

MOTOROLA **SEMICONDUCTOR** **TECHNICAL DATA**

The RF Line **NPN Silicon** **RF Power Transistor**

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

ON CHARACTERISTICS

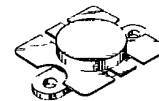
DC Current Gain (I _C = 2 A _{dc} , V _{CE} = 5 V _{dc})	h _{FE}	20	—	120	—
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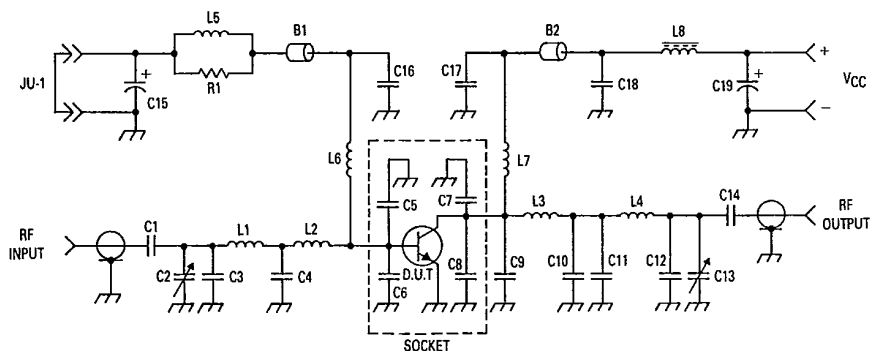
DYNAMIC CHARACTERISTICS

Output Capacitance (V _{CB} = 12.5 V _{dc} , 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 V _{dc} , P _{out} = 80 W, f = 175 MHz)	G _{pe}	10	11.3	—	dB
Collector Efficiency (V _{CC} = 12.5 V _{dc} , P _{out} = 80 W, f = 175 MHz)	η _c	50	59	—	%
Load Mismatch (V _{CC} = 15.5 V _{dc} , P _{in} = 2 dB Overdrive, f = 175 MHz, VSWR = 30:1 All Phase Angles)	ψ	No Degradation In Output Power			

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

CASE 316-01



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

Figure 1. 135-175 MHz Broadband Test Circuit

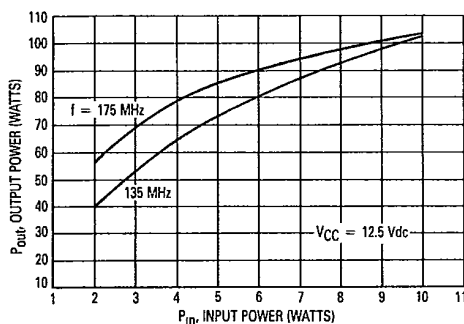


Figure 2. Output Power versus Input Power

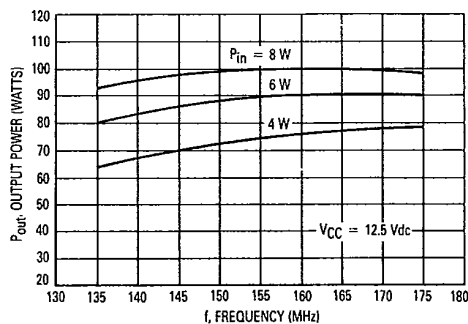


Figure 3. Output Power versus Frequency

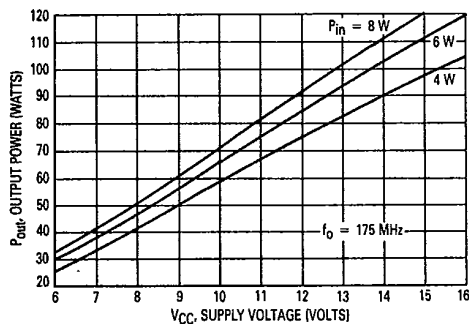


Figure 4. Output Power versus Voltage

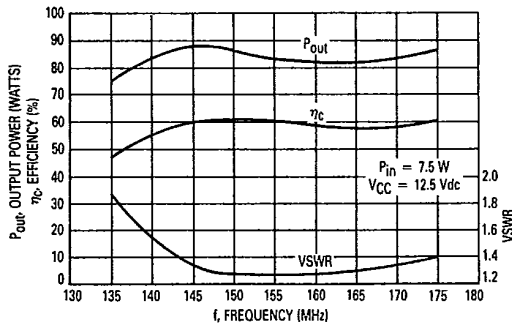


Figure 5. Typical Broadband Performance

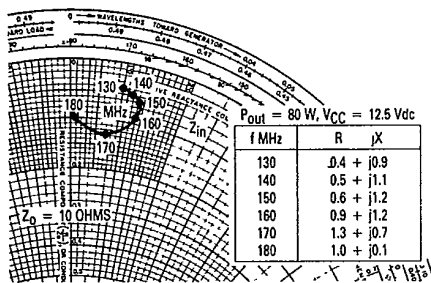


Figure 6. Z_{in} , Input Impedance

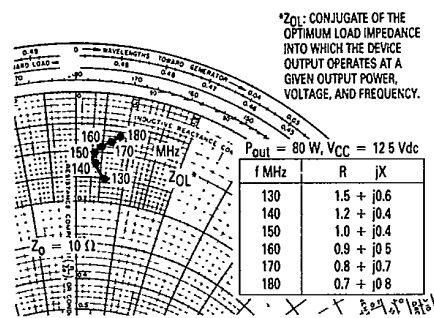
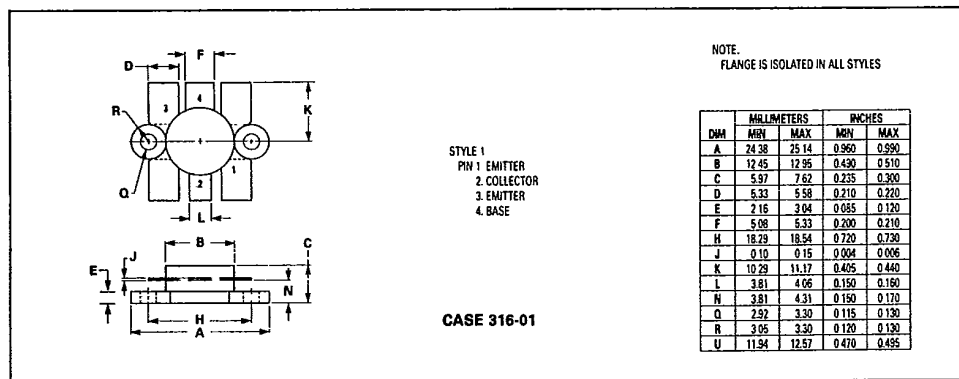
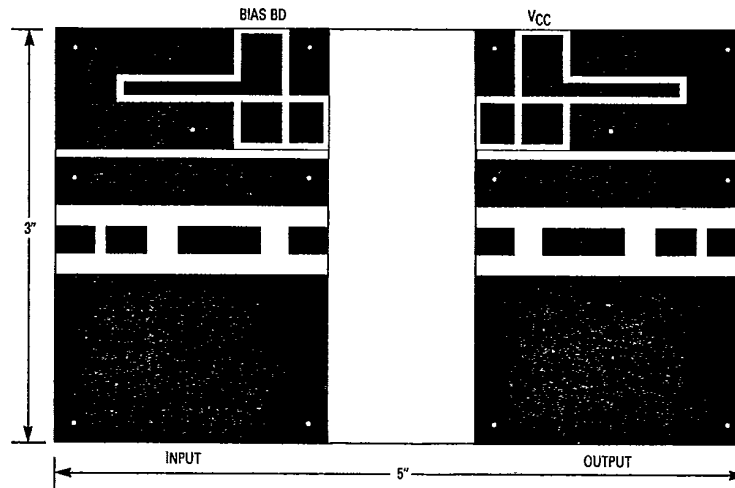


Figure 7. Z_{OL}^* , Output Impedance

OUTLINE DIMENSIONS





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

Figure 8. MRF248 Photomaster

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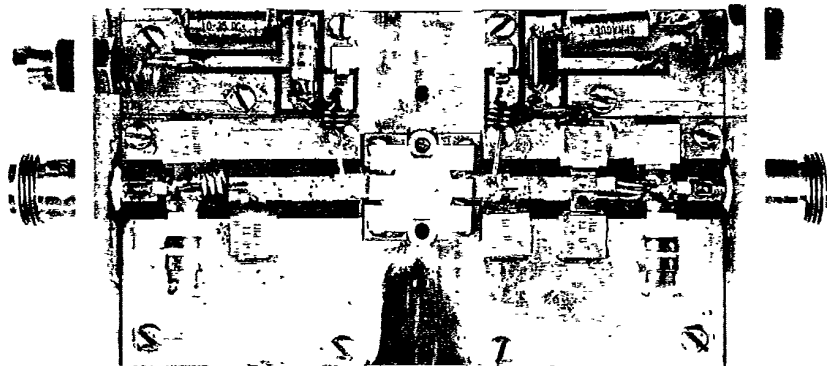


Figure 9. 136-175 MHz Test Circuit