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Realization of an on-chip superconducting microwave switch MAREK PECHAL, SIMONE GASPARINETTI, MINTU MONDAL, MARKUS OPPLIGER, ANDREAS WALLRAFF, ETH Zurich — As state-of-the-art superconducting quantum devices get increasingly complex, they require a growing number of control and detection channels. On-chip routing and multiplexing of signals presents a way to realize these without requiring an unrealistically large number of microwave lines. The ability to route signals on a chip will also be a useful tool for fast in-situ characterization of superconducting devices. Here, we describe and experimentally demonstrate a superconducting on-chip microwave switch which can be integrated with current superconducting quantum circuits. The device is based on interference effects and is in principle lossless, making it well-suited for operation in dilution cryostats and for routing of signals at the single quantum level with near-unity efficiency. The first proof-of-principle device has a bandwidth of 150 MHz, a 1 dB compression point of −80 dBm and turn-on/off times on the order of 5 ns. On/off power ratios reach values of approximately 30 dB. We expect that our device will find use in (de)multiplexing of control and readout in superconducting circuits and routing of microwave fields in quantum optical experiments and quantum communication applications.

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