M1621B

The **M1621B** is an electronic frequency tuning pulsed type X-band magnetron, designed to operate at 9380 to 9440 MHz with a peak output power of 4kW. The oscillation frequency is tuned by applying bias voltage to the tuning bias terminal from the customer's control circuit board. The magnetron has a waveguide output.
This magnetron only needs to be conduction cooled.
A permanent magnet is packaged as part of the magnetron.

GENERAL CHARACTERISTICS

----ELECTRICAL----

Heater voltage (note 1)	6.3V
Heater current	0.55A
Minimum preheat time (note 2)	65sec

----MECHANICAL----

Dimensions	Per outline drawing
Net weight	0.44kg approximately
Mounting position	Any direction
Cooling (note 3)	Conduction cooling or forced air.
Output coupling	UG-40B/U or WRJ-10

ABSOLUTE MAXIMUM RATINGS

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

	Min	Max	Units
Heater voltage	5.7	6.9	V
Peak anode voltage	3.4	3.9	kV
Peak anode current (note 4, 5)	2.5	4.5	A
Average anode power input (note 6)	—	13	W
Duty cycle	—	0.0012	
Pulse duration (note 7)	0.05	4.0	us
Rate of rise of voltage pulse (note 8)	—	55	kV/us

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	Min	Max	Units
Anode temperature (note 3)	—	100	degree centigrade
V.S.W.R. at the output coupler	—	1.2:1	
Tuning bias voltage (note 10)	0	10	V

TYPICAL OPERATION

Operational Conditions	Condition 1	Condition 2	Units
Heater voltage	6.3	6.3	V
Peak anode current	3.0	3.0	A
Pulse duration	4.0	1.0	us
Pulse repetition rate	250	1000	p.p.s
Rate of rise of voltage pulse	35	35	kV/us
Typical performance			
Peak anode voltage	3.6	3.6	kV
Peak output power	4.0	4.0	kW
Average output power	4.0	4.0	W

TEST CONDITIONS AND LIMITS

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

Test Conditions	Condition 1	Condition 2	Units
Heater voltage (operating)	6.3	6.3	V
Average anode current	3.0	3.0	mA
Duty cycle	0.001	0.001	
Pulse duration (note 7)	4.0	1.0	us
V.S.W.R. at the output coupler	1.05	1.05	
Rate of voltage pulse	35	35	kV/us min.

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Limits	Condition 1		Condition 2		
	Min	Max	Min	Max	Units
Peak anode voltage	3.4	3.8	—	—	kV
Peak output power	3.8	4.4	—	—	kW
Frequency (Bias voltage =0V)	9380	9440	—	—	MHz
R.F bandwidth at 1/4 power	—	2.5/tp	—	2.5/tp	MHz
Frequency pulling: (V.S.W.R. not less than 1.5:1)	—	23	—	—	MHz
Tuning frequency Bias voltage = 0 to 8 V (note10)	20	—	—	—	MHz
Tuning response time (increase)	0.04	—	—	—	MHz/us
(note10) (decrease)	20	—	—	—	MHz/us
Frequency repetition stability at each bias voltage (note 9)	—		—	1.1	MHz
Stability (note 11)	—	0.05	—	0.05	%
Heater current (note 12)			0.5	0.6	A
Temperature coefficient of frequency (note 14)				-0.25	MHz/ degree

LIFE TEST

End of Life Performance (under Test Conditions 1)

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

Peak anode voltage	3.4 to 3.9 kV
Peak output power	3.0 kW min
R.F. bandwidth at 1/4 power	3.5/tp MHz max
Frequency	9315 to 9375 MHz
Stability (note 11)	0.5 % max

NOTE:

1. No reduction of heater voltage is required.
2. For ambient temperatures from -10 degrees centigrade to +70 degrees centigrade at heater voltage between 5.7V and 6.9V.

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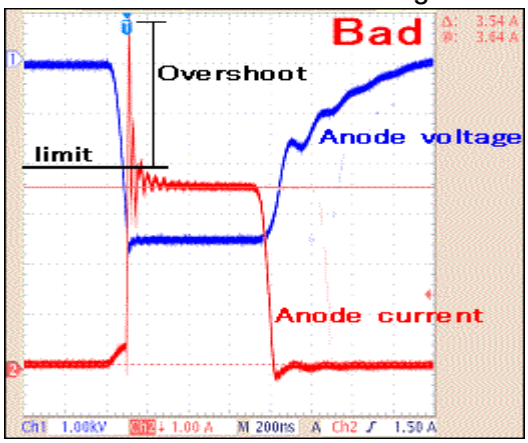
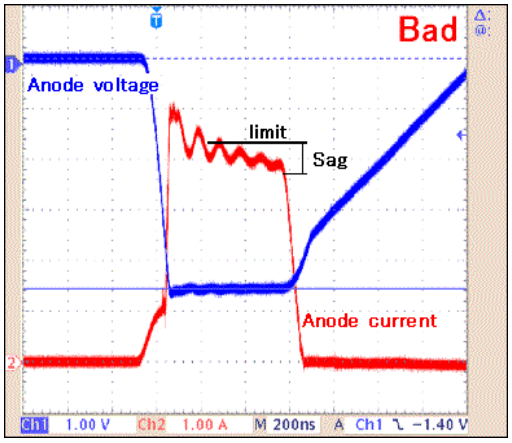
3. The anode temperature measured at the point indicated on the outline drawing must be kept below the limit specified by means of a suitable flow of air or additional thermal radiator.
The thick waveguide flange and the flange contact to the pedestal with a thick metal plate design are better for conduction cooling.

4. Any overshoot of the anode current is not acceptable.
The impedance of this magnetron is similar to current production magnetrons however the transient impedance is different.
This means that additional reactance may be required for adjusting the anode current waveform, if this magnetron will be installed into a standard modulator designed for a standard magnetron.



5. Saggy anode current should be avoided by adjusting the anode voltage pulse waveform. The flat part of anode current waveform must be kept above the anode current's lower limit value.
The flat anode current increases the Sharp Spectrum main lobe.



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

$$Pi = ib \times epy \times Du$$

where Pi = mean input power in watts
ib = peak anode current in amperes
epy = peak anode voltage in volts
Du = duty cycle

7. Tolerance ±10%
8. Defined as steepest tangent to leading edge of voltage pulse above 80% amplitude.

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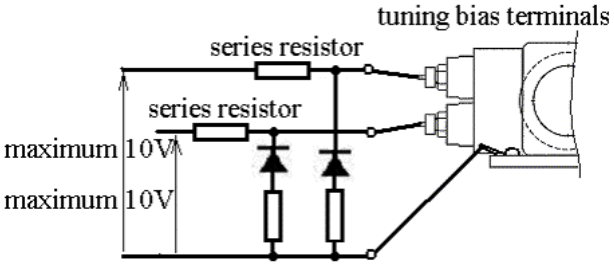
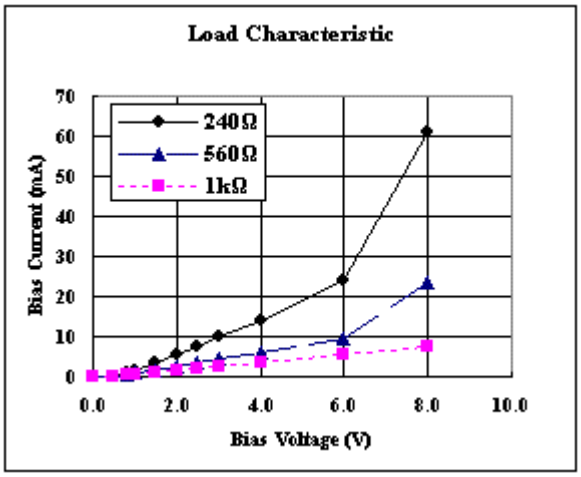
9. The frequency repetition stability is measured with a frequency detector. Then the bias voltage is applied to sweep full range of the specification from 0V to 8V in a pulse duration with a saw wave form.
   Then install a 240 Ω resistor in series to each bias terminal.



10. A 240 Ω resistor must be installed in series to the each tuning bias terminal to avoid over current of the reactance devices.
    The load characteristics of each tuning bias terminal is shown in the graph on the right side.



11. The response rate for tuning the frequency lower is faster than the response rate for tuning the frequency higher. It is recommended to tune the frequency lower when using frequency modulation within a pulse. Then the rising up slope of the tuning bias voltage will be used.
12. 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 the 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 5 minutes.
13. Measured with heater voltage of 6.3V and no anode input power.
14. Design test only. The maximum frequency change with anode temperature change is measured after warming.

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15. It is necessary to reconfirm the spectrum, spurious emission, RF waveform, and anode voltage/current waveform if any hardware modification is made. The modification of the hardware for the modulator and the RF transmission line is critical in defining the resultant spectrum produced by the magnetron. Modification to any part of this hardware may result in change to the required spectrum and the magnetron driving characteristics which may include the overshoot of the anode current.
16. The heater lead wires should be covered with an insulator tube to avoid high voltage arcing. The high voltage limit for these lead wires is AC 1.5kV 1 minute.
17. The magnets should be kept 1′ away from any ferrous objects to avoid them from being degaussed. A non-magnetic screwdriver must be used to tighten the screw on the wave guide flange.
18. This magnetron is designed and intended to be used within each country′s radio frequency regulation. Any use outside these regulations is not authorized or approved by the manufacturer.

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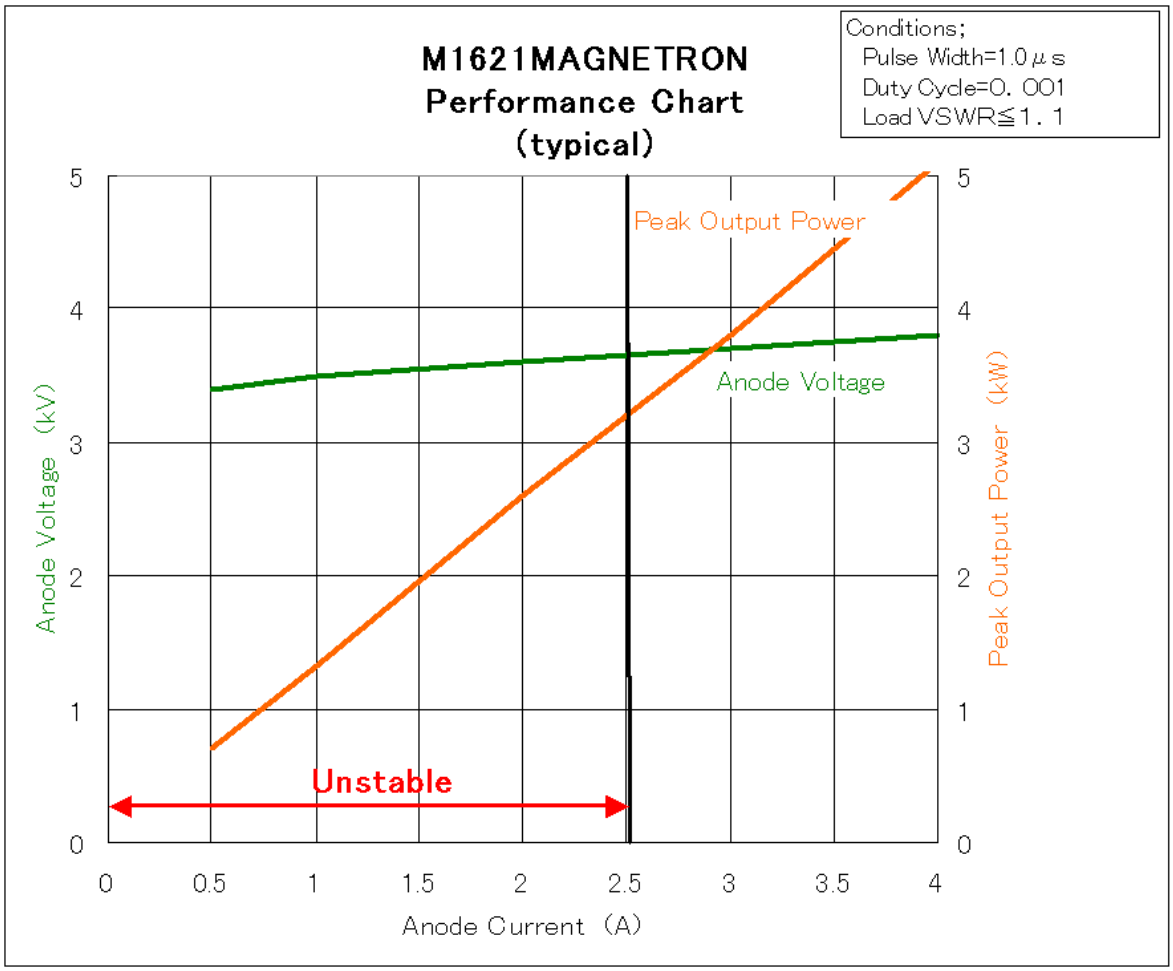
Performance Chart:



A magnetron unstable oscillates at the low anode current condition less than 2.5A specified the absolute maximum ratings. Unstable oscillation degrades the magnetron's performance.

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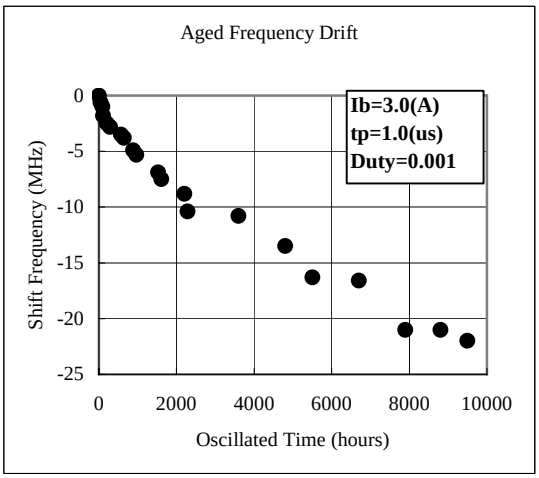
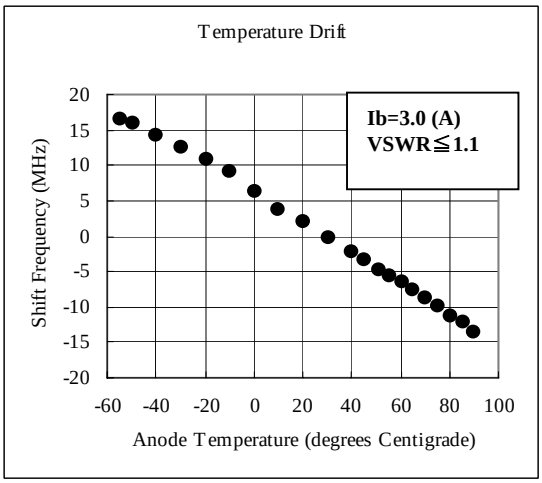
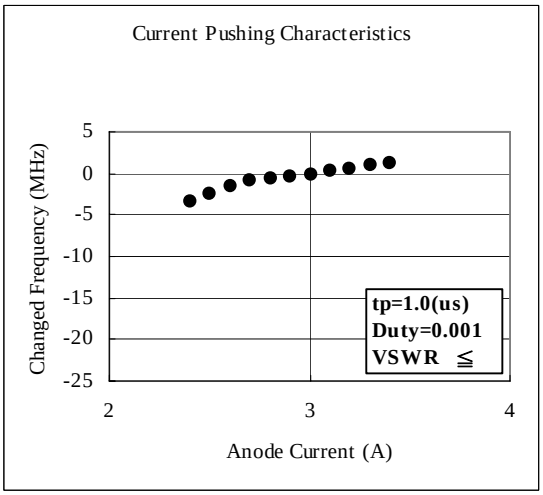
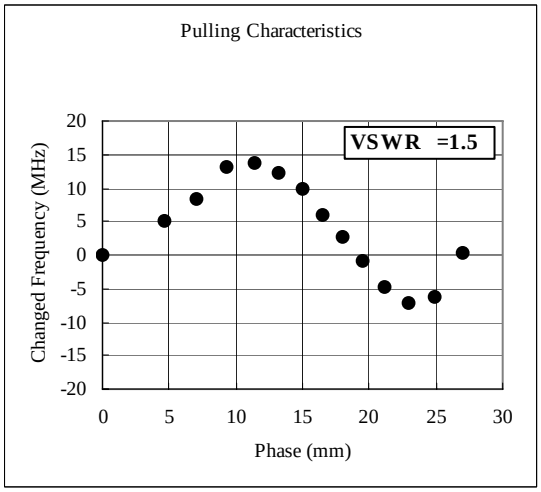
Typical data:

Original frequency stability

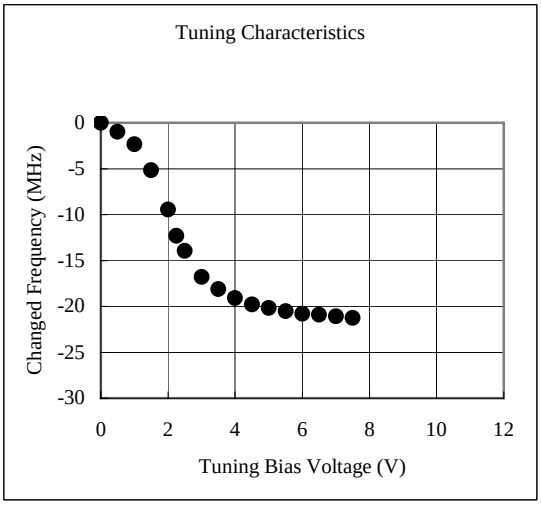


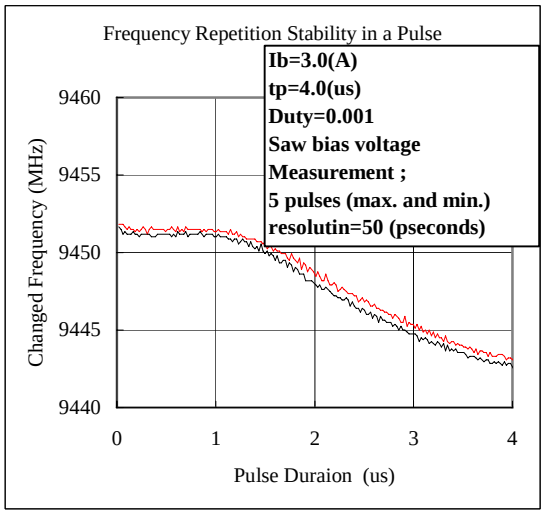






Tuning Frequency Characteristics





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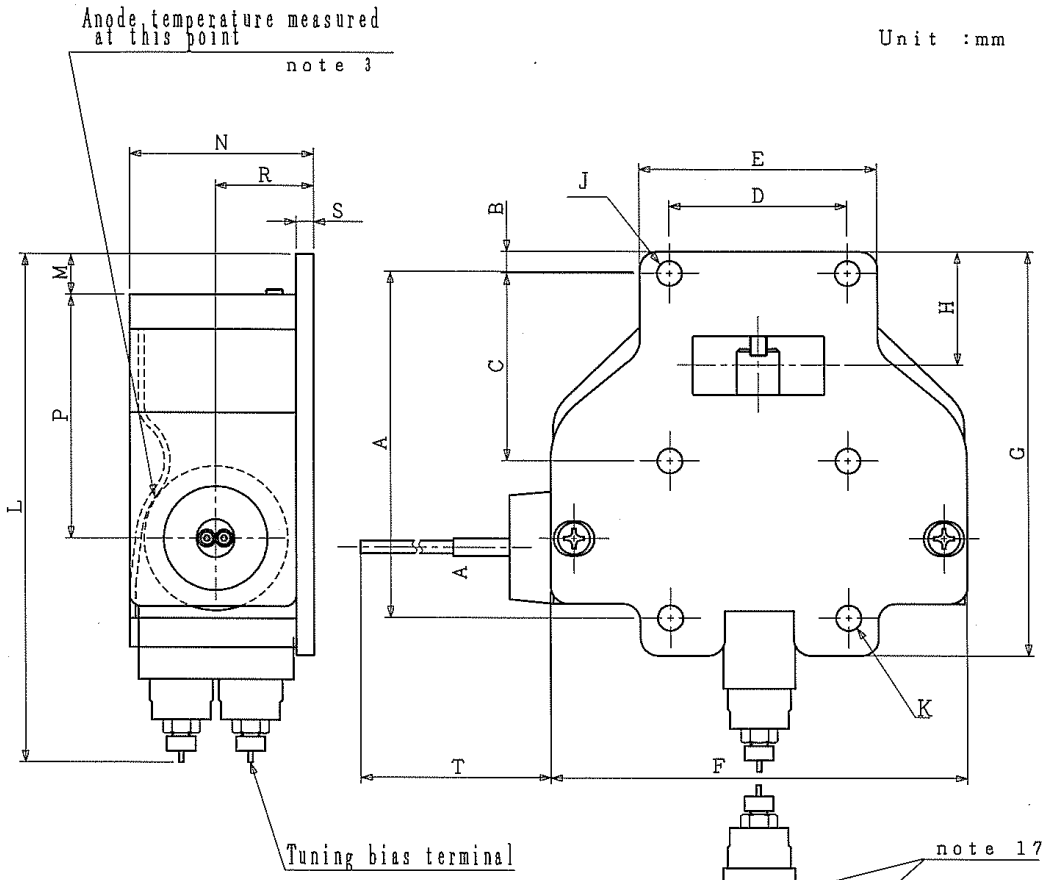
Outline



A	60±0.2	K	$2-\phi 4.4 \pm 0.1$
B	3.75	L	90MAX
C	32.5±0.1	M	7
D	31±0.1	N	33MAX
E	41.3	P	43
F	72	R	17
G	70	S	3
H	20	T	185±10
J	$4-\phi 4.32 \pm 0.08$		

Lead Connections

Colour	Element
Green	Heater
Yellow	Heater, Cathode

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