LNP-6

Simulation of Superconducting Coplanar Waveguides for Quantum Computing

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Superconducting circuit plays an important role in realization of a scalable quantum computer. Anomalous characteristics of superconductor such as extremely low surface losses and a single quantum state at the macroscopic level have been able to realize a scalable and programmable quantum computer. Unlike the ion trap architecture – another type of candidate for the realization of a quantum computer, Josephson junctions are mainly used as superconducting quantum bits (qubits) in superconducting quantum computing. Since the control and readout of multiple superconducting qubits are one of the most challenging issues to address, precise design and simulations of quantum IO systems are required. In particular, 3D cavities and 2D coplanar waveguides (CPW) are mainly employed to manipulate superconducting qubits using electromagnetic waves. In this paper, we present the performance simulation results of superconducting CPW and theoretical approaches for calculating anomalous characteristics of a superconductor.

Acknowledgement: This research was supported by Samsung Electronics. It was also supported by the BK21 Plus Project in 2019

Keywords: Coplanar Waveguide, RF Resonator, Q-factor, Quantum Computing