

P8G

Radiometer MMIC

A. Emrich^{1*}, T. Pellikka¹ and S.E. Gunnarsson²

*1 Omnisys Instrument AB *, Västra Frölunda, Sweden*

2 Chalmers University of Technology

* Contact: ae@omnisys.se, phone +46 31 7343401

Abstract—There are several radiometer instruments covering 10-1000 GHz planned and projected over the next 10-15 years. There exist MMIC based front-end solutions up to 60-90 GHz today but for frequencies above 100 GHz, Schottky mixers have been preferred in most cases. Omnisys has now through a development project under the GHz Center at Chalmers University of Technology, financed partly under an ESA GSTP contract, developed heterodyne radiometer MMIC's for the 118 and 183 GHz bands using "Fraunhofer Institute for Applied Solid State Physics" 100nm mHEMT process. Radiometer components such as LNA's, mixers and frequency multipliers have been developed as well as integrated radiometer MMIC's. Test results will be presented for components as well as for the first iteration of the integrated radiometer MMIC's.

The 118 GHz LNA measurements show a gain of more than 20 dB over 80-135 GHz with NF of 2.5-3 dB. For the 183 GHz LNA, the gain is > 17 dB over 130-210 GHz with a NF 5 dB for frequencies below 185 GHz going up to 6.5 at 195 GHz. Both the 118GHz and 183GHz mixers are single ended resistive mixers for a broadband response with good conversion loss. The measured values are about 6dB for the 118GHz design and about 10dB for the 183GHz design. The usable bandwidth for both RF and LO is at least +20GHz. For the system design we have also developed multiplier chains for both frequency bands. As LO chain for the 118GHz we have an X4-multiplier that with the output power amplifier is delivering +6dBm output power at saturation. For the 183GHz receiver we have an X6 multiplier also with an output power amplifier, delivering at least +4dBm.