

Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

ONR Approval #43-3252-17

Topic # N111-080

Frequency Selective Limiters for Counter Directed Energy and Electronic Warfare Protection

Metamagnetics Inc.

WHO

SYSCOM: ONR

Sponsoring Program: Code 35

Transition Target: Specific Program of Record (POR) not identified

TPOC:

Mr. Peter Morrison

peter.a.morrison@navy.mil

Other transition opportunities:

ARMY – Cruise Missile Defense Systems Project Office
X and C Band Frequency Selective Limiter (FSL) technology for Sentinel and Patriot missile systems.

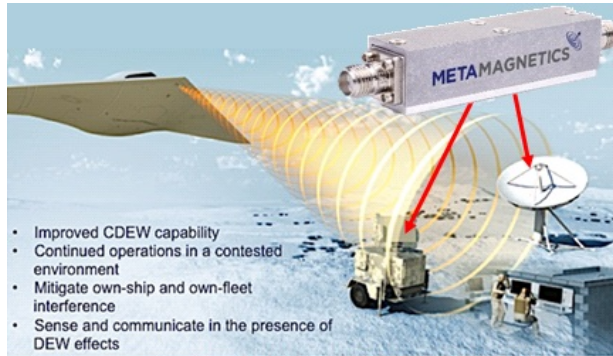
SPAWAR Systems Center Pacific – PEO Space Systems - PMW 146

Lower power threshold FSL for protecting satellites in UHF-band

Interest from: OSD, AFRL, ONR, DARPA, SPAWAR, NRL, Raytheon IDS, Rockwell Collins, Lockheed Martin, Northrop Grumman, BAE Systems, Harris Corp., and more.

Actively working with these partners to customize FSLs for different applications from handheld SATCOM radios to electronic attack pods.

Notes: Metamagnetics is coordinating with the US Naval Research Lab to evaluate FSLs in relevant environment tests.



adapted from www.nextbigfuture.com

WHAT

Operational Need and Improvement: The US Navy is seeking technologies that protect radio frequency receivers that exist in RADAR, communications, and electronic warfare systems, from high power microwave attack and threats. Metamagnetics' Frequency Selective Limiter (FSL) technology has the ability to protect receivers from high power microwave attack and improves the functionality of a receiver system.

Specifications Required: This research and development is aimed at increasing the power handling limits and decreasing the response time of the FSL technology. Specific performance metrics are TBD.

Technology Developed: Metamagnetics has developed and demonstrated FSL technology that has the ability to automatically attenuate high-power RF threats while simultaneously allowing low-power signals of interest to be received. This technology is unlike any existing semiconductor limiter technology or tunable filter bank because it is able to automatically respond to signals based on their power level and only attenuate signals that exceed a designated power threshold. From a systems perspective, the FSL effectively extends the dynamic range of a receiver and protects the signal chain from high power microwave attack. The purpose of this program is to further develop the power handling ability of the FSL technology and also to improve its response time.

Warfighter Value: Metamagnetics' FSL protects RF receivers (RADAR, Communications, EW) from high power microwave threats, extends the dynamic range of a system, and enables the warfighter to continue to receive signals of interest in electromagnetically contested and congested environments.

WHEN

Contract Number: N00014-16-C-1028 **Ending on:** February 16, 2018

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|------------------------------------|------------|-------------------------------------|------------|---------------|
| Complete time response experiments | Low | Demonstrate tuning of response time | 3 | October 2017 |
| High power testing | Med | Demonstrate high power handling | 3 | February 2018 |
| Prototype hardware developed | Med | Demonstrate improved response time | 3 | February 2018 |

HOW

Projected Business Model: Metamagnetics will design and manufacture the FSLs to sell directly to the primes and government entities looking to add protection to their systems. Early transitions will be low quantity highly customized devices for radars and EW systems. Metamagnetics will then look to drive costs down to focus on larger quantities applications including handheld radios and datalink terminals. As the company moves into low rate initial production, the company will look to scale up the material foundry. Estimated scale up time is 6 to 12 months.

Company Objectives: In the short term Metamagnetics is looking to identify potential primes and programs to integrate the technology. Directed energy and EW programs are inherently difficult to make connections with primes and government agencies due to clearance issues. Metamagnetics is looking for direct introductions with key PMs and TPOCs with the primes and government agencies. In the long term, Metamagnetics is hoping to increase the application use cases for FSLs across the DoD and public sectors. Frequency selective limiters are cutting edge with only a handful of individuals having an understanding of how the technology works and can be applied. So far Metamagnetics has found use cases ranging from radars, to GPS, to broadband EW systems, to power amplifier enhancement.

Potential Commercial Applications: High power FSLs have limited application in the commercial sector. The exception may be critical infrastructure needed to be protected from a directed energy terrorist attack. Law enforcement, nuclear facilities, news stations, ect.. Low power frequency selective limiters have a much higher potential for commercial applications due to size, sensitivity, and cost. Metamagnetics is already talking to a few commercial customers for handheld first responder radios, 5G base stations, and commercial SATCOM antennas. RF interference is a growing concern/problem for these industries as wireless applications continue to grow. Metamagnetics' FSL technology offers a solution to this problem.

Contact: Scott Gillette, Ph.D., Senior RF Engineer
sgillette@mtmgx.com 781-562-0756