



product bulletin

M1337

X-Band Magnetron

GENERAL DESCRIPTION

M1337 is a fixed frequency pulsed type X-band magnetron designed to operate in the frequency range of 9725 to 9755 MHz with a peak output power of 50 kW. It is packaged and waveguide output type and forced air cooled.

GENERAL CHARACTERISTICS

Electrical

Heater voltage (see note 1) 6.3 V
 Heater current 1.0 A
 Minimum preheat time (see note 9) 120 s

Mechanical

Dimensions per outline drawing
 Net weight 1.9 kg approximately
 Mounting position any
 Cooling (see note 5) forced air
 Output coupling UG-52 B/U

ABSOLUTE MAXIMUM RATINGS

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	—	16	kV
Peak anode current	—	16	A
Peak anode power input	—	230	kW
Average anode power input (see note 2)	—	180	W
Duty cycle	—	0.001	
Pulse duration (see note 3)	—	2.5	μs
Rate of rise of voltage pulse (see note 4)	—	150	kV/μs
Anode temperature (see note 5)	—	100	°C
V.S.W.R. at the output coupler	—	1.5:1	
Pressurizing of waveguide	—	45	lb/in ²
	—	3.2	kg/cm ²

TYPICAL OPERATION

Operational Conditions

Heater voltage 0 V
 Peak anode current 12 A
 Pulse duration 1.0 μs
 Pulse repetition rate 1000 p.p.s.
 Rate of rise of voltage pulse 100 kV/μs

Typical Performance

Peak anode voltage 12 kV
 Peak output power 50 kW
 Average output power 50 W

TEST CONDITIONS AND LIMITS

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

Test Conditions	Oscillation 1		Oscillation 2		Unit
	Min	Max	Min	Max	
Heater voltage (operating)		0		2.5	V
Average anode current		12		8.0	mA
Duty cycle		0.001		0.00065	
Pulse duration (see note 3)		1.0		2.0	μs
V.S.W.R. at the output coupler (max)		1.1:1		1.1:1	
Rate of rise of voltage pulse (max) (see note 4)		100		100	kV/μs
Limits	Min	Max	Min	Max	Unit
Peak anode voltage	11	13	—	—	kV
Average output power	40	—	—	—	W
Frequency	9725	9775	—	—	MHz
R.F. bandwidth at 1/4 power	—	3	—	1.25	MHz
Frequency pulling (v.s.w.r. not less than 1.5:1)	—	18	—	—	MHz
Stability (see note 6)	—	0.6	—	0.6	%
Heater current					see note 7
Temperature coefficient					see note 8

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	30 W min
R.F. bandwidth at 1/4 power	3.0 MHz max
Frequency range	9725 to 9775 MHz
Stability (see note 6)	1.0% max

NOTES:

1. With no anode input power.

For average pulse input powers less than 150 watts the heater voltage must be reduced within 3 seconds after the application of h.t. according to the following schedule:

$$E_f = 6.3 \sqrt{1 - \frac{P_i}{150}} \text{ volts}$$

where P_i = mean input power in watts.

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

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

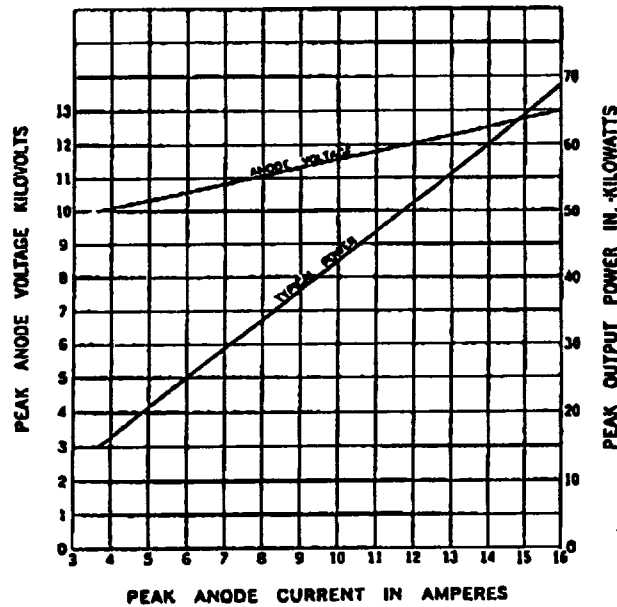
where P_i = mean input power in watts
 i_b = peak anode current in amperes
 e_{py} = peak anode voltage in volts
 D_u = duty cycle

3. Tolerance ±10%.

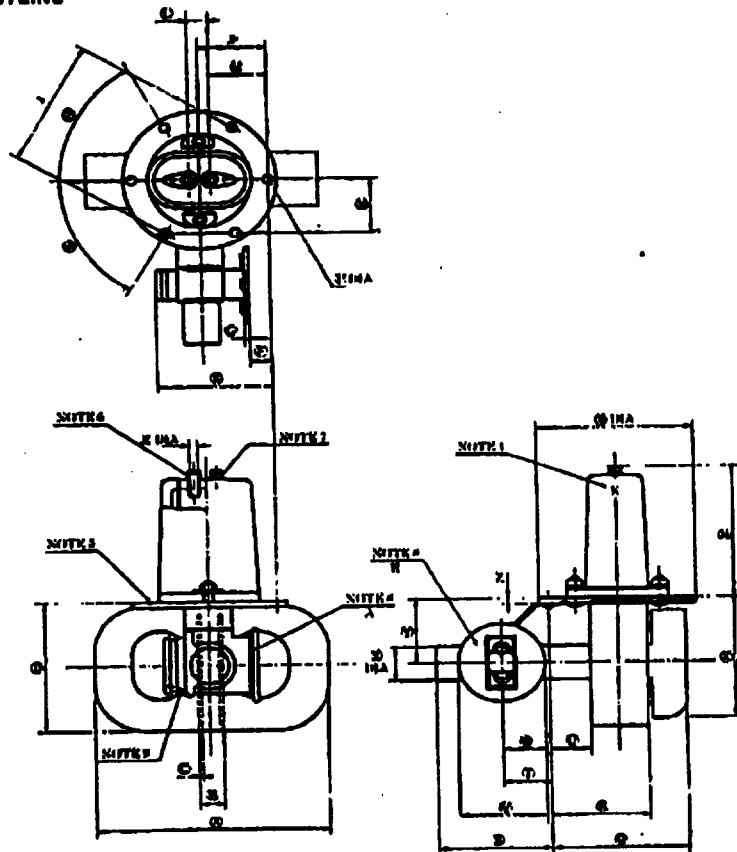
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4. Defined as steepest tangent to leading edge of voltage pulse above 80% amplitude. Any capacitance in the viewing system must not exceed 6.0 pF.
5. The anode temperature measured at the point indicated on the outline drawing must be kept below the limit specified by means of a suitable flow of air over the anode body and 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. Measured with heater voltage of 6.3 V and no anode input power, the heater current limits are 0.9 A minimum, 1.1 A maximum.
8. Design test only. The maximum frequency change with anode temperature change (after warming) is $-0.25 \text{ MHz}/^\circ\text{C}$.
9. For ambient temperatures above 0°C . For ambient temperatures between 0 and -55°C the cathode heating time is 3 minutes minimum.

PERFORMANCE CHART



OUTLINE



OUTLINE DIMENSIONS (All dimensions without limit are nominal.)

Ref	Max (mm)	Min (mm)	Ref	Max (mm)	Min (mm)
A	136.6		H	52.3	
B	12.7		S	67.6	
C		1.6	T	30.78	29.78
D	79.4		U		11
E	63.5		V	44.63	44.27
F	11.6	10.8	W	22.385	22.065
G	2.29	2.09	X		19.1
H	60° 12'	59° 48'	Y	40.18	39.18
J	73.15	72.65	Z	3.33	3.07
K	60° 12'	59° 48'	AA	77.3	74.3
L	12.85	12.45	AB	83.4	81.8
M		30.15	AC	75.4	
N		31.61	AD	37.25	35.75
P	4.96	4.82	AE	4.43	4.17
Q	69.7				

Outline Notes:

1. Common cathode connection is indicated by letter "K".
2. All metal surfaces except bottom surface of mounting plate and nylon cover shall be painted.
3. Output flange will be concentric with open end of waveguide to within 0.25 mm.
4. 31.75 x 15.88 mm external dimension x 1.63 mm wall commercial rectangular waveguide.
5. This surface will be free from paint.
6. Heater connection.
7. Cathode connection.
8. Surfaces A, B and interior surfaces of waveguide is alodine disposition.
9. Anode temperature measured at this point.