

Japanese Activities for Superconducting Circuits Using Flip-chip Configurations

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Abstract— Multi-chip-modules (MCMs) using flip-chip configurations are quite important for improving integration scale of superconducting circuits and also bringing out their abilities. Many efforts have been devoted to the MCM developments in the world. This article describes the efforts in Japan. For example, ISTEK succeeded single flux quantum (SFQ) pulse transfers between different chips in the MCM structure up to 117 Gbps. Using this technology, a 4×4 switch chip and a voltage driver chip with 5 mm square size were mounted on a 16 mm square interposer and the MCM demonstrated video image transfer between four PCs with 10 Gbps. A 2.5-dimensional MCM structure for quantum annealing devices was proposed and superconducting connections of flipchip configuration in high-density bump array were demonstrated at AIST.

Keywords (Index Terms) — Superconducting device; multi-chip module; flipchip bonding.

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