUENCY

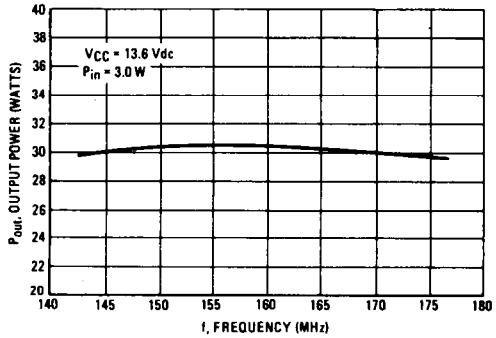


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

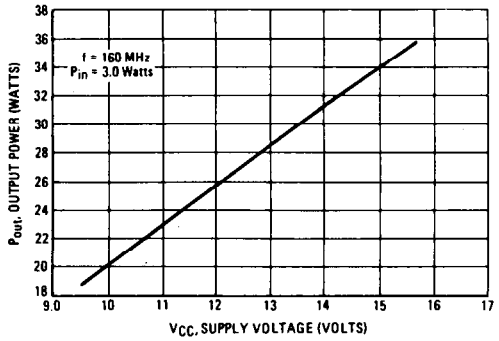


FIGURE 5 – SERIES EQUIVALENT IMPEDANCE