Logitech
Antenna Under Test (AUT)
Report

Model Name: F00015

Equipment Type: PEN

Manufacturer: LOGITECH EUROPE S.A.

Address: EPFL – Quartier de l'Innovation Daniel Borel Innovation Center,1015 Lausanne, Switzerland

Tested by: _________Alice Künstner, H.Favey________

Report Date: ___________2025/08/21________________

Report Release History

Report version	Description	Date Issued
1.00	Original release	2025/08/21

Table of Contents

1. EUT Antenna Information

1) Antenna Material : Polyimide printed
2) Antenna Type : Dipole
3) Antenna Dimension: 17.2 x 10 mm
4) Operating Frequency : 2.4 GHz – 2.4835 GHz
5) Input Impedance : 50 Ω
6) Standing-Wave Ratio : < 2

2. Measured Values and Calculation of Antenna Gains

Measure peak horizontal/vertical EIRP on each x-y, y-z, x-z plane. The highest measured values will be used to calculate the antenna peak gain.

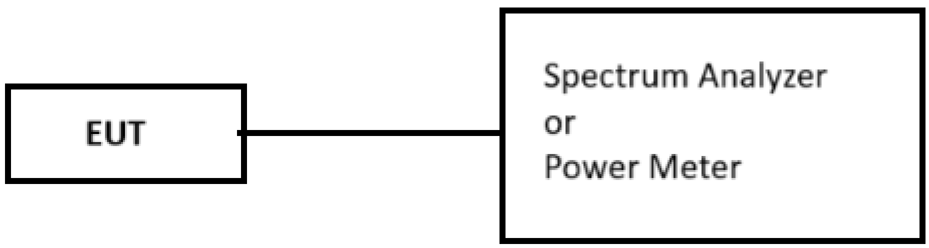
Antenna Peak Gain (dBi) = Max EIRP(dBm) - Conducted Power (dBm)

Frequency	**X-Y Plane ϕ=0~360º, θ=90º**		**X-Z Plane ϕ=0º, θ=0~360º**		**Y-Z Plane ϕ=90º, θ=0~360º**		**Max Peak EIRP (dBm)**	**Conducted Power (dBm)**	**Antenna Peak Gain (dBi)**
	Ver. Peak EIRP (dBm)	**Hori. Peak EIRP (dBm)**	**Ver. Peak EIRP (dBm)**	**Hori. Peak EIRP (dBm)**	**Ver. Peak EIRP (dBm)**	**Hori. Peak EIRP (dBm)**			
2.402 GHz	-10.6	-1.3	-4.4	**1.6**	1.1	-4.7	**1.6**	**7.97**	**-6.37**
2.440 GHz	-9.5	0.1	-2.7	**2.6**	2.1	-4.2	**2.6**	**7.94**	**-5.34**
2.480 GHz	-10.1	-0.3	-1.6	**1.4**	0.9	-3.7	**1.4**	**8.11**	**-6.71**

Test Date: ______________2025/06/25_________________________

3. Conducted Power Measurement

3.1 Test Setup



3.2 Test Instruments

Description	Model No.	Serial No.	Last Calibration
Spectrum Analyzer Keysight	N9000B	**MY57102570**	27-JUL-2023

Note: The calibration interval of the above test instruments is __24__ months

3.3 Test Procedure

A spectrum analyzer or Power meter was used to perform output power measurement, setting the detector to average and configuring EUT continuously transmitting power(100% duty cycle).

3.4 Test Result of RF conducted Power

Frequency	Conducted Power (dBm)
2.402 GHz	7.97
2.440 GHz	7.94
2.480 GHz	8.11

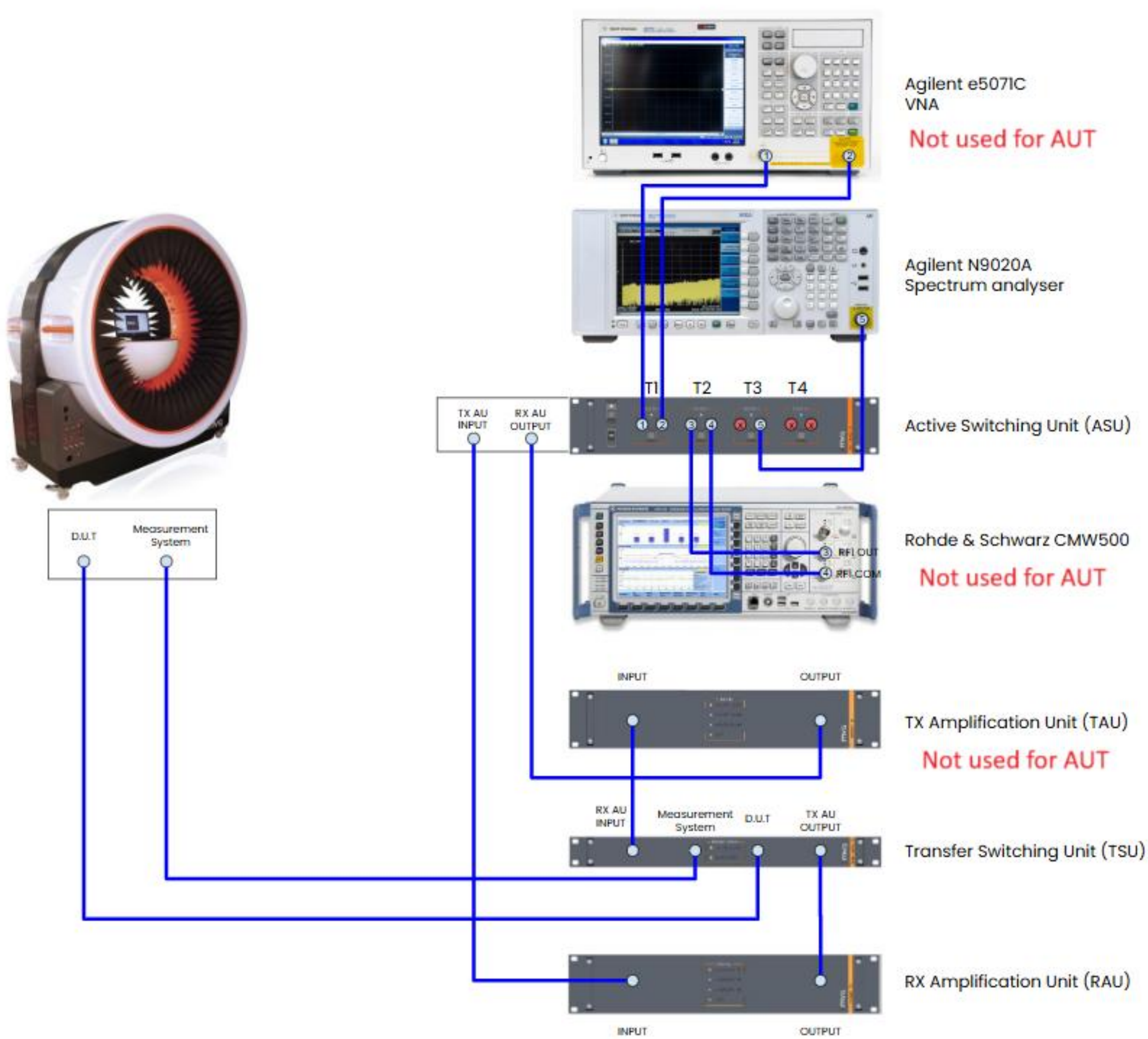
Test Date: ________2025/06/25_________________________________

4. Radiation Pattern Measurement

4.1 Test Location

Radiation pattern measurement in the anechoic chamber

4.2 Description of the anechoic chamber



4.3 Test Instruments

Description	Model No.	Serial No.	Last Calibration
Anechoic chamber Keysight	Microwave Vision Group: 650Mhz to 18GHz , 4.7 x 4.6 x 3.2 m	N.A.	N.A.
Starlab Main Unit	SL V2_065-18GHz	1102284-0035	9 Aug. 2024
Starlab (Active Switching Unit)			
Starlab (Tx Amplification Unit)			
Starlab (Transfer Switching Unit)			
Starlab (Rx Amplification Unit)			
Spectrum Analyzer	Keysight N9020B MXA Signal Analyzer, Multi-touch, 10 Hz to 26.5 GHz	MY60110720	27 Jul 2023
VNA	Agilent E5071C	MY46111439	18 Jul. 2024
Radio tester	Rohde & Schwarz CMW500	146151	26 Aug 2021
Software	WaveStudio for passive and active measurements	V22.1	
Workstation	Asus 841R6 windows 10	N.A.	N.A.

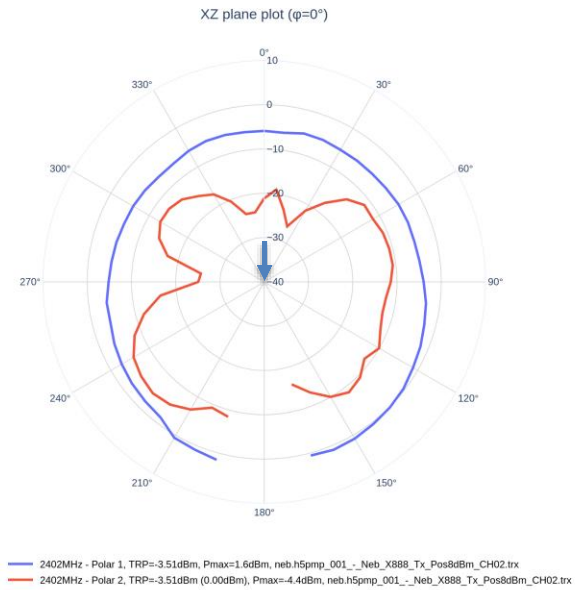
Note: The calibration interval of the above test instruments is 24 and 36 months

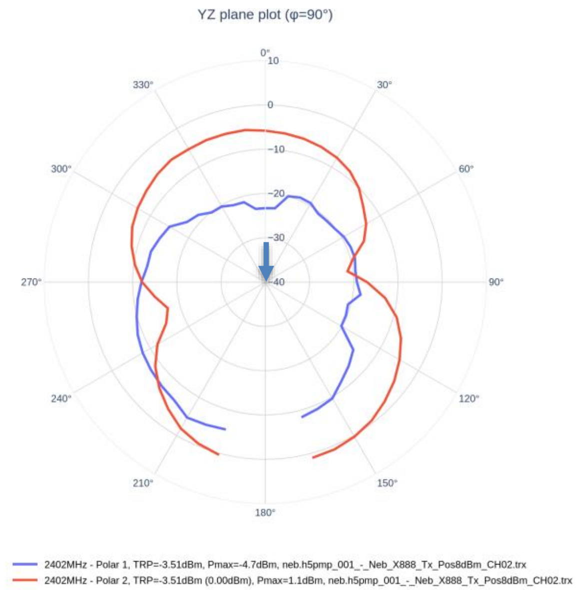
4.4 Test Procedure

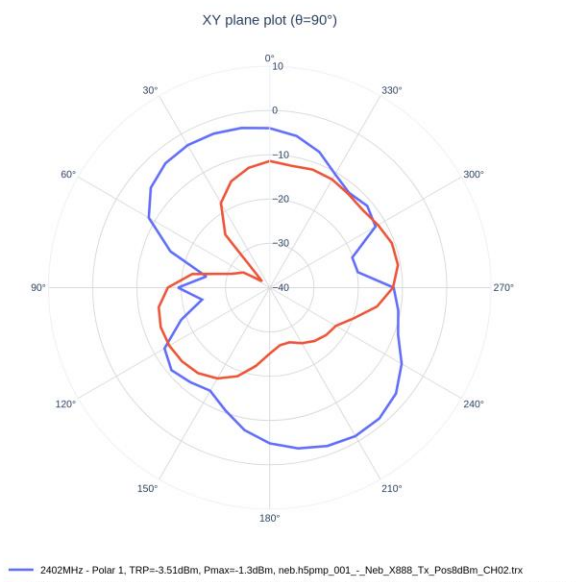
i. Set the EUT in test mode, fixed frequency, carrier only, 100% duty cycle, at maximum RF power level.
ii. Place the EUT on the White support (front of the EUT on the X direction) in the Starlab chamber
iii. Setup the Wave studio software to the frequency set in the EUT (2.402 GHz, 2.440 GHz or 2.480 GHz
iv. Set the Starlab chamber to measure the data of emitted radiation power in steps of 10 degrees.
v. Verify that the signal is stable and not perturbed
vi. Close the door of the anechoic chamber
vii. Run the test. The Starlab chamber measures the data of emitted radiation power in steps of 10 degrees. In theta and Phi, for both Horizontal and Vertical antenna polarization.
viii. Once the test is completed, save the results for both Horizontal and Vertical polarization to a file.
ix. Record the maximum radiation pattern among the 3 planes XY, XZ, YZ. Antenna Peak Gain (dBi) = Max EIRP (dBm) - Conducted power (dBm)

4.6 2D Pattern Test Plot

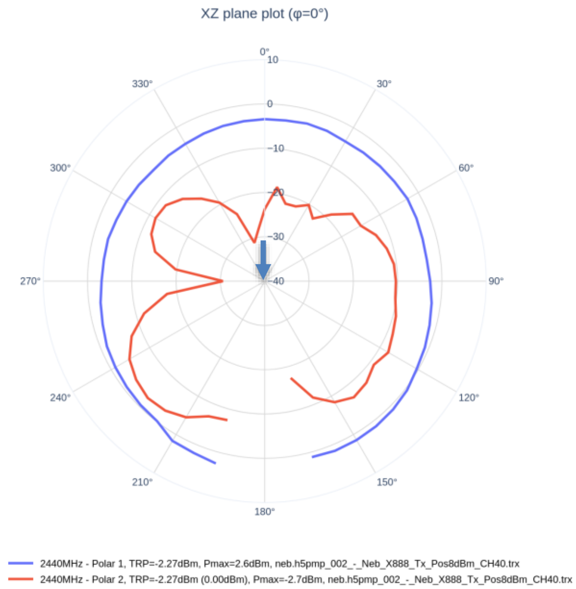
EUT at 2.402 GHz: measured radiated power. Polar 1 = H, Polar 2 = V

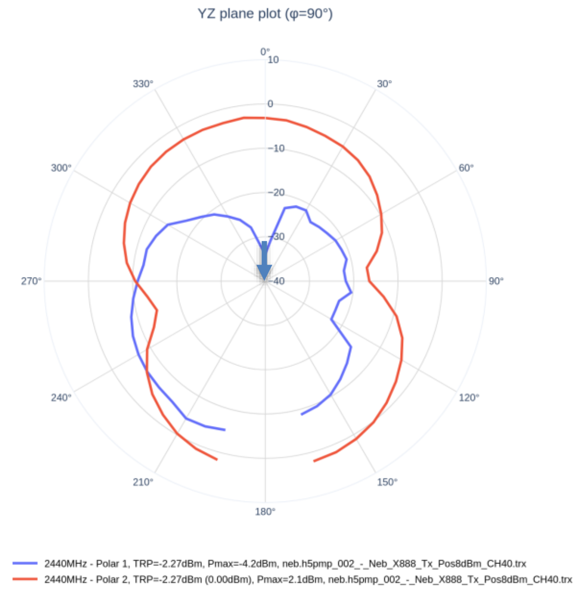


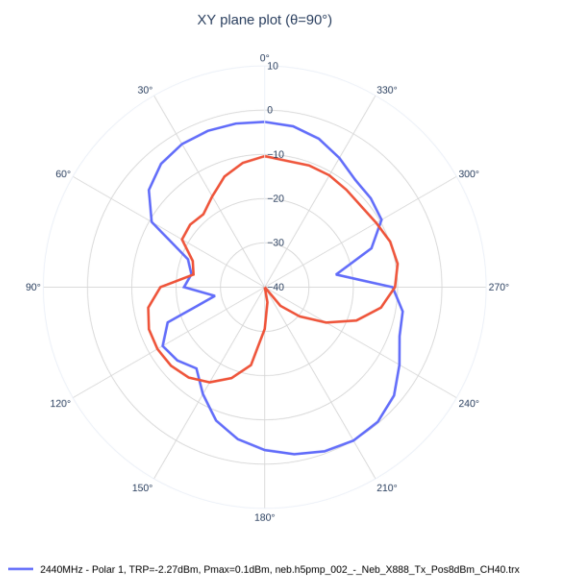




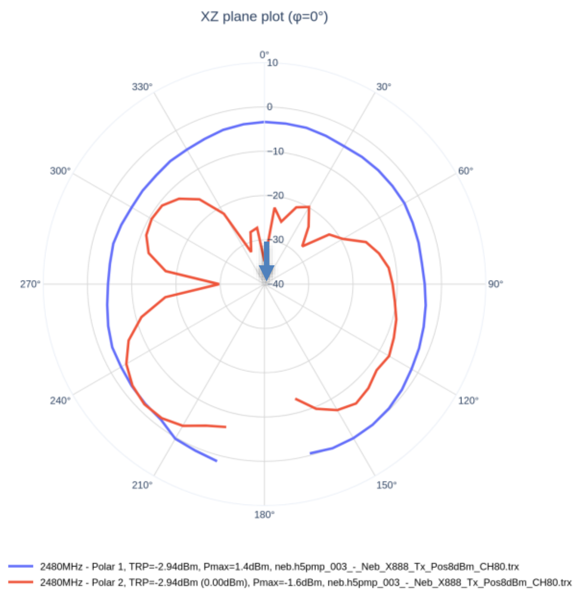
EUT at 2.440 GHz: measured radiated power. Polar 1 = H, Polar 2 = V

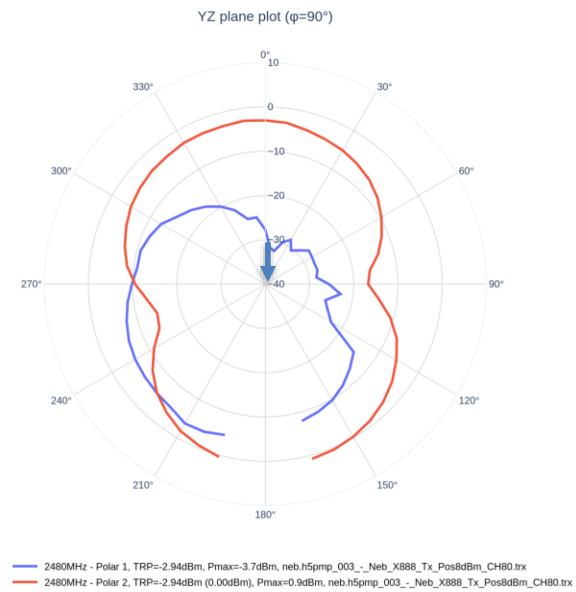


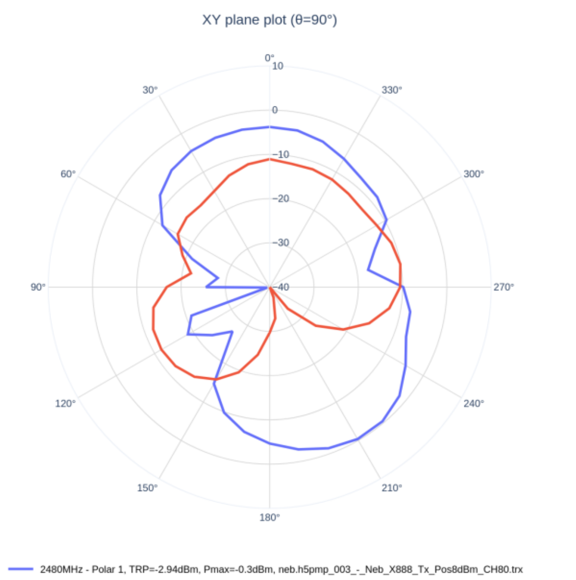




EUT at 2.480 GHz: measured radiated power. Polar 1 = H, Polar 2 = V







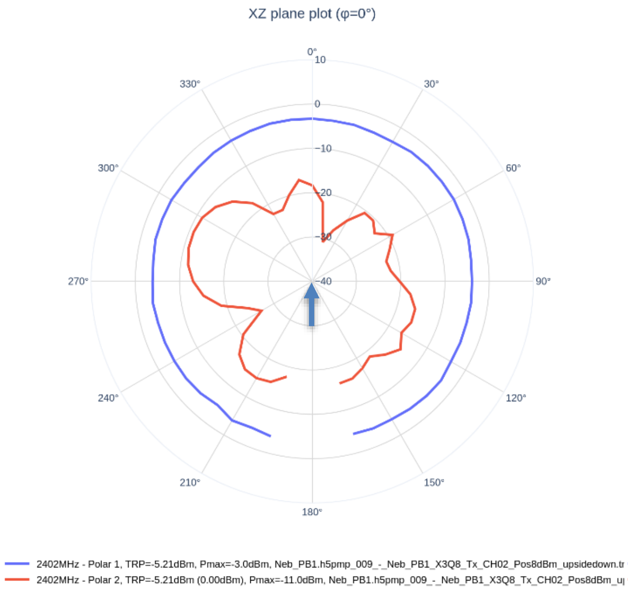
Clarifying the Location of Maximum EiRP Measurement

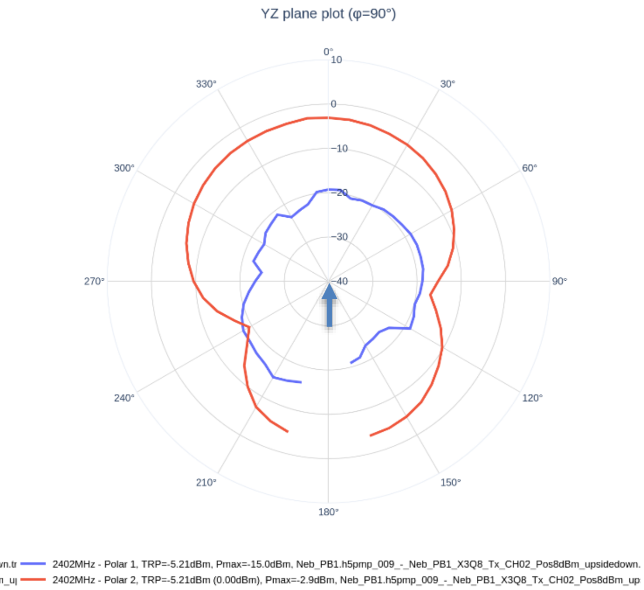
The Starlab measurement setup includes a blind area, where data cannot be captured, corresponding to the theta angle range of approximately 165° to 195°. To ensure no unintended gain occurs within this blind spot, an additional measurement is conducted by flipping the Device Under Test (DUT) within the Starlab system. This process is indicated by the arrow in the accompanying image, highlighting the actuation direction on the device's switch.

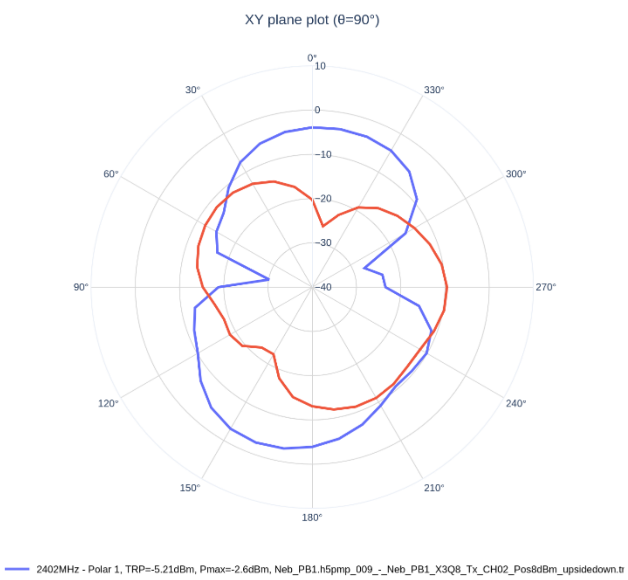
Due to technical constraints, the original DUT could not be reused for this measurement, and a different DUT was employed instead. This explains the observed variation in measurement consistency. Nevertheless, the results demonstrate uniform EiRP continuity over the blind spot region, which can also be extrapolated to the original DUT.

The results below show the radiated power where the unit is flipped, exposing the section that was in the blind spot to the corresponding angle theta = 0°.

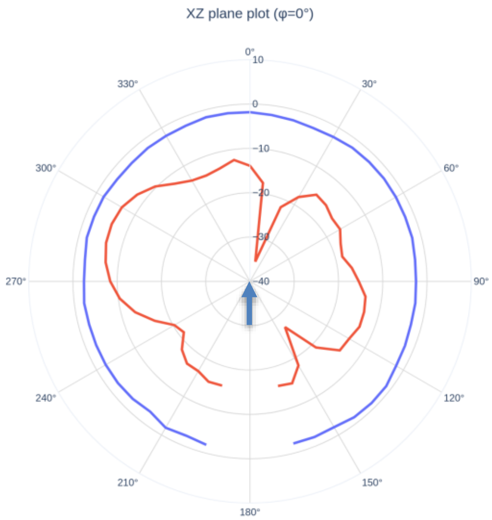
EUT at 2.402 GHz: measured radiated power. Polar 1 = H, Polar 2 = V

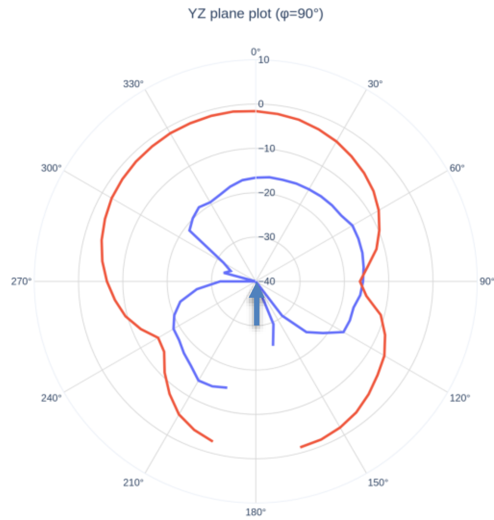






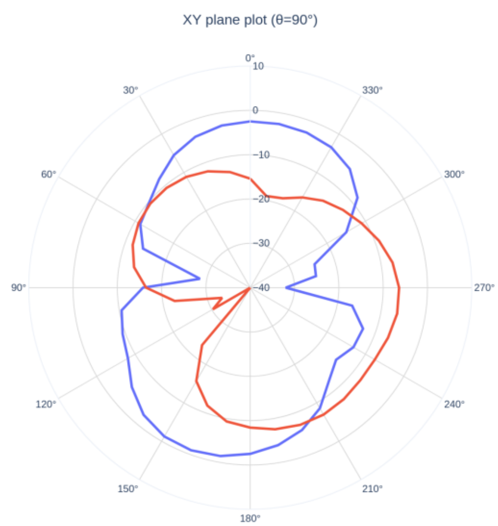
EUT at 2.440 GHz: measured radiated power. Polar 1 = H, Polar 2 = V





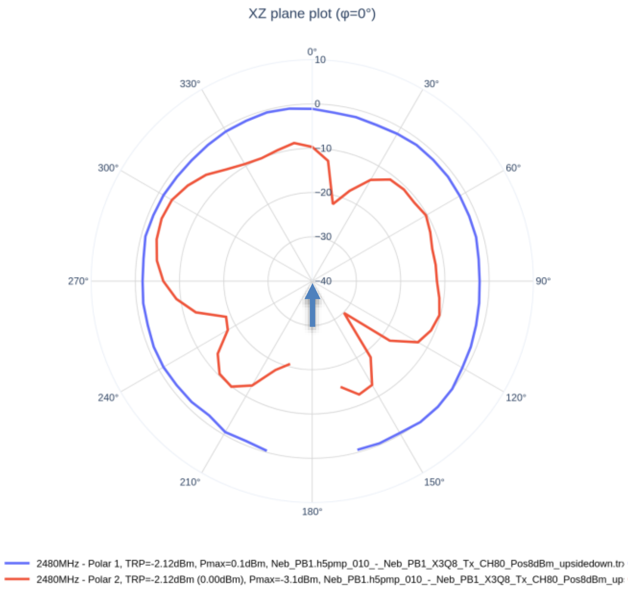
2440MHz - Polar 1, TRP=-3.45dBm, Pmax=-1.2dBm, Neb_PB1.h5pmp_007_-_Neb_PB1_X3Q8_Tx_CH40_Pos8dBm_upsidedown.tr
2440MHz - Polar 2, TRP=-3.45dBm (0.00dBm), Pmax=-6.2dBm, Neb_PB1.h5pmp_007_-_Neb_PB1_X3Q8_Tx_CH40_Pos8dBm_up

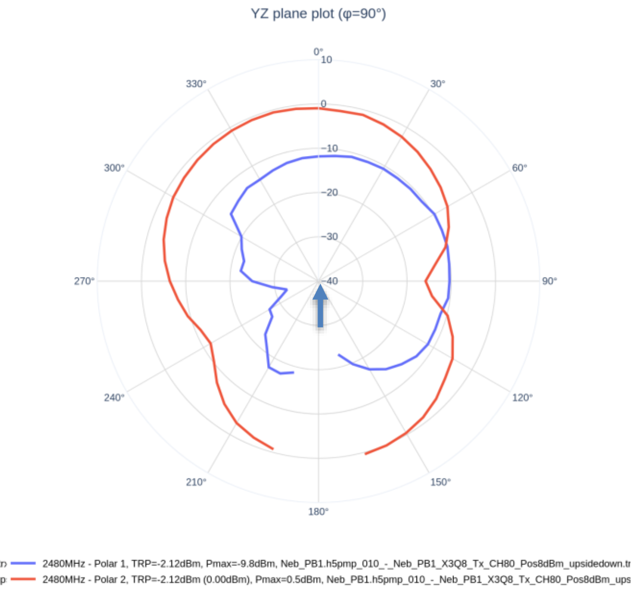
2440MHz - Polar 1, TRP=-3.45dBm, Pmax=-14.2dBm, Neb_PB1.h5pmp_007_-_Neb_PB1_X3Q8_Tx_CH40_Pos8dBm_upsidedown.
2440MHz - Polar 2, TRP=-3.45dBm (0.00dBm), Pmax=-1.2dBm, Neb_PB1.h5pmp_007_-_Neb_PB1_X3Q8_Tx_CH40_Pos8dBm_up

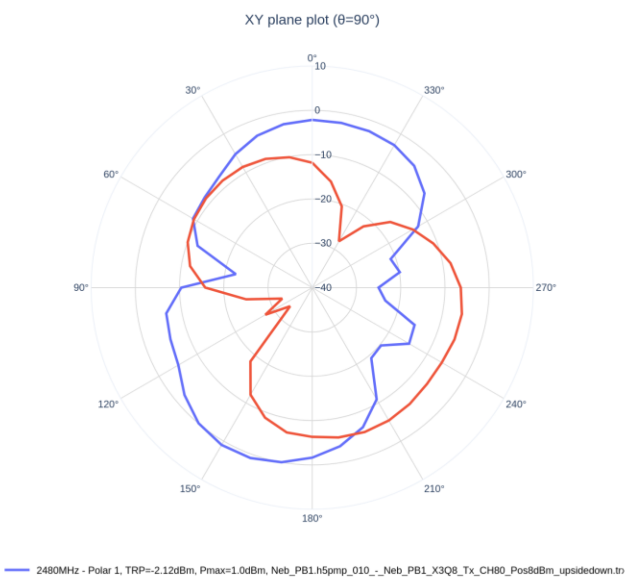


2440MHz - Polar 1, TRP=-3.45dBm, Pmax=-1.0dBm, Neb_PB1.h5pmp_007_-_Neb_PB1_X3Q8_Tx_CH40_Pos8dBm_upsidedown.tr
2440MHz - Polar 2, TRP=-3.45dBm (0.00dBm), Pmax=-6.3dBm, Neb_PB1.h5pmp_007_-_Neb_PB1_X3Q8_Tx_CH40_Pos8dBm_up

EUT at 2.480 GHz: measured radiated power. Polar 1 = H, Polar 2 = V







5.0 Conclusion

The additional measurements conducted by flipping the DUT within the Starlab system effectively addressed the blind spot in the theta angle range (165° to 195°). Despite using a different DUT due to technical constraints, the results confirmed consistent EiRP continuity within this region. Furthermore, no unexpected gain was observed in the blind spot, validating the efficiency of the measurement methodology in ensuring accurate radiated power analysis.