JRC product bulletin

9M752/M1414 X-Band Magnetron

GENERAL DESCRIPTION

9M752/M1414 is a fixed frequency pulsed type X-band magnetron designed to operate in the frequency range of 9380 to 9440 MHz with a peak output power of 25 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 ..... 0.52 A
Minimum preheat time ..... 120 s

Mechanical

Dimensions ..... per outline drawing
Net weight ..... 1.6 kg approximately
Mounting position ..... any
Cooling (see note 5) ..... forced or natural air
Output coupling ..... UG-40 B/U (5985-99-083-0051)

ABSOLUTE MAXIMUM RATINGS

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

	Min	Max	Unit
Heater voltage	5.7	6.9	V
Peak anode voltage	7.5	8.5	kV
Peak anode current	6.0	10	A
Peak anode power input	–	75	kW
Average anode power input (see note 2)	–	85	W
Duty cycle	–	0.0015	
Pulse duration (see note 3)	0.05	2.0	μs
Rate of rise of voltage pulse (see note 4)	–	150	kV/μs
Anode temperature (see note 5)	–	120	°C
V.S.W.R. at the output coupler	–	1.5:1	

TYPICAL OPERATION

Operational Conditions	Condition 1	Condition 2	Unit
Heater voltage	6.3	6.3	V
Peak anode current	8.0	8.0	A
Pulse duration	1.0	0.1	s
Pulse repetition rate	500	1000	p.p.s.
Rate of rise of voltage pulse	150	150	kV/μs
Typical Performance			
Peak anode voltage	8.2	8.2	kV
Peak output power	25	25	kW
Average output power	12.5	2.5	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)	3.8		6.3		V
Average anode current	8.0		2.08		mA
Duty cycle	0.001		0.00026		
Pulse duration (see note 3)	1.0		0.13		μs
V.S.W.R. at the output coupler	1.1:1		1.1:1		
Rate of rise of voltage pulse	150		150		kV/μs min
Limits	**Min**	**Max**	**Min**	**Max**	**Unit**
Peak anode voltage	7.5	8.5	7.5	8.5	kV
Average output power	20	–	–	–	W
Frequency	9380	9440	–	–	MHz
R.F. bandwidth at 1/4 power	–	2.5	–	20	MHz
Frequency pulling (v.s.w.r. not less than 1.5:1)	–	28	–	–	
Stability (see note 6)	–	0.5	–	0.5	%
Cold impedance					see note 7
Heater current					see note 8
Temperature coefficient of frequency					see note 9

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:

Peak anode voltage	7.5 to 8.5 kV
Average output power	16 W min
R.F. bandwidth at 1/4 power	5.0 MHz max
Frequency	9380 to 9440 MHz
Stability (see note 6)	1 max

NOTES:

1. With no anode input power.
   For average pulse input powers greater than 40 watts the heater voltage must be reduced within 3 seconds after the application of h.t. according to the following schedule:

   $$Ef = 0.08\,(110 - P_i) \text{ volts}$$

   where P_i = mean input power in watts.

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

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

   where P_i = mean input power in watts
   i_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.

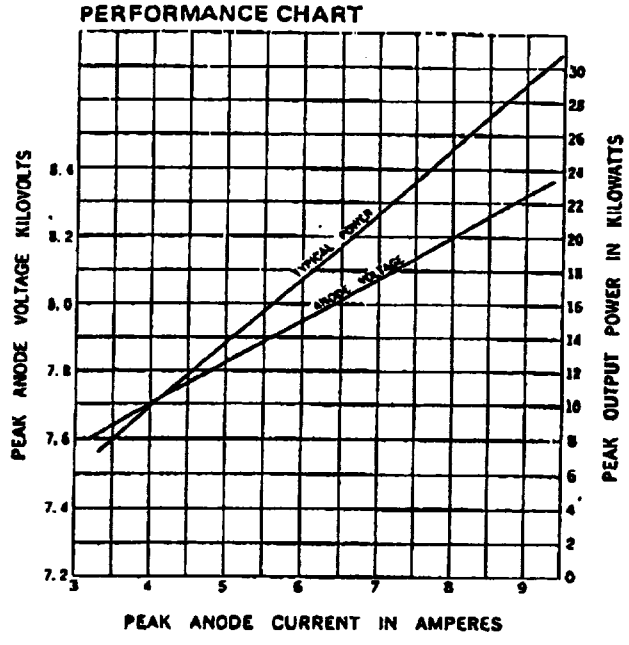
5. The anode temperature measured at the point indicated on the outline drawing must be kept below the limit specified by means of a suitable flow of air over the anode body and waveguide attachment brackets which serve as cooling fins.

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.

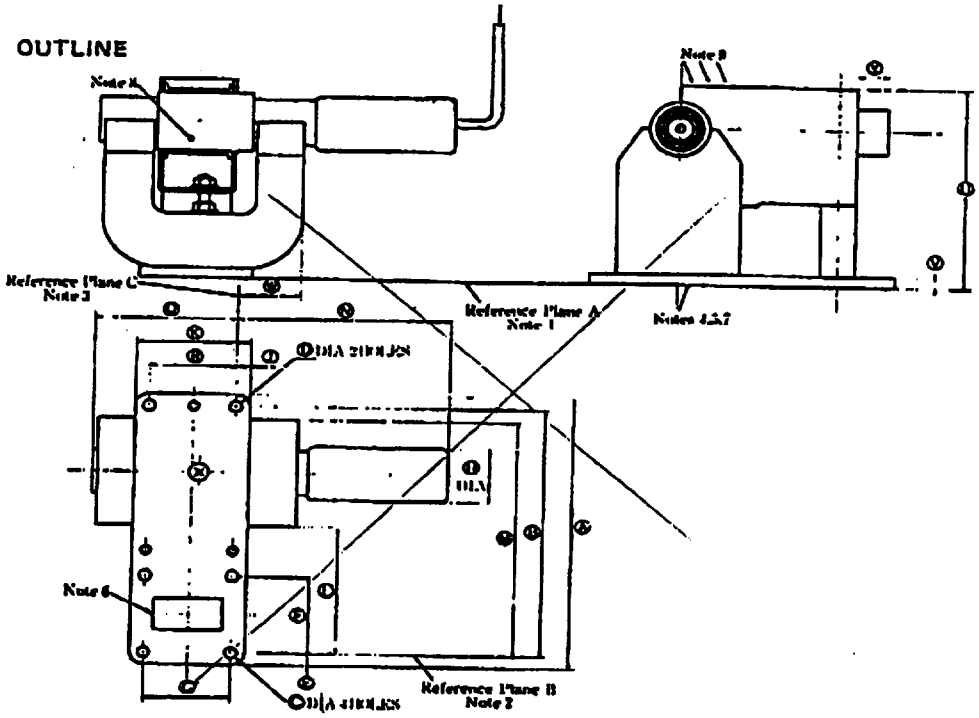
7. For the range 9380 to 9440 MHz the impedance of the tube measured at the operating frequency when not oscillating will be such as to give a v.s.w.r. of at least 8:1 with a minimum 16.5 to 22.5 mm from the output flange toward the anode.

8. Measured with heater voltage of 6.3 V and no anode input power, the heater current limits are 0.43 A minimum, 0.6 A maximum.

9. Design test only. The maximum frequency change with anode temperature change (after warming) is –0.25 MHz/°C.



OUTLINE



Outline Dimensions(All dimensions without limits are nominal)

Ref	Inches	Millimeters	Ref	Inches	Millimeters
A	4.453 ± 0.015	113.11 ±0.4	M	4.000max	101.6max
B	3.103	104.22	N	3.25max	82.5max
C	0.170 ± 0.003	4.315 ± 0.075	Q	2.187max	55.55max
D	0.175 ± 0.003	4.445 ± 0.075	R	1.22 ± 0.004	30.99 ± 0.1
E	0.187max	4.75max	S	0.875	22.23
F	1.240 ± 0.004	32.51 ±0.1	T	0.375max	9.53max
G	1.220 ± 0.004	30.99 ±0.1	U	3.313max	84.15max
H	1.000	25.4	V	0.125	3.18
J	0.218max	5.54max	W	1.187max	30.15max
K	1.625	41.28			
L	1.811min	46min	Y	0.475max	12max

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-40 B/U.
7. Bottom surface to mounting plate and interior surface of waveguide shall be plated 10 MSI of gold or 30 MSI silver but need not be plated if made of a corrosion resistant material.
8. Anode temperature measured at this point.
9. Recommended direction of air flow.

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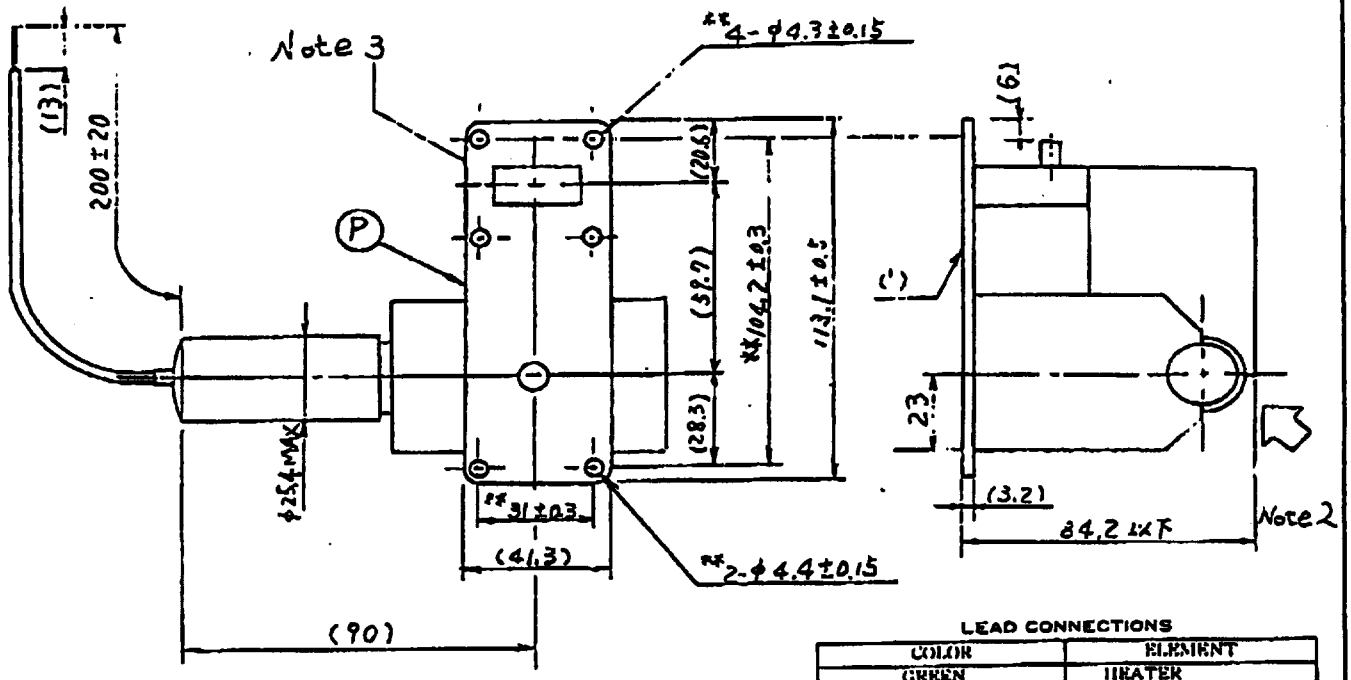
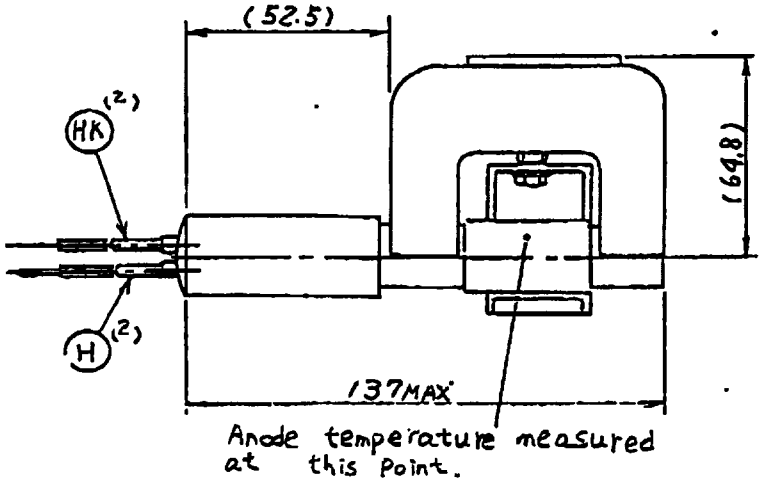


LEAD CONNECTIONS	
COLOR	ELEMENT
GREEN	HEATER
YELLOW	HEATER.CATHODE



Outline Notes:

1. 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
2. Recommended direction of air flow.
3. The position of the waveguide and fixing holes will be such that the valve operates into coupler type UG-40B/U.