



This test report cancels and replaces RR-EVE-21H495-1A Ed.0
Test report issued under the responsibility of:
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006
Canadian CAB Identifier: FR0003

RADIO TEST REPORT

FCC 47 CFR Part 15: February 2021
FCC 47 CFR Part 15.247
RSS-247 Issue 2: February 2017

Company: **EDGE TECHNOLOGIES**
Address.....: 735 RUE DU LIEUTENANT PARAYRE
13290 - AIX EN PROVENCE
FRANCE

Test item description: **Valve position including wireless transmitter with data measurement capability**
Trade Mark: EDGE TECHNOLOGIES
Manufacturer.....: EDGE TECHNOLOGIES SAS
Model/Type reference.....: SENSEA915A / SENSEA.VALV including SENSEAIO
FCC ID.....: 2A2T5-SENSEA915A
IC: 29177-SENSEA915A
Ratings.....: 2.4Vdc to 3.7Vdc

Testing Laboratory: **EMITECH MONTPELLIER laboratory**
Address.....: 145 rue de Massacan
34740 VENDARGUES
FRANCE

Report Reference No: **RR-EVE-21H495-1A**
Test procedure: FCC IC Certification
Diffusion.....: Mr LEVEQUE
Applicant's name: EDGE TECHNOLOGIES SAS
Date of issue.....: January 25, 2023
Total number of pages.....: 65
Revision: 1
Modified page(s).....: Creation
Compiled by.....: Morgan PATEY
Approved by (+ signature): Olivier HEYER (Laboratory Manager)

*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	January 17, 2022	/	Creation
1	January 25, 2023	1, 5, 6, 10	Informations about EST (FCC and ID, Model, type etc...) and RF exposure completed

1. GENERAL INFORMATION

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

TESTING PROCEDURE AND TESTING LOCATION:					
Testing Location : EMITECH MONTPELLIER laboratory Address : 145 rue de Massacan 34740 VENDARGUES FRANCE Test procedure : FCC IC Certification Tested by : Morgan PATEY Test supervisor : None Date of receipt of test item : N/A Date (s) of performance of tests : From November 24 th to 26 th of 2021					
APPLICANT'S GENERAL INFORMATION:					
Company name : EDGE TECHNOLOGIES Company address : 735 RUE DU LIEUTENANT PARAYRE 13290 - AIX EN PROVENCE FRANCE Person(s) present during the tests : No representative for company attended the tests. Responsible : Mr LEVEQUE					
GENERAL REMARKS:					
The information in italics is declared by the manufacturer and is under his responsibility 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. "(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)					
DEFINITIONS AND ABBREVIATIONS:					
E.U.T.	Equipment under test	AE	Ancillary equipment	Pk	Peak detector
RBW	Resolution bandwidth	VBW	Video bandwidth	QP	Quasi-peak detector
OATS	Open area test site	FAR	Full anechoic room	Av	Average detector
VP	Vertical Polarization	HP	Horizontal Polarization	RMS	Root Mean Square
RF	Radio frequency	NTR	Nothing to report	N/C	Not communicated

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:

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

FCC 47 CFR Part 15: February 2021

Code of federal regulations – Title 47 telecommunication - Part 15 - Radio frequency devices

FCC 47 CFR Part 15.247

Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

RSS 247 Issue 2: February 2017

Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

ANSI C 63.4:2014

American National Standard for Methods of measurement of Radio-Noise from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI C 63.10: 2013

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

KDB 447498 D01

General RF Exposure Guidance V06

Although the product standard uses obsolete technical standards, the latest versions of standards achievable by the laboratory will be used for testing.

INFORMATIVE REFERENCES:

The following referenced documents are not necessary for the application of the present test report but they assist the user with regard to a particular subject area.

3. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

Test item description. : Valve position
Model/Type reference..... : SENSEA915A / SENSEA.VALV including SENSEAIO
Trade Mark. : EDGE TECHNOLOGIES
Serial number (S/N)..... : Not communicated
Part number (P/N). : Not communicated
Software version..... : *Not communicated*
Firmware version. : 1.2
Type of sample. : Pre-serial
Function(s)..... : Battery powered sensors family with long range communication ability (Valve position)
Manufacturer name. : EDGE TECHNOLOGIES SAS
Address. : 735 RUE DU LIEUTENANT PARAYRE
13290 - AIX EN PROVENCE
FRANCE

General product information:

N/A

3.2. EUT Marking plate

During tests, EUT did not have its marking plate.

3.3.EUT General view



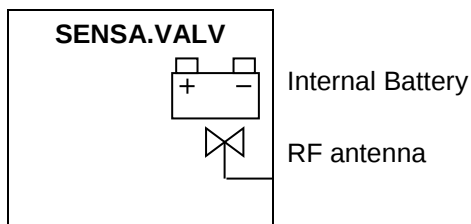
3.4.EUT Mechanical and Electrical Design

Power supply.....	: 3Vdc
Power supply range.....	: 2.4Vdc to 3.7Vdc
Power type.....	: DC
Power (W).....	: 0.375
Nominal current (A).	: 0.125
Dimensions (L x W x H) (m).	: 0.06 x 0.06 x 0.12
Weight (kg).	: 1
Temperature range (°C).	: -40 to +85
Ground bounding strap.....	: No

Comments:

N/A

3.5. EUT Input/Output ports



PORT	NAME	TYPE	LENGTH	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	Metallic	N/A
1	Internal Battery	DC	N/A	N/A	3V _{DC}
2	RF antenna	RF	N/A	N/A	902MHz to 928MHz

AC/DC : AC/DC Converter port AC.....: Alternative current port DC.....: Discontinuous current port
I/O: Input or Output port TP: Telecommunication port RF: Radio frequency port
N/E: Non Electrical port

3.6. EUT Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	Transceiver
Technology	SRD
Environmental profile.....	Data transmissions
Temperature range.....	-40°C to +85°C
Antenna type	Internal
Antenna Gain.....	-2 dBi
Comments: N/A	
b) TRANSMITTER PARAMETERS (Tx)	
Frequency bands.....	902.3 MHz to 914.9 MHz
RF Power.....	Not communicated
Number of channels / Separation.....	64 channels / 125 kHz
Modulation type	LoRa
Duty cycle	<1 %
Tested frequency.....	902.3 MHz (Low Channel) 908.25 MHz (Mid Channel) 914.9 MHz (High Channel)
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	902.3 MHz to 914.9 MHz
Category/Class	Not communicated
Bandwidth.....	Not communicated

4. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
SUBPART A - GENERAL			
Labeling requirements		N/P	15.19 / See certification documents
Information to user		N/P	15.21 / See certification documents
Home-built devices		N/A	15.23
Kits		N/A	15.25
Special Accessories		N/P	15.27 / See certification documents
Inspection by the Commission		N/A	15.29
Measurement standards		PASS	15.31
Test procedure for CPU boards and computer power supplies		N/A	15.32
Frequency range of radiated measurements		PASS	15.33
Measurement detector functions and bandwidths		PASS	15.35
Transition provisions for compliance with the rules		PASS	15.37 / See certification documents
SUBPART B – UNINTENTIONAL RADIATORS			
Equipment authorization			15.101
- Verification		N/A	
- Declaration of Conformity		N/A	
CPU boards and power supplies used in personal computers		N/A	15.102
Exempted device		N/A	15.103
Information to the user		N/P	15.105 / See certification documents
Conducted limits		N/A	15.107 / Battery powered equipment
Radiated emission limits	Class B	PASS	15.109
Antenna power conduction limits for receivers		N/A	15.111
Power line carrier systems		N/A	15.113
TV interface devices, including cable system terminal devices		N/A	15.115
TV broadcast receivers		N/A	15.117
Cable ready consumer electronics equipment		N/A	15.118
Program blocking technology requirements for TV receivers		N/A	15.120
Scanning receivers and frequency converters used with scanning receivers		N/A	15.121
Labeling of digital cable ready products		N/A	15.123
SUBPART C –INTENTIONAL RADIATORS			

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
Equipment authorization requirement		PASS	15.201 / Transmitter part is subject to Certification procedure
Certified operating frequency range		N/A	15.202
Antenna requirement		PASS	15.203 / Dedicated integral antenna
External radio frequency power amplifiers and antenna modifications		N/A	15.204
Restricted bands of operation		PASS	15.204
Conducted limits	Class B	N/A	15.207 / Battery powered equipment
Radiated emission limits; general requirements	Class B	PASS	15.209
Tunnel radio systems		N/A	15.211
Modular transmitters		N/A	15.212
Cable locating equipment		N/A	15.213
Cordless telephones		N/A	15.214
Additional provisions to the general radiated emission limits		PASS	15.215
Operation within the band 902-928MHz, 2400-2483.5MHz and 5725-5850MHz			15.247
- Frequency hopping and digitally modulated		-	a)
- Frequency hopping system		PASS	a) (1) BW = 125kHz
- Digital modulation system		N/A	a) (2)
- Maximum peak conducted output power		-	b)
- For hopping system in the 2400-2483.5 MHz and 5725-5850 MHz bands		N/A	b) (1)
- For hopping system in the 902-928MHz band		PASS	b) (2) BW = 125kHz
- For system using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands		N/A	b) (3)
- Operation with directional antenna gains > 6 dBi		N/A	c)
- Out-of-band emissions		PASS	d)
- Power spectral density conducted		N/A	e)
- Hybrid system		N/A	f)
- Frequency hopping additional requirements		PASS	g)
- Frequency hopping intelligence		PASS	h)
- RF exposure compliance		PASS	i)

Sample subject to the test complies with the requirements of the reference document(s) listed in §2 of this test report and, where applicable, with deviation(s) 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.

Opinion(s) and interpretation(s): N/A

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		
Power spectral density	$\pm 2.3\text{dB}$	$\pm 3\text{ dB}$
Occupied bandwidth		
RF power	$\pm 3.8\%$	$\pm 5\%$
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 (ERP / EIRP / 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	$\pm 5.4\text{ dB}$	$\pm 6\text{ dB}$
Radiated emission (magnetic field)		
9kHz – 30MHz	$\pm 3\text{ dB}$	$\pm 6\text{ dB}$
Supply voltages	$\pm 3\%$	$\pm 3\%$
Temperature	$\pm 1\text{ }^{\circ}\text{C}$	$\pm 1\text{ }^{\circ}\text{C}$
Humidity	$\pm 5\%$	$\pm 5\%$
Time / Duty cycle	$\pm 4.4\%$	$\pm 5\%$
Adaptivity	$\pm 2.9\text{ dB}$	/
Conducted emission (FCC)		
(Artificial Mains Network) 150kHz – 30MHz	$\pm 3.4\text{ dB}$	$\pm 3.4\text{ dB}$
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 calculation of expanded uncertainty, the confidence interval is 95 % (k=2).

6. RF EXPOSURE

Maximum EIRP = 10.4 dBm (10.96 mW) at 902.3 MHz (see §7.3 of this document)

In accordance with KDB 447498 D01 General RF Exposure Guidance v06:

$$\text{PSD} = \text{EIRP} / (4 \cdot \pi \cdot R^2) = 1.06 / (4 \cdot \pi \cdot (20\text{ cm})^2) = 0.61\text{ mW/cm}^2$$

Limit= 1 mW/cm²

In accordance with RSS-102, Issue 5, Section 2.5.1., as EIRP is lower than 16.37 mW at 902.3 MHz, SAR exemption for ISED can be considered for a distance $\leq 5\text{cm}$.

7. TEST CONDITIONS AND RESULTS

7.1. Number of channels, 20 dB bandwidth, and average time of occupancy

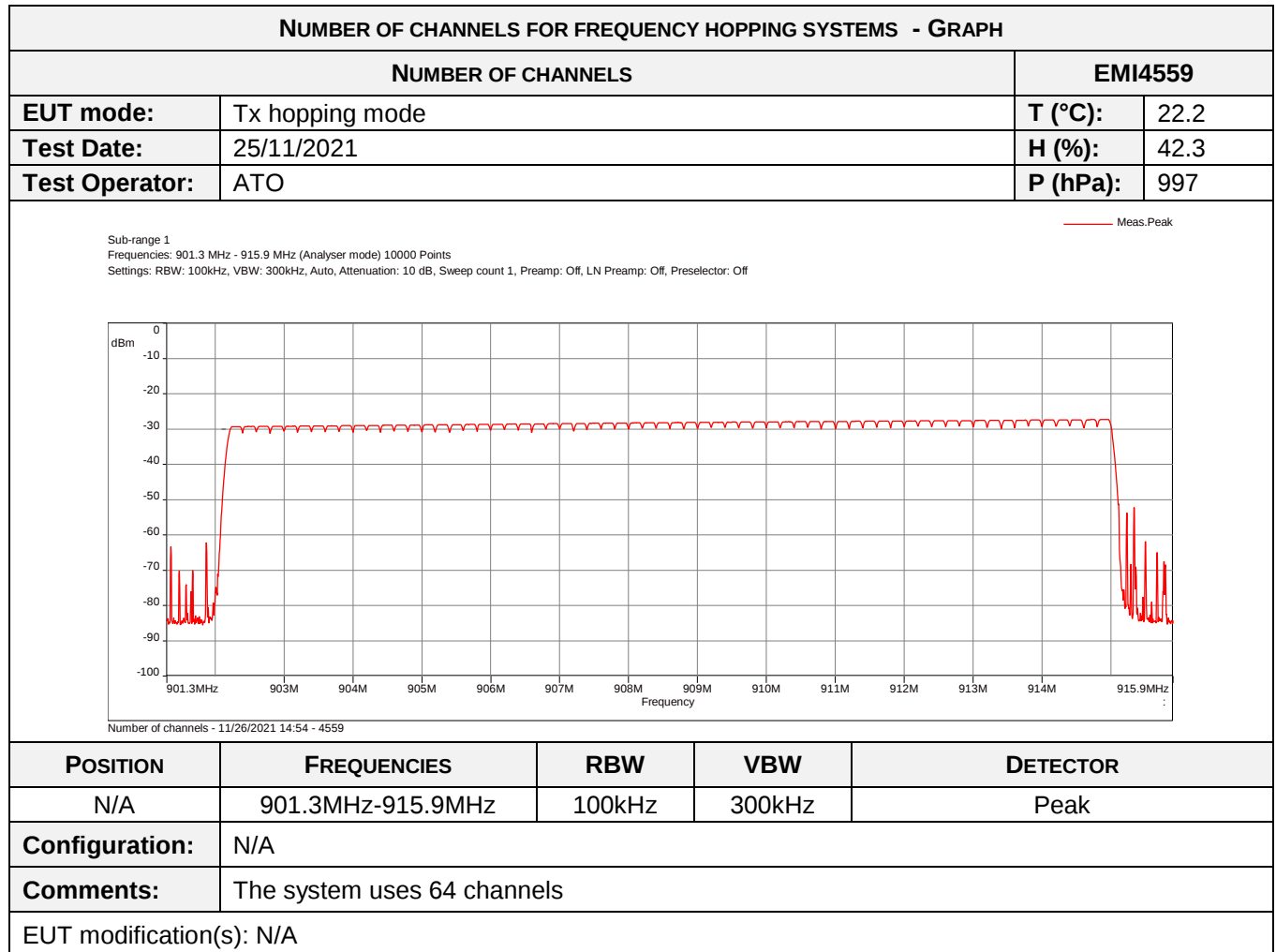
Reference standard:	FCC part 15 Radio part 15.247 and RSS 247
Test method:	ANSI C63.10: 2013
Test description: (a) (1) (i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.	

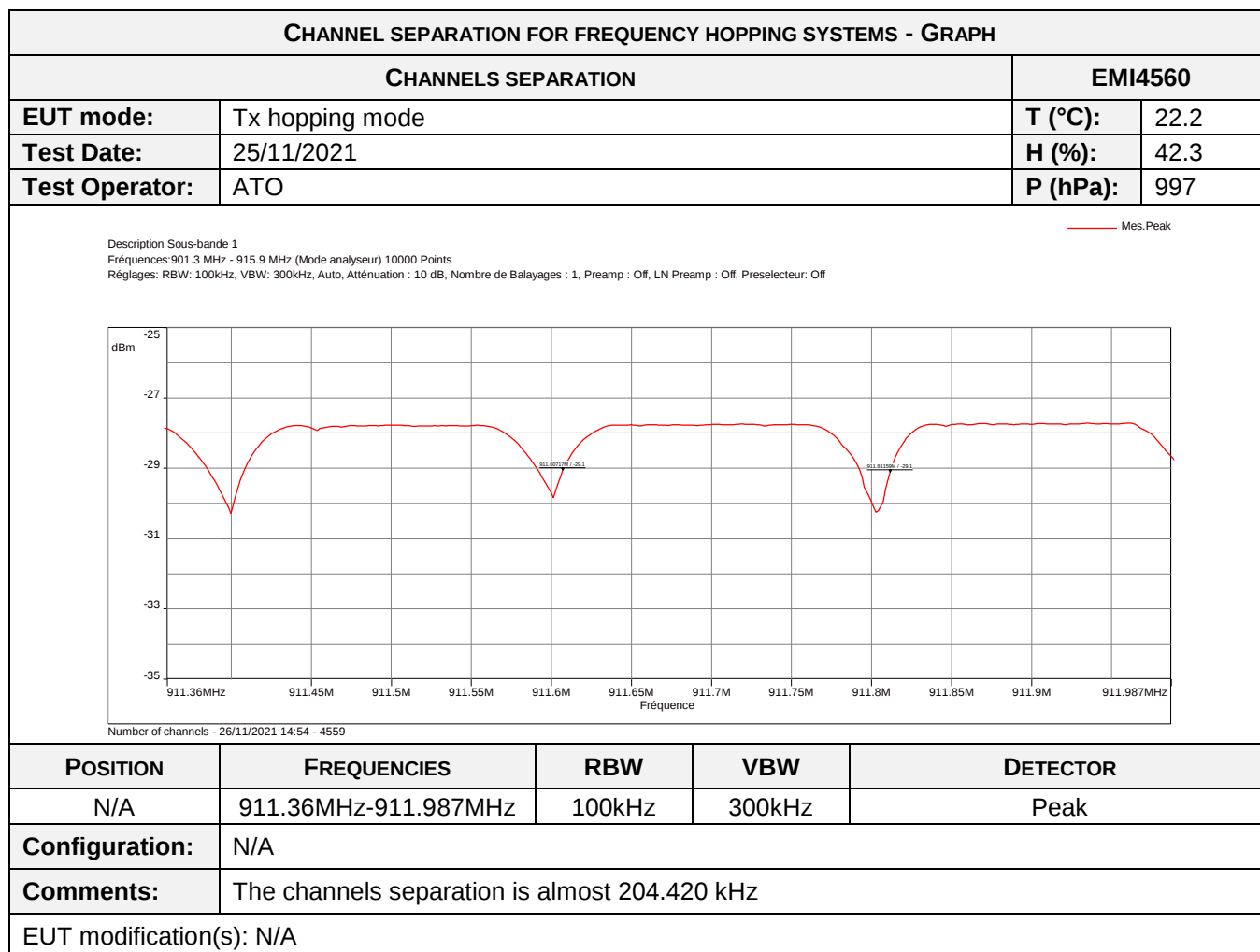
TESTED PARAMETER	RESULT	SEVERITY	RESULT TAB.	VERDICT
Number of channels	64 channels	≥ 50 channels	EMI4559	PASS
Channels separation	204.420 kHz	>146.8 kHz	EMI4560	PASS
20 dB bandwidth / Low channel	145.915 kHz	< 204.420 kHz	EMI5993	PASS
20 dB bandwidth / Mid channel	146.550 kHz	< 204.420 kHz	EMI5994	PASS
20 dB bandwidth / High channel	146.800 kHz	< 204.420 kHz	EMI5995	PASS
Average time of occupancy	291 ms / 20 s	≤ 400 ms / 20 s	EMI5996	PASS

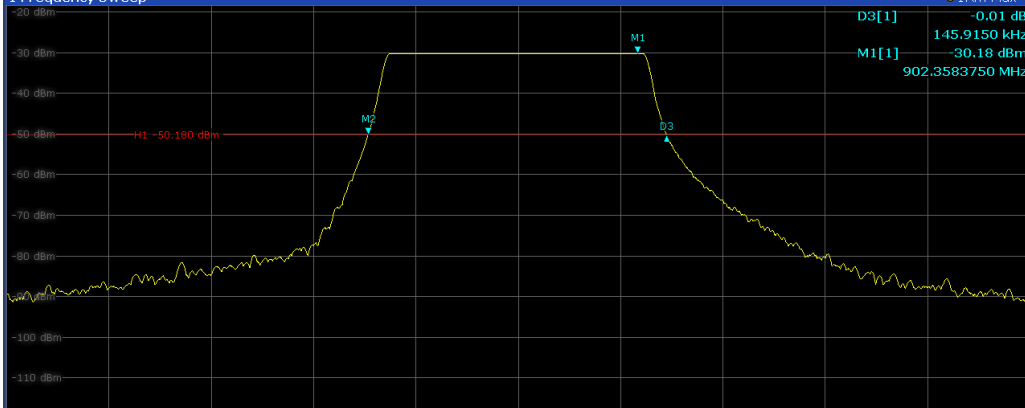
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	See Graph(es)
Relative Humidity	20 to 75 %	See Graph(es)
Atmospheric pressure	N/A	See Graph(es)
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HL223	3126	21/08/2021	21/10/2024
Attenuator	EMITECH	SUB.V2-V	14496	13/01/2021	13/03/2022
Cable	MegaPhase	F135N1N28	16666	24/10/2019	24/12/2021
Cable	MegaPhase	N-5m	14854	12/05/2020	12/07/2022
Cable	Huber + Suhner	SF102K	16042	24/03/2021	24/05/2023
Cable	MegaPhase	TM18-N1N1-118	12841	14/08/2020	14/10/2022
Receiver	Rohde & Schwarz	FSW43	14830	30/07/2020	30/03/2022
Shielded enclosure	RAY PROOF	C.V2	1423	04/10/2019	04/12/2022
Software	Nexio	BAT EMC	0000		
Thermohygrometer	Testo	608-H1	7562	09/06/2021	09/08/2023
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

Blank cells = Permanent validity

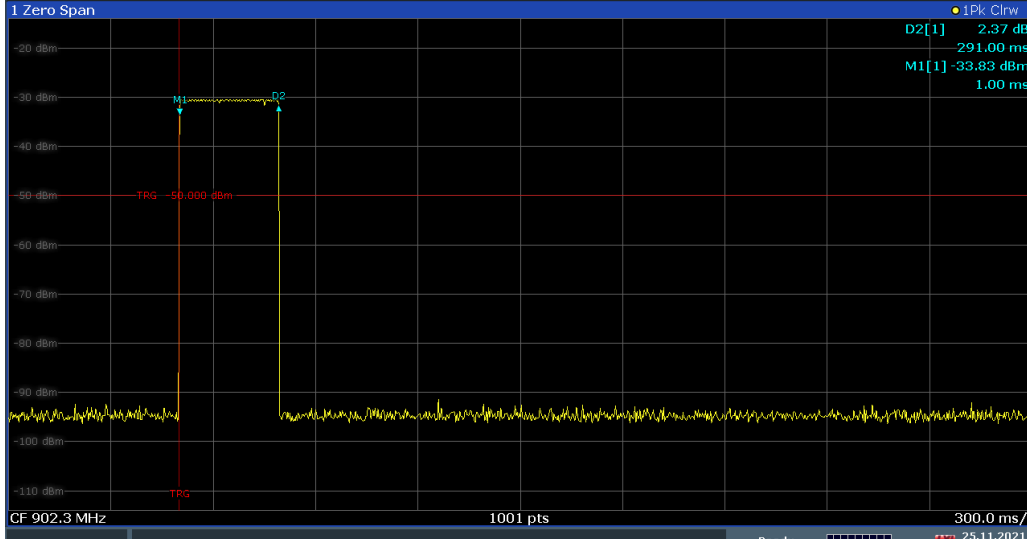
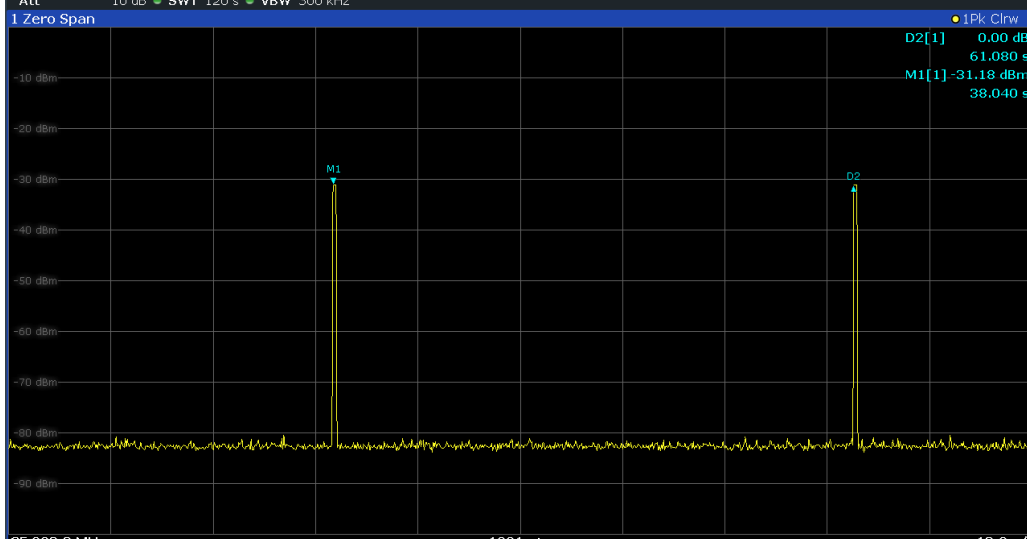




20 dB BANDWIDTH FOR FREQUENCY HOPPING SYSTEMS - GRAPH																																
LOW CHANNEL			EMI5993																													
EUT mode:	Tx mode		T (°C):	21.0																												
Test Date:	24/11/2021		H (%):	39.8																												
Test Operator:	MPA		P (hPa):	1008																												
MultiView Spectrum Ref Level -18.40 dBmAtt 0 dBSWT 10 msRBW 5 kHzVBW 20 kHzMode Sweep 1 Frequency Sweep  D3[1]-0.01 dB145.9150 kHzM1[1]-30.18 dBm902.3583750 MHz CF 902.3 MHz10000 pts50.0 kHz/Span 500.0 kHz 2 Marker Table <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-Value</th><th>Y-Value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td></td><td>1</td><td>902.358375 MHz</td><td>-30.18 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>902.22656 MHz</td><td>-50.22 dBm</td><td></td><td></td></tr><tr><td>D3</td><td>M2</td><td>1</td><td>145.915 kHz</td><td>-0.01 dB</td><td></td><td></td></tr></tbody></table> Aborted24.11.2021 16:41:39					Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1		1	902.358375 MHz	-30.18 dBm			M2		1	902.22656 MHz	-50.22 dBm			D3	M2	1	145.915 kHz	-0.01 dB		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																										
M1		1	902.358375 MHz	-30.18 dBm																												
M2		1	902.22656 MHz	-50.22 dBm																												
D3	M2	1	145.915 kHz	-0.01 dB																												
Results:	The system has an OBW of 145.915 kHz																															
EUT modification(s): N/A																																

20 dB BANDWIDTH FOR FREQUENCY HOPPING SYSTEMS - GRAPH																																
MID CHANNEL			EMI5994																													
EUT mode:	Tx mode		T (°C):	21.0																												
Test Date:	24/11/2021		H (%):	39.8																												
Test Operator:	MPA		P (hPa):	1008																												
MultiView Spectrum Ref Level -18.40 dBm RBW 5 kHz Att 0 dB SWT 10 ms VBW 20 kHz Mode Sweep DC 1 Frequency Sweep 20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm -80 dBm -90 dBm -100 dBm -110 dBm H1 -48.390 dBm M2 M1 D3 D3[1] 0.03 dB 146.5500 kHz M1[1] -28.39 dBm 908.3046750 MHz CF 908.25 MHz 10000 pts 50.0 kHz/ Span 500.0 kHz 2 Marker Table <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-Value</th><th>Y-Value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>908.304675 MHz</td><td>-28.39 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>908.175975 MHz</td><td>-48.41 dBm</td><td></td><td></td></tr><tr><td>D3</td><td>M2</td><td>1</td><td>146.55 kHz</td><td>0.03 dB</td><td></td><td></td></tr></tbody></table> - Measuring... 24.11.2021 16:38:14					Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		908.304675 MHz	-28.39 dBm			M2	1		908.175975 MHz	-48.41 dBm			D3	M2	1	146.55 kHz	0.03 dB		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																										
M1	1		908.304675 MHz	-28.39 dBm																												
M2	1		908.175975 MHz	-48.41 dBm																												
D3	M2	1	146.55 kHz	0.03 dB																												
Results:	The system has an OBW of 146.550 kHz																															
EUT modification(s): N/A																																

20 dB BANDWIDTH FOR FREQUENCY HOPPING SYSTEMS - GRAPH				
HIGH CHANNEL			EMI5995	
EUT mode:	Tx mode		T (°C):	21.0
Test Date:	24/11/2021		H (%):	39.8
Test Operator:	MPA		P (hPa):	1008
MultiView Spectrum Ref Level -18.40 dBm Att 0 dB DC RBW 5 kHz SWT 10 ms VBW 20 kHz Mode Sweep 1 Frequency Sweep				

OCCUPANCTION TIME FOR FREQUENCY HOPPING SYSTEMS - GRAPH				
AVERAGE TIME OF OCCUPANCY			EMI5996	
EUT mode:	Tx mode		T (°C):	21.0
Test Date:	24/11/2021		H (%):	39.8
Test Operator:	MPA		P (hPa):	1008
MultiView Spectrum Ref Level -14.00 dBm Att 0 dB RBW 100 kHz SWT 3 s VBW 300 kHz TRG:VID SGL 1 Zero Span  CF 902.3 MHz1001 pts300.0 ms/Ready25.11.2021 10:41:33 MultiView Spectrum Ref Level 0.00 dBm Att 10 dB RBW 100 kHz SWT 120 s VBW 300 kHz 1 Zero Span SGL 1 Pk Clrw  CF 902.3 MHz1001 pts12.0 s/Ready25.11.2021 10:35:56				
Results:	The averaging time of occupancy on any channel is less than 0.4 seconds within a period of 20 seconds.			
	The EUT transmit during 0.291ms every 61 seconds on each channel.			
EUT modification(s): N/A				

7.2. Radiated spurious emissions

Reference standard:	FCC Part 15.109 & 15.209 and RSS 247
Test method:	ANSI C63.10: 2013
General test setup: For $f < 30\text{MHz}$, EUT is set on an insulating support at 80cm above the ground reference plane. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter in a semi-anechoic chamber. The EUT was rotated 360° in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°). Final measurements (quasi-peak) were then performed in a 10-meter Open Area Test Site that complies to CISPR 16 in the same measurement conditions. For $f > 30\text{MHz}$, EUT is set on an insulating support at 80cm above the ground reference plane (150cm for $f > 1\text{GHz}$). Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (quasi-peak or average) were then performed in a semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. The EUT was rotated 360° about its azimuth and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated, where applicable. For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Radiated measurement / All channels / Positions 1 / 0°	9kHz-30MHz	15.209	EMI4567	PASS
Radiated measurement / All channels / Positions 1 / 45°	9kHz-30MHz	15.209	EMI4568	PASS
Radiated measurement / All channels / Positions 1 / 90°	9kHz-30MHz	15.209	EMI4569	PASS
Radiated measurement / All channels / Positions 2 / 0°	9kHz-30MHz	15.209	EMI4571	PASS
Radiated measurement / All channels / Positions 2 / 45°	9kHz-30MHz	15.209	EMI4572	PASS
Radiated measurement / All channels / Positions 2 / 90°	9kHz-30MHz	15.209	EMI4573	PASS
Radiated measurement / All channels / Positions 3 / 0°	9kHz-30MHz	15.209	EMI4575	PASS
Radiated measurement / All channels / Positions 3 / 45°	9kHz-30MHz	15.209	EMI4576	PASS
Radiated measurement / All channels / Positions 3 / 90°	9kHz-30MHz	15.209	EMI4577	PASS
Radiated measurement / All channels / Position 1	30MHz-1GHz	15.209	EMI4561	PASS
Radiated measurement / All channels / Position 2	30MHz-1GHz	15.209	EMI4562	PASS
Radiated measurement / All channels / Position 3	30MHz-1GHz	15.209	EMI4563	PASS
Radiated measurement / for Freq $> 1\text{GHz}$ / Low Channel / Position 1	1GHz-10GHz	15.209	EMI4531	PASS
Radiated measurement / for Freq $> 1\text{GHz}$ / Low Channel / Position 2	1GHz-10GHz	15.209	EMI4532	PASS

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Radiated measurement / for Freq > 1GHz / Low Channel / Position 3	1GHz-10GHz	15.209	EMI4533	PASS
Radiated measurement / for Freq > 1GHz / Mid Channel / Position 1	1GHz-10GHz	15.209	EMI4541	PASS
Radiated measurement / for Freq > 1GHz / Mid Channel / Position 2	1GHz-10GHz	15.209	EMI4542	PASS
Radiated measurement / for Freq > 1GHz / Mid Channel / Position 3	1GHz-10GHz	15.209	EMI4543	PASS
Radiated measurement / for Freq > 1GHz / High Channel / Position 1	1GHz-10GHz	15.209	EMI4535	PASS
Radiated measurement / for Freq > 1GHz / High Channel / Position 2	1GHz-10GHz	15.209	EMI4536	PASS
Radiated measurement / for Freq > 1GHz / High Channel / Position 3	1GHz-10GHz	15.209	EMI4537	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	See Graph(s)
Relative Humidity	20 to 75 %	See Graph(s)
Atmospheric pressure	N/A	See Graph(s)
Test method deviation: N/A		
Supplementary information: From 9 kHz to 30MHz: limit indicated on the curves is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor. From 30MHz to 1GHz Quasi peak limit provided is the limit given in §15.209. Above 1GHz average limit in restricted bands §15.205 is 54dBµV/m. Otherwise, the limit is 20dB under carrier emission level at 3m without averaging.		

TEST EQUIPMENT USED – 9 KHz TO 30 MHz					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HFH2-Z2	5825	24/04/2020	24/06/2022
Cable	SUCOFLEX	N-6,5m	14380	23/08/2021	23/10/2023
Cable	MegaPhase	N-8m	15813	14/01/2021	14/03/2023
Cable	MegaPhase	TM18-N1N1-118	12842	02/12/2020	02/02/2023
Receiver	Rohde & Schwarz	ESW26	17791	14/04/2021	14/06/2022
Shielded enclosure	COMTEST	SAC 3m	14494	02/10/2019	02/12/2022
Software	Nexio	BAT EMC	0000		
Thermohygrometer	Testo	608-H2	12269	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

BAT-EMC software version: V3.18.0.26

Blank cells = Permanent validity

TEST EQUIPMENT USED – 30 MHz TO 10 GHz					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	23/07/2019	23/09/2022
Antenna	Electro Metrics	BIA-30HF	0824	21/08/2021	21/10/2024
Antenna	Rohde & Schwarz	HL223	3126	21/08/2021	21/10/2024
Attenuator	EMITECH	SUB.V2-H	14495	13/01/2021	13/03/2022
Attenuator	EMITECH	SUB.V2-V	14496	13/01/2021	13/03/2022
Cable	MegaPhase	F135N1N28	16664	24/10/2019	24/12/2021
Cable	MegaPhase	F135N1N28	16666	24/10/2019	24/12/2021

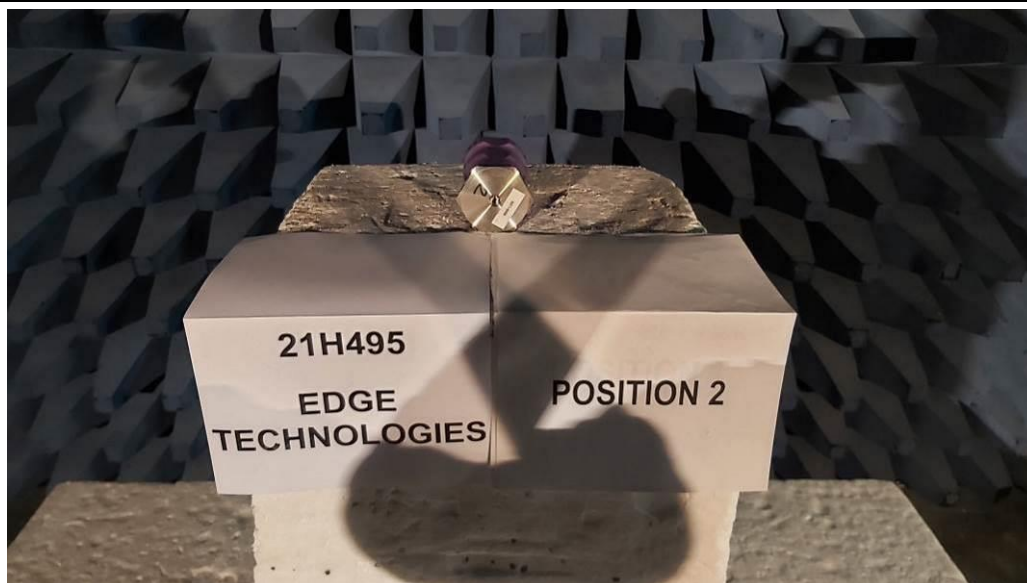
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Cable	/	N-1m	3626	27/01/2021	27/03/2023
Cable	SUCOFLEX	N-3m	14378	23/08/2021	23/10/2023
Cable	SUCOFLEX	N-3m	14379	23/08/2021	23/10/2023
Cable	MegaPhase	N-5m	14854	12/05/2020	12/07/2022
Cable	SUCOFLEX	N-6,5m	14380	23/08/2021	23/10/2023
Cable	MegaPhase	N-8m	15813	14/01/2021	14/03/2023
Cable	Huber + Suhner	SF102K	16042	24/03/2021	24/05/2023
Cable	MegaPhase	TM18-N1N1-118	12841	14/08/2020	14/10/2022
Cable	MegaPhase	TM18-N1N1-118	12842	02/12/2020	02/02/2023
Filter	Micro-Tronics	HPM18865	12843	24/08/2021	24/10/2023
Preamplifier	Techniwave	APS16-0087	14040	02/12/2020	02/02/2022
Receiver	Rohde & Schwarz	ESW26	17791	14/04/2021	14/06/2022
Receiver	Rohde & Schwarz	FSW43	14830	30/07/2020	30/03/2022
Shielded enclosure	RAY PROOF	C.V2	1423	04/10/2019	04/12/2022
Shielded enclosure	COMTEST	SAC 3m	14494	02/10/2019	02/12/2022
Software	Nexio	BAT EMC	0000		
Thermohygrometer	Testo	608-H1	7562	09/06/2021	09/08/2023
Thermohygrometer	Testo	608-H2	12269	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

BAT-EMC software version: V3.18.0.26

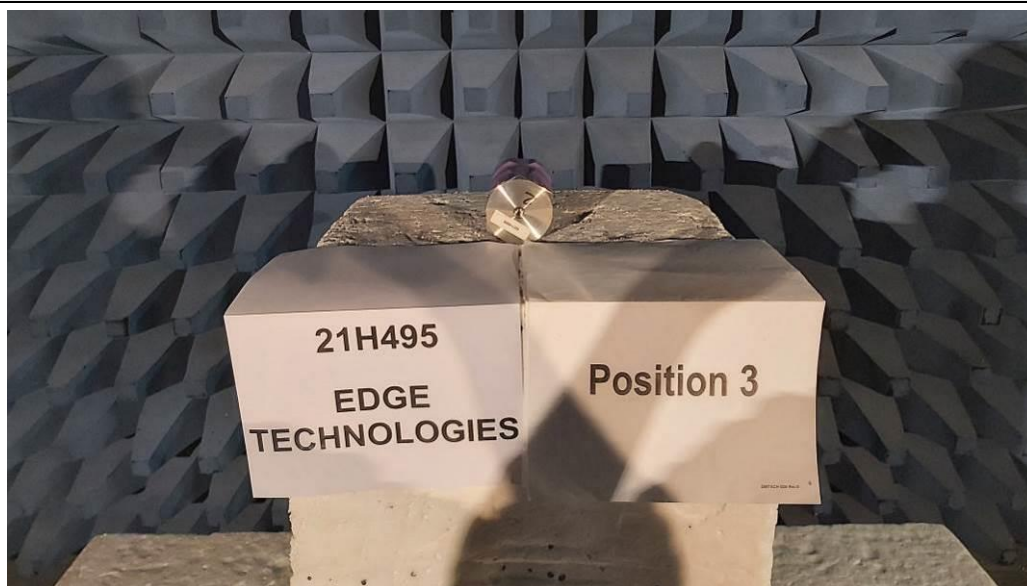
Blank cells = Permanent validity

TEST SETUP PHOTO(S) – RADIATED EMISSION LIMITS – POSITION 1


TEST SETUP PHOTO(S) – RADIATED EMISSION LIMITS – POSITION 2



TEST SETUP PHOTO(S) – RADIATED EMISSION LIMITS – POSITION 3



TEST SETUP PHOTO(S) – RADIATED EMISSION LIMITS – 9 KHz TO 30 MHz



TEST SETUP PHOTO(S) – RADIATED EMISSION LIMITS – 30 MHz TO 200 MHz



TEST SETUP PHOTO(S) – RADIATED EMISSION LIMITS – 200 MHz TO 1 GHz



TEST SETUP PHOTO(S) – RADIATED EMISSION LIMITS – 1 GHz TO 10 GHz

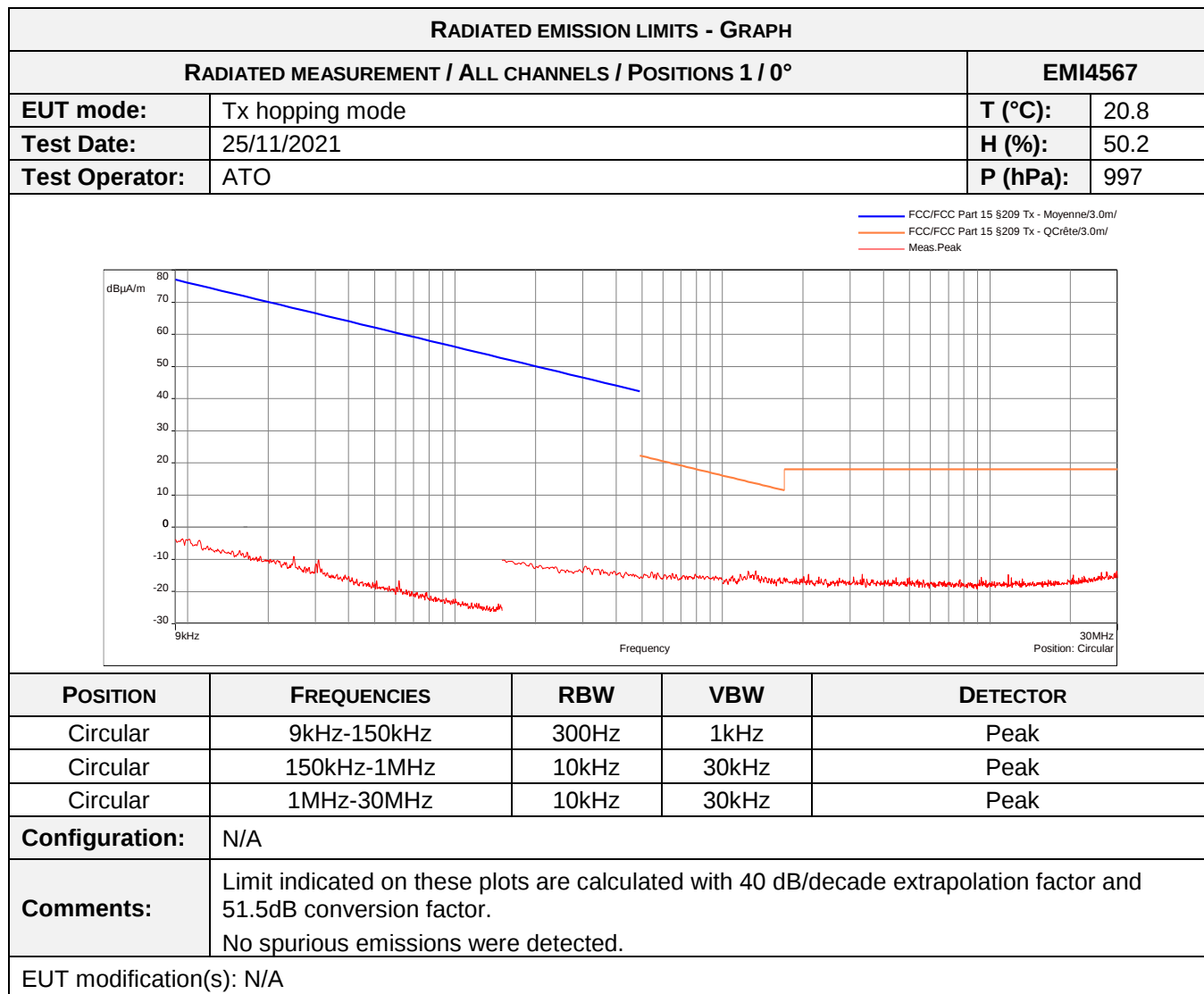


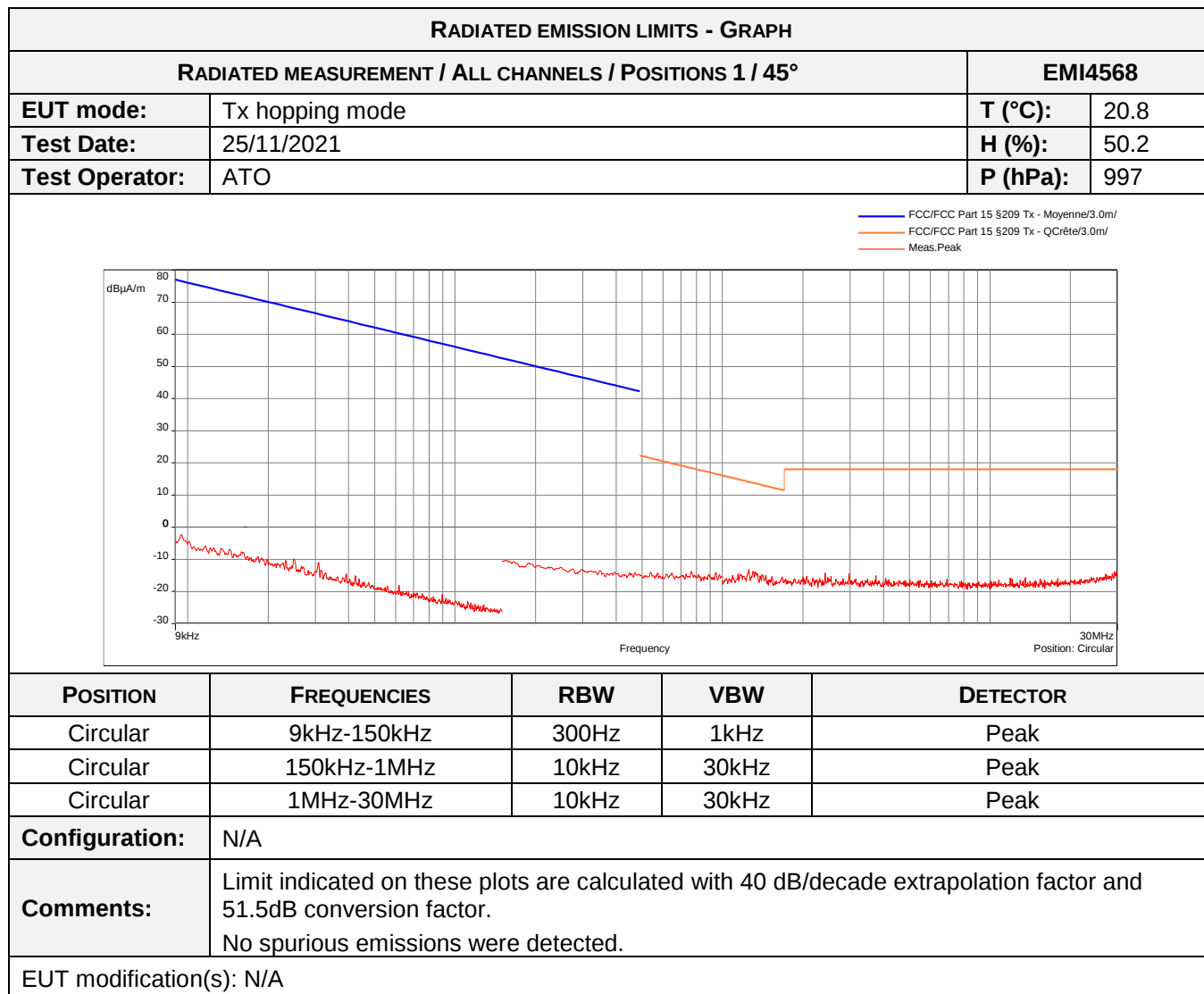
RADIATED EMISSION LIMITS – TABULATED RESULTS						
RADIATED MEASUREMENT / FOR FREQ < 1GHz / ALL CHANNELS						
FREQUENCY (MHz)	POLARIZATION	EUT POSITION	PEAK LEVEL (dB μ V/m)	AVERAGE / QPEAK LEVEL (dB μ V/m)	AVERAGE / QPEAK LIMIT (dB μ V/m)	MARGING (dB)
N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: No spurious emissions were detected.						

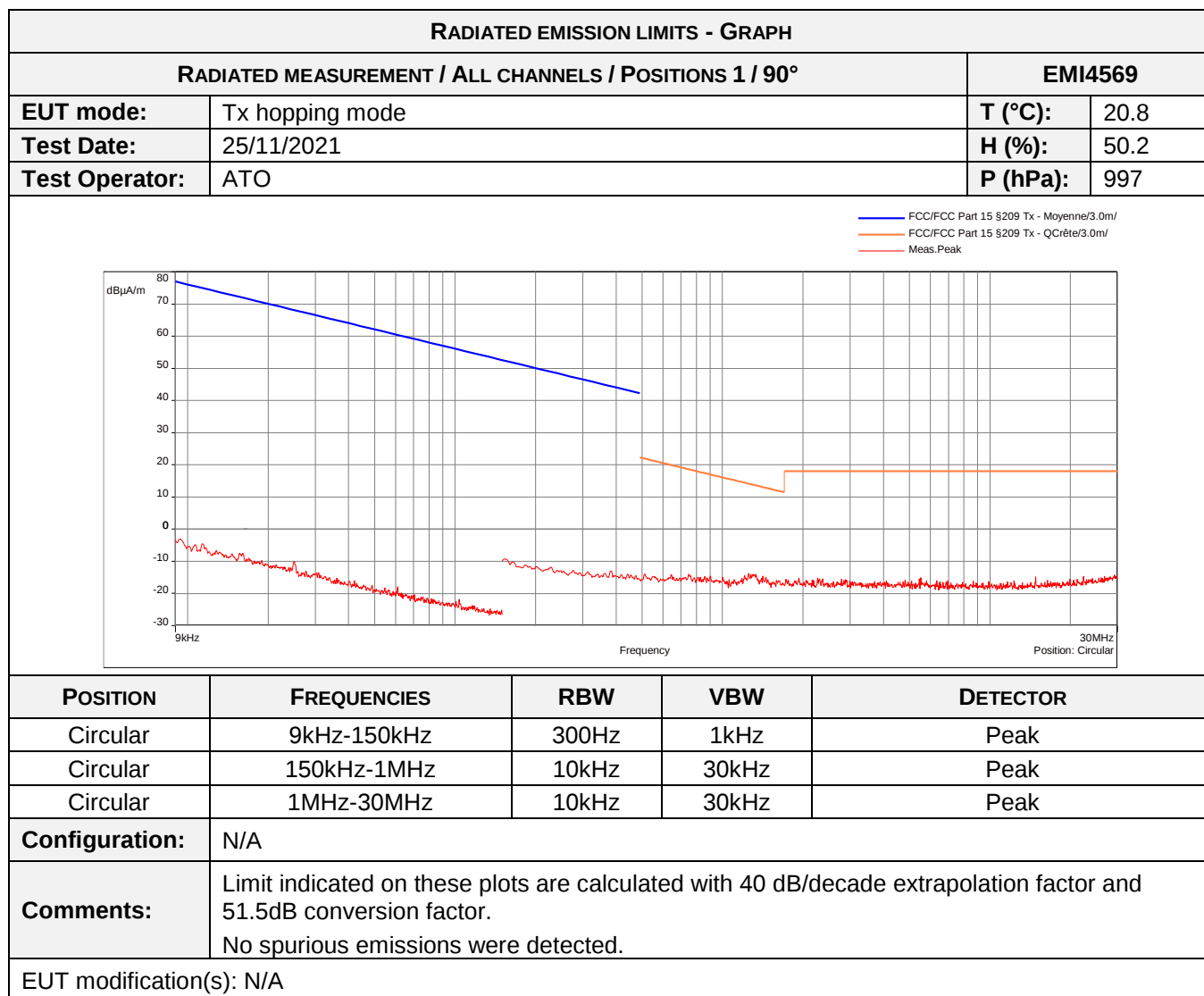
RADIATED EMISSION LIMITS – TABULATED RESULTS						
RADIATED MEASUREMENT / FOR FREQ > 1GHz / LOW CHANNEL						
FREQUENCY (MHz)	POLARIZATION	EUT POSITION	PEAK LEVEL (dB μ V/m)	AVERAGE LEVEL (dB μ V/m)	AVERAGE LIMIT (dB μ V/m)	MARGING
9023.0	Vertical	Position 1	50.42	45.15	54	-8.85
9023.0	Horizontal	Position 2	50.24	45.97	54	-8.03
2706.9	Vertical	Position 3	48.68	44.90	54	-9.10
Supplementary information: Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported						

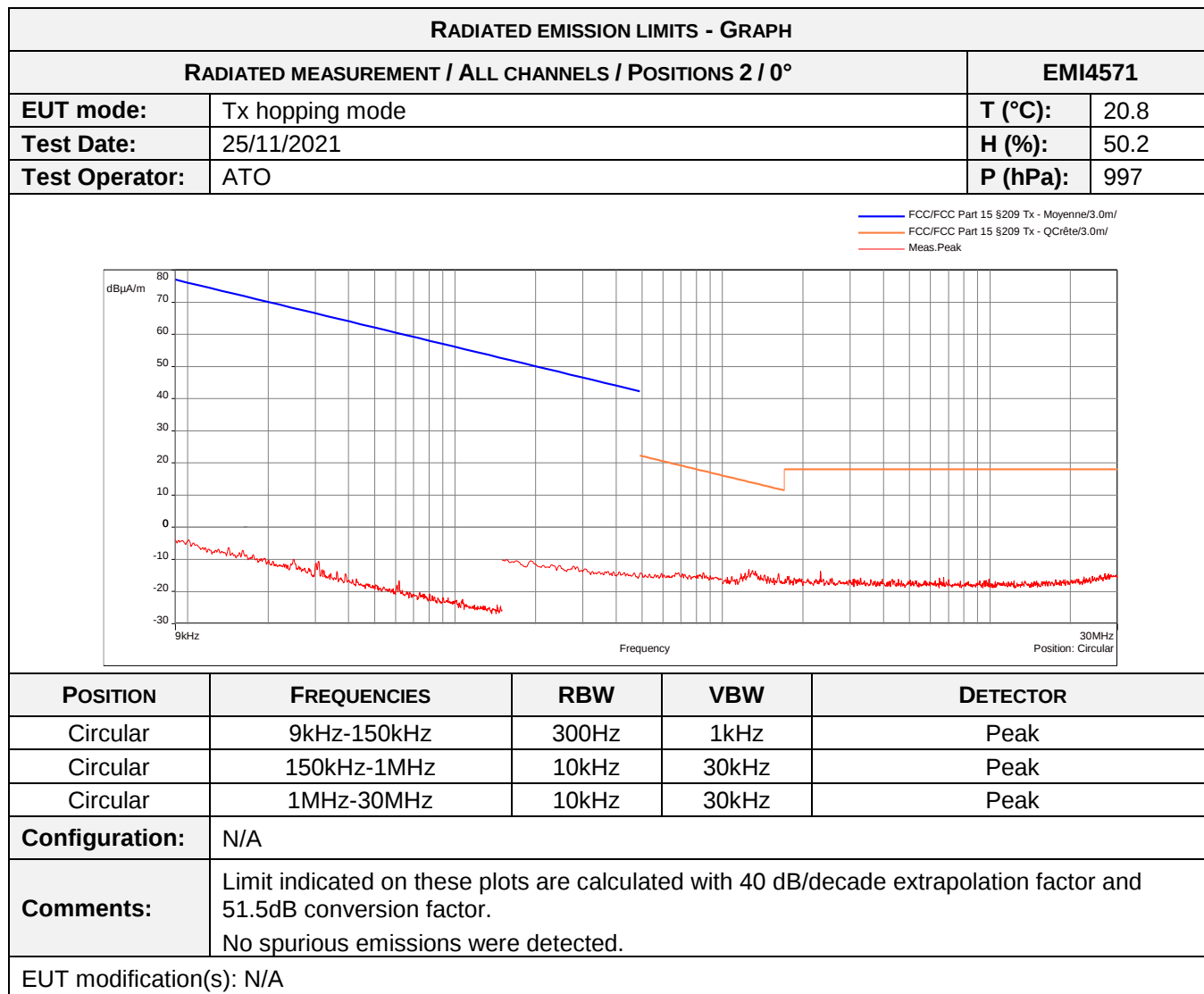
RADIATED EMISSION LIMITS – TABULATED RESULTS						
RADIATED MEASUREMENT / FOR FREQ > 1GHz / MID CHANNEL						
FREQUENCY (MHz)	POLARIZATION	EUT POSITION	PEAK LEVEL (dB μ V/m)	AVERAGE LEVEL (dB μ V/m)	AVERAGE LIMIT (dB μ V/m)	MARGING
7266.0	Vertical	Position 1	48.11	42.45	54	-11.55
9082.5	Vertical	Position 1	49.44	44.39	54	-9.61
7266.0	Horizontal	Position 2	49.17	43.34	54	-10.66
9082.5	Horizontal	Position 2	51.26	45.17	54	-8.83
2724.7	Vertical	Position 3	47.98	43.77	54	-10.23
4541.2	Horizontal	Position 3	47.57	41.67	54	-12.43
Supplementary information: Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported						

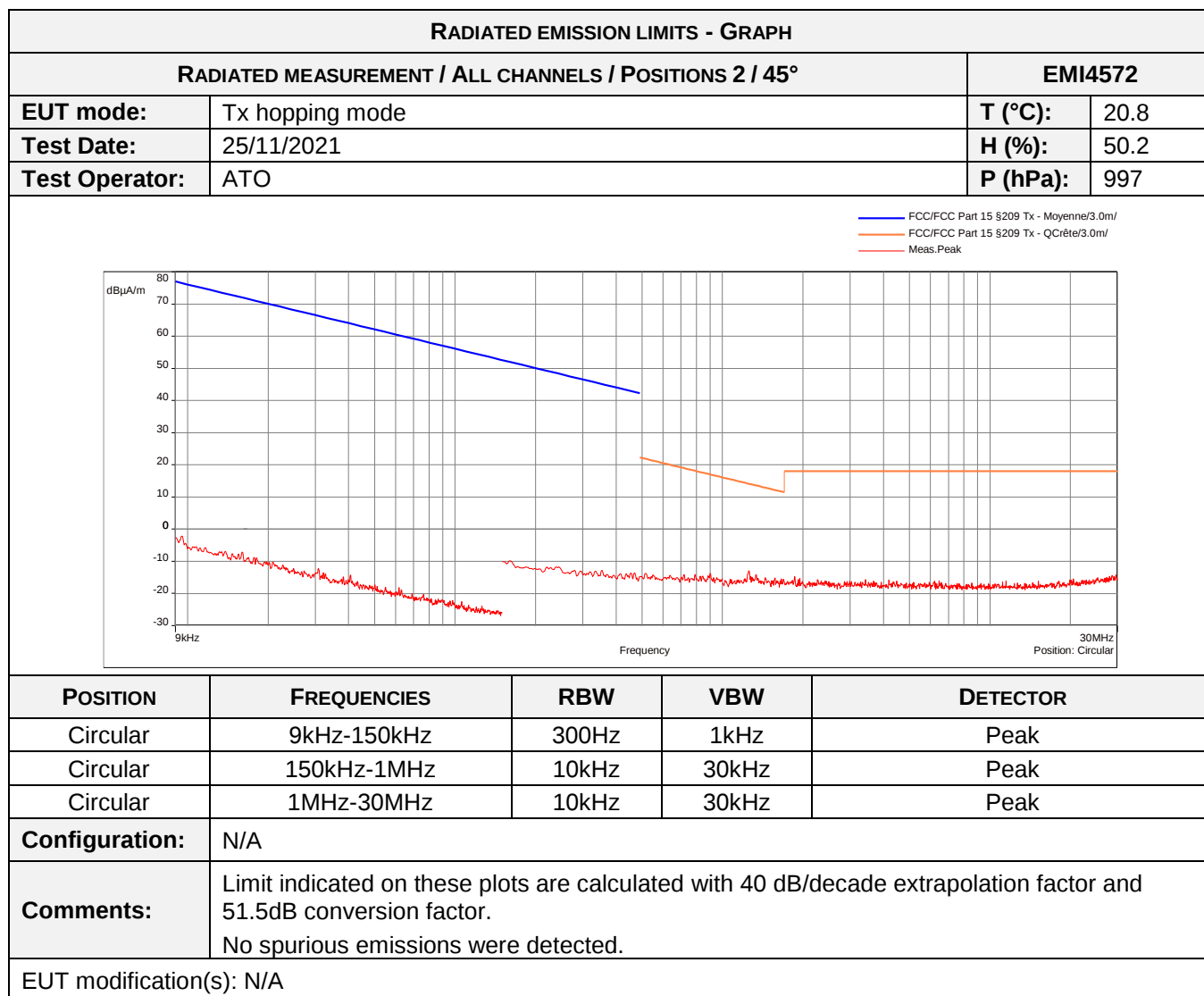
RADIATED EMISSION LIMITS – TABULATED RESULTS						
RADIATED MEASUREMENT / FOR FREQ > 1GHz / HIGH CHANNEL						
FREQUENCY (MHz)	POLARIZATION	EUT POSITION	PEAK LEVEL (dB μ V/m)	AVERAGE LEVEL (dB μ V/m)	AVERAGE LIMIT (dB μ V/m)	MARGING
8234.1	Vertical	Position 1	48.72	44.38	54	-9.62
8234.1	Horizontal	Position 2	51.00	48.19	54	-5.81
8234.1	Vertical	Position 3	51.28	47.95	54	-6.05
7319.2	Horizontal	Position 3	48.89	43.76	54	-10.24
8234.1	Horizontal	Position 3	49.25	45.92	54	-8.08
Supplementary information: Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported						

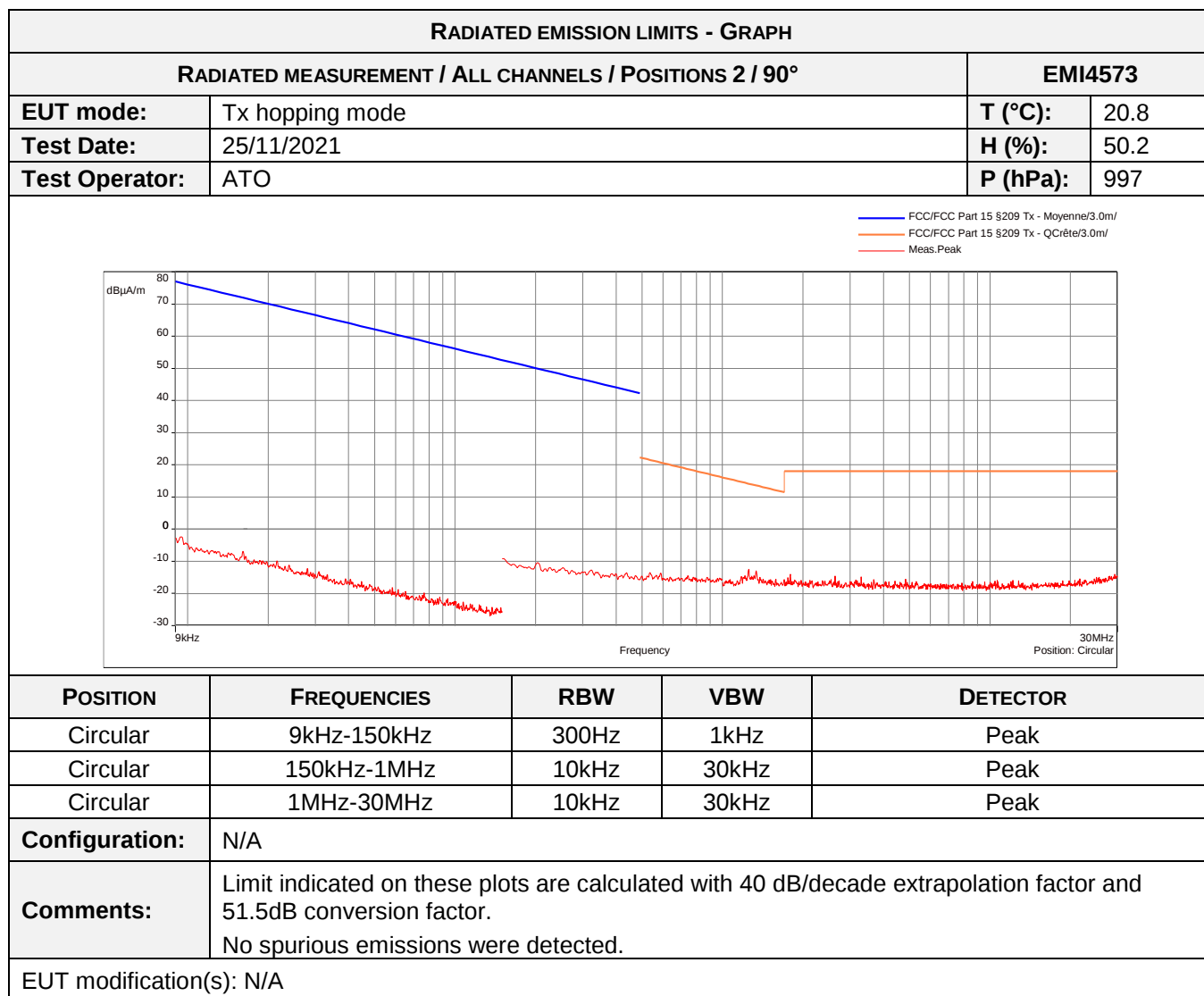


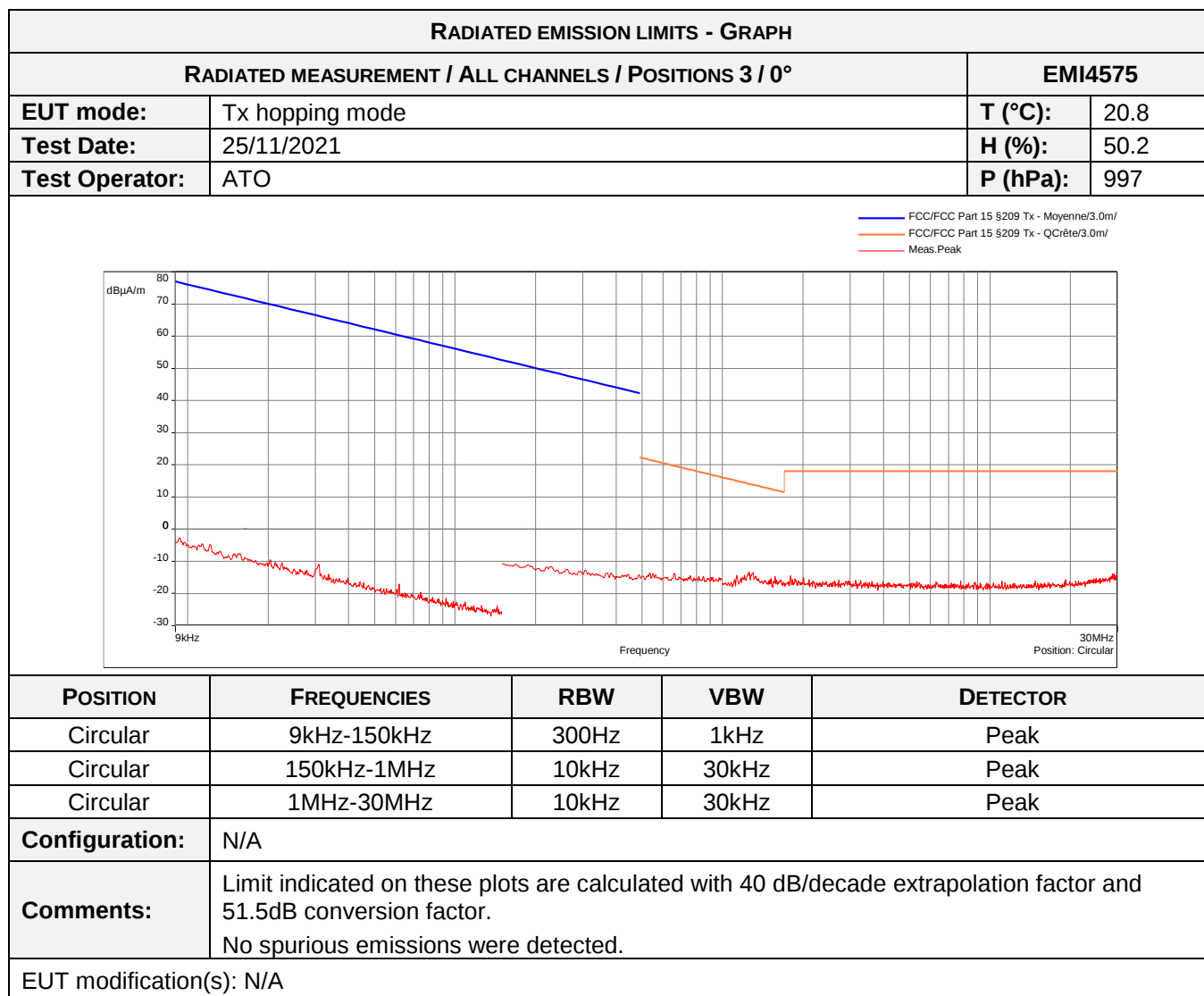


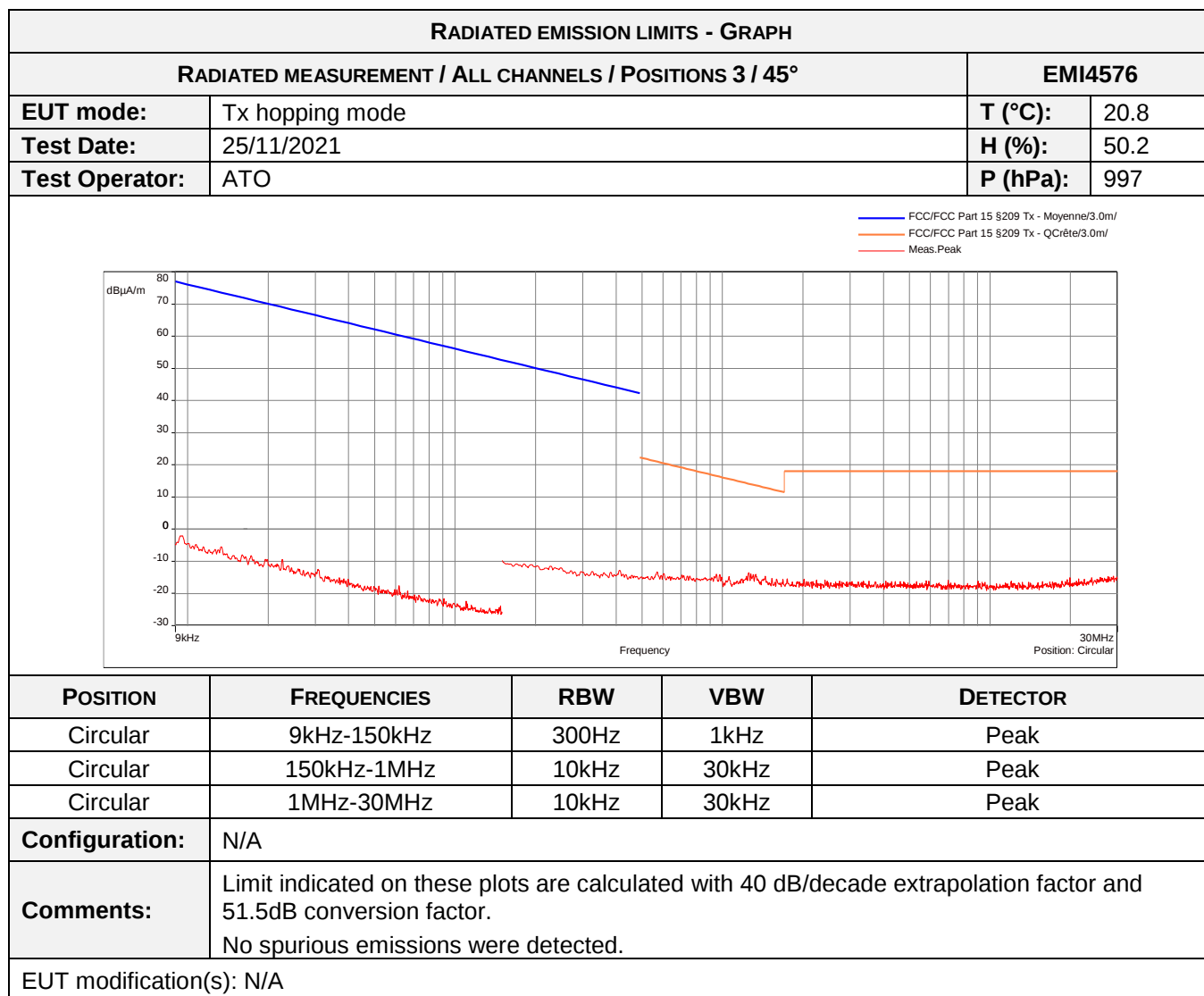


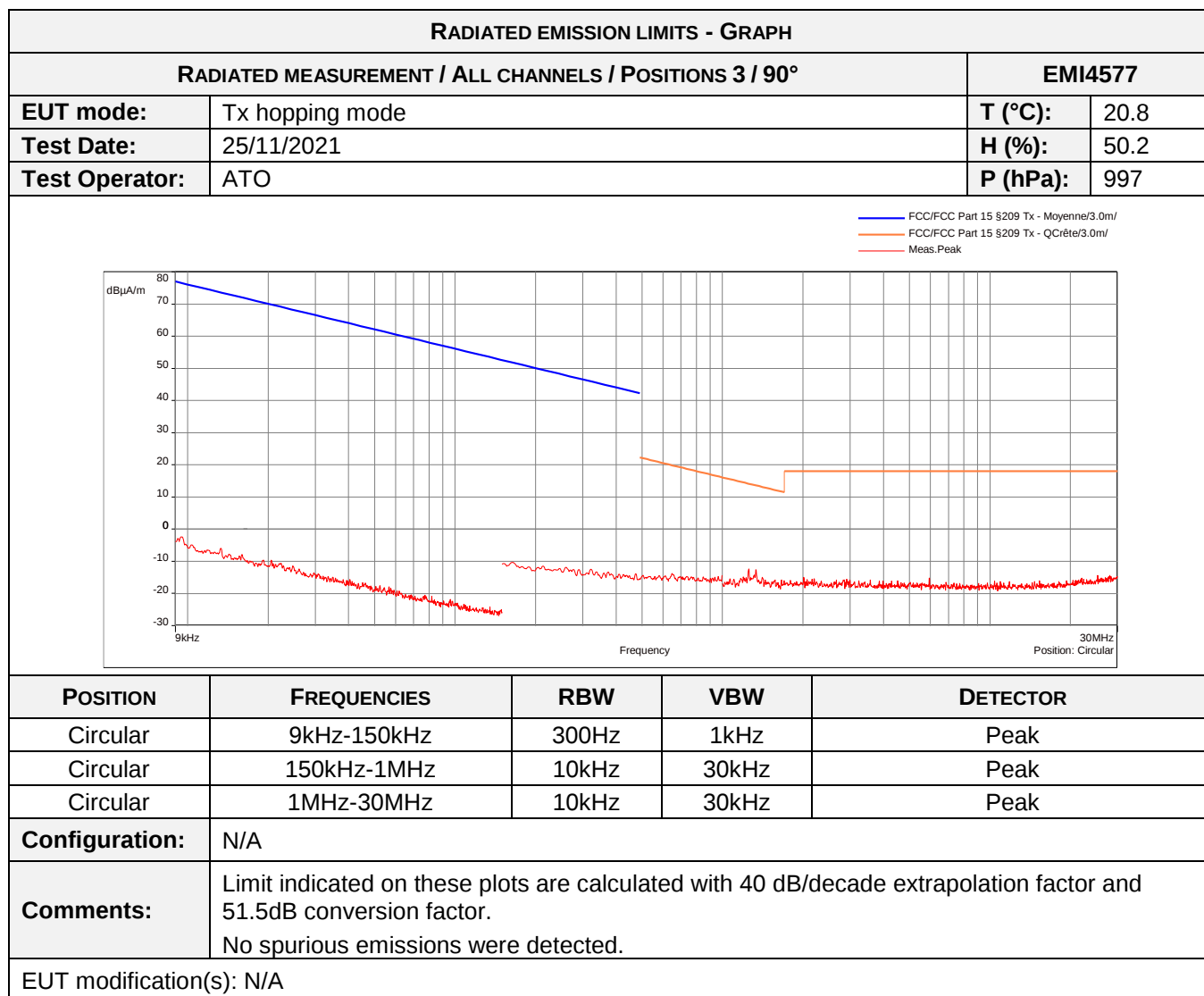


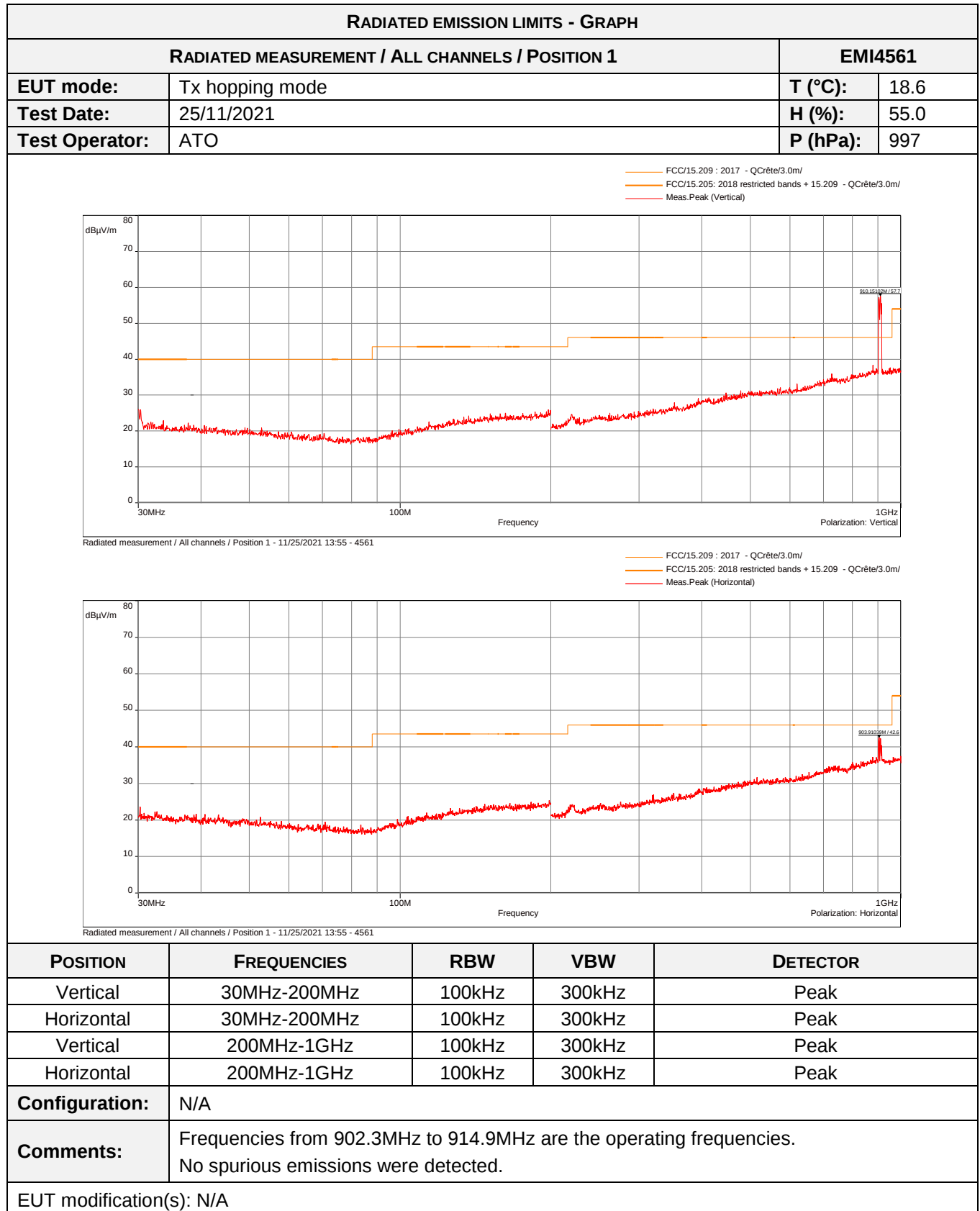


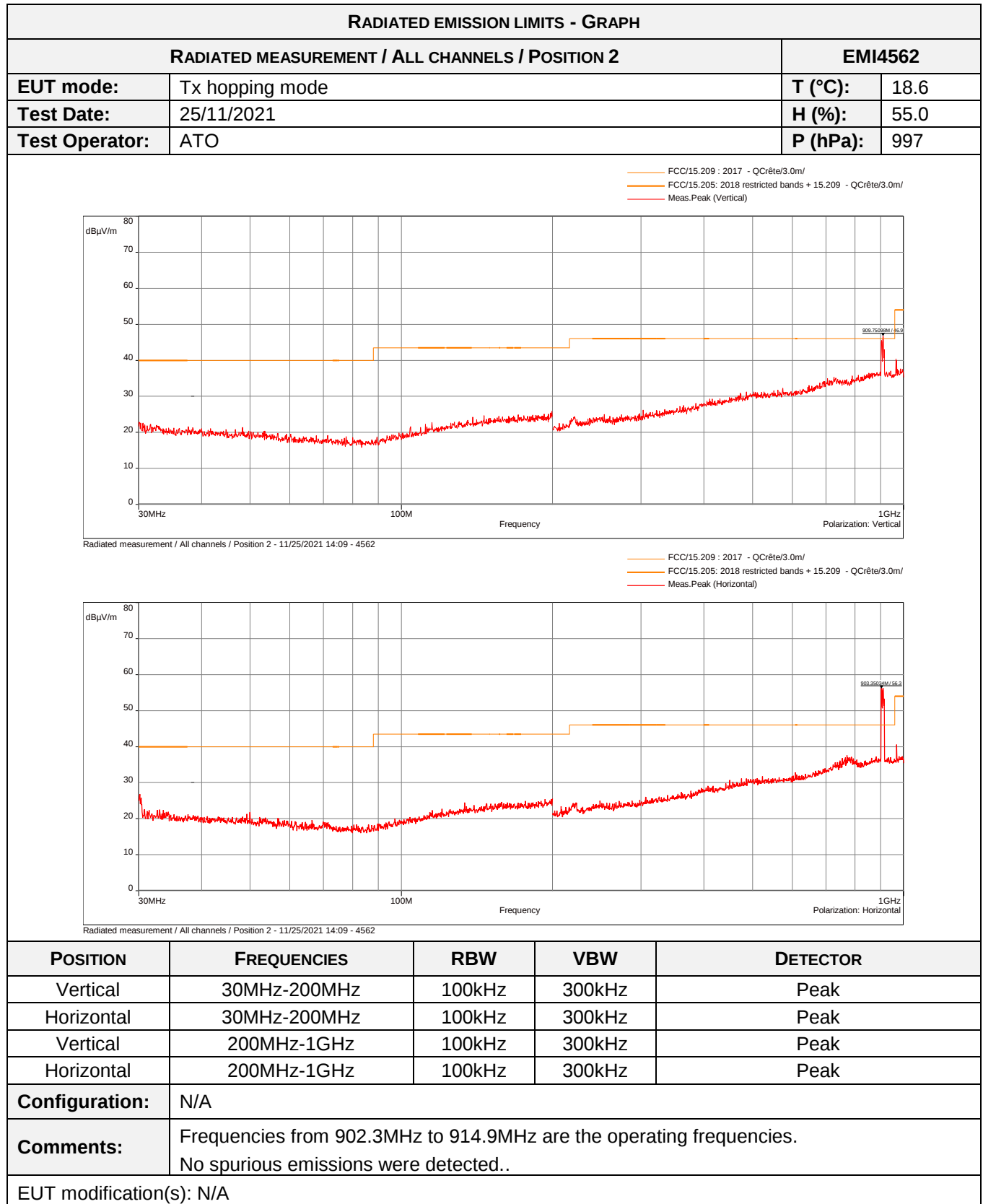


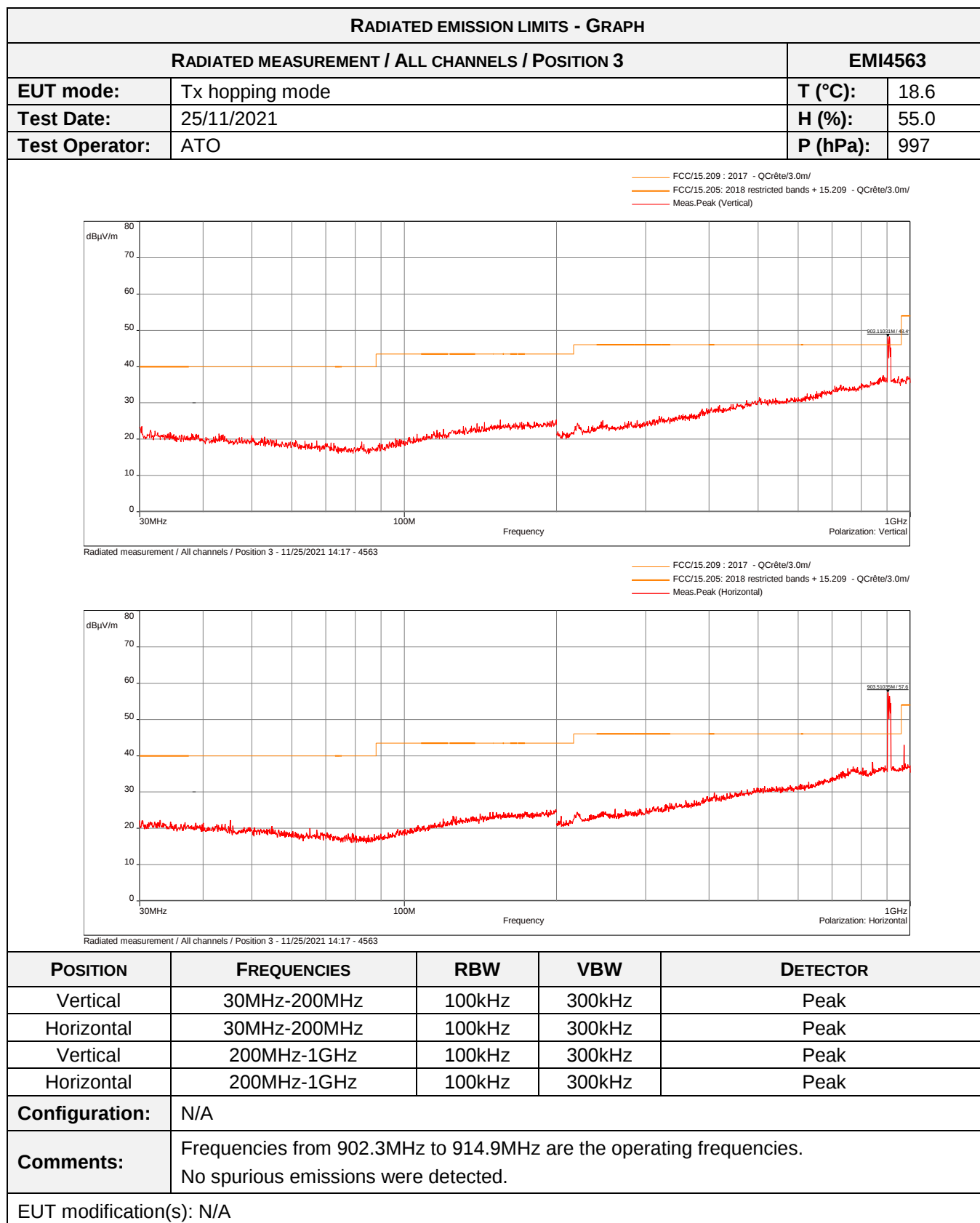


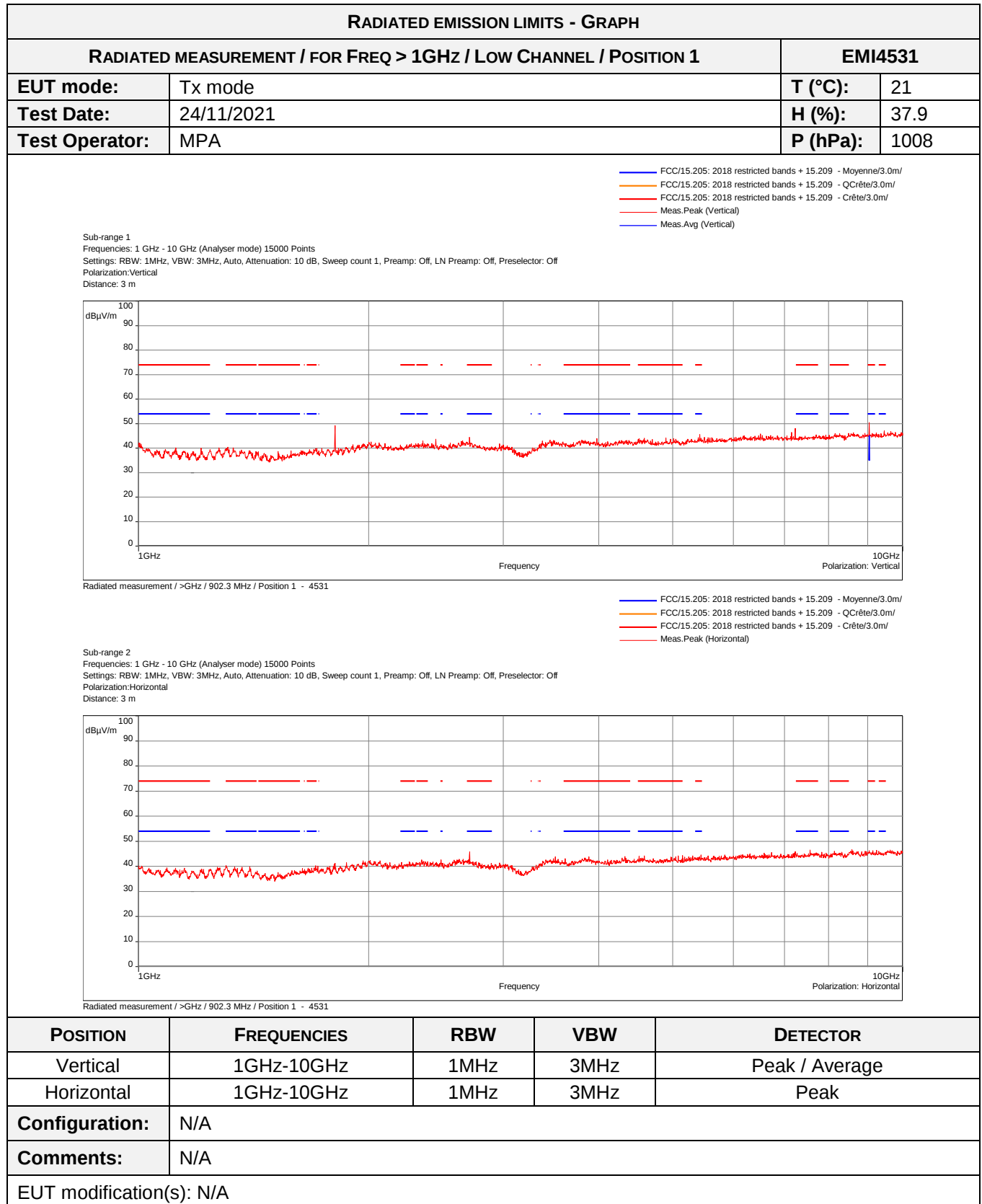


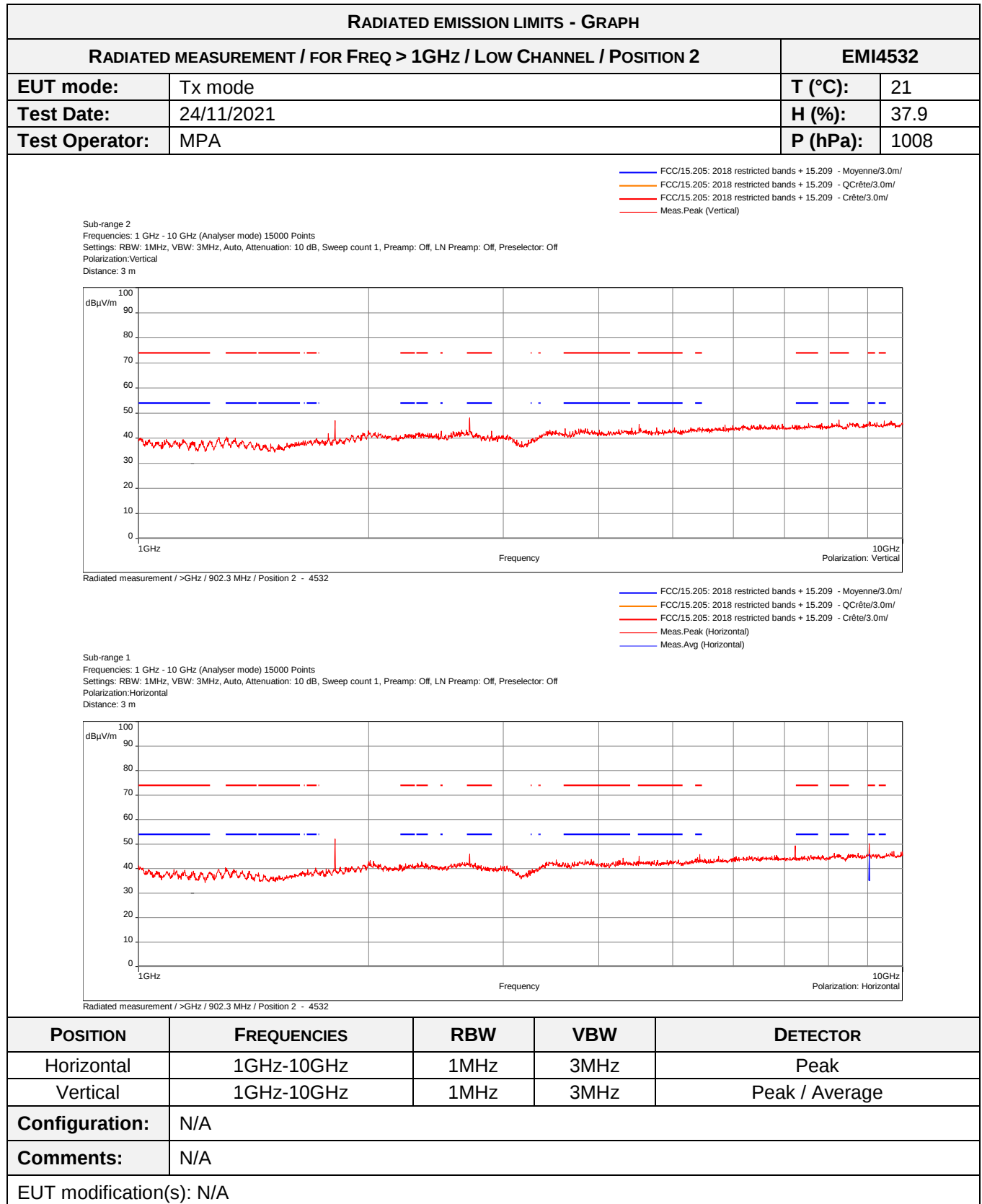


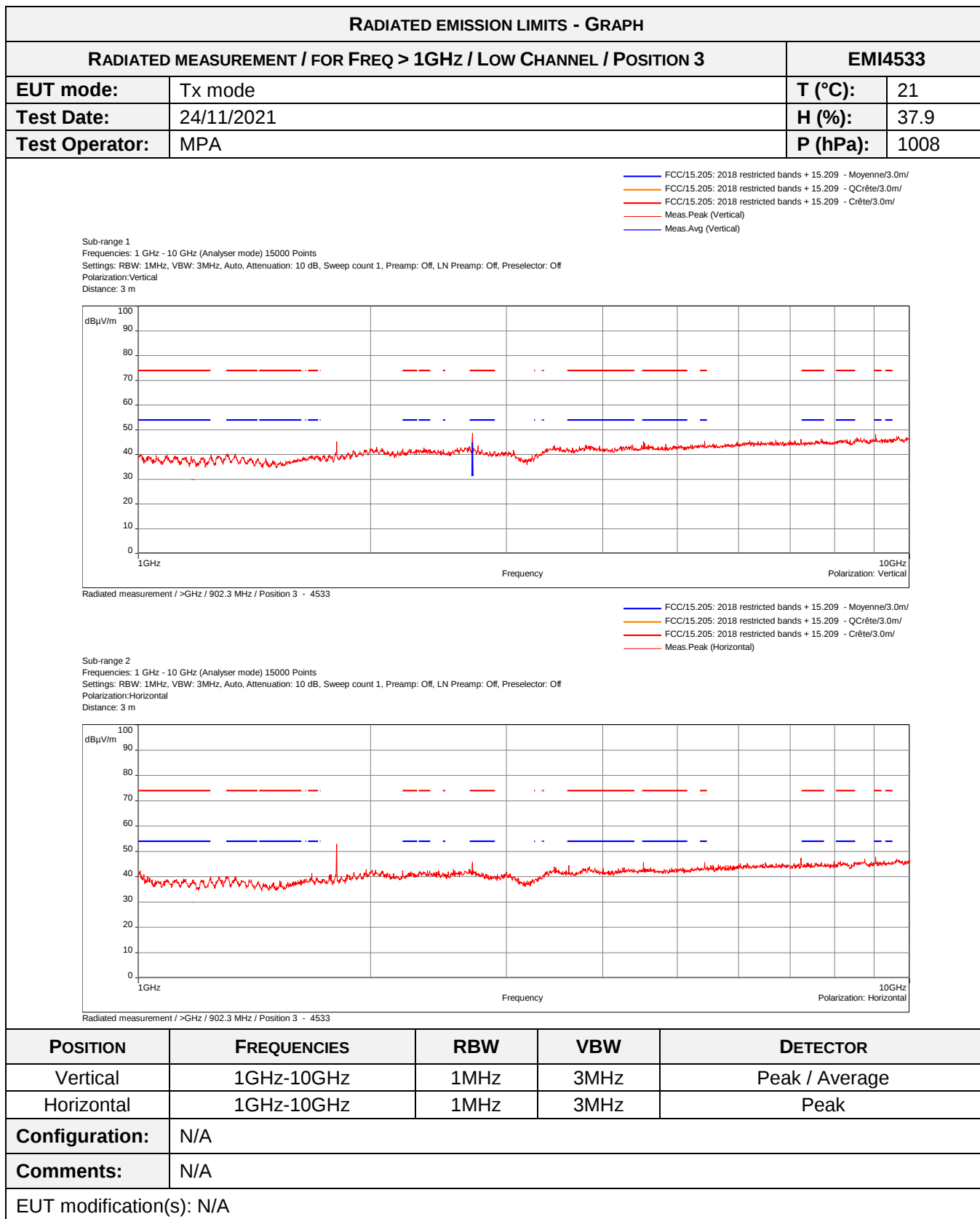


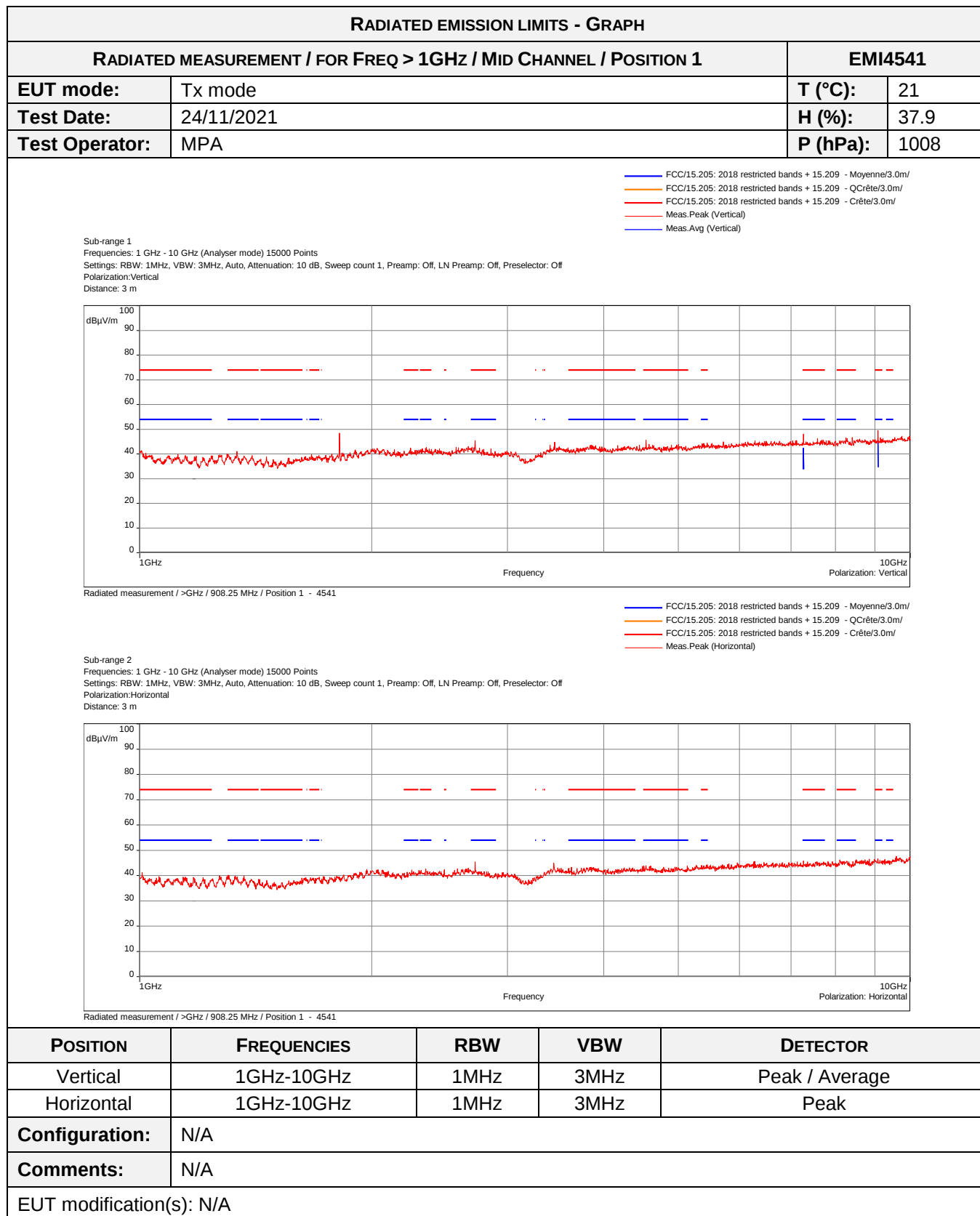


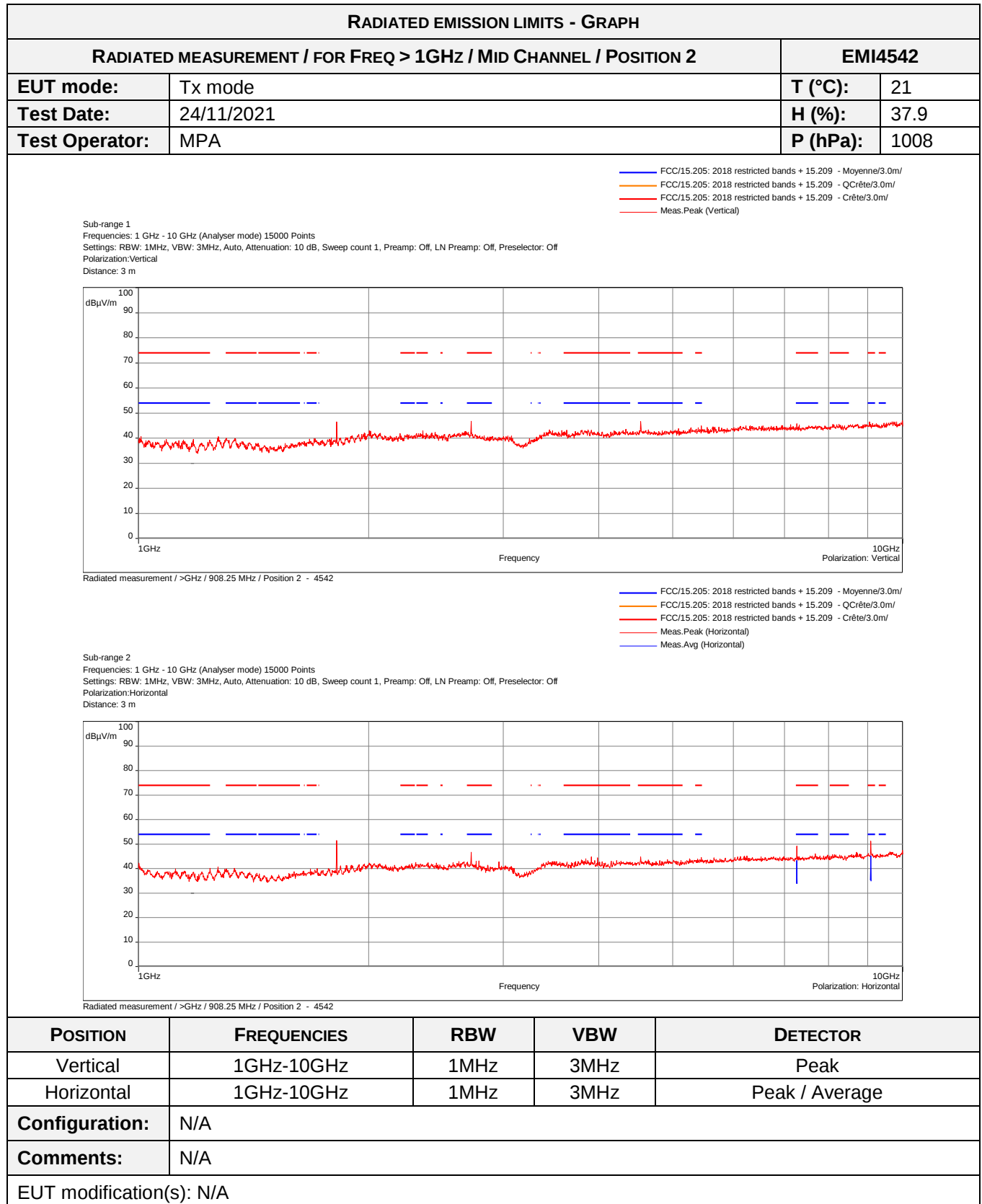


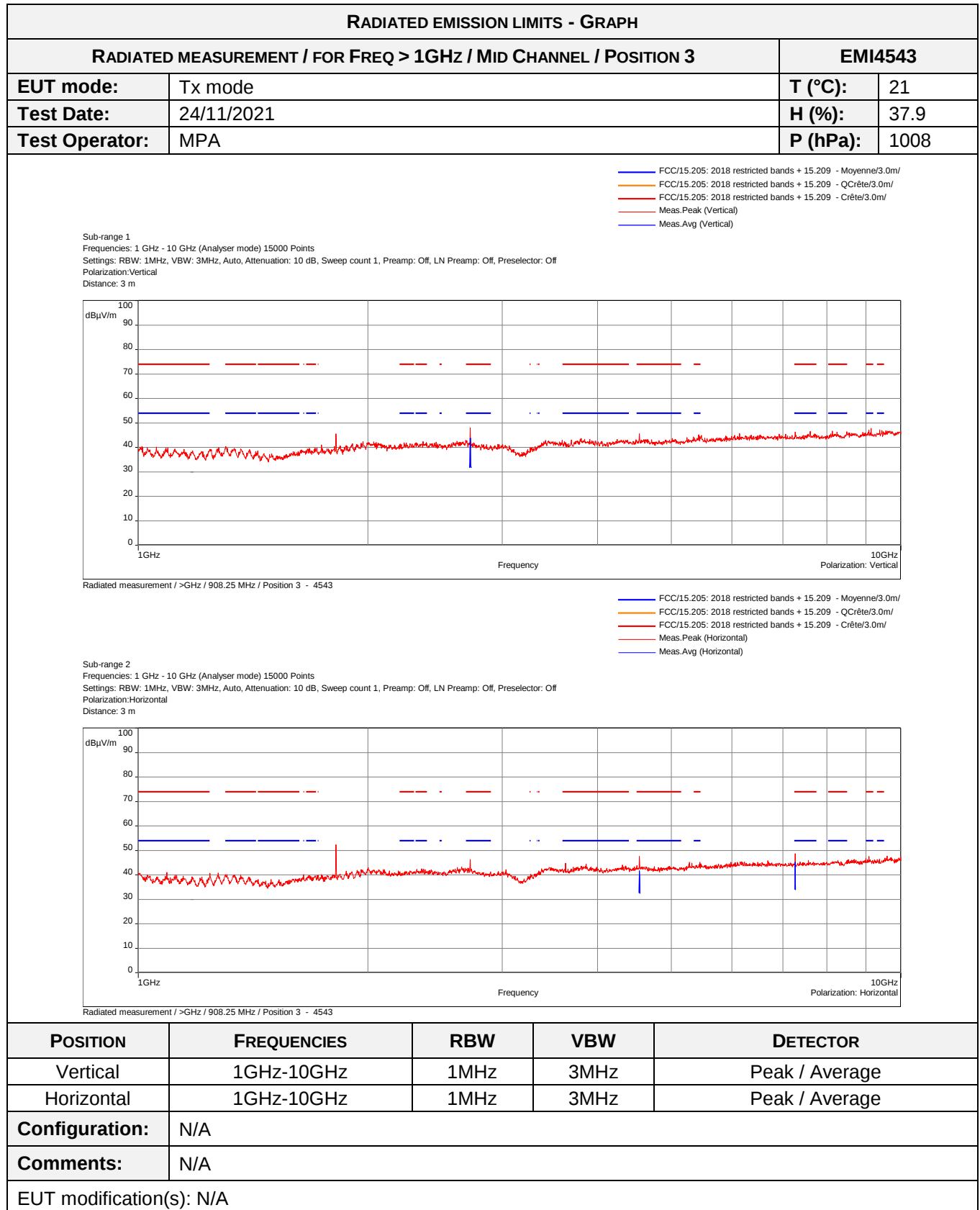


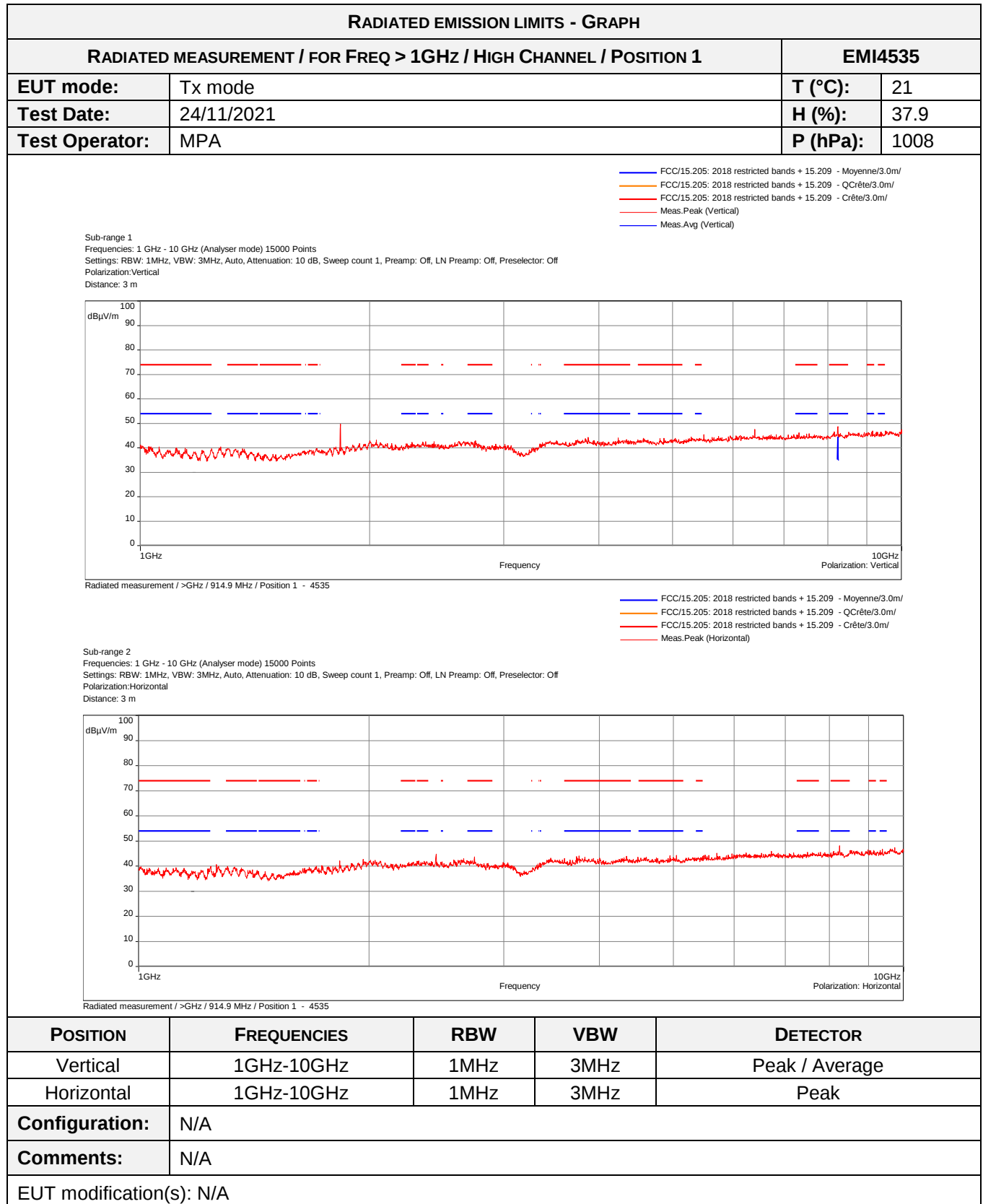
















7.3. Equivalent isotropic radiated power

Reference standard:	FCC Part 15.247 and RSS 247
Test method:	ANSI C63.10: 2013
Test description: b) (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section. Only the highest levels are recorded. The measurement is performed in radiated mode because the product antenna is a printed circuit type antenna. The results are directly compared to the conducted limits	

TESTED CONFIGURATION	RESULTS	SEVERITY	RESULT TAB.	VERDICT
E.I.R.P. / Low Channel / Position 1	10.40 dBm	1W (30dBm)	EMI4539	PASS
E.I.R.P. / Low Channel / Position 2	8.34 dBm	1W (30dBm)	EMI4545	PASS
E.I.R.P. / Low Channel / Position 3	8.60 dBm	1W (30dBm)	EMI4546	PASS
E.I.R.P. / Mid Channel / Position 1	10.10 dBm	1W (30dBm)	EMI4547	PASS
E.I.R.P. / Mid Channel / Position 2	7.48 dBm	1W (30dBm)	EMI4548	PASS
E.I.R.P. / Mid Channel / Position 3	7.85 dBm	1W (30dBm)	EMI4549	PASS
E.I.R.P. / High Channel / Position 1	9.51 dBm	1W (30dBm)	EMI4551	PASS
E.I.R.P. / High Channel / Position 2	6.77 dBm	1W (30dBm)	EMI4552	PASS
E.I.R.P. / High Channel / Position 3	7.47 dBm	1W (30dBm)	EMI4553	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21 °C
Relative Humidity	20 to 75 %	37.9 %
Atmospheric pressure	N/A	1008 hPa
Test method deviation: N/A		
Supplementary information: Measurements are done in radiated.		

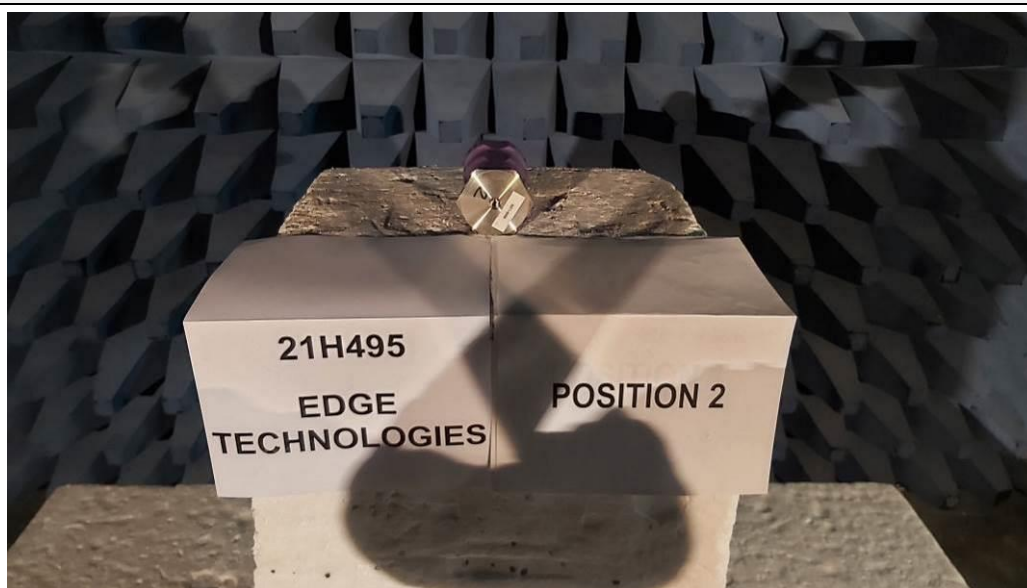
TEST EQUIPMENT USED – NORMAL CONDITIONS					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HL223	3126	21/08/2021	21/10/2024
Attenuator	EMITECH	SUB.V2-H	14495	13/01/2021	13/03/2022
Attenuator	EMITECH	SUB.V2-V	14496	13/01/2021	13/03/2022
Cable	MegaPhase	F135N1N28	16666	24/10/2019	24/12/2021
Cable	SUCOFLEX	N-3m	14379	23/08/2021	23/10/2023
Cable	MegaPhase	N-5m	14854	12/05/2020	12/07/2022
Cable	Huber + Suhner	SF102K	16042	24/03/2021	24/05/2023
Cable	MegaPhase	TM18-N1N1-118	12841	14/08/2020	14/10/2022
Receiver	Rohde & Schwarz	FSW43	14830	30/07/2020	30/03/2022
Shielded enclosure	RAY PROOF	C.V2	1423	04/10/2019	04/12/2022
Software	Nexio	BAT EMC	0000		
Thermohygrometer	Testo	608-H1	7562	09/06/2021	09/08/2023
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

TEST SETUP PHOTO(S) – EUT POSITION 1



TEST SETUP PHOTO(S) – EUT POSITION 2

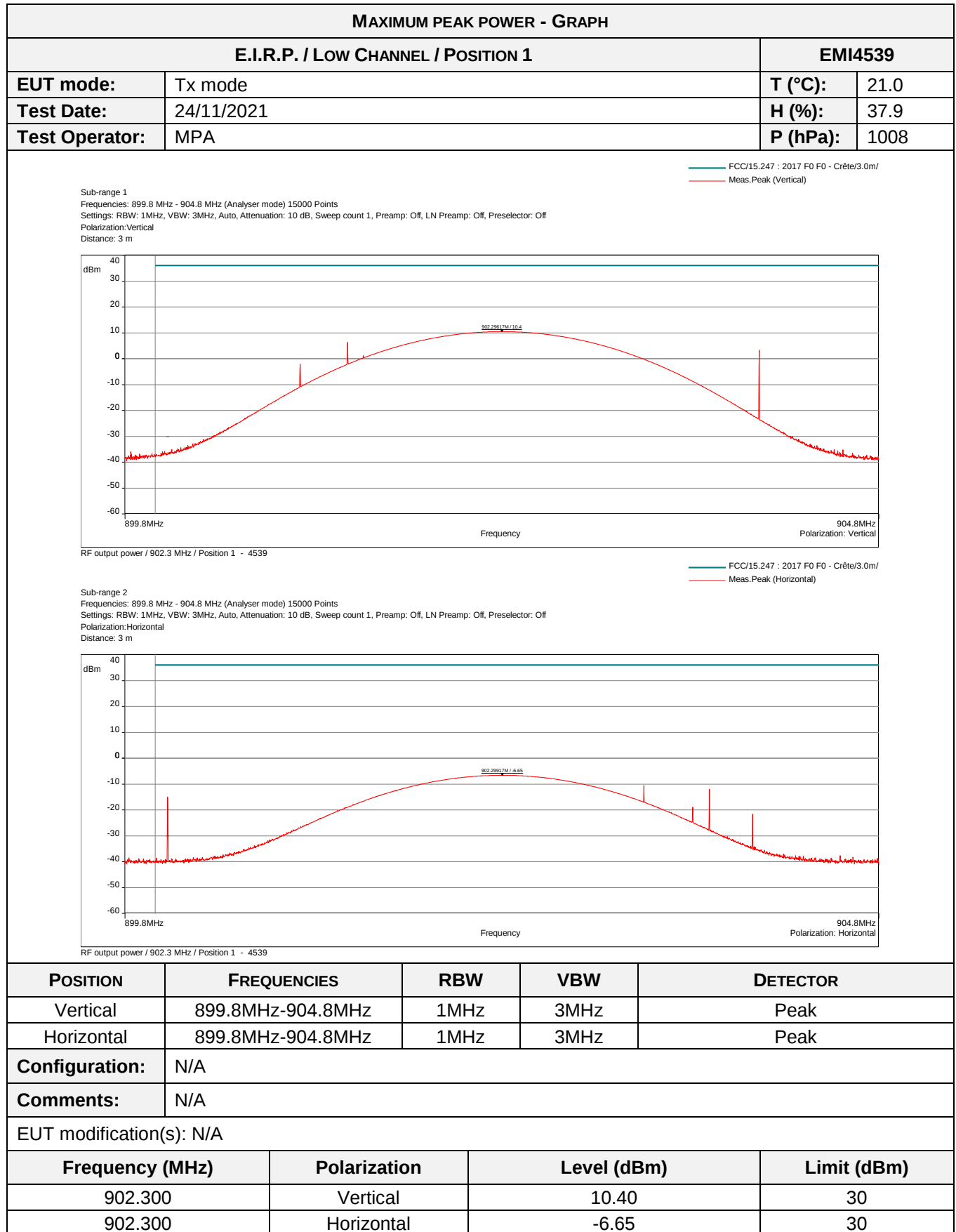


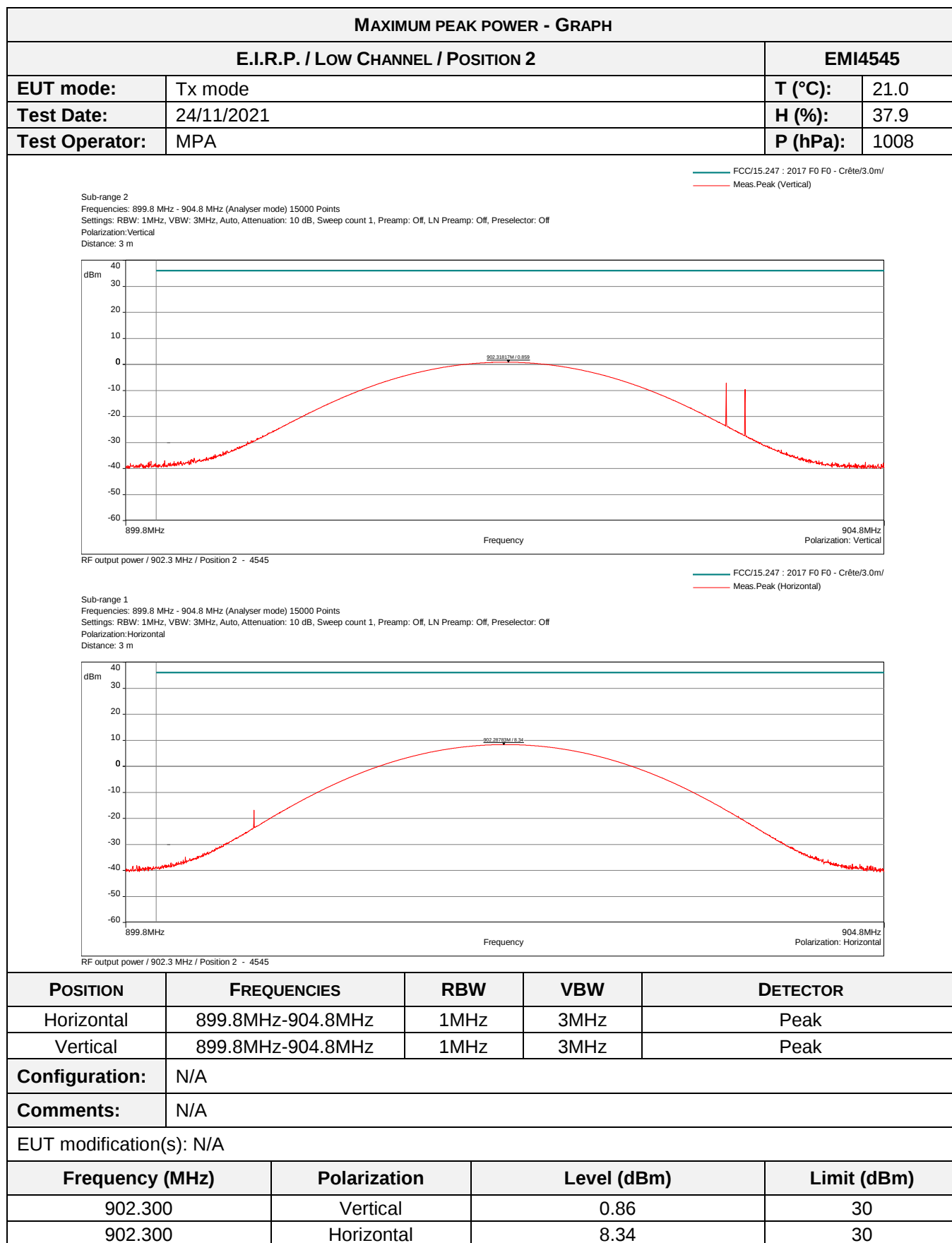
TEST SETUP PHOTO(S) – EUT POSITION 3

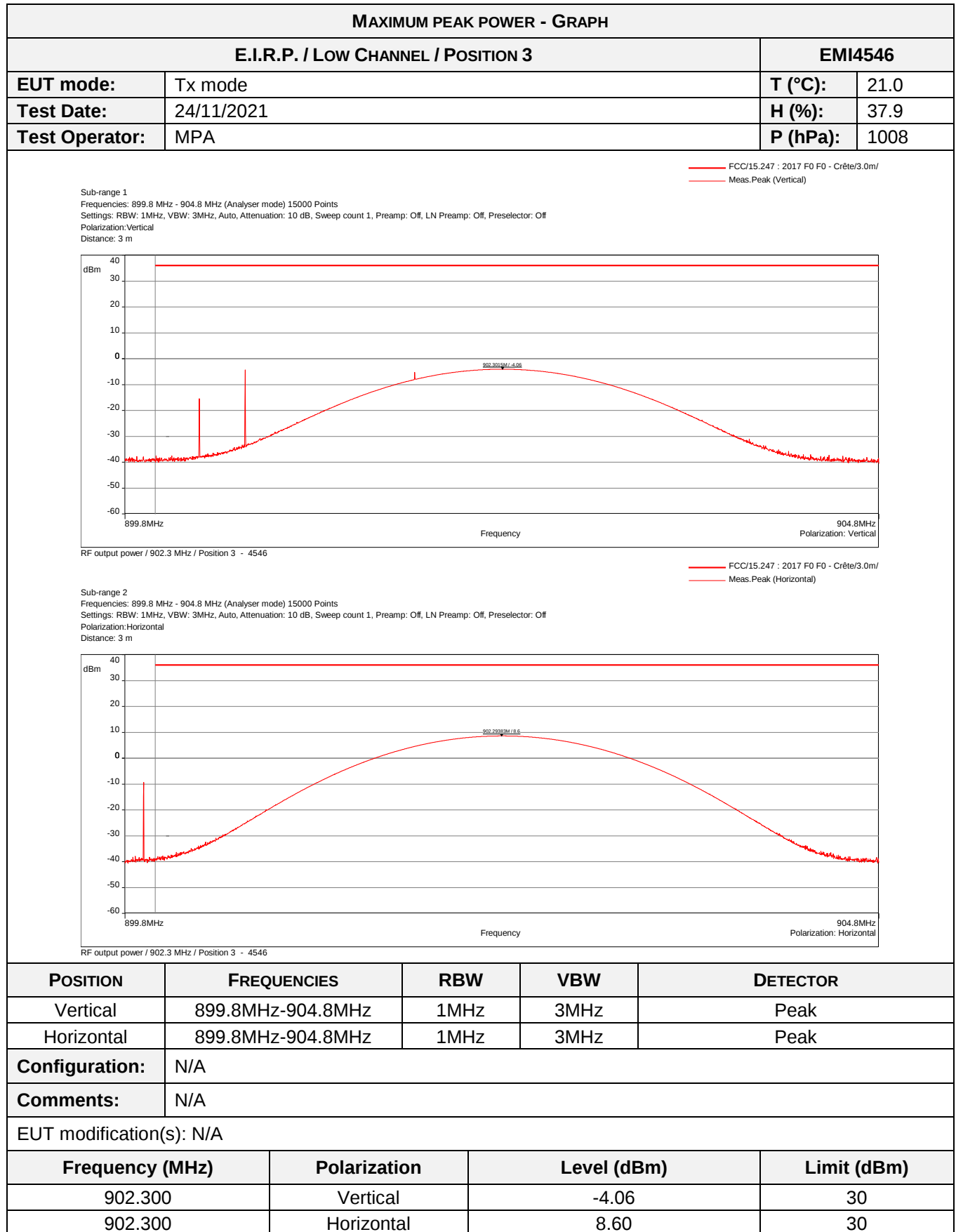


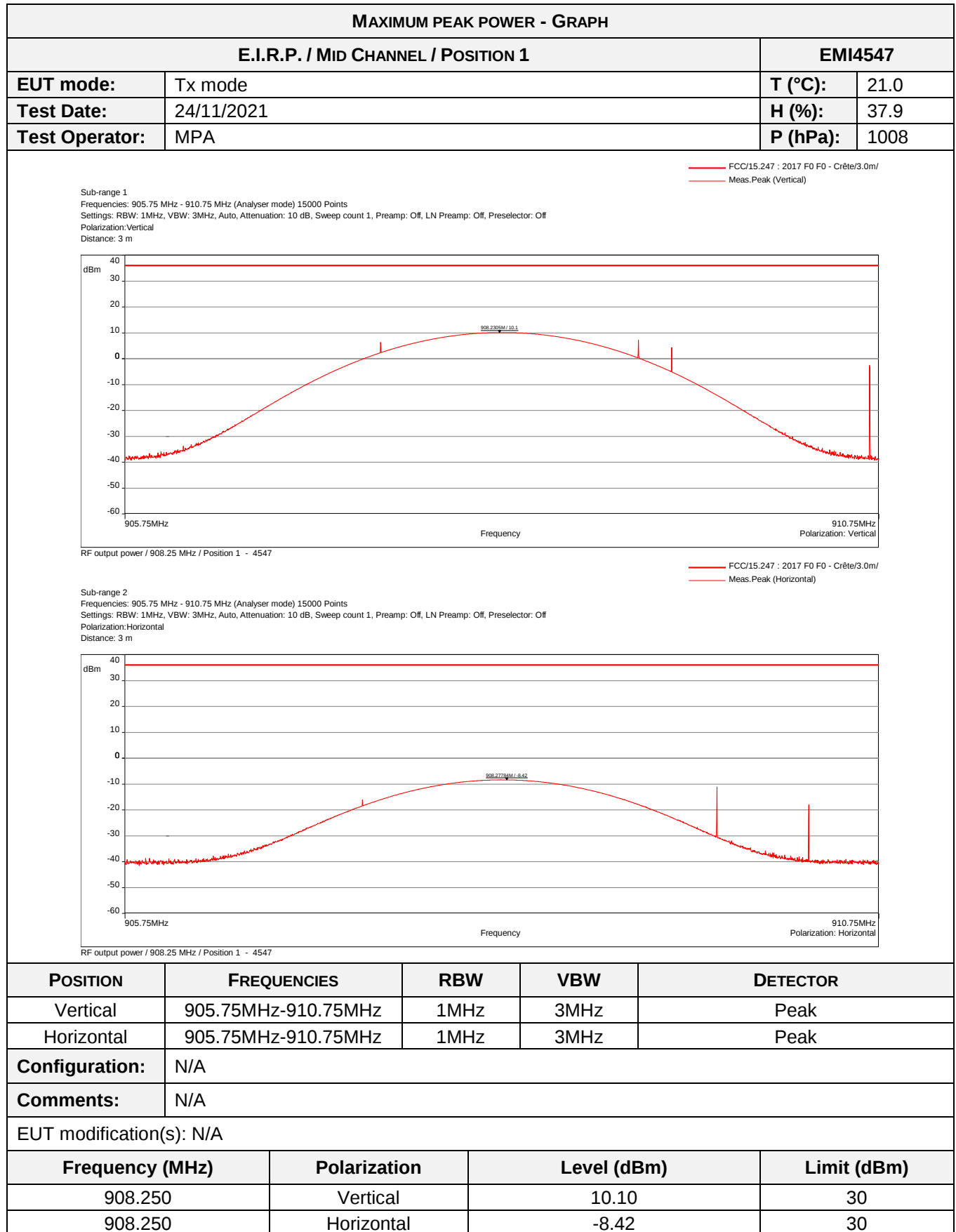
TEST SETUP PHOTO(S)

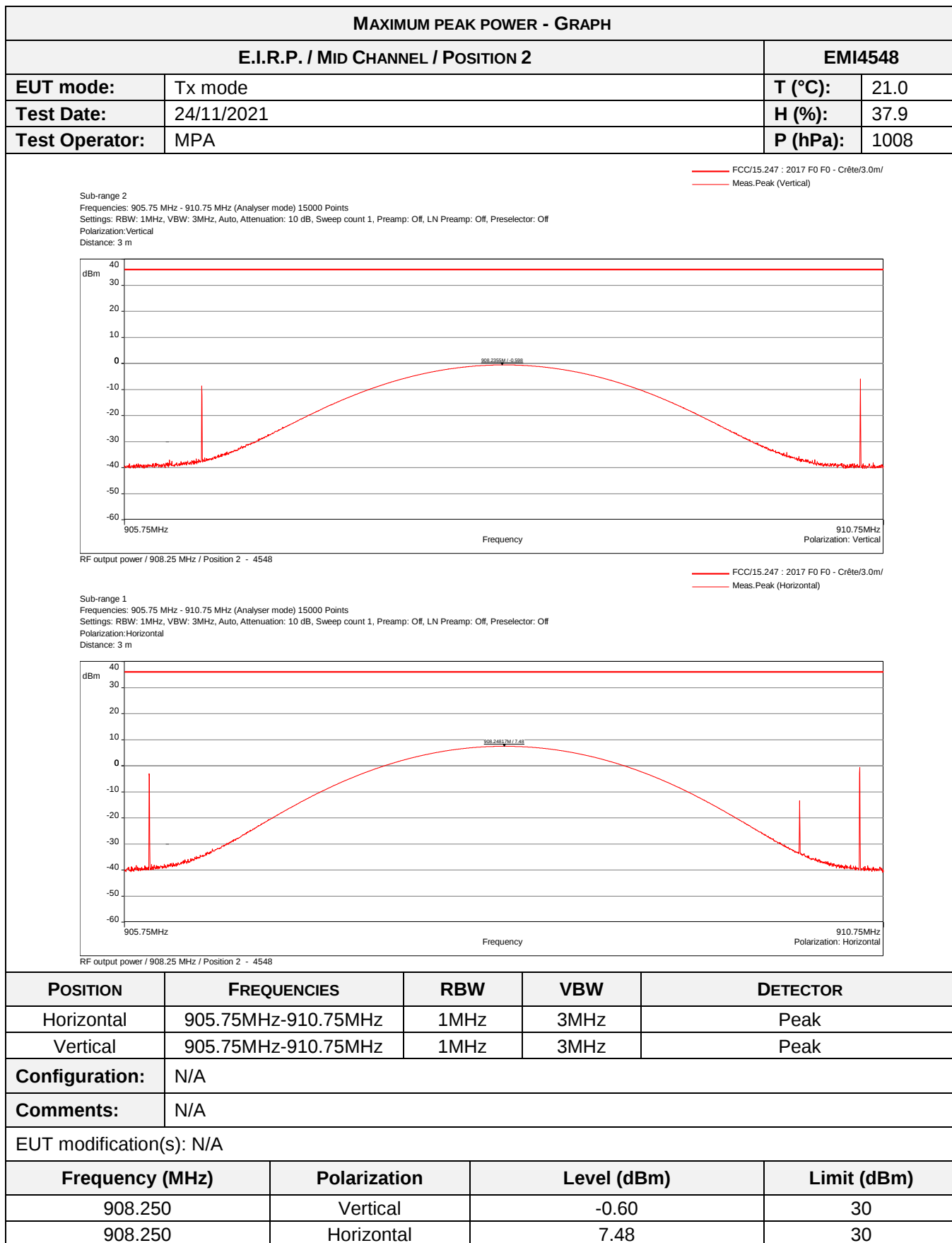


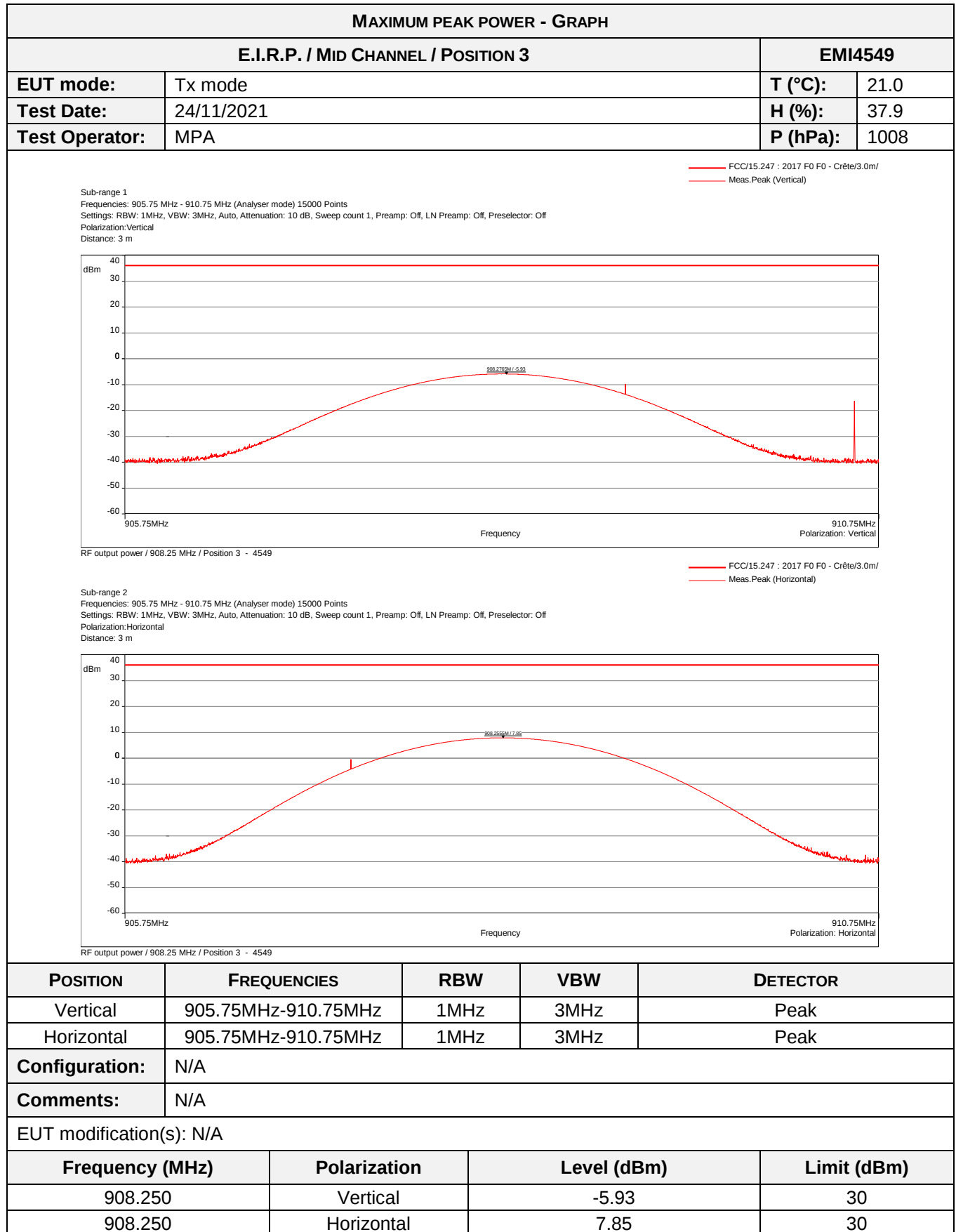


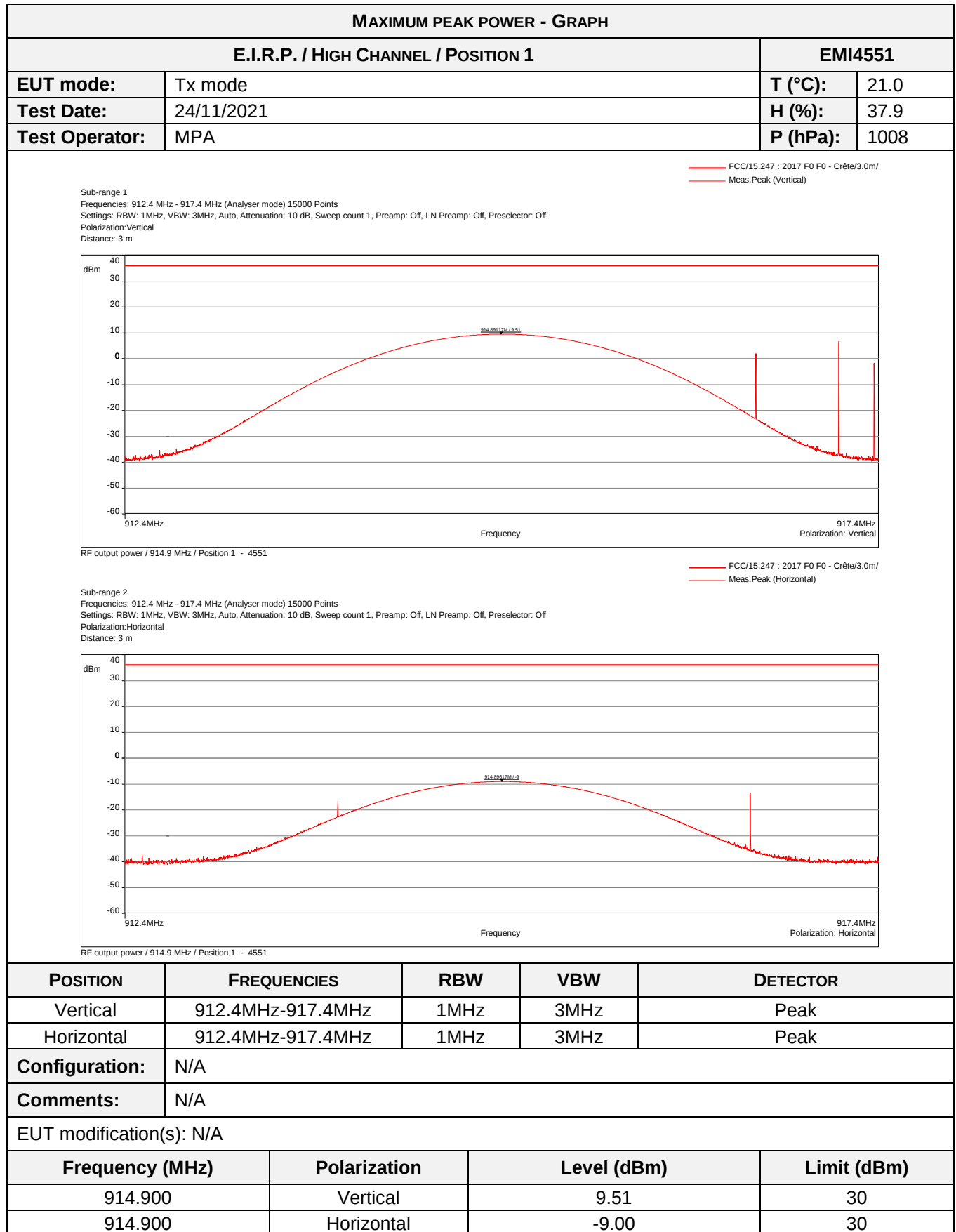


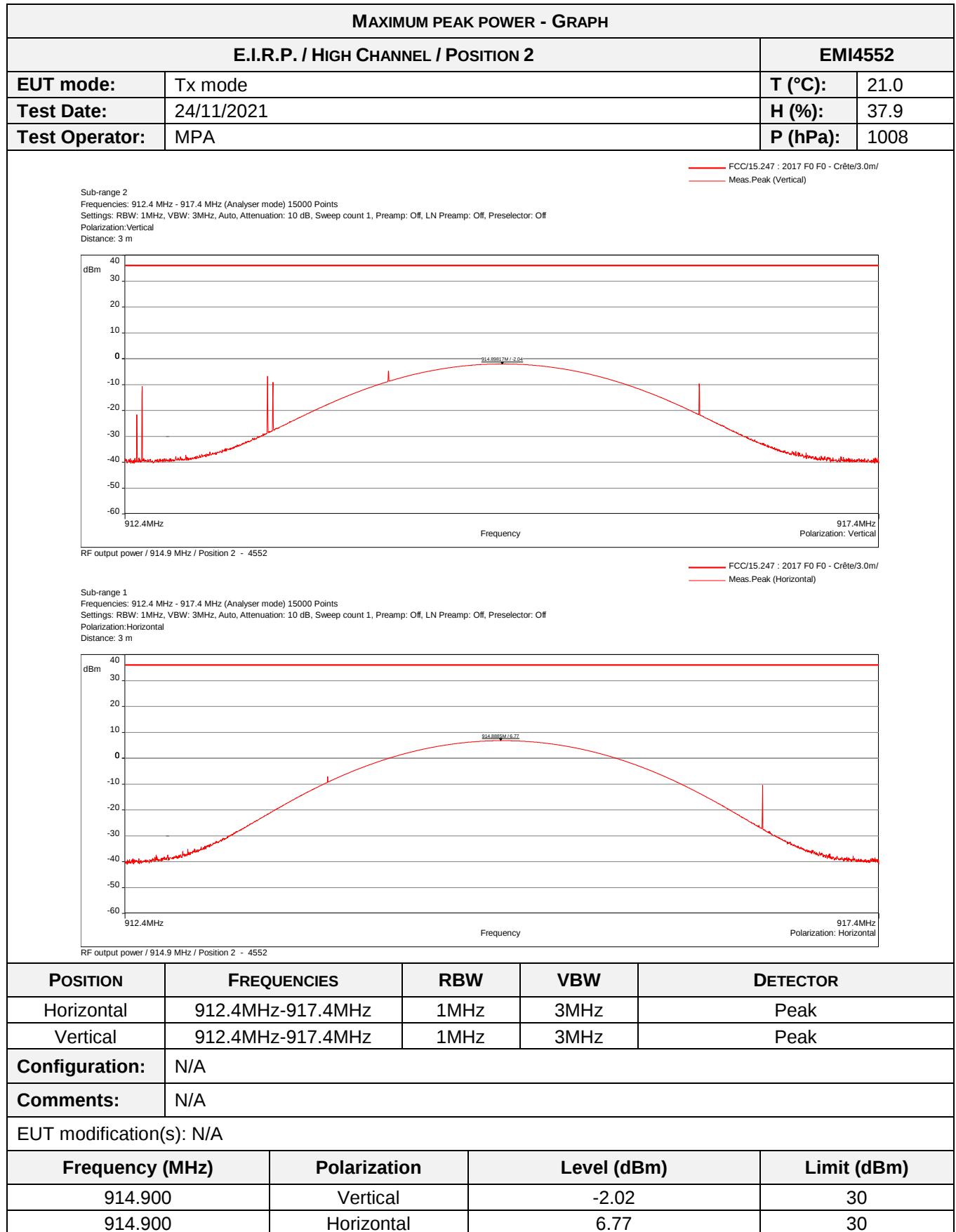


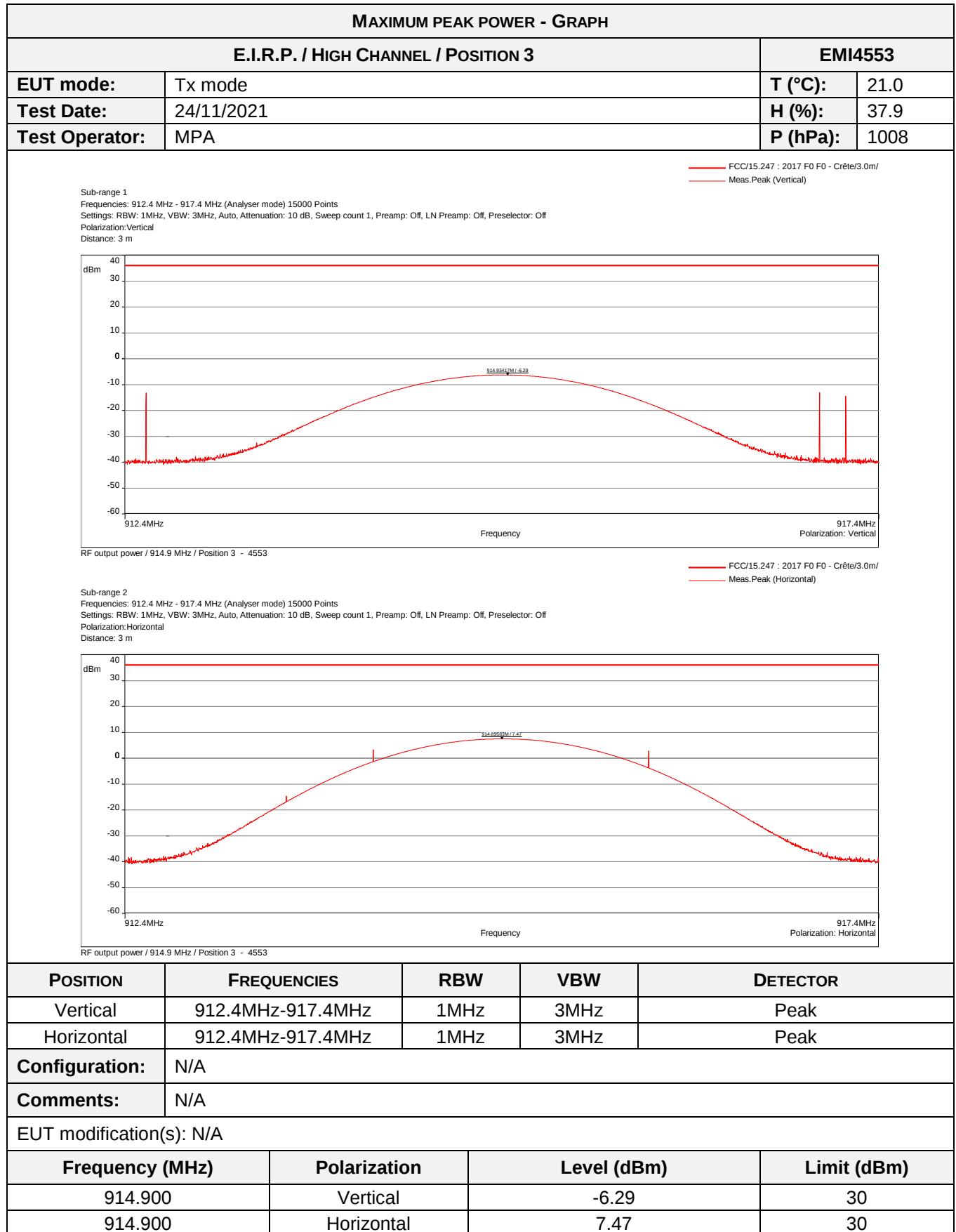












7.4. Band-edge compliance

Reference standard:	FCC 15.247, 15.209 and RSS 247
Test method:	ANSI C63.10: 2013
Test description: d) In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Only the highest levels are recorded.	

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Band edge / Low Channel	876MHz-954MHz	20 dBc and §15.209	EMI4555	PASS
Band edge / Mid Channel	876MHz-954MHz	20 dBc §15.209	EMI4556	PASS
Band edge / High Channel	876MHz-954MHz	20 dBc §15.209	EMI4557	PASS

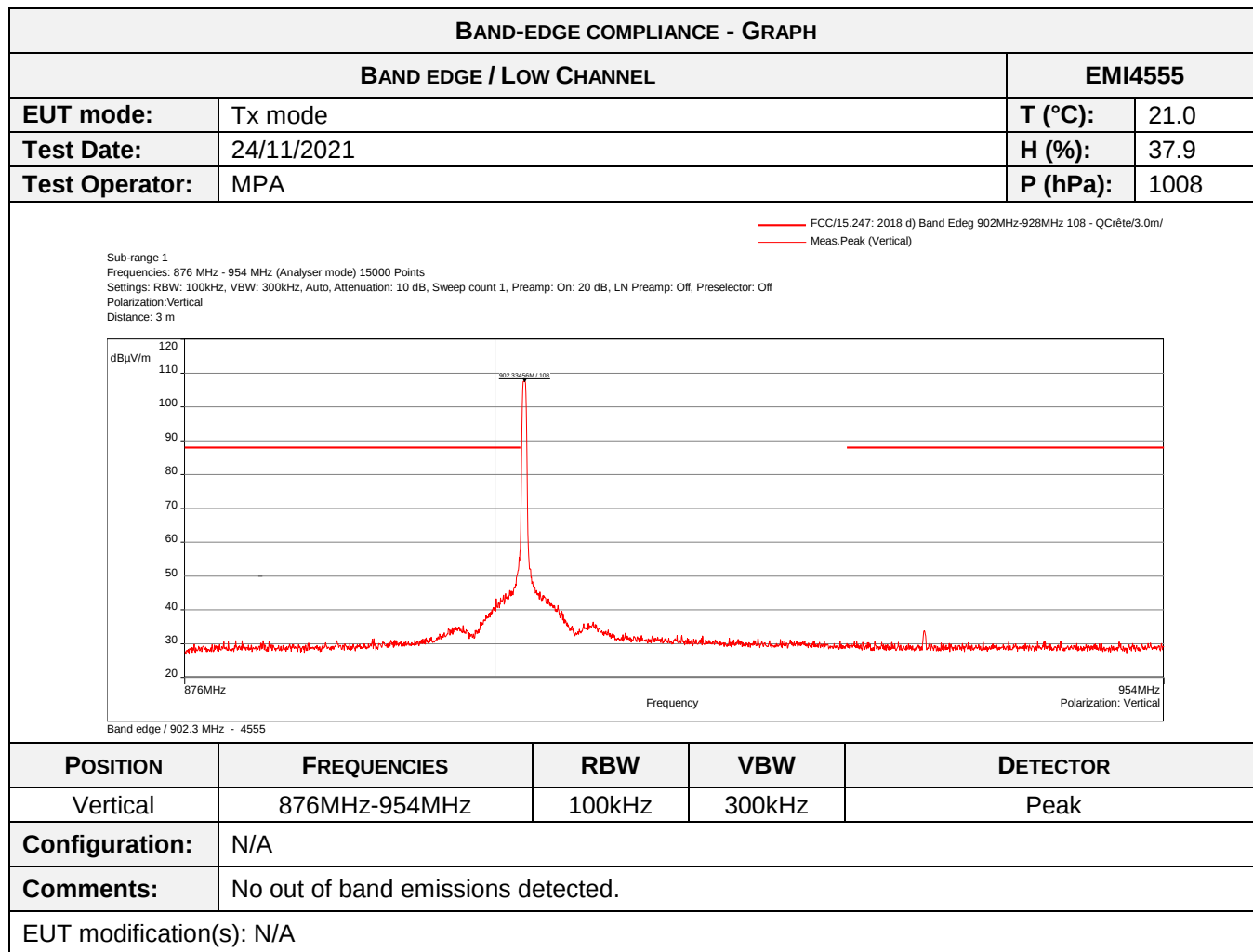
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.0 °C
Relative Humidity	20 to 75 %	37.9 %
Atmospheric pressure	N/A	1008 hPa
Test method deviation: N/A		
Supplementary information: N/A		

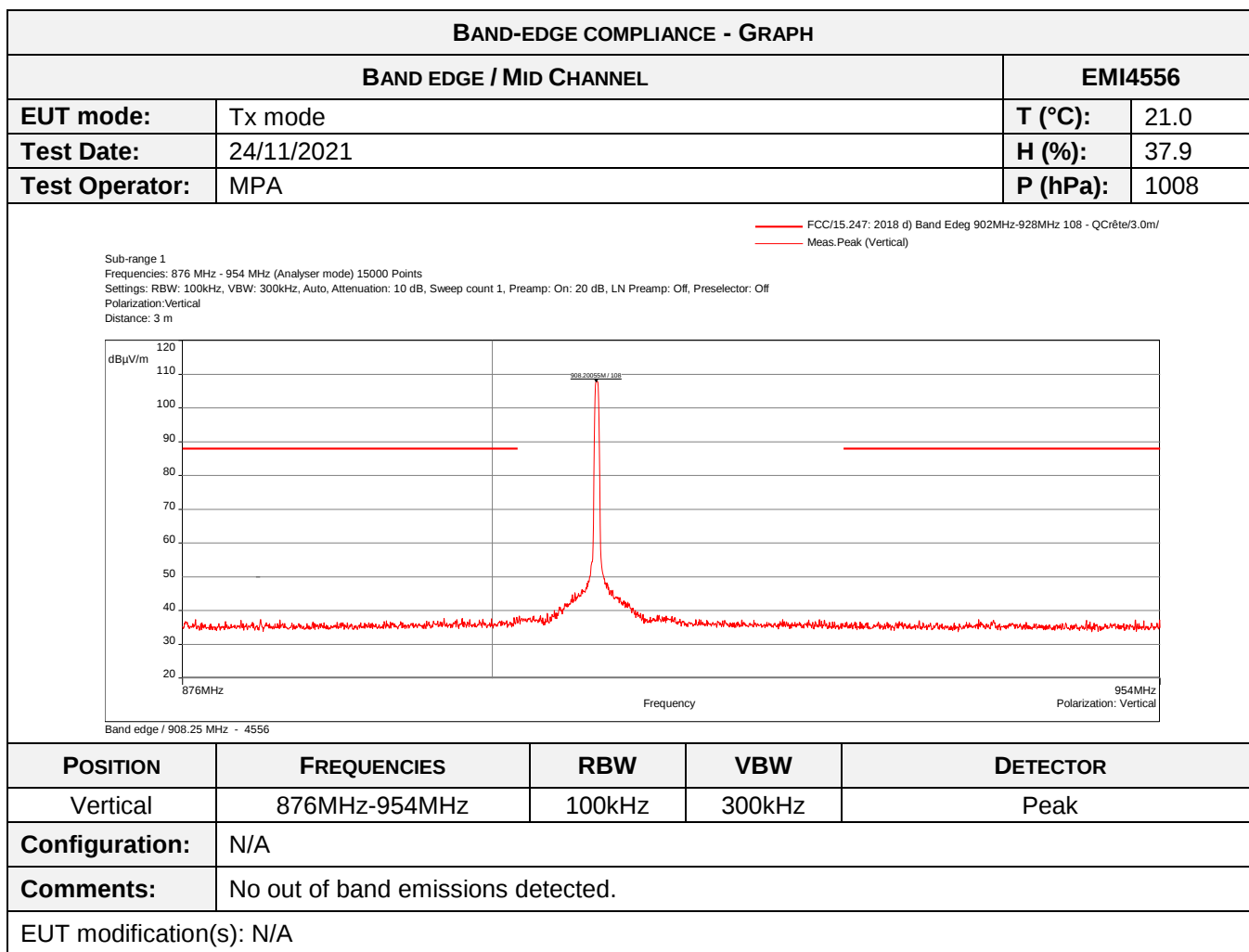
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HL223	3126	21/08/2021	21/10/2024
Cable	MegaPhase	F135N1N28	16666	24/10/2019	24/12/2021
Cable	SUCOFLEX	N-3m	14379	23/08/2021	23/10/2023
Cable	MegaPhase	N-5m	14854	12/05/2020	12/07/2022
Cable	Huber + Suhner	SF102K	16042	24/03/2021	24/05/2023
Cable	MegaPhase	TM18-N1N1-118	12841	14/08/2020	14/10/2022
Receiver	Rohde & Schwarz	FSW43	14830	30/07/2020	30/03/2022
Shielded enclosure	RAY PROOF	C.V2	1423	04/10/2019	04/12/2022
Software	Nexio	BAT EMC	0000		
Thermohygrometer	Testo	608-H1	7562	09/06/2021	09/08/2023
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

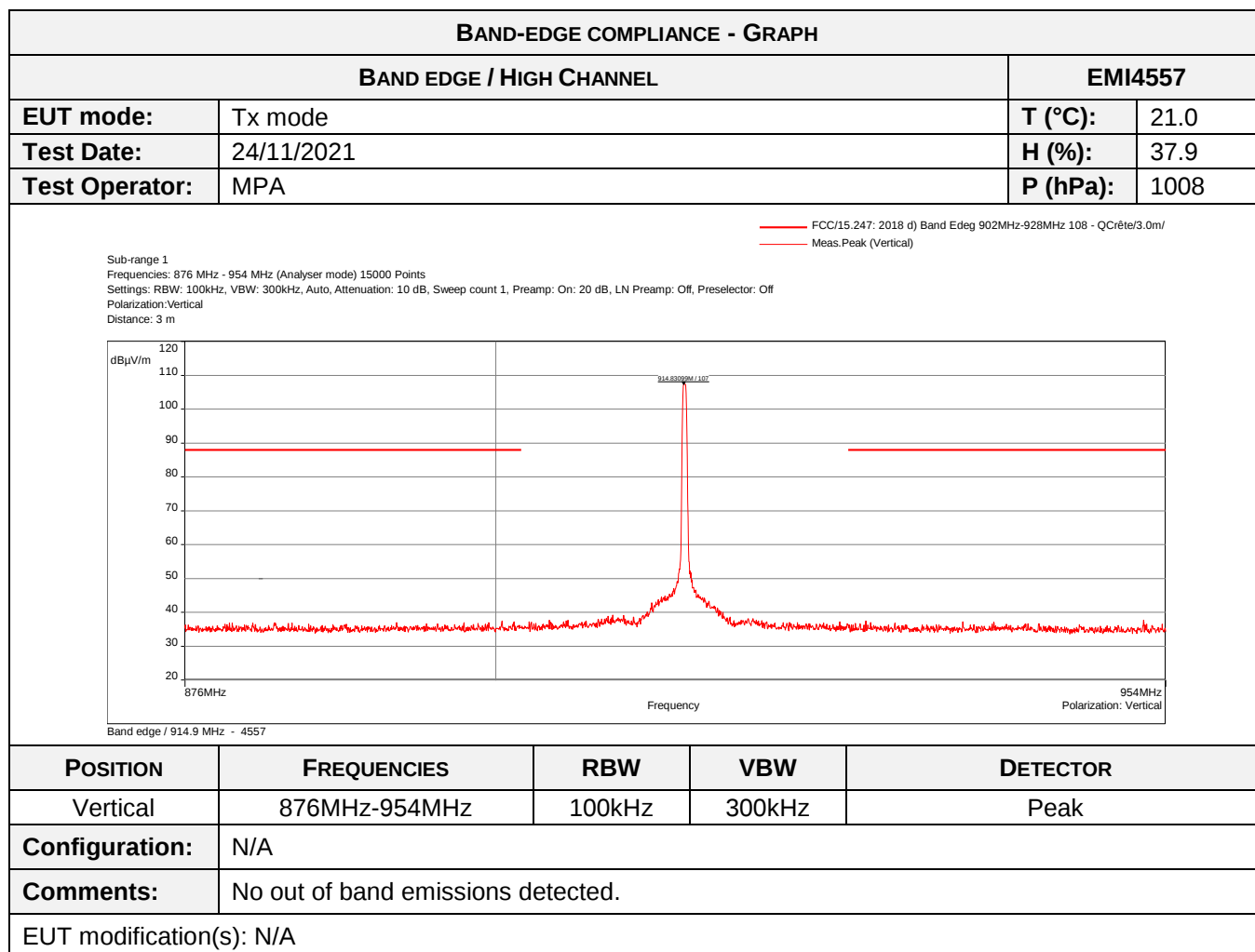
Blank cells = Permanent validity

TEST SETUP PHOTO(S)









7.5. Measurement of frequency stability

Reference standard:	FCC Part 15.215 and RSS 247
Test method:	ANSI C63.10: 2013
General test setup: The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. EUT is set inside the climatic enclosure.	

TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
902.3 MHz	Tx mode	Within 902MHz to 928MHz	EMI6410	PASS
908.25 MHz	Tx mode		EMI6411	PASS
914.9 MHz	Tx mode		EMI6412	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.0 °C
Relative Humidity	20 to 75 %	42.5 %
Atmospheric pressure	N/A	1002 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	EMITECH	3.5 cm	4653		
Cable	N	3m	16413	24/08/2021	24/10/2023
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	07/04/2021	07/06/2022
Spectrum analyzer	Rohde & Schwarz	FPL1007	17908	26/08/2021	26/10/2022
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023
Thermohygrometer	Testo	608-H2	7611	09/06/2021	09/08/2023
Thermometer contactless	GHM Greisinger	GMH 3710	12968	06/10/2020	06/12/2021

Blank cells = Permanent validity

TEST SETUP PHOTO(S)



MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS					
902.3 MHz					EMI6410
Test case	Temperature (°C)	Power supply (Vdc)	Frequency (MHz)	Frequency error (kHz)	Limit
Normal conditions	+25	3	902.299320	-	Within 902MHz to 928MHz
Extrem conditions	-40	3	902.299926	0.605	
	+85	3	902.300691	1.370	

MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS					
908.25 MHz					EMI6411
Test case	Temperature (°C)	Power supply (Vdc)	Frequency (MHz)	Frequency error (kHz)	Limit
Normal conditions	+25	3	908.249325	-	Within 902MHz to 928MHz
Extrem conditions	-40	3	908.249928	0.602	
	+85	3	908.250741	1.415	

MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS					
914.9 MHz					EMI6412
Test case	Temperature (°C)	Power supply (Vdc)	Frequency (MHz)	Frequency error (kHz)	Limit
Normal conditions	+25	3	914.899325	-	Within 902MHz to 928MHz
Extrem conditions	-40	3	914.899922	0.596	
	+85	3	914.900737	1.411	

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	MPA	26/11/2021	-

End of test report