

Dual Band MM-Wave Receiver for Onsala 20 m Antenna

I. Lapkin¹, M. Fredrixon¹, E. Sundin¹, L. Helldner², L. Pettersson², S.-E. Ferm¹, M. Pantaleev², V. Belitsky¹

¹ Group for Advanced Receiver Development, ² Electronic Laboratory, Onsala Space Observatory, Department of Earth and Space Sciences, Chalmers University of Technology
Gothenburg, Sweden
E-mail: victor.belitsky@chalmers.se

We present the design and the first light results for the new dual band receiver (4 mm and 3 mm bands) for Onsala Observatory 20 m antenna. For single dish operation, the receiver uses innovative on-source/off-source optical switch. Within the same optical layout, the switch, in combination with additional optical components, provides 2 calibration loads and sideband measurements possibilities. The optics layout of the receiver uses offset elliptical cold mirrors for both channels whereas the on-off switch employs flat mirrors only. The 3 mm channel employs 2SB dual polarization receiver with OMT, 4-8 GHz IF, x 2pol x (USB+LSB). The cryostat has 4 optical windows made of HDPE with anti-reflection corrugations, two for the signal and two for each frequency band cold load. The cryostat employs a two stage cryocooler RDK 408D2 and uses anti-vibration suspension of the cold-head to minimize impact of the vibrations on the receiver stability. The LO system is based on Gunn oscillator with PLL and two mechanical tuners for broadband operation, providing independently tunable LO power for each polarization. At the conference, we will present details on the receiver optics, cryostat design and the result of the first on-sky observations.

