

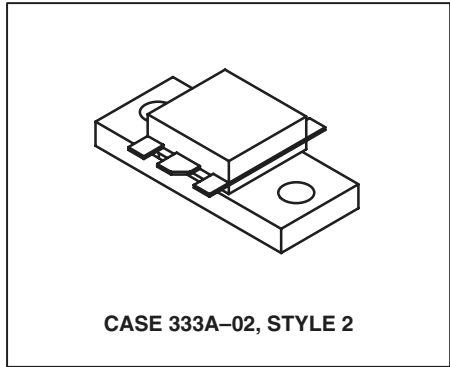
The RF Line

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

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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	$^\circ\text{C}/\text{W}$

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 ($I_C = 20 \text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	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

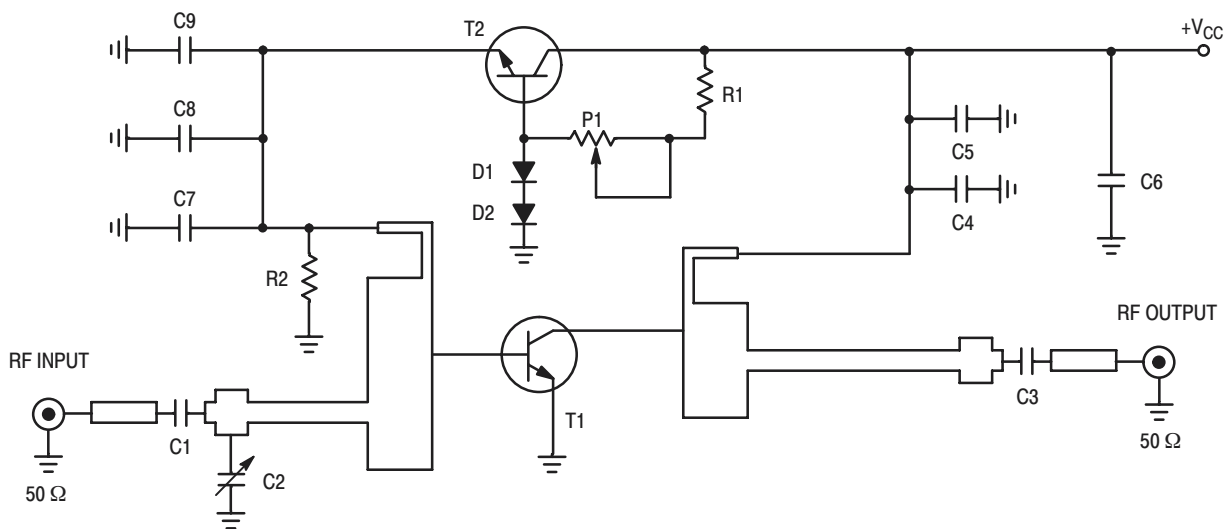
ON CHARACTERISTICS

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



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|--------|-------------------------------------|----|------------------------------|
| C1, C3 | 100 pF, Chip Capacitor, High Q | P1 | 1 k Ω , Trimmer |
| C2, C7 | 330 pF, Chip Capacitor, 0805 | R1 | 1 k Ω , 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

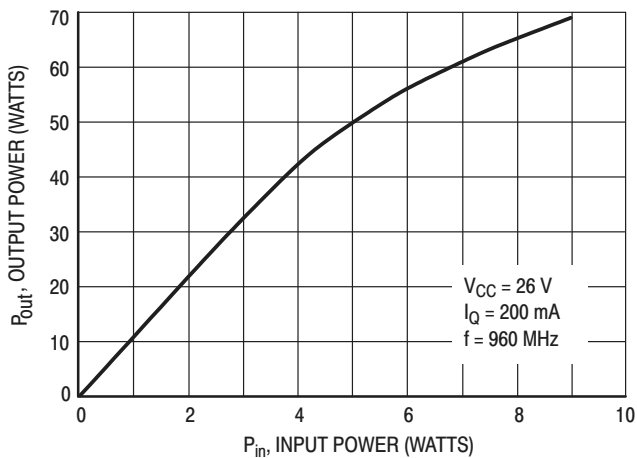


Figure 2. Output Power versus Input Power (Typical)

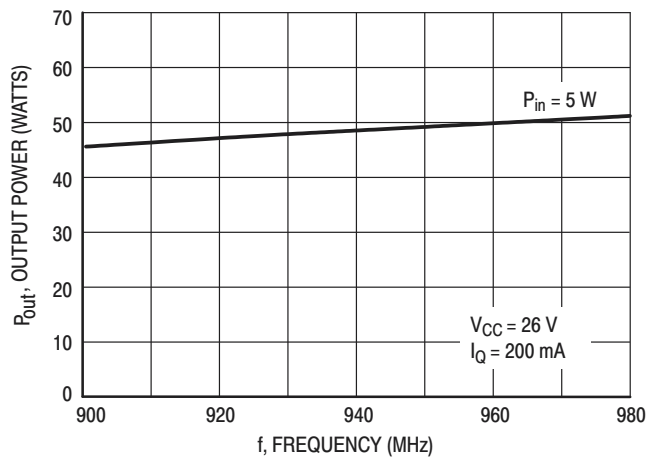


Figure 3. Output Power versus Frequency

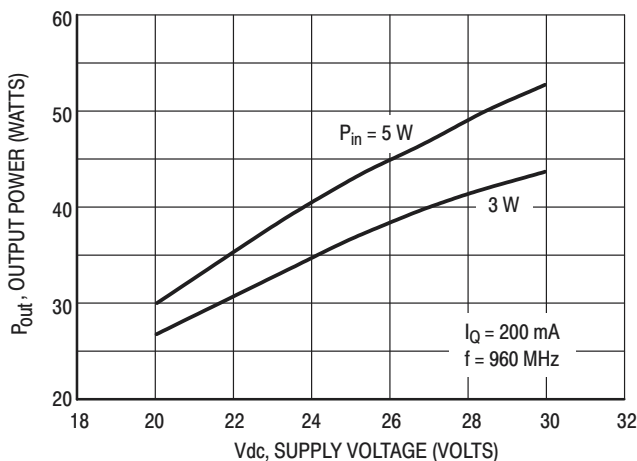


Figure 4. Output Power versus Supply Voltage

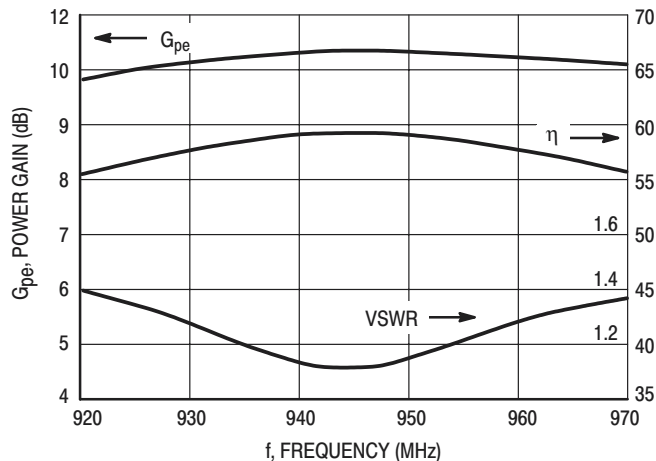
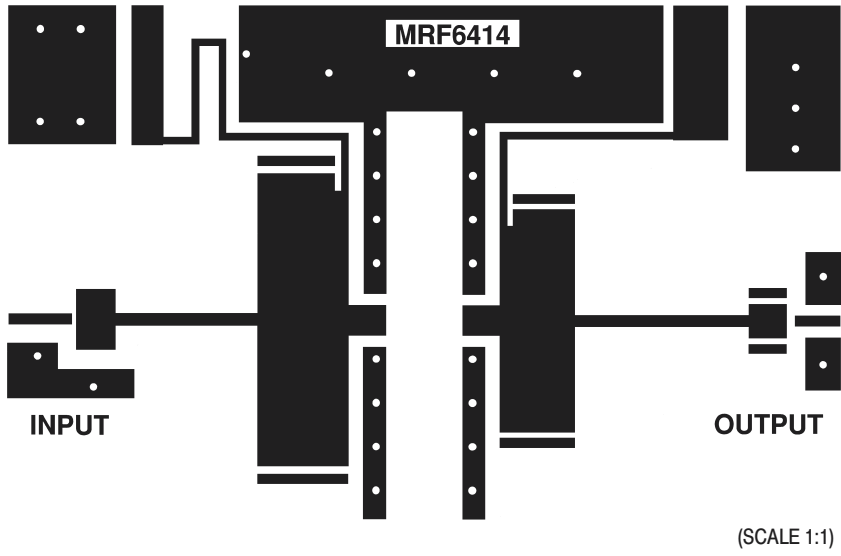


Figure 5. Typical Broadband Amplifier

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TEST CIRCUIT @ $f = 960 \text{ MHz}$
 TEFLON[®] GLASS 1/50 INCH $\epsilon_r = 2.55$

Figure 6. MRF6414 Photomaster
 (Reduced 18% in printed data book, DL110/D)

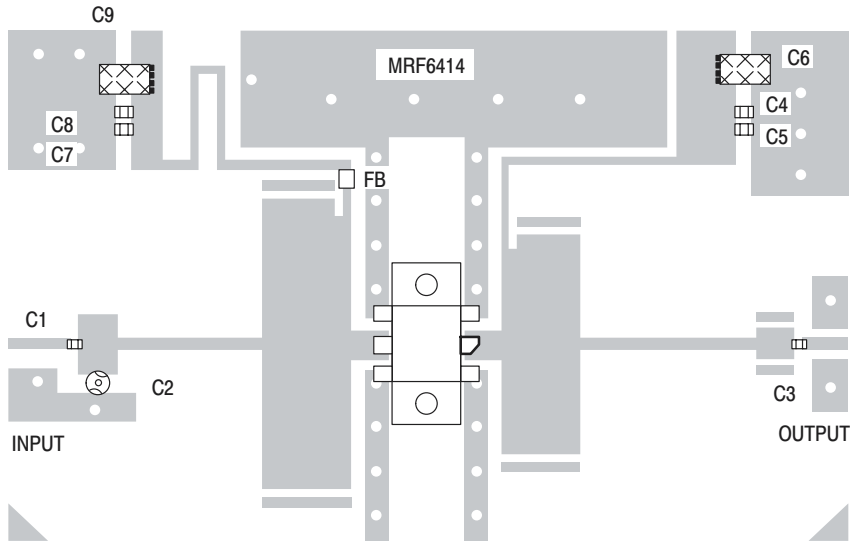
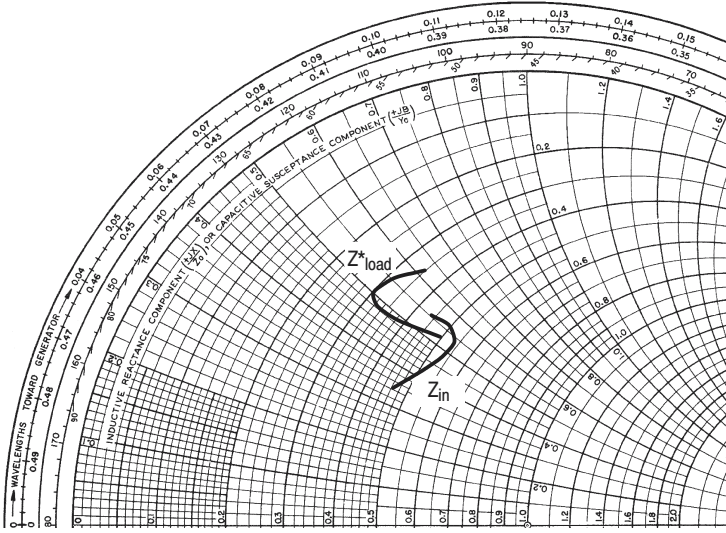


Figure 7. 960 MHz Test Circuit Components Layout

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

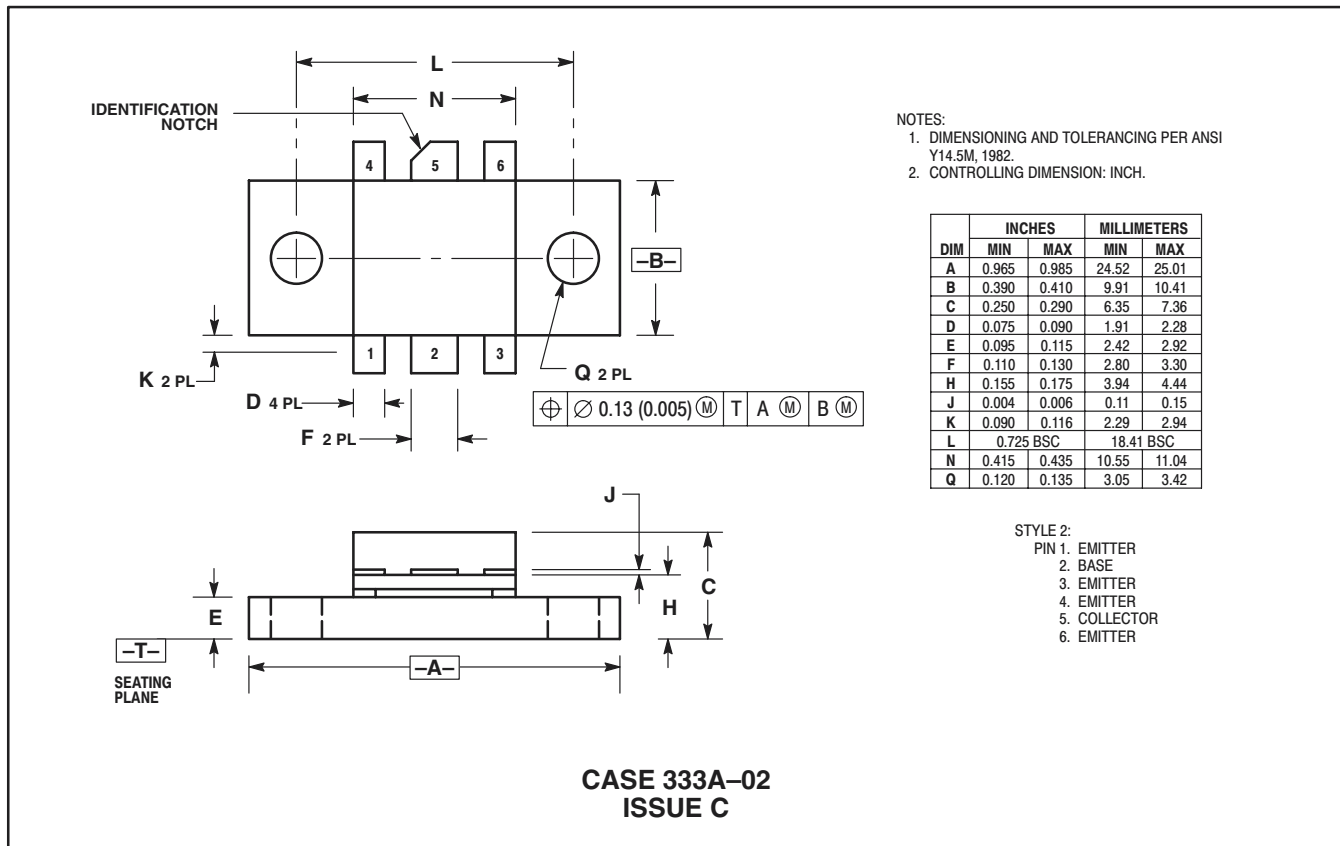


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