The RF Line

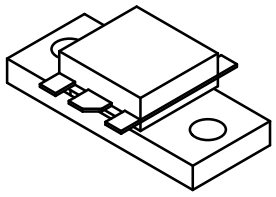
NPN Silicon RF Power Transistor

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°C Derate above 25°C	P_D	134 0.77	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

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

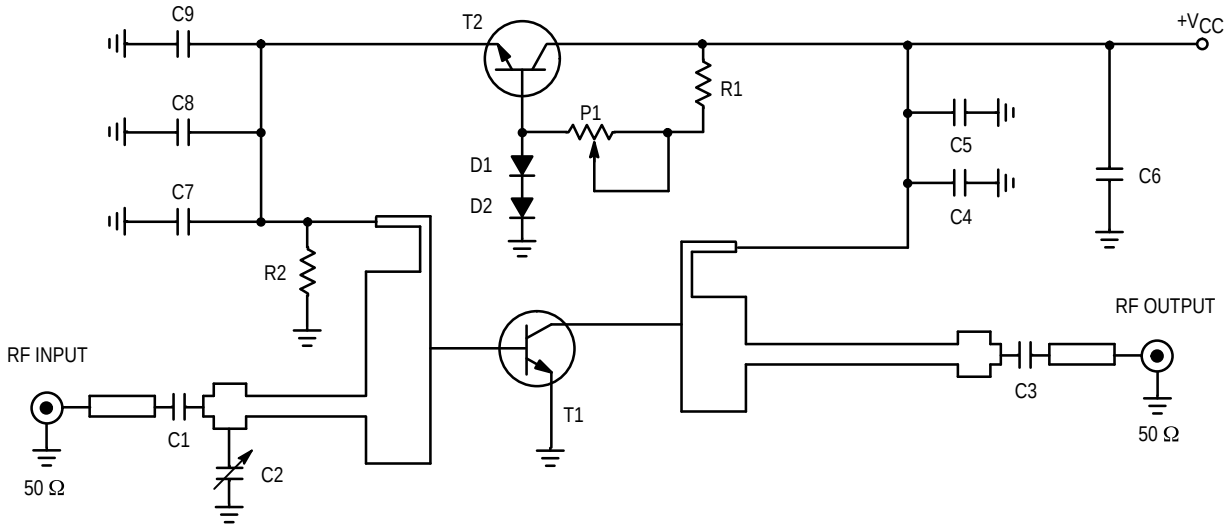
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 20 mAdc, I_B = 0)	$V_{(BR)CEO}$	28	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 20 mAdc, I_E = 0)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector–Emitter Leakage Current (V_{CE} = 30 Vdc, R_{BE} = 75 Ω)	I_{CER}	—	—	10	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_{CE} = 1 Adc, V_{CE} = 5 Vdc)	h_{FE}	30	—	120	—

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

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 26 Vdc, I_E = 0, f = 1 MHz) (1)	C_{ob}	—	45	—	pF
FUNCTIONAL TESTS					
Common–Emitter Amplifier Power Gain (V_{CC} = 26 Vdc, P_{out} = 50 W, I_{CQ} = 200 mA, f = 960 MHz)	G_{pe}	8.5	—	—	dB
Collector Efficiency (V_{CC} = 26 Vdc, P_{out} = 50 W, I_{CQ} = 200 mA, f = 960 MHz)	η	50	55	—	%
Output Mismatch Stress (V_{CC} = 26 Vdc, P_{out} = 50 W, I_{CQ} = 200 mA, f = 960 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	P1	1 kΩ, Trimmer
C2, C7	330 pF, Chip Capacitor, 0805	R1	1 kΩ, Resistor
C5, C8	10 nF, Chip Capacitor, 0805	R2	58 Ω, Resistor, 0805
C6	15 μF, Capacitor, 63 V	T1	MRF6414
C9	100 μF, Capacitor, 16 V	T2	Transistor NPN Type BD135
D1, D2	Diode 1N4007		

Figure 1. 960 MHz Test Circuit Schematic

TYPICAL CHARACTERISTICS

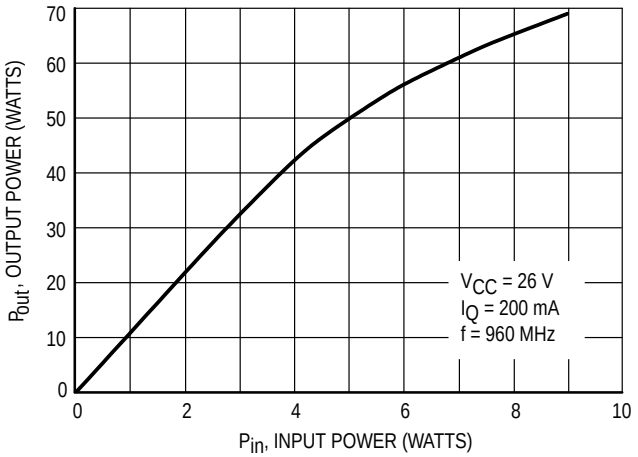


Figure 2. Output Power versus Input Power (Typical)

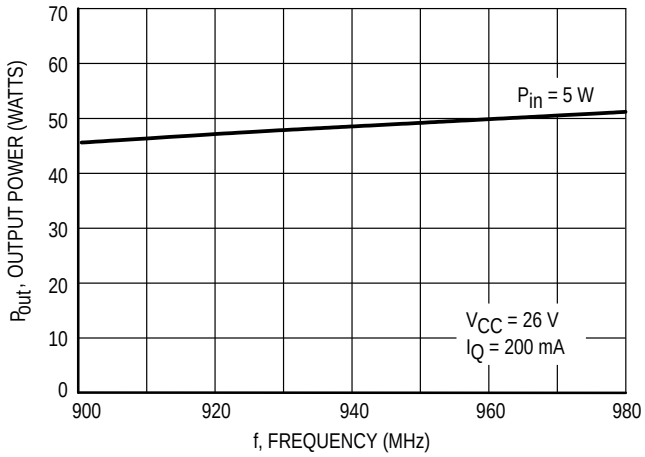


Figure 3. Output Power versus Frequency

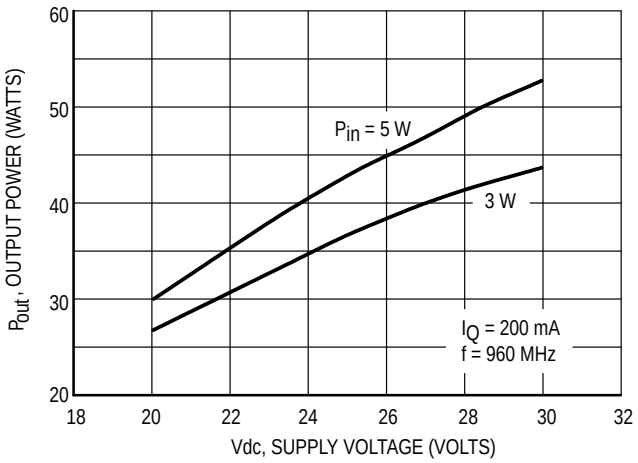


Figure 4. Output Power versus Supply Voltage

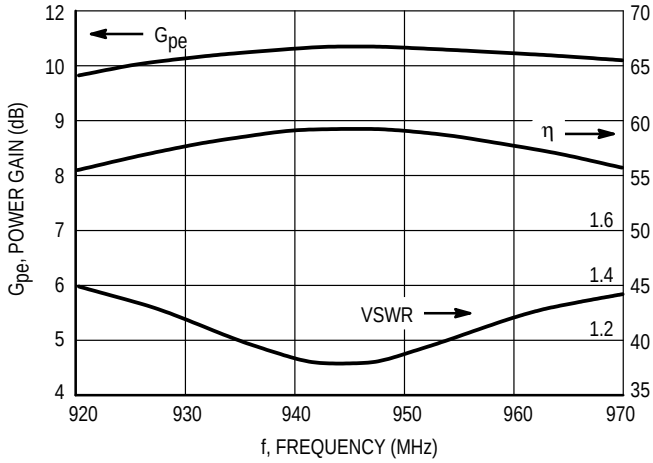


Figure 5. Typical Broadband Amplifier

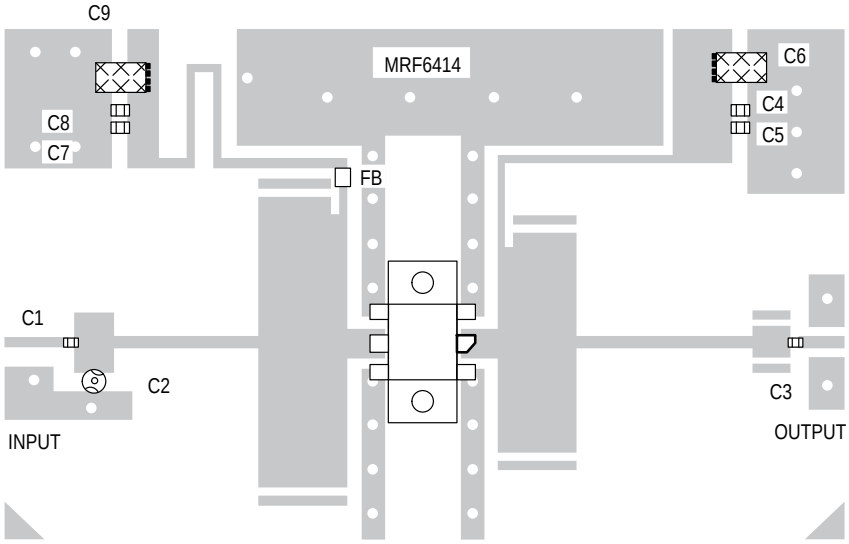
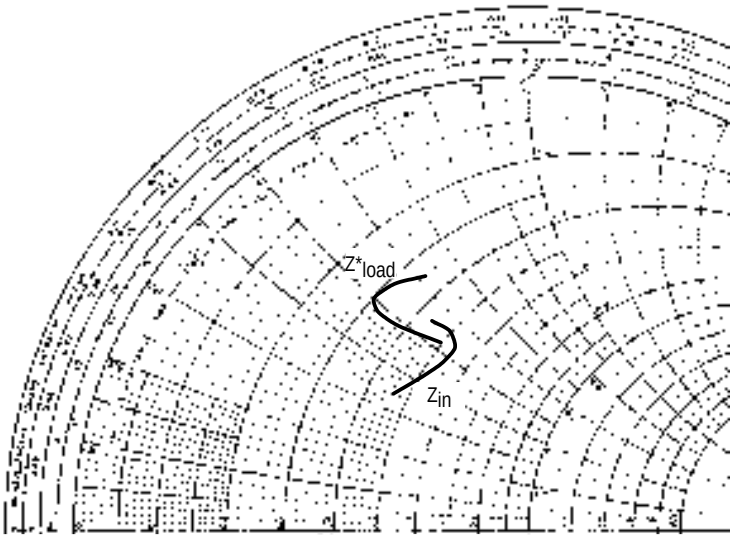


Figure 6. 960 MHz Test Circuit Components Layout



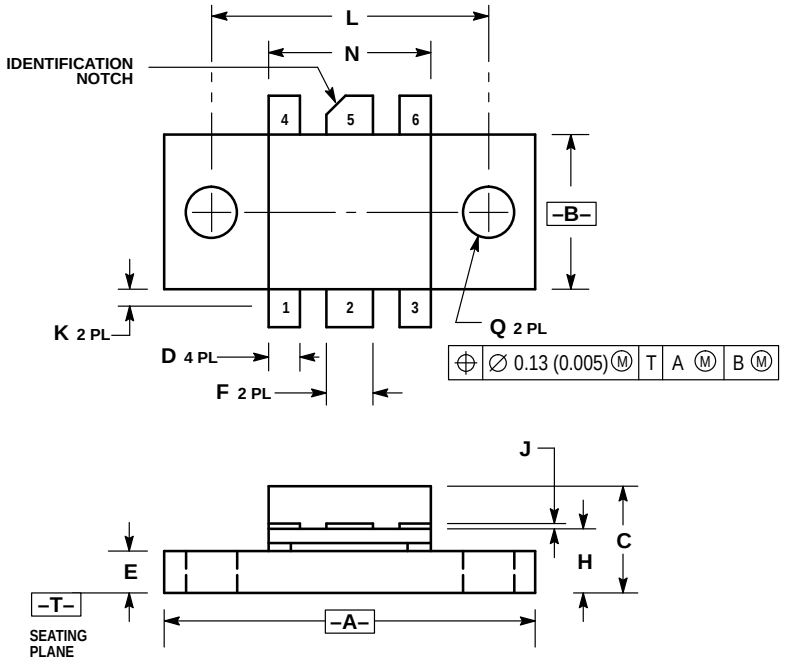
Normalized to 10 Ω

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.

	INCHES		MILLIMETERS	
DIM	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

How to reach us:
USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, Toshikatsu Otsuki,
6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–3521–8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298