

"This report cancels and replaces the test report N° RRA-EMIESS23H153SUN-3A v0"



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

RADIO TESTS REPORT

FCC 47 CFR PART 15 : 2023 (§15.247)

RSS-247_Issue 2 : 2017

RSS-Gen_Issue 5 : 2019

Company : **SUNRISE**
Address..... : *Chaussée de Marche 598/02*
5101 NAMUR - BELGIUM

Test item description. : **SUNRISE AIR**
Trade Mark. : **SUNRISE®**
Manufacturer..... : **SUNRISE SA**
Model/Type reference..... : *R&D : S300 – commercial : A9xx (for US) / B1xx (for EU)*
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-EMIESS23H153SUN-3A v1**
Test procedure. : FCC and CANADA marking
Diffusion..... : Mr. LEJEUNE
Applicant's name. : **SUNRISE AIR**
Date of issue..... : 31/07/2024
Total number of pages..... : 95
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.*

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REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	03/06/2024	/	Creation
1	31/07/2024	5	Add of FCC Id reference

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.		FCC Certification	
Tested by		C.A. ROBERT	
Test supervisor		B. PELLERIN	
Date of receipt of test item		The 03/04/2024	
Dates of performance of tests		From 03/04/2024 to 11/04/2024	
APPLICANT'S GENERAL INFORMATION:			
Company name		SUNRISE	
Company address.		Chaussée de Marche 598/02 5101 NAMUR - BELGIUM	
Person present during the tests.		Mr. LEJEUNE / Ms. BOBDA	
Responsible.		Mr. LEJEUNE	
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 : 2023

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 C63.4 : 2014

Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.

ANSI C63.10 : 2013

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

INFORMATIVE REFERENCE:

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. : *SUNRISE AIR*

Model/Type reference..... : *R&D : S300 – commercial : A9xx (for US) / B1xx (for EU)*

Trade Mark. : *SUNRISE®*

Serial number (S/N)..... : *Sensor : E000006 and E000015*
Station : E000020

Part number (P/N). : *N/A*

Software version..... : *N/A*

Firmware version. : *0.0.0*

Fcc ID : *2BHAASUN300*

N°IC : *Not communicated*

Type of sample..... : *Prototype*

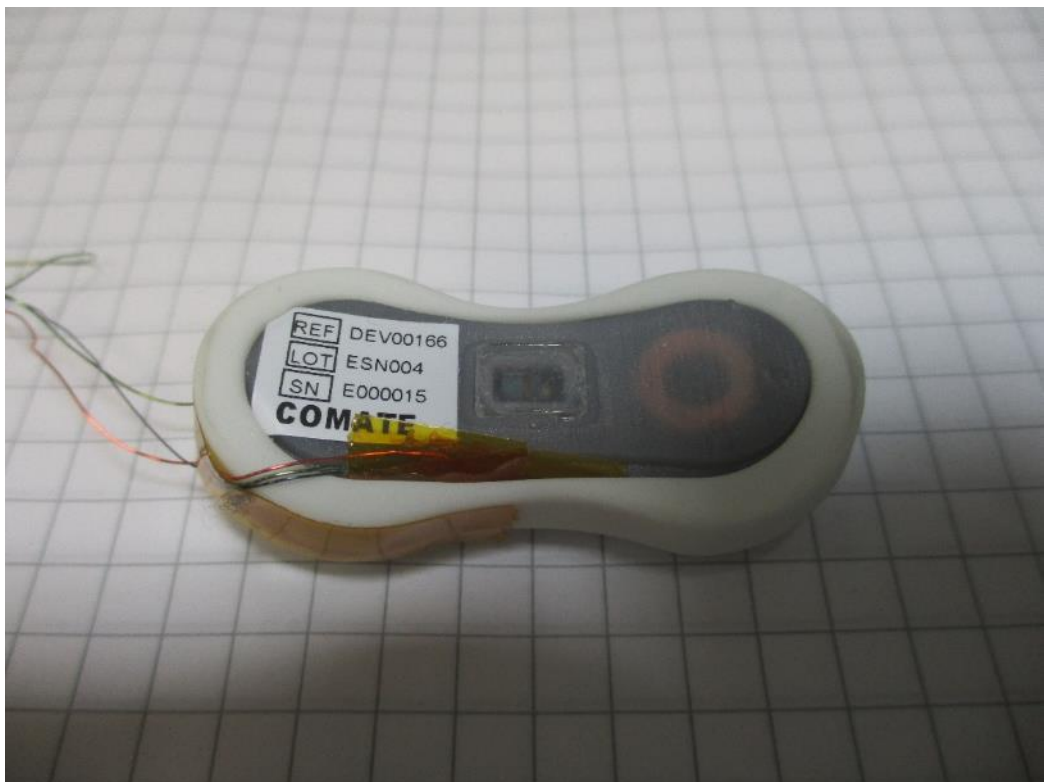
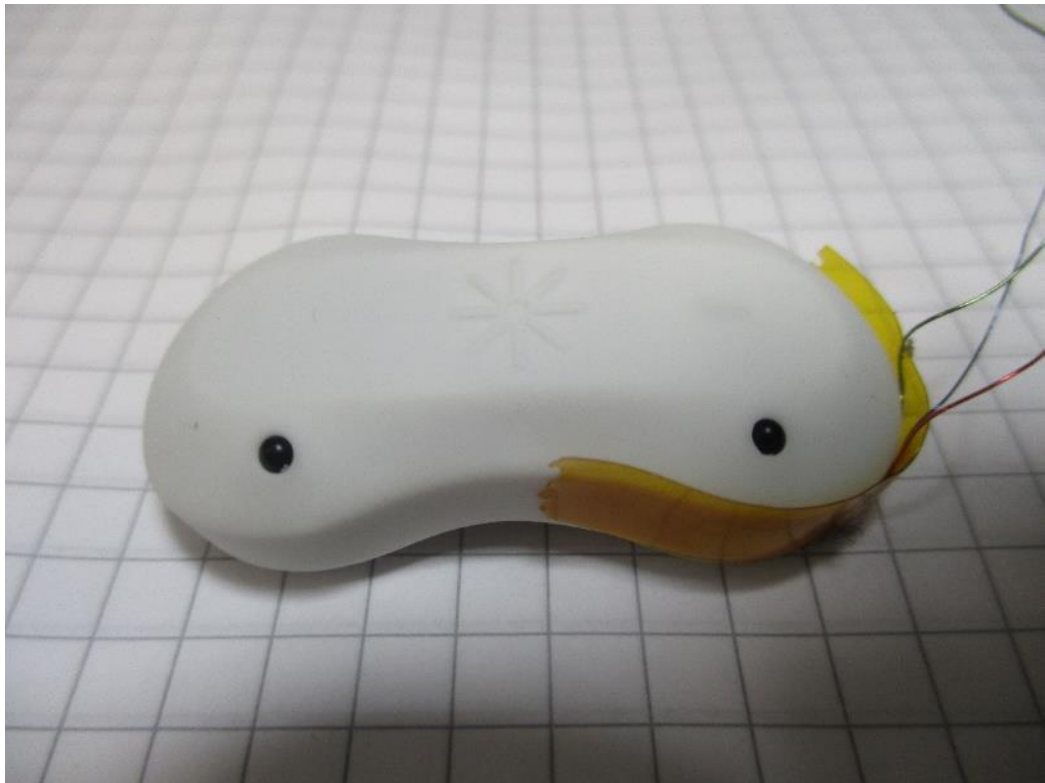
Function(s)..... : *The Sunrise Air is a multiple-use sensor placed on the chin and intended to record mandibular jaw movements, pulse waves, variations of air temperature and sound level for use by the Sunrise software to achieve its intended purpose. The Sunrise Air is indicated for use in patients 3 years and older in the home or clinical environment.*

Manufacturer name. : *SUNRISE SA*

Address. : *Chaussée de Marche 598/02*
5101 ERPENT - BELGIUM

General product information: -

3.2.E.U.T Overview



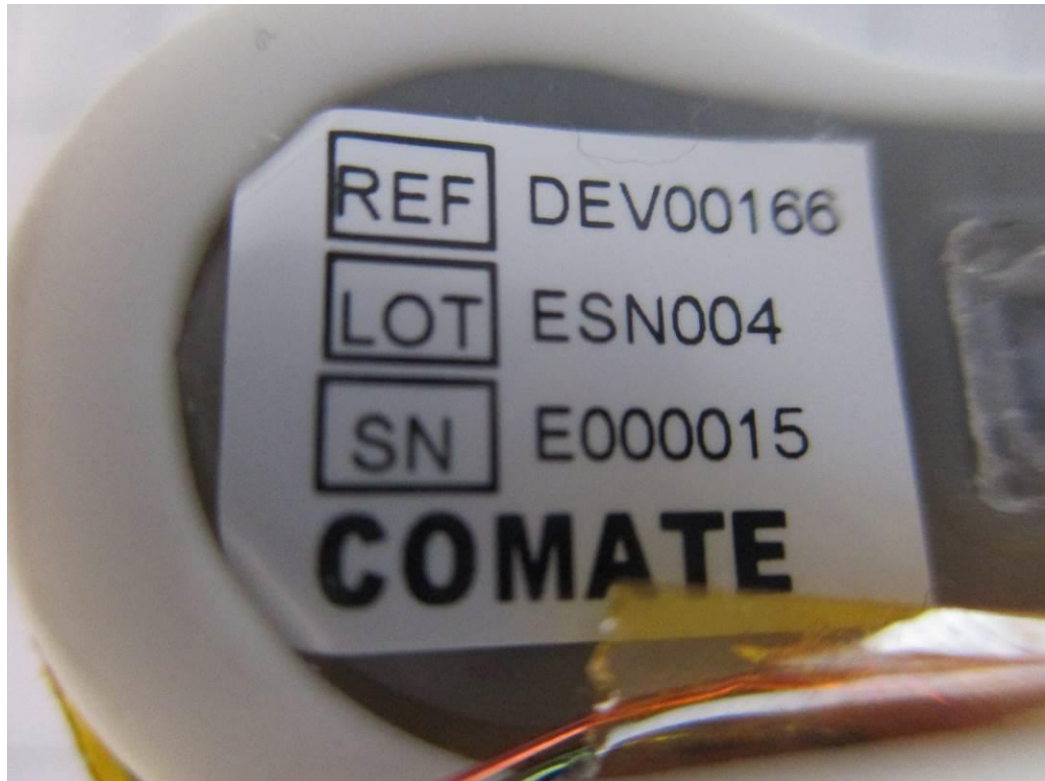
Sensor

3.2.E.U.T Overview



Station

3.3.E.U.T Marking Plate



Sensor

3.3.E.U.T Marking Plate



Station

3.4.EUT Electronic board

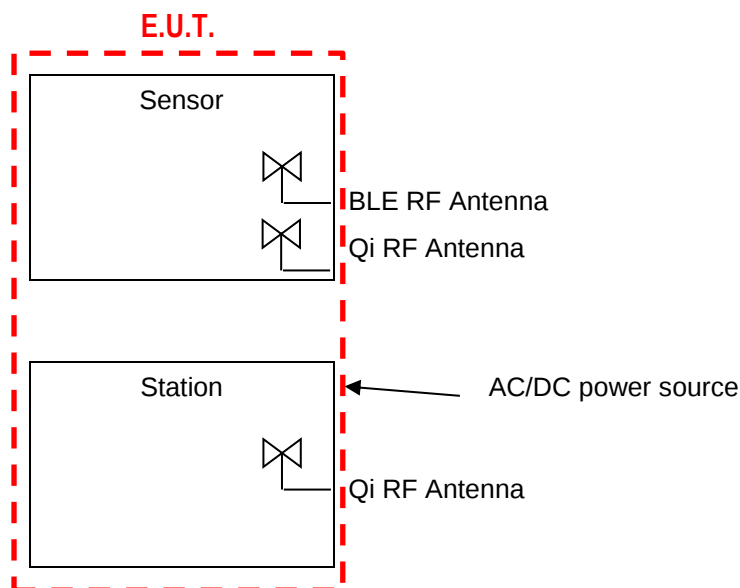
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3.5.E.U.T Mechanical and Electrical Design

Power supply.	5Vdc (E.U.T. only) 120 Vac / 60 Hz (E.U.T. with representative AC/DC adapter)
Power supply range.....	4.75Vdc to 5.25Vdc (E.U.T. only) 100-240Vac / 50-60Hz (E.U.T. with representative AC/DC adapter)
Power type.....	DC (E.U.T only) Single phase without ground (E.U.T. with representative AC/DC adapter)
Power (W).....	0.75
Nominal current (A).	0.015
Dimensions (L x W x H) (mm).	0.008 x 0.004 x 0.0021
Weight (kg).	0.1
Temperature range (°C).	+5 to +35
Ground bounding strap.....	No

Comments: -

3.6. EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	CABLE TYPE	COMMENTS
1	Power source	AC/DC	< 3m	Not shielded	2 wires
2	BLE RF Antenna	RF	-	-	Internal antenna
3	Qi RF Antenna	RF	-	-	Internal antenna, Only for charging.

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.....	Transmitter
Technology	Bluetooth Low Energy
Environmental profile.....	Data transmission
Temperature range.....	+5 to +35
Antenna type	Integrated
Antenna Gain.....	-10dBi
Comments: -	
b) TRANSMITTER PARAMITERS (Tx)	
Frequency bands.....	2400MHz-2483.5MHz
RF Power.....	+4dBm
Number of channels / Separation.....	37+3 / 2MHz
Modulation type	GFSK
Duty cycle	Not communicated
Tested frequency.....	Bluetooth low energy – Pairing mode
	Lowest channel - 2402 MHz
	Middle channel - 2426 MHz
	Highest channel - 2480 MHz
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	2400MHz-2483.5MHz
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	BLE is ON when sensor is on Station.
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	PASS	
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	

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
- c) (2) multiple directional beams in the band 2400–2483.5 MHz	-	N/A	
- c) (2) (i) information	-	N/A	
- 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	-	PASS	

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 : 2023 RSS-247 Issue 2 : 2017
Test method:	§ 15.247 a) (2) of FCC 47 CFR PART 15 : 2023 § 5.2 (1) of RSS-247 Issue 2 : 2017
General test setup: E.U.T. is set on an insulating support at 150 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	23.0°C
Relative Humidity	10 to 90 %	40.6%
Atmospheric pressure	N/A	1030 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
Category	Manufacturer	Type	Order Nr	Last validity date	Next validity date
Amplifier	HP	8449B	16922	09/05/2023	09/07/2024
Antenna	Emco	3115	00941	01/03/2022	01/05/2025
Cable	Câbles et Connectiques	N-2m	02451	29/08/2022	29/10/2024
Cable	C&C	N-5m	11184	22/06/2023	22/08/2024
Cable	C&C	N-4m	14226	26/06/2023	26/08/2024
Cable	Huber + Suhner	N-6m	17269	29/08/2022	29/10/2024
Receiver	Rohde & Schwarz	ESW44	17058	15/06/2023	15/08/2024
Shielded enclosure	Comtest	SAC 3m	14622	27/04/2022	27/06/2025

Blank cells = Permanent validity

TEST SETUP PHOTOS



Sensor + Station



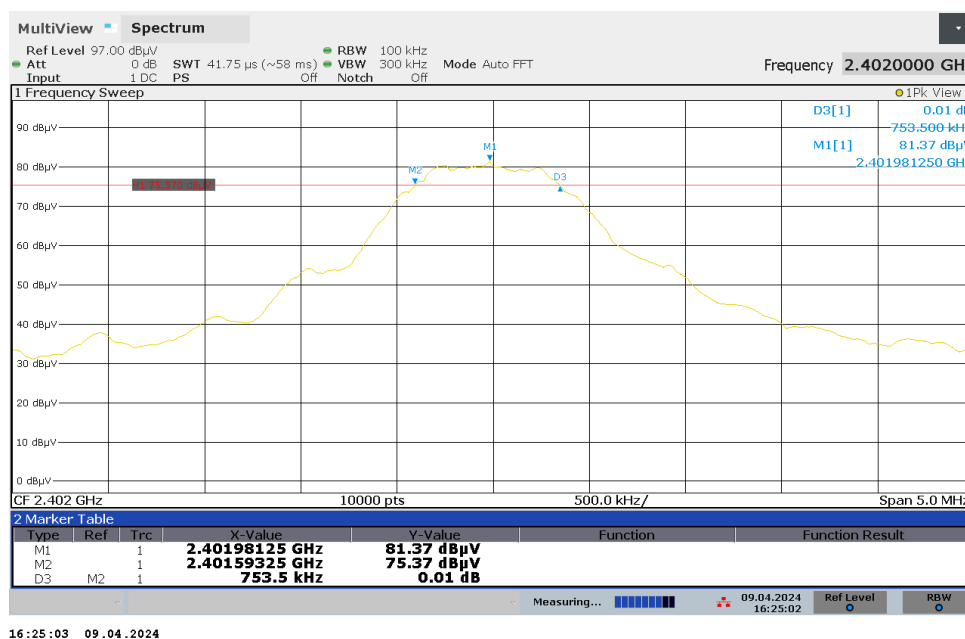
Sensor alone

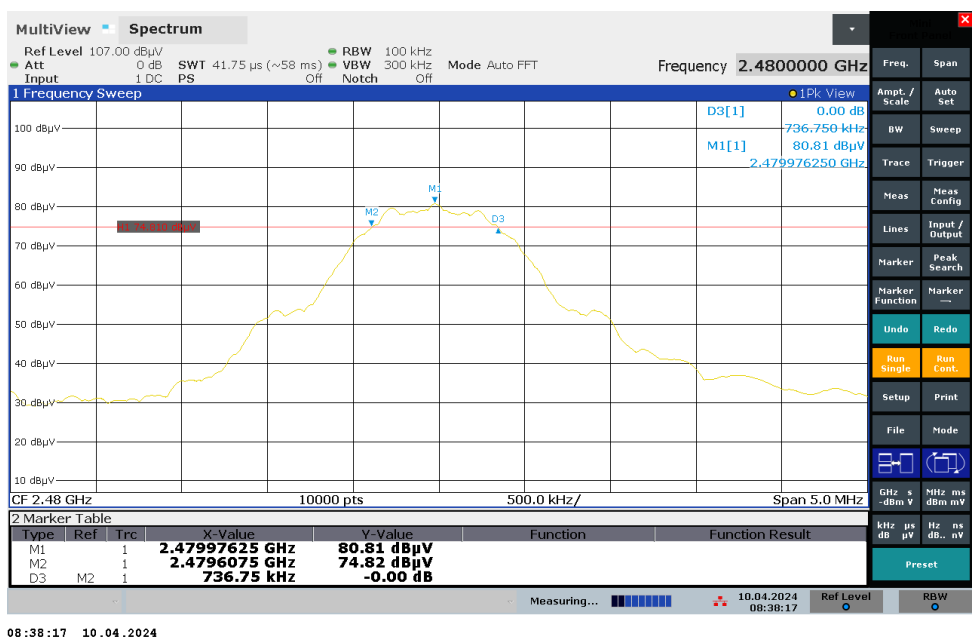
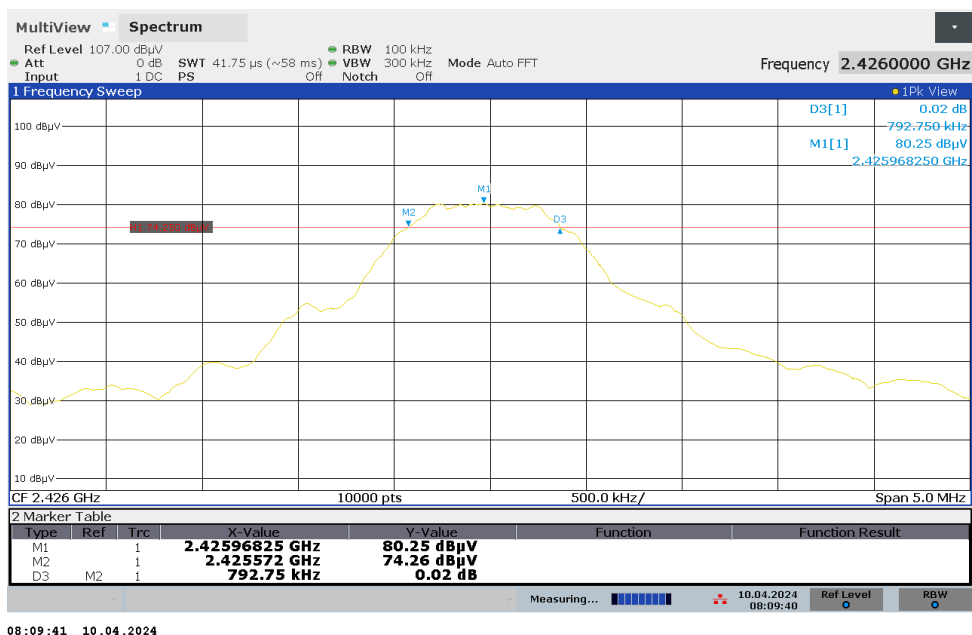
Sensor + Station

Frequency	Polarization of test antenna	Azimuth (°)	Antenna height (cm)
2402 MHz	Horizontal	60	150
2426 MHz	Horizontal	0	120
2480 MHz	Horizontal	0	120

6 dB Bandwidth

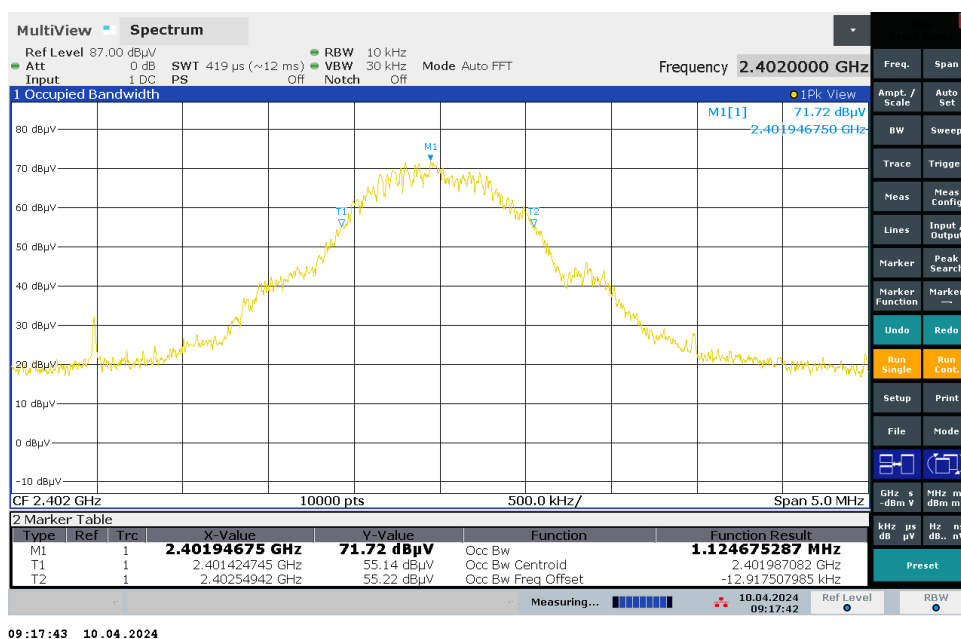
E.U.T. mode	Frequency	Results (kHz)	Limit (kHz)
DTS mode	2402 MHz	753.5	≥ 500
	2426 MHz	792.8	≥ 500
	2480 MHz	736.8	≥ 500



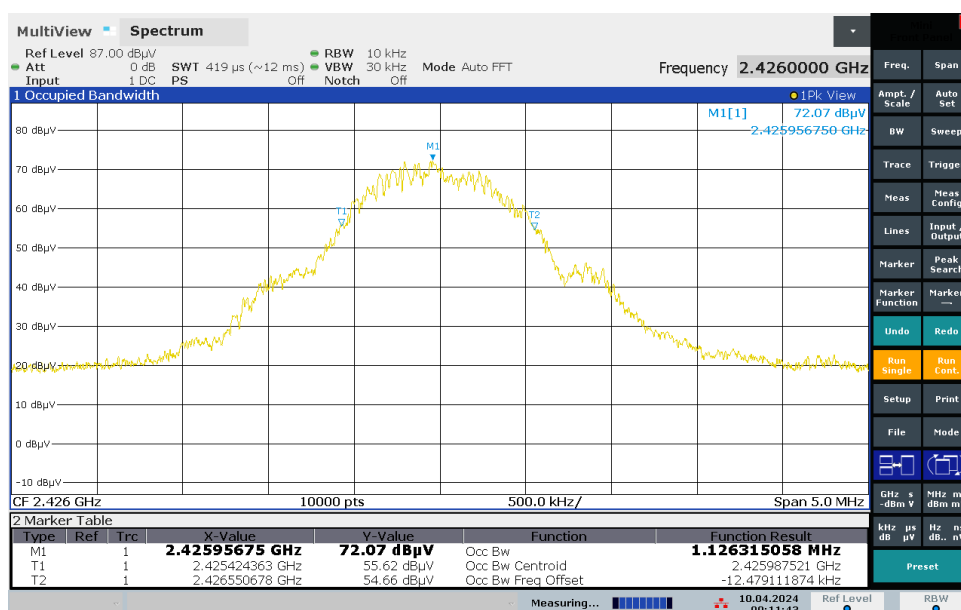


99 % Bandwidth

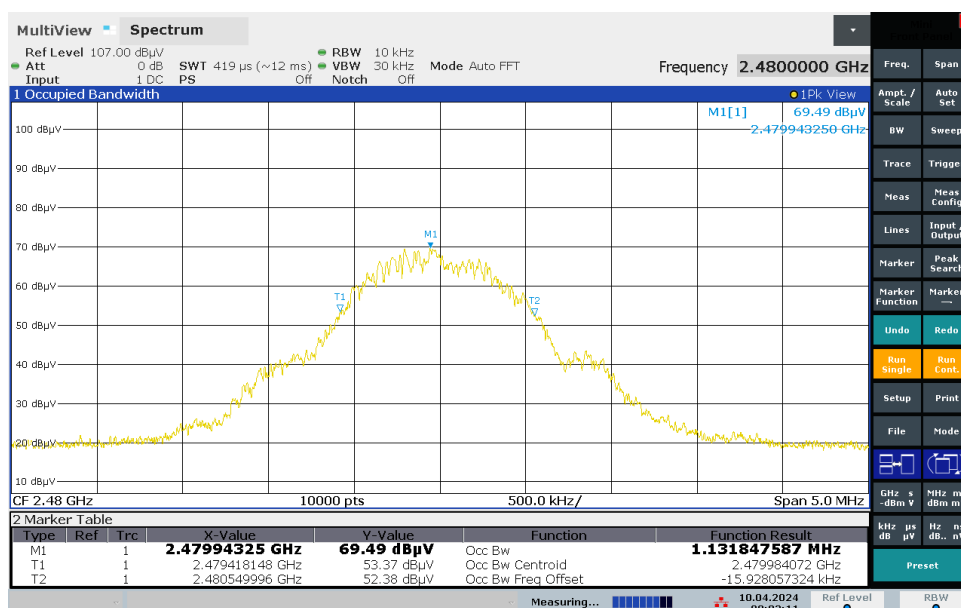
E.U.T. mode	Frequency	Results (MHz)	Limit (kHz)
DTS mode	2402 MHz	1.13	≥ 500
	2426 MHz	1.13	≥ 500
	2480 MHz	1.13	≥ 500



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09:11:44 10.04.2024



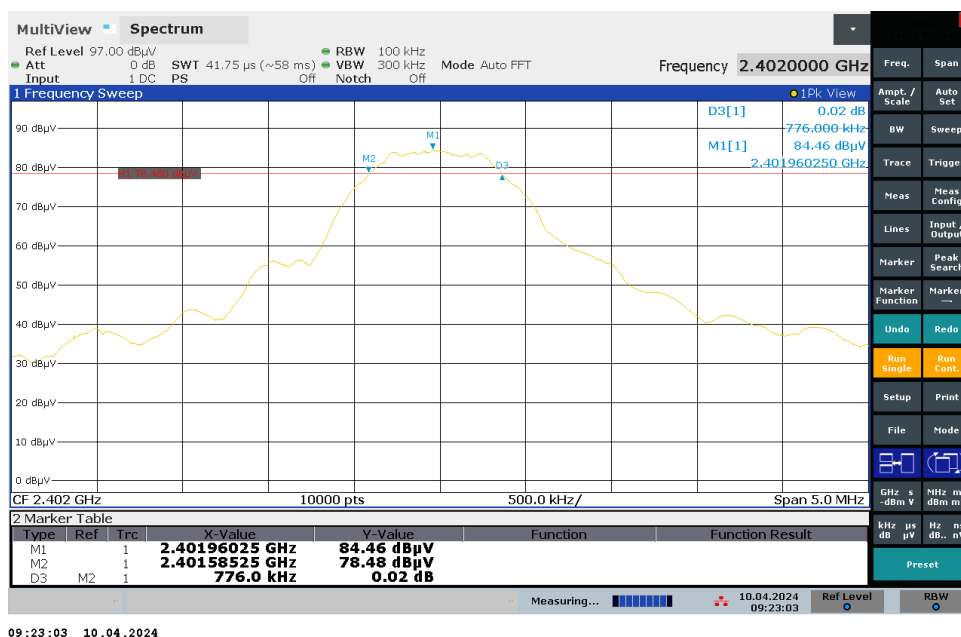
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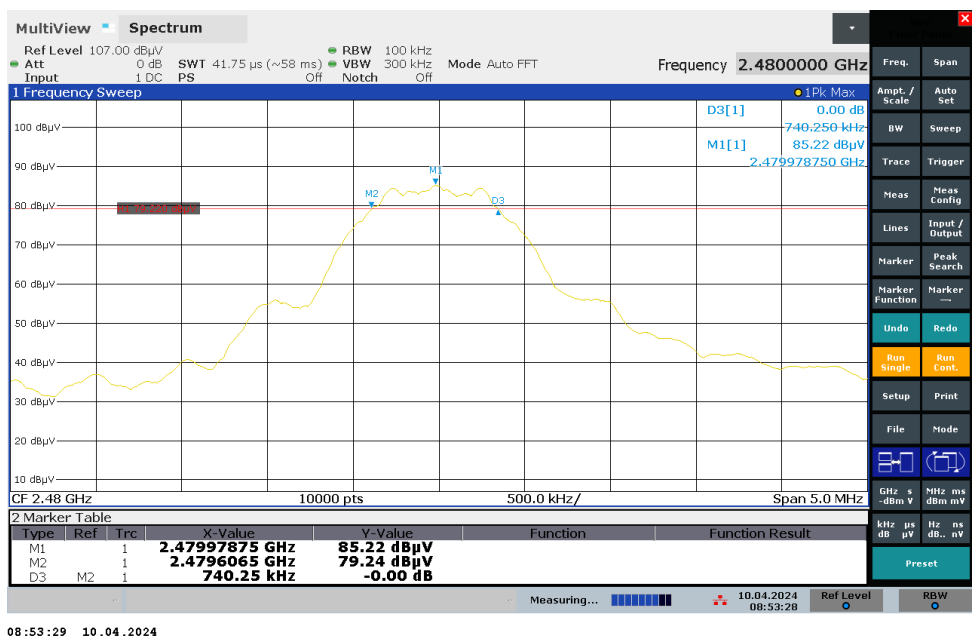
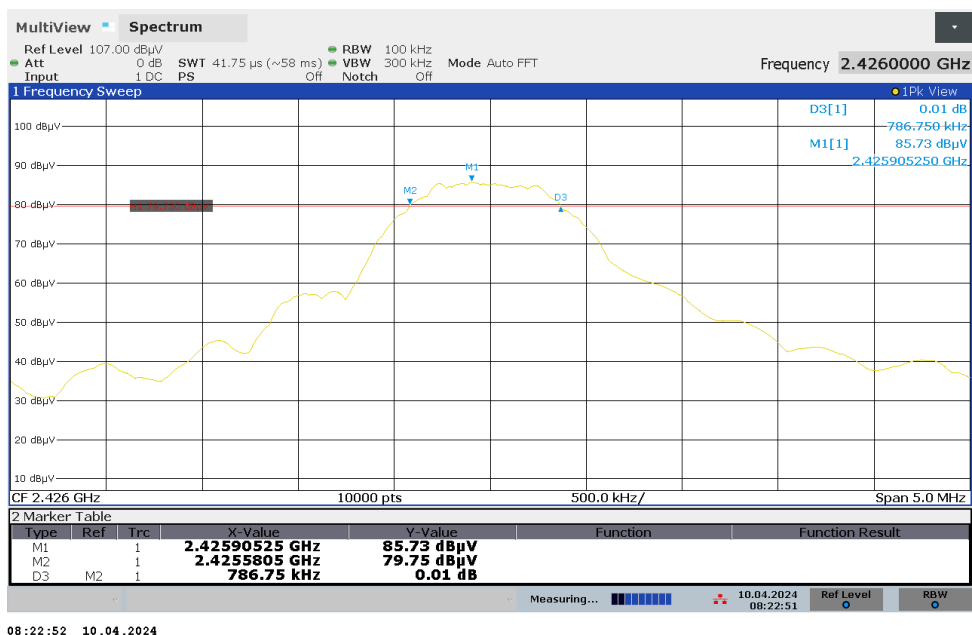
Sensor alone

Frequency	Polarization of test antenna	Azimuth (°)	Antenna height (cm)
2402 MHz	Horizontal	0	150
2426 MHz	Vertical	270	200
2480 MHz	Horizontal	185	150

6dB Bandwidth

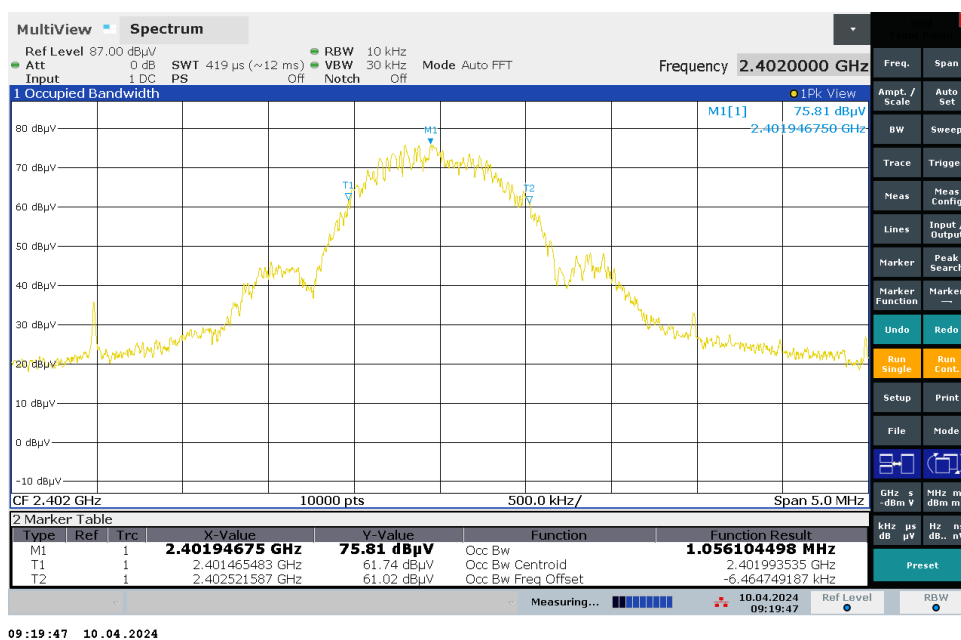
E.U.T. mode	Frequency	Results (kHz)	Limit (kHz)
DTS mode	2402 MHz	776.0	≥ 500
	2426 MHz	786.8	≥ 500
	2480 MHz	740.3	≥ 500

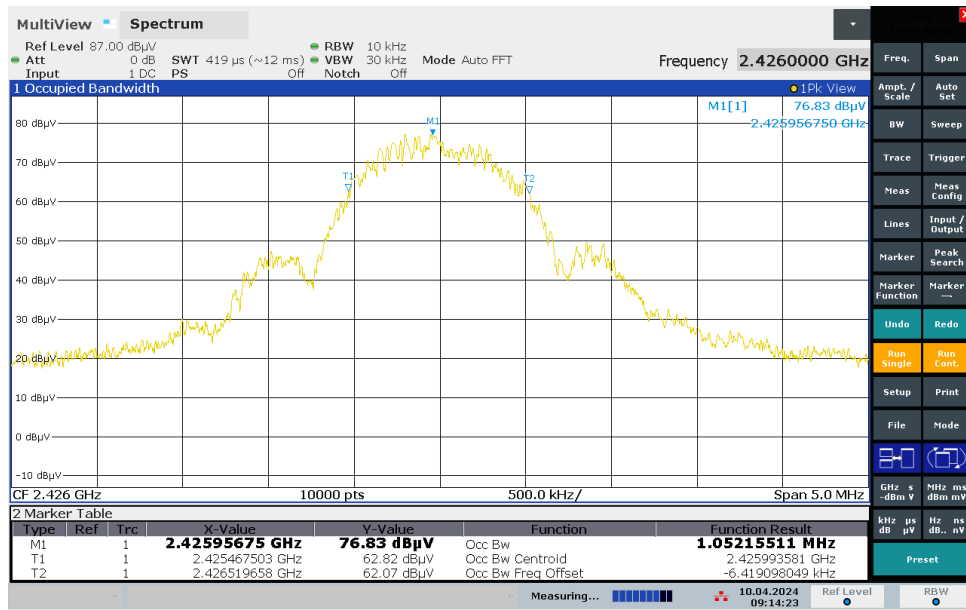




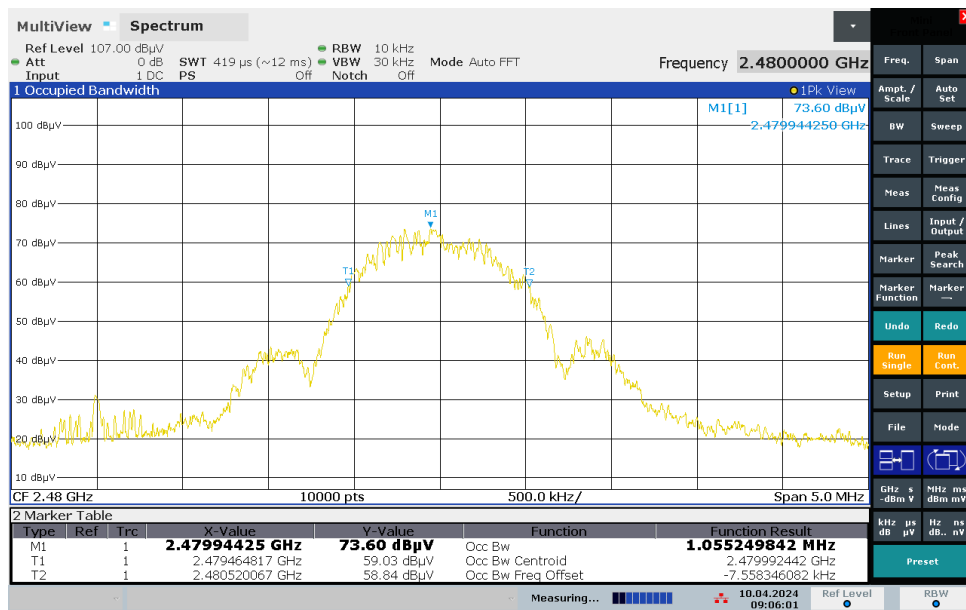
99 % Bandwidth

E.U.T. mode	Frequency	Results (MHz)	Limit (kHz)
DTS mode	2402 MHz	1.06	≥ 500
	2426 MHz	1.05	≥ 500
	2480 MHz	1.06	≥ 500





09:14:24 10.04.2024



09:06:02 10.04.2024

6.2. Transmitter output power

Reference standard:	FCC 47 CFR PART 15 : 2023 RSS-247 Issue 2 : 2017
Test method:	§ 15.247 b) (3) of FCC 47 CFR PART 15 : 2023 § 5.4 (4) of RSS-247 Issue 2 : 2017
General test setup: E.U.T. is set on an insulating support at 150 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	20.7°C
Relative Humidity	10 to 90 %	40.5%
Atmospheric pressure	N/A	1030 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
Category	Manufacturer	Type	Order Nr	Last validity date	Next validity date
Amplifier	HP	8449B	16922	09/05/2023	09/07/2024
Antenna	Emco	3115	0941	01/03/2022	01/05/2025
Cable	Câbles et Connectiques	N-2m	2451	29/08/2022	29/10/2024
Cable	C&C	N-5m	11184	22/06/2023	22/08/2024
Cable	C&C	N-4m	14226	26/06/2023	26/08/2024
Cable	Huber + Suhner	N-6m	17269	29/08/2022	29/10/2024
Receiver	Rohde & Schwarz	ESW44	17058	15/06/2023	15/08/2024
Shielded enclosure	Comtest	SAC 3m	14622	27/04/2022	27/06/2025

Blank cells = Permanent validity

TEST SETUP PHOTOS



Sensor + Station



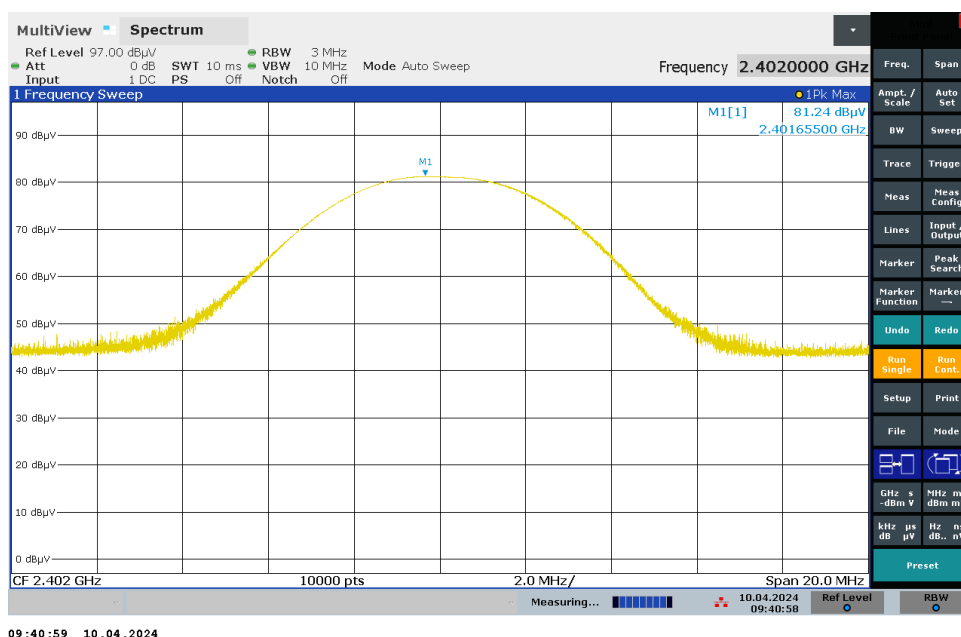
Sensor alone

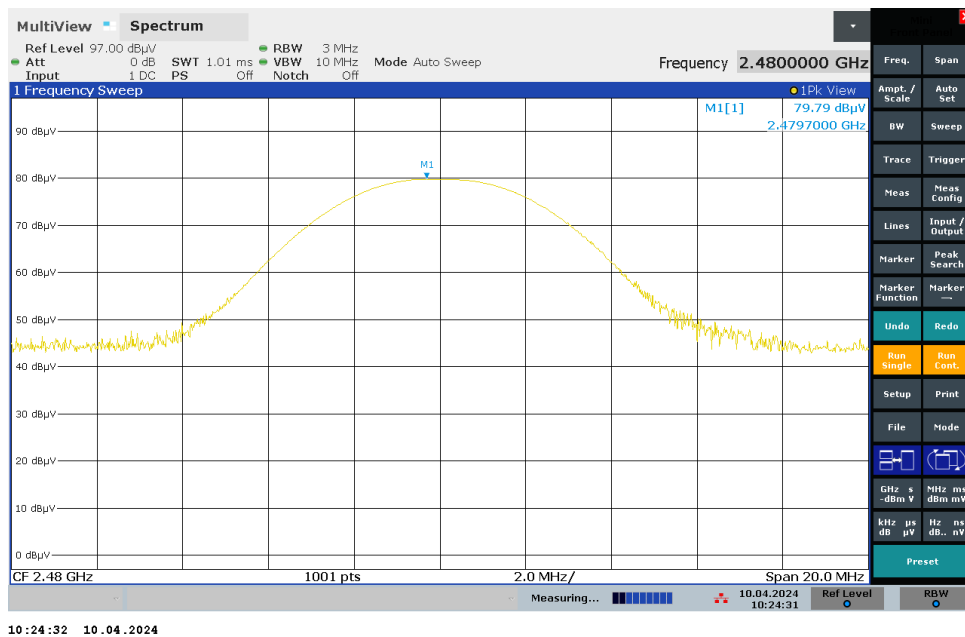
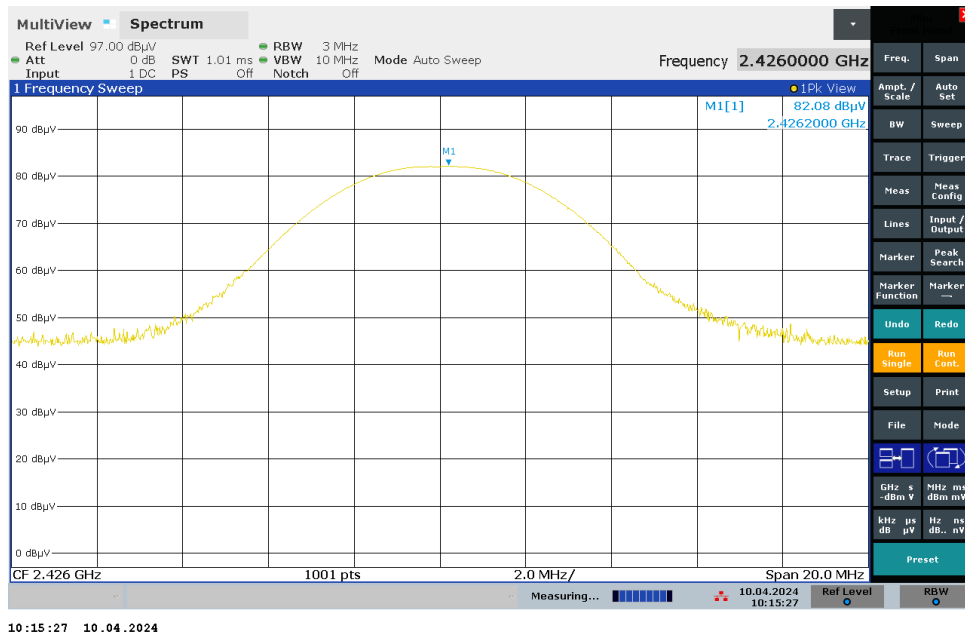
Sensor + Station

Frequency	Polarization of test antenna	Azimuth (°)	Antenna height (cm)
2402 MHz	Horizontal	60	150
2426 MHz	Horizontal	0	120
2480 MHz	Horizontal	0	120

E.U.T. mode	Frequency	Electro-magnetic field (dBμV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	81.2	-16.2	30.0
	2426 MHz	82.0	-15.4	30.0
	2480 MHz	80.1	-17.3	30.0

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



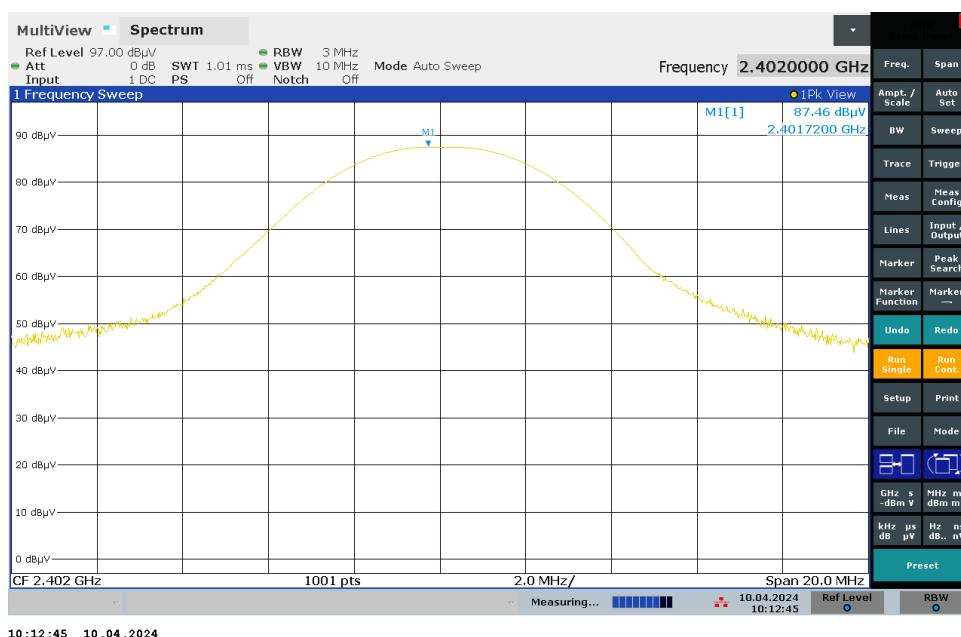


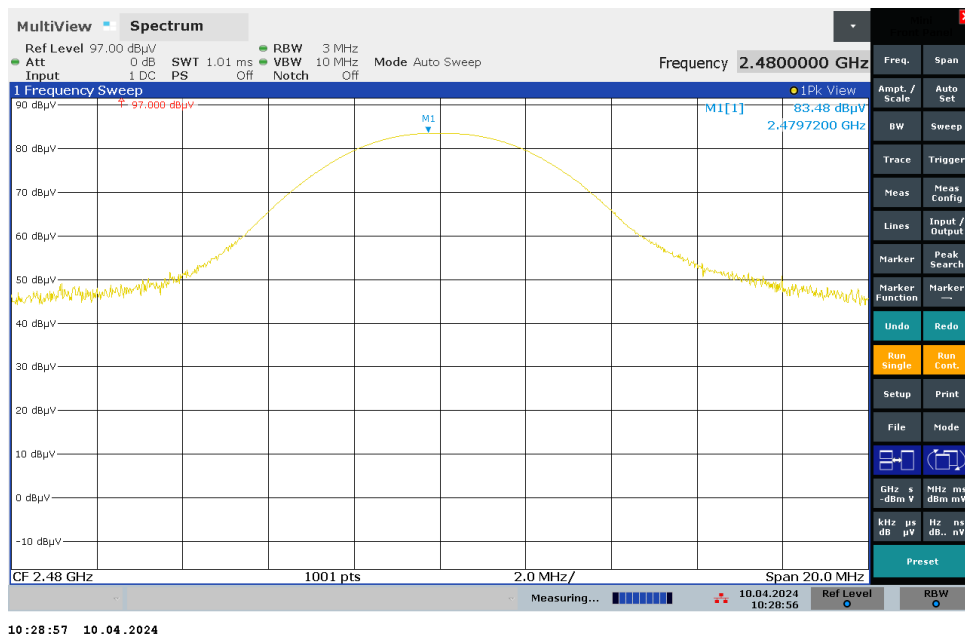
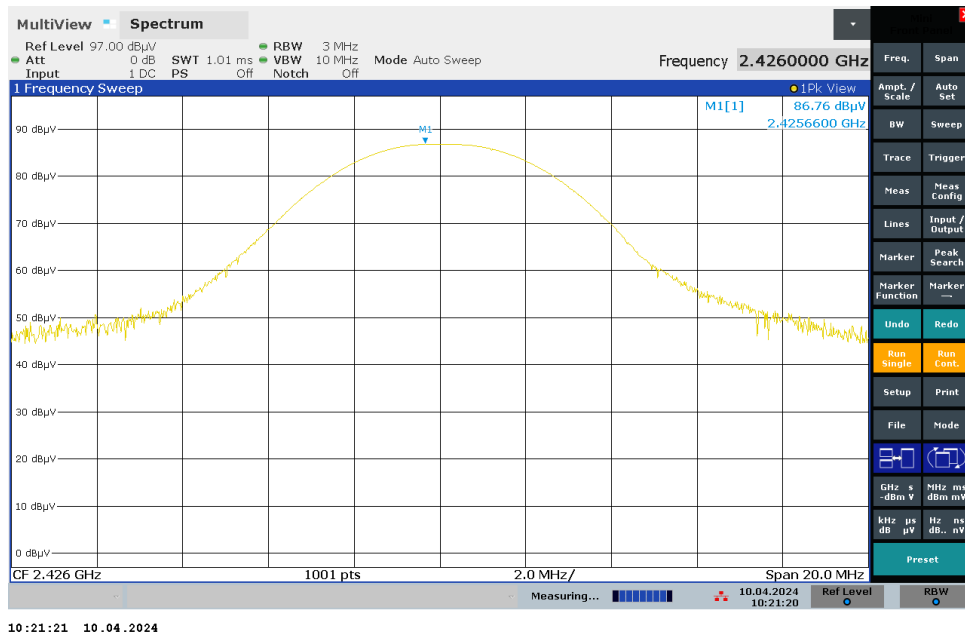
Sensor alone

Frequency	Polarization of test antenna	Azimuth (°)	Antenna height (cm)
2402 MHz	Horizontal	0	150
2426 MHz	Vertical	270	200
2480 MHz	Horizontal	185	150

E.U.T. mode	Frequency	Electro-magnetic field (dBμV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	87.4	-10.0	30.0
	2426 MHz	86.7	-10.7	30.0
	2480 MHz	83.8	-13.6	30.0

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





6.3. Peak power spectral density

Reference standard:	FCC 47 CFR PART 15 : 2023 RSS-247 Issue 2 : 2017
Test method:	§ 15.247 e) of FCC 47 CFR PART 15 : 2023 § 5.2 (2) of RSS-247 Issue 2 : 2017
General test setup: E.U.T. is set on an insulating support at 150 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	20.8°C
Relative Humidity	10 to 90 %	40.4%
Atmospheric pressure	N/A	1030 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
Category	Manufacturer	Type	Order Nr	Last validity date	Next validity date
Amplifier	HP	8449B	16922	09/05/2023	09/07/2024
Antenna	Emco	3115	0941	01/03/2022	01/05/2025
Cable	Câbles et Connectiques	N-2m	2451	29/08/2022	29/10/2024
Cable	C&C	N-5m	11184	22/06/2023	22/08/2024
Cable	C&C	N-4m	14226	26/06/2023	26/08/2024
Cable	Huber + Suhner	N-6m	17269	29/08/2022	29/10/2024
Receiver	Rohde & Schwarz	ESW44	17058	15/06/2023	15/08/2024
Shielded enclosure	Comtest	SAC 3m	14622	27/04/2022	27/06/2025

Blank cells = Permanent validity

TEST SETUP PHOTOS



Sensor + Station



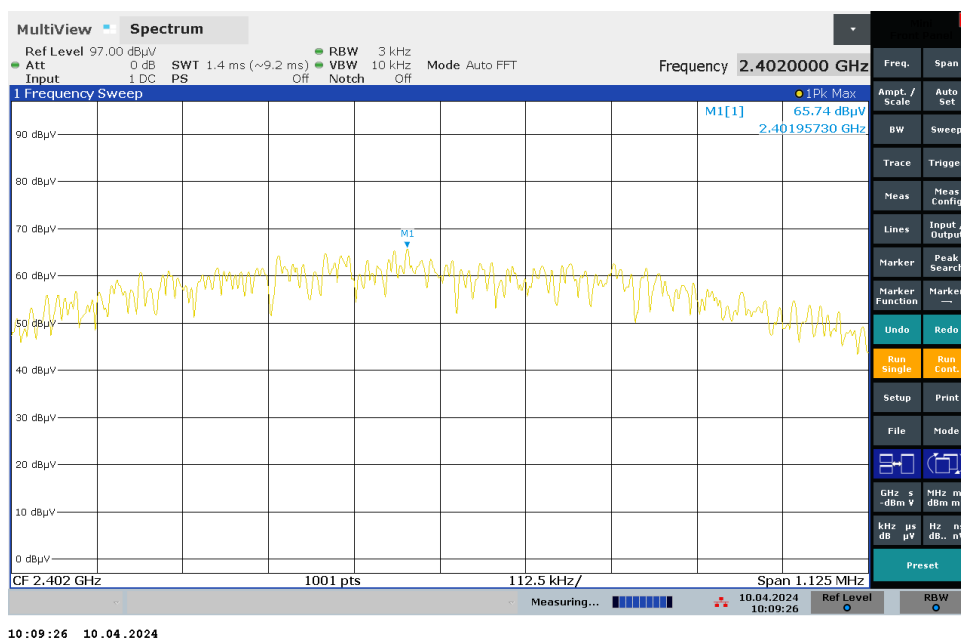
Sensor alone

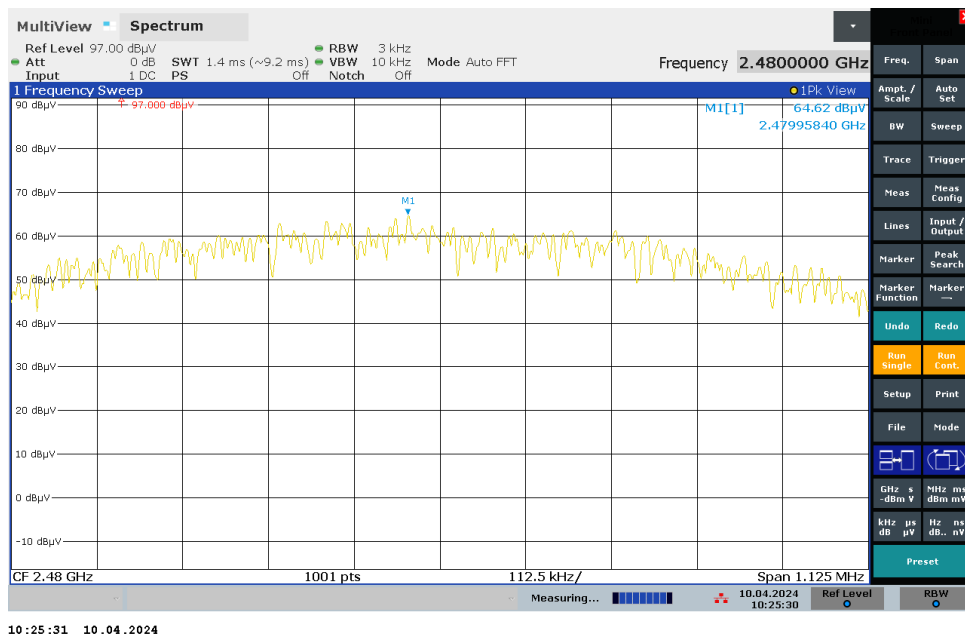
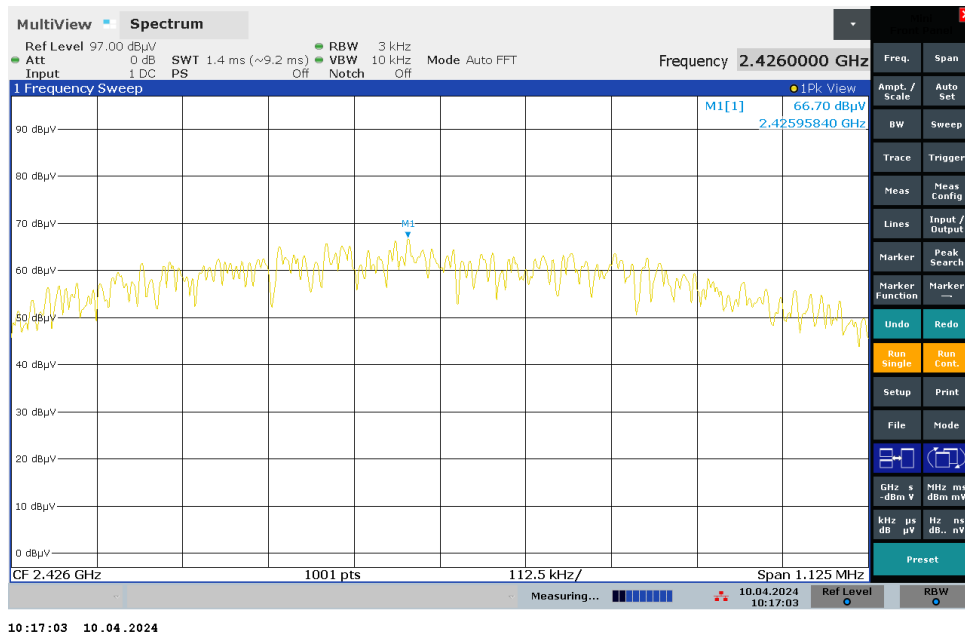
Sensor + Station

Frequency	Polarization of test antenna	Azimuth (°)	Antenna height (cm)
2402 MHz	Horizontal	60	150
2426 MHz	Horizontal	0	120
2480 MHz	Horizontal	0	120

E.U.T. mode	Frequency	Electro-magnetic field (dBµV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	65.7	-31.7	8.0
	2426 MHz	66.6	-30.8	8.0
	2480 MHz	64.9	-32.5	8.0

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



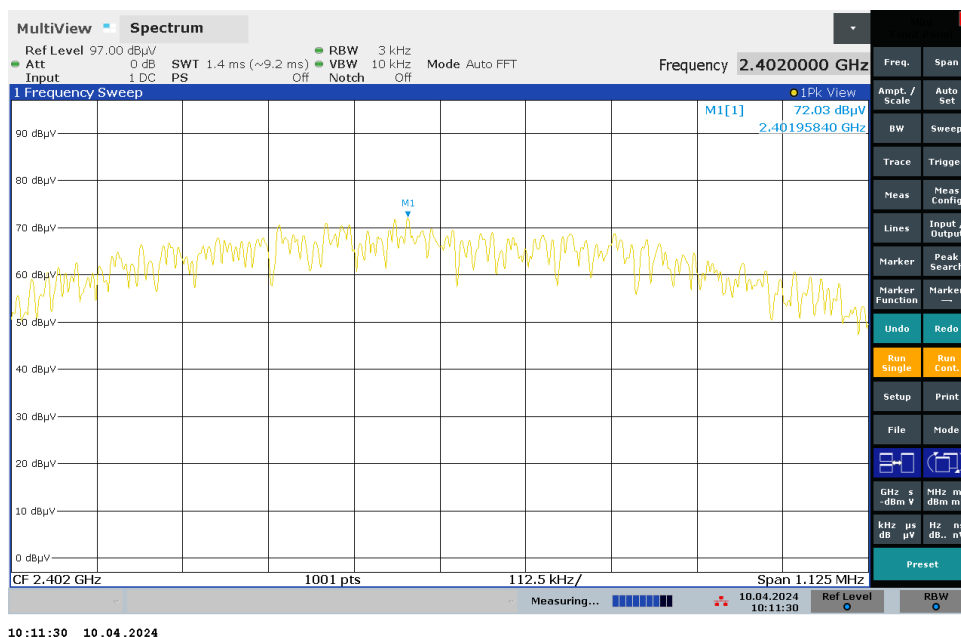


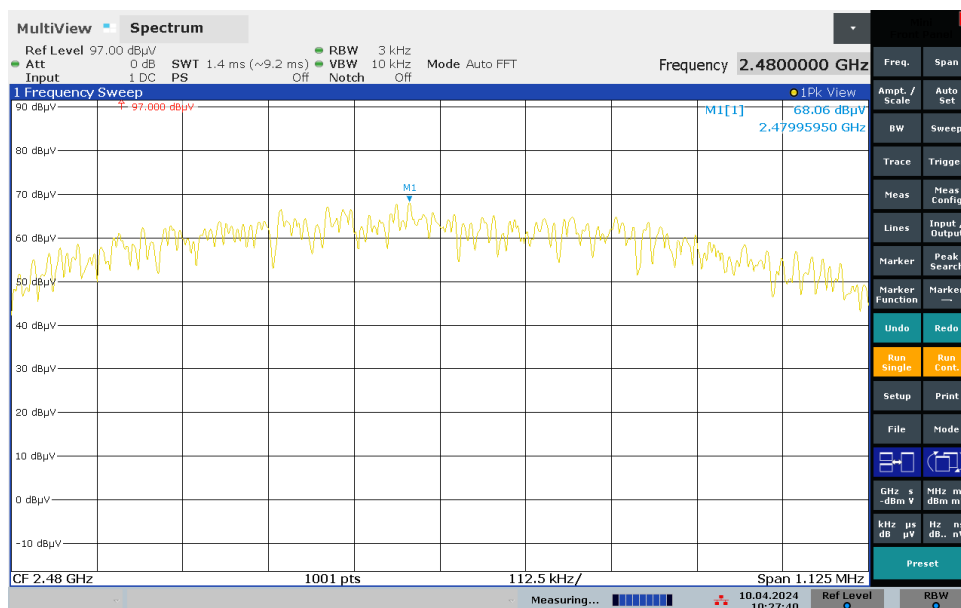
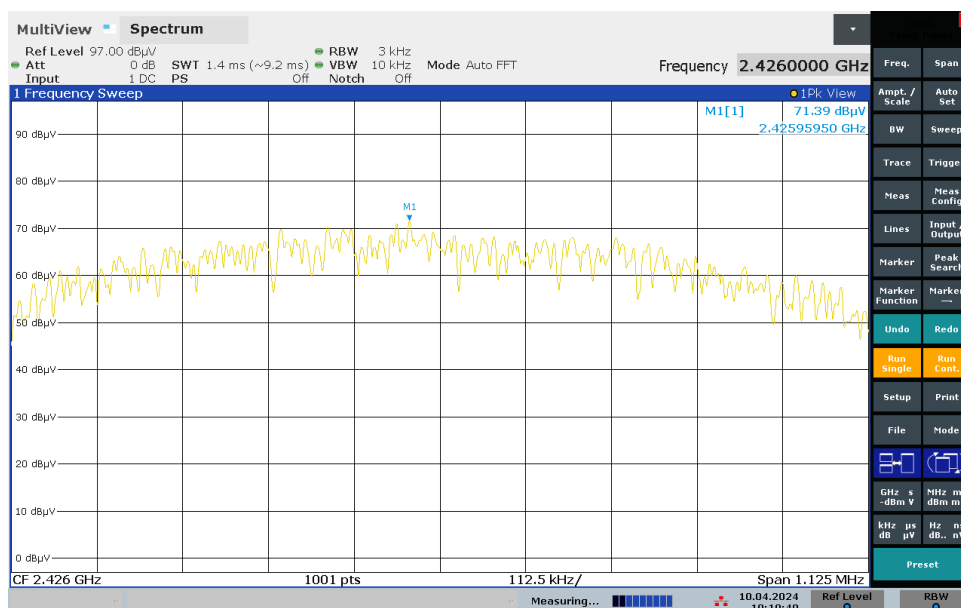
Sensor alone

Frequency	Polarization of test antenna	Azimuth (°)	Antenna height (cm)
2402 MHz	Horizontal	0	150
2426 MHz	Vertical	270	200
2480 MHz	Horizontal	185	150

E.U.T. mode	Frequency	Electro-magnetic field (dBμV/m)	TP* (dBm)	Limit (dBm)
DTS mode	2402 MHz	71.9	-25.5	8.0
	2426 MHz	71.3	-26.1	8.0
	2480 MHz	68.4	-29.0	8.0

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





6.4. Additional provisions to the general radiated emissions limitation

Reference standard:	FCC 47 CFR PART 15 : 2023 RSS-247 Issue 2 : 2017
Test method:	§ 15.215 (c) and § 15.247 d) of FCC 47 CFR PART 15 : 2023 § 5.5 of RSS-247 Issue 2 : 2017
General test setup: E.U.T. is set on an insulating support at 150 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	21.0°C
Relative Humidity	10 to 90 %	40.6%
Atmospheric pressure	N/A	1030 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
Category	Manufacturer	Type	Order Nr	Last validity date	Next validity date
Amplifier	HP	8449B	16922	09/05/2023	09/07/2024
Antenna	Emco	3115	0941	01/03/2022	01/05/2025
Cable	Câbles et Connectiques	N-2m	2451	29/08/2022	29/10/2024
Cable	C&C	N-5m	11184	22/06/2023	22/08/2024
Cable	C&C	N-4m	14226	26/06/2023	26/08/2024
Cable	Huber + Suhner	N-6m	17269	29/08/2022	29/10/2024
Receiver	Rohde & Schwarz	ESW44	17058	15/06/2023	15/08/2024
Shielded enclosure	Comtest	SAC 3m	14622	27/04/2022	27/06/2025

Blank cells = Permanent validity

Band Edge measurement :

For Sensor + Station

Polarization of test antenna: Horizontal (height = 150 cm) } For 2402 MHz
Position of equipment: azimuth = 60°

Polarization of test antenna: Horizontal (height = 120 cm) } For 2480 MHz
Position of equipment: azimuth = 0°

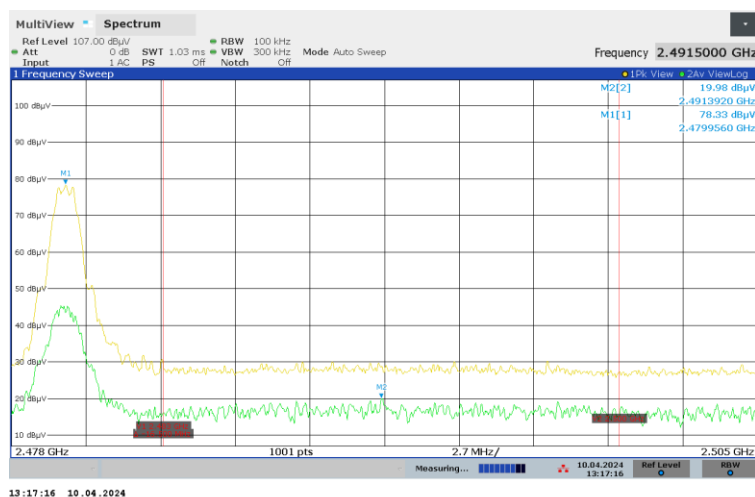
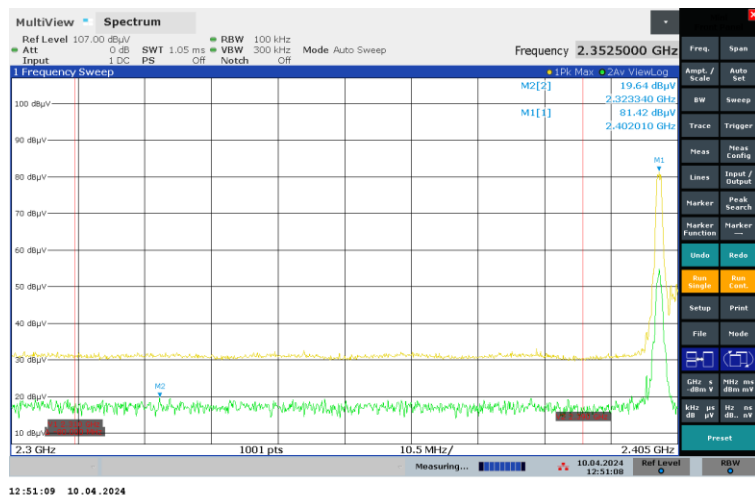
For Sensor alone

Polarization of test antenna: Horizontal (height = 150 cm) } For 2402 MHz
Position of equipment: azimuth = 0°

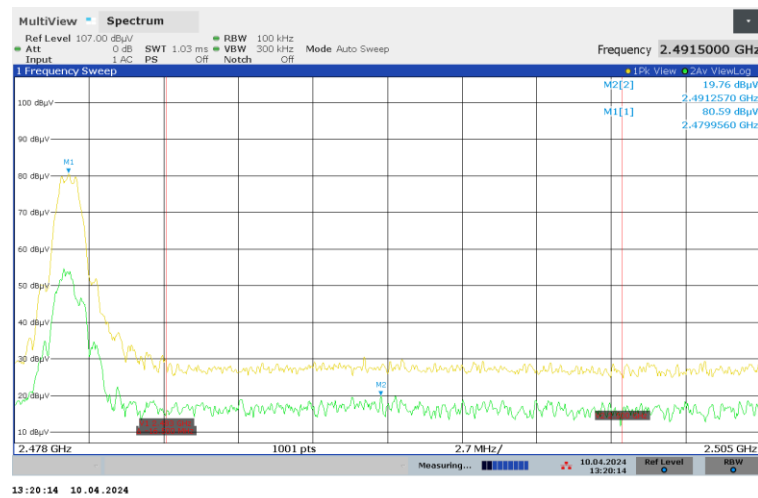
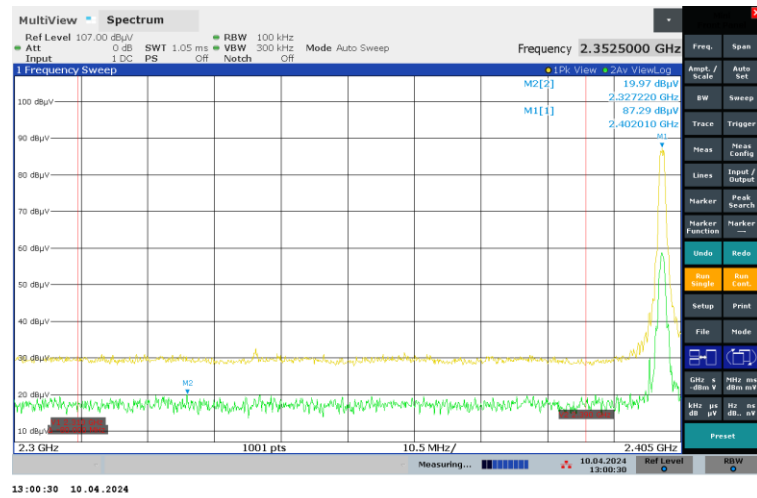
Polarization of test antenna: Horizontal (height = 150 cm) } For 2480 MHz
Position of equipment: azimuth = 185°

E.U.T.	Frequency (MHz)	Field Strength Level of fundamental (dBμV/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Calculated Max Out of Band Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Sensor + Station	2401.96	89.7	Average	2338.9	41.5	54	12.5
	2480.08	91.3	Average	2488.2	41.9	54	12.1
Sensor alone	2401.96	102.4	Average	2338.0	41.1	54	12.9
	2480.02	102.3	Average	2484.4	42.1	54	11.9

For Sensor + Station



For Sensor alone



6.5. Conducted emission (measurement)

Reference standard:	FCC 47 CFR PART 15 : 2023 RSS-Gen Issue 5 : 2019
Test method:	§ 15.207 and § 15.247 of FCC 47 CFR PART 15 : 2023 § 8.8 of RSS-Gen Issue 5 : 2019
General test setup: E.U.T is set on an insulating support at 80 cm from the ground reference plane. All power are connected to the system through Artificial Mains Network (AMN). The AMN is placed at 80 cm from the boundary of the E.U.T and bonded to a ground reference plane. All tested telecommunications lines (if applicable) are connected to an Asymmetric Artificial Network (AAN) and conducted voltage measurements on telecommunications lines are made at the output of the AAN. Where an AAN is not appropriate or available, measurements are made using a Capacitive Voltage Probe and/or a Current probe. Additional ground terminals (if any) are connected to earth terminal of the AMN.	

TESTED CABLE	PARAMETER	RESULT TAB.	VERDICT
120Vac/60Hz Power Supply	150kHz-30MHz	EMI4690	-
120Vac/60Hz Power Supply (Average value)	150kHz-30MHz	EMI4691	PASS

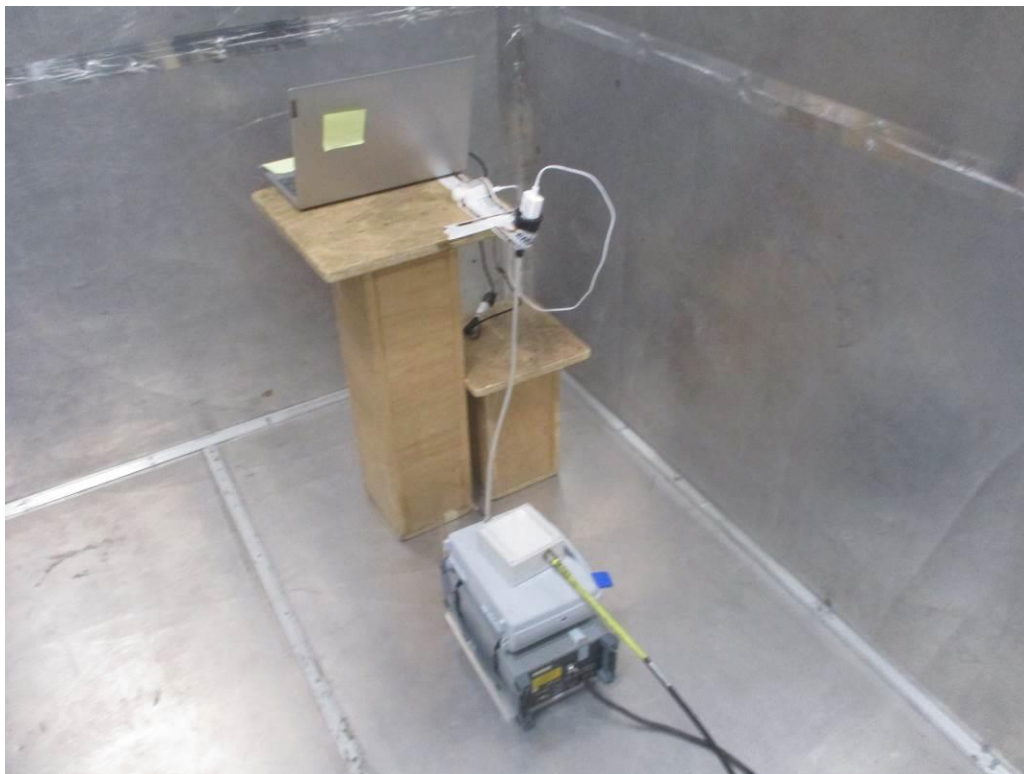
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	See Graph(s)
Relative Humidity	30 to 60 %	See Graph(s)
Atmospheric pressure	N/A	See Graph(s)
Test method deviation: No		
Supplementary information: -		

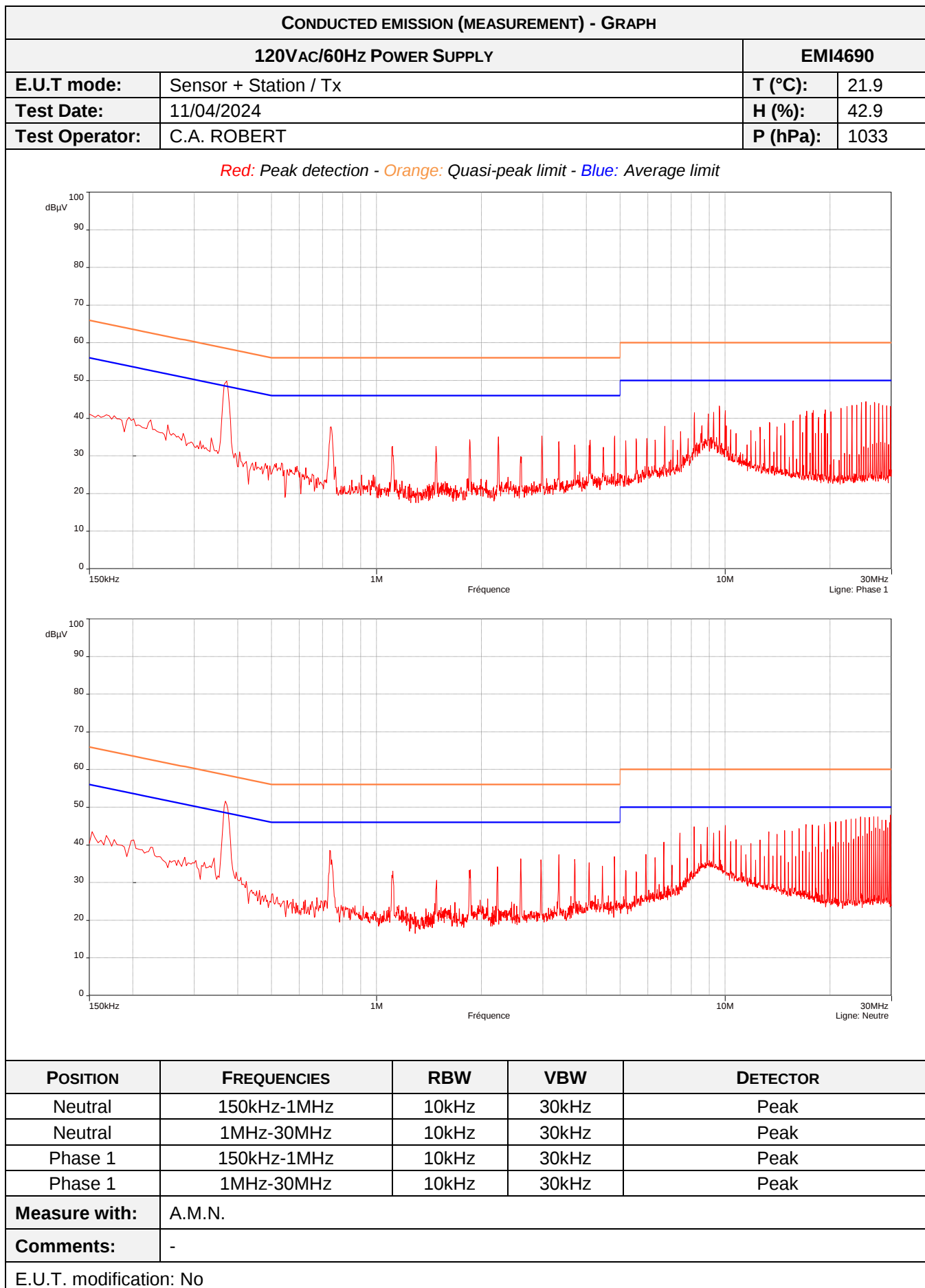
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Cable	/	N-2m	2816	20/05/2024	20/07/2026
Cable	C&C	BNC-0.5m	16508	10/03/2023	10/05/2025
LISN	Rohde & Schwarz	ESH3-Z5	6602	29/01/2024	29/03/2026
Multimeter	Emitech	Absorbeur courant de gaine	10656	12/01/2024	12/03/2026
Power supply	SECAS	CF1000 50/60	2102		
Receiver	Rohde & Schwarz	ESW44	17058	15/06/2023	15/08/2024
Shielded enclosure	Comtest	FAR 3m	14804	28/09/2021	28/11/2024
Software	Nexio	BAT EMC	0000		
Surges Suppressor	Com-Power	LIT-930A	16924	15/03/2024	15/05/2025

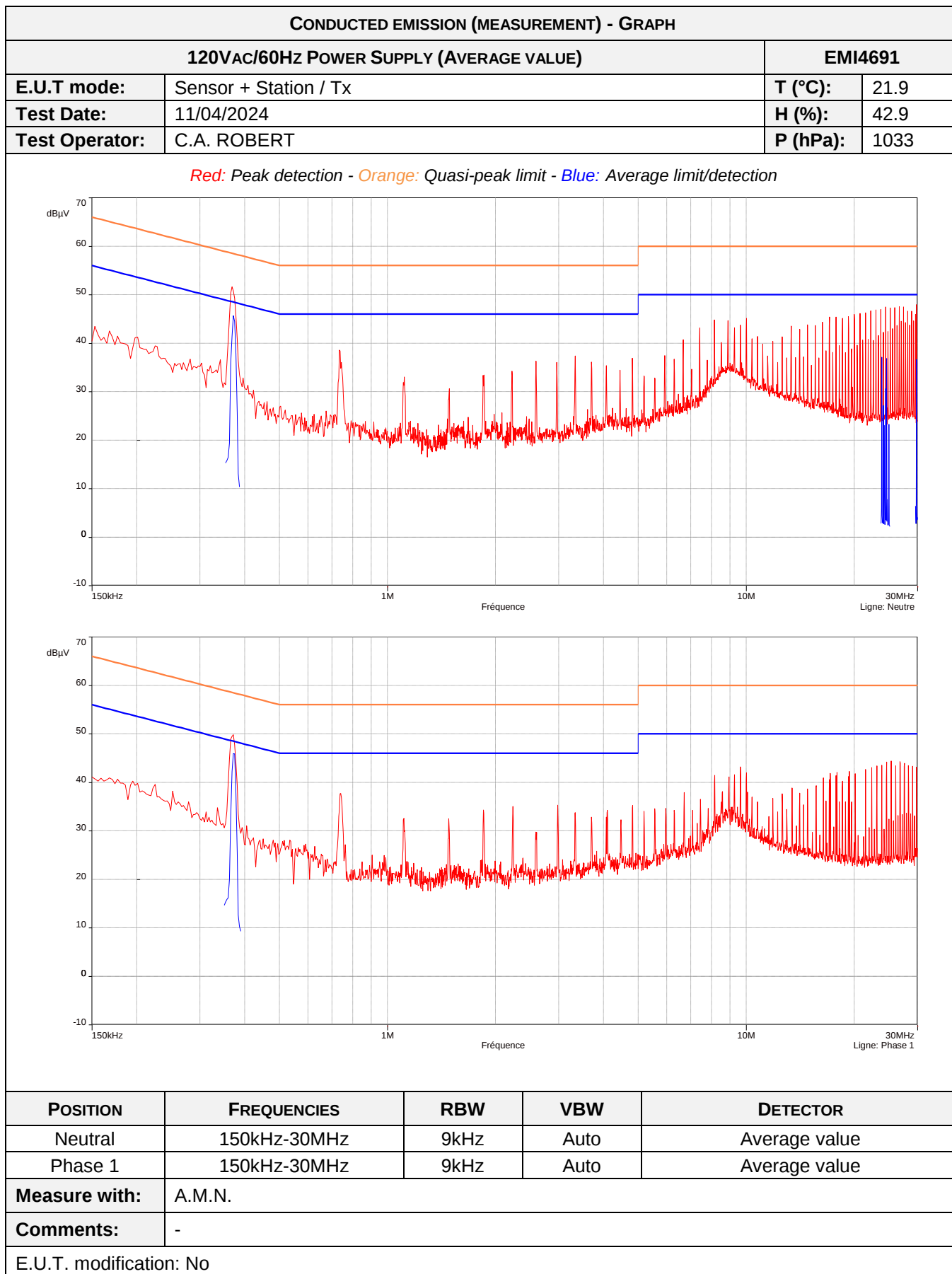
BAT-EMC software version: V3.18.0.26

Blank cells = Permanent validity

TEST SETUP PHOTO - 120VAC/60Hz POWER SUPPLY







6.6. Unintentional radiated emissions and transmitter unwanted emission in the band 9 kHz – 26 GHz

Reference standard:	FCC 47 CFR PART 15 : 2023 RSS-Gen Issue 5 : 2019
Test method:	§ 15.205; § 15.209 and § 15.247 of FCC 47 CFR PART 15 : 2023 § 6.13 of RSS-Gen Issue 5 : 2019
General test setup: E.U.T. is set on an insulating support at 0.8 m (<1GHz) and 1.5 m (>1GHz) above the ground reference plane. <u>Bandwidth 150kHz-30MHz:</u> Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter. The E.U.T was rotated 360° about its azimuth with the receive antenna oriented in 3 axes (0°, 45° and 90°). Final measurements (quasi-peak) were then performed. All frequencies were investigated, where applicable. <u>Bandwidth 30MHz-26GHz:</u> First (peak) measurements were performed at an antenna to E.U.T separation distance of 3-meter. The E.U.T was rotated 360° about its azimuth with the receive antenna located in horizontal and vertical polarities and at various heights. Final measurements (quasi-peak) were then performed. The E.U.T was rotated 360° about its azimuth and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarization, where applicable.	

TESTED CONFIGURATION	PARAMETER	VERDICT
Maxhold 360° - Tx 2402 MHz channel - Sensor + Station	9kHz-30MHz	PASS
Maxhold 360° - Tx 2426 MHz channel - Sensor + Station	9kHz-30MHz	PASS
Maxhold 360° - Tx 2480 MHz channel - Sensor + Station	9kHz-30MHz	PASS
Maxhold 360° - Tx 2402 MHz channel - Sensor alone	9kHz-30MHz	PASS
Maxhold 360° - Tx 2426 MHz channel - Sensor alone	9kHz-30MHz	PASS
Maxhold 360° - Tx 2480 MHz channel - Sensor alone	9kHz-30MHz	PASS
Maxhold 360° - Tx 2402 MHz channel - Sensor + Station	30MHz-1GHz	PASS
Maxhold 360° - Tx 2426 MHz channel - Sensor + Station	30MHz-1GHz	PASS
Maxhold 360° - Tx 2480 MHz channel - Sensor + Station	30MHz-1GHz	PASS
Maxhold 360° - Tx 2402 MHz channel - Sensor alone	30MHz-1GHz	PASS
Maxhold 360° - Tx 2426 MHz channel - Sensor alone	30MHz-1GHz	PASS
Maxhold 360° - Tx 2480 MHz channel - Sensor alone	30MHz-1GHz	PASS
Maxhold 360° - Tx 2402 MHz channel - Sensor + Station	1GHz-26GHz	PASS
Maxhold 360° - Tx 2426 MHz channel - Sensor + Station	1GHz-26GHz	PASS
Maxhold 360° - Tx 2480 MHz channel - Sensor + Station	1GHz-26GHz	PASS
Maxhold 360° - Tx 2402 MHz channel - Sensor alone	1GHz-26GHz	PASS
Maxhold 360° - Tx 2426 MHz channel - Sensor alone	1GHz-26GHz	PASS
Maxhold 360° - Tx 2480 MHz channel - Sensor alone	1GHz-26GHz	PASS

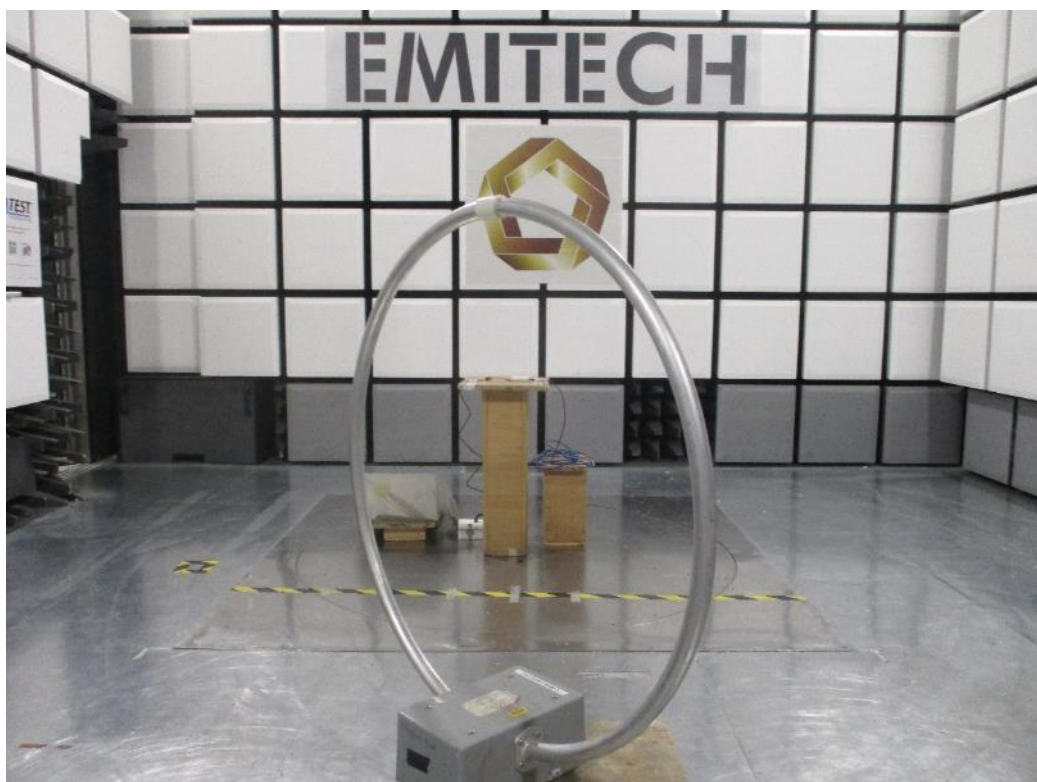
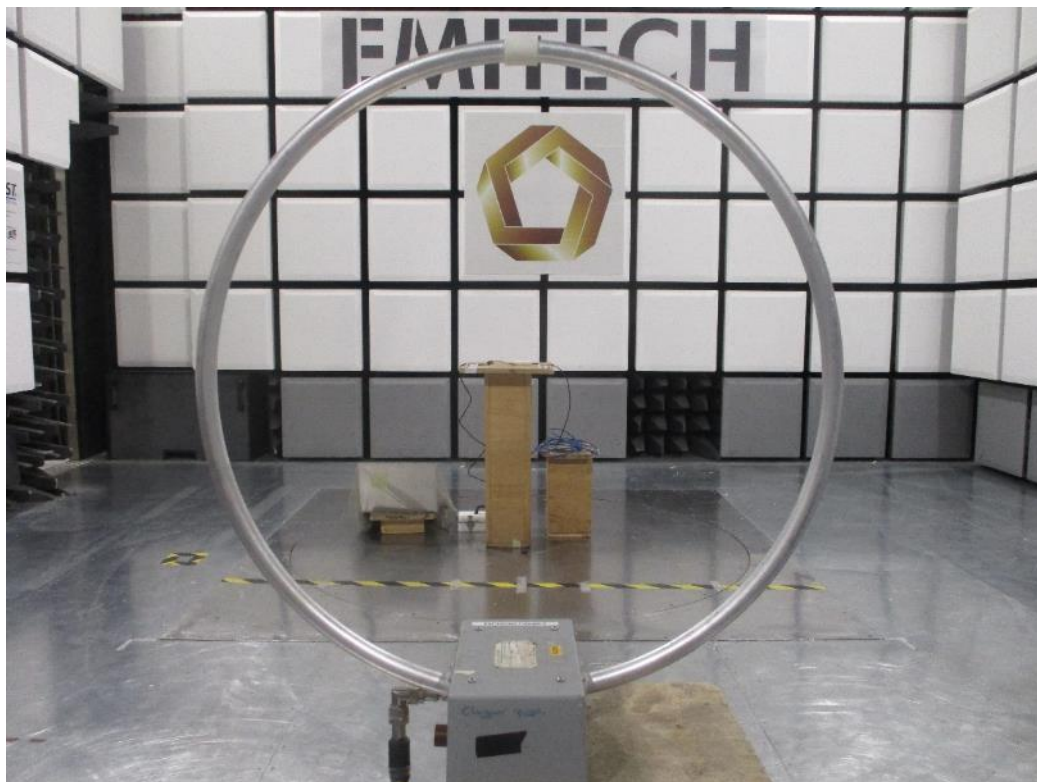
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	21.6°C
Relative Humidity	10 to 90 %	46.2%
Atmospheric pressure	N/A	1030 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Amplifier	Mini-circuit	ZFL-1000N	5023	31/01/2024	31/03/2025
Amplifier	HP	8449B	14524	16/02/2023	16/04/2024
Antenna	Rohde & Schwarz	HK116	0293	30/09/2021	30/11/2024
Antenna	Oritel	CM 42/25	1045	01/03/2022	01/05/2025
Antenna	Schwarzbeck	UHALP 9108A	3106	25/04/2023	25/06/2025
Antenna	Emco	3115	3374	02/05/2022	02/07/2025
Antenna	Emco	6502	9579	13/01/2023	13/03/2025
Cable	Câbles et Connectiques	N-2m	2451	29/08/2022	29/10/2024
Cable	C&C	K-2m	11132	23/09/2022	23/11/2024
Cable	C&C	K-4m	11134	23/09/2022	23/11/2024
Cable	C&C	N-5m	11184	22/06/2023	22/08/2024
Cable	C&C	N-4m	14226	26/06/2023	26/08/2024
Cable	Huber + Suhner	N-6m	17269	29/08/2022	29/10/2024
Filter	Micro-Tronics	HPM 14758	4692	01/09/2022	01/11/2025
Receiver	Rohde & Schwarz	ESW44	17058	15/06/2023	15/08/2024
Shielded enclosure	Comtest	SAC 3m	14622	27/04/2022	27/06/2025
Software	Nexio	BAT EMC	0000		
Spectrum analyzer	Rohde & Schwarz	ESR7	12811	22/05/2023	22/07/2024

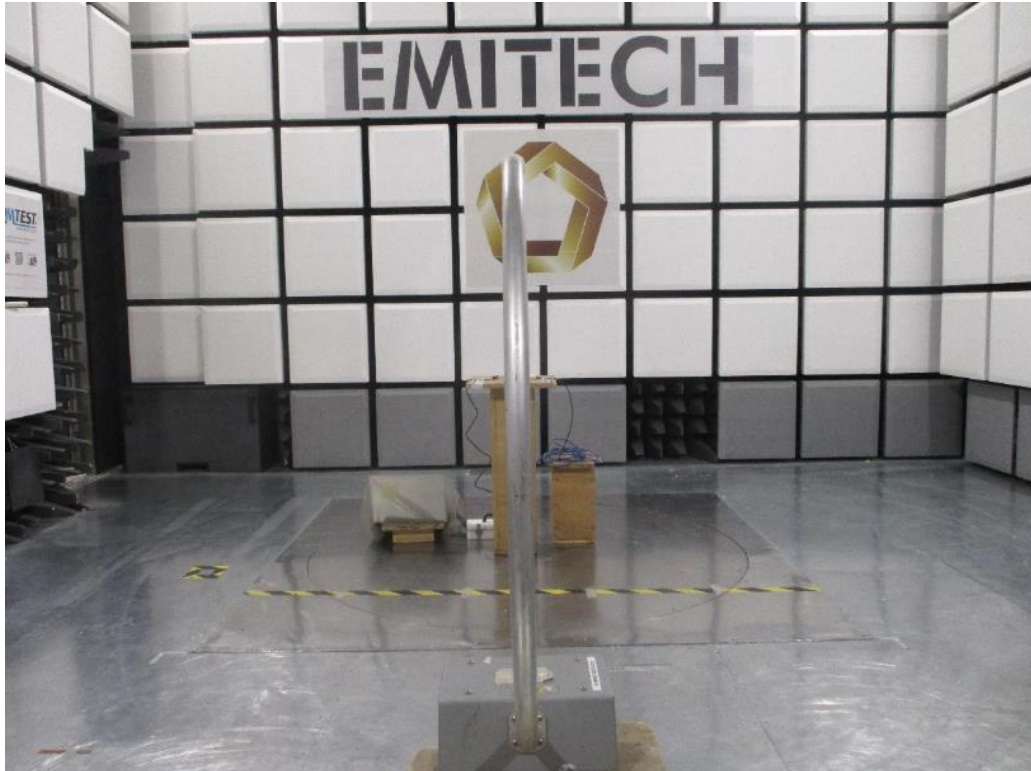
BAT-EMC software version: V3.18.0.26

Blank cells = Permanent validity

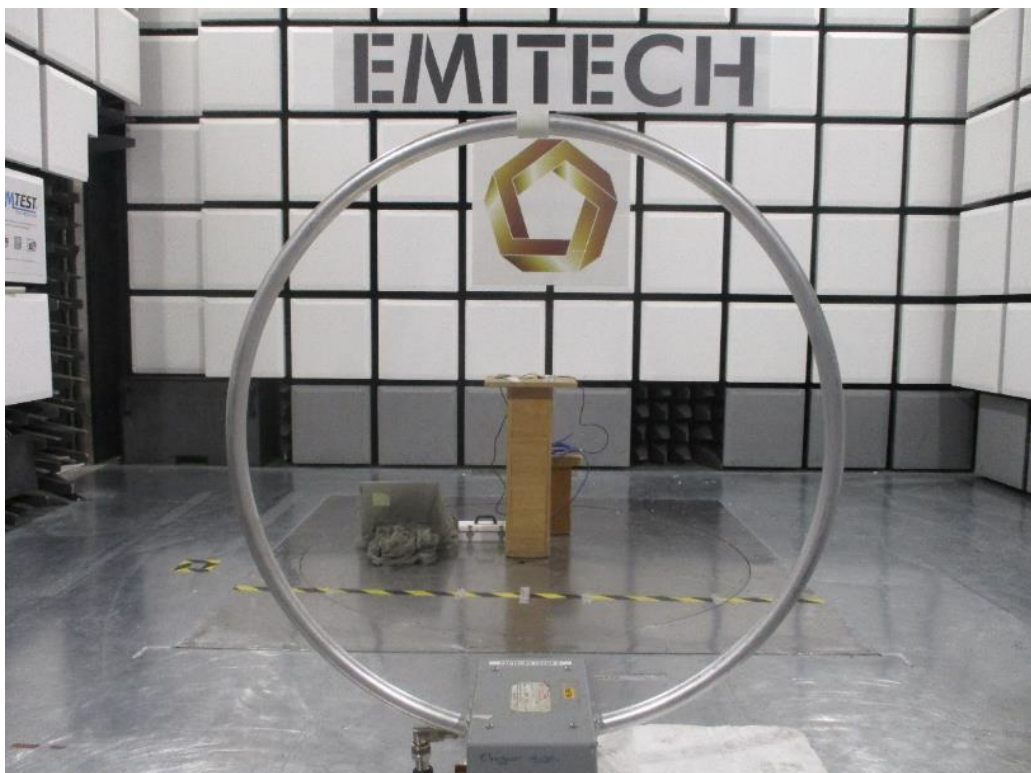
TEST SETUP PHOTOS - SENSOR + STATION
9kHz - 30 MHz



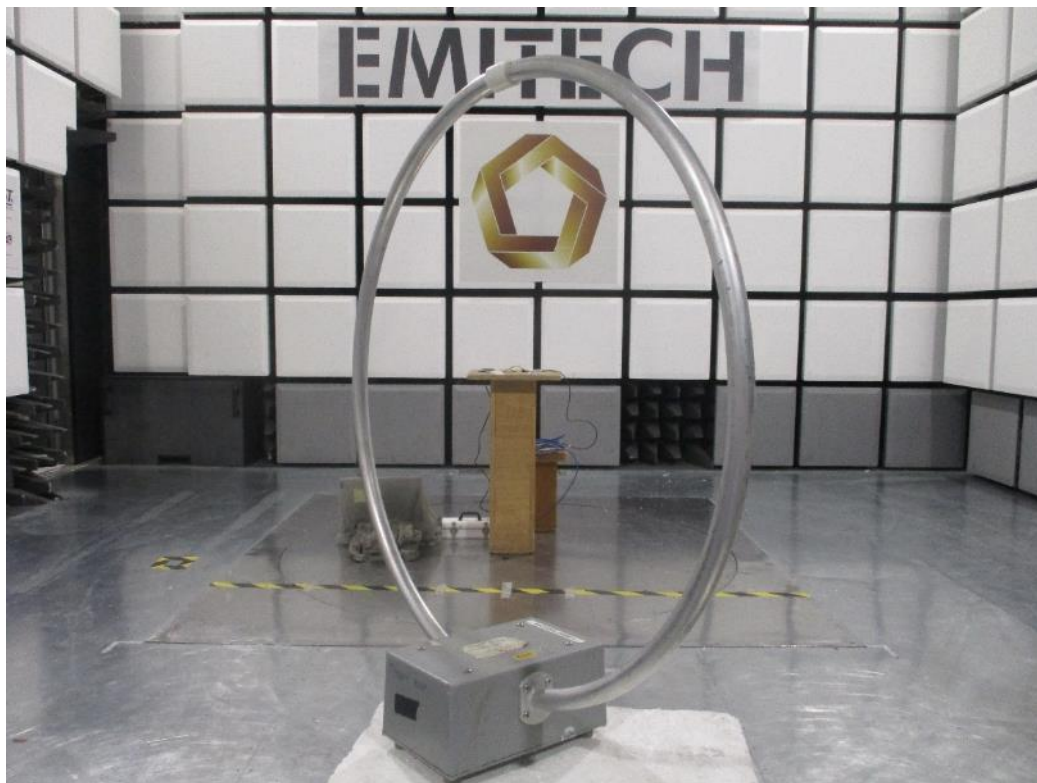
TEST SETUP PHOTOS - SENSOR + STATION
9kHz - 30 MHz



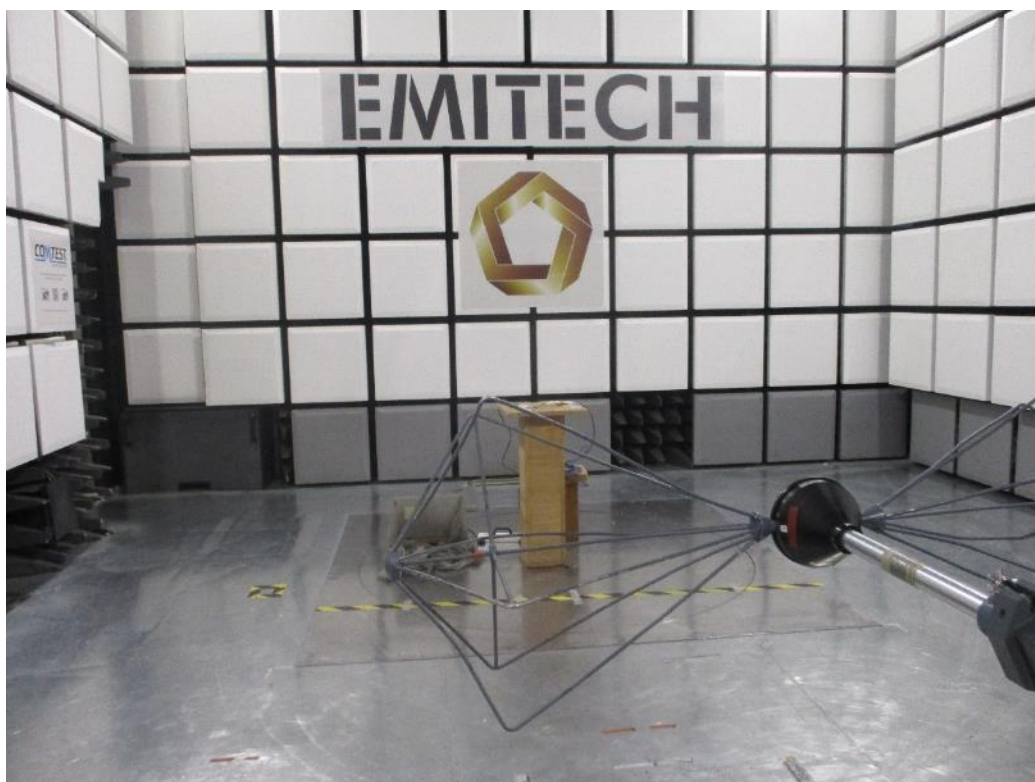
TEST SETUP PHOTOS - SENSOR ALONE
9kHz - 30 MHz



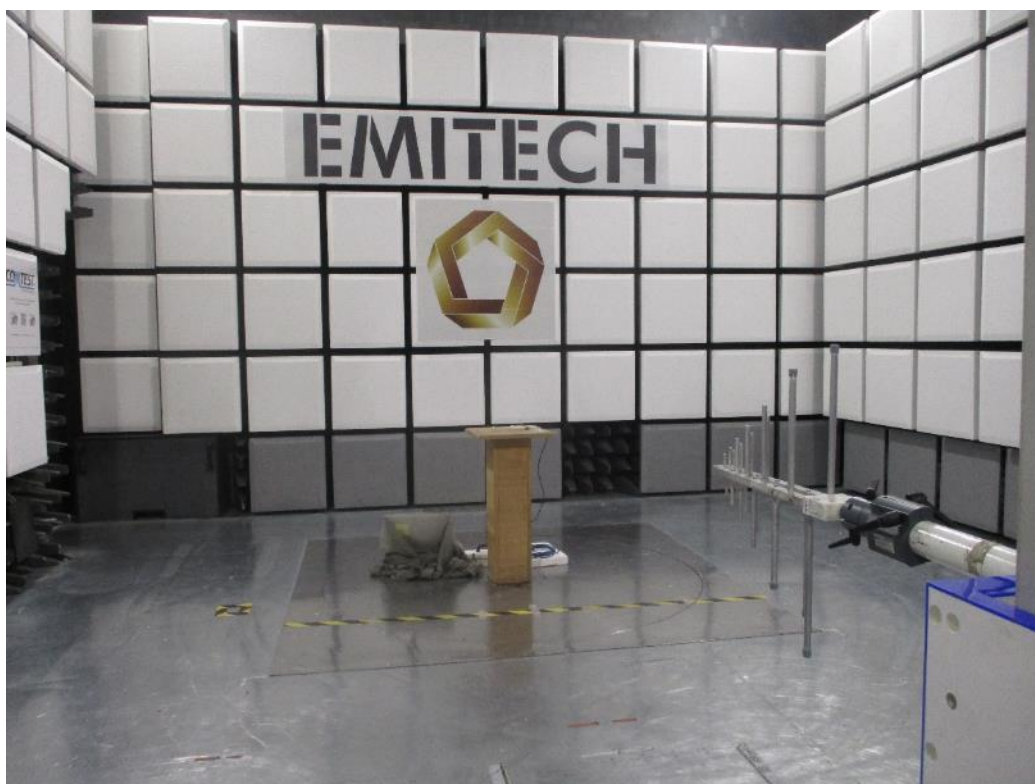
TEST SETUP PHOTOS - SENSOR ALONE
9kHz - 30 MHz



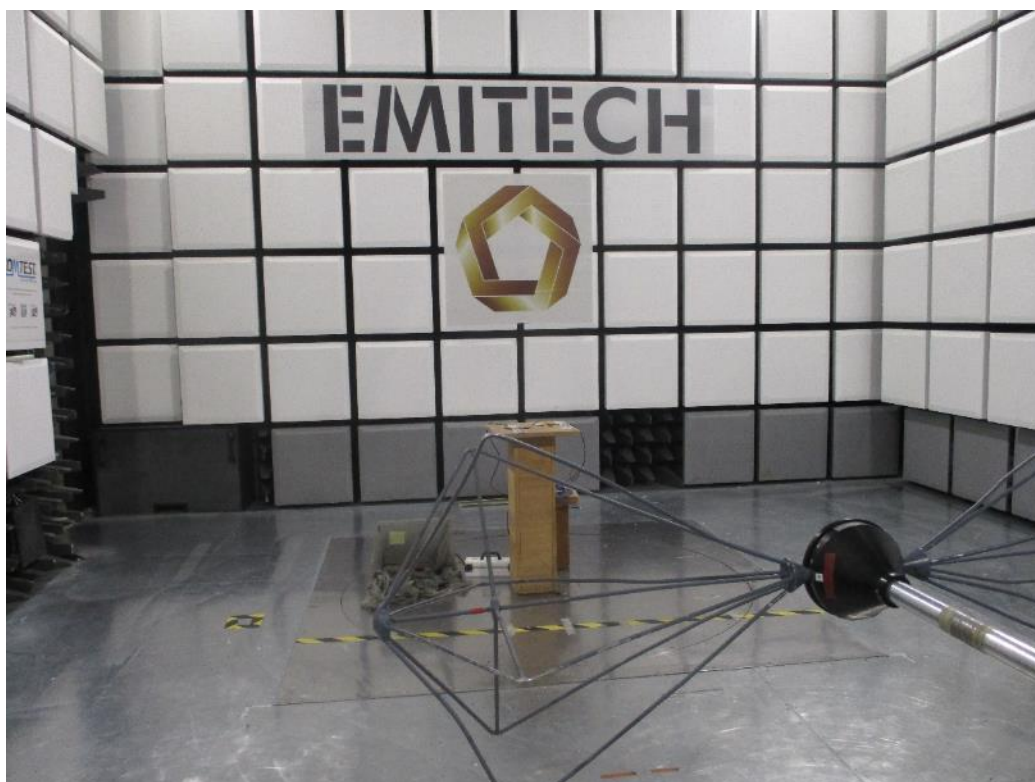
TEST SETUP PHOTOS - SENSOR + STATION
30 MHz - 1 GHz



TEST SETUP PHOTOS - SENSOR + STATION
30 MHz - 1 GHz



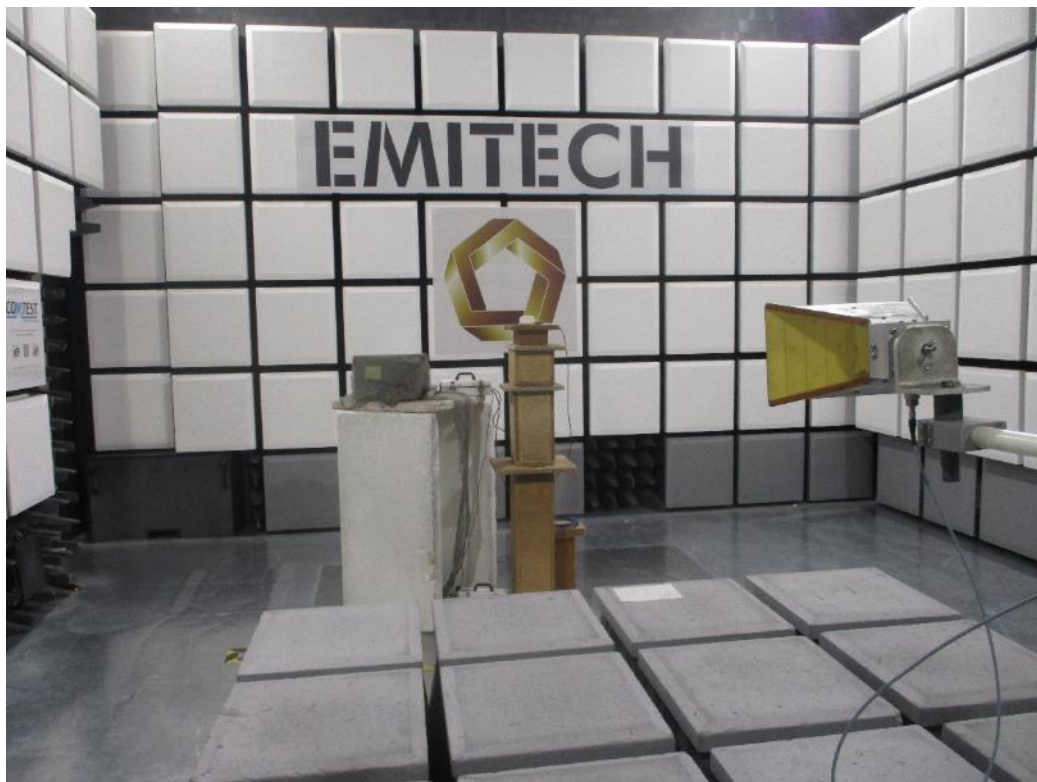
TEST SETUP PHOTOS - SENSOR ALONE
30 MHz - 1 GHz



TEST SETUP PHOTOS - SENSOR ALONE
30 MHz - 1 GHz



TEST SETUP PHOTOS - SENSOR + STATION
1 GHz - 26 GHz



TEST SETUP PHOTOS - SENSOR + STATION
1 GHz - 26 GHz

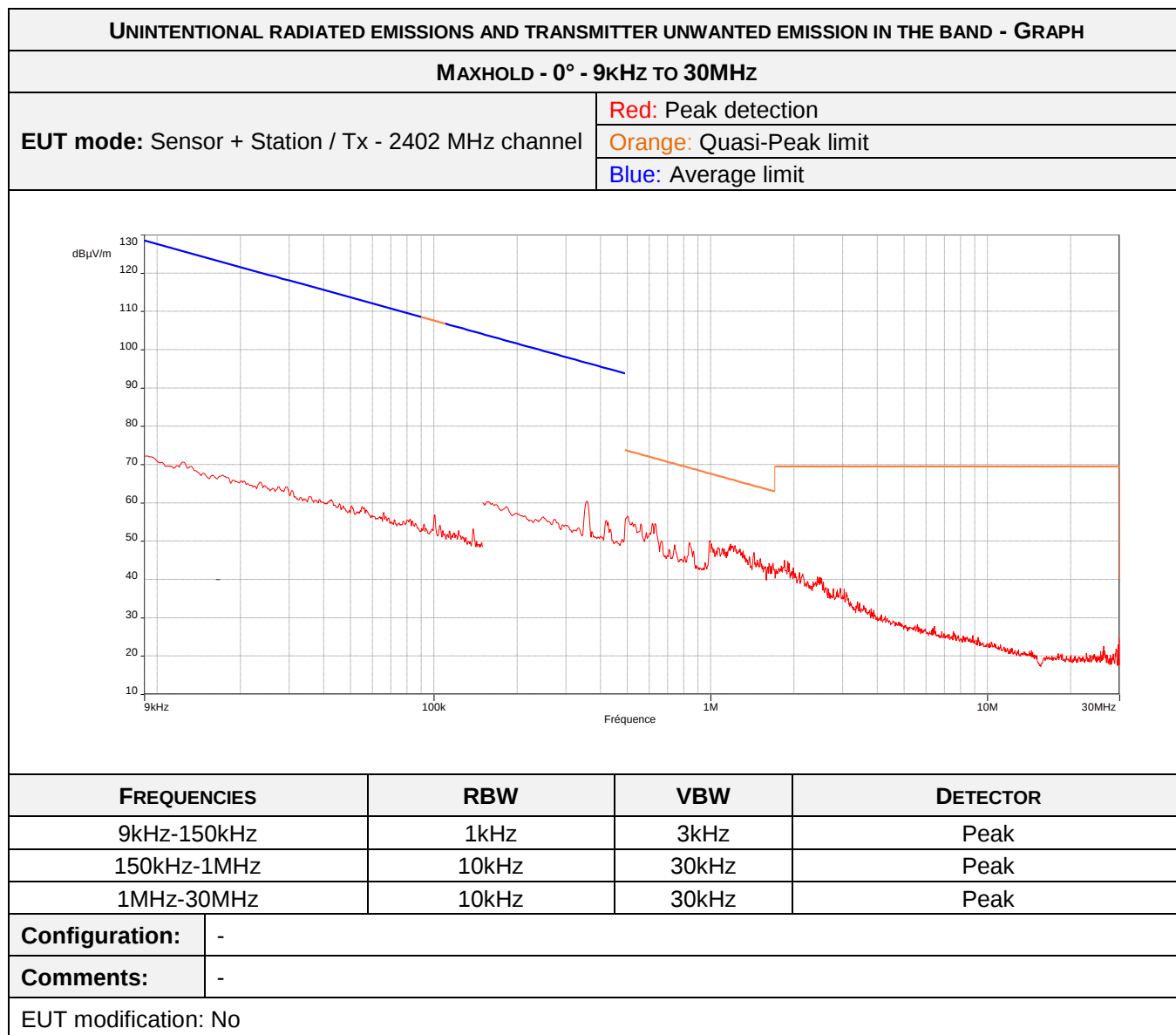


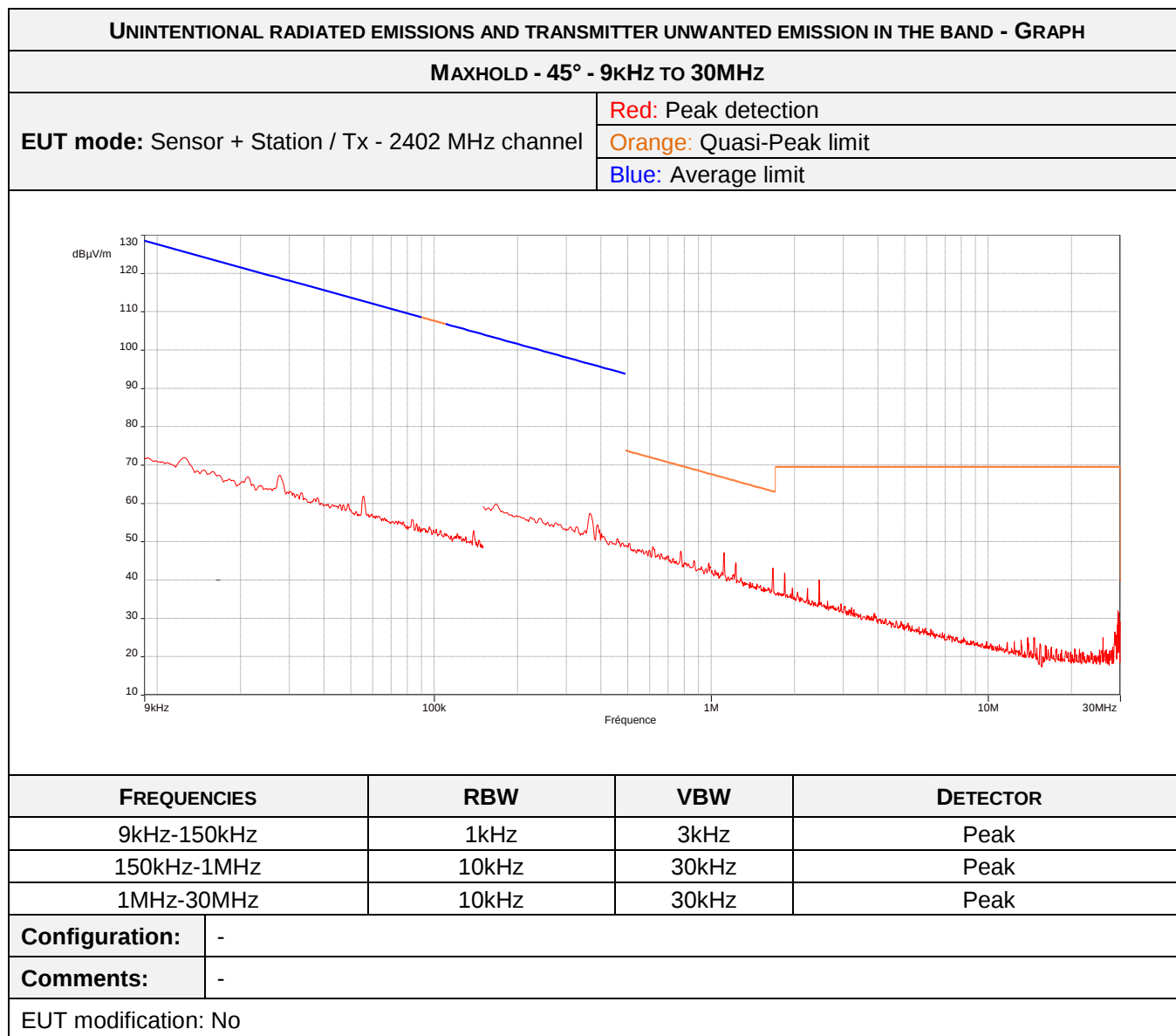
TEST SETUP PHOTOS - SENSOR ALONE
1 GHz - 26 GHz

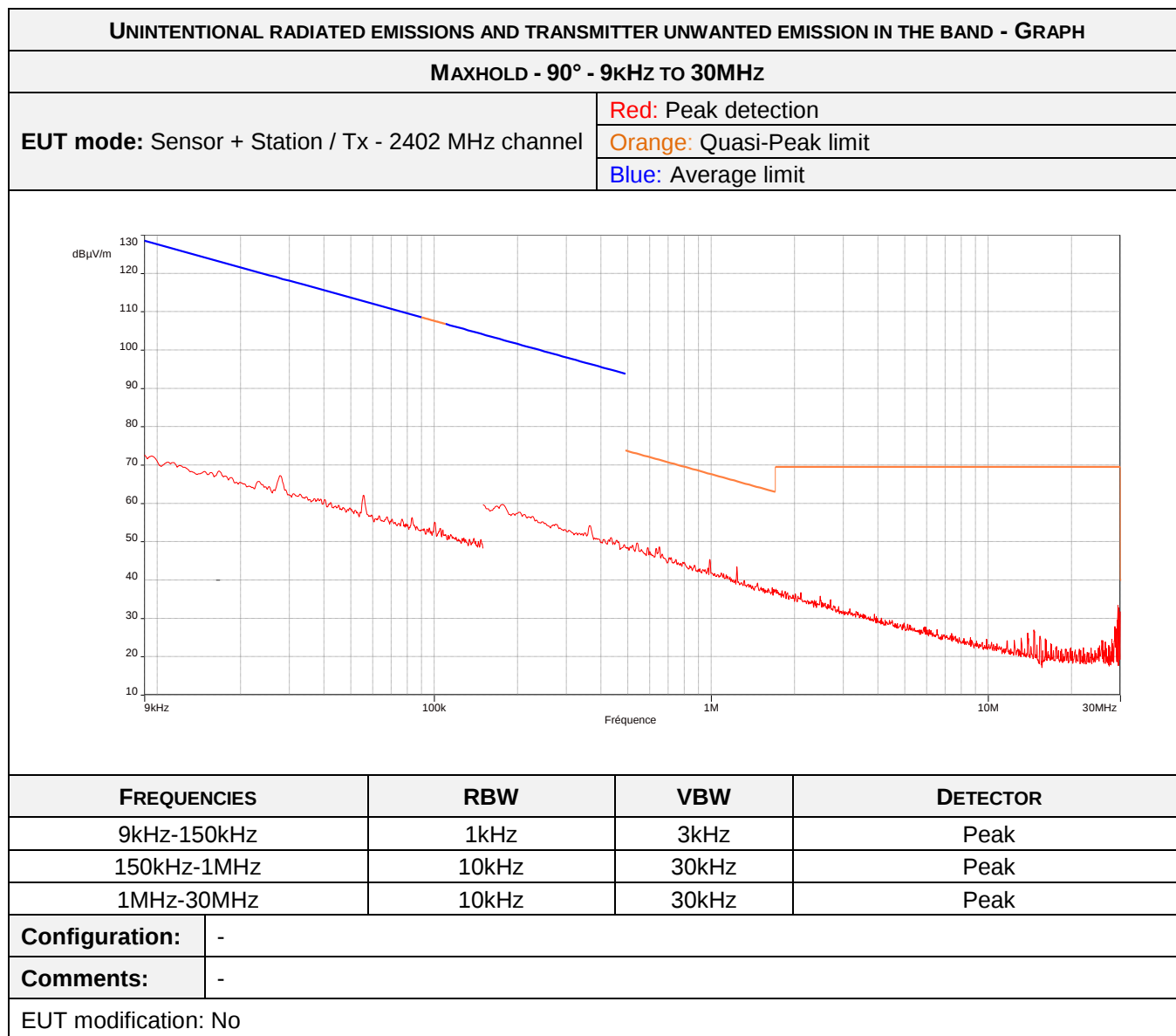


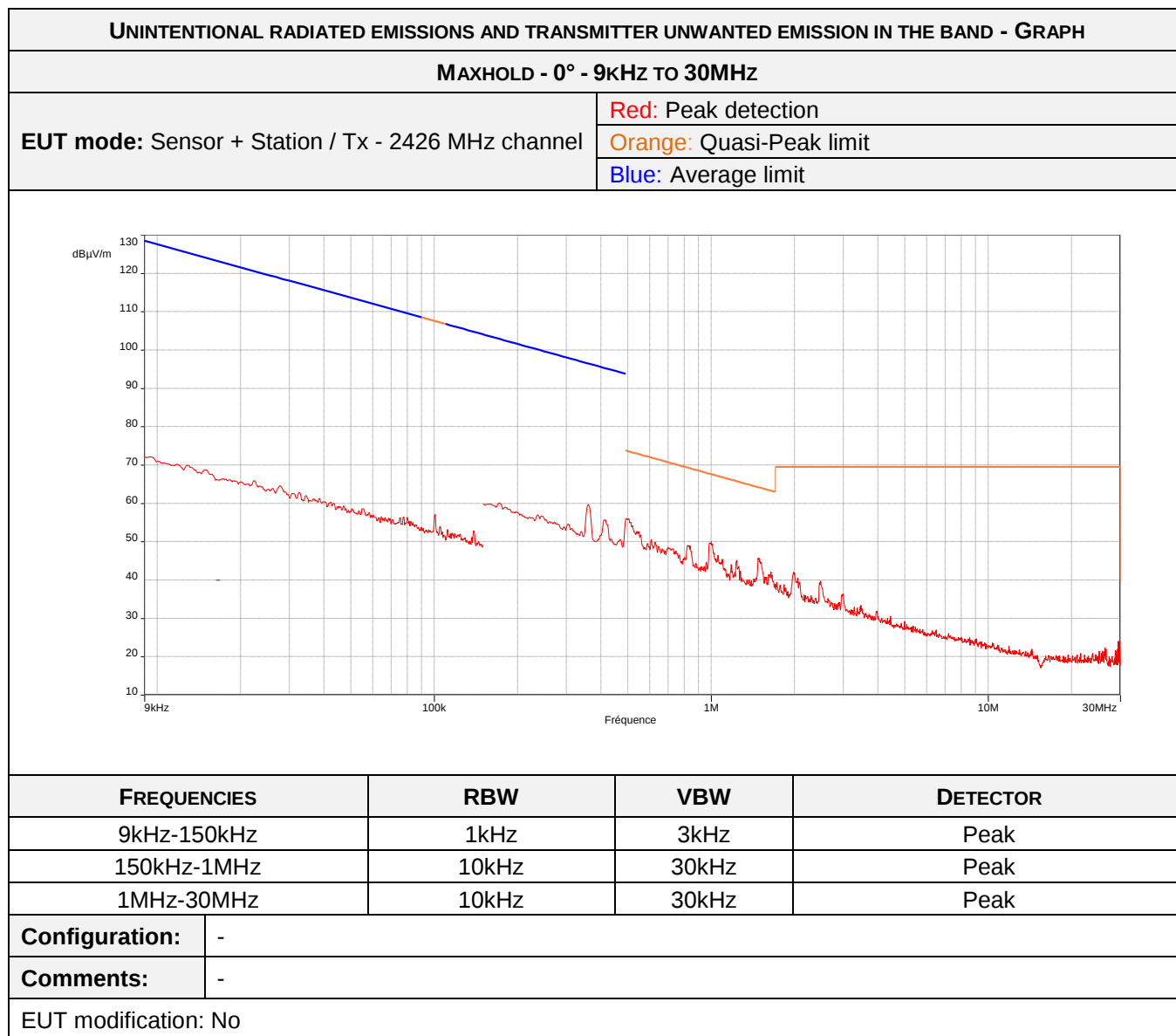
TEST SETUP PHOTOS - SENSOR ALONE
1 GHz - 26 GHz

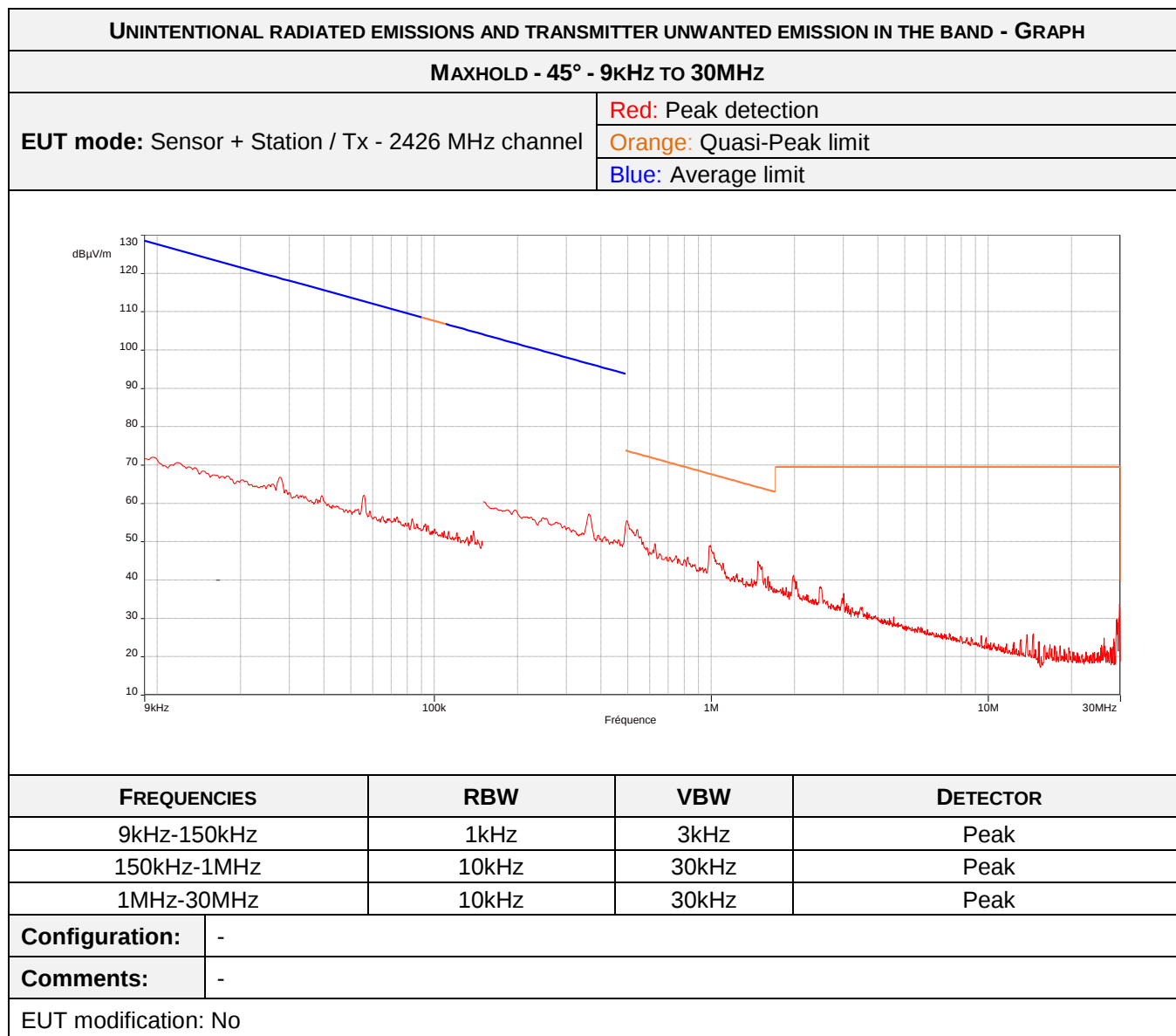


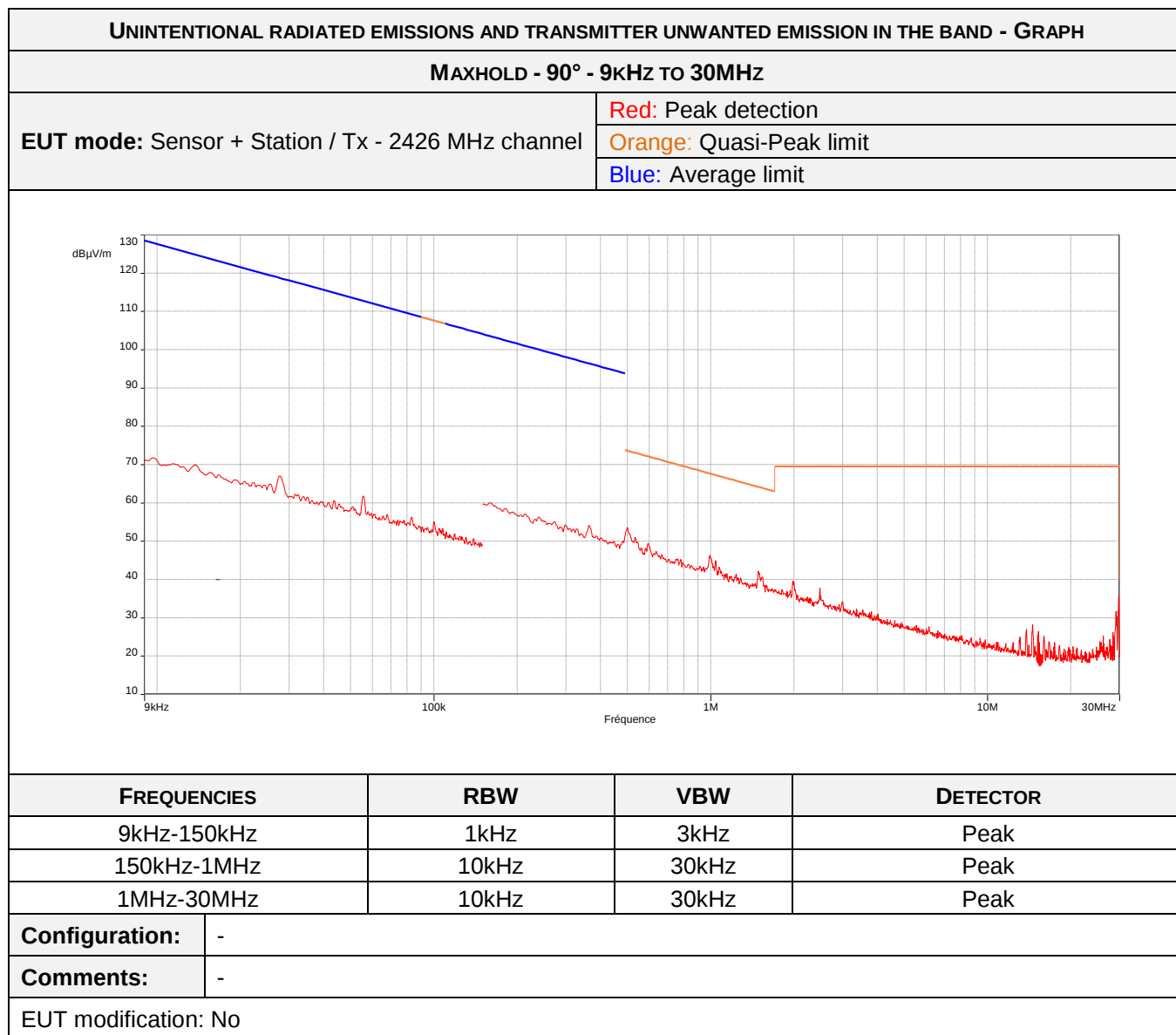


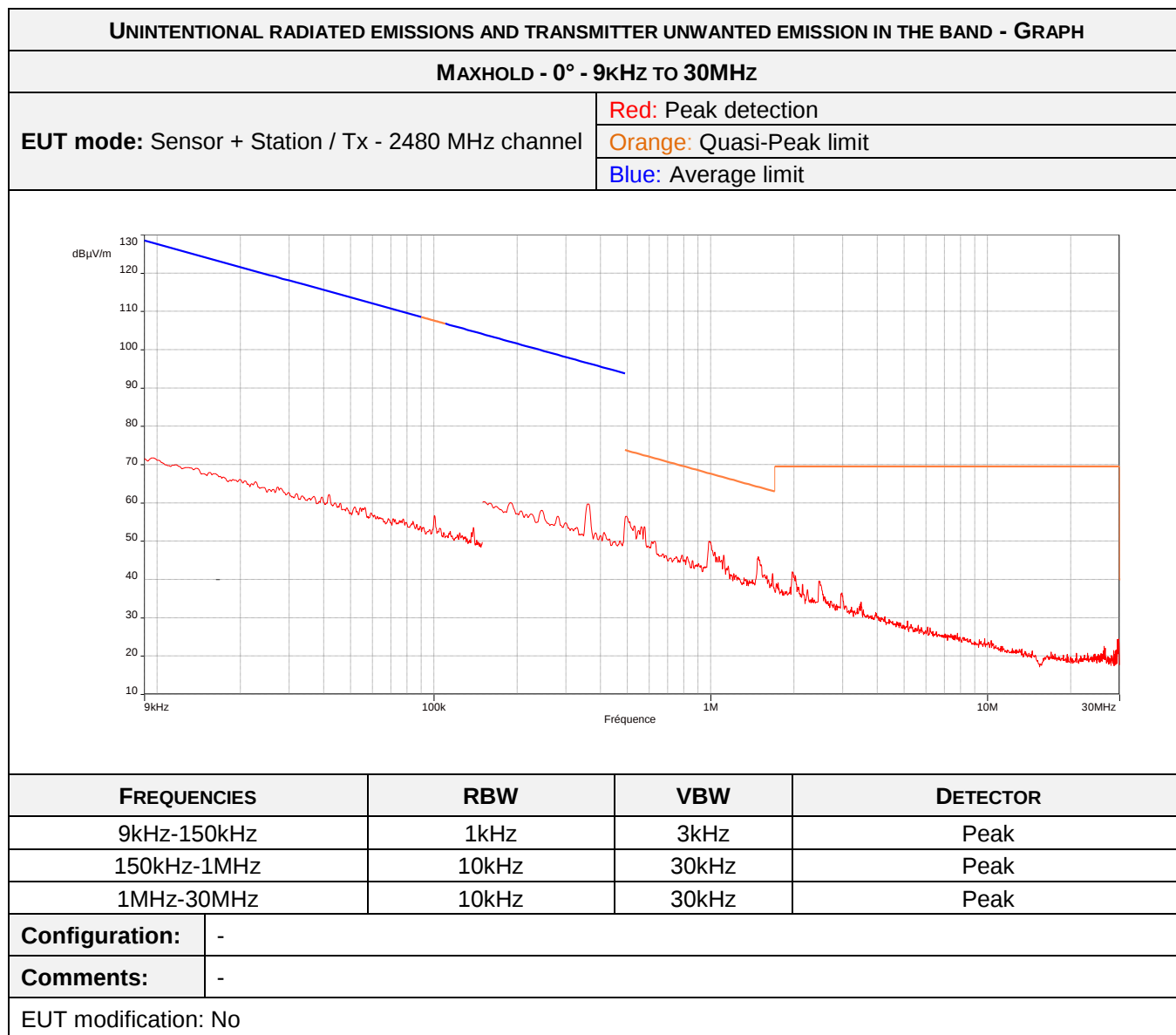


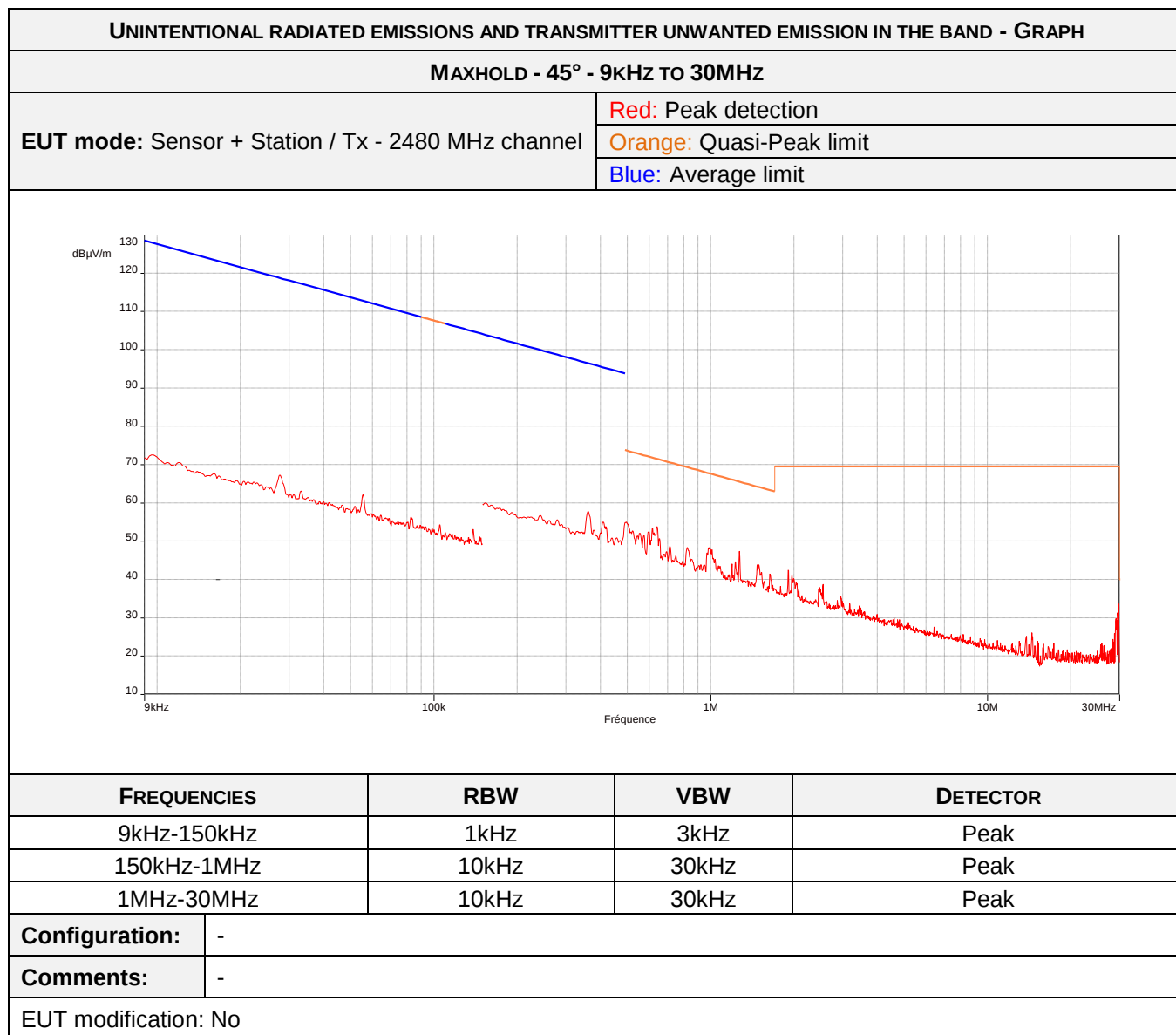


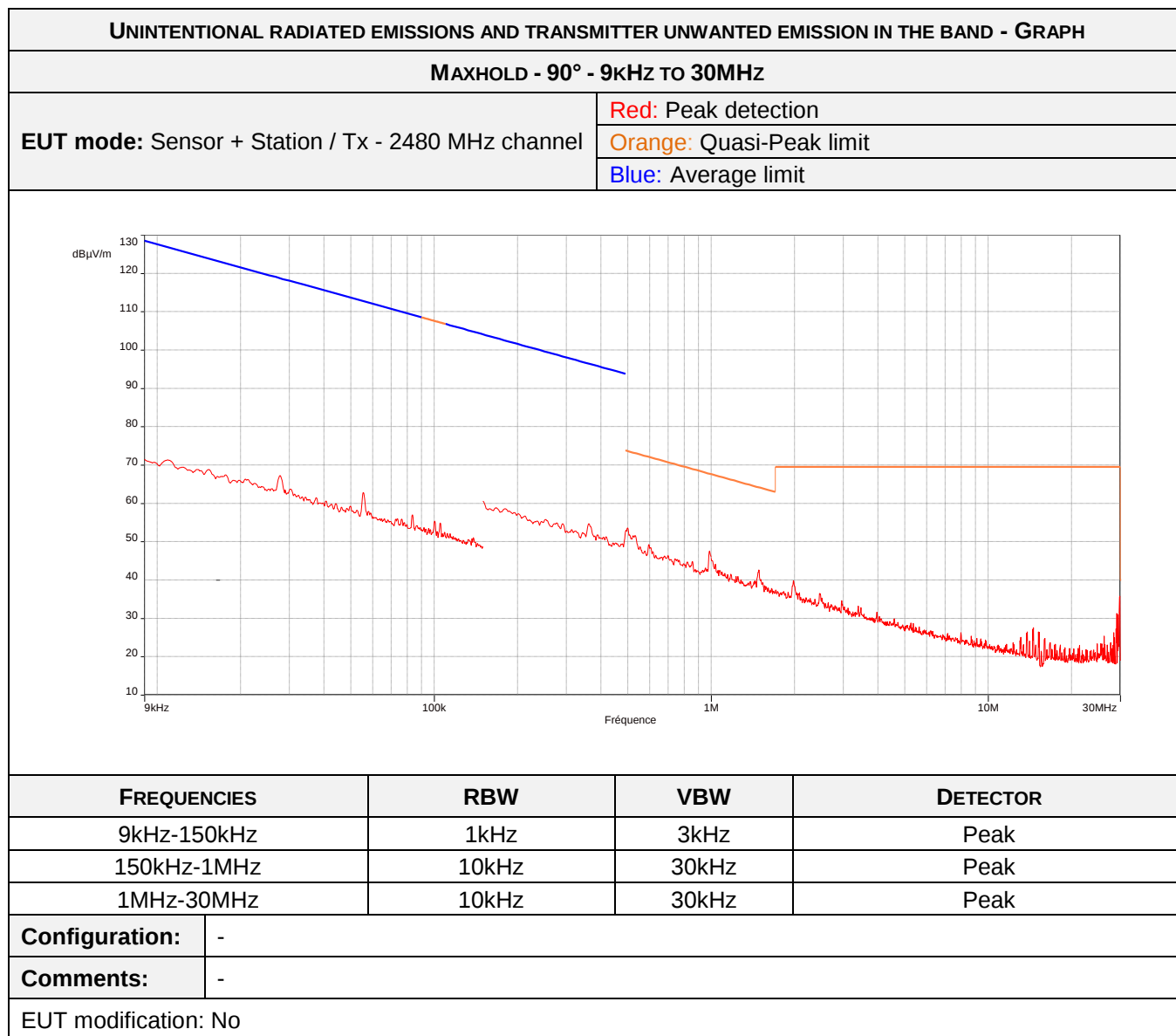


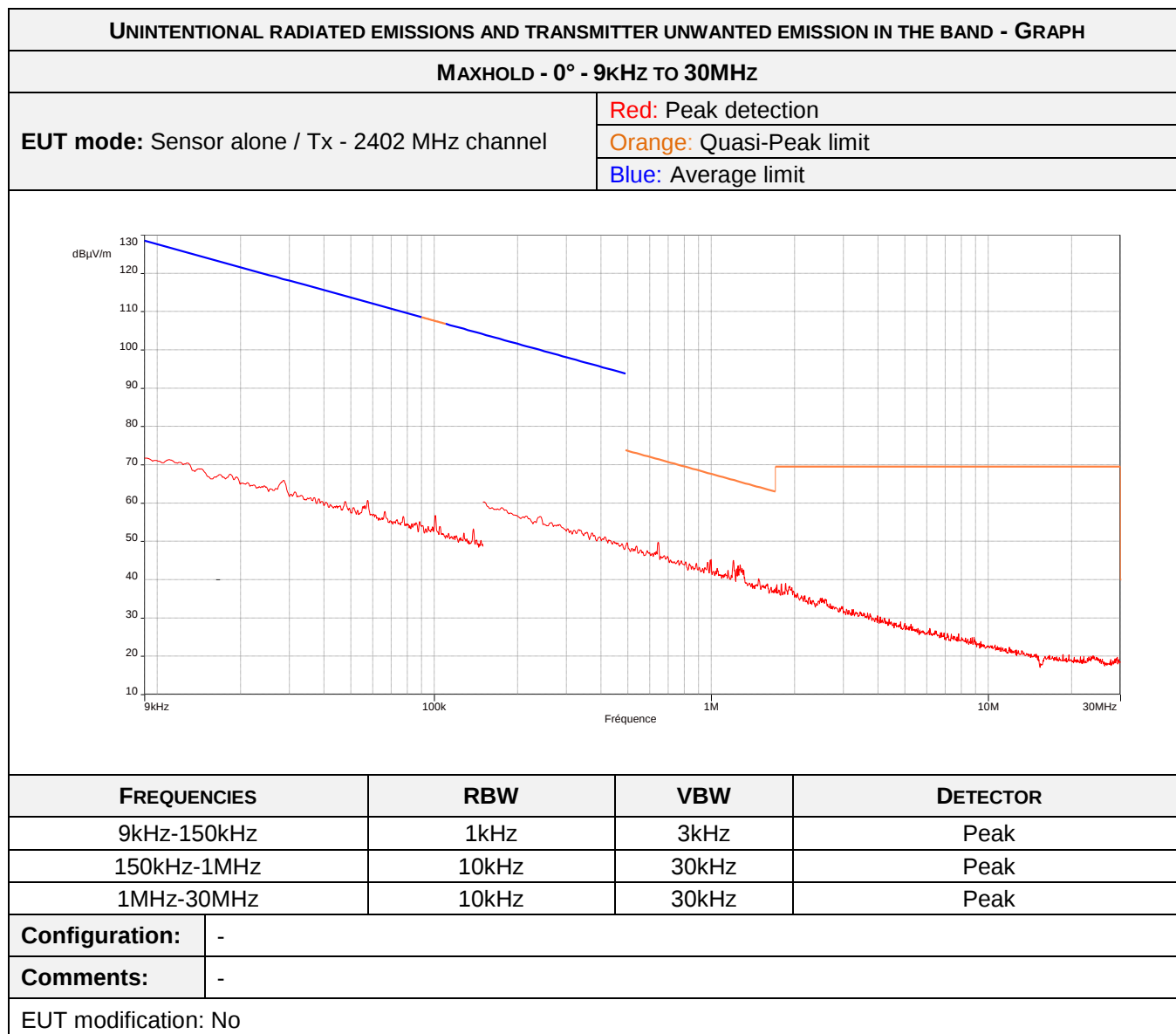


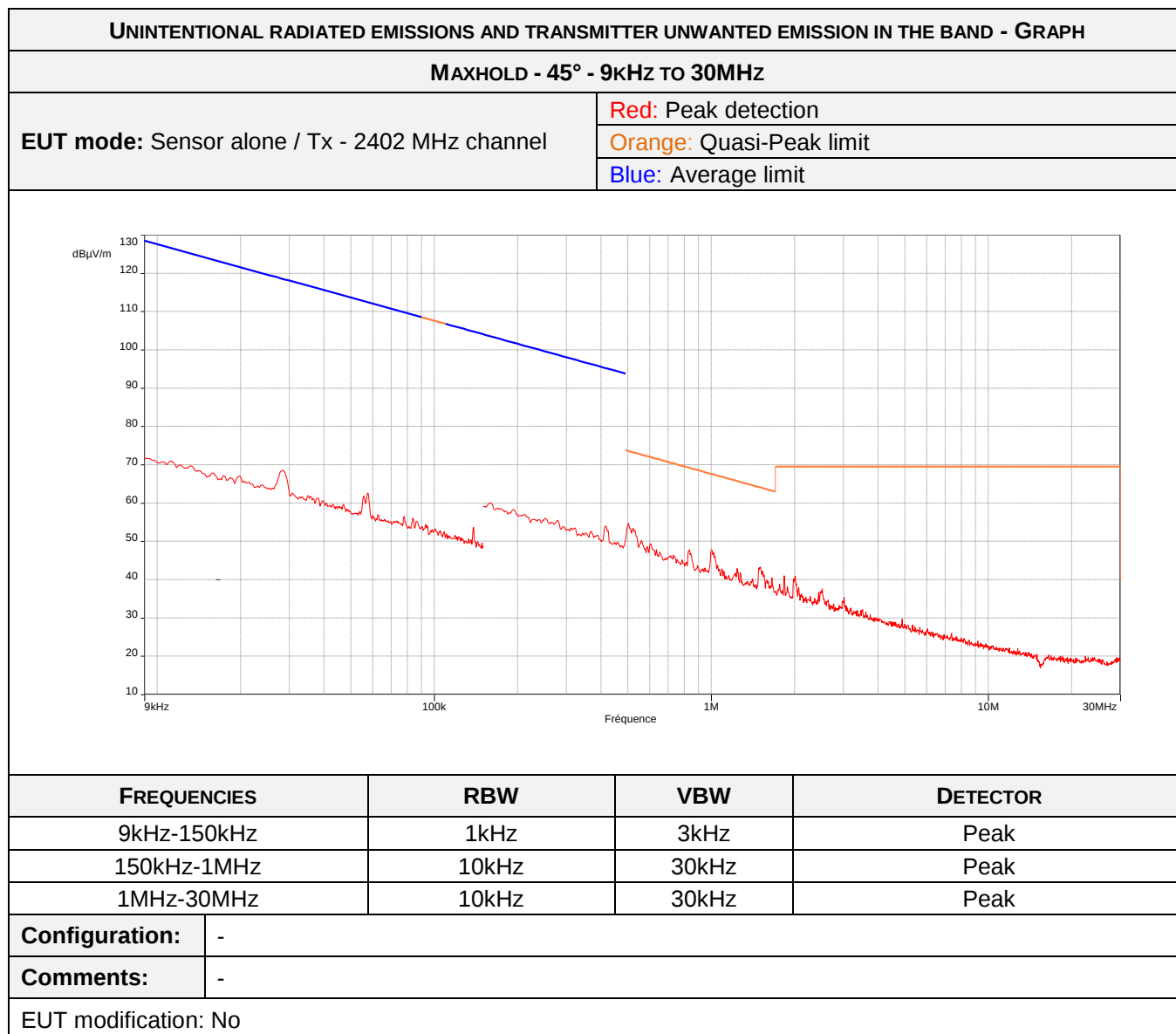


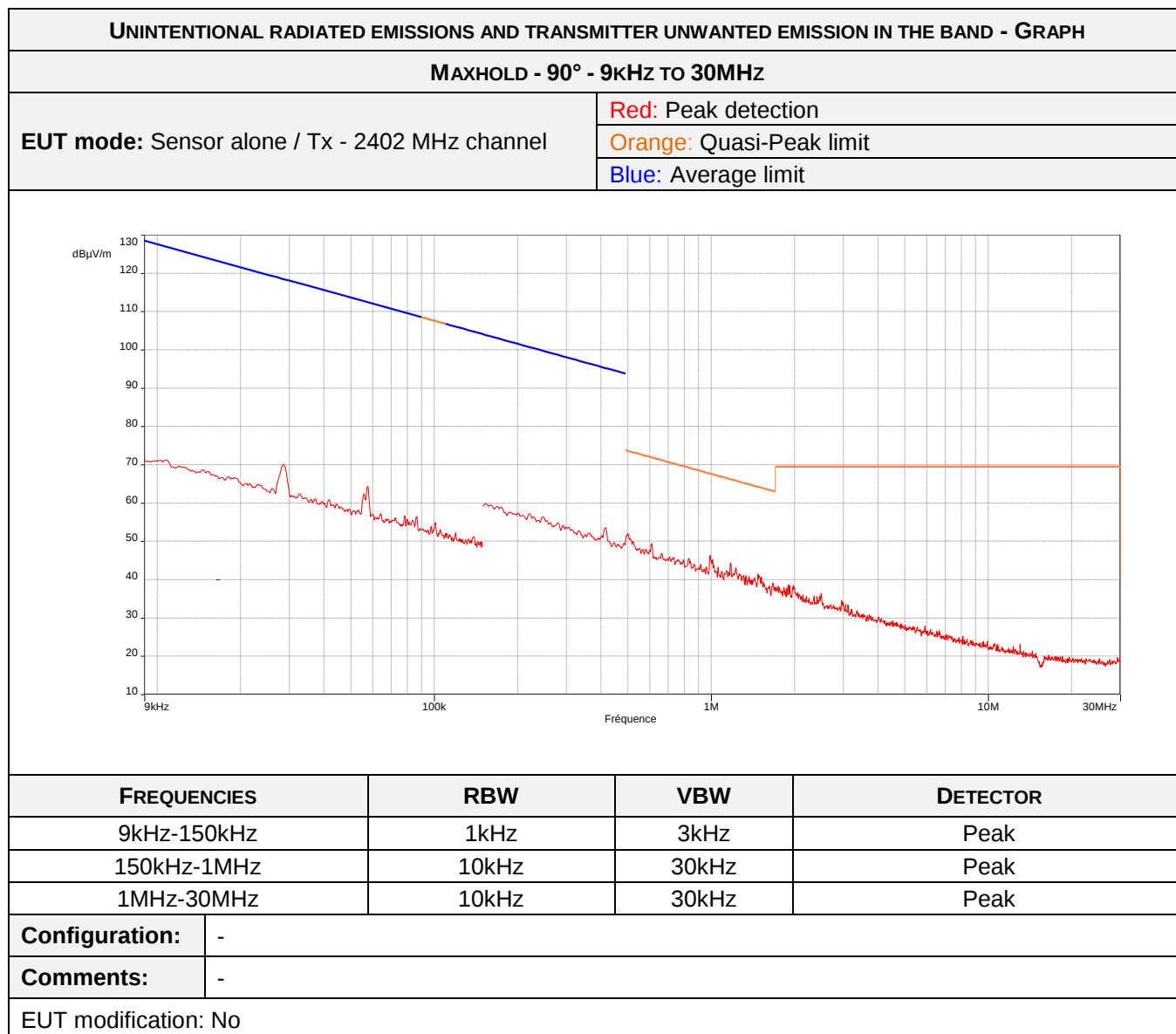


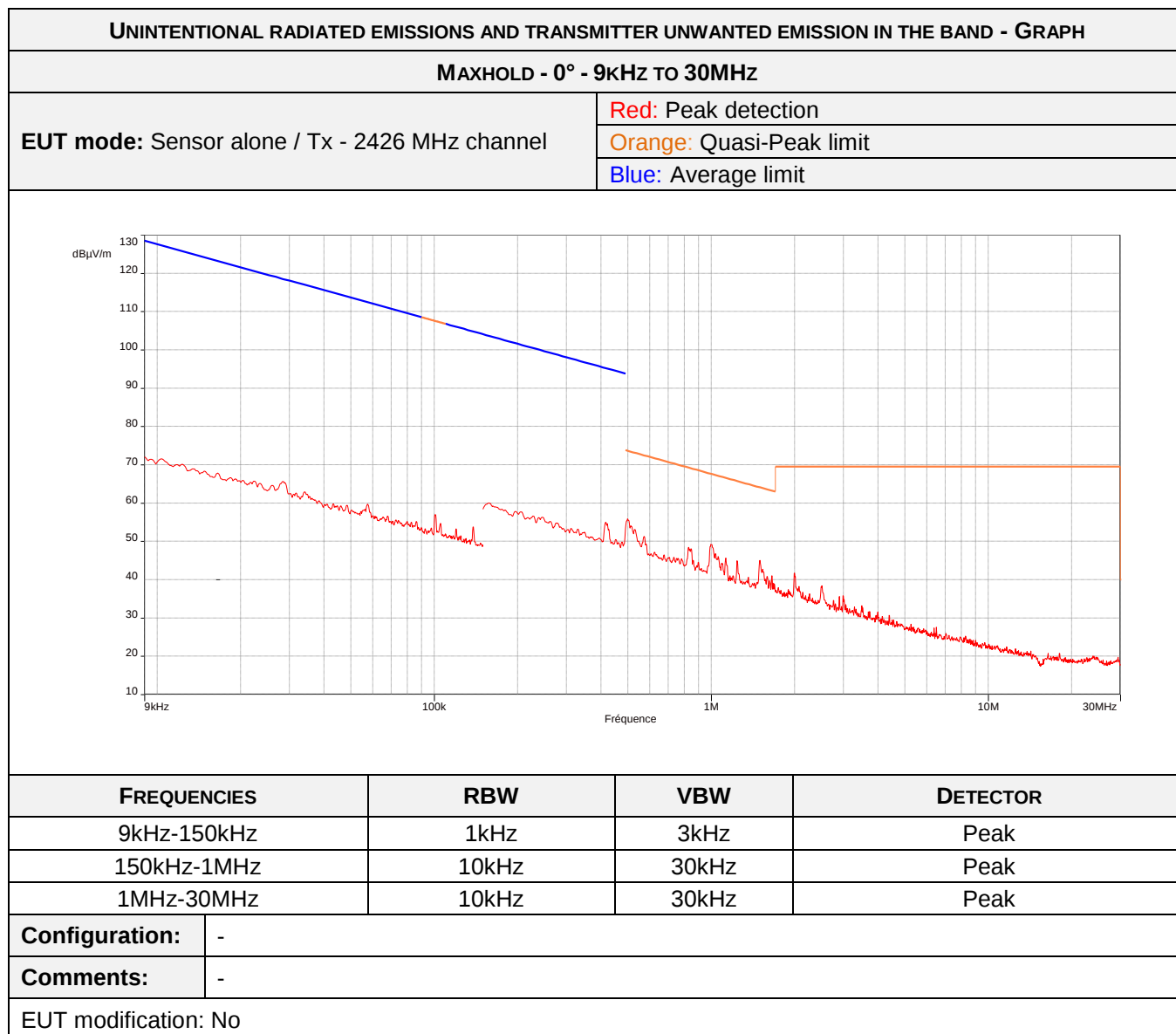


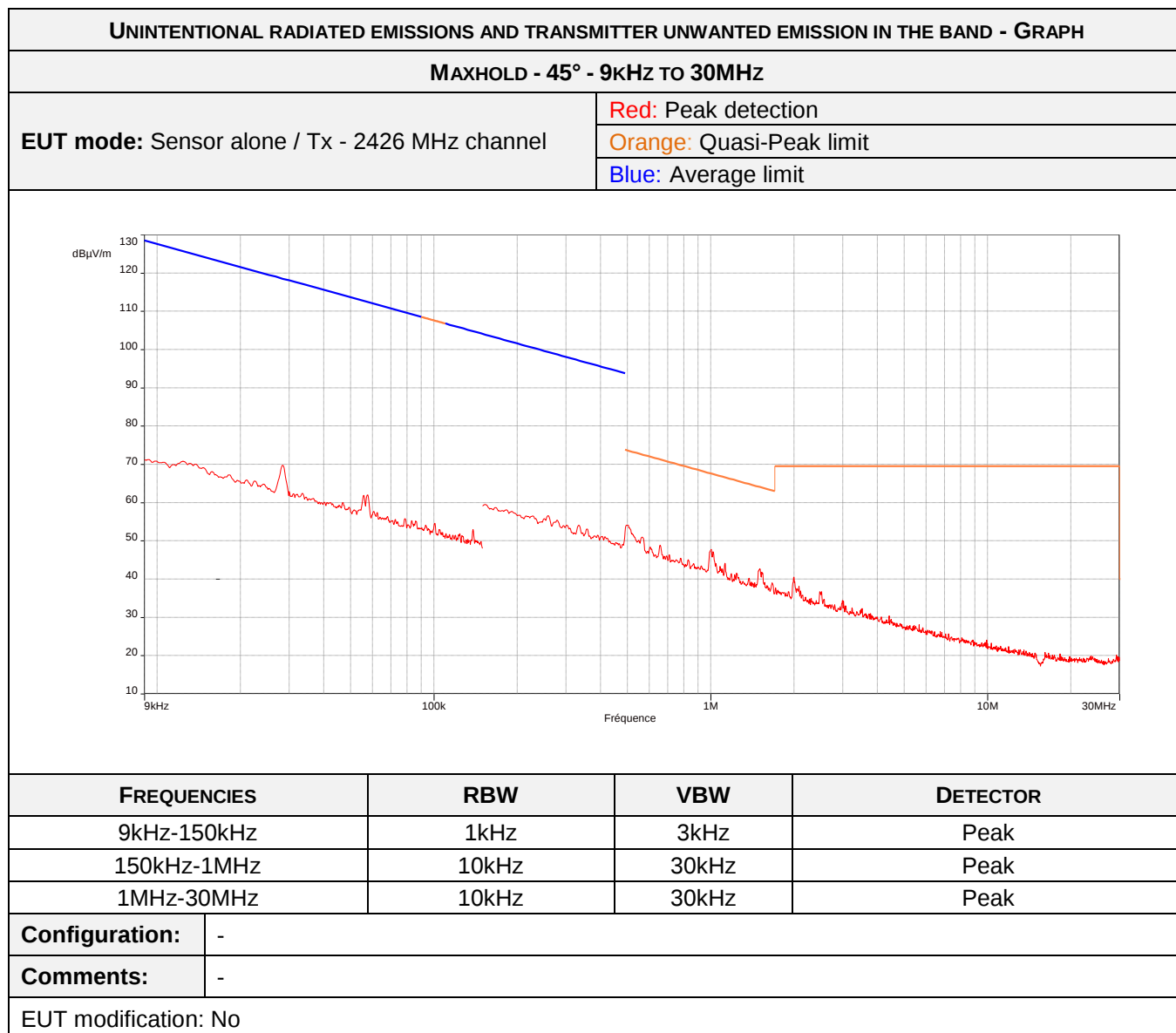


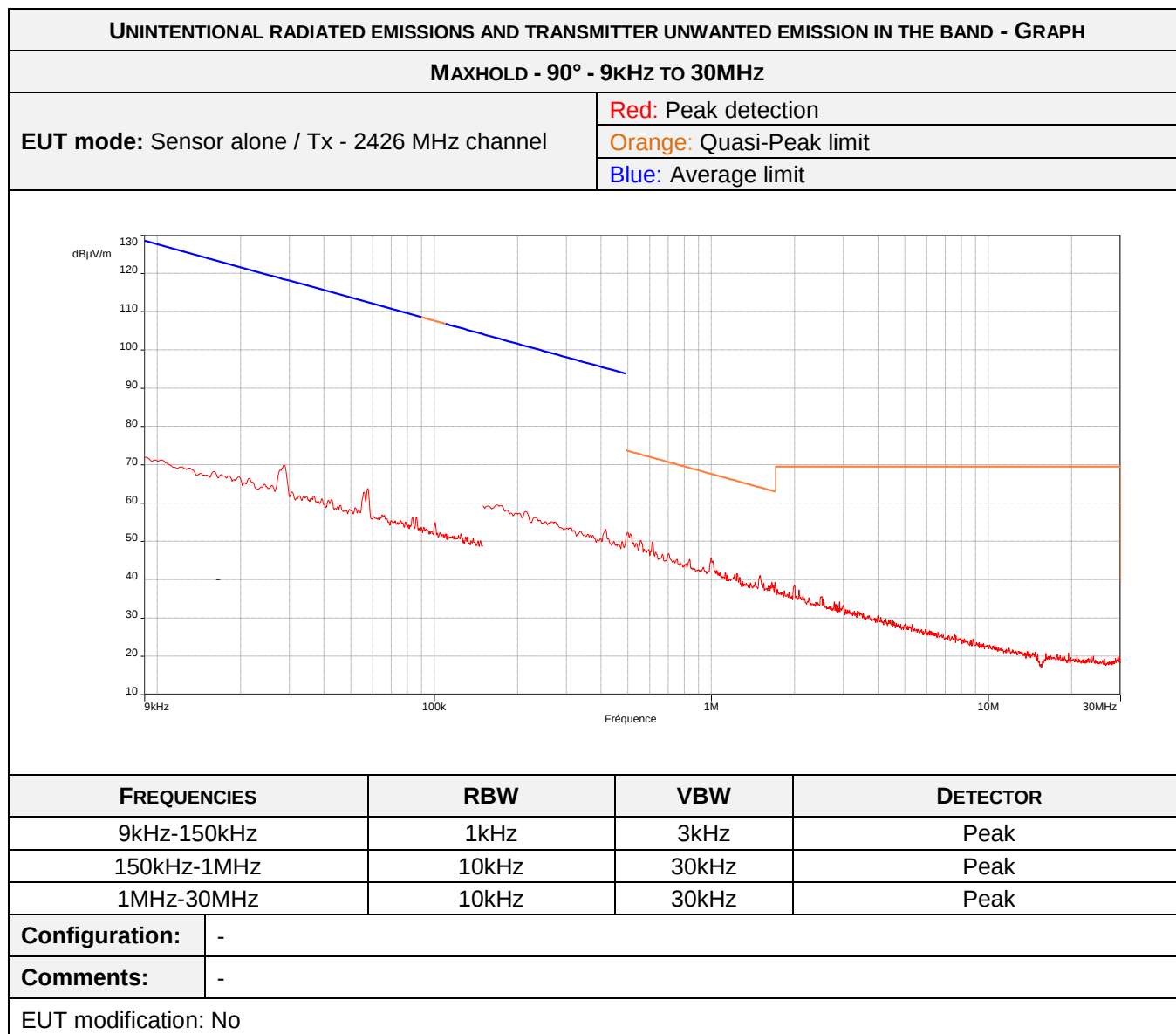


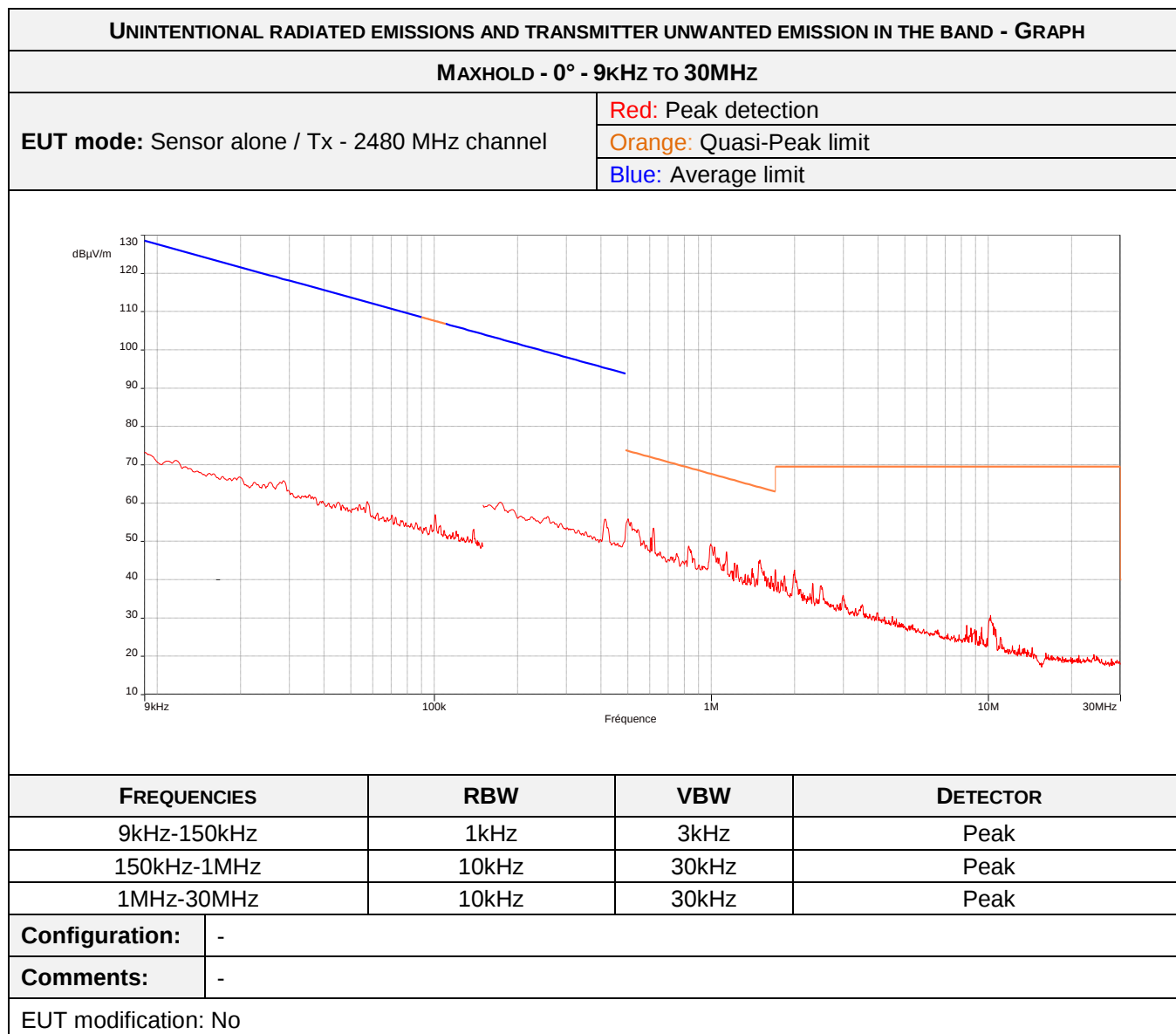


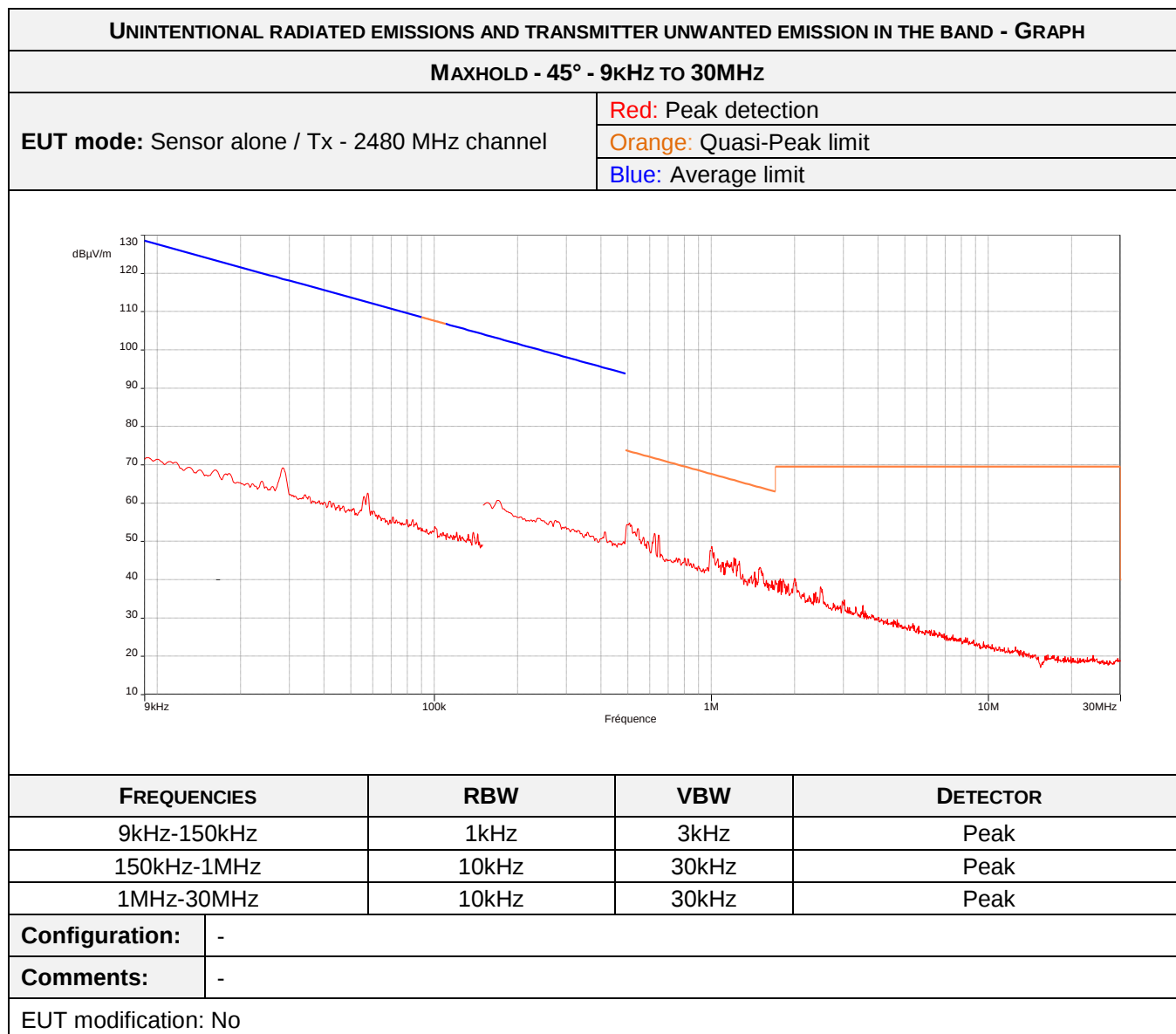


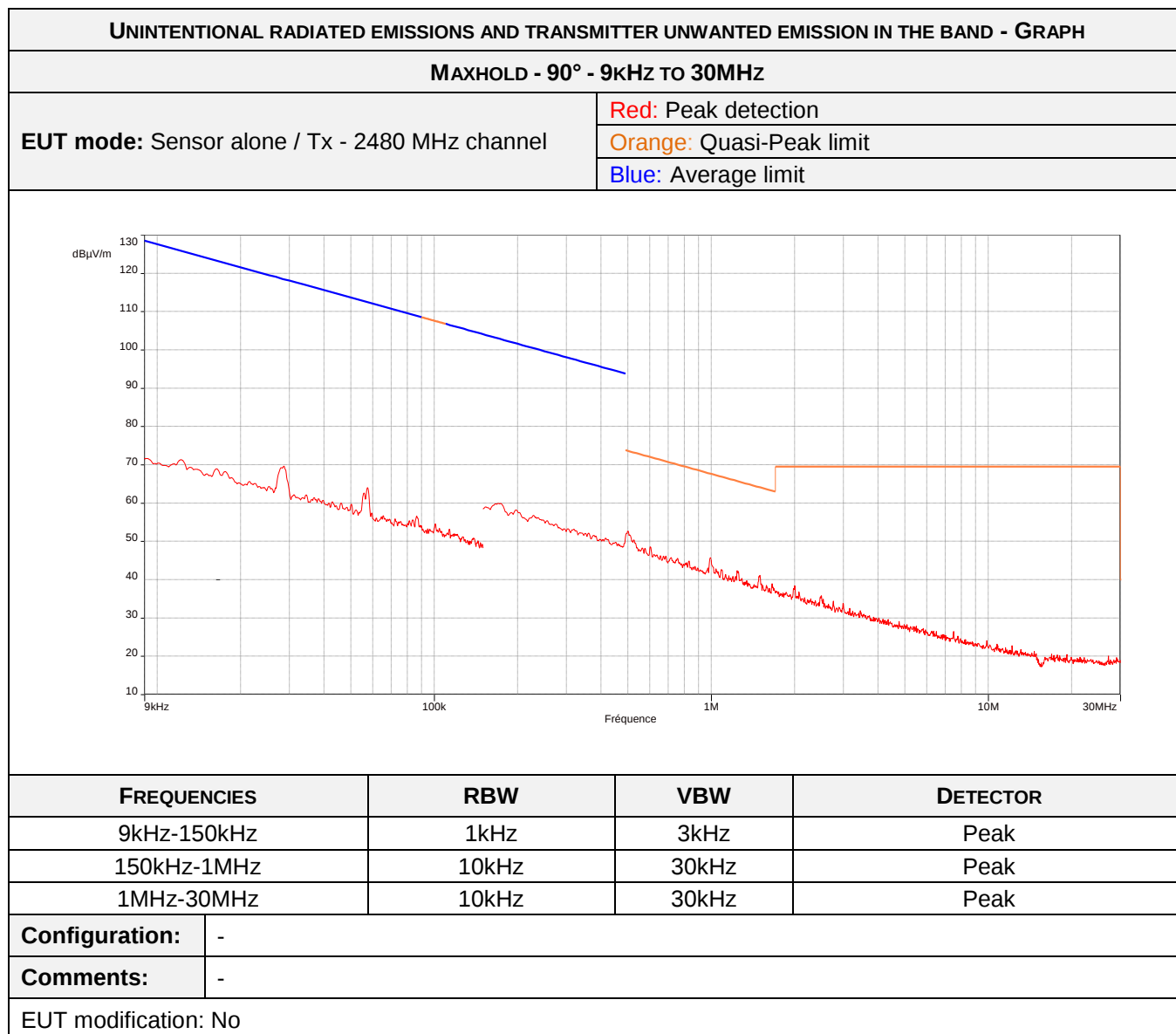


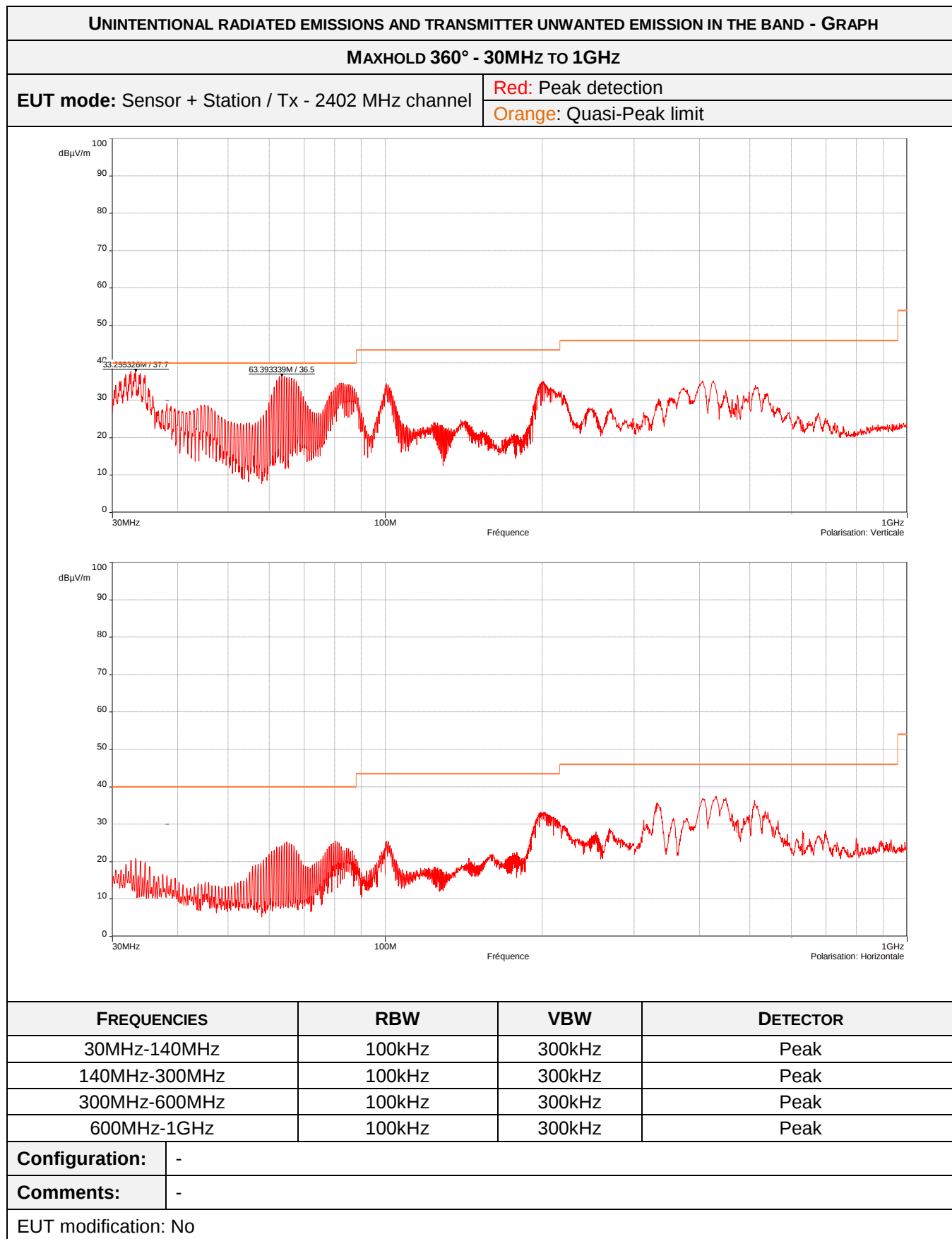


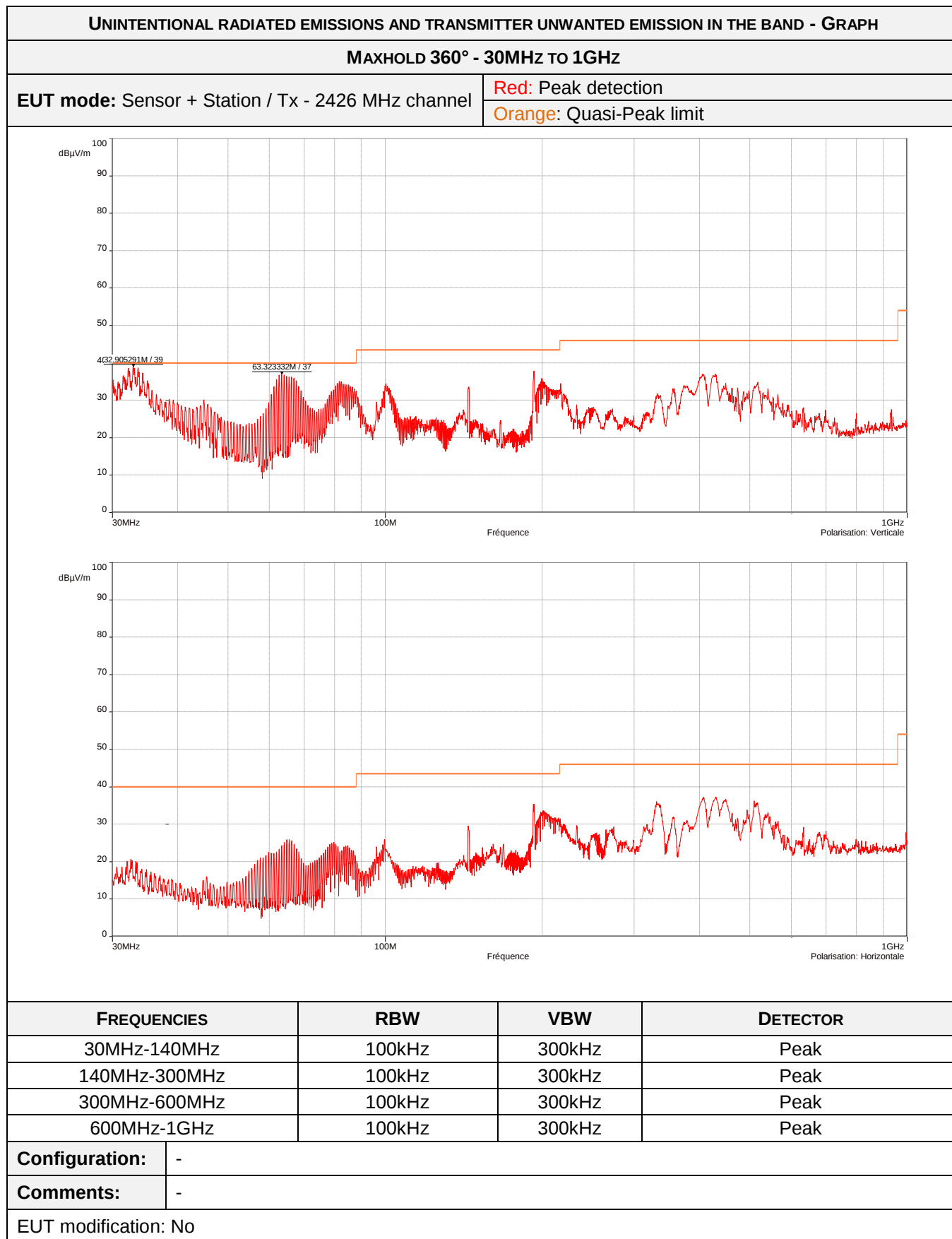


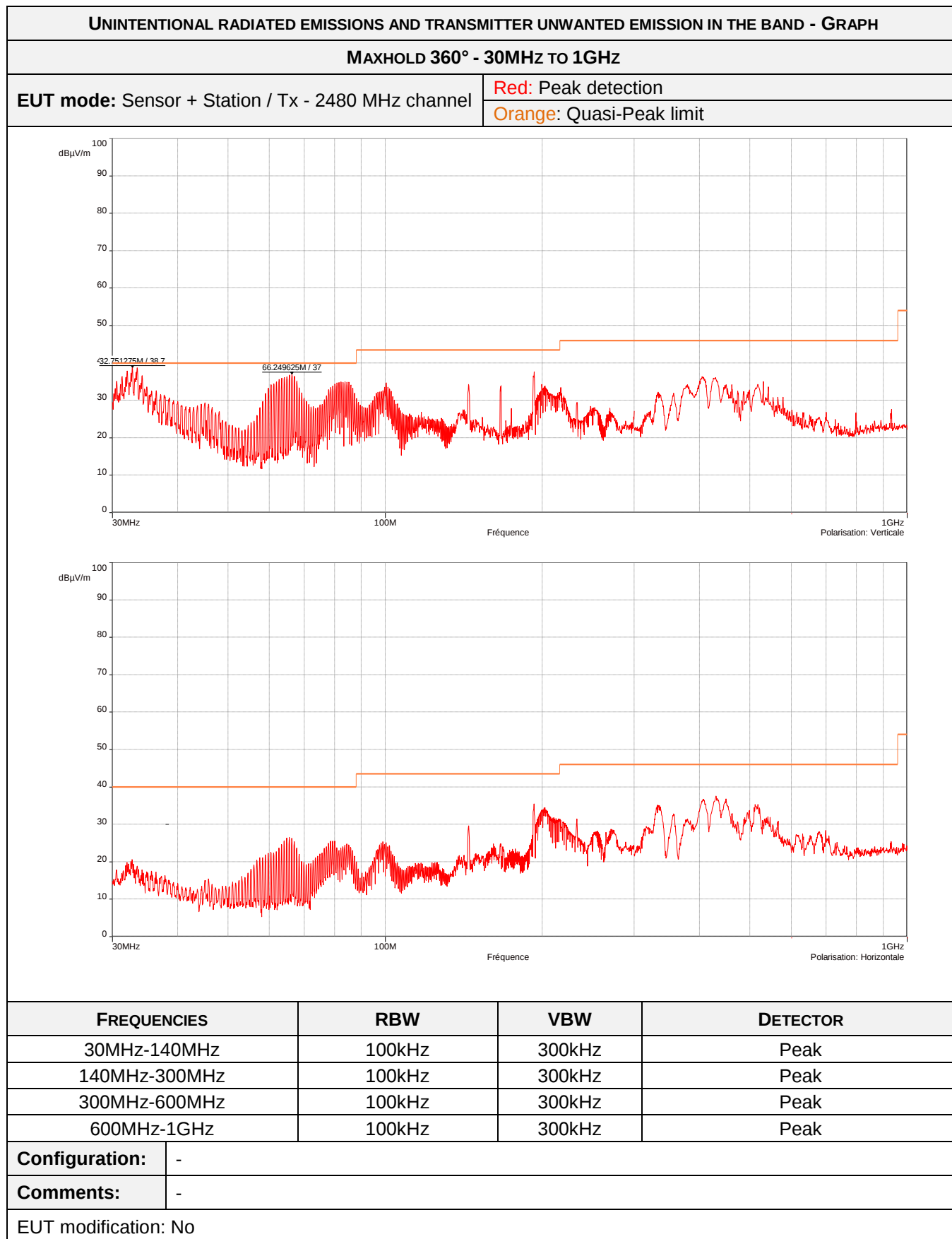


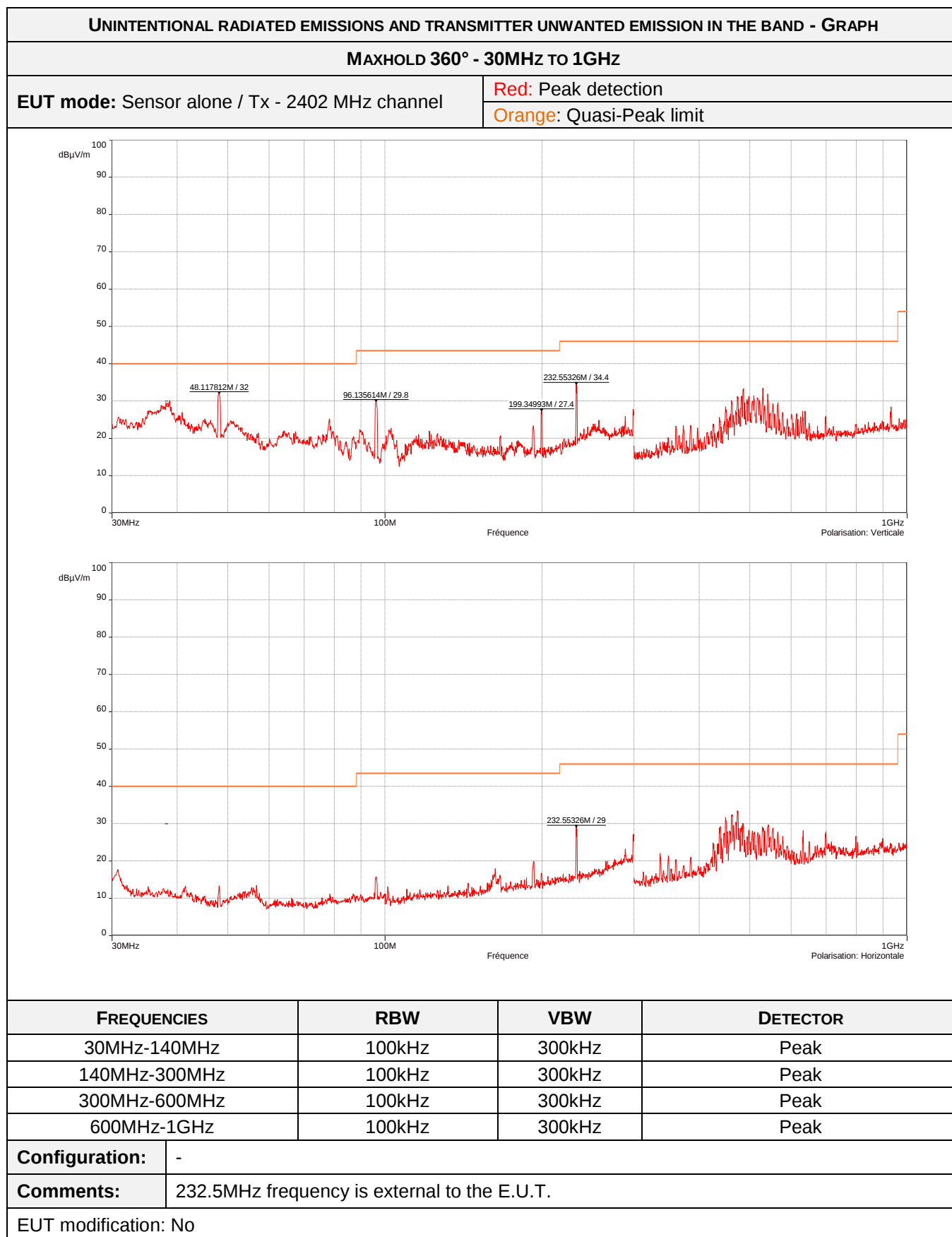


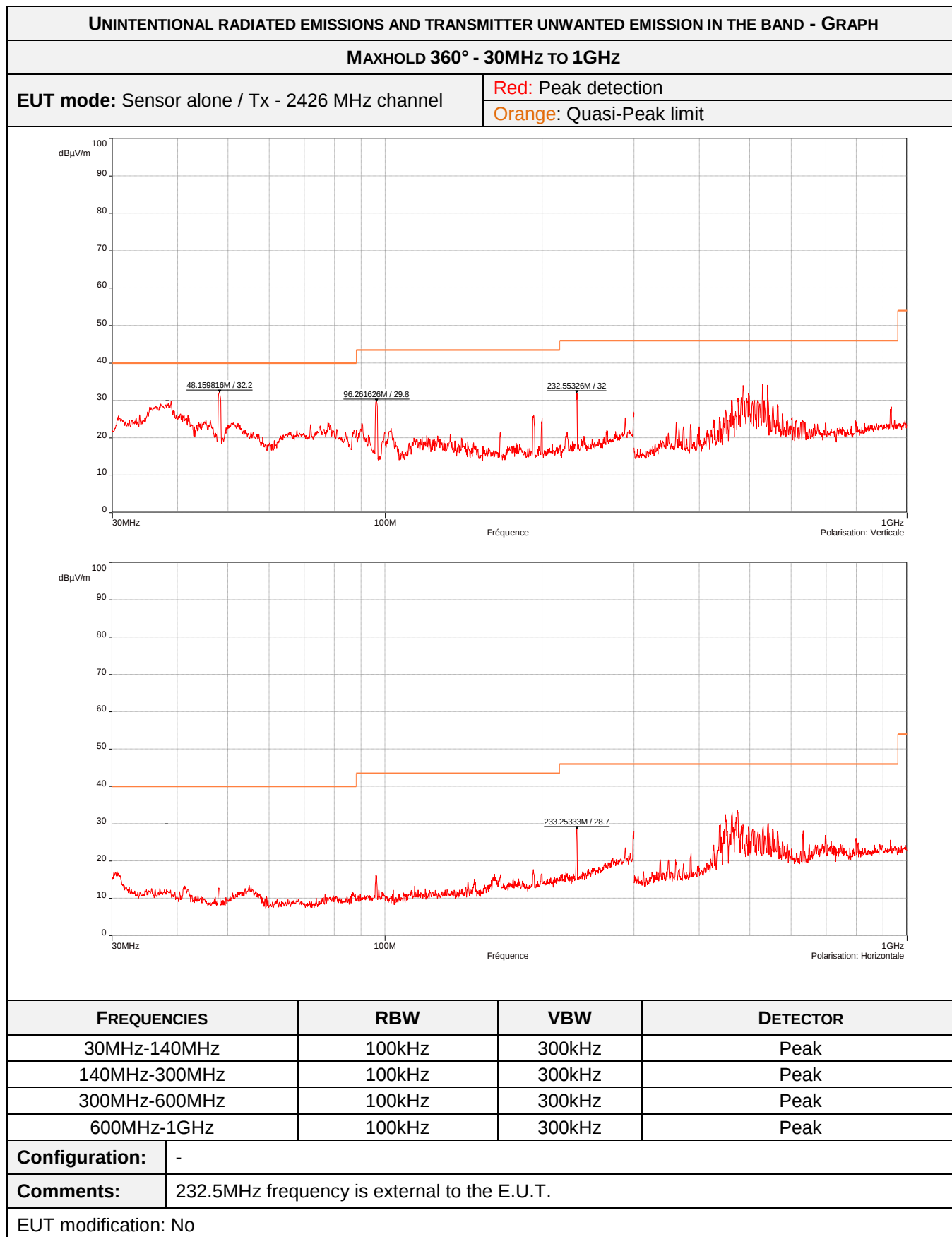


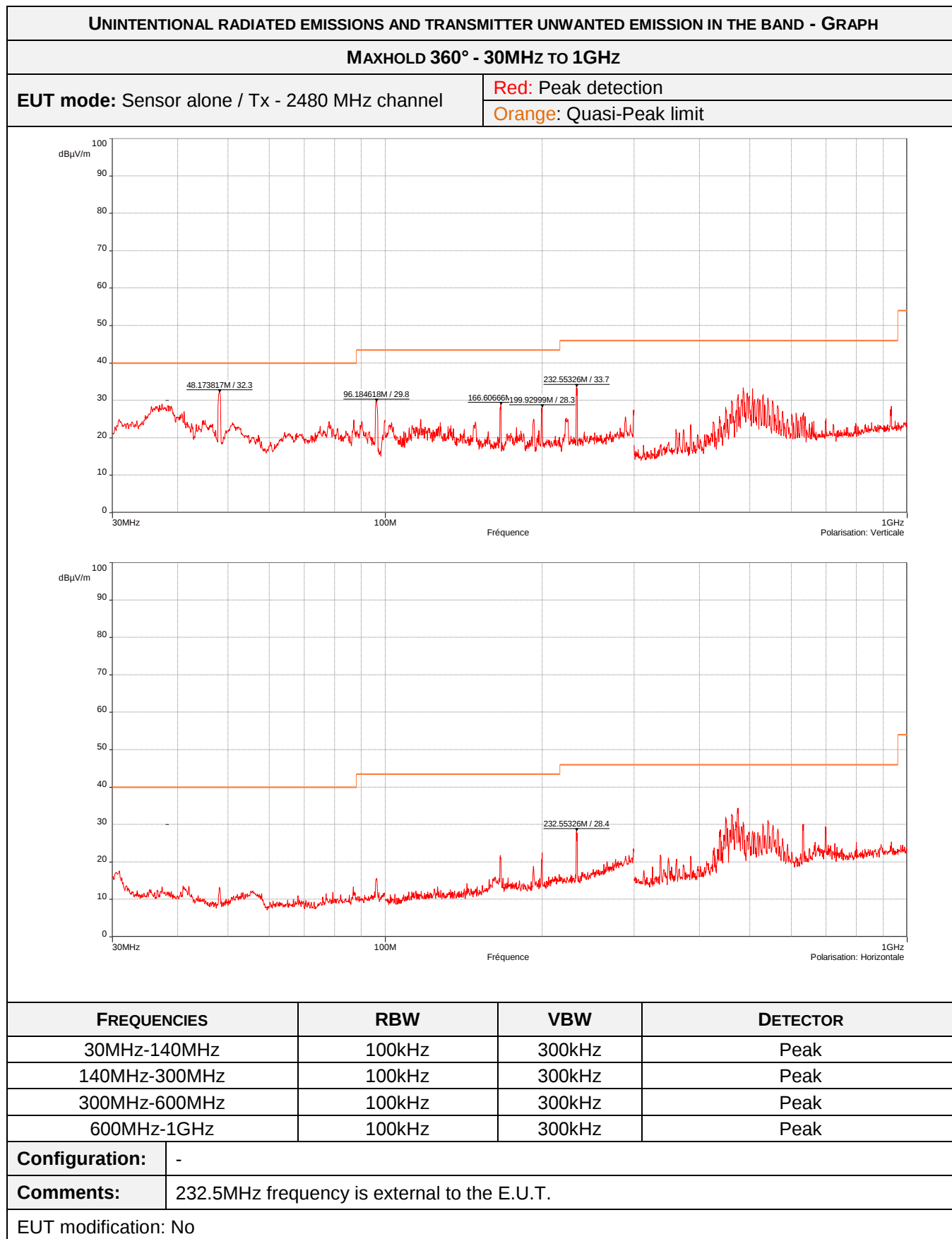


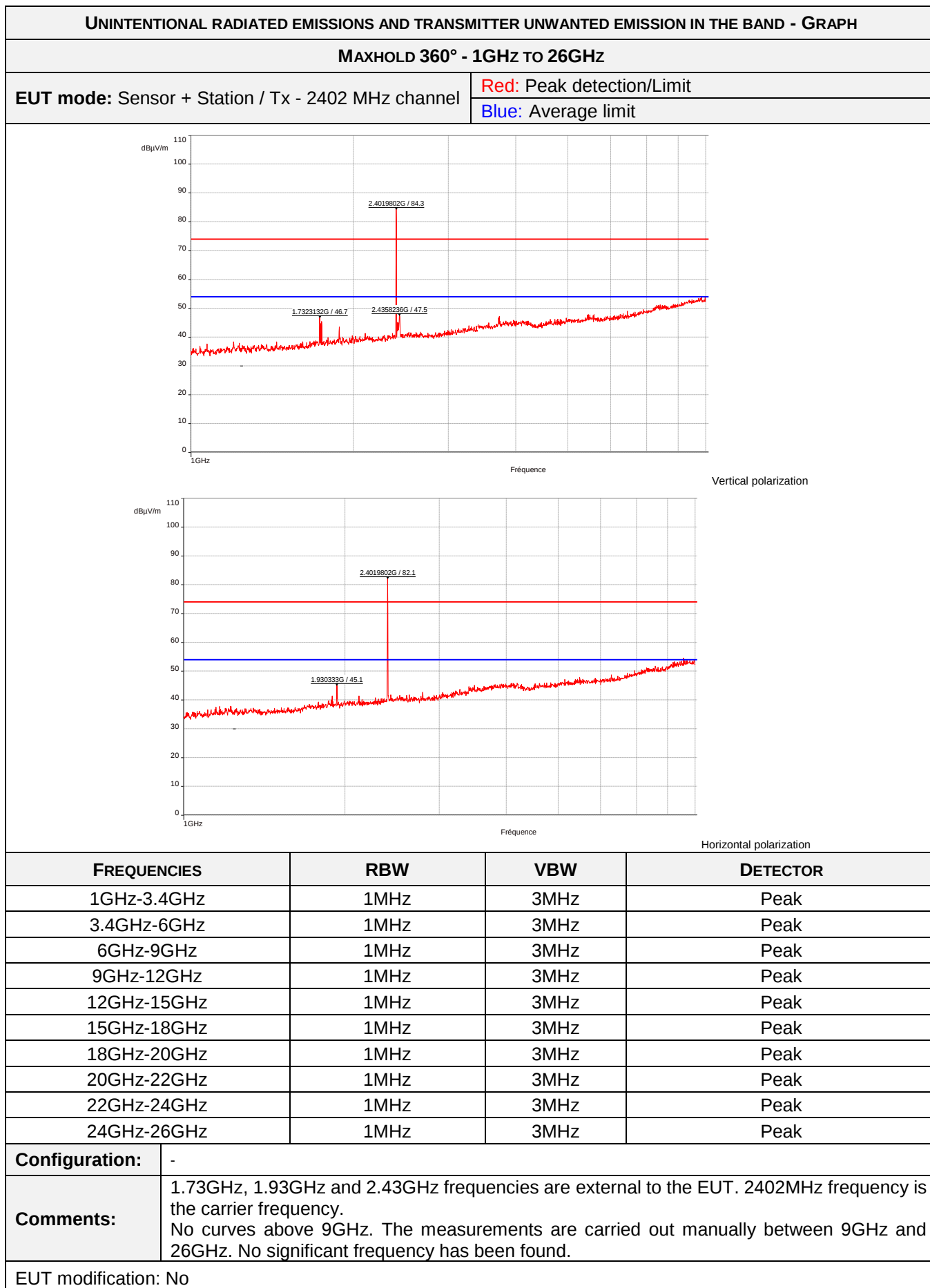


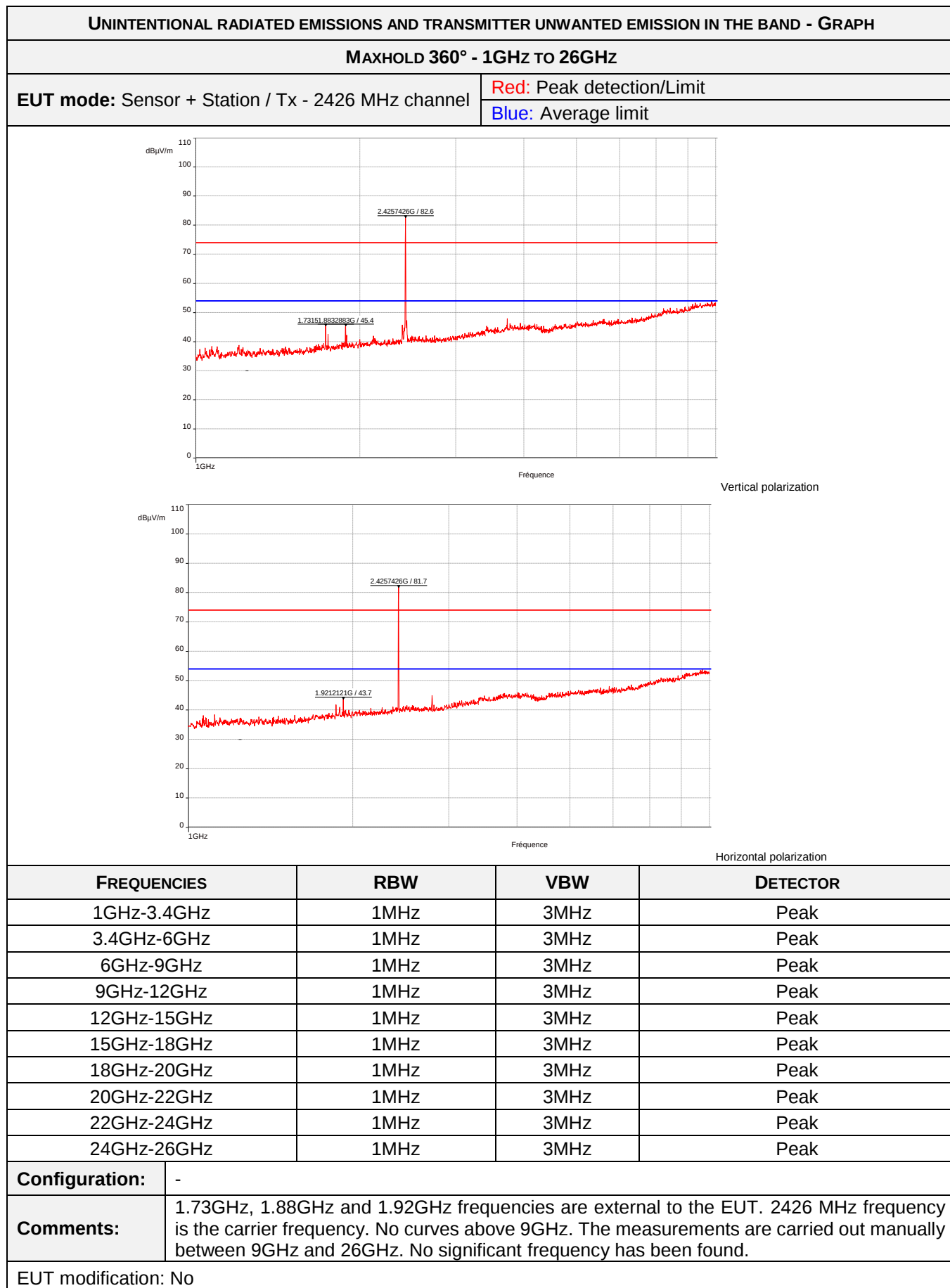


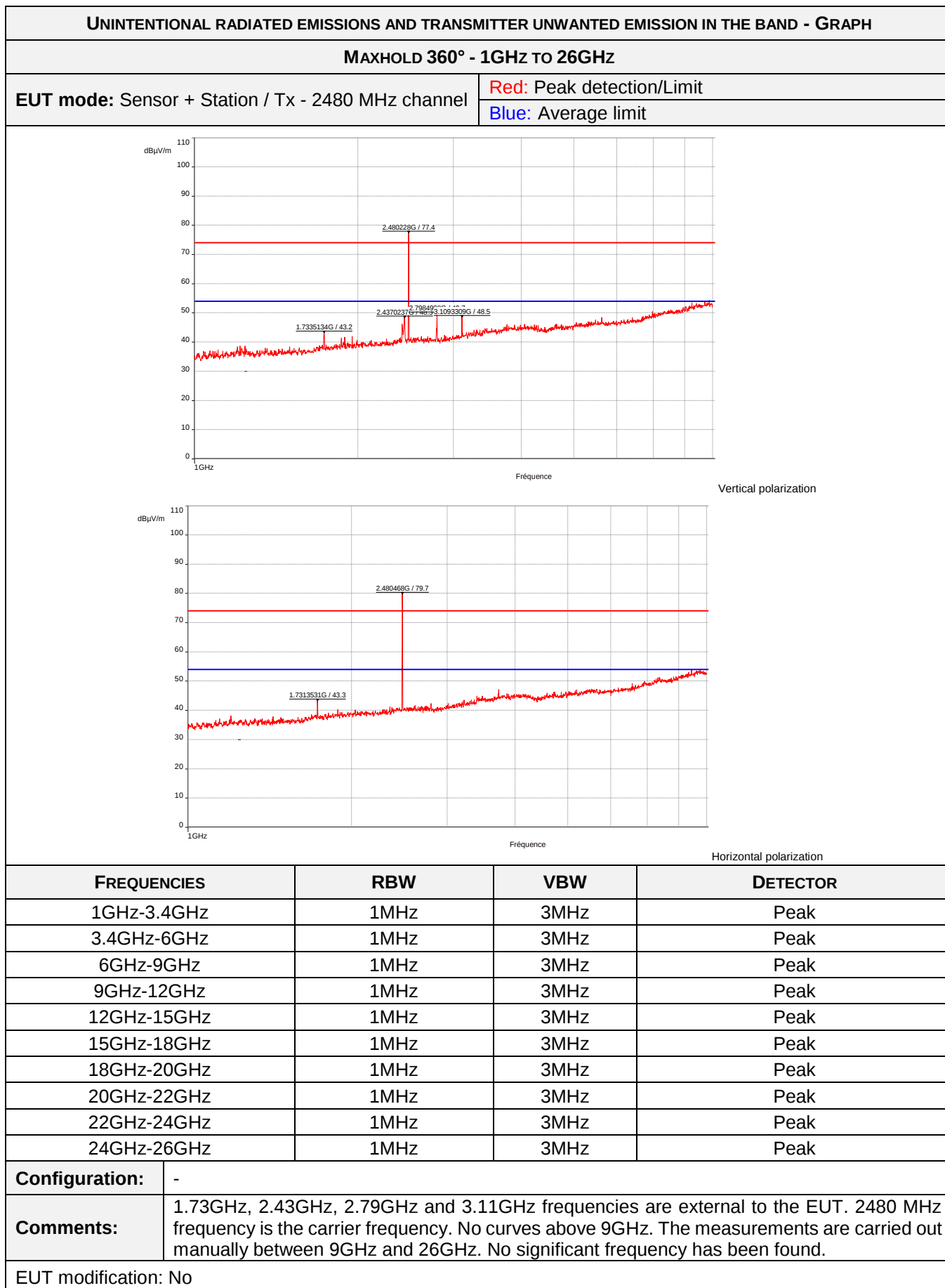


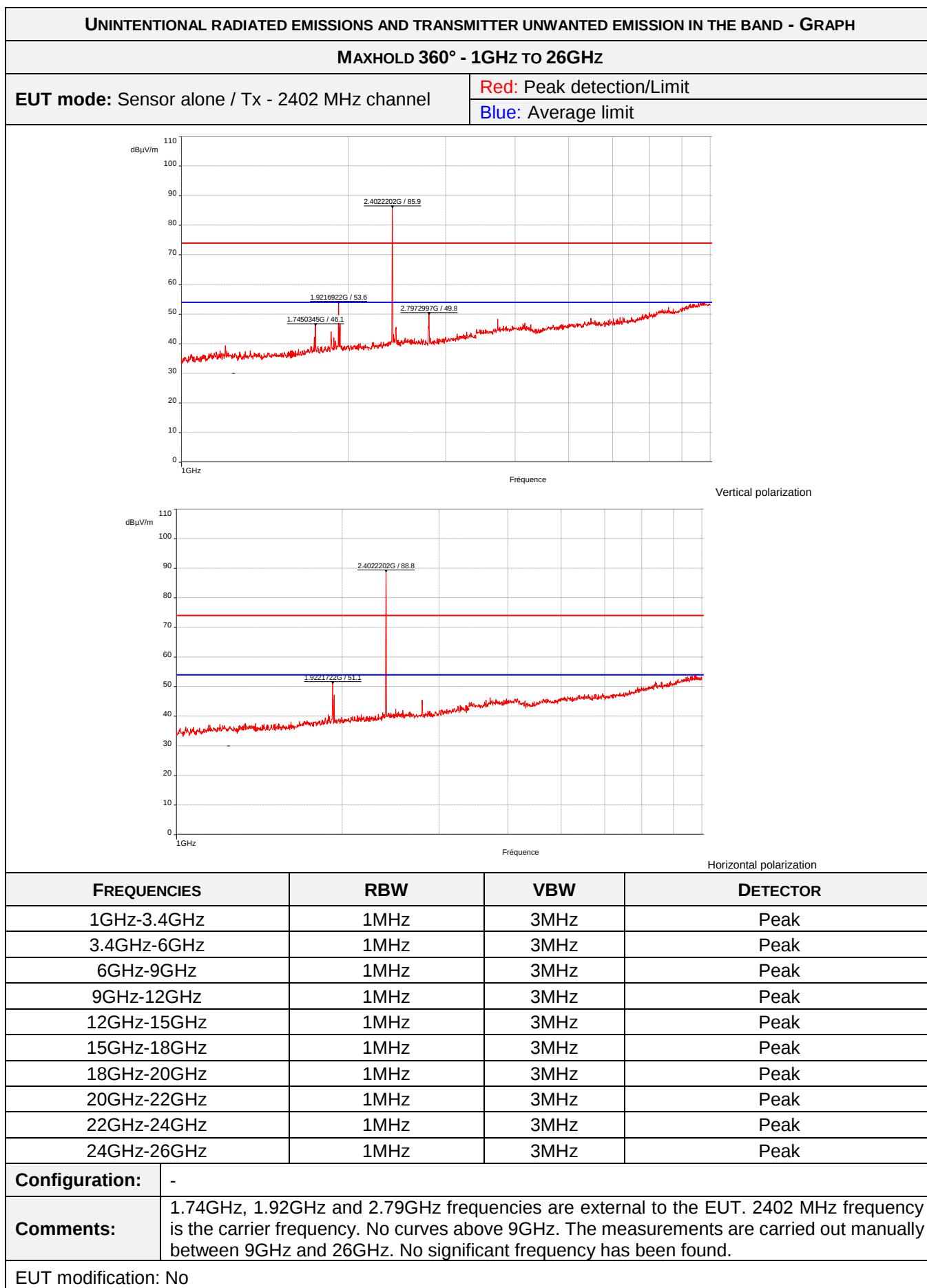


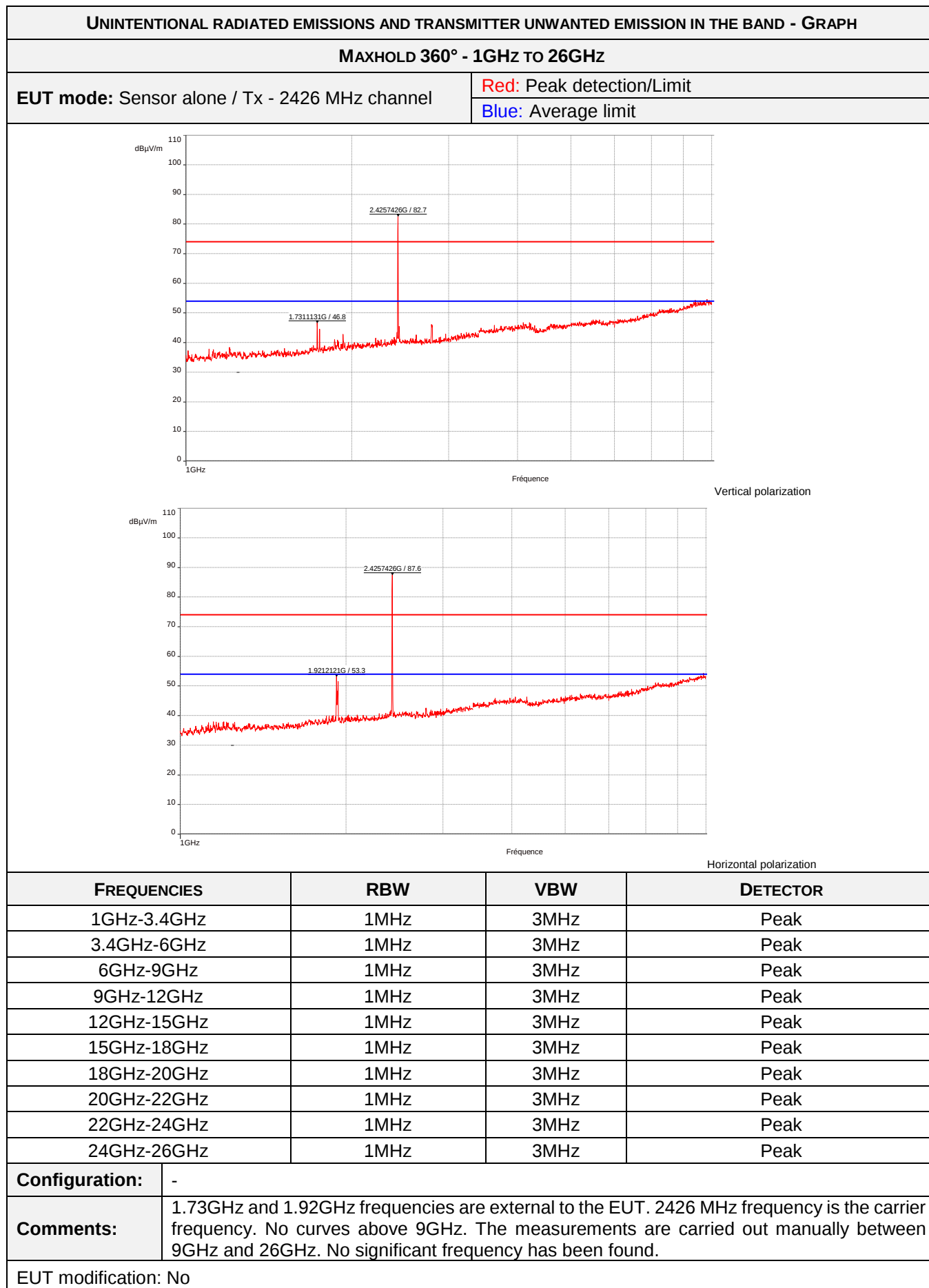


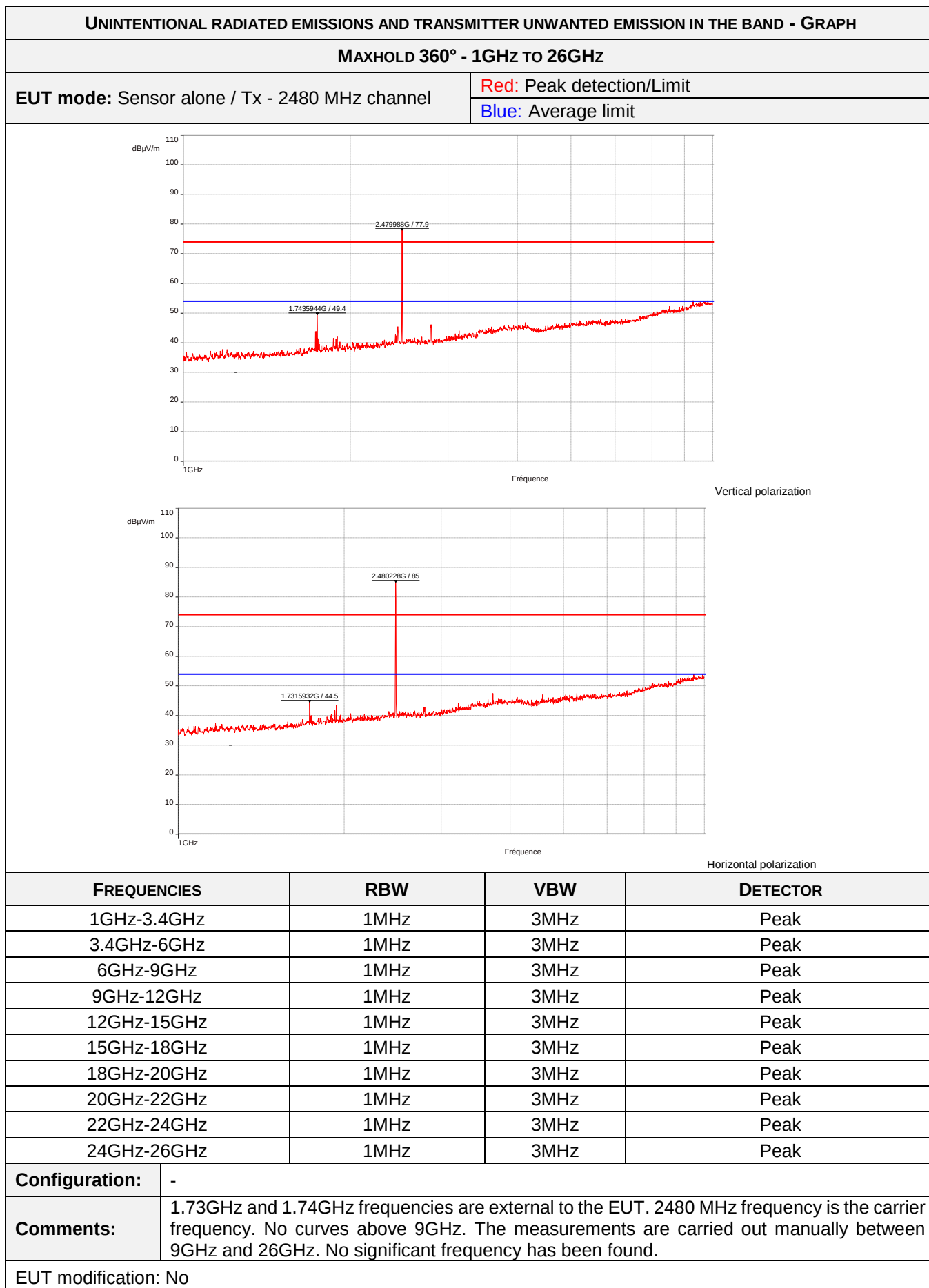












Nota : some frequencies are not necessarily recorded in the table because they have more than 10 dB of the margin with the limit. This is the case for frequencies that are not part of the restrictive bands of §15.205 of FCC 47 CFR PART 15 and therefore, which are compared to the limit of 74dBµV/m.

Sensor + Station

Frequency (MHz)	Detector mode	Height (cm)	Polarization	Azimuth (°)	Electro-magnetic field (dBµV/m)	Limit (dBµV/m)	Margin (dB)
32.77	Quasi-Peak	100	Vertical	110	37.1	40.0	2.9
65.52	Quasi-Peak	100	Vertical	110	38.3	40.0	1.7

Sensor alone

Frequency (MHz)	Detector mode	Height (cm)	Polarization	Azimuth (°)	Electro-magnetic field (dBµV/m)	Limit (dBµV/m)	Margin (dB)
48.14	Quasi-Peak	100	Vertical	70	30.3	40.0	9.7

6.7. Unintentional radiated emissions in the band 30 MHz – 13 GHz

Reference standard:	FCC 47 CFR PART 15 : 2023 RSS-Gen Issue 5 : 2019
Test method:	§ 15.109 of FCC 47 CFR PART 15 : 2023 § 6.13 of RSS-Gen Issue 5 : 2019
General test setup: E.U.T. is set on an insulating support at 0.8 m (<1GHz) and 1.5 m (>1GHz) above the ground reference plane. For maximum meter reading at each frequency, the antenna height is adjusted between 1 m and 4 m above the ground plane for 30 MHz - 13 GHz. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization.	

TESTED CONFIGURATION	PARAMETER	VERDICT
Maxhold 360° - Radio Off - Sensor alone	30MHz-1GHz	PASS
Maxhold 360° - Radio Off - Sensor alone	1GHz-13GHz	PASS

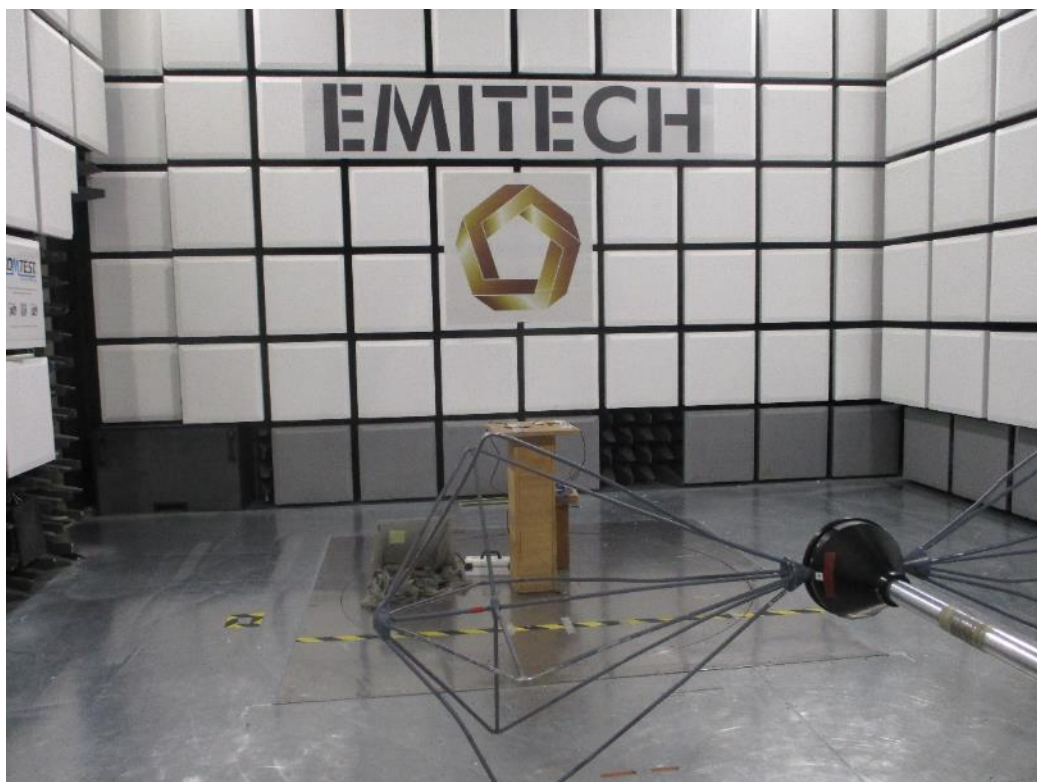
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	21.6°C
Relative Humidity	10 to 90 %	46.2%
Atmospheric pressure	N/A	1007 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Amplifier	Mini-circuit	ZFL-1000N	5023	31/01/2024	31/03/2025
Amplifier	HP	8449B	14524	16/02/2023	16/04/2024
Antenna	Rohde & Schwarz	HK116	0293	30/09/2021	30/11/2024
Antenna	Schwarzbeck	UHALP 9108A	3106	25/04/2023	25/06/2025
Antenna	Emco	3115	3374	02/05/2022	02/07/2025
Cable	Câbles et Connectiques	N-2m	2451	29/08/2022	29/10/2024
Cable	C&C	K-2m	11132	23/09/2022	23/11/2024
Cable	C&C	K-4m	11134	23/09/2022	23/11/2024
Cable	C&C	N-5m	11184	22/06/2023	22/08/2024
Cable	C&C	N-4m	14226	26/06/2023	26/08/2024
Cable	Huber + Suhner	N-6m	17269	29/08/2022	29/10/2024
Receiver	Rohde & Schwarz	ESW44	17058	15/06/2023	15/08/2024
Shielded enclosure	Comtest	SAC 3m	14622	27/04/2022	27/06/2025
Software	Nexio	BAT EMC	0000		
Spectrum analyzer	Rohde & Schwarz	ESR7	12811	22/05/2023	22/07/2024

BAT-EMC software version: V3.18.0.19

Blank cells = Permanent validity

TEST SETUP PHOTOS - SENSOR ALONE
30 MHz - 1 GHz

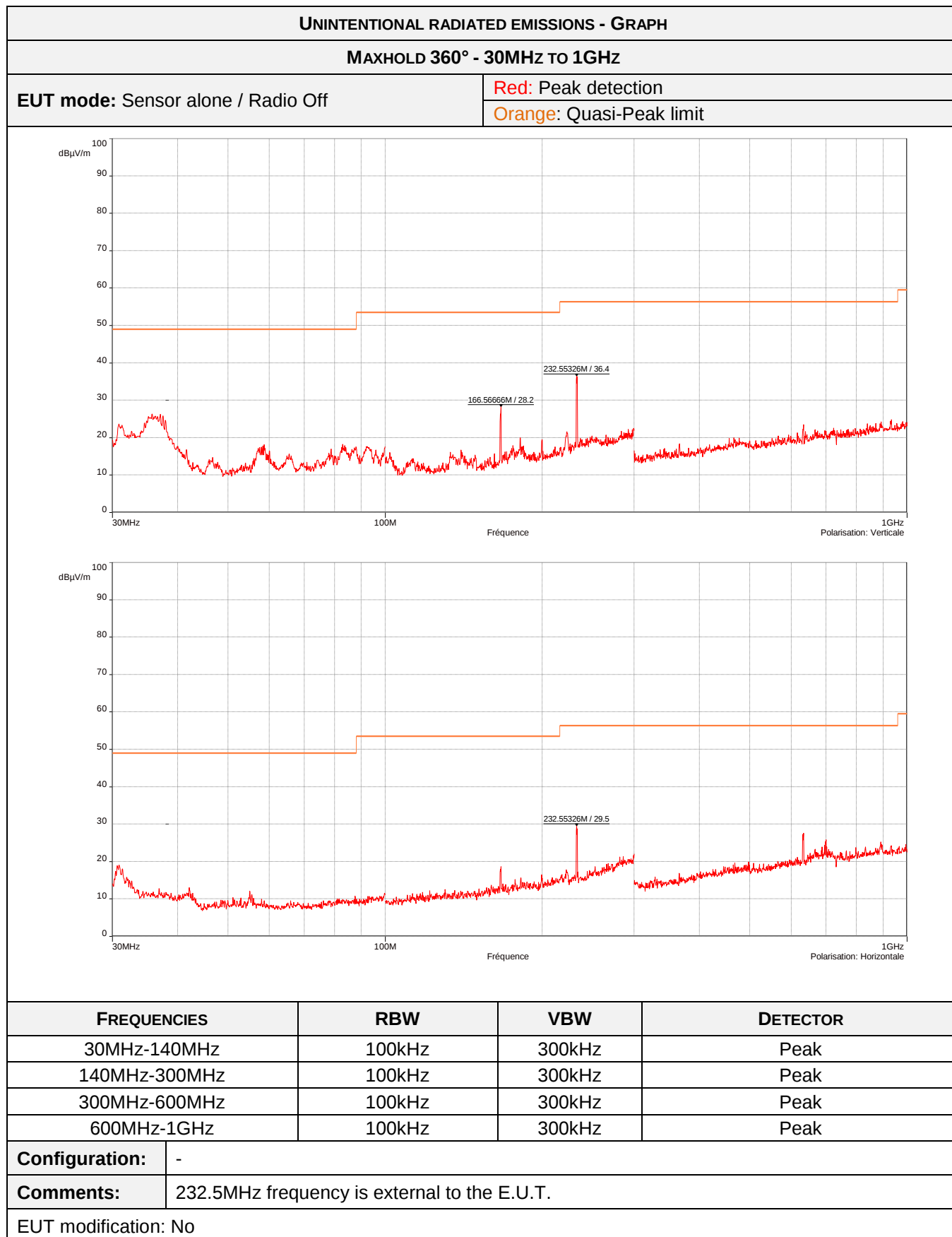


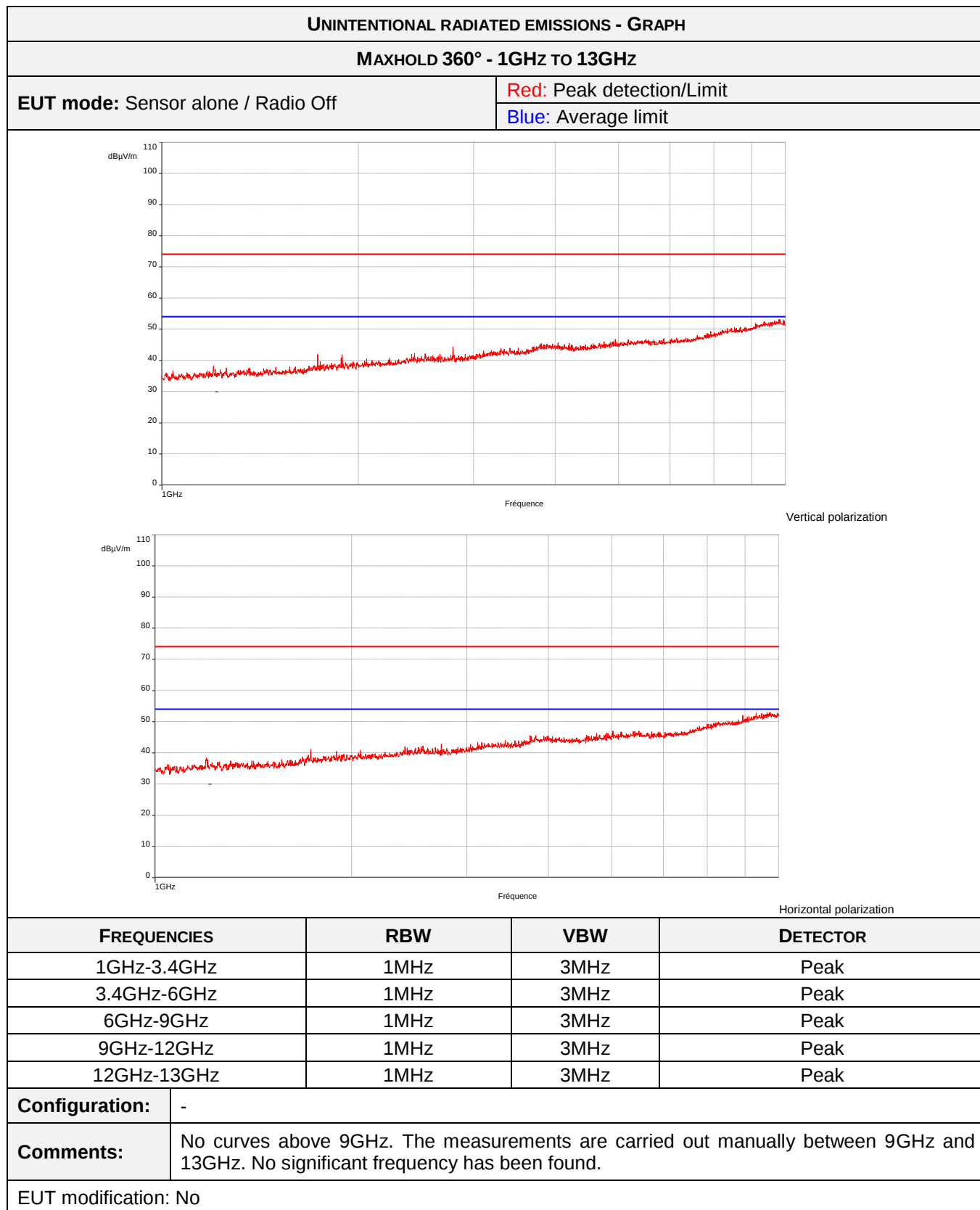
TEST SETUP PHOTOS - SENSOR ALONE
30 MHz - 1 GHz



TEST SETUP PHOTOS - SENSOR ALONE
1 GHz - 13 GHz







Nota : some frequencies are not necessarily recorded in the table because they have more than 10 dB of the margin with the limit. This is the case for frequencies that are not part of the restrictive bands of §15.205 of FCC 47 CFR PART 15 and therefore, which are compared to the limit of 74dBµV/m.

End of test report