

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.

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 _{θJC}	7.0	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (I _C = 25 mA _{dc} , I _B = 0)	V _{(BR)CEO}	16	—	—	Vdc
Collector-Emitter Breakdown Voltage (I _C = 25 mA _{dc} , V _{BE} = 0)	V _{(BR)CES}	36	—	—	Vdc
Collector-Base Breakdown Voltage (I _C = 25 mA _{dc} , I _E = 0)	V _{(BR)CBO}	36	—	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 5.0 mA _{dc} , I _C = 0)	V _{(BR)EBO}	4.0	—	—	Vdc
Collector Cutoff Current (V _{CE} = 15 Vdc, V _{BE} = 0)	I _{CES}	—	—	1.0	mA _{dc}

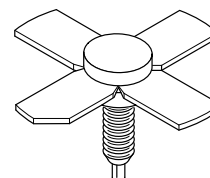
ON CHARACTERISTICS

DC Current Gain (I _C = 200 mA _{dc} , V _{CE} = 5.0 Vdc)	h _{FE}	10	—	150	—
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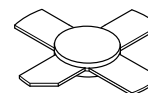
(continued)

MRF652
MRF652S

5.0 W, 512 MHz
RF POWER
TRANSISTORS
NPN SILICON



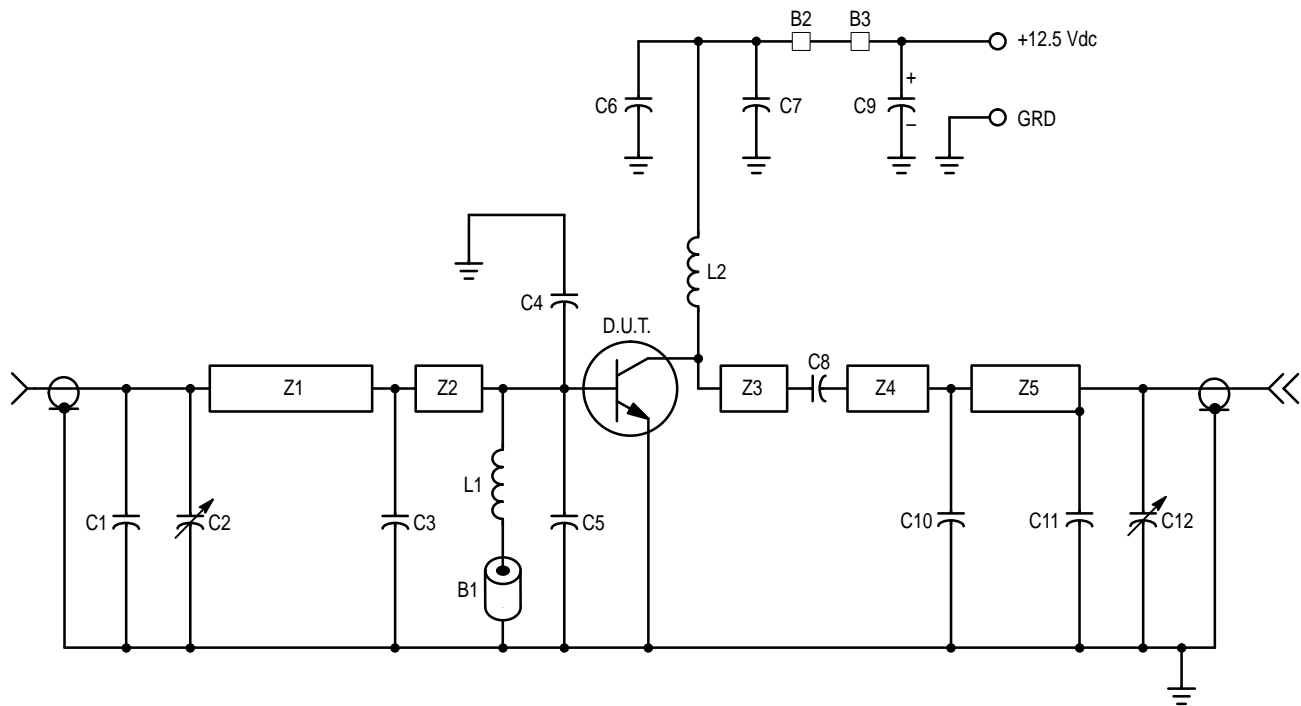
CASE 244-04, STYLE 1
MRF652



CASE 249-06, STYLE 1
MRF652S

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

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



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

Figure 1. 440–512 MHz Broadband Test Circuit

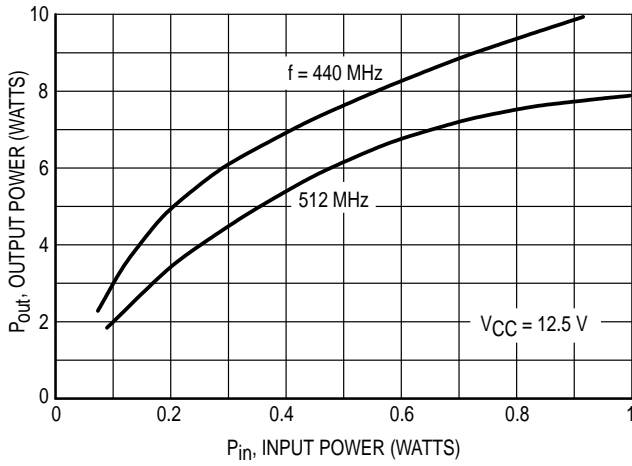


Figure 2. Output Power versus Input Power

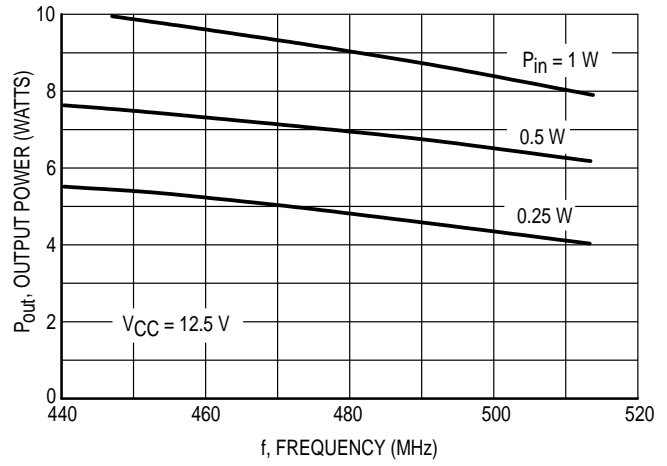


Figure 3. Output Power versus Frequency

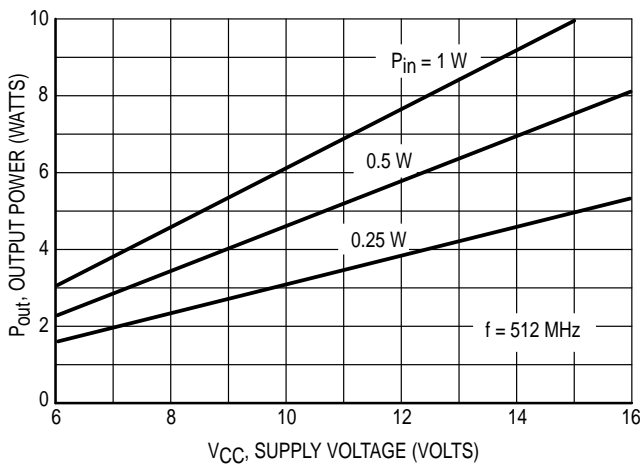


Figure 4. Output Power versus Supply Voltage

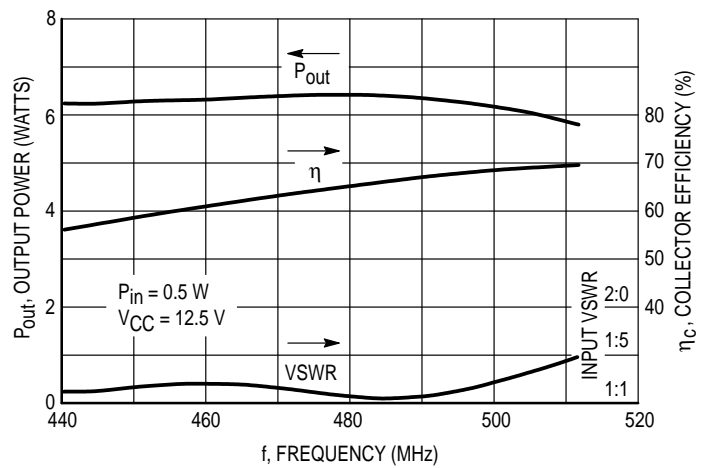
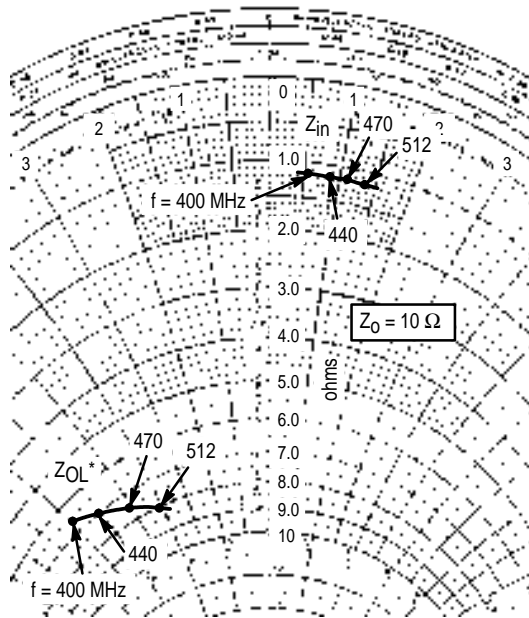


Figure 5. Typical Broadband Circuit Performance



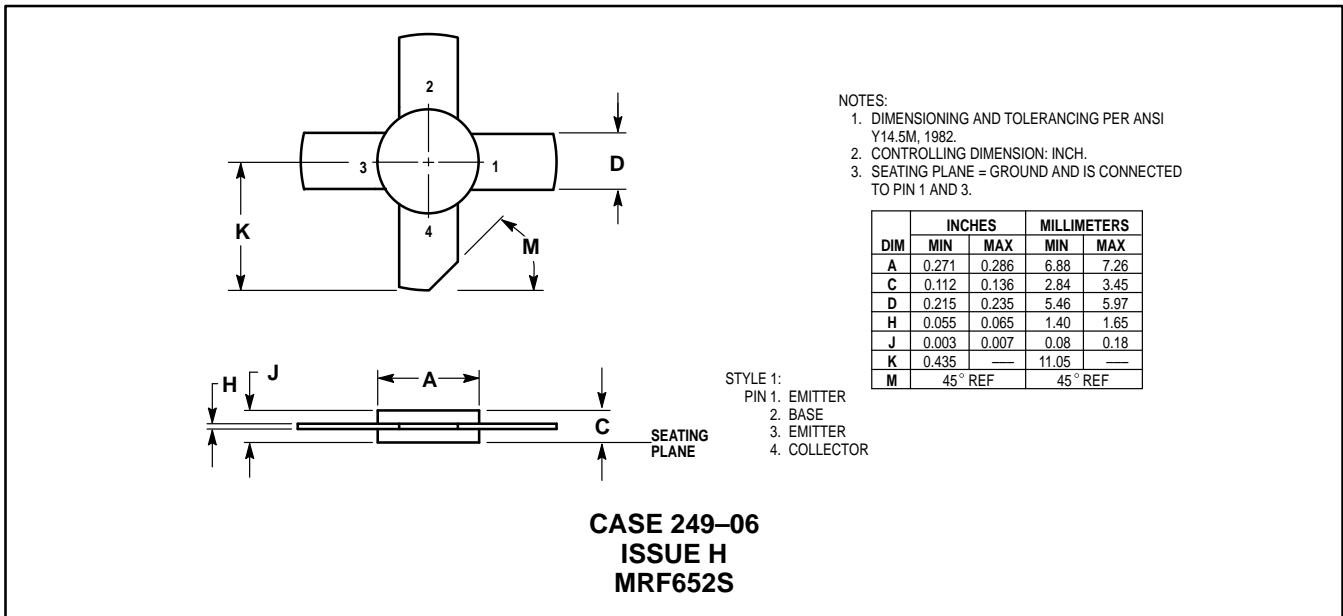
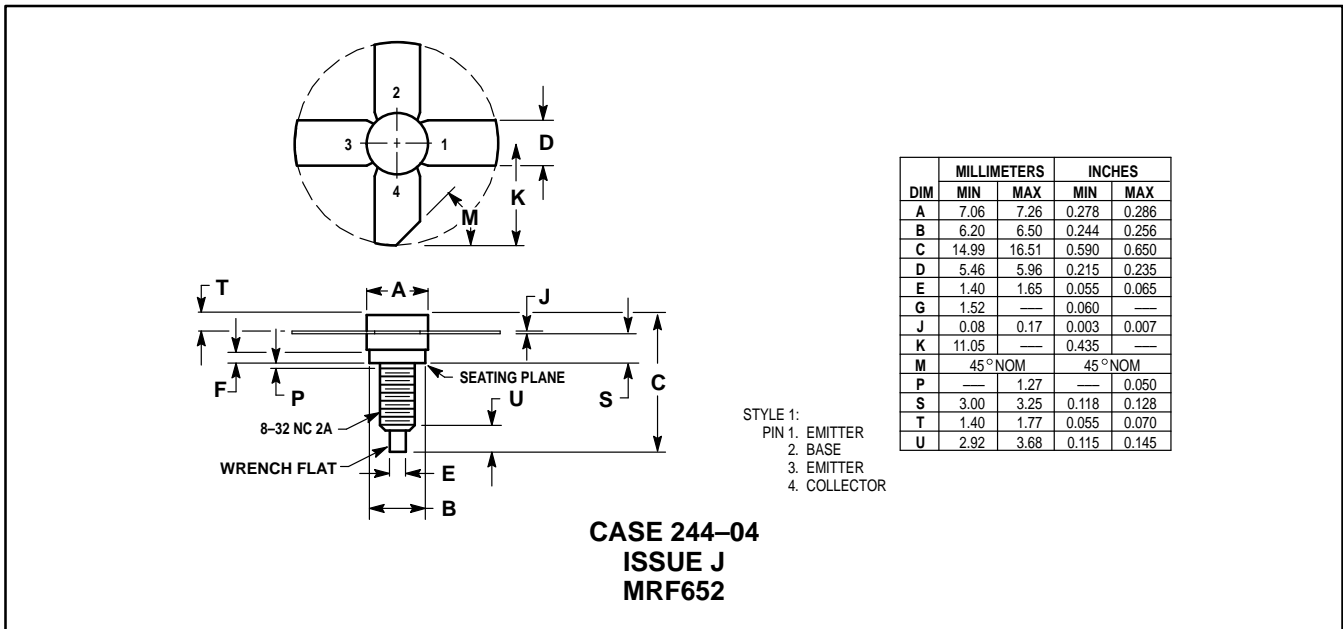
$V_{CC} = 12.5 \text{ Vdc}$
 $P_{out} = 5.0 \text{ W}$

f MHz	Z_{in} Ohms	Z_{OL}^* 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	$1.19 + j1.35$	$8.1 - j4.1$

Z_{OL}^* = 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



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