

## **The Band 3 and 4 Flight Model mixer units for HIFI**

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The Heterodyne Instrument for the Far-Infrared (HIFI) is in its final stage of assembly. It will cover the 0.48-1.9 THz frequency range. This frequency range is divided into 7 bands. SRON is developing the band 3 and 4 SIS waveguide mixer units. Band 3 and 4 cover the 800-960 GHz and 960-1120 GHz frequency range, respectively. Each of these bands contains two mixers for dual polarization measurements. The mixers have a corrugated horn antenna and operate with a 4-8 GHz IF bandwidth. Nb/AlO<sub>x</sub>/Nb SIS tunnel junctions with NbTiN/Al wiring layers are used as mixing element. Besides the heterodyne functionality, the units also incorporate a superconducting magnet, an internal ESD/EMC protection circuit, a 4-8 GHz bias T, and a de-flux heater.

The mechanical and optical design is to a large extent driven by the specific environmental requirements for a space mission, the mass and thermal budget, and the electrical and optical interfaces with the rest of the instrument.

In the paper we discuss the design and performance of the Flight Model mixer units. The DSB receiver noise temperature as measured in the laboratory (with warm optics) vary from 220-315 K in the band 3 frequency range and 330-600 K in band 4. With the cold HIFI optics and the absence of atmospheric losses, the noise temperature will drop to 150-250 K and 250-350 K for band 3 and 4, respectively.