

Integrated Balanced SIS Mixer at 500 GHz

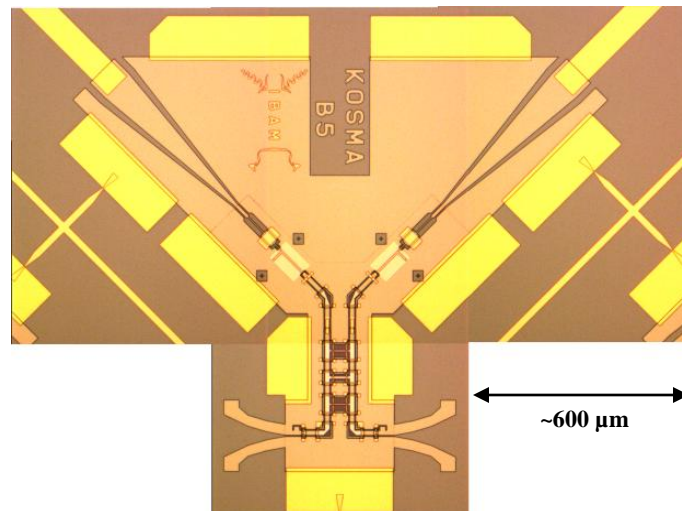
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Abstract—We present the design and measurement results of a balanced SIS mixer for the 400-500 GHz band fully integrated on a thin Silicon substrate. A superconducting coplanar waveguide circuit with two broadband waveguide probes, a 90° hybrid coupler and two pairs of SIS junctions with integrated tuning was extensively simulated using CST and Sonnet. The coplanar waveguides use capacitive bridges to suppress odd mode propagation. The circuit is deposited on a 9 micrometer thick Silicon substrate shaped with deep reactive ion etching from a Silicon-On-Insulator wafer. IF and ground connections to a waveguide block are made via integrated beam lead contacts, enhancing the RF and IF performance as well as the device cooling. We show details of the RF design and measurement results which show excellent performance over the RF band measured within a 4-8 GHz IF band.



On-wafer photo of an Integrated Balanced Mixer (IBAMI) device