

This report cancels and replaces the test report N° RRA-EMIESS23C288FIN-01A v0



Test report issued under the responsibility of:
EMITECH ILE DE FRANCE Laboratory
MRA US-EU Designation Number: FR0004
IC Assigned Code: 4379A

RADIO TEST REPORT

FCC 47 CFR PART 15 : 2022 (§15.247)

RSS-247_Issue 2 : 2017

RSS-Gen_Issue 5 : 2019

Company : **Finalmouse LLC**

Address..... : 802 Indiana ave
VENICE, CA USA 90291

Test item description. : **Wireless Gaming Mouse and Wireless Gaming Mouse USB Dongle**

Trade Mark. : Finalmouse

Manufacturer..... : Finalmouse LLC

Model/Type reference..... : UltralightX Medium : ULXM/ UltralightX Dongle : ULXD

Ratings..... : 5Vdc

Testing Laboratory : **EMITECH ILE DE FRANCE Laboratory**

Address..... : 30-32, avenue des 3 Peuples
78180 MONTIGNY-LE-BRETONNEUX
FRANCE

Report Reference No. : **RRA-EMIESS23C288FIN-02A v1**

Test procedure. : FCC and CANADA marking

Diffusion..... : Mr VINCENT

Applicant's name. : Mr VINCENT

Date of issue..... : 25/09/2023

Total number of pages..... : 76

Revision. : V1

Compiled by..... : C.A. ROBERT (Tests technician)

Approved by (+ signature). :

Quality approval..... :

Certain services reported in this document are not covered by the accreditation. They are identified by the symbol (*)

Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.
This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

REPORT INDEX:

1. GENERAL INFORMATIONS	3
2. REFERENCE DOCUMENTS	4
3. EQUIPMENT TECHNICAL DESCRIPTION.....	5
3.1. TEST CONDITIONS	5
3.2. E.U.T OVERVIEW	6
3.3. E.U.T MARKING PLATE.....	8
3.4. EUT ELECTRONIC BOARD	8
3.5. E.U.T MECHANICAL AND ELECTRICAL DESIGN.....	10
3.6. EUT INPUT/OUTPUT PORTS.....	10
3.7. SUPPORTING EQUIPMENT USED DURING TEST	11
3.8. AUXILIARY EQUIPMENT	11
3.9. E.U.T RADIO SPECIFICATIONS.....	12
4. RESULT SUMMARY	13
5. MEASUREMENT UNCERTAINTY	16
6. TEST CONDITIONS AND RESULTS	17
6.1. FREQUENCY HOPPING AND DIGITAL MODULATION SYSTEMS.....	17
6.2. TRANSMITTER OUTPUT POWER	27
6.3. PEAK POWER SPECTRAL DENSITY	33
6.4. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSIONS LIMITATION.....	38
6.5. UNINTENTIONAL RADIATED EMISSIONS AND TRANSMITTER UNWANTED EMISSION IN THE BAND 9 KHZ – 26 GHZ	42
6.6. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHZ – 13 GHZ.....	65

REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	11/07/2023	/	Creation
1	25/09/2023	1, 3, 5	Address modification and description of product Add FCC and IC Id number

1. GENERAL INFORMATION

This document submits the results of Radio tests performed on the equipment (denominated hereafter E.U.T.: equipment under test) according to documents listed in §2 of this test report.

TESTING PROCEDURE AND TESTING LOCATION:			
Testing Laboratory		EMITECH ILE DE FRANCE Laboratory	
Address.		30-32, avenue des 3 Peuples 78180 MONTIGNY-LE-BRETONNEUX FRANCE	
Test procedure.		CE Marking	
Tested by		C.A.ROBERT	
Test supervisor		F.LHEUREUX	
Date of receipt of test item		22/05/2023	
Dates of performance of tests		From 26/05/2023 to 31/05/2023	
APPLICANT'S GENERAL INFORMATION:			
Company name		<i>Finalmouse LLC</i>	
Company address.		802 Indiana ave VENICE, CA USA 90291	
Person present during the tests.		Mr VINCENT	
Responsible.		Mr VINCENT	
GENERAL REMARKS:			
<i>The information in italics is declared by the manufacturer and is under his responsibility.</i> The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report the decimal separator is point.			
POSSIBLE TEST CASE VERDICTS:			
Test case does not apply to the test object.:		N/A	
Test case not performed.....:		N/P	
Test object does meet the requirement.....:		P (Pass)	
Test object does not meet the requirement.:		F (Fail)	
Test object was not subjected to all tests...:		I (Inconclusive)	
DEFINITIONS AND ABBREVIATIONS:			
E.U.T.	Equipement under test	AE	Auxiliary / Associated equipment
RBW	Resolution bandwidth	VBW	Video bandwidth
OATS	Open area test site	FAR	Full anechoic room
RF	Radio frequency	NTR	Nothing to report

2. REFERENCE DOCUMENTS

NORMATIVE REFERENCES:

The following referenced documents are necessary for the application of the present test report.

FCC 47 CFR Part 15 : 2022

Code of federal regulations

Title 47- Telecommunication Chapter 1- Federal Communication Commission

Part 15- Radio frequency devices Subpart B- Unintentional Radiators

Limits and methods of measurement of radio disturbance

Characteristic of information technology equipment.

RSS-247 Issue 2 : 2017

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs)

And Licence-Exempt Local Area Network (LE-LAN) Devices.

RSS-Gen Issue 5 : March 2019

General Requirements and Information for the Certification of Radio Apparatus

ANSI C63.10 : 2013

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

INFORMATIVE REFERENCES:

The following referenced document is not necessary for the application of the present test report but it assist the user with regard to a particular subject area.

KDB 558074 D01 DTS Meas Guidance V05 r02

Guidance for performing compliance measurement on Digital Transmission Systems (DTS) operating under § 15.247.

3. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

Test item description. : *Wireless Gaming Mouse and Wireless Gaming Mouse USB Dongle*

Model/Type reference..... : *UltralightX Medium :ULXM / UltralightX Dongle : ULXD*

Trade Mark. : *Finalmouse*

Serial number (S/N)..... : *Sample #1*

Part number (P/N). : *PVT batch*

Software version..... : *V2.0.*

Firmware version. : *V2.0.*

Fcc ID : *2AZX7-ULXM (UltralightX Medium)*
2AZX7-ULXD (UltralightX Dongle)

N°IC : *27237-ULXM (UltralightX Medium)*
27237-ULXD (UltralightX Dongle)

Type of sample..... : *PVT sample (pre-mass production)*

Function(s)..... : *Wireless gaming mouse*

Manufacturer name. : ***Finalmouse LLC***

Address. : *802 Indiana ave*
VENICE, CA USA 90291

General product information: -

3.2.E.U.T Overview



UltralightX Medium



UltralightX Dongle

3.3.E.U.T Marking Plate

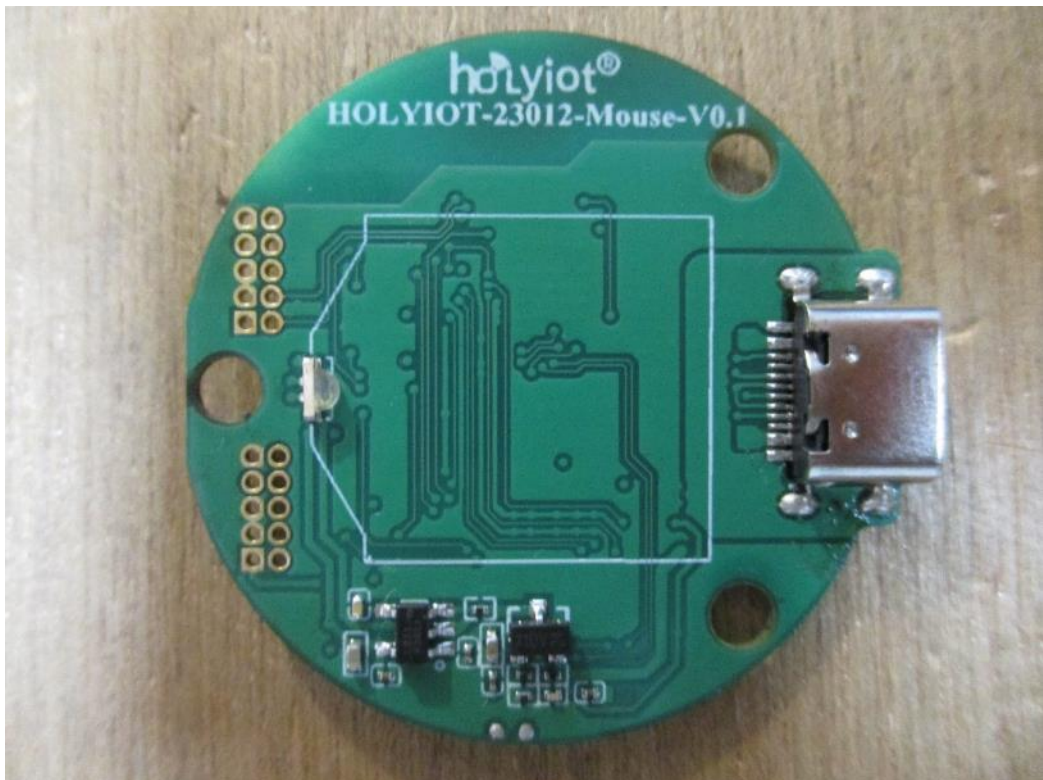
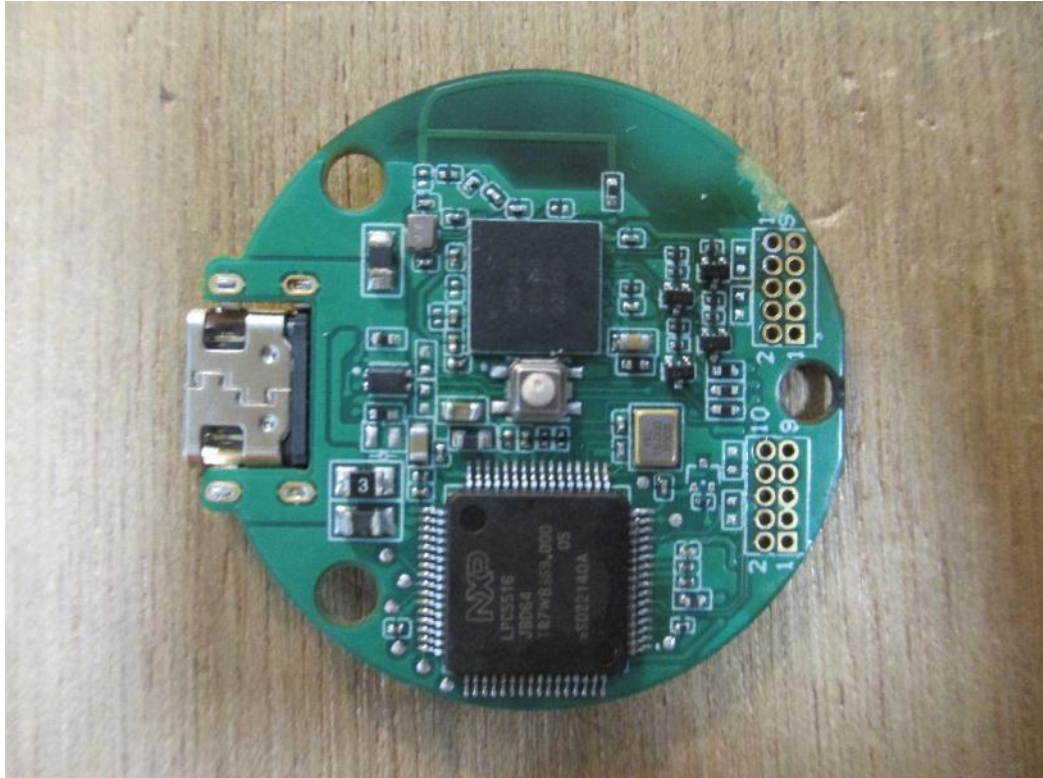
There is no marking plate on tested EUTs.

3.4.EUT Electronic board



UltralightX Medium

3.4. EUT Electronic board



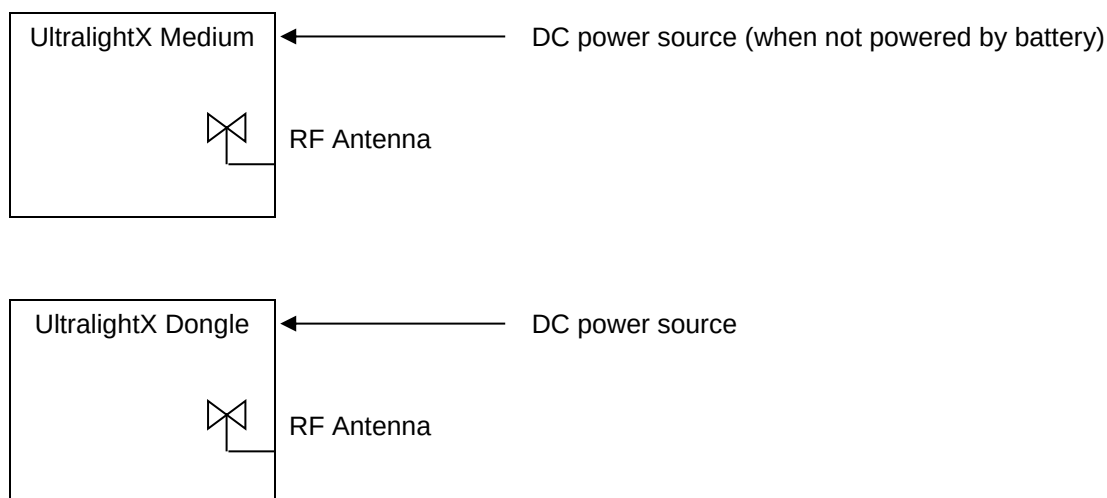
UltralightX Dongle

3.5.E.U.T Mechanical and Electrical Design

Power supply.	: USB power supply, 5Vdc
Power supply range.....	: 5Vdc
Power type.....	: Battery powered device or DC Power Supply
Power (W).....	: UltralightX Medium : 0.5 / UltralightX Dongle : 0.2
Nominal current (A).	: UltralightX Medium : 0.10 / UltralightX Dongle : 0.04
Dimensions (L x W x H) (mm).	: UltralightX Medium : 0.121 x 0.057 x 0.037 UltralightX Dongle : 0.042 x 0.042 x 0.008
Weight (kg).	: UltralightX Medium : 0.035 / UltralightX Dongle : 0.01
Temperature range (°C).	: 0 to +40
Ground bounding strap.....	: No

Comments: -

3.6.EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	CABLE TYPE	COMMENTS
1	Power source	DC	<3m	Not shielded	-
2	Battery (UltralightX Medium only)	DC	-	-	-
3	RF Antenna	RF	-	-	Internal antenna

AC/DC : AC/DC Converter port

I/O: Input or Output port

N/E: Non Electrical port

AC: Alternative current port

TP : Telecommunication port

DC: Direct current port

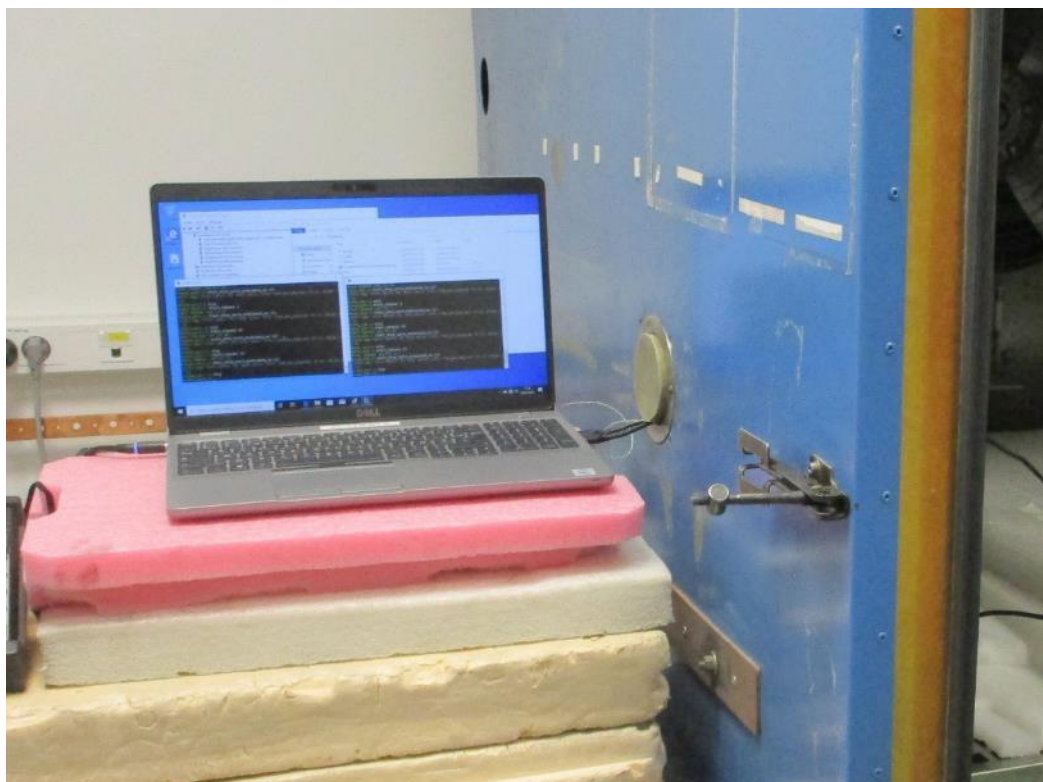
RF : Radio frequency port

3.7. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
-	-	-	-

3.8. Auxiliary equipment



3.9. E.U.T Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	Transceiver
Technology	Proprietary 2.4 GHz band radio
Environmental profile.....	Residential / Data transmissions
Temperature range.....	Low extreme conditions: 0°C High extreme conditions: 40°C
Antenna type	Integrated PCB antenna
Antenna Gain.....	UltralightX Medium : -3 dB / UltralightX Dongle : 0 dB
Comments: -	
b) TRANSMITTER PARAMITERS (Tx)	
Frequency bands.....	2400-2483.5 MHz
RF Power.....	Max +8 dBm
Number of channels / Separation.....	2 MHz channels
Modulation type	GFSK modulation
Duty cycle	Duty cycle derivation: Transmission frequency is adaptive; the mouse transmits only when it has new sensor data or other data to report to the dongle. The maximum rate is 8000 packets per second. The dongle transmits to acknowledge packets it has received, or with small infrequent updates for the mouse. – again at a maximum rate of 8,000 acknowledgements per second. Transmission data rate is fixed at 2 Mbps. Maximum packet size is 20 bytes of data and overhead. Duration of transmission (per packet): Duration = Packet size / Transmission data rate Duration = (20 bytes/packet * 8 bits/byte) / 2,000,000 bits/second Duration = 0.000128 seconds/packet Duty cycle for maximum transmission frequency: Duty cycle = (Duration of transmission * Transmissions per unit time) / Time Duty cycle = (0.000080 seconds/packet * 8,000 packets) / 1 second Maximum duty cycle = 64 %
Tested frequency.....	Lowest channel - 2402 MHz Middle channel - 2440 MHz Highest channel - 2480 MHz
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	2400-2483.5 MHz
Category/Class	2
Bandwidth.....	2 MHz

4. RESULT SUMMARY

Subpart B of the standard FCC part 15 – Unintentional radiators

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
Measurement of conducted emission on AC mains ports	15.107	N/A	
Radiated emission limits	15.109	PASS	

Subpart C of the standard FCC part 15 – Intentional radiators

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
Restriction bands of operation	15.205	PASS	
Measurement of conducted emission on AC mains ports	15.207	N/A	
Radiated emission limits; general requirements	15.209	PASS	
Additional provision to the general radiated emission limitations	15.215		
-(a) Alternative to general radiated emission limits	-	N/A	
-(b) Unwanted emissions outside of § 15.247 frequency bands	-	N/A	
-(c) 20 dB bandwidth and band-edge compliance	-	PASS	
Intentional radiated emissions	15.247		
- a) frequency hopping and digitally modulated	-	-	
- a) (1) hopping mode	-	N/A	
- a) (1) (i) frequency hopping in the band 902-928 MHz	-	N/A	
- a) (1) (ii) frequency hopping in the band 5725-5850 MHz	-	N/A	
- a) (1) (iii) frequency hopping in the band 2400-2483.5 MHz	-	N/A	
- a) (2) systems using digital modulation in the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz (6 dB bandwidth)	-	PASS	
- b) maximum peak conducted	-	-	
- b) (1) frequency hopping in the bands 2400-2483.5 MHz or 5725-5850 MHz	-	N/A	
- b) (2) frequency hopping in the band 902-928 MHz	-	N/A	
- b) (3) systems using digital modulation in the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz	-	PASS	
- b) (4) maximum peak conducted > 6 dBi	-	N/A	
- b) (4) (i) frequency hopping in the band 2400-2483.5 MHz	-	N/A	
- b) (4) (ii) frequency hopping in the band 5725-5850 MHz	-	N/A	
- b) (4) (iii) fixed, point-to-point	-	N/A	
- c) directional antenna > 6 dBi	-	N/A	
- c) (1) fixed, point-to-point operation	-	N/A	
- c) (1) (i) in the band 2400-2483.5 MHz	-	N/A	
- c) (1) (ii) in the band 5725-5850 MHz	-	N/A	
- c) (1) (iii) fixed, point-to-point	-	N/A	
- c) (2) multiple directional beams in the band 2400-2483.5 MHz	-	N/A	
- c) (2) (i) information	-	N/A	

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
- c) (2) (ii) sum of the power supplied to all antennas	-	N/A	
- c) (2) (iii) one antenna for multiple directional beams	-	N/A	
- c) (2) (iv) single directional beam	-	N/A	
- d) intentional radiator	-	PASS	
- e) peak power spectral density	-	PASS	
- f) hybrid system	-	N/A	
- g) continuous data stream during the test	-	N/A	
- h) to avoid hopping on occupied channels	-	N/A	
- i) RF exposure compliance	-	N/A	P < 500 mW

Standard RSS-247 Issue 2 : 2017

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
3. Certification Requirements			
- 3.1 RSS-gen compliance	-	N/A	
5.1 Frequency hopping systems (FHS)			
- 5.1.a)	-	N/A	
- 5.1.b)	-	N/A	
- 5.1.c)	-	N/A	
- 5.1.d)	-	N/A	
- 5.1.e)	-	N/A	
5.2 Digital Modulation Systems			
- (1) -6 dB bandwidth	-	PASS	
- (2) transmitter power spectral density	-	PASS	
5.4 Transmitter Output Power and e.i.r.p. Requirement			
- 1) 902-928 MHz frequency hopping systems output power / e.i.r.p.	-	N/A	
- 2) 2400-2483.5 MHz frequency hopping systems output power / e.i.r.p	-	N/A	
- 3) 5725-5850 MHz frequency hopping systems output power / e.i.r.p.	-	N/A	
- 4) Digital modulation systems output power / e.i.r.p.	-	PASS	
- 5) point-to-point systems (2400-2483.5 and 5725-5850 MHz)	-	N/A	
- 6) Multiple directional beams antenna systems (2400-2483.5 MHz)	-	N/A	
5.5 Unwanted emission	-	PASS	

Standard RSS-Gen Issue 5 : 2019

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
6 Technical Requirements			
- 6.6 Occupied Bandwidth	-	PASS	
- 6.9 CISPR Quasi-peak detector	-	PASS	
- 6.12 Transmitter Output Power	-	PASS	
- 6.13 Transmitter unwanted emissions	-	PASS	
7.2 Measurement Methods and Standard Specifications			
- 7.2.1 Measurement Bandwidths and Detector Functions	-	N/A	
- 7.2.2 Emissions Falling Within Restricted Frequency Bands	-	N/A	
- 7.2.3 Devices Employing Pulsed Operation	-	N/A	
- 7.2.4 AC Power Line Conducted Emissions Limits	-	N/A	
- 7.2.5 Transmitter Spurious Emission Limits	-	N/A	
- 7.2.6 Transmitter Frequency Stability	-	N/A	
- 7.2.7 Measurement Distance	-	N/A	
8. Licence-Exempt radio Apparatus			
- 8.8 AC Power Line Conducted Emission Limits for licence-Exempt Radio Apparatus	-	N/A	

Sample subject to the test **complies** with the requirements of the reference document listed in §2 of this test report and, where applicable, with deviations specified in this document.

To declare, or not, the compliance with the specifications, it was not explicitly taken account of uncertainty associated with the results.

Modifications : No

5. MEASUREMENT UNCERTAINTY

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	MINIMAL STANDARD UNCERTAINTY
Radio frequency	$\pm 1 \times 10^{-7}$	$\pm 1 \times 10^{-7}$
RF power, conducted		
RF power	$\pm 0.8\text{dB}$	$\pm 1 \text{ dB}$
RF power (EN 300328 / EN 301893)	$\pm 1.3\text{dB}$	$\pm 1.5 \text{ dB}$
Power spectral density	$\pm 2.3\text{dB}$	$\pm 3 \text{ dB}$
Occupied bandwidth		
RF power	$\pm 3.8 \%$	$\pm 5 \%$
RF power (EN 300328 / EN 301893)	$\pm 3.8 \%$	$\pm 5 \%$
Maximum frequency deviation		
300 Hz < audio frequency < 6 kHz	$\pm 1.2 \%$	$\pm 5 \%$
6 kHz < audio frequency < 25 kHz	$\pm 1.2 \%$	$\pm 3 \text{ dB}$
Adjacent channel power	$\pm 1.6 \text{ dB}$	$\pm 3 \text{ dB}$
Sensibility of receiver (conducted)	$\pm 2.0 \text{ dB}$	$\pm 3 \text{ dB}$
Blocking	$\pm 4.0 \text{ dB}$	$\pm 4 \text{ dB}$
Transitoire		
Amplitude	$\pm 8.5 \%$	$\pm 20 \%$
At the frequency	$\pm 166 \text{ Hz}$	$\pm 250 \text{ Hz}$
Conducted emission (spurious)		
$f \leq 1 \text{ GHz}$	$\pm 0.8 \text{ dB}$	$\pm 3 \text{ dB}$
1 GHz - 12.75 GHz	$\pm 1.6 \text{ dB}$	
Radiated emission (PAR / PIRE / RNE)		
$f \leq 62.5 \text{ MHz}$	$\pm 5.1 \text{ dB}$	$\pm 6 \text{ dB}$
62.5 MHz - 1 GHz	$\pm 5.1 \text{ dB}$	$\pm 6 \text{ dB}$
1 GHz - 18 GHz	$\pm 5.2 \text{ dB}$	$\pm 6 \text{ dB}$
18 GHz – 26 GHz	$\pm 5.1 \text{ dB}$	$\pm 6 \text{ dB}$
26 GHz – 40 GHz	$\pm 5.4 \text{ dB}$	$\pm 6 \text{ dB}$
RF power (EN 300328 / EN 301893)	$\pm 5.3 \text{ dB}$	$\pm 6 \text{ dB}$
PIRE and power spectral density with diode	$\pm 5.4 \text{ dB}$	$\pm 6 \text{ dB}$
Radiated emission (magnetic field)		
9kHz – 30MHz	$\pm 3 \text{ dB}$	$\pm 6 \text{ dB}$
RF level for a given BER	$\pm 0.8 \text{ dB}$	$\pm 1.5 \text{ dB}$
Supply voltages	$\pm 3 \%$	$\pm 3 \%$
Temperature	$\pm 1 \text{ }^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5 \%$	$\pm 5 \%$
Time / Duty cycle	$\pm 4.4 \%$	$\pm 5 \%$
Adaptivity	$\pm 2.9 \text{ dB}$	/
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	$\pm 2.7 \text{ dB}$	/
30MHz – 1GHz	$\pm 5.0 \text{ dB}$	/
1GHz – 18GHz	$\pm 5.6 \text{ dB}$	/
18GHz – 26GHz	$\pm 5.7 \text{ dB}$	/
26GHz – 40GHz	$\pm 5.7 \text{ dB}$	/

For the calcul of expanded uncertainty, the confidence interval is 95 % (k=2).

6. TEST CONDITIONS AND RESULTS

6.1. Frequency hopping and Digital modulation systems

Reference standard:	FCC 47 CFR PART 15 : 2022 RSS-247 Issue 2 : 2017
Test method:	§ 15.247 a) (2) of FCC 47 CFR PART 15 : 2022 § 5.2 (1) of RSS-247 Issue 2 : 2017
General test setup: E.U.T. is set on an insulating support at 80 cm above the ground reference plane. Measurement are done on a normalized test site. The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected. For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	23.5°C
Relative Humidity	10 to 90 %	44.5%
Atmospheric pressure	N/A	1019 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
Order Nr	Category	Manufacturer	Type	Last validity date	Next validity date
0941	Antenna	Emco	3115	01/03/2022	01/05/2025
17270	Cable	Huber + Suhner	N-6m	10/06/2022	10/08/2024
14228	Cable	C&C	N-4m	10/06/2022	10/08/2024
17272	Cable	Huber + Suhner	N-10m	01/07/2022	01/09/2024
14768	Receiver	Rohde & Schwarz	ESR7	02/01/2023	02/03/2024
14803	Shielded enclosure	Comtest	SAC 3m		

Blank cells = Permanent validity

TEST SETUP PHOTOS



UltralightX Medium



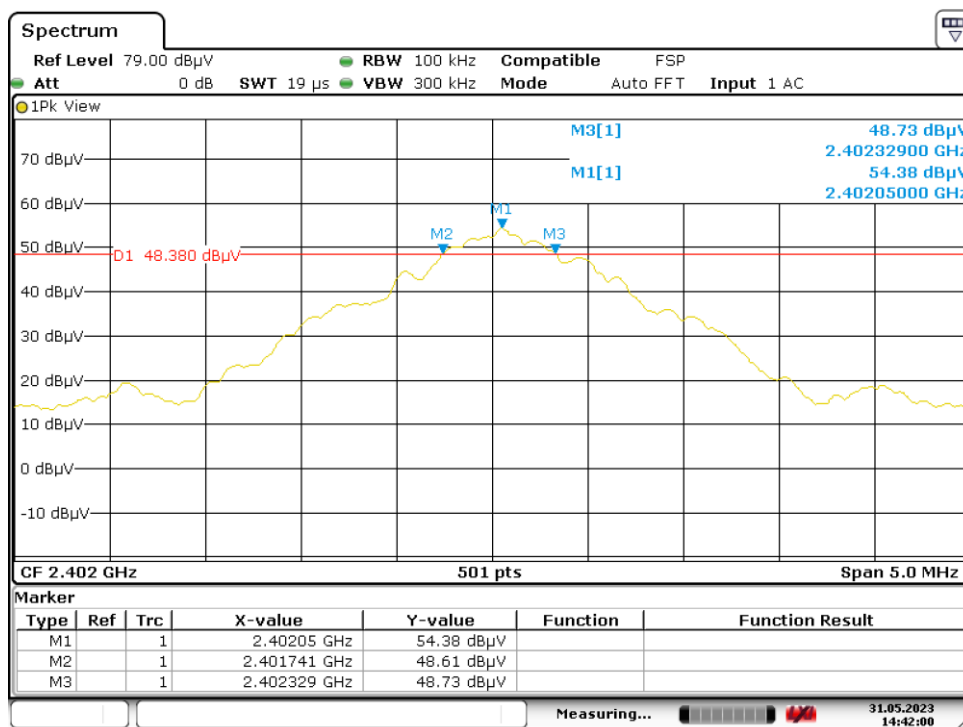
UltralightX Dongle

UltralightX Medium

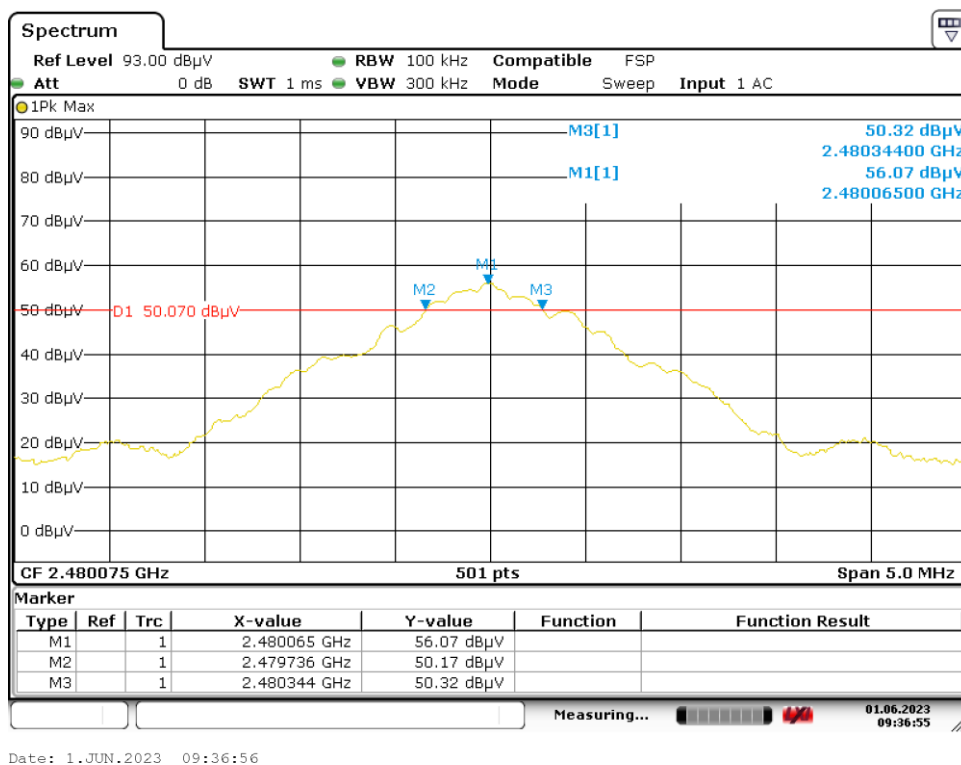
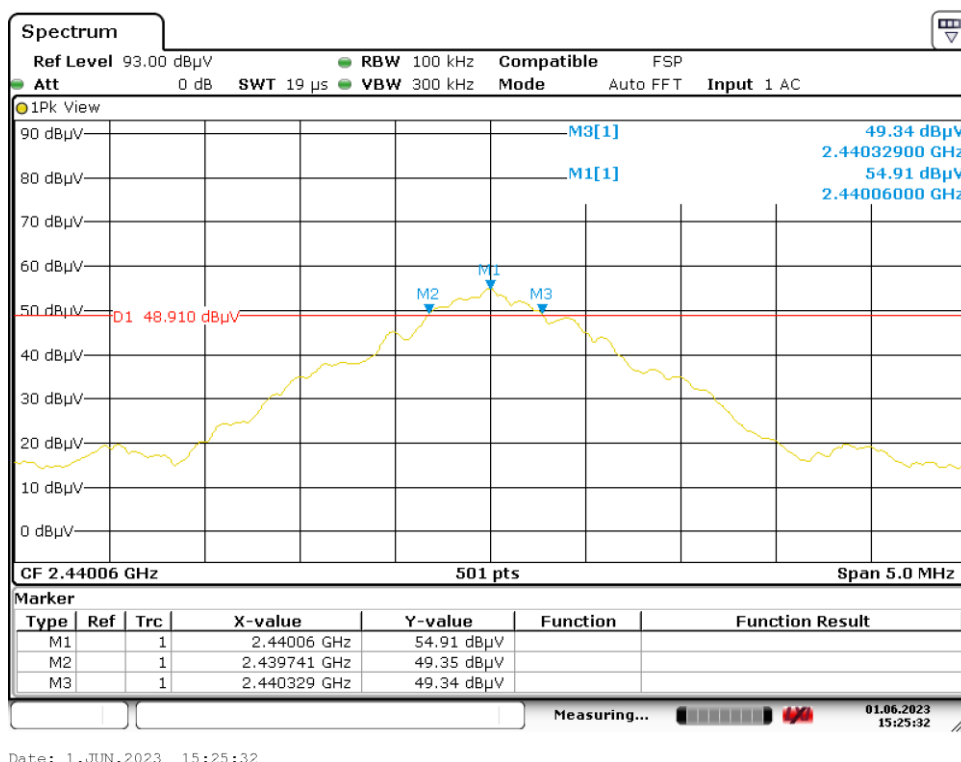
Polarization of test antenna: horizontal (height: 150cm at 2402MHz / 160cm at 2440MHz / 170cm at 2480MHz)
Position of equipment: azimuth: 305°

6 dB Bandwidth

E.U.T. mode	Frequency	Results (kHz)	Limit (kHz)
DTS mode	2402 MHz	590	≥ 500
	2440 MHz	588	≥ 500
	2480 MHz	608	≥ 500

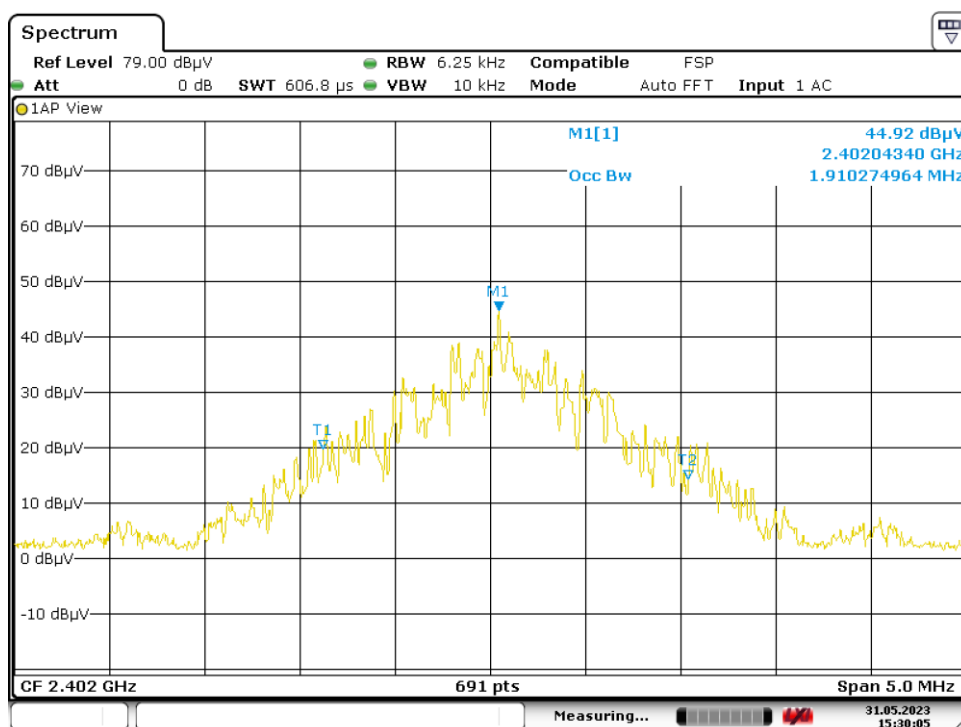


Date: 31.MAY.2023 14:42:00

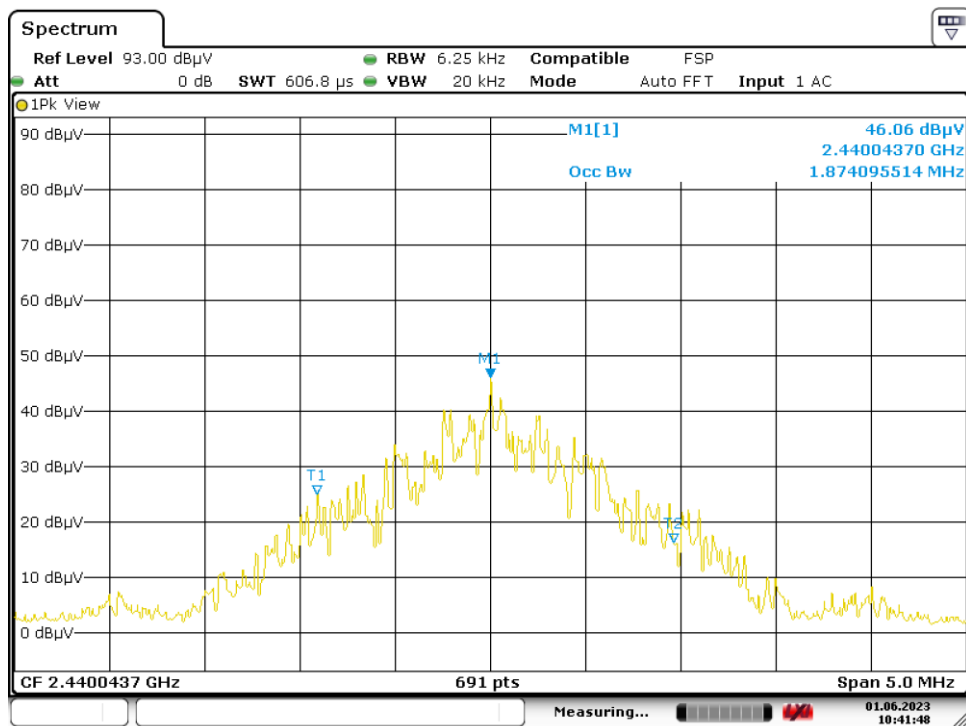


99 % Bandwidth

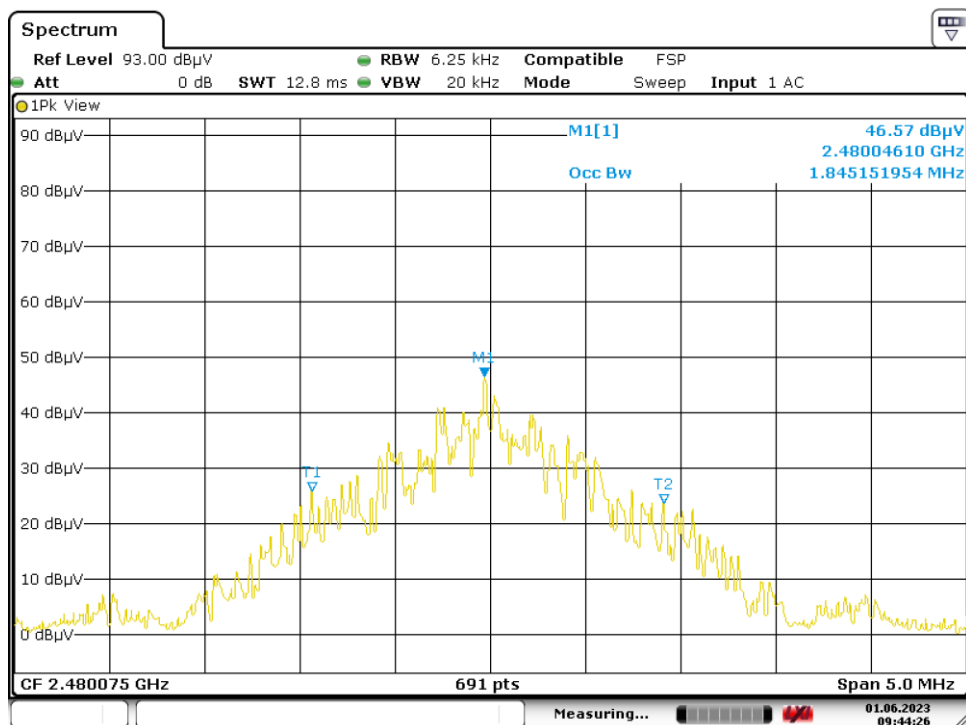
E.U.T. mode	Frequency	Results (MHz)	Limit (kHz)
DTS mode	2402 MHz	1.91	≥ 500
	2440 MHz	1.87	≥ 500
	2480 MHz	1.85	≥ 500



Date: 31.MAY.2023 15:30:05



Date: 1.JUN.2023 10:41:49



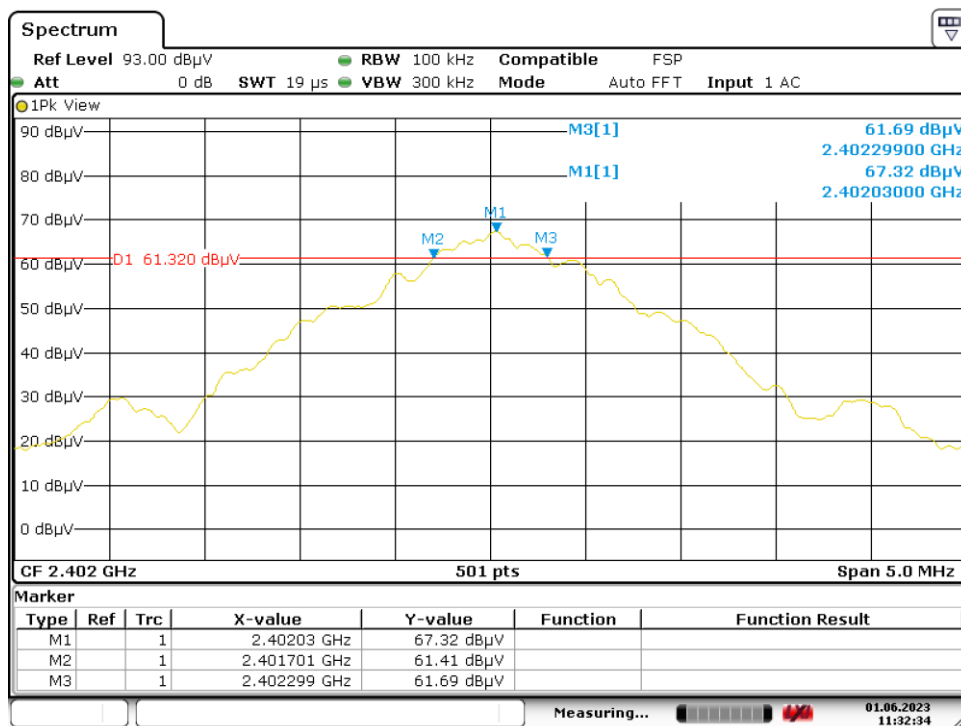
Date: 1.JUN.2023 09:44:26

UltralightX Dongle

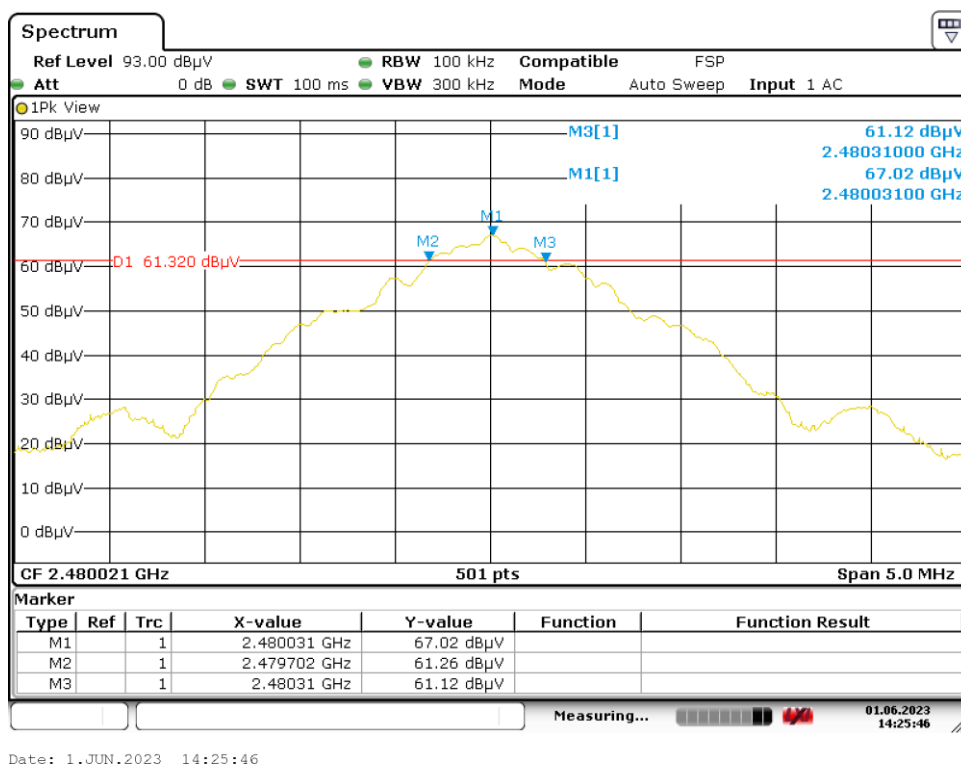
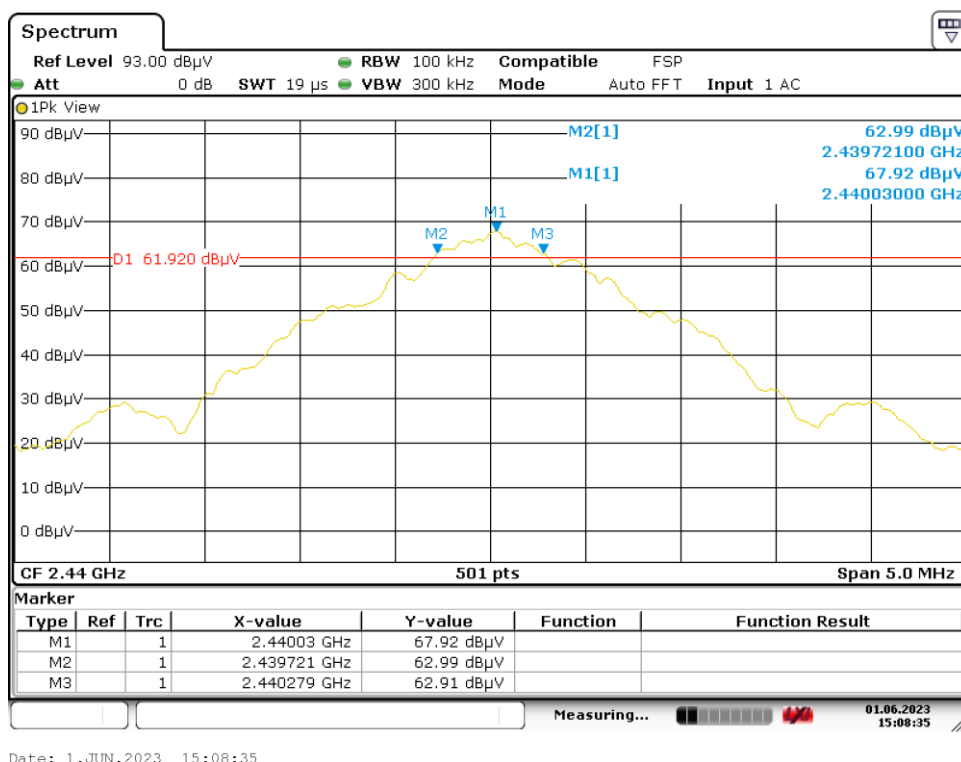
Polarization of test antenna: horizontal (height: 125cm at 2402MHz / 115cm at 2440MHz / 155cm at 2480MHz)
Position of equipment: azimuth: 260°

6dB Bandwidth

E.U.T. mode	Frequency	Results (kHz)	Limit (kHz)
DTS mode	2402 MHz	508	≥ 500
	2440 MHz	558	≥ 500
	2480 MHz	608	≥ 500

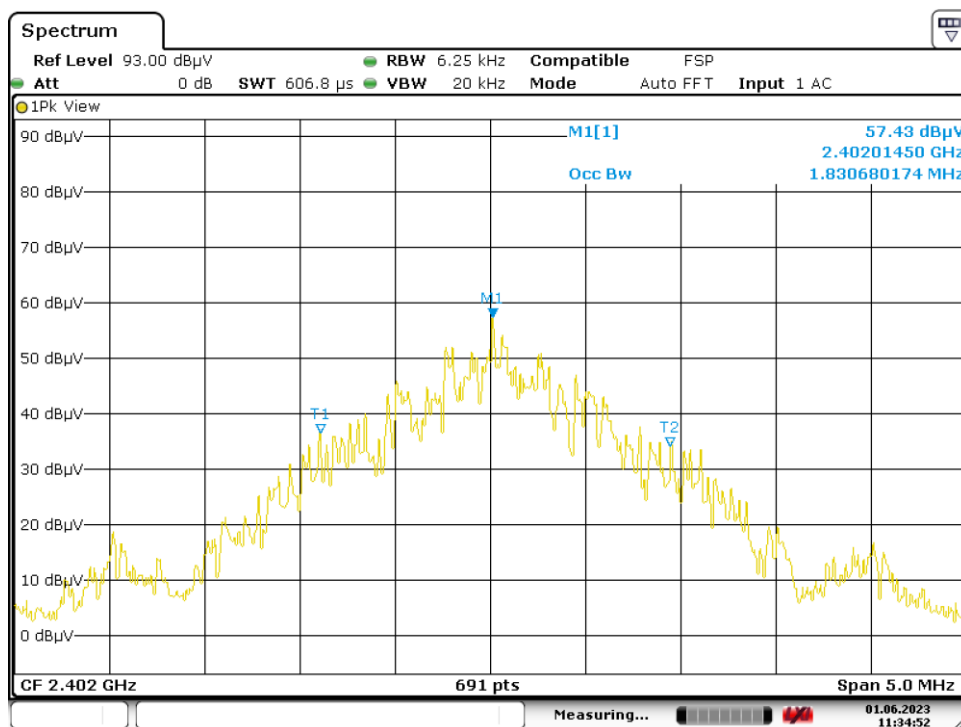


Date: 1.JUN.2023 11:32:34

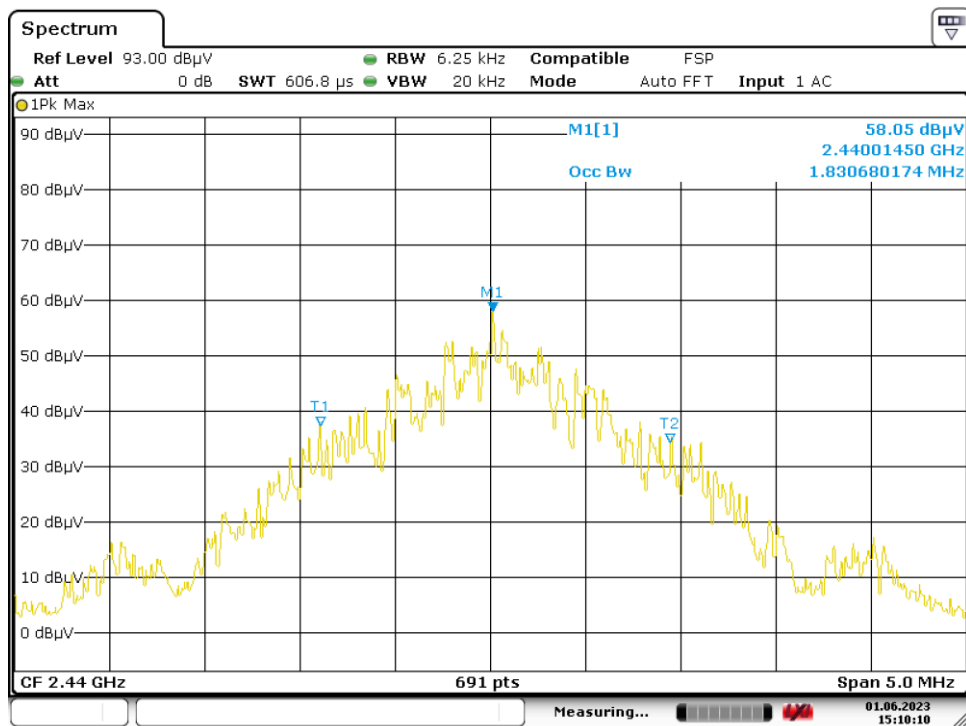


99 % Bandwidth

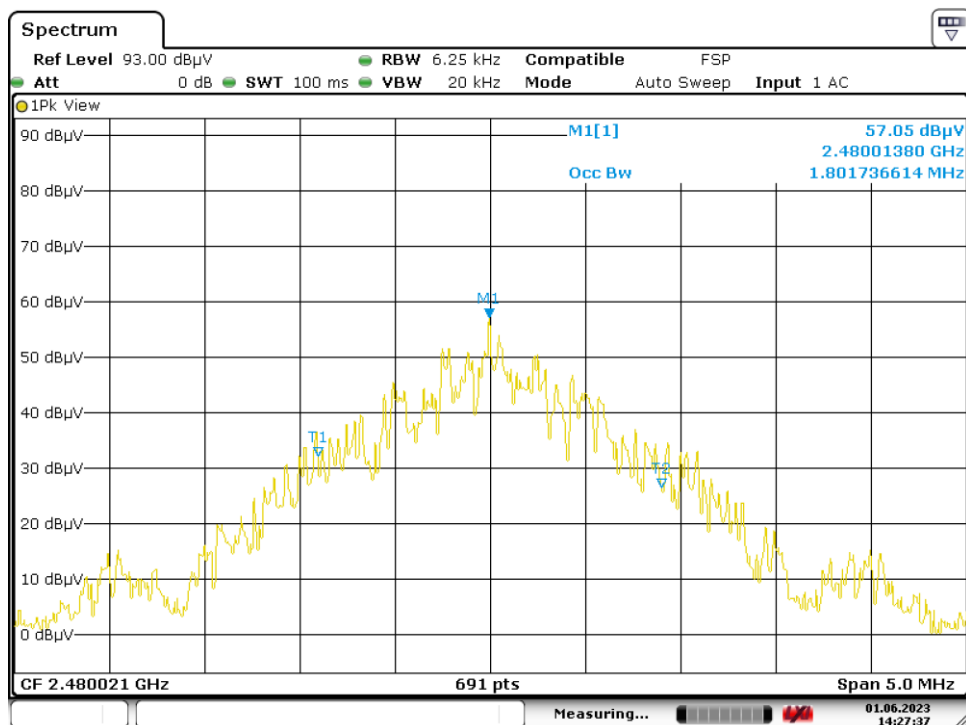
E.U.T. mode	Frequency	Results (MHz)	Limit (kHz)
DTS mode	2402 MHz	1.83	≥ 500
	2440 MHz	1.83	≥ 500
	2480 MHz	1.80	≥ 500



Date: 1.JUN.2023 11:34:52



Date: 1.JUN.2023 15:10:10



Date: 1.JUN.2023 14:27:37

6.2. Transmitter output power

Reference standard:	FCC 47 CFR PART 15 : 2022 RSS-247 Issue 2 : 2017
Test method:	§ 15.247 b) (3) of FCC 47 CFR PART 15 : 2022 § 5.4 (4) of RSS-247 Issue 2 : 2017
General test setup: E.U.T. is set on an insulating support at 80 cm above the ground reference plane. Measurement are done on a normalized test site. The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected. For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	23.5°C
Relative Humidity	10 to 90 %	44.5%
Atmospheric pressure	N/A	1019 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
Order Nr	Category	Manufacturer	Type	Last validity date	Next validity date
0941	Antenna	Emco	3115	01/03/2022	01/05/2025
17270	Cable	Huber + Suhner	N-6m	10/06/2022	10/08/2024
14228	Cable	C&C	N-4m	10/06/2022	10/08/2024
17272	Cable	Huber + Suhner	N-10m	01/07/2022	01/09/2024
14768	Receiver	Rohde & Schwarz	ESR7	02/01/2023	02/03/2024
14803	Shielded enclosure	Comtest	SAC 3m		

Blank cells = Permanent validity

TEST SETUP PHOTOS



UltralightX Medium



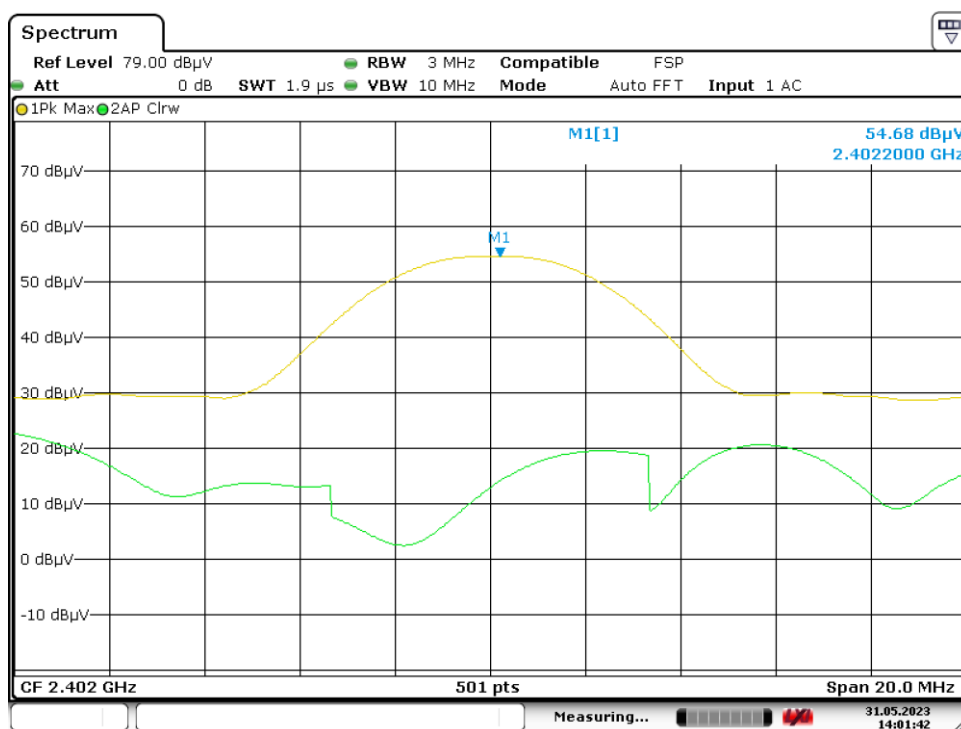
UltralightX Dongle

UltralightX Medium

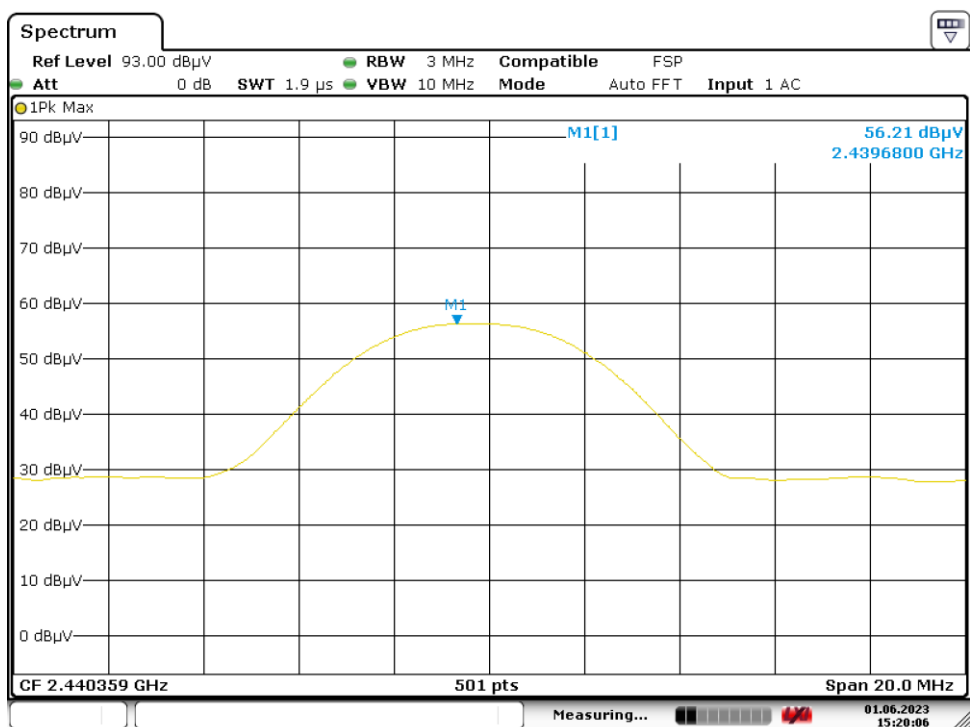
Polarization of test antenna: horizontal (height: 150cm at 2402MHz / 160cm at 2440MHz / 170cm at 2480MHz)
Position of equipment: azimuth: 305°

E.U.T. mode	Frequency	Electro-magnetic field (dBμV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	89.7	-7.7	30.0
	2440 MHz	91.3	-6.1	30.0
	2480 MHz	91.6	-5.8	30.0

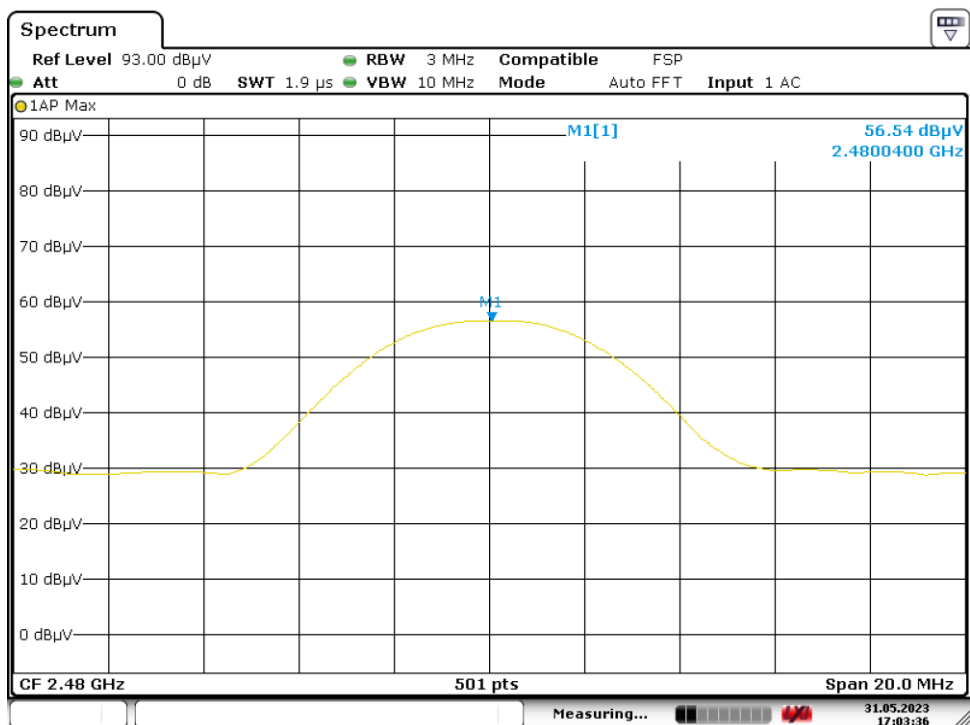
* TP = $(E \times d)^2 / (30 \times 1.64)$ for d = 3 m



Date: 31.MAY.2023 14:01:42



Date: 1.JUN.2023 15:20:06



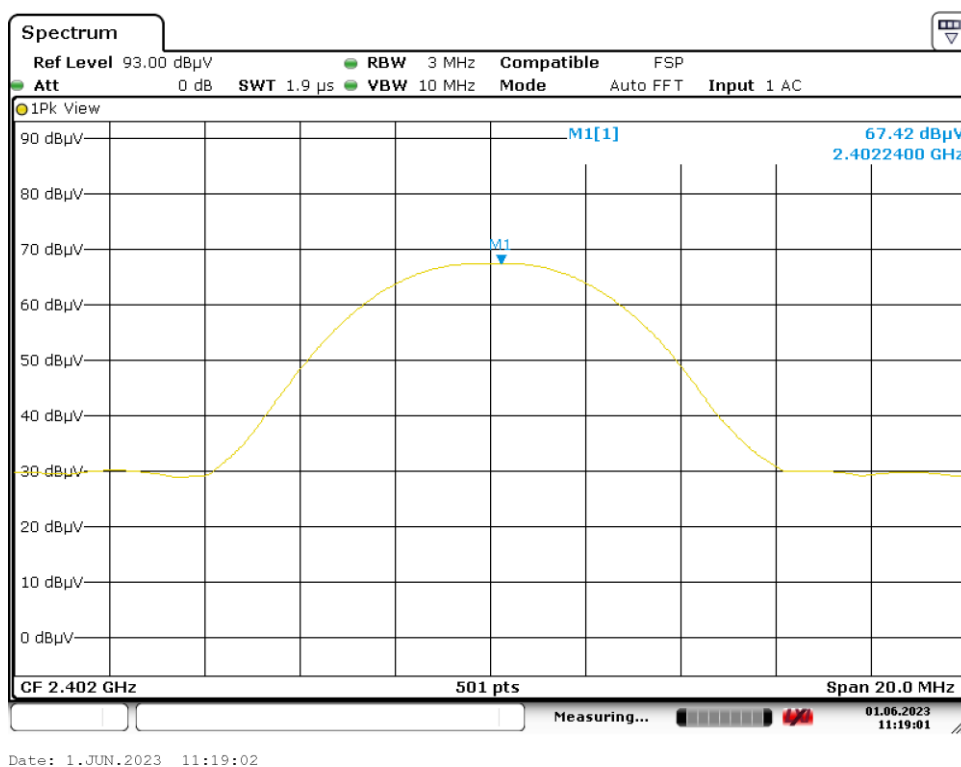
Date: 31.MAY.2023 17:03:36

UltralightX Dongle

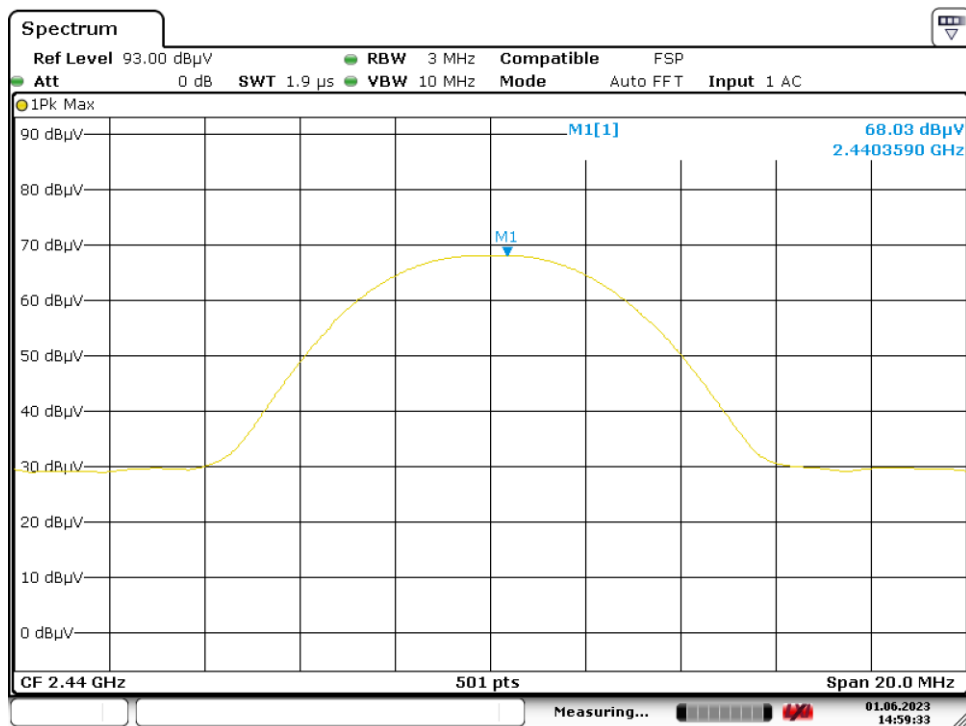
Polarization of test antenna: horizontal (height: 125cm at 2402MHz / 115cm at 2440MHz / 155cm at 2480MHz)
Position of equipment: azimuth: 260°

E.U.T. mode	Frequency	Electro-magnetic field (dBμV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	102.4	5.0	30.0
	2440 MHz	103.0	5.6	30.0
	2480 MHz	102.3	4.9	30.0

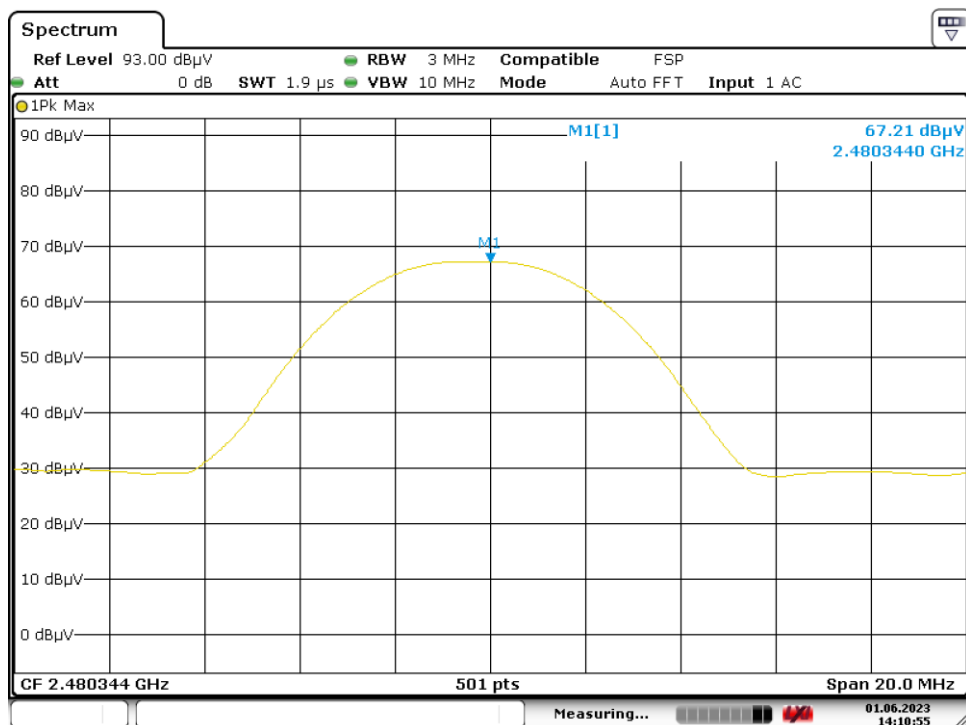
* TP = $(E \times d)^2 / (30 \times 1.64)$ for d = 3 m



Date: 1.JUN.2023 11:19:02



Date: 1.JUN.2023 14:59:33



Date: 1.JUN.2023 14:10:55

6.3. Peak power spectral density

Reference standard:	FCC 47 CFR PART 15 : 2022 RSS-247 Issue 2 : 2017
Test method:	§ 15.247 e) of FCC 47 CFR PART 15 : 2022 § 5.2 (2) of RSS-247 Issue 2 : 2017
General test setup: E.U.T. is set on an insulating support at 80 cm above the ground reference plane. Measurement are done on a normalized test site. The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected. For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	23.5°C
Relative Humidity	10 to 90 %	44.5%
Atmospheric pressure	N/A	1019 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
Order Nr	Category	Manufacturer	Type	Last validity date	Next validity date
0941	Antenna	Emco	3115	01/03/2022	01/05/2025
17270	Cable	Huber + Suhner	N-6m	10/06/2022	10/08/2024
14228	Cable	C&C	N-4m	10/06/2022	10/08/2024
17272	Cable	Huber + Suhner	N-10m	01/07/2022	01/09/2024
14768	Receiver	Rohde & Schwarz	ESR7	02/01/2023	02/03/2024
14803	Shielded enclosure	Comtest	SAC 3m		

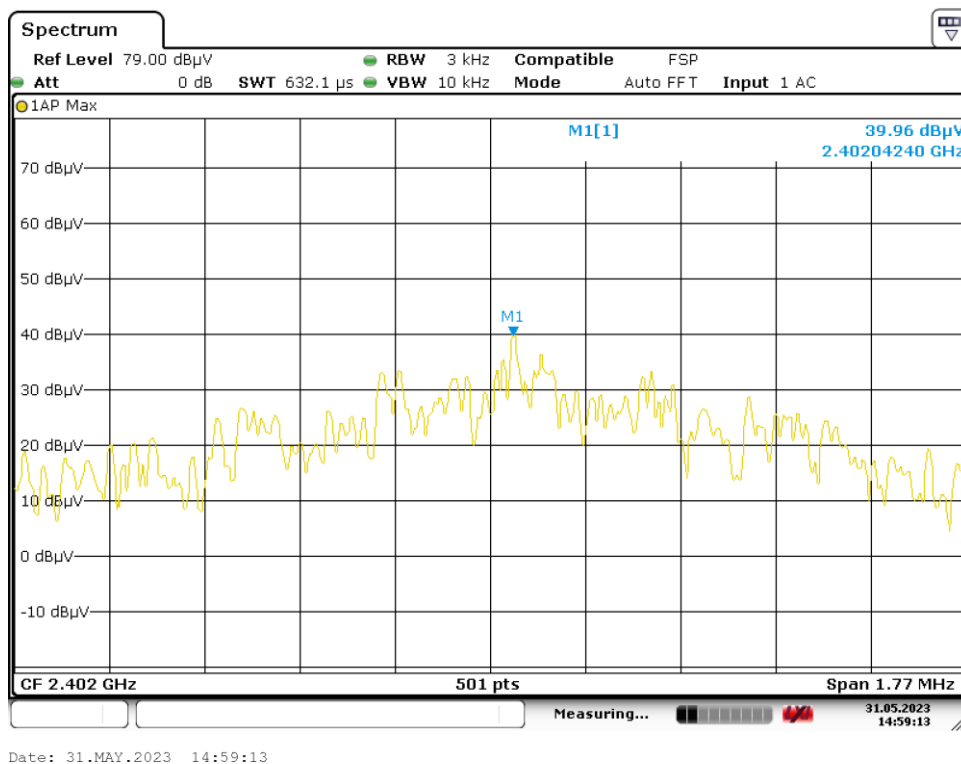
Blank cells = Permanent validity

UltralightX Medium

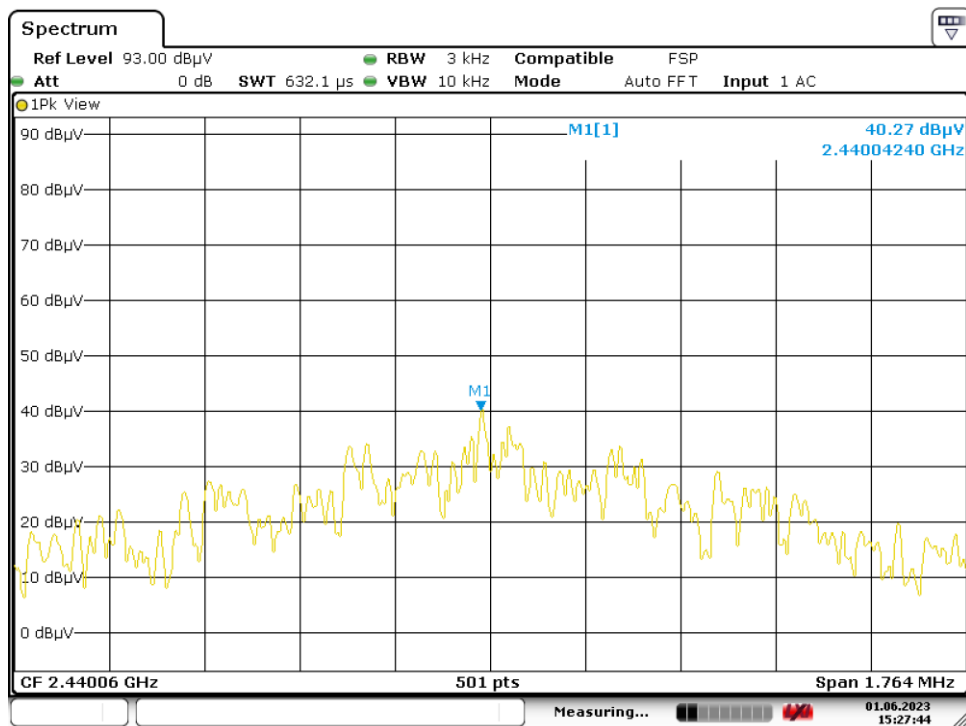
Polarization of test antenna: horizontal (height: 150cm at 2402MHz / 160cm at 2440MHz / 170cm at 2480MHz)
 Position of equipment: azimuth: 305°

E.U.T. mode	Frequency	Electro-magnetic field (dBμV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	74.96	- 22.42	8.0
	2440 MHz	75.27	- 22.11	8.0
	2480 MHz	76.24	- 21.04	8.0

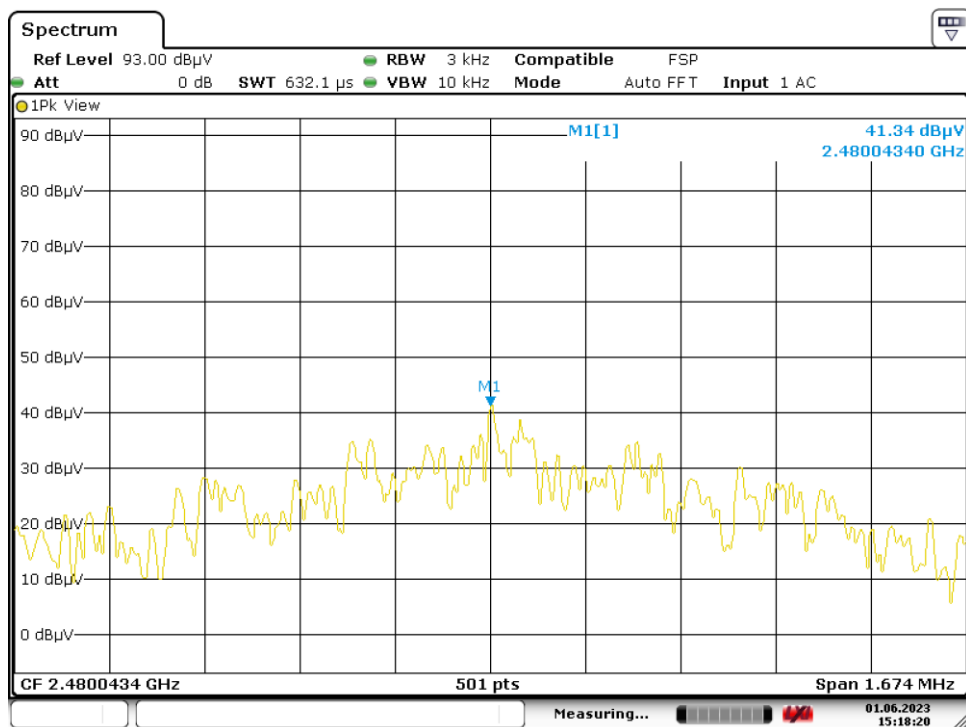
* TP = $(E \times d)^2 / (30 \times 1.64)$ for d = 3 m



Date: 31.MAY.2023 14:59:13



Date: 1.JUN.2023 15:27:45



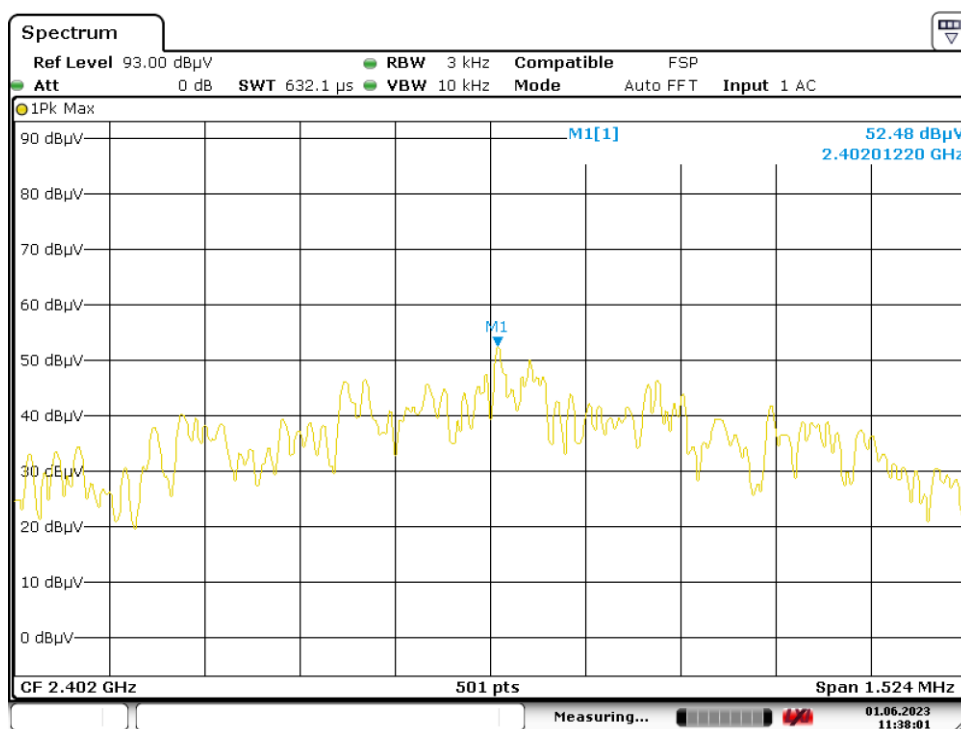
Date: 1.JUN.2023 15:18:20

UltralightX Dongle

Polarization of test antenna: horizontal (height: 125cm at 2402MHz / 115cm at 2440MHz / 155cm at 2480MHz)
Position of equipment: azimuth: 260°

E.U.T. mode	Frequency	Electro-magnetic field (dBµV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	87.51	- 9.87	8.0
	2440 MHz	88.15	- 9.23	8.0
	2480 MHz	87.27	- 10.12	8.0

* TP = $(E \times d)^2 / (30 \times 1.64)$ for d = 3 m



Date: 1.JUN.2023 11:38:01