The RF Line

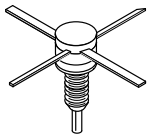
NPN Silicon RF Power Transistors

MRF890

2.0 W, 900 MHz RF POWER TRANSISTORS NPN SILICON

Designed for 24 volt UHF large–signal, common–emitter amplifier applications in industrial and commercial FM equipment operating in the range of 804–960 MHz.

- Specified 24 Volt, 900 MHz Characteristics
  - Output Power = 2.0 Watts
  - Power Gain = 9.0 dB Min
  - Efficiency = 55% Min
- Series Equivalent Large–Signal Characterization
- Capable of 30:1 VSWR Load Mismatch at Rated Output Power and Supply Voltage
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Silicon Nitride Passivated
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



CASE 305–01, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	30	Vdc
Collector–Base Voltage	V_{CBO}	55	Vdc
Emitter–Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	0.5	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	7.0 40	Watts mW/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	25	°C/W

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

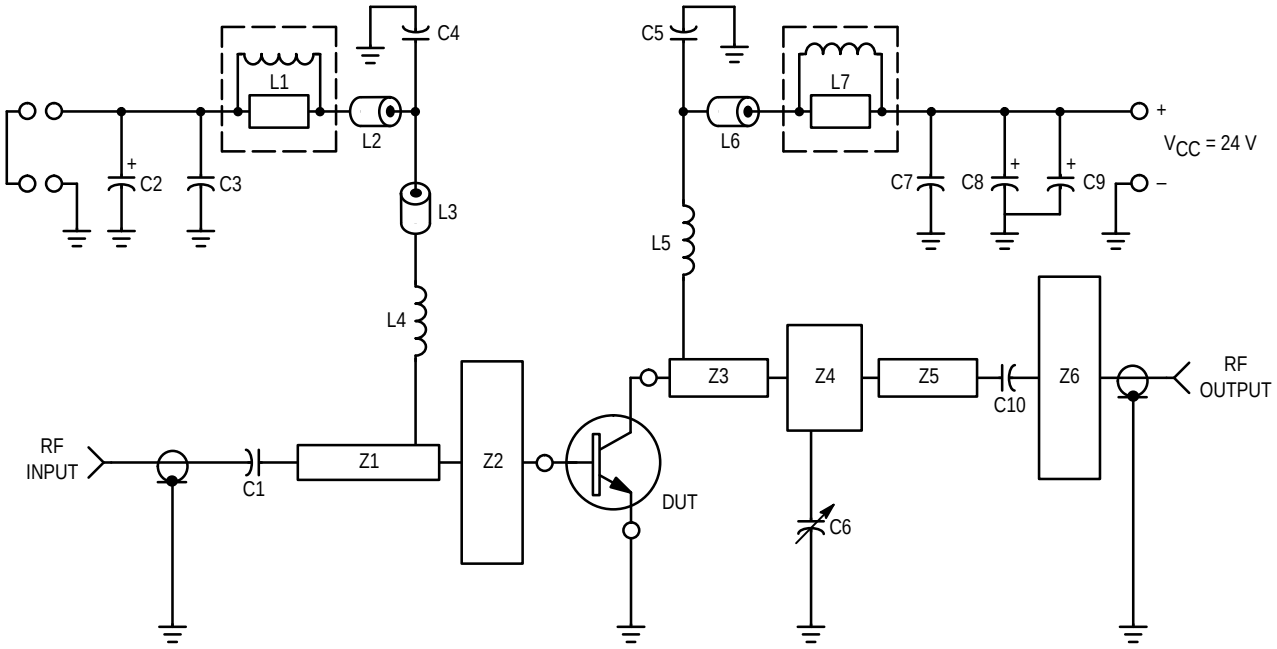
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Emitter–Base Breakdown Voltage (I_C = 5.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	30	—	—	Vdc
Collector–Emitter Breakdown Voltage (I_C = 5.0 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	55	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	—	—	0.5	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 100 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	—	100	—

NOTES: (continued)

1. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.
2. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	2.0	—	pF
FUNCTIONAL TESTS					
Common–Emitter Amplifier Power Gain (P_{out} = 2.0 W, V_{CC} = 24 Vdc, f = 900 MHz)	G_{PE}	8.5	9.0	—	dB
Collector Efficiency (P_{out} = 2.0 W, V_{CC} = 24 Vdc, f = 900 MHz)	η	55	60	—	%



C1, C4, C5 — 91 pF Mini Underwood Mica
C2, C8 — 1.0 μF Electrolytic
C3, C7 — 250 pF Unelco
C6 — Johanson 0.5–4.0 pF Giga–Trim
C9 — 10 μF, 50 V, Electrolytic
C10 — 39 pF Mini Underwood
L1, L7 — 10 Turns Around 10 Ω 1/2 W Resistor
L2, L3, L6 — Ferrite Bead
L4, L5 — 5 Turns 20 AWG 0.1″ ID
Z1, Z2, Z3, Z4, Z5, Z6 — Distributed Microstrip Elements (see photomask)
Board Material — Glass Teflon ε_r = 2.55 t = 0.031″

Figure 1. 850–900 MHz Test Circuit

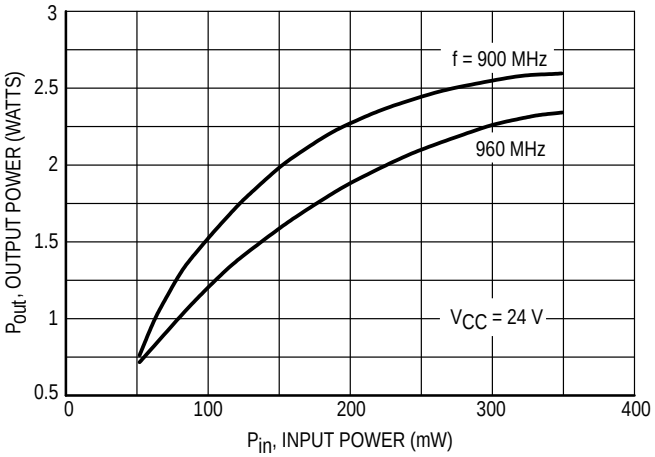


Figure 2. Output Power versus Input Power

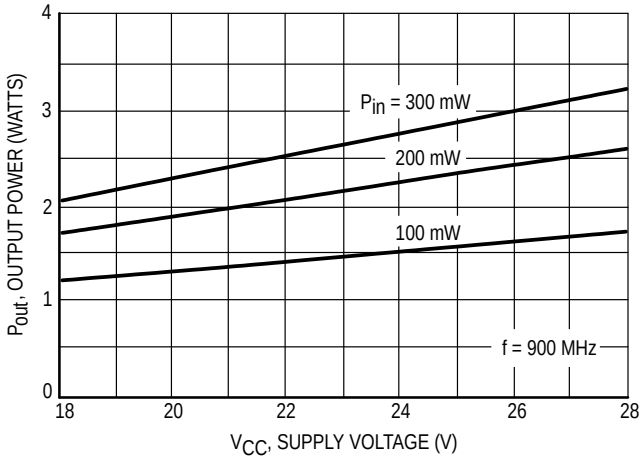


Figure 3. Output Power versus Supply Voltage

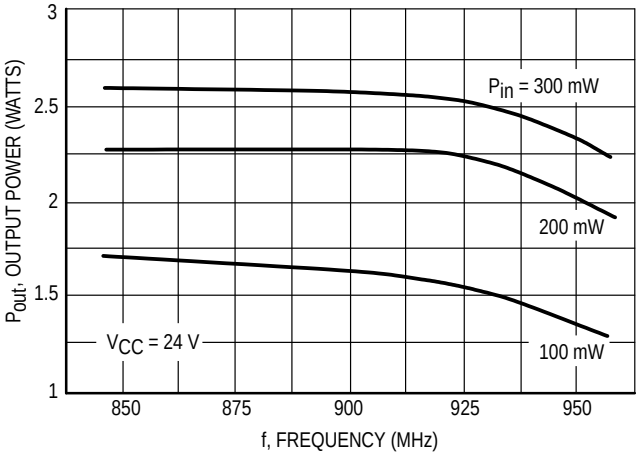


Figure 4. Output Power versus Frequency

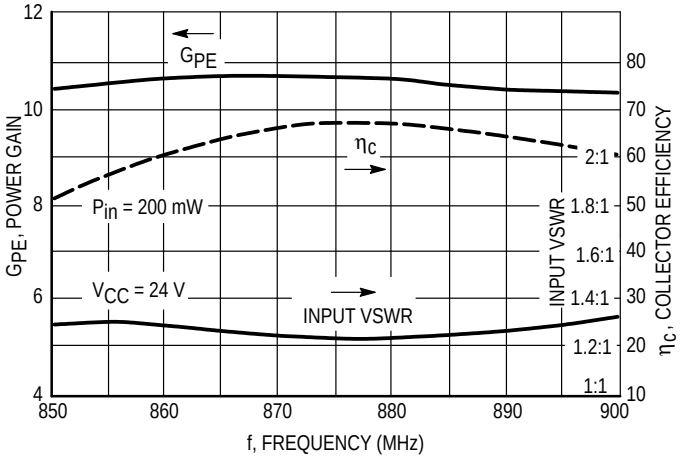
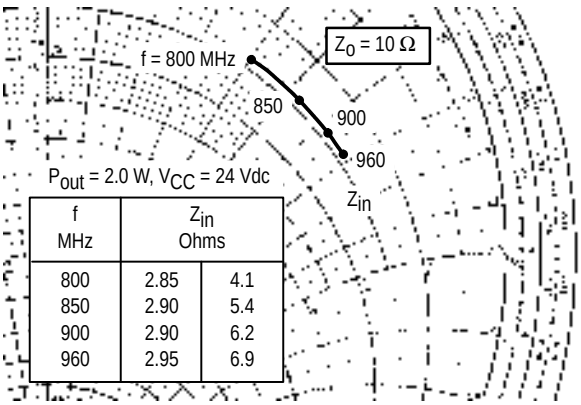
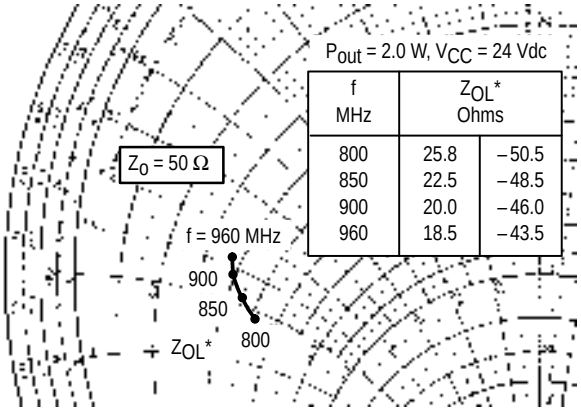


Figure 5. Typical Performance in Broadband Circuit



f MHz	Z_{in} Ohms	
800	2.85	4.1
850	2.90	5.4
900	2.90	6.2
960	2.95	6.9

Figure 6. Series Equivalent Input Impedance

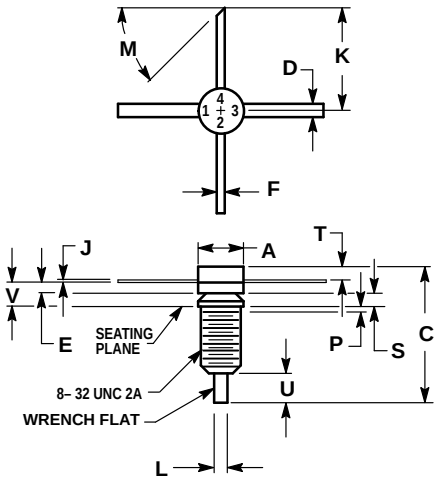


f MHz	Z_{OL}* Ohms	
800	25.8	– 50.5
850	22.5	– 48.5
900	20.0	– 46.0
960	18.5	– 43.5

Z_{OL}* = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

Figure 7. Series Equivalent Output Impedance

PACKAGE DIMENSIONS



	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.200	0.220	5.08	5.59
C	0.550	0.640	13.97	16.26
D	0.055	0.065	1.40	1.65
E	0.040	0.050	1.02	1.27
F	0.025	0.035	0.64	0.89
J	0.003	0.007	0.08	0.18
K	0.435	—	11.05	—
L	0.055	0.065	1.40	1.65
M	45 °NOM		45 °NOM	
P	—	0.050	—	1.27
S	0.055	0.065	1.40	1.65
T	0.055	0.070	1.40	1.78
U	0.110	0.150	2.79	3.81
V	0.095	0.115	2.41	2.92

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

CASE 305–01
ISSUE O

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