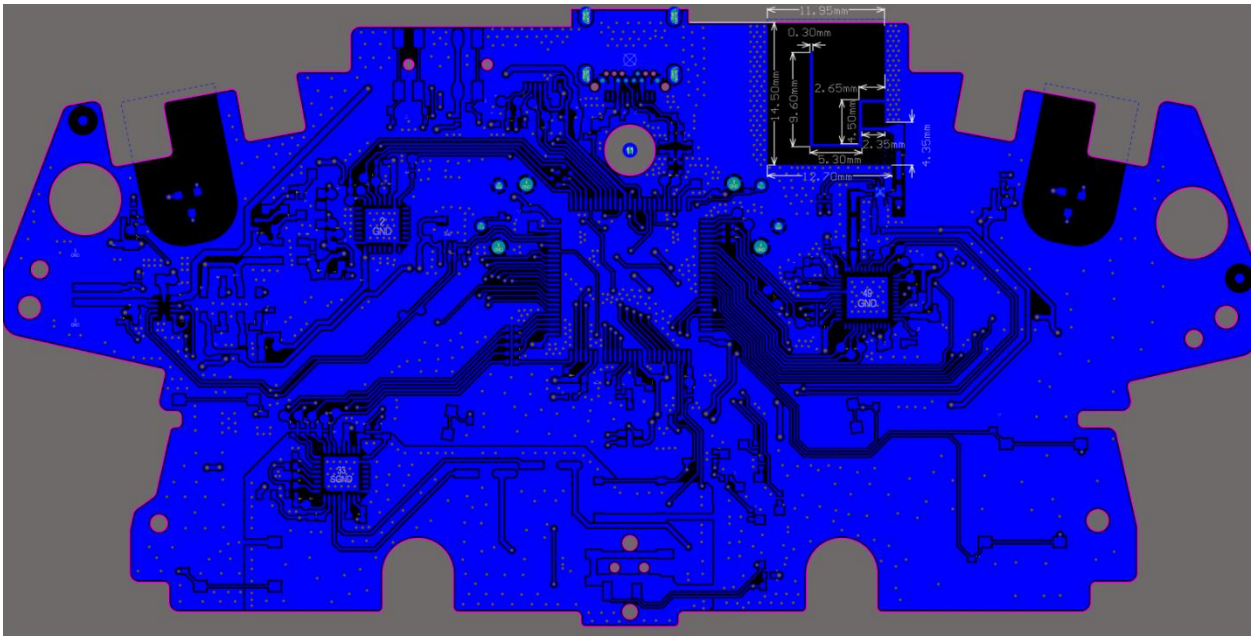
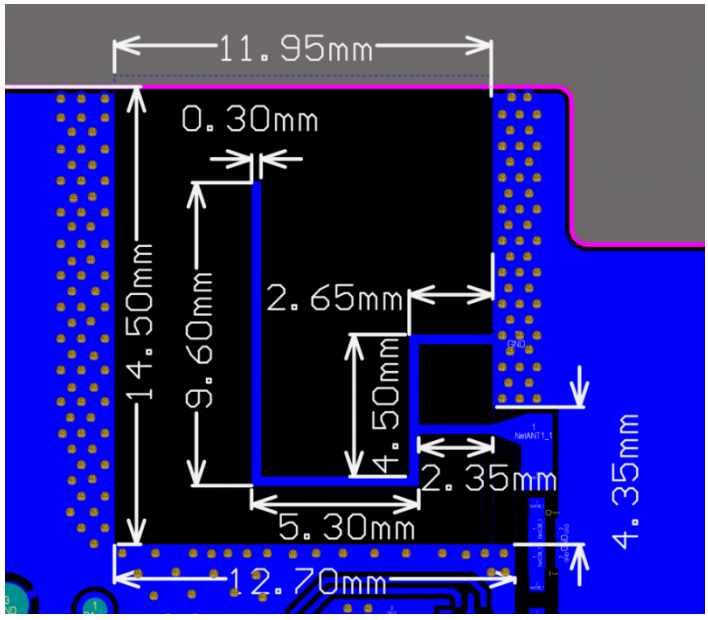
# VICTRIX PRO BFG

## CONTROLLER ANTENNA DIMENSIONS




Antenna Module Peak Gain: ~4.3dBi (3 planes tested)

Antenna Efficiency: >80%


# PS5 Controller & Dongle Antennas Evaluation

Rev. 1.0
Date: 6/06/2022

**Document Revision History**

| Date | Revision | Author | Description Of Changes |
|---|---|---|---|
| 6/06/2022 | 1.0 | Jacek Czajka | First revision |
| | | | |

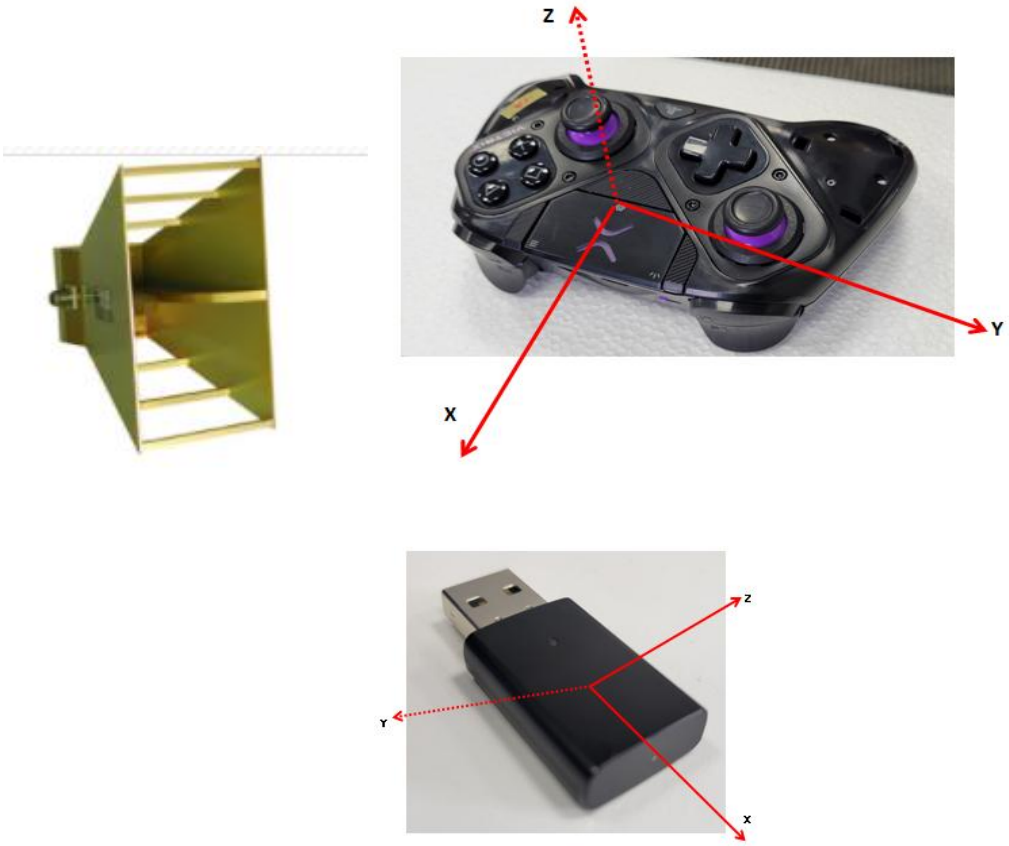
## Table of Contents

## Introduction

PS5 controller and dongle BT antennas are designed and fully simulated including required components (low pass filter and antenna impedance matching). LPF / antenna impedance matching circuits are "driven" by 8TR8211 (2.4GHz Bluetooth Smart Front End RFIC).

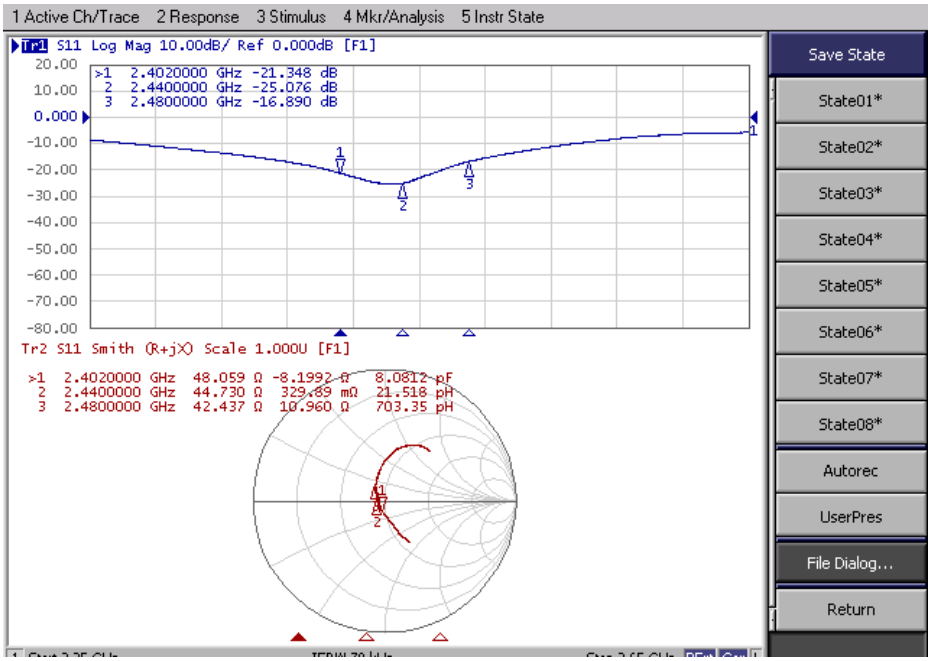
Antennas' S11 / gains were simulated and tested.

## Visuals (planes definition)

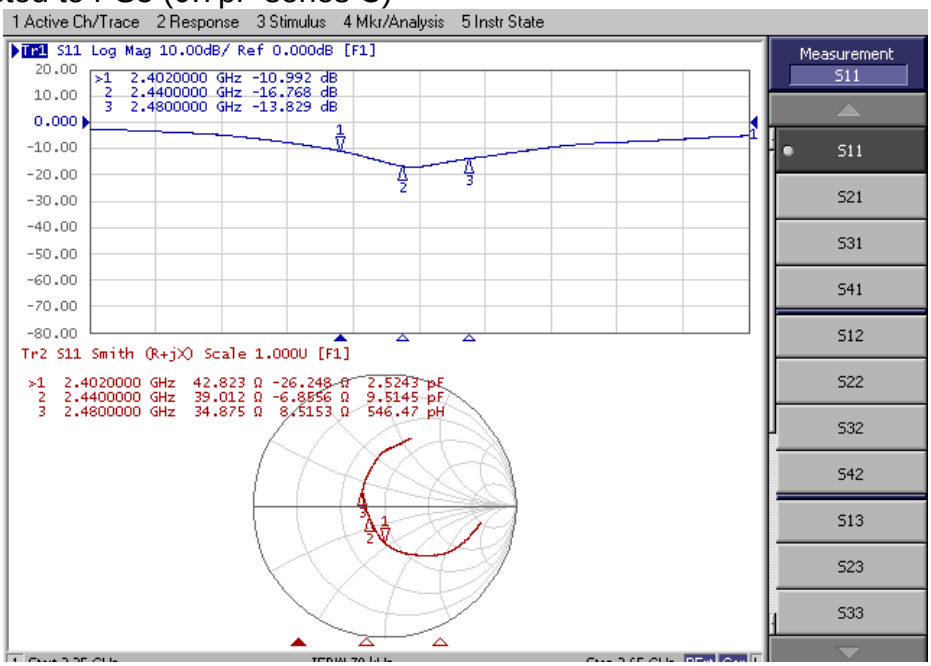



## Measured Results BT Antennas - S11

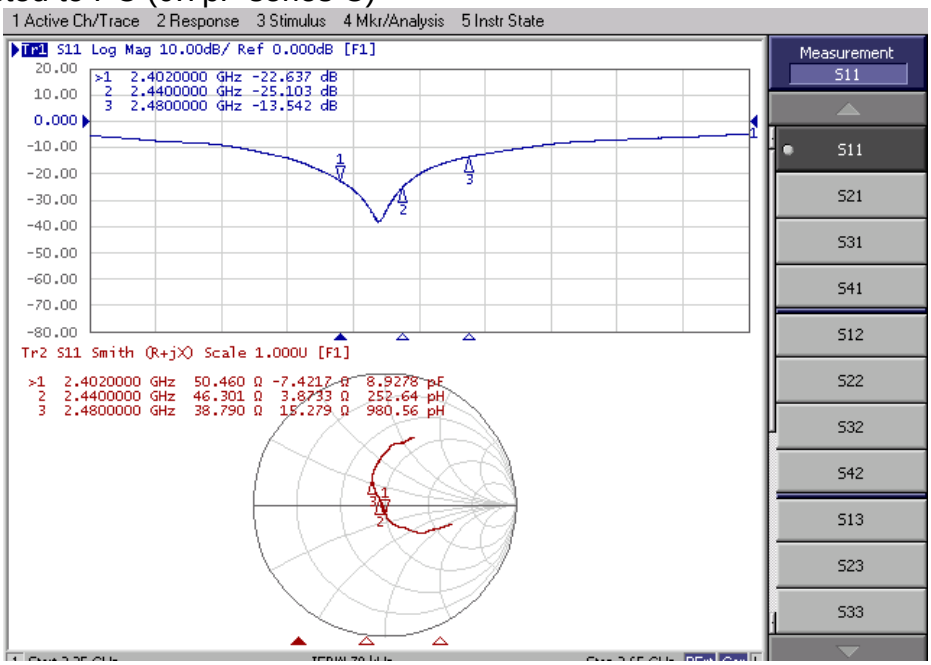
Fully Assembled PS5 controller (5pF series C)



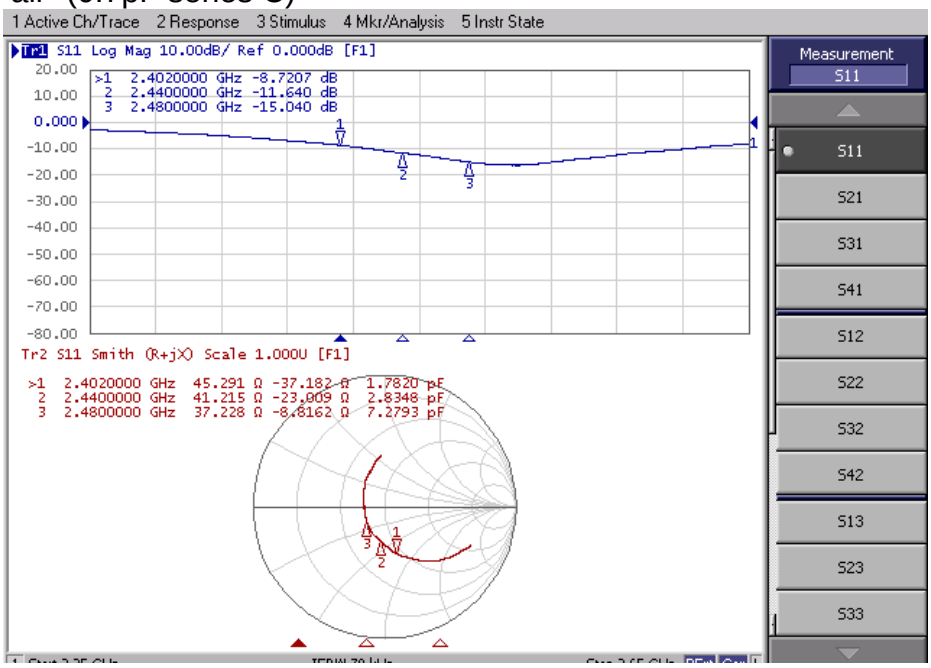
Dongle connected to PS5 (0.7pF series C)




Dongle connected to PC (0.7pF series C)



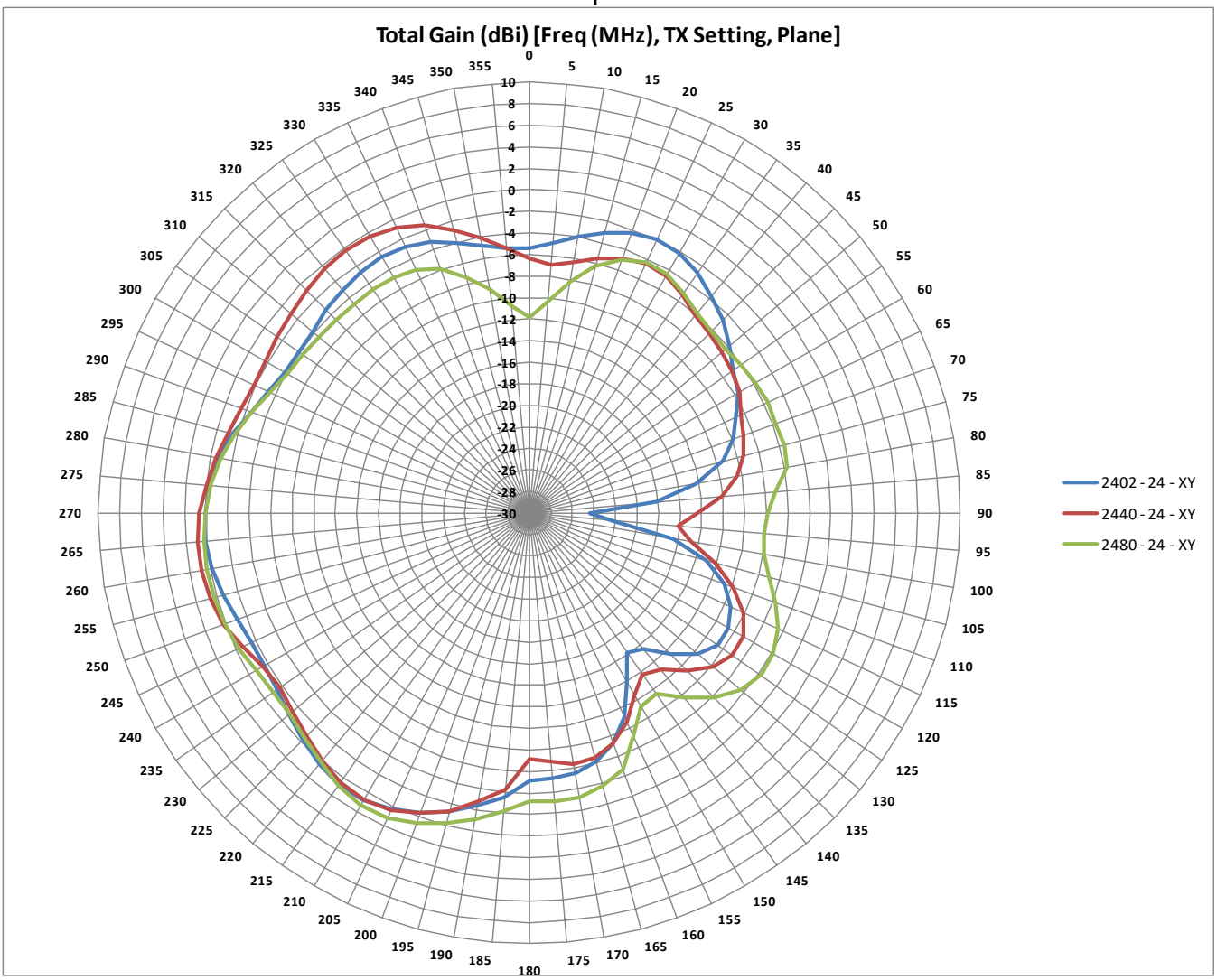
Dongle in "free air" (0.7pF series C)



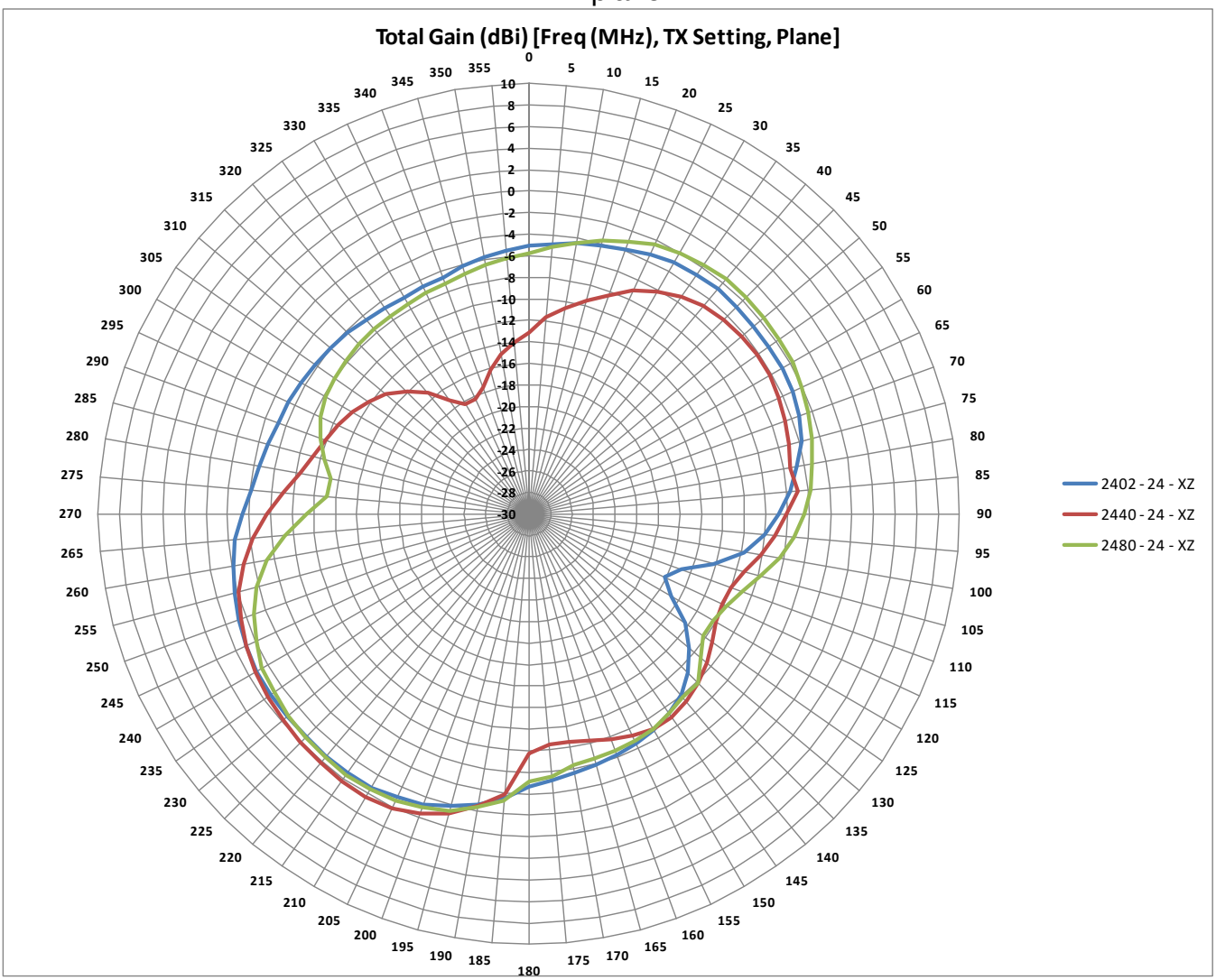
# Measured Results BT Antennas - Gain

Antenna Gain of PS5 Controller

XY plane



XZ plane

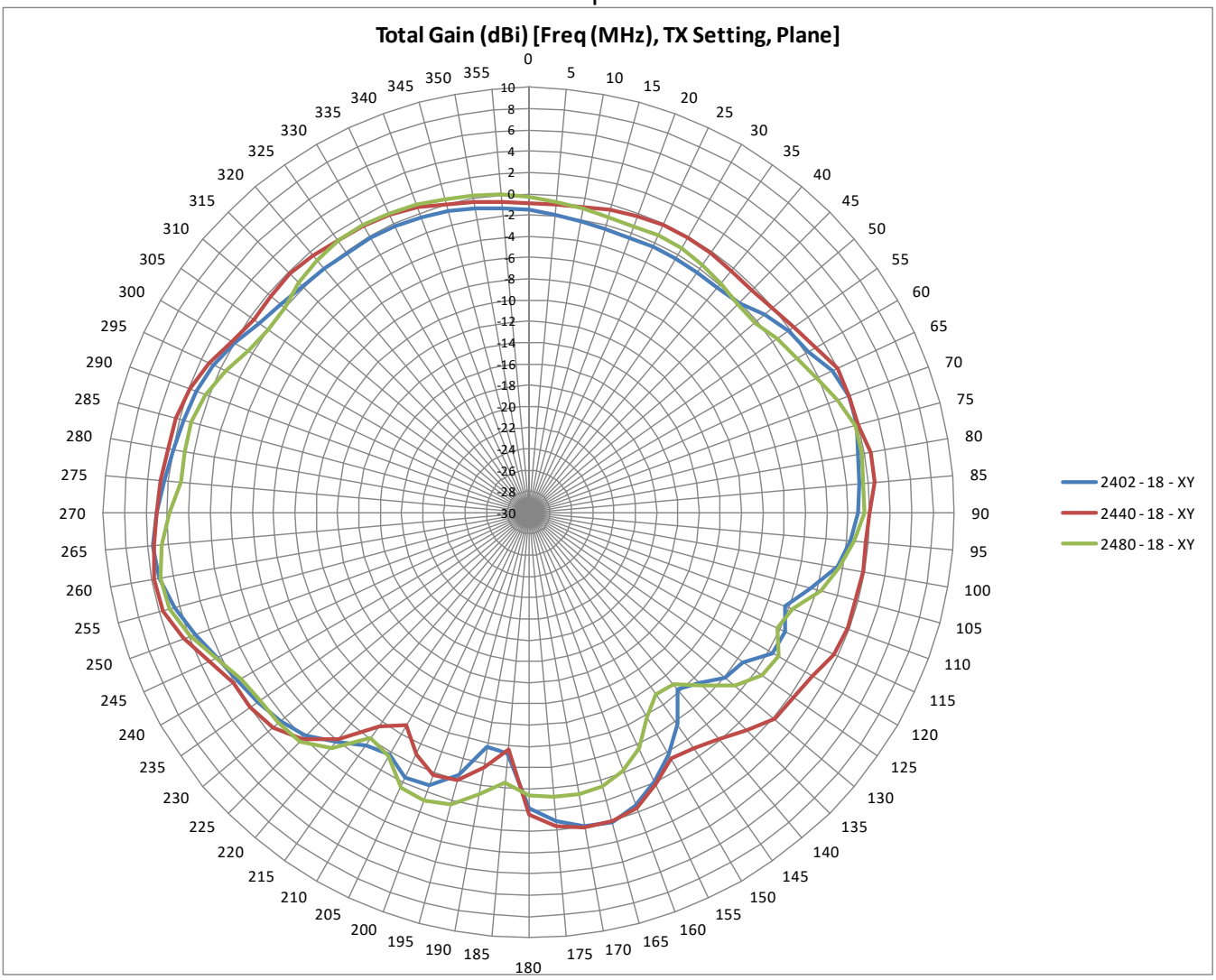


YZ plane

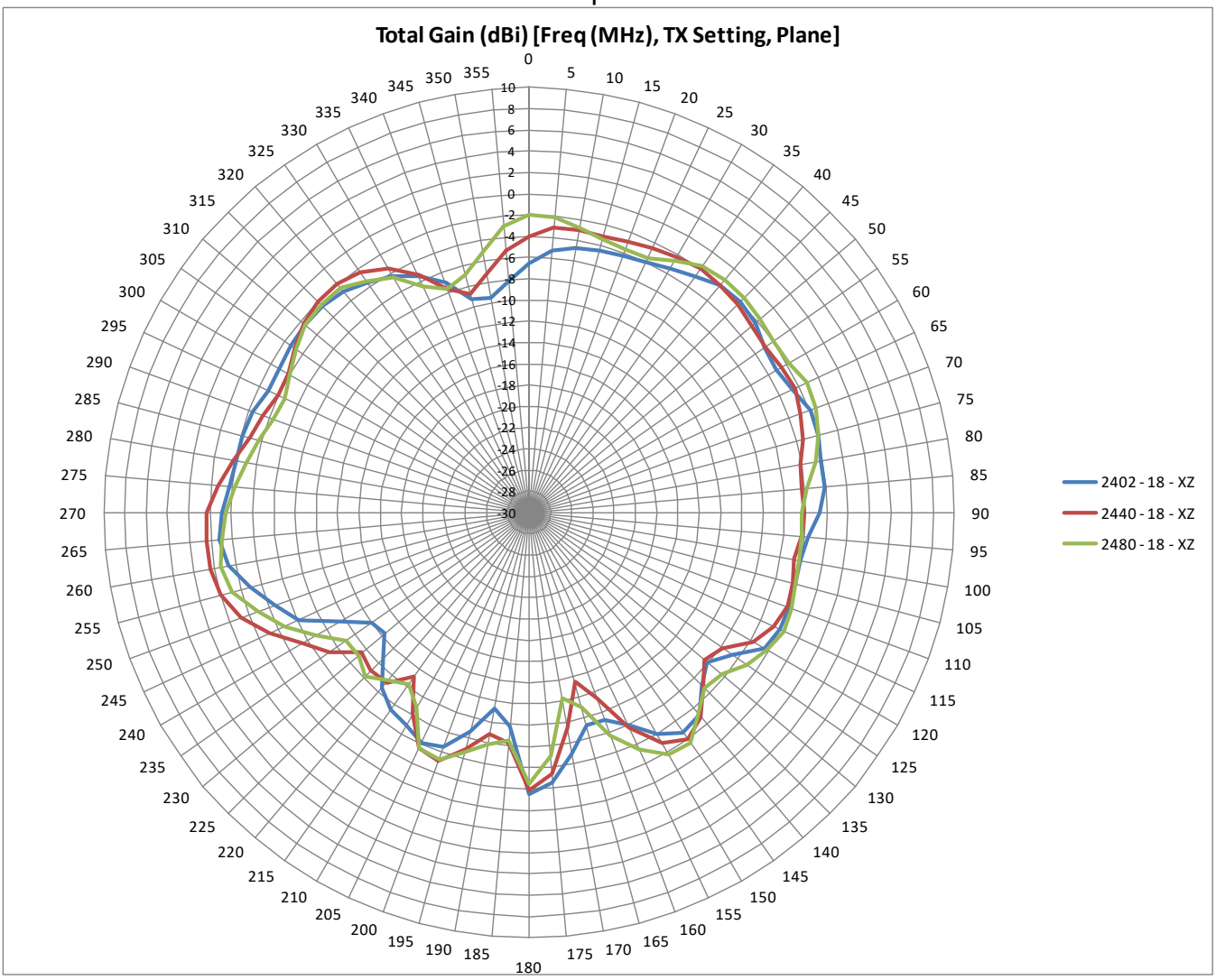

Controller antenna peak gain of ~4.3dBi (3 planes tested)

## Antenna Gain of dongle connected to PS5

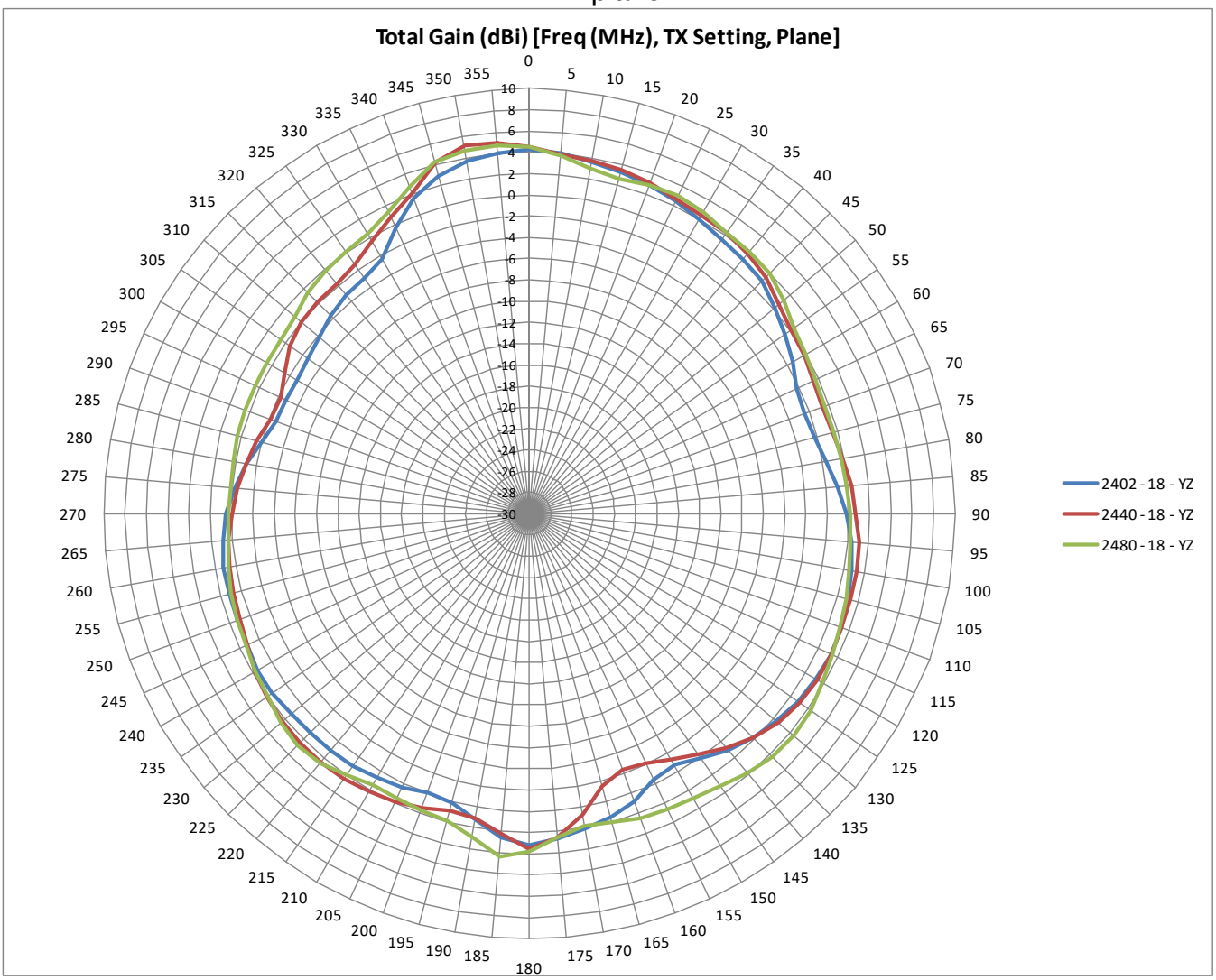
XY plane



XZ plane



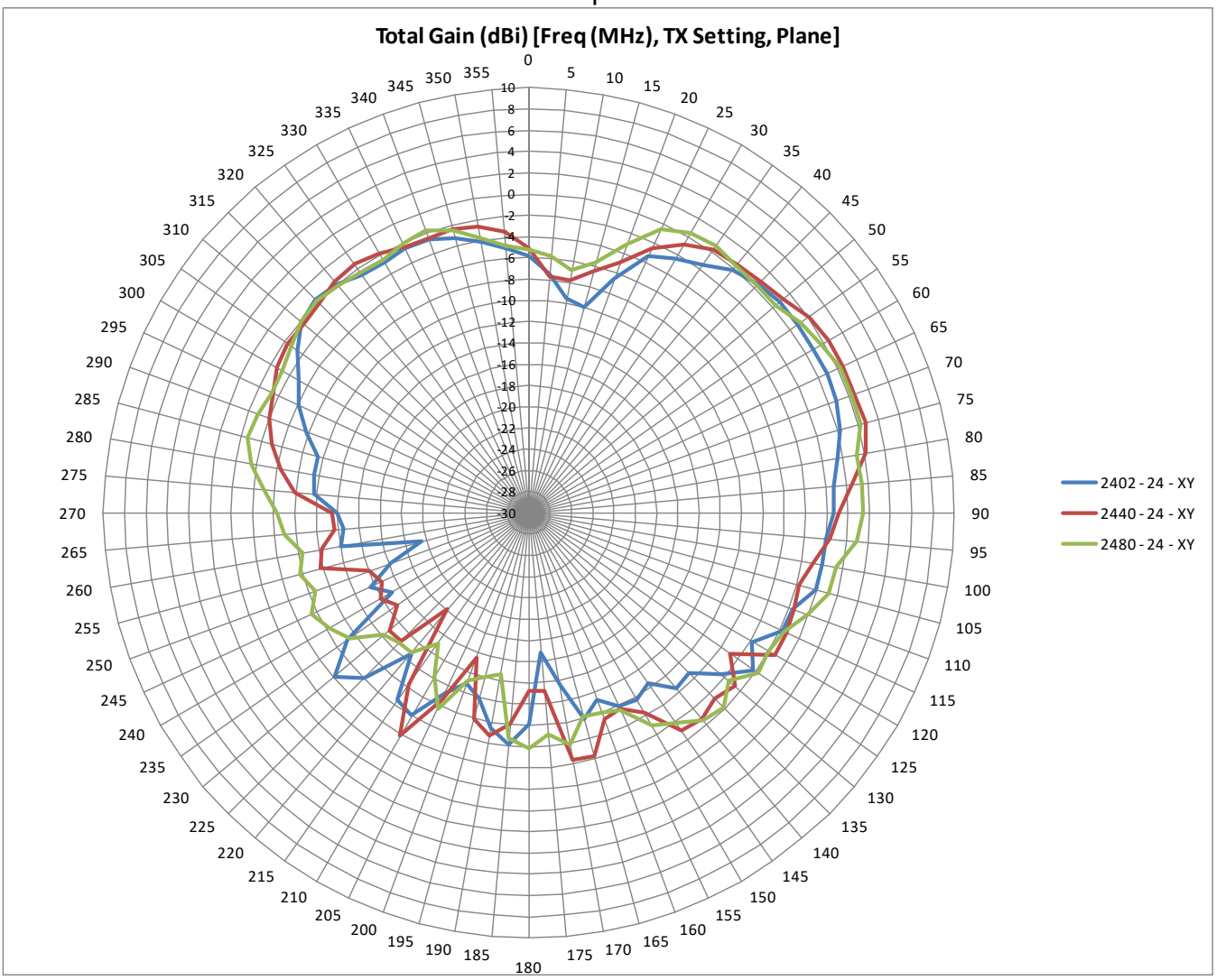
YZ plane



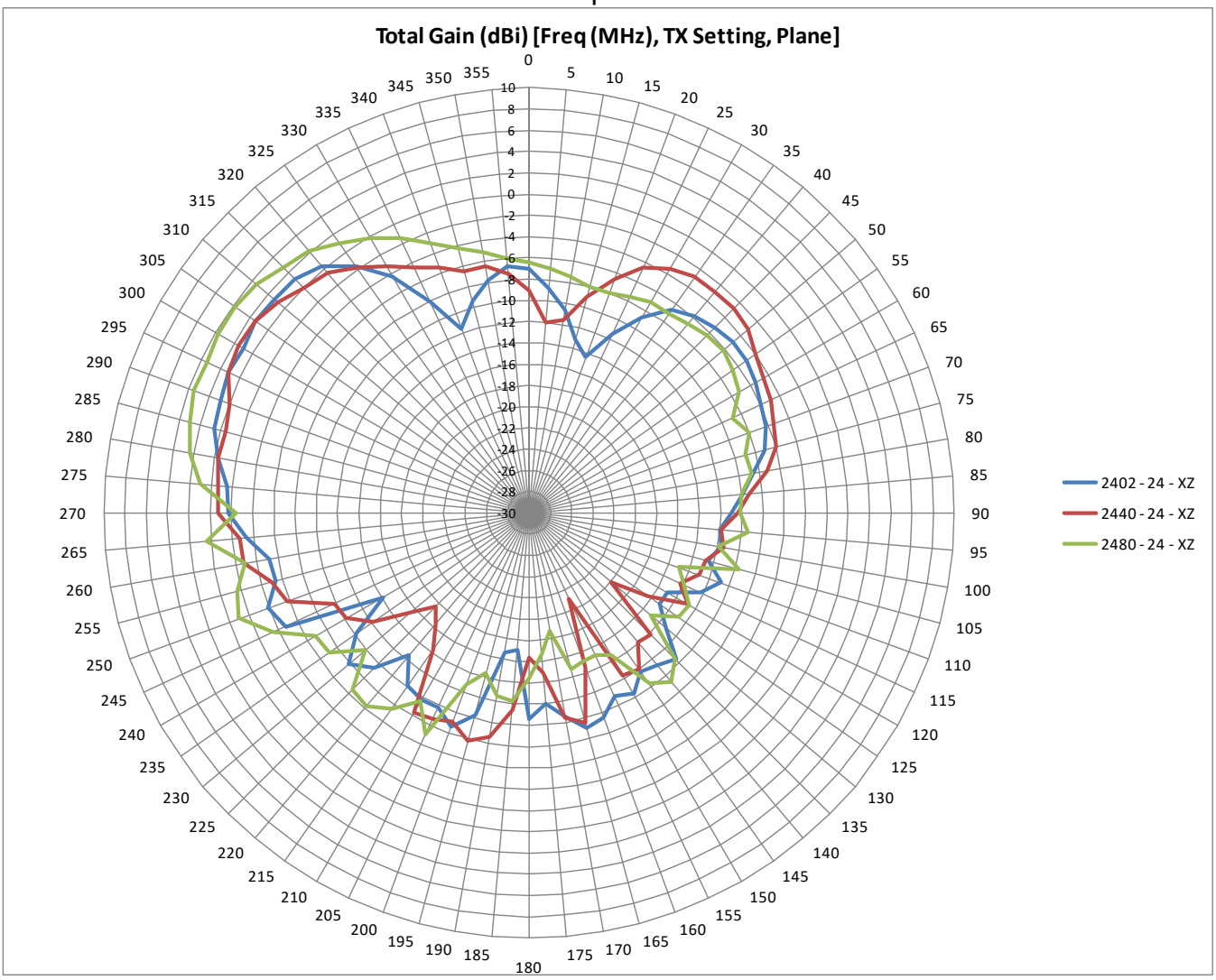

Dongle with PS5 antenna peak gain of ~5.8dBi (3 planes tested)

## Antenna Gain of dongle connected to PC (back side)

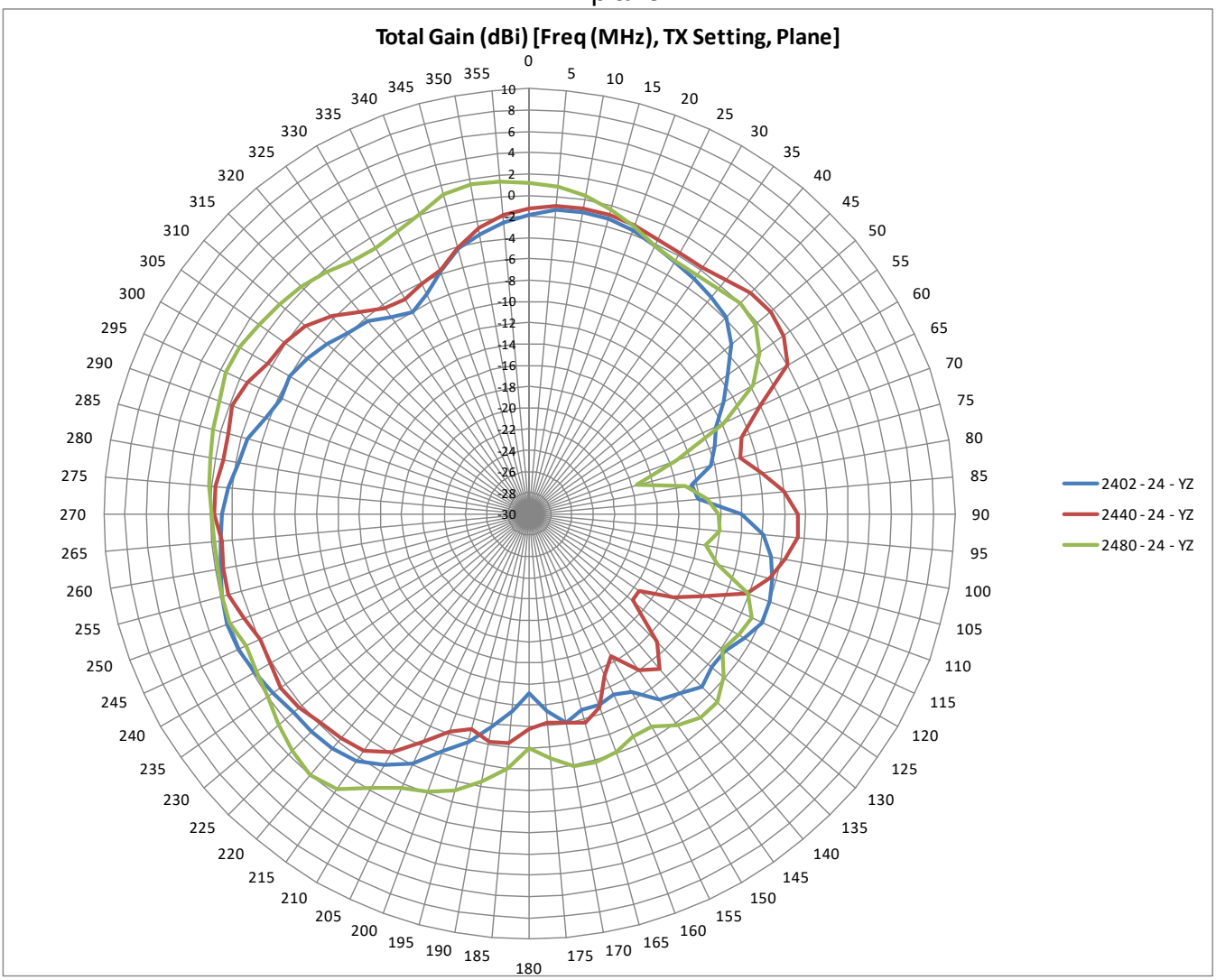
XY plane



XZ plane



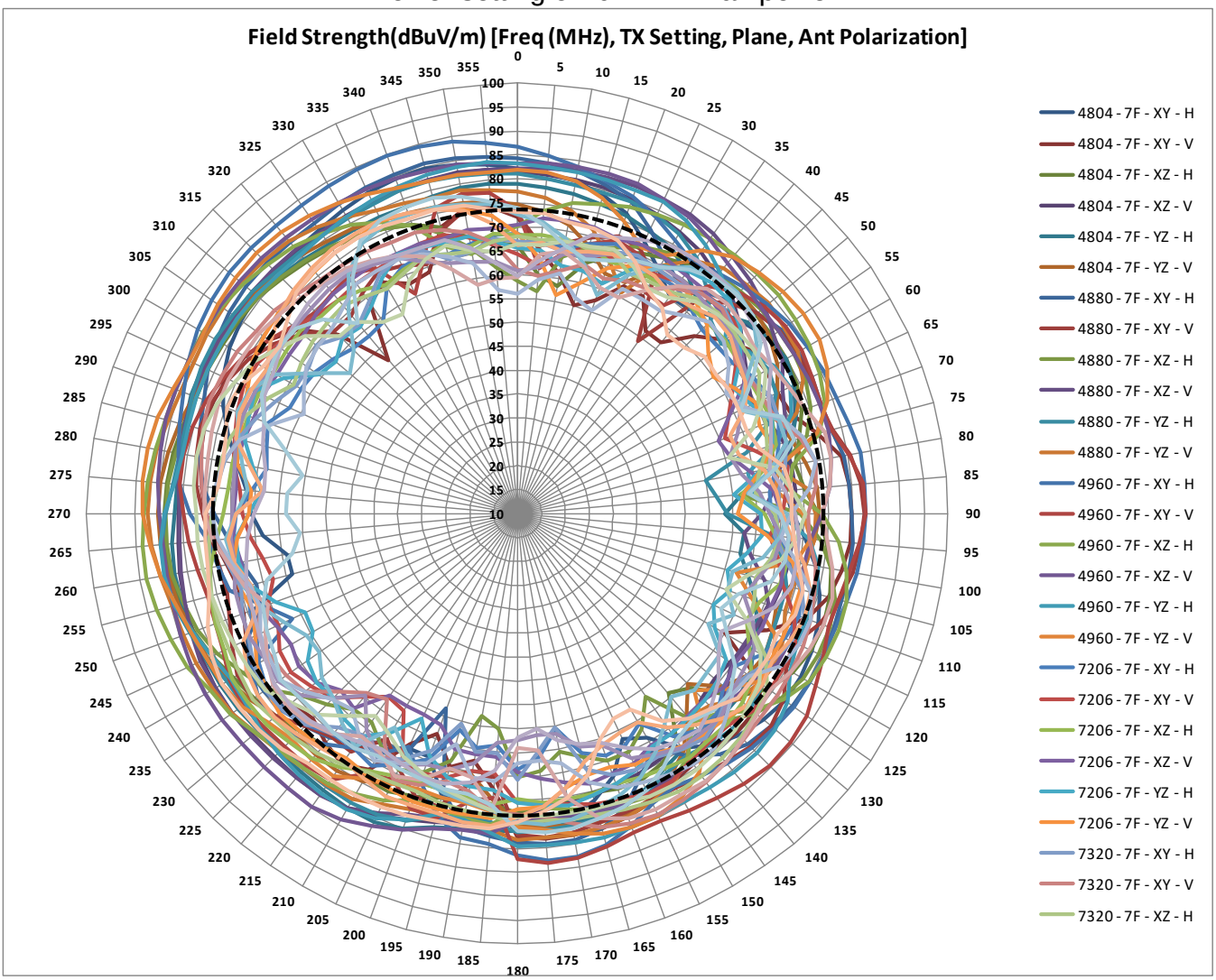
YZ plane




Dongle with PPC antenna peak gain of ~3.7dBi (3 planes tested)

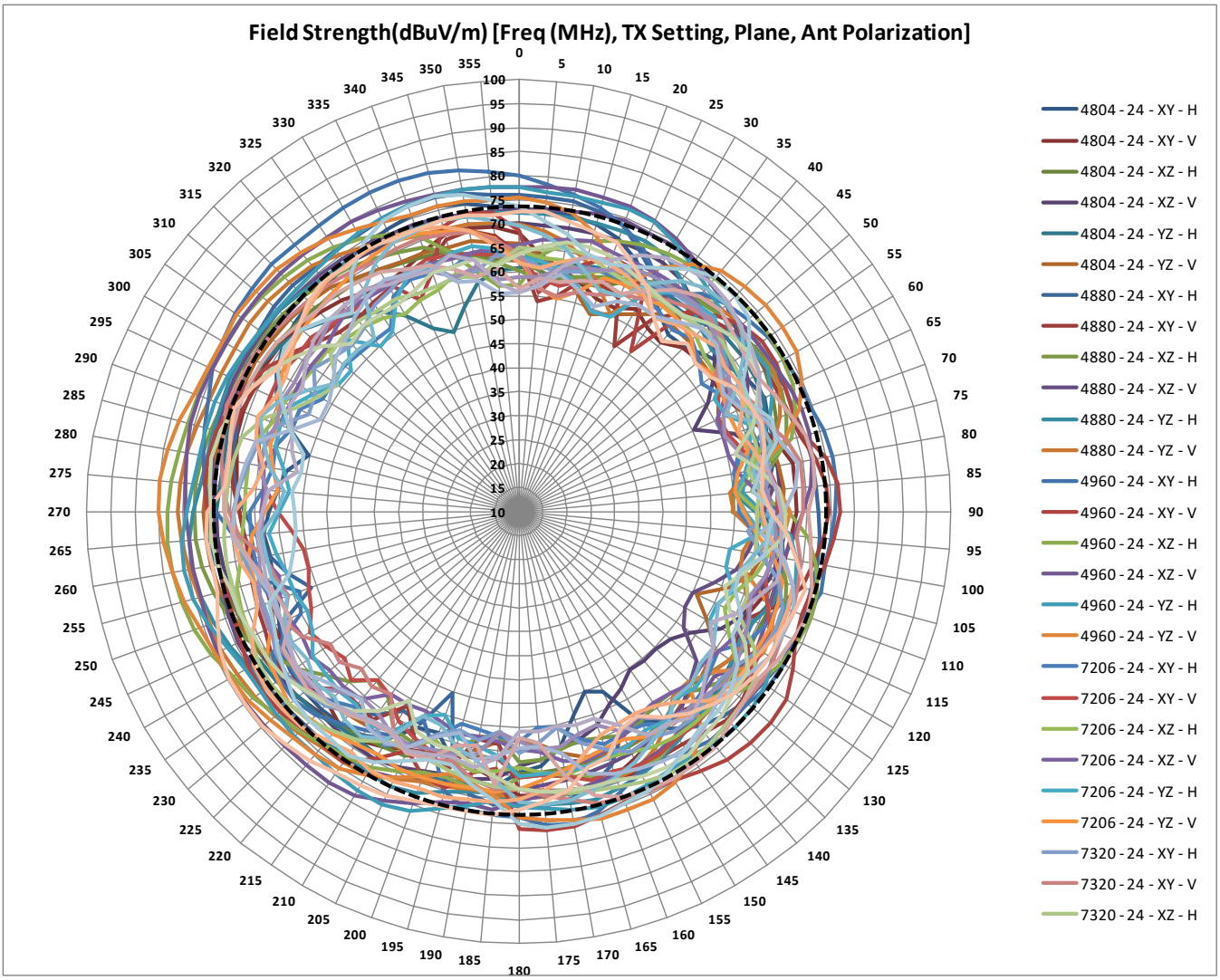
## Measured Results BT Antennas - H2/H3 radiated

PS5 controller H2/H3 (3 planes, 3 frequencies, horizontal and vertical polarization)
Power setting of "0x7F" - max power

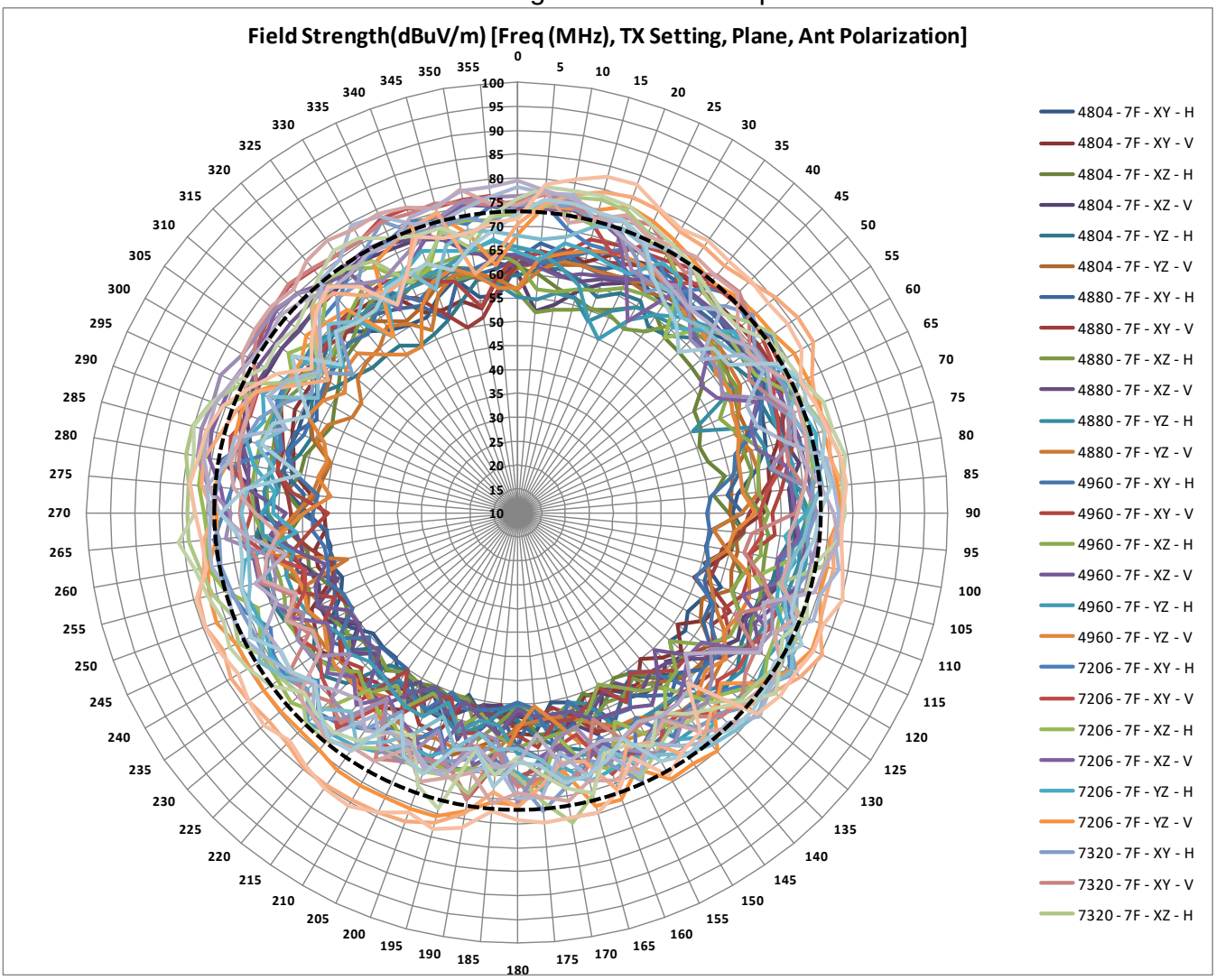



Note for all harmonics plots: "---- " represents max peak emision level of 73.9dBuV/m

Power setting of "0x24" - TX power reduced by ~1dB

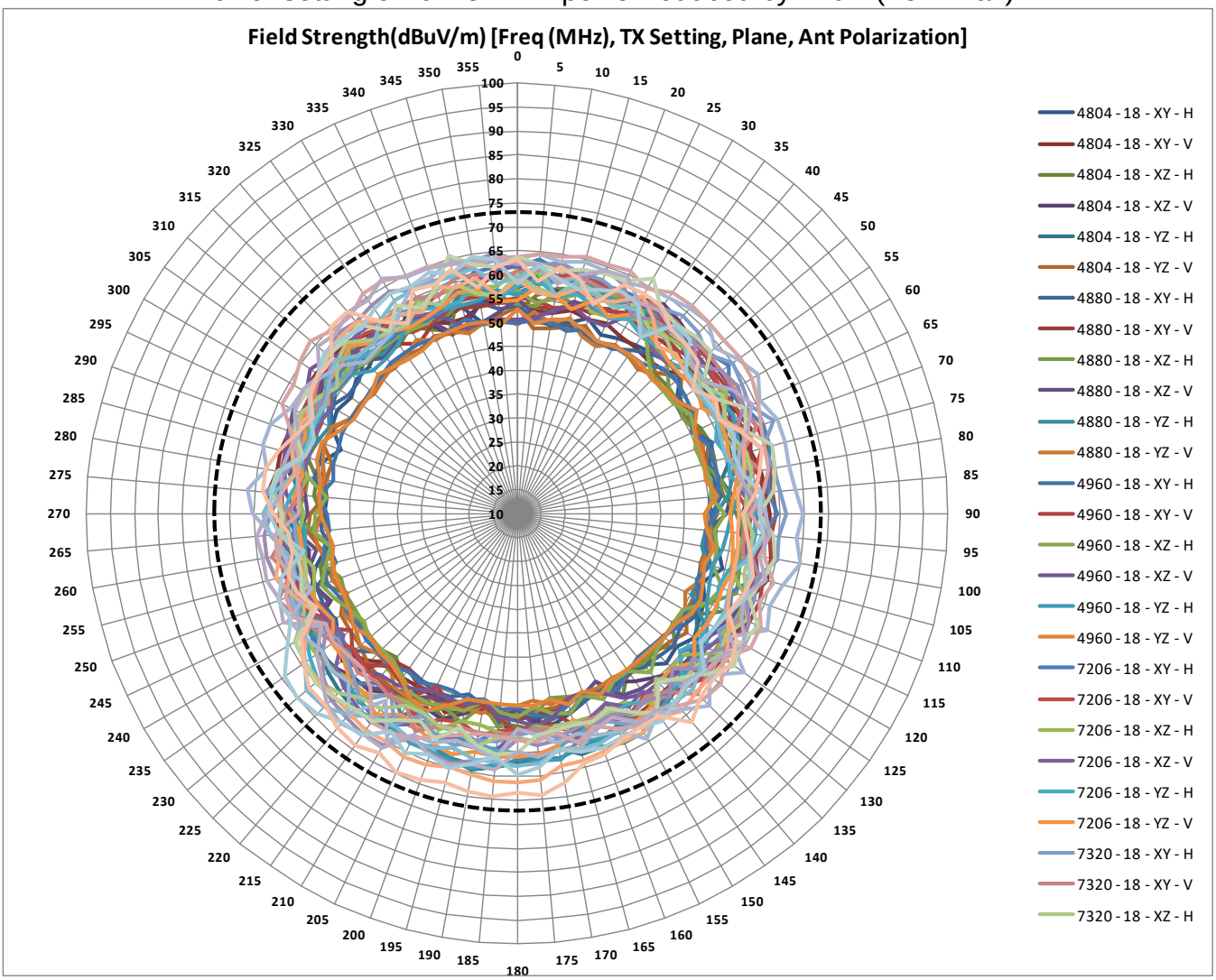


Dongle with PC - H2/H3 (3 planes, 3 frequencies, horizontal and vertical polarization)
Power setting of "0x7F" - max power

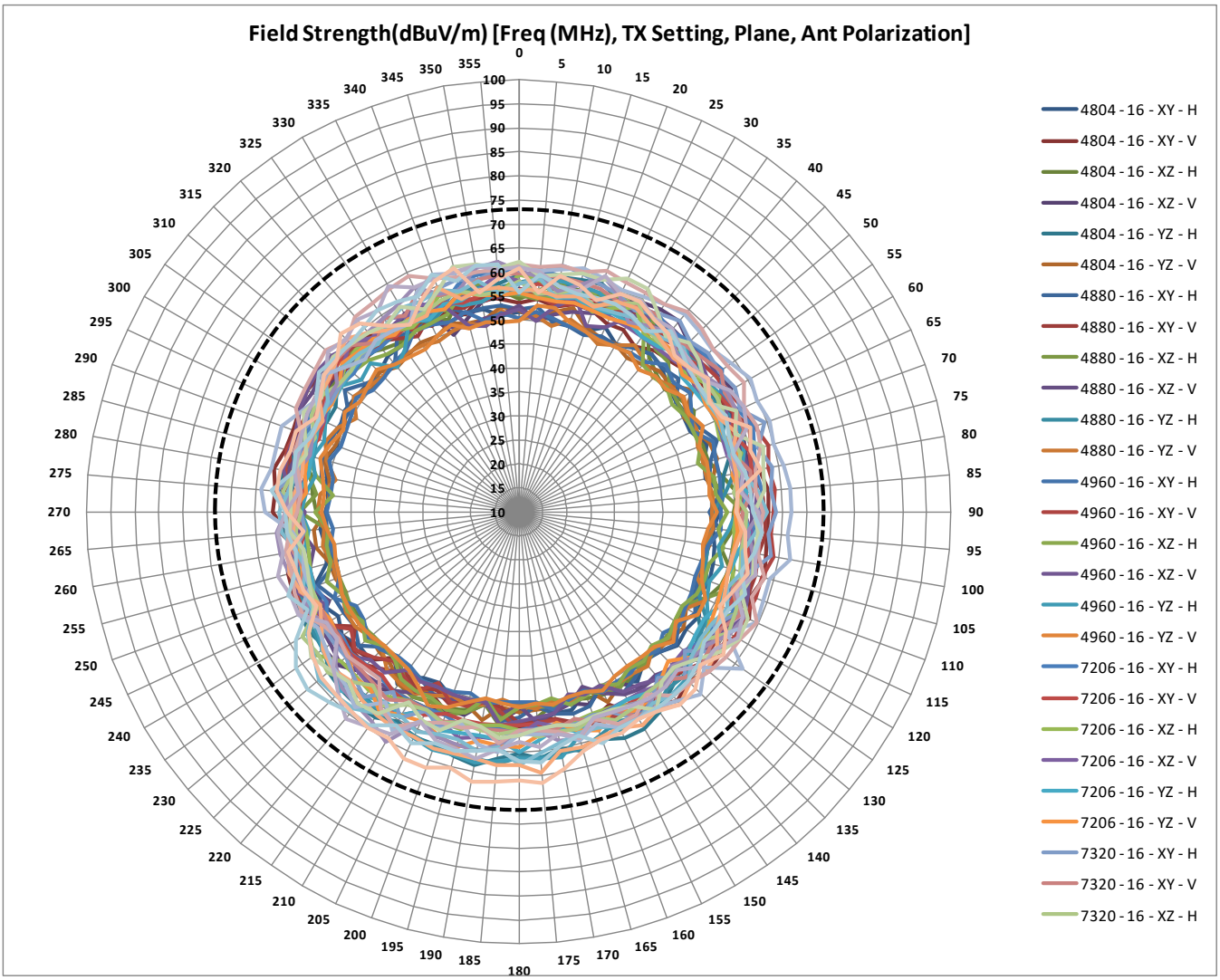


Dongle with PS5 - H2/H3 (3 planes, 3 frequencies, horizontal and vertical polarization)

Power setting of "0x18" - TX power reduced by ~2dB (from max)



Power setting of "0x16" - TX power reduced by ~2.5dB (from max)



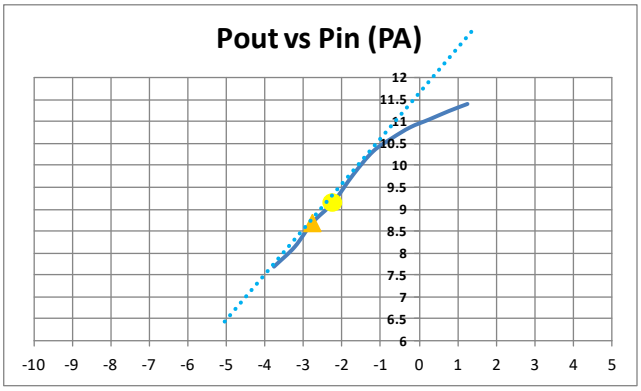

## Summary

Antenna peak gain is close to the simulated value (controller and dongle with PS5). S11 with selected impedance matching C value correlates well to simulation. BT transmit power should be reduced to minimize radiated harmonics - recommended power setting of "0x16" or "0x18".

# Appendix A

PS5 dongle conducted power (at antenna input including harmonics)

| CH | FREQ (MHz) | Carrier Signal Setting (power) | Conducted TX power at antenna input | | | | |
|---|---|---|---|---|---|---|---|
| | | | TX Power (dBm) | H2 (dBm) | H2 (dBc) | H3 (dBm) | H3 (dBc) |
| 0 | 2402 | 7F | 13 | -32.2 | 45.2 | -42.6 | 55.6 |
| 0 | 2402 | 36 | 12.6 | -34.8 | 47.4 | -45.5 | 58.1 |
| 0 | 2402 | 24 | 12.1 | -37.2 | 49.3 | -48.1 | 60.2 |
| 0 | 2402 | 18 | 10.6 | -41.4 | 52 | -51.5 | 62.1 |
| 19 | 2440 | 7F | 12.9 | -28.8 | 41.7 | -44.5 | 57.4 |
| 19 | 2440 | 36 | 12.5 | -31.7 | 44.2 | -47 | 59.5 |
| 19 | 2440 | 24 | 12 | -34.3 | 46.3 | -49.2 | 61.2 |
| 19 | 2440 | 18 | 10.6 | -38.4 | 49 | -52.5 | 63.1 |
| 39 | 2480 | 7F | 12.5 | -27.6 | 40.1 | -44.4 | 56.9 |
| 39 | 2480 | 36 | 12.2 | -30.3 | 42.5 | -47.1 | 59.3 |
| 39 | 2480 | 24 | 11.7 | -33.2 | 44.9 | -49.6 | 61.3 |
| 39 | 2480 | 18 | 10.4 | -37.6 | 48 | -52.8 | 63.2 |



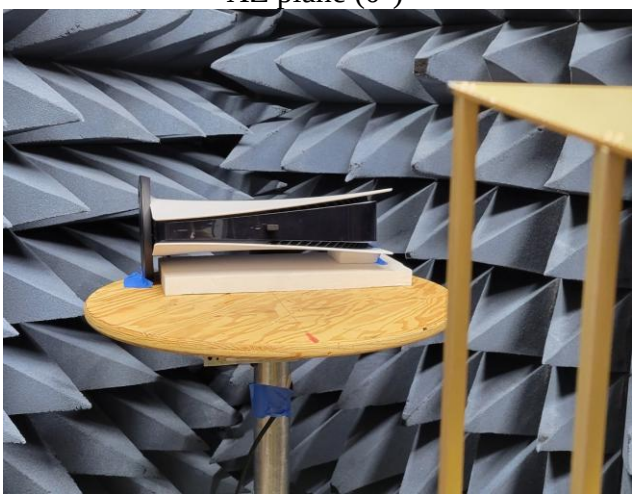

PS5 controller conducted power (at antenna input including harmonics)

| CH | FREQ (MHz) | Carrier Signal Setting (power) | Conducted TX power at antenna input | | | | |
|---|---|---|---|---|---|---|---|
| | | | TX Power (dBm) | H2 (dBm) | H2 (dBc) | H3 (dBm) | H3 (dBc) |
| 0 | 2402 | 7F | 13.1 | -28.5 | 41.6 | -41.8 | 54.9 |
| 0 | 2402 | 36 | 12.8 | -30.7 | 43.5 | -44.6 | 57.4 |
| 0 | 2402 | 24 | 12.4 | -33.4 | 45.8 | -46.9 | 59.3 |
| 0 | 2402 | 18 | 11.2 | -39.8 | 51 | -50.1 | 61.3 |
| 19 | 2440 | 7F | 13.3 | -26.4 | 39.7 | -44.7 | 58 |
| 19 | 2440 | 36 | 12.9 | -28.9 | 41.8 | -47.4 | 60.3 |
| 19 | 2440 | 24 | 12.4 | -32.1 | 44.5 | -49.3 | 61.7 |
| 19 | 2440 | 18 | 11.1 | -38.3 | 49.4 | -52.1 | 63.2 |
| 39 | 2480 | 7F | 13.8 | -26.8 | 40.6 | -44.4 | 58.2 |
| 39 | 2480 | 36 | 13.4 | -29.8 | 43.2 | -46.4 | 59.8 |
| 39 | 2480 | 24 | 12.7 | -33.8 | 46.5 | -47.8 | 60.5 |
| 39 | 2480 | 18 | 11.4 | -40.6 | 52 | -50.7 | 62.1 |

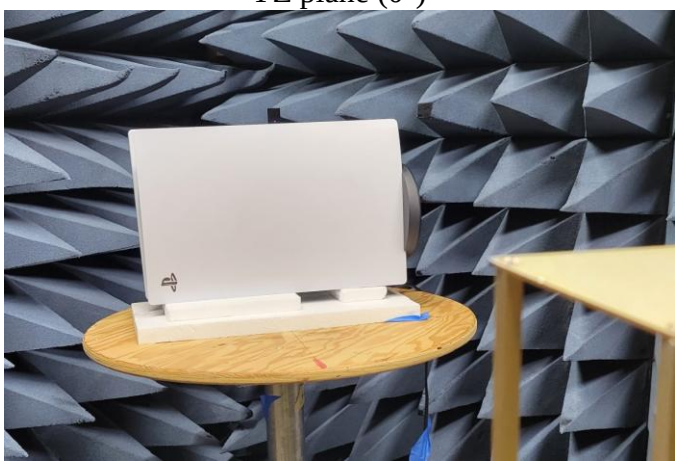
## Appendix B (Dongle with PS5)

XY plane (330º)

XZ plane (0º)



YZ plane (0º)

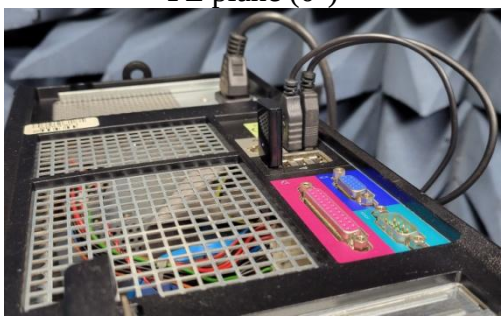


## Appendix B (Dongle with PC)

XY plane (0º)

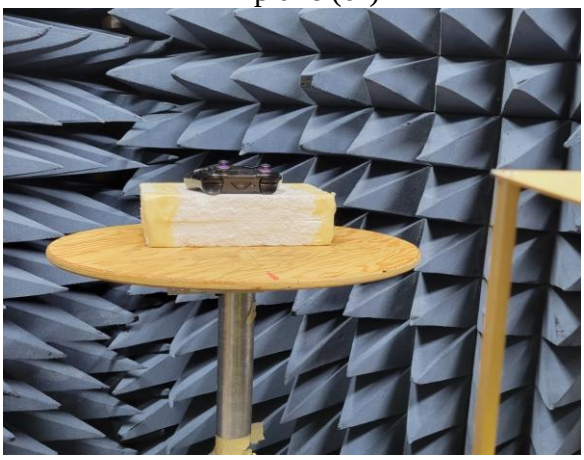
XZ plane (0º)

YZ plane (0º)

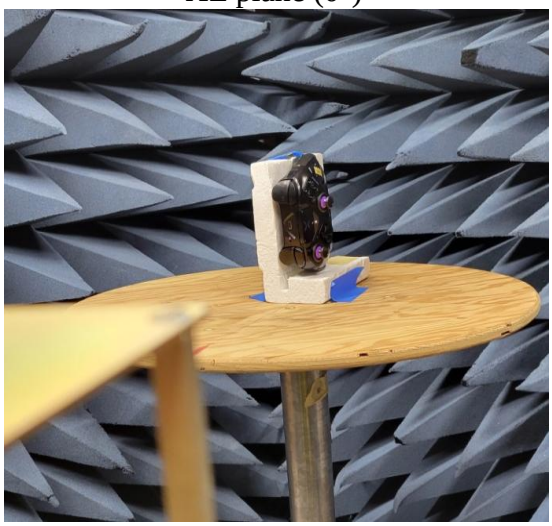


# Appendix B (PS5 controller)

XY plane (0º)



XZ plane (0º)



YZ plane (0º)