

Discrete GaAs Schottky beamlead mixer diodes for space-borne receiver applications

Peter J. Sobis*, Vladimir Drakinskiy², Tony Pellikka¹, Slavko Dejanovic¹, Anders Emrich¹, and Jan Stake²

¹*Omnisys Instruments AB, Västra Frölunda, SE-421 32, Sweden*

²*Chalmers University of Technology, Göteborg, SE-412 96, Sweden*

*Contact: peter.sobis@omnisys.se

Abstract— This paper presents the design and implementation of a anti-parallel GaAs Schottky beamlead mixer diode suitable for use in discrete diode type subharmonic mixer applications up to about 500 GHz. The particular chip has been developed for the MWI instrument 118 GHz receiver channel which is part of the METOP Second Generation weather and climate research satellite programme. The main objective of the activity has been to develop a fabrication route for “pick and place” type antiparallel diode chip structures employing beamlead interconnects as a part of an ESA supervised lot acceptance testing (LAT) program. This has included qualification of the Chalmers E-beam based GaAs Schottky diode membrane process and statistical on-wafer yield analysis, assembly methods for beamlead type diodes, and pre-qualification activities. The results so far include 96 hours of biased and 500 hours of unbiased high humidity high temperature tests conducted at 85 degrees C and 85 % relative humidity, high temperature tests, total dose tests of up to 2 MRad and bondpull strength tests on representative carriers. The MetOp 118 GHz receiver development is currently in a pre-LAT phase with final LAT program scheduled to the end of 2018.