# Quad-Ridged Feed Horn Prototype

## Intro:

This document describes the initial results and tests for the QRFH prototype that was installed on antenna 1C in Feb 2025. It includes pictures of the assembly, LNA settings, Cool-down performance, Focus tests, and Tsys, Measurement.

## 1. Assembly of the QRFH Prototype

## 2. LNA settings

The Low Noise Factory LNAs used in the QRFH operate from 0.3GHz to 14GHz (LNF-LNC0.3\_14B). They are designed to operate down to a temperature of 4 Kelvin. In our case we operate them at around 85 Kelvin, hence we adjust the biasing current to compensate for it. Each LNA comes with its unique bias values, in our case we have the following values:

X pol LNA (4332H) Y pol LNA (4270H)

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For the initial testing we set the following bias values:

X-pol: Y-pol:

vd 1.2 vd 1.0

id 20.3 id 16.6

vg 1.56 vg 1.6

## 3. Cool-down and heat load results

The QRFH prototype was cooled down using the default configuration of the feed control board. The controller will operate the cryocooler at a constant power of 70W until the diode temp sensor located close to the front of the QRFH reaches a temperature of 130K. It then

## 4. Raster Scan and Focus Tests

## 5. Tsys Measurement

The Tsys measurement was done by pointing the antenna to the default location (AZ=330 EL=23), and by putting a flat absorber in front of the vacuum window. Based on the weather conditions during the time of the measurement we estimate a cold temperature of 16 Kelvin.

The absorber temperature was measured before and after the recording of the hot spectrum, its temperature was 285 Kelvin.

Here is a plot of the return loss of the feed measured with a VNA:

A graph showing different colored lines

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@Alex, check sensitivity at 1.37GHz

Tsys and Spectra for QRFH Prototype 2:

A graph of a system

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Comparison between Tsys and Spectra for QRFH Prototype 2 and Log-Periodic Feed (2a):

A graph of a system

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A graph of different colored lines

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Comparison between Tsys and Spectra for QRFH Prototype 2 and 1:

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