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by MRF10150H/D

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRF10150H*

Microwave Pulse Power Transistor 150 Watts Peak NPN 1025–1150 MHz

Designed for 1025–1150 MHz pulse common base amplifiers.

- Guaranteed Performance at 1090 MHz
  - Output Power = 150 Watts Peak
  - Gain = 9.5 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
- Internal Input and Output Matching
- Hermetically Sealed Package

CPTO
Commercial Plus Technologies Operation

AVAILABLE AS

1) JANTX:	**MRF10150HX**
2) JANTXV:	**MRF10150HXV**
3) JANS:	**MRF10150HS**
4) COML+:	**MRF10150HC**
PACKAGE:	**Case 376B-02**

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	14	Adc
Device Dissipation at T_C = 25 °C (1 & 2) Derate above 25 °C	P_D	700 4.0	W W/ °C
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	0.25	°C/W

NOTES: (continued)

1. Under pulse RF operating conditions.
2. These devices are designed for RF operation. The total device dissipation rating applies only when operated as RF amplifier.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

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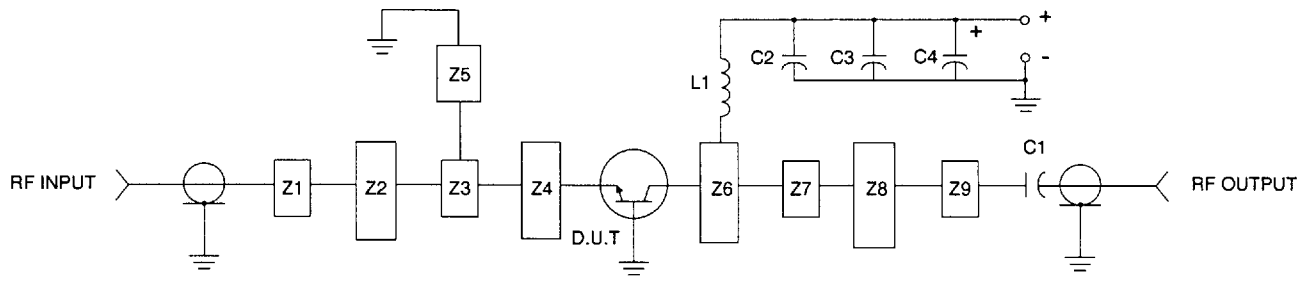
ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

Characteristic	Symbol	Min	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} = 36 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} = 150 W Peak, f = 1090 MHz)	G_{PB}	9.5	–	dB
Collector Efficiency (V_{CC} = 50 Vdc, P_{OUT} = 150 W Peak, f = 1090 MHz)	η	40	–	%
Load Mismatch (V_{CC} = 50 Vdc, P_{OUT} = 150 W Peak, f = 1090 MHZ)	ψ	No Degradation in Output Power		

ASSURANCE TESTING (Pre/Post Burn-In)
Burn-In Test Conditions: $V_{CB} \geq$ 10 Vdc, T_J = 162.5 °C + 12.5 °C

Characteristic	Symbol	Min	Max	Unit
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0)	I_{CBO}	–	25	mAdc
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	20	–	–



C1 – 82 pF 100 mil Chip Capacitor
C2 – 39 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-Z9 – Microstrip, see details below
Board Material – 0.030" Glass Teflon®
2 Oz. Copper, ϵ_r = 2.55

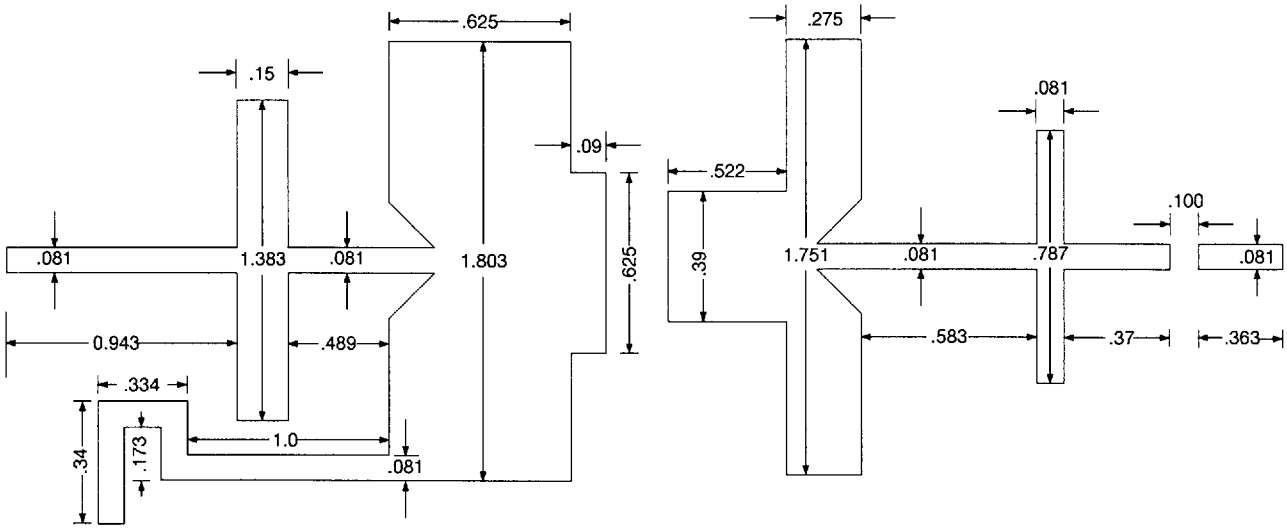


Figure 1. Test Circuit

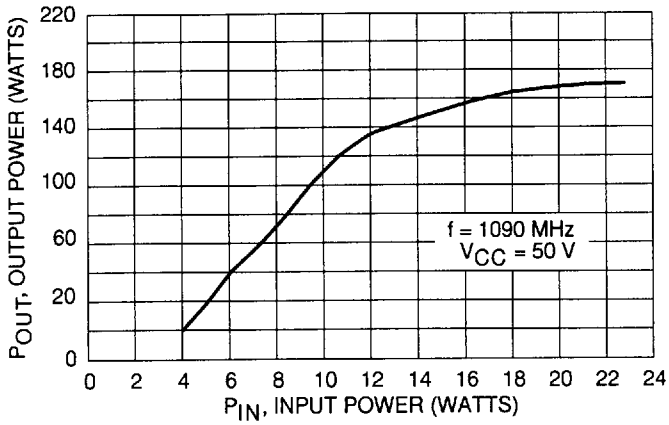
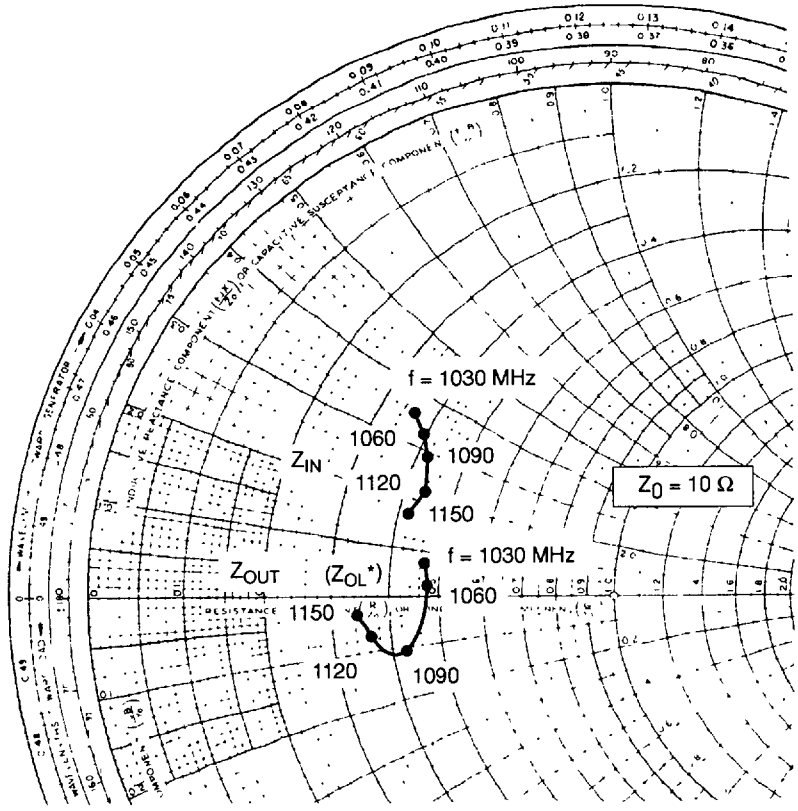


Figure 2. Output Power versus Input Power



P_{OUT} = 150 W Pk, V_{CC} = 50 V

f MHz	Z_{IN} OHMS	Z_{OL}^* (Z_{OUT}) OHMS
1030	3.8 + j3.5	4.6 +j0.7
1060	4.0 + j3.3	4.6 + j0.3
1090	4.2 + j3.0	4.1 - j1.0
1120	4.4 + 2.3	3.8 - j0.8
1150	4.1 + j1.8	3.6 - j0.3

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

TABLE 1. SCREENING REQUIREMENTS

SCREEN	METHOD	HX	HXV
1. Internal visual inspection (precap)	2072	N/A	100%
2. High temperature non-operating life	1032	100%	100%
3. Temperature cycling	1051	100%	100%
4. Constant Acceleration (Gold wires only)	2006	100%	100%
5. Hermetic seal (Fine and Gross)	1071	100%	100%
6. Establish Unit Identity	none	100%	100%
7. Interim electrical parameters	as specified	100%	100%
8. High temperature reverse bias (HTRB)	1039	100%	100%
9. Interim electrical parameters	as specified	100%	100%
10. Power burn-in	1039	100%	100%
11. Final electrical parameters	as specified	100%	100%
12. Hermetic seal (Fine and Gross)	1071	optional	optional

GROUP A TEST SEQUENCE

Subgroups			
A1	A2	A3	A4
Type of Test			
Visual/Mechanical Package: Dimensions, Marking	DC Tests $V_{(BR)CBO}$ $V_{(BR)CES}$ $V_{(BR)EBO}$ I_{CBO} h_{FE}	Hi/Lo Temp Not Applicable	AC Tests G_{PB} η

GROUP B TEST SEQUENCE

Subgroups					
B1**	B2*	B3*	B4	B5	B6*
Type of Test					
Solderability (1) Resistance to Solvents	Temp. Cycling Hermetic Seal Fine Gross	Steady State Operating Life Bond Strength	Decap Visual	Not Required	High Temp. Life (Non-Operating)

* The tests in this subgroup are preceded and followed by I_{CBO} and h_{FE} electrical tests.

** Separate samples may be used for each test.

(1) Omit Steam Aging requirements.

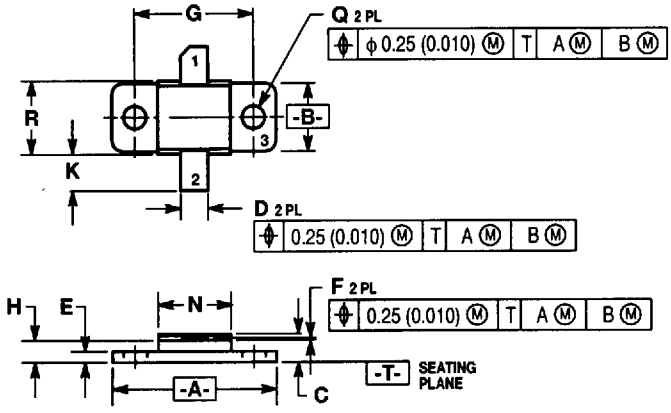
GROUP C TEST SEQUENCE*

Subgroups					
C1	C2**	C3**	C4	C5	C6**
Type of Test					
Physical Dimensions	Thermal Shock (Glass Strain) Terminal Strength Hermetic Seal Moist. Resistance	Mech. Shock Vibration (Var. Freq.) Const. Accel.	Salt Atmosphere	Not Applicable	Steady State Op Life

* Group C is performed on the initial lot and requalification only.

** The tests in this subgroup are preceded and followed by I_{CBO} and h_{FE} electrical tests.

OUTLINE DIMENSIONS



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

NOTES.
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 376B-01 OBSOLETE, NEW STANDARD 376B-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	22.61	23.11	0.890	0.910
B	9.40	10.16	0.370	0.400
C	3.69	4.06	0.145	0.160
D	3.56	4.06	0.140	0.160
E	1.40	1.65	0.055	0.065
F	0.08	0.15	0.003	0.006
G	16.51 BSC		0.650 BSC	
H	2.80	3.30	0.110	0.130
K	4.57	5.59.	0.180	0.220
N	9.91	10.41	0.390	0.410
Q	2.93	3.42	0.115	0.135
R	9.91	10.41	0.390	0.410

CASE 376B-02

Literature Distribution Centers:
USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.
EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.
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