We present recent developments of a sideband separating SIS mixer at 345 GHz. 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 +/-1 dB 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.