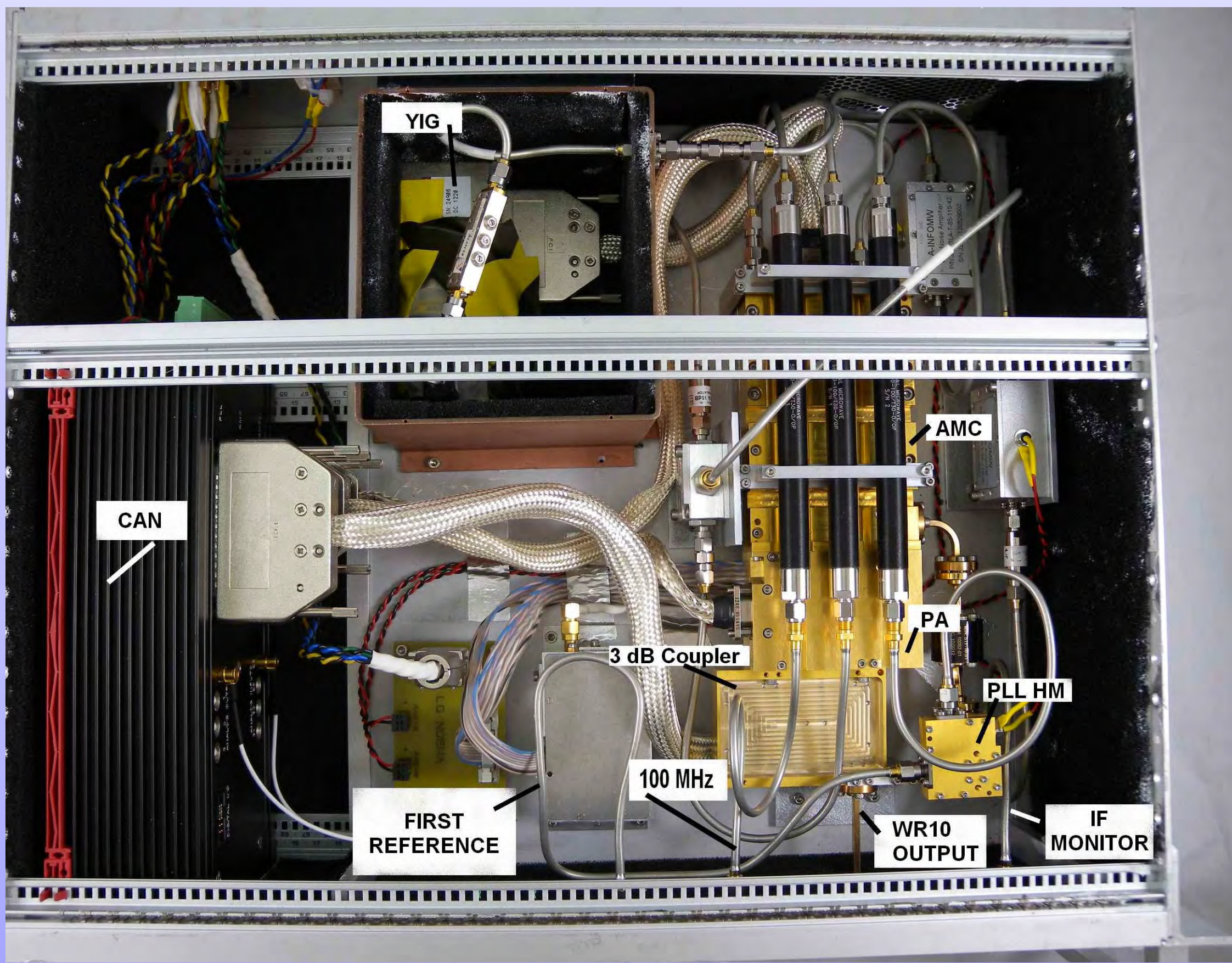
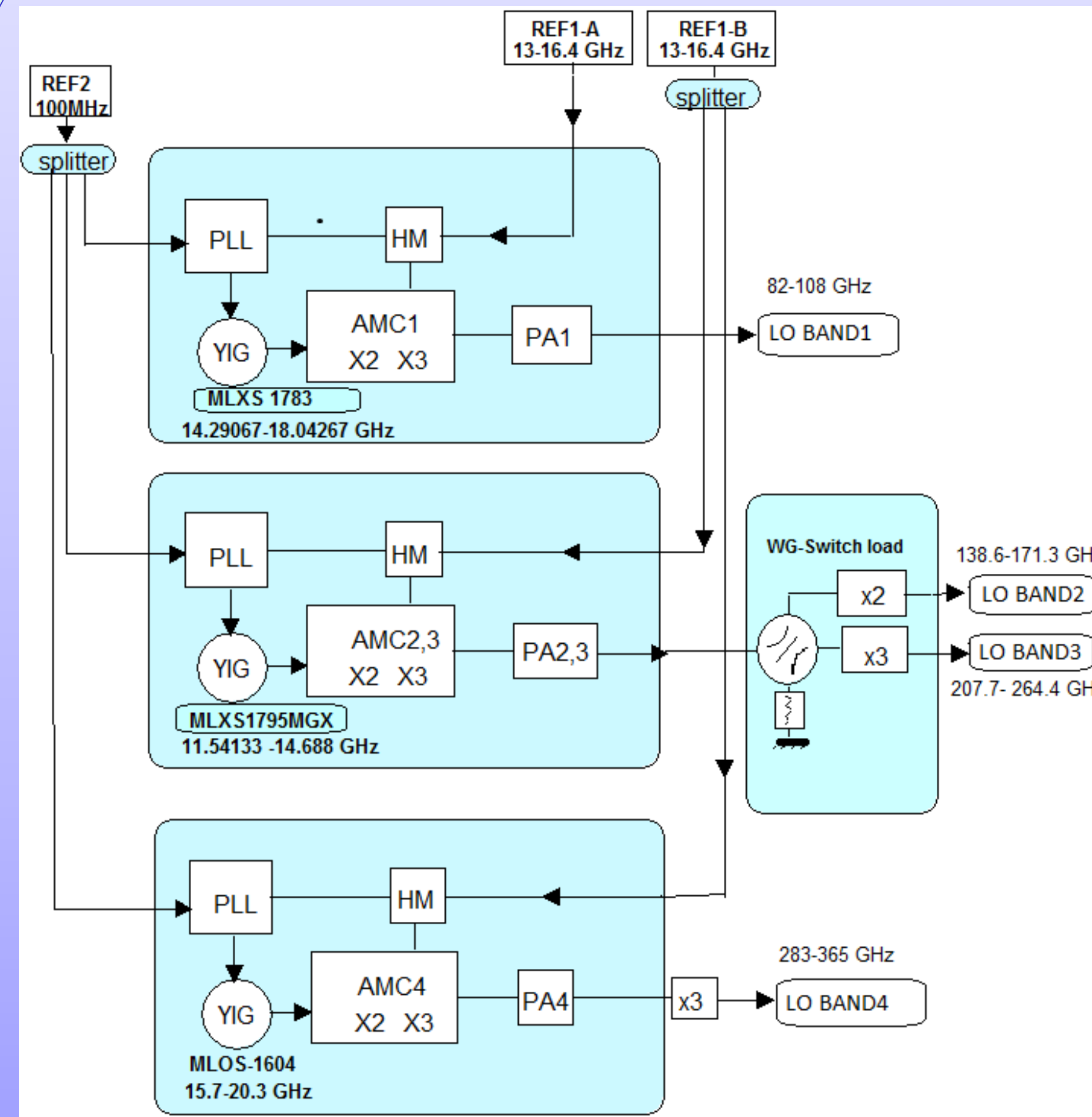


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 \*Contact: mattiocc@iram.fr, phone +33-4-76824932

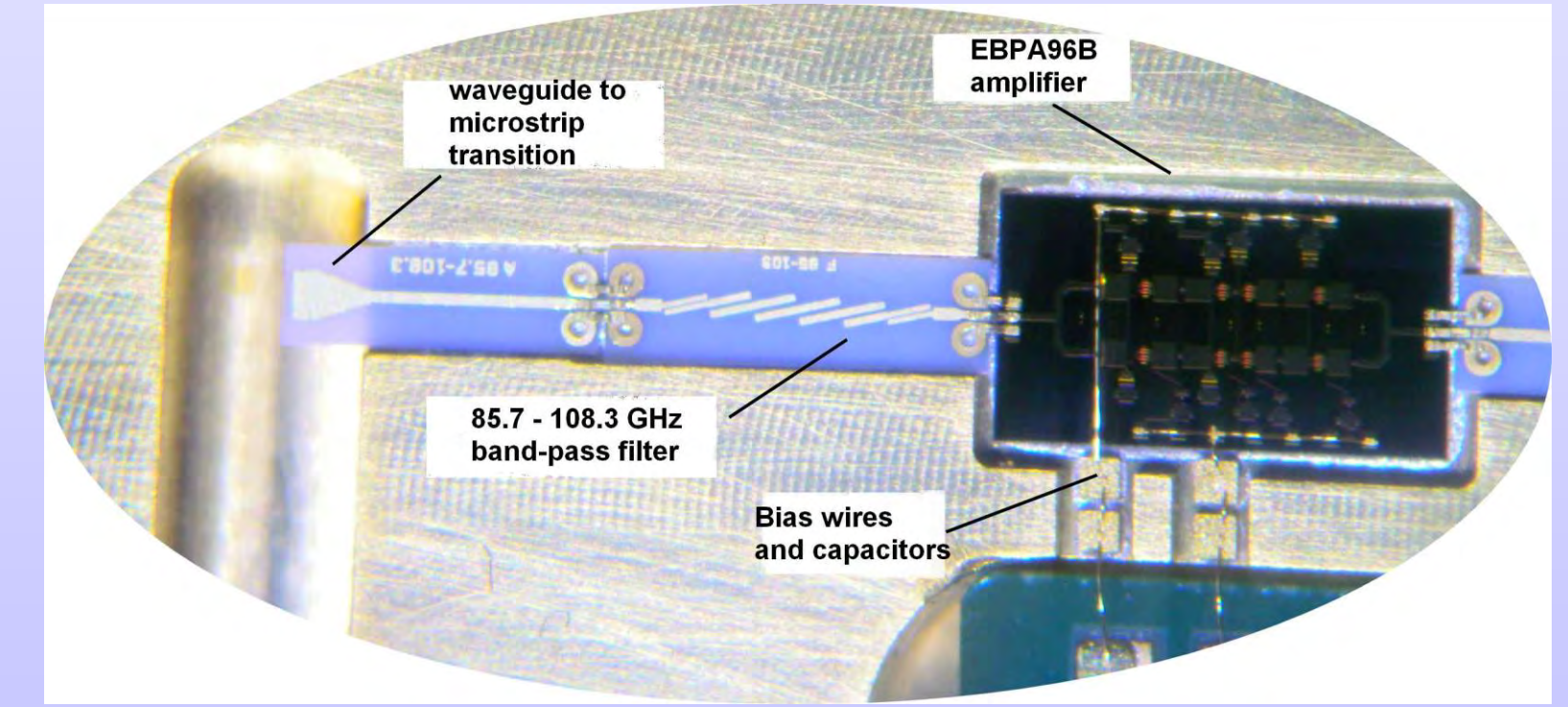
We present the electronically tuned Local Oscillator (LO) system developed at IRAM for the Superconductor-Insulator-Superconductor (SIS) receivers of the Northern Extended Millimeter Array interferometer (NOEMA). The NOEMA LOs cover the frequency ranges 82-108.3 GHz (Band 1), 138.6-171.3 GHz (Band 2), 207.7-264.4 GHz (Band 3), 283-365 GHz (Band 4). The NOEMA LO system employs commercially available MMICs and GaAs millimeter MMICs from NRAO which are micro-assembled into Active Multiplied Chain (AMC) and Power Amplifier (PA) modules.



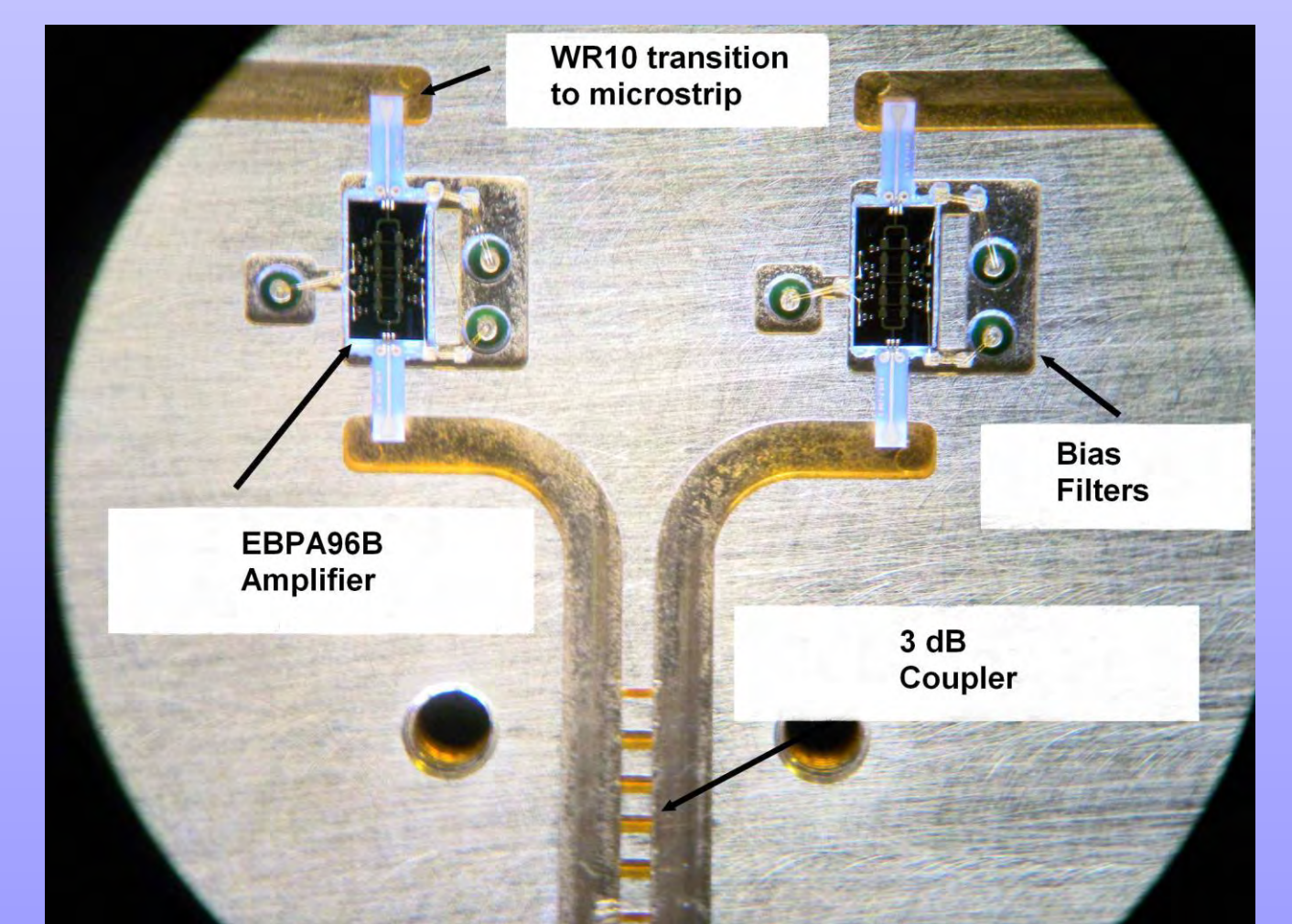
Typical NOEMA LO Rack



Synoptic of future all electronic LO system for NOEMA

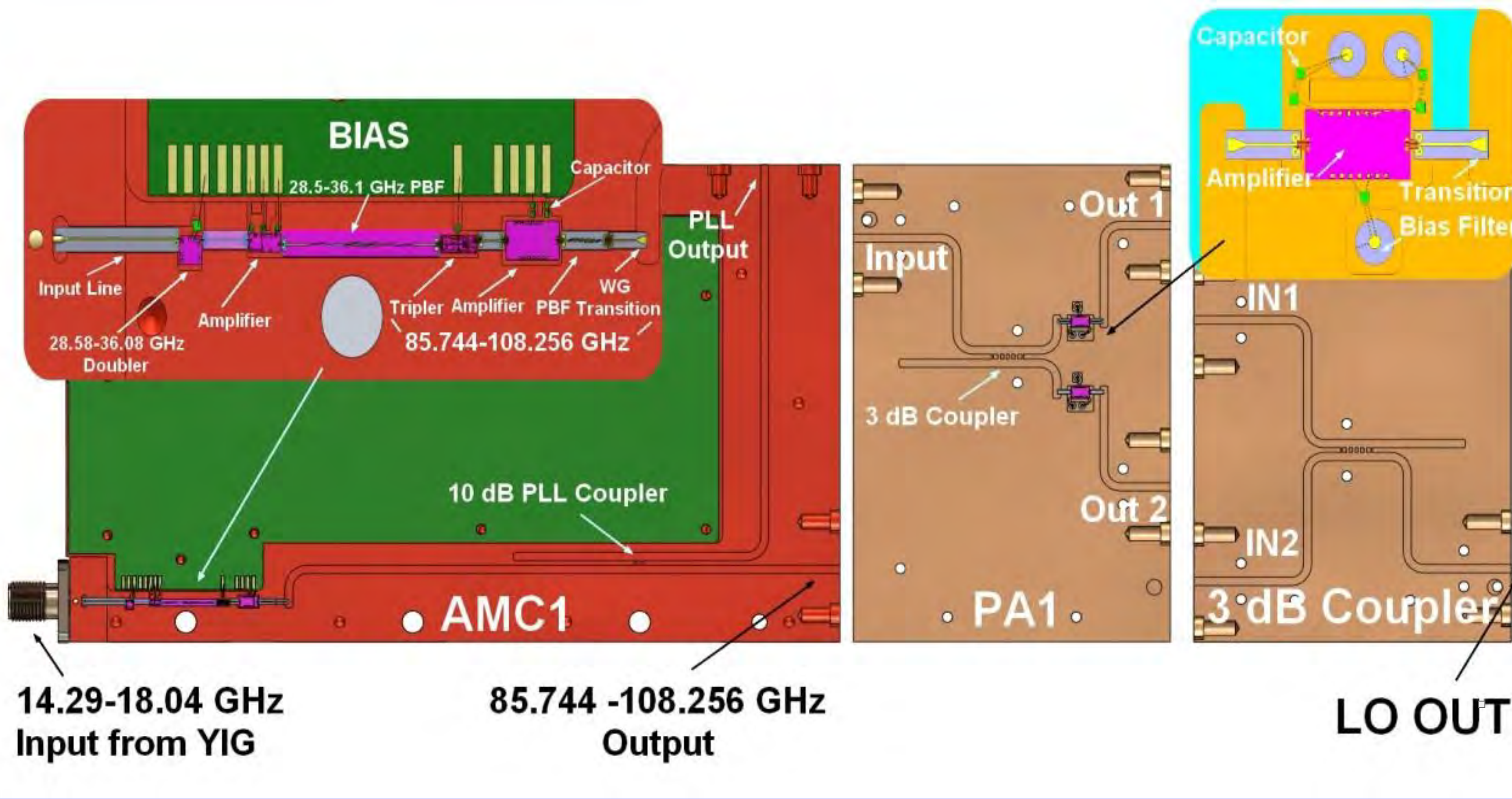


Part of the AMC1 microassembly

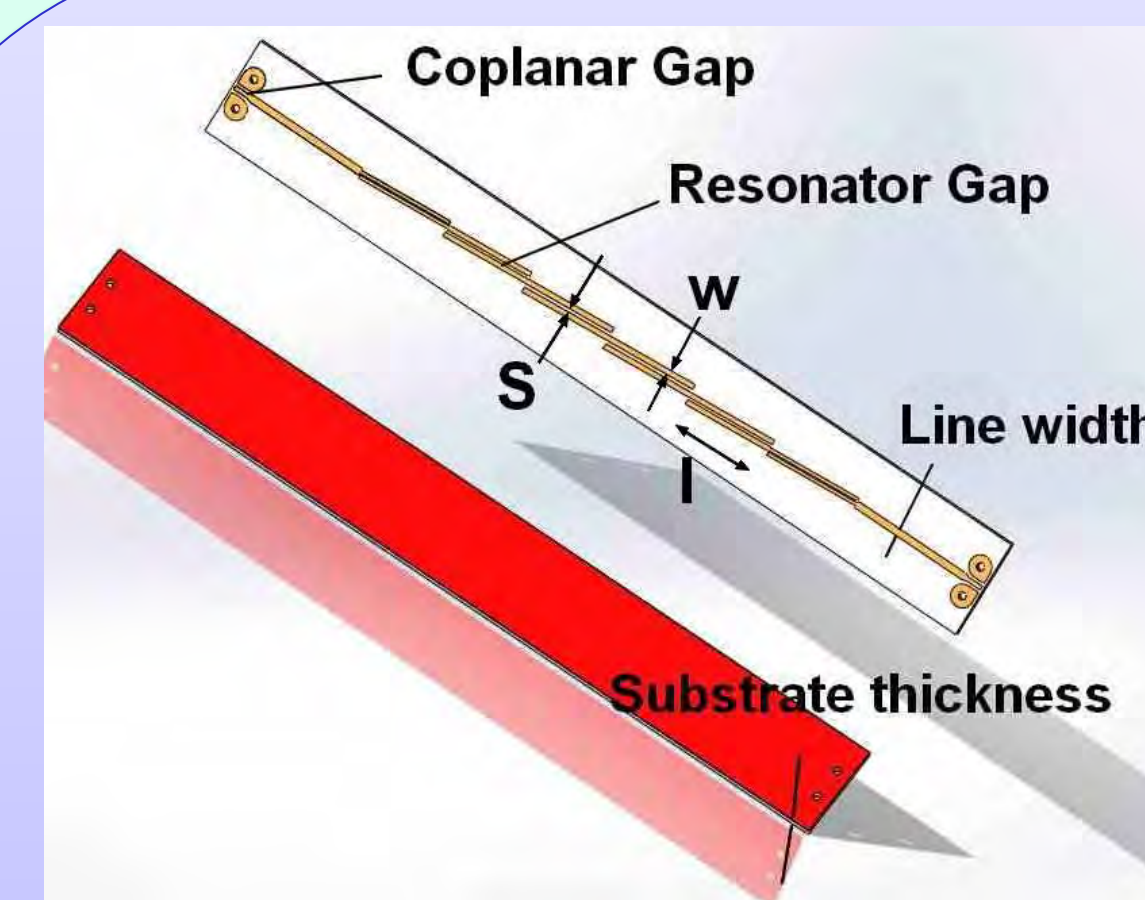


Part of the PA1 microassembly

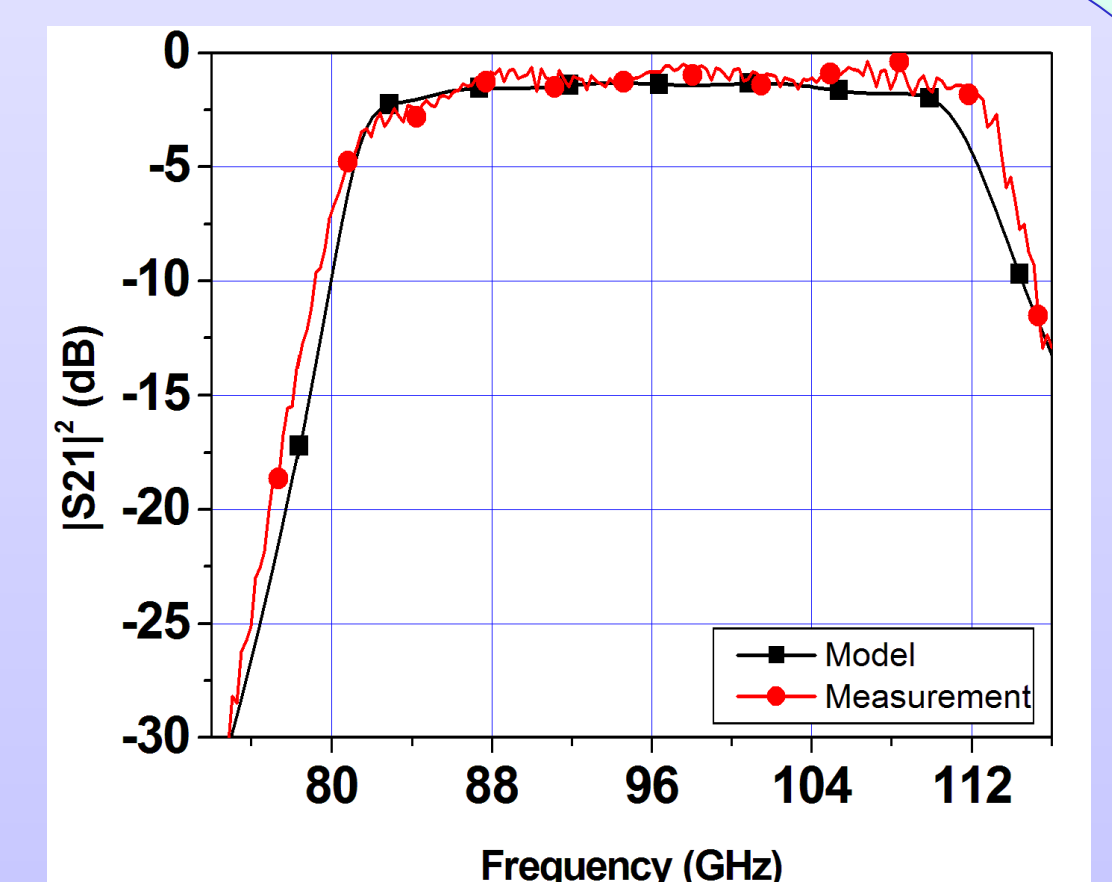
The LO system use three independent commercial YIG oscillators (MLXS-1783, MLXS-1795 and MLOS-1604) an Active Multiplier Chain (AMC) module a Power Amplifier (PA) module and 3 dB hybrid coupler module. The YIGs of the LO system are locked to a 13-16.4 GHz first reference and a 100 MHz second reference.



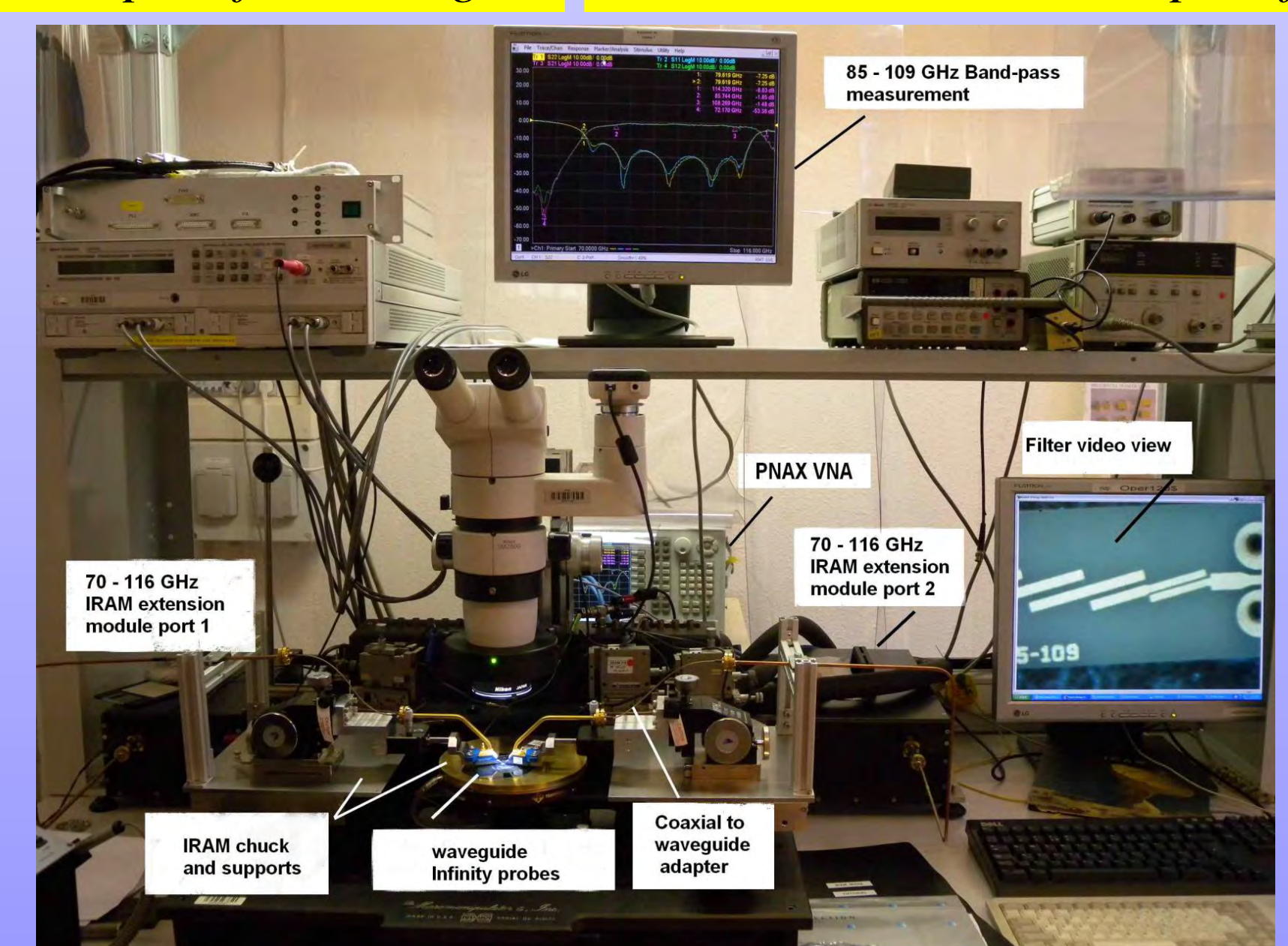
Active Multiplier Chain (AMC), Power Amplifier (PA) and 3 dB hybrid coupler modules which are part of the NOEMA LO system. Design details of the multiplication chain microassembly of the AMC1 (used in the NOEMA Band 1 LO) are shown on the inset on the top left. Details of the 3 mm band MMIC micro-assembly of the PA1 to be used in a future 3 mm multibeam receiver LO, are shown on the inset on the top right.



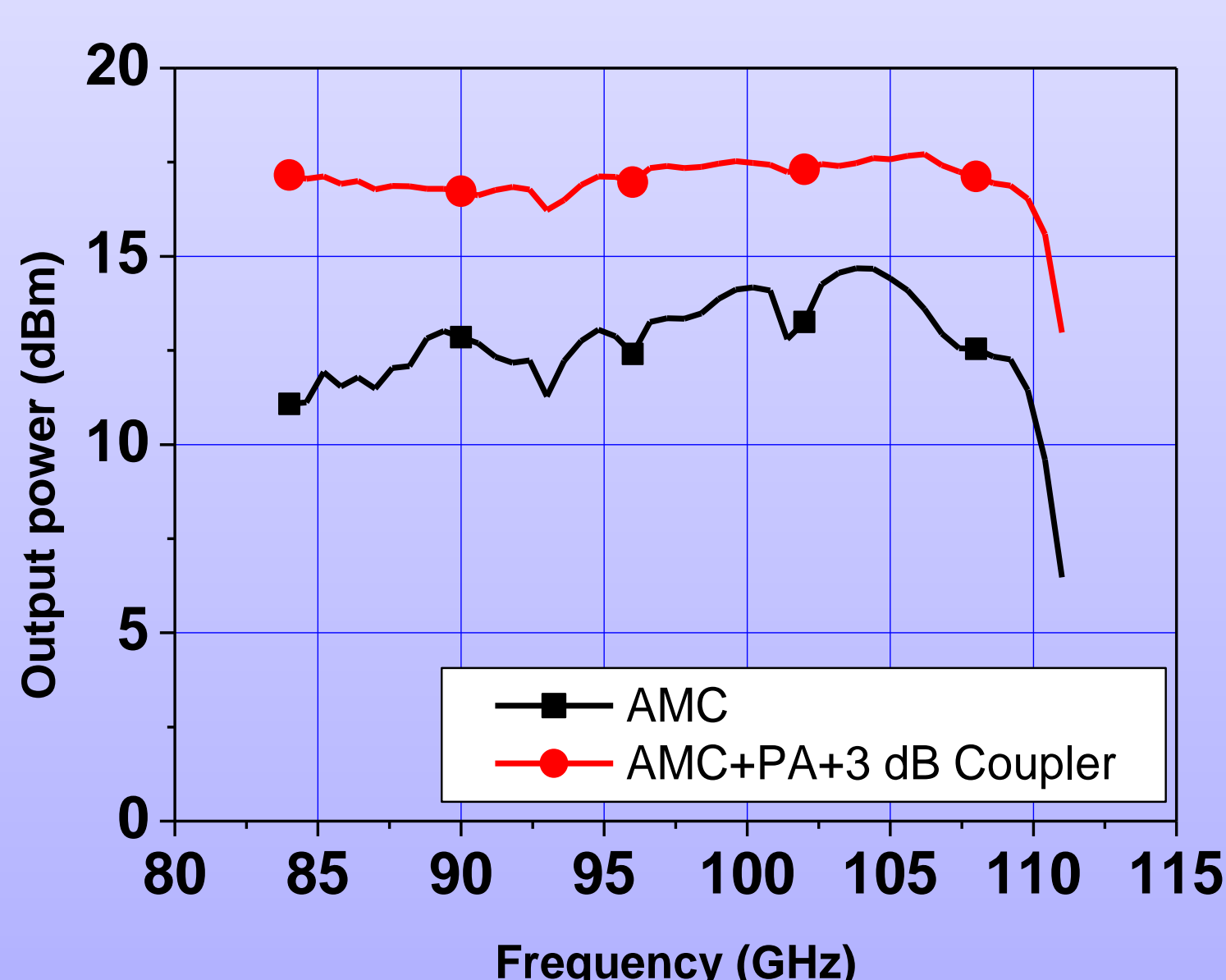
AMC bandpass filter design.



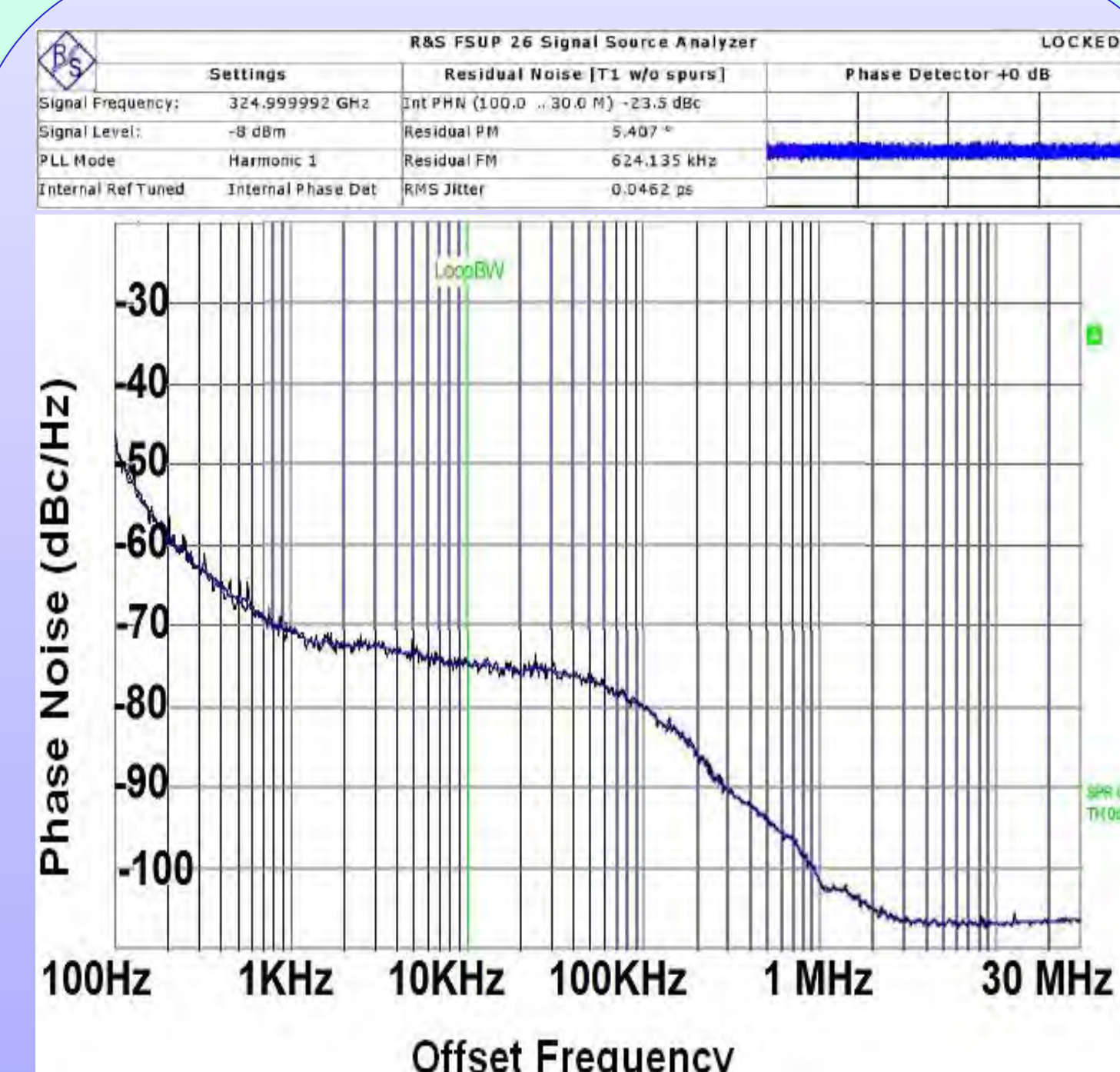
84-109 GHz AMC1 bandpass filter response.



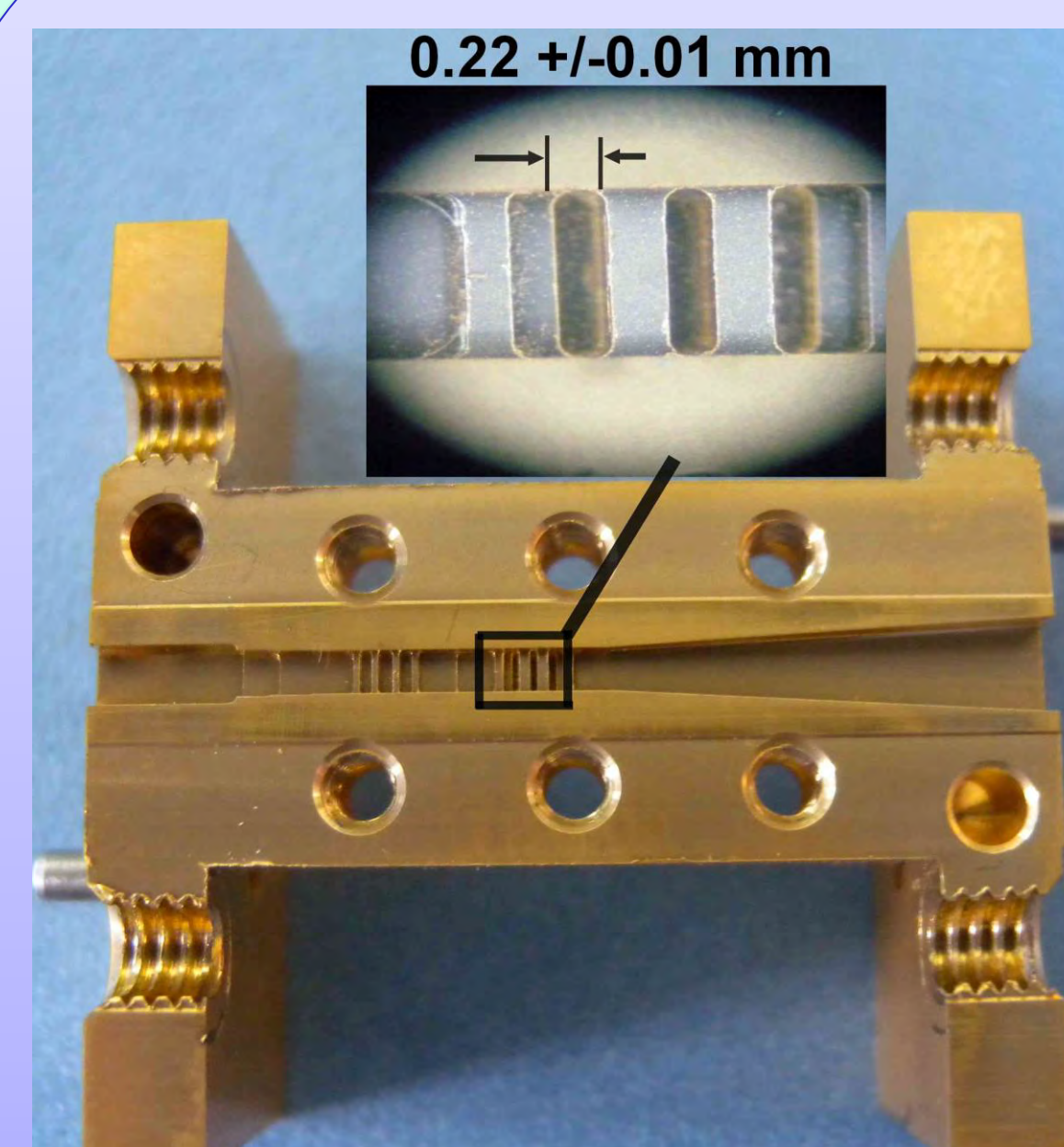
Filter test with the IRAM MVNA.



LO Band 1 output power with and without the PA module and the 3 dB coupler.



LO Band 4 phase noise measured at 325 GHz with a R&S FSUP (5° rms integrated between 100 Hz and 30 MHz).



LO Band 2 harmonic filter (left). Comparison of 3D electromagnetic simulation and measured response of filter (right). Measurements were performed across 132-375 GHz with the IRAM MVNA and prober developed in-house.

