MRF2000-5L

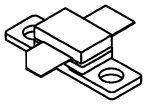
Motorola Preferred Device

The RF Line
Microwave Linear Power Transistor

Designed primarily for wideband, large signal output and driver amplifier stages in the 1.0 to 2.0 GHz frequency range.

- Designed for Class A or AB, Common Emitter Power Amplifiers
- Specified 20 Volt, 2.0 GHz Characteristic Power Gain — 7.0 dB Min @ 5.0 W P_{out}
- Built In Matching Network for Broadband Operation
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors

7.0–8.0 dB GAIN
USABLE 1.0–2.0 GHz
5.0 WATTS
MICROWAVE
LINEAR POWER TRANSISTOR



CASE 360A, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	22	Vdc
Collector-Base Voltage	V_{CES}	50	Vdc
Emitter-Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Continuous	I_C	2.0	Adc
Operating Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{stg}	– 65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case, DC	$R_{\theta JC}$ (DC)	12	°C/W
Thermal Resistance, Junction to Case, RF	$R_{\theta JC}$ (RF)	10	°C/W

ELECTRICAL CHARACTERISTICS

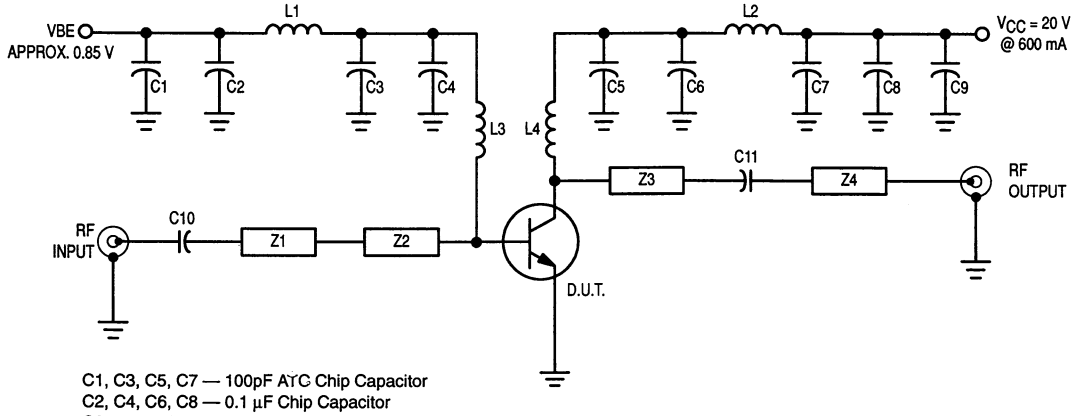
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mA, I_C = 0)	$V_{(BR)CEO}$	22	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mA, V_{BE} = 0)	$V_{(BR)CES}$	50	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 1.25 mA, I_C = 0)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mA, R_{BE} = 10 Ohms)	$V_{(BR)CER}$	35	—	—	Vdc
Collector Cutoff Current (V_{CE} = 20 V, I_E = 0)	I_{CBO}	—	—	1.25	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.5 A, V_{CE} = 5.0 V)	h_{FE}	20	35	100	—

(continued)

Preferred devices are Motorola recommended choices for future use and best overall value.

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CE} = 20 V, P_{out} = 5.0 W, f = 2.0 GHz, I_C = 600 mA)	G_{PE1}	7.0	—	—	dB
Collector Efficiency (V_{CE} = 20 V, P_{out} = 5.0 W, f = 2.0 GHz, I_C = 600 mA)	η_c	39	—	—	%
Typical Class AB Performance					
Common-Emitter Amplifier Power Gain (V_{CE} = 20 V, P_{out} = 6.0 W, f = 2.0 GHz, I_{CQ} = 100 mA)	G_{PE2}	—	5.0	—	dB
Collector Efficiency (V_{CE} = 20 V, P_o = 6.0 W, f = 2.0 GHz, I_{CQ} = 100 mA)	η_c	—	48	—	%
Common-Emitter Amplifier Power Gain (V_{CE} = 24 V, P_{out} = 8.0 W, f = 2.0 GHz, I_{CQ} = 100 mA)	G_{PE3}	—	6.5	—	dB
Collector Efficiency (V_{CE} = 24 V, P_o = 8.0 W, f = 2 .0 GHz, I_{CQ} = 100 mA)	η_c	—	50	—	%



C1, C3, C5, C7 — 100pF ATC Chip Capacitor
C2, C4, C6, C8 — 0.1 µF Chip Capacitor
C9 — 50 µF Electrolytic Capacitor
C10, C11 — 28 pF ATC Chip Capacitor
L1, L2, L3 — 3 Turns, 0.125″ Dia., 18 AWG
L4 — Loop, 18 AWG
Z1, Z4 — 50r Line
Z2 — 0.55″ wide x 0.4″ Long Microstrip
Z3 — 0.4″ wide x 1.125″ Long Microstrip
PC Board — 0.018″ Teflon® Fiberglass, Cu Clad ϵ_r = 2.55

Figure 1. 2.0 GHz Test Circuit

TYPICAL CHARACTERISTICS

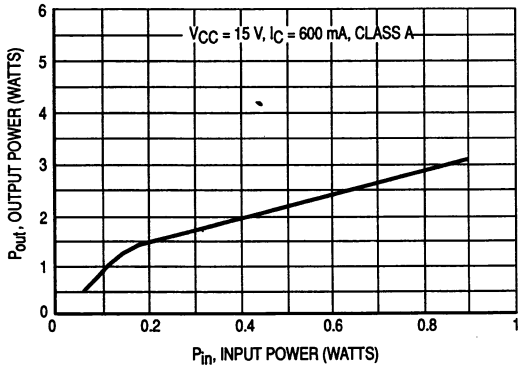


Figure 2. Output Power versus Input Power

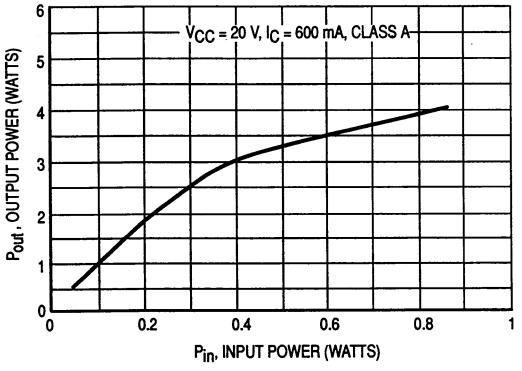


Figure 3. Output Power versus Input Power

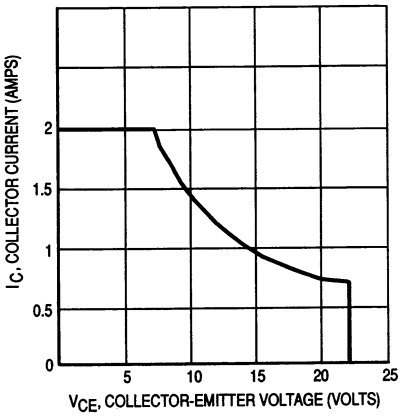
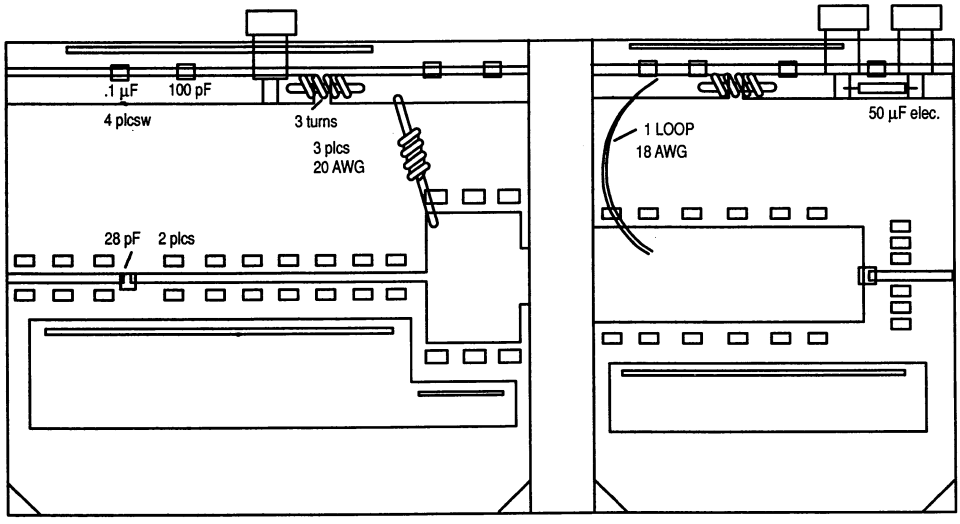


Figure 4. DC Safe Operating Area

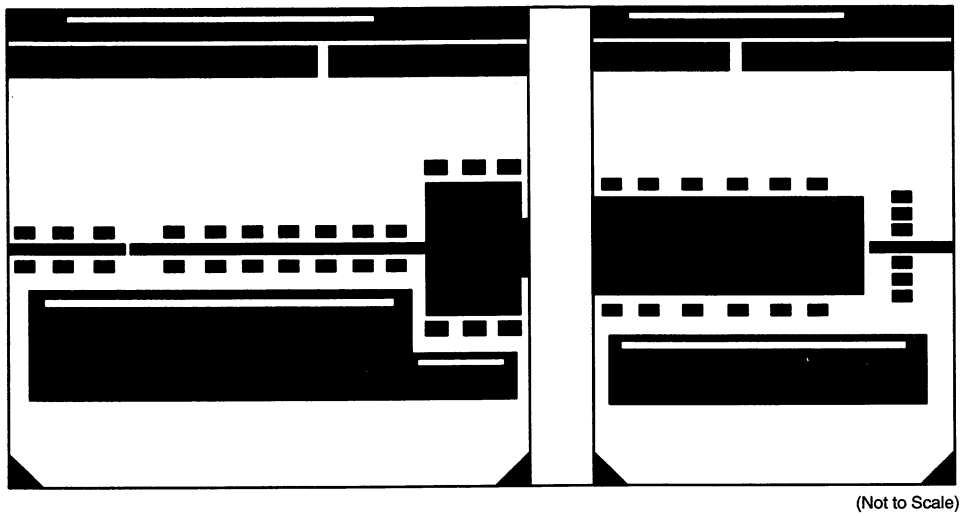
V_{CE} (Vdc)	I_C (mA)	f MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	∠φ	$\|S_{21}\|$	∠φ	$\|S_{12}\|$	∠φ	$\|S_{22}\|$	∠φ
20	500	500	0.94	174	1.95	−17	0.02	−63	0.57	−170
		600	0.94	172	1.65	−40	0.02	−78	0.59	−170
		700	0.94	171	1.44	−62	0.02	−93	0.61	−170
		800	0.93	170	1.28	−84	0.02	−107	0.63	−170
		900	0.92	169	1.16	−107	0.02	−121	0.65	−169
		1000	0.92	169	1.06	−129	0.02	−138	0.67	−169
		1100	0.91	169	0.99	−152	0.02	−155	0.70	−169
		1200	0.90	169	0.93	−175	0.02	−172	0.73	−169
		1300	0.89	169	0.88	161	0.02	171	0.75	−169
		1400	0.88	169	0.84	137	0.02	154	0.76	−170
		1500	0.88	170	0.81	113	0.02	141	0.80	−170
		1600	0.87	171	0.77	88	0.01	130	0.81	−171
		1700	0.87	172	0.73	62	0.01	120	0.83	−173
		1800	0.81	172	0.69	34	0.01	123	0.83	−174
		1900	0.89	173	0.64	8	0.01	125	0.83	−176
		2000	0.90	173	0.58	−18	0.01	127	0.83	−177
		2100	0.92	173	0.52	−46	0.01	122	0.82	−178
		2200	0.93	172	0.48	−73	0.02	110	0.81	−179
		2300	0.94	170	0.42	−99	0.02	95	0.80	−179
		2400	0.95	167	0.37	−126	0.02	82	0.80	−180
		2500	0.95	165	0.32	−153	0.03	67	0.81	−180

Table 1. Common Emitter S-Parameters



NOTE: MATERIAL IS TEFLON FIBERGLASS, 20 MIL THICK, Cu CLAD 2 SIDES

Figure 5. Test Circuit Board — Component Placement



(Not to Scale)

Figure 6. Test Circuit Photomaster

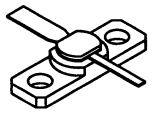
MRF3094
MRF3095
MRF3096

The RF Line
Microwave Linear Power Transistors

. . . designed for Class A, common emitter linear power amplifiers.

- Specified 20 Volt, 1.6 GHz Characteristics
  Output Power — 0.5, 0.8, 1.6 Watts
  Gain — 9.0–12 dB
- Low Parasitic Microwave Stripline Package
- Gold Metallization Diffused Emitter Ballast Resistors

9.0–12 dB
1.55–1.65 GHz
0.5–1.6 WATTS
MICROWAVE LINEAR
POWER TRANSISTORS



CASE 328F, STYLE 1

MAXIMUM RATINGS

Rating		Symbol	Limit	Unit
Collector Base Voltage		V_{CES}	50	Vdc
Emitter Base Voltage		V_{EBO}	3.5	Vdc
Collector Emitter Voltage		V_{CEO}	22	Vdc
Collector Current	MRF3094, 3095 MRF3096	I_C	0.4 0.8	Adc
Operating Junction Temperature		T_J	200	°C
Storage Temperature		T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max			Unit
		MRF3094	MRF3095	MRF3096	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	40	35	22	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage		$V_{(BR)CES}$	50	—	—	Vdc
(I_C = 10 mA)	MRF3094, MRF3095					
(I_C = 20 mA)	MRF3096					
Emitter Base Breakdown Voltage		$V_{(BR)EBO}$	3.5	—	—	Vdc
(I_E = 0.25 mA)	MRF3094, MRF3095					
(I_E = 0.5 mA)	MRF3096					
Collector Base Breakdown Voltage		$V_{(BR)CBO}$	45	—	—	Vdc
(I_C = 1.0 mA)	MRF3094, MRF3095					
(I_C = 2.0 mA)	MRF3096					
Collector-Emitter Breakdown Voltage		$V_{(BR)CEO}$	22	—	—	Vdc
(I_C = 10 mA)	MRF3094, MRF3095					
(I_C = 20 mA)	MRF3096					
Collector Cutoff Current		I_{CBO}				mAdc
(V_{CB} = 28 V)	MRF3094, MRF3095		—	—	0.25	
	MRF3096		—	—	0.5	
ON CHARACTERISTICS						
DC Current Gain		h_{fe}	20	35	120	—
(V_{CE} = 5.0 V, I_C = 100 mA)	MRF3094, MRF3095					
(V_{CE} = 5.0 V, I_C = 200 mA)	MRF3096					
DYNAMIC CHARACTERISTICS						
Output Capacitance		C_{ob}				pF
(V_{CB} = 28 V, f = 1.0 MHz)	MRF3094, MRF3095		—	—	3.5	
	MRF3096		—	—	5.5	
Functional Tests		G_{PE}				dB
(V_{CE} = 20 V, I_C = 120 mA, P_o = 0.5 W, f = 1.6 GHz)	MRF3094		10.5	11.5	—	
(V_{CE} = 20 V, I_C = 120 mA, P_o = 0.8 W, f = 1.6 GHz)	MRF3095		9.0	10	—	
(V_{CE} = 20 V, I_C = 240 mA, P_o = 1.6 W, f = 1.6 GHz)	MRF3096		9.0	9.5	—	
Output Load Mismatch		Ψ	No degradation in output power			
(V_{CE} = 20 V, I_C = 120 mA, P_o = 0.5 W, f = 1.6 GHz, Load VSWR = ∞:1)	MRF3094					
(V_{CE} = 20 V, I_C = 120 mA, P_o = 0.8 W, f = 1.6 GHz, Load VSWR = ∞:1)	MRF3095					
(V_{CE} = 20 V, I_C = 240 mA, P_o = 1.6 W, f = 1.6 GHz, Load VSWR = ∞:1)	MRF3096					
Gain Linearity		L_G				dB
(V_{CE} = 20 V, I_C = 120 mA, f = 1.6 GHz, P_{o1} = 0.5 W, P_{o2} = 0.5 mW)	MRF3094		—	—	−0.2 to +1.0	
(V_{CE} = 20 V, I_C = 120 mA, f = 1.6 GHz, P_{o1} = 0.8 W, P_{o2} = 0.8 mW)	MRF3095		—	—	−0.2 to +1.0	
(V_{CE} = 20 V, I_C = 120 mA, f = 1.6 GHz, P_{o1} = 1.6 W, P_{o2} = 1.6 mW)	MRF3096		—	—	−0.2 to +1.0	

TYPICAL CHARACTERISTICS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			Mag	∠ϕ	Mag	∠ϕ	Mag	∠ϕ	Mag	∠ϕ
20	100	500	0.77	−177.9	6.16	83.7	0.36	31.9	0.32	−57.1
		600	0.78	176.7	5.20	77.2	0.38	32.2	0.30	−60.3
		700	0.78	171.8	4.48	71.1	0.40	33.4	0.29	−62.6
		800	0.78	167.4	3.90	66.3	0.41	35.0	0.29	−67.3
		900	0.79	163.3	3.46	61.2	0.42	36.6	0.28	−70.8
		1000	0.79	159.3	3.11	56.4	0.46	38.1	0.29	−74.5
		1100	0.80	155.7	2.81	52.0	0.48	39.2	0.29	−79.3
		1200	0.80	152.4	2.60	47.5	0.50	40.1	0.29	−83.3
		1300	0.80	149.3	2.40	43.5	0.53	40.7	0.30	−88.3
		1400	0.80	147.1	2.18	40.6	0.57	42.2	0.30	−93.3
		1500	0.81	143.6	2.06	34.3	0.59	41.0	0.30	−97.7
		1600	0.81	140.8	1.92	30.8	0.62	41.9	0.30	−103.4
		1700	0.82	137.9	1.81	27.9	0.66	42.5	0.31	−107.6
		1800	0.82	135.2	1.67	22.7	0.68	41.9	0.32	−112.7
		1900	0.83	132.7	1.61	19.4	0.71	41.9	0.33	−117.8
		2000	0.83	130.2	1.52	16.3	0.75	41.8	0.34	−121.3

Table 1. MRF3094 Common Emitter S-Parameters

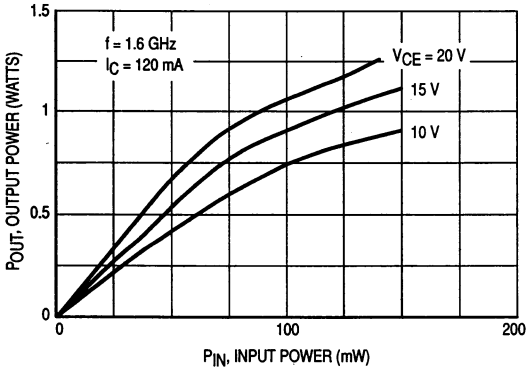
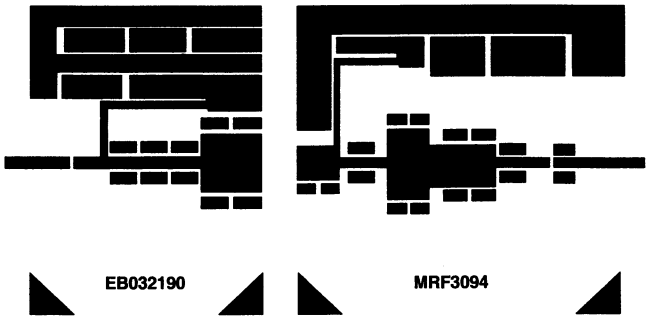


Figure 1. Output Power versus Input Power

f GHz	Z_{IN} Ohms		Z_{OL}* Ohms	
	R	jx	R	jx
1.55	5.9	11.9	10.2	0.23
1.60	5.8	11.3	11.3	−2.4
1.65	5.6	10.6	12.4	−6.0

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

Figure 2. Series Equivalent Input and Output Impedance



(Not to Scale)

NOTE: Material is Teflon Fiberglass, 18 mils thick, Cu clad 2 sides

Figure 3. Photomaster of Test Circuit

TYPICAL CHARACTERISTICS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			Mag	∠ϕ	Mag	∠ϕ	Mag	∠ϕ	Mag	∠ϕ
20	120	500	0.83	−177.4	4.90	71.1	0.29	21.7	0.36	−81.6
		600	0.83	179.6	4.08	64.4	0.30	22.1	0.37	−87.2
		700	0.83	176.9	3.48	59.3	0.31	23.6	0.39	−92.3
		800	0.83	175.0	3.20	52.8	0.34	23.2	0.42	−96.4
		900	0.82	171.6	2.70	48.6	0.33	25.0	0.43	−103.2
		1000	0.82	169.5	2.49	42.3	0.36	24.9	0.46	−107.6
		1100	0.83	167.4	2.26	37.0	0.38	25.2	0.48	−112.5
		1200	0.80	164.3	2.10	29.4	0.39	22.1	0.51	−117.7
		1300	0.81	162.2	1.87	27.9	0.41	25.9	0.54	−121.6
		1400	0.81	160.1	1.77	21.7	0.44	24.4	0.57	−125.3
		1500	0.80	157.8	1.63	15.2	0.45	22.4	0.58	−129.3
		1600	0.80	155.2	1.46	11.1	0.46	22.6	0.61	−131.7
		1700	0.80	152.3	1.42	9.6	0.48	23.9	0.66	−133.9
		1800	0.78	148.5	1.36	2.5	0.53	21.6	0.66	−136.6
		1900	0.77	144.5	1.25	−3.1	0.54	19.7	0.66	−139.3
		2000	0.78	141.0	1.17	−5.6	0.58	20.3	0.67	−141.9

Table 2. MRF3095 Common Emitter S-Parameters

MRF3095

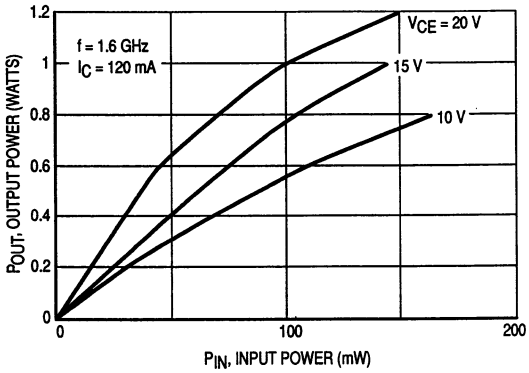
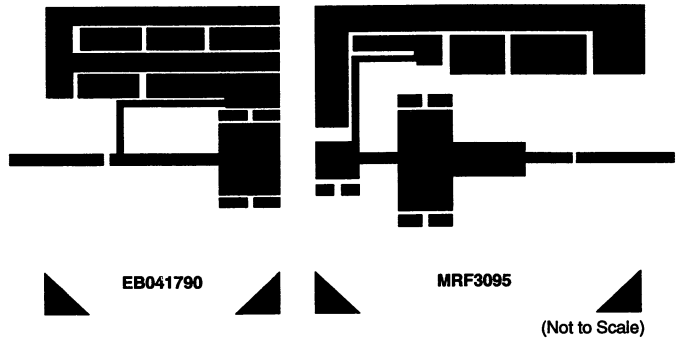


Figure 4. Output Power versus Input Power

f GHz	Z_{IN} Ohms		Z_{OL}* Ohms	
	R	jx	R	jx
1.55	5.2	10.6	8.6	−22.4
1.60	4.9	9.9	9.6	−25.4
1.65	4.8	9.3	10.3	−27.8

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

Figure 5. Series Equivalent Input and Output Impedance



NOTE: Material is Teflon Fiberglass, 18 mils thick, Cu clad 2 sides

Figure 6. Photomaster of Test Circuit

TYPICAL CHARACTERISTICS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			Mag	∠ϕ	Mag	∠ϕ	Mag	∠ϕ	Mag	∠ϕ
20	230	500	0.87	174.6	3.66	65.2	0.31	17.2	0.34	−133.0
		600	0.88	171.1	3.01	57.8	0.32	18.9	0.36	−137.4
		700	0.88	167.9	2.56	50.9	0.33	20.5	0.39	−140.0
		800	0.88	165.2	2.21	44.9	0.36	21.9	0.41	−143.0
		900	0.88	161.8	1.92	37.8	0.37	23.6	0.44	−145.8
		1000	0.88	158.9	1.72	32.7	0.39	24.7	0.48	−149.2
		1100	0.88	156.0	1.54	26.3	0.40	25.8	0.50	−152.4
		1200	0.88	153.2	1.39	20.5	0.42	25.7	0.53	−156.2
		1300	0.88	150.6	1.28	15.2	0.44	26.5	0.56	−158.6
		1400	0.88	147.9	1.15	10.3	0.50	27.2	0.58	−162.9
		1500	0.88	146.2	1.06	4.8	0.50	26.6	0.60	−166.1
		1600	0.88	143.2	0.98	−1.0	0.52	26.4	0.64	−170.4
		1700	0.89	140.9	0.90	−4.2	0.54	27.3	0.65	−173.3
		1800	0.88	138.5	0.84	−10.5	0.58	25.4	0.67	−175.9
		1900	0.88	136.0	0.79	−15.2	0.59	24.2	0.67	179.1
		2000	0.88	133.6	0.73	−16.6	0.64	26.2	0.69	178.6

Table 3. MRF3096 Common Emitter S-Parameters

MRF3096

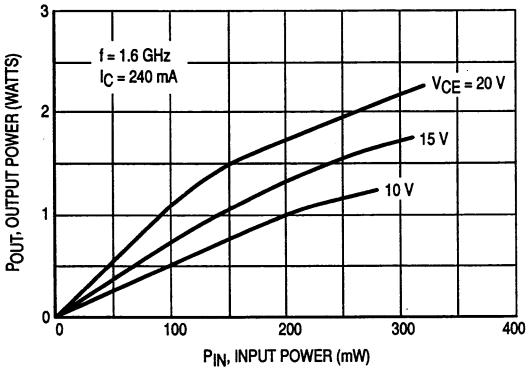
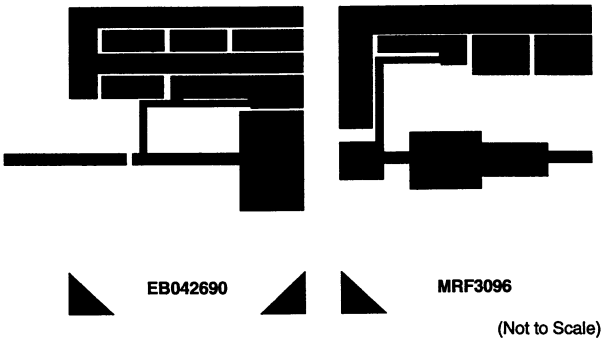


Figure 7. Output Power versus Input Power

f GHz	Z_{IN} Ohms		Z_{OL}* Ohms	
	R	jx	R	jx
1.55	2.9	6.1	8.2	−12.0
1.60	3.0	5.2	8.5	−12.8
1.65	2.7	4.6	8.9	−14.3

Z_{OL} = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and power.

Figure 8. Series Equivalent Input and Output Impedance



(Not to Scale)

NOTE: Material is Teflon Fiberglass, 18 mils thick, Cu clad 2 sides

Figure 9. Photomaster of Test Circuit

MRF3104
MRF3105
MRF3106

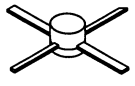
The RF Line
Microwave Linear Power Transistors

- Designed for Class A, Common Emitter Linear Power Amplifiers.
- Specified 20 Volt, 1.6 GHz Characteristics:

	MRF3104	MRF3105	MRF3106
Output Power	0.5 W	0.8 W	1.6 W
Power Gain	10.5 dB	9 dB	8 dB

- Low Parasitic Microwave Stripline Package
- Gold Metalization for Improved Reliability
- Diffused Ballast Resistors

8.0–12 dB GAIN
1.55–1.65 GHz
MICROWAVE LINEAR
POWER TRANSISTORS



CASE 305A, STYLE 1
(.204" PILL)

2

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	22	Vdc
Collector-Emitter Voltage	V_{CES}	50	Vdc
Emitter-Base Voltage	V_{EBO}	3.5	Vdc
Collector Current MRF3104, MRF3105 MRF3106	I_C	0.4 0.8	Adc
Operating Junction Temperature	T_j	200	°C
Storage Temperature	T_{stg}	−65 to +125	°C

THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
Thermal Resistance, Junction to Case, DC	MRF3104 MRF3105 MRF3106	$R_{\theta JC}$ (DC)	40 35 22	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 10 mA, I_B = 0)		BV_{CEO}	22	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 10 mA, V_{BE} = 0)		BV_{CES}	50	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 1 mA, I_E = 0)		BV_{CBO}	45	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 0.25 mA, I_C = 0)		BV_{EBO}	3.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 28 V, I_E = 0)	MRF3104, MRF3105 MRF3106	I_{CBO}	— —	— —	0.25 0.5	mAdc
ON CHARACTERISTICS						
DC Current Gain (V_{CE} = 5.0 V, I_C = 100 mA)		h_{FE}	20	35	120	—

(continued)

ELECTRICAL CHARACTERISTICS — continued

Characteristic		Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS						
Output Capacitance (V_{CB} = 28 V, I_E = 0, f = 1.0 MHz)	MRF3104	C_{OB}	—	—	1.5	pF
	MRF3105		—	—	3.5	
	MRF3106		—	—	5.5	
FUNCTIONAL TESTS						
Common Emitter Amplifier Gain		Gpe				dB
(V_{CE} = 20 V, I_C = 120 mA, P_{out} = 0.5 W, f = 1.6 GHz)	MRF3104		10.5	11.5	—	
(V_{CE} = 20 V, I_C = 120 mA, P_{out} = 0.8 W, f = 1.6 GHz)	MRF3105		9.0	10.0	—	
(V_{CE} = 20 V, I_C = 240 mA, P_{out} = 1.6 W, f = 1.6 GHz)	MRF3106		8.0	9.0	—	
Output Load Mismatch						—
(V_{CE} = 20 V, I_C = 120 mA, P_{out} = 0.5 W, f = 1.6 GHz)	MRF3104		No Degradation in Output Power			—
(V_{CE} = 20 V, I_C = 120 mA, P_{out} = 0.8 W, f = 1.6 GHz)	MRF3105					—
(V_{CE} = 20 V, I_C = 240 mA, P_{out} = 1.6 W, f = 1.6 GHz)	MRF3106					
Gain Linearity		L_G				dB
(V_{CE} = 20 V, I_C = 120 mA, f = 1.6 GHz, P_{o1} = 0.5 W, P_{o2} = 0.5 mW)	MRF3104		—	—	–0.2 to 1.0	
(V_{CE} = 20 V, I_C = 120 mA, f = 1.6 GHz, P_{o1} = 0.8 W, P_{o2} = 0.5 mW)	MRF3105		—	—	–0.2 to 1.0	
(V_{CE} = 20 V, I_C = 240 mA, f = 1.6 GHz, P_{o1} = 1.6 W, P_{o2} = 0.5 mW)	MRF3106		—	—	–0.2 to 1.0	

TYPICAL CHARACTERISTICS

MRF3104

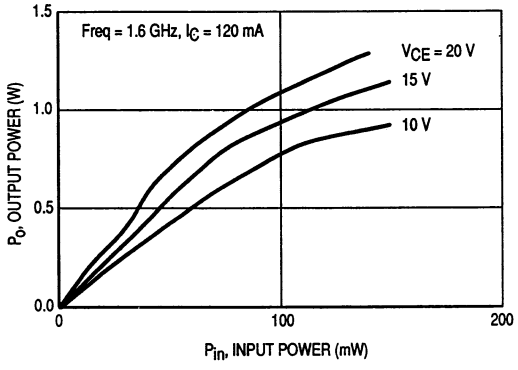


Figure 1. Output Power versus Input Power

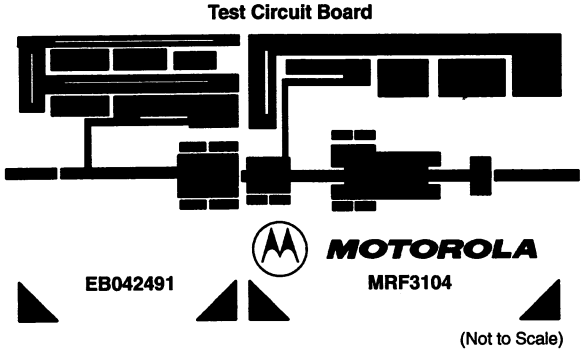


Figure 2. Photomaster for Test Circuit

V_{CE} (V)	I_C (mA)	f (MHz)	S11		S21		S12		S22	
			Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
20	120	1550	0.75	123	1.97	21	0.08	44	0.31	–113
		1575	0.76	123	1.93	20	0.09	44	0.32	–115
		1600	0.76	122	1.91	19	0.09	43	0.32	–116
		1625	0.76	122	1.80	18	0.09	42	0.32	–117
		1650	0.76	121	1.85	17	0.09	42	0.33	–119

Table 1. Common Emitter S-Parameters

TYPICAL CHARACTERISTICS — continued

MRF3105

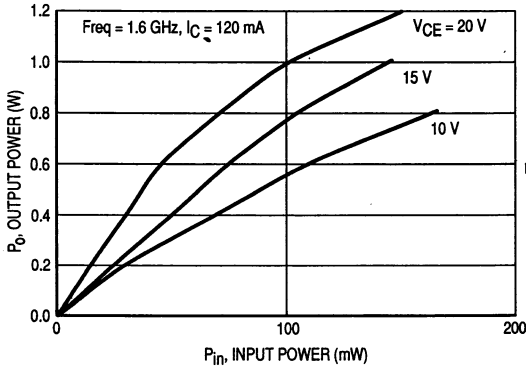


Figure 3. Output Power versus Input Power

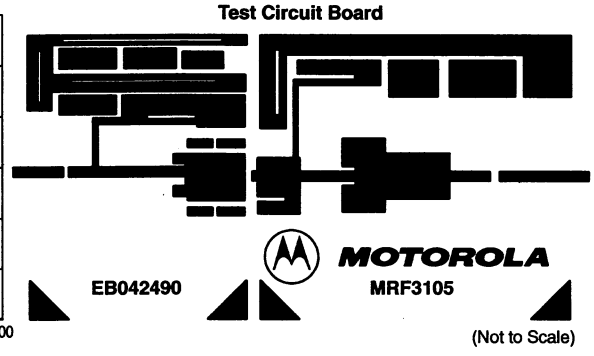


Figure 4. Photomaster for Test Circuit

V_{CE} (V)	I_C (mA)	f (MHz)	S11		S21		S12		S22	
			Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
20	120	1550	0.75	139	1.49	19	0.09	44	0.42	–124
		1575	0.75	138	1.46	18	0.10	43	0.42	–126
		1600	0.75	137	1.44	17	0.10	43	0.43	–127
		1625	0.75	137	1.42	15	0.10	43	0.43	–129
		1650	0.75	136	1.39	14	0.10	42	0.44	–130

Table 2. Common Emitter S-Parameters

MRF3106

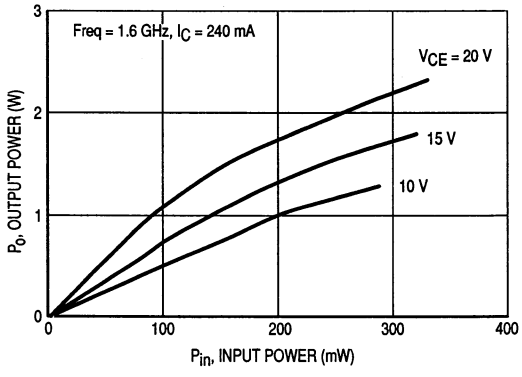


Figure 5. Output Power versus Input Power

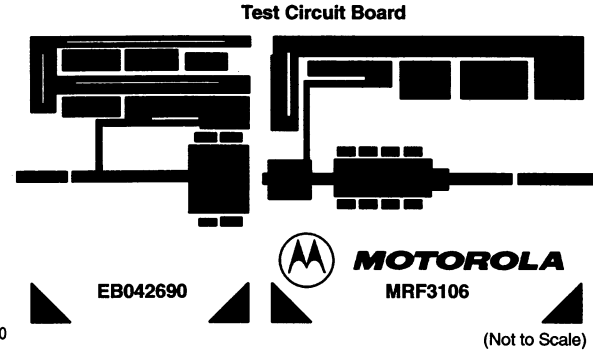


Figure 6. Photomaster for Test Circuit

V_{CE} (V)	I_C (mA)	f (MHz)	S11		S21		S12		S22	
			Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
20	240	1550	0.97	145	0.78	11	0.20	–130	0.56	169
		1575	0.97	143	0.78	10	0.17	–104	0.56	168
		1600	0.96	142	0.77	9	0.16	–104	0.56	166
		1625	0.96	140	0.76	8	0.14	–104	0.56	165
		1650	0.95	139	0.75	7	0.12	–104	0.56	164

Table 3. Common Emitter S-Parameters