

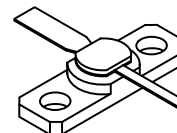
The RF Line Microwave Linear Power Transistors

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
- Circuit board photomaster available upon request by contacting
RF Tactical Marketing in Phoenix, AZ.

MRF3094
MRF3095
MRF3096

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



CASE 328A-03, STYLE 2

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 ($I_C = 10\text{ mA}$) ($I_C = 20\text{ mA}$)	$V_{(BR)CES}$ MRF3094, MRF3095 MRF3096	50	—	—	Vdc
Emitter Base Breakdown Voltage ($I_E = 0.25\text{ mA}$) ($I_E = 0.5\text{ mA}$)	$V_{(BR)EBO}$ MRF3094, MRF3095 MRF3096	3.5	—	—	Vdc
Collector Base Breakdown Voltage ($I_C = 1.0\text{ mA}$) ($I_C = 2.0\text{ mA}$)	$V_{(BR)CBO}$ MRF3094, MRF3095 MRF3096	45	—	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 10\text{ mA}$) ($I_C = 20\text{ mA}$)	$V_{(BR)CEO}$ MRF3094, MRF3095 MRF3096	22	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 28\text{ V}$)	I_{CBO} MRF3094, MRF3095 MRF3096	— —	— —	0.25 0.5	mAdc

ON CHARACTERISTICS

DC Current Gain ($V_{CE} = 5.0\text{ V}$, $I_C = 100\text{ mA}$) ($V_{CE} = 5.0\text{ V}$, $I_C = 200\text{ mA}$)	h_{fe} MRF3094, MRF3095 MRF3096	20	35	120	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 28\text{ V}$, $f = 1.0\text{ MHz}$)	C_{ob} MRF3094, MRF3095 MRF3096	— —	— —	3.5 5.5	pF
Functional Tests ($V_{CE} = 20\text{ V}$, $I_C = 120\text{ mA}$, $P_O = 0.5\text{ W}$, $f = 1.6\text{ GHz}$) ($V_{CE} = 20\text{ V}$, $I_C = 120\text{ mA}$, $P_O = 0.8\text{ W}$, $f = 1.6\text{ GHz}$) ($V_{CE} = 20\text{ V}$, $I_C = 240\text{ mA}$, $P_O = 1.6\text{ W}$, $f = 1.6\text{ GHz}$)	MRF3094 MRF3095 MRF3096	10.5 9.0 9.0	11.5 10 9.5	— — —	dB
Output Load Mismatch ($V_{CE} = 20\text{ V}$, $I_C = 120\text{ mA}$, $P_O = 0.5\text{ W}$, $f = 1.6\text{ GHz}$, Load VSWR = $\infty:1$) ($V_{CE} = 20\text{ V}$, $I_C = 120\text{ mA}$, $P_O = 0.8\text{ W}$, $f = 1.6\text{ GHz}$, Load VSWR = $\infty:1$) ($V_{CE} = 20\text{ V}$, $I_C = 240\text{ mA}$, $P_O = 1.6\text{ W}$, $f = 1.6\text{ GHz}$, Load VSWR = $\infty:1$)	MRF3094 MRF3095 MRF3096	No degradation in output power			
Gain Linearity ($V_{CE} = 20\text{ V}$, $I_C = 120\text{ mA}$, $f = 1.6\text{ GHz}$, $P_{O1} = 0.5\text{ W}$, $P_{O2} = 0.5\text{ mW}$) ($V_{CE} = 20\text{ V}$, $I_C = 120\text{ mA}$, $f = 1.6\text{ GHz}$, $P_{O1} = 0.8\text{ W}$, $P_{O2} = 0.8\text{ mW}$) ($V_{CE} = 20\text{ V}$, $I_C = 120\text{ mA}$, $f = 1.6\text{ GHz}$, $P_{O1} = 1.6\text{ W}$, $P_{O2} = 1.6\text{ mW}$)	MRF3094 MRF3095 MRF3096	— — —	— — —	–0.2 to +1.0 –0.2 to +1.0 –0.2 to +1.0	dB

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

MRF3094

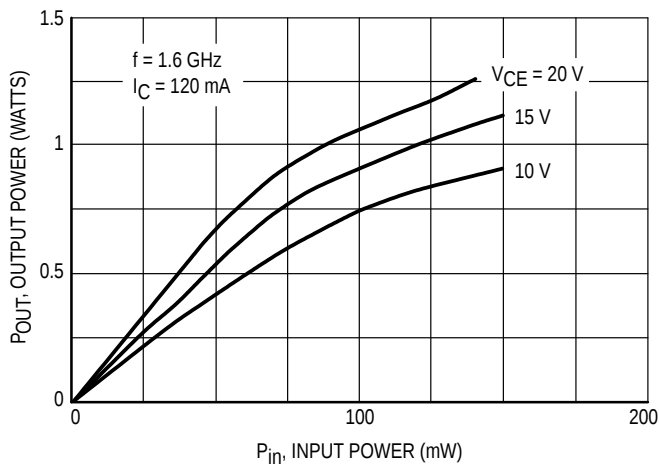


Figure 1. Output Power versus Input Power

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

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

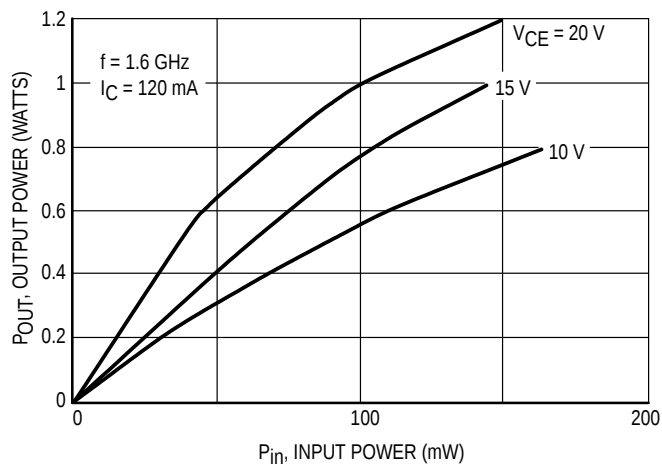


Figure 3. Output Power versus Input Power

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 4. Series Equivalent Input and Output Impedance

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

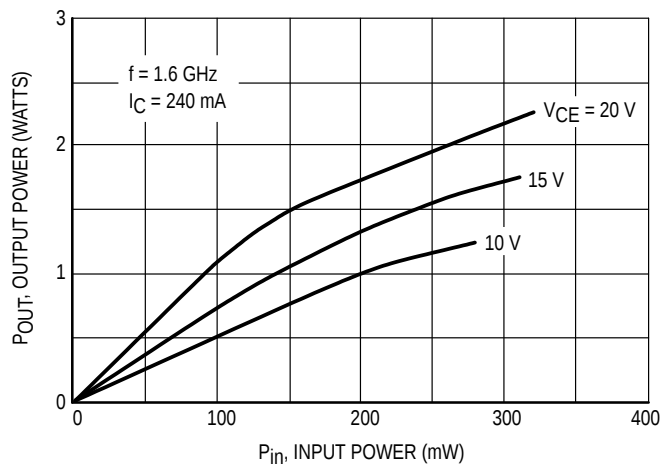


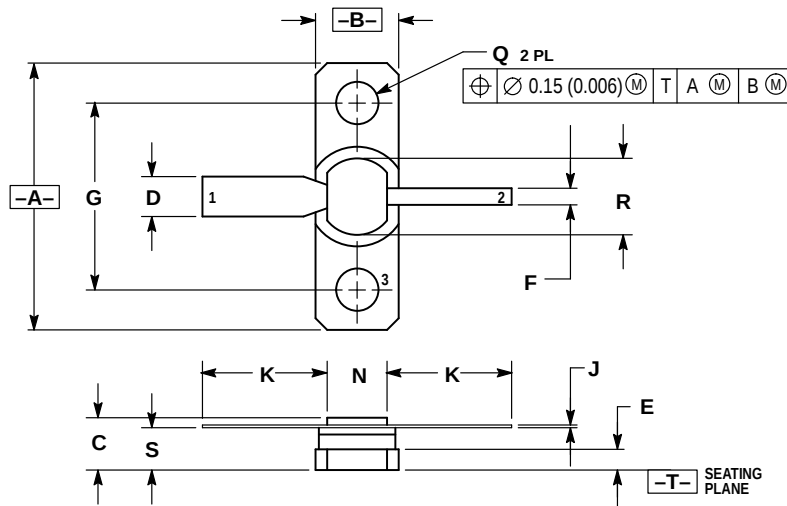
Figure 5. Output Power versus Input Power

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 6. Series Equivalent Input and Output Impedance

PACKAGE DIMENSIONS



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.795	0.805	20.20	20.45
B	0.245	0.255	6.23	6.47
C	0.145	0.170	3.69	4.31
D	0.115	0.125	2.93	3.17
E	0.055	0.065	1.40	1.65
F	0.045	0.055	1.15	1.39
G	0.562 BSC		14.27 BSC	
J	0.003	0.006	0.08	0.15
K	0.260	0.375	6.60	9.52
N	0.175	0.185	4.45	4.69
Q	0.120	0.135	3.05	3.42
R	0.225	0.235	5.72	5.97
S	0.120	0.130	3.05	3.30

- STYLE 2:
 PIN 1. BASE
 2. COLLECTOR
 3. EMITTER

CASE 328A-03 ISSUE D

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MOTOROLA



MRF3094/D

