Department of the Navy SBIR/STTR Transition Program

STATEMENT A. Approved for public release; distribution is unlimited.
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Topic # N141-060
Flexible Solid State High Power Radio Frequency Pulsed Source
Metamagnetics, Inc.

WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 35 Directed Energy Weapons

Transition Target: Initial program work will be out of the Navy HPM (high power microwave) program under code 35. Other targeted programs include programs under the Air Force and Army like Counter-electronics High Power Microwave Advanced Missile Project and various IED vehicle mounted detonation device programs.

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Photo courtesy of U.S. Navy

Other transition opportunities: Metamagnetics will also partner with Primes to insert our technology into the final system they integrate our device with. The HPM system is composed of three major sections; high voltage source which generates the power; RF source which converts the power to microwaves; and antenna which radiates those microwaves out at the target. Metamagnetics creates the RF source (NLTL). The RF source is a vital component for the total system since converting power to microwaves is the primary function of the HPM system. Warfighters would most likely source the Prime to integrate all 3 parts of the HPM system together into a major platform such as in a ship.

WHAT

Operational Need and Improvement: US Navy relies on directed energy (DE) weapons, such as HPM sources, to disrupt, damage, or destroy enemy electronic equipment at a standoff distance while minimizing collateral damage. A high power, solid state flexible test capability would provide critical data to improve the effectiveness of DE weapons against specific enemy targets and to reduce the susceptibility of friendly systems to enemy DE attacks.

Metamagnetics' system satisfies the Navy's requirement for a compact, frequency agile high power microwave (HPM) system to support development of practical high power solid state HPM systems for use in the field.

Specifications Required: An innovative, all solid-state, arbitrary waveform, HPM source. The design should establish realizable technological solutions for a device capable of achieving output power levels of 10 MW, at a minimum, and rep-rates on the order of kHz in the frequency range of VHF to S-band.

Technology Developed: A compact solid-state HPM source based on magnetic, planar, non-linear transmission line (NLTL), capable of arbitrary waveforms, possess frequency and bandwidth agility, as well as improved efficiency over traditional HPRF sources. It will be able to provide over 60 percent volume reduction, and up to 5 times weight reduction compared to equivalent cylindrical gyromagnetic NLTL based sources.

Warfighter Value: Metamagnetics' innovative planar NLTL is drastically smaller than traditional HPM systems; thus enabling vehicle mounted solutions. It has the added benefit of frequency tunability; giving the user the ability to adapt to different threats and environments. All this is offered to the customer at a reduced cost compared to large and expensive traditional HPM systems.

WHEN

Contract Number: N00014-15-C-0161 **Ending on:** February 6, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Proof-of-feasibility demonstration of an innovative planar NLTL for the generation of HPM signals	N/A	Development and testing of the innovative magnetic planar NLTL	3	November 2014
Functional arrayed NLTL device	Low	Development and characterization of an arrayed NLTL device to meet specs	4-5	November 2017
Environmental testing of NLTL prototype NLTL	Low	Testing of prototype in a relevant environment	5-6	May 2019

HOW

Projected Business Model: Sales channel will be direct B2B sales with the Primes and various other firms within the DoD. Current method of reaching customers is mostly through government referrals.

Company Objectives: 1) Seek out current government HPM programs
2) Establish relationships with major Primes performing under the HPM program
3) Develop an ideal "spec sheet" for the NLTL based on customer feedback
4) Understand competing options based on technology and cost

Potential Commercial Applications: Possible commercial opportunities include private security, communications, sensor and medical applications. Industrial electromagnetic interference (EMI) testing also stand to benefit from this technology.

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