

SUBMILLIMETER WAVE LNA BASED RECEIVERS USING INP HEMT TECHNOLOGY

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Receivers with Low Noise Amplifier Front-Ends offer the benefit of high sensitivity, high received signal power, low DC power consumption. Moreover, low temperature operation improves sensitivity. This talk will focus on InP HEMT receivers developed by Northrop Grumman. This technology has already progressed to the point where high sensitivity receivers have been demonstrated to as high as 670 GHz, and development work is currently focused on a new generation of receiver at 850 GHz. Benefits to using this technology include realization of all front-end semiconductor components, including LNA, mixers, multipliers and IF amplification. This allows the entire front-end to be fabricated on a single chip, or a minimal chipset when filtering is added. In addition to single-chip receivers, single-chip LO chains will be presented. These MMICs feature monolithic electromagnetic transitions integrated directly into the integrated circuit for broadband response and high frequency performance. This high level of integration results in a small, DC efficient form factor should enable compact, multi-band radiometers for sophisticated profiling of atmospheric conditions.

A brief overview of the technology will be given, which includes a description of the MMIC technology which demonstrates > 1.4 THz f_{MAX} . Noise temperature benchmarks will be provided from W-Band to 670 GHz, along with initial cryogenic noise temperature at Sub-millimeter wave frequencies. Details on receivers will be presented, including noise temperatures and basic receiver characteristics. Some results will also be provided for 670 GHz receivers with a fully monolithic, silicon micromachined packaging technology. The talk will conclude on an overview of expected future capabilities of this rapidly improving technology.