

# The RF Line

## NPN Silicon

### RF Low Power Transistor

**MRF8372R1, R2**

Designed primarily for wideband large signal predriver stages in 800 MHz and UHF frequency ranges.

- Specified @ 12.5 V, 870 MHz Characteristics
  - Output Power = 750 mW
  - Minimum Gain = 8.0 dB
  - Efficiency 60% (Typ)
- State-of-the-Art Technology
  - Fine Line Geometry
  - Gold Top Metal and Wires
  - Silicon Nitride Passivated
  - Ion Implanted Arsenic Emitters
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.
- Order MRF8372 in tape and reel packaging by adding suffix:
  - R1 suffix = 500 units per reel
  - R2 suffix = 2,500 units per reel

750 mW, 870 MHz  
RF LOW POWER  
TRANSISTOR  
NPN SILICON



CASE 751-05, STYLE 1  
SORF (SO-8)

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	16	Vdc
Collector-Base Voltage	$V_{CBO}$	36	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	200	mAdc
Total Device Dissipation @ $T_C = 75^\circ\text{C}$ (1) Derate above $75^\circ\text{C}$	$P_D$	1.67 22.2	Watts mW/ $^\circ\text{C}$
Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$
Maximum Junction Temperature	$T_{Jmax}$	150	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	45	$^\circ\text{C}/\text{W}$

#### DEVICE MARKING

MRF8372 = 8372
----------------

#### NOTE:

- Case temperature measured on collector lead immediately adjacent to body of package.

(Replaces MRF837/D)

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

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

**OFF CHARACTERISTICS**

Collector–Emitter Breakdown Voltage ( $I_C = 5.0\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	16	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 5.0\text{ mA}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	36	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 0.1\text{ mA}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = 15\text{ Vdc}$ , $V_{BE} = 0$ , $T_C = 25^\circ\text{C}$ )	$I_{CES}$	—	—	0.1	mA

**ON CHARACTERISTICS**

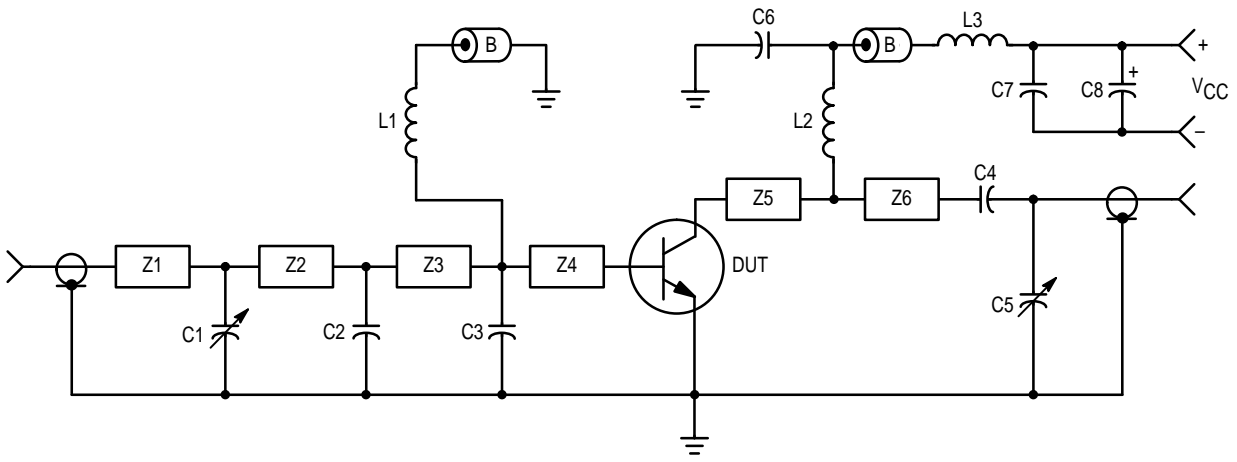
DC Current Gain ( $I_C = 50\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )	$h_{FE}$	30	90	200	—
------------------------------------------------------------------------	----------	----	----	-----	---

**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 15\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	1.8	2.5	pF
---------------------------------------------------------------------------------------	----------	---	-----	-----	----

**FUNCTIONAL TESTS**

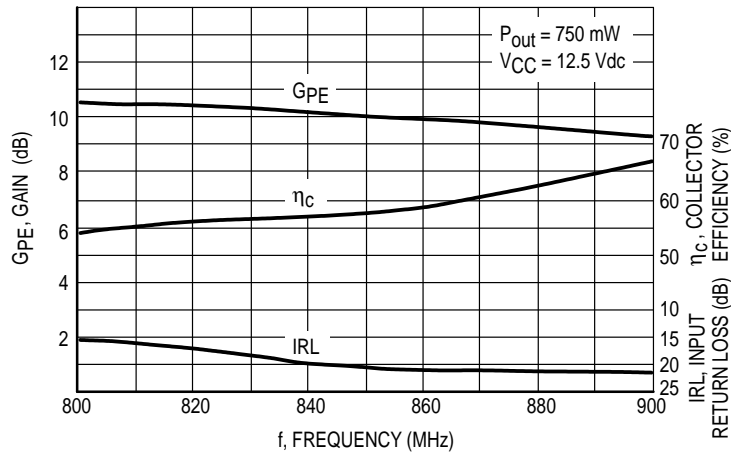
Common–Emitter Amplifier Power Gain ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{out} = 0.75\text{ W}$ , $f = 870\text{ MHz}$ )	$G_{pe}$	8.0	10	—	dB
Collector Efficiency ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{out} = 0.75\text{ W}$ , $f = 870\text{ MHz}$ )	$\eta$	55	60	—	%



- |                                         |                                                  |
|-----------------------------------------|--------------------------------------------------|
| C1, C5 — 0.8–8.0 pF Johanson Gigatrim   | L1, L2 — 4 Turns, #21 AWG, 5/32" ID              |
| C2, C3 — 10 pF Ceramic Chip Capacitor   | L3 — 7 Turns, #21 AWG, 5/32" ID                  |
| C6 — 91 pF Clamped Mica, Mini-Underwood | Z1, Z2 — 1" x 0.078" Microstrip, $Z_0 = 50$ Ohms |
| C4 — 47 pF Ceramic Chip Capacitor       | Z3 — 0.25" x 0.078" Microstrip, $Z_0 = 50$ Ohms  |
| C7 — 91 pF Clamped Mica, Mini-Underwood | Z4 — 0.15" x 0.078" Microstrip, $Z_0 = 50$ Ohms  |
| C8 — 1.0 $\mu$ F 25 V Tantalum          | Z5 — 0.30" x 0.078" Microstrip, $Z_0 = 50$ Ohms  |
| B — Bead, Ferroxcube 56–590–65/3B       | Z6 — 1.63" x 0.078" Microstrip, $Z_0 = 50$ Ohms  |
|                                         | PCB — 1/32" Glass Teflon, $\epsilon_r = 2.56$    |

**Figure 1. 800–900 MHz Broadband Circuit**

**800/900 MHz BAND DATA**



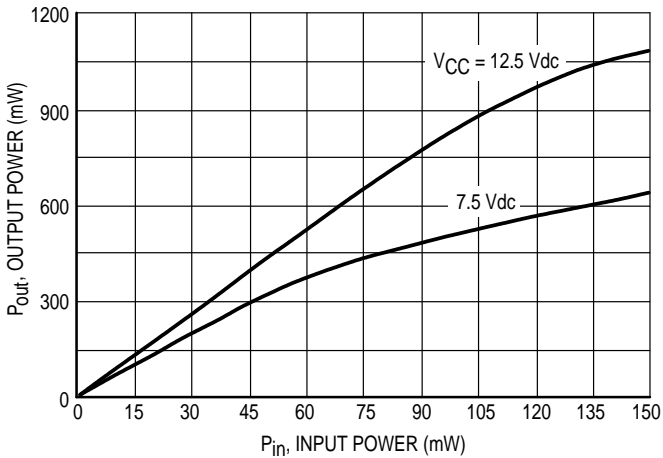
**Figure 2. Typical Broadband Performance**

f Frequency MHz	$Z_{in}$ Ohms		$Z_{OL}^*$ Ohms	
	$V_{CC} = 7.5\text{ V}$	$V_{CC} = 12.5\text{ V}$	$V_{CC} = 7.5\text{ V}$	$V_{CC} = 12.5\text{ V}$
	$P_{in} = 150\text{ mW}$	$P_{in} = 100\text{ mW}$	$P_{out} = 806\text{ MHz} = 820\text{ mW}$ $P_{out} = 870\text{ MHz} = 635\text{ mW}$ $P_{out} = 960\text{ MHz} = 530\text{ mW}$	$P_{out} = 806\text{ MHz} = 1.05\text{ mW}$ $P_{out} = 870\text{ MHz} = 855\text{ mW}$ $P_{out} = 960\text{ MHz} = 580\text{ mW}$
806	$8.0 + j1.9$	$4.0 + j1.2$	$24.7 - j19.2$	$20.9 - j31.0$
870	$5.2 + j3.5$	$6.0 + j1.9$	$36.9 - j20.5$	$32.1 - j26.6$
960	$6.8 + j4.0$	$6.1 + j2.5$	$39.3 - j18.5$	$36.3 - j25.7$

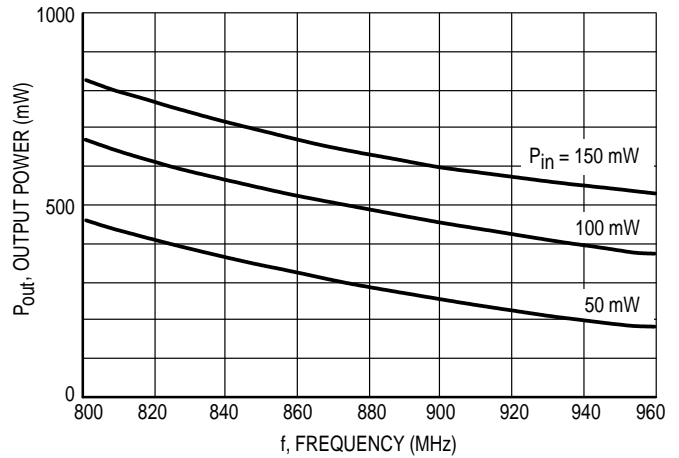
$Z_{OL}^*$  = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage, and frequency.

**Table 1. Series Equivalent Input/Output Impedance**

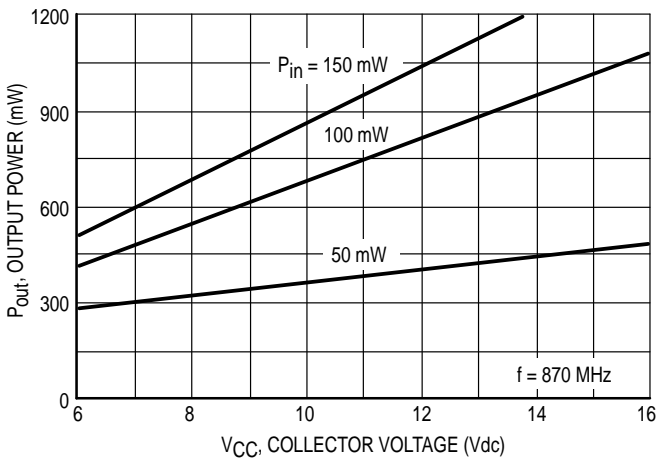
**TYPICAL CHARACTERISTICS  
800/900 MHz BAND DATA (continued)**



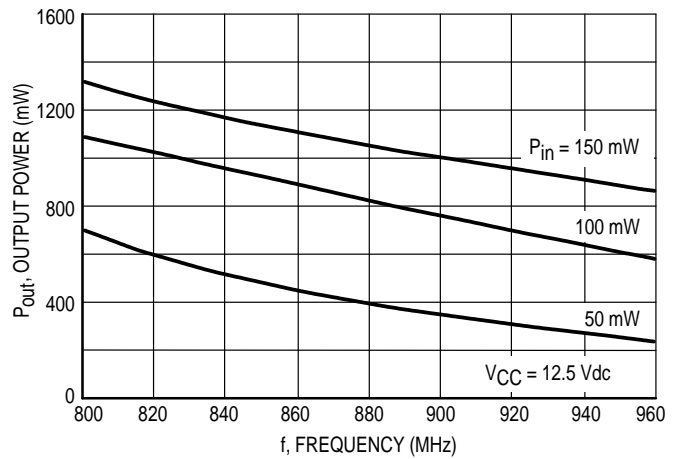
**Figure 3. Output Power versus Input Power  
f = 870 MHz**



**Figure 4. Output Power versus Frequency  
VCC = 7.5 Vdc**

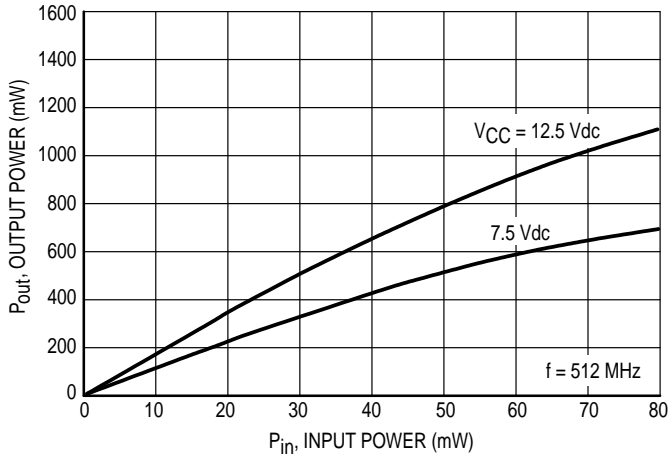


**Figure 5. Output Power versus Collector Voltage**

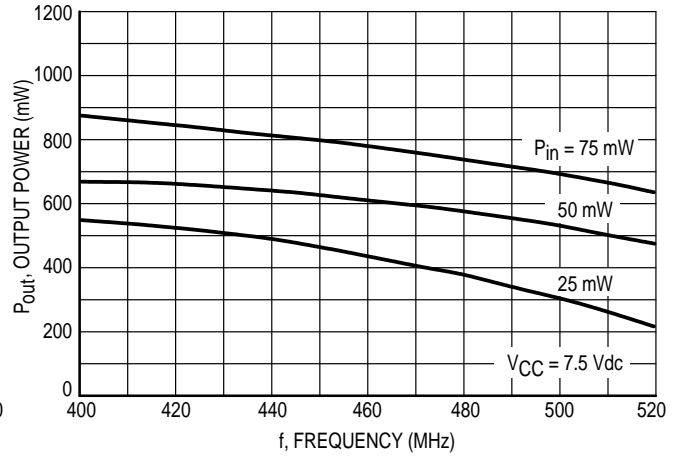


**Figure 6. Output Power versus Frequency**

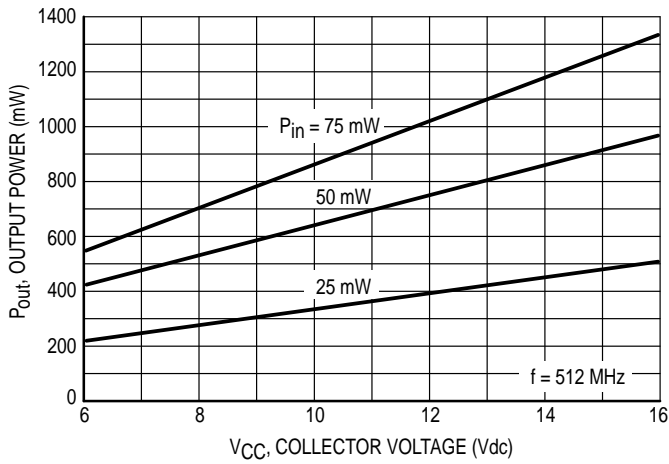
**TYPICAL CHARACTERISTICS**  
**800/900 MHz BAND DATA (continued)**



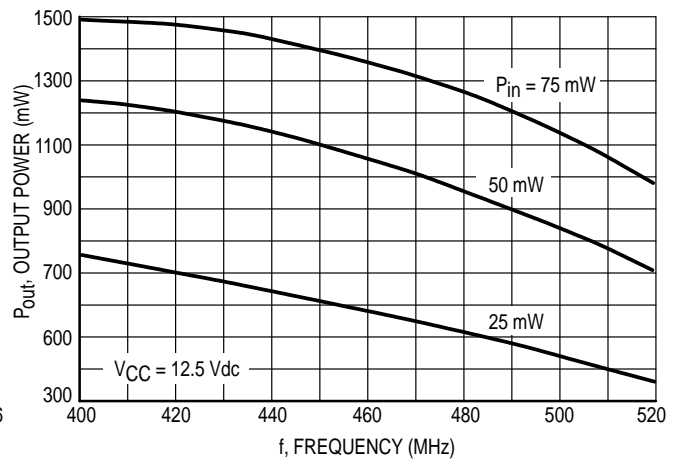
**Figure 7. Output Power versus Input Power**



**Figure 8. Output Power versus Frequency**

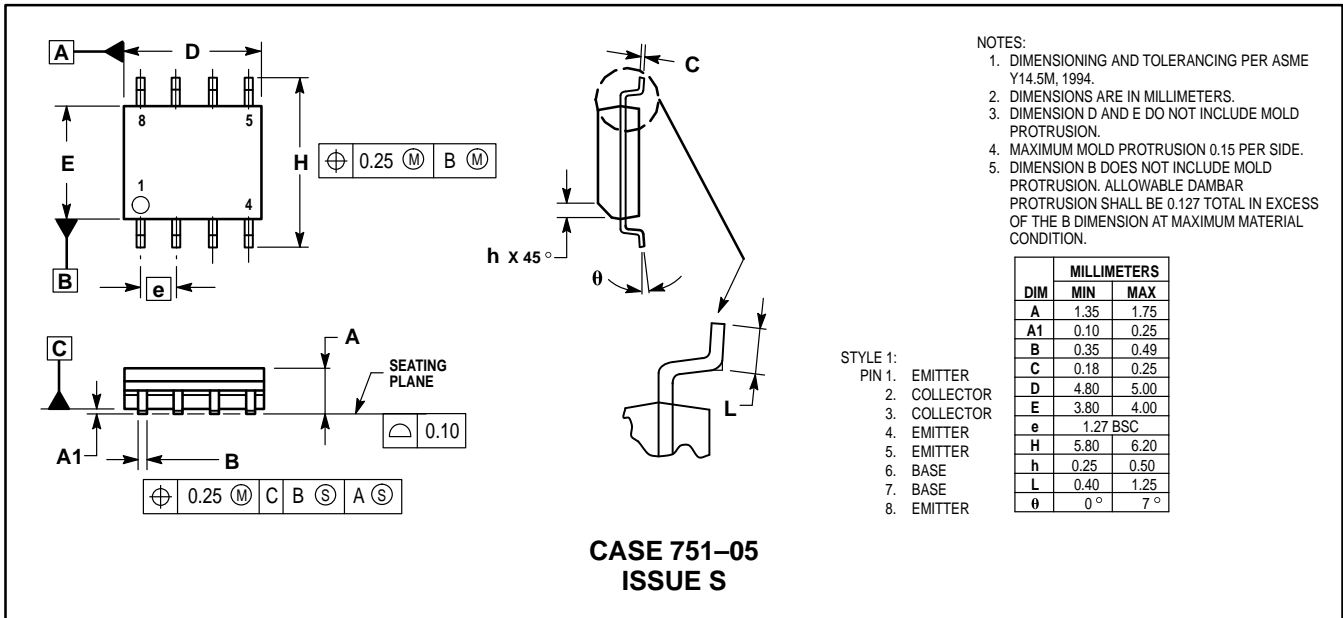


**Figure 9. Output Power versus Collector Voltage**



**Figure 10. Output Power versus Frequency**

## 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 which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. 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.

Mfax is a trademark of Motorola, Inc.

**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
 P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.: SPD, Strategic Planning Office, 4-32-1,  
 Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan. 81-3-5487-8488

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
 – US & Canada ONLY 1-800-774-1848

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

**INTERNET:** <http://motorola.com/sps>

