

## RSFQ DFFC Circuit Design for Use in ALU

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RSFQ (Rapid Single Flux Quantum) circuits are used in many practical applications. RSFQ DFFC (Delay Flip-Flop with complementary outputs) circuits can be used in a RAM, an ALU (Arithmetic Logic Unit), a microprocessor, and many communication devices. A DFFC circuit has one input, one switch input, and two outputs (output1 and output2). DFFC circuit functions in such way that output1 follows the input and output2 is the complement of the input when the switch input is "0." However, when there is a switch input "1," the opposite output signals are generated. In this work, we have designed an RSFQ DFFC circuit based on 1 kA/cm<sup>2</sup> niobium trilayer technology. As circuit design tools, we used Xic, WRspice, and Lmeter. After circuit optimization, we could obtain the bias current margins of the DFFC circuit to be above 40 %.

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