

RF and IF couplers for a sideband separating SIS waveguide mixer for a 345 GHz focal plane array

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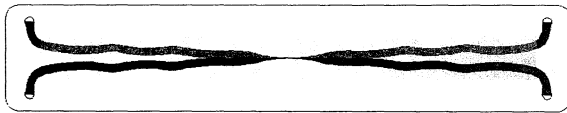
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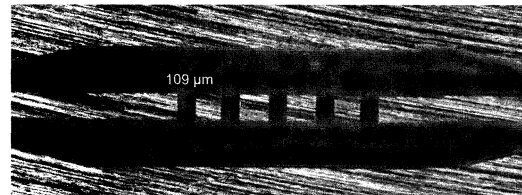
We present recent developments of a sideband separating SIS mixer at 345GHz. Special emphasis is placed on the critical design of the RF- and the IF-hybrids.

Two similar waveguide RF couplers designed for a bandwidth from 330-370 GHz are fabricated on two CNC lathes with different precision. Both couplers show adequate performance. The couplers are compared by accurate phase and amplitude measurements at the operating frequency with an ABmm vector network analyzer.

The IF signal of the two SIS junctions is recombined by a 90° -3dB hybrid. A nonuniform transmission line directional coupler has been specially designed for operation at cryogenic temperatures and integration into the mixer units. The coupling accuracy is +/-1dB over a very broad bandwidth from 1.5 to 8 GHz. Both the RF and IF hybrids are completely fabricated in house and can be easily adapted to the requirements of a focal plane array receiver.



The IF hybrid with nonuniform stripline structure. Two RT/duroid6002 substrates separated by 12µm Mylar foil. Structure size: 77.6 x 14.6 mm²



One half of a 345GHz branch line waveguide coupler in milled in brass. Coupling slit width: 109µm.