GENERAL DESCRIPTION

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

The Electronically tunable filter (ETF) has the following basic characteristics which can be customized based on application:

The version of the ETF presented in this data sheet provides 184KHz 3dB pass band and 50dB transition bands of 70KHz at center frequencies from 5GHz to 10GHz. Frequency switching speed below 100microseconds is typical.

Figure 1: X-Band Electronically Tunable Filter

The ETF technology can be scaled in frequency from 1GHz to 40GHz and the architecture can also be modified on request to provide high pass, low pass and band reject filter transfer functions. Filter bandwidths and transition bands can also be customized based on requirement.

The ETF technology is ideal for applications which require low power frequency agile filtering at microwave frequencies.

FEATURES

- Custom band pass characteristics.
- Wide operating frequency
- Fast center frequency adjustment speeds.
- Electronically adjustable bandwidth.
- Electronically adjustable filter center frequency.
- MIL-PRF-38534 construction
- Subject to NANOWAVE international patent CA2852383A1, US9264017, EP2982037A4.

APPLICATIONS

- RADAR
- Communications
- EW/SIGINT

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ELECTRICAL PARAMETERS

Parameter	Unit	Min	Typ	Max	Remarks
Center Frequency (fc)	GHz	5.0		10.0	Electronically controlled bandwidth. Operation can be set to cover RADAR bands L,S,C,X,Ku,K,Ka.
Center frequency control	Hz	1			<1Hz bandwidth control to full band
Pass-band 3 dB Bandwidth	KHz	30		190.0	Electronically adjustable bandwidth customization available on request.
Bandwidth adjustment resolution	Hz	1			<1Hz bandwidth control to full band
Gain in pass-band @ fc	dB	2.5	4.0	6.5	Input power = -5 dBm used for test case.
Maximum Ripple within Pass-band (pk-pk)	dB			2.0	Depending on inter stage filter specification
Flatness across every 200 MHz	dB		± 1.0	± 2.5	
Input return Loss	dB	20	15	7.5	Return loss subject to operational bandwidth
Output return Loss	dB	20	15	7.5	Return loss subject to operational bandwidth
50 dB Transition band	kHz		70		
1 dB Input Compression Point	dBm	-6.7	0.0	20	Higher Maximum compression point available on request.
Maximum Input Power Level	dBm	-10	0	10.0	Higher input power level on request
Noise Figure	dB	5	15.5	17.5	@ 10 GHz, Min noise figure achieved with input LNA prior to input mixer.
Passband frequency set speed	µs	50	100	150	Sub 50us available on request.
DC supply	V			15	
DC current	A			1	
Spurious Level	dBc	-60		-50	
Control Interface			DB25-F		Digital interface can be customized on request.

Notes:
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.

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	
Size (length, width, height)	Inches	10.7 x 8.6 x 1.9			
Mass	kg		1.6		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.

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MEASURED PERFORMANCE

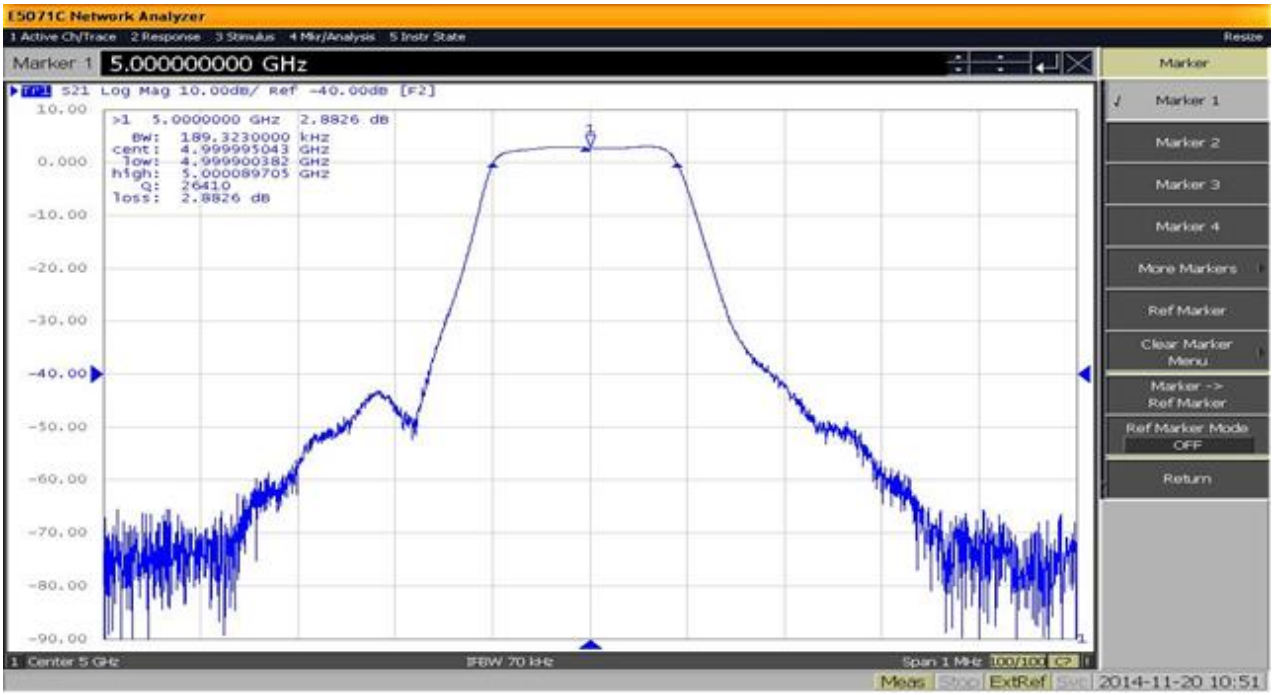

Fig 2: Pass-Band 3 dB Bandwidth at 5 GHz

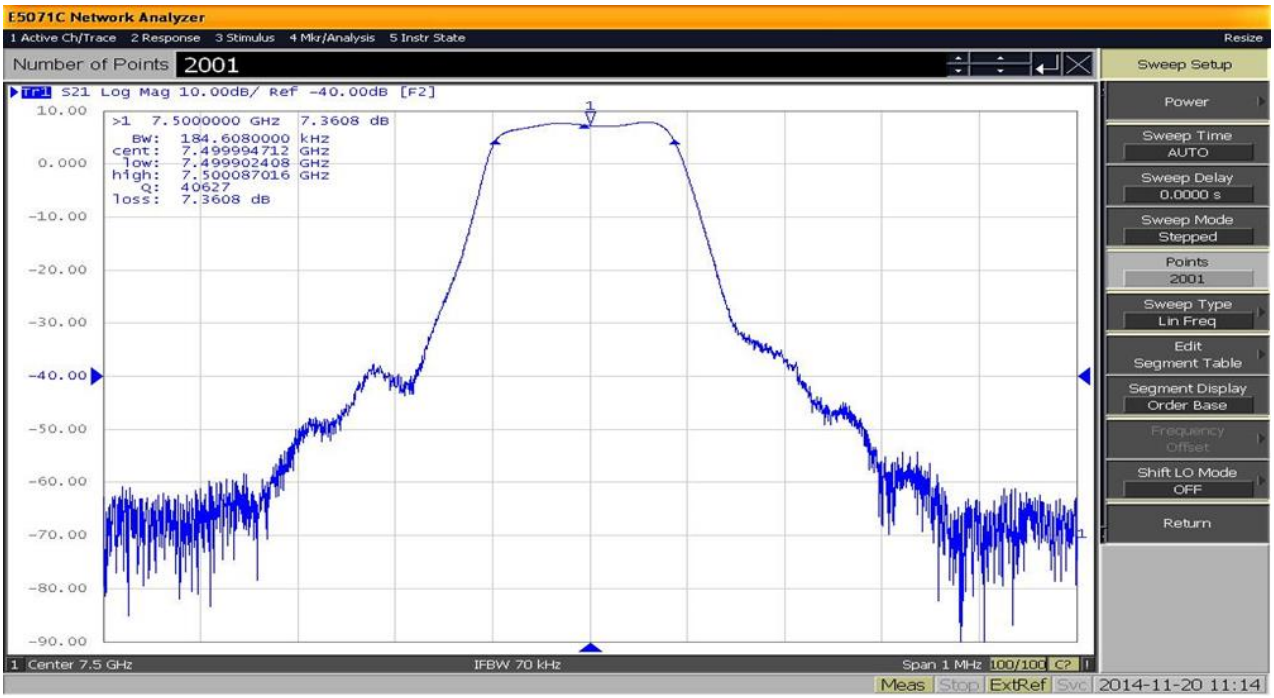

Fig 3: Pass-Band 3 dB Bandwidth at 7.5GHz

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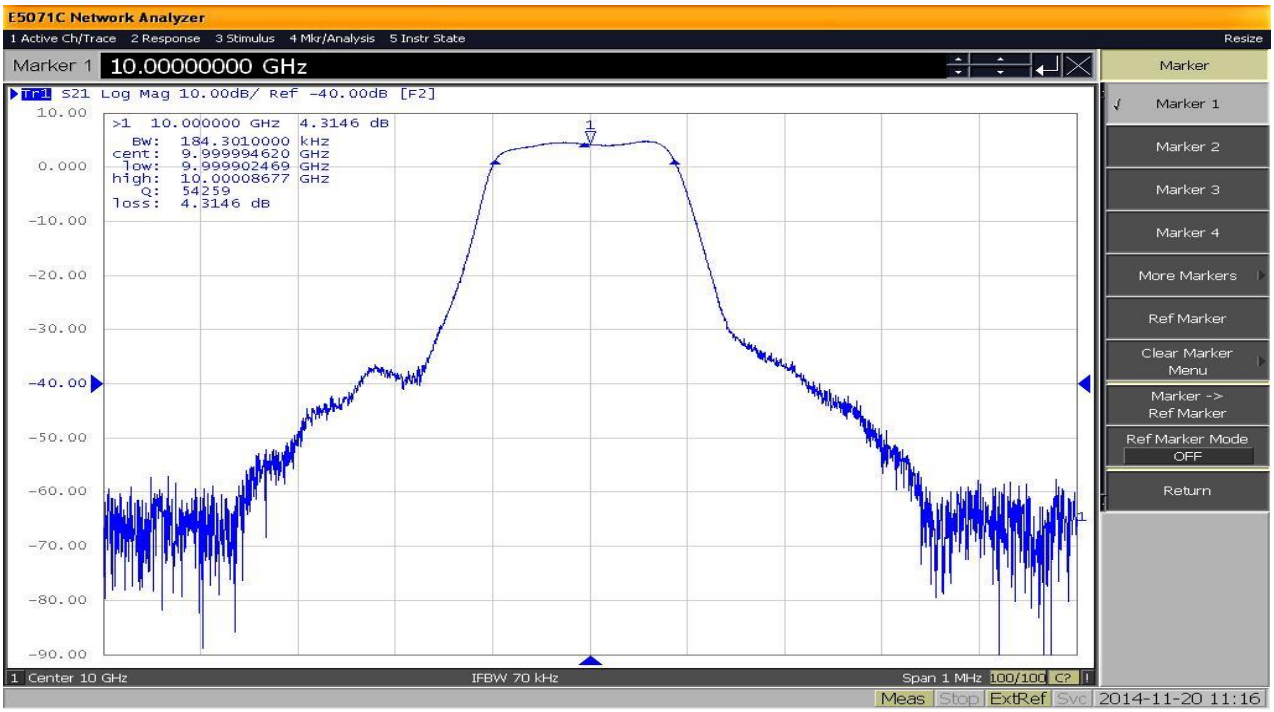

Fig 4: Pass-Band 3 dB Bandwidth at 10GHz

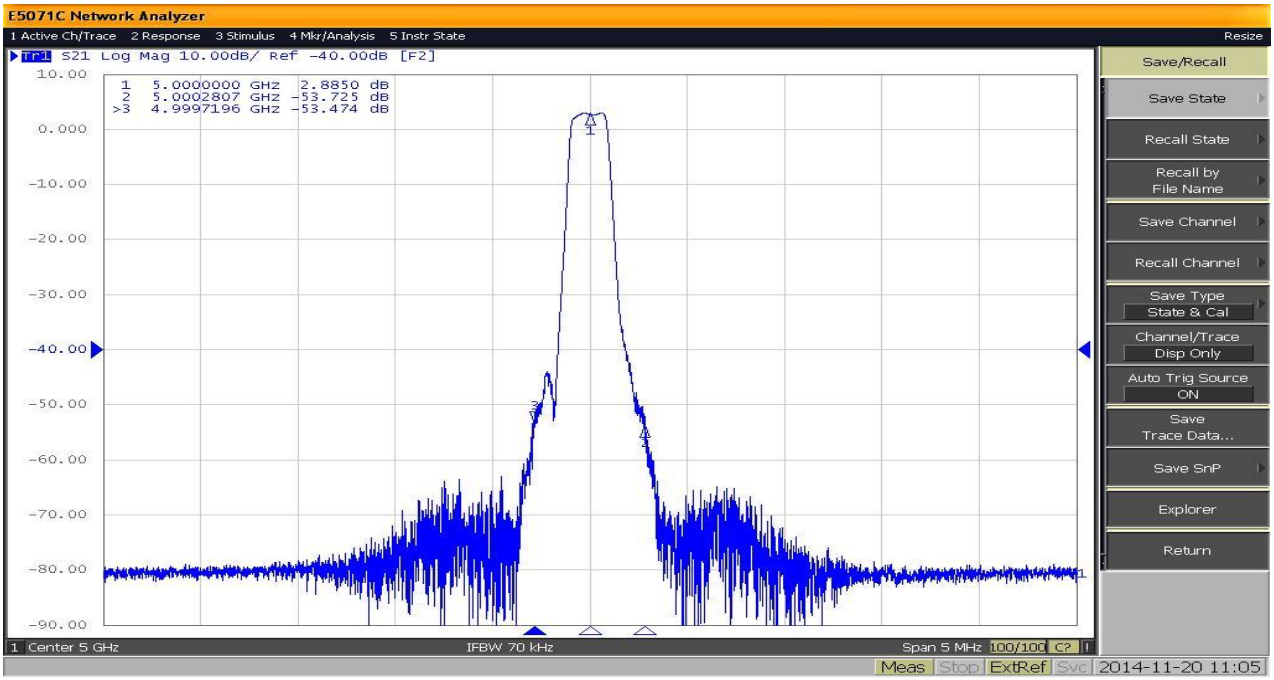

Fig 5: 50 dB Rejection at 5 GHz +/-280KHz

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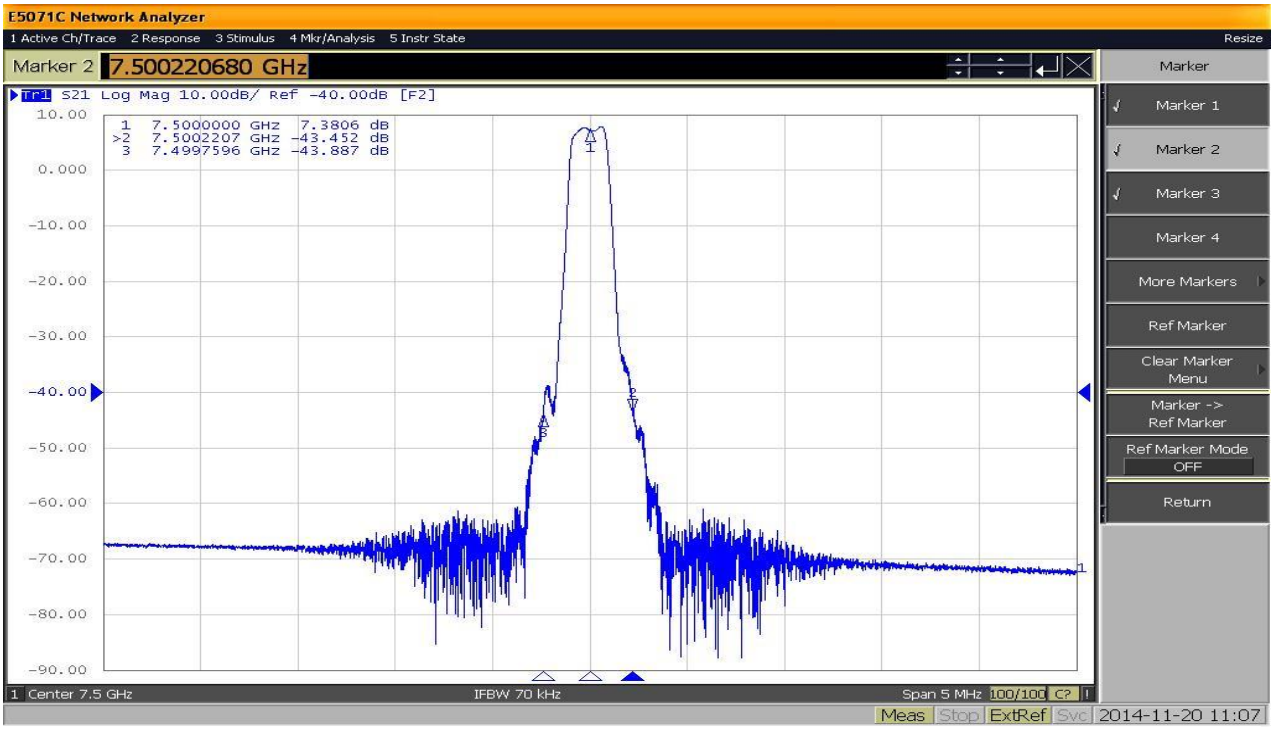

Fig 6: 50 dB Rejection at 7.5 GHz+/-220kHz

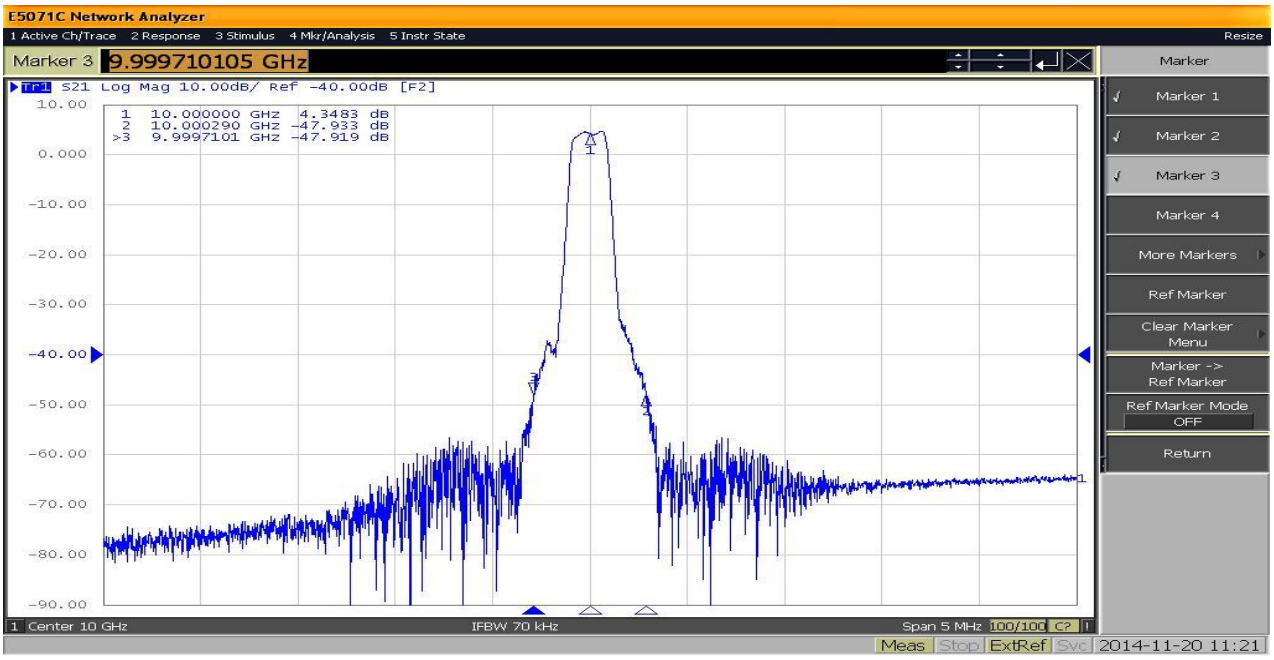

Fig. 7: 50 dB Rejection at 10 GHz+/-290kHz

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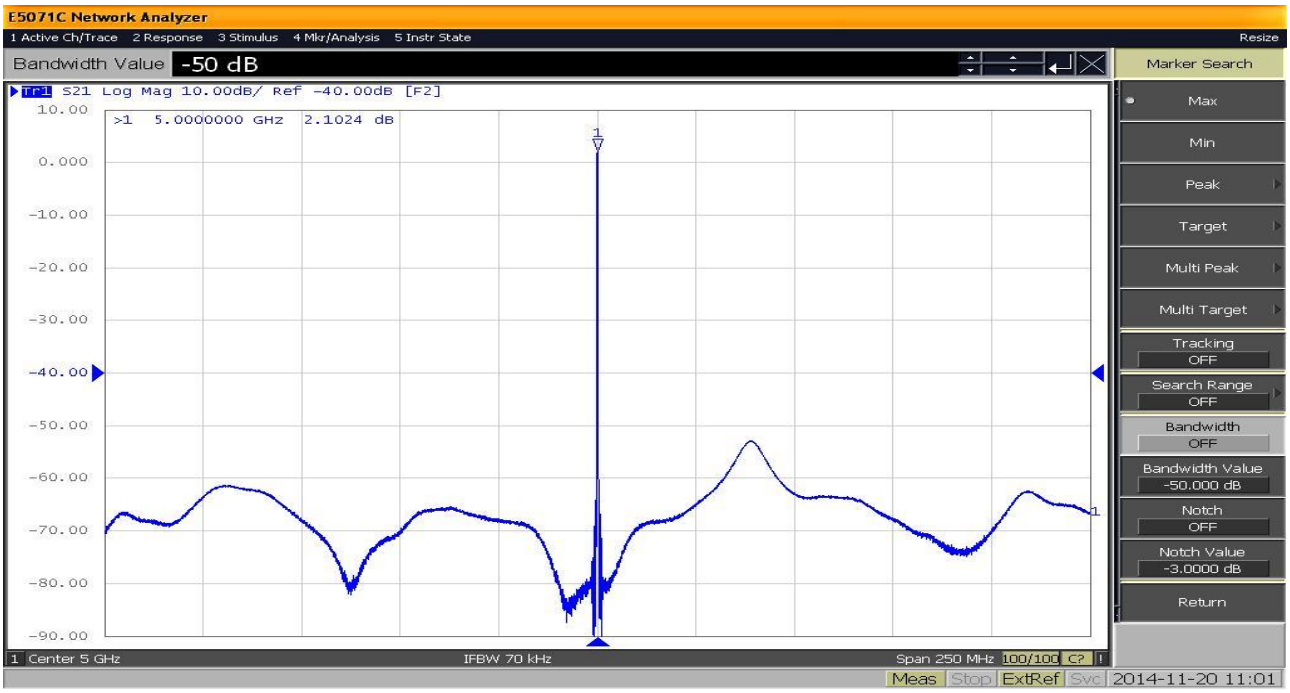

Fig. 8: 250MHz Span 50dB Rejection at 5GHz

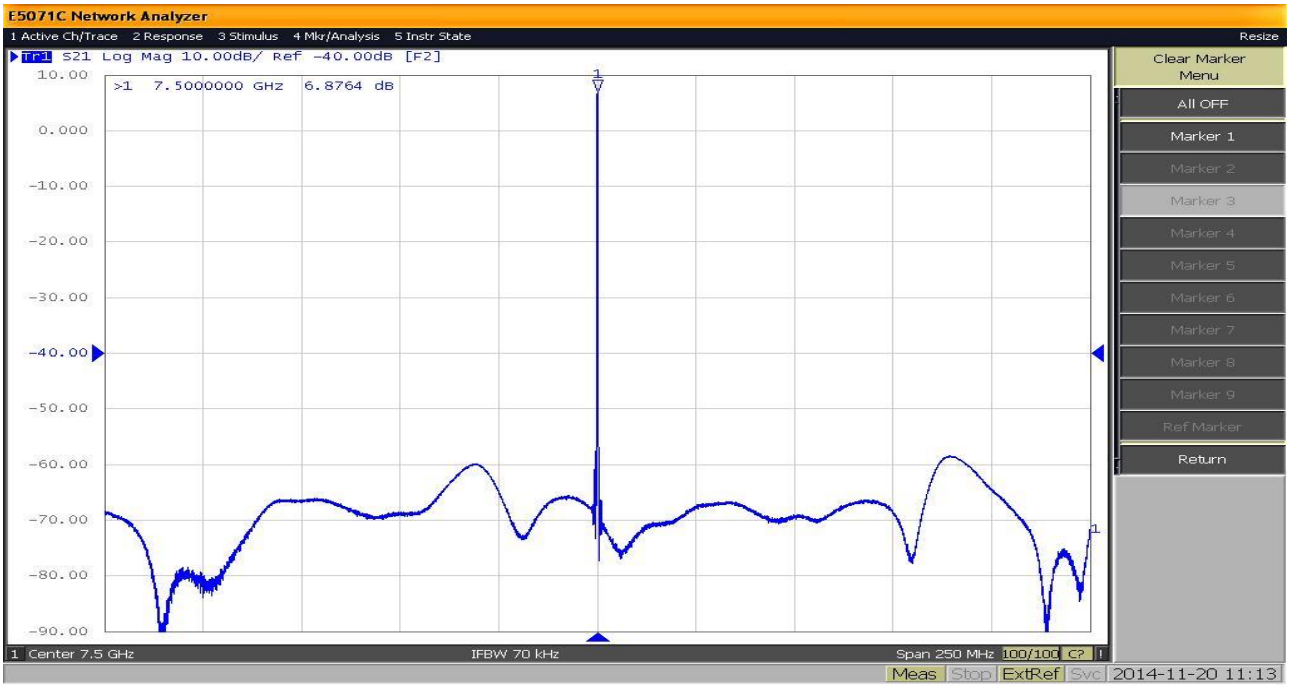

Fig. 9: 250MHz Span 50dB Rejection at 7.5GHz

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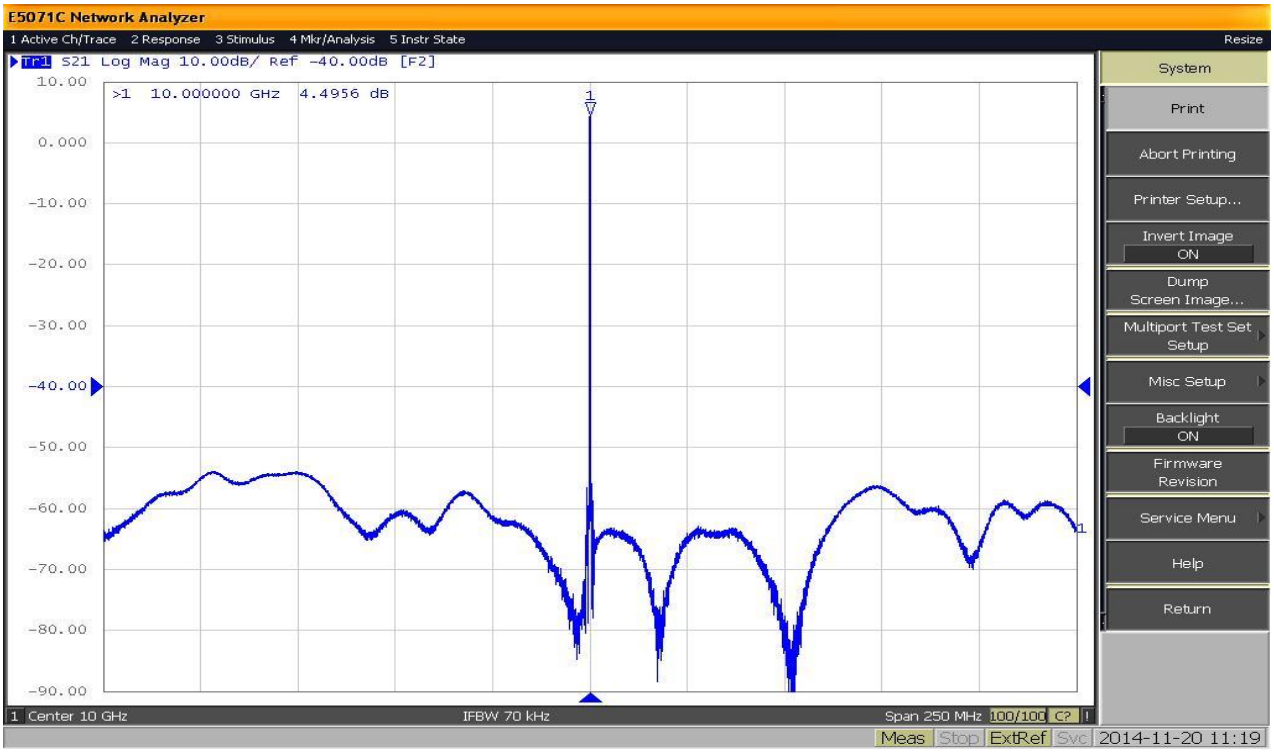

Fig. 10: 250MHz Span 50dB Rejection at 10GHz

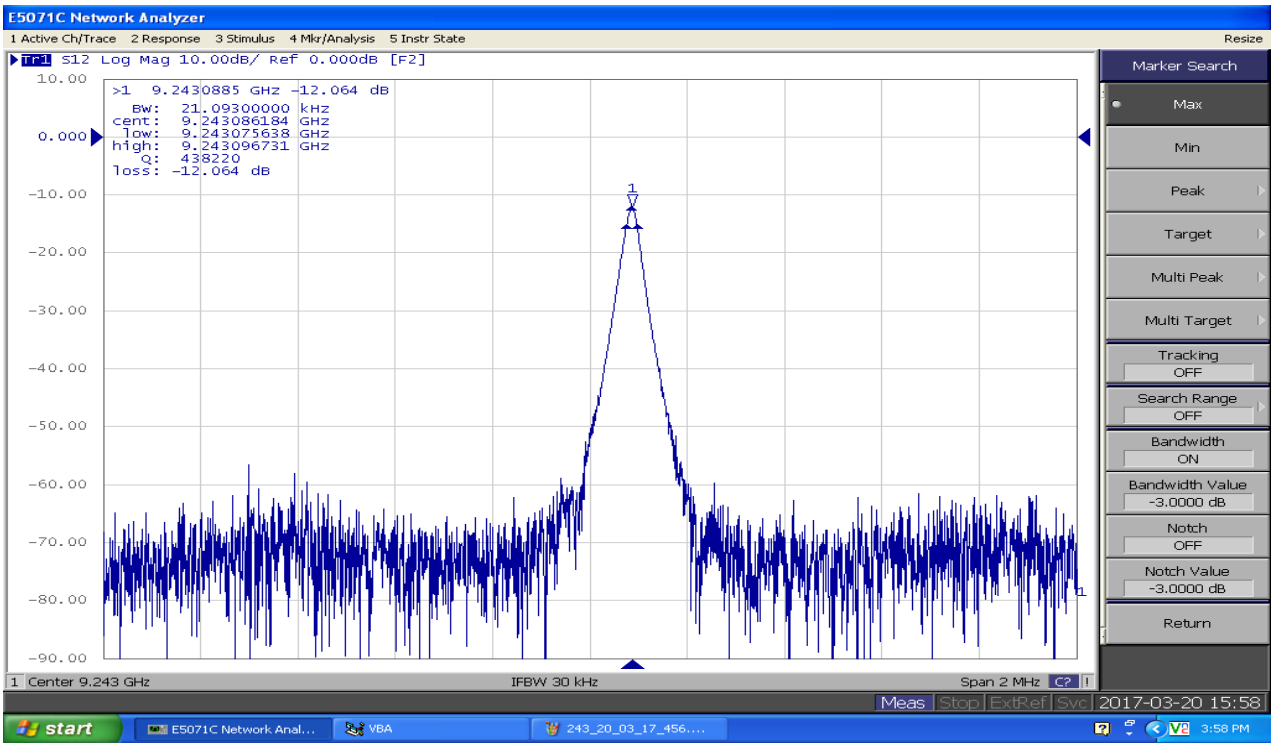

Fig. 11: Bandwidth 21kHz at 9.243GHz

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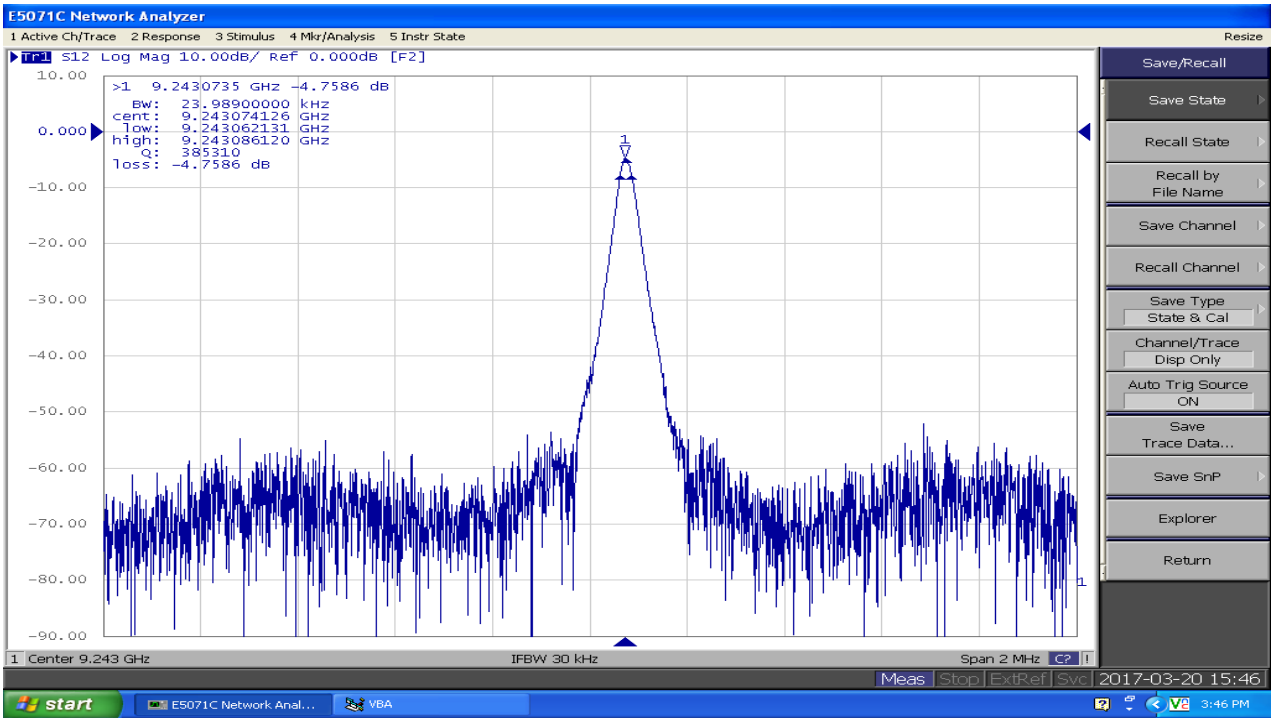

Fig. 12: Bandwidth 24kHz at 9.243GHz

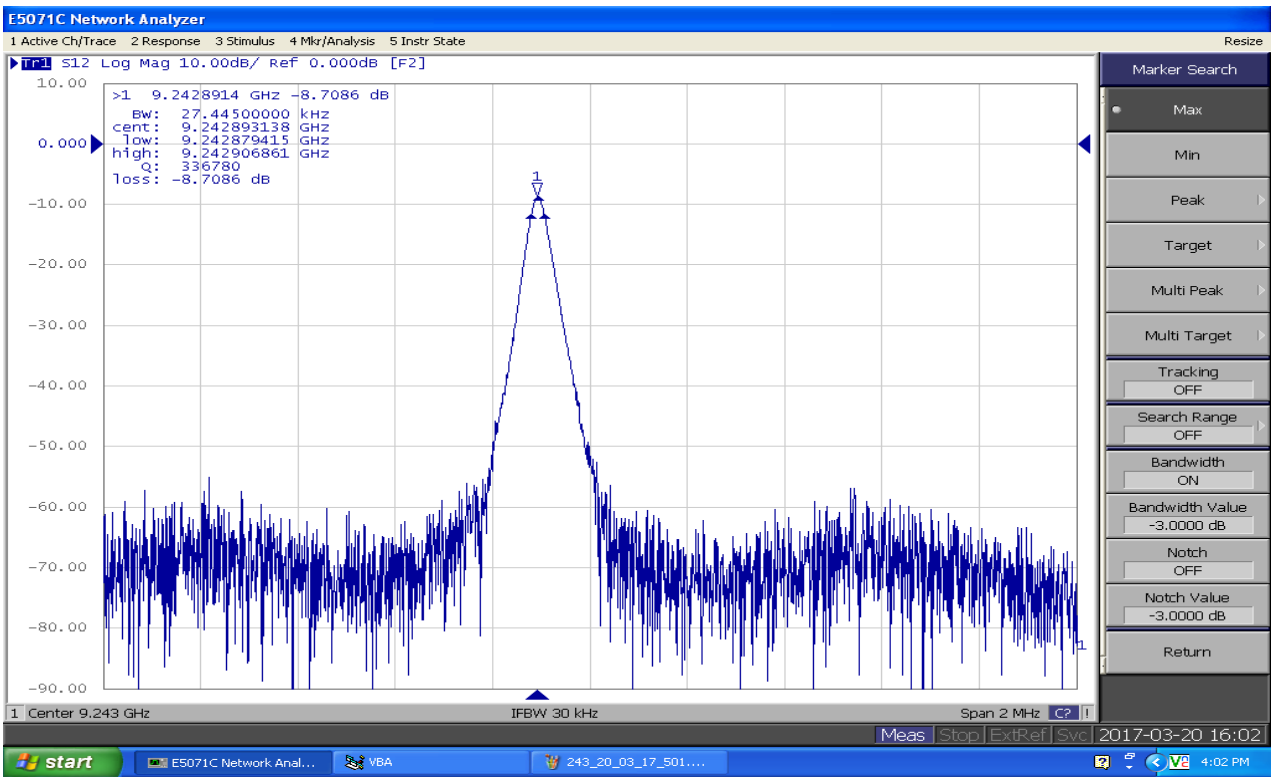

Fig. 13: Bandwidth 27kHz at 9.243GHz

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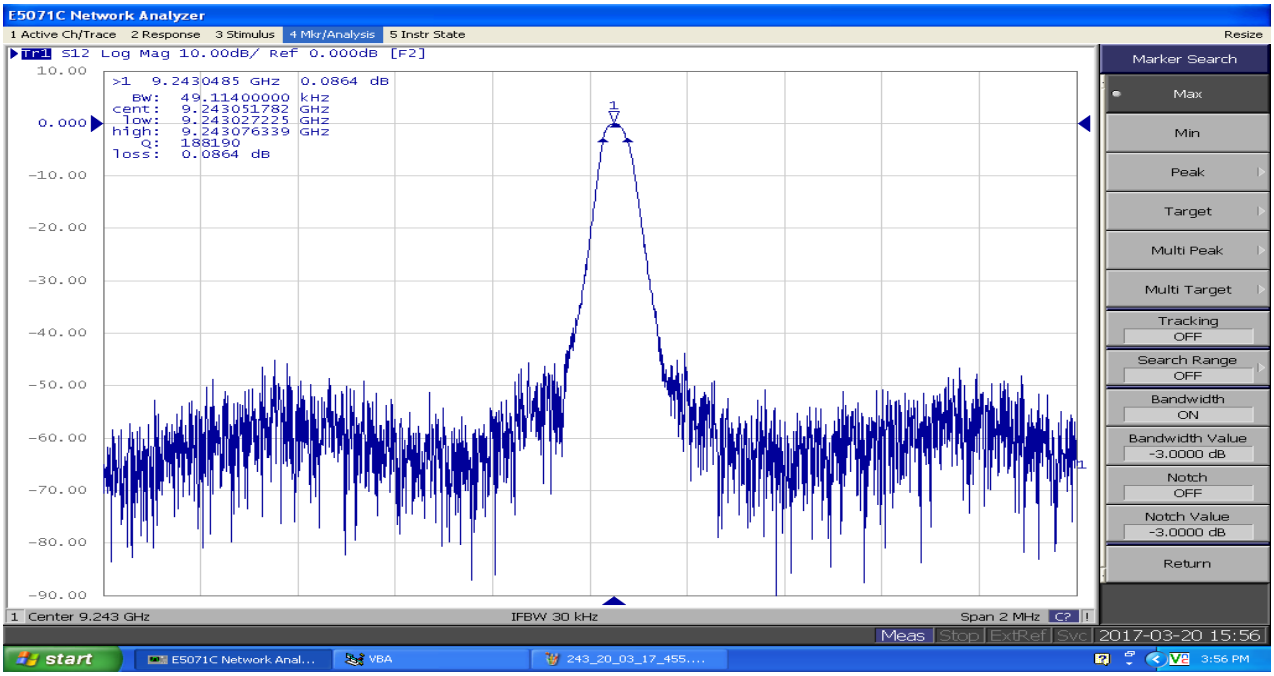

Fig. 14: Bandwidth 49kHz at 9.243GHz

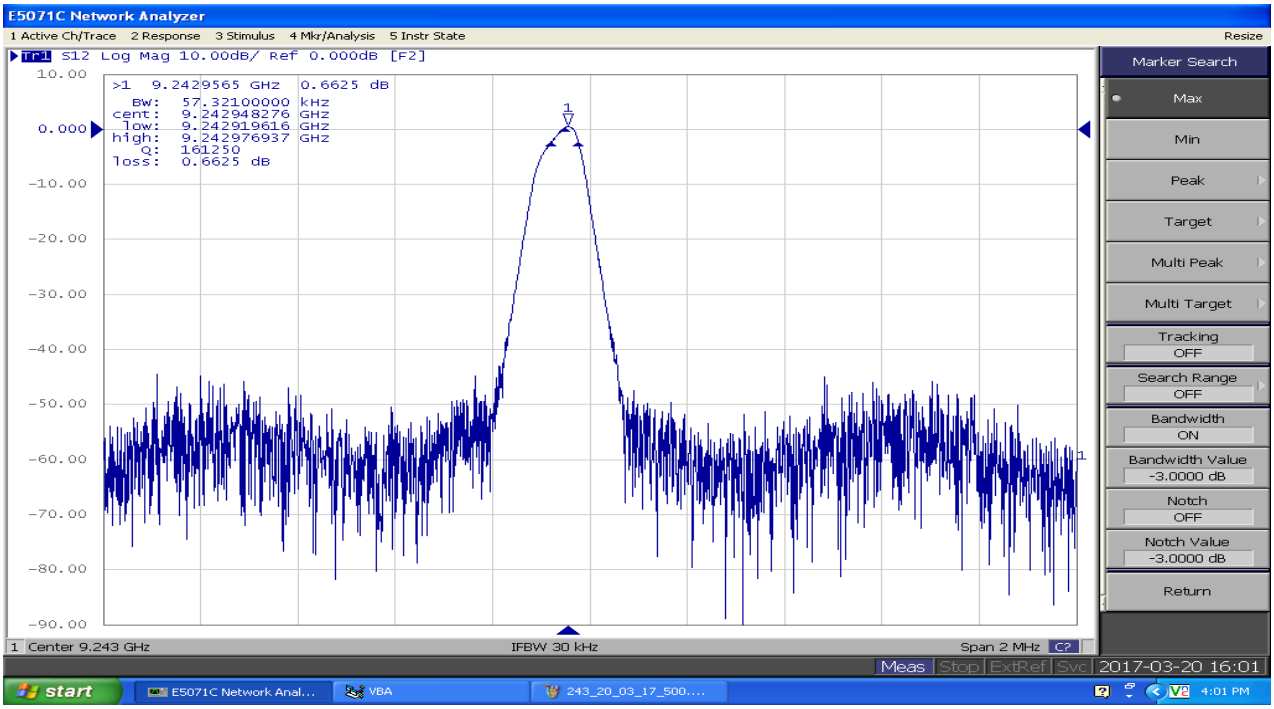

Fig. 15: Bandwidth 57kHz at 9.243GHz

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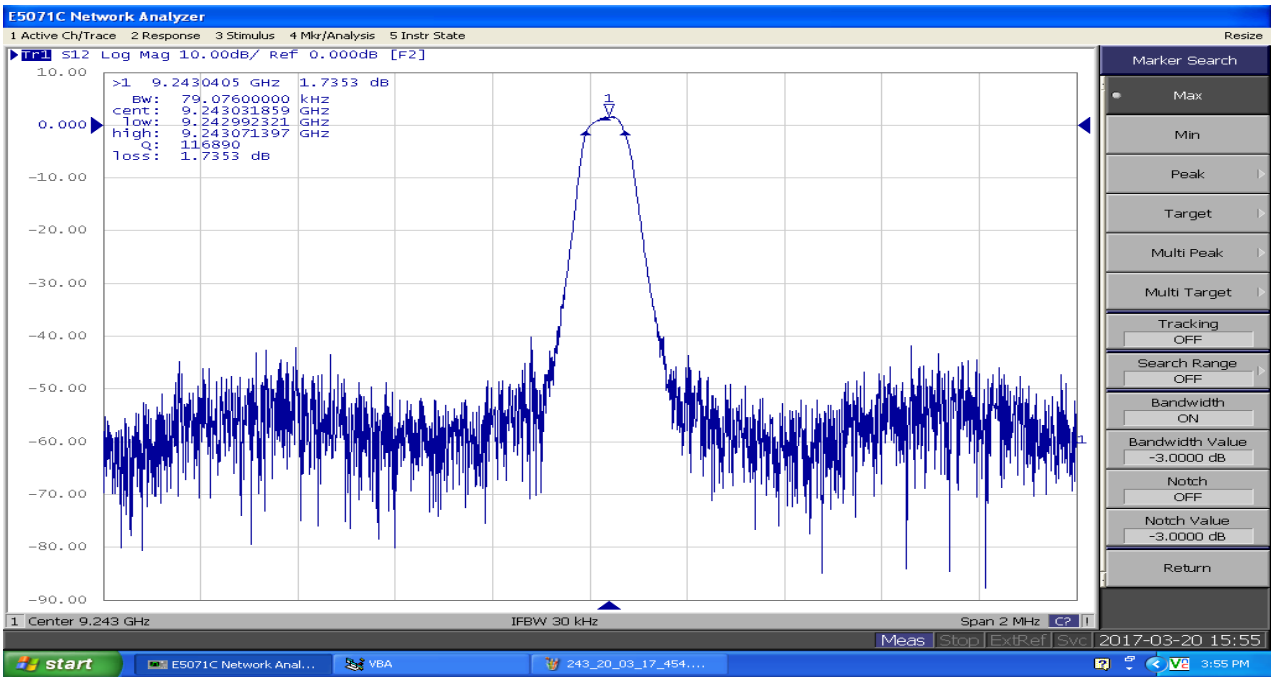

Fig. 16: Bandwidth 79kHz at 9.243GHz

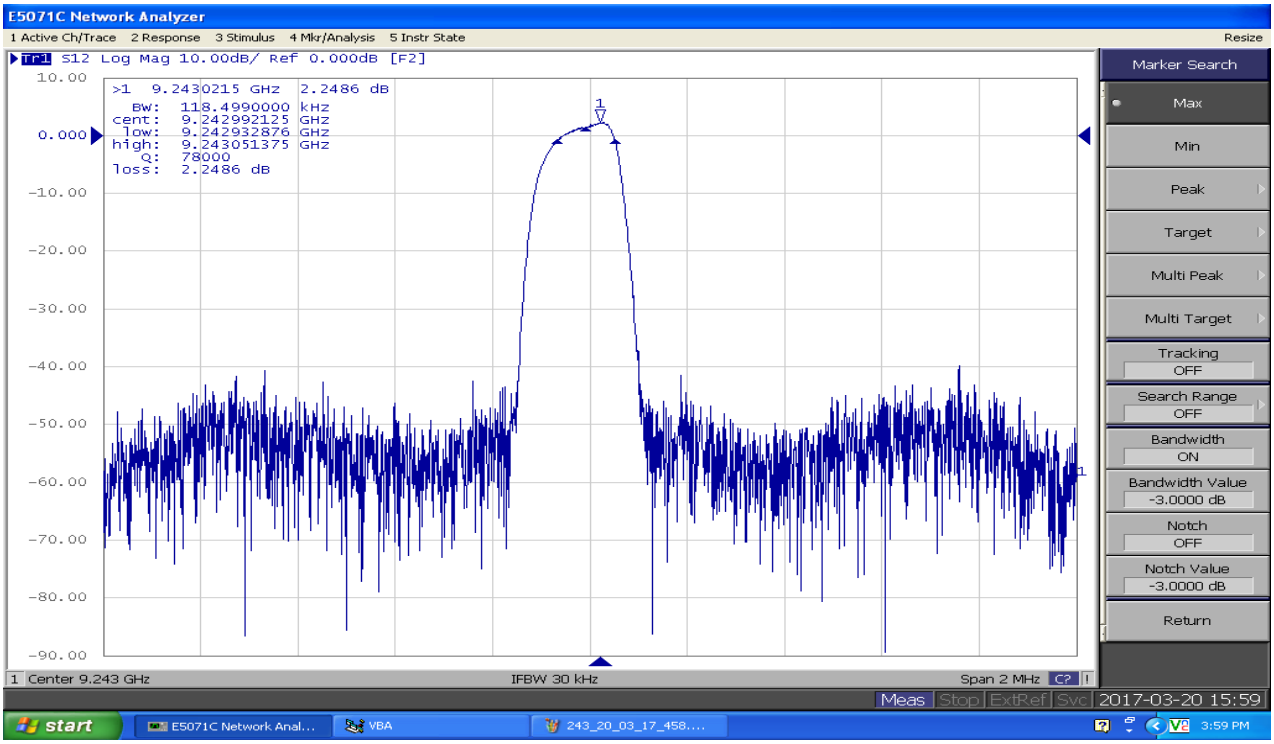

Fig. 17: Bandwidth 118kHz at 9.243GHz

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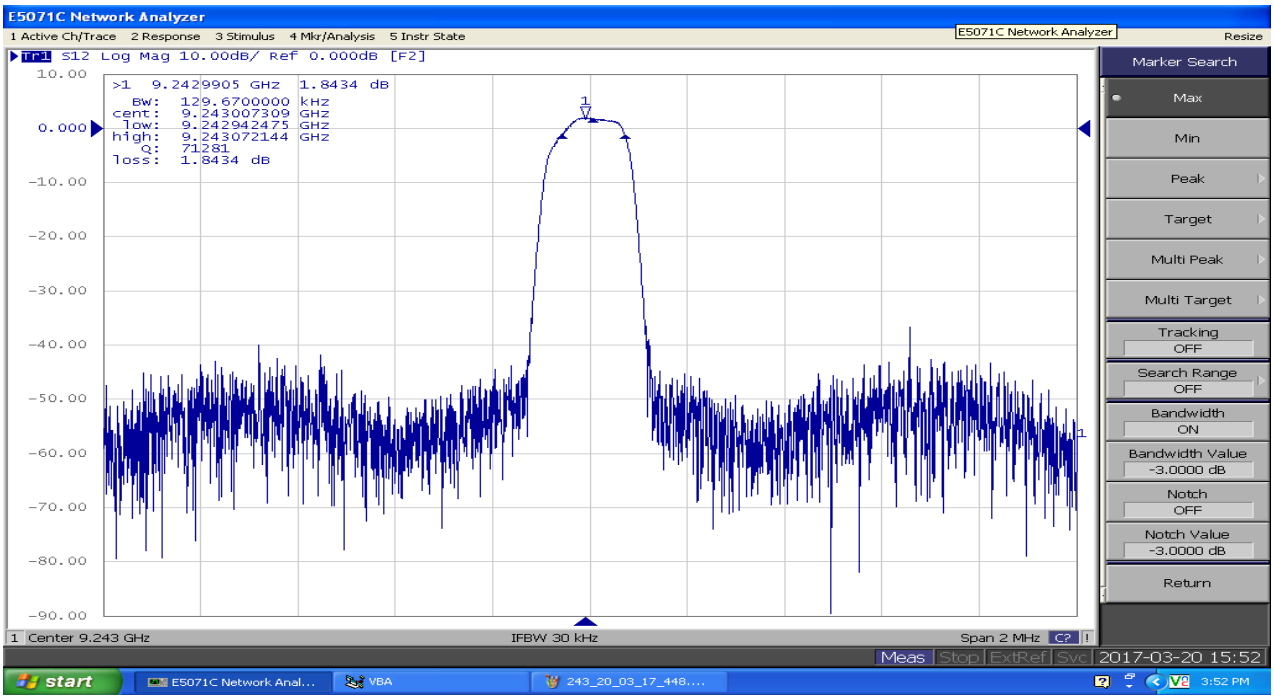

Fig. 18: Bandwidth 129kHz at 9.243GHz

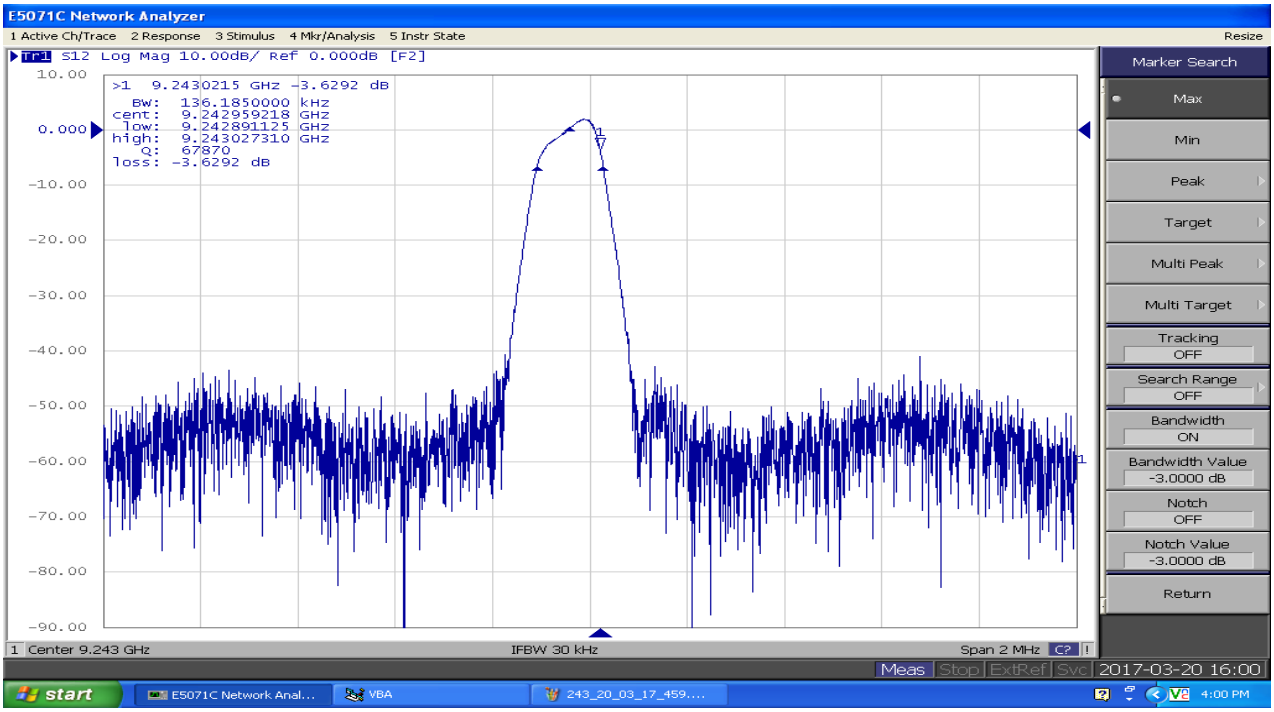

Fig. 19: Bandwidth 136kHz at 9.243GHz

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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

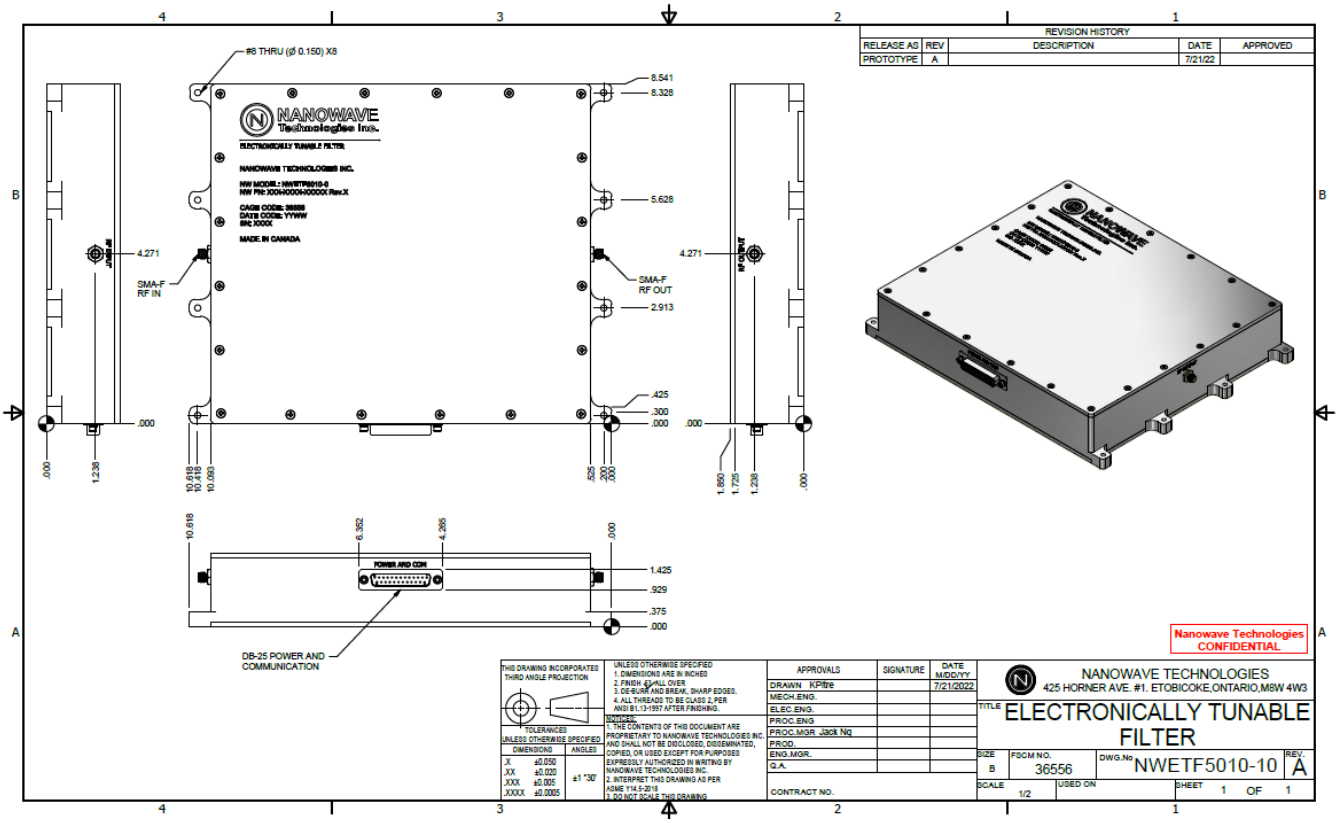

Fig 20: Outline Drawing of 5GHz – 10GHz Electronically Tunable Filter

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

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