JRC product bulletin

M1310JRC0

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M1310 *X-Band Magnetron*

GENERAL DESCRIPTION

M1310 is a fixed frequency pulsed type X-band magnetron designed to operate in the frequency range of 9345 to 9405 MHz with a peak output power of 10.5 kW. It is packaged and waveguide output type and forced or natural air cooled.

GENERAL CHARACTERISTICS

Electrical

Heater voltage (see note 1)	6.3 V
Heater current	0.5 A
Minimum preheat time	120 s

Mechanical

Dimensions	per outline drawing
Net weight	1.4 Kg approximately
Mounting position	any
Cooling (see note 5)	forced or natural air
Output coupling	UG-40 B/U

MAXIMUM AND MINIMUM RATINGS (Absolute)

These ratings cannot necessarily be used simultaneously and no individual ratings should be exceeded.

	Min	Max	Unit
Heater voltage (see note 1)	5.7	6.9	V
Peak anode voltage	5.0	6.2	kV
Peak anode current	3.5	5.5	A
Peak anode power input	–	33	kW
Average anode power input (see note 2)	–	82.5	W
Duty cycle	–	0.0025	
Pulse duration (see note 3)	0.1	2.5	μs
Rate of rise of voltage pulse (see note 4)	–	125	kV/μs
Anode temperature (see note 5)	–	120	°C
V.S.W.R. at the output coupler	–	1.5:1	
Ambient pressure for satisfactory operation	500	–	mmHg

TYPICAL OPERATION

Operational Conditions	Condition 1	Condition 2	Unit
Heater voltage	6.3	6.3	V
Peak anode current	5.0	5.0	A
Pulse duration	0.5	0.05	μs
Pulse repetition rate	1250	2500	p.p.s.
Rate of rise of voltage pulse	100	100	kV/μs
Typical Performance			
Peak anode voltage	5.7	5.7	kV
Peak output power	10.5	8.5	kW
Average output power	6.5	1.1	W

TEST CONDITIONS AND LIMITS

The tube is tested to comply with the following electrical specification.

Test Conditions	Oscillation 1	Oscillation 2	Unit
Heater voltage (operating)	6.3	6.3	V
Pulse repetition frequency	1250	2000	p.p.s.
Average anode current	3.1	0.5	mA
Duty cycle	0.000625	0.0001	
Pulse duration (see note 3)	0.5	0.05	μs
V.S.W.R. at the output coupler	1 1 1	1.1 1	
Rate of rise of voltage pulse (see note 4)	100	100	kV/μs
Peak anode current	5	5	A

Test (Oscillation 1)	Condition	Insp. Level	Symbol	Limit Min	Limit Max	Unit
Heater current	Ef=6.3V only t=120S min	100%	IF	0.5	0.6	A
Pulse voltage	–	100%	e_{py}	5.5	5.8	kV
Power output (note 7)	t=3000S max	100%	p_o	6.0		W
Frequency	T(Anode) = 40 ± 10°C	100%	F	9345	9405	MHz
Pulling factor	–	100%	ΔF		18	MHz
Mode free current range	Average anode current (note 1)	100%		2.2	3.4	mA
Non oscillating characteristics position standing wave min. (note 8)	Condition 1	100%	Distance	16.5	22.5	mm

LIFE TEST

End of Life Performance (under Test Conditions Oscillation 1)

The tube is deemed to have reached end of life when it fails to satisfy the following:

Average output power	4.5 W min
Frequency	9345 to 9405 MHz
Stability (see note 6)	0.1% max

Magnetron will be supplied with flying connecting leads and glass portion of tube sealed. A life warranty of 1000 hours (pro-rata).

NOTES:

1 With no anode input power.
For average pulse input powers greater than 25 watts the heater voltage must be reduced within 3 seconds after the application of h.t. according to the following schedule:

$$Ef = 6.3\left(1 - \frac{P_i}{180}\right) \text{ volts}$$

where P_i = mean input power in watts.

2. The various parameters are related by the following formula.

$$P_i = \imath_b \times e_{py} \times Du$$

where P_i = mean input power in watts
$\imath_b$ = peak anode current in amperes
e_{py} = peak anode voltage in volts
Du = duty cycle

3. Tolerance ±10%.

4. Defined as steepest tangent to leading edge of voltage pulse above 80% amplitude. Any capacitance in viewing system must not exceed 6.0 pF

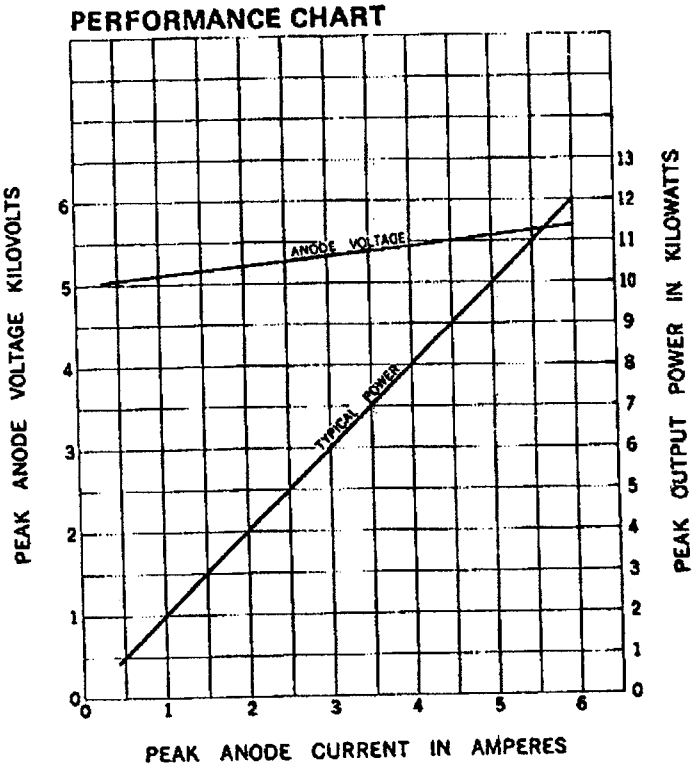
5. The anode temperature measured at the point indicated on the outline drawing must be kept below the limit specified by means of a suitable flow of air over the anode body and waveguide attachment brackets which serve as cooling fins.

6. With the tube operating into a v.s.w.r. of 1.5 1 phased to give maximum instability Pulses are defined as missing when the r.f. energy level is less than 70% of normal energy level in a 0.5% frequency range. Missing pulses are expressed as a percentage of the number of input pulses applied during the period of observation after a period of 10 minutes.

7 There shall be no evidence of moding so the average anode current is varied over the specified time.

8. For range 9345 to 9405 MHz the impedance of the valve measured at the operating frequency when not oscillating will be such as to give a v.s.w.r. of at least 6.1 with a minimum 16.5 to 22.5 mm from the output flange toward the anode.

PERFORMANCE CHART



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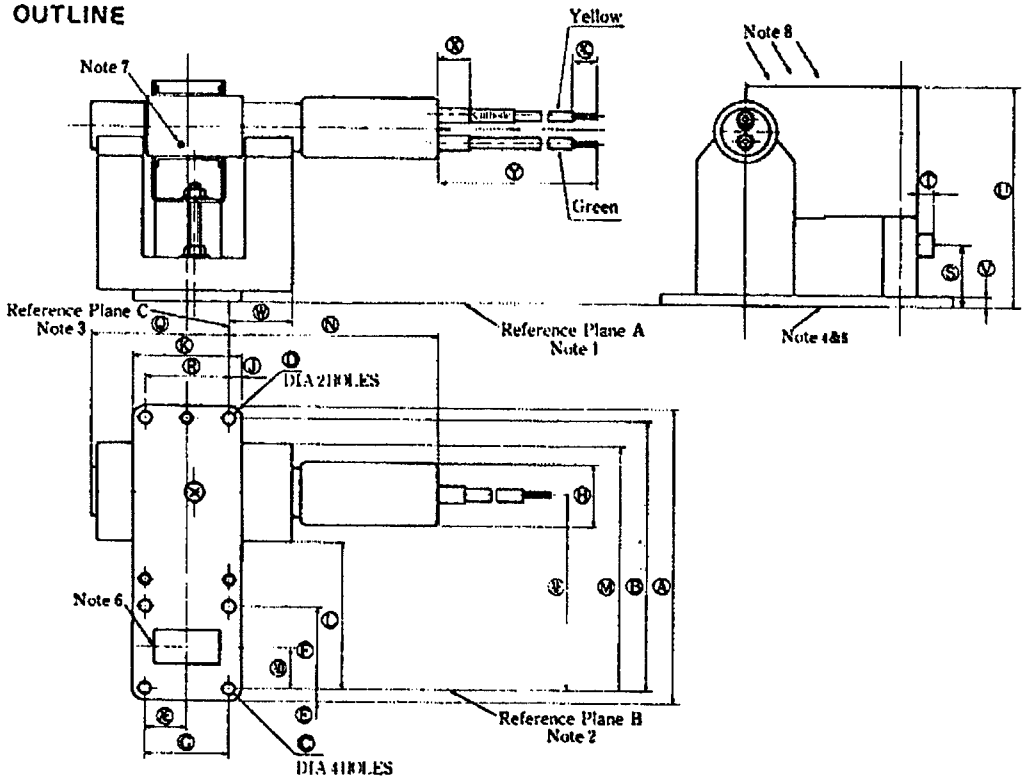
OUTLINE



Outline Dimensions(All dimensions without limits are nominal)

Ref	Inches	Millimeteters	Ref	Inches	Millimeters
A	4.453±0.015	113.11 ±0.38	N	3.25max	82.5max
B	4.103	104.22	Q	2.188max	55.58max
C	0.170±0.003	4.315±0.076	R	1.220±0.004	30.99±0.102
D	0.175±0.003	4.445±0.076	S	0.875±0.015	22.23±0.38
E	0.172±0.015	4.37 ±0.38	T	0.375±0.015	9.53±0.38
F	1.280±0.004	32.51 ±0.012	U	3.31 ±0.03	84.07±0.76
G	1.220±0.004	30.99 ±0.102	V	0.125±0.015	3.18±0.38
H	1.000max	25.4max	W	1.188max	30.18max
J	0.203±0.015	5.16 ±0.38	X	1.00 +0.015	25.4 -0.76
K	1.625±0.015	41.28 ±0.38	Y	4.50 ±0.12	114.3±3.05
L	1.938mm	50.37mm	Z	0.16max	4.06max
M	4.000max	101.6max	AB	0.25 ±0.03	6.35±0.76
AD	0.640±0.015	16.26 ±0.38	AC	0.38 ±0.06	9.65±1.52
AE	0.610±0.015	15.49 ±0.38	AF	2.968±0.015	75.39±0.38

Outline Notes:

1 Reference plane "A" lies on bottom surface of mounting plate.

2. Reference plane "B" passes through the centers of the two top holes of the mounting plate as shown and is perpendicular to plane "A"

3. Reference plane "C" intersects plane "B" at the center of the mounting plate hole as shown, and is perpendicular to planes "A" and "B"

4 With bottom surface of mounting plate resting on a flat surface a feeler guage .508 (0.02 inch) thick and 3 1 (0.125 inch) wide shall not enter more than 3.1 (0.125 inch) at any point.

5. All metal surfaces except bottom surface of mounting plate shall be painted.

6. The position of the waveguide and fixing holes will be such that the valve operates into coupler type UG-40B/U.

7 Anode temperature measured at this point.