

MWA Memo
MWA LNA Stability
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Introduction

The MWA active antenna LNA uses the ATF-54143 which is not an un-conditionally stable part. The LNA design is observed under several different conditions to verify that it achieves stability. In these tests two different LNA boards were tested with similar results.

LNA with Antenna Elements Attached

The LNA uses a 10k feedback resistor, as well as low source inductance (multiple ground vias) to achieve stability. The following plots were done in the control room at Haystack Observatory where there are plenty of strong, broadband signals. These plots were done with the MWA bowtie elements attached to the input of the LNA. The first plot is the output spectrum from 0-2.5GHz and the second plot is the output spectrum 2-22GHz and there is no evidence of oscillation.

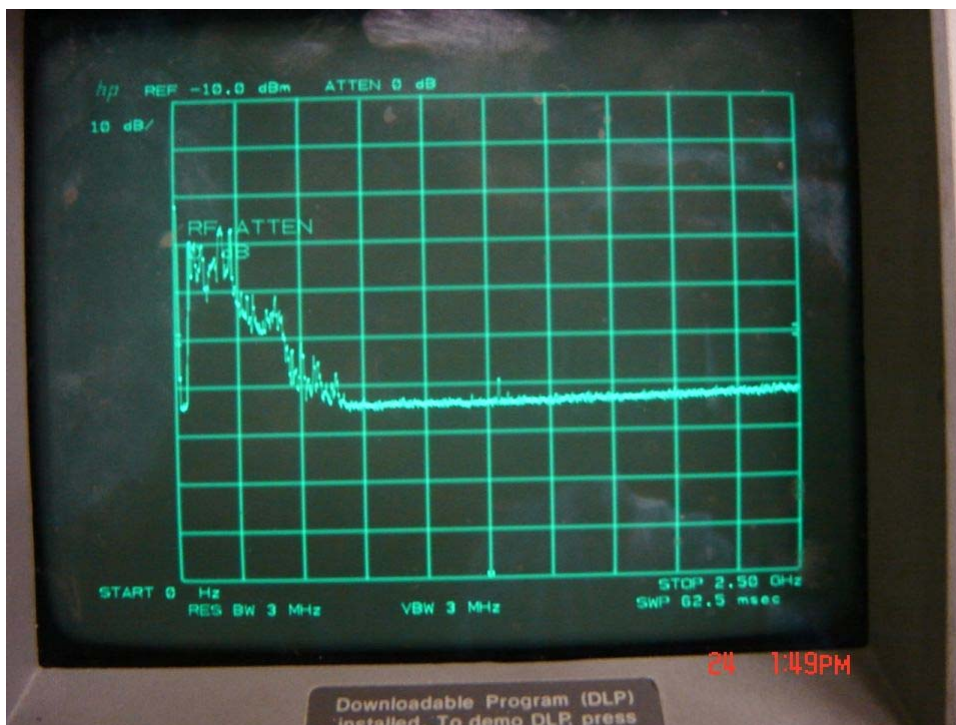


Figure 1. 0-2.5GHz w/ elements attached.

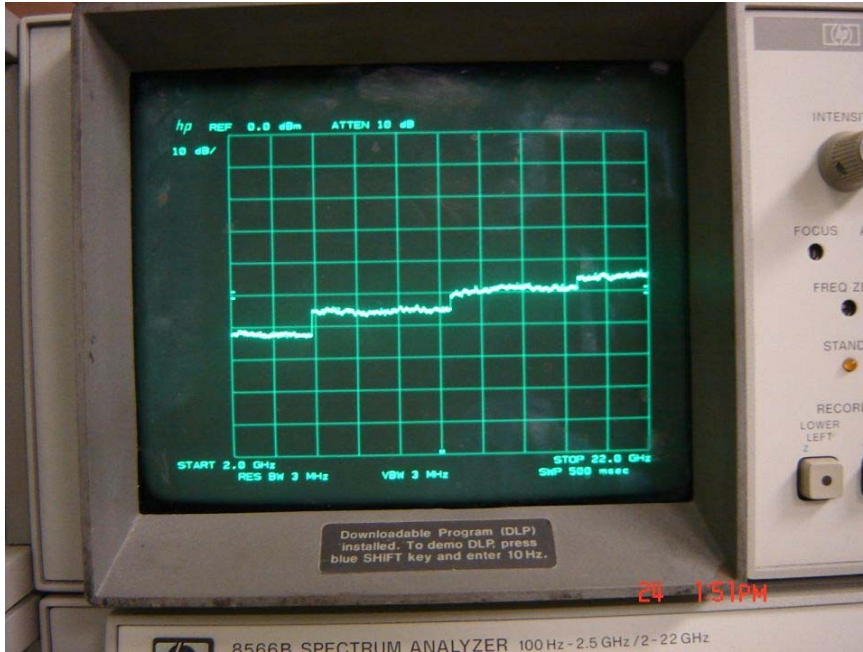


Figure 2. 2-22GHz w/ elements attached.

LNA with inputs opened

The LNA inputs were disconnected from the antenna elements and left open to change the input impedance that the LNA sees. There is no evidence for oscillation.

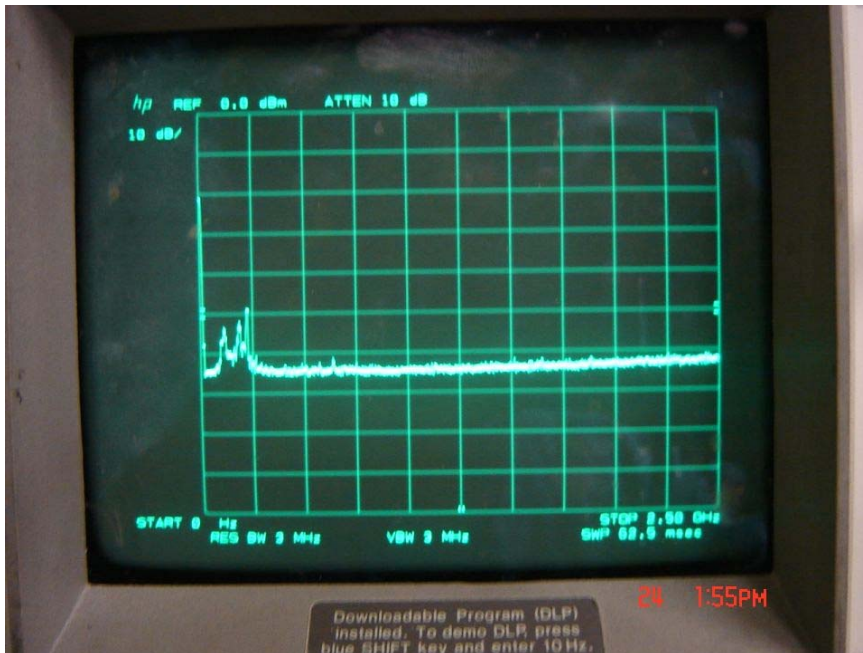


Figure 3. 0-2.5GHz w/ inputs opened.

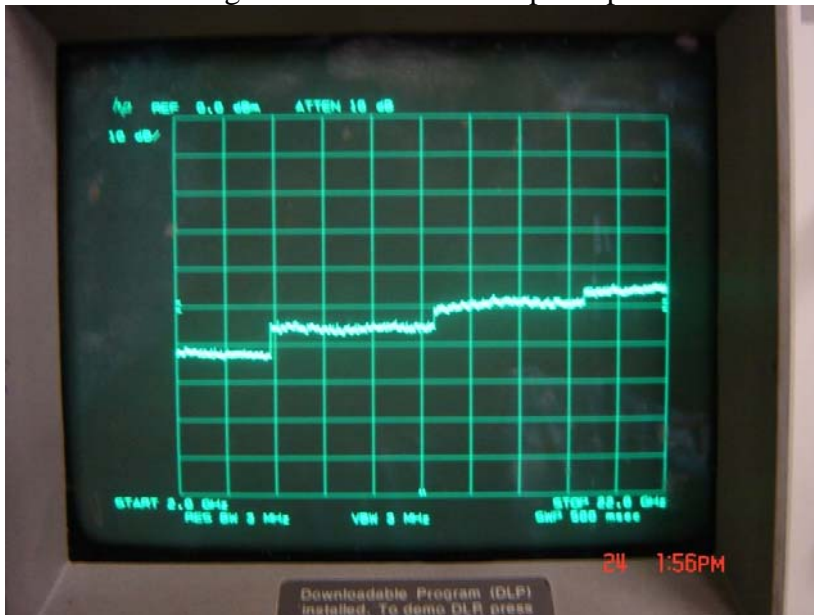


Figure 4. 2-22GHz w/ inputs opened.

LNA with Inputs Shorted

To further perturb the input impedance the inputs were shorted together. There is no evidence of oscillation.

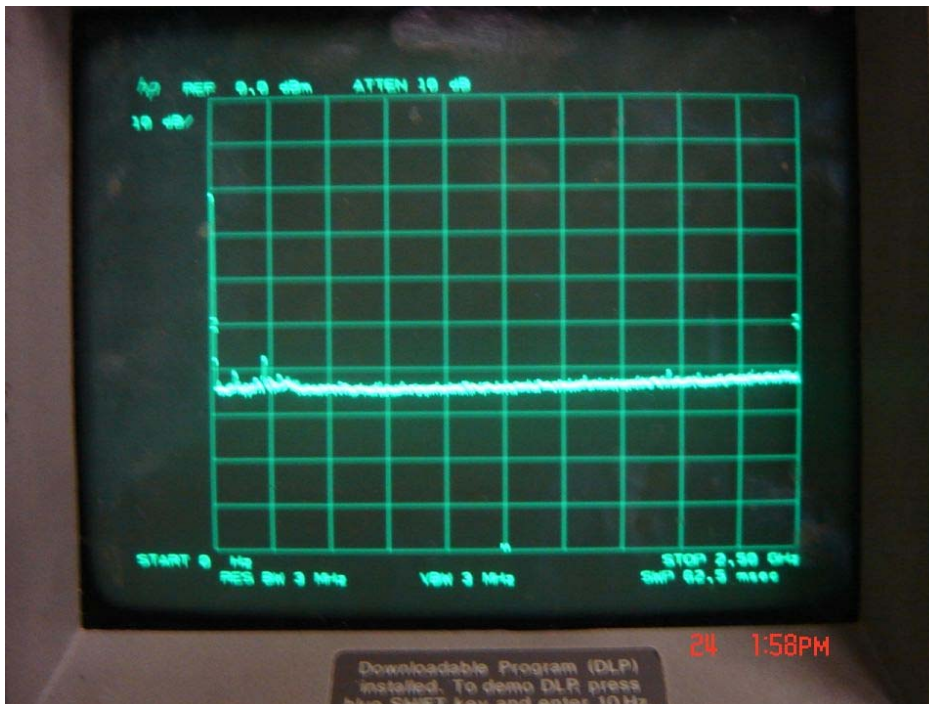


Figure 5. 0-2.5GHz w/ inputs shorted.



Figure 6. 2-22GHz w/ inputs shorted.