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by MRF10120H/D

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRF10120H*

MHz Microwave Power Transistor
120 Watts NPN 960–1215 MHz

CPTO
Commercial Plus Technologies Operation

Designed for long pulsed common base amplifiers.

- Guaranteed Performance at 1215 MHz
  - Output Power = 120 Watts Peak
  - Gain = 8.0 dB Min
- 100% Tested for Load Mismatch at All Phase Angles with 3:1 VSWR
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life
- Internal Input and Output Matching
- Hermetically Sealed Package

AVAILABLE AS

1) JANTX:	**MRF10120HX**
2) JANTXV:	**MRF10120HXV**
3) JANS:	**MRF10120HS**
4) COML+:	**MRF10120HC**
PACKAGE:	**Case 355C-02**

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	55	Vdc
Collector-Base Voltage	V_{CBO}	55	Vdc
Emitter-Base Voltage	V_{EBO}	3.5	Vdc
Collector Current – Continuous (1)	I_C	15	Adc
Device Dissipation at T_C = 25 °C (1 & 2) Derate above 25 °C	P_D	380 2.17	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)	$R_{\theta JC}$	0.46	°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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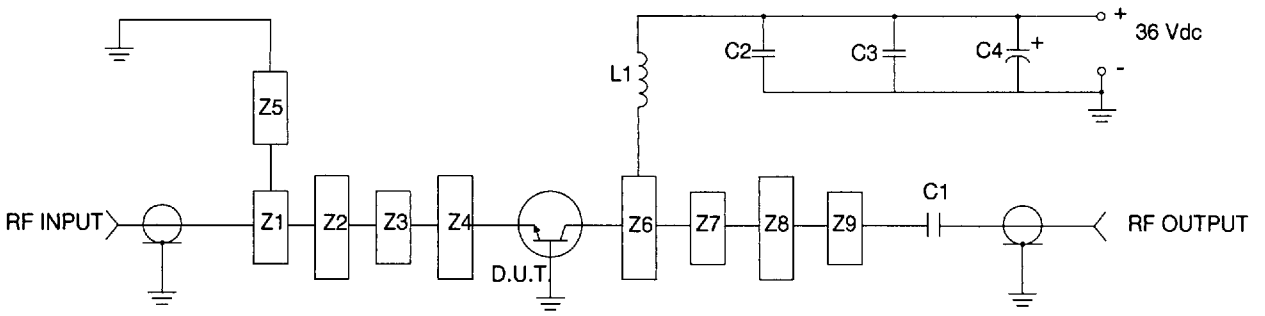
ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 60 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	55	–	Vdc
Collector-Base Breakdown Voltage (I_C = 60 mAdc, I_E = 0)	$V_{(BR)CBO}$	55	–	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} = 28 Vdc, P_{OUT} = 120 W Peak, f = 1215 MHz)	G_{PB}	8.0	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{OUT} = 120 W Peak, f = 1215 MHz)	η	50	–	%
Load Mismatch (V_{CC} = 36 Vdc, P_{OUT} = 120 W Peak, f = 1215 MHz, VSWR = 3:1 All Phase Angles)	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} = 36 Vdc, I_E = 0)	I_{CBO}	–	25	mAdc
DC Current Gain (I_C = 5.0 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	20	–	–



C1 – 270 pF 100 Mil Chip Capacitor
C2 – 220 pF 100 Mil Chip Capacitor
C3 – 0.1 μF
C4 – 47 μF 50 V 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

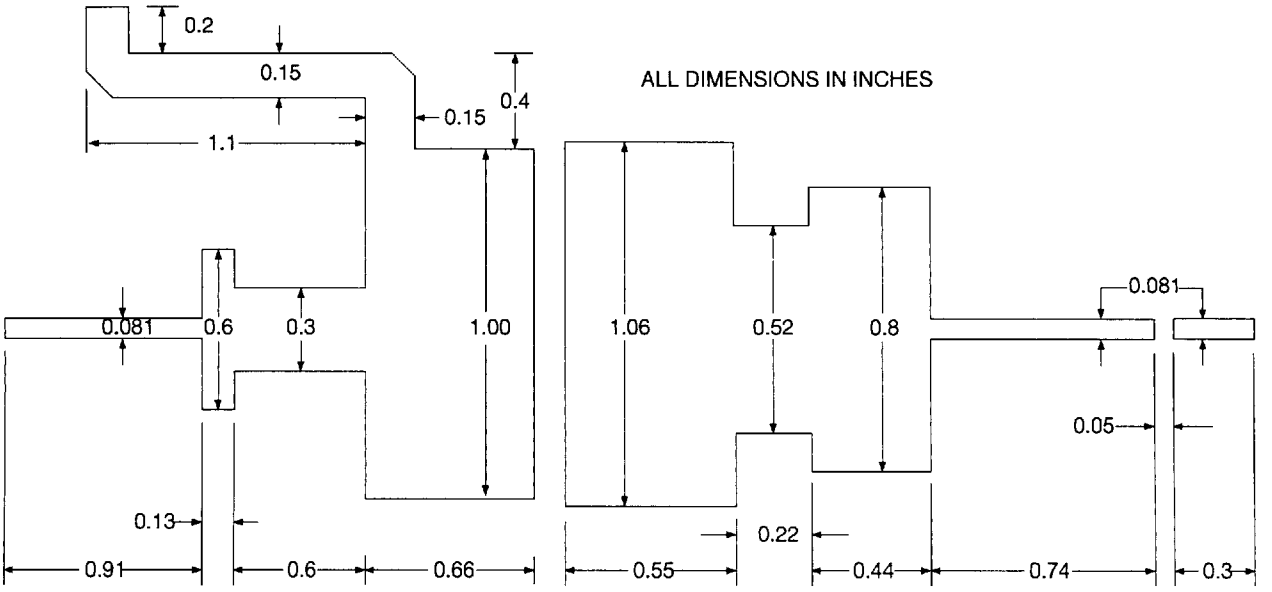


Figure 1. Test Circuit

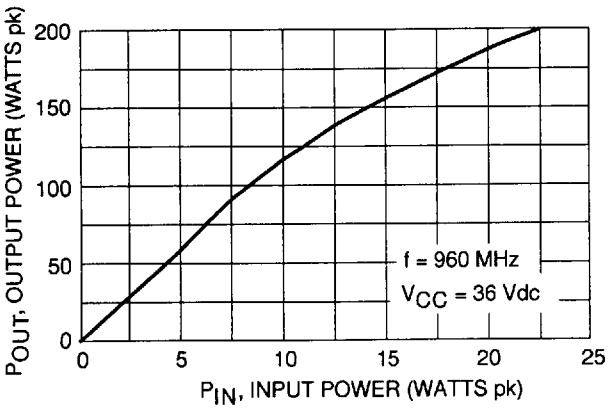


Figure 2. Output Power versus Input Power

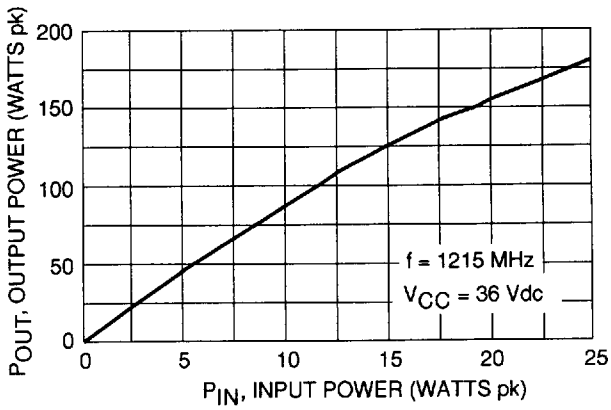
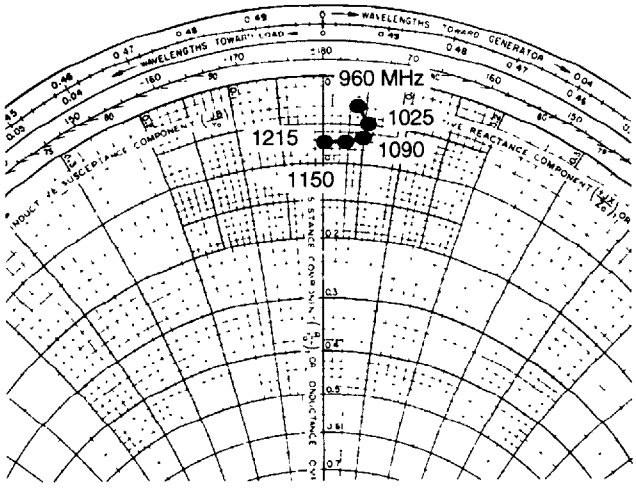


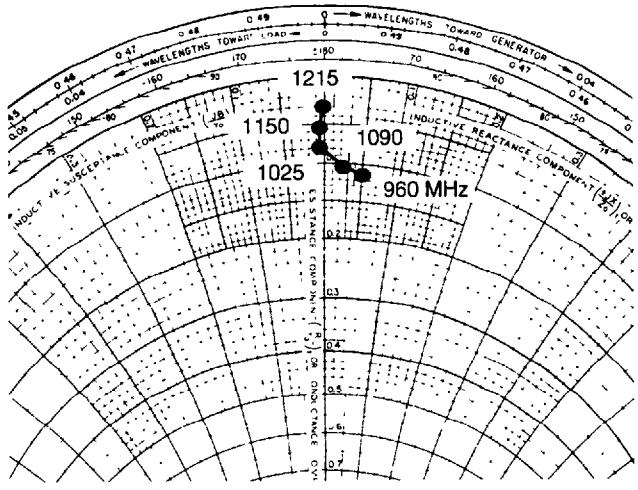
Figure 3. Output Power versus Input Power



P_{OUT} = 120 W, V_{CC} = 36 V

f MHz	Z_{IN} OHMS
960	1.45 - j2.57
1025	2.22 - 2.91
1090	2.77 - j2.80
1150	2.90 - j2.22
1215	2.71 - j1.07

Figure 4. Series Equivalent Input Impedance



P_{OUT} = 120 W, V_{CC} = 36 V

f MHz	ZOL* OHMS
960	5.33 - j1.37
1025	4.59 - j0.307
1090	3.74 - j0.612
1150	2.43 - j0.492
1215	1.80 - j0.385

*ZOL is the conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

Figure 5. Series Equivalent Output Impedance

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 C_{OBO} 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.

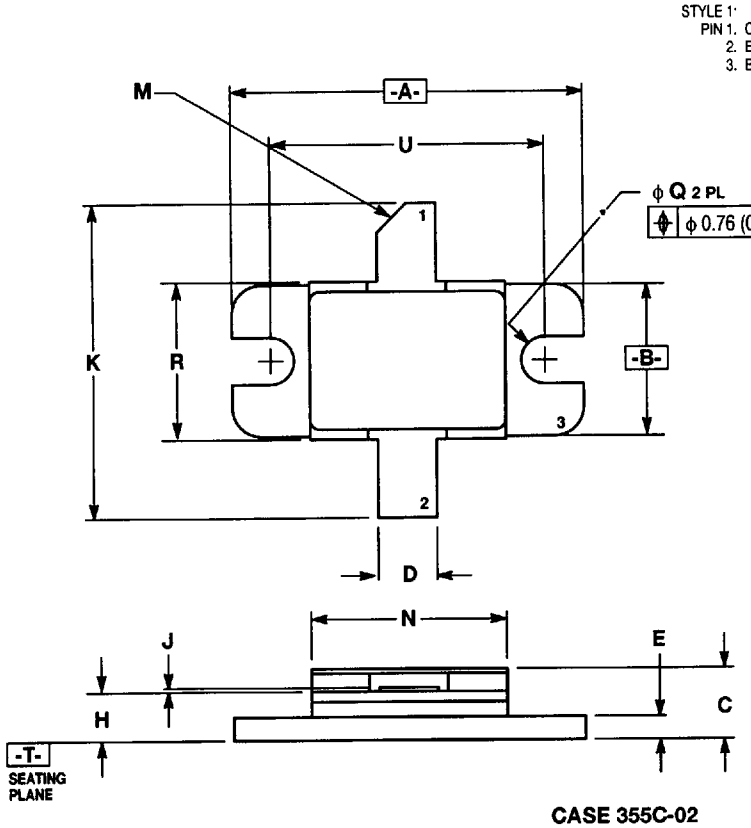
GROUP C TEST SEQUENCE*

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



CASE 355C-02

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 355C-01 OBSOLETE, NEW STANDARD 355C-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	22.61	23.11	0.890	0.910
B	9.53	10.03	0.375	0.395
C	3.94	5.33	0.155	0.210
D	3.69	3.93	0.145	0.155
E	1.40	1.65	0.055	0.065
H	3.05	3.30	0.120	0.130
J	0.08	0.15	0.003	0.006
K	19.56	21.08	0.770	0.830
M	45° REF		45° REF	
N	12.45	12.95	0.490	0.510
Q	2.93	3.17	0.115	0.125
R	10.04	10.28	0.395	0.405
U	17.78 BSC		0.700 BSC	

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