The RF Line

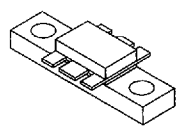
NPN Silicon RF Power Transistors

MRF839F

. . . 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.

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



CASE 319–07, STYLE 2
MRF839F

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°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°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°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			

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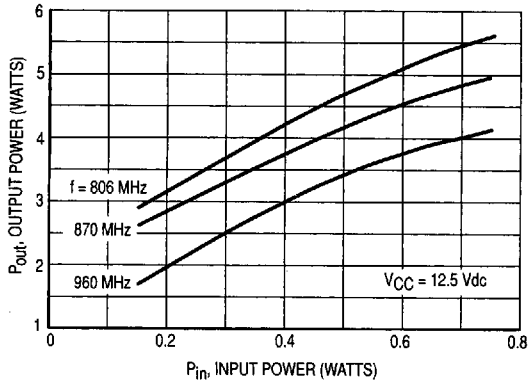


Figure 1. Output Power versus Input Power

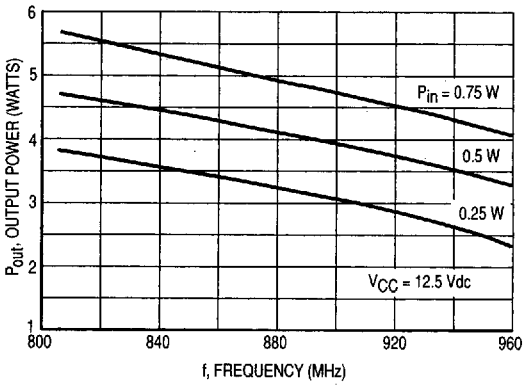


Figure 2. Output Power versus Frequency

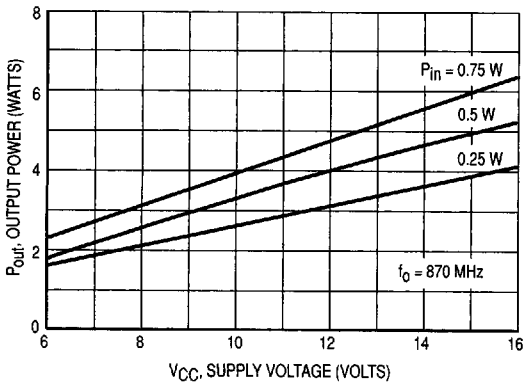


Figure 3. Output Power versus Supply Voltage

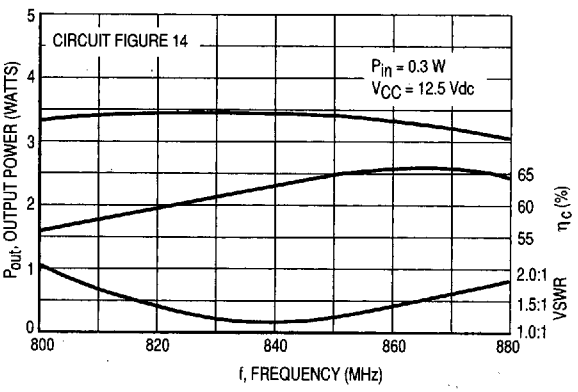
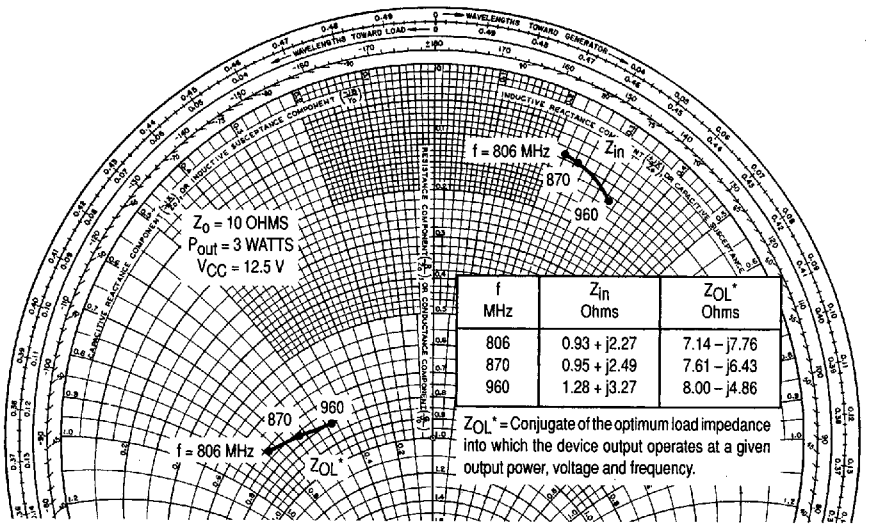


Figure 4. Broadband Performance



f MHz	Zin Ohms	ZOL* Ohms
806	0.93 + j2.27	7.14 – j7.76
870	0.95 + j2.49	7.61 – j6.43
960	1.28 + j3.27	8.00 – j4.86

ZOL* = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

Figure 5. Series Equivalent Input/Output Impedances

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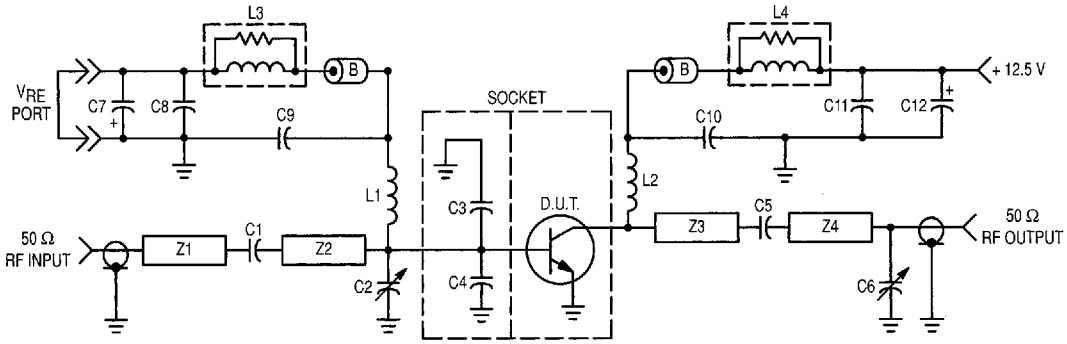

B — Bead, Ferroxcube #56–590–65/3B
C1 — 47 pF Chip Cap (Murata Erie MA20470B)
C3, C4 — 13 pF Mini–Underwood
C5 — 51 pF Chip Cap (ATC 100B510JC500)
C2, C6 — 0.8–8.0 pF Johanson #7291
C7, C12 — 10 μF, 35 V Electrolytic Capacitor
C8, C11 — 1000 pF Unelco, J101
C9, C10 — 91 pF Mini–Underwood
L1, L2 — 4 Turns, #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 λ @ 838 MHz)
Z3 — 16 Ohm Stripline (1/4 λ @ 838 MHz)
Board Material — 0.032″ Glass Teflon, 2 oz. Copper Clad, ε_r = 2.55

Figure 6. 800–880 MHz Broadband Test Circuit

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