National Aeronautics and Space Administration

Integrated Solar-Panel Antenna Array for CubeSats

NASAfacts

The goal of the Integrated Solar-Panel Antenna Array for CubeSats (ISAAC) project is to design and demonstrate an effective and efficient optically transparent, high-gain, lightweight, conformal X-band antenna array that is integrated with the solar panels of a CubeSat. The targeted demonstration is for a Near Earth Network (NEN) radio at X-band, but the design can be easily scaled to other network radios for higher frequencies. ISAAC is a less expensive and more flexible design for communication systems compared to a deployed dish antenna or the existing integrated solar panel antenna design.

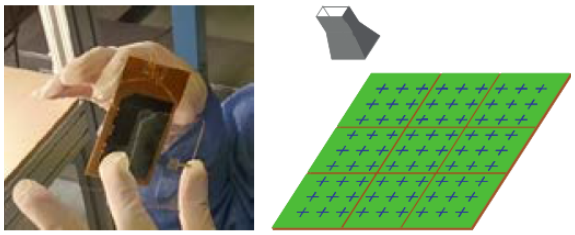
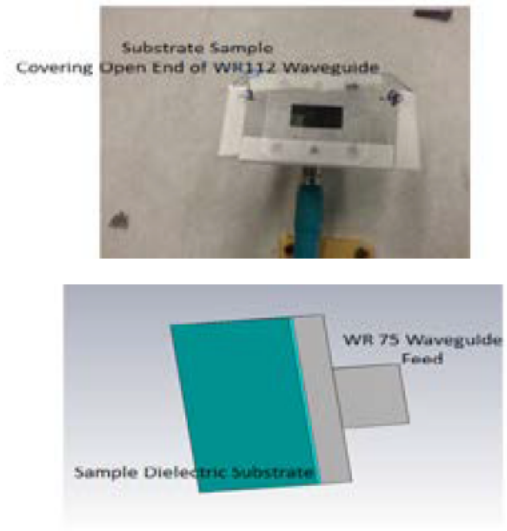


Illustration of ISAAC Concept

The project team has designed four antenna arrays. Each array has gain higher than 22 decibels (dB) and optical transparency of higher than 94%. Both of these values are higher than any reported result in reflectarray antenna design as well as transparent antenna technology.

Traditional low-gain antennas have limited communication capability. For higher gain design, today's approach is either a deployed dish or integration of the antennas on the backside of a solar panel. ISAAC does not need deployment, which means low cost, and it is not limited to locations of solar cells. In summary, ISAAC is high gain, low cost, and is not limited by the geometry of the small spacecraft.



Measurement performed at Goddard Space Flight Center to characterize the geometry and dielectric properties of the solar cell assembly

Utah State University in Logan, Utah is the lead institute for the ISAAC project and is working in collaboration with NASA's Goddard Space Flight Center in Greenbelt, Maryland.

This project is funded through the SmallSat Technology Partnerships, a program within the Small Spacecraft Technology Program (SSTP). The SSTP is chartered to develop and mature technologies to enhance and expand the capabilities of small spacecraft with a particular focus on communications, propulsion, pointing, power, and autonomous operations. The SSTP is one of nine programs within NASA's Space Technology Mission Directorate.

For more information about the SSTP, please visit: http://www.nasa.gov/smallsats

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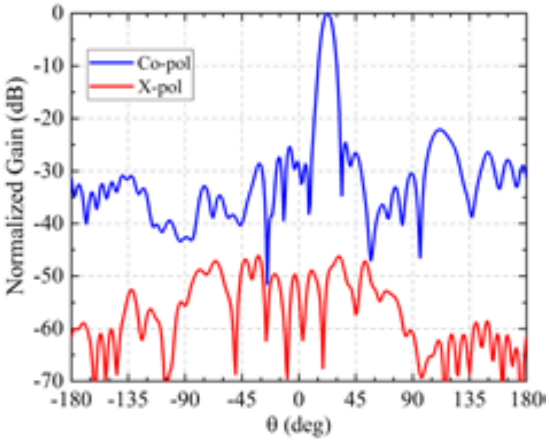
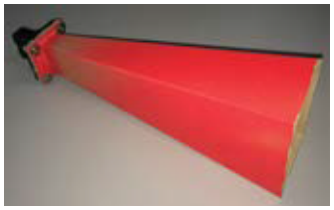
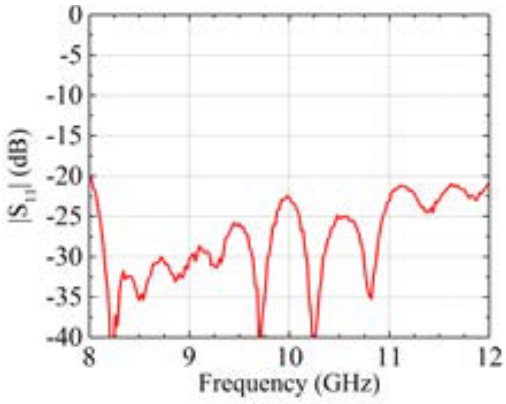


One of the four ISAAC Designs





3D in-house printed horn antenna feed for ISAAC

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