

1. OTA ACTIVE ANTENNA TEST REPORT

Date of Report	7/05/2024	Client's Contact person:	Reetta Kuonanoja
Number of pages:	12	Responsible Test engineer:	Sami Laukkanen
Testing laboratory:	Verkotan Oy Elektroniikkatie 17 90590 Oulu Finland	Client:	Oura Health Oy Elektroniikkatie 10, 90590 Oulu
Tested devices	OA11 Size 10		
Testing has been carried out in accordance with:	Active measurements per customer request		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory.		
Test Results:	The test results relate only to devices specified in this document		

Date and signatures:

07.05.2024



Sami Laukkanen
CTO

2. SUMMARY

2.1 Test Details

Devices under Test (DUT):

Product:	OA11 Size 10
Note	DUT was measured in CW test mode
Manufacturer info:	-
SW Info:	-
DUT number:	21248
Tested bands	BLE ch37, ch38, ch39

Pre-Compliance SISO OTA measurements



Figure 1 DUT top



Figure 2 DUT bottom

Testing information:

Testing performed:	18.4.2024
Notes:	-
Document name:	OTA_test_report_ID6561b_OA11_Size_10_FS_07052024
Temperature °C / Humidity RH%	22±2 / 25%±10%
Measurement performed by:	Veli-Matti Niemitalo
Document history:	19.4.2024 Draft version 25.4.2024 Product name updated, Max EIRP array, pattern images scaling unified 29.4.2024 Signed version 07.5.2024 Max gain table added. This report replaces OTA_test_report_ID6561b_OA11_Size_10_FS_29042024.pdf

TABLE OF CONTENTS

1. OTA Active Antenna Test Report	1
2. Summary	2
2.1 Test Details	2
3. Test Equipment.....	5
4. Test setup	7
5. RESULTS	8
5.1 BLE Total Radiated Power	8
5.1.1 Free Space	8
6. Antenna pattern cuts.....	9
6.1 BLE	9
7. ANTENNA PATTERNS	10
7.1 Antenna pattern results BLE	10
7.1.1 Total Radiated Power.....	10

3. TEST EQUIPMENT

Main used test equipment is listed below. For full equipment list and calibration intervals, please contact the testing laboratory.

Type of Equipment	Type	Manufacturer	Calibration date	Calibration period	Calibration due	Purpose
Diagonal Dual Polarized Horn Measurement Antenna	114960	ETS	Included in range calibration	Included in range calibration	Included in range calibration	Probe antenna
Positioning Controller	2090	EMCO	n/a	n/a	n/a	DUT alignment
3D Positioner	Custom made	ETS-Lindgren	n/a	n/a	n/a	DUT alignment
Anechoic Chamber	4	ETS-Lindgren	23.09.2023	1 year	23.09.2024	Test range
Switching System	MSN-6TD-06-DEC-SP	American Microwave	Included in range calibration	Included in range calibration	Included in range calibration	Probe selection
Switching System	SW6AD-A61	Pulsar	Included in range calibration	Included in range calibration	Included in range calibration	Probe selection
Network Analyzer	E5071C	Agilent	23.05.2023	1 year	23.05.2024	Range calibration
Signal analyzer	MS2692A	Anritsu	13.09.2023	1 year	13.09.2024	Power measurement
Dual-Ridge Horn Antenna	SH600	MVG	20.08.2020	n/a	n/a	Calibration antenna 1-9 GHz

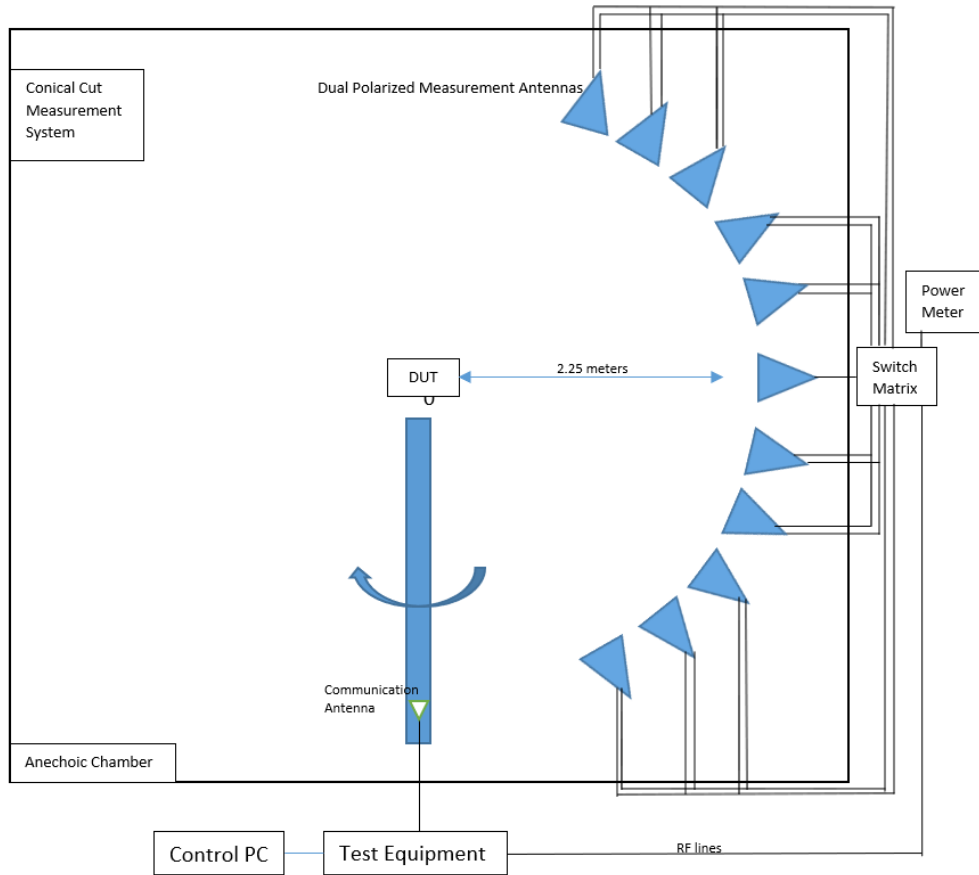


Figure 3. Laboratory 4 chamber schematic.

4. TEST SETUP

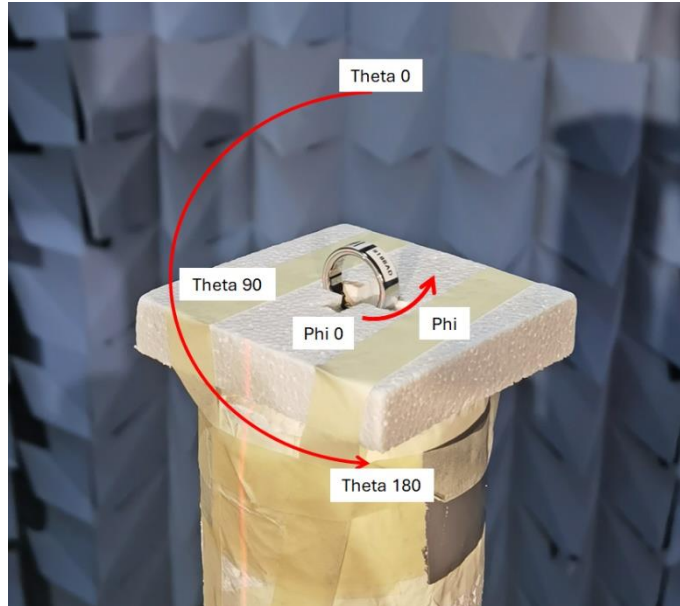


Figure 4 DUT in Free Space and coordinate system

Vertical laser in DUT setup position denotes $\phi=0$, horizontal laser denotes $\theta=90$. $\theta=0$ is directly up from DUT, and $\theta=180$ is down from DUT.

5. RESULTS

5.1 BLE Total Radiated Power

5.1.1 Free Space

Band info	Bandwidth [MHz]	Uplink Channel	Frequency [MHz]	TRP [dBm]
BLE	CW	37	2402	-15.1
	CW	38	2426	-14.7
	CW	39	2480	-14.4

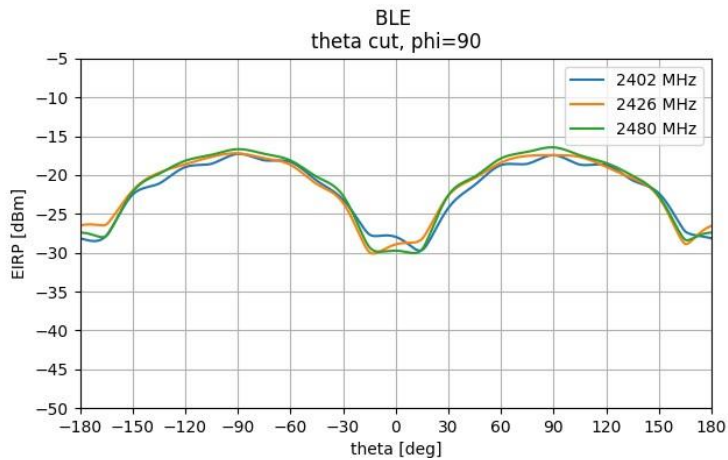
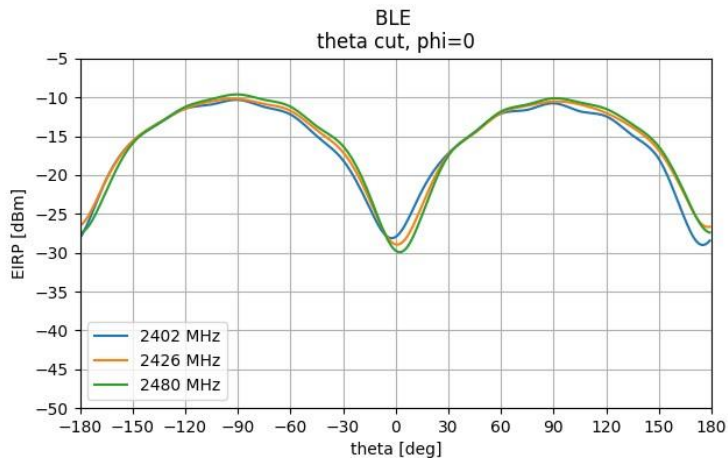
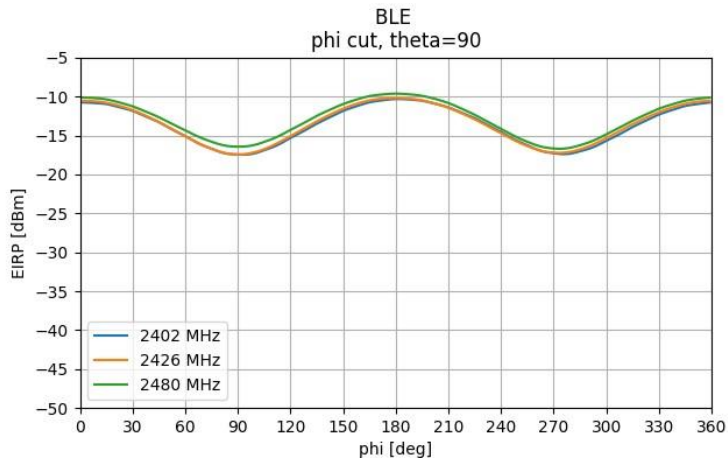
Band info	Bandwidth [MHz]	Uplink Channel	Frequency [MHz]	Max EIRP [dBm]
BLE	CW	37	2402	-10.3
	CW	38	2426	-10.2
	CW	39	2480	-9.6

Band info	Bandwidth [MHz]	Uplink Channel	Frequency [MHz]	Max Gain [dBi]
BLE	CW	37	2402	-10.3
	CW	38	2426	-10.2
	CW	39	2480	-9.6

Note: Antenna gain calculated as EIRP - radio output power. Radio output power declared by manufacturer = 0 dBm.

6. ANTENNA PATTERN CUTS

6.1 BLE



7. ANTENNA PATTERNS

7.1 Antenna pattern results BLE

7.1.1 Total Radiated Power

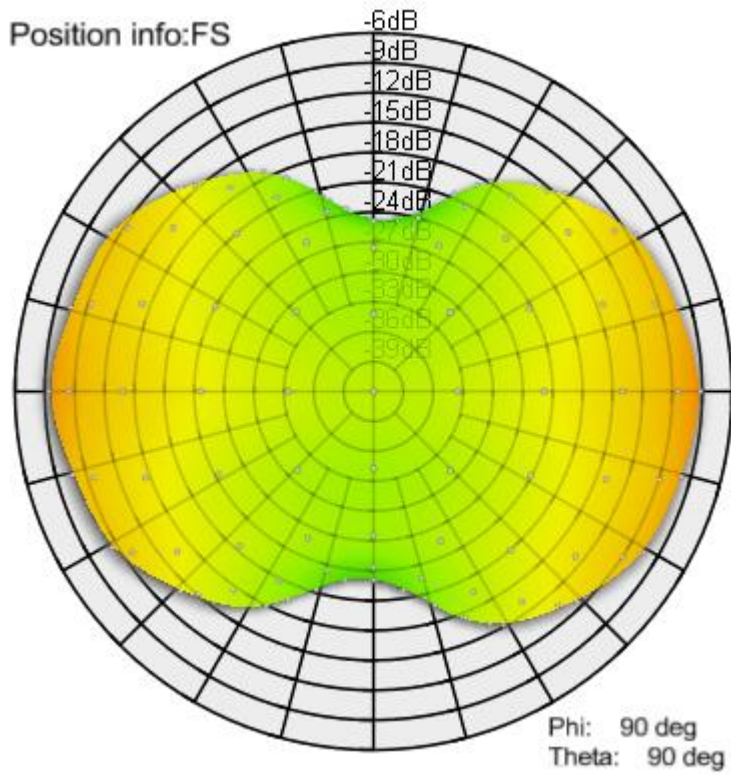


Figure 5 Antenna pattern BLE channel 37 [dBm]

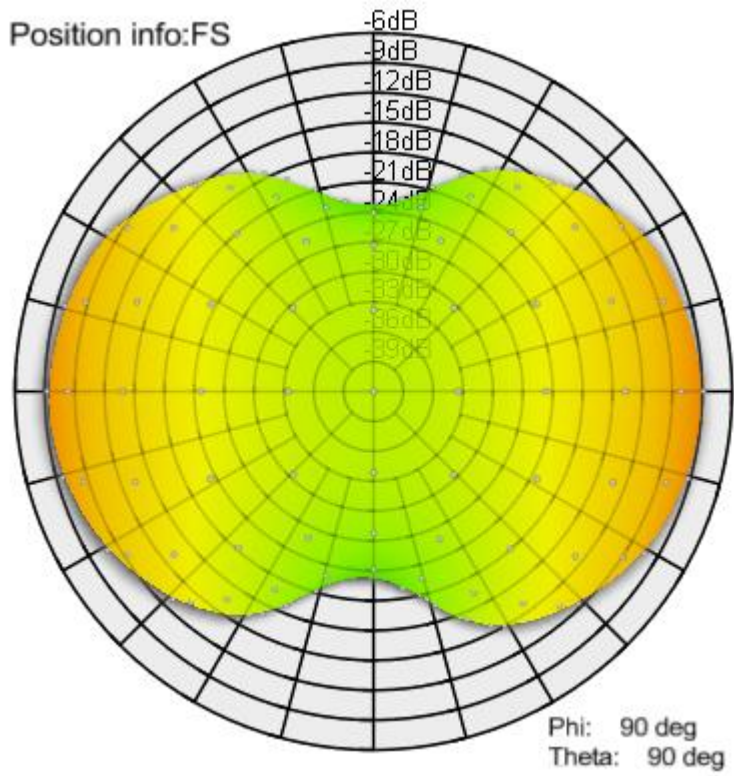


Figure 6 Antenna pattern BLE channel 38 [dBm]

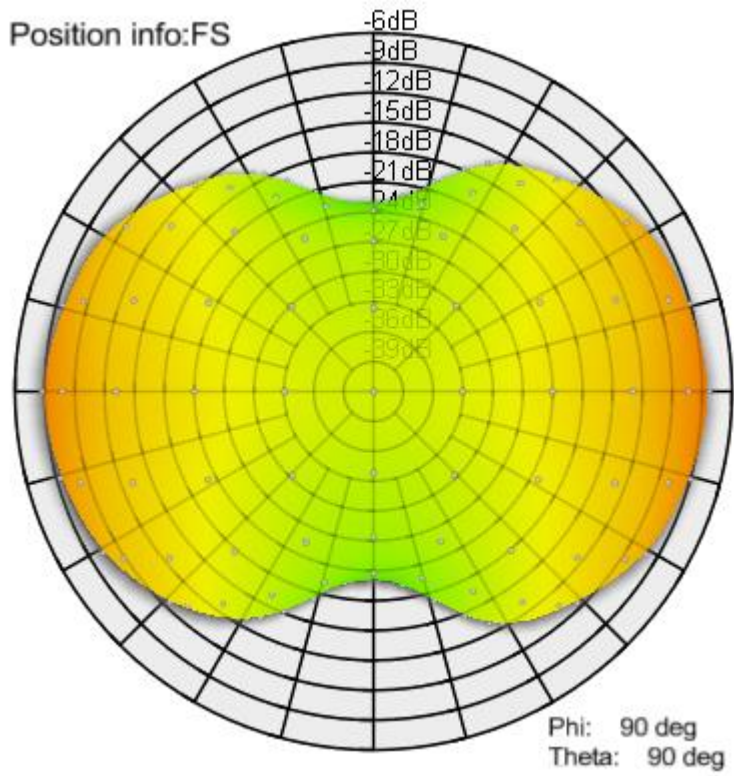


Figure 7 Antenna pattern BLE channel 39 [dBm]