

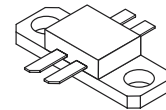
The RF Line
NPN Silicon
RF Power Transistor

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 | $^\circ\text{C/W}$ |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

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 | — |
|---|----------|----|----|-----|---|

DYNAMIC CHARACTERISTICS

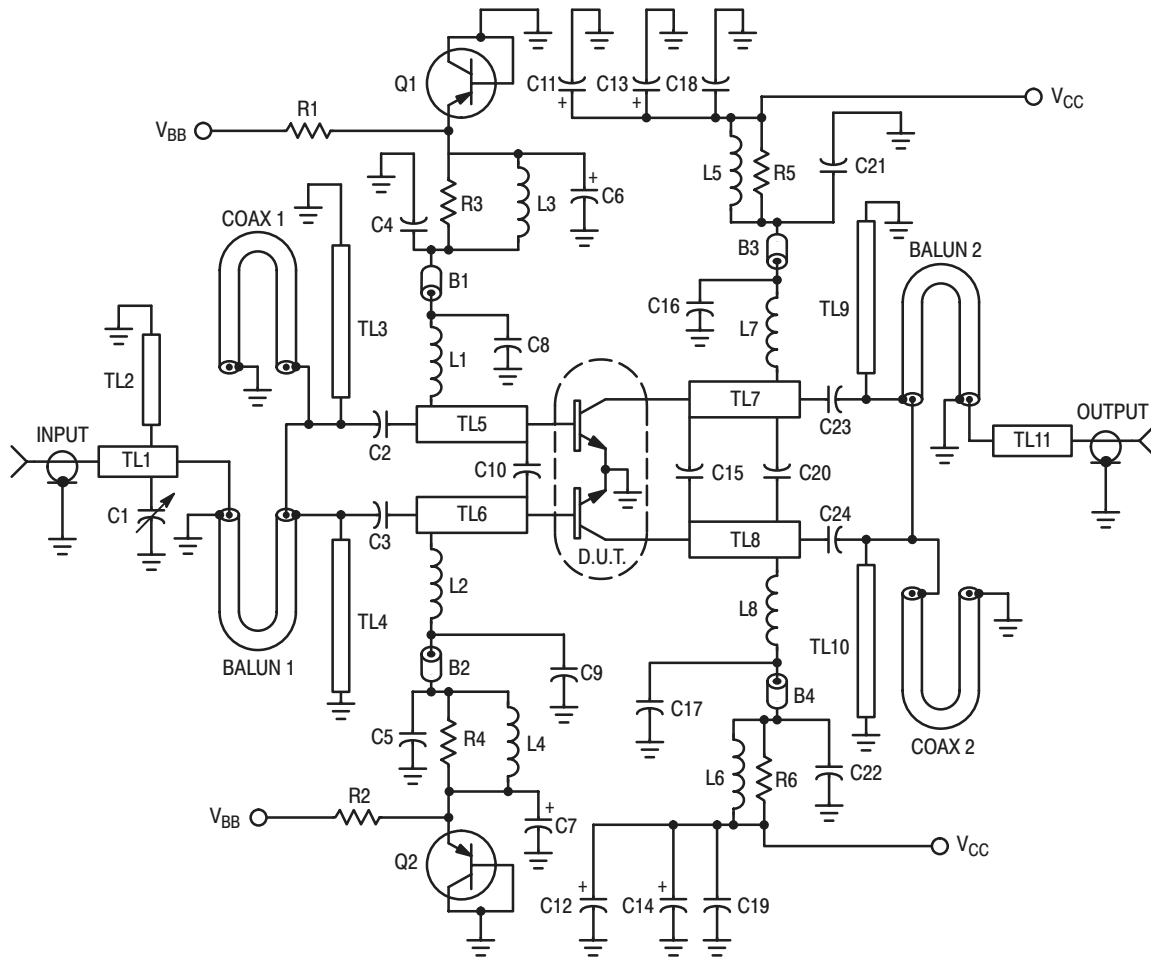
| | | | | | |
|--|----------|----|----|----|----|
| Output Capacitance ($V_{CB} = 24 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{ob} | 14 | 21 | 28 | pF |
|--|----------|----|----|----|----|

(continued)



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 ($V_{CC} = 24\text{ Vdc}$, $P_{out} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$) | G_{pe} | 10.0 | 12.0 | — | dB |
| Collector Efficiency ($V_{CC} = 24\text{ Vdc}$, $P_{out} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$) | η | 35 | 38 | — | % |
| Intermodulation Distortion ($V_{CC} = 24\text{ Vdc}$, $P_{out} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$) | IMD | — | -37 | -30 | dBc |
| Output Mismatch Stress ($V_{CC} = 26\text{ Vdc}$, $P_{out} = 30\text{ Watts (PEP)}$, $I_{CQ} = 125\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$, 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

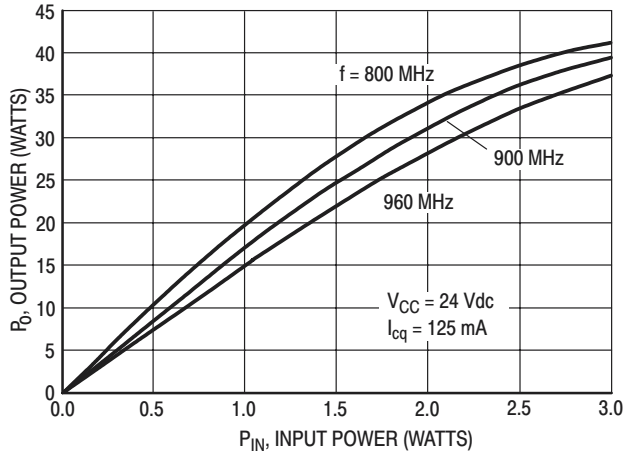


Figure 2. Output Power versus Input Power

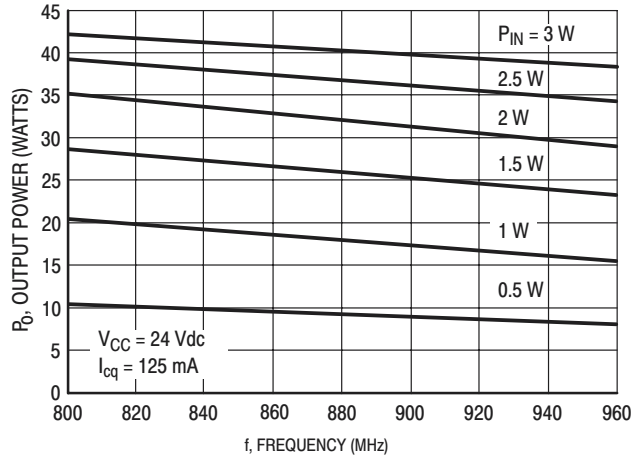


Figure 3. Output Power versus Frequency

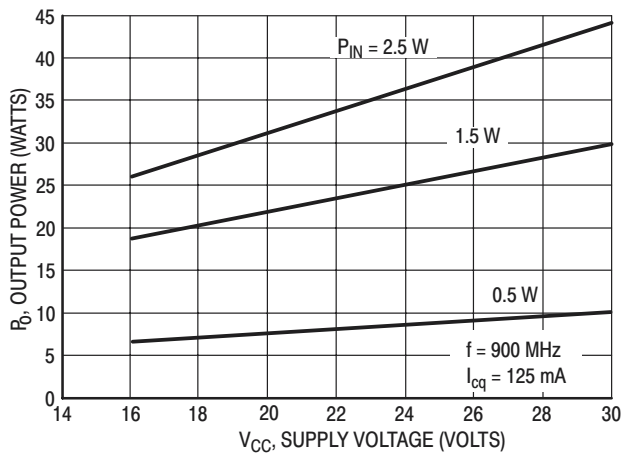


Figure 4. Output Power versus Supply Voltage

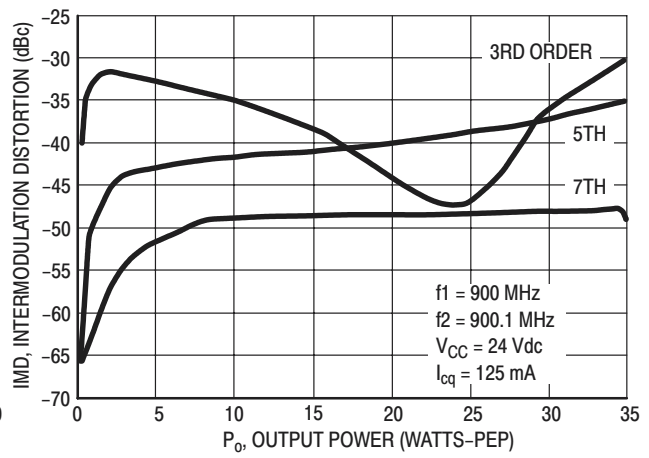


Figure 5. Intermodulation versus Output Power

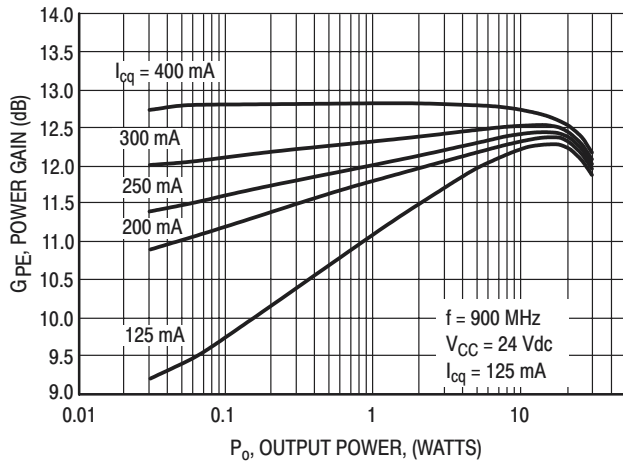


Figure 6. Power Gain versus Output Power

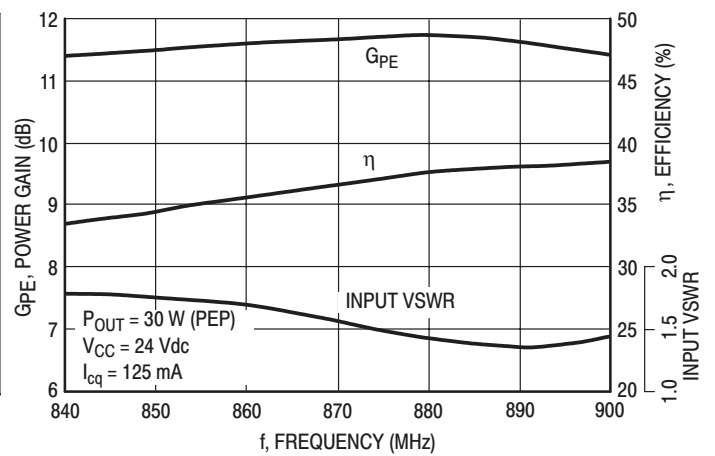
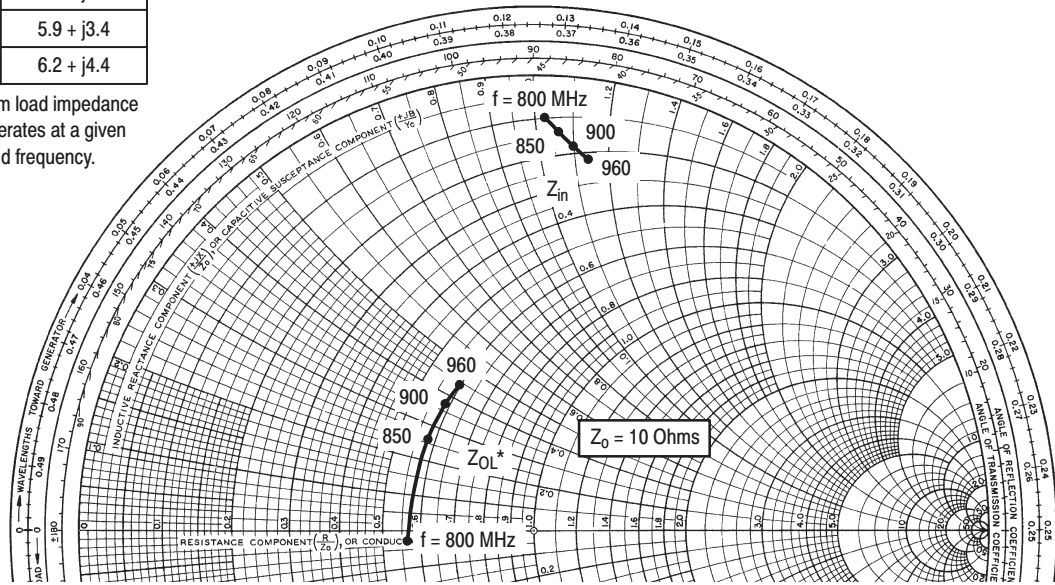


Figure 7. Broadband Test Fixture Performance

| 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 |

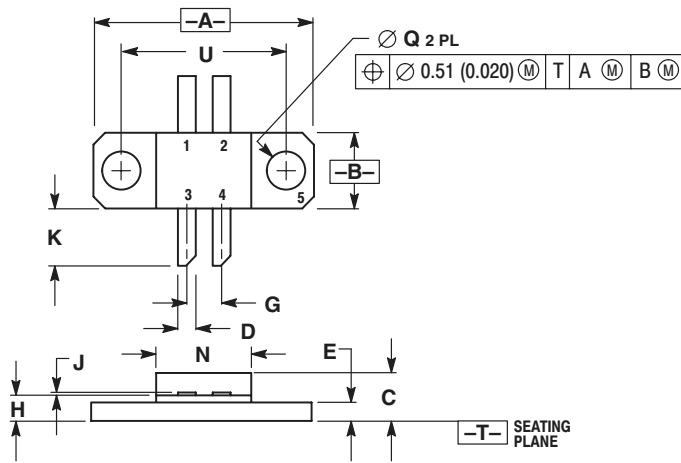
Z_{OL}* = Conjugate of the optimum load impedance into which the device operates at a given output power, voltage and frequency.



NOTE: Z_{in} & Z_{OL}* are given from base-to-base and collector-to-collector respectively.
 P_o = 300 W (PEP), V_{CC} = 24 V

Figure 8. Series Equivalent Input/Output Impedances

PACKAGE DIMENSIONS




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

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.739 | 0.750 | 18.77 | 19.05 |
| B | 0.240 | 0.260 | 6.10 | 6.60 |
| C | 0.165 | 0.198 | 4.19 | 5.03 |
| D | 0.055 | 0.065 | 1.40 | 1.65 |
| E | 0.055 | 0.070 | 1.40 | 1.78 |
| G | 0.110 | 0.130 | 2.79 | 3.30 |
| H | 0.079 | 0.091 | 2.01 | 2.31 |
| J | 0.003 | 0.005 | 0.08 | 0.13 |
| K | 0.180 | 0.220 | 4.57 | 5.59 |
| N | 0.315 | 0.330 | 8.00 | 8.38 |
| Q | 0.125 | 0.135 | 3.18 | 3.42 |
| U | 0.560 BSC | | 14.22 BSC | |

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

**CASE 395B-01
 ISSUE A**

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MOTOROLA



MRF897/D

