MRF1250M

The RF Line

2

MICROWAVE PULSE POWER TRANSISTOR

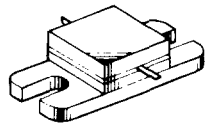
. . . designed for Class B and C *common base* amplifier applications in short pulse TACAN, IFF, and DME transmitters.

- Guaranteed Performance @ 1090 MHz, 50 Vdc
  Output Power = 250 Watts Peak
  Minimum Gain = 6.0 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
- Compatible with Other 1250M Types
- Internal Input and Output Matching for Broadband Operation

250 W PEAK, 1020-1150 MHz

MICROWAVE POWER TRANSISTOR

NPN SILICON



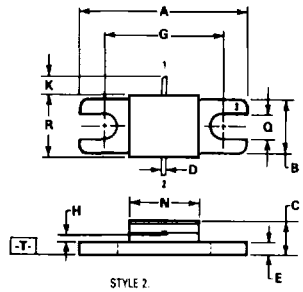
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	70	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector-Current — Peak (1, 2)	I_C	24	Adc
Peak Device Dissipation @ T_C = 25°C (1, 2) Derate above 25°C	P_D	1166 6.67	Watts W/°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1,2,3)	$R_{\theta JC}$	0.15	°C/W

(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 short pulse amplifier.
(3) Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.



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

NOTES:
1. DIMENSIONS A, B AND R ARE DATUMS.
2. POSITIONAL TOLERANCE FOR MOUNTING HOLES
⌖ 0.76 (0.030) M T A M B M
POSITIONAL TOLERANCE FOR LEADS.
⌖ 0.25 (0.010) M T A M R M
3. -T- IS BOTH A SEATING PLANE AND A DATUM SURFACE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	22.61	23.11	0.890	0.910
B	9.65	9.91	0.380	0.390
C	4.06	5.84	0.160	0.230
D	0.51	0.76	0.020	0.030
E	1.40	1.65	0.055	0.065
G	16.51 BSC		0.650 BSC	
H	1.14	1.77	0.045	0.070
K	2.54	—	0.100	—
N	9.91	10.41	0.390	0.410
Q	3.00	3.61	0.118	0.142
R	9.91	10.41	0.390	0.410

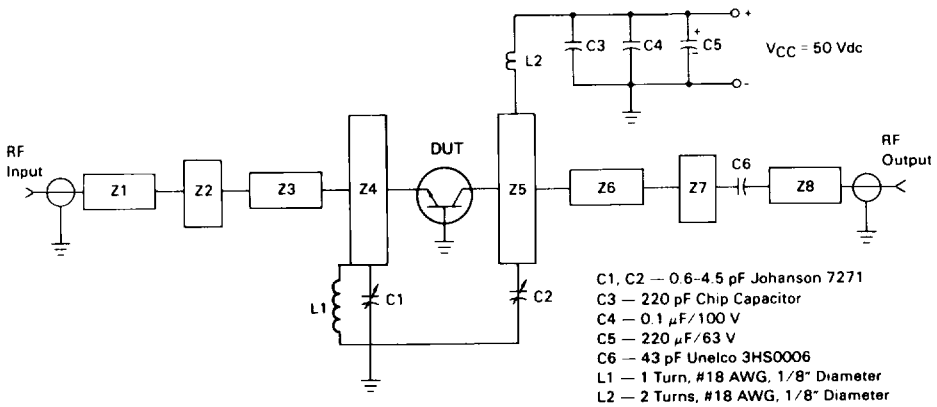
CASE 336-03

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	70	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 mAdc, I_E = 0)	$V_{(BR)CBO}$	70	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0)	I_{CBO}	—	—	20	mAdc
ON CHARACTERISTICS					
DC Current Gain* (I_C = 10 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	30	—	—
FUNCTIONAL TESTS (Pulse Width = 10 μs, Duty Cycle = 1.0%)					
Common-Base Amplifier Power Gain (V_{CC} = 50 Vdc, P_{out} = 250 W pk, f = 1090 MHz)	G_{PB}	6.0	7.2	—	dB
Collector Efficiency (V_{CC} = 50 Vdc, P_{out} = 250 W pk, f = 1090 MHz)	η	33	—	—	%
Load Mismatch (V_{CC} = 50 Vdc, P_{out} = 250 W pk, f = 1090 MHz, VSWR = 10:1 All Phase Angles)	ψ	No Degradation in Power Output			

*80 μs Pulse on Tektronix 576 or equivalent

FIGURE 1 — 1090 MHz TEST CIRCUIT



C1, C2 — 0.6-4.5 pF Johanson 7271
C3 — 220 pF Chip Capacitor
C4 — 0.1 μF/100 V
C5 — 220 μF/63 V
C6 — 43 pF Unelco 3HS0006
L1 — 1 Turn, #18 AWG, 1/8" Diameter
L2 — 2 Turns, #18 AWG, 1/8" Diameter
Z1-Z8 — Distributed Microstrip Elements — See Figure 9
Board Material — 0.062" Thick Teflon*-Fiberglass, ϵ_r = 2.55

*Registered Trademark of DuPont

FIGURE 2 — OUTPUT POWER versus INPUT POWER

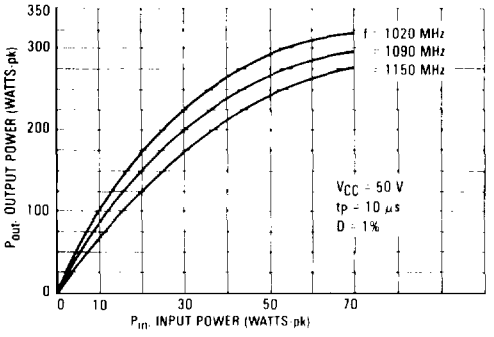


FIGURE 3 — OUTPUT POWER versus FREQUENCY

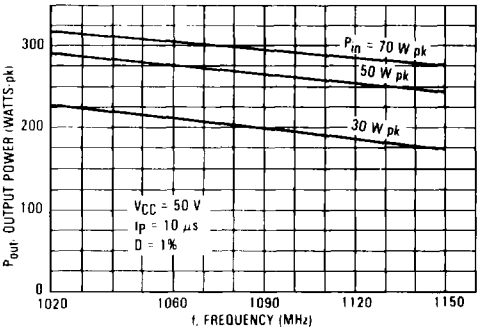


FIGURE 4 — OUTPUT POWER versus SUPPLY VOLTAGE

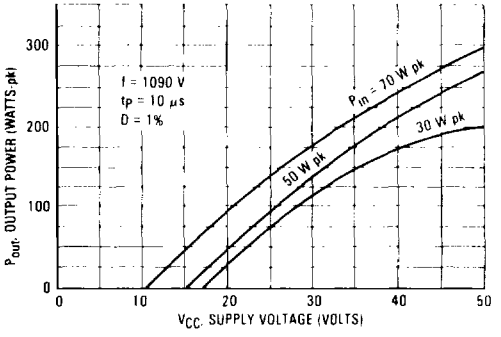


FIGURE 5 — POWER GAIN versus FREQUENCY

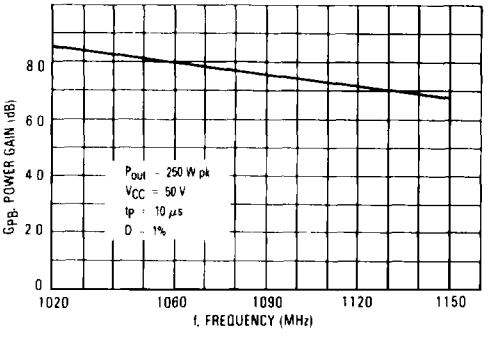
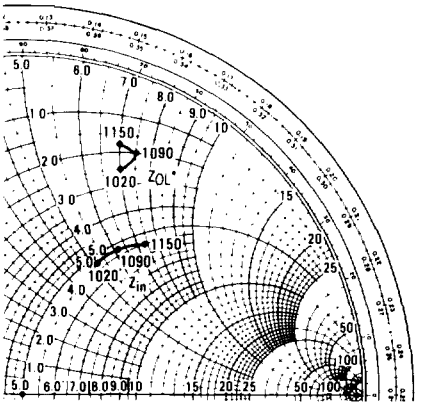


FIGURE 6 — SERIES EQUIVALENT INPUT/OUTPUT IMPEDANCE



P_{out} = 250 W pk V_{CC} = 50 V
tp = 10 μs D = 1%

f MHz	Z_{in} Ohms	Z_{OL}* Ohms
1020	5.2 + j5.2	2.5 + j7.0
1090	5.2 + j6.2	2.0 + j7.5
1150	5.5 + j7.3	1.8 + j7.0

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

FIGURE 7 — 1090 MHz TEST AMPLIFIER

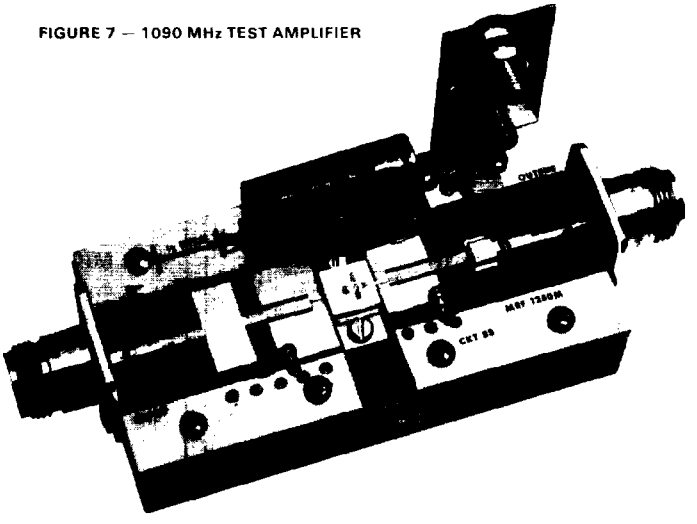


FIGURE 8 — TYPICAL PULSE PERFORMANCE

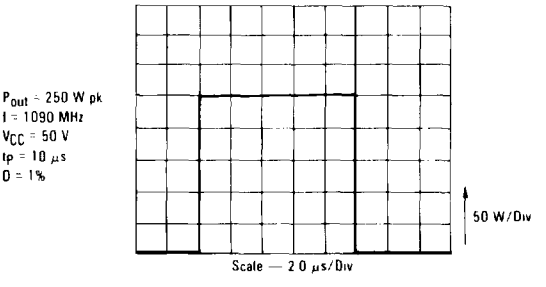
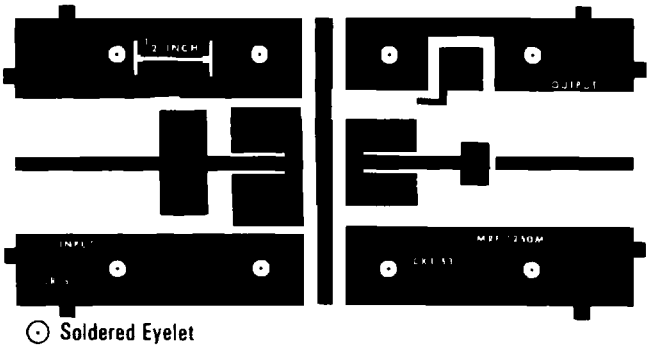


FIGURE 9 — PRINTED CIRCUIT BOARD LAYOUT — 1090 MHz TEST CIRCUIT



⊙ Soldered Eyelet

NOTE: The Printed Circuit Board shown is 75% of the original.