

Hardware Report: SANT

Prepared for:

SANT17

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1 Scope

This report covers the test results of the S-band patch antenna (SANT) with the serial number: SANT17. The antenna was subjected to comprehensive testing inside an anechoic chamber. The antenna was designed and optimized to be mounted on a 3U CubeSat structure, specifically, at the centre of one of the 300 x 100 mm panels. The measured results under heading 4 are based on this configuration. As requested by the customer, hereafter referred to as the user, CAD simulations were also performed to compare the users intended mounting of the antenna, with the ideal design for a 3U satellite. The results of these simulations are shown under heading 3.

2 SANT Specifications

A summary of the most important specifications for SANT17 are given in Table 1.

Specification	
Serial Number	SANT17
Frequency Range	2.4 GHz – 2.45 GHz
Polarisation	Left Hand Circular
Connector	SMA Female Right Angle
Weight	35 g

Table 1: SANT17 Specifications

3 Simulated Results

The results found in this section are the simulated results comparing the ideal 3U design with the users design. The particular parameters that were compared are Reflection Coefficient (S_{11}), antenna polarization and the antenna gain. Figure 1 shows the CAD model used in the simulations for the users intended mounting of the antenna.

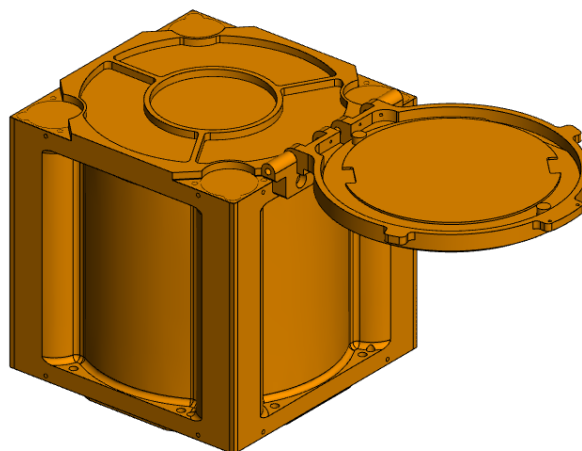


Figure 1: Users Intended Mounting Configuration

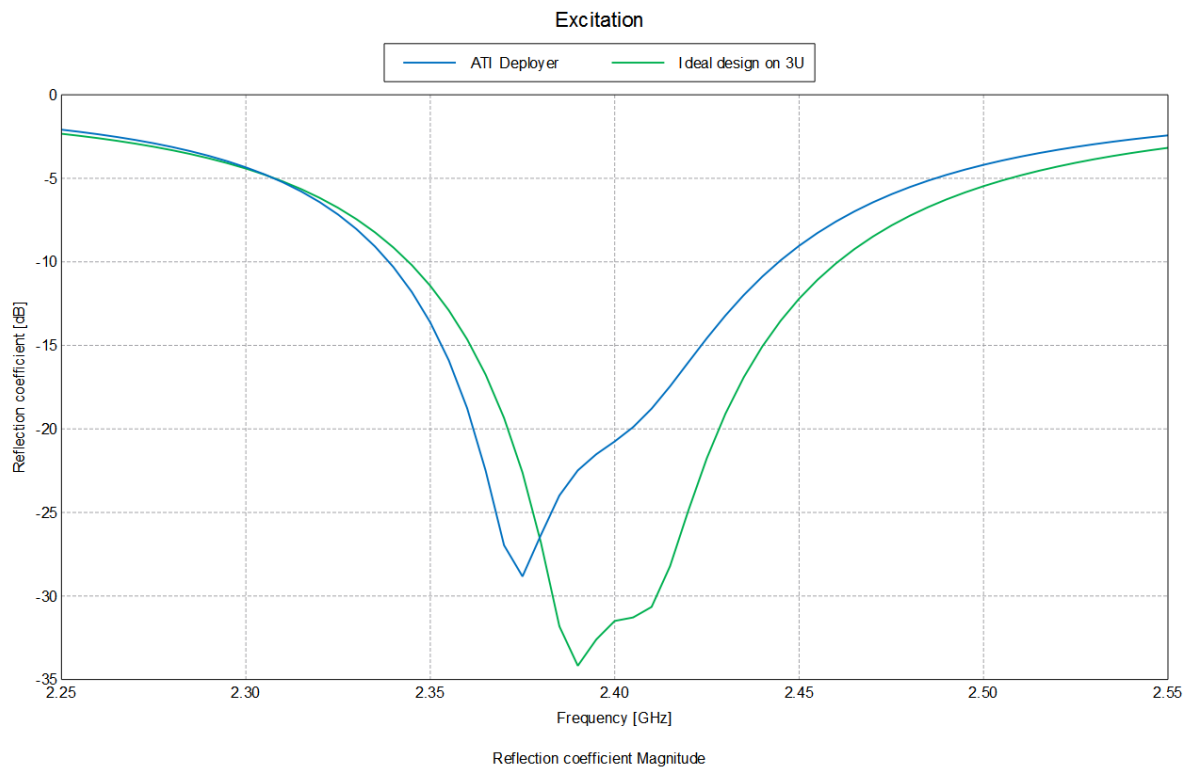


Figure 2: Simulated Reflection Coefficient (S₁₁)

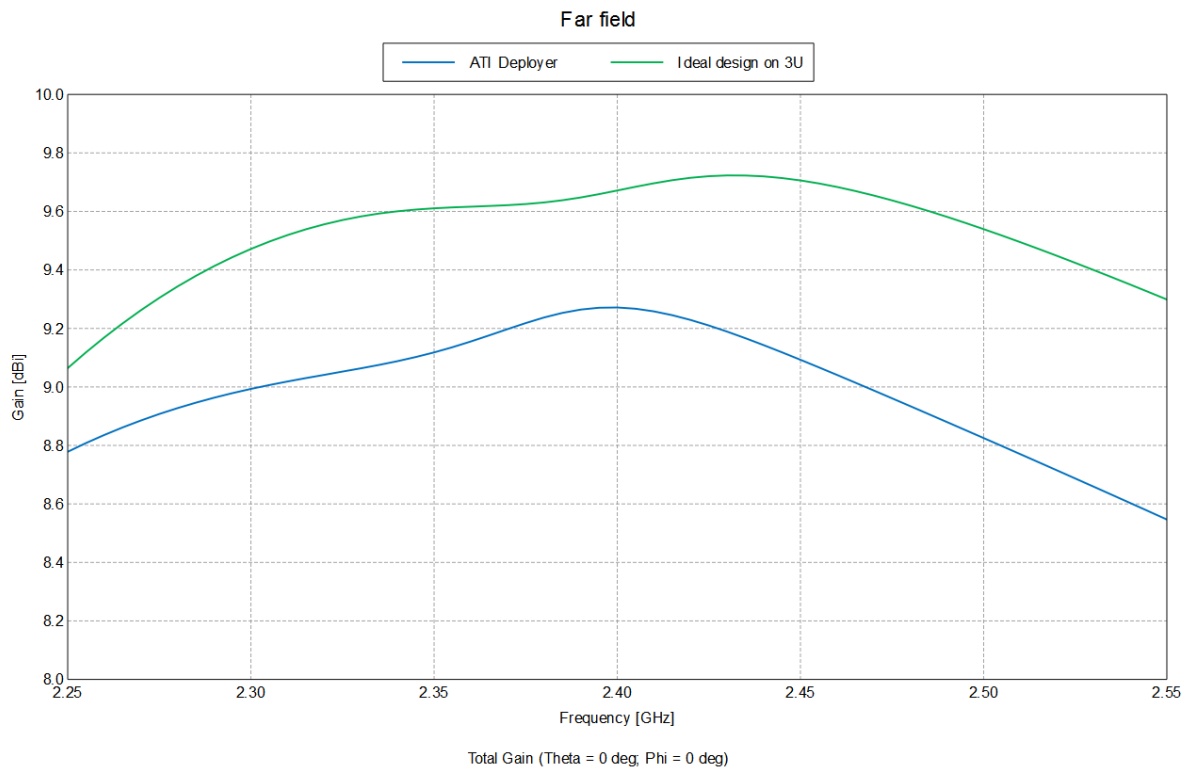


Figure 3: Simulated Gain

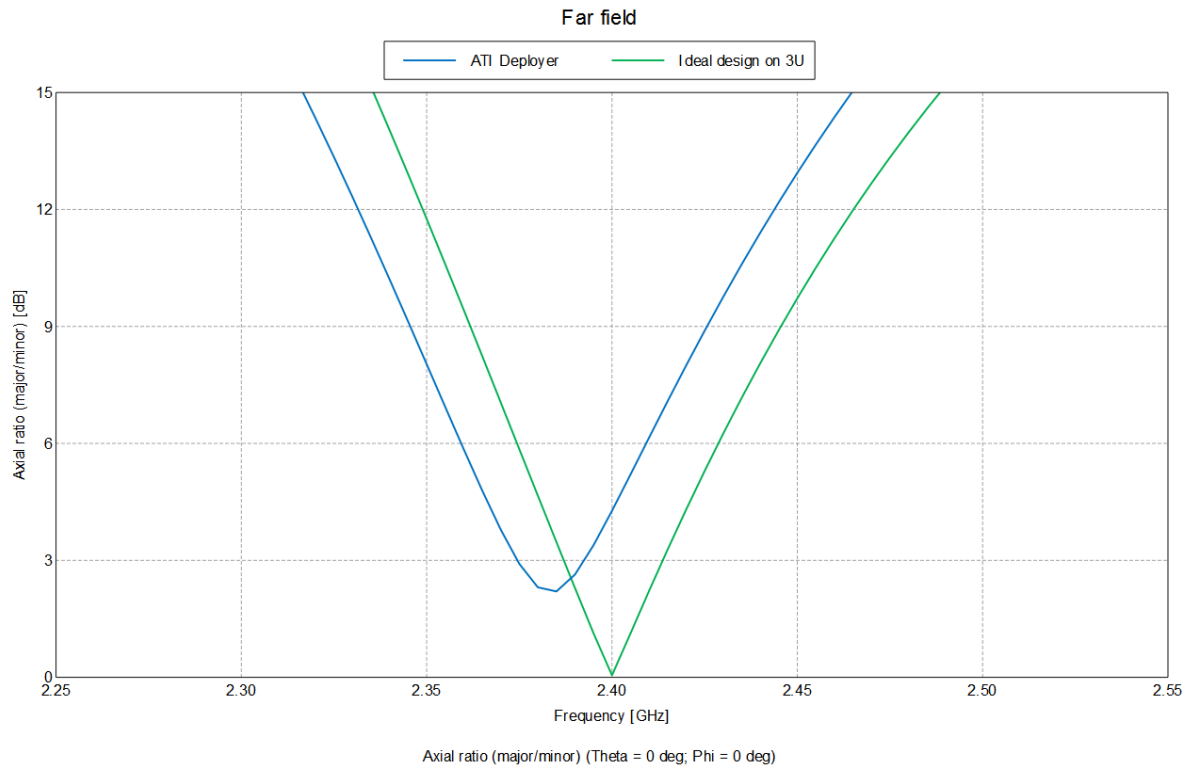


Figure 4: Simulated Axial Ratio

4 Measured Results

As stated, the antenna was fully characterised inside an anechoic chamber. The antenna was measured according to the ideal 3U mounting configuration. The particular parameters measured were Reflection Coefficient (S_{11}), antenna polarization, the antenna radiation patterns and the antenna gain. The antenna gain measurement was performed using the three antenna measurement method. A NSI-RF-GRP10 horn probe and a Marconi horn antenna were used in combination with the SANT to perform the gain measurement.

A summary of the measured results are given in Table 2 and the figures below.

Parameter	Measured Values		
	2.4 GHz	2.425 GHz	2.45 GHz
S_{11}	-14.5 dB	-13.5 dB	-11.27 dB
Axial Ratio	-3.983 dB	-1.925 dB	-4.233 dB
Gain	7.97 dB	7.94 dB	8.12 dB

Table 2: Measured Results Summary

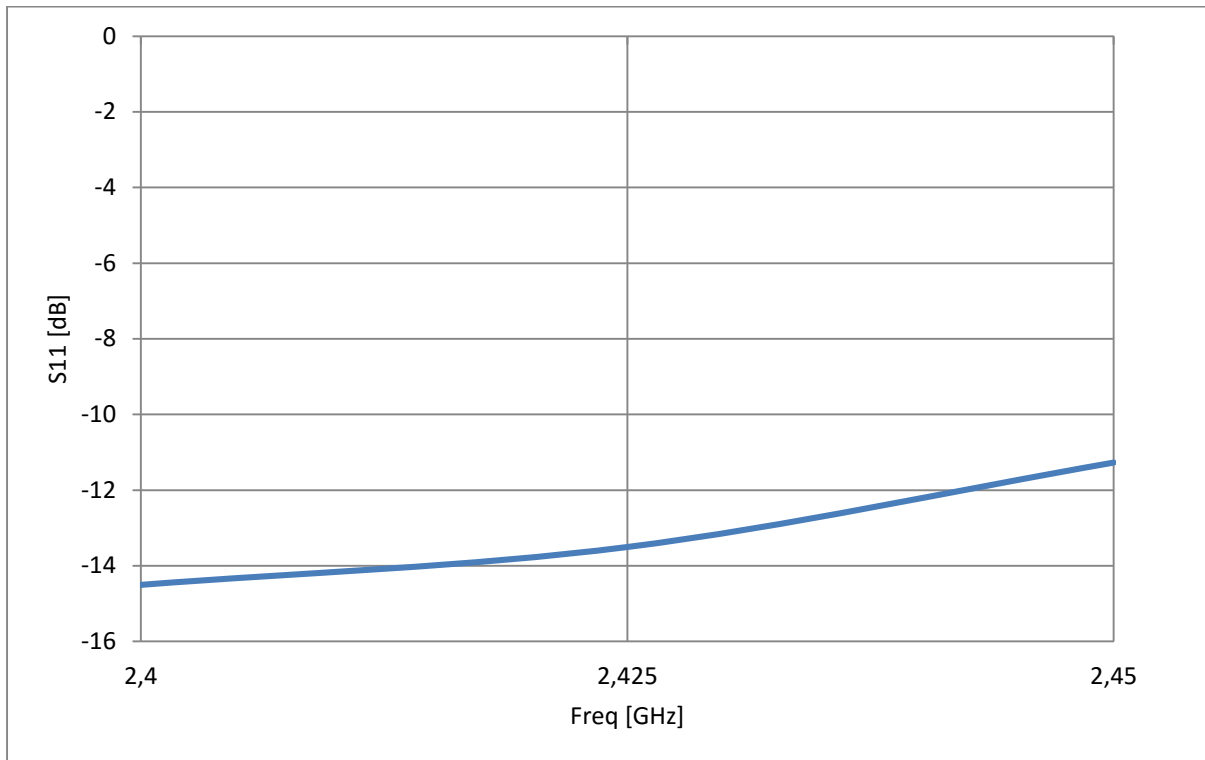


Figure 5: Measured Reflection Coefficient (S_{11})

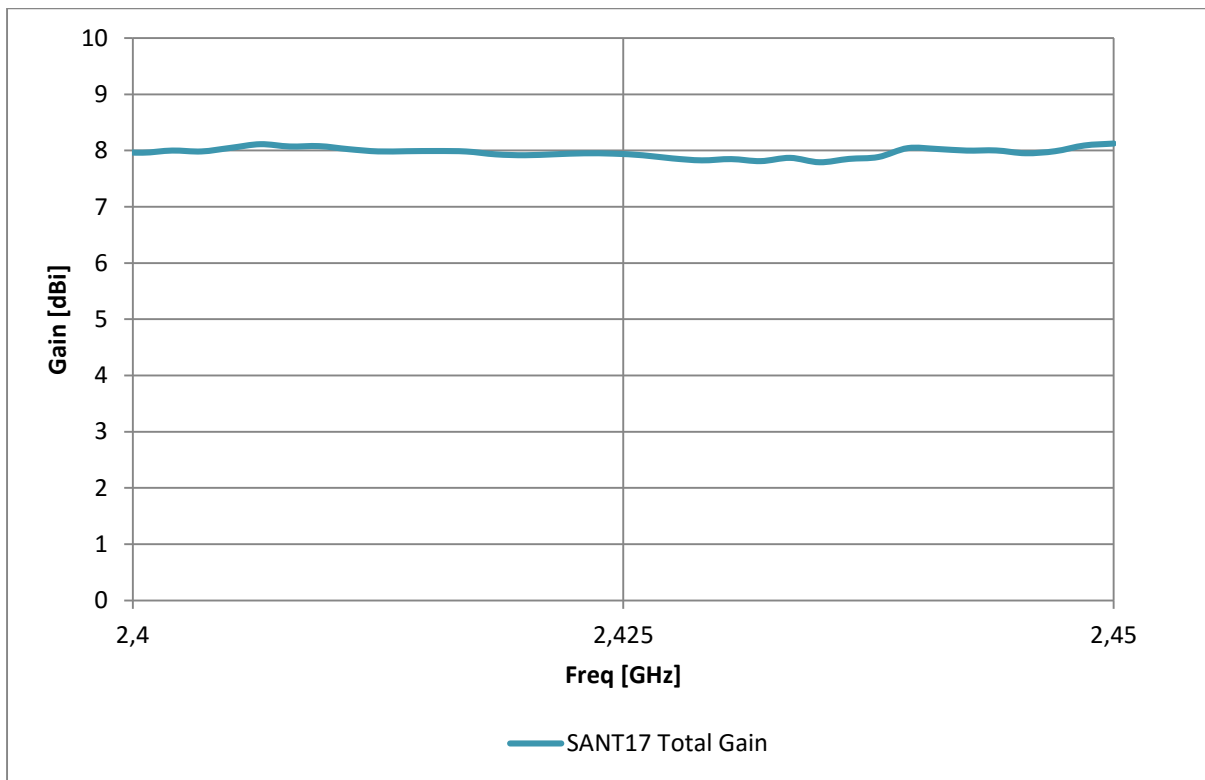


Figure 6: Measured Gain

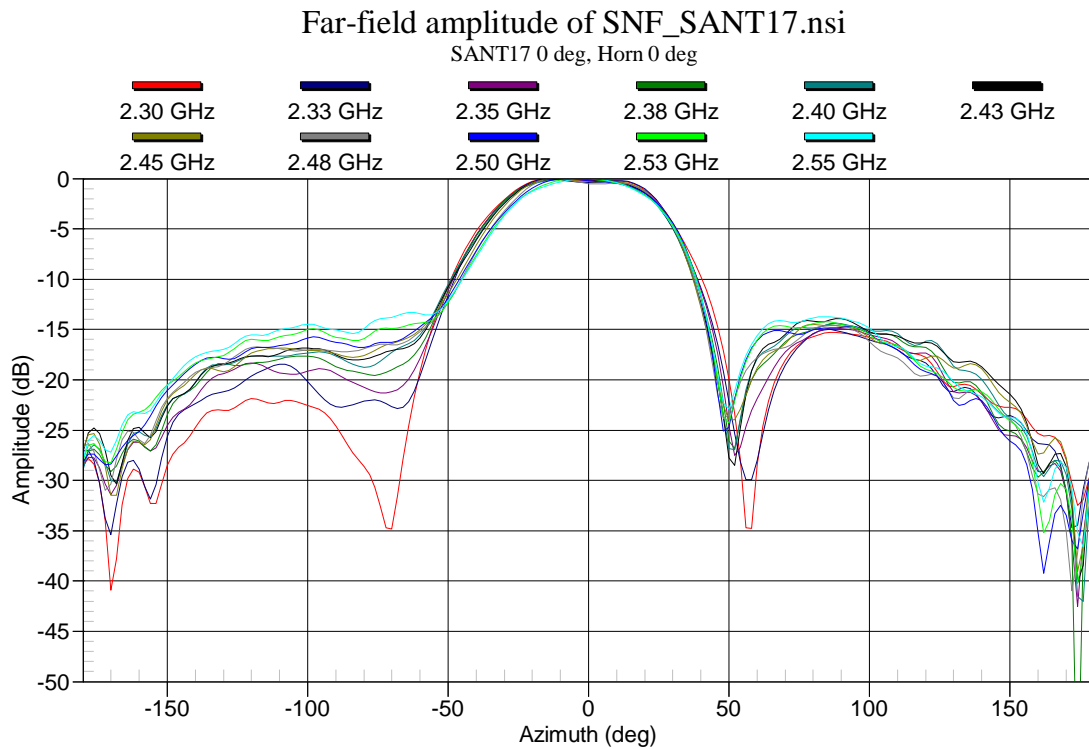


Figure 7: Far Field Pattern - SANT Horizontally Aligned, HORN Antenna Horizontally Aligned

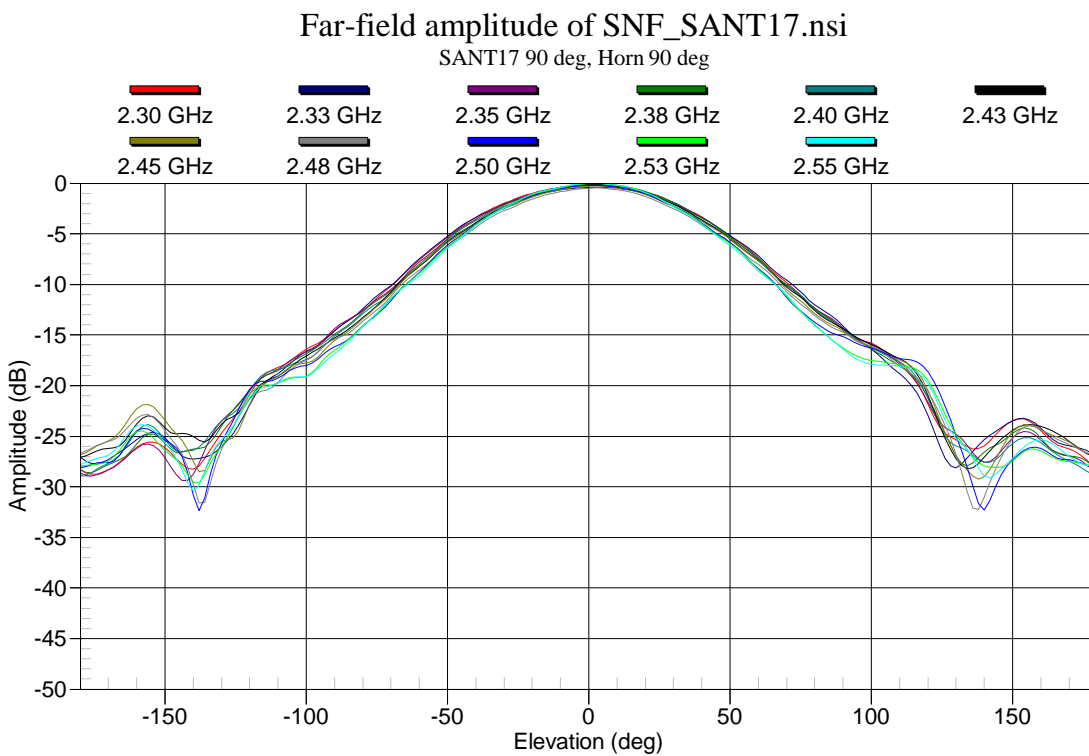


Figure 8: Far Field Pattern - SANT Vertically Aligned, HORN Antenna Vertically Aligned

The beam width of SANT17 is approximately 60 degrees within its operating frequency range.

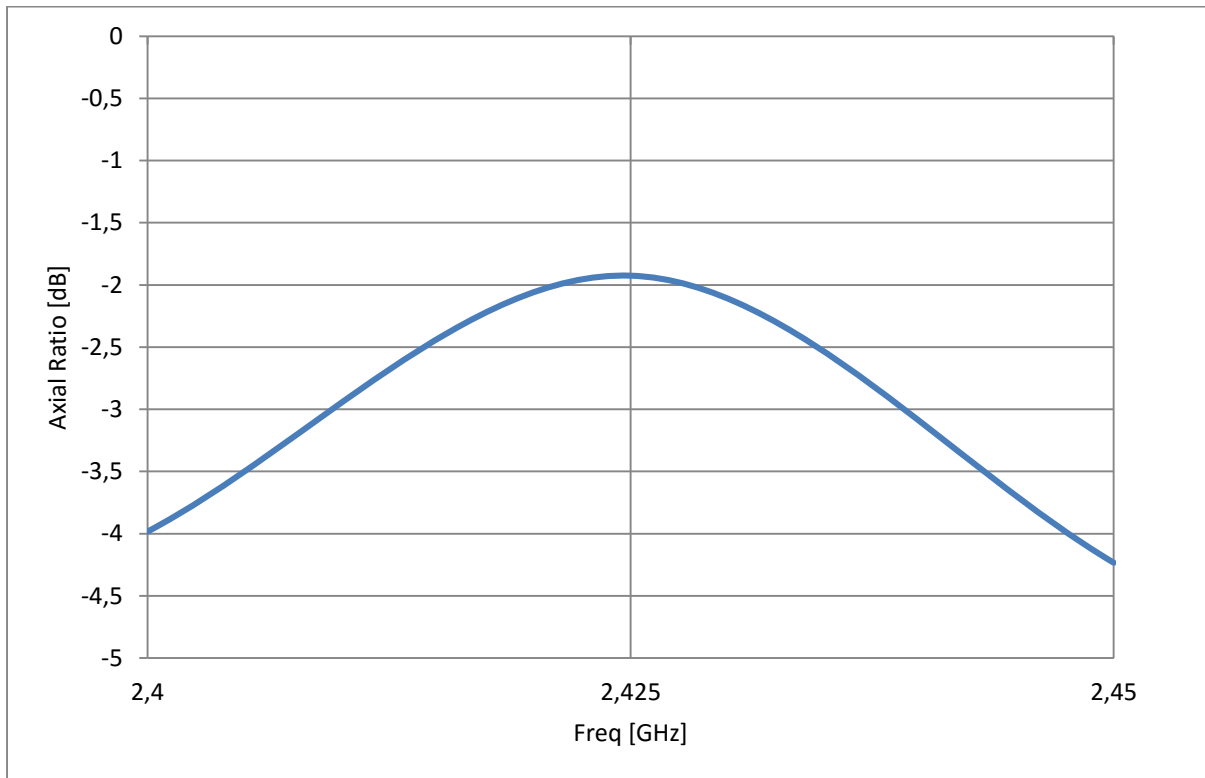


Figure 9: Measured Axial Ratio