Electronic Frequency Tuning Magnetron

NewJRC's design is to take V9 Technology long life magnetrons and add a connection for an electrical tuning circuit. The circuit will adjust the frequency of the magnetron to maintain frequency stability. The quick frequency tune response realizes the frequency modulation and frequency hopping.

This technology is useful for radar requiring high resolution of short and long range targets.
Applications to name of a few;

Meteorology
Coast guard to homeland security
VTS
Harbor control
Search and rescue

Electronic Frequency Tuning Magnetron Advantage

	Magnetron mono pulse radar	Solid state pulse compression radar	Electronic Frequency Tuning Magnetron FM pulse radar
Advantage	*Better rain clutter elimination *Lower cost *Applied current infrastructure of the transponder (RACONs, SARTs and AIS) *High reliability *Sustainable production supply	*Higher range resolution *Narrow spectrum bandwidth *No warm up time	*Better rain clutter elimination *Lower cost *Applied current infrastructure of the transponder *High reliability *Higher range resolution *Narrow spectrum bandwidth *Sustainable production supply
Disadvantage	*Short range detection (Min. 10m) *Used high voltage *8000 hours life time	*Can not trigger the transponder at the whole *Big affect from the rain clutter *Interference between each other and to current radar	*Used high voltage *8000 hours life time

The electronic frequency tuning magnetron includes both advantages of the conventional magnetron and solid state radar devices.

Its advantage is that it produces a very informative signal similar to solid state but at high output power thereby eliminating the disadvantages of solid state while keeping the advantages.

Detecting performance calculation

Pulse Compression

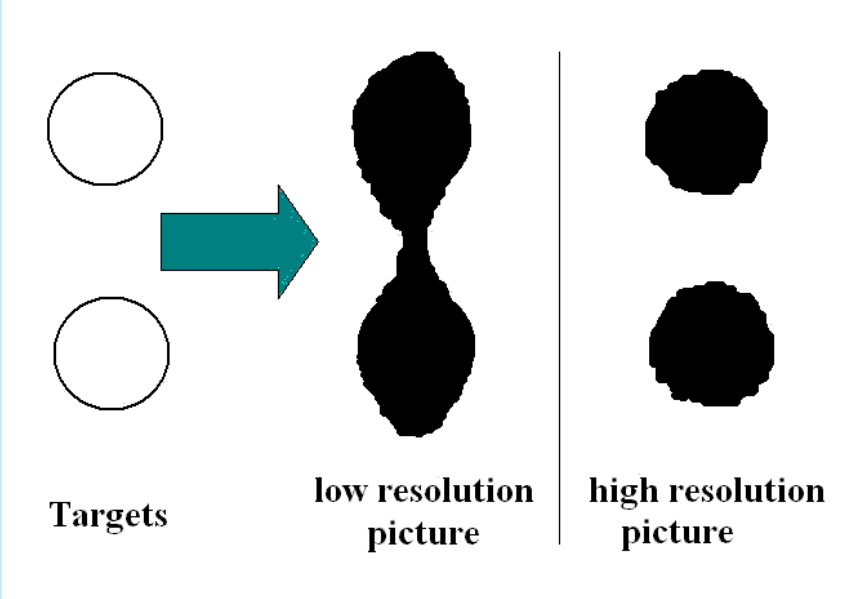
Peak Output Power [W]	tp [sec]	δf [Hz]	Pulse Compression Ratio	Calculated Power [W]		
4000	4.00E-06	2.00E+07	80	320000	320kW	4kW EFT magnetron
12000	1.00E-06	2.00E+07	20	240000	240kW	12kW EFT magnetron

Range resorution;

For example : δ f= 20MHz

1/δf=	50	(ns)
Range Resolution=	7.5	(m)

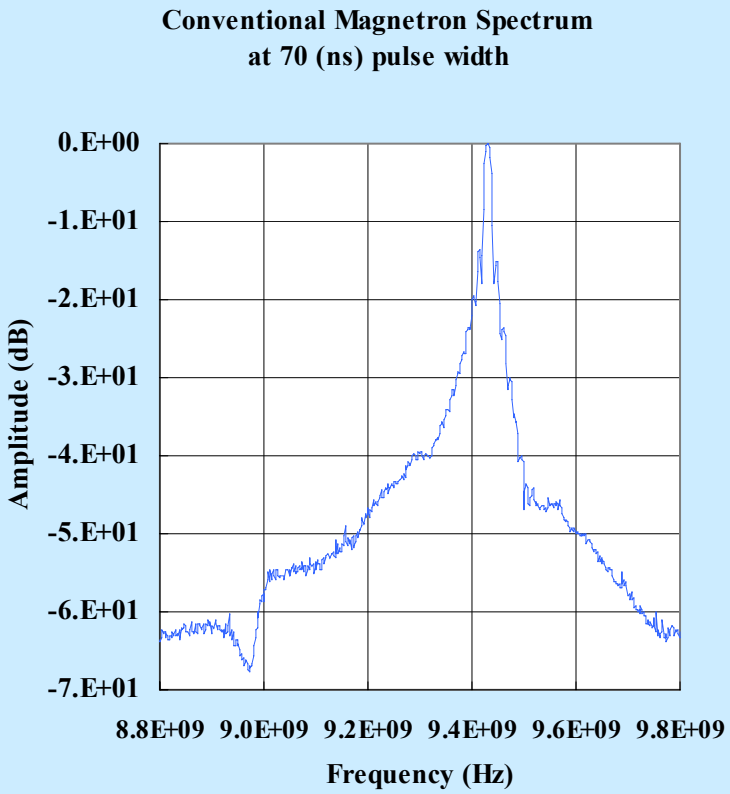
The higher range resolution and pulse compression can show the very long distance target clearer on the scope.

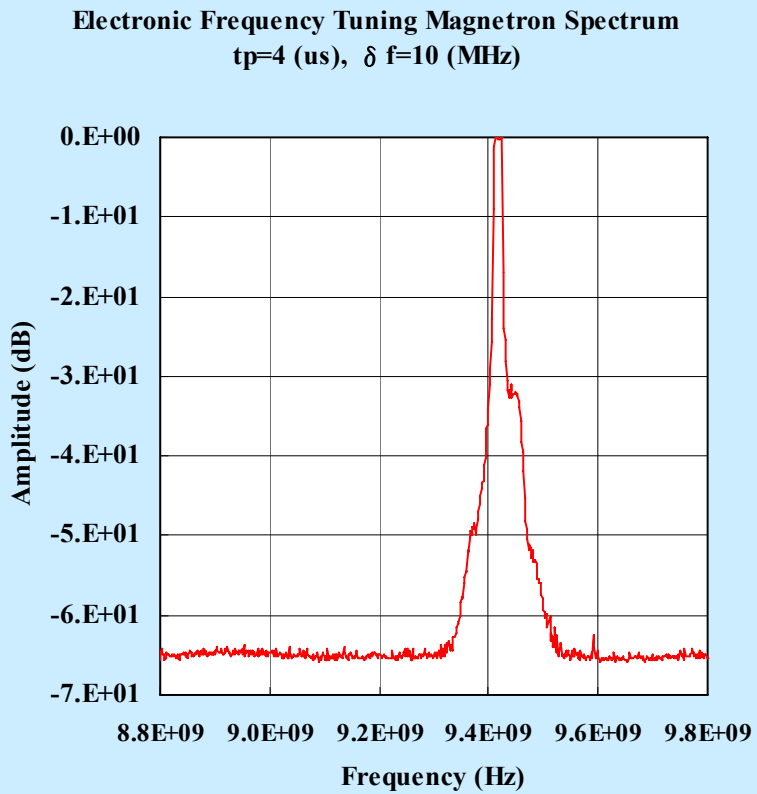


Unwanted emission and spectrum bandwidth

Spurious emission include the pi –1 mode and the harmonics is easily reduce to less than –60dBc.

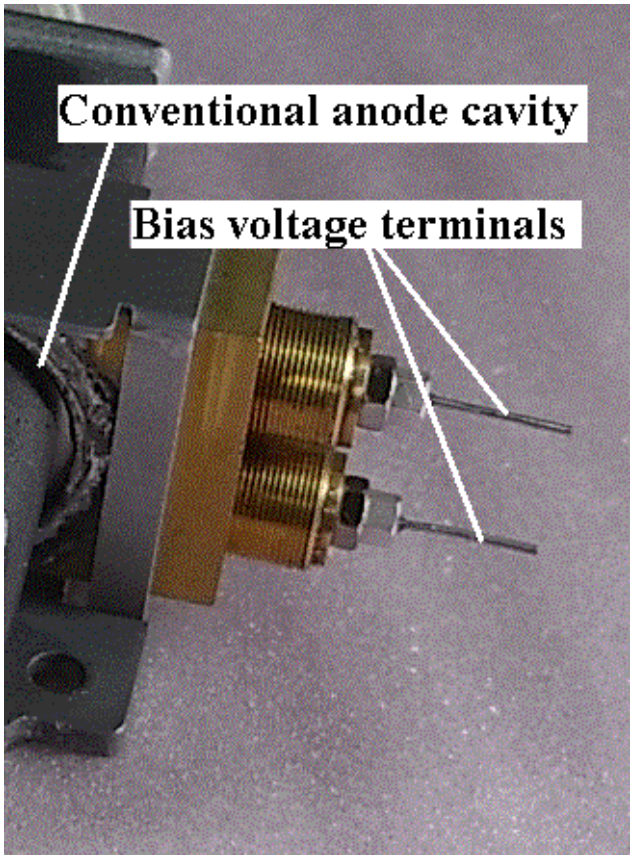
The long pulse reduces the narrow spectrum bandwidth.

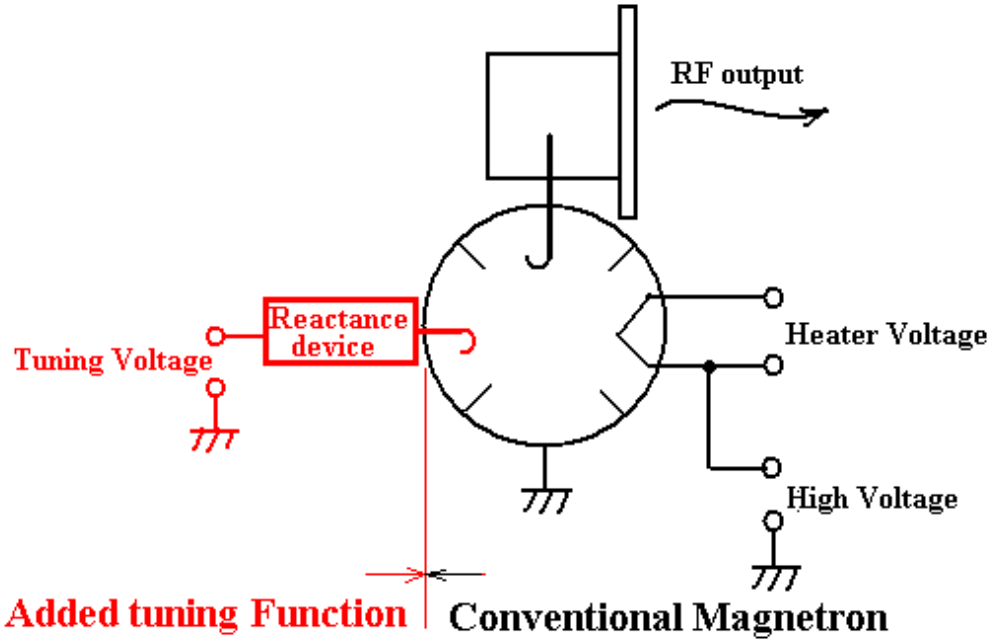




Electronic Frequency Tuning Magnetron Form

The form is almost the same as a conventional ESAC type however we have added an external reactance control unit.





Electronic Frequency Tuning Magnetron Spectrum

Peak output power: 10kW, 4kW
Oscillation frequency : 9410MHz band
Sweep frequency :21MHz
Bias voltage : 0 to 10V (saw bias voltage)