



## Kintex-7 FPGA board for FDM scheme readout for superconducting mm-wavelength detectors

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In recent years large format arrays of transition edge sensors (TES) and kinetic inductance detectors (KIDs) have been successfully fabricated for millimeter wavelength astronomy instruments. In order to achieve the readout and handle the thermal load in the cryogenic system, several frequency domain multiplexed (FDM) schemes have been developed on different platforms.

In this paper we present the implementation of an algorithm on a Kintex-7 FPGA board for multiplexing and de-multiplexing bias signals for superconducting mm-wavelength detector arrays operating at sub-Kelvin temperatures. The process of programming the board using MATLAB and Vivado of Xilinx is explained and an analysis of amplitude and phase stability of the multiplexed signals is also described according to the detection technologies. In order to test the performance of this method an 8-channel tank circuit at 4 K is fed with a multi-tone signal (0.3-1 MHz) and measured by a SQUID in a TES-scheme read out, the results of the digitized and de-multiplexed signal by the FPGA board are shown. The modularity of the FPGA algorithm and hardware architecture allows to scale the proposed scheme for larger arrays or adapt it for a KIDs scheme readout.