Bulk GaN Schottky Diodes for Millimeter Wave Frequency Multipliers, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

Within the context of this project, White Light Power Inc. (WLPI) will demonstrate the feasibility of using vertical GaN Schottky diodes for high-power rectification at W-band. To achieve this goal, WLPI will utilize it's experience of fabricating power rectifier diodes to enable highly cost-efficient selection of a wafer. The same experience will also be utilized in selecting and working with an epi-supplier to ensure demonstration of the requisite 1000 cm2/Vs mobility. WLPI will design, manufacture and test the diodes to ensure that the device characteristics such as breakdown voltage, C-V characteristics, leakage and ideality factor are consistent with the target 200 mW power handling capacity. WLPI will provide data and documentation supporting and detailing the wafer selection, epi qualification, manufacturing and testing of the devices. WLPI will dice and deliver devices to NASA for further testing.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: Terahertz radiometry-spectrometry is an important technique for remote sensing of terrestrial, planatery, and interstellar trace constituents and physical properties. Numerous NASA missions with sub-millimeter wave instruments have been deployed with a wide-range of mission targets. Further expansion of the capabilities requires increased local oscillator power. A first GaN stage that can provide increased power-handling capability will extend the sub-millimeter wave power that can be supplied for radiometry-spectrometry instruments. Potential NASA commercial applications will likely center around terrestrial sensing for various industries.

To the commercial space industry:

Potential Non-NASA Commercial Applications: One of the most important non-NASA applications of the multiplier diodes is in the terahertz imaging radars for home-land security applications.

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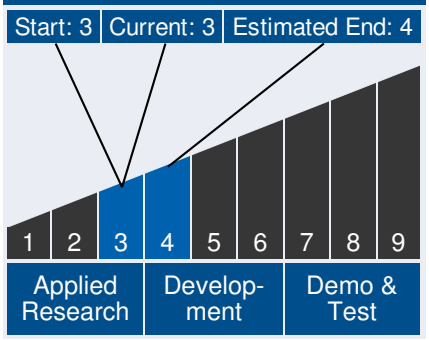
Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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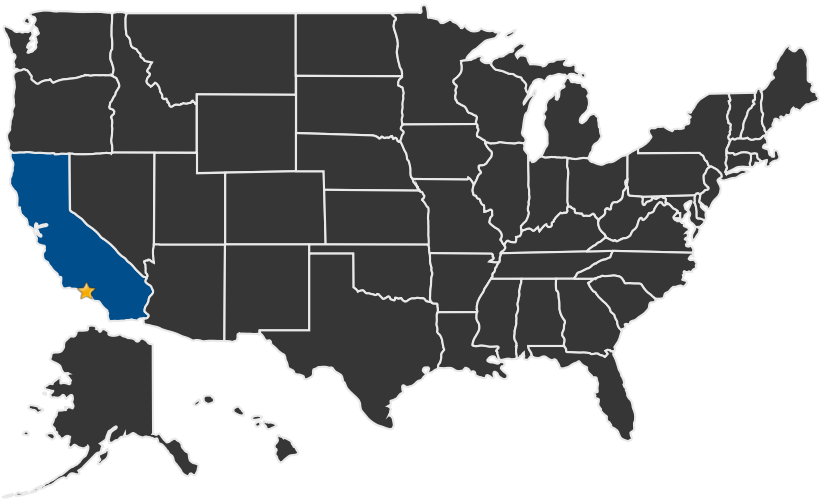
The high power GaN diodes that we are proposing to develop with this project will enable higher transmitter power and, thus, higher stand-off distance and higher sensitivity. Potential Non-NASA applications will center around remote-sensing and imaging for security or industrial control applications.

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Jet Propulsion Laboratory

Other Organizations Performing Work:

- White Light Power, Inc. (Los Altos, CA)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23215)

Management Team *(cont.)*

Principal Investigator:

- Richard Brown

Technology Areas

Primary Technology Area:
Science Instruments, Observatories, and Sensor Systems (TA 8)
└ Remote Sensing Instruments and Sensors (TA 8.1)
  └ Microwave, Millimeter-, and Submillimeter-Waves (TA 8.1.4)

Bulk GaN Schottky Diodes for Millimeter Wave Frequency Multipliers, Phase I Project

IMAGE GALLERY

Bulk GaN Schottky Diodes for Millimeter Wave Frequency Multipliers, Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

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Potential Applications

Terahertz radiometry-spectrometry is an important technique for remote sensing of terrestrial, planatery, and interstellar trace constituents and physical properties. Numerous NASA missions with sub-millimeter wave instruments have been deployed with a wide-range of mission targets. Further expansion of the capabilities requires increased local oscillator power. A first GaN stage that can provide increased power-handling capability will extend the sub-millimeter wave power that can be supplied for radiometry-spectrometry instruments. Potential NASA commercial applications will likely center around terrestrial sensing for various industries.