

Test report No:
NIE: 79752RAN.001A1

Test report

Antenna Gain, Efficiency and Radiation Pattern Tests

(*) Identification of 1tem tested	Verio Flex BLE5 TI CC2340 DV1 meter
(*) Trademark	OneTouch Verio Flex
(*) Model and /or type reference tested	Verio Flex (With Texas Instruments CC2340R2 BLE IC)
(*) Other identification of the product	HW version: DV1 SW version: 99.99.94 FCC ID: 2ACT5-Z03 IC: 12202A-Z03
(*) Features	Bluetooth Low Energy
(*) Manufacturer	LifeScan Europe GmbH Dannstrasse 19, 6300 Zug, Switzerland
Test methodology according to	[1] IEEE Std 149™-2021 - IEEE Recommended Practice for Antenna Measurements, September 2021.
Approved by (name / position & signature)	Manuel García Fuertes Antennas Laboratory Technical Responsible
Date of issue	2025-03-17
Report template No	FAN41_01 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification, S.A.U. is a testing laboratory competent to carry out the tests described in this report.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the following documents:

1. FAN02 - OTA SISO CTIA - AMS-8500 Uncertainty report

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested", "Other identification of the product", "Features", "Manufacturer" and "Test sample description").

DEKRA Testing and Certification, S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by the client.

Sample M/01 is composed of the following elements:

Control N°	Description	Model	S/N	Date of reception
79752/002	Bluetooth Low Energy module	One Touch Verio Flex	AZK89CH0R	2024/10/04

1. Sample M/01 has undergone the test(s) specified in subclause "Test method requested".

Test sample description

The device under test consist of a Bluetooth Low Energy module.

Identification of the client

Company name: LifeScan Scotland Ltd
Postal address: Beechwood Park North, Inverness, IV2 3ED, UK
Contact person: Brian Guthrie
Telephone / E-mail: +447785774458 / bguthrie@lifescan.com

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2024-10-10
Date (finish)	2024-10-10

Document history

Report number	Date	Description
79752RAN.001	2024-11-06	First release
79752RAN.001	2025-03-17	FCC ID and IC updated upon customer request. This test report cancels and replaces test report 79752RAN.001.

Remarks and comments

The instrumentation utilized to perform the tests covered in this test report is listed in the following table.

	Equipment	S/N	DEKRA Control Number
1.	Anechoic chamber ETS LINDGREN AMS-8500	3954	02729
2.	Positioning system controller and RF switch Agilent Technologies 3499A	MY42003363	02831
3.	OTA measurement software ETS LINDGREN EMQuest v1.14	1095	04428
4.	Spectrum analyzer Agilent Technologies PSA	MY44300521	02327
5.	Temperature and Pico Tehcnology, model Humidityprobe	ZNR30/064	03574

Testing has been performed by Francisco José Alcaide.

Appendix A: Test results

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1. TEST CONDITIONS

1.1 Test frequencies and output power

3D radiation pattern and conducted power measurements were performed at the range from 2400 MHz to 2500 MHz for the EUT.

Test frequencies were selected accordingly with the EUT operating frequency range.

1.2 Antenna orientation and setup requirements

For the 3D radiation pattern measurements the EUT is rotated along two different spherical axes: theta (θ) and phi (Φ). The relationship between the 3D Cartesian coordinate system (X, Y, Z) and the theta and phi axes is illustrated in the following figure. This coordinate system should be used as reference in all 3D radiation pattern graphs in section 3 as well as test setup photographs in Appendix B.

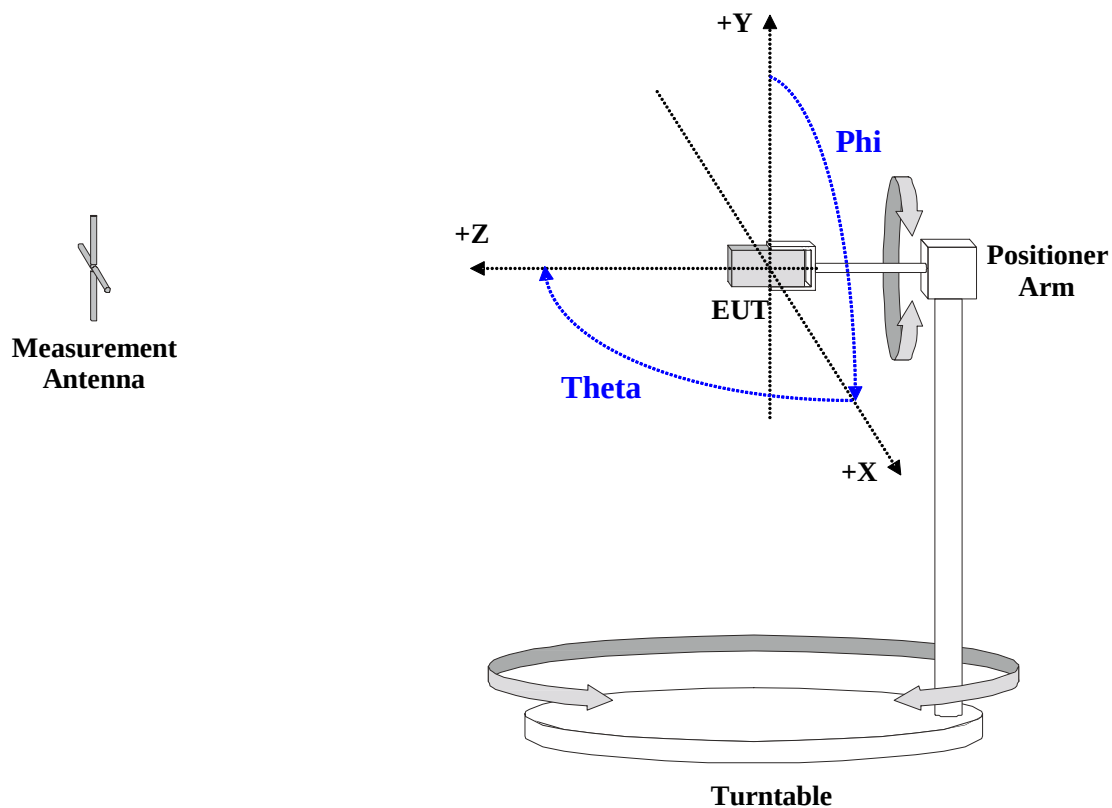


Fig. 1. Coordinate system.

Theta is the spherical axis that rotates along the Cartesian Y axis while Phi is the spherical axis that rotates along the Cartesian Z axis. The initial measurement position (Theta = 0° and Phi = 0°) is illustrated in each of the test setup photographs in Appendix B. The EUT has only one mechanical configuration and it was tested in the "Free-space" placed 5 meters away from the measurement antenna.

2. TEST RESULTS

2.1 Peak Gain

The test setup used to derive test results in this clause is illustrated below.

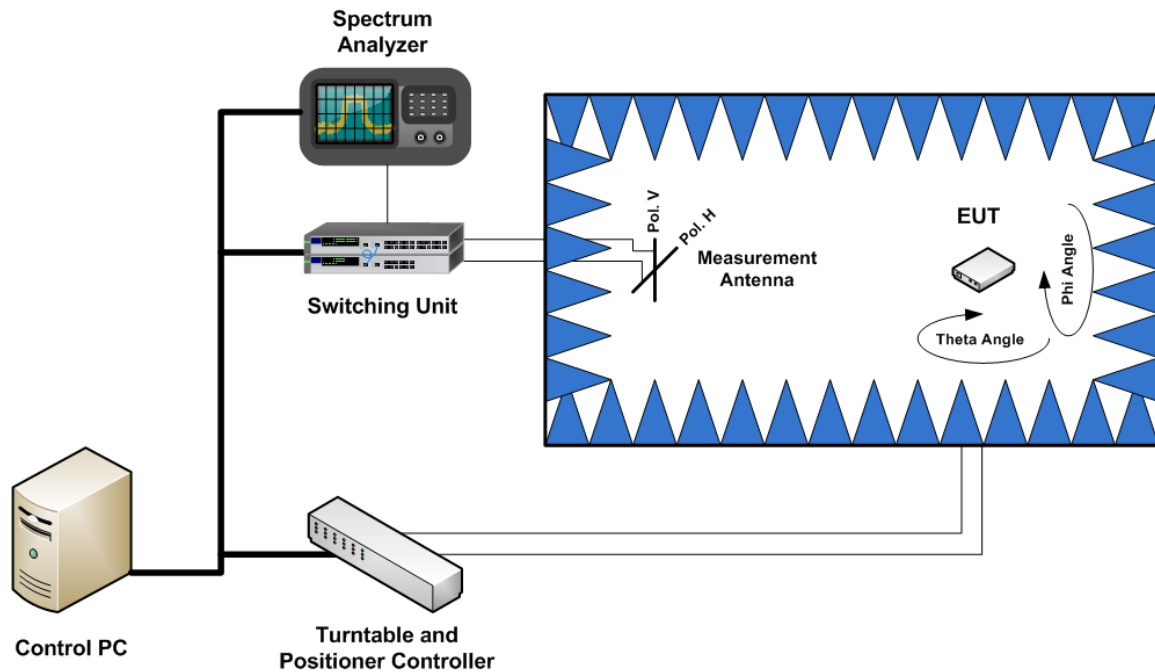


Fig. 2. Equipment and connections for peak antenna gain measurements.

For radiated tests, the EUT was placed inside a fully anechoic test system and hold on a multi-axis positioning system for Free Space (FS) configuration (see Figure 16). The EUT was never switched on, all signal excitations were generated by a Vector Network Analyzer (VNA) set to operate on the different test frequencies.

The measurements were performed at intervals of 15 degrees along the theta and phi axes and at both horizontal and vertical polarizations.

Antenna Efficiency and Peak Gain:

Frequency (MHz)	Efficiency (%)	Peak Gain (dBi)
2400	36.85	0.40
2402	39.58	0.67
2404	37.00	0.33
2406	30.92	-0.40
2408	29.73	-0.63
2410	31.68	-0.37
2412	34.06	-0.12
2414	36.41	0.17
2416	37.39	0.26
2418	38.55	0.35
2420	35.99	0.06
2422	37.20	0.19
2424	39.80	0.45
2426	38.81	0.39
2428	34.89	-0.05
2430	33.98	-0.18
2432	32.38	-0.42
2434	33.05	-0.29
2436	37.72	0.30
2438	43.12	0.90
2440	44.79	1.03
2442	40.30	0.48
2444	34.54	-0.22
2446	32.52	-0.53
2448	32.57	-0.44
2450	34.94	-0.16

Frequency (MHz)	Efficiency (%)	Peak Gain (dBi)
2452	36.84	0.04
2454	36.65	0.08
2456	35.67	0.05
2458	36.49	0.16
2460	37.75	0.19
2462	39.78	0.37
2464	38.12	0.28
2466	33.33	-0.39
2468	29.99	-0.74
2470	29.23	-0.80
2472	30.63	-0.58
2474	35.48	0.04
2476	40.72	0.63
2478	40.28	0.59
2480	35.61	0.03
2482	32.73	-0.34
2484	31.51	-0.60
2486	33.07	-0.39
2488	34.38	-0.24
2490	36.87	0.07
2492	35.94	-0.07
2494	32.00	-0.50
2496	32.43	-0.44
2498	35.75	0.01
2500	39.51	0.50

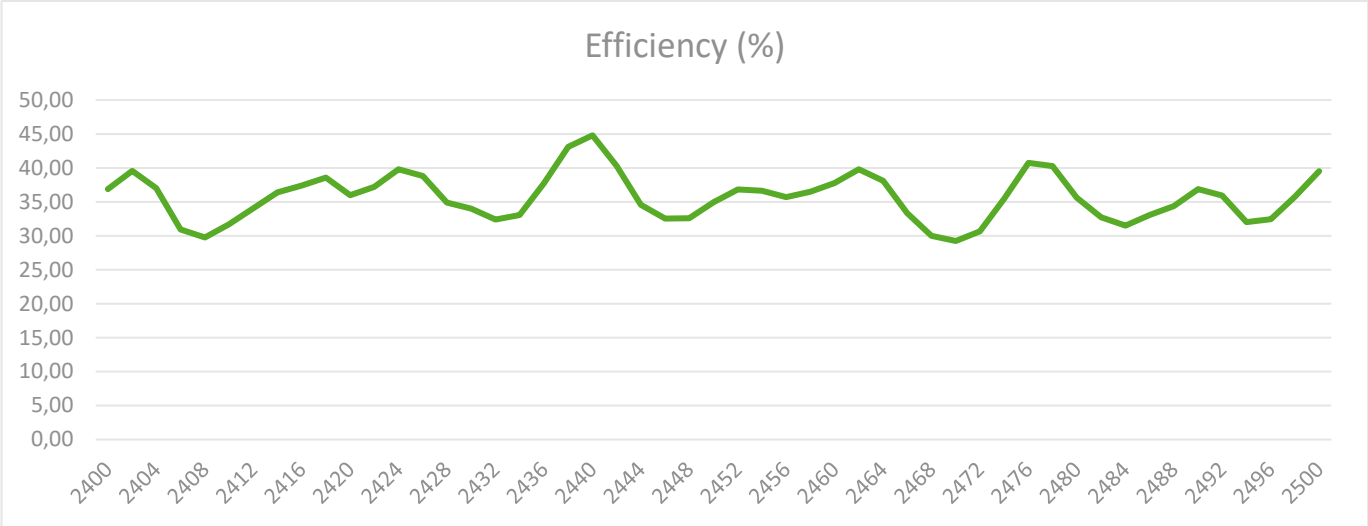


Fig. 3. Efficiency vs frequency.

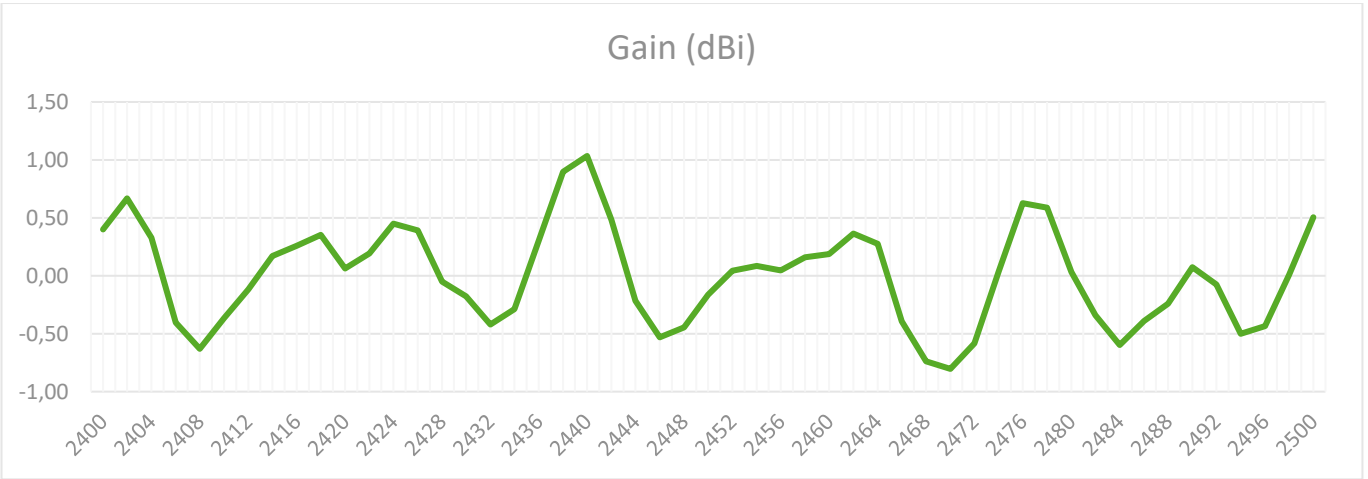


Fig. 4. Peak gain vs frequency.

3. 3D RADIATION PATTERNS

3.1 Free Space - Radiation Pattern – 2402 MHz - VERIO FLEX BLE5

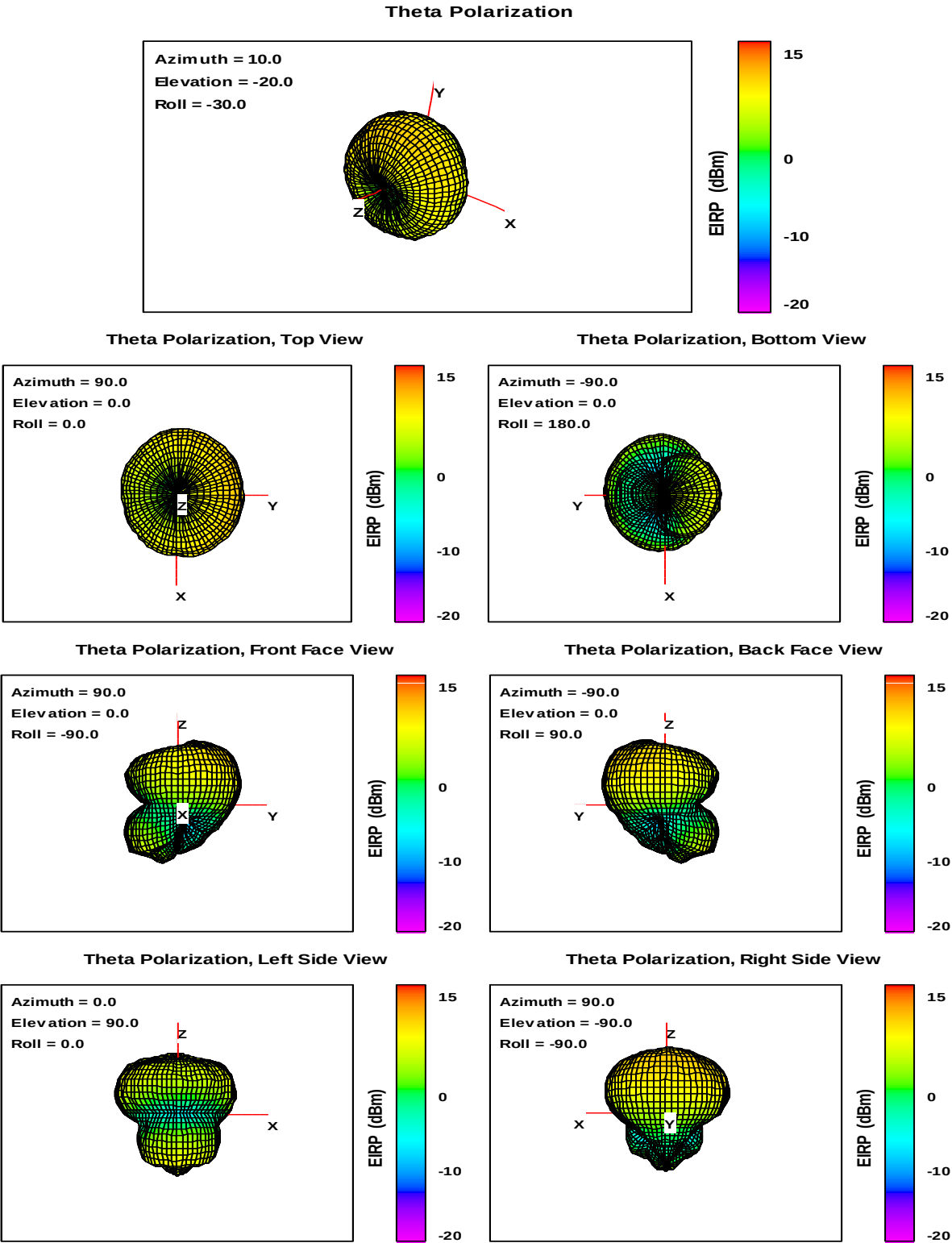


Fig. 5. Theta Polarization EIRP, Free Space, 2402 MHz.

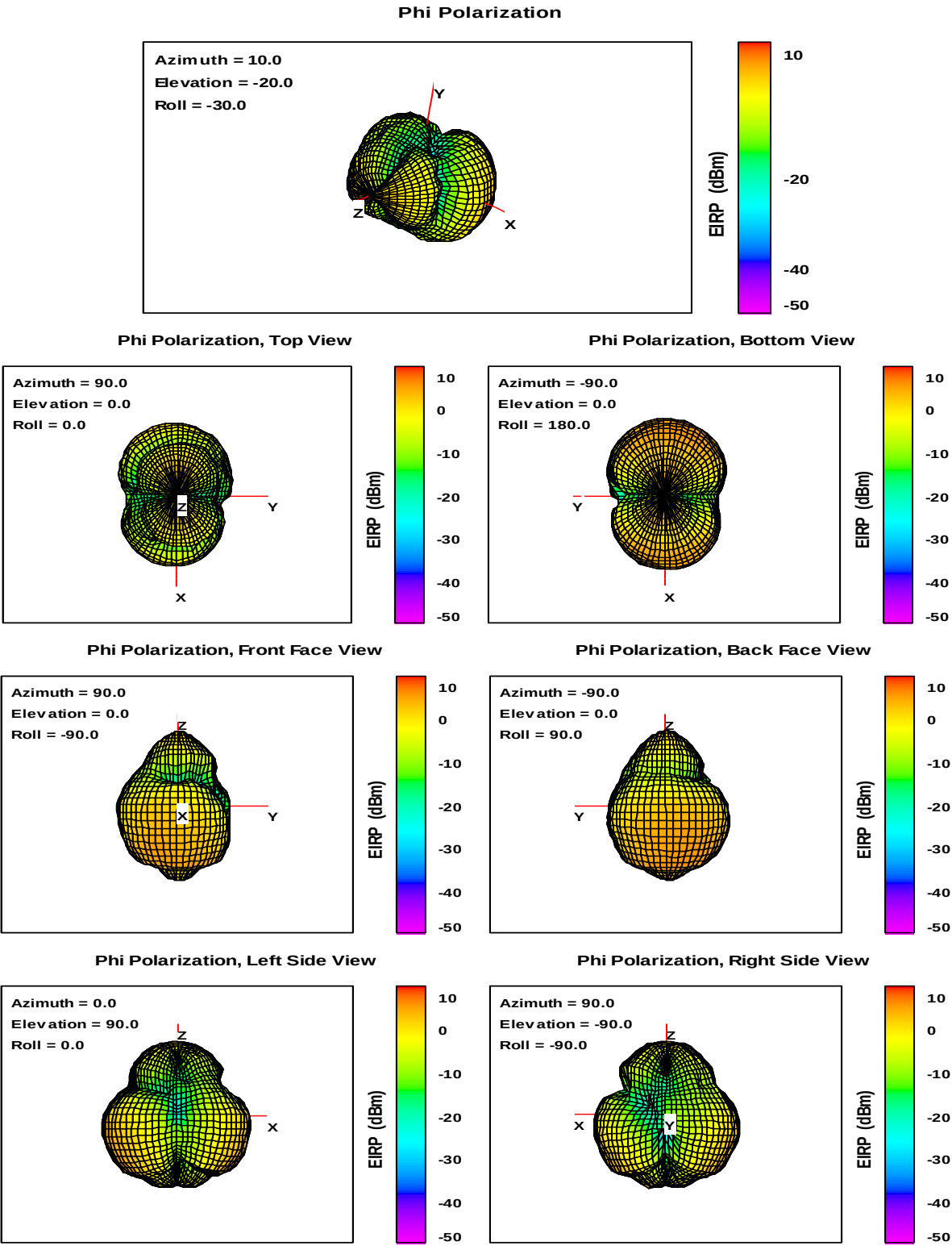


Fig. 6. Phi Polarization EIRP, Free Space, 2402 MHz.

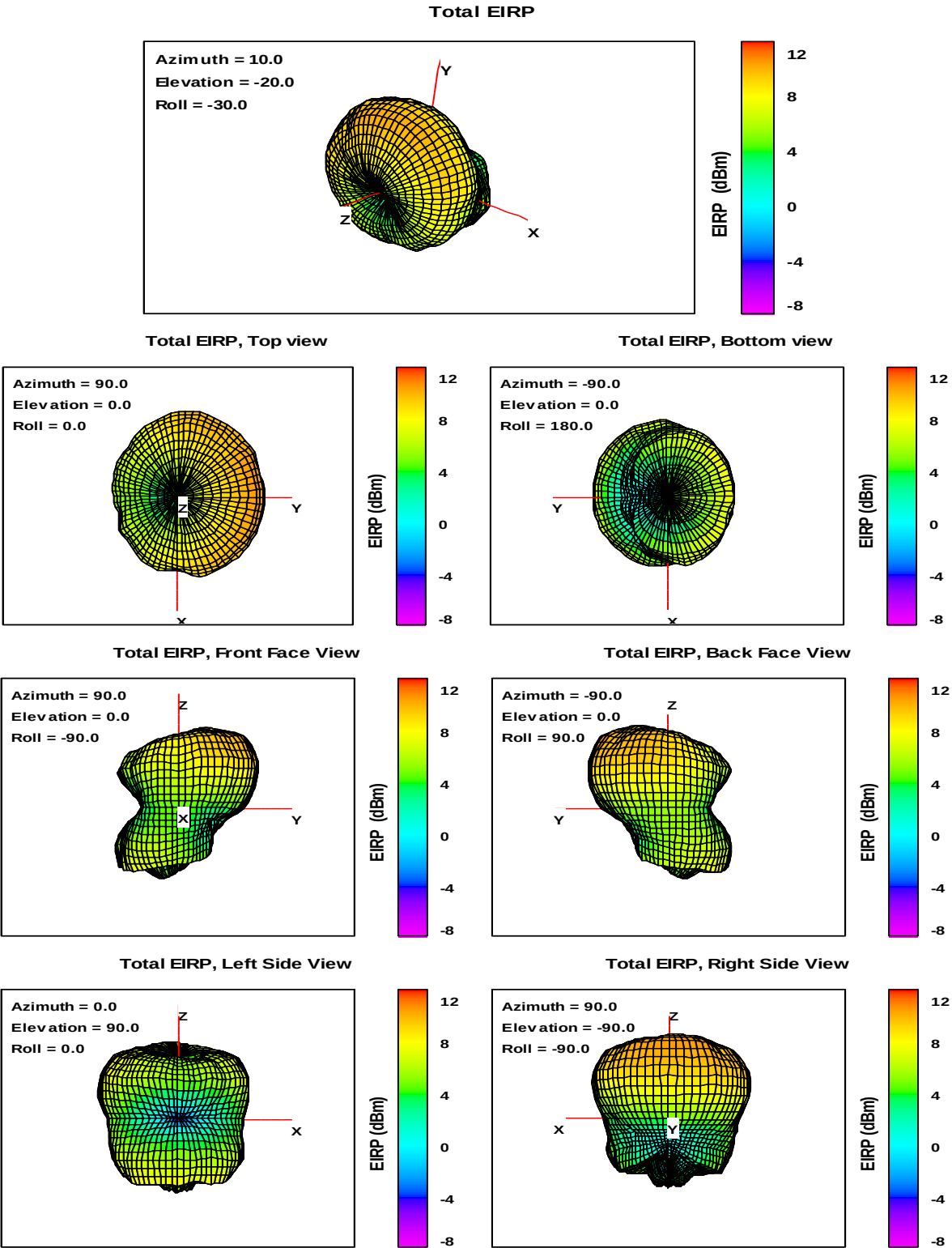


Fig. 7. Total EIRP, Free Space, 2402 MHz.

3.2 Free Space - Radiation Pattern – 2440 MHz - VERIO FLEX BLE5

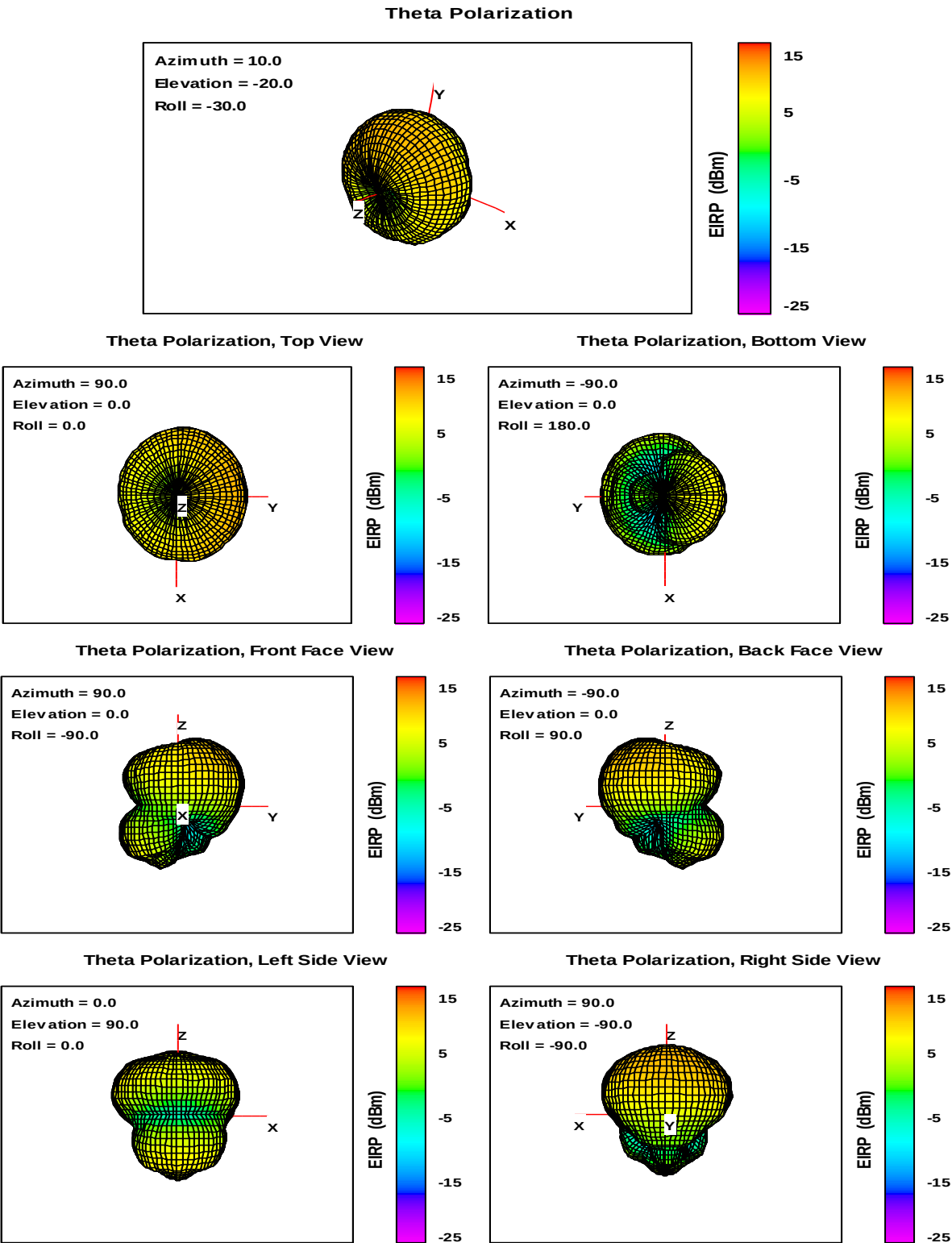


Fig. 8. Theta Polarization EIRP, Free Space, 2440 MHz.

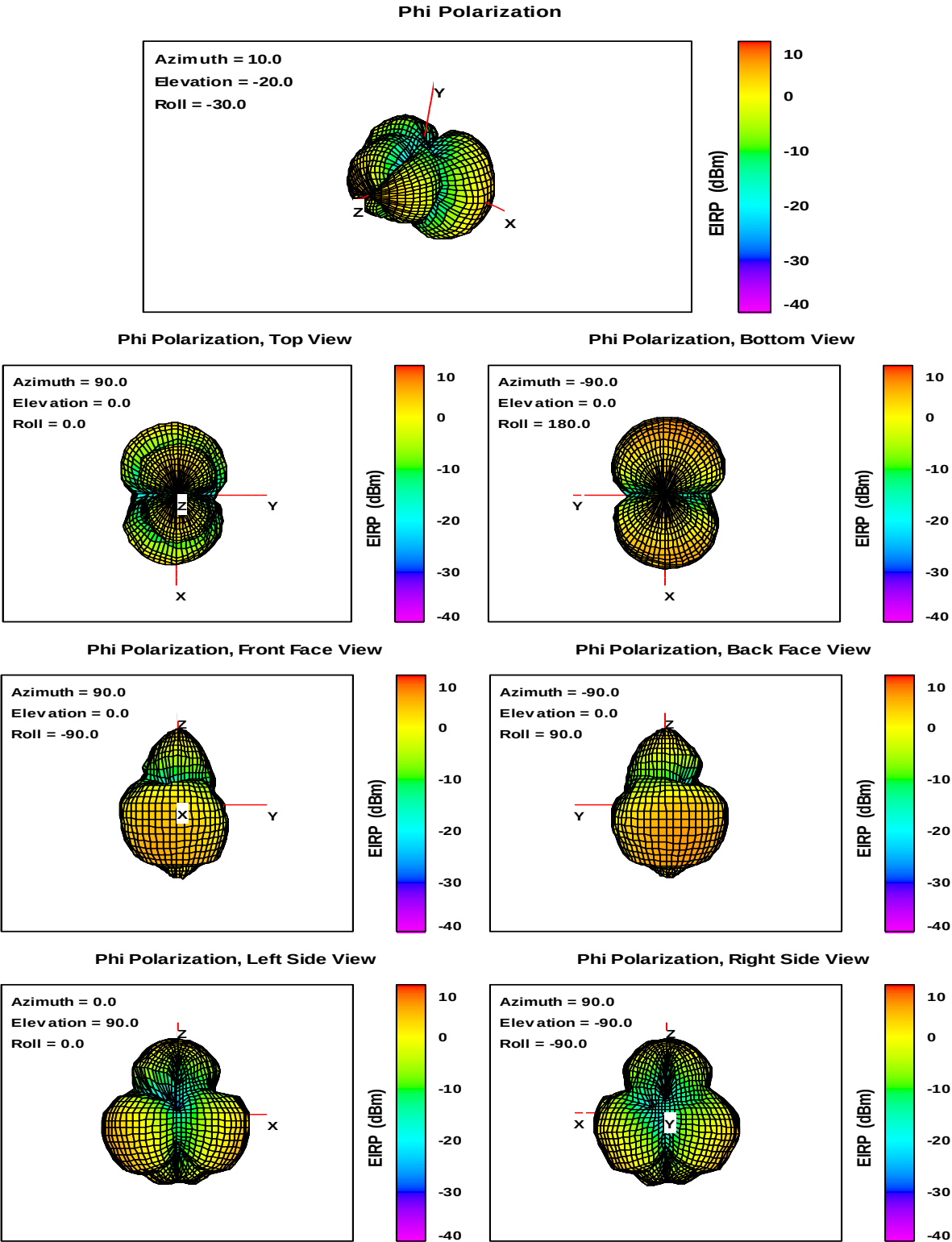


Fig. 9. Phi Polarization EIRP, Free Space, 2440 MHz.

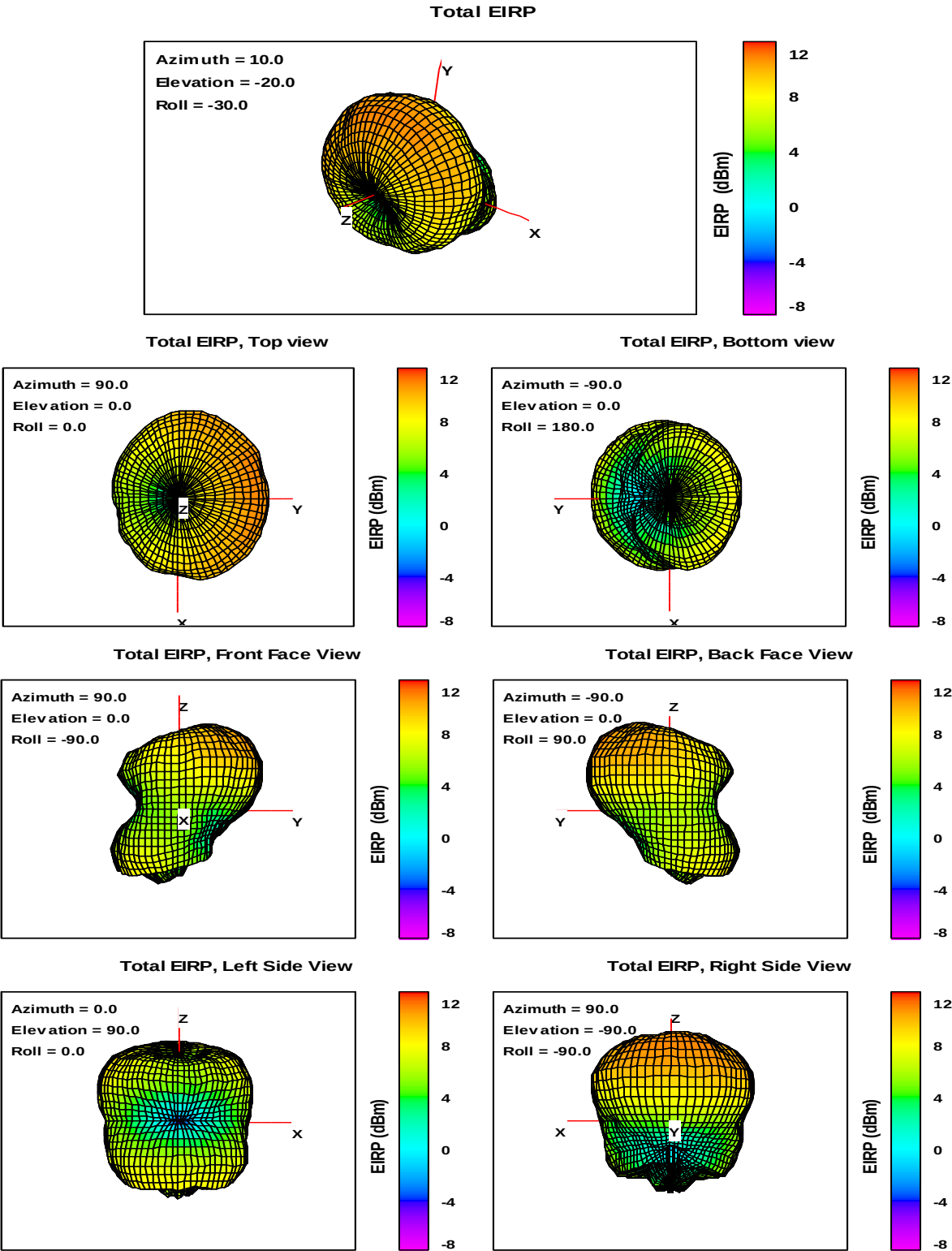


Fig. 10. Total EIRP, Free Space, 2440 MHz.

3.3 Free Space - Radiation Pattern – 2480 MHz - VERIO FLEX BLE5

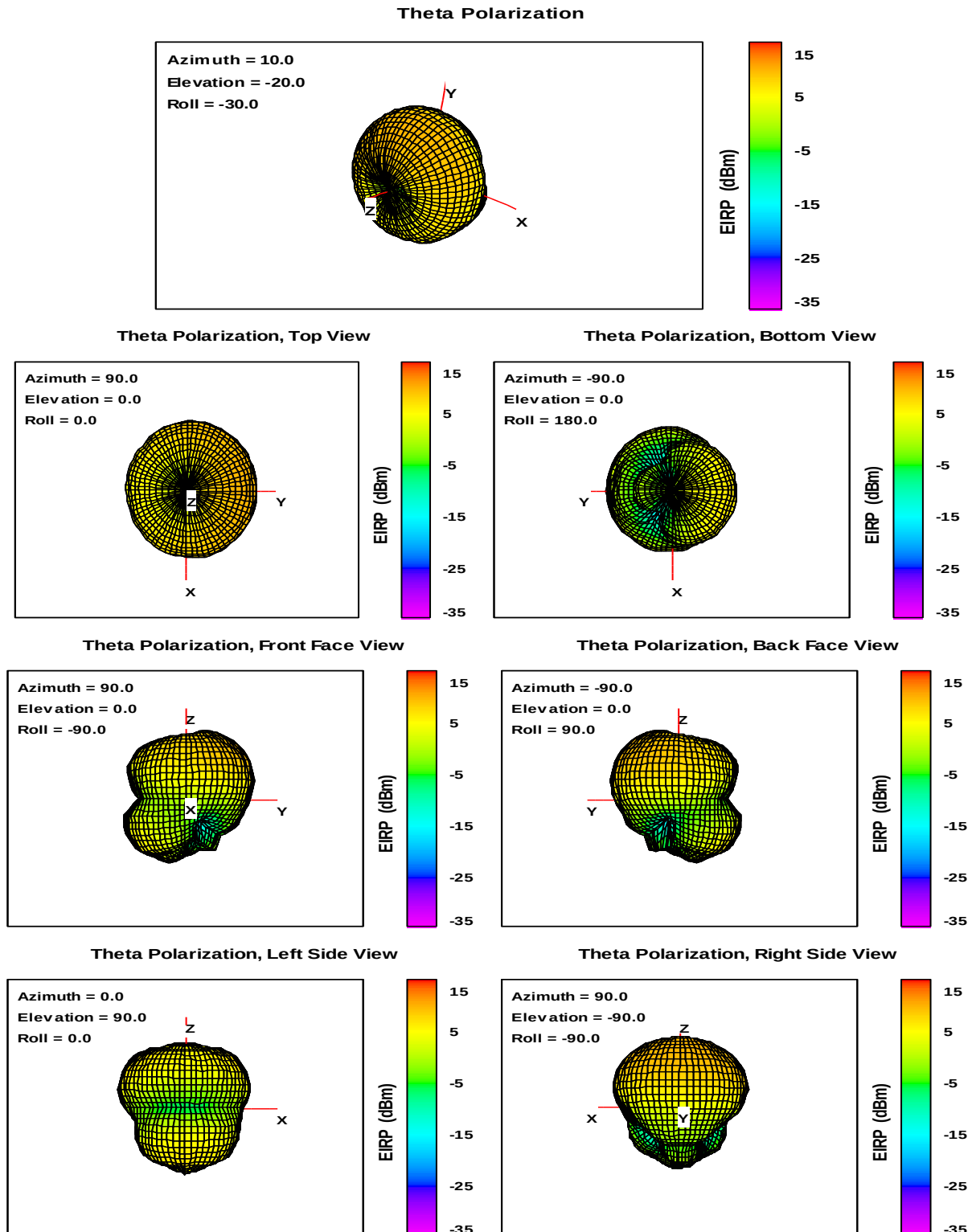


Fig. 11. Theta Polarization EIRP, Free Space, 2480 MHz.

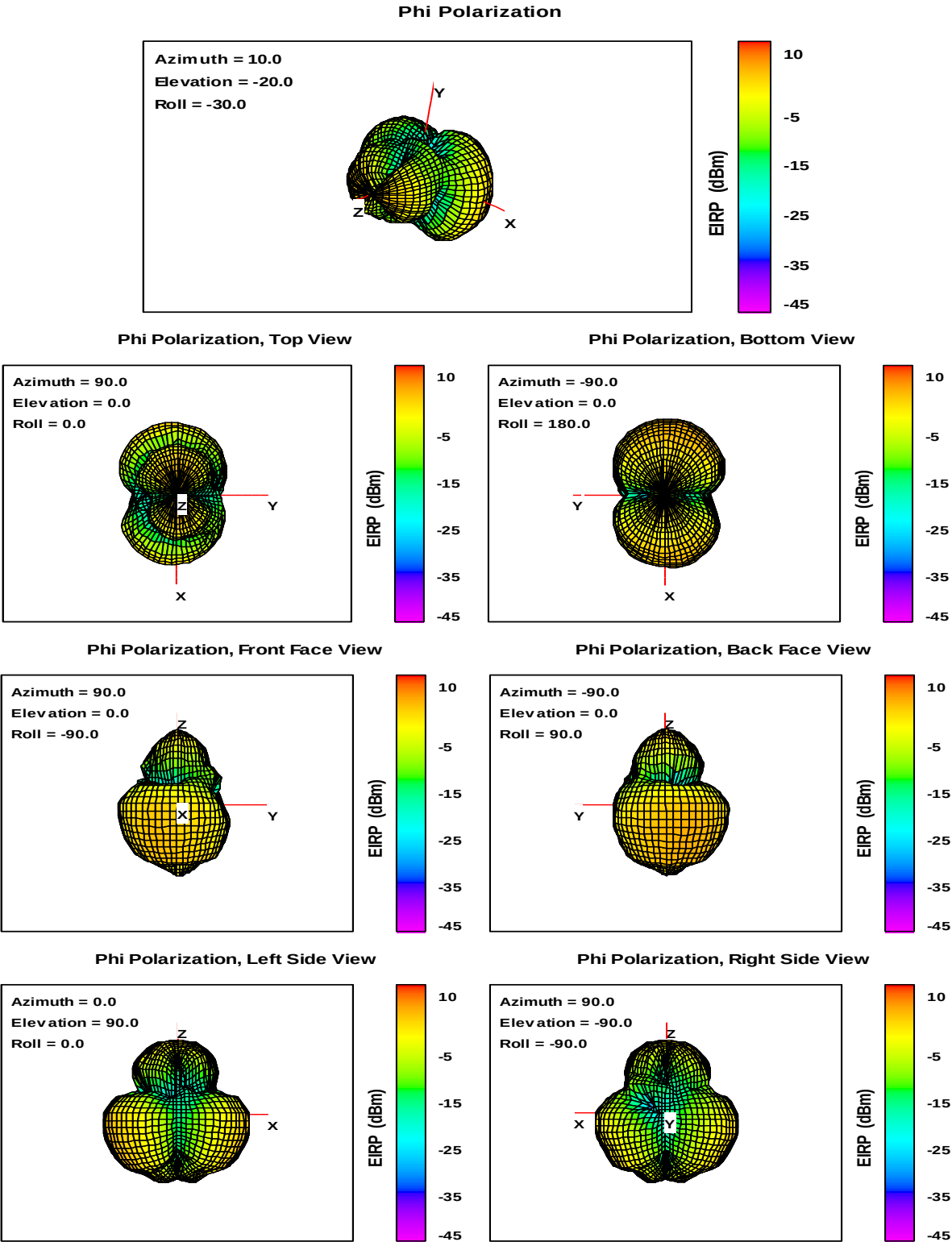


Fig. 12. Phi Polarization EIRP, Free Space, 2480 MHz.

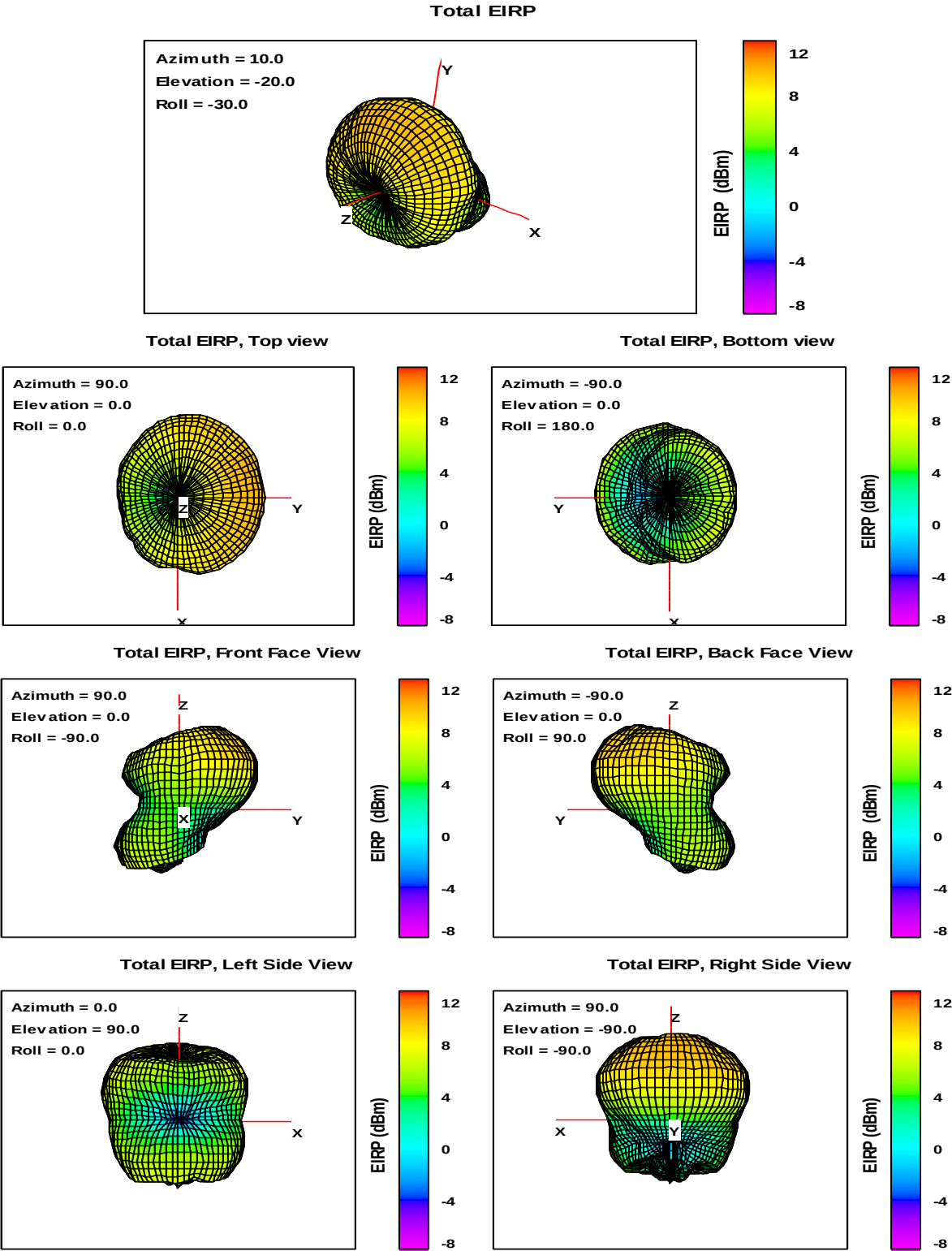


Fig. 13. Total EIRP, Free Space, 2480 MHz.

Appendix B: Photographs

Equipment under test:

- EUT front view:



Fig 14. EUT radiated and conducted front view for VERIO FLEX BLE5.

- EUT back view:

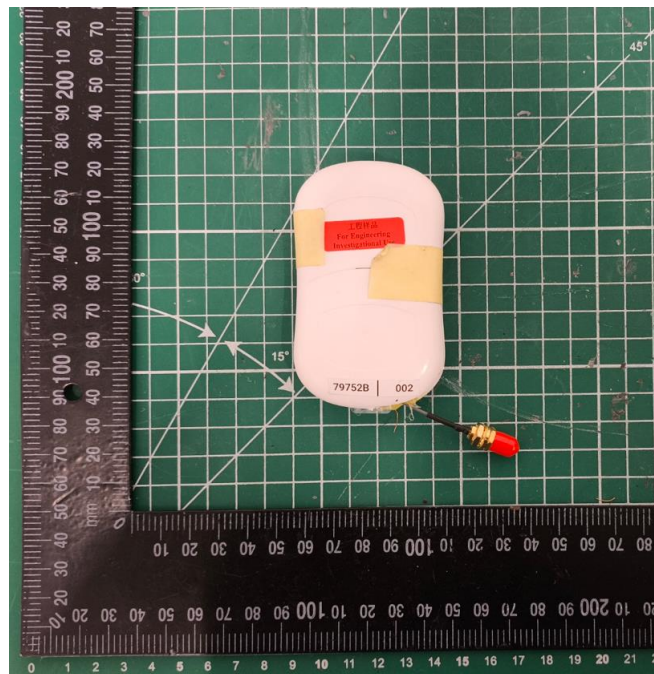


Fig 15. EUT radiated and conducted back view for VERIO FLEX BLE5.

Test set:

- Free Space set-up: Initial position: $\Theta = 0^\circ$, $\Phi = 0^\circ$

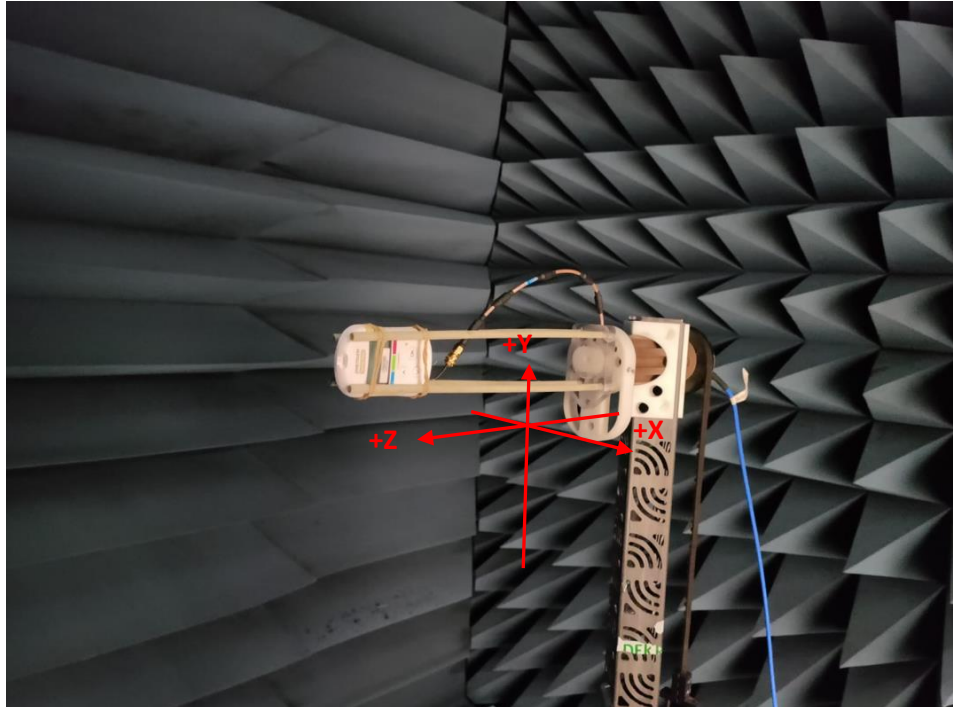
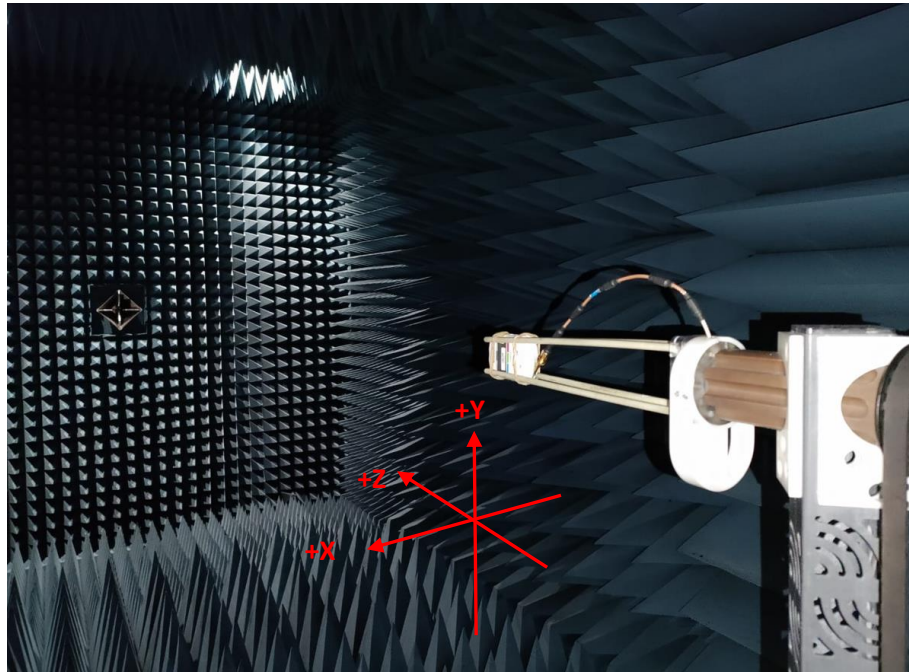


Fig 16. Free Space configuration set-up view for VERIO FLEX BLE5.