The RF Line

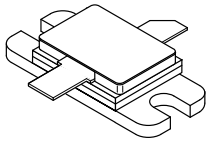
Microwave Long Pulse Power Transistor

MRF10120

Designed for 960–1215 MHz long pulse common base amplifier applications such as JTIDS and Mode S transmitters.

- Guaranteed Performance @ 1.215 GHz, 36 Vdc
  Output Power = 120 Watts Peak
  Gain = 8.0 dB Min., 9.2 dB (Typ)
- 100% Tested for Load Mismatch at All Phase Angles with 3:1 VSWR
- Hermetically Sealed Industry Standard Package
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Internal Input and Output Matching for Broadband Operation
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

120 W (PEAK), 960–1215 MHz
MICROWAVE POWER
TRANSISTOR
NPN SILICON



CASE 355C–02, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	55	Vdc
Collector–Base Voltage	V_{CBO}	55	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Peak (1)	I_C	15	Adc
Total Device Dissipation @ T_C = 25°C (1), (2) Derate above 25°C	P_D	380 2.17	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +200	°C
Junction Temperature	T_J	200	

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	0.46	°C/W

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

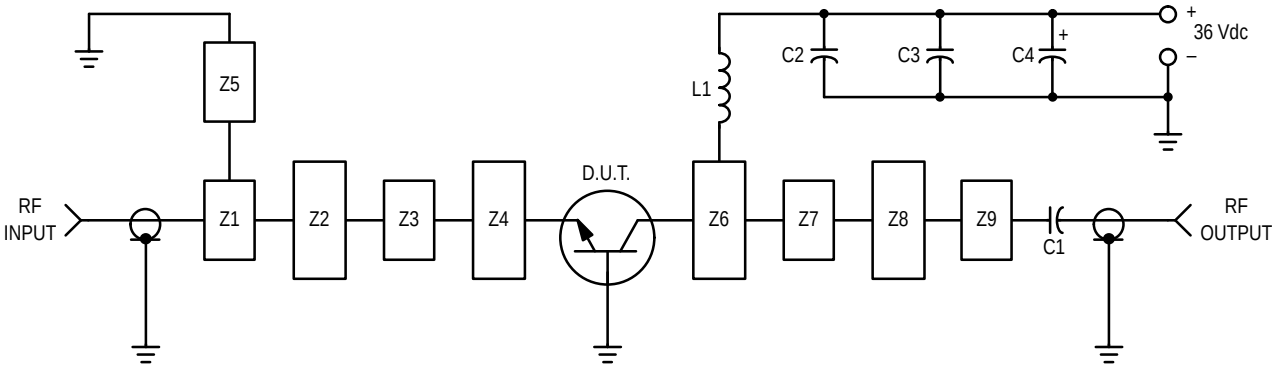
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 60 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	55	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 60 mAdc, I_E = 0)	$V_{(BR)CBO}$	55	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 36 Vdc, I_E = 0)	I_{CBO}	—	—	25	mAdc

NOTES: (continued)

1. Under pulse RF operating conditions.
2. These devices are designed for RF operation. The total device dissipation rating applies only when the device is operated as RF amplifiers.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	20	—	—	—
FUNCTIONAL TESTS (7.0 μs Pulses @ 54% duty cycle for 3.4 ms; then off for 4.5 ms; overall duty cycle = 23%)					
Common–Base Amplifier Power Gain (V_{CC} = 36 Vdc, P_{out} = 120 W Peak, f = 1215 MHz)	G_{PB}	8.0	9.2	—	dB
Collector Efficiency (V_{CC} = 36 Vdc, P_{out} = 120 W Peak, f = 1215 MHz)	η	50	55	—	%
Load Mismatch (V_{CC} = 36 Vdc, P_{out} = 120 W Peak, f = 1215 MHz, VSWR = 3:1 All Phase Angles)	ψ	No Degradation in Output Power			



C1 — 270 pF 100 Mil Chip Capacitor
C2 — 220 pF 100 Mil Chip Capacitor
C3 — 0.1 μF
C4 — 47 μF 50 V Electrolytic
L1 — 3 Turns #18 AWG, 1/8″ ID, 0.18 Long

Z1–Z9 — Microstrip, See Details
Board Material — Teflon®/Glass Laminate,
Dielectric Thickness = 0.030″,
ε_r = 2.55, 2 Oz. Copper

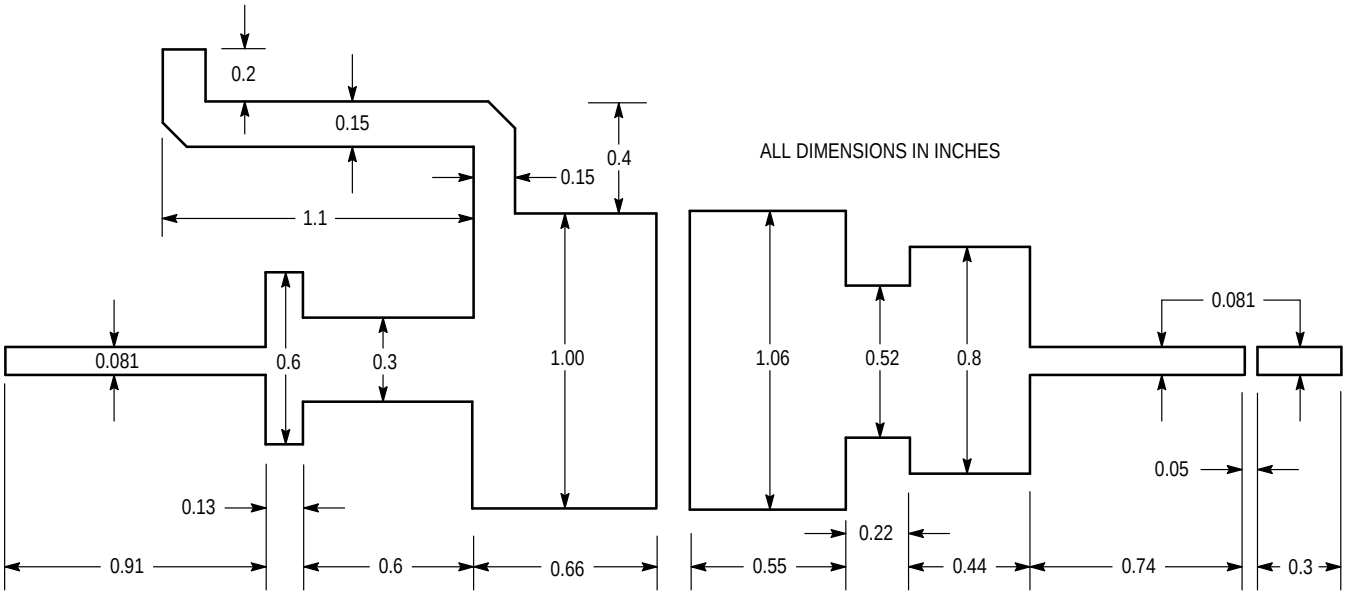


Figure 1. Test Circuit

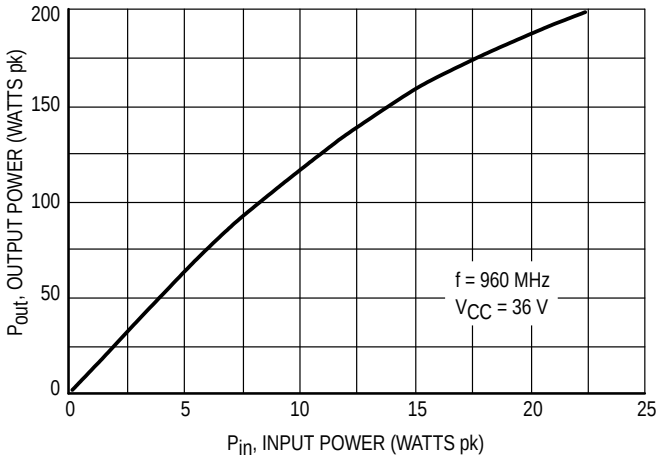


Figure 2. Output Power versus Input Power

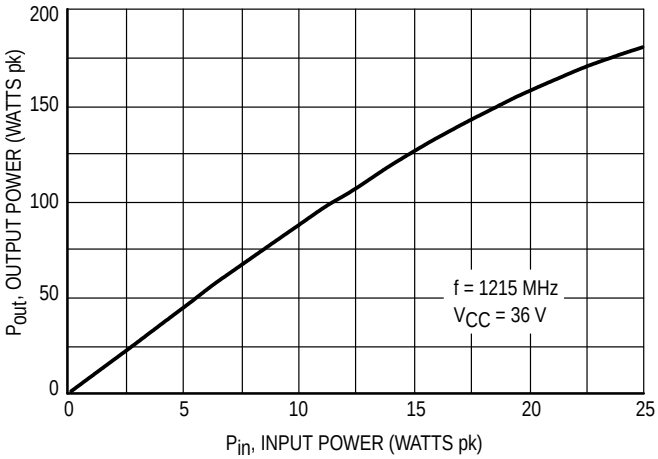
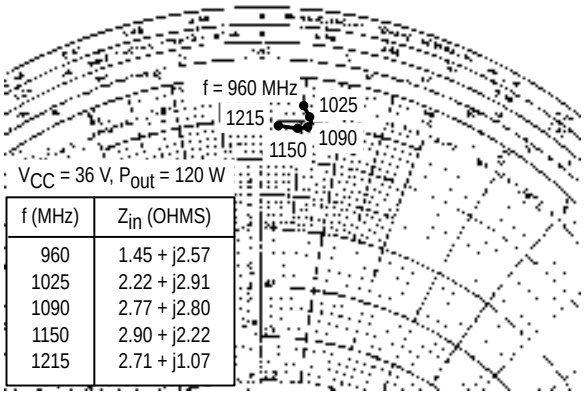
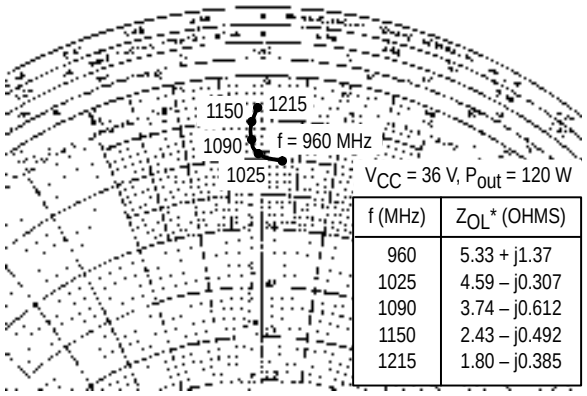


Figure 3. Output Power versus Input Power



f (MHz)	Z_{in} (OHMS)
960	1.45 + j2.57
1025	2.22 + j2.91
1090	2.77 + j2.80
1150	2.90 + j2.22
1215	2.71 + j1.07

Figure 4. Series Equivalent Input Impedances

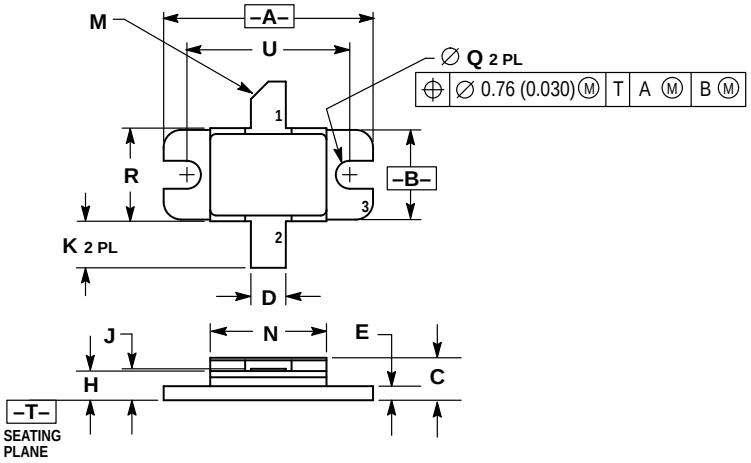


f (MHz)	Z_{OL}* (OHMS)
960	5.33 + j1.37
1025	4.59 – j0.307
1090	3.74 – j0.612
1150	2.43 – j0.492
1215	1.80 – j0.385

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

Figure 5. Series Equivalent Output Impedance

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.890	0.910	22.61	23.11
B	0.375	0.395	9.53	10.03
C	0.150	0.165	3.81	4.19
D	0.145	0.155	3.69	3.93
E	0.055	0.065	1.40	1.65
H	0.120	0.130	3.05	3.30
J	0.003	0.006	0.08	0.15
K	0.185	0.215	4.70	5.46
M	45° REF		45° REF	
N	0.490	0.510	12.45	12.95
Q	0.115	0.125	2.93	3.17
R	0.395	0.405	10.04	10.28
U	0.700 BSC		17.78 BSC	

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

CASE 355C–02
ISSUE C

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