

The RF Line

NPN Silicon

RF Power Transistors

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

ON CHARACTERISTICS

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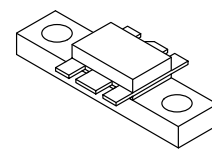
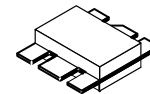
NOTES:

- 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.

(continued)

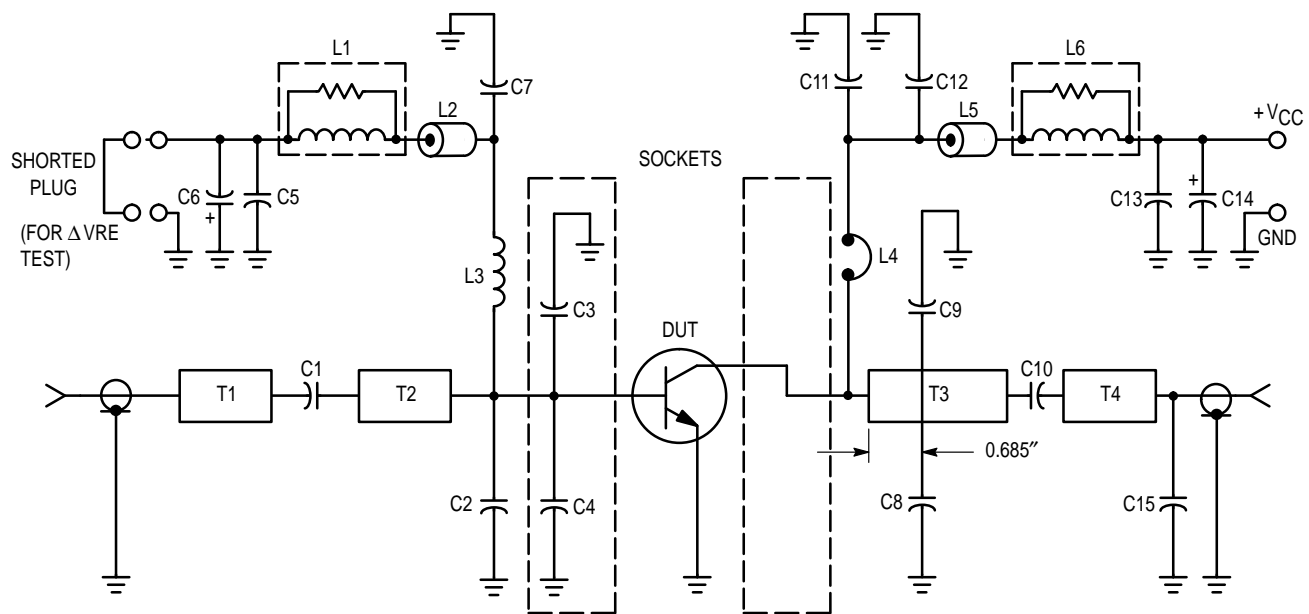
REV 6

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MOTOROLA
MRF891
MRF891S
5.0 W, 900 MHz
RF POWER
TRANSISTORS
NPN SILICON

CASE 319-07, STYLE 2
MRF891

CASE 319A-02, STYLE 2
MRF891S

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

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}	—	6.5	8.0	pF
FUNCTIONAL TESTS					
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 ($V_{CC} = 24\text{ Vdc}$, $P_{out} = 5.0\text{ W}$, $f = 900\text{ MHz}$)	η	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)	ψ	No Degradation in Output Power			



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 μF , 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

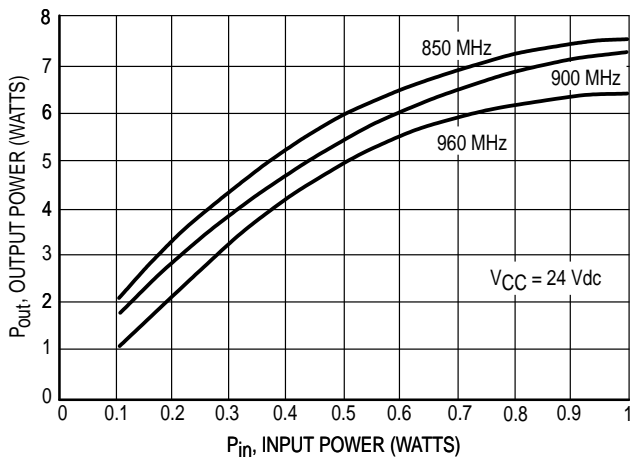


Figure 2. Output Power versus Input Power

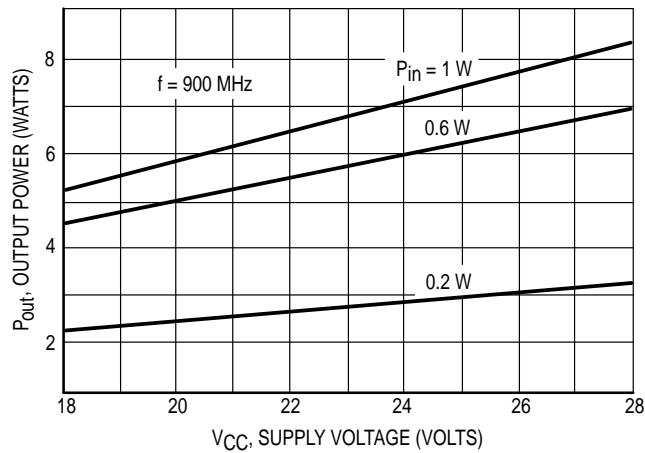


Figure 3. Output Power versus Supply Voltage

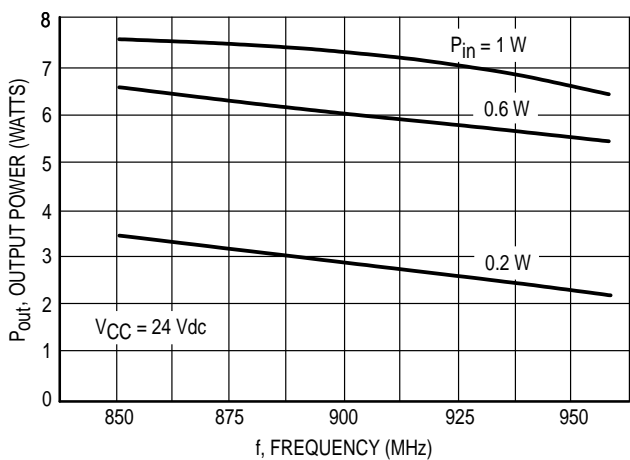


Figure 4. Output Power versus Frequency

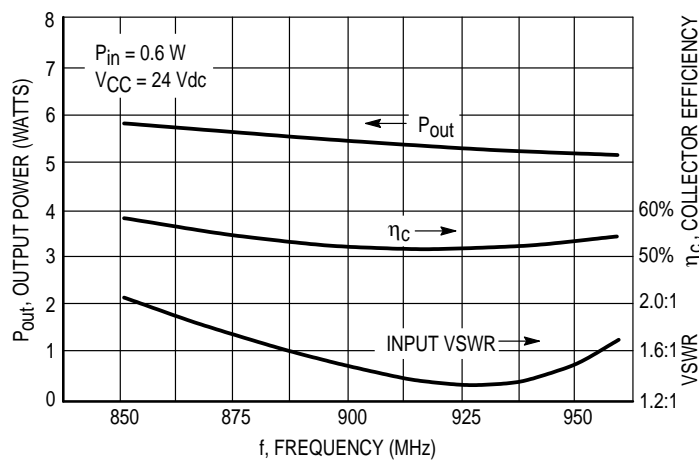


Figure 5. Typical Broadband Circuit Performance

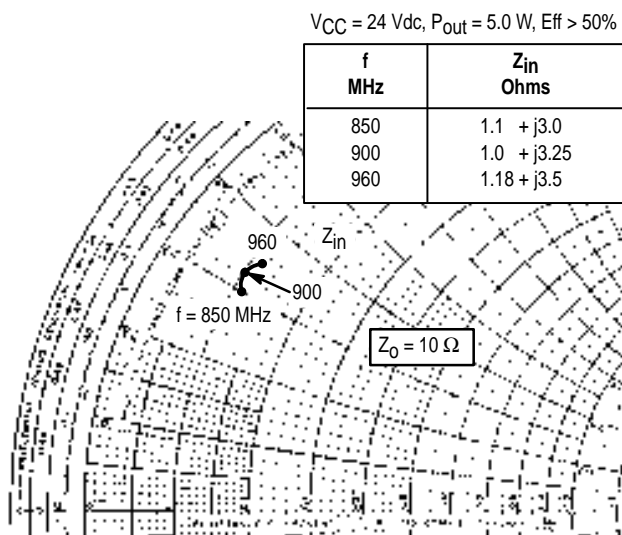


Figure 6. Series Equivalent Input Impedance

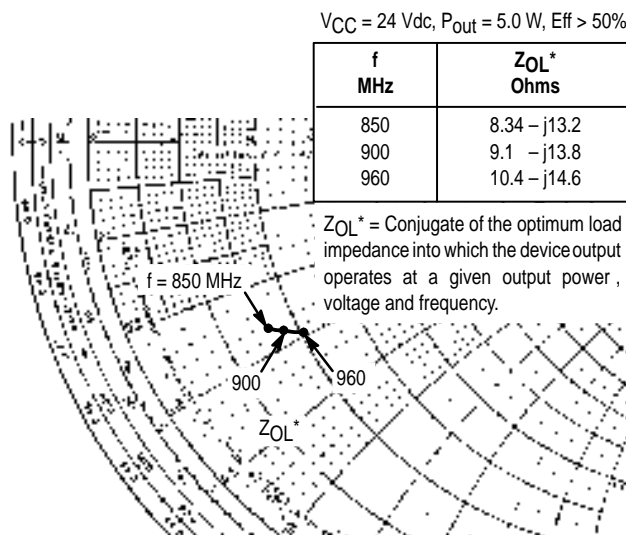


Figure 7. Series Equivalent Output Impedance

PACKAGE DIMENSIONS

IDENTIFICATION NOTCH

Q 2 PL
 $\oplus \text{ } \varnothing 0.15 (0.006) \text{ (M) T A (M) N (M)}$

-A-
 $\oplus 0.38 (0.015) \text{ (M) T A (M) N (M)}$

D 2 PL
 $\oplus 0.38 (0.015) \text{ (M) T A (M) N (M)}$

-N-

-T- SEATING PLANE

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

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

**CASE 319-07
ISSUE M
MRF891**

IDENTIFICATION NOTCH

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

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

**CASE 319A-02
ISSUE B
MRF891S**

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MRF891/D

