The RF Line

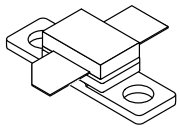
Microwave Linear Power Transistor

MRF2000-5L

7.0 – 8.0 dB GAIN
USABLE 1.0 – 2.0 GHz
5.0 WATTS
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
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



CASE 360A–01, STYLE 2

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

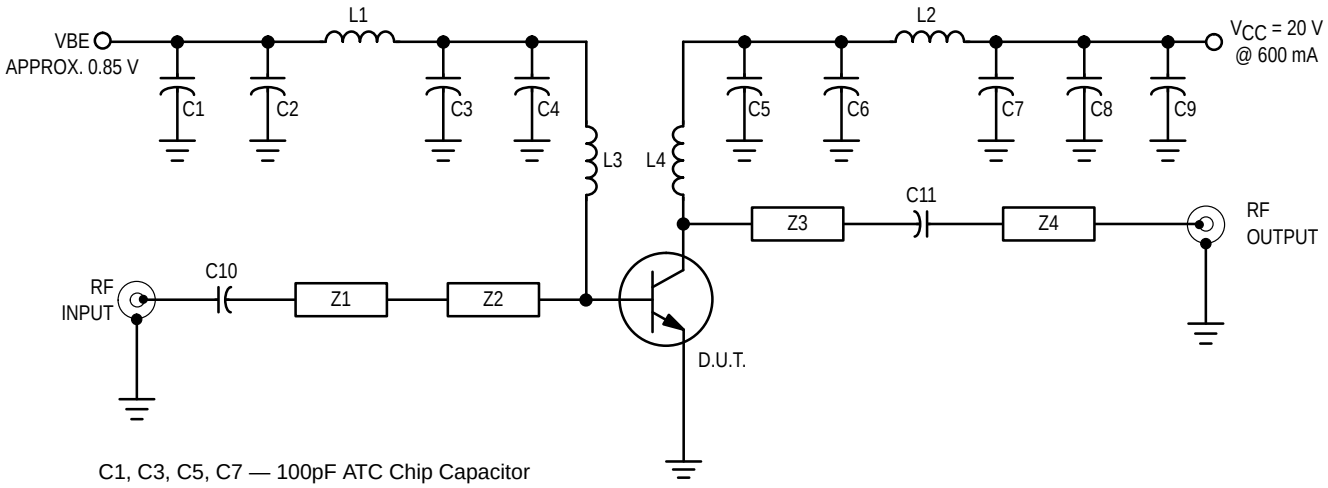
ELECTRICAL CHARACTERISTICS

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)

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 $\in_r$ = 2.55

Figure 1. 2.0 GHz Test Circuit

TYPICAL CHARACTERISTICS

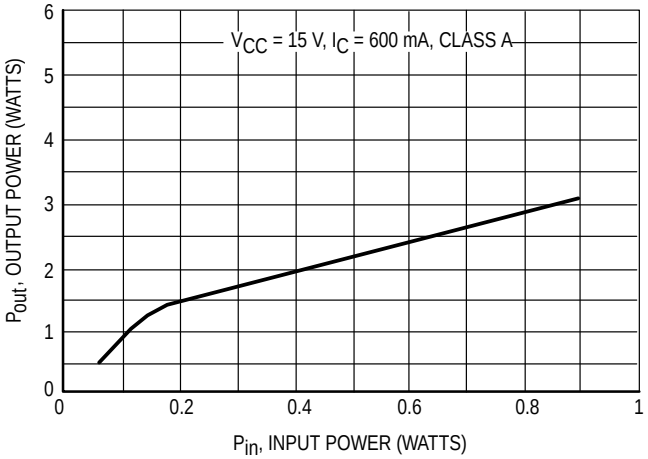


Figure 2. Output Power versus Input Power

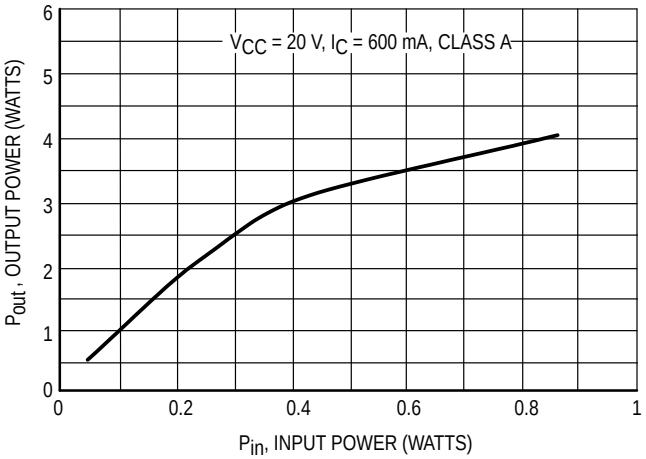


Figure 3. Output Power versus Input Power

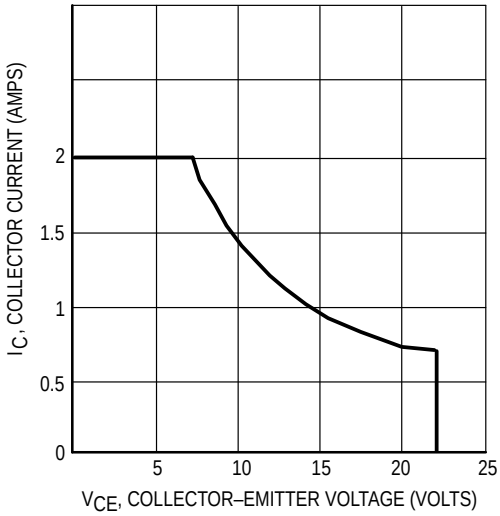
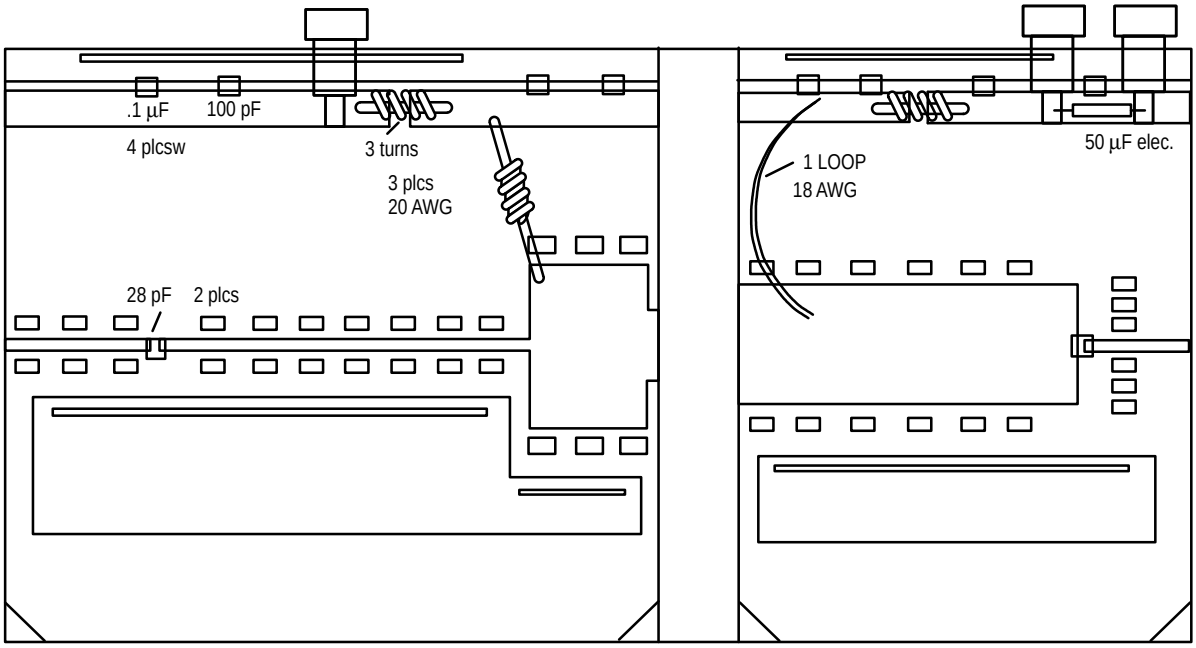


Figure 4. DC Safe Operating Area

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

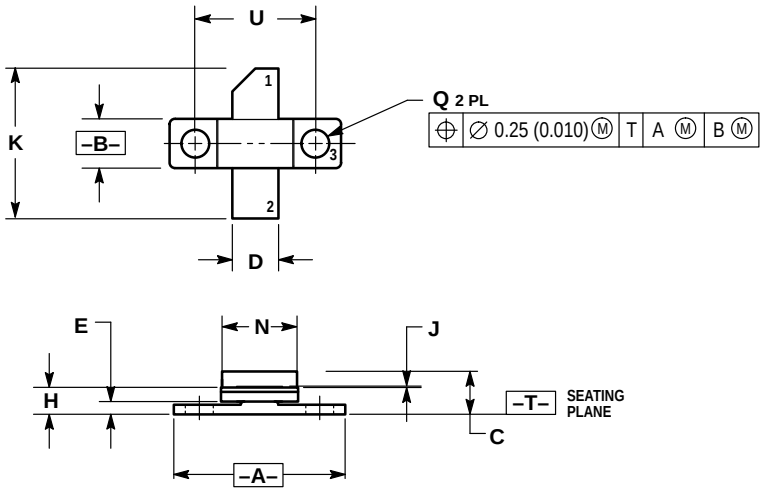
Table 1. Common Emitter S–Parameters



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

Figure 5. Test Circuit Board — Component Placement

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.795	0.805	20.19	20.45
B	0.225	0.235	5.71	5.97
C	0.184	0.216	4.67	5.49
D	0.210	0.220	5.33	5.59
E	0.055	0.065	1.40	1.65
H	0.115	0.135	2.92	3.43
J	0.004	0.006	0.10	0.15
K	0.670	0.730	17.02	18.54
N	0.345	0.355	8.76	9.02
Q	0.125	0.135	3.18	3.43
U	0.560 BSC		14.22 BSC	

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

CASE 360A–01
ISSUE A

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