

Test report No:
NIE: 71695RAN.001

Test report

Antenna Gain and Radiation Pattern Tests

(*) Identification of 1tem tested	Bluetooth enabled blood glucose meter.
(*) Trademark	OneTouch
(*) Model and /or type reference tested	Verio Reflect
(*) Other identification of the product	HW version: rev E SW version: 4.1.2
(*) Features	Bluetooth LE
(*) Manufacturer	Lifescan Europe GmbH Gubelstrasse 34, 6300 Zug, Switzerland
Test methodology according to	[1] 3GPP TS 34.114: "User Equipment (UE) / Mobile Station (MS) Over The Air (OTA) antenna performance; Conformance testing", V 12.2.0, (2016-10-05).
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager
Date of issue	2022-08-22
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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DEKRA Testing and Certification, S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification, S.A.U. at the time of performance of the test.

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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
71695B/006	Bluetooth enabled blood glucose meter Radiated	Verio Reflect	-	2022-05-17
71695B/002	Bluetooth enabled blood glucose meter Conducted	Verio Reflect	-	2022-05-09

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 blood glucose meter for measuring the levels of Glucose in a patient's blood. Bluetooth is used to transfer the patients result(s) to their smart device.

Identification of the client

Company name: Lifescan Scotland Ltd

Postal address: Beechwood Park North, Inverness, IV2 3ED, UK

Contact person: Andrew Finlayson

E-mail: afinlays@lifescan.com

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-05-25
Date (finish)	2022-05-26

Document history

Report number	Date	Description
71695RAN.001	2022-08-22	First release

Remarks and comments

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

	Equipment	Calibration Date	S/N	DEKRA Control Number
1.	Anechoic chamber ETS LINDGREN AMS-8500	N/A	3954	2729
2.	RF unit switch Agilent Technologies 3499A	N/A	MY42003363	2831
3.	Positioning system controller ETS LINDGREN 2115-72	N/A	-	2731
4.	OTA measurement software ETS LINDGREN EMQuest v1.14	N/A	1095	4428
5.	Spectrum analyzer Agilent Technologies PSA	2020/11	MY44300521	2327
6.	Temperature and Pico Technology, model Humidiprobe	2022/04	ZNR30/064	3547

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 2402 MHz, 2440 MHz and 2480 MHz test frequencies.

The output power of the device under test was set to maximum for all tests.

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.

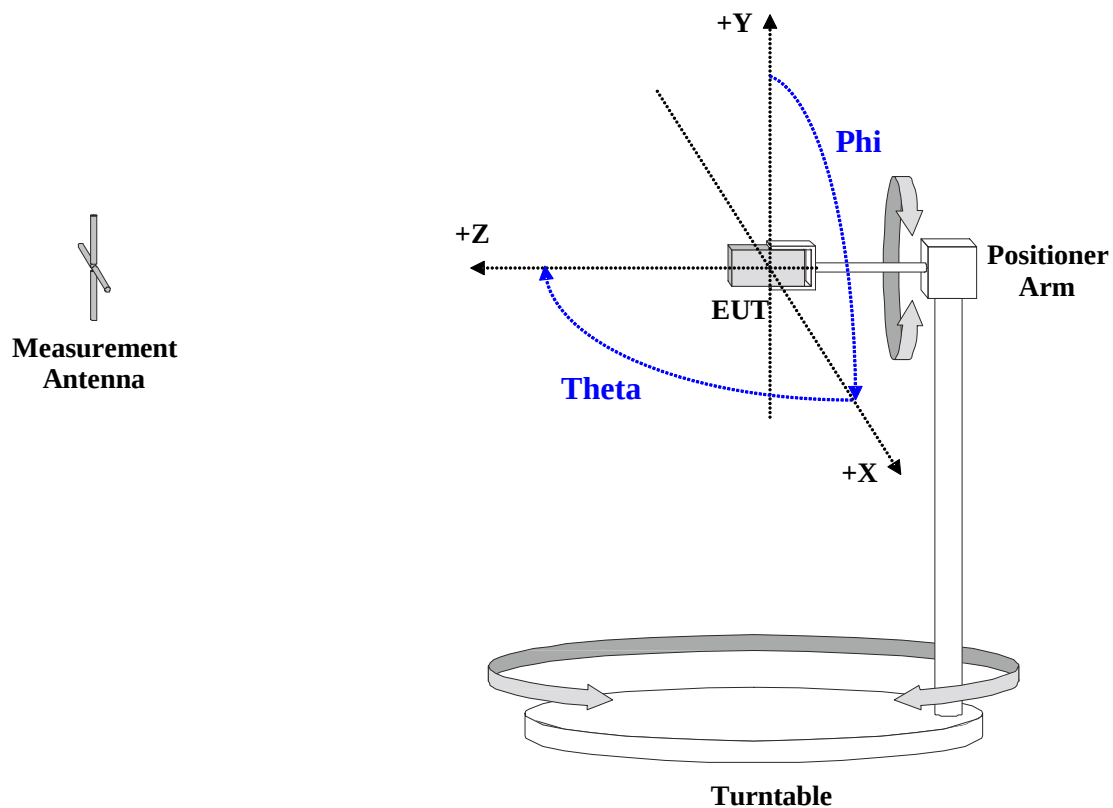


Fig. 1. Coordinate system.

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 antenna gain

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

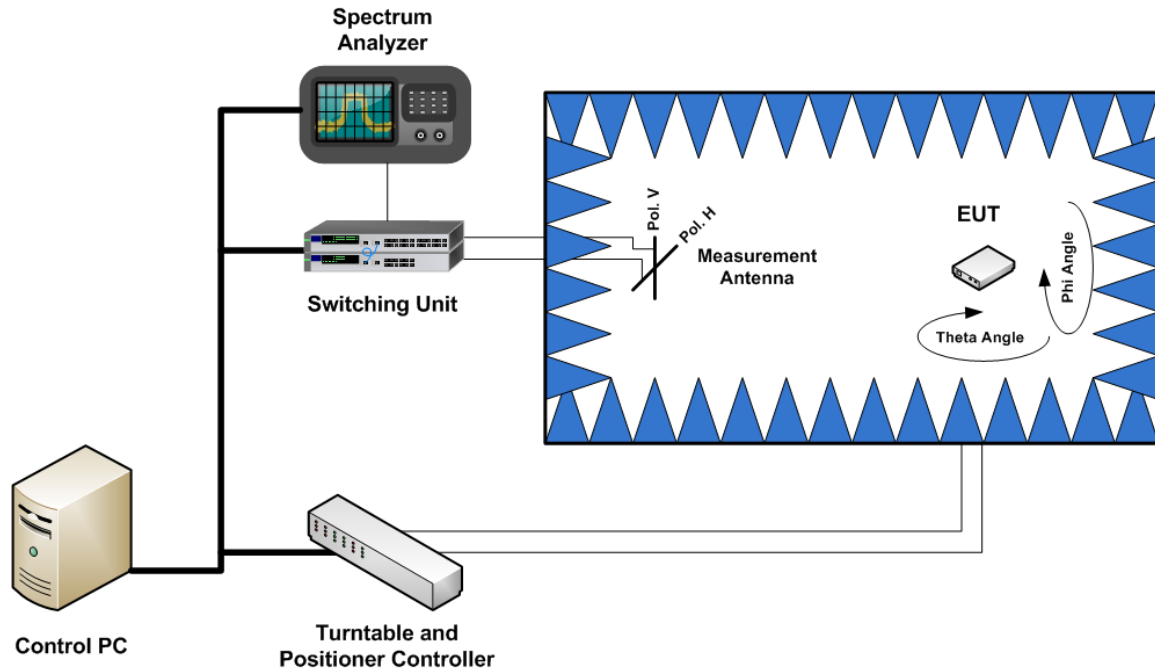


Fig. 2. Equipment and connections for peak antenna gain measurements.

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 7). The EUT was set to operate on a test mode radiating a CW signal at maximum output power for the frequencies under test. Equivalent Isotropically Radiated Power (EIRP) measurements were performed using a power spectrum analyzer. EIRP measurements were performed at intervals of 15 degrees along the theta and phi axes and at both horizontal and vertical polarizations.

For conducted tests, the EUT was set to operate on a CW test mode signal at maximum output power for the frequencies under test. Conducted output power measurements were performed over the output module connector using a power spectrum analyzer.

Peak EIRP measurements for Free Space configuration are presented below.

Frequency (MHz)	TRP (dBm)	Peak EIRP (dBm)	Theta Angle (°)	Phi Angle (°)
2402	-5.63	-2.18	135	330
2440	-7.89	-4.46	75	345
2480	-6.83	-3.28	0	75

Conducted output power measurements are presented below.

Frequency (MHz)	Conducted Power (dBm)
2402	-4.32
2440	-3.99
2480	-3.66

Peak antenna gain results are presented below.

Frequency (MHz)	Antenna Peak Gain (dBi)
2402	2.14
2440	-0.47
2480	0.38

3. 3D RADIATION PATTERNS

3.1 Free Space - Radiation Pattern – 2402 MHz

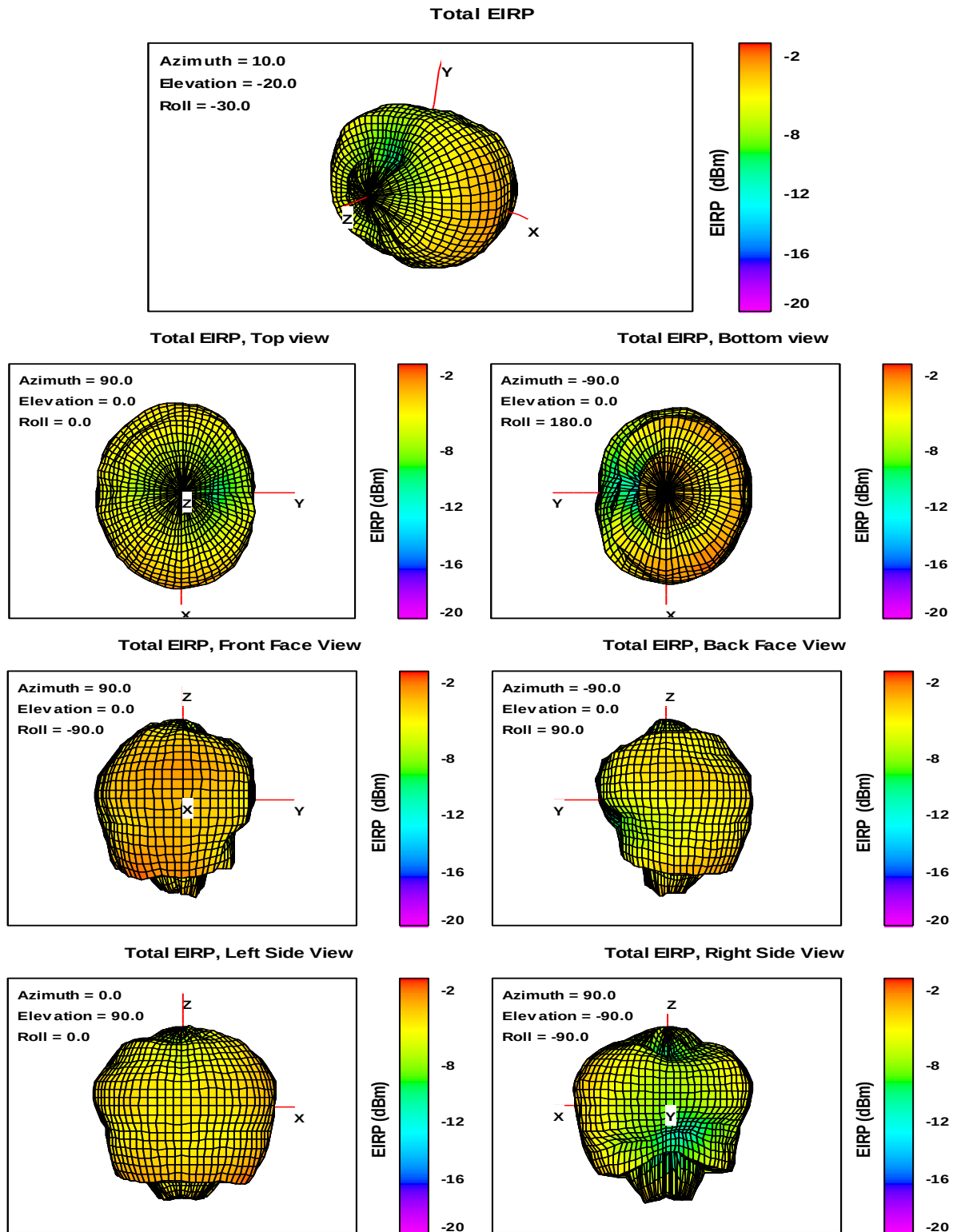


Fig. 3. Total EIRP, Free Space, 2402 MHz.

3.2 Free Space - Radiation Pattern – 2440 MHz

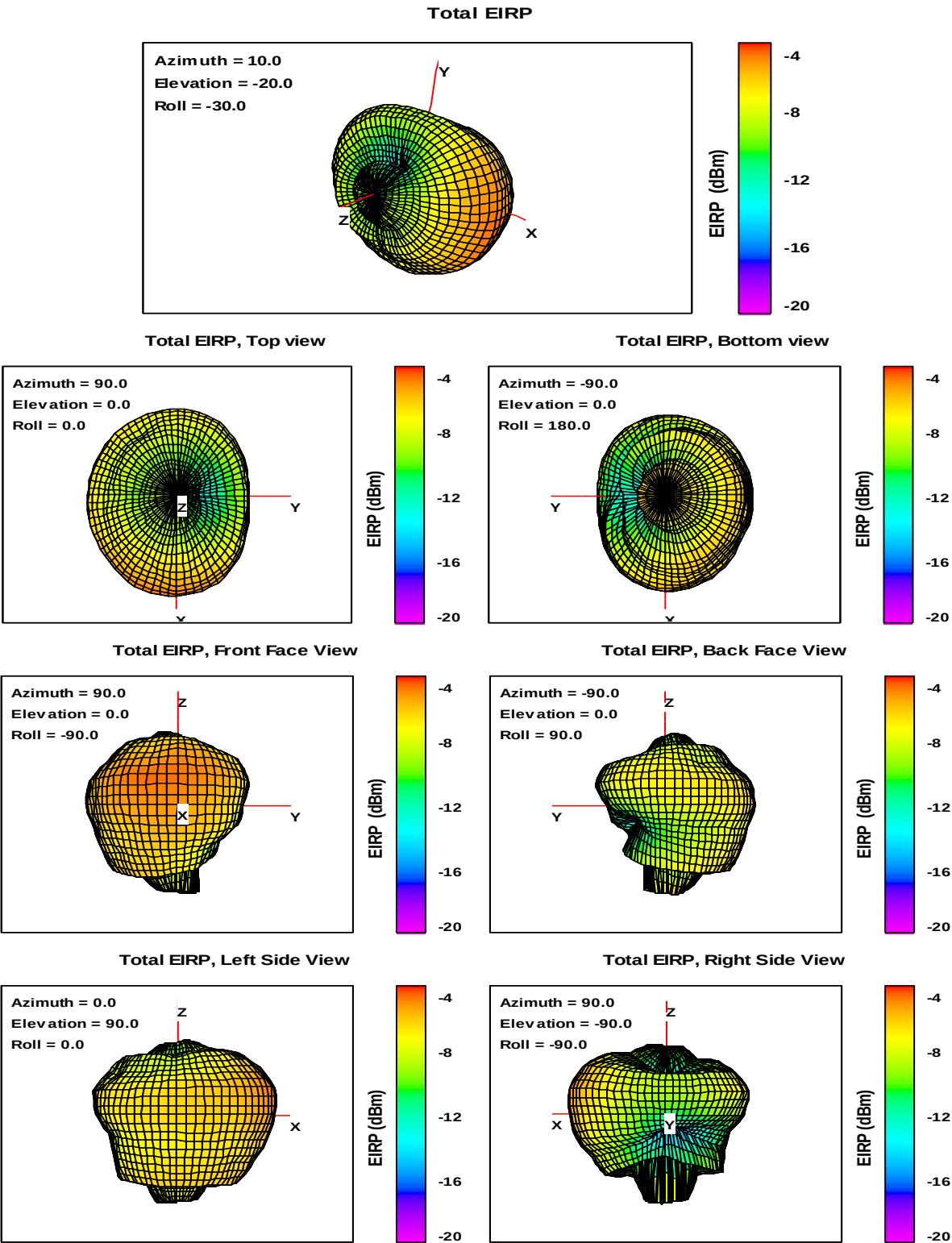


Fig. 4. Total EIRP, Free Space, 2440 MHz.

3.3 Free Space - Radiation Pattern – 2480 MHz

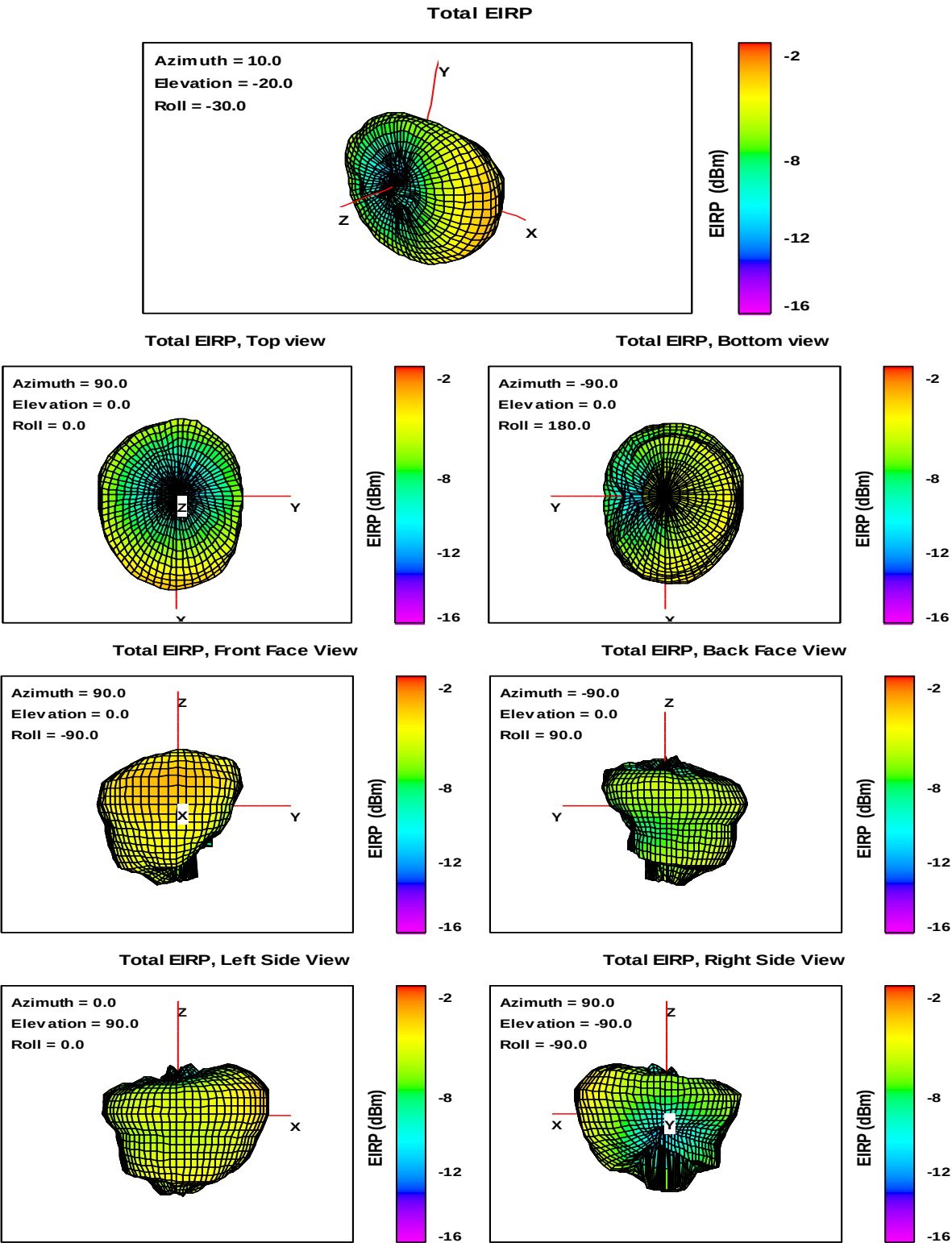


Fig. 5. Total EIRP, Free Space, 2480 MHz.

Appendix B: Photographs

Equipment under test:

- EUT front view:



Fig 6. EUT radiated and conducted back view.

- EUT back view:



Fig 7. EUT back view.

Test set:

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

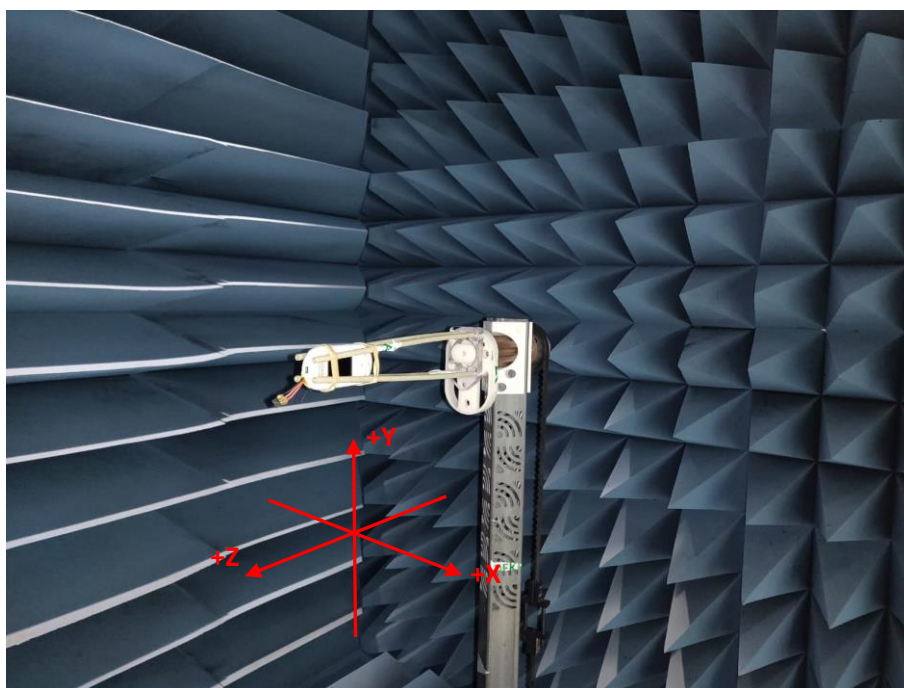
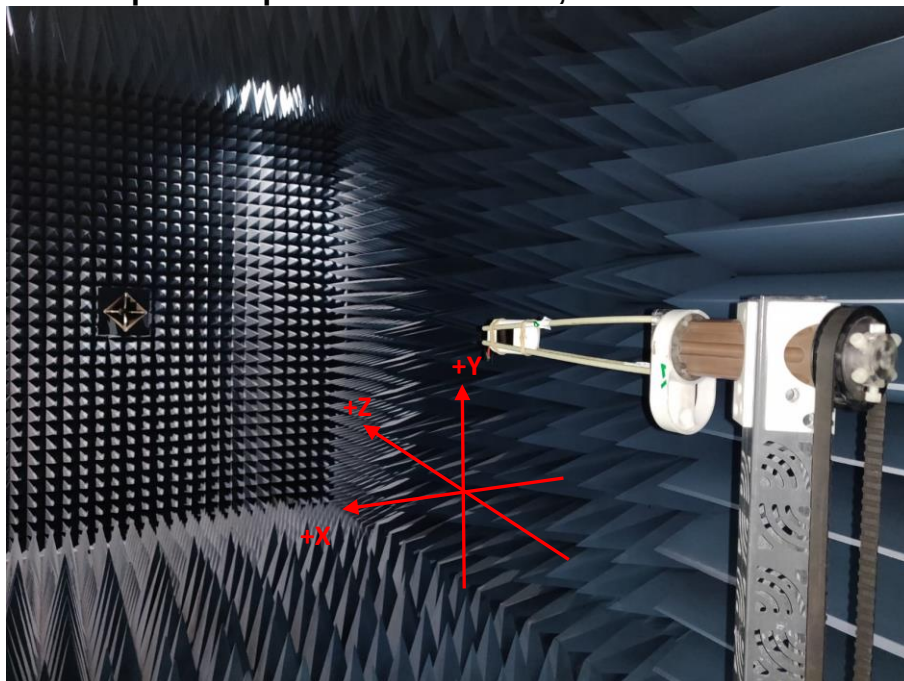


Fig 8. Free Space configuration set-up view.