MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRF843
MRF843F

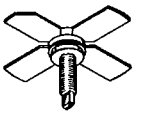
2

The RF Line
NPN Silicon RF Power Transistors

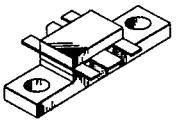
15 W 806–960 MHz RF POWER TRANSISTORS COMMON BASE NPN SILICON

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

- Specified 12.5 Volt, 870 MHz Characteristics
  - Output Power = 15 Watts
  - Minimum Gain = 7 dB
  - Efficiency = 55%
- Internally Matched Input for Broadband Operation
- Gold Metallized and Emitter Ballasted for Long Life
- 100% Tested for Load Mismatch at 2 dB Overdrive and 15.5 V



CASE 244-04, STYLE 4
MRF843



CASE 319-06, STYLE 1
MRF843F

MAXIMUM RATINGS

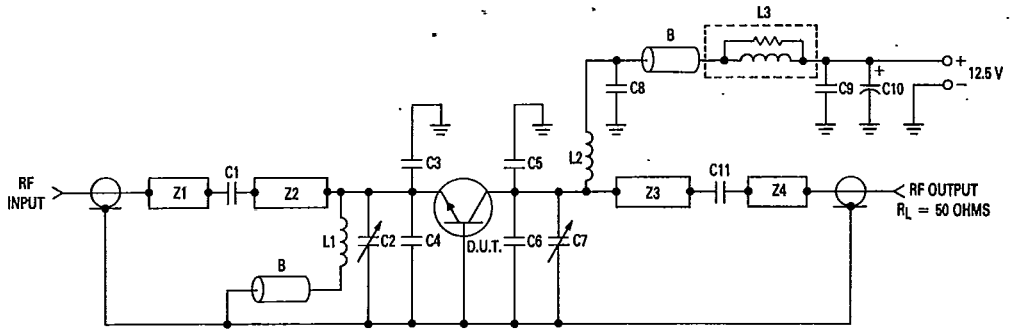
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	16	Vdc
Collector-Base Voltage	V_{CBO}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4	Vdc
Collector-Current — Continuous	I_C	4	Adc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	44 0.25	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4	°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 = 25 mAdc, I_B = 0)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 25 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	36	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 5 mAdc, I_C = 0)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector Cutoff Current (V_{CE} = 15 Vdc, V_{BE} = 0, T_C = 25°C)	I_{CES}	—	—	5	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 1 Adc, V_{CE} = 5 Vdc)	h_{FE}	10	—	120	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 15 Vdc, I_E = 0, f = 1 MHz)	C_{ob}	—	30	45	pF
FUNCTIONAL TESTS					
Common Base Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 15 W, f = 870 MHz)	G_{pb}	7	7.9	—	dB
Collector Efficiency (V_{CC} = 12.5 Vdc, P_{out} = 15 W, f = 870 MHz)	η	55	60	—	%
Load Mismatch Stress (P_{in} = 2 dB Overdrive, V_{CC} = 15.5 V, f = 870 MHz, VSWR = 20:1 @ All Phase Angles)	ψ	No Degradation in Output Power			



C1 — 39 pF ATC 100 Mil Ceramic Chip
C2, C7 — 0.8–8 pF Johanson Gigatrim (7290)
C3, C4 — 8 pF Mini Underwood Mica
C5, C6 — 10 pF Mini Underwood Mica
C8 — 68 pF Mini Underwood Mica
C9 — 1000 pF Unelco
C10 — 10 μF Electrolytic
C11 — 33 pF Mini Underwood Mica
L1 — 4 Turns 0.10" ID #24 AWG
L2 — 4 Turns 0.20" ID #24 AWG
L3 — 10 Turns on 10 Ohm ½ W Resistor
Z1 — 0.100" x 0.525" Microstrip TX Line
Z2 — 0.100" x 1.80 36 Ohm Microstrip TX Line
Z3 — 0.200" x 1.90" 30 Ohm Microstrip TX Line
Z4 — 0.150" x 0.450" Microstrip TX Line
B — Bead, Ferroxcube #56-590-65/3B
Board Material — 0.032" Glass Teflon 2 oz. Copper Clad ϵ_r = 2.55

Figure 1. MRF843 800–900 MHz Broadband Test Fixture

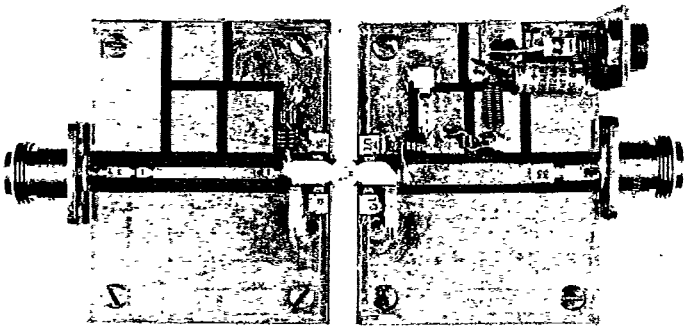


Figure 2. MRF843 800–900 MHz Test Circuit

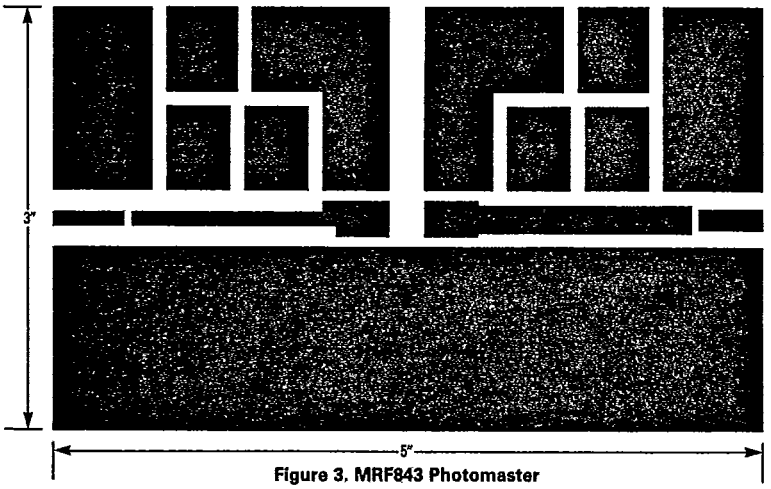


Figure 3. MRF843 Photomaster

NOTE: The Printed Circuit Board shown is 75% of the original.

MRF843

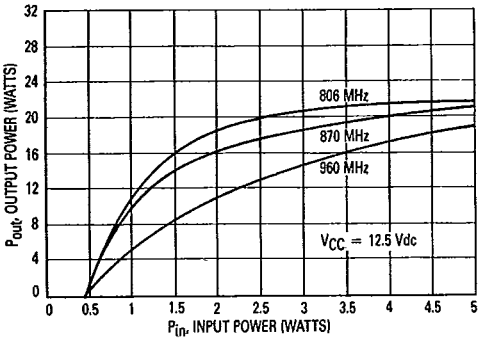


Figure 4. Output Power versus Input Power

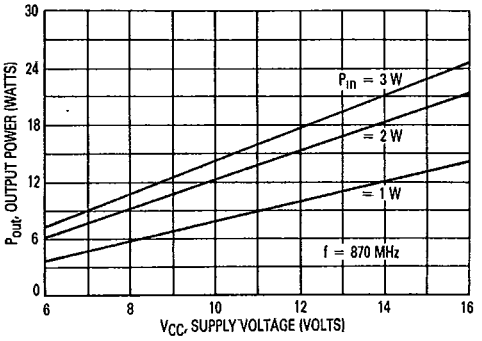


Figure 5. Output Power versus Supply Voltage

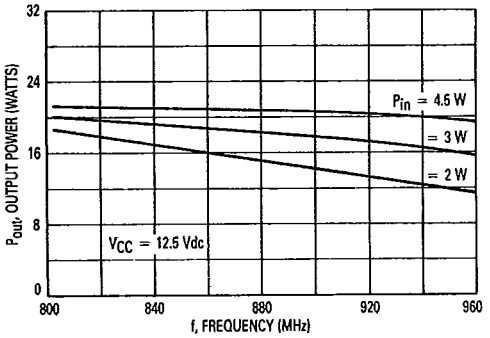


Figure 6. Output Power versus Frequency

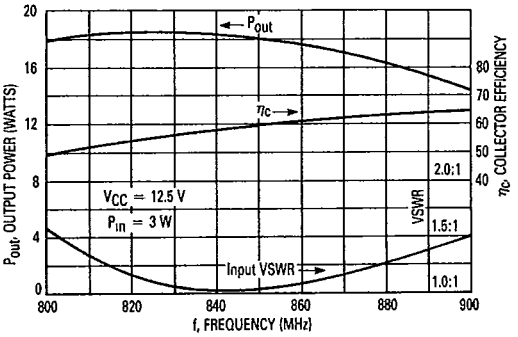
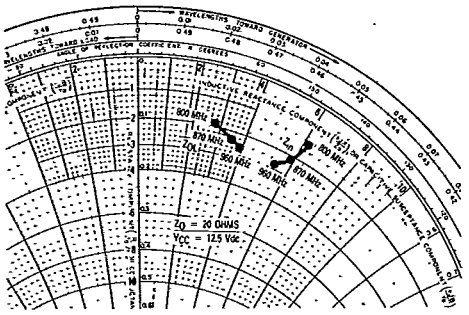


Figure 7. Typical Performance in Broadband Test Fixture



f MHz	Z_{in} Ohms	Z_{OL}* Ohms
800	1.23 +j 6.13	1.98 +j 2.62
870	2.09 +j 5.91	2.24 +j 3.49
960	2.58 +j 5.46	2.51 +j 3.92

NOTE: Circuit tuning and input power adjusted to maintain output power of 15 W and 65% efficiency.

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

Figure 8. Series Equivalent Input and Output Impedance

MRF843F

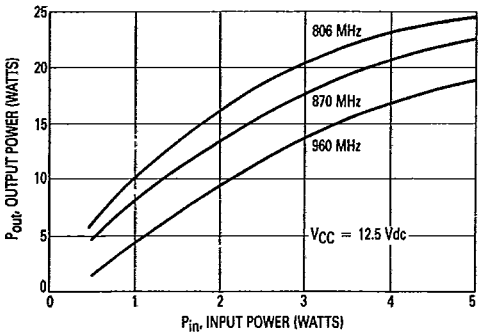


Figure 9. Output Power versus Input Power

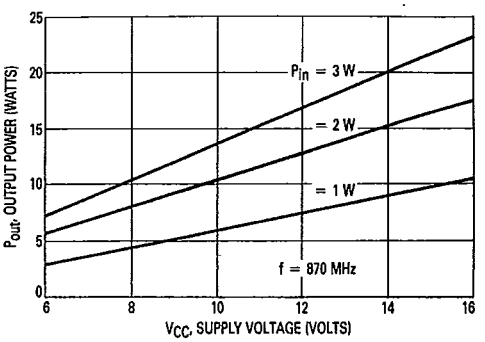


Figure 10. Output Power versus Supply Voltage

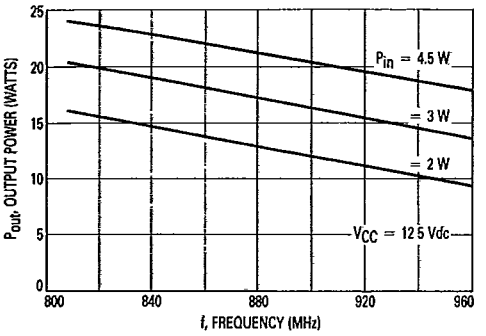


Figure 11. Output Power versus Frequency

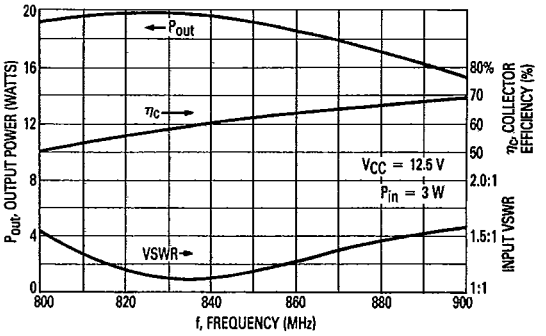
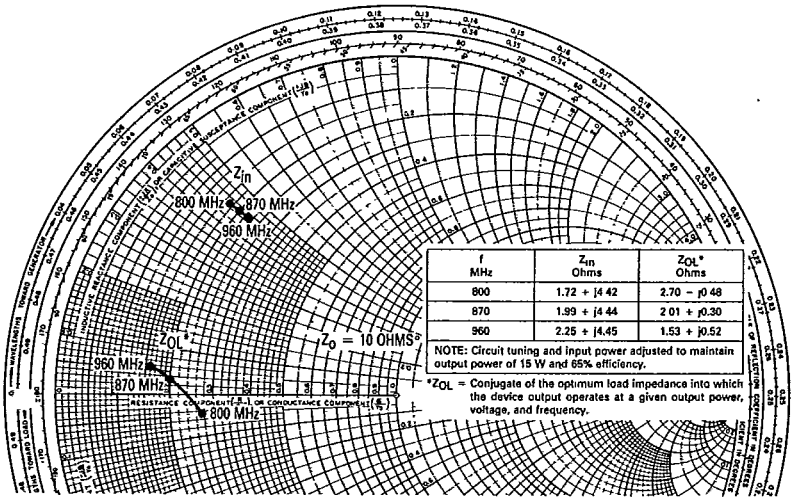


Figure 12. Typical Performance in Broadband Test Fixture

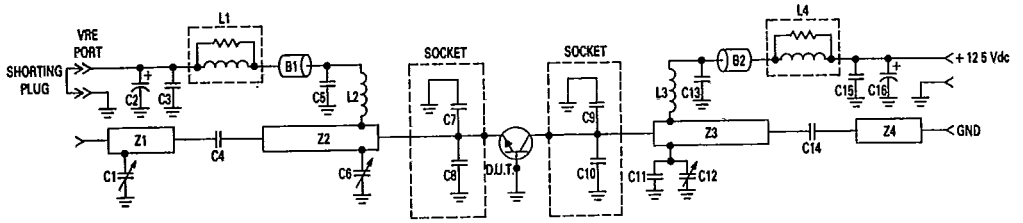


f MHz	Zin Ohms	ZOL* Ohms
800	1.72 + j4.42	2.70 − j0.48
870	1.99 + j4.44	2.01 + j0.30
960	2.25 + j4.45	1.53 + j0.52

NOTE: Circuit tuning and input power adjusted to maintain output power of 15 W and 65% efficiency.

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

Figure 13. Series Equivalent Input and Output Impedance



C1 — 0.6–4.5 pF Johansen Gigatrim (7270)
C2, C16 — 1 μF, 35 WV Tantalum
C3, C15 — 1000 pF Underwood Mica J101
C4, C14 — 47 pF 100 Mil ATC
C5, C13 — 91 pF Mini-Underwood Mica
C6, C12 — 0.8–8 pF Johansen Gigatrim (7290)
C7, C8 — 8 pF Mini-Underwood Mica
C9, C10 — 15 pF Mini-Underwood Mica
C11 — 10 pF Mini-Underwood Mica
L1, L4 — 11 Turns #20 AWG over 100 HM ½ W Resistor
L2, L3 — 4 Turns #18 AWG, 0.15" ID
B1, B2 — Ferrite Bead, Ferroxcube 56-590-65-3B
Z1, Z4 — 50 Ohm Microstrip
Z2 — 36 Ohm Microstrip λ/4 @ 838 MHz
Z3 — 32 Ohm Microstrip λ/4 @ 838 MHz
Board Material — 0.032" Glass Teflon, 2 oz. Copper Clad, ϵ_r = 2.55

Figure 14. MRF843F 800–900 MHz Broadband Test Circuit

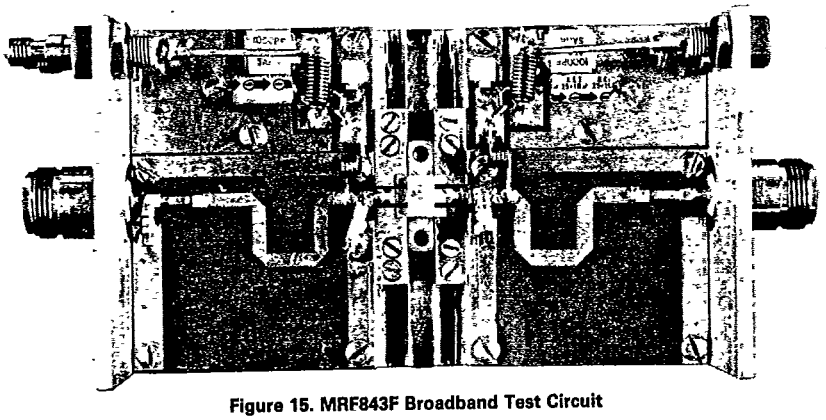


Figure 15. MRF843F Broadband Test Circuit

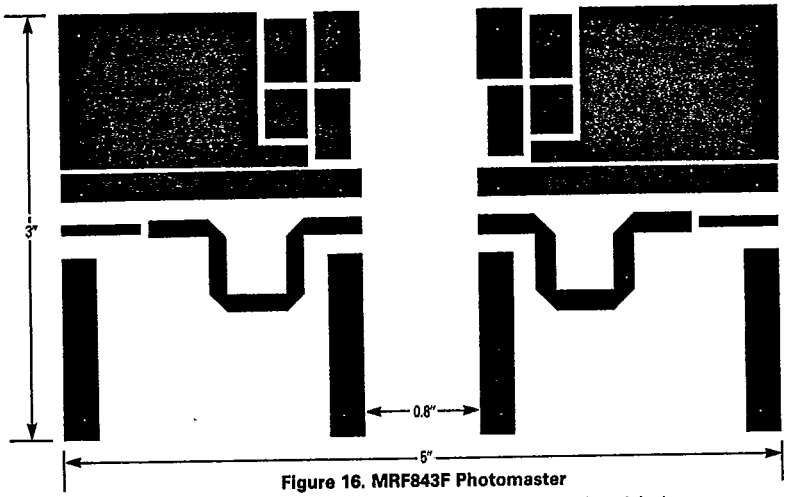


Figure 16. MRF843F Photomaster
NOTE: The Printed Circuit Board shown is 75% of the original.