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Title

SiGe Millimeter-Wave (W-Band) Down-Converter for Phased Focal Plane Array

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Abstract

A millimeter-wave (W-Band) down-converter for Phased Focal Plane Arrays (PFPAs) has been designed and fabricated using the IBM Silicon-Germanium (SiGe) BiCMOS 8HP process technology. The radio frequency (RF) input range of the down-converter chip is from 70 95GHz. The intermediate frequency (IF) range is from 5 30GHz. The local oscillator (LO) frequency is fixed at 65GHz. The down-converter chip has been designed to achieve a conversion gain greater than 20dB, a noise figure (NF) below 10dB and input return loss greater than 10dB. The chip also has novel LO circuitry facilitating LO feed-through among down-converters chips in parallel. This wide bandwidth down-converter will be part of millimeter-wave PFFA receiver designed and fabricated in collaboration with the University of Massachusetts-Amherst Department of Astronomy. This PFFA receiver will be installed on Green Bank Telescope (GMT) / Large millimeter wave telescope (LMT) in Q2 of 2014. This project is collaboration between the University of Massachusetts-Amherst (UMass), Brigham Young University (BYU) and National Radio Astronomy Observatory (NRAO).

To the best of the author's knowledge, this is first wide bandwidth down-converter at W-band to achieve this high gain and low noise figure among Si/SiGe based systems.

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Joseph Cheney Bardin

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