

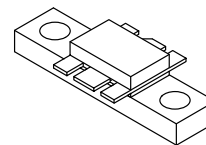
The RF Line
NPN Silicon
RF Power Transistor

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

- Specified 24 Volt, 900 MHz Characteristics
 - Output Power = 30 Watts
 - Power Gain = 7.0 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

MRF894

30 W, 900 MHz
RF POWER
TRANSISTOR
NPN SILICON



CASE 319-07, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	30	Vdc
Collector-Base Voltage	V_{CBO}	50	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	7.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	115 0.66	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	1.5	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 25\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	30	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 25\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	50	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5.0\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	10	mAdc

NOTES:

(continued)

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

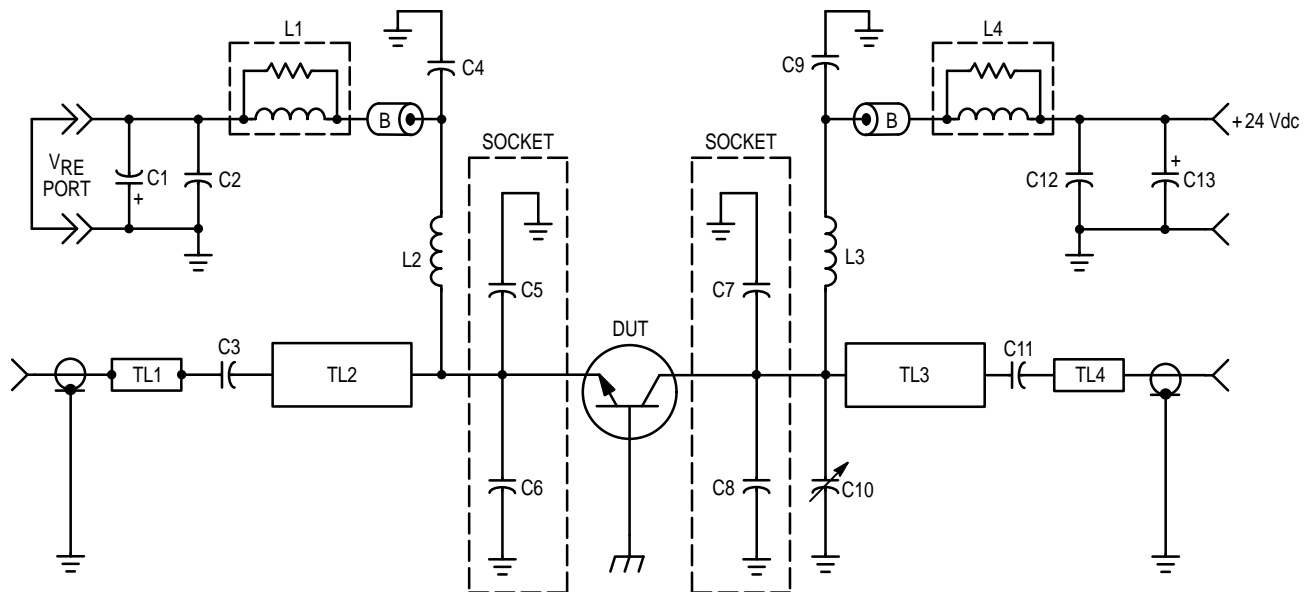
LIFETIME BUY

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 2.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	10	—	120	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 30 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	45	—	pF
FUNCTIONAL TESTS					
Common-Base Amplifier Power Gain ($P_{out} = 30 \text{ W}$, $V_{CC} = 24 \text{ Vdc}$, $f = 900 \text{ MHz}$)	G_{PE}	7.0	8.5	—	dB
Collector Efficiency ($P_{out} = 30 \text{ W}$, $V_{CC} = 24 \text{ Vdc}$, $f = 900 \text{ MHz}$)	η	55	60	—	%

LIFETIME BUY



- B — Ferrite Bead, Ferroxcube 56-590-65-3B
- C1, C13 — 5.0 μF , 50 Vdc
- C2, C12 — 1000 pF Unelco
- C3, C11 — 47 pF, 100 Mil Chip Capacitor
- C4, C9 — 91 pF, Mini-Underwood
- C5, C6 — 12 pF, Mini-Underwood
- C7 — 18 pF, Mini-Underwood
- C8 — 24 pF, Mini-Underwood
- C10 — 0.8-8.0 pF Johanson Gigatrim

- L1, L4 — 11 Turns #20 Enameled Over 10 Ω Carbon Resistor
- L2, L3 — 4 Turns #20 Enameled, .15" ID
- TL1, TL4 — Micro Strip Line, 50 Ω
- TL2 — Micro Strip, $Z_0 = 30 \Omega$, $\lambda/4$ @ 875 MHz
- TL3 — Micro Strip, $Z_0 = 22 \Omega$, $\lambda/4$ @ 875 MHz
- Board — 0.032" Glass Teflon
2 oz. Cu CLAD, $\epsilon_r = 2.55$

Figure 1. 850-900 MHz Broadband Circuit Schematic

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TYPICAL CHARACTERISTICS

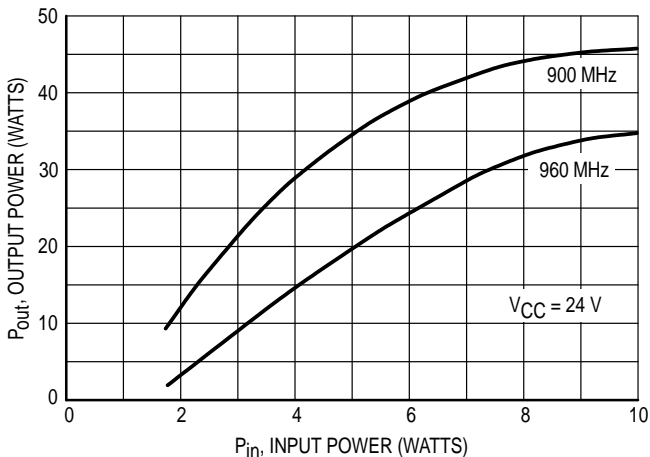


Figure 2. Output Power versus Input Power

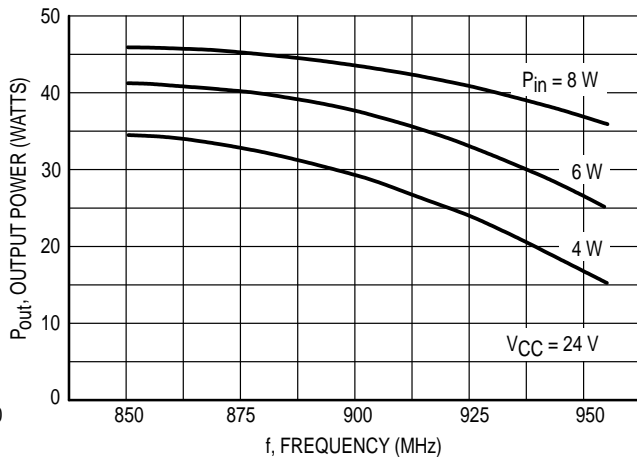


Figure 3. Output Power versus Frequency

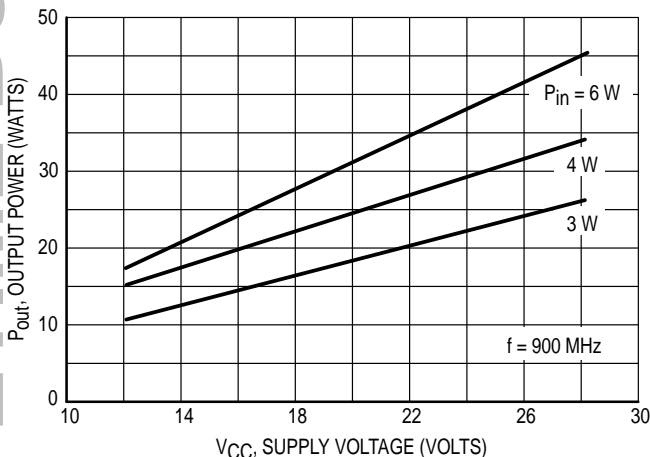


Figure 4. Output Power versus Supply Voltage

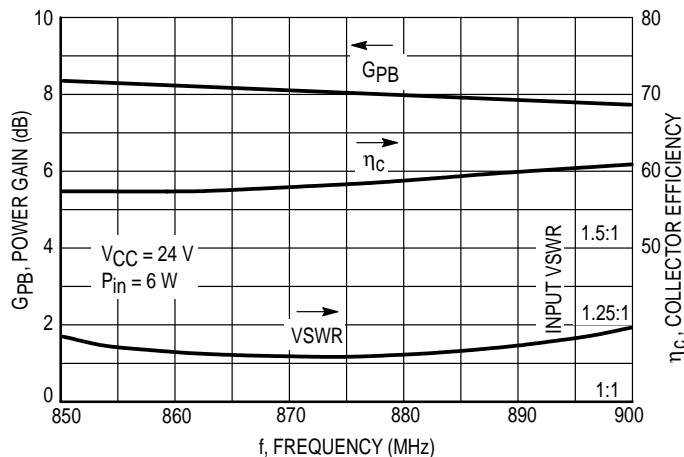
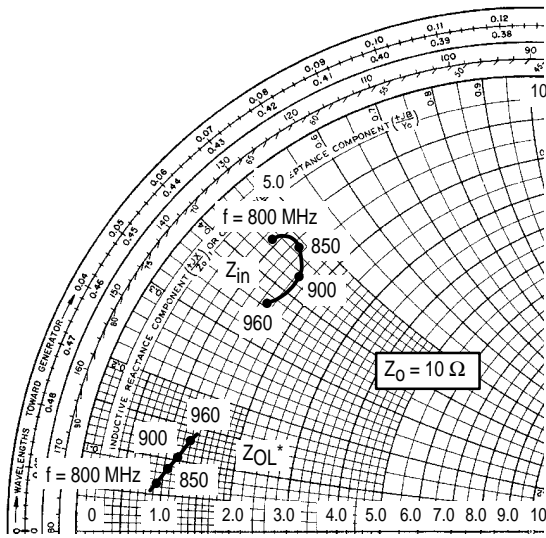


Figure 5. Typical Broadband Circuit Performance

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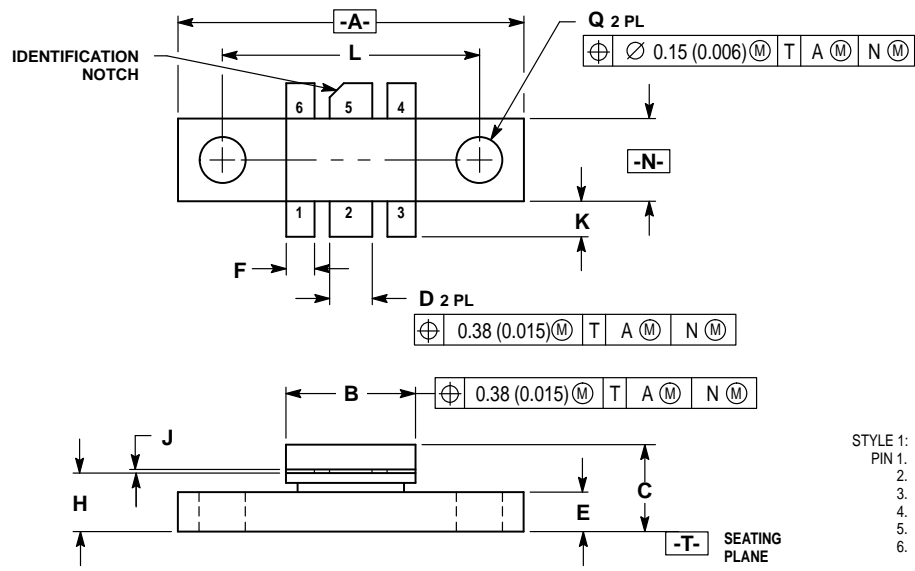
VCC = 24 Vdc, Pout = 30 W

f Frequency MHz	Z _{in} Ohms	Z _{OL} [*] Ohms
800	0.9 + j4.5	1.0 + j0.7
850	1.3 + j4.7	1.1 + j0.9
900	1.6 + j4.4	1.2 + j1.1
960	1.5 + j3.7	1.2 + j1.3

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

Figure 6. Series Equivalent Impedance

PACKAGE DIMENSIONS



NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	0.965	0.985	24.52	25.01
B	0.355	0.375	9.02	9.52
C	0.230	0.260	5.85	6.60
D	0.115	0.125	2.93	3.17
E	0.102	0.114	2.59	2.90
F	0.075	0.085	1.91	2.15
H	0.160	0.170	4.07	4.31
J	0.004	0.006	0.11	0.15
K	0.090	0.110	2.29	2.79
L	0.725 BSC		18.42 BSC	
N	0.225	0.241	5.72	6.12
Q	0.125	0.135	3.18	3.42

STYLE 1:
 PIN 1. BASE (COMMON)
 2. EMITTER (INPUT)
 3. BASE (COMMON)
 4. BASE (COMMON)
 5. COLLECTOR (OUTPUT)
 6. BASE (COMMON)


CASE 319-07
 ISSUE M

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LAST ORDER 06/01/00 LAST SHIP 06/07/00

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