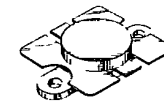


MOTOROLA SEMICONDUCTOR TECHNICAL DATA

The RF Line NPN Silicon RF Power Transistor

MRF248
**80 WATTS, 175 MHz
CONTROLLED Q
RF POWER
TRANSISTOR
NPN SILICON**

CASE 316-01

... designed for 12.5 volt VHF large-signal amplifier applications in industrial and commercial FM equipment operating to 175 MHz.

- Typical 12.5 Volt, 175 MHz Characteristics in Broadband Circuit:
 - Output Power = 80 Watts
 - Gain = 11.3 dB
 - Efficiency = 59%
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Internal Matching Network Optimized for Broadband Operation
- Ion Implanted Emitter Ballast Resistors for Improved Load Mismatch Capability at Elevated Drive and Voltage

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	16.5	Vdc
Collector-Base Voltage	V _{CBO}	38	Vdc
Emitter-Base Voltage	V _{EBO}	4	Vdc
Collector-Current — Continuous	I _C	15	Adc
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	250 1.43	Watts W/°C
Storage Temperature Range	T _{stg}	-65 to +150	°C
Junction Temperature	T _J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R _{θJC}	0.7	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Emitter-Base Breakdown Voltage (I _E = 5 mA _{dc} , I _C = 0)	V _{(BR)EBO}	4	—	—	Vdc
Collector-Emitter Breakdown Voltage (I _C = 50 mA _{dc} , I _B = 0)	V _{(BR)CEO}	16.5	—	—	Vdc
Collector-Emitter Breakdown Voltage (I _C = 50 mA _{dc} , V _{BE} = 0)	V _{(BR)CES}	38	—	—	Vdc
Collector Cutoff Current (V _{CE} = 15 Vdc, V _{BE} = 0)	I _{CES}	—	—	10	mA _{dc}

ON CHARACTERISTICS

DC Current Gain (I _C = 2 Adc, V _{CE} = 5 Vdc)	h _{FE}	20	—	120	—
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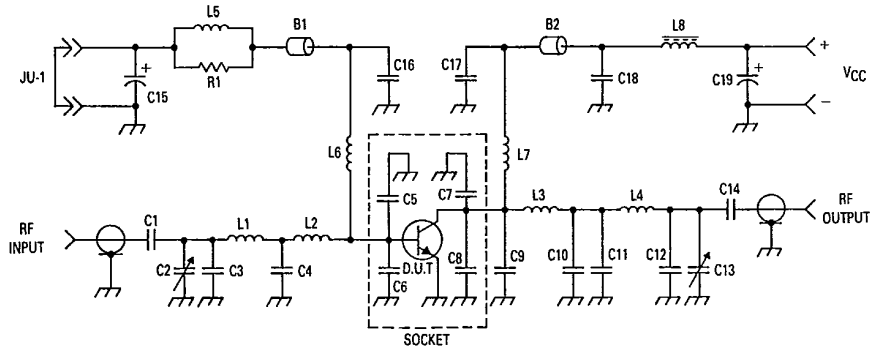
DYNAMIC CHARACTERISTICS

Output Capacitance (V _{CB} = 12.5 Vdc, I _E = 0, f = 1 MHz)	C _{ob}	—	270	350	pF
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FUNCTIONAL TESTS

Common-Emitter Amplifier Power Gain (V _{CC} = 12.5 Vdc, P _{out} = 80 W, f = 175 MHz)	G _{pe}	10	11.3	—	dB
Collector Efficiency (V _{CC} = 12.5 Vdc, P _{out} = 80 W, f = 175 MHz)	η _c	50	59	—	%
Load Mismatch (V _{CC} = 12.5 Vdc, P _{in} = 2 dB Overdrive, f = 175 MHz, VSWR = 30:1 All Phase Angles)	ψ	No Degradation In Output Power			

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- C1, C14 — 1000 pF Chip Cap, ATC100B102JC50
- C3 — 15 pF Unelco, Standex J-101-15
- C2, C13 — 1-20 pF Johanson
- C4 — 150 pF Unelco, Standex J-101-150
- C5 — 300 pF Chip Cap, ATC100B301JC200
- C6, C8 — 270 pF Chip Cap, ATC100B271JC200
- C7 — 240 pF Chip Cap, ATC100B241JC200
- C9, C11 — 80 pF Unelco, Standex J-101-80
- C10 — 100 pF Unelco, Standex J-101-100
- C12 — 30 pF Unelco, Standex J-101-30
- C15, C19 — 10 μ F/35 V
- C16, C17 — 91 pF Mini-Unelco, Standex 3HS0006-91
- C18 — 0.001 μ F

- L1 — 3 Turns #18 AWG, 0.165" ID
 - L2, L3 — 0.2"W x 0.3"L, 5 mil Cu Sheet
 - L4 — 2 Turns #18 AWG, 0.165" ID
 - L5 — 5.6 μ H Choke, Cambion
 - L6, L7 — 3 Turns #18 AWG, 0.13" ID
 - L8 — Ferrite Choke, Ferroxcube VK200-20-4B
 - B1, B2 — Ferrite Bead, Ferroxcube 56-590-65-3B
 - R1 — 10 Ω , 1/2 Watt
- Board Material — 0.062" G-10, 2 oz. Cu, $\epsilon_r = 4.5$
 JU-1 — Jumper for V_{re} Test Port

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Figure 1. 135-175 MHz Broadband Test Circuit

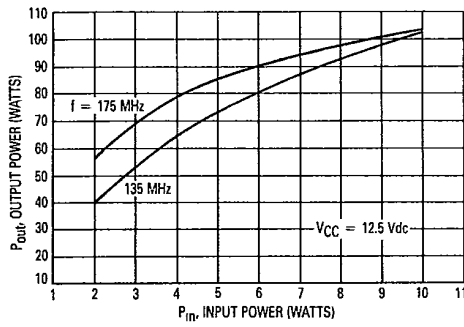


Figure 2. Output Power versus Input Power

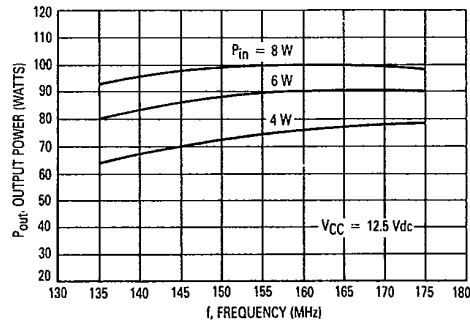


Figure 3. Output Power versus Frequency

MRF248

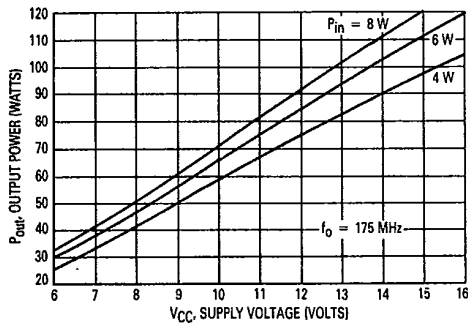


Figure 4. Output Power versus Voltage

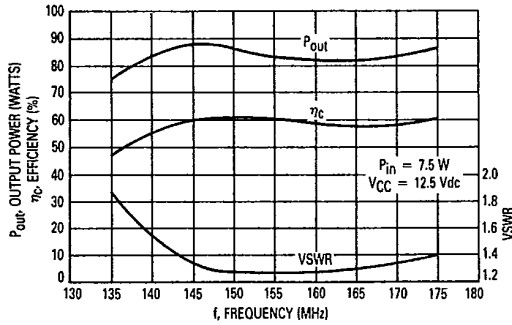


Figure 5. Typical Broadband Performance

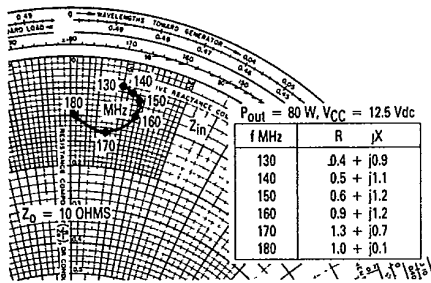


Figure 6. Z_{in} , Input Impedance

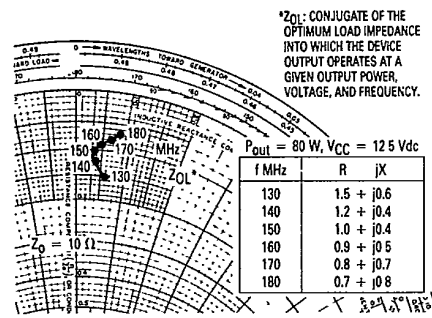


Figure 7. Z_{OL}^* , Output Impedance

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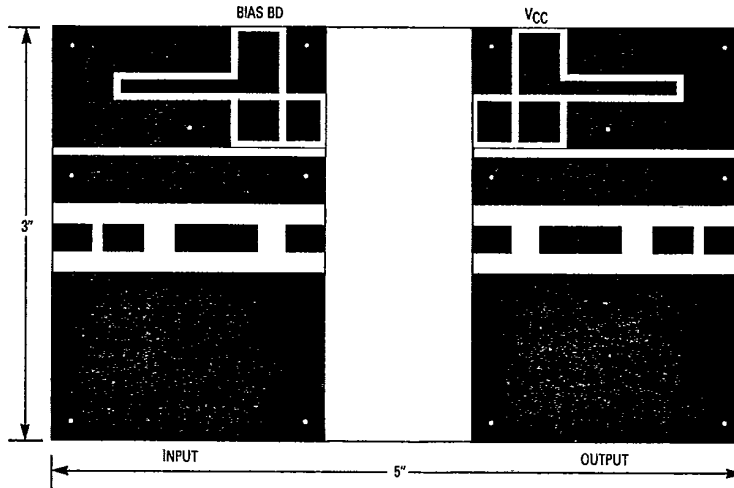
OUTLINE DIMENSIONS

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

CASE 316-01

NOTE:
FLANGE IS ISOLATED IN ALL STYLES

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	24.38	25.14	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.58	0.210	0.220
E	2.16	3.04	0.085	0.120
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	10.29	11.17	0.405	0.440
L	3.81	4.66	0.150	0.180
N	3.81	4.31	0.150	0.170
Q	2.92	3.30	0.115	0.130
R	3.05	3.30	0.120	0.130
U	11.94	12.57	0.470	0.495



NOTE: The Printed Circuit Board shown is 75% of the original.

Figure 8. MRF248 Photomaster

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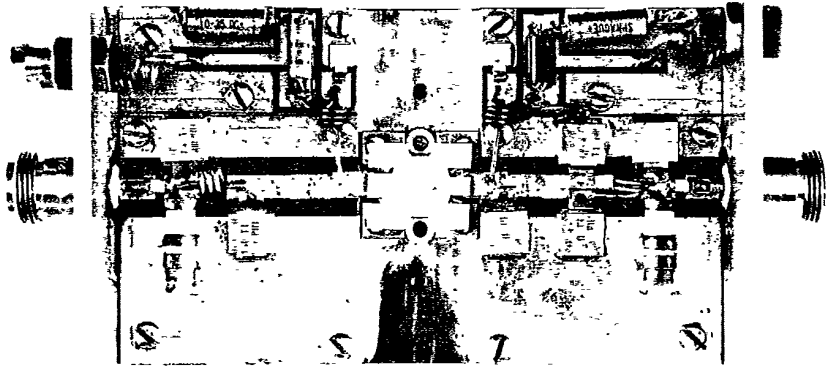


Figure 9. 136-175 MHz Test Circuit