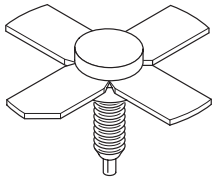
The RF Line
NPN Silicon RF Power Transistors

Designed for 12.5 Vdc UHF large–signal, amplifier applications in industrial and commercial FM equipment operating to 512 MHz.

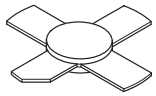
- Guaranteed 12.5 Volt, 512 MHz Characteristics
  Output Power = 5.0 Watts
  Minimum Gain = 10 dB
  Efficiency = 65% (Typ)
- Typical Performance at 512 MHz, 12.5 V, 5.0 W Output = 6.0 dB
- Series Equivalent Large–Signal Characterization
- Gold Metallized, Emitter Ballasted for Long Life and Reliability
- Capable of 30:1 VSWR Load Mismatch at 15.5 V Supply Voltage
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

MRF652
MRF652S

5.0 W, 512 MHz
RF POWER
TRANSISTORS
NPN SILICON



CASE 244–04, STYLE 1
MRF652



CASE 249–06, STYLE 1
MRF652S

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}	4.0	Vdc
Collector Current — Continuous	I_C	2.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	25 143	Watts mW/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	7.0	°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 = 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
Collector–Base Breakdown Voltage (I_C = 25 mAdc, I_E = 0)	$V_{(BR)CBO}$	36	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CE} = 15 Vdc, V_{BE} = 0)	I_{CES}	—	—	1.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 200 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	—	150	—

(continued)

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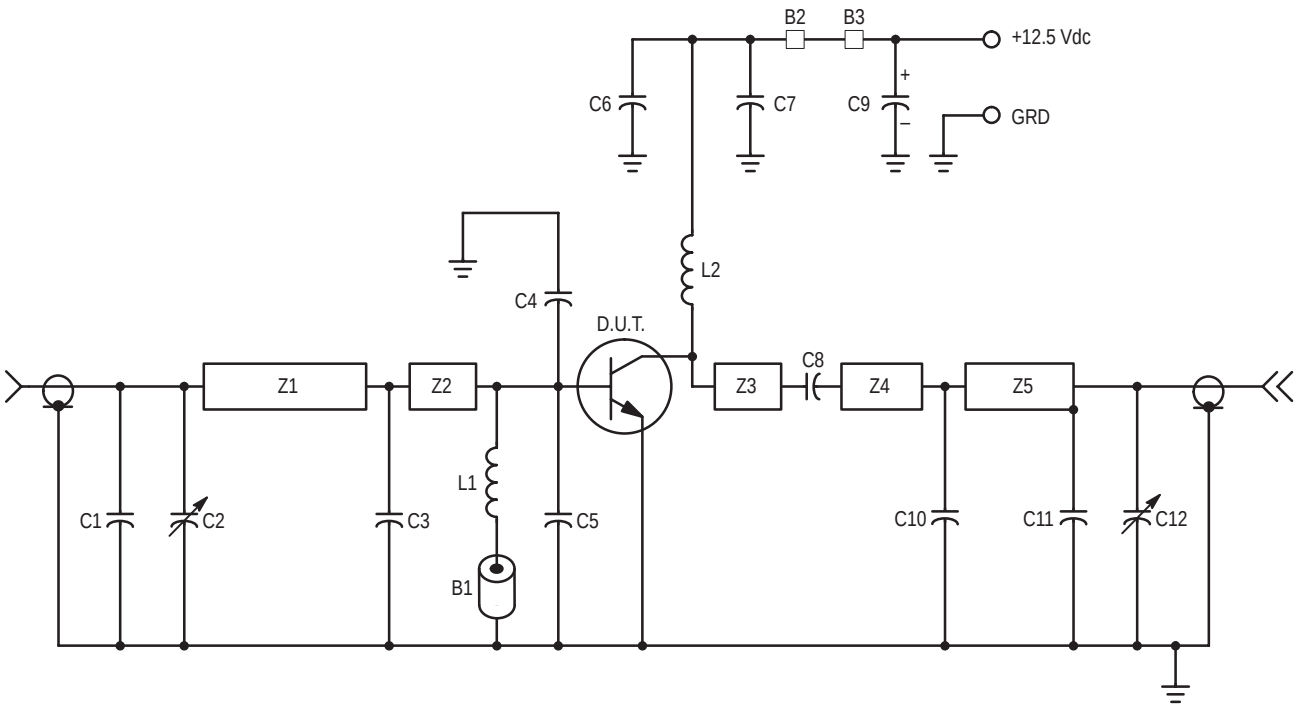
ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS						
Output Capacitance (V_{CB} = 15 Vdc, I_E = 0, f = 1.0 MHz)		C_{ob}	—	9.5	15	pF
FUNCTIONAL TESTS						
Common–Emitter Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 5.0 W)	f = 512 MHz f = 870 MHz	G_{pe}	10 —	11 6.0	— —	dB
Collector Efficiency (V_{CC} = 12.5 Vdc, P_{out} = 5.0 W, f = 512 MHz)		η	60	65	—	%
Load Mismatch (V_{CC} = 15.5 Vdc, P_{in} = 500 mW, f = 512 MHz, VSWR = 30:1, At All Phase Angles)		ψ	No Degradation in Output Power			



B1, B2, B3 — Ferrite Bead
C1 — 7.0 pF Unelco Mica
C2 — 1.0–6.0 pF Johanson Variable 5201
C3 — 15 pF Unelco Mica
C4 — 43 pF Mini–Underwood Mica
C5 — 56 pF Mini–Underwood Mica
C6 — 1000 pF Unelco Mica
C7 — 0.1 μF Ceramic
C8 — 68 pF Mini–Underwood Mica
C9 — 1.0 μF Electrolytic 25 V
C10, C11 — 5.0 pF Unelco Mica
C12 — 1.0–10 pF Johanson Variable 5501
L1, L2 — 6 Turns, 20 AWG Wire 0.125″ ID
Z1, Z2 — 25 Ohm μStripline
Z3, Z4, Z5 — 50 Ohm μStripline
Board — 0.032″ Glass–Teflon

Figure 1. 440–512 MHz Broadband Test Circuit

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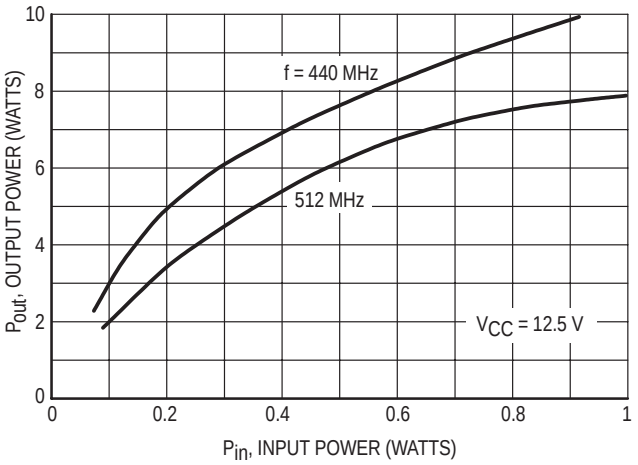


Figure 2. Output Power versus Input Power

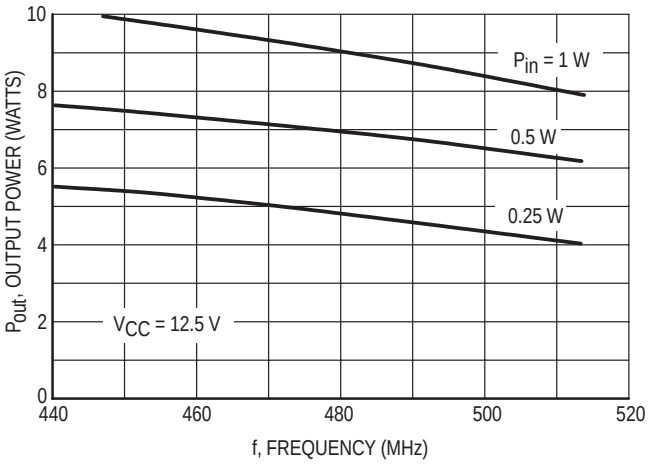


Figure 3. Output Power versus Frequency

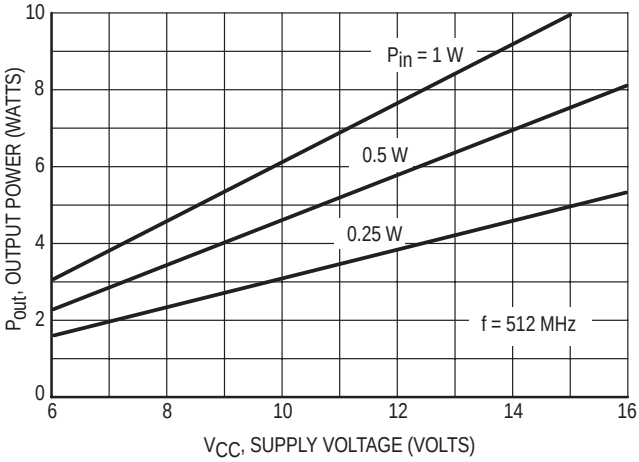


Figure 4. Output Power versus Supply Voltage

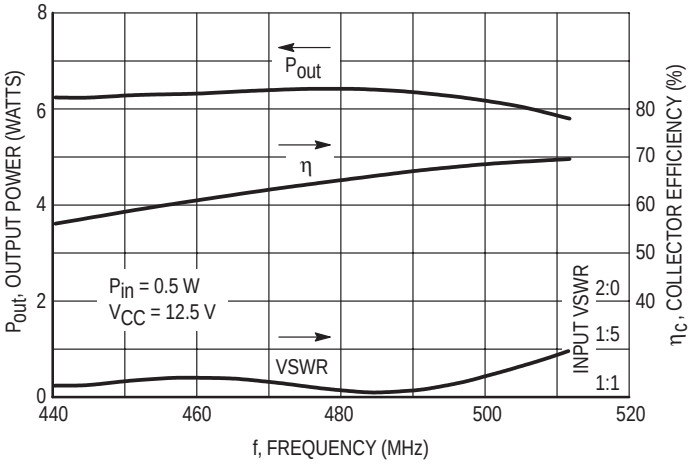
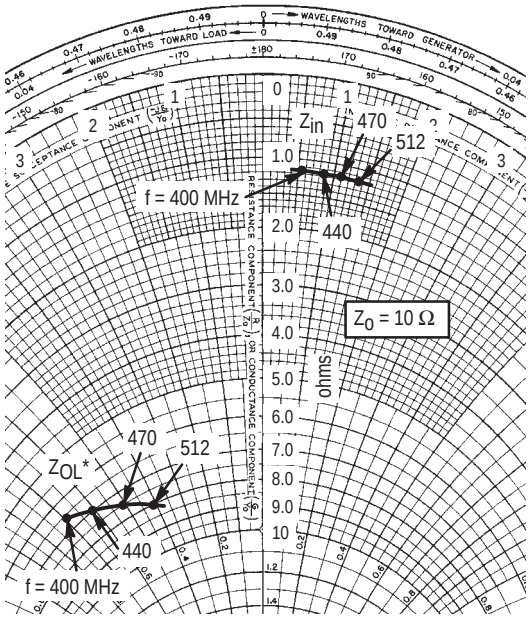


Figure 5. Typical Broadband Circuit Performance



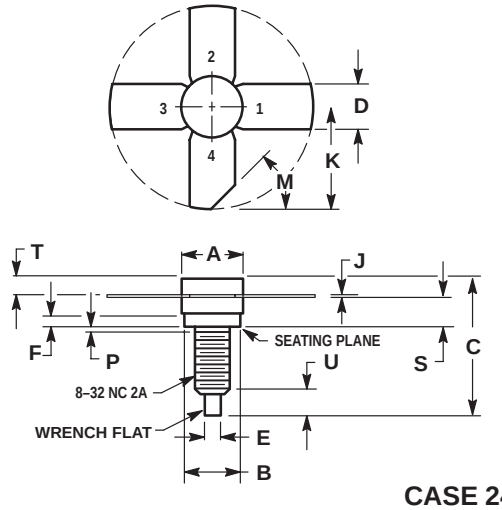
VCC = 12.5 Vdc
Pout = 5.0 W

f MHz	Zin Ohms	ZOL* Ohms
400	1.18 + j0.54	6.7 – j6.9
440	1.19 + j0.88	7.05 – j6.1
470	1.19 + j1.11	7.6 – j5.1
512	1.19 + j1.35	8.1 – j4.1

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

Figure 6. Series Equivalent Input/Output Impedance

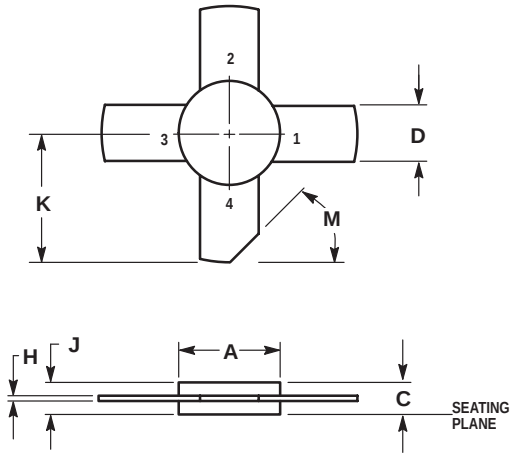
PACKAGE DIMENSIONS



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	7.06	7.26	0.278	0.286
B	6.20	6.50	0.244	0.256
C	14.99	16.51	0.590	0.650
D	5.46	5.96	0.215	0.235
E	1.40	1.65	0.055	0.065
G	1.52	—	0.060	—
J	0.08	0.17	0.003	0.007
K	11.05	—	0.435	—
M	45° NOM		45° NOM	
P	—	1.27	—	0.050
S	3.00	3.25	0.118	0.128
T	1.40	1.77	0.055	0.070
U	2.92	3.68	0.115	0.145

STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

CASE 244–04
ISSUE J
MRF652



STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. SEATING PLANE = GROUND AND IS CONNECTED TO PIN 1 AND 3.

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.271	0.286	6.88	7.26
C	0.112	0.136	2.84	3.45
D	0.215	0.235	5.46	5.97
H	0.055	0.065	1.40	1.65
J	0.003	0.007	0.08	0.18
K	0.435	—	11.05	—
M	45° REF		45° REF	

CASE 249–06
ISSUE H
MRF652S

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