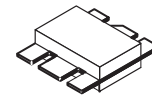


The RF Line  
**NPN Silicon**  
**RF Power Transistors**

**MRF891S**

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



CASE 319A-02, STYLE 2

Designed for 24 volt UHF large-signal, common-emitter amplifier applications in industrial and commercial FM equipment operating in the range of 800–960 MHz.

- Specified 24 Volt, 900 MHz Characteristics
  - Output Power = 5.0 Watts
  - Power Gain = 9.0 dB Min
  - Efficiency = 50% Min
- Series Equivalent Large-Signal Characterization
- Capable of Withstanding 20:1 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.

**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	$I_C$	0.6	Adc
Total Device Dissipation @ $T_A = 50^\circ\text{C}$ (1) Derate above $50^\circ\text{C}$	$P_D$	18 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 (2)	$R_{\theta JC}$	7.0	$^\circ\text{C}/\text{W}$

**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 ( $I_C = 20 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	30	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 20 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	55	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 0.5 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = 30 \text{ Vdc}$ , $V_{BE} = 0$ , $T_C = 25^\circ\text{C}$ )	$I_{CES}$	—	—	1.0	mAdc

**ON CHARACTERISTICS**

DC Current Gain ( $I_C = 200 \text{ mAdc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	30	—	150	—
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NOTES:

- 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.

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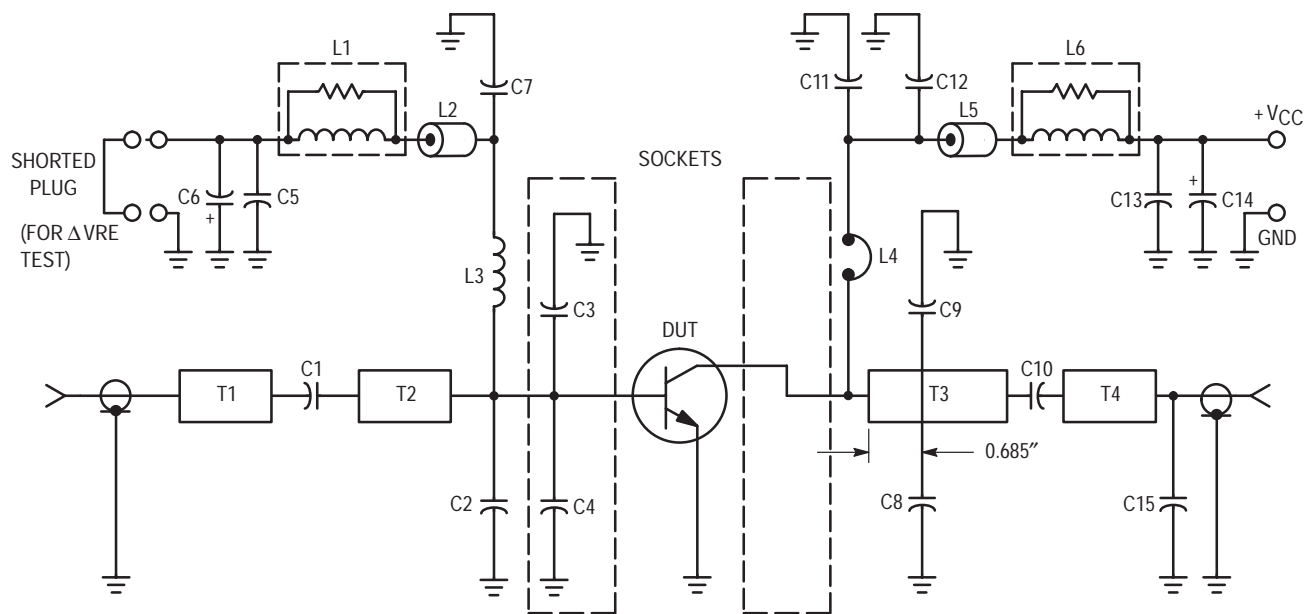
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**ELECTRICAL CHARACTERISTICS — continued** ( $T_C = 25^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 24\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	6.5	8.0	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain (Broadband) ( $V_{CC} = 24\text{ Vdc}$ , $P_{out} = 5.0\text{ W}$ , $f = 900\text{ MHz}$ )	$G_{pe}$	9.0	10	—	dB
Collector Efficiency ( $V_{CC} = 24\text{ Vdc}$ , $P_{out} = 5.0\text{ W}$ , $f = 900\text{ MHz}$ )	$\eta$	50	57	—	%
Load Mismatch Stress ( $V_{CC} = 24\text{ Vdc}$ , $P_{in} = 0.63\text{ W}$ , $f = 900\text{ MHz}$ , $VSWR = 20:1$ , all phase angles)	$\psi$	No Degradation in Output Power			

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- C1 — 39 pF, 100 Mil Chip Capacitor
- C2, C8, C15 — 0.8–8.0 pF Johansen Gigatrim
- C3, C4 — 12 pF, Mini-Unelco
- C5, C13 — 1000 pF, 350 V Unelco
- C6, C14 — 10  $\mu\text{F}$ , 25 V Tantalum
- C7, C11, C12 — 91 pF, Mini-Unelco
- C9 — 5.0 pF, Mlni-Unelco
- C10 — 47 pF, 100 Mil Chip Capacitor

- L1, L6 — 10 Turns #20 AWG Around 10 Ohm 1/2 Watt Resistor
- L2, L5 — Ferrite Bead
- L3 — 4 Turns #16 AWG Choke
- L4 — 0.5", #18 AWG Wire
- T1, T4 — 50 Ohm Microstrip Line
- T2 —  $W = 165\text{ Mils}$ ,  $\ell = 1946\text{ Mils}$
- T3 —  $W = 166\text{ Mils}$ ,  $\ell = 1563\text{ Mils}$
- PC Board — 0.031" Glass Teflon ( $\epsilon_r = 2.56$ )

**Figure 1. Broadband Test Fixture**

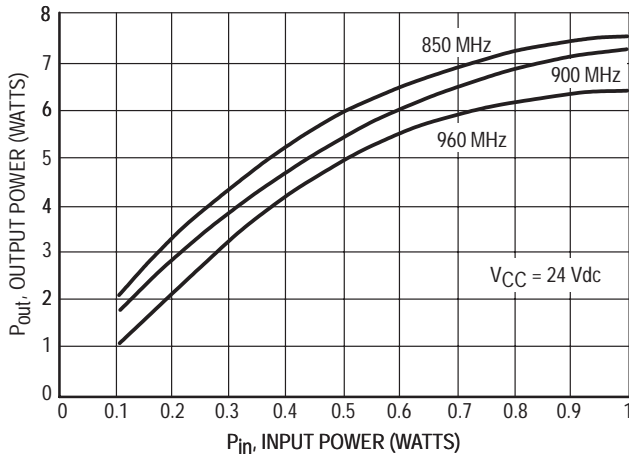


Figure 2. Output Power versus Input Power

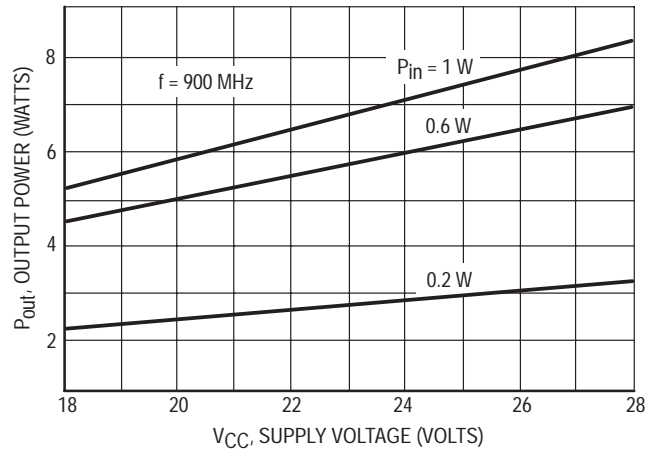


Figure 3. Output Power versus Supply Voltage

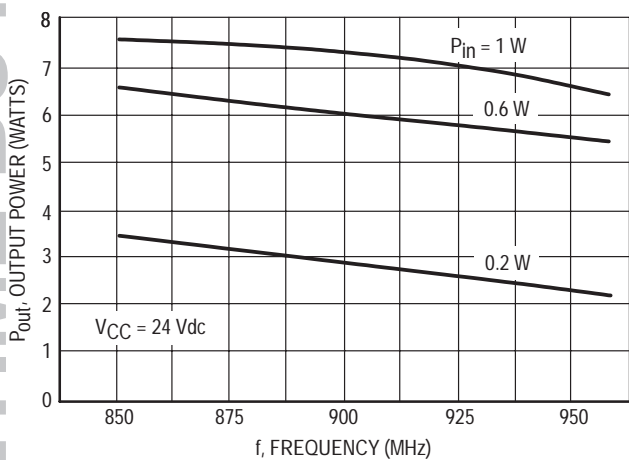


Figure 4. Output Power versus Frequency

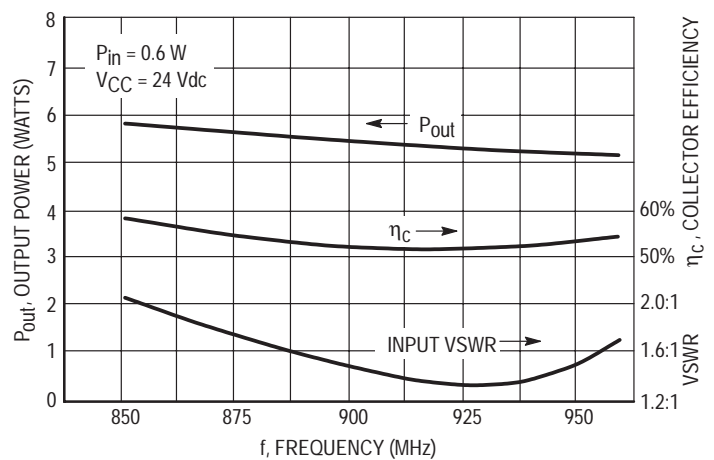


Figure 5. Typical Broadband Circuit Performance

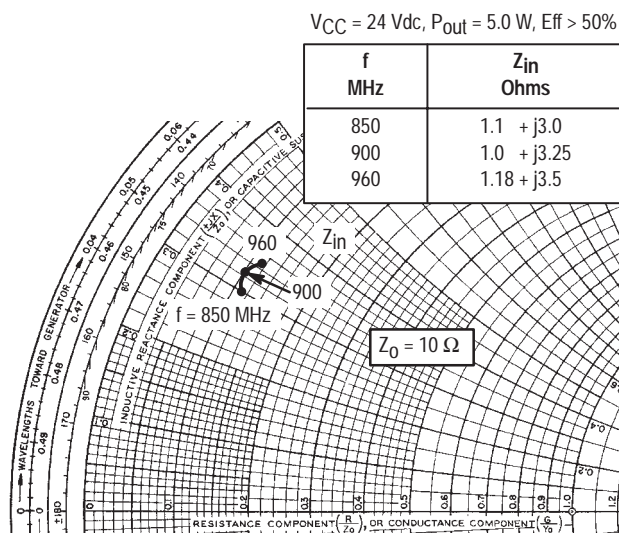


Figure 6. Series Equivalent Input Impedance

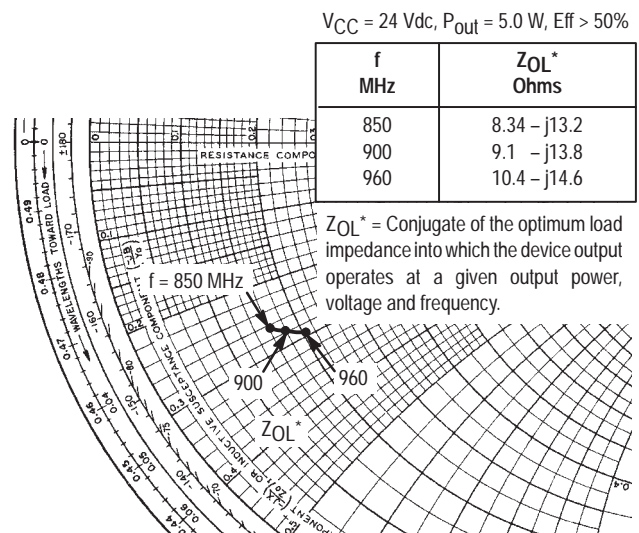
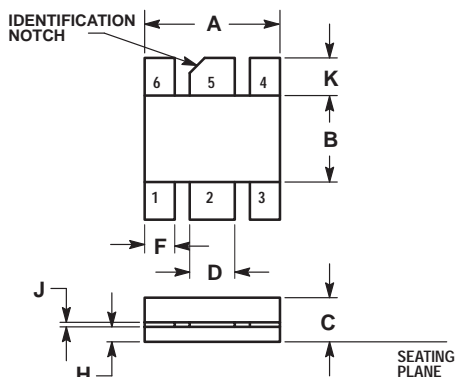


Figure 7. Series Equivalent Output Impedance

PACKAGE DIMENSIONS



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.355	0.365	9.02	9.27
B	0.225	0.235	5.72	5.96
C	0.110	0.125	2.80	3.17
D	0.115	0.125	2.93	3.17
F	0.075	0.085	1.91	2.15
H	0.035	0.045	0.89	1.14
J	0.004	0.006	0.11	0.15
K	0.090	0.110	2.29	2.79

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

CASE 319A-02  
 ISSUE B

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