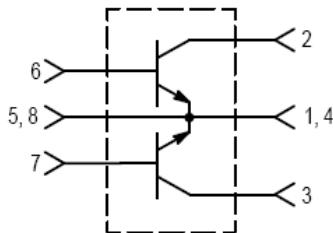


## The RF Line Controlled “Q” Broadband Power Transistor 100W, 30 to 500MHz, 28V

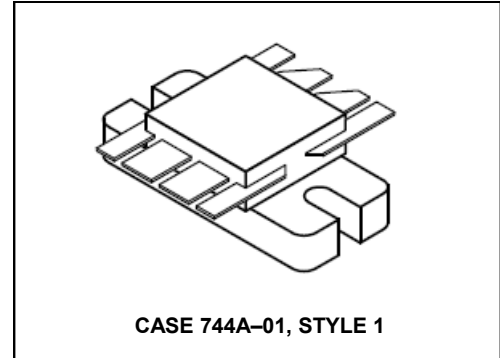
Rev. V1

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

- Specified 28 V, 500 MHz characteristics —
  - Output power = 100 W
  - Typical gain = 9.5 dB (Class AB); 8.5 dB (Class C)
  - 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



### Product Image



The MRF393 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	$^\circ\text{C/W}$

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.

## The RF Line Controlled “Q” Broadband Power Transistor 100W, 30 to 500MHz, 28V

Rev. V1

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted.)

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

#### OFF CHARACTERISTICS (1)

Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 50 mA <sub>dc</sub> , I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	30	—	—	V <sub>dc</sub>
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 50 mA <sub>dc</sub> , V <sub>BE</sub> = 0)	V <sub>(BR)CES</sub>	60	—	—	V <sub>dc</sub>
Emitter–Base Breakdown Voltage (I <sub>E</sub> = 5.0 mA <sub>dc</sub> , I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	4.0	—	—	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = 30 V <sub>dc</sub> , I <sub>E</sub> = 0)	I <sub>CBO</sub>	—	—	5.0	mA <sub>dc</sub>

#### ON CHARACTERISTICS (1)

DC Current Gain (I <sub>C</sub> = 1.0 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> )	h <sub>FE</sub>	20	—	100	—
---	-----------------	----	---	-----	---

#### DYNAMIC CHARACTERISTICS (1)

Output Capacitance (V <sub>CB</sub> = 28 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>ob</sub>	40	75	95	pF
---	-----------------	----	----	----	----

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

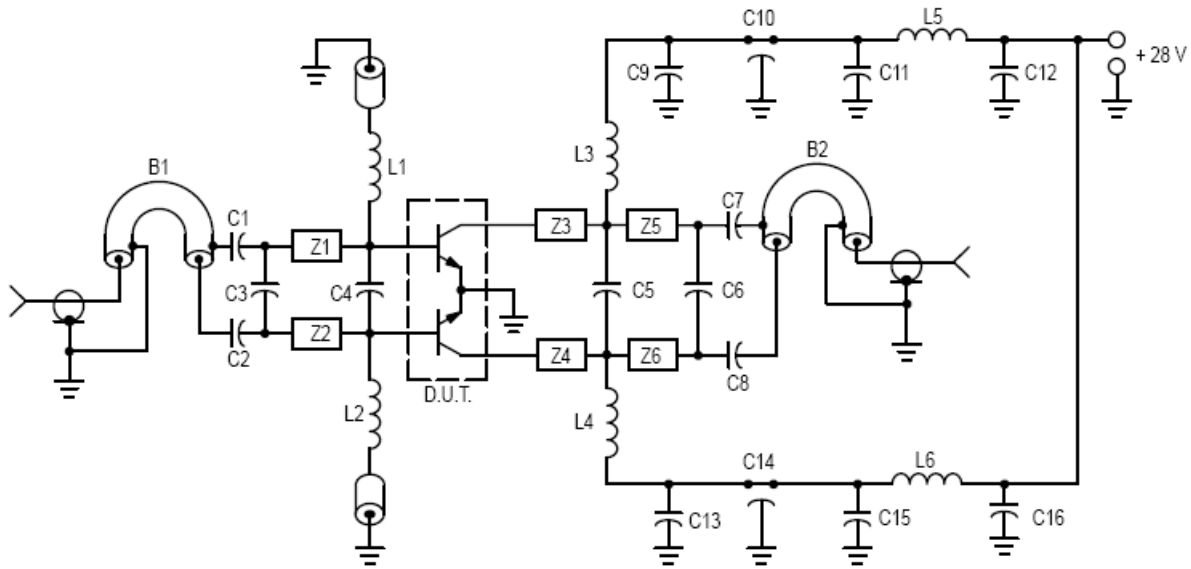
Common–Emitter Amplifier Power Gain (V <sub>CC</sub> = 28 V <sub>dc</sub> , P <sub>out</sub> = 100 W, f = 500 MHz)	G <sub>pe</sub>	7.5	8.5	—	dB
Collector Efficiency (V <sub>CC</sub> = 28 V <sub>dc</sub> , P <sub>out</sub> = 100 W, f = 500 MHz)	η	50	55	—	%
Load Mismatch (V <sub>CC</sub> = 28 V <sub>dc</sub> , P <sub>out</sub> = 100 W, f = 500 MHz, VSWR = 30:1, all phase angles)	ψ	No Degradation in Output Power			

#### NOTES:

1. Each transistor chip measured separately.
2. Both transistor chips operating in push–pull amplifier.

## The RF Line Controlled “Q” Broadband Power Transistor 100W, 30 to 500MHz, 28V

Rev. V1



C1, C2, C7, C8 — 240 pF 100 mil Chip Cap  
 C3 — 15 pF 100 mil Chip Cap  
 C4 — 24 pF 100 mil Chip Cap  
 C5 — 33 pF 100 mil Chip Cap  
 C6 — 12 pF 100 mil Chip Cap  
 C9, C13 — 1000 pF 100 mil Chip Cap  
 C10, C14 — 680 pF Feedthru Cap  
 C11, C15 — 0.1  $\mu$ F Ceramic Disc Cap  
 C12, C16 — 50  $\mu$ F 50 V

L1, L2 — 0.15  $\mu$ 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, B2 — Balun 50  $\Omega$  Semi Rigid Coax, 86 mil OD, 4" Long  
 Z1, Z2 — 850 mil Long x 125 mil W. Microstrip  
 Z3, Z4 — 200 mil Long x 125 mil W. Microstrip  
 Z5, Z6 — 800 mil Long x 125 mil W. Microstrip  
 Board Material — 0.0325" Teflon-Fiberglass,  $\epsilon_r = 2.56$ ,  
 1 oz. Copper Clad both sides.

Figure 1. 500 MHz Test Fixture

## The RF Line Controlled "Q" Broadband Power Transistor 100W, 30 to 500MHz, 28V

Rev. V1

### CLASS C

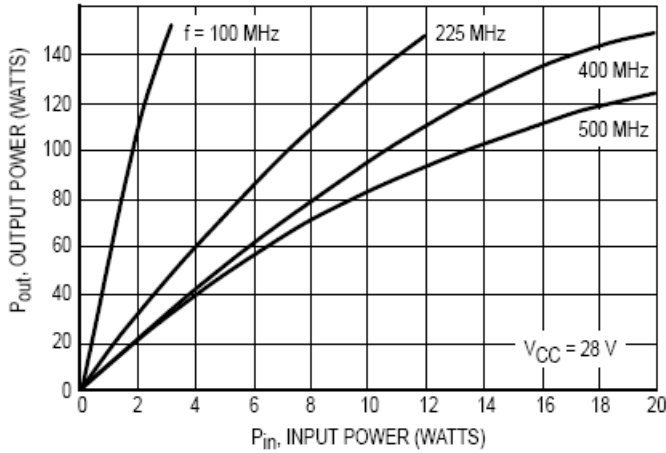


Figure 2. Output Power versus Input Power

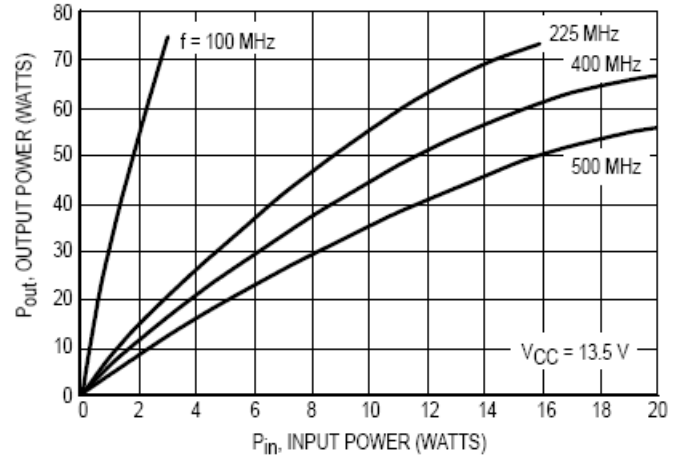


Figure 3. Output Power versus Input Power

### CLASS C

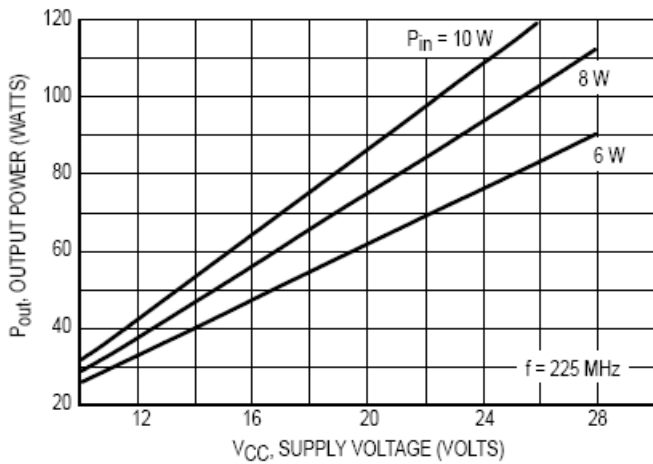


Figure 4. Output Power versus Supply Voltage

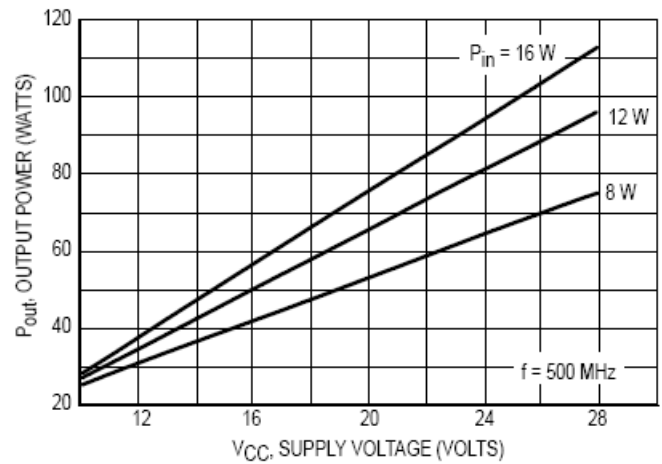
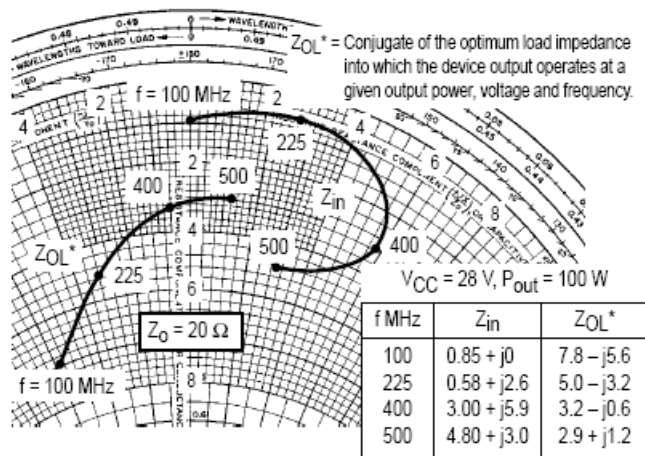


Figure 5. Output Power versus Supply Voltage

## The RF Line Controlled “Q” Broadband Power Transistor 100W, 30 to 500MHz, 28V

Rev. V1



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

Figure 6. Series Equivalent Input/Output Impedance

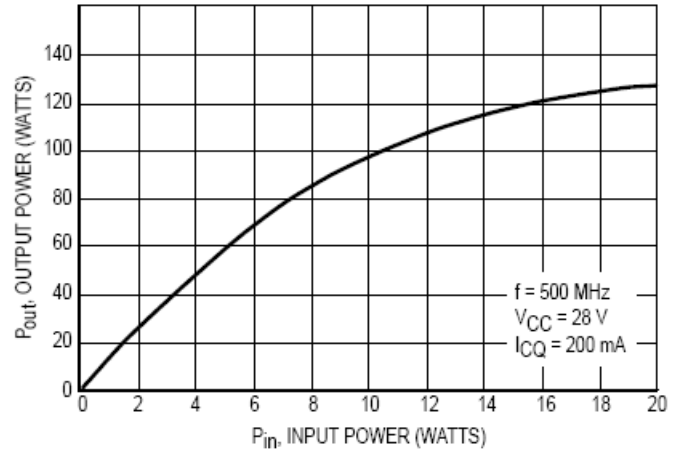


Figure 7. Class AB Output Power versus Input Power

## The RF Line Controlled "Q" Broadband Power Transistor 100W, 30 to 500MHz, 28V

Rev. V1

### PACKAGE DIMENSIONS

