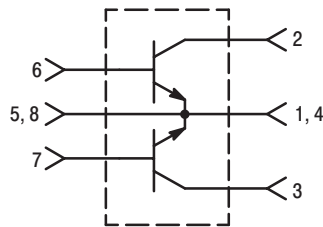


## The RF Line NPN Silicon Push-Pull RF Power Transistor

Designed primarily for wideband large-signal output and driver amplifier stages in the 30 to 500 MHz frequency range.

- Specified 28 Volt, 400 MHz Characteristics —  
Output Power = 125 W  
Typical Gain = 10 dB  
Efficiency = 55% (Typ)
- Built-In Input Impedance Matching Networks for Broadband Operation
- Push-Pull Configuration Reduces Even Numbered Harmonics
- Gold Metallization System for High Reliability
- 100% Tested for Load Mismatch
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



The MRF392 is two transistors in a single package with separate base and collector leads and emitters common. This arrangement provides the designer with a space saving device capable of operation in a push-pull configuration.

### PUSH-PULL TRANSISTORS

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	Vdc
Collector-Base Voltage	$V_{CBO}$	60	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	16	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	270 1.54	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Junction Temperature	$T_J$	200	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

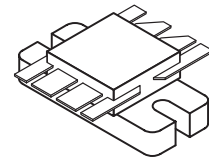
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.65	$^\circ\text{C}/\text{W}$

#### NOTE:

- This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF push-pull amplifier.

**MRF392**

125 W, 30 to 500 MHz  
CONTROLLED "Q"  
BROADBAND PUSH-PULL  
RF POWER TRANSISTOR  
NPN SILICON



CASE 744A-01, STYLE 1

ARCHIVE INFORMATION

PRODUCT TRANSFERRED TO M/A-COM

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS (1)</b>					
Collector-Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	30	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 5.0 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	5.0	mAdc

**ON CHARACTERISTICS (1)**

DC Current Gain ( $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	40	60	100	—
--	----------	----	----	-----	---

**DYNAMIC CHARACTERISTICS (1)**

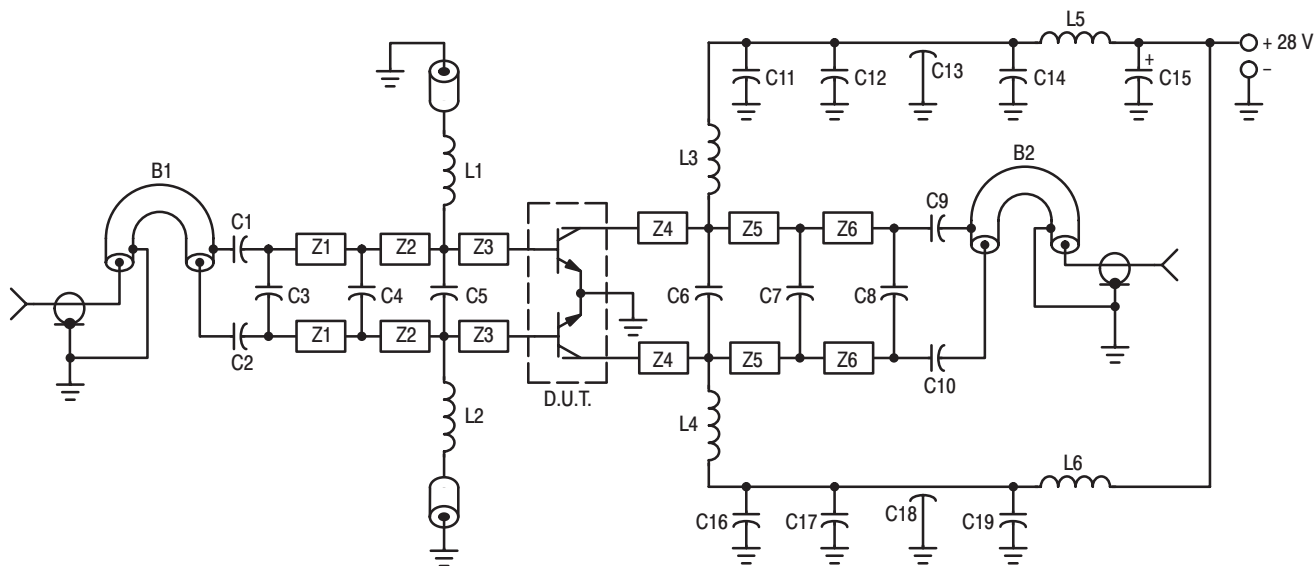
Output Capacitance ( $V_{CB} = 28 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	75	95	pF
--	----------	---	----	----	----

**FUNCTIONAL TESTS (2) — See Figure 1**

Common-Emitter Amplifier Power Gain ( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 125 \text{ W}$ , $f = 400 \text{ MHz}$ )	$G_{pe}$	8.0	10	—	dB
Collector Efficiency ( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 125 \text{ W}$ , $f = 400 \text{ MHz}$ )	$\eta$	50	55	—	%
Load Mismatch ( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 125 \text{ W}$ , $f = 400 \text{ MHz}$ , VSWR = 30:1, all phase angles)	$\psi$	No Degradation in Output Power			

**NOTES:**

- Each transistor chip measured separately.
- Both transistor chips operating in push-pull amplifier.



- C1, C2 — 240 pF, 100 Mil Chip Cap (ATC) or Equivalent  
 C3 — 3.6 pF, 100 Mil Chip Cap (ATC) or Equivalent  
 C4, C8 — 8.2 pF, 100 Mil Chip Cap (ATC) or Equivalent  
 C5, C6 — 20 pF, 100 Mil Chip Cap (ATC) or Equivalent  
 C7 — 18 pF, Mini Unelco or Equivalent  
 C9, C10 — 270 pF, 100 Mil Chip Cap (ATC) or Equivalent  
 C11, C12, C16, C17 — 470 pF 100 Mil Chip Cap (ATC) or Equivalent  
 C13, C18 — 680 pF Feedthru  
 C14, C19 — 0.1  $\mu\text{F}$  Erie Redcap or Equivalent  
 C15 — 20  $\mu\text{F}$ , 50 V

- L1, L2 — 0.15  $\mu\text{H}$  Molded Choke With Ferrite Bead  
 L3, L4 — 2-1/2 Turns #20 AWG, 0.200 ID  
 L5, L6 — 3-1/2 Turns #18 AWG, 0.200 ID

- B1 — Balun, 50  $\Omega$  Semi-Rigid Coaxial Cable 86 Mil OD, 2" L  
 B2 — Balun, 50  $\Omega$  Semi-Rigid Coaxial Cable 86 Mil OD, 2" L  
 Z1 — Microstrip Line 270 Mil L x 125 Mil W  
 Z2 — Microstrip Line 375 Mil L x 125 Mil W  
 Z3 — Microstrip Line 280 Mil L x 125 Mil W  
 Z4 — Microstrip Line 300 Mil L x 125 Mil W  
 Z5 — Microstrip Line 350 Mil L x 125 Mil W  
 Z6 — Microstrip Line 365 Mil L x 125 Mil W

Board Material — 0.0625" Teflon Fiberglass  $\epsilon_r = 2.5 \pm 0.05$  1 oz. Cu. CLAD, Double Sided

**Figure 1. 400 MHz Test Fixture**

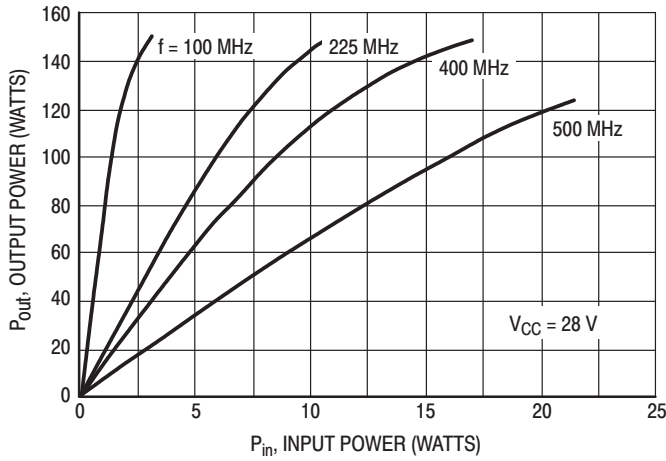


Figure 2. Output Power versus Input Power

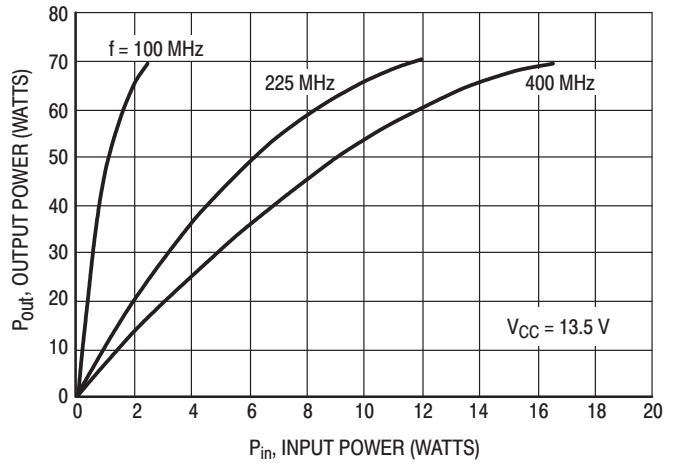


Figure 3. Output Power versus Input Power

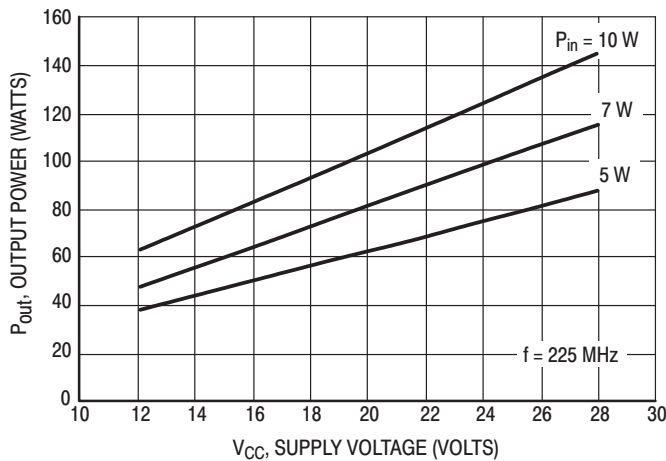


Figure 4. Output Power versus Supply Voltage

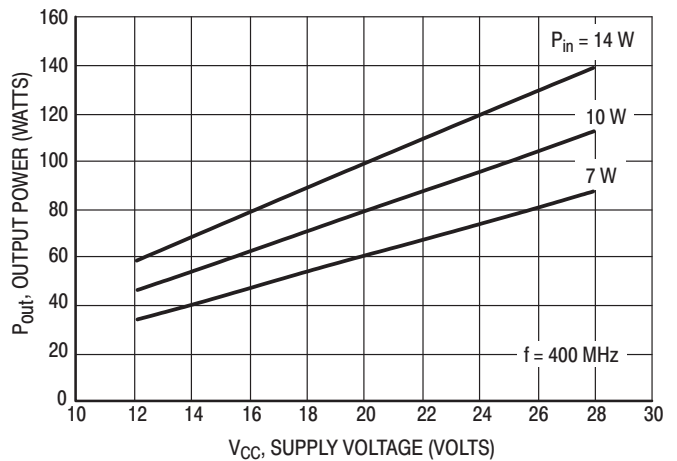
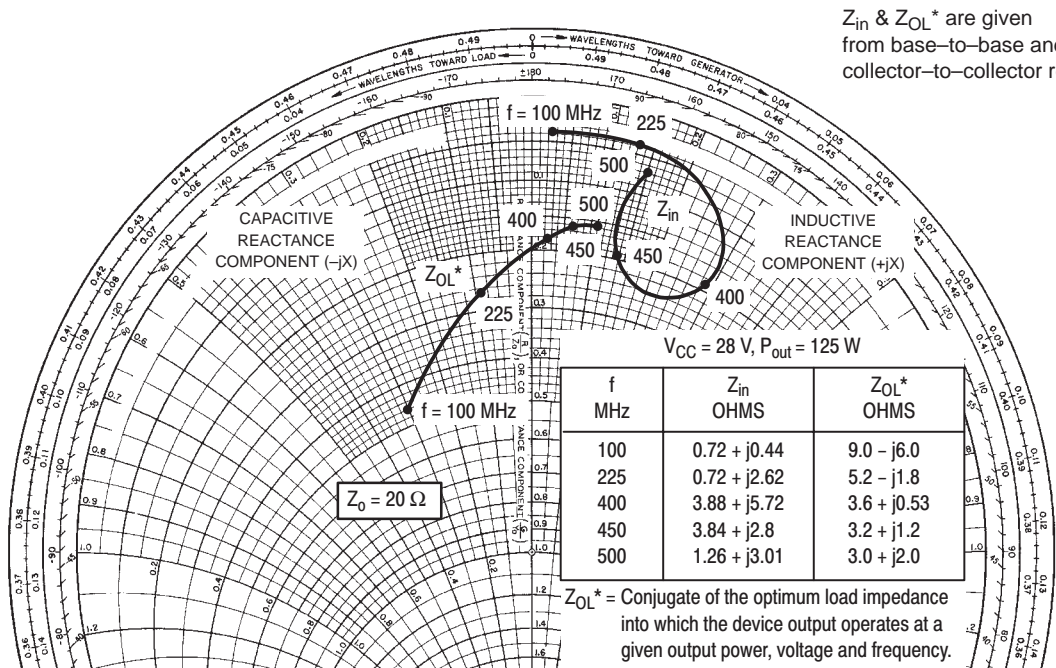


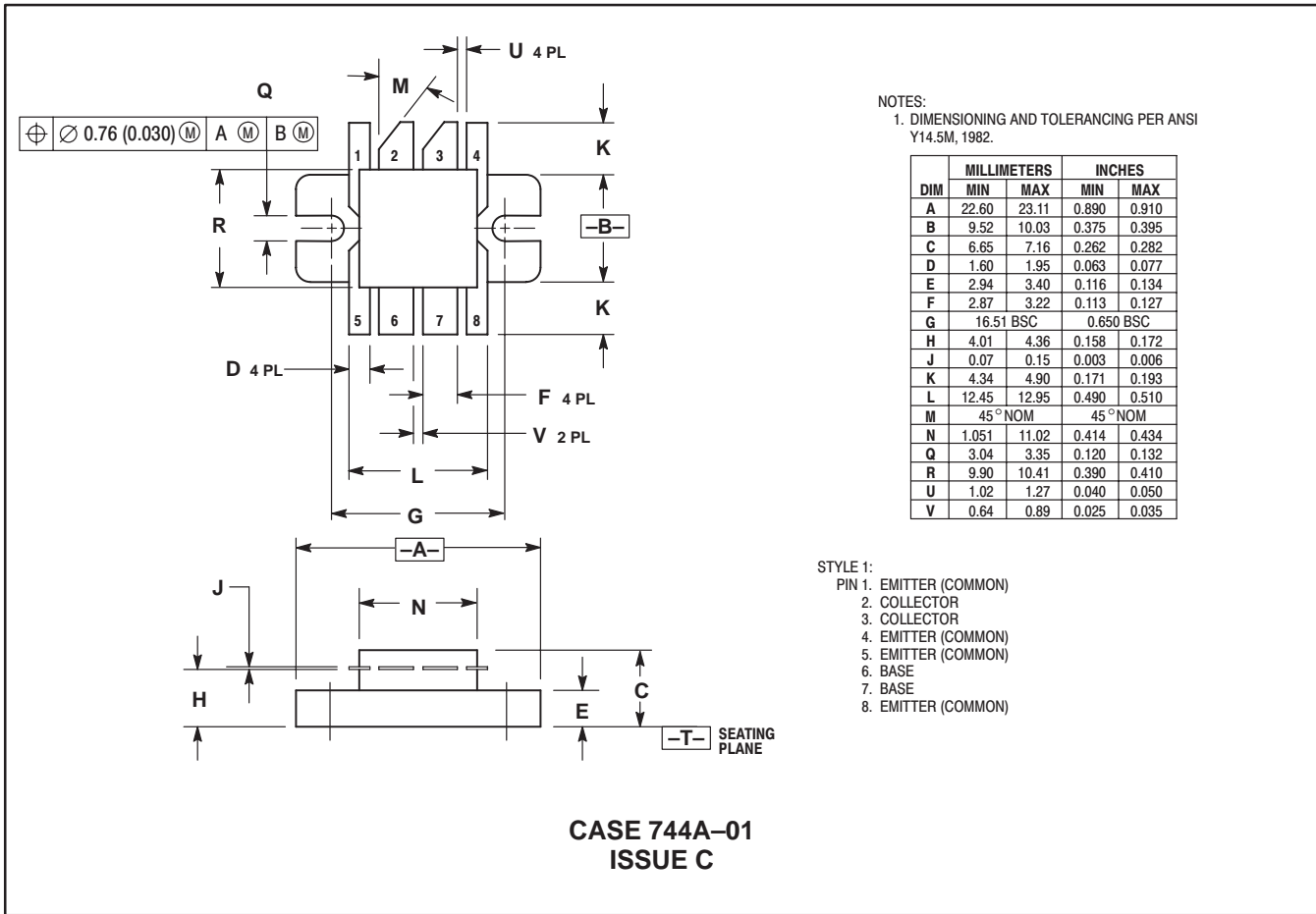
Figure 5. Output Power versus Supply Voltage



$Z_{in}$  &  $Z_{OL}^*$  are given from base-to-base and collector-to-collector respectively.

Figure 6. Series Equivalent Input/Output Impedance

## PACKAGE DIMENSIONS



NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.60	23.11	0.890	0.910
B	9.52	10.03	0.375	0.395
C	6.65	7.16	0.262	0.282
D	1.60	1.95	0.063	0.077
E	2.94	3.40	0.116	0.134
F	2.87	3.22	0.113	0.127
G	16.51 BSC		0.650 BSC	
H	4.01	4.36	0.158	0.172
J	0.07	0.15	0.003	0.006
K	4.34	4.90	0.171	0.193
L	12.45	12.95	0.490	0.510
M	45° NOM		45° NOM	
N	1.051	11.02	0.414	0.434
Q	3.04	3.35	0.120	0.132
R	9.90	10.41	0.390	0.410
U	1.02	1.27	0.040	0.050
V	0.64	0.89	0.025	0.035

- STYLE 1:  
 PIN 1. EMITTER (COMMON)  
 2. COLLECTOR  
 3. COLLECTOR  
 4. EMITTER (COMMON)  
 5. EMITTER (COMMON)  
 6. BASE  
 7. BASE  
 8. EMITTER (COMMON)

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.

**How to reach us:**

**USA/EUROPE:** Motorola Literature Distribution;  
 P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,  
 6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

**MFAX:** RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609  
**INTERNET:** http://Design-NET.com

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



MRF392/D

