MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

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by MRF10070/D

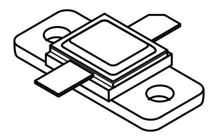
The RF Line
Microwave Pulse Power Transistor

MRF10070

Designed for 1025–1150 MHz pulse common base amplifier applications such as TCAS, TACAN and Mode–S transmitters.

- Guaranteed Performance @ 1090 MHz
  Output Power = 70 Watts Peak
  Gain = 9.0 dB Min
- 100% Tested for Load Mismatch at All Phase Angles with 10:1 VSWR
- Characterized with 10 µs, 10% Duty Cycle Pulses
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Internal Input and Output Matching
- Hermetically Sealed Package
- Recommended Driver for MRF10500 Transistor or a Pair of MRF10350 Transistors

70 W (PEAK)
1025 – 1150 MHz
MICROWAVE POWER
TRANSISTOR
NPN SILICON



CASE 376C–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	8.8	Adc
Total Device Dissipation @ T_C = 25°C (1), (2) Derate above 25°C	P_D	438 2.5	Watts W/°C
Storage Temperature Range	T_{stg}	– 65 to + 200	°C
Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

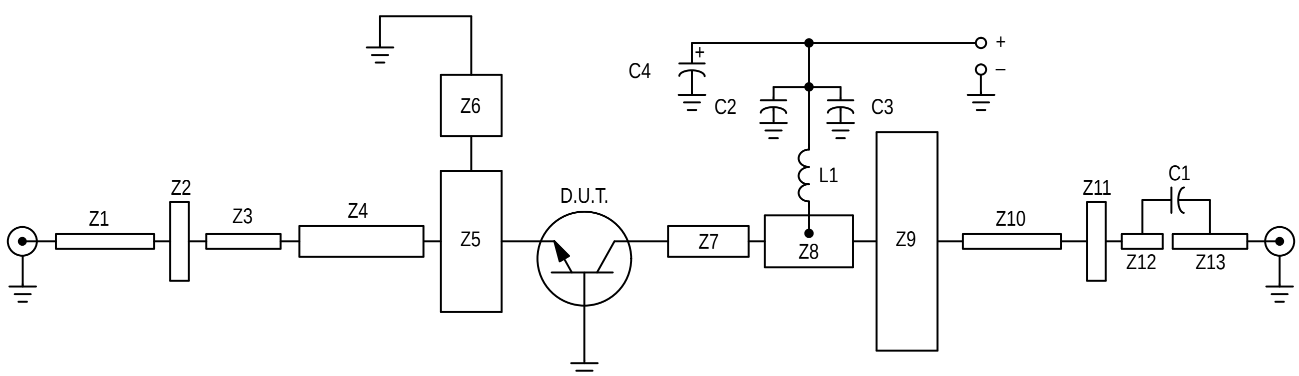
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	0.4	°C/W

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 @ 10 µs, 10%.)

MOTOROLA

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)	$V_{(BR)CES}$	65	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 60 mAdc, I_E = 0)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0)	I_{CBO}	—	—	25	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	20	—	—	—
FUNCTIONAL TESTS					
Common–Base Amplifier Power Gain (V_{CC} = 50 Vdc, P_{out} = 70 W Peak, f = 1090 MHz)	G_{PB}	9.0	10	—	dB
Collector Efficiency (V_{CC} = 50 Vdc, P_{out} = 70 W Peak, f = 1090 MHz)	η	40	—	—	%
Load Mismatch (V_{CC} = 50 Vdc, P_{out} = 70 W Peak, f = 1090 MHz, Load VSWR = 10:1 All Phase Angles)	ψ	No Degradation in Output Power Before or After Test			



C1 — 82 pF 100 mil Chip Capacitor
C2 — 82 pF 100 mil Chip Capacitor
C3 — 0.1 µF
C4 — 100 µF/100 Vdc Electrolytic
L1 — 3 turns #18 AWG, 1/8″ ID, 0.18″ Long

Z1 – Z13 — Microstrip, see details below
Board Material — 0.030″ Glass Teflon®; 2 oz. Cu clad; both sides; ϵ_r = 2.55

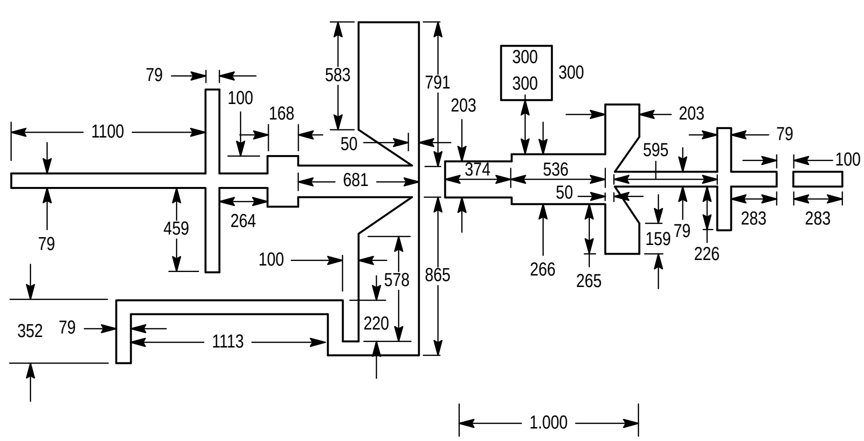


Figure 1. Test Circuit

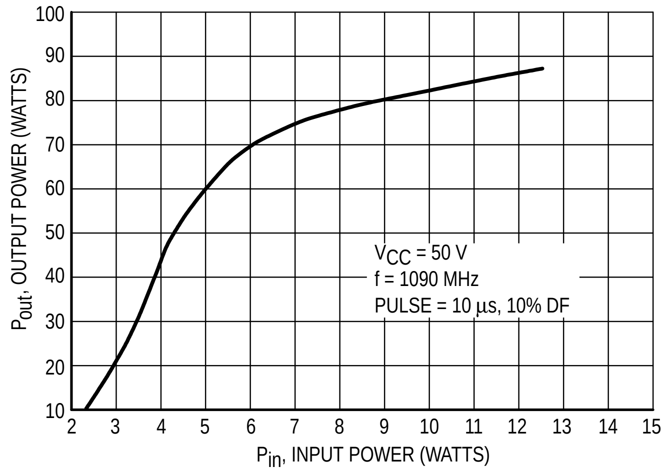
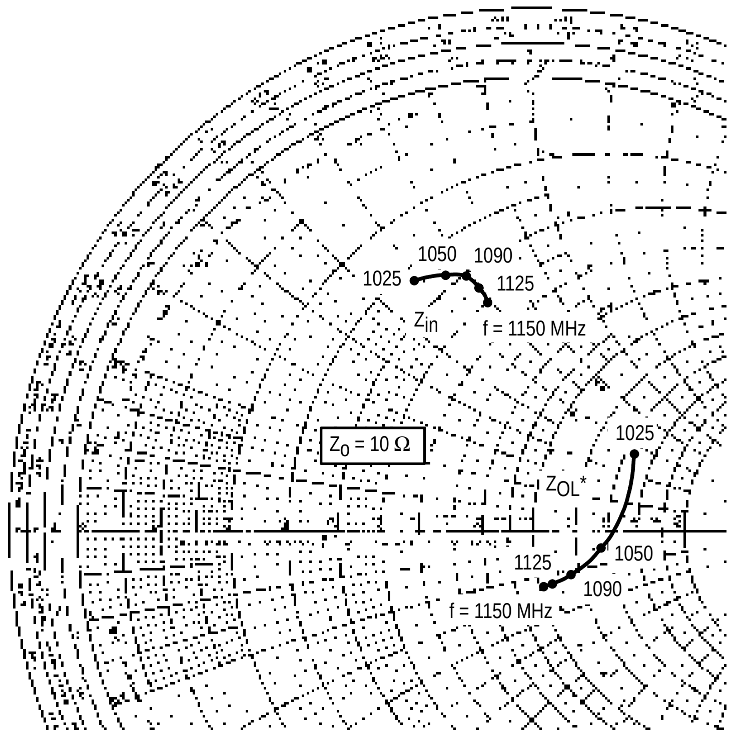


Figure 2. Output Power versus Input Power



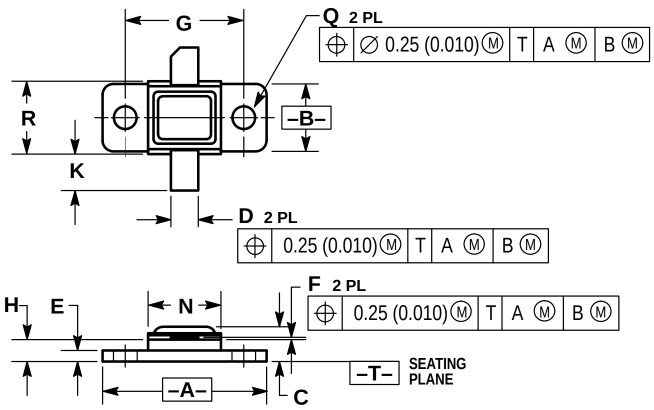
P_{out} = 70 W Pk V_{CC} = 50 V

f MHz	ZIN OHMS	Z_{OL}* (Z_{OUT}) OHMS
1025	3.3 + j5.8	14.3 + j5.6
1050	3.6 + j6.5	13.3 – j1.0
1090	4.0 + j6.9	11.3 – j2.1
1125	4.5 + j6.9	10.4 – j2.5
1150	5.0 + j6.9	10.2 – j2.6

Z_{OL}* is the 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	0.370	0.400	9.40	10.16
C	0.190	0.210	4.83	5.33
D	0.140	0.160	3.56	4.06
E	0.055	0.065	1.40	1.65
F	0.003	0.006	0.08	0.15
G	0.650 BSC		16.51 BSC	
H	0.110	0.130	2.80	3.30
K	0.180	0.220	4.57	5.59
N	0.390	0.410	9.91	10.41
Q	0.115	0.135	2.93	3.42
R	0.390	0.140	9.91	10.41

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

CASE 376C–01
ISSUE O

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