

Performance Test of High-speed Probe for Single Flux Quantum Circuits

Sang-Mun Kim^{a,c}, Jong-Hyun Choi^a, Young-Hwan Kim^{*,a},
Joonhee Kang^b, and Ki Huyn Yoon^c

^a Korea Institute of Science and Technology, Seoul, Korea

^b University of Incheon, Incheon, Korea

^c Yonsei University, Seoul, Korea

High-speed probe for single flux quantum circuits is comprised of semi-rigid coaxial cables and microstrip lines whose impedance is 50Ω to carry high-speed signals without loss. To do performance test of high-speed probe, we have attempted to fabricate a testing chip which has a coplanar waveguide(CPW) structure. Electromagnetic simulation has been carried out to obtain the suitable dimension of CPW that has an impedance of 50Ω for impedance matching with the probe and to investigate the effect of width of signal line and gap between signal line and ground plane on the impedance of CPW. Two CPW could be placed on the chip with the size of $5 \times 5 \text{mm}^2$. And we fabricated it with gold film deposited on high resistant Si wafer. The magnitudes of S_{21} of CPW at 6 GHz obtained from simulation and practical measurement by using a network analyzer were -0.2dB and -0.45dB , respectively. Using this testing chip, we have successfully done performance test of high-speed probe for SFQ circuits. The probe with the chip showed the good performance over 10 GHz.

keywords : single flux quantum circuit, high-speed probe, coplanar waveguide