



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 15.225: April 2020
RSS-210 Issue 9: August 2016 (A1: 2017)

Company: **STMicroelectronics SAS**
Address.....: 190 Avenue Celestin Coq
13106 ROUSSET
FRANCE

Test item description: **NFC card reader evaluation board**
Trade Mark: STMicroelectronics
Manufacturer.....: STMicroelectronics SAS
Model/Type reference.....: STEVAL-25R3916B
FCC ID.....: YCPRR3916BD1
IC: 8967A-R3916BD1
Ratings.....: 5 V_{DC} +/-5%

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

Report Reference No.....: **RR-EVE-21F232-2A**
Test procedure: FCC IC Certification
Diffusion.....: Mr. Joel HULOUX
Applicant's name: STMicroelectronics SAS
Date of issue.....: May 23, 2022
Total number of pages.....: 51
Revision.....: 0
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	May 23, 2022	/	Creation

1. GENERAL INFORMATION

This document submits the results of Radio tests performed on the equipment **NFC Evaluation board STEVAL-25R3916B** (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 & Open Area Test Site in SALINELLES (30) 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 October the 1 st to the 07 th of 2021					
APPLICANT'S GENERAL INFORMATION:					
Company name : STMicroelectronics SAS Company address : 190 Avenue Celestin Coq 13106 ROUSSET FRANCE Person(s) present during the tests : No representative for company attended the tests. Responsible : Mr. Joel HULOUX					
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: April 2020

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.

FCC 47 CRF Part 15.225 : April 2020

Operation within the bands 13.553-13.567MHz

RSS-210, Issue 9, August 2016, Amendment November 2017

Licence-Exempt Radio Apparatus: Category I Equipment

RSS/CNR-Gen, Issue 5, March 2019, Amendment 1

General Requirements for Compliance of Radio Apparatus

ANSI C 63.10: 2013

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless 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

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

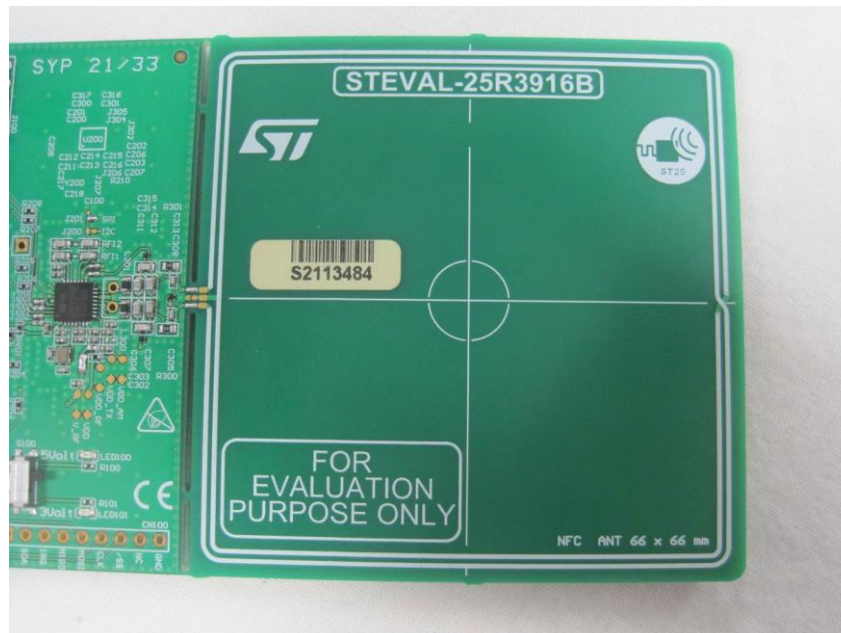
3.1. Test Conditions

Test item description. : NFC card reader evaluation board
Model/Type reference..... : STEVAL-25R3916B
Trade Mark. : STMicroelectronics
FCC ID..... : YCPRR3916BD1
IC. : 8967A-R3916BD1
Serial number (S/N)..... : N/A
Part number (P/N). : N/A
Software version..... : N/A
Firmware version. : ST25R3916BDemo_v1.3.5
Type of sample. : Prototype
Function(s)..... : The EUT is the Discovery kit for ST25R3916B RFID reader IC
from ST Microelectronis.
The ST25R3916B supporting NFC reader, P2P and Card
emulation modes.
Manufacturer name. : STMicroelectronics
Address. : 635 ROUTE DES LUCIOLES
06560 VALBONNE
FRANCE

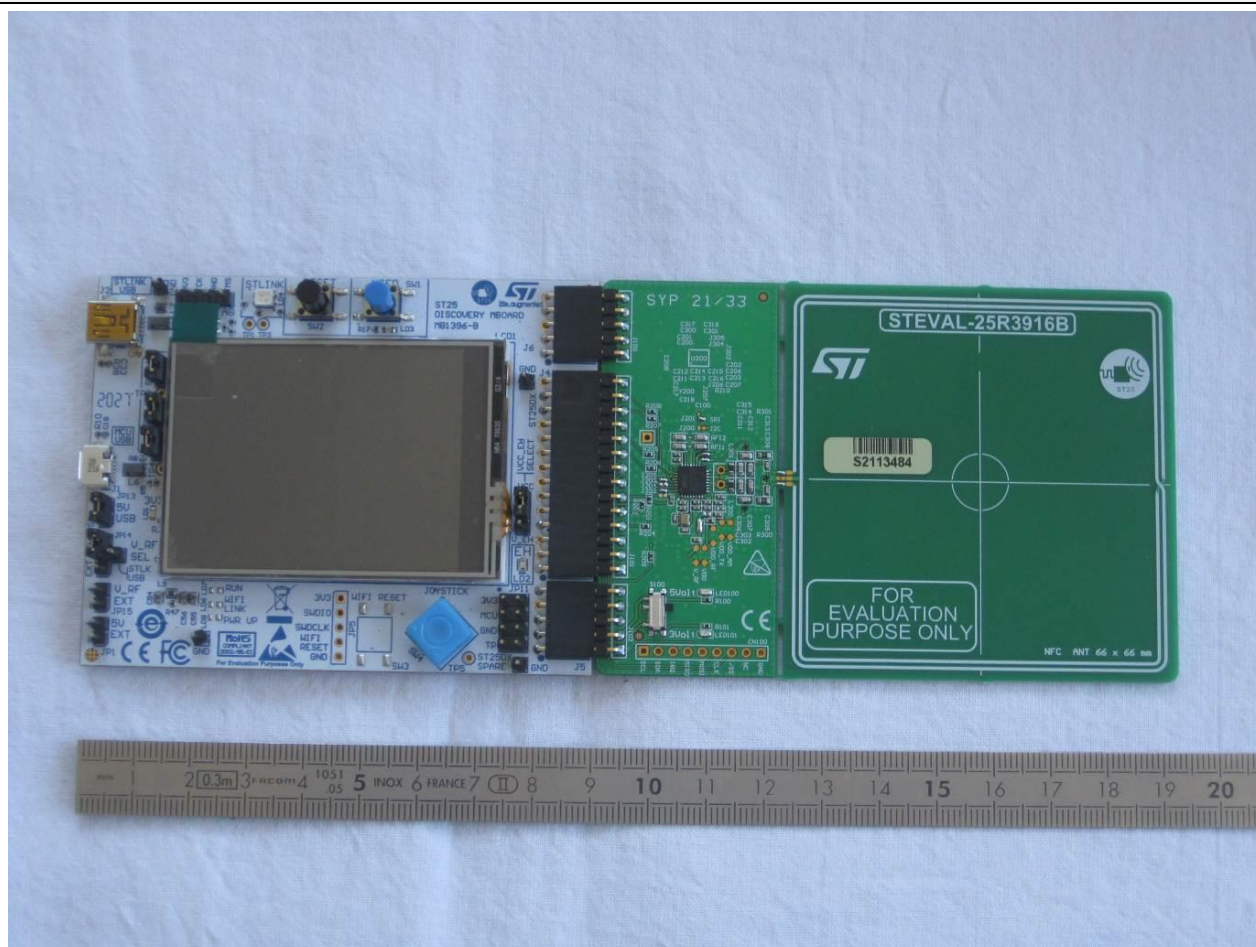
General product information:

N/A

3.2. EUT Marking plate



3.3. EUT General view



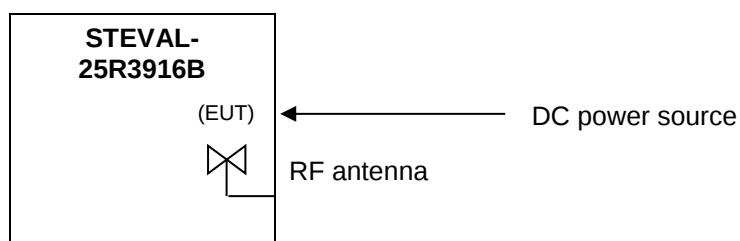
3.4. EUT Mechanical and Electrical Design

Power supply. : $5 V_{DC}$
Power supply range. : $5 V_{DC} \pm 5\%$
Power type. : DC
Power (W). : 2
Nominal current (A). : 0.2
Dimensions (L x W x H) (m). : $0.11 \times 0.07 \times 0.006$
Weight (kg). : 0.05
Temperature range (°C). : +10 to +40
Ground bounding strap. : No

Comments:

N/A

3.5. EUT Input/Output ports



PORT	NAME	TYPE	LENGTH	CABLE TYPE	COMMENTS
0	Main frame	N/A	N/A	PCB	N/A
1	DC power source	DC	<3m	USB	5 VDC USB
2	RF antenna	RF	N/A	N/A	13.56 MHz PCB printed

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

3.6. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
Power bank	Xindao B.V.	P324.25	5 VDC used to power the EUT
RFID Tag	STMICROELECTRONICS	ST25TV02KC	Used for Reader mode
Demo board	STMICROELECTRONICS	STEVAL-25R3916B	Used for Card Emulation & P2P mode
Laptop	DELL	Latitude 5510	Used to powered the EUT for conducted emissions measurement
AC/DC block	DELL	LA55NM170	Used to powered the Laptop for conducted emissions measurement

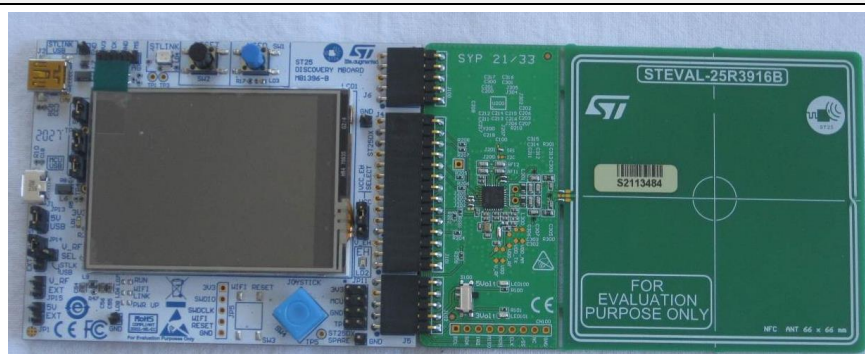
POWER BANK (AE)



RFID TAG (AE)



DEMO BOARD (AE)



LAPTOP (AE)



AC/DC BLOCK (AE)



3.7. EUT Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations:	
EUT type.....	<i>Transceiver</i>
Technology	<i>RFID</i>
Environmental profile.....	<i>Data transmissions</i>
Temperature range.....	<i>+10°C to +40°C</i>
Antenna type	<i>Integrated</i>
Antenna Gain.....	<i>1 - Magnetic antenna</i>
Comments:	
<i>FCC ID: YCPR3916BD1</i>	
<i>N° IC: 8967A-R3916BD1</i>	
b) TRANSMITTER PARAMETERS (Tx)	
Frequency bands.....	<i>13.56 MHz</i>
RF Power.....	<i>1.7 W</i>
Number of channels / Separation.....	<i>N/A</i>
Modulation type	<i>RFID</i>
Duty cycle	<i>4/5</i>
Tested frequency.....	<i>13.56 MHz</i>
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	<i>13.56 MHz</i>
Bandwidth.....	<i>50 kHz</i>

4. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	COMMENTS
GENERAL			
Labeling requirements		N/P	See certification documents
Information to user		N/P	See certification documents
Home-built devices		N/A	
Kits		N/A	
Special Accessories		N/P	See certification documents
Inspection by the Commission		N/A	
Measurement standards		PASS	
Test procedure for CPU boards and computer power supplies		N/A	
Frequency range of radiated measurements		PASS	
Measurement detector functions and bandwidths		PASS	
Transition provisions for compliance with the rules		N/P	See certification documents
UNINTENTIONAL RADIATORS			
Equipment authorization		N/A	
- Verification		N/A	
- Declaration of Conformity			
CPU boards and power supplies used in personal computers		N/A	
Exempted device		N/A	
Information to the user		N/P	See certification documents
Conducted limits	Class B	PASS	
Radiated emission limits	Class B	PASS	
Antenna power conduction limits for receivers		N/A	
Power line carrier systems		N/A	
TV interface devices, including cable system terminal devices		N/A	
TV broadcast receivers		N/A	
Cable ready consumer electronics equipment		N/A	
Program blocking technology requirements for TV receivers		N/A	
Scanning receivers and frequency converters used with scanning receivers		N/A	
Labeling of digital cable ready products		N/A	
INTENTIONAL RADIATORS			

TEST DESIGNATION	SEVERITY	VERDICT	COMMENTS
Equipment authorization requirement		PASS	Transmitter part is subject to Certification procedure
Certified operating frequency range		N/A	
Antenna requirement		PASS	Dedicated integral antenna
External radio frequency power amplifiers and antenna modifications		N/A	
Restricted bands of operation		PASS	
Conducted limits	Class B	PASS	
Radiated emission limits; general requirements	Class B	PASS	
Tunnel radio systems		N/A	
Modular transmitters		N/A	
Cable locating equipment		N/A	
Cordless telephones		N/A	
Additional provisions to the general radiated emission limits		PASS	
Operation within the band 13.110-14.010 MHz.		PASS	
- Field strength in the band 13.553-13.567 MHz		PASS	
- Field strength in the band 13.410-13.553 MHz and 13.567-13.710 MHz		PASS	
- Field strength in the band 13.110-13.410 MHz and 13.710-14.010 MHz		PASS	
- Field strength outside the band 13.110-14.010 MHz		PASS	
- Frequency tolerance of the carrier signal		PASS	
- Radio frequency powered tag		PASS	EUT is an RFID reader

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	$\pm 1 \times 10^{-7}$	$\pm 1 \times 10^{-7}$
Occupied bandwidth		
RF power	$\pm 3.8 \%$	$\pm 5 \%$
RF power (EN 300328 / EN 301893)	$\pm 3.8 \%$	$\pm 5 \%$
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	$\pm 2.9 \text{ dB}$	/
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

In accordance with RSS-102, Issue 5, Section 2.5.2 :

TEST CONDITION	FREQUENCY	Level at 10m	EIRP Level (W) Calculation : see below	EIRP Limit (W)
X-NUCLEO-NFC08A1 (OATS)	13.56MHz	9.66 dBμA/m	40.5x10 ⁻⁶	1

From ANSI C63.10 Annexe G.2 :

$$\text{EIRP} = (\text{E} \times \text{d})^2 / 30 = (377\text{H} \times \text{d})^2 / 30$$

where

E = electric field strength in V/m

H = magnetic field strength in A/m

D = measurement distance in m

7. TEST CONDITIONS AND RESULTS

7.1. Conducted emissions measurement

Reference standard:	FCC part 15.107, 15.207 and RSS-Gen
Test method:	ANSI C63.4: 2014
General test setup: Test is done inside a shielded room. EUT is set on an insulating support at 40cm from the ground reference plane. All power was connected to the system through Artificial Mains Network (AMN). The AMN is placed at 80cm from the boundary of the EUT and bonded to a ground reference plane.	

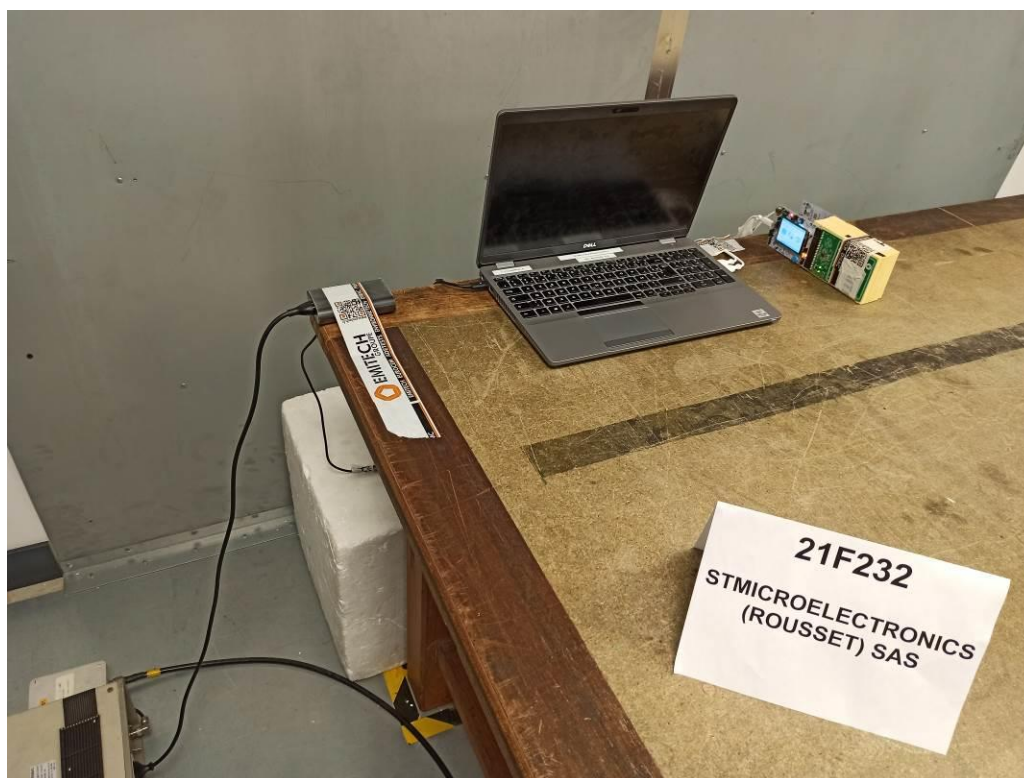
TESTED CABLE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
120V _{AC} /60Hz / Car emulation & P2P mode	150kHz-30MHz	Class B	EMI4536	PASS
120V _{AC} /60Hz / Reader Mode	150kHz-30MHz	Class B	EMI4663	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	See Graph(es)
Relative Humidity	30 to 60 %	See Graph(es)
Atmospheric pressure	N/A	See Graph(es)
Test method deviation: N/A		
Supplementary information: EUT power supply is done through a "standard power supply" which meets FCC and RSS requirements.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	KIKUSUI	PCR4000L	3074	25/07/2019	25/03/2022
Cable	EMITECH	Current absorber sheath	9491	23/06/2020	23/08/2022
Cable	C&C	N-3m	14335	18/03/2021	18/05/2023
Ground plane	EMITECH	Test area	11569		
LISN	PMM	L2-16	1209	08/06/2020	08/08/2022
Multimeter	FLUKE	8808A	11842	29/09/2020	29/11/2021
PE choke	EMITECH	CISPR 16-2-1 : 2008	10071		
Receiver	Rohde & Schwarz	ESI	9704	24/08/2021	24/10/2022
Software	Nexio	BAT EMC	0000		
Surges Suppressor	Hewlett Packard	11947A	0238	19/12/2019	19/02/2023
Thermohygrometer	Testo	608-H2	12268	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

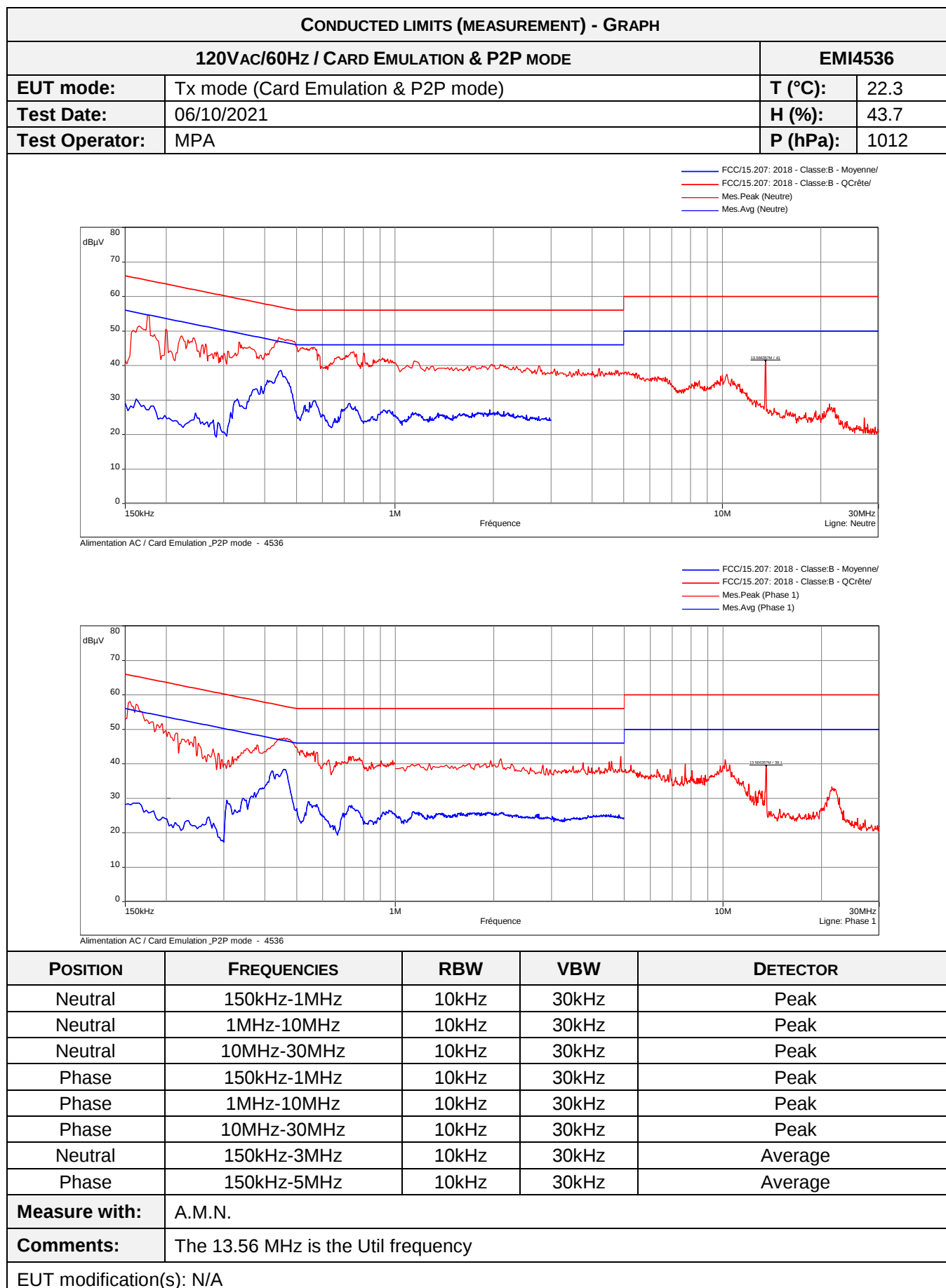
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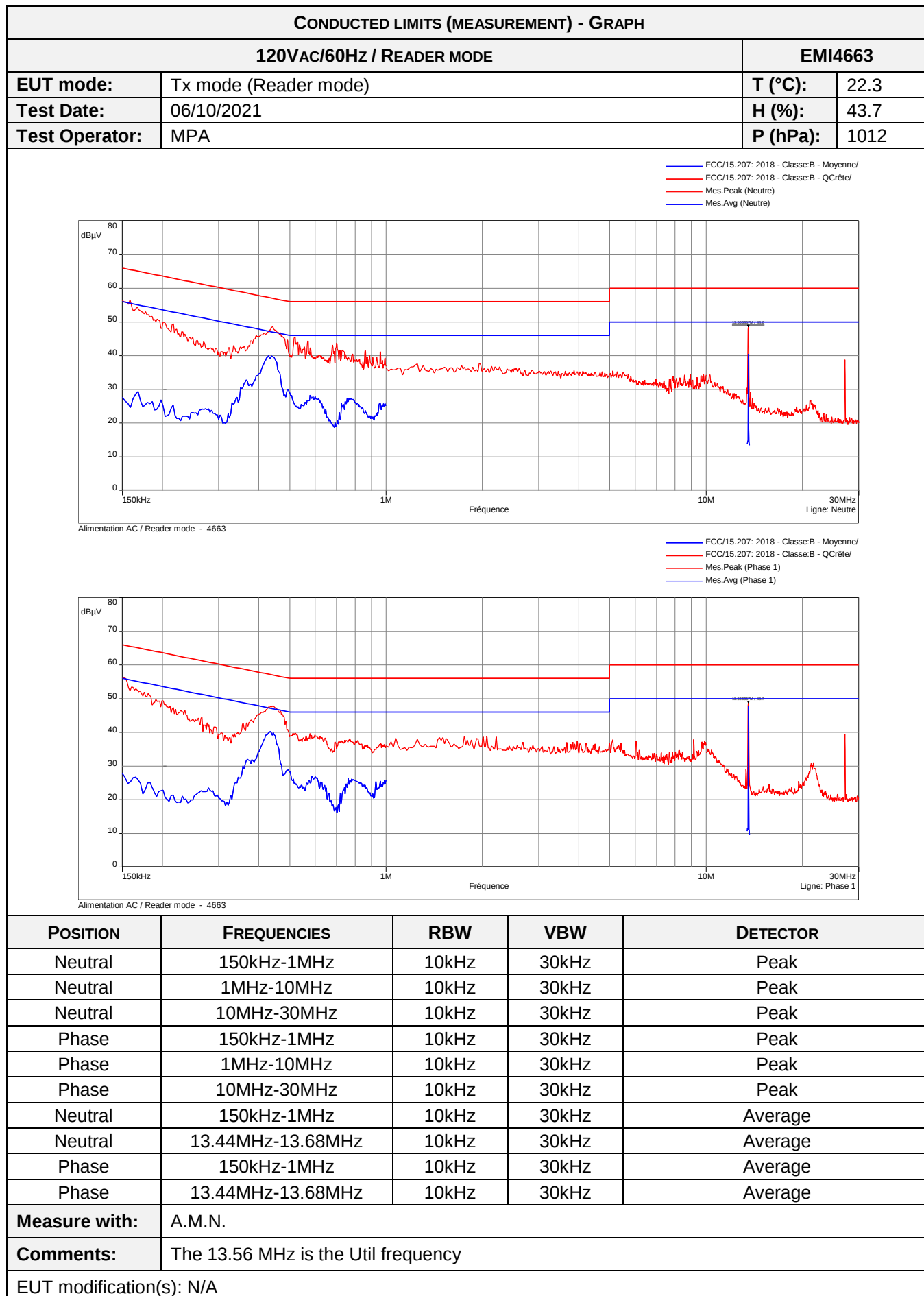
TEST SETUP PHOTO(S) – CONDUCTED LIMITS



CONDUCTED EMISSION (MEASUREMENT) - TABULATED RESULTS						
120VAC/60Hz / CAR EMULATION & P2P MODE						EMI4536
Terminal	Test Frequency (MHz)	Level Peak (dBμV)	Level Avg (dBμV)	Gain/Loss Factor (dB)	Limit Avg (dBμV)	Margin (dB)
Neutral	0.447	47.77	38.59	10.11	46.93	-8.34
Neutral	0.570	44.83	29.80	10.12	46.00	-16.20
Neutral	0.726	43.07	29.02	10.13	46.00	-16.98
Phase	0.459	47.37	38.35	10.11	46.71	-8.36
Phase	0.543	42.71	29.06	10.12	46.00	-16.94
Phase	0.735	41.00	27.91	10.13	46.00	-18.09
Neutral	4.211	39.19	N/P	10.32	46.00	-6.81
Phase	4.878	42.19	N/P	10.35	46.00	-3.81
Phase	10.160	41.27	N/P	10.50	50.00	-8.73
Supplementary information: N/A						

CONDUCTED EMISSION (MEASUREMENT) - TABULATED RESULTS						
120VAC/60HZ / READER MODE						EMI4663
Terminal	Test Frequency (MHz)	Level Peak (dBμV)	Level Avg (dBμV)	Gain/Loss Factor (dB)	Limit Avg (dBμV)	Margin (dB)
Neutral	0.429	47.15	40.03	10.11	47.27	-7.24
Phase	0.435	38.06	40.25	10.11	47.16	-6.91
Neutral	0.579	41.83	28.31	10.12	46.00	-17.69
Phase	0.585	38.81	26.97	10.12	46.00	-19.03
Neutral	0.756	38.83	27.43	10.14	46.00	-18.57
Phase	0.762	37.18	26.30	10.14	46.00	-19.70
Phase	1.758	38.84	N/P	10.20	46.00	-7.16
Neutral	1.956	37.82	N/P	10.21	46.00	-8.18
Phase	9.152	37.92	N/P	10.49	50.00	-12.08
Phase	10.120	35.10	N/P	10.50	50.00	-14.90
Neutral	13.557	48.55	40.45	10.68	50.00	-9.55
Phase	13.560	48.73	47.82	10.68	50.00	-2.18
Phase	27.154	39.59	N/P	10.74	50.00	-10.41
Neutral	27.154	38.75	N/P	10.74	50.00	-11.25
Supplementary information: N/A						





7.2. Occupied Bandwidth

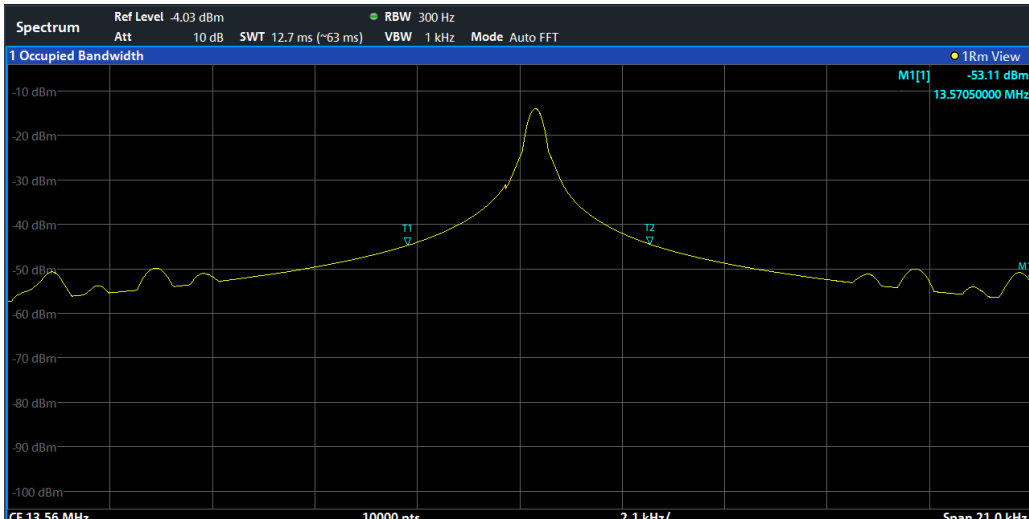
Reference standard:	FCC part 15 Radio part 15.225 & RSS-210
Test method:	FCC part 15.225 & RSS-210
Test description: The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β , which, in cases of symmetrical spectra, splits up into $\beta/2$ on each side of the spectrum. Unless otherwise specified, $\beta/2$ is taken as 0,5 %. The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions. EUT is connected to the measuring receiver via 50 Ω attenuator(s).	

TESTED PARAMETER	OBW	SEVERITY	RESULT TAB.	VERDICT
99% Bandwidth	4.959 kHz	<14kHz	EMI5993	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	20°C
Relative Humidity	20 to 75 %	46.2 %
Atmospheric pressure	N/A	1012 hPa
Test method deviation: N/A		
Supplementary information: Worst case (the mode with the largest modulation bandwidth was chosen, with the maximum power measured in OATS).		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	EMITECH	3.5 cm	4653		
Cable	C&C	N-3m	14332	18/03/2021	18/05/2023
Climatic enclosure	Secasi	SM600C	1670		
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	15/08/2020	15/10/2021
Thermohygrometer	Testo	608-H2	12268	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

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OCCUPIED BANDWIDTH - GRAPH																													
99% BANDWIDTH																													
EMI5993																													
EUT mode:	Tx mode																												
Test Date:	10/04/2019																												
Test Operator:	MPA																												
Spectrum Ref Level -4.03 dBm Att 10 dB SWT 12.7 ms (~63 ms) RBW 300 Hz VBW 1 kHz Mode Auto FFT 1 Occupied Bandwidth  CF 13.56 MHz10000 pts2.1 kHz/Span 21.0 kHz 2 Marker Table<table><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><tr><td>M1</td><td>1</td><td></td><td>13.5705 MHz</td><td>-53.11 dBm</td><td>Occ Bw</td><td>4.959654803 kHz</td></tr><tr><td>T1</td><td>1</td><td></td><td>13.55770346 MHz</td><td>-44.68 dBm</td><td>Occ Bw Centroid</td><td>13.56018329 MHz</td></tr><tr><td>T2</td><td>1</td><td></td><td>13.56266312 MHz</td><td>-44.44 dBm</td><td>Occ Bw Freq Offset</td><td>183.290366348 Hz</td></tr></table> 08:11:5707.10.2021Measuring...07.10.202108:11:56		Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		13.5705 MHz	-53.11 dBm	Occ Bw	4.959654803 kHz	T1	1		13.55770346 MHz	-44.68 dBm	Occ Bw Centroid	13.56018329 MHz	T2	1		13.56266312 MHz	-44.44 dBm	Occ Bw Freq Offset	183.290366348 Hz
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																							
M1	1		13.5705 MHz	-53.11 dBm	Occ Bw	4.959654803 kHz																							
T1	1		13.55770346 MHz	-44.68 dBm	Occ Bw Centroid	13.56018329 MHz																							
T2	1		13.56266312 MHz	-44.44 dBm	Occ Bw Freq Offset	183.290366348 Hz																							
Results:	The system has an OBW of 4.959 kHz																												
EUT modification(s): N/A																													

7.3. Radiated emission limits

Reference standard:	FCC CRF 47 Part 15.225: 2020 & CNR-Gen
Test method:	FCC CRF 47 Part 15.109, 15.209, 15.205, 15.215, CNR-Gen
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 / Reader mode / All positions / 0°	9kHz-30MHz	15.209	EMI4605	PASS
Radiated measurement / Reader mode / All positions / 45°	9kHz-30MHz	15.209	EMI4607	PASS
Radiated measurement / Reader mode / All positions / 90°	9kHz-30MHz	15.209	EMI4608	PASS
Radiated measurement / Card Emulation mode / All positions / 0°	9kHz-30MHz	15.209	EMI4609	PASS
Radiated measurement / Card Emulation mode / All positions / 45°	9kHz-30MHz	15.209	EMI4610	PASS
Radiated measurement / Card Emulation mode / All positions / 90°	9kHz-30MHz	15.209	EMI4611	PASS
Radiated measurement / P2P mode / All positions / 0°	9kHz-30MHz	15.209	EMI4612	PASS
Radiated measurement / P2P mode / All positions / 45°	9kHz-30MHz	15.209	EMI4613	PASS
Radiated measurement / P2P mode / All positions / 90°	9kHz-30MHz	15.209	EMI4614	PASS
Radiated measurement / Reader mode / Position 1	30MHz-1GHz	15.209	EMI4621	PASS
Radiated measurement / Reader mode / Position 2	30MHz-1GHz	15.209	EMI4622	PASS
Radiated measurement / Reader mode / Position 3	30MHz-1GHz	15.209	EMI4623	PASS
Radiated measurement / Card Emulation mode / Position 1	30MHz-1GHz	15.209	EMI4625	PASS
Radiated measurement / Card Emulation mode / Position 2	30MHz-1GHz	15.209	EMI4657	PASS

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Radiated measurement / Card Emulation mode / Position 3	30MHz-1GHz	15.209	EMI4658	PASS
Radiated measurement / P2P mode / Position 1	30MHz-1GHz	15.209	EMI4660	PASS
Radiated measurement / P2P mode / Position 2	30MHz-1GHz	15.209	EMI4661	PASS
Radiated measurement / P2P mode / Position 3	30MHz-1GHz	15.209	EMI4662	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.		

TEST EQUIPMENT USED – 9KHZ TO 30MHZ					
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	25/07/2019	25/03/2022
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

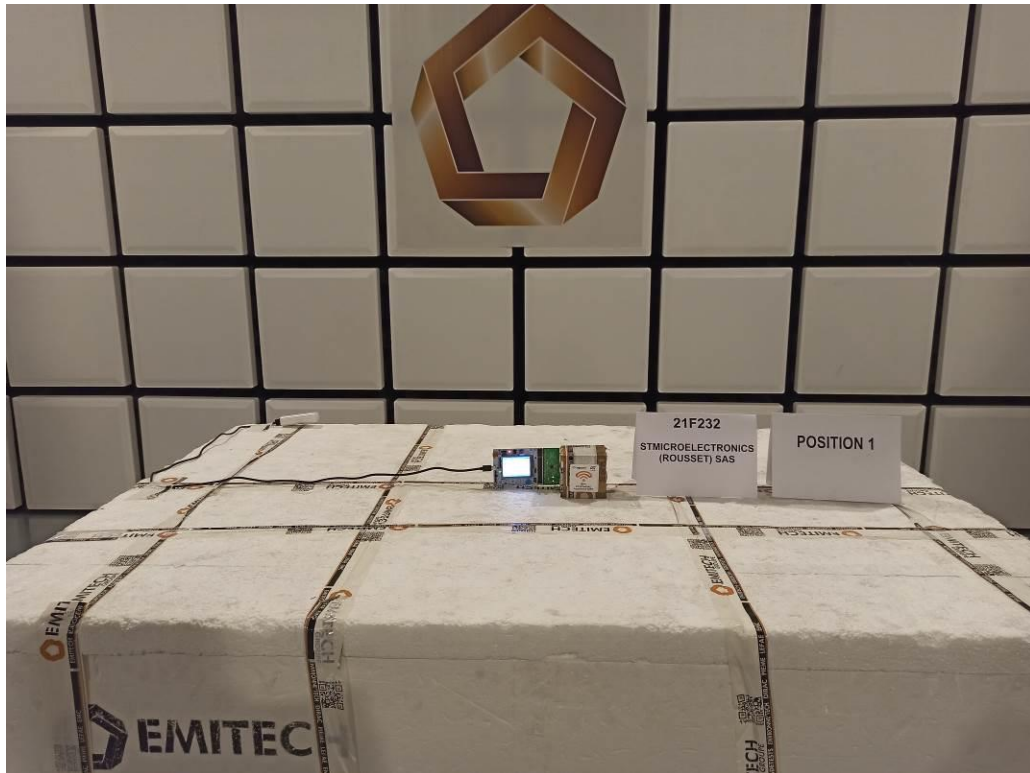
Blank cells = Permanent validity

TEST EQUIPMENT USED – 30MHZ TO 1GHZ					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Electro Metrics	BIA-30HF	0824	21/08/2021	21/10/2024
Antenna	Electro Metrics	BIA-30HF	1107	21/08/2021	21/10/2024
Antenna	Rohde & Schwarz	HL223	1137	21/08/2021	21/10/2024
Cable	MegaPhase	F135N1N28	16664	24/10/2019	24/12/2021
Cable	MegaPhase	F135N1N28	16667	24/10/2019	24/12/2021
Cable	MegaPhase	F135N1N28	16668	24/10/2019	24/12/2021
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/03/2022
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

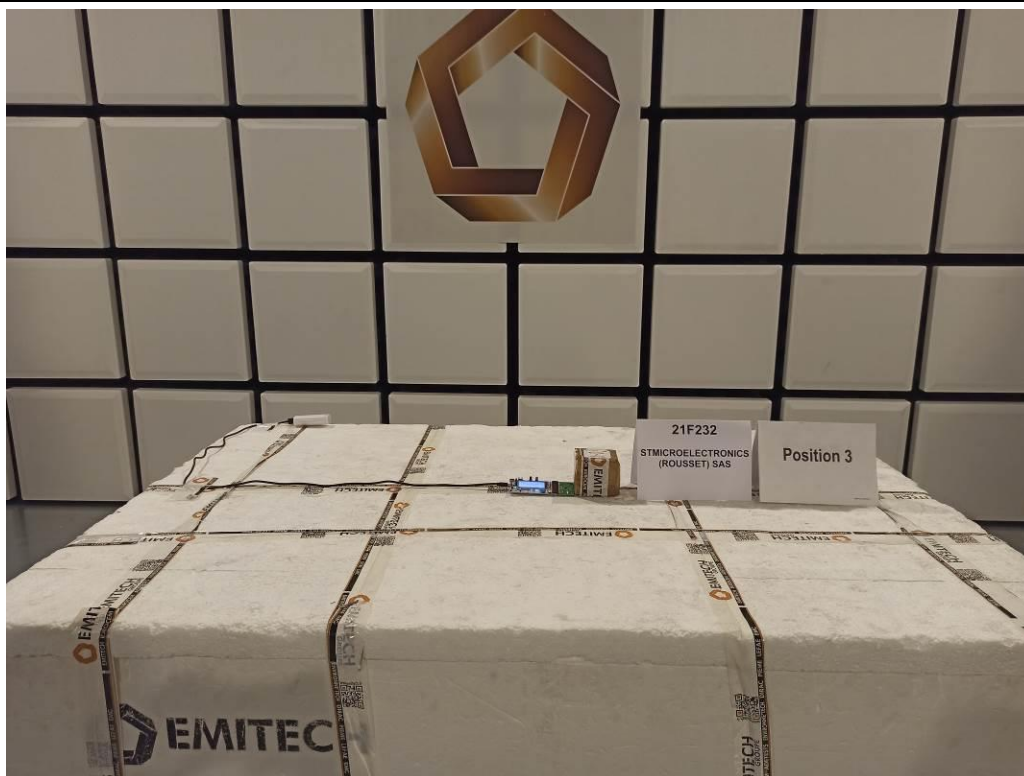
TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / POSITION 1



TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / POSITION 2



TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / POSITION 3



TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / 9KHZ TO 30MHZ



TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / 30MHZ TO 200MHZ



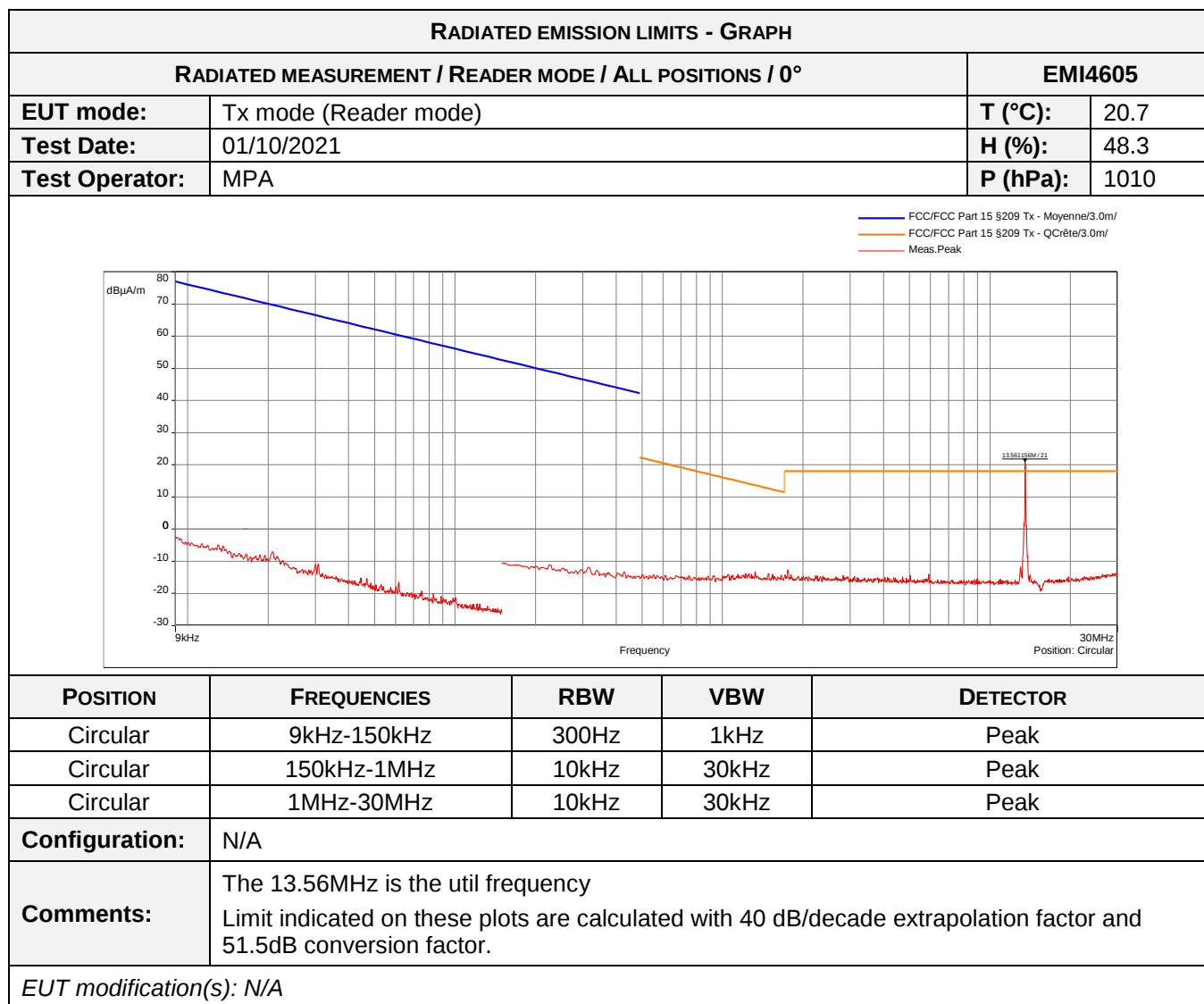
TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / 200MHZ TO 1GHZ



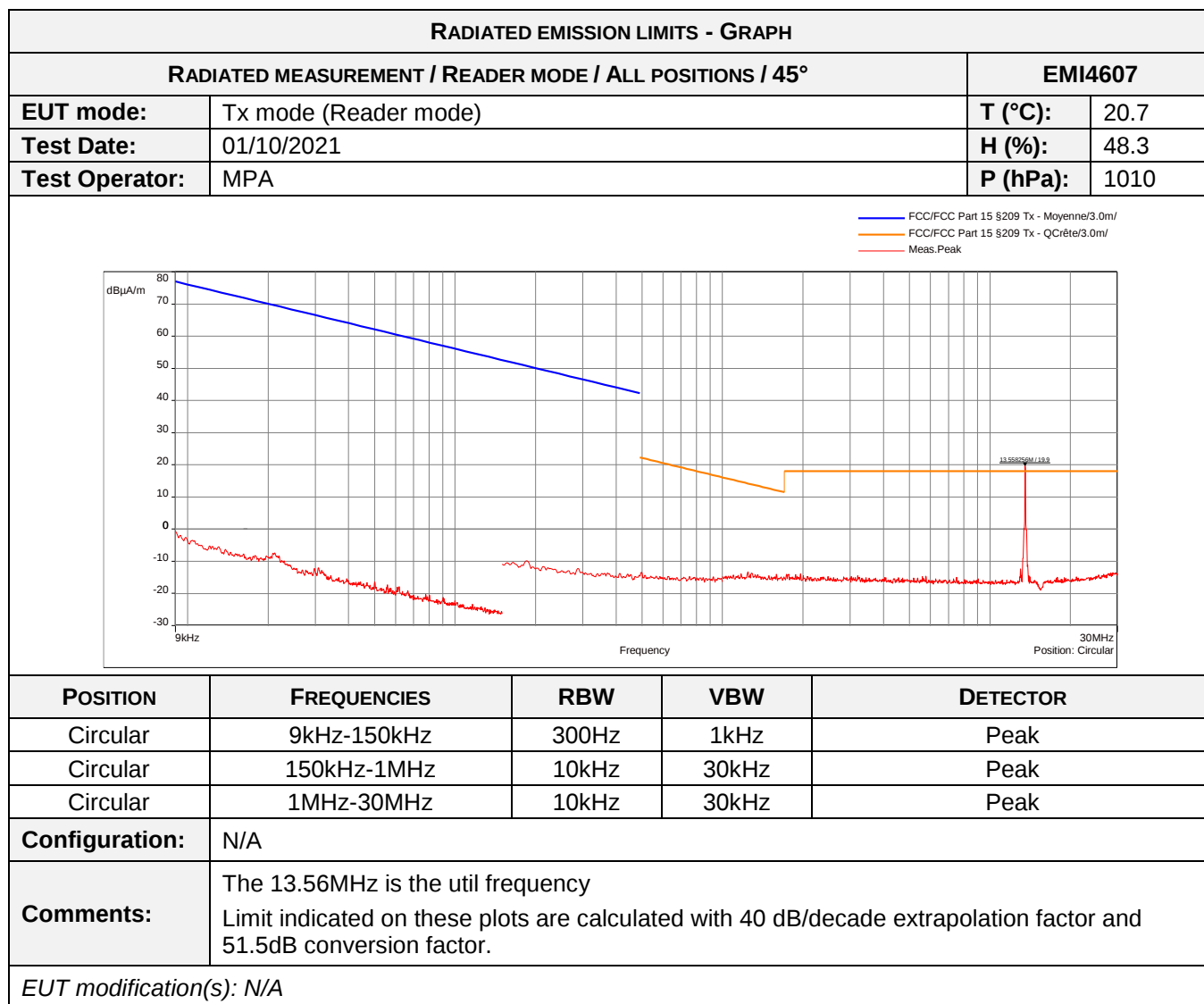
QPEAK RESULTS TABLE					
RADIATED MEASUREMENT / READER MODE / POSITION 1					EMI4621
FREQUENCY (MHz)	POLARIZATION	PEAK VALUE (dB μ V/m)	QPEAK VALUE (dB μ V/m)	QPEAK LIMIT (dB μ V/m)	MARGIN (dB)
40.677	Vertical	32.1	32.36	40	-7.44
199.982	Horizontal	43.1	33.64	46	-12.36
280.008	Horizontal	42.4	38.25	46	-7.75
359.935	Horizontal	46.5	37.73	46	-8.27
695.249	Horizontal	41.7	34.85	46	-11.15

QPEAK RESULTS TABLE					
RADIATED MEASUREMENT / READER MODE / POSITION 2					EMI4622
FREQUENCY (MHz)	POLARIZATION	PEAK VALUE (dB μ V/m)	QPEAK VALUE (dB μ V/m)	QPEAK LIMIT (dB μ V/m)	MARGIN (dB)
360.016	Vertical	39.9	33.25	46	-12.75
559.955	Vertical	39.6	34.34	46	-11.66
174.973	Horizontal	42.7	31.8	43.5	-11.7

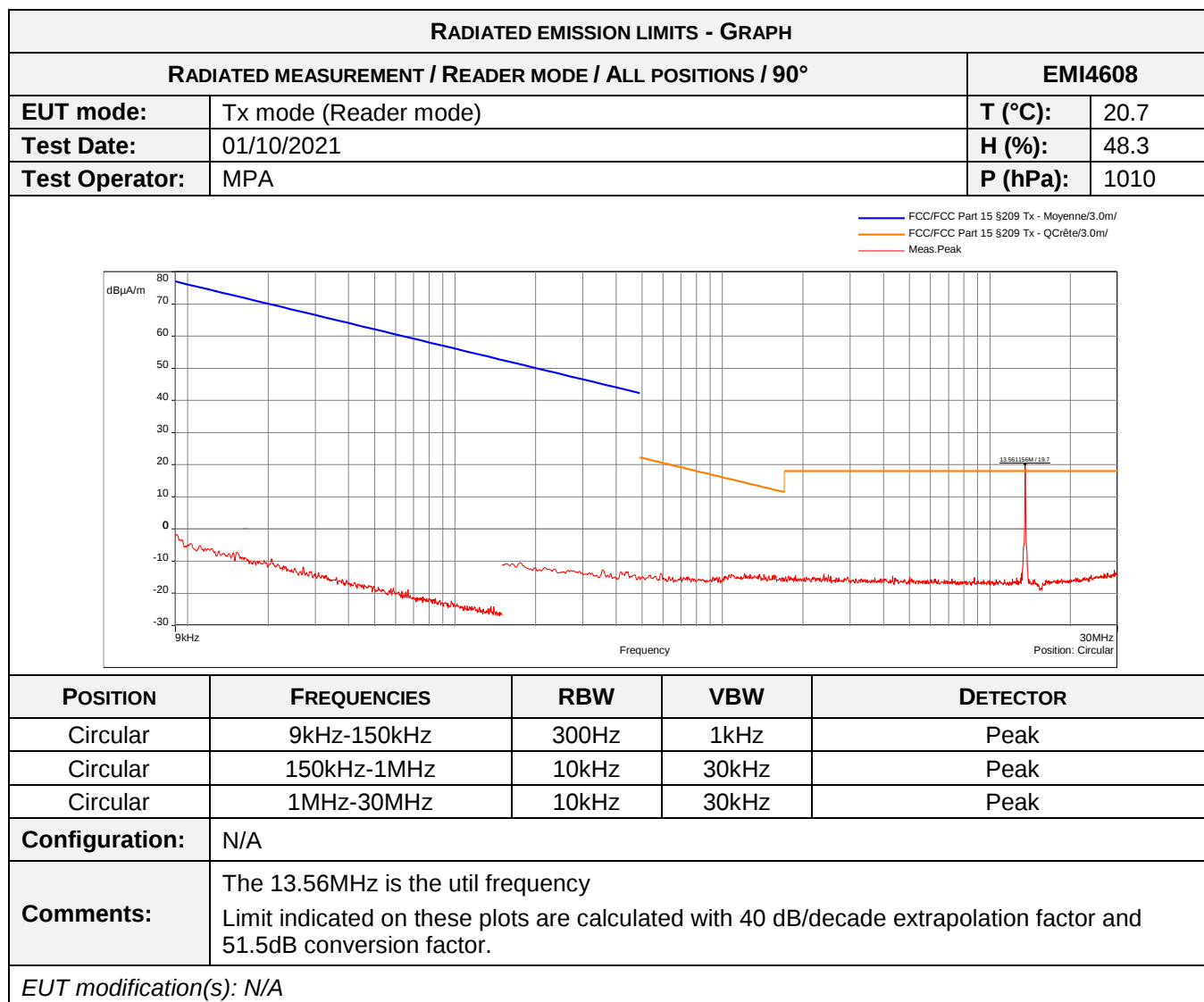
QPEAK RESULTS TABLE					
RADIATED MEASUREMENT / CARD EMULATION MODE / POSITION 1					EMI4625
FREQUENCY (MHz)	POLARIZATION	PEAK VALUE (dB μ V/m)	QPEAK VALUE (dB μ V/m)	QPEAK LIMIT (dB μ V/m)	MARGIN (dB)
215.921	Horizontal	38.3	31.32	46	-14.68
361.856	Horizontal	40.9	31.23	46	-14.77
707.650	Horizontal	40.8	33.11	46	-8.89



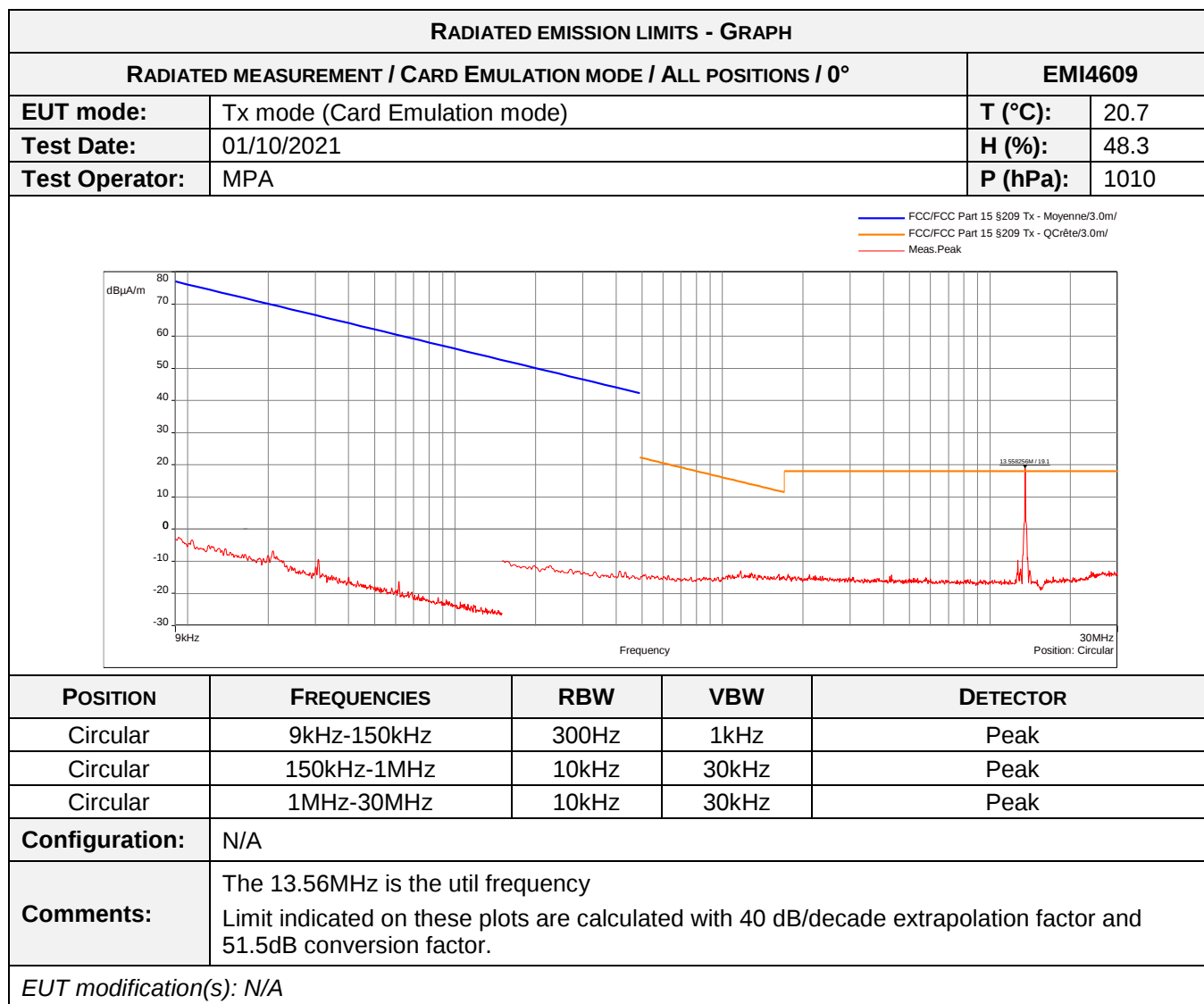
No spurious emissions were detected.



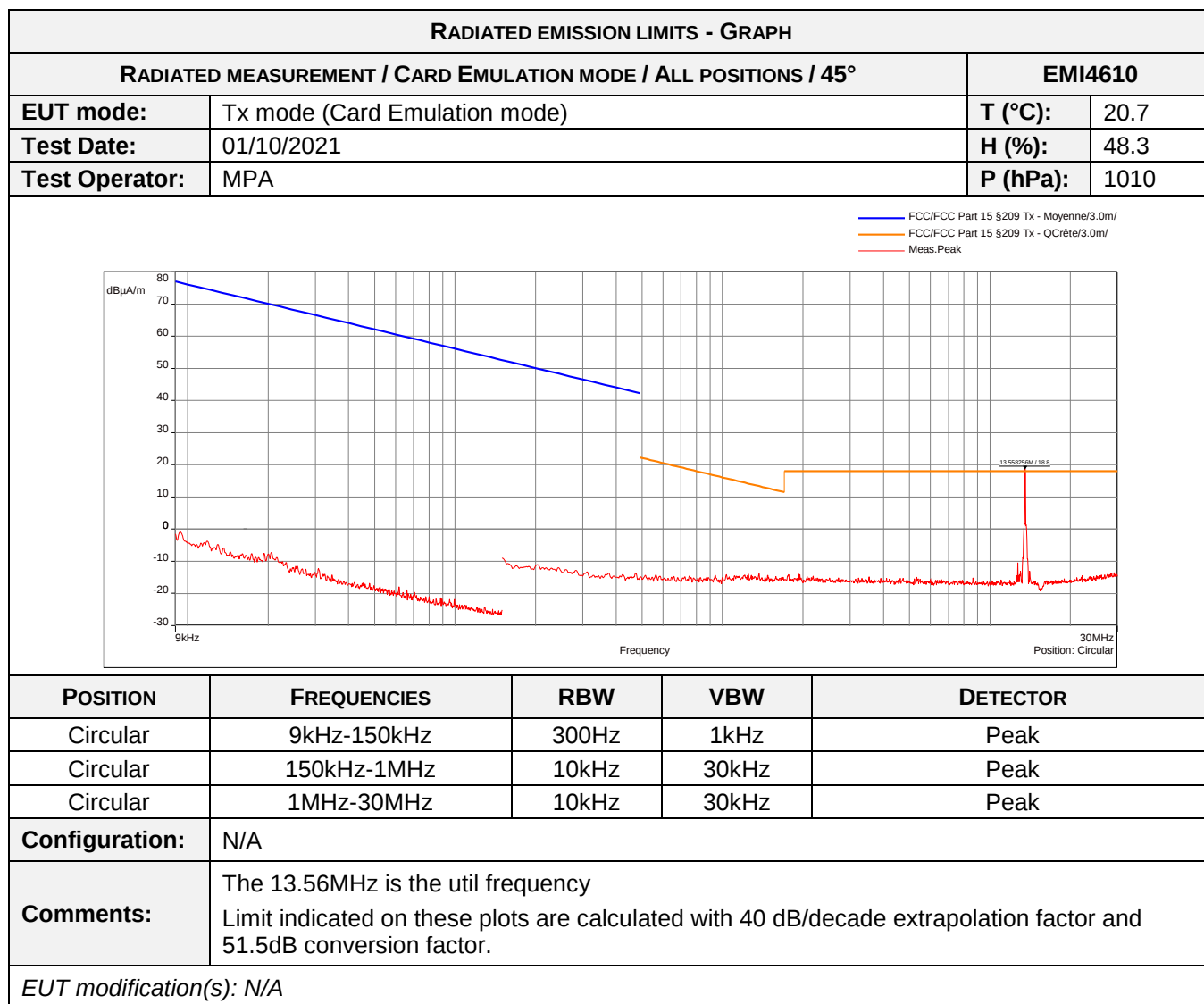
No spurious emissions were detected.



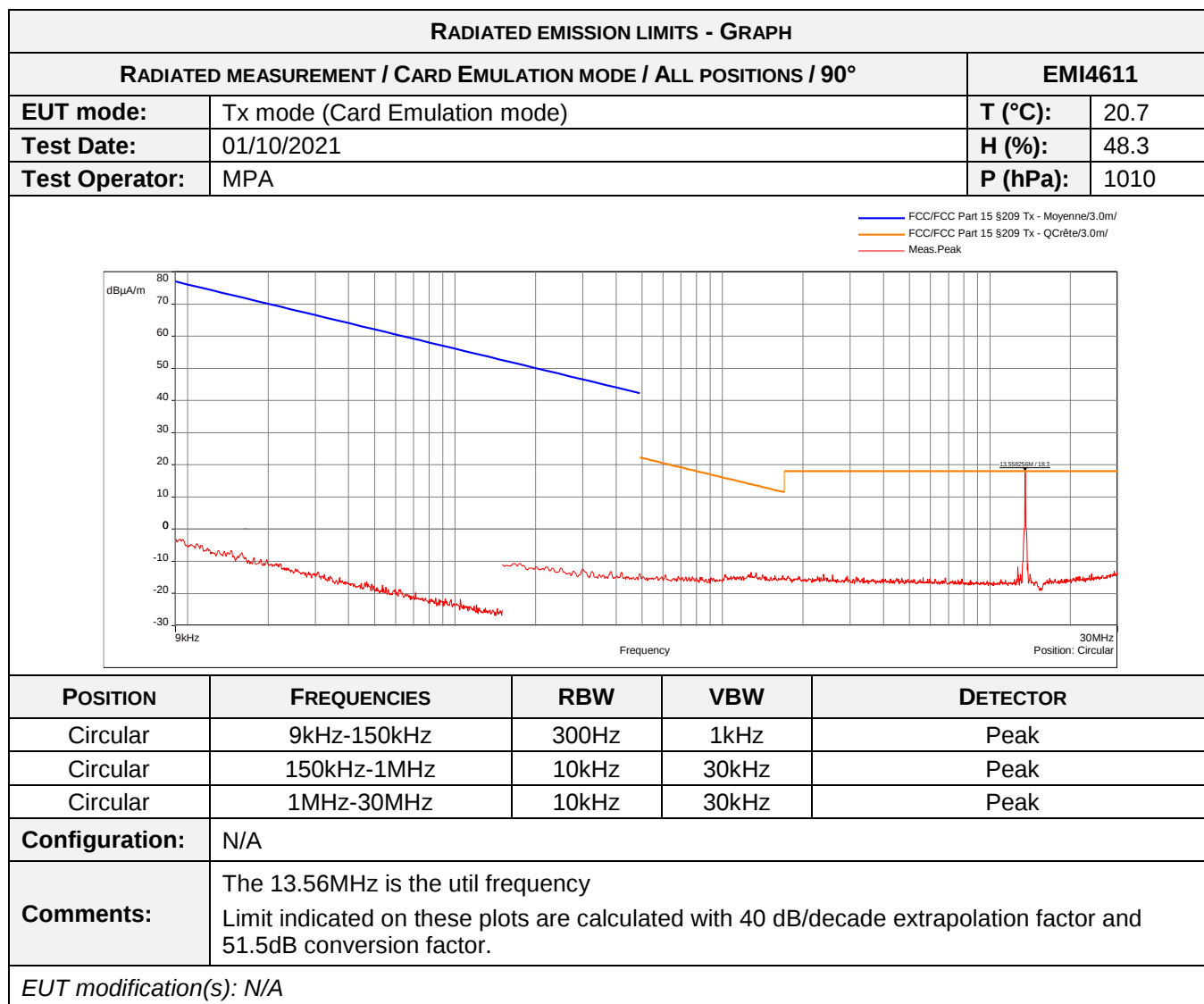
No spurious emissions were detected.



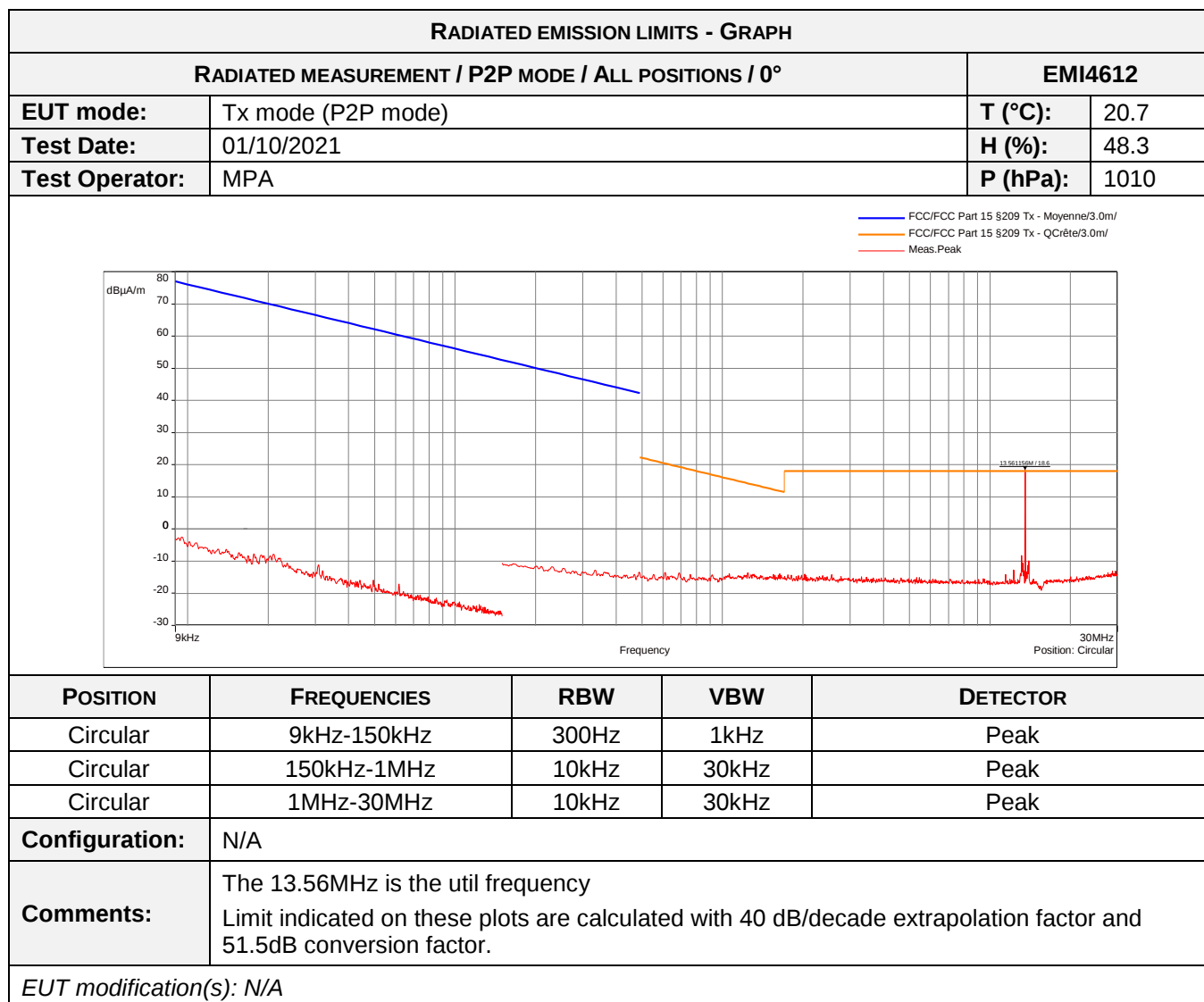
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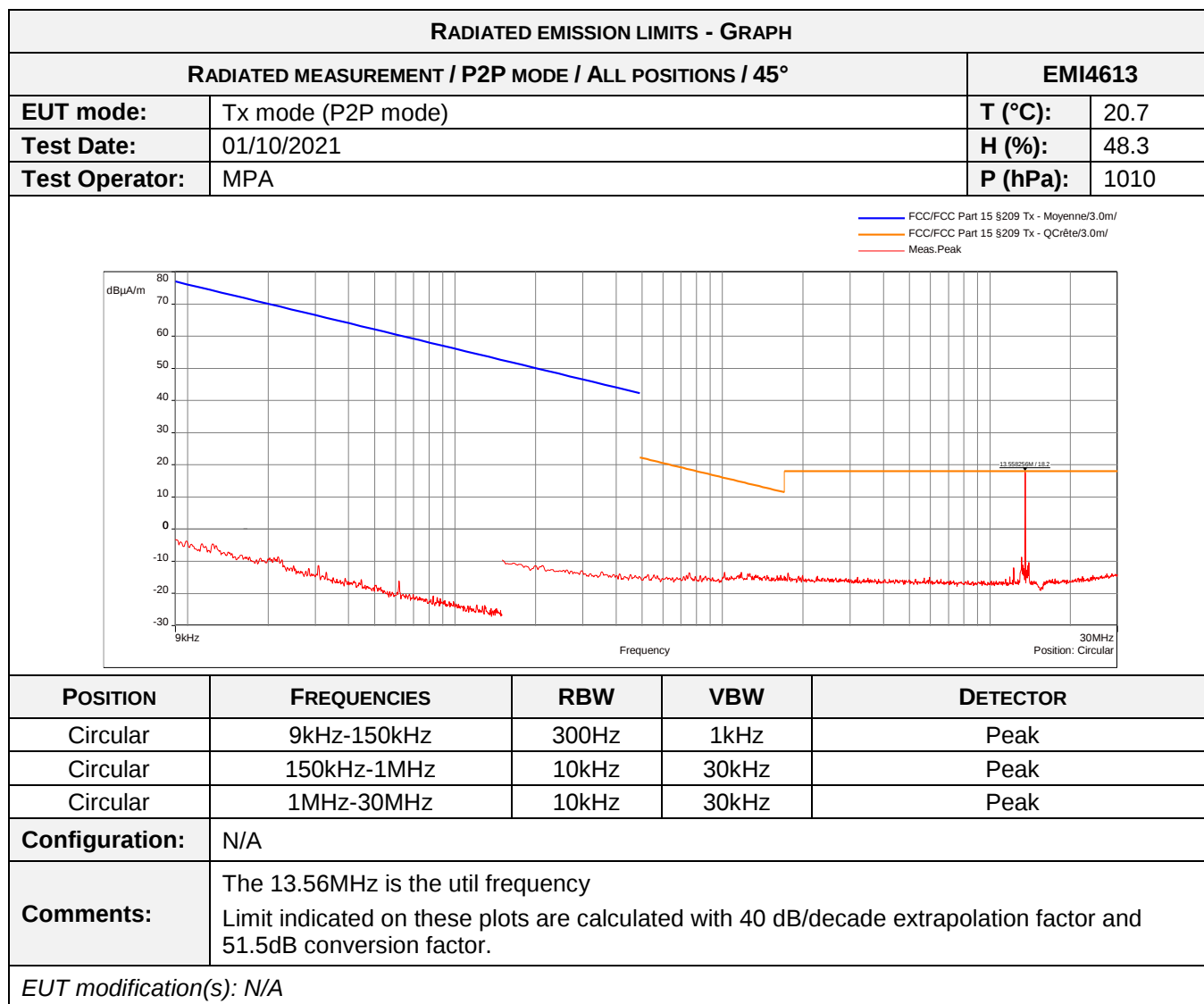
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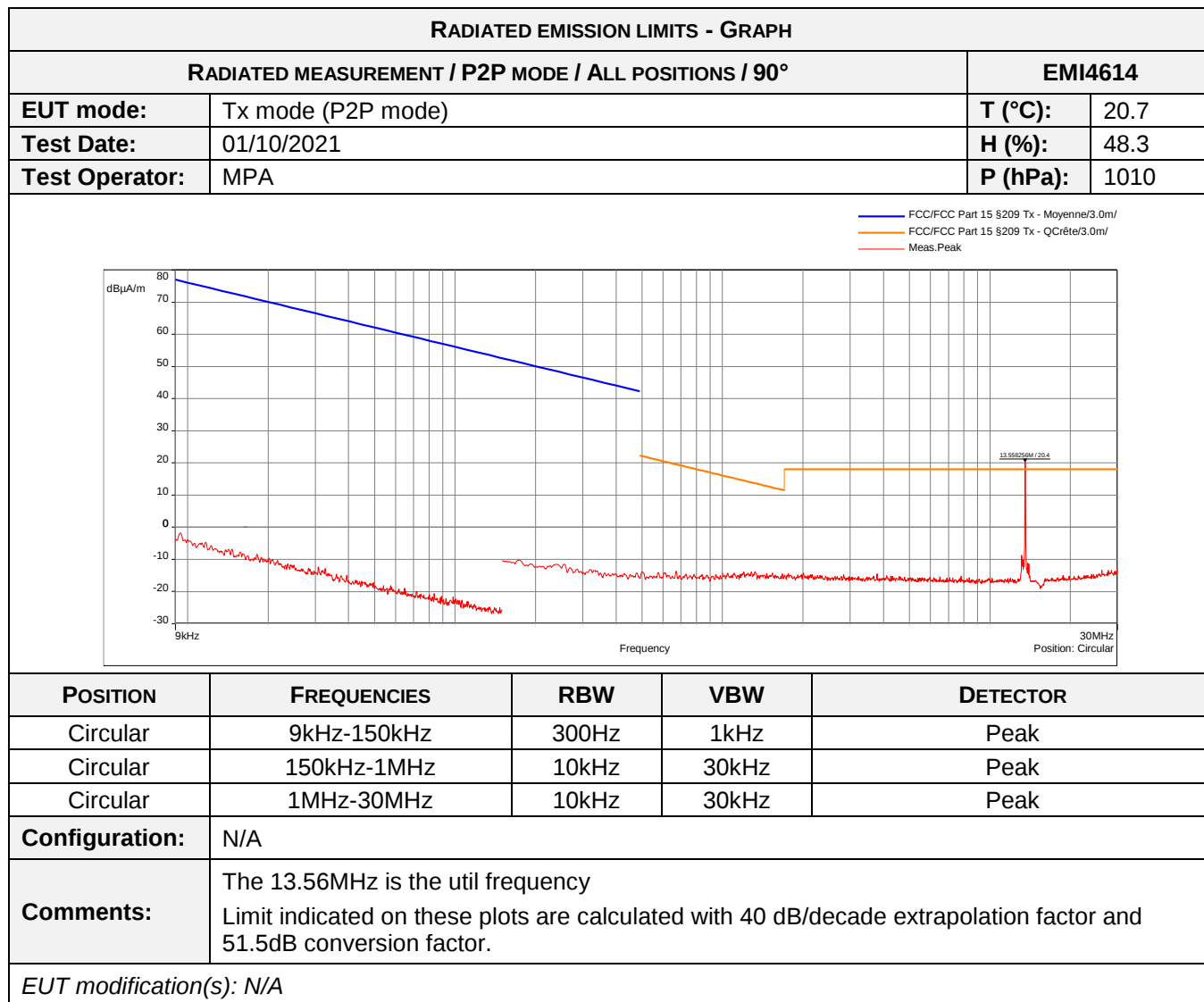
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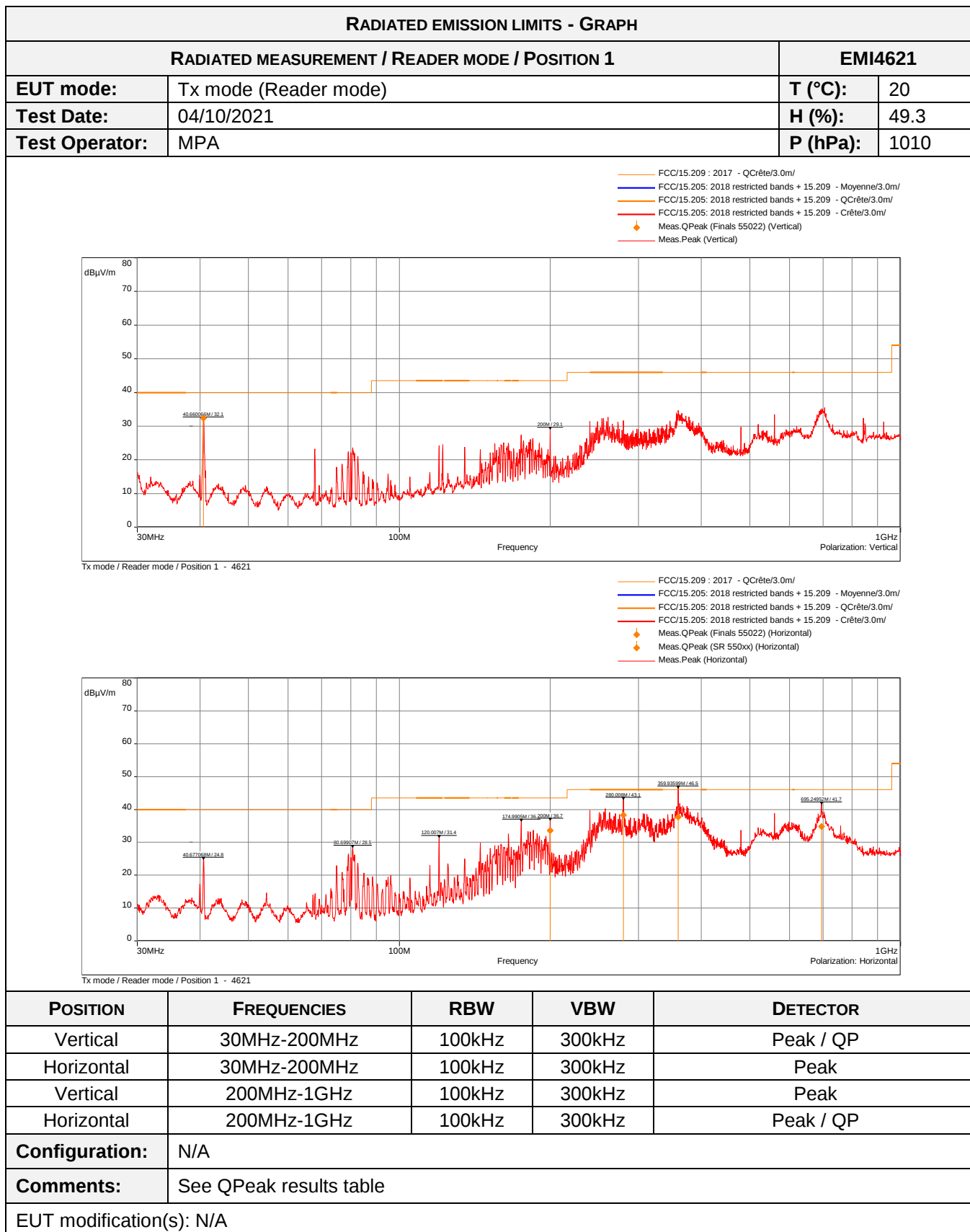
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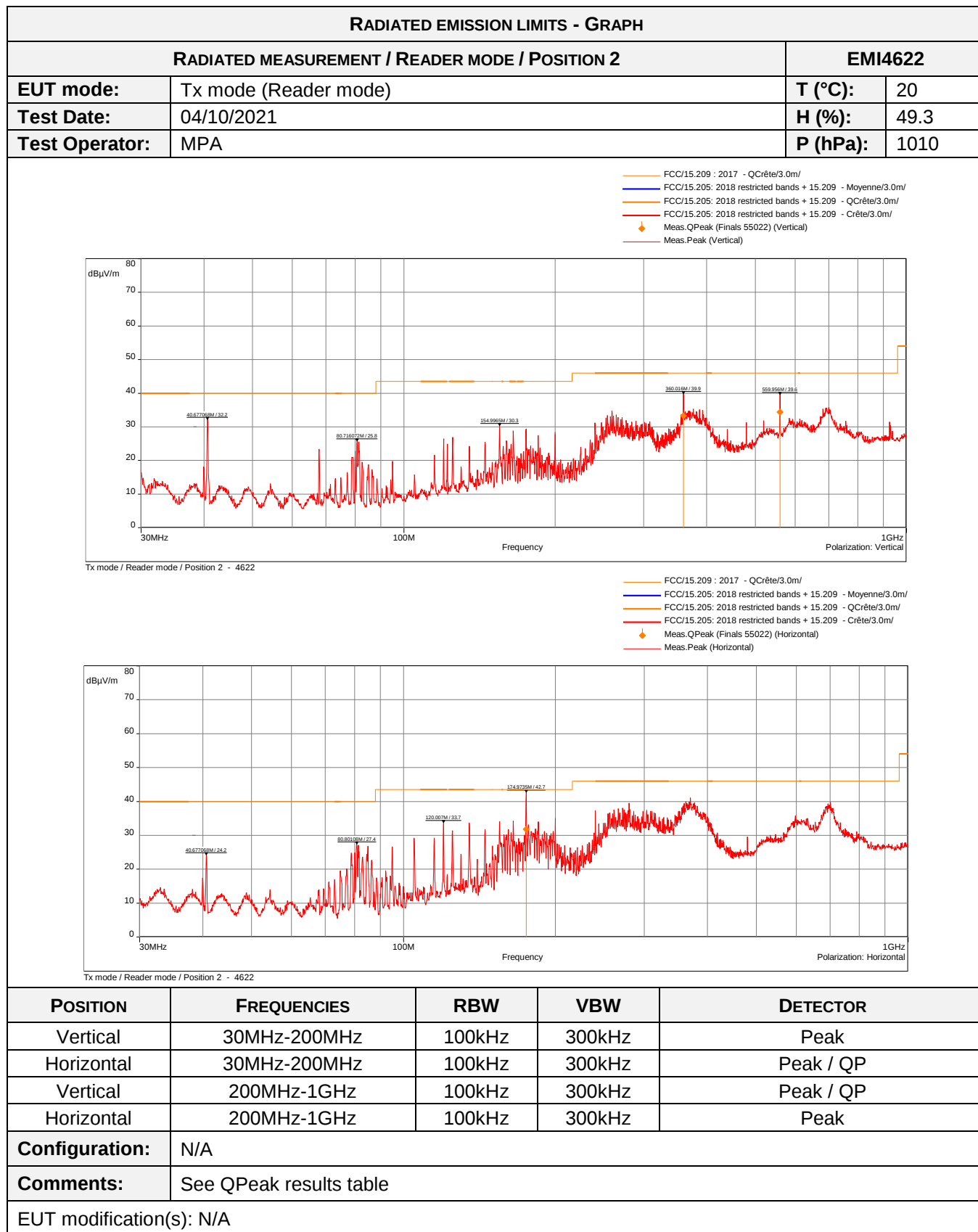


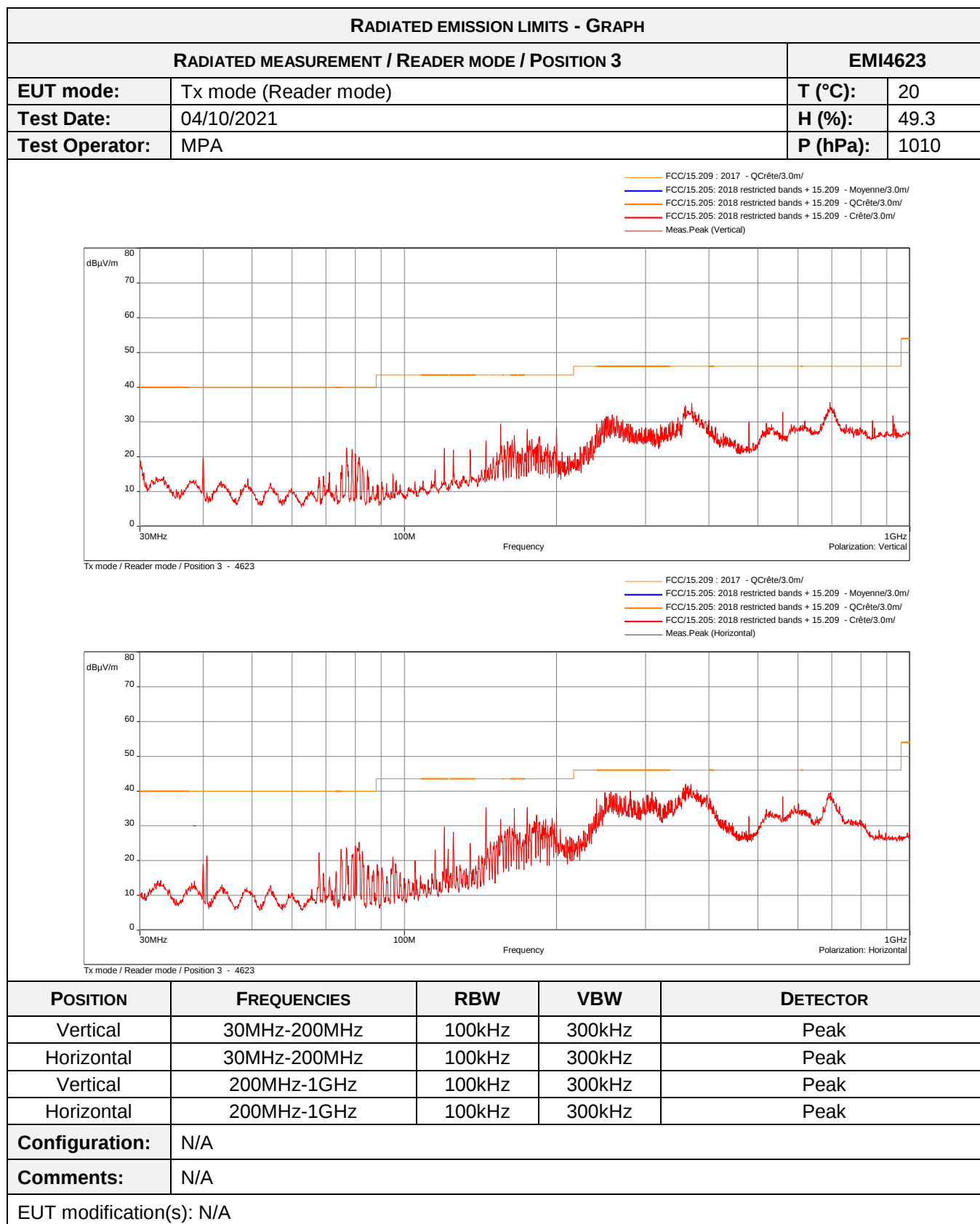
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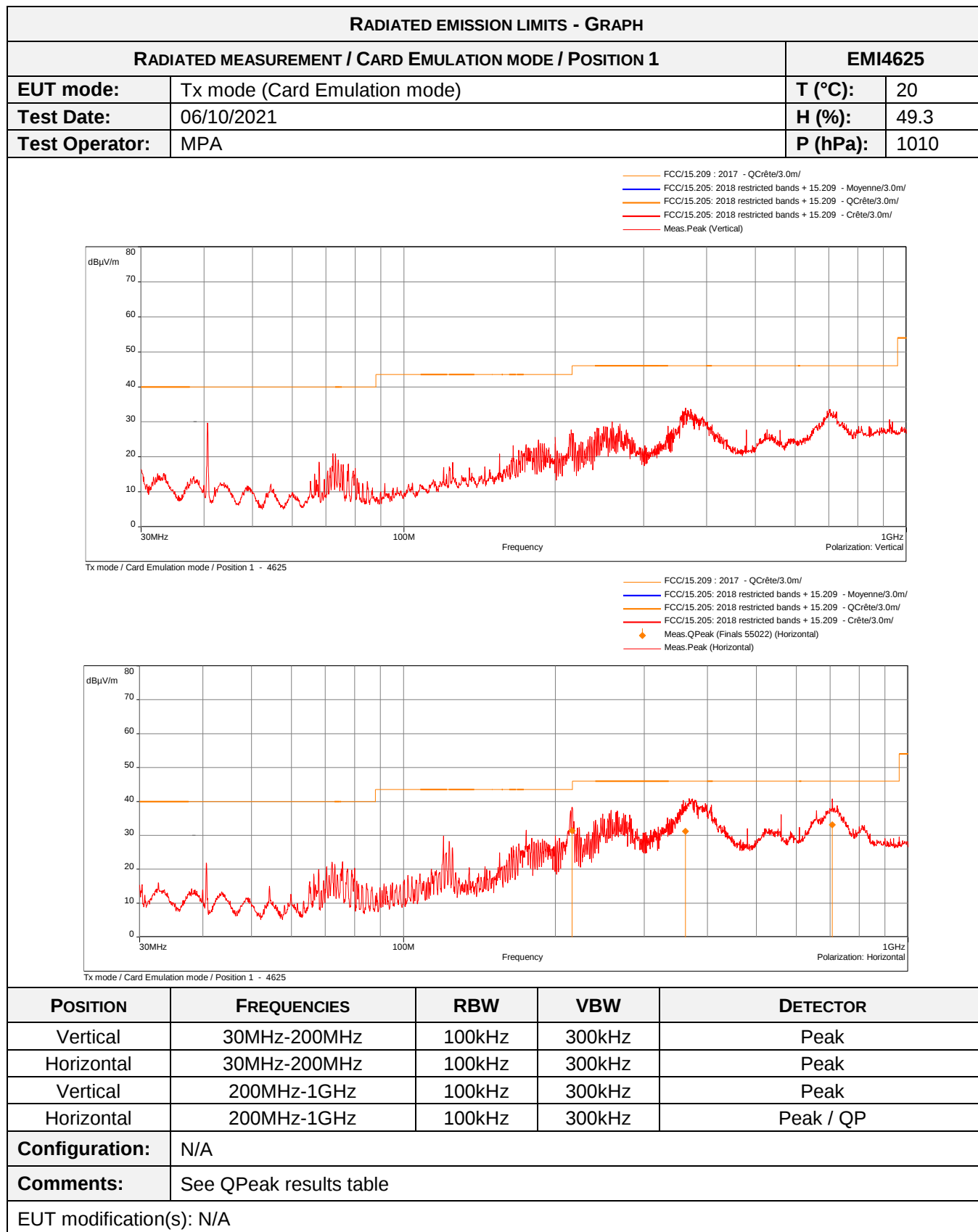


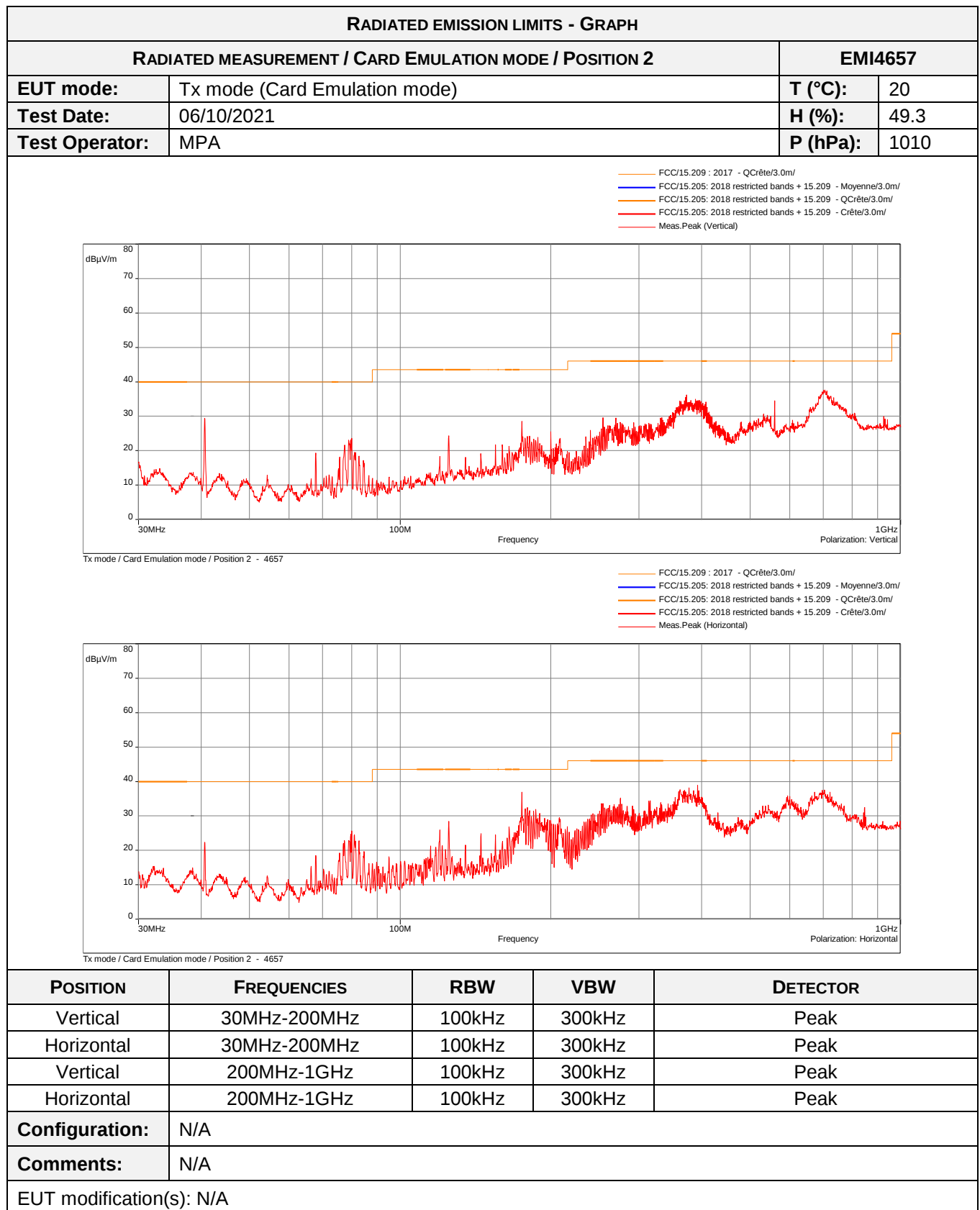
No spurious emissions were detected.

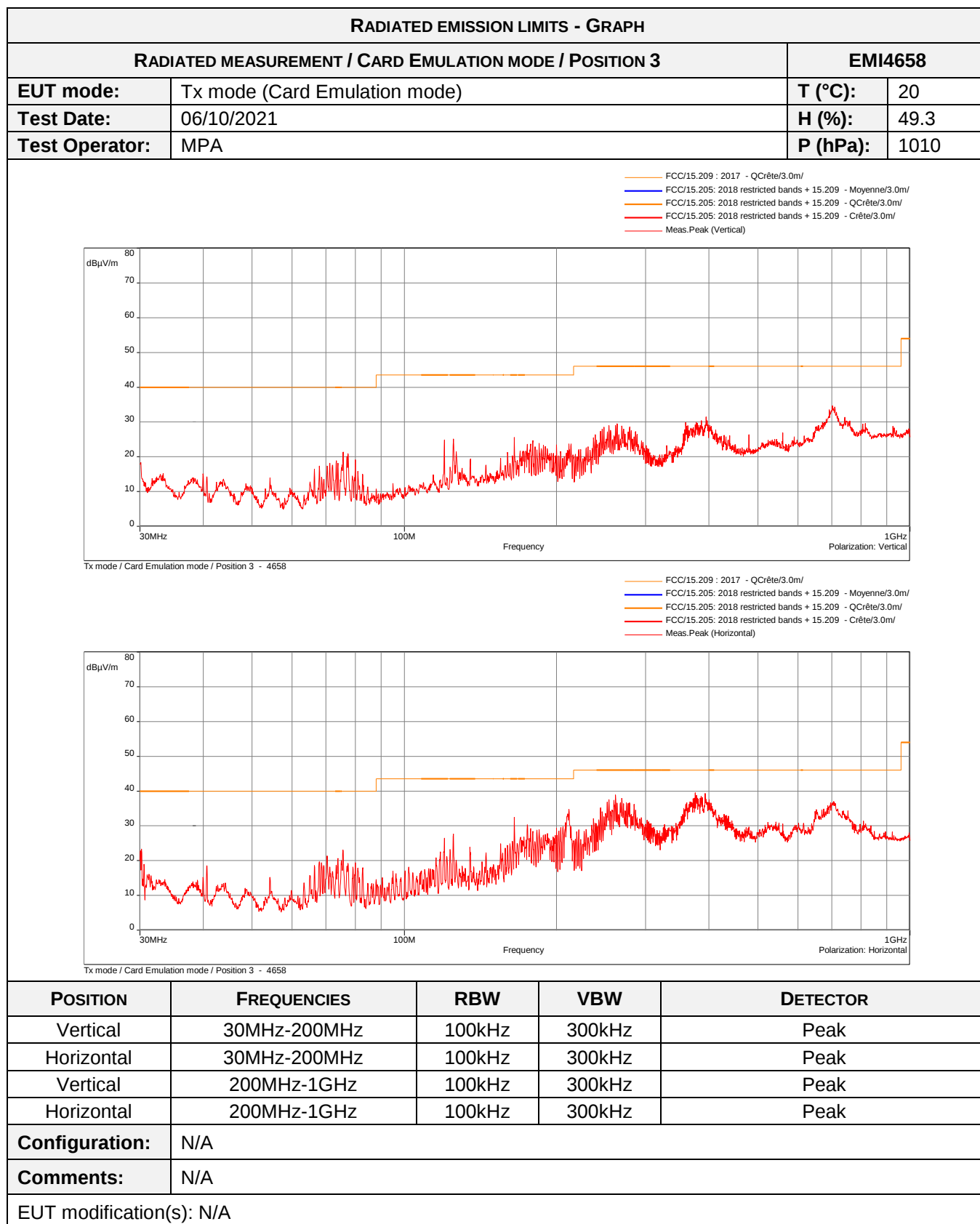


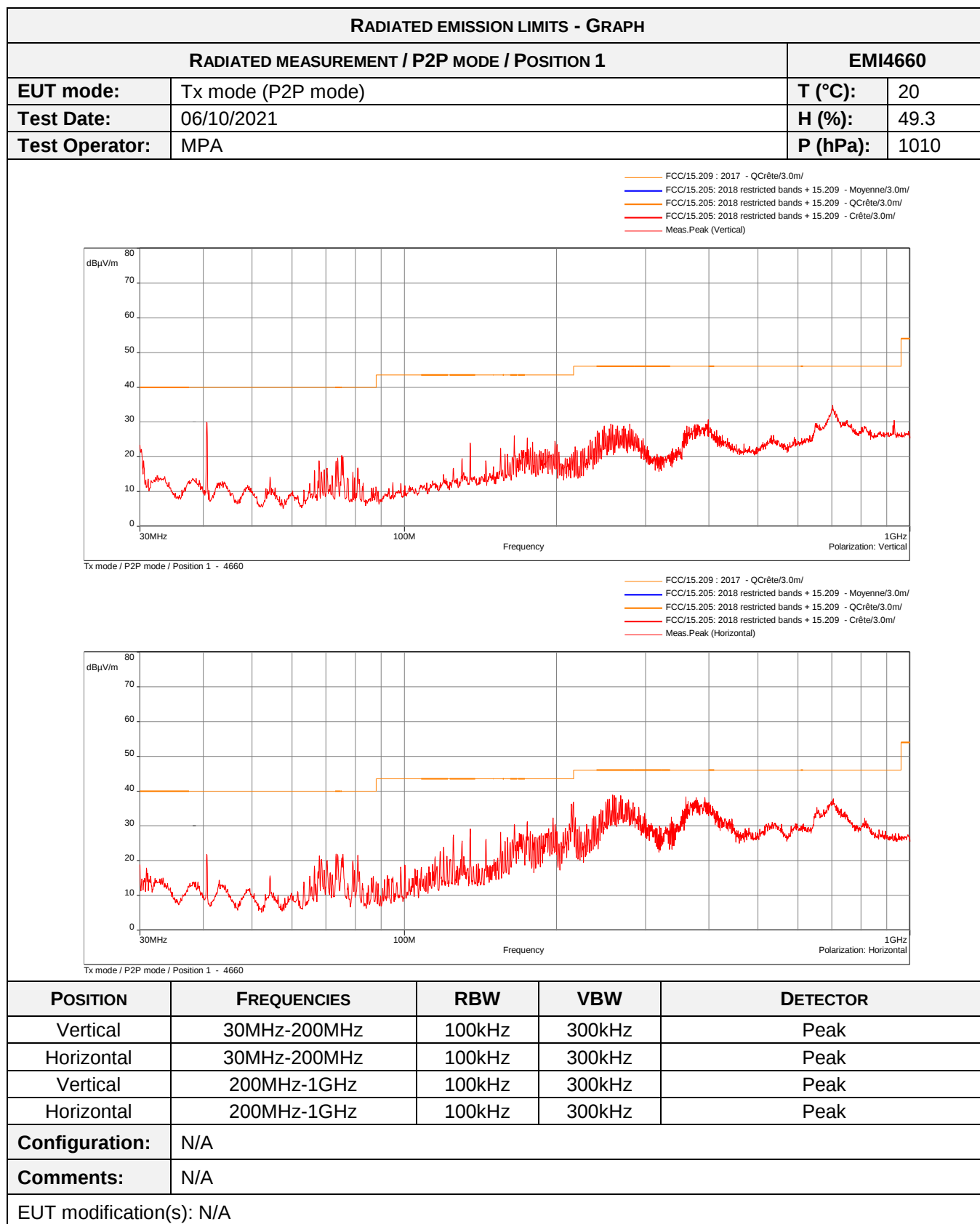


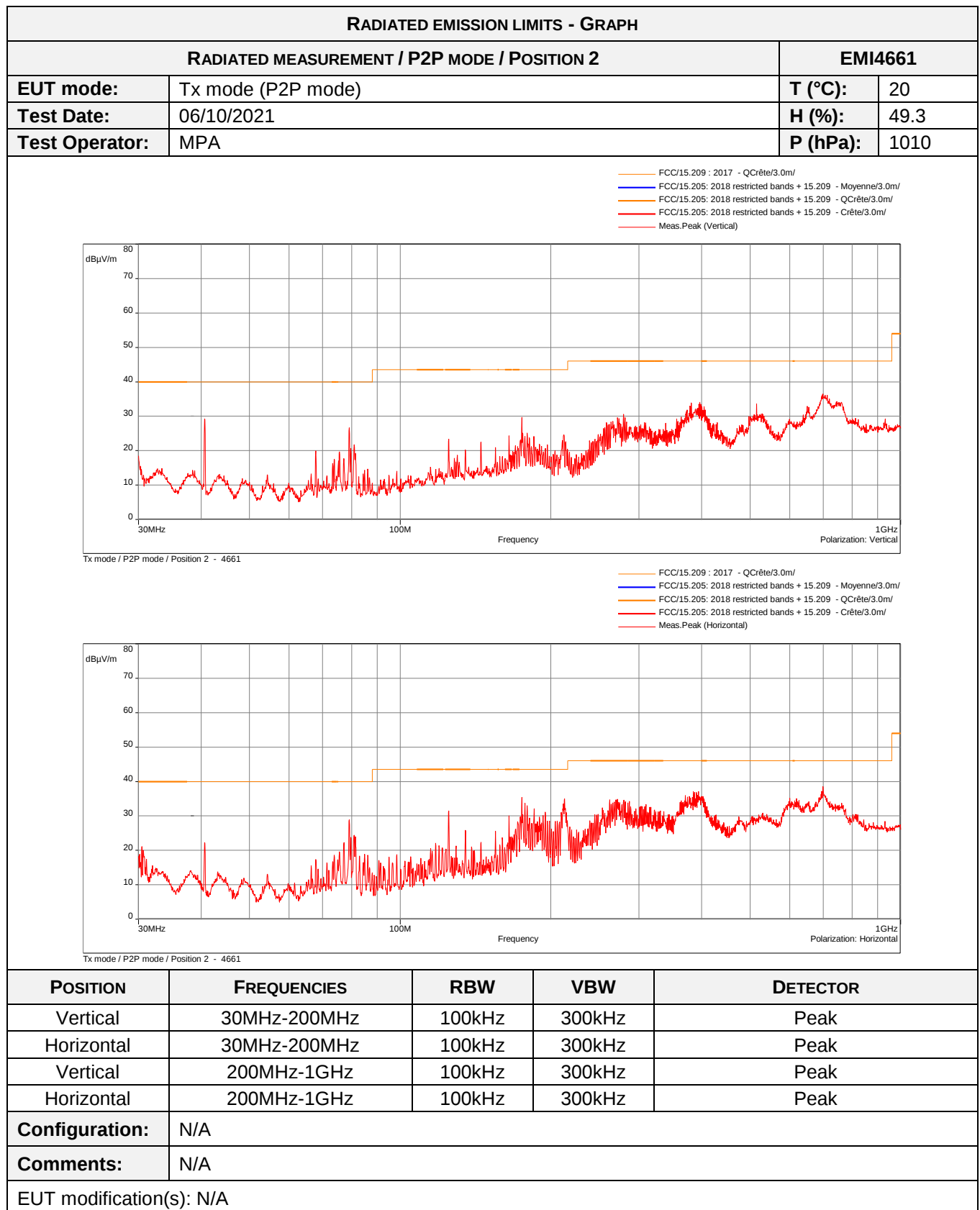


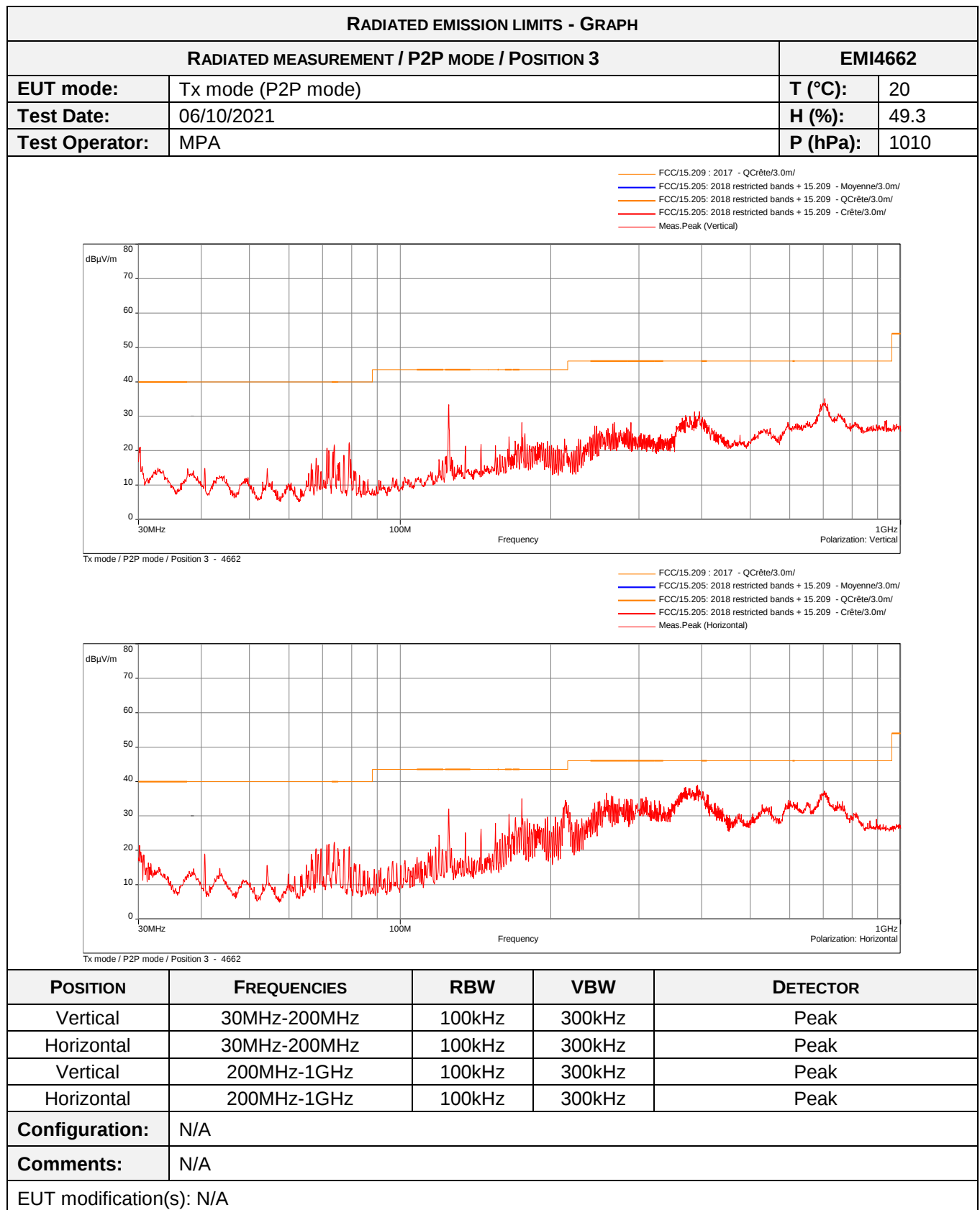












7.4. Field strength in the band 13.553-13.567MHz

Reference standard:	FCC 47 CRF Part 15.225 a) & RSS-210
Test method:	FCC 47 CRF Part 15.225 a) & RSS-210
General test setup: EUT is set on an insulating support at 80cm. Measurements were then performed in a 10-meter Open Area Test Site that complies to CISPR 16. The EUT was rotated 360° in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°). For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
13.56MHz	Tx mode	15848µV/m at 30m	EMI4001	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	N/A
Relative Humidity	20 to 75 %	N/A
Atmospheric pressure	N/A	N/A
Test method deviation: N/A		
Supplementary information: Only maximum level is recorded		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HFH2-Z2	5825	24/04/2020	24/06/2022
Cable	Huber + Suhner	N-20m	8385	07/01/2021	07/03/2023
Mast controller	Heinrich Deisel	HD100	4036		
Open area test site	EMITECH	Salinelles	3482	11/10/2017	11/12/2021
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	15/08/2020	15/10/2021
Turntable	Heinrich Deisel	D4420	4038		

Blank cells = Permanent validity

FIELD STRENGTH - TABULATED RESULTS				
13.56MHz				EMI4001
Frequency (MHz)	Polarization (°)	Level at 10m (dBµA/m)	Limit at 10m (dBµA/m)	Limit at 30m (µV/m)
13.56	0	5.36	51.58	15848
13.56	45	6.66	51.58	15848
13.56	90	9.66	51.58	15848

Maximun level at 10m is 9.66 dBµA/m for a limit at 51.58 dBµA/m.

Using an extrapolation factor of 40dB/dec and a conversion factor of +51.5dB, level at 30m is 42.08 dBµV/m for a limit at 84 dBµV/m.

TEST SETUP PHOTO(S) – OATS / POSITION 1



TEST SETUP PHOTO(S) – OATS / POSITION 2



TEST SETUP PHOTO(S) – OATS / POSITON 3



TEST SETUP PHOTO(S) - OATS



7.5. Field strength outside the band 13.110-14.010MHz

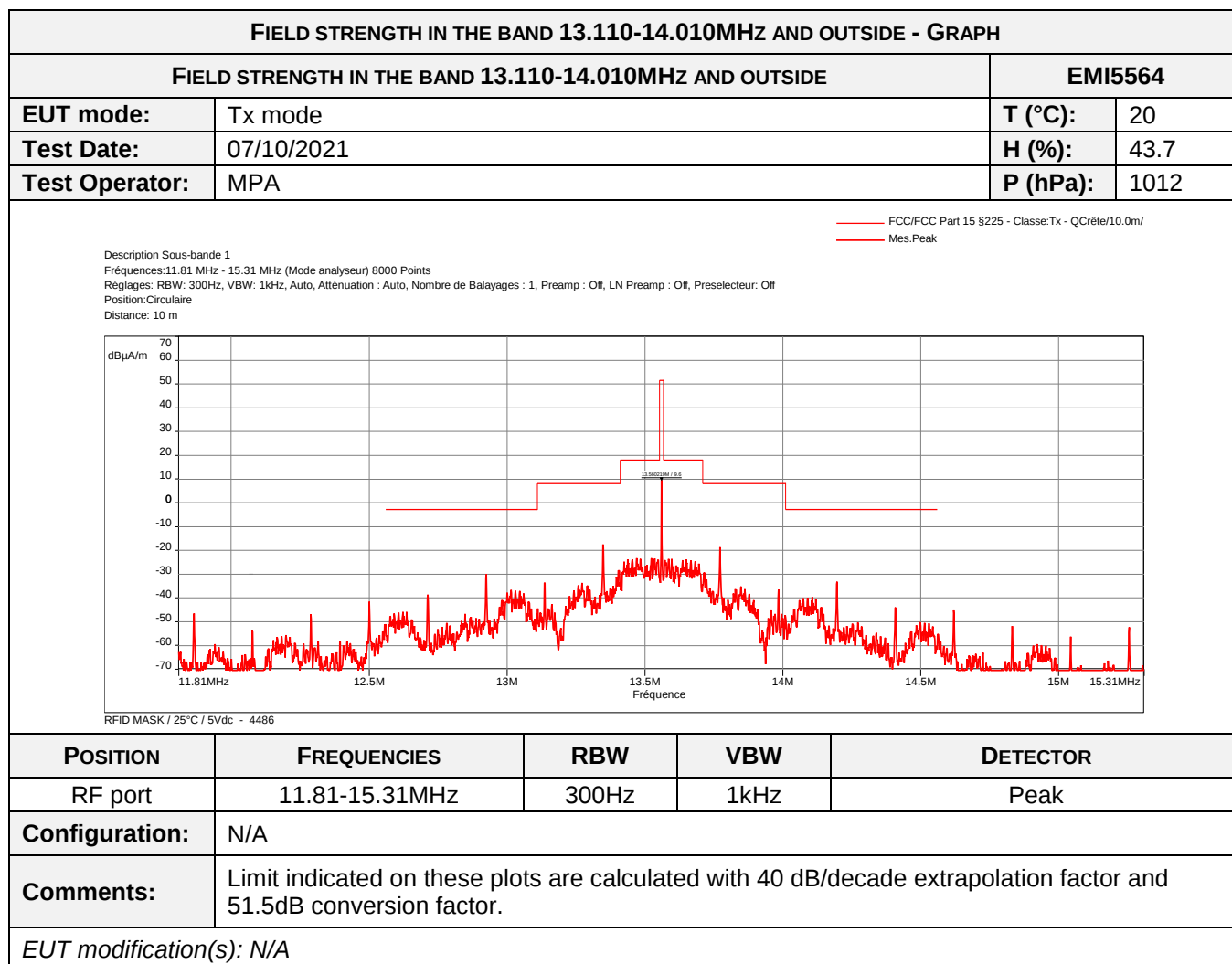
Reference standard:	FCC 47 CRF Part 15.225 b) c) & d) & RSS-210
Test method:	FCC 47 CRF Part 15.225 a) c) & d) & RSS-210
General test setup: EUT is set inside the climatic enclosure. Carrier level are correlated with the maximum carrier level measured in normal conditions.	

FREQUENCY BAND	SEVERITY	RESULT TAB.	VERDICT
Below 13.110MHz	§15.209	See graphic & §6.3 of this report	PASS
13.110-13.410MHz	106µV/m at 30m	See graphic	PASS
13.410-13.553MHz	334µV/m at 30m	See graphic	PASS
13.553-13.567MHz	15,848µV/m at 30m	See graphic & §6.4 of this report	PASS
13.567-13.710MHz	334µV/m at 30m	See graphic	PASS
13.710-14.010MHz	106µV/m at 30m	See graphic	PASS
Above 14.010MHz	§15.209	See graphic & §6.3 of this report	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	N/A
Relative Humidity	20 to 75 %	N/A
Atmospheric pressure	N/A	N/A
Test method deviation: N/A		
Supplementary information: Worst case (the mode with the largest modulation bandwidth was chosen, with the maximum power measured in OATS).		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	EMITECH	3.5 cm	4653		
Cable	C&C	N-3m	14332	18/03/2021	18/05/2023
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	15/08/2020	15/10/2021
Thermohygrometer	Testo	608-H2	12268	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

Blank cells = Permanent validity



7.6. Measurement of Frequency Stability

Reference standard:	FCC 47 CRF Part 15.225 e) & RSS-210
Test method :	FCC 47 CRF Part 15.225 e) & RSS-210
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. Carrier level are correlated with the maximum carrier level measured in normal conditions.	

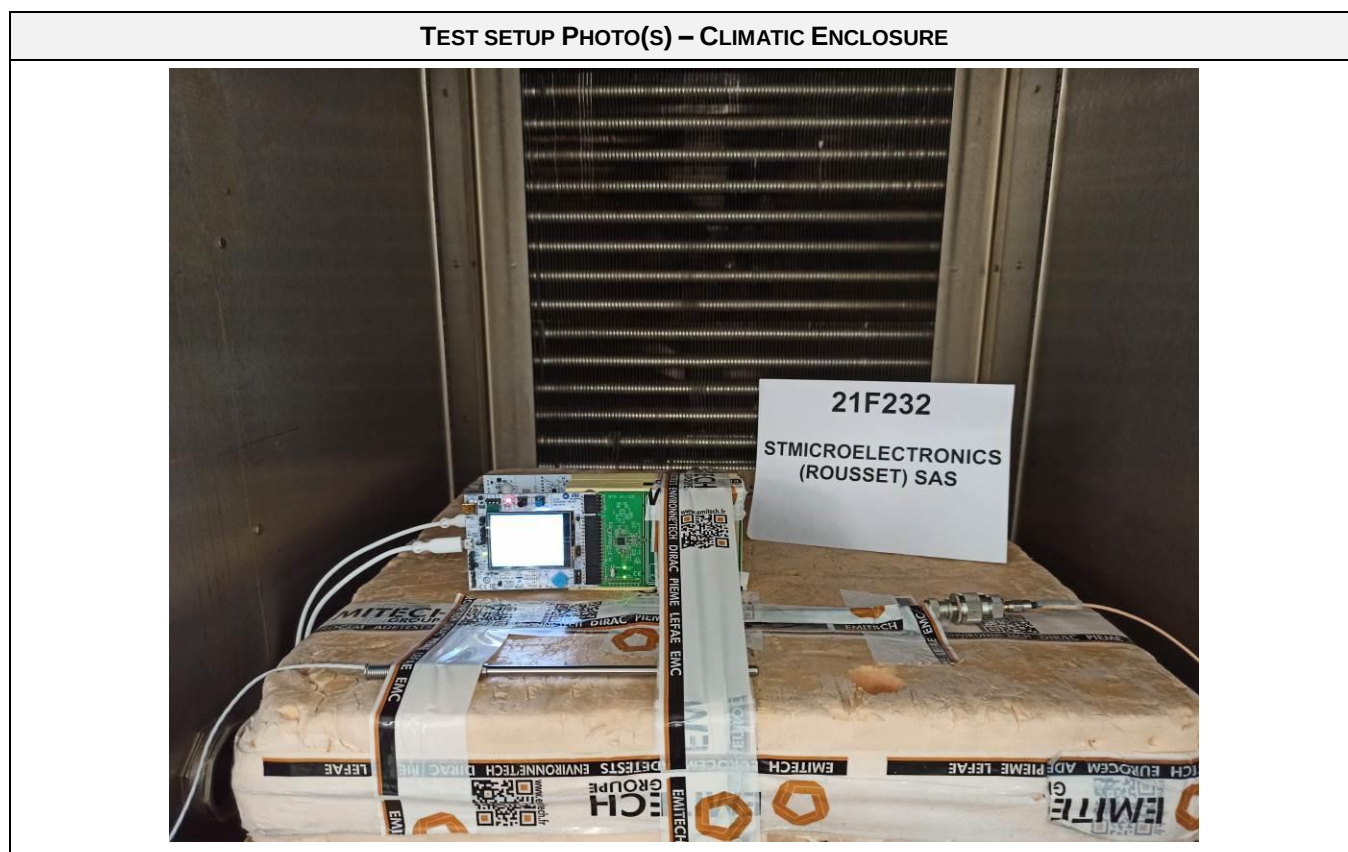
TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Tx mode	Tx mode	+/-0.01%	-	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	20 °C
Relative Humidity	20 to 75 %	43.7 %
Atmospheric pressure	N/A	1012 hPa
Test method deviation: N/A		
Supplementary information: EUT was powered and programmed with a laptop, so the extreme voltage conditions were not realized		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	EMITECH	3.5 cm	4653		
Cable	C&C	N-3m	14332	18/03/2021	18/05/2023
Climatic enclosure	Secasi	SM600C	1670		
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	15/08/2020	15/10/2021
Thermohygrometer	Testo	608-H2	12268	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

Blank cells = Permanent validity

MEASUREMENT OF FREQUENCY STABILITY- TABULATED RESULTS				
Test Case (Temperature variation)	Temperature (°C)	Power supply (VDC)	Frequency (MHz)	Frequency error (%)
Normal conditions	+25	5	13.560220	-
Extremes tests conditions	+10	5	13.560251	0.00023
	+40	5	13.560296	0.00056



End of test report