

Hybrid Semiconductor-Superconductor Fast-Readout Memory for Digital RF Receivers

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Abstract - Results of the development of a new type of a hybrid memory for superconducting Digital-RF receivers supporting 30 Gbps memory readout speed are presented. The main feature of this memory is a combination of a high-capacity room-temperature memory and a high speed on-chip superconductive cache in order to provide digital waveform templates for Digital-RF signal processing. As a room-temperature high-capacity memory with fast readout, we selected Sympuls pattern generator BMG 30G-64M capable of producing a 30 Gbps serial data stream of programmable pattern of 67,108,864 bits. We designed, fabricated, and tested an on-chip cache which receives high-speed template serial data from the room temperature memory and converts it into a stream of 3-bit words of template of local oscillator (LO) for digital mixer. We integrated the memory with a 1x3-bit digital I/Q mixer (1-bit digitized RF stream multiplied by 3-bit digital LO).

Index Terms - RSFQ, SFQ, DSP, DRFM, cryogenic, RF template, waveform library, digital correlator

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