

The RF Line

NPN Silicon

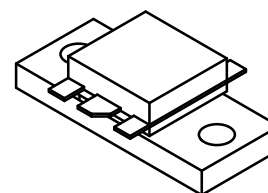
RF Power Transistor

MRF6414

50 W, 960 MHz
RF POWER TRANSISTOR
NPN SILICON

The MRF6414 is designed for 26 volt UHF large signal, common emitter, class AB linear amplifier applications.

- Specified 26 Volt, 960 MHz Characteristics
 - Output Power = 50 Watts
 - Minimum Gain = 8.5 dB @ 960 MHz, Class AB
 - Minimum Efficiency = 50% @ 960 MHz, 50 Watts
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Circuit Board Photomaster Available by Ordering Document MRF6414PHT/D from Motorola Literature Distribution.



CASE 333A-02, STYLE 2

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	28	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4	Vdc
Collector-Current — Continuous	I_C	6	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	134 0.77	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.3	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 20\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CEO}$	28	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 20\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector-Emitter Leakage Current ($V_{CE} = 30\text{ Vdc}$, $R_{BE} = 75\ \Omega$)	I_{CER}	—	—	10	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_{CE} = 1\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	h_{FE}	30	—	120	—
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ELECTRICAL CHARACTERISTICS — continued ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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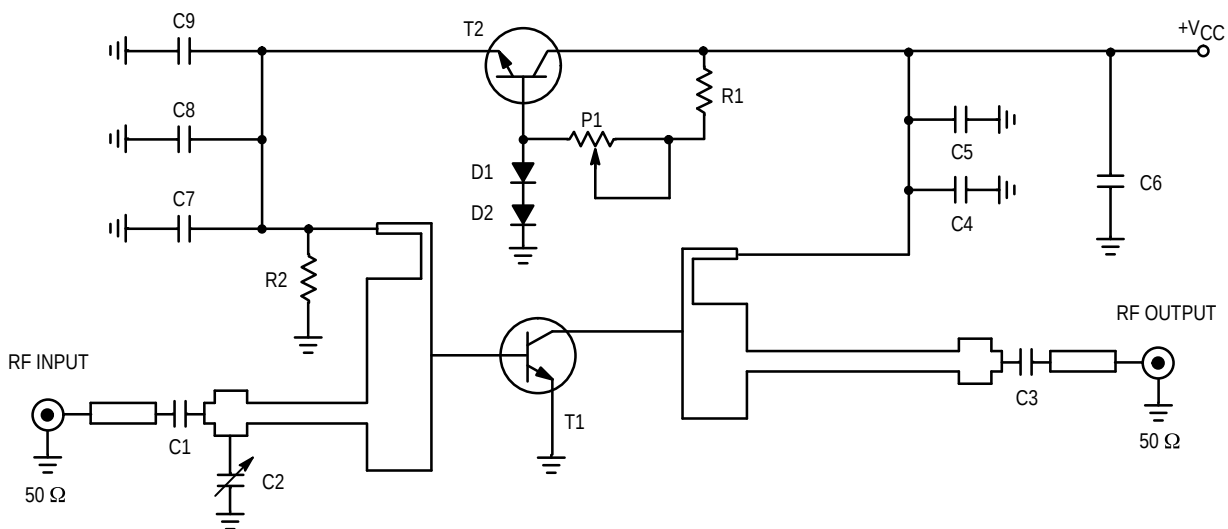
DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 26\text{ Vdc}$, $I_E = 0$, $f = 1\text{ MHz}$) (1)	C_{ob}	—	45	—	pF
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FUNCTIONAL TESTS

Common-Emitter Amplifier Power Gain ($V_{CC} = 26\text{ Vdc}$, $P_{out} = 50\text{ W}$, $I_{CQ} = 200\text{ mA}$, $f = 960\text{ MHz}$)	G_{pe}	8.5	—	—	dB
Collector Efficiency ($V_{CC} = 26\text{ Vdc}$, $P_{out} = 50\text{ W}$, $I_{CQ} = 200\text{ mA}$, $f = 960\text{ MHz}$)	η	50	55	—	%
Output Mismatch Stress ($V_{CC} = 26\text{ Vdc}$, $P_{out} = 50\text{ W}$, $I_{CQ} = 200\text{ mA}$, $f = 960\text{ MHz}$) VSWR = 3:1; all phase angles at frequency of test	Ψ	No Degradation in Output Power			

(1) For information only. It is not measurable in MRF6414 because of internal matching network.



C1, C3 100 pF, Chip Capacitor, Hight Q
C2, C7 330 pF, Chip Capacitor, 0805
C5, C8 10 nF, Chip Capacitor, 0805
C6 15 μF , Capacitor, 63 V
C9 100 μF , Capacitor, 16 V
D1, D2 Diode 1N4007

P1 1 k Ω , Trimmer
R1 1 k Ω , Resistor
R2 58 Ω , Resistor, 0805
T1 MRF6414
T2 Transistor NPN Type BD135

Figure 1. 960 MHz Test Circuit Schematic

TYPICAL CHARACTERISTICS

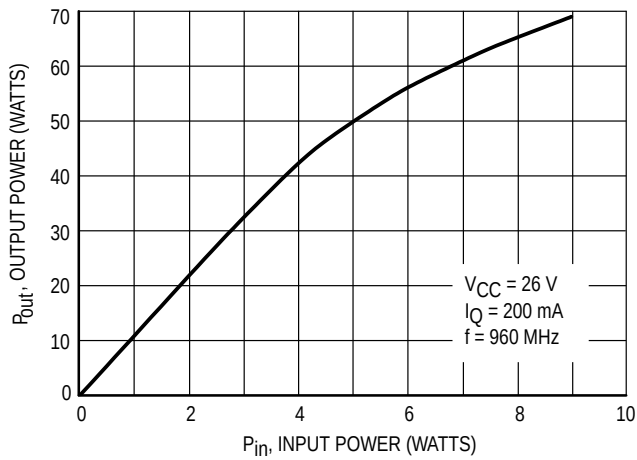


Figure 2. Output Power versus Input Power (Typical)

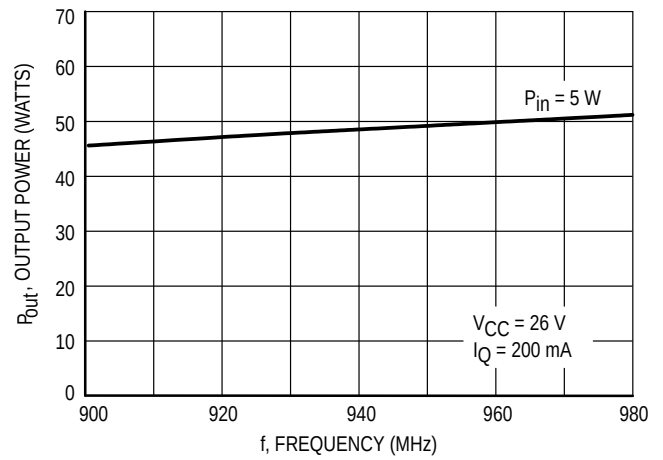


Figure 3. Output Power versus Frequency

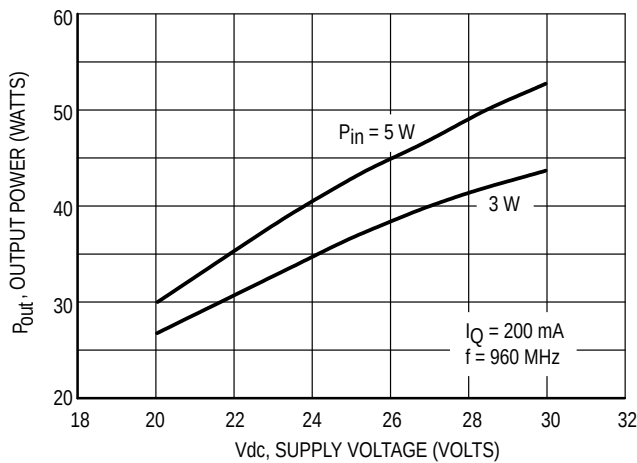


Figure 4. Output Power versus Supply Voltage

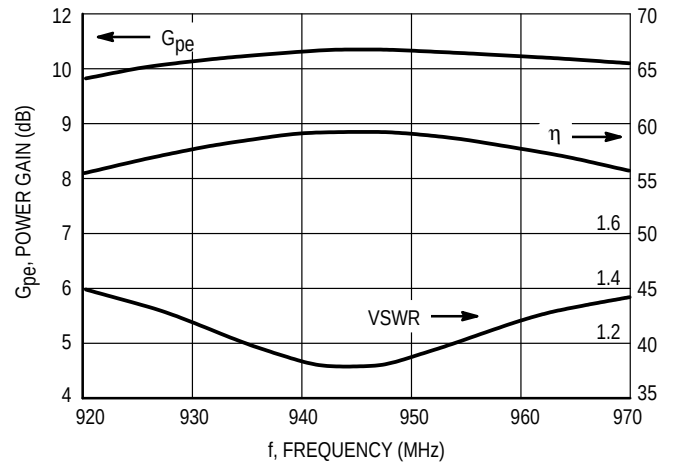


Figure 5. Typical Broadband Amplifier

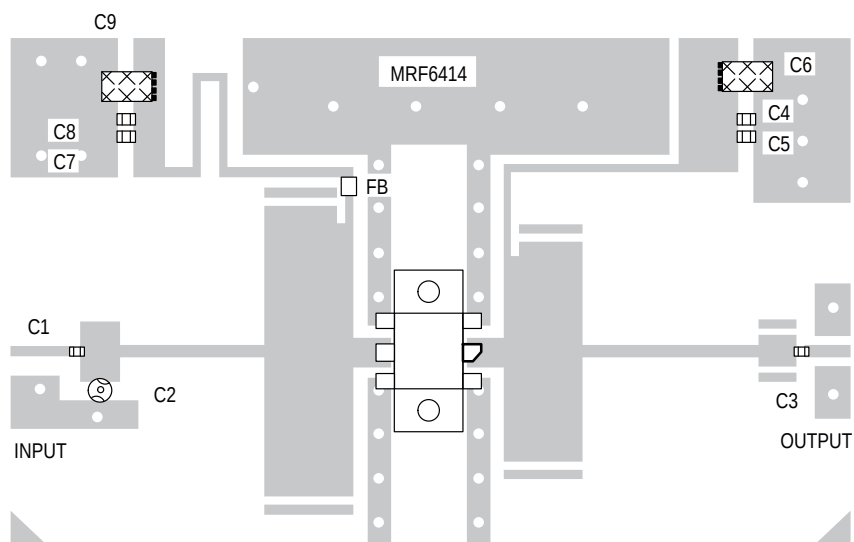
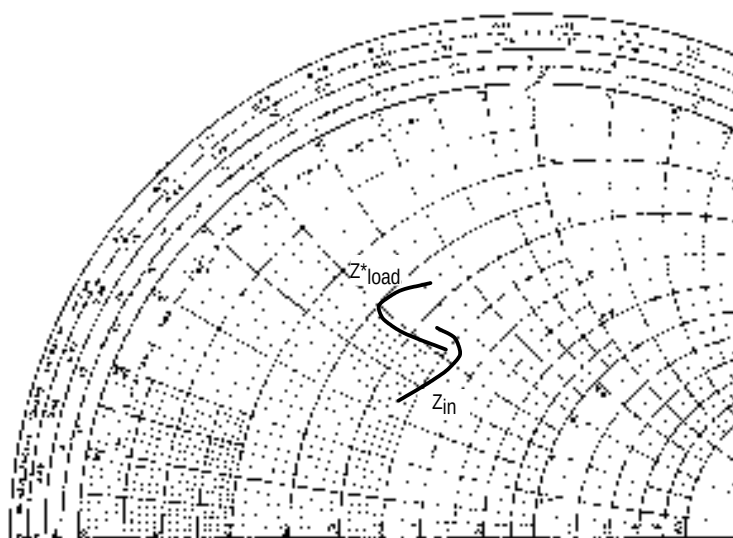


Figure 6. 960 MHz Test Circuit Components Layout



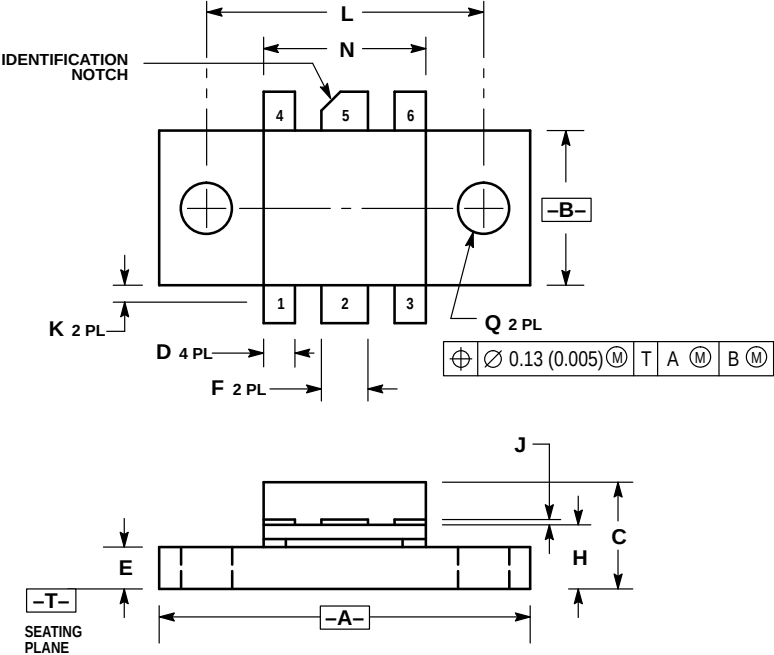
Normalized to 10 Ω

f MHz	Z_{in} Ohms	Z_{OL}^* Ohms
900	$4.4 + j4.6$	$4.7 + j4.7$
935	$5.1 + j4.8$	$4.0 + j3.9$
960	$5.4 + j3.6$	$3.7 + j4.5$
980	$4.7 + j2.5$	$3.4 + j4.7$

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

Figure 7. Input and Output Impedances with Circuit Tuned for Maximum Gain
@ $V_{CC} = 26$ V, $I_Q = 200$ mA, $P_{out} = 50$ W

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.965	0.985	24.52	25.01
B	0.390	0.410	9.91	10.41
C	0.250	0.290	6.35	7.36
D	0.075	0.090	1.91	2.28
E	0.095	0.115	2.42	2.92
F	0.110	0.130	2.80	3.30
H	0.155	0.175	3.94	4.44
J	0.004	0.006	0.11	0.15
K	0.090	0.116	2.29	2.94
L	0.725 BSC		18.41 BSC	
N	0.415	0.435	10.55	11.04
Q	0.120	0.135	3.05	3.42

- STYLE 2:
- PIN 1. EMITTER
 - 2. BASE
 - 3. EMITTER
 - 4. EMITTER
 - 5. COLLECTOR
 - 6. EMITTER

CASE 333A-02
ISSUE C

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MRF6414/D

