Edge AI RIC 312 Antenna Description

2.4 GHz Bluetooth antenna

The Bluetooth 2.4 GHz antenna is a bowtie (butterfly).

The effective peak gain of the antenna in the assembled DUT is nominally 1.4 dBi (see calculations on page 6).

Date of antenna pattern measurement: March 13, 2024

Figure 1 2.4 GHz Antenna (scale in mm)

Three-dimensional pattern (scale in dBm noted)

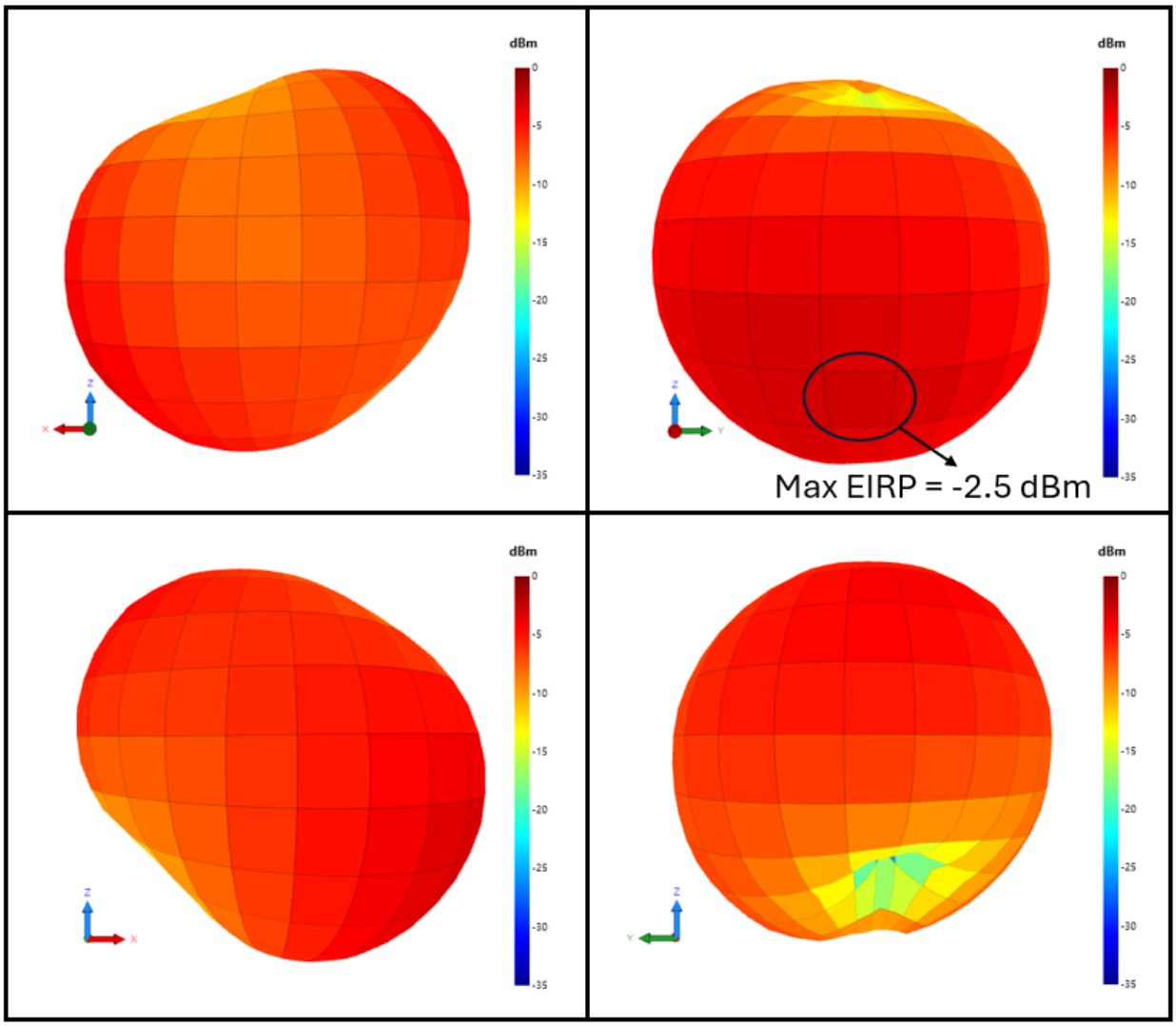
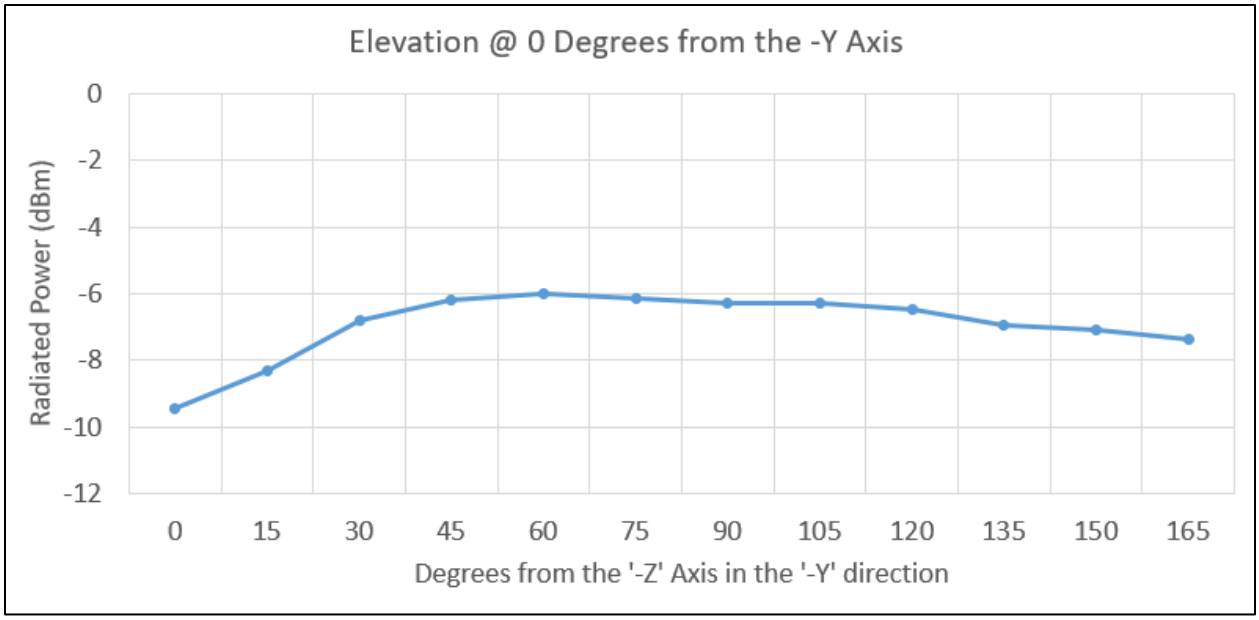


Figure 2a 3-Dimensional Antenna Pattern



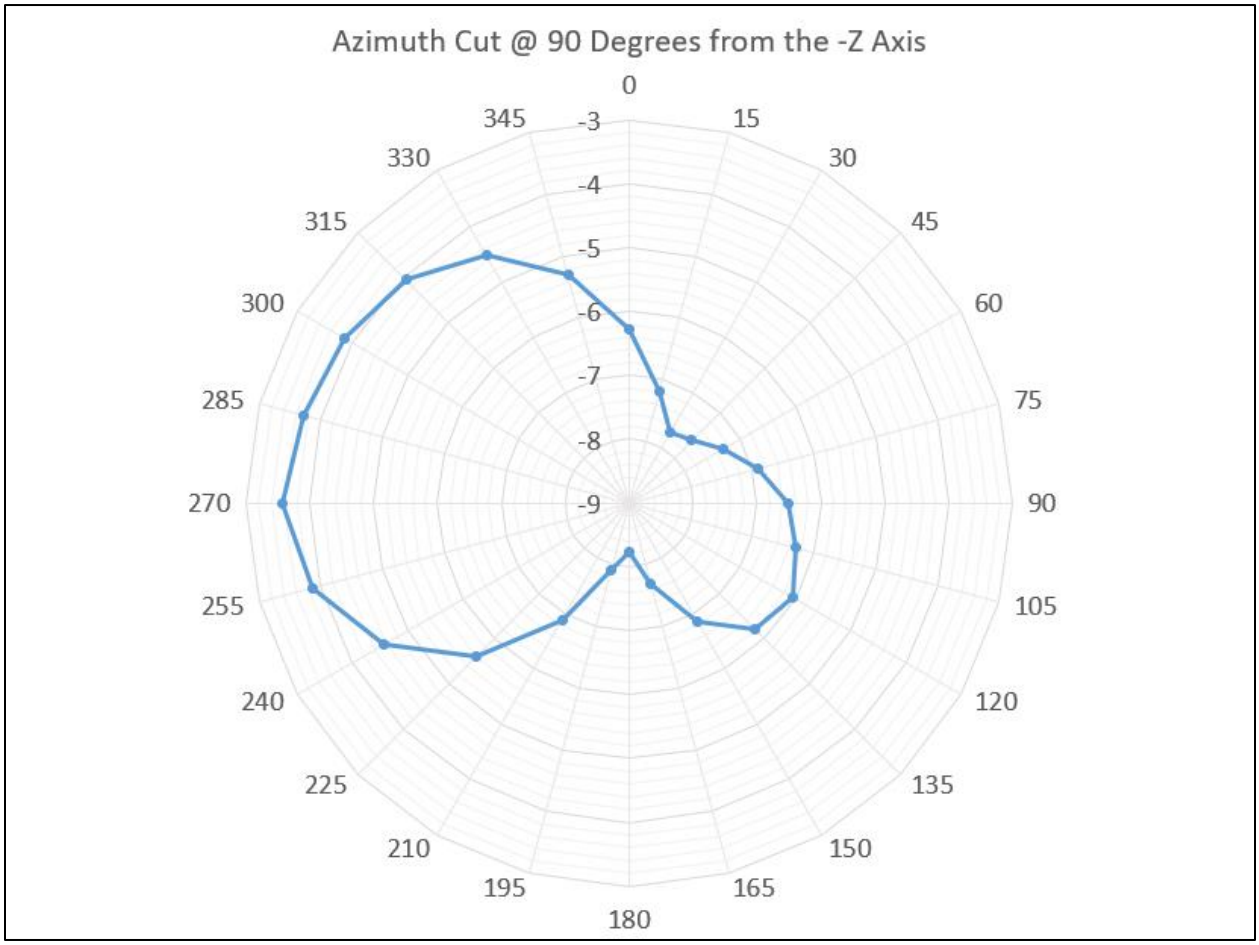


Figure 2b Hearing Aid Antenna Elevation and Azimuth Cuts

scale in dBm

Antenna Pattern Measurement Information

The antenna patterns shown in Figures 2a were measured using a
MVG SG24L antenna test system, serial number ATL3843S
located at Starkey Laboratories, Inc., 6600 Washington Avenue, South, Eden Prairie, MN 55344
The system was calibrated on October 12, 2023, and due for calibration in October 2024.

Signal levels were measured using a Keysight N9020B MXA Signal Analyzer (Spectrum Analyzer). serial number MY63470227,
calibrated on May 04, 2023 and due for calibration on May 04, 2025.

The antenna pattern plots in Figures 2 are generated by the SG24L test system software.

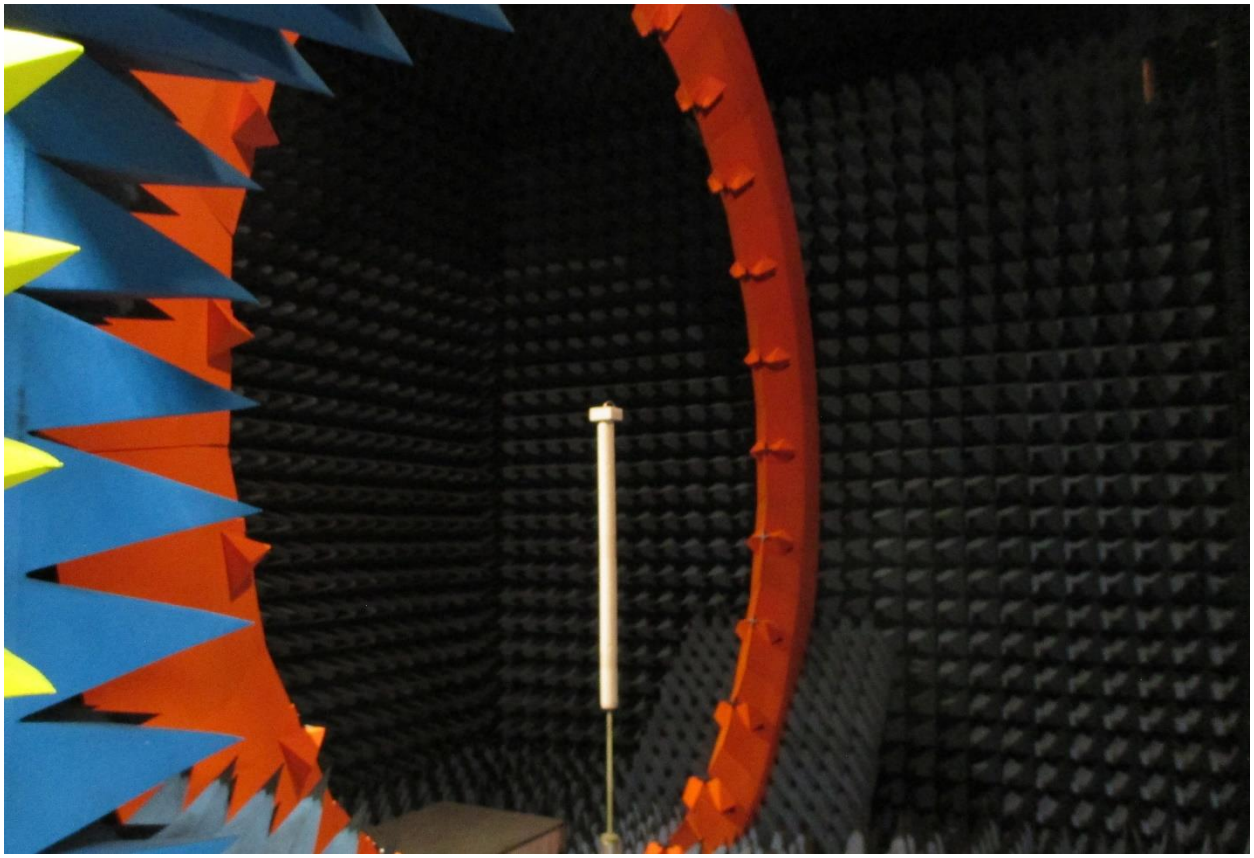


Figure 3a Overall view of SG24L test chamber, showing ring of receiving antennas

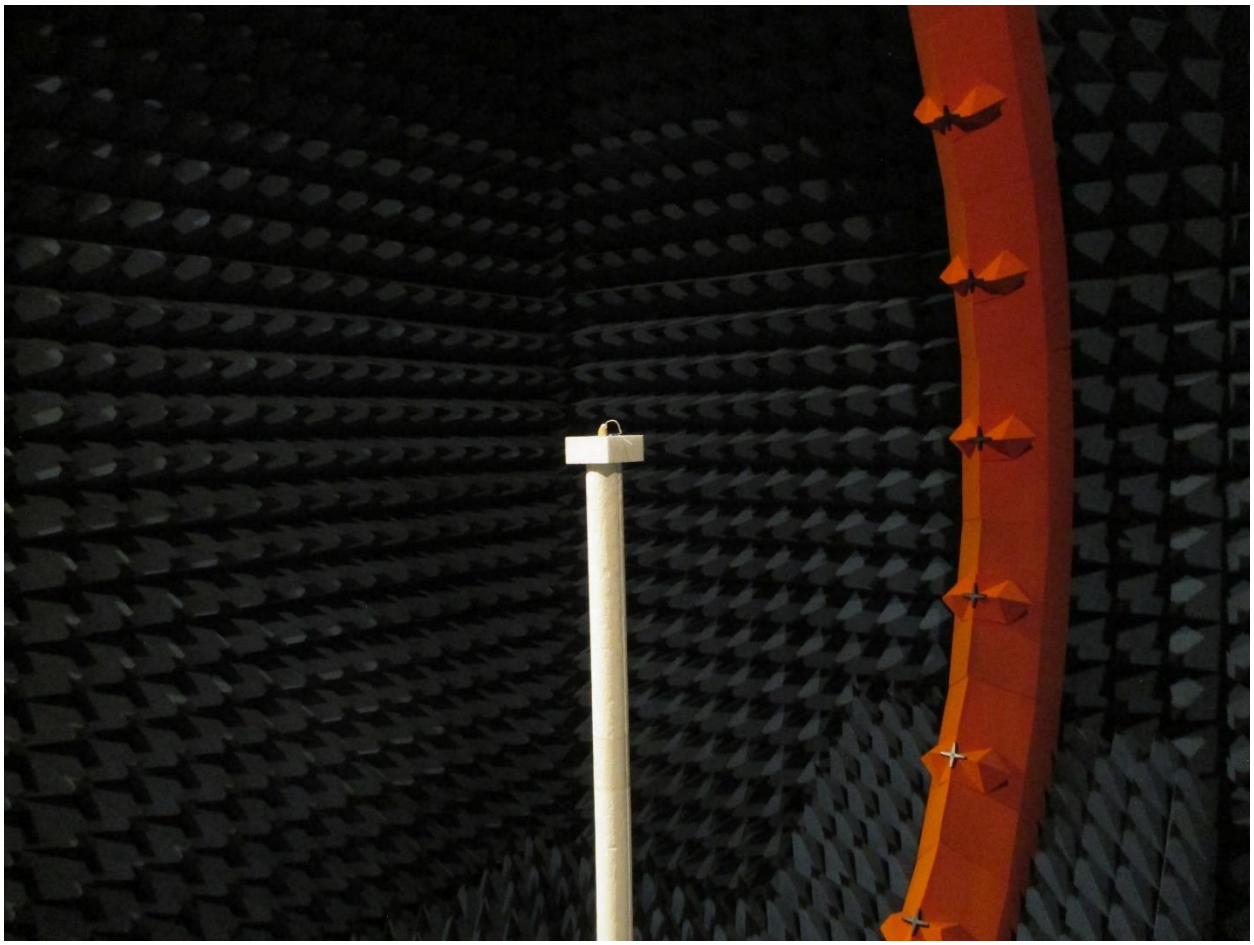


Figure 3b Test stand in SG24L test chamber

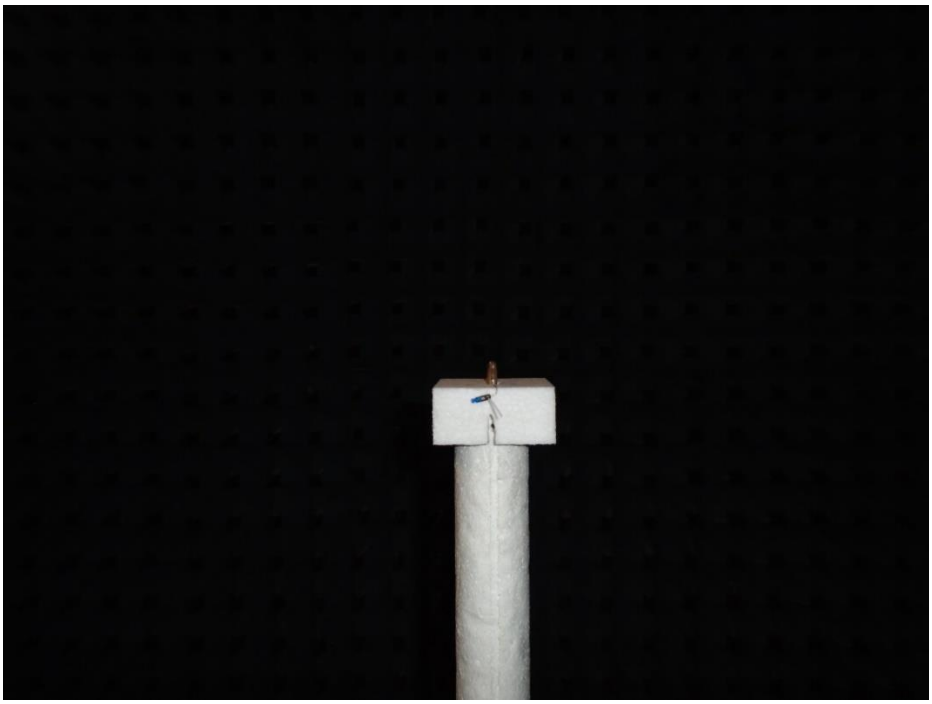


Figure 3c close-up of unit under test in test chamber

Antenna Gain Measurement Information

The MVG SG24L antenna test system runs internal scripts that yield the maximum EIRP from each radiated power measurement. From there, the following equation could be used to calculate the antenna gain in dBi.

$$\text{Max Antenna Gain} = \text{Max EIRP} - \text{Power at antenna pads} \quad (1)$$

Where,

$$\text{Power at antenna pads} = \text{Conducted Power} + \text{Probe Mismatch Loss} \quad (2)$$

And 'Conducted Power' is measured by removing the antenna and soldering an SMA probe to the antenna pads instead.

Substituting (2) into (1)

$$\text{Max Antenna Gain} + \text{Probe Mismatch Loss} = \text{Max EIRP} - \text{Conducted Power} \quad (3)$$

$$\text{Effective Max Antenna Gain} = \text{Max EIRP} - \text{Conducted Power}$$

Subtracting the conducted power at from the EIRP value, yields the effective antenna gain as follows:

- Effective Max Antenna Gain = -2.5 – (-3.9) = 1.4 dBi

10.281 MHz NFMI antenna

The 10.281 MHz NFMI antenna is a coil wrapped on a ferrite core

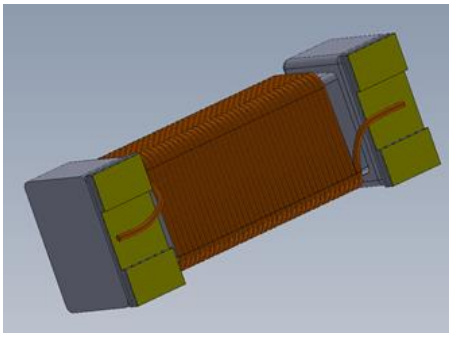


Figure 4a NFMI Antenna

that is mounted on a PCBA as shown in Figure 4b

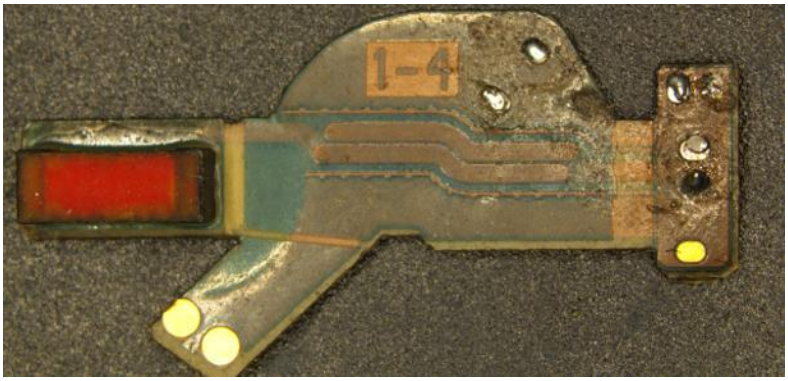


Figure 4b NFMI Antenna on PCBA

Figure 4c shows the NFMI antenna in the complete hearing aid.

Figure 4c NFMI Antenna in Assembled Hearing Aid

The NFMI antenna coil is an SMD cubical prism of nominal length 5.1 mm and width 1.9 mm. The max height is 1.915 mm. There are 41 turns going from one end of the coil to the other.