A Low VSWR 340 GHz 2SB Schottky Receiver for Earth Observation Applications

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***Abstract*-A state-of-the-art waveguide integrated 2SB Schottky receiver operating in the 320-360 GHz band is demonstrated. The unique receiver topology utilizes a low RF and LO VSWR design leading to better mixer performance and superior response for the radiometer system in general. Characterization of the receiver system will be presented.**

I. Introduction

We report on the development of a fully integrated 2SB receiver designed for the STEAMR instrument operating at 320-360 GHz, consuming only 4 mW of LO power. The unique receiver design exhibits low LO and RF voltage standing wave ratios as 90-degree hybrids are used, see [1-7], for both the RF and LO feeding of the two subharmonic Schottky diode DSB mixers. Commercial IF LNA's with a 1.8 dB minimum noise figure have been integrated to the receiver I and Q paths. This approach has two advantages, it improves the flatness and bandwidth of the IF response and provides a flexible way for tuning of the image rejection by external IF networks without affecting the receiver sensitivity.

Several modules, both SSB and DSB, have been fabricated and tested using both commercial and in house developed Schottky diodes. Results have been consistent and repeatable for all the assembled units, with an optimum 2SB receiver noise below 2800 K(SSB) not including the contribution from the RF hybrid termination, and with an estimated mixer noise and total conversion loss of 800 K(DSB) and 8 dB(SSB) respectively. The measured image rejection was typically around 15 dB without compensation of the IQ-imbalance and the typical LO input return loss was measured to about 15 dB broadband.

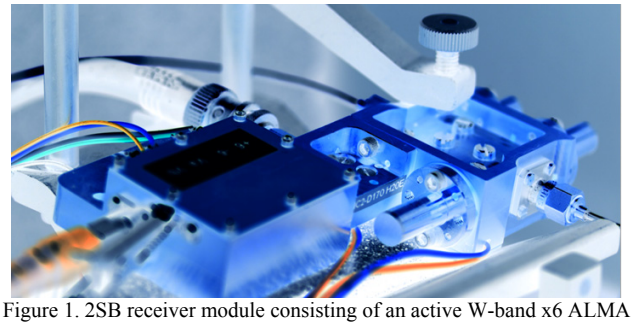

Figure 1. 2SB receiver module consisting of an active W-band x6 ALMA WVR LO module followed by a broadband Chalmers Schottky varactor doubler pumping the 340 GHz SubHarmonic IQ Mixer (SHIQ-Mixer).

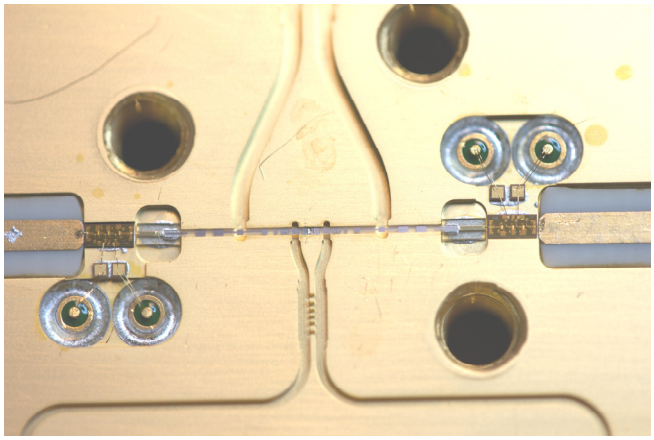

Figure 2. Front-End receiver module assembly.

Acknowledgment

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