

Department of the Navy SBIR/STTR Transition Program

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NAVAIR JSF19-1008

Topic # N171-031

1 Micron Fiber Optic Receiver for Mil-Aero Environment

Phase Sensitive Innovations, Inc.

WHO

SYSCOM: NAVAIR

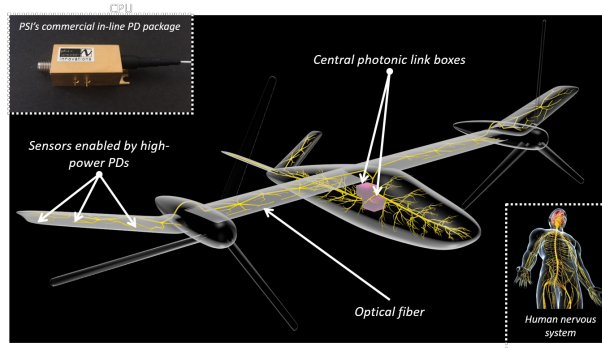
Sponsoring Program:

Transition Target: JSF

TPOC:

(301)342-4122

Other transition opportunities: MQ-25, EA-18G, V-22



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WHAT

Operational Need and Improvement: Modern trends toward increasing RF/analog bandwidth and frequency requirements are often complicated by significant increases in system cost and size, weight, and power (C-SWaP). Replacing conventional coaxial cables with fiber-optic links can improve these metrics, but requires the development of a high-power photodetectors (PDs) to maintain signal fidelity.

Specifications Required: For low-noise figure analog photonic links, the power handling of the photodetector is of prime importance. PSI's high-power near-IR photodetectors are capability of outputting over 15 dBm of RF output power at 45 GHz, 0.6 A/W responsivity, and third-order intercept point (OIP3) greater than 30 dBm. Additionally, for mil-aero environments, the package is hermetically sealed into a form-factor less than 2.5 cm³. The photo-receiver module is capable of withstanding temperature cycling from -40 °C to 100 °C, and the expected mechanical shock from aircraft vibration.

Technology Developed: PSI has developed a new type of uni-traveling carrier (UTC) photodetector for operation at an optical wavelength of 1 μm, in addition to our current commercial line of C-band (1530 nm - 1565 nm) PDs. Both singular and balanced configuration photo-receiver modules are being developed for high-power operation in mil-aero environments. This allows the end-user to determine the best photo-receiver choice for their desired RF photonic link configuration.

Warfighter Value: RF photonic links with gain and low-noise figure have the potential to replace vast swathes of traditional RF cabling in new craft. This will allow for not only the integration of more on-board systems, but access to new bands of frequency for next generation radar, imaging, and communications.

WHEN

Contract Number: N68335-19-C-0099 **Ending on:** December 11, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Meeting required photodiode chip specifications	Low	Performance metrics outlined in solicitation	3	September 2019
Packaging of singular and balanced photodetectors	Med	RF photonic link demonstration	4	December 2019
Reliability testing and yield improvements	Med	Manufacturing analysis	5	December 2020

HOW

Projected Business Model: PSI has already begun low rate initial production of the photodetector modules. Within the next 2 years we intend to scale production to full scale after transitioning our fabrication and packaging processes to a new, larger manufacturing facility.

Company Objectives: PSI wishes to improve reliability and expand production of our photodetector products, with the goal of becoming a leading commercial provider of high-power photodetectors for analog photonic link applications.

Potential Commercial Applications: Potential commercial applications include avionics, on-board autonomous vehicle sensors, medical imaging, and tomography.

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