

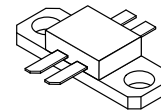
The RF Line

NPN Silicon

RF Power Transistor

Designed for 24 Volt UHF large-signal, common emitter, class-AB linear amplifier applications in industrial and commercial FM/AM equipment operating in the range 800–970 MHz.

- Specified 24 Volt, 900 MHz Characteristics
 - Output Power = 30 Watts
 - Minimum Gain = 10 dB @ 900 MHz, class-AB
 - Minimum Efficiency = 30% @ 900 MHz, 30 Watts (PEP)
 - Maximum Intermodulation Distortion –30 dBc @ 30 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, and Rated Output Power
- Gold Metalized, Emitter Ballasted for Long Life and Resistance to Metal-Migration
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

MRF897
30 W, 900 MHz
RF POWER
TRANSISTOR
NPN SILICON

CASE 395B-01, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	30	Vdc
Collector-Emitter Voltage	V_{CES}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector-Current — Continuous	I_C	4.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	105 0.60	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	$R_{\theta JC}$	1.67	$^\circ\text{C}/\text{W}$

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 ($I_C = 50\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	30	33	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 50\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	60	80	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	4.7	—	Vdc
Collector Cutoff Current ($V_{CE} = 30\text{ Vdc}$, $V_{BE} = 0$)	I_{CES}	—	—	10.0	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_{CE} = 1.0\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	h_{FE}	30	80	120	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 24\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	14	21	28	pF
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(continued)

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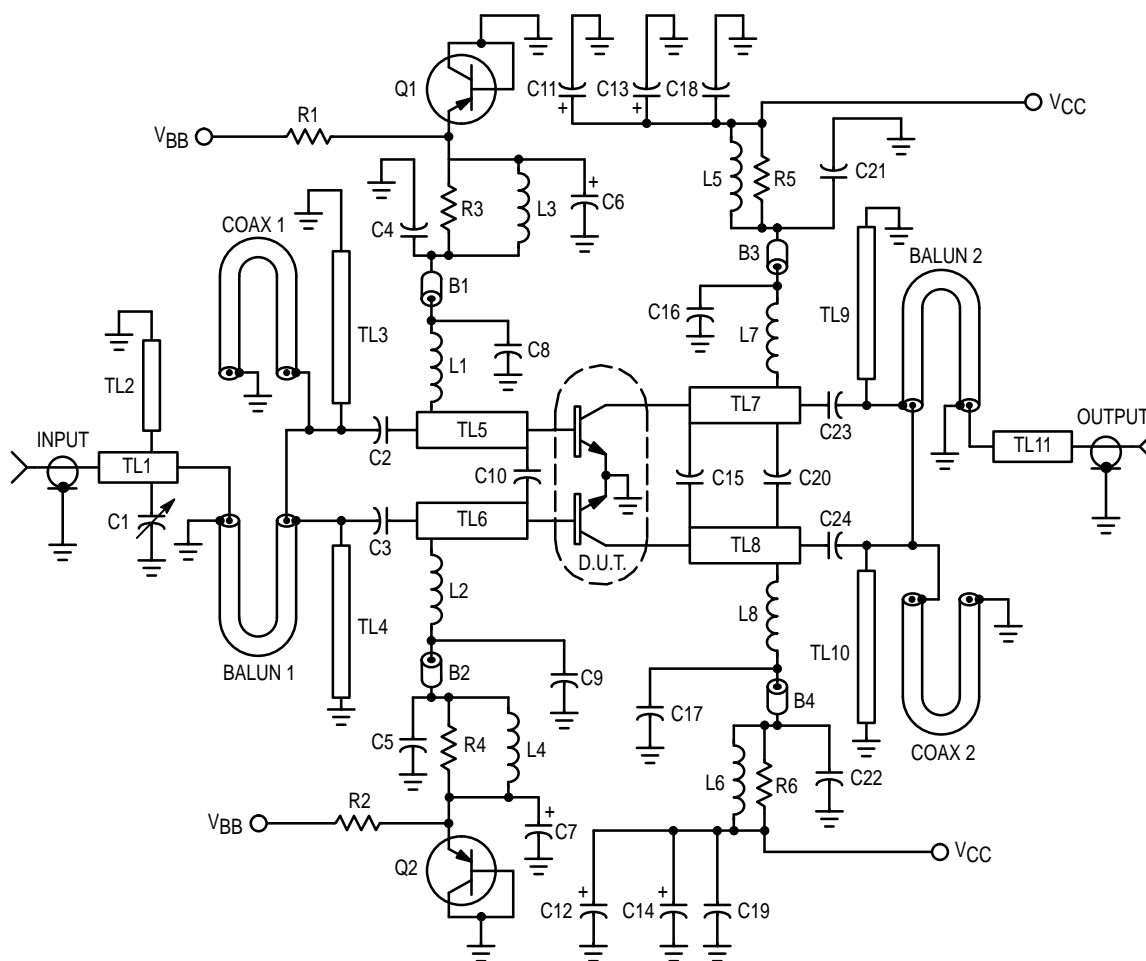
REV 6

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MOTOROLA

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

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL CHARACTERISTICS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 24\text{ Vdc}$, $P_{\text{out}} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$)	G_{pe}	10.0	12.0	—	dB
Collector Efficiency ($V_{CC} = 24\text{ Vdc}$, $P_{\text{out}} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$)	η	35	38	—	%
Intermodulation Distortion ($V_{CC} = 24\text{ Vdc}$, $P_{\text{out}} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$)	IMD	—	-37	-30	dBc
Output Mismatch Stress ($V_{CC} = 26\text{ Vdc}$, $P_{\text{out}} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$, Load VSWR = 5:1 (all phase angles))	ψ	No Degradation in Output Power Before and After Test			



B1, B2, B3, B4 — Ferrite Bead, Fair Rite #2743019447
 C1 — 0.8–8.0 pF Trimmer Capacitor, Johanson
 C2, C3, C23, C24 — 43 pF, 100 mil, ATC Chip Capacitor
 C4, C5, C18, C19, C21, C22 — 820 pF, 100 mil, Chip Capacitor, Kemet
 C6, C7, C11, C12 — 10 μF , Lytic Capacitor, Panasonic
 C8, C9, C16, C17 — 100 pF, 100 mil, Chip Capacitor, Murata Erie
 C10 — 13 pF, 50 mil, ATC Chip Capacitor
 C13, C14 — 250 μF Lytic Capacitor, Mallory
 C15 — 1.1 pF, 50 mil, ATC Chip Capacitor
 C20 — 6.8 pF, 100 mil, ATC Chip Capacitor
 L1, L2, L3, L4, L5, L6 — 5 Turns 20 AWG, IDIA 0.126" choke

N1, N2 — Type N Flange Mount, Omni Spectra 3052–1648–10
 Q1 — Bias Transistor BD136 PNP
 R1, R12 — 39 Ohm, 2.0 W
 R3, R4, R5, R6 — 4.0 x 39 Ohm, 1/8 W, Chips in Parallel, Rohm 390-J
 TL1–TL11 — See Photomaster
 Balun1, Balun2, Coax 1, Coax 2 — 2.20" 50 Ohm, 0.088" o.d. semi-rigid coax, Micro Coax UT-85-M17
 Board — 1/32" Glass Teflon, Arlon GX-0300-55-22, $\epsilon_r = 2.55$

Figure 1. MRF897 Broadband Test Circuit

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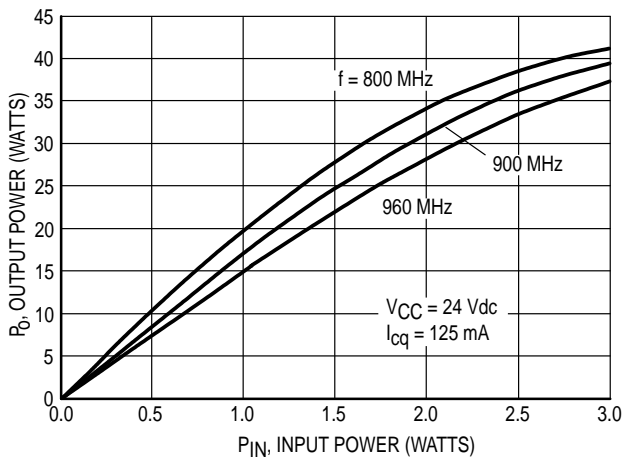


Figure 2. Output Power versus Input Power

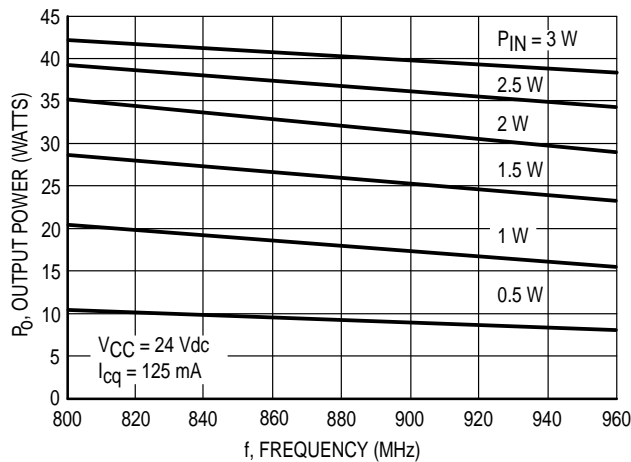


Figure 3. Output Power versus Frequency

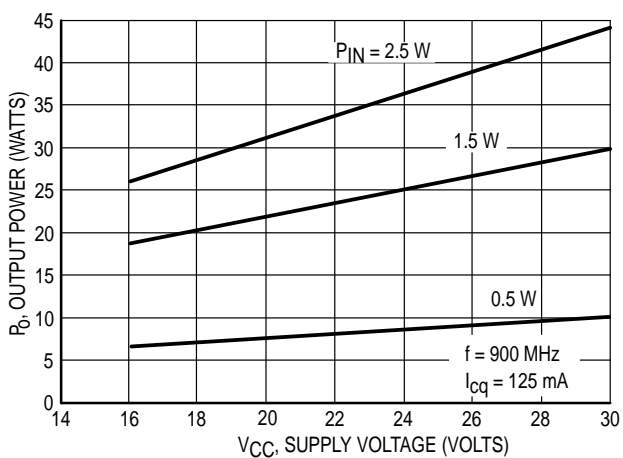


Figure 4. Output Power versus Supply Voltage

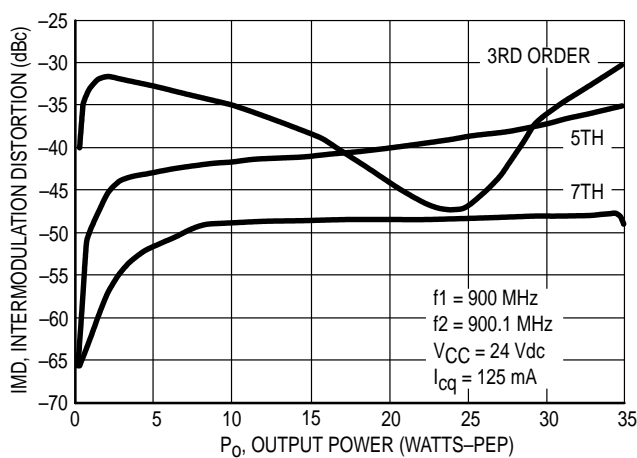


Figure 5. Intermodulation versus Output Power

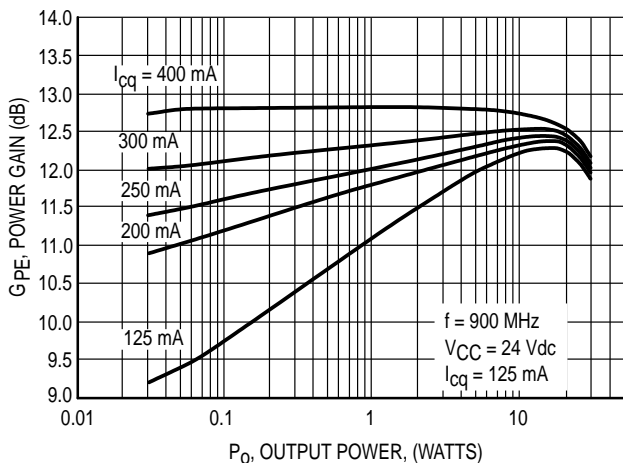


Figure 6. Power Gain versus Output Power

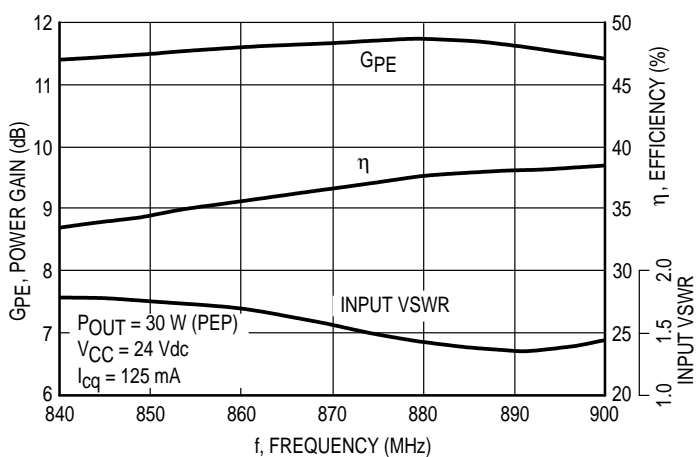
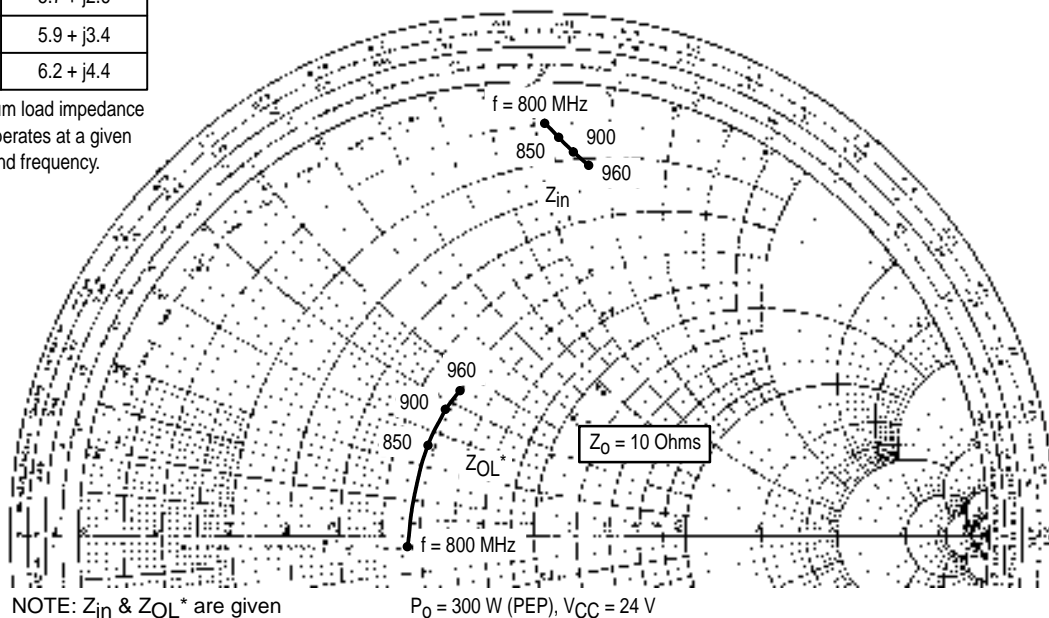


Figure 7. Broadband Test Fixture Performance

f MHz	Z _{in} Ohms	Z _{OL} * Ohms
800	1.0 + j10.3	5.9 - j0.4
850	1.5 + j10.5	5.7 + j2.6
900	1.8 + j11.0	5.9 + j3.4
960	2.2 + j11.4	6.2 + j4.4

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

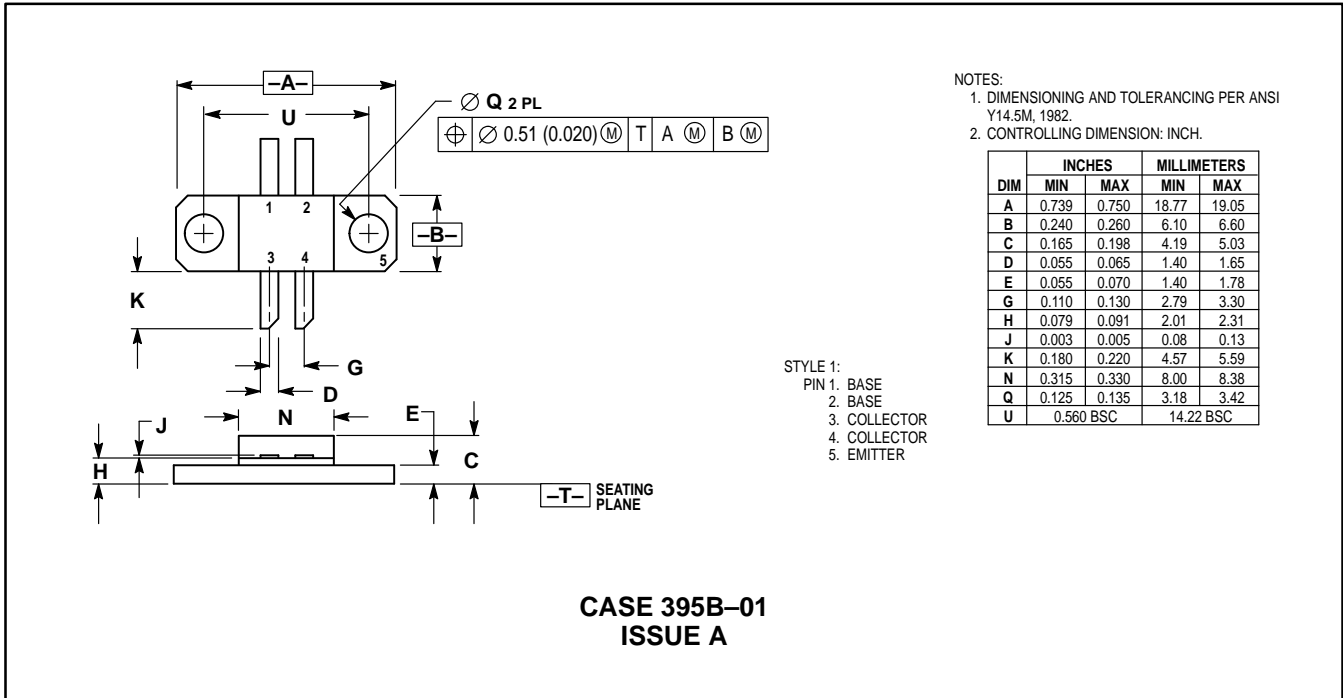



NOTE: Z_{in} & Z_{OL}* are given from base-to-base and collector-to-collector respectively.

P₀ = 300 W (PEP), V_{CC} = 24 V

Figure 8. Series Equivalent Input/Output Impedances

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