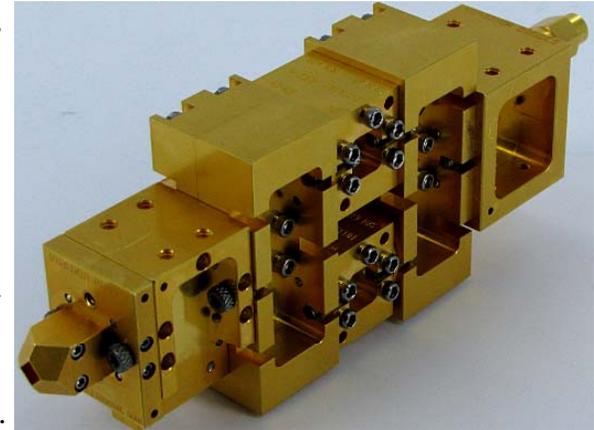


Identification and Significance of Innovation

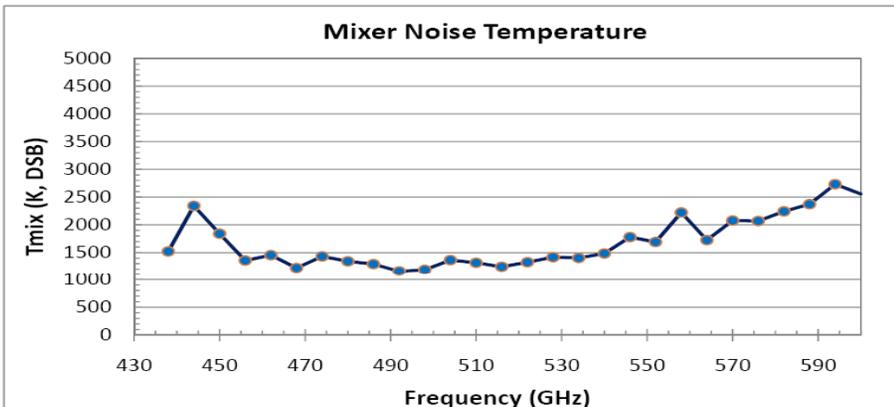
VDI has demonstrated a highly compact receiver architecture that can be used across full waveguide bands without any mechanical or electrical tuning other than the control of the input LO frequency. This has been achieved with improved design of the mixer and multiplier circuits, close integration of the subharmonically-pumped mixer with its LO tripler and the use of a W-Band amplifier developed by NASA JPL. The delivered prototype meets the basic requirements of the proposed Vesper receiver system.

The delivered prototype receiver. This compact module meets the basic requirements of the Vesper Mission, with $T_{mix} \sim 2,000K$ (DSB, typical) across the 440-590GHz band, compact size, low DC power requirement and exceptional ease-of-use.



Technical Objectives: Achieve full waveguide band performance with highly integrated mixer / multiplier chains while maintaining optimal sensitivity, reducing power requirements, eliminating bias circuitry, and reducing system volume and component count.

NASA Applications: Submillimeter-wave receivers are used to study Earth’s atmosphere from satellites and airborne platforms. Similar systems are also proposed for planetary probes. This SBIR effort has yielded more compact, power efficient, frequency agile and reliable submillimeter receivers. These receivers achieve excellent sensitivity across full waveguide bands without mechanical tuners, bias adjustments or LO power tuning.



Non-NASA: Full waveguide band receivers are required for advanced test & measurement equipment, such as VNA and SA extenders. These improved mixer and multiplier designs are used in VDI’s frequency extenders spanning the frequency range from 75GHz through 1.1THz.

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