

# Simulation and Layout of HTS Rapid Single Flux Quantum(RSFQ) 1-bit A/D Converter

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Analog-to-digital converter is a key element in many communications systems. Since the high performance analog-to-digital converter can be built with Rapid Single Flux Quantum (RSFQ) logic circuits the development of superconductive analog-to-digital converter has attracted a lot of interests as one of the most prospective area of the application of Josephson Junction technology. One of the main advantages in using Rapid Single Flux Quantum logic in the analog-to-digital converter is the low voltage output from the Josephson junction switching, and hence the resolution of the superconductive analog-to-digital converter can be very high. In this study, we have used several circuit design softwares to study RSFQ toggle Flip-Flop circuit. These softwares include WinS, Lmeter, Xic, and Wrspice. Toggle flip-flop is a basic building block of an analog-to-digital circuit. We composed 1-bit RSFQ analog-to-digital converter with a Josephson transmission line (JTL), a toggle-Flip-Flop, an RSFQ pulse generator. We obtained operating margins of the important circuit values by simulation experiments and have laid out a 1-bit RSFQ A/D Converter to fabricate with high temperature superconductor,  $\text{YBa}_2\text{Cu}_3\text{O}_x$ .

keywords : RSFQ, analog, digital, converter, low noise,  $\text{YBa}_2\text{Cu}_3\text{O}_x$