

AUTO-TUNE FILTER (AtF)

A superior alternative to limiters and filters, Metamagnetics®' Auto-tune Filter provides a broadband, fast-response, simple solution that protects receivers from electromagnetic interference (EMI) and ensures that signals-of-interest are detected. These devices have a power threshold level which no one signal can exceed. If one or more signals exceeds the threshold, the AtF automatically limits it by attenuating the dangerous signal. Simultaneously, desired signals operating below the power threshold pass through the system unaltered. Applications include military EW, radar, and comms along with commercial applications such as wireless communications and satellite broadcasting.

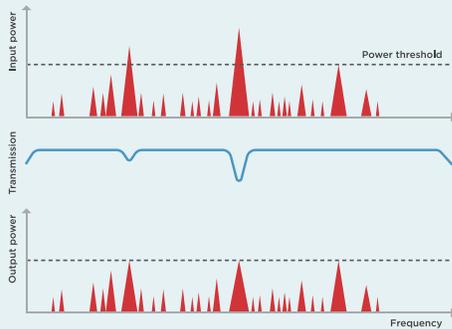


Fig. 1. The AtF provides automatic selective attenuation (aka signal limiting) of above-threshold power signals while all other signals propagate unaltered. This capability allows for the mitigation of EMS threats and interference with improved performance at a fraction of the cost.

Features

PROBLEM

Time Lag: Traditional tunable RF filters have a search-and-respond approach, making the process time consuming. Sophisticated software is required to reduce the power of the detected offending signal. This causes a lag from when the signal hits to when the system reacts, and in that window the system can be compromised.

Protection: Catch-all protection measures shut off the input to the receiver until the threat is gone, preventing harmful signals from damaging your system at the cost of hindering desired signals necessary to communication efforts.

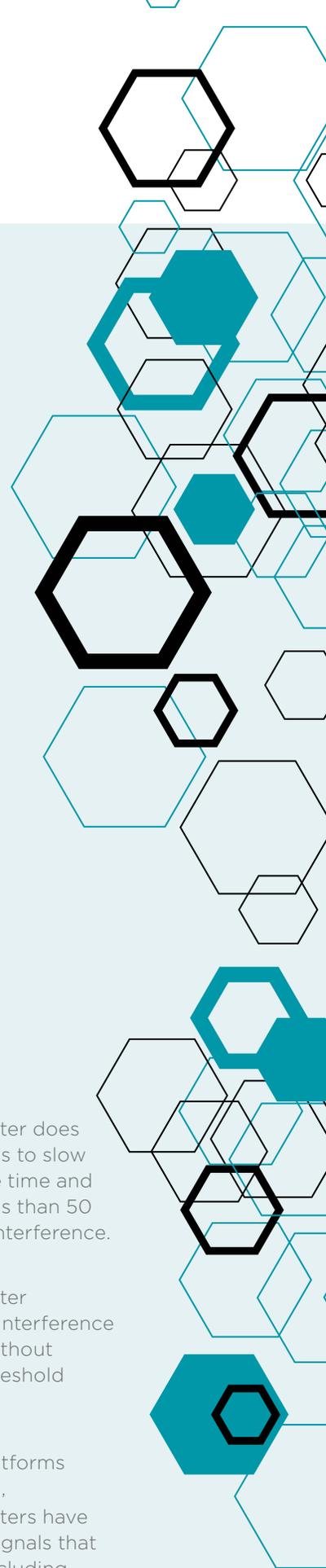
Limited Tones Per Device: Typical RF notch filters are only able to mitigate one tone per device, thereby limiting the user to determine how many, which frequency, and what direction the interference is coming from. This rigidity leaves systems designers to attempt to predict the number of signals their devices will encounter in the field.

SOLUTION

Unlike traditional RF filters, Metamagnetics' Auto-tune Filter does not rely on digital components to slow it down. It has a fast response time and excellent selectivity taking less than 50 nanoseconds to remove the interference.

Metamagnetics' Auto-tune Filter automatically adapts to filter interference above a preset power level without attenuating desired below threshold signals.

Adaptable across multiple platforms for land, sea, and air solutions, Metamagnetics' Auto-tune Filters have no limitations on number of signals that can be attenuated in band, including intermods.



Reflective Auto-tune Filter Specifications

Frequency Range (MHz)	Instantaneous Bandwidth (MHz)	Insertion Loss (dB)	Return Loss (dB)	P1dB Power Threshold (dBm)	Selectivity (MHz)	Peak Power (W)	Package
1400 to 2100	Full Band	2.5	12	-15	5	30	5mm QFN
960-1215	Full Band	3.0	12	-30	5	30	5mm QFN
1200 to 1400	Full Band	1.5	12	-15	5	30	5mm QFN
1400 to 1600	Full Band	1.5	12	-15	5	30	5mm QFN
1000 to 1200	Full Band	3.5	12	-23	5	30	10mm QFN
1300 to 2600	Full Band	5.0	12	-8	5	30	10mm QFN
Custom Designs							
300 to 1000	200	6	12	-30 to -10	5	30	Coaxial
	450	8	10	-30 to -10	5	30	Coaxial
	Full Band	10	10	-30 to -10	5	30	Coaxial
1000 to 3000	300	2.0	12	-30 to -10	5	30	5mm QFN
	500	3	12	-30 to -10	5	30	Coaxial
	900	3	10	-30 to -10	5	30	Coaxial
	1300	5	10	-30 to -10	5	30	10mm QFN

Absorptive Auto-tune Filter Specifications

Frequency Range (GHz)	Instantaneous Bandwidth (MHz)	Insertion Loss (dB)	Return Loss (dB)	P1dB Power Threshold (dBm)	Selectivity (MHz)	Peak Power (W)	Package
2 to 4	Full Band	3.2	12	+5	25	200	0.5" x 0.5" x 2.5" SMA
4 to 8	Full Band	2.6	15	+12	25	200	0.5" x 0.5" x 2.5" SMA
8 to 12	Full Band	3.0	15	+18	25	200	0.5" x 0.5" x 2.5" SMA
9.1 to 9.8	Full Band	1.5	15	+10	25	200	0.5" x 0.5" x 1.5" SMA
9.1 to 9.8	Full Band	1.5	15	+32	25	200	0.5" x 0.5" x 1.5" SMA
9.1 to 9.8	Full Band	1.5	12	+10	Limiter Only	up to 1 kW	1.25 x 0.65 x 3.5" SMA
12 to 18	Full Band	4.0	15	+23	25	200	0.5" x 0.5" x 2.5" SMA
Custom Designs							
2 to 18	500	1.5	12	0 to +30	25	200	Coaxial
	1000	1.5	12	0 to +30	25	200	Coaxial
	2000	2	12	+5 to +30	25	200	Coaxial
	Full Band	4	12	+5 to +30	25	200	Coaxial

Disclaimer: The information outlined above are not final specifications. The information outlined above is provided as example specifications and are not the extent of our full capabilities, nor does Metamagnetics believe that the specifications list above will work with every application. Metamagnetics takes pride in working with each customer's exact specifications and meeting those needs to benefit your project.

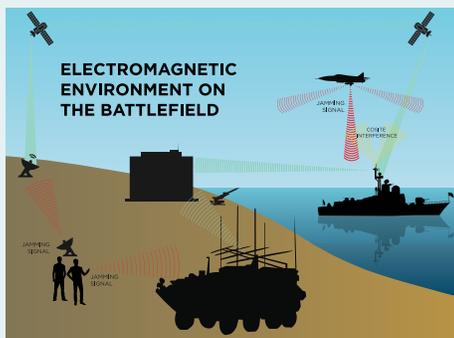


Fig. 2. To the left are some examples of the electromagnetic environment on the battlefield. Secure communications are crucial to maintain communications from land, to sea, to air, to even space. At any moment these systems could be under attack including small handheld systems by insurgents, advanced widespread systems like jet carried jamming systems, and even interference from one's own electronic systems.

Receiver Block Diagram Using Notch Filter Bank

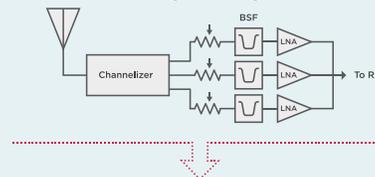
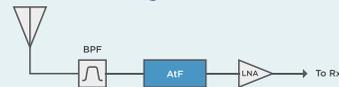


Fig. 3. A single Auto-tune Filter replaces an entire tunable notch filter bank. Since the AtF tunes automatically to any number of notches, this eliminates the need for sensing and control circuitry greatly reducing system complexity.

Receiver Block Diagram Simplified and Enhanced Using the Auto-tune Filter



Contact us today to learn how Metamagnetics' Auto-tune Filters can improve your application.

ABOUT METAMAGNETICS

U.S. based and veteran owned, Metamagnetics LLC develops and markets advanced RF and microwave solutions to enhance the performance and effectiveness of mission-critical security, surveillance and communication systems. Our unparalleled knowledge of electromagnetism and materials science empowers break-through technologies that can bring significant value to defense and commercial projects. Efficient and agile, our team can help you rapidly design and deploy innovative solutions for current and next-generation radar, sensing and related systems.

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