

The RF Line

NPN Silicon

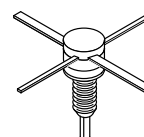
RF Power Transistors

Designed for 24 Volt UHF large-signal, common emitter, Class AB and Class A linear amplifier applications in industrial and commercial FM/AM equipment operating in the range 800–960 MHz.

- Specified 24 Volt, $I_{CQ} = 8.0$ mA (Class AB), 900 MHz Characteristics
Output Power = 3.0 Watts
Minimum Gain = 10 dB @ 900 MHz
Minimum Efficiency = 30% @ 900 MHz, 3.0 Watts
Maximum Intermodulation Distortion –30 dBc @ 3.0 Watts (PEP)
- Characterized with Series Equivalent Large-Signal Parameters from 800 to 960 MHz
- Silicon Nitride Passivated
- 100% Tested for Load Mismatch Stress at all Phase Angles with 5:1 VSWR @ 26 Vdc, at rated output power
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

MRF896

**3.0 W, 900 MHz
RF POWER
TRANSISTORS
NPN SILICON**



**CASE 305-01, STYLE 1
MRF896**

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	30	Vdc
Collector–Emitter Voltage	V_{CES}	55	Vdc
Emitter–Base Voltage	V_{EBO}	4.0	Vdc
Collector–Current — Continuous	I_C	0.45	Adc
Total Device Dissipation @ $T_C = 50^\circ\text{C}$ Derate Above 50°C	P_D	17 0.143	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	$R_{\theta JC}$	7.0	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 20$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	30	37	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 20$ mAdc, $V_{BE} = 0$)	$V_{(BR)CES}$	55	92	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 1.0$ mAdc, $I_C = 0$)	$V_{(BR)EBO}$	4.0	5.0	—	Vdc
Collector Cutoff Current ($V_{CE} = 30$ Vdc, $V_{BE} = 0$)	I_{CES}	—	1.0 nA	1.0	mAdc

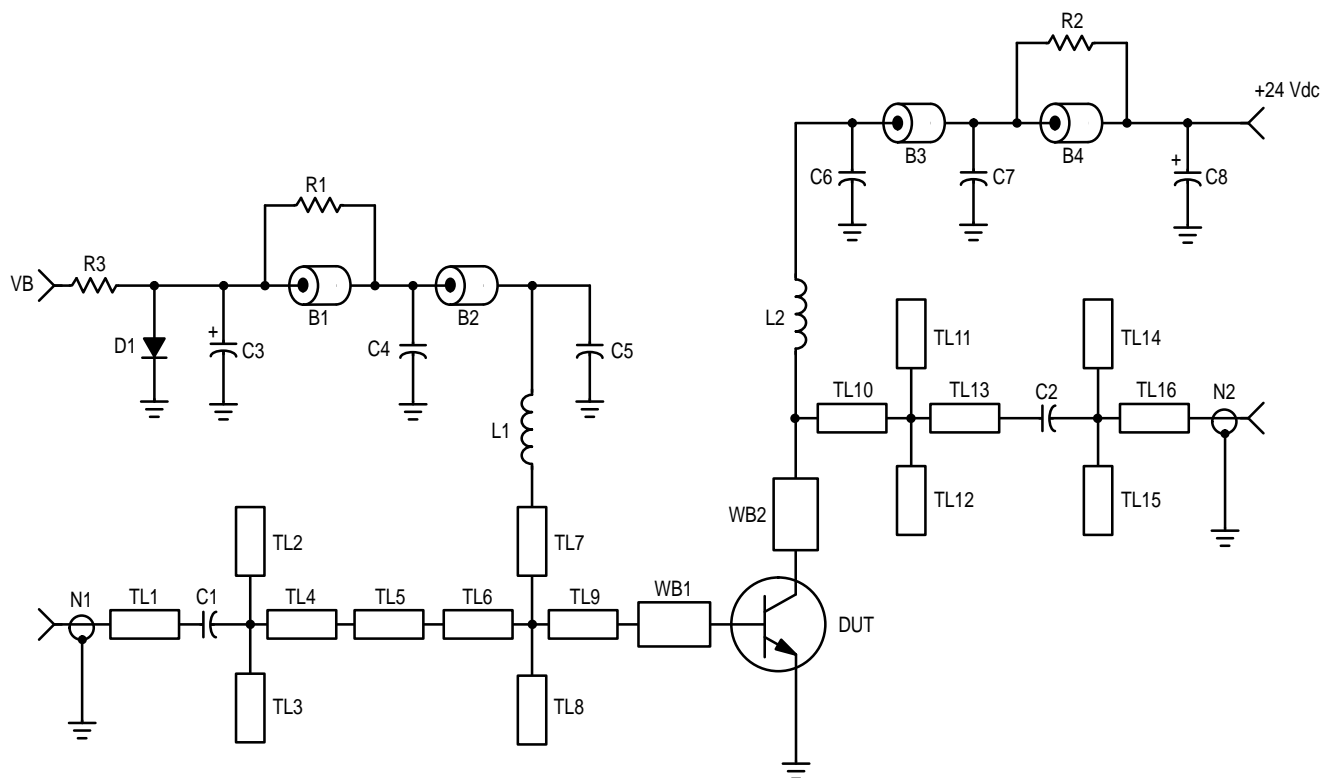
ON CHARACTERISTICS

DC Current Gain ($I_E = 100$ mAdc, $V_{CE} = 5.0$ Vdc)	h_{FE}	30	60	120	—
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(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 24\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	2.4	3.3	4.4	pF
FUNCTIONAL TESTS (In Motorola Test Fixture. See Figure 1.)					
Common-Emitter Amplifier Power Gain ($V_{CC} = 24\text{ Vdc}$, $P_{out} = 3.0\text{ Watts}$, $I_{CQ} = 8.0\text{ mA}$, $f = 900\text{ MHz}$)	G_{pe}	10	12	—	dB
Collector Efficiency ($V_{CC} = 24\text{ Vdc}$, $P_{out} = 3.0\text{ Watts}$, $I_{CQ} = 8.0\text{ mA}$, $f = 900\text{ MHz}$)	η_c	30	45	—	%
3rd Order Intermodulation Distortion ($V_{CC} = 24\text{ Vdc}$, $P_{out} = 3.0\text{ Watts (PEP)}$, $I_{CQ} = 8.0\text{ mA}$, $f_1 = 900\text{ MHz}$, $F_2 = 900.1\text{ MHz}$)	IMD	—	-37	-30	dBc
Output Mismatch Stress ($V_{CC} = 26\text{ Vdc}$, $P_{out} = 3.0\text{ Watts}$, $I_{CQ} = 8.0\text{ mA}$, $f = 900\text{ MHz}$, Load VSWR = 5:1, all phase angles)	ψ	No Degradation in Output Power Before and After Test			



B1, B4 — Long Bead, Fair Rite (2743019446)
 B2, B3 — Short Bead, Fair Rite (2743021446)
 C1, C2 — 43 pF, 100 Mil Chip Capacitor, ATC (100B430JCA500X)
 C3, C8 — 10 μF , 50 V Electrolytic, Panasonic (ECEV1HV100R)
 C4, C7 — 820 pF, Surface Mount, Kemit (C1206N821J1GSC)
 C5, C6 — 100 pF Chip Cap, Murata Erie (GRH710COG101J100VBE)
 D1 — Diode 1N4001, Motorola
 L1, L2 — 7 Turns, 24 AWG, IDIA 0.116"

N1, N2 — Type N Flange, Omni Spectra (3052-1648-10)
 R1, R2 — 4 x 39 Ohm, 1/8 W chips in parallel, Rohm (390-J)
 R3 — 82 Ohm, 1.0 W
 TL1 — $Z_0 = 50\text{ Ohm}$
 TL2-TL15 — See Photomaster
 TL16 — $Z_0 = 50\text{ Ohm}$
 WB1 — Wear Block .200" x .005" BeCu
 WB2 — Wear Block .200" x .060" x .005" BeCu
 Board — 30 mil Glass Teflon, $\epsilon_r = 2.55$, Keene (GX-0300-55-22)

Figure 1. 840-960 MHz Broadband Test Circuit

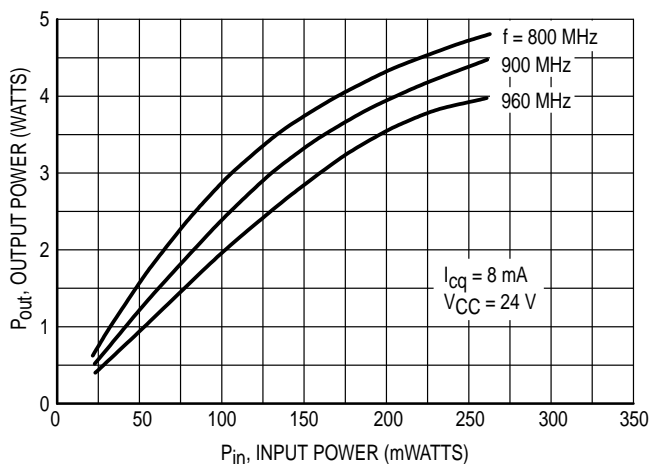


Figure 2. Output Power versus Input Power

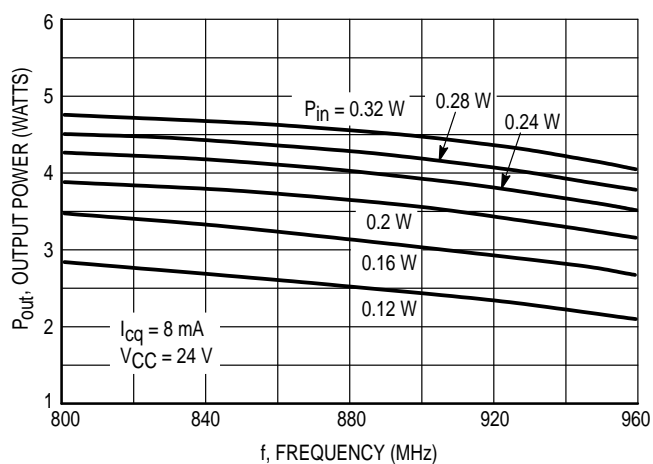


Figure 3. Output Power versus Frequency

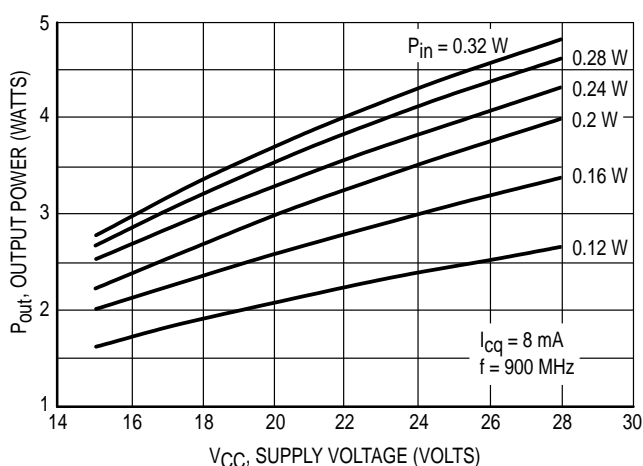


Figure 4. Output Power versus Supply Voltage

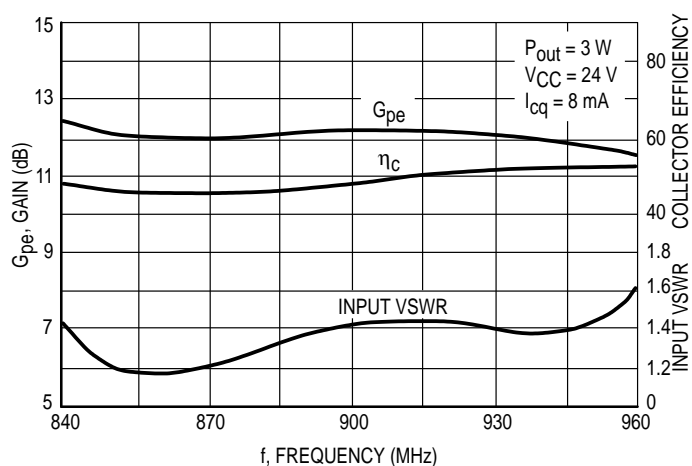


Figure 5. Performance in Broadband Test Fixture

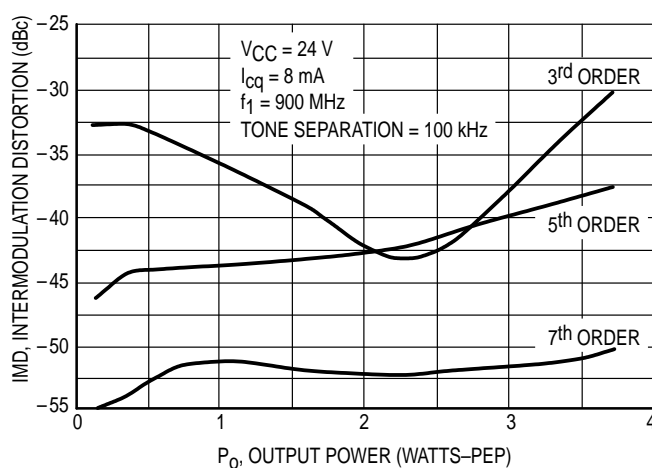
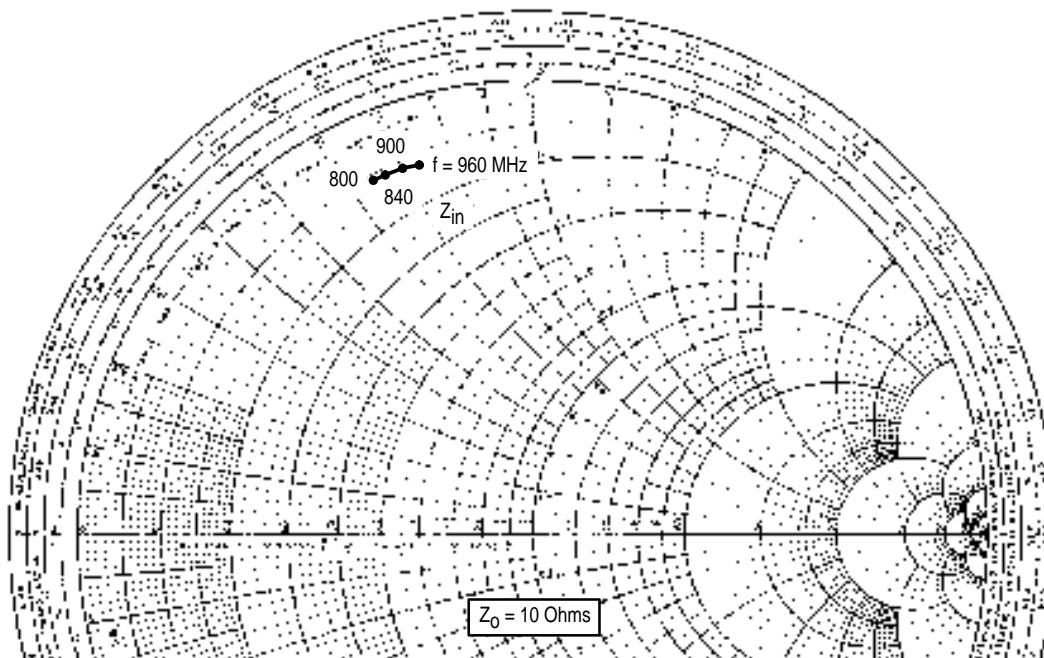
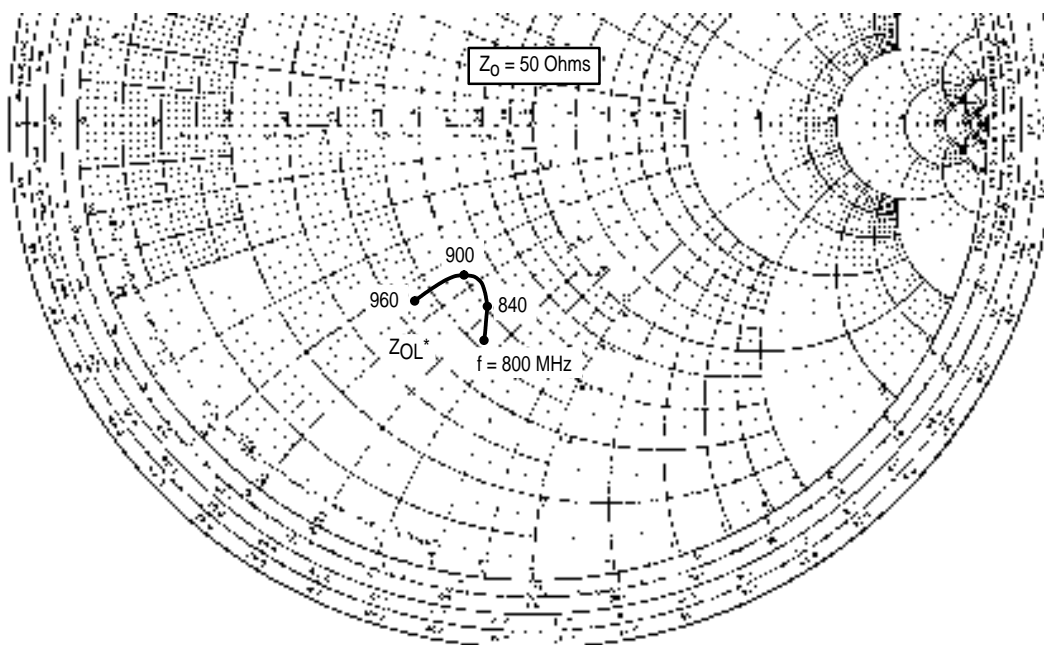


Figure 6. Intermodulation versus Output Power



f (MHz)	Z_{in} Ohms	Z_{OL}^* Ohms
800	$1.1 + j6.4$	$26.4 - j32.7$
840	$1.2 + j6.6$	$30.3 - j28.9$
900	$1.2 + j7.0$	$30.1 - j23.4$
960	$1.3 + j7.3$	$22.1 - j22.5$

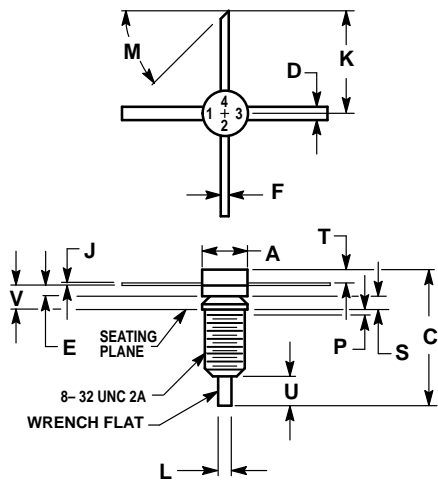


Z_{OL}^* = Conjugate of the optimum load impedance into which the device operates at a given output power, voltage and frequency.

$P_0 = 3 \text{ W}$, $V_{CC} = 24 \text{ V}$, $I_{CQ} = 8 \text{ mA}$

Figure 7. Series Equivalent Input/Output Impedances


PACKAGE DIMENSIONS



DIM	INCHES		MILLIMETERS	
	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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