

# Antenna Report

FCC ID: A4RGD2WG

04/06/2023

Google LLC

Test Engineer:

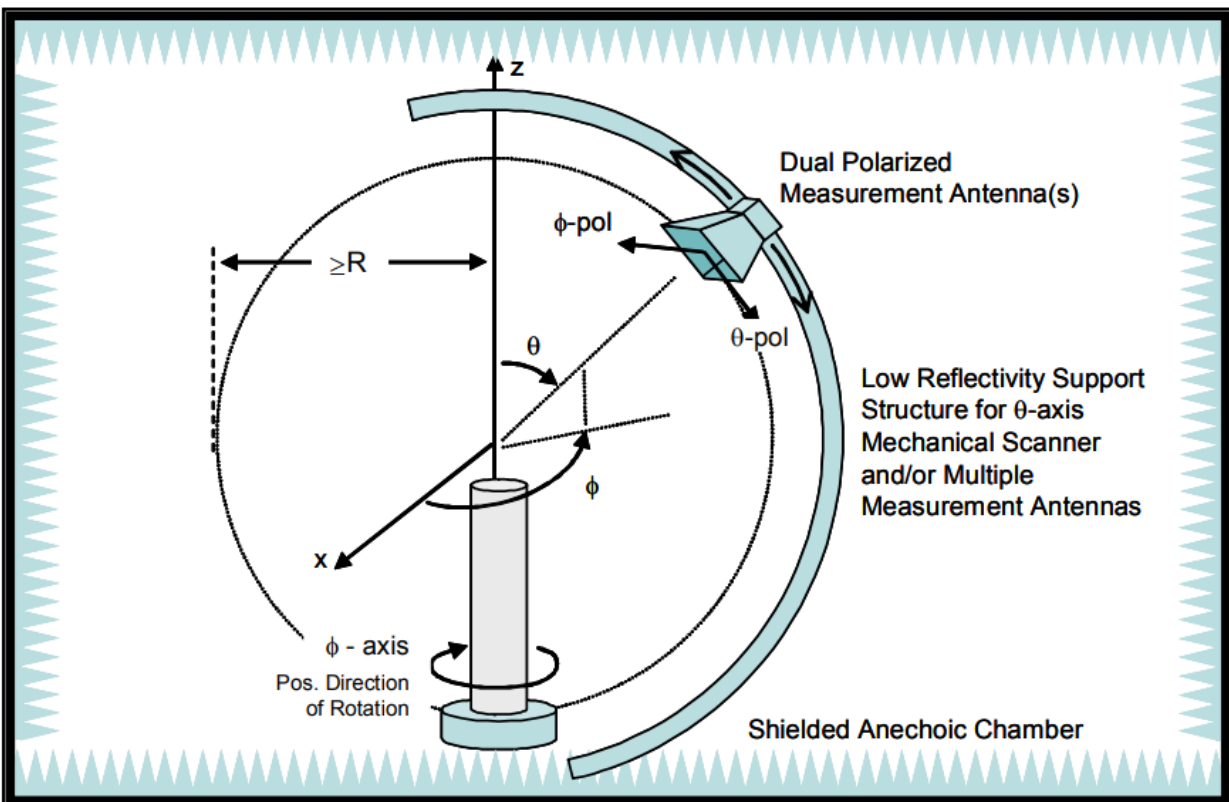
DocuSigned by:  
*Teemu Kaiponen*  
29490EC0608D490...

## 1. Test Method

The antenna gains are obtained through measurements in a fully anechoic OTA chamber with a 3D positioner.

Measurements are taken in discrete steps in theta and phi direction, data is being recorded using the spectrum analyzer (active) or network analyzer (passive) for both theta and phi polarizations at each position resulting in a 3D gain pattern. Step size is <30 deg along both axes.

Gain is derived directly through spatial averaging of VNA S21 measurements (passive measurement).



## 2. Test Equipment

Site Description	Chamber Manufacturer	Type
Satimo Stargate 64	MVG	Fully Anechoic
Software Version	Wave Studio 22.3.1	
Site location:	16618 W Bernardo Dr, San Diego, CA 92127	
Test Engineer	Teemu Kaiponen, Faton Tefiku, Juhi Godhwani, Ritu Verma	
Date	March 29, 2023	

Description	Manufacturer	Model	Calibration Date	Due Date
Network Analyzer	Rohde & Schwarz	ZNB20	May 16, 2022	May 16, 2023

## 3. Antenna Type

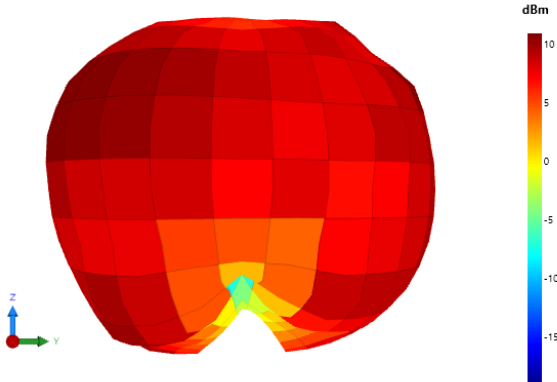
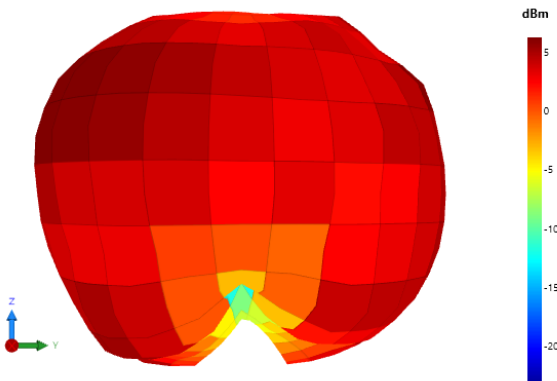
Antenna	Type
Top Antenna(ANT0) BT/WLAN(2.4GHz)	PIFA

## 4. Test Data

**BT:BR/EDR2/EDR3/BLE1M/BLE2M/WLAN:802.11 b/g/n20/**

Radio	Antenna location	Peak Gain(dBi)
BT/BLE/WLAN(2.4GHz)	Ant0 - Top	-5.9

**Radiation Plots for Max Gain Plane**

Antenna	Frequency (MHz)	Radiation Pattern
BT BR	2440	
BT EDR2	2440	
WiFi 802.11b	2440	