

General Description

The NW ETF products are electronically tunable filters that offer wideband operation and fast electronic adjustment of center frequency and bandwidth.

The ETF presented in this data sheet provides 10MHz to 100MHz electronically controlled 10dB pass band and 50dB stop band attenuation at 60MHz from the center frequency. The center frequency of the filter is electronically tunable from 8GHz to 10GHz. Both bandwidth and frequency of the filter can be electronically controlled in frequency steps of less than 1MHz.



Fig. 1: X-Band Electronically Tunable Filter

The ETF technology can be modified to provide electronically tunable passband characteristics over a frequency range within 1GHz to 40GHz, the current configuration being from 8GHz to 10GHz. The system can be modified to provide high pass, low pass or band reject filter transfer functions. Filter bandwidths and transition bands can also be customized depending on requirement.

The ETF technology is suitable for frequency agile filtering of low power microwave signals, multiple ETF in parallel can be used to enable frequency agile channelization.

The ETF assembly detailed in this data sheet is an initial engineering model to demonstrate capability at TRL 4. Based on the knowledge of the technology significant size reduction can be realized depending on the requirement. The ETF can be reduced to a compact multi-chip to enable a surface mount part.

Features

- Electronically adjustable filter center frequency.
- Electronically adjustable bandwidth.
- Fast center frequency adjustment speeds.
- Subject to NANOWAVE international patents:
US 9,264,017 B2, Canada 2, 852, 3831,
CA2023/050153, U.K. 2982037, France
2982037, Germany 60 2013 035 568

Applications

- Radar
- Communications
- EW/SIGINT
- Signal channelization

Electrical Parameters

Parameter	Unit	Min	Typ	Max	Remarks
Center frequency control range	GHz	8.0		10.0	1GHz -40GHz frequencies on request.
Center frequency control resolution	MHz	<1		2000	1 MHz to Full band
Filter 3dB Bandwidth	MHz	10		100	Electronically adjustable bandwidth.
Bandwidth adjustment resolution	MHz	<1		100	
Pass-band ripple	dB			2.0	
Passband flatness	dB	-2		2	Over 90MHz passband
Transition band to 50dB rejection	MHz	50		60	Rejection at 60MHz from filter center frequency.
Passband characteristic set time	μs	50	100	150	Sub 50us available on request.
Noise Figure	dB			25	
Input P1dB	dBm	-2		6	P1dB can be optimized based on requirement
Input power	dBm	-15	-10	-5	
Output power	dBm	-15	-10	-5	
Harmonic level	dBc			-30	
Spurious passband center to +/-1GHz	dBc			-50	
Additive phase noise	Offset	Phase Noise /dBc/Hz			
	10Hz		-84		
	100Hz		-102		
	1kHz		-122		
	10kHz		-134		
	100kHz		-124		
	1MHz		-136		
	10MHz		-142		
Input return Loss	dB	10			Return loss subject to operational bandwidth
Output return Loss	dB	10			Return loss subject to operational bandwidth
DC supply	V			15	
DC current	A			0.8	
Control Interface			DB25-F		Digital interface can be customized as required.

Note:

1) The operational parameters for the ETF captured in this data sheet are to show the capability of the technology with respect to one implementation. The operational parameters can be customized for a particular application.

Typical Performance

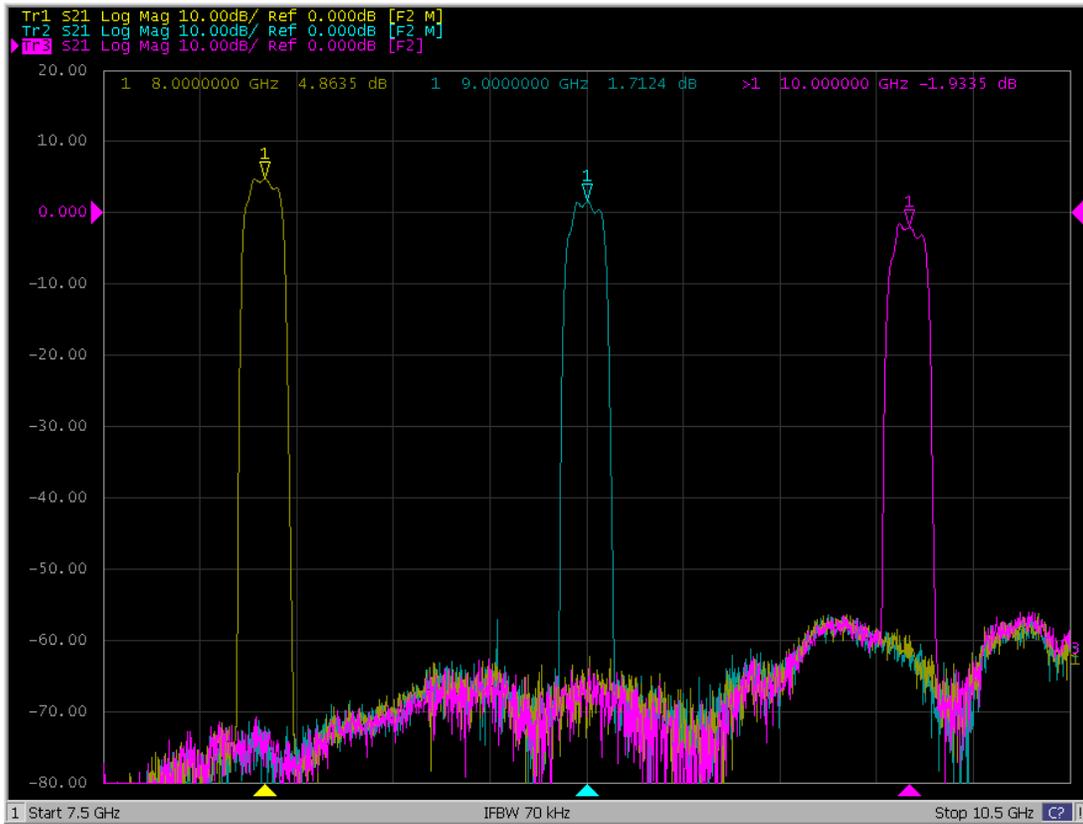


Fig. 2: ETF bandpass waveforms at 8GHz, 9GHz and 10GHz at 10dB bandwidth setting of 90MHz

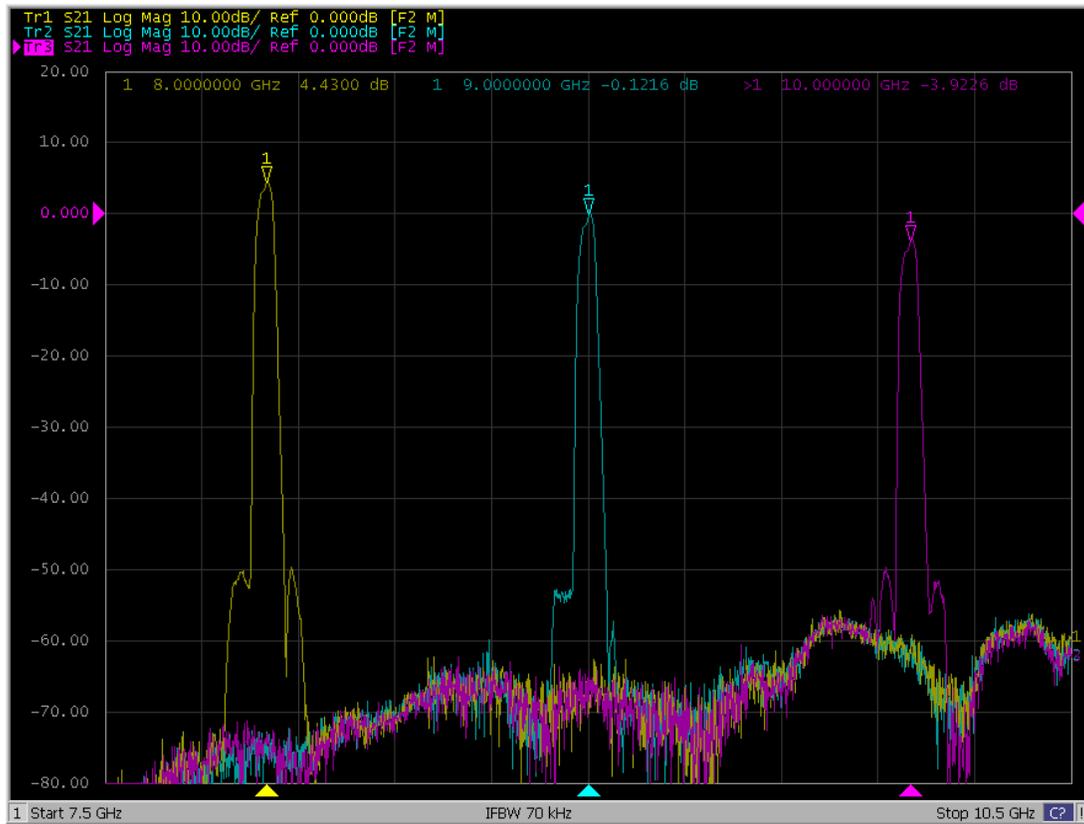


Fig. 3: ETF bandpass waveforms at 8GHz, 9GHz and 10GHz at a 10dB bandwidth setting of 10MHz

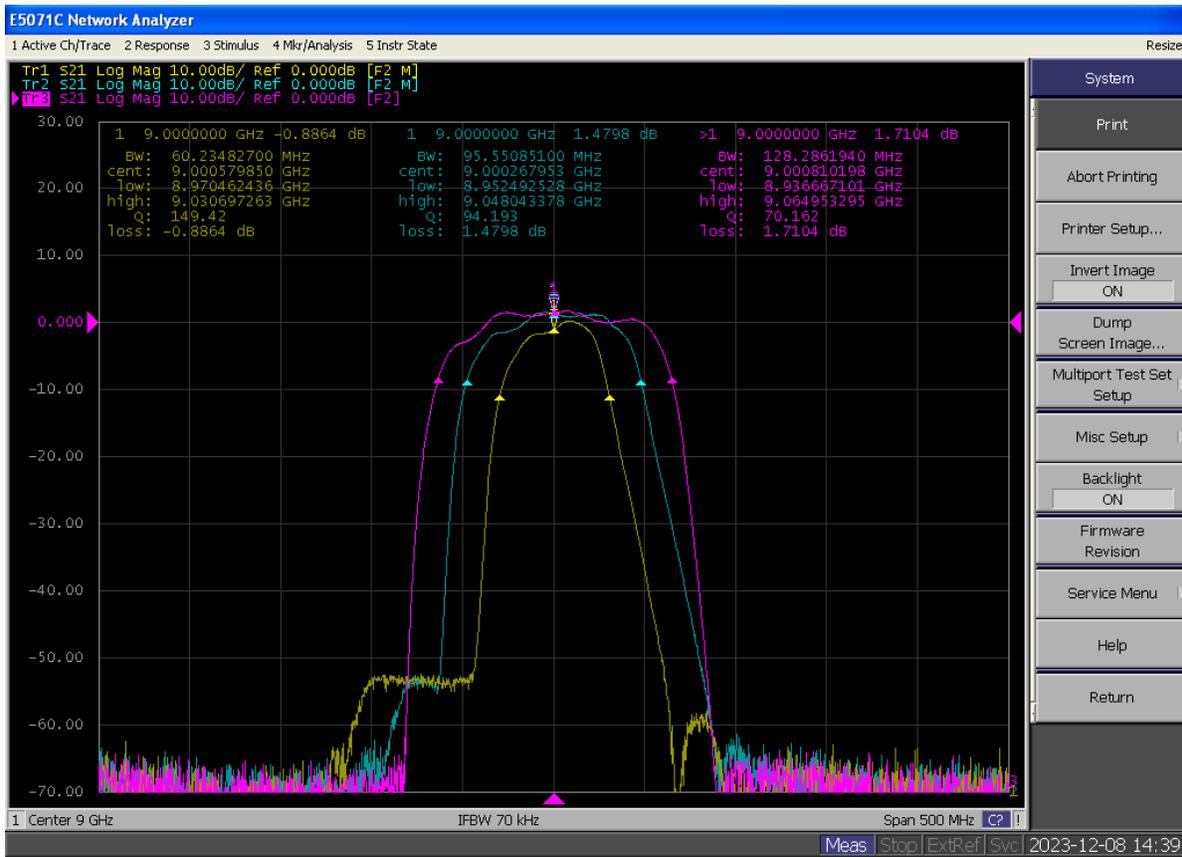


Fig. 4: ETF bandpass waveforms at 9GHz at a 10dB bandwidth setting of 10MHz, 50MHz and 90MHz

Mechanical and Environmental Parameters

Parameter	Unit	Min	Typ.	Max	Remarks
Operating Temperature Range	°C	10		+50	Extended temperature on request.
Non-operating Temperature Range	°C	0		+50	Extended temperature on request.
Size (length, width, height)	Inches		10.7 x 8.6 x 1.9		Reduce form factor on request.
Mass	kg			2.4	Subject to change based on filter.
Digital/DC Power connector			DB25-F		
RF Output Connector			SMA-F		
RF Input Connector			SMA-F		
Marking		Manufacturer name, model, serial number, date code			

Notes: Specifications subject to change without notice.

COMMUNICATION AND CONTROL INTERFACE

The ETF can be controlled via a Graphical User Interface (GUI) for the purpose of test. Communication to the unit is conducted using an SPI interface allowing center frequency and bandwidth to be set from the system. The unit's internal temperature and supply voltages can also be monitored as part of a built in self-test capability.

Outline Drawing:

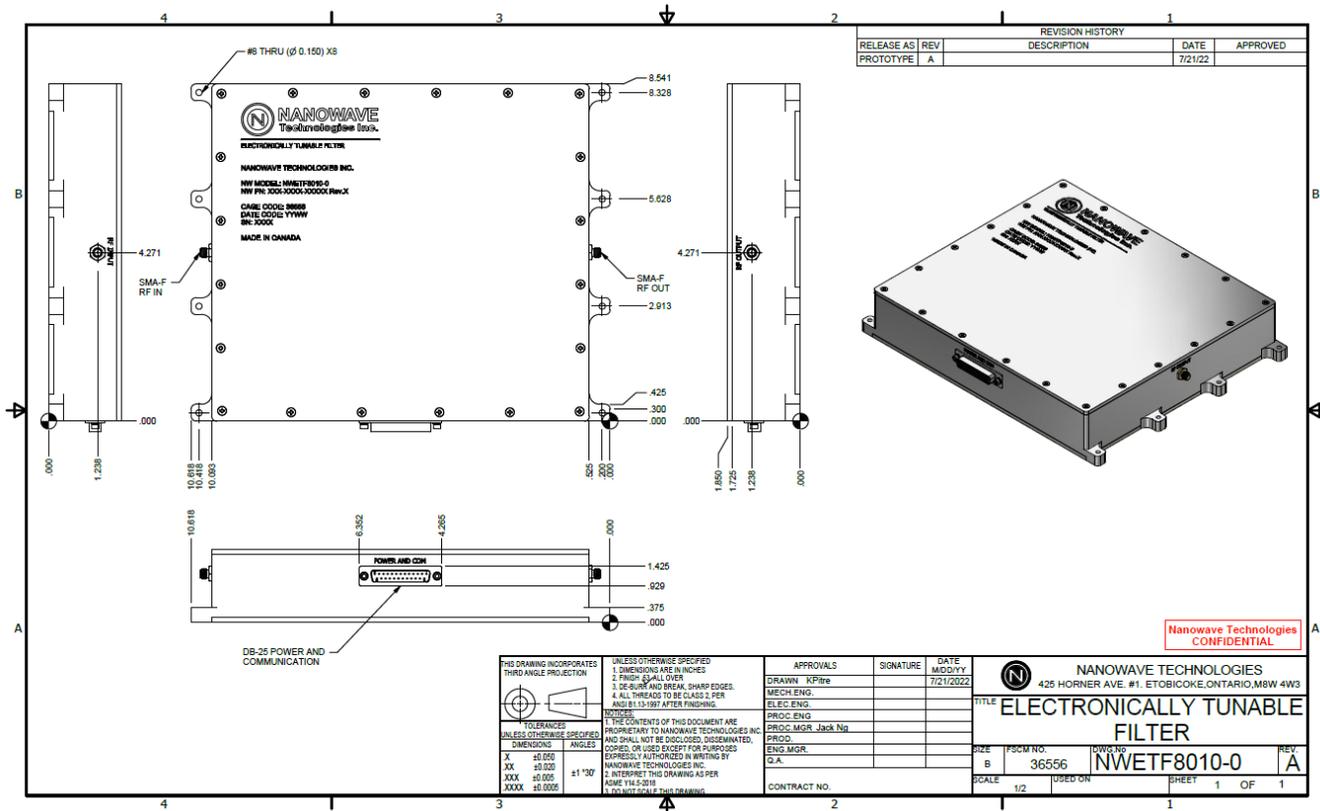


Fig. 5: Outline Drawing of 8GHz – 10GHz Electronically Tunable Filter

Additional features:

- Marking: the unit is marked with manufacturer part no., date code, and Serial Number.
- All plating and painting is RoHS compliant

For further information please contact NANOWAVE Technologies Inc. at sales@nanowavetech.com, or call at (+1) 416-252-5602.