

The RF Line

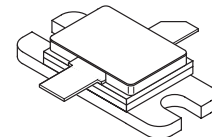
Microwave Long Pulse Power Transistor

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 = 7.6 dB Min., 8.5 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

MRF10120

**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 @ $T_C = 25^\circ\text{C}$ (1), (2) Derate above 25°C	P_D	380 2.17	Watts $\text{W}/^\circ\text{C}$
Storage Temperature Range	T_{stg}	–65 to +200	$^\circ\text{C}$
Junction Temperature	T_J	200	

THERMAL CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

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

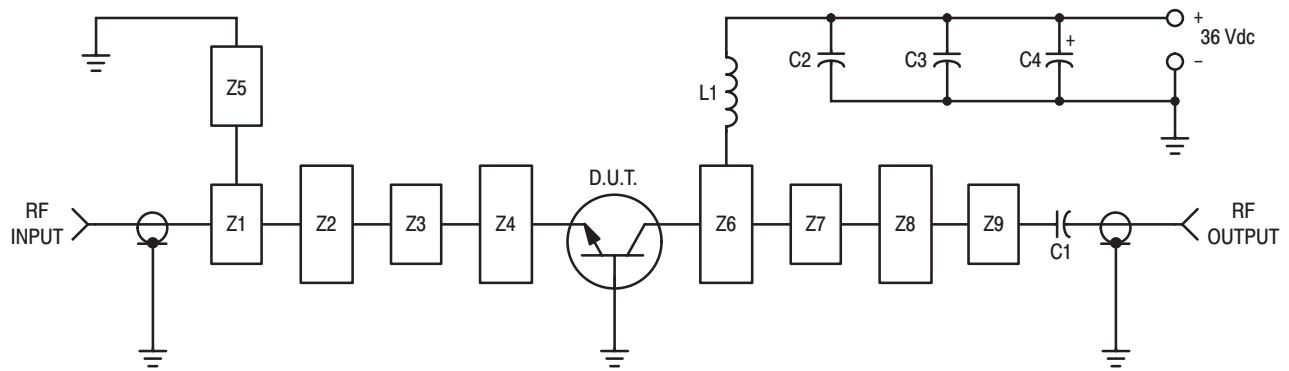
NOTES:

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.

(continued)

ELECTRICAL CHARACTERISTICS — continued ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$)	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 ($V_{CC} = 36 \text{ Vdc}$, $P_{out} = 120 \text{ W Peak}$, $f = 1215 \text{ MHz}$)	G_{PB}	7.6	8.5	—	dB
Collector Efficiency ($V_{CC} = 36 \text{ Vdc}$, $P_{out} = 120 \text{ W Peak}$, $f = 1215 \text{ MHz}$)	η	50	55	—	%
Load Mismatch ($V_{CC} = 36 \text{ Vdc}$, $P_{out} = 120 \text{ W Peak}$, $f = 1215 \text{ MHz}$, $VSWR = 3:1$ 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",
 $\epsilon_r = 2.55$, 2 Oz. Copper

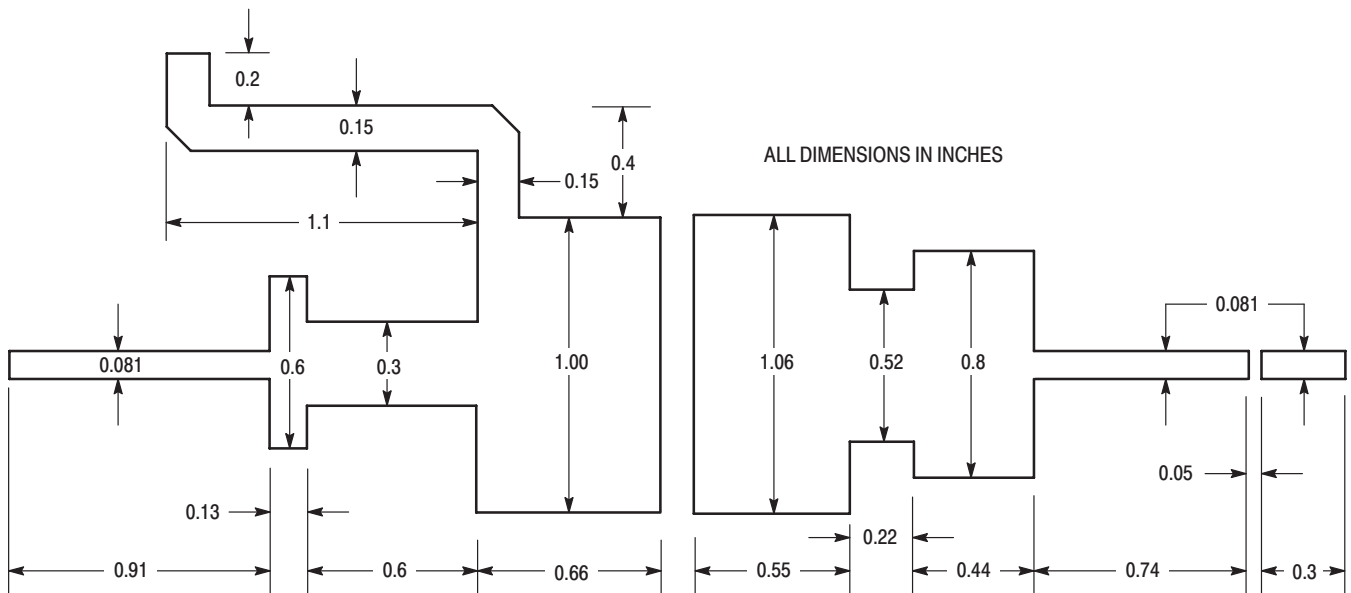


Figure 1. Test Circuit

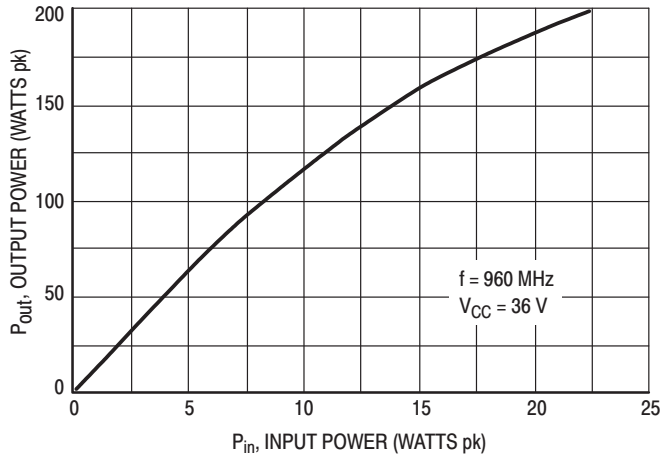


Figure 2. Output Power versus Input Power

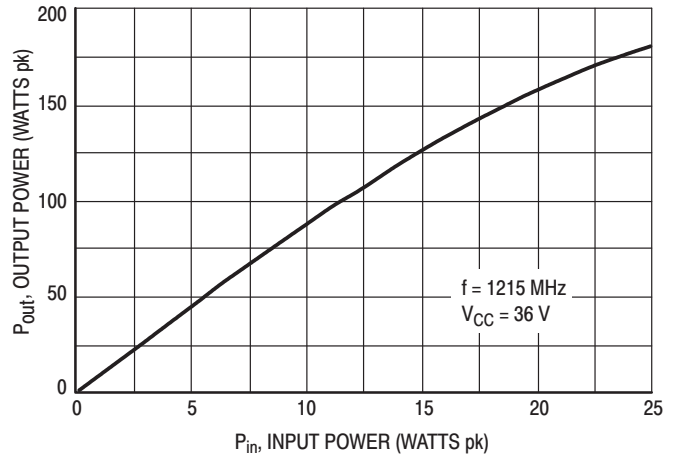


Figure 3. Output Power versus Input Power

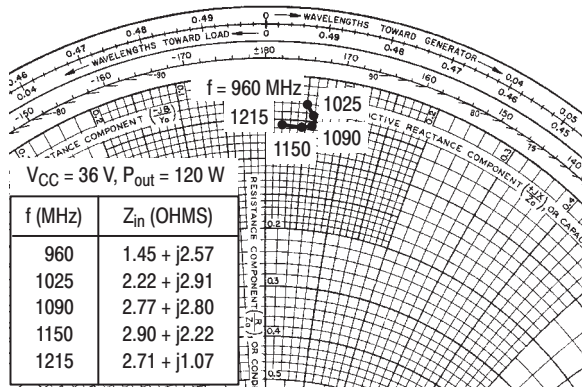
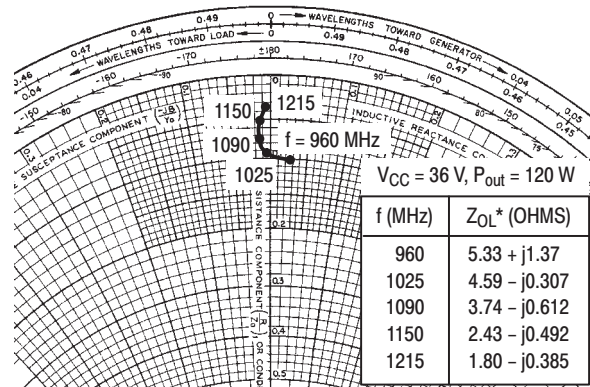


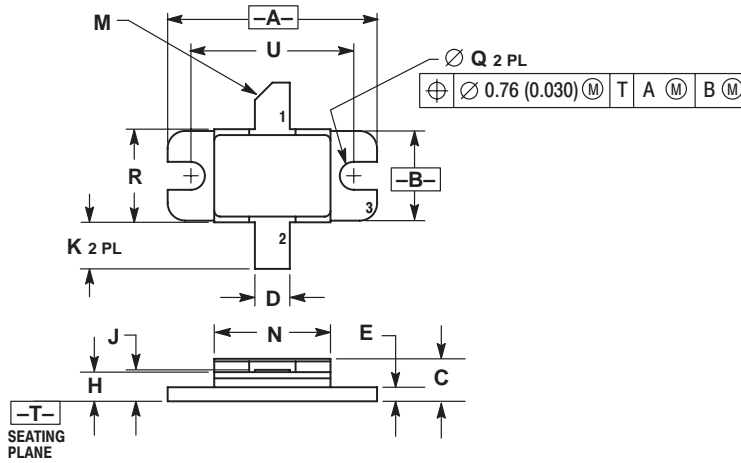
Figure 4. Series Equivalent Input Impedances



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.

DIM	INCHES		MILLIMETERS	
	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**

Specifications subject to change without notice.

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