

# Bead-Pull Results for a W-Band Folded Waveguide Structure and Design of an F-Band Structure

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## ABSTRACT

First attempts to manufacture a w-band folded waveguide with deep X-ray lithography (LIGA) showed that 3-d tapers to couple WR10 waveguides are very difficult. The structure was therefore fabricated by inline milling. The former bead-pull set-up, presented in 2014 [1], has been improved and the results agree now well with simulations, Fig. 1. It is a scalar measurement and the phase is detected in three steps with shorts of different length [1]. Due to the improvements, i.e. increased signal level, averaging and a new bead, we are now able to localize defects like burs and judge the surface quality.

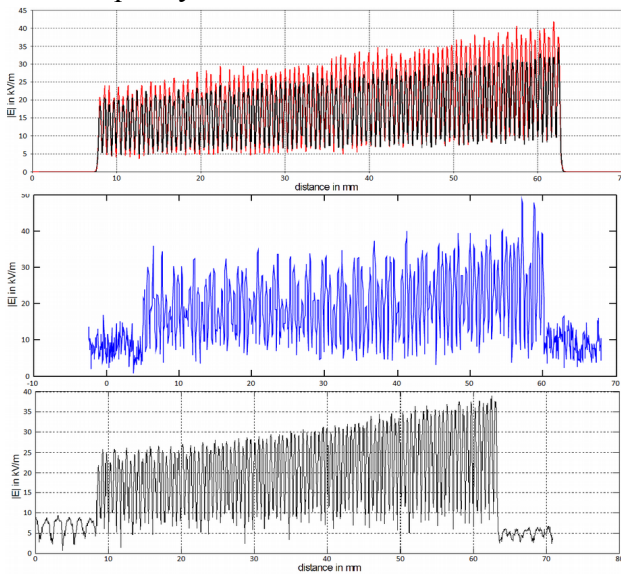


Figure 1: On-axis electric field at 94GHz. Top: Simulation for WR10 (red) and WR8 (black) structure. Center: Former measurement, WR10 structure. Bottom: Improved measurement, WR10 structure.

Because of the difficulties to manufacture a non-planar structure with LIGA, we also decided to design a purely planar f-band structure to accommodate WR8 flanges instead of WR10. The difference is shown in Figure 2. The structures depth is increased from 1.8mm to 2.032mm and the cut-off frequency decreased from 84GHz to 75GHz.

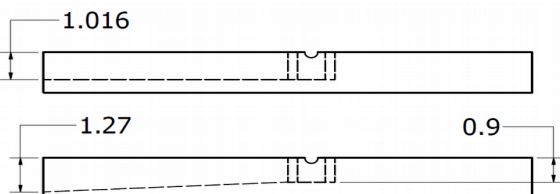


Figure 2: Cross section of taper and structure. Top: WR8 structure. Bottom: WR10 structure.

## References

- [1] H. Büssing, A. Grede, H. Henke: "First Measurements of a W-Band Folded Waveguide RF Structure", ITG IVEW 2014, Bad Honnef, April 2014