The RF Line
Microwave Pulse Power Transistor

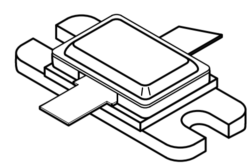
MRF1500

Motorola Preferred Device

**500 W (PEAK), 1025–1150 MHz
MICROWAVE POWER
TRANSISTOR
NPN SILICON**

Designed for 1025–1150 MHz pulse common base amplifier applications such as DME.

- Guaranteed Performance @ 1090 MHz
  Output Power = 500 Watts Peak
  Gain = 5.2 dB Min
- 100% Tested for Load Mismatch at All Phase Angles with 10:1 VSWR
- Hermetically Sealed Industry Package
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Internal Input Matching
- Characterized with 10 μs, 1.0% Duty Cycle Pulses



CASE 355E–01, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	65	Vdc
Collector–Base Voltage	V_{CBO}	65	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Peak (1)	I_C	35	Adc
Total Device Dissipation @ T_C = 25°C (1), (2) Derate above 25°C	P_D	1750 10	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +200	°C
Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	0.1	°C/W

NOTES:
1. Under pulse RF operating conditions.
2. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as pulsed RF amplifiers.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques. (Worst case θ_{JC} value measured @32 μs, 2.0%)

Preferred devices are Motorola recommended choices for future use and best overall value.

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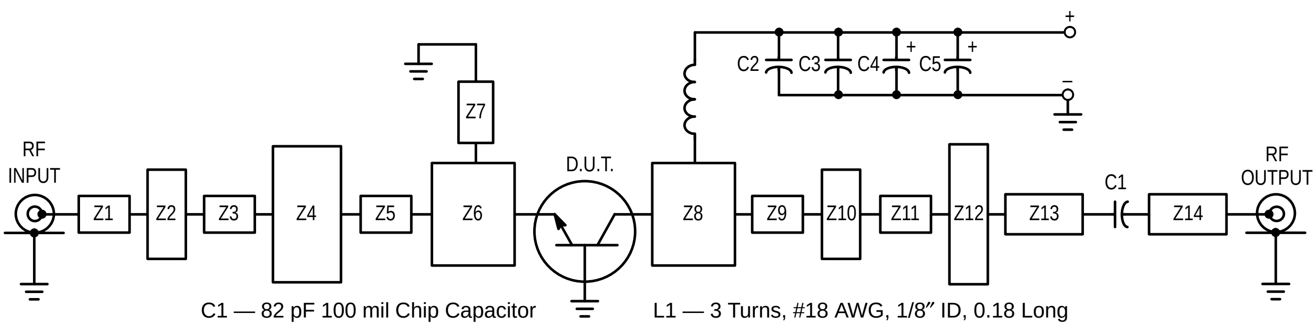
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 60 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	70	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 60 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}	—	—	40	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	20	40	—	—
FUNCTIONAL TESTS					
Common–Base Amplifier Power Gain (V_{CC} = 50 Vdc, P_{out} = 500 W Peak, f = 1090 MHz)	G_{PB}	5.2	—	—	dB
Collector Efficiency (V_{CC} = 50 Vdc, P_{out} = 500 W Peak, f = 1090 MHz)	η	37	—	—	%
Load Mismatch (V_{CC} = 50 Vdc, P_{out} = 500 W Peak, f = 1090 MHz, Load VSWR = 10:1 All Phase Angles)	ψ	No Degradation in Output Power			



C1 — 82 pF 100 mil Chip Capacitor
C2 — 82 pF 100 mill Chip Capacitor
C3 — 0.1 µF
C4 — 10 µF 100 V, Electrolytic
C5 — 1000 µF 60 V, Electrolytic

L1 — 3 Turns, #18 AWG, 1/8″ ID, 0.18 Long
Z1–Z14 — Microstrip, See Details Below
Board Material — Teflon–Glass Laminate,
Dielectric Thickness = .020″,
ϵ_r = 2.55, 2 oz. Copper

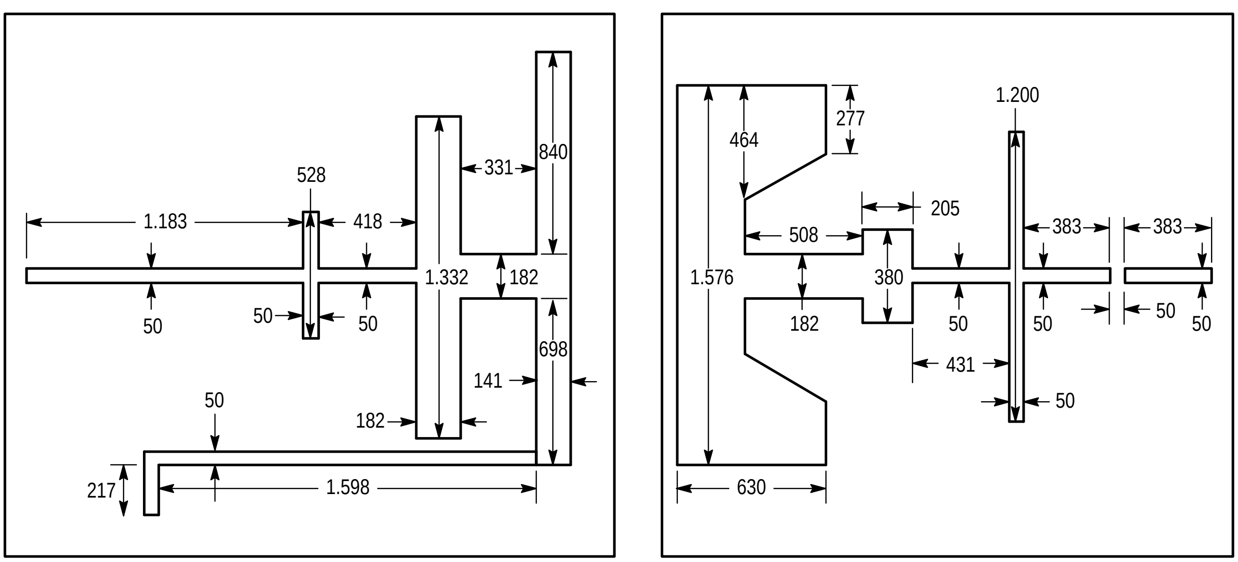


Figure 1. Test Circuit

TYPICAL CHARACTERISTICS

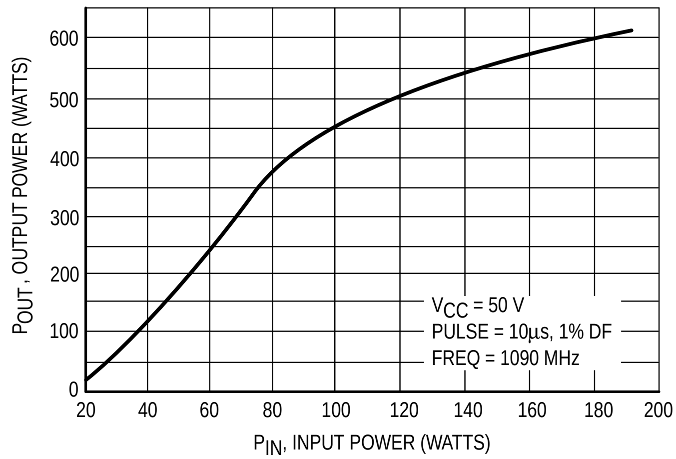
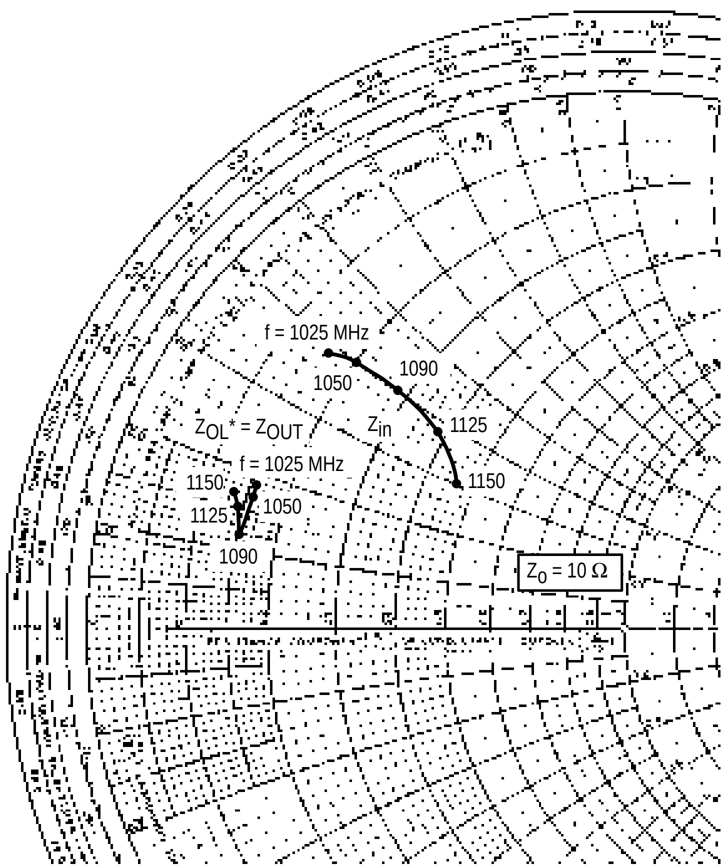


Figure 2. Output Power versus Input Power

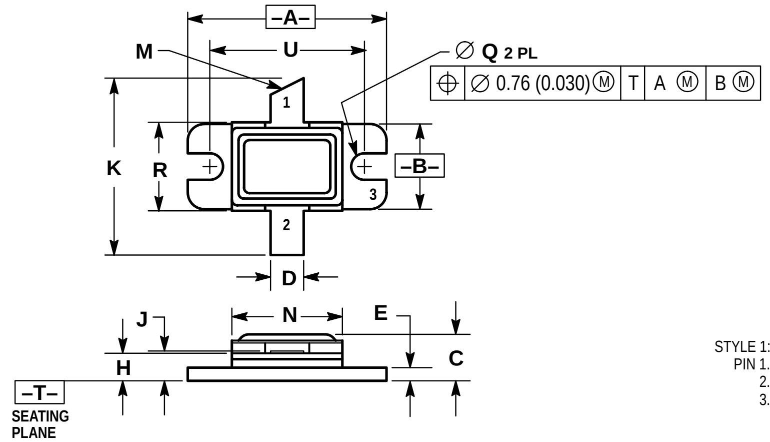


f MHz	Z_{in} OHMS	Z_{OL}^{*}
1025	1.6 + j3.9	1.6 + j1.7
1050	2.0 + j4.0	1.6 + j1.6
1090	2.8 + j4.0	1.5 + j1.1
1125	3.9 + j3.8	1.5 + j1.4
1150	4.6 + j3.0	1.4 + j1.6

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

Figure 3. Series Equivalent Input/Output Impedances

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	0.190	0.210	4.83	5.33
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	0.770	0.830	19.56	21.08
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 355E–01
ISSUE A

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