

The RF Line

NPN Silicon

RF Power Transistors

... designed for 12.5 Volt UHF large-signal, common-emitter amplifier applications in industrial and commercial FM equipment operating in the range of 806–960 MHz.

- Specified 12.5 V, 870 MHz Characteristics
 - Output Power = 3.0 Watts
 - Power Gain = 8.0 dB Min
 - Efficiency = 55% Min
- 100% Tested for Load Mismatch at Rated Input Power and 15.5 V
- Series Equivalent Large-Signal Characterization
- 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}	16	Vdc
Collector–Base Voltage	V_{CBO}	36	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Continuous	I_C	0.6	Adc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation @ $T_C = 110^\circ\text{C}$ Derate above 110°C	P_D	10 111	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	9.0	°C/W

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

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

OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 5.0$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 5.0$ mAdc, $V_{BE} = 0$)	$V_{(BR)CES}$	36	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 0.1$ mAdc, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 15$ Vdc, $V_{BE} = 0$, $T_C = 25^\circ\text{C}$)	I_{CES}	—	—	1.0	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 100$ mAdc, $V_{CE} = 5.0$ Vdc)	h_{FE}	10	90	150	—
---	----------	----	----	-----	---

DYNAMIC CHARACTERISTICS

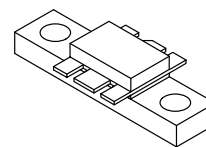
Output Capacitance ($V_{CB} = 15$ Vdc, $I_E = 0$, $f = 1.0$ MHz)	C_{ob}	—	6.5	10	pF
--	----------	---	-----	----	----

FUNCTIONAL TESTS (Figure 1)

Common–Emitter Amplifier Power Gain ($P_{out} = 3.0$ W, $V_{CC} = 12.5$ Vdc, $f = 870$ MHz)	G_{PE}	8.0	10	—	dB
Collector Efficiency ($P_{out} = 3.0$ W, $V_{CC} = 12.5$ Vdc, $f = 870$ MHz)	η_c	55	63	—	%
Load Mismatch Stress ($V_{CC} = 15.5$ Vdc, $P_{in} = 0.5$ W, $f = 870$ MHz, VSWR = 20:1, all phase angles)	ψ	No Degradation in Output Power			

MRF839F

3.0 W, 806–960 MHz
RF POWER
TRANSISTORS
COMMON-EMITTER
NPN SILICON



CASE 319–07, STYLE 2
MRF839F

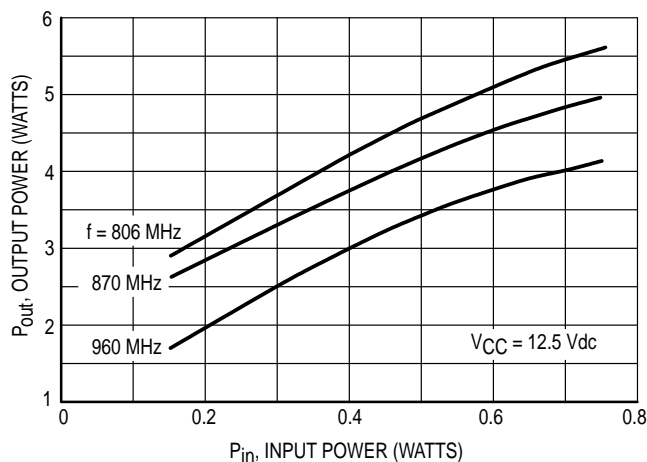


Figure 1. Output Power versus Input Power

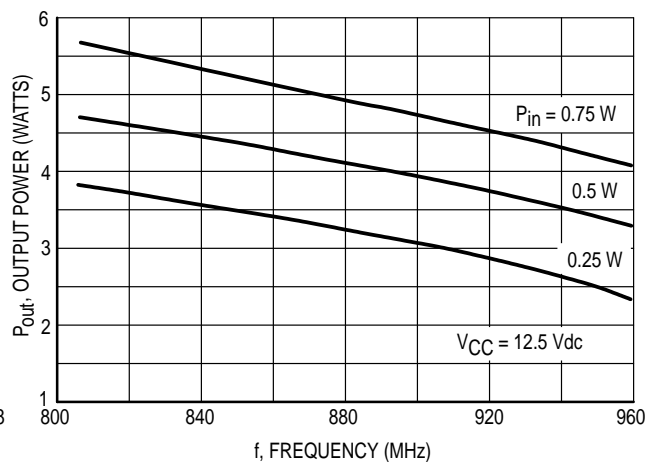


Figure 2. Output Power versus Frequency

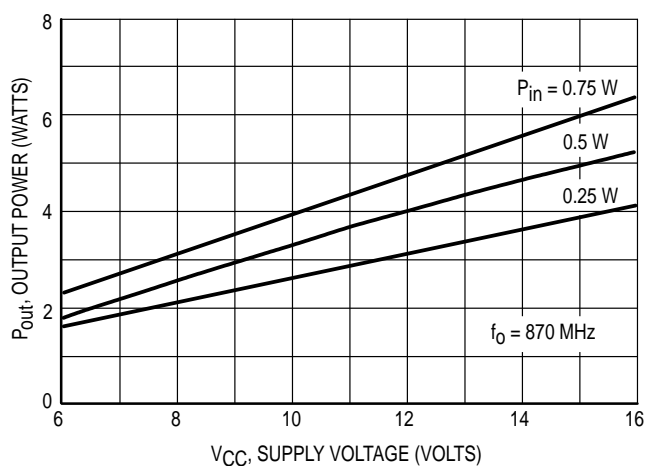


Figure 3. Output Power versus Supply Voltage

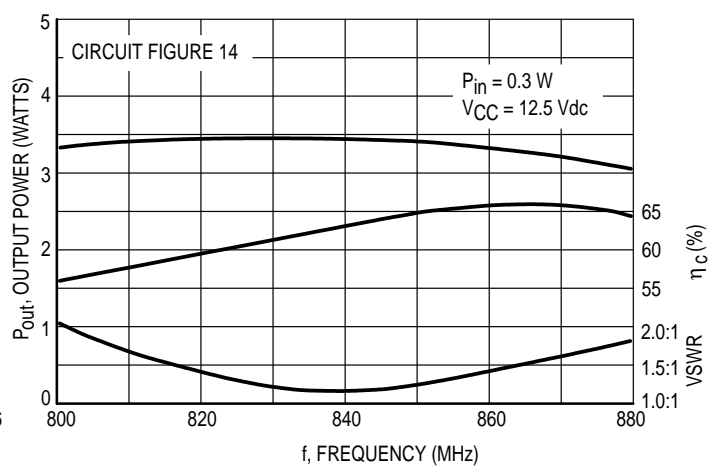


Figure 4. Broadband Performance

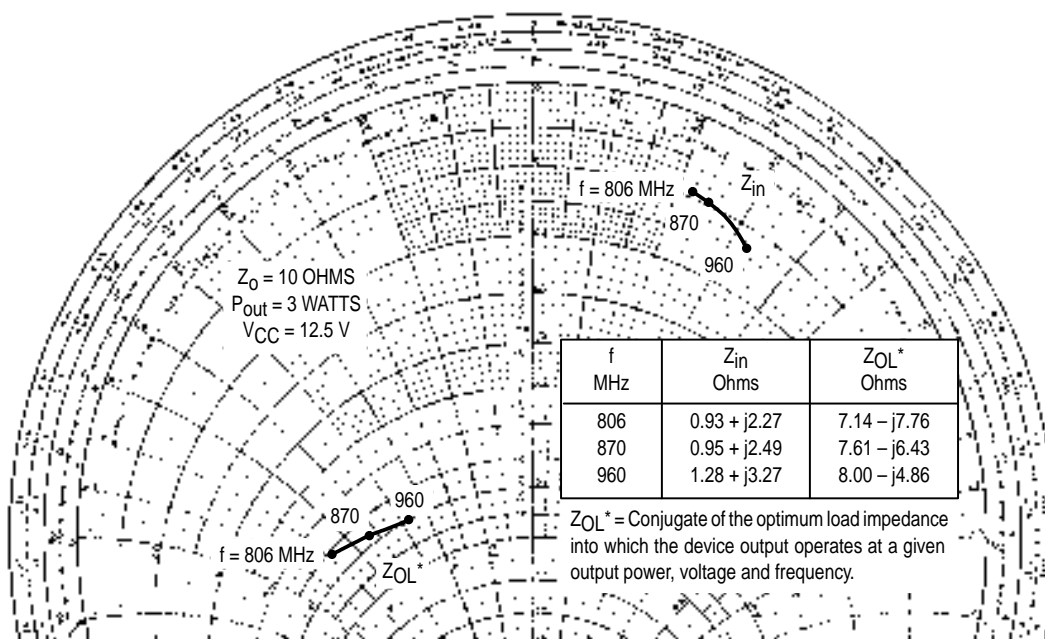
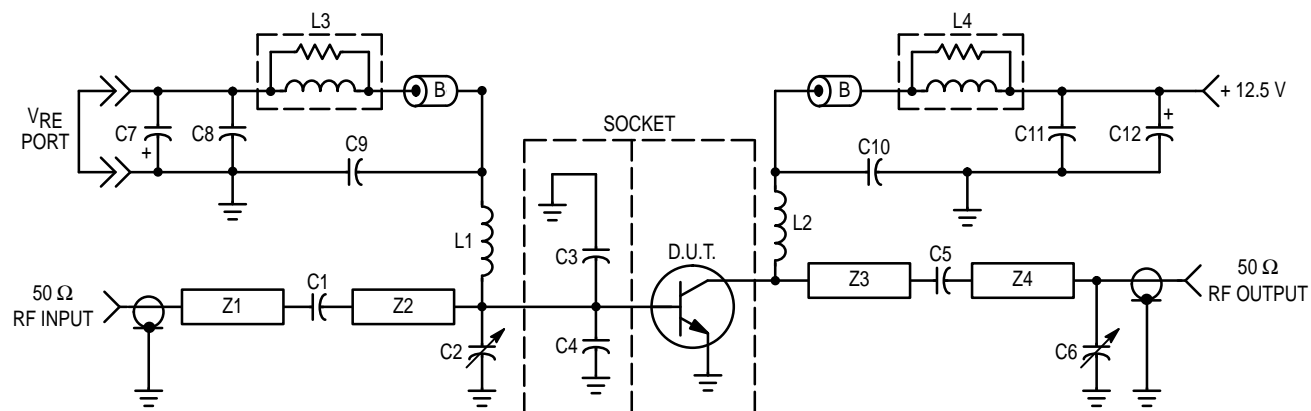


Figure 5. Series Equivalent Input/Output Impedances

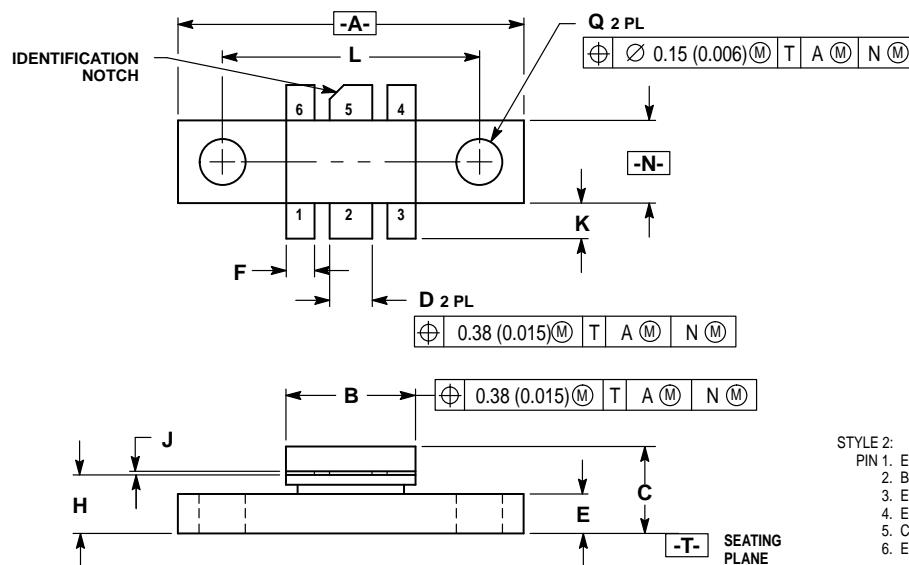


B — Bead, Ferroxcube #56-590-65/3B
 C1 — 47 pF Chip Cap (Murata Erie MA20470B)
 C3, C4 — 13 pF Mini-Underwood
 C5 — 51 pF Chip Cap (ATC 100B510JC500)
 C2, C6 — 0.8-8.0 pF Johanson #7291
 C7, C12 — 10 μ F, 35 V Electrolytic Capacitor
 C8, C11 — 1000 pF Unelco, J101
 C9, C10 — 91 pF Mini-Underwood

L1, L2 — 4 Turns, #18 Enameled, 5/32" ID
 L3, L4 — 12 Turns, #22 Enameled over 10 Ohm, 1/2 W Carbon Resistor
 Z1, Z4 — 50 Ohm Stripline
 Z2 — 32 Ohm Stripline ($1/4 \lambda$ @ 838 MHz)
 Z3 — 16 Ohm Stripline ($1/4 \lambda$ @ 838 MHz)
 Board Material — 0.032" Glass Teflon, 2 oz. Copper Clad, $\epsilon_r = 2.55$

Figure 6. 800-880 MHz Broadband Test Circuit

TPACKAGE DIMENSIONS



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

STYLE 2:

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

CASE 319-07 ISSUE M

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.



MRF839F/D

