MRF1090MB

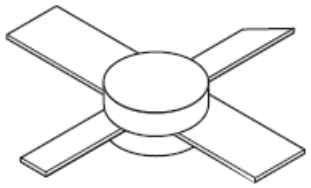
Microwave Pulse Power Silicon NPN Transistor
90W (peak), 960–1215MHz

M/A-COM Products
Released - Rev. 07.07

Designed for Class B and C common base amplifier applications in short pulse TACAN, IFF, and DME transmitters.

- Guaranteed performance @ 1090 MHz, 50 Vdc
  Output power = 90 W Peak
  Minimum gain = 8.4 dB
- 100% tested for load mismatch at all phase angles with 10:1 VSWR
- Industry standard package
- Nitride passivated
- Gold metallized for long life and resistance to metal migration
- Internal input matching for broadband operation

Product Image



CASE 332A–03, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Base Voltage	V_{CBO}	70	Vdc
Emitter–Base Voltage	V_{EBO}	4.0	Vdc
Collector–Current — Peak (1)	I_C	6.0	Adc
Total Device Dissipation @ T_C = 25°C (1) (2) Derate above 25°C	P_D	290 1.66	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	0.6	°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 = 25 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	70	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 25 mAdc, I_E = 0)	$V_{(BR)CBO}$	70	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0)	I_{CBO}	—	—	5.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (4) (I_C = 2.5 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	30	—	—

NOTES: (continued)

1. Pulse Width = 10 µs, Duty Cycle = 1%.
2. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.
4. 80 µs Pulse on Tektronix 576 or equivalent.

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298
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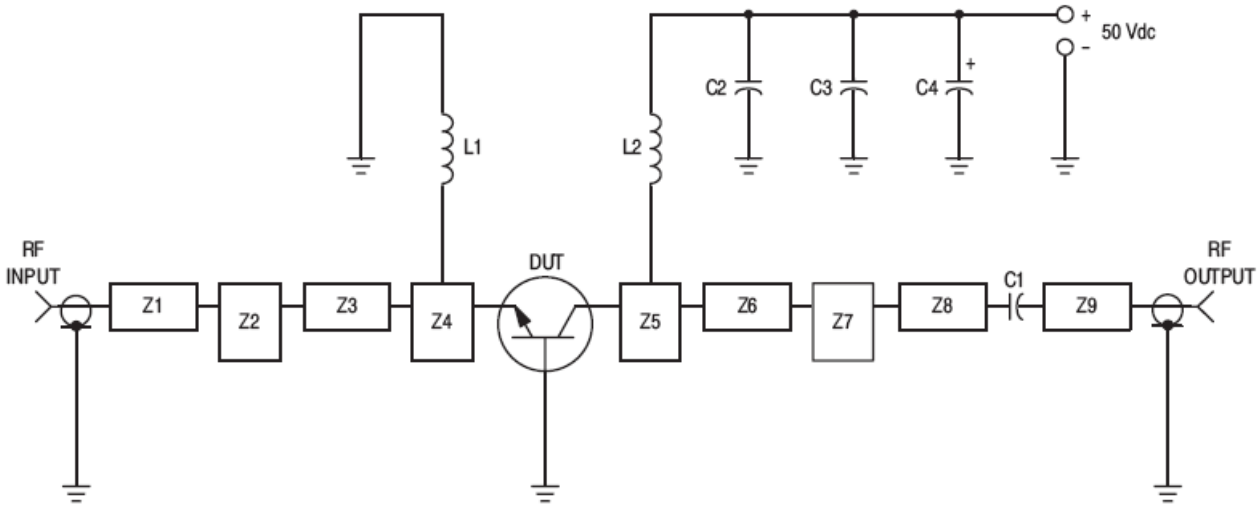
ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 50 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	12	16	pF
FUNCTIONAL TESTS (Pulse Width = 10 μs, Duty Cycle = 1.0%)					
Common–Base Amplifier Power Gain (V_{CC} = 50 Vdc, P_{out} = 90 W pk, f = 1090 MHz)	G_{PB}	8.4	10.8	—	dB
Collector Efficiency (V_{CC} = 50 Vdc, P_{out} = 90 W pk, f = 1090 MHz)	η	35	40	—	%
Load Mismatch (V_{CC} = 50 Vdc, P_{out} = 90 W pk, f = 1090 MHz, VSWR = 10:1 All Phase Angles)	ψ	No Degradation in Power Output			



C1, C2 — 220 pF Chip Capacitor, 100–mil ATC
C3 — 0.1 μF
C4 — 47 μF/75 V
L1, L2 — 3 Turns #18 AWG, 1/8″ ID
Z1–Z9 — Distributed Microstrip Elements,
See Photomaster
Board Material — 0.031″ Thick Glass Teflon, ε_r = 2.5

Figure 1. 1090 MHz Test Circuit

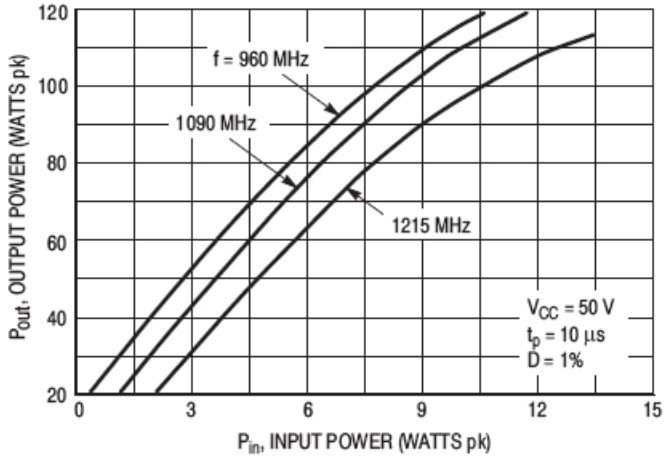


Figure 2. Output Power versus Input Power

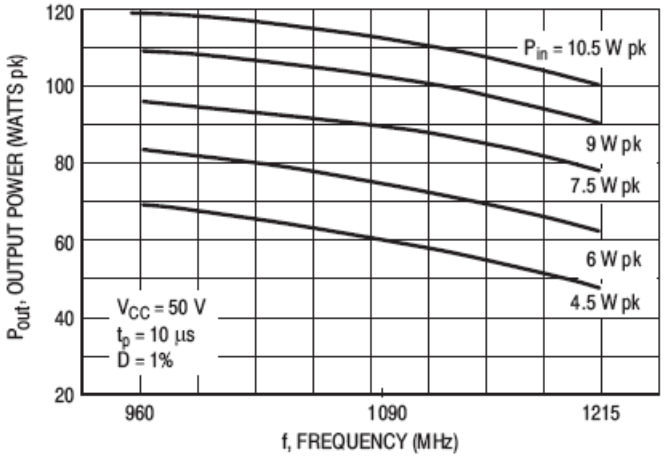


Figure 3. Output Power versus Frequency

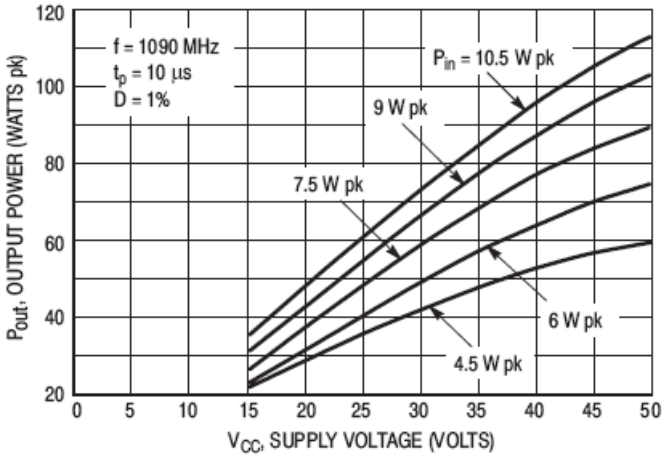


Figure 4. Output Power versus Supply Voltage

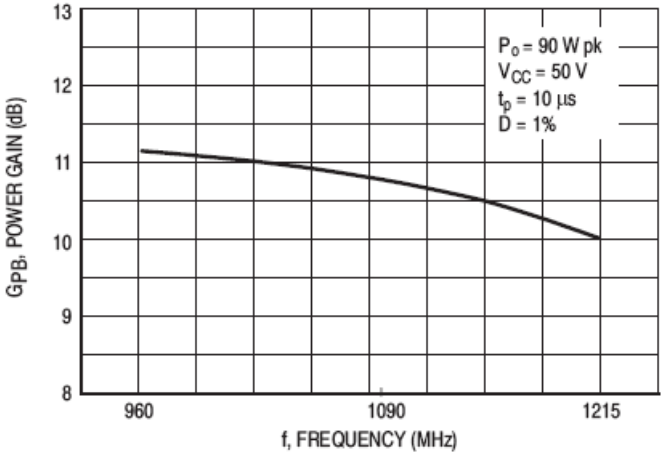


Figure 5. Power Gain versus Frequency

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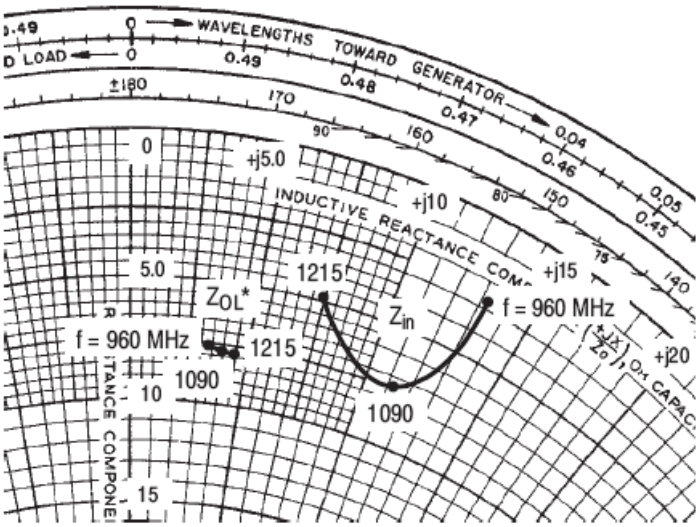


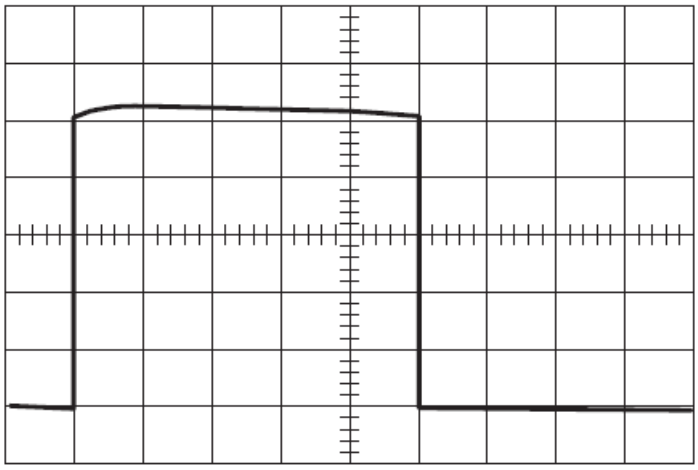
Coordinates in Ohms

P_{out} = 90 W pk V_{CC} = 50 V
t_p = 10 μs D = 1%

f MHz	Z_{in} Ohms	Z_{OL}* Ohms
960	2.8 + j13.2	7.6 + j3.5
1090	7.4 + j11.4	7.6 + j4.0
1215	4.7 + j7.5	7.7 + j4.5

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

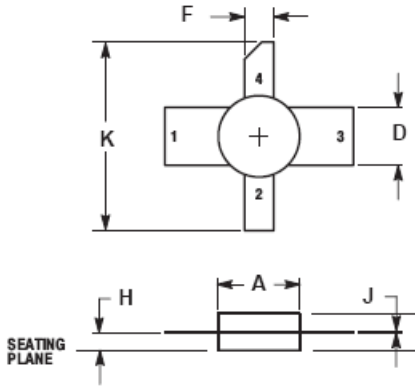
Figure 6. Series Equivalent Input/Output Impedance



P_o = 90 W pk
V_{CC} = 50 V
t_p = 10 μs
D = 1%
f = 1090 MHz

Figure 7. Typical Pulse Performance

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.270	0.290	6.86	7.36
C	0.115	0.135	2.93	3.42
D	0.195	0.205	4.96	5.20
F	0.095	0.105	2.42	2.66
H	0.050	0.070	1.27	1.77
J	0.003	0.007	0.08	0.17
K	0.600	---	15.24	---

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

CASE 332A–03
ISSUE D

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