

The RF Line

NPN Silicon

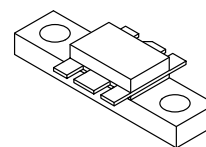
RF Power Transistors

... 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.

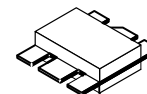
- Specified 24 Volt, 900 MHz Characteristics
 - Output Power = 5.0 Watts
 - Power Gain = 9.0 dB Min
 - Efficiency = 50% Min
- Series Equivalent Large-Signal Characterization
- Capable of Withstanding 20:1 VSWR Load Mismatch at Rated Output Power and Supply Voltage
- Gold Metallized, Emitter Ballasted 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.

MRF891
MRF891S

5.0 W, 900 MHz
RF POWER
TRANSISTORS
NPN SILICON



CASE 319-07, STYLE 2
MRF891



CASE 319A-02, STYLE 2
MRF891S

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
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 20\text{ mA}$, $I_B = 0$)	$V_{(BR)CEO}$	30	—	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 20\text{ mA}$, $V_{BE} = 0$)	$V_{(BR)CES}$	55	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 0.5\text{ mA}$, $I_C = 0$)	$V_{(BR)EBO}$	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 ($I_C = 200\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	30	—	150	—
--	----------	----	---	-----	---

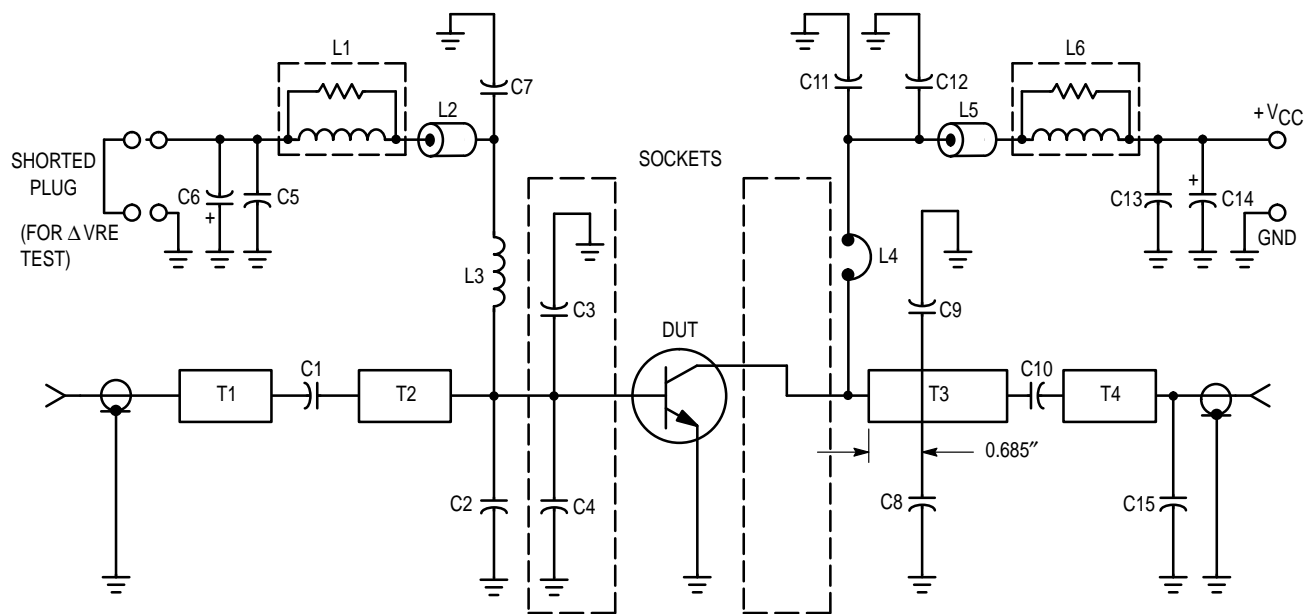
NOTES:

- 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)

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

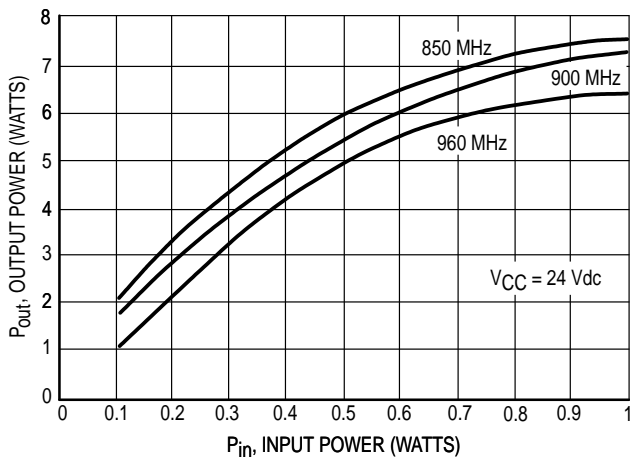


Figure 2. Output Power versus Input Power

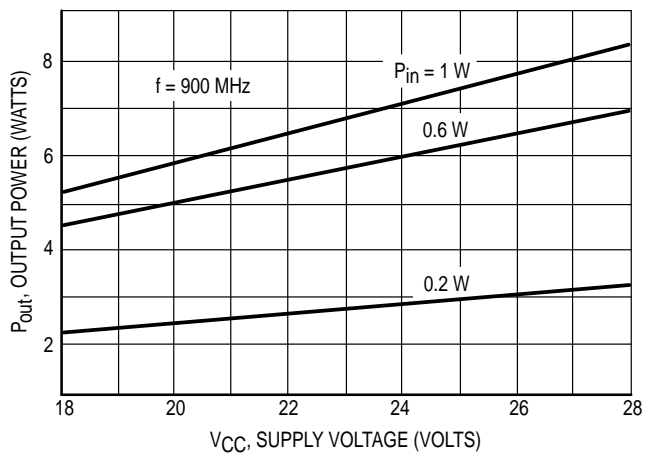


Figure 3. Output Power versus Supply Voltage

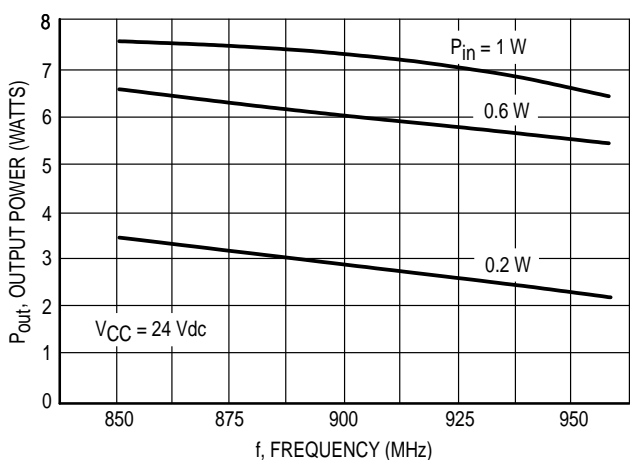


Figure 4. Output Power versus Frequency

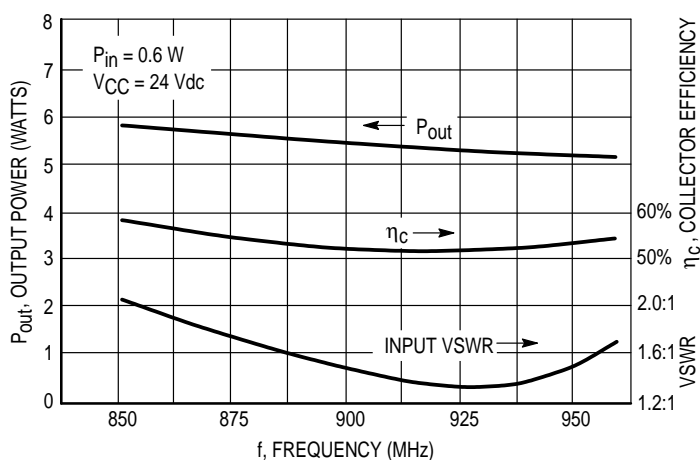


Figure 5. Typical Broadband Circuit Performance

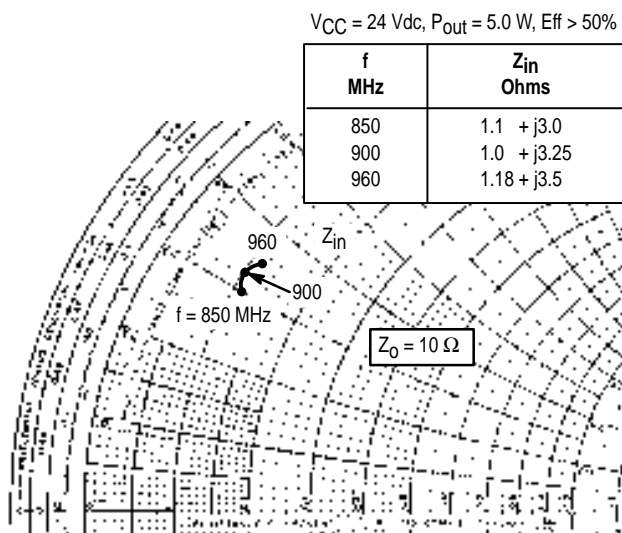


Figure 6. Series Equivalent Input Impedance

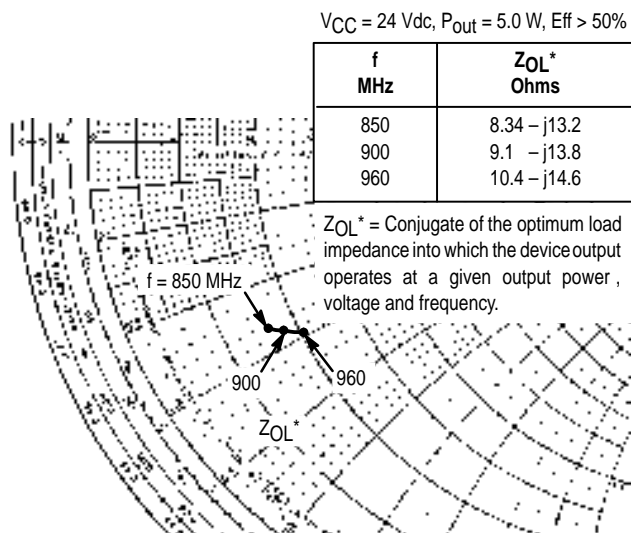
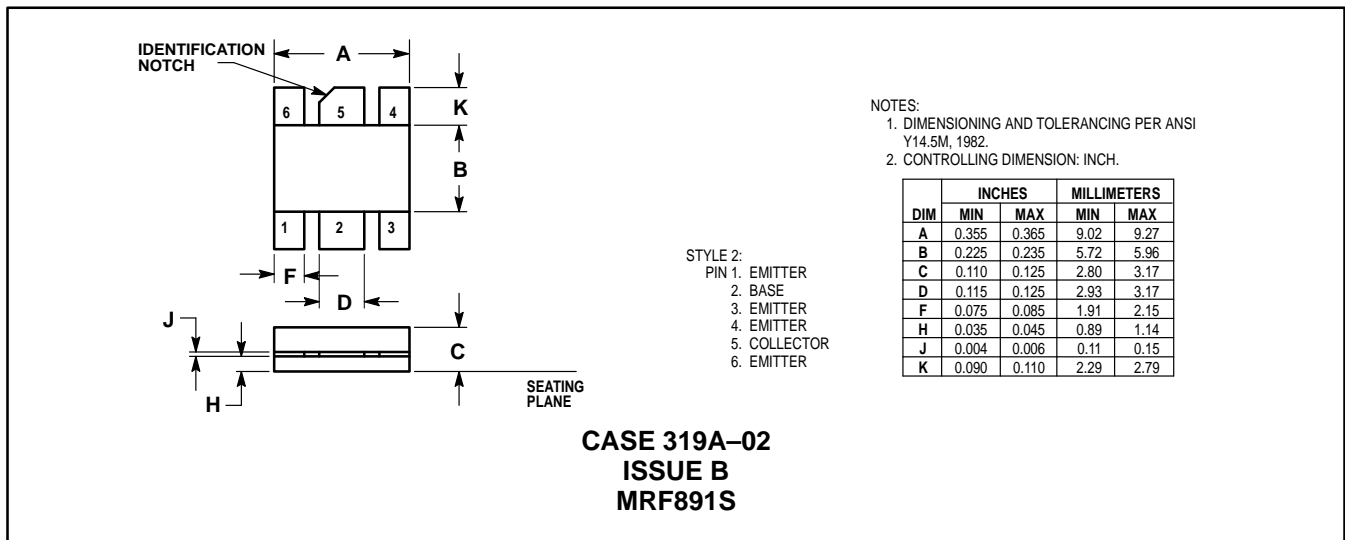
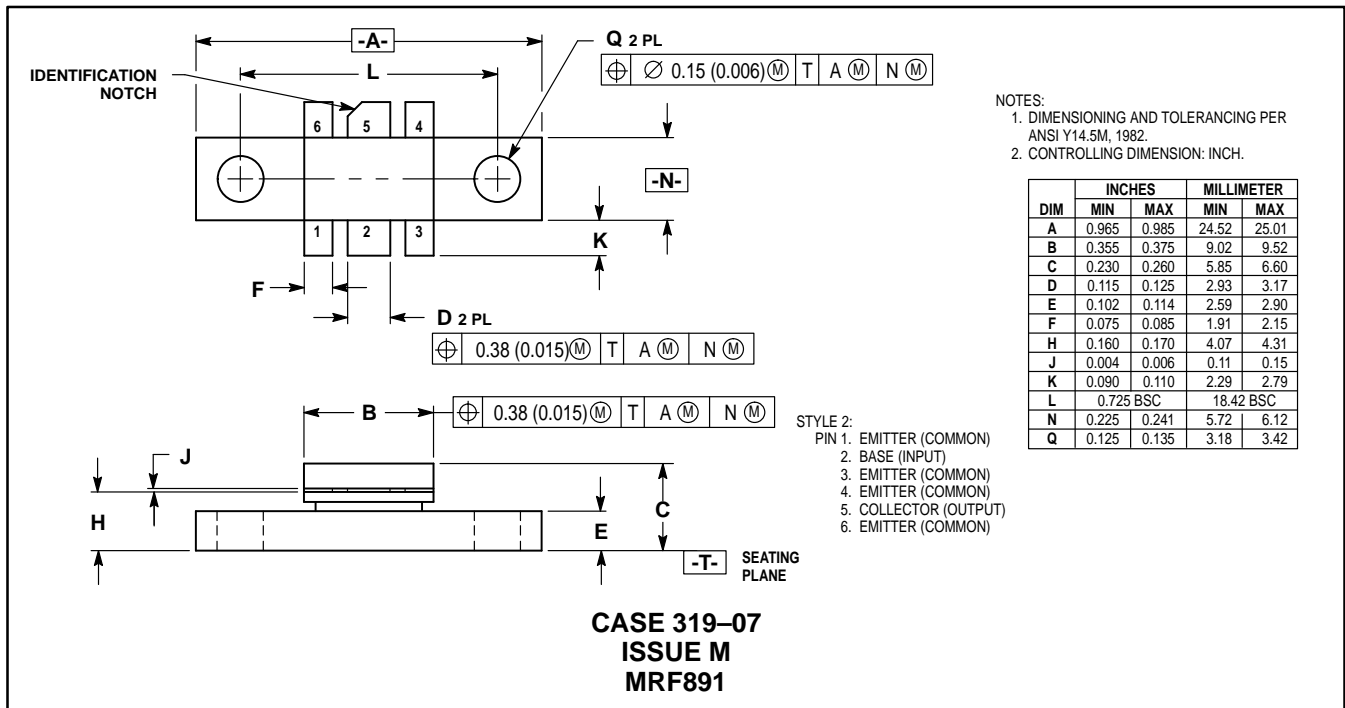


Figure 7. Series Equivalent Output Impedance

PACKAGE DIMENSIONS



Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.
 EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.
 JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.
 ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.

