



This test report cancels and replaces **RRA-EMIESS21D154ECH-01Av0**
Test report issued under the responsibility of: EMITECH LYON laboratory
MRA US-EU Designation Number: FR0013
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RADIO TEST REPORT

FCC 47 CFR Part 15: 2021
KDB 447498 D01
KDB 558074 D01 DTS v03r03
Public Notice DA 00-705

Company : **E-CHRONOS SA**
Address..... : Rue d'Airmon 5
CH-2900 PORRENTUROY JU
SWITZERLAND

Test item description : **915MHz radio module**
Trade Mark : E-Chronos SA
Manufacturer..... : E-Chronos SA
Model/Type reference..... : CRT.0036.915
FCC ID..... : 2A2B4-36915V3
Ratings..... : 3.2-3.4 Vdc

Testing Laboratory : **EMITECH LYON laboratory**
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Report Reference No : **RRA-EMIESS21D154ECH-01Av0**
Test procedure : FCC Certification
Diffusion..... : Mr Mickael ALLEMANN
Applicant's name : Voir devis
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Modified page(s)..... : See revision history in page 2
Compiled by..... : T. VINAY
Approved by (+ signature)..... : E. COEURET (Technical 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 whole manufactured products of the tested sample.*

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REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	September 3, 2021	/	Creation
1	October 14, 2021	1, 3, 5	FCC ID added "FCC IC Verification" becomes "FCC Certification" Mistake on Company name

This document submits the results of Radio tests performed on the equipment **915MHz radio module CRT.0036.915** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

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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: 2021

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

KDB 447498 D01

General RF Exposure Guidance V06

KDB 558074 D01 DTS v03r03

Guidance for Performing Compliance on Digital Transmission
System Operating under 15.247

Public Notice DA 00-705

Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

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

3. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

Test item description. :	915MHz radio module
Model/Type reference..... :	CRT.0036.915
Trade Mark. :	E-Chronos SA
FCC ID..... :	2A2B4-36915V3
Serial number (S/N)..... :	Not communicated
Part number (P/N). :	CRT.0036.915
Software version..... :	-
Firmware version..... :	1.6.2
Type of sample..... :	Prototype
Function(s)..... :	Radio module to interate in E-Chronos products using 915MHz ISM band. This module is a transceiver (Rx+Tx).
Manufacturer name..... :	E-Chronos SA
Address. :	Rue d'Airmon 5 CH-2900 PORRENTROY JU SWITZERLAND

General product information:
N/A

3.2. EUT Marking plate

No marking plate present during the test

3.3. EUT Modification(s)

None

3.4. EUT General view



3.5. EUT Internal view

None

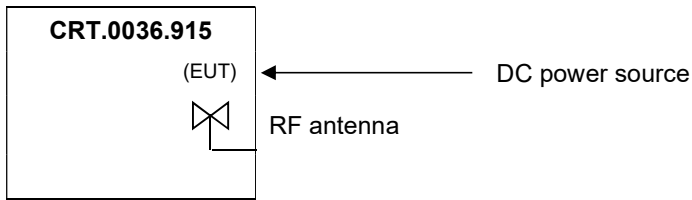
3.6. EUT Mechanical and Electrical Design

Power supply. : 3.3Vdc
 Power supply range..... : 3.2-3.4 Vdc
 Power type..... : *Battery powered*
 Power (W)..... : 0.33
 Nominal current (A). : 0.1
 Dimensions (L x W x H) (m). : 0.038x0.045x0.006
 Weight (kg). : 0.01
 Temperature range (°C). : -20; +70
 Ground bounding strap..... : No

Comments:

N/A

3.7. EUT Input/Output ports



PORT	NAME	TYPE	LENGTH	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	PCB	
1	DC power source	DC	<1m	2P	3.3 Vdc
2	RF antenna	RF	N/A	N/A	

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

3.8. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS

3.9. EUT Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	<i>Transceiver</i>
Technology.....	<i>Proprietary</i>
Environmental profile.....	<i>Light industrial, industrial</i>
Temperature range.....	<i>-20°C; +70°C</i>
Antenna type	<i>Integral</i>
Antenna Gain.....	<i>6 dBi</i>
b) TRANSMITTER PARAMETERS (Tx)	
Frequency bands.....	<i>902-928 MHz</i>
RF Power.....	<i>17 dBm (conducted) 14 dBm (radiated)</i>
Number of channels / Separation.....	<i>20 channels / 1.288 MHz separation</i>
Modulation type	<i>GFSK</i>
Duty cycle	<i>Not communicated</i>
Tested frequency.....	<i>902.764, 915.644 & 927.236 MHz</i>
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	<i>902-928 MHz</i>
Category/Class	<i>Not applicable</i>
Bandwidth.....	<i>1.288 MHz</i>

4. EUT REQUIREMENTS FOR FCC RULES

4.1. Subpart A - General

This part sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of part 15 devices.

The user notice, shall include the following informations:

a) LABELING REQUIREMENTS (§15.19):
Equipment authorization: Supplier's Declaration of Conformity (SDoC) or Certification List of different type of devices and associated "<i>statement on product</i>". §15.19(a)(1) - Receivers associated with the operation of a licensed radio service: <i>"This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference."</i> §15.19(a)(2) - A stand-alone cable input selector switch: <i>"This device complies with part 15 of the FCC Rules for use with cable television service."</i> §15.19(a)(3) - All other devices: <i>"This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:</i> <i>(1) This device may not cause harmful interference, and</i> <i>(2) this device must accept any interference received, including interference that may cause undesired operation.</i> §15.19(a)(4) - Where a device is constructed in two or more sections connected by wires and marketed together: The statement specified only to the main control unit: <i>"This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference."</i> §15.19(a)(5) - When the device is so small: The statement of §15.19(a) shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device. Compliance information (§2.1077): The identification, by name, address and telephone number or internet contact information, of the responsible party, as defined in § 2.909 of the standard. The responsible party for Supplier's Declaration of Conformity must be located within the United States. Identification (§2.1074): (a) Devices subject only to Supplier's Declaration of Conformity shall be uniquely identified by the party responsible for marketing or importing the equipment within the United States. (b) Devices subject to authorization under Supplier's Declaration of Conformity may be labeled with the following logo on a voluntary basis as a visual indication that the product complies with the applicable FCC requirements.  (image size: 6.7 x 2.8" ;3.5 x 1.4" ;1.6 x .7")

The label shall be located in a conspicuous location on the device.

The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible (font of at least 4-point or larger) to the purchaser at the time of purchase.

EUT LABEL
No label present during the tests

b) DEVICES INCLUDING MODULAR TRANSMITTER(S) (§15.212):

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

“Contains Transmitter Module FCC ID: XYZMODEL1” or “Contains FCC ID: XYZMODEL1.”

Device under test includes single modular transmitter(s):

FCC ID:

IC:

c) INFORMATION TO USER (§15.21):

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that:

“The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user’s authority to operate the equipment”

4.2. Subpart B - Unintentional Radiators

In addition to Subpart A, the user notice Référence du manuel utilisateur, shall include the following informations:

a) INFORMATION TO USER (§15.105):

Equipment authorization: Supplier's Declaration of Conformity (SDoC) or Certification

§15.105(a) - For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

“NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.”

§15.105(b) - For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

“NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.*
- Increase the separation between the equipment and receiver.*
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- Consult the dealer or an experienced radio/TV technician for help.”*

5. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
SUBPART A - GENERAL			
Labeling requirements		PASS	15.19 / See certification documents
Information to user		PASS	15.21 / See certification documents
Home-built devices		N/A	15.23
Kits		N/A	15.25
Special Accessories		PASS	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		PASS	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			
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		N/P	a) (1)
- Digital modulation system		PASS	a) (2) BW > 500kHz
- 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		N/P	b) (2)
- For system using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands		PASS	b) (3) BW > 500kHz
- Operation with directional antenna gains > 6 dBi		N/A	c)
- Out-of-band emissions		PASS	d)
- Power spectral density conducted		PASS	e)
- Hybrid system		N/A	f)
- Frequency hopping additional requirements		N/P	g) See certification documents
- Frequency hopping intelligence		N/P	h) See certification documents
- RF exposure compliance		PASS	i)

Sample subject to the test complies for tests done 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 into account of uncertainty associated with the results with the exception of emission tests based on CISPR standards.

TEST(S) PERFORMED	MODIFICATION(S)
Part 15.247 a) 2)	N/A
Part 15.247 (e)	N/A
Part 15.247 (d)	N/A
Part 15.247 (b)	N/A
Part 15.247	N/A

TEST(S) PERFORMED	MODIFICATION(S)
Part 15.215	N/A
Part 15.212	N/A
Part 15.209	N/A
Part 15.207	N/A
Part 15.205, Part 15.209 Part 15.247	N/A
Part 15.205	N/A
Part 15.203	N/A

6. RF EXPOSURE

Conducted measurement = 15.81dBm

Maximum antenna gain = 6dBi

Maximum EIRP with antenna gain of 6dBi = 151.705 mW (eirp) at 902.764MHz

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

$PSD = EIRP / (4 \cdot \pi \cdot R^2) = 151.705 / (4 \cdot \pi \cdot (20 \text{ cm})^2) = 0.0302 \text{ mW/cm}^2$

Limit = 0.60 mW/cm² (f /1500 if 300<f< 1500 MHz)

7. 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	$\pm 4.0 \text{ dB}$	$\pm 4 \text{ dB}$
Transient		
Amplitude	$\pm 8.5 \%$	$\pm 20 \%$
At the frequency	$\pm 166 \text{ Hz}$	$\pm 250 \text{ Hz}$
Conducted emission (spurious)		
f ≤ 1 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 ≤ 62.5 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	$\pm 5.4 \text{ dB}$	$\pm 6 \text{ dB}$
180-1000 MHz / 1 – 12.75 GHz (EN 301 908-1)	$\pm 3.0 / 2.9 \text{ dB}$	$\pm 3 \text{ dB}$
RF power (EN 300328 / EN 301893)	$\pm 5.3 \text{ dB}$	$\pm 6 \text{ dB}$
PIRE and power spectral density with diode	$\pm 5.2 \text{ dB}$	$\pm 6 \text{ dB}$
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	$\pm 1 \text{ }^{\circ}\text{C}$	$\pm 1 \text{ }^{\circ}\text{C}$
Humidity	$\pm 5 \%$	$\pm 5 \%$
Time / Duty cycle	$\pm 4.4 \%$	$\pm 5 \%$
Adaptivity	$\pm 2.9 \text{ dB}$	/
Conducted emission (FCC)		

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	MINIMAL STANDARD UNCERTAINTY
(Artificial Mains Network) 150kHz – 30MHz	± 3.4 dB	± 3.4 dB
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	± 2.7 dB	/
30MHz – 1GHz	± 5.0 dB	/
1GHz – 18GHz	± 5.6 dB	/
18GHz – 26GHz	± 5.7 dB	/
26GHz – 40GHz	± 5.7 dB	/

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

8. TEST CONDITIONS AND RESULTS

8.1. Occupied Bandwidth

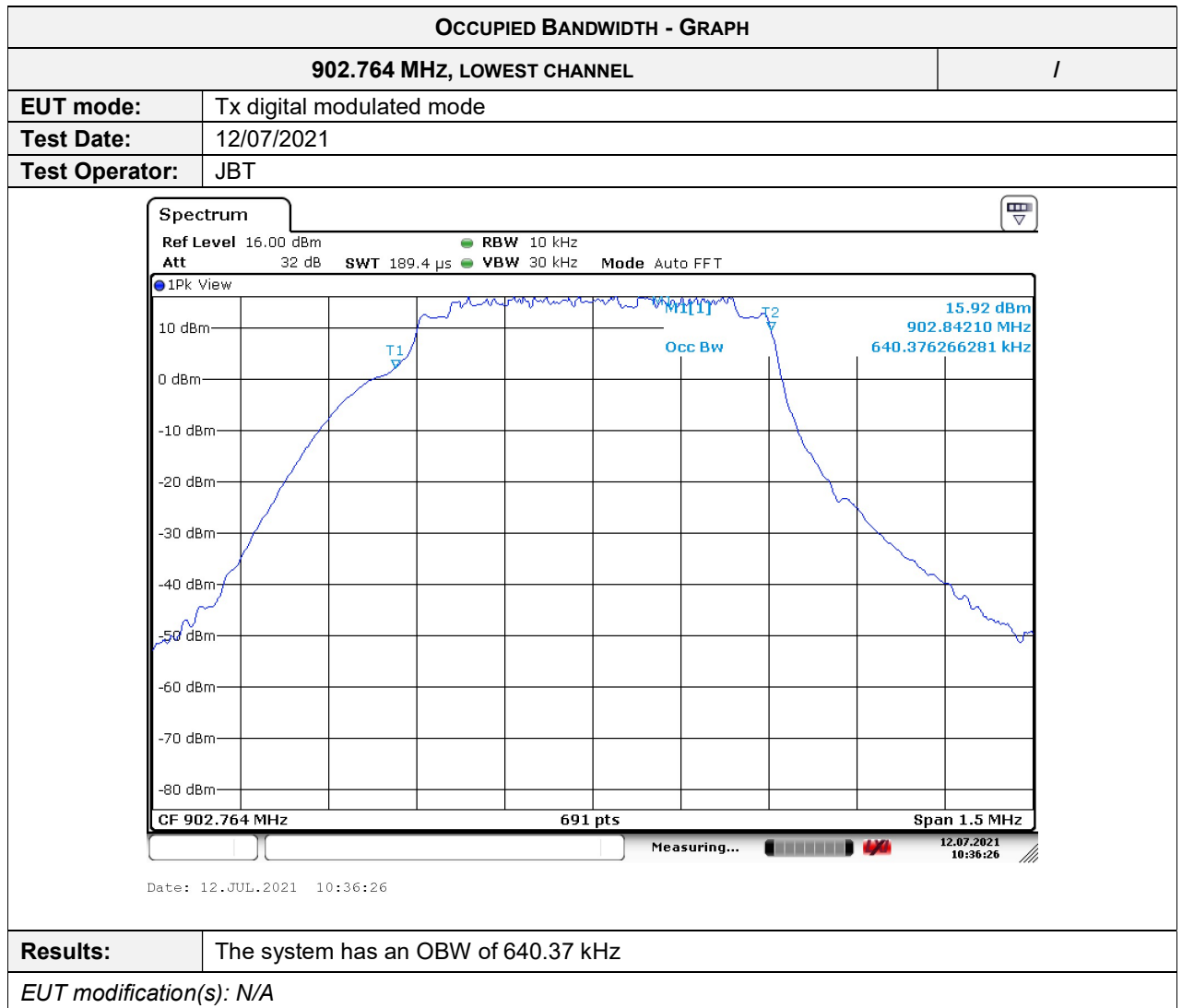
Reference standard:	FCC part 15 Radio part 15.247
Test method:	FCC part 15.247
Test description: The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β, which, in cases of symmetrical 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 50Ω attenuator(s).	

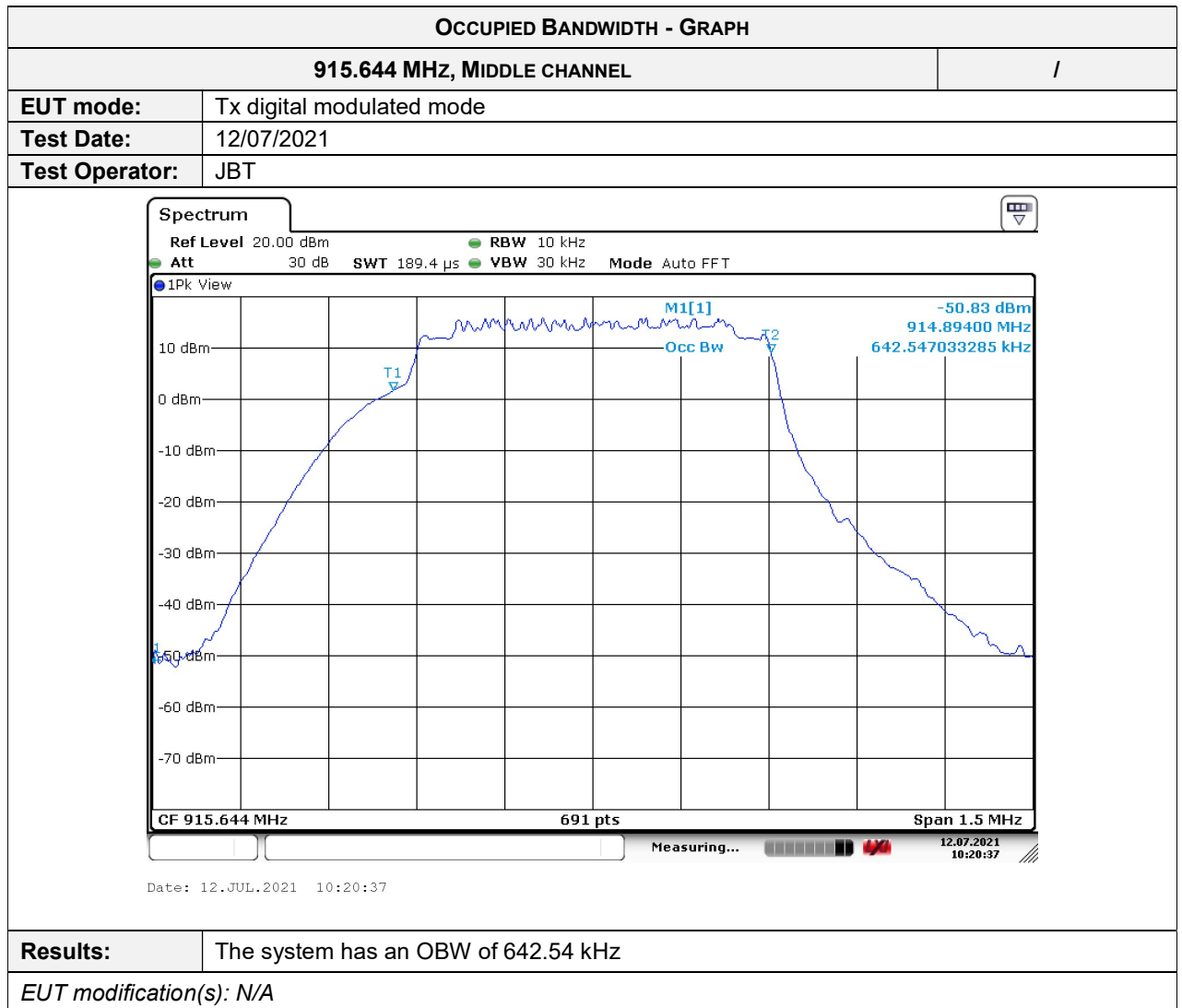
TESTED PARAMETER	OBW	SEVERITY	RESULT TAB.	VERDICT
902.764 MHz, lowest channel	640.37 kHz	>500kHz	/	PASS
915.644 MHz, central channel	642.54 kHz	>500 kHz	/	PASS
927.236 MHz, highest channel	640.37 kHz	>500 kHz	/	PASS

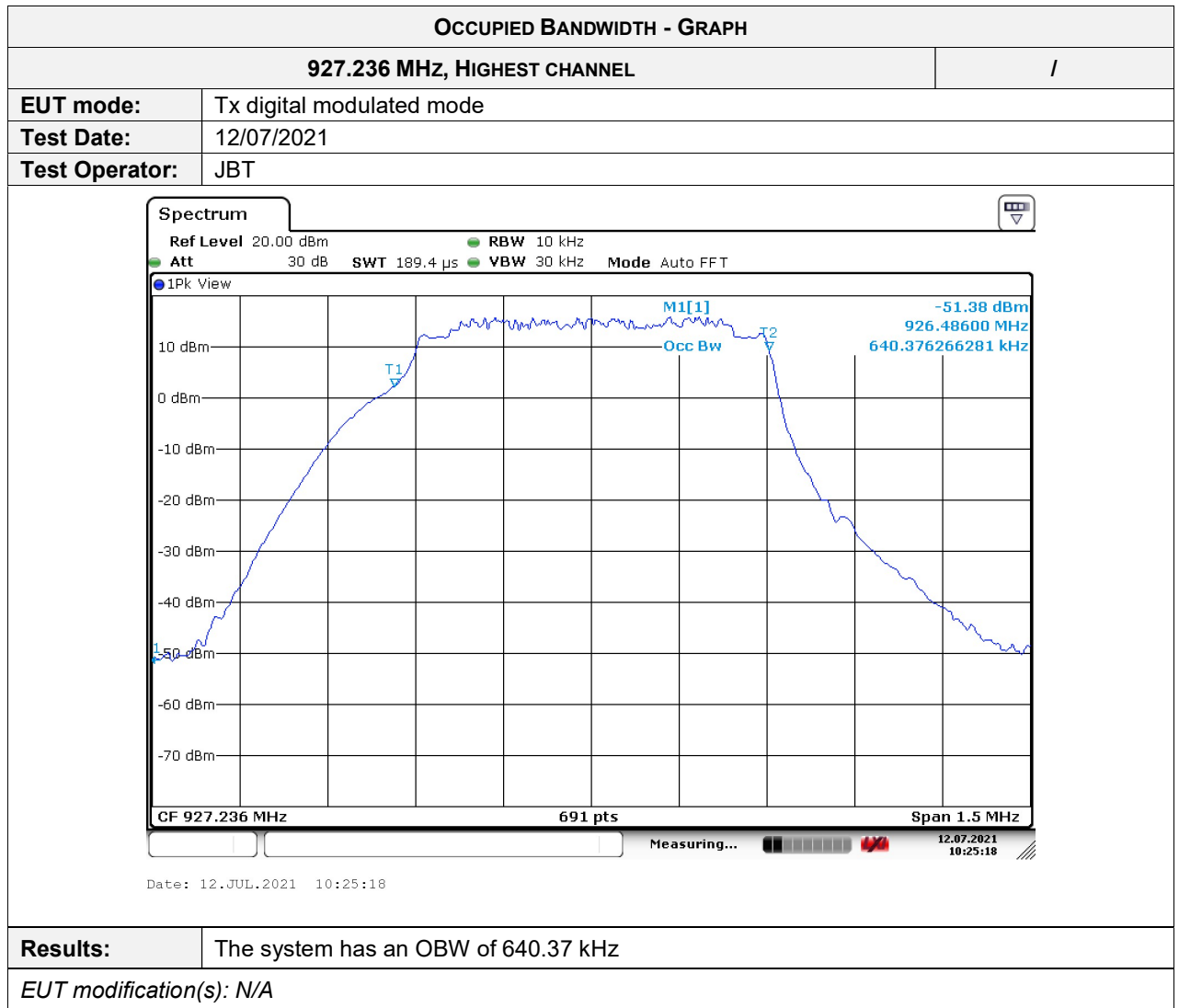
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	16.4 °C
Relative Humidity	20 to 75 %	31.7 %
Atmospheric pressure	N/A	994 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Spectrum Analyzer	Rohde & Schwarz	FSV40	15776	20/03/2021	20/05/2022
Cable	H&S	N-1m	15931	04/12/2018	04/02/2021
Attenuator	Narda	6dB	6549	18/06/2019	18/08/2021

Blank cells = Permanent validity







8.2. 6dB, 20dB bandwidth, Carrier Frequency separation and Number of Channels

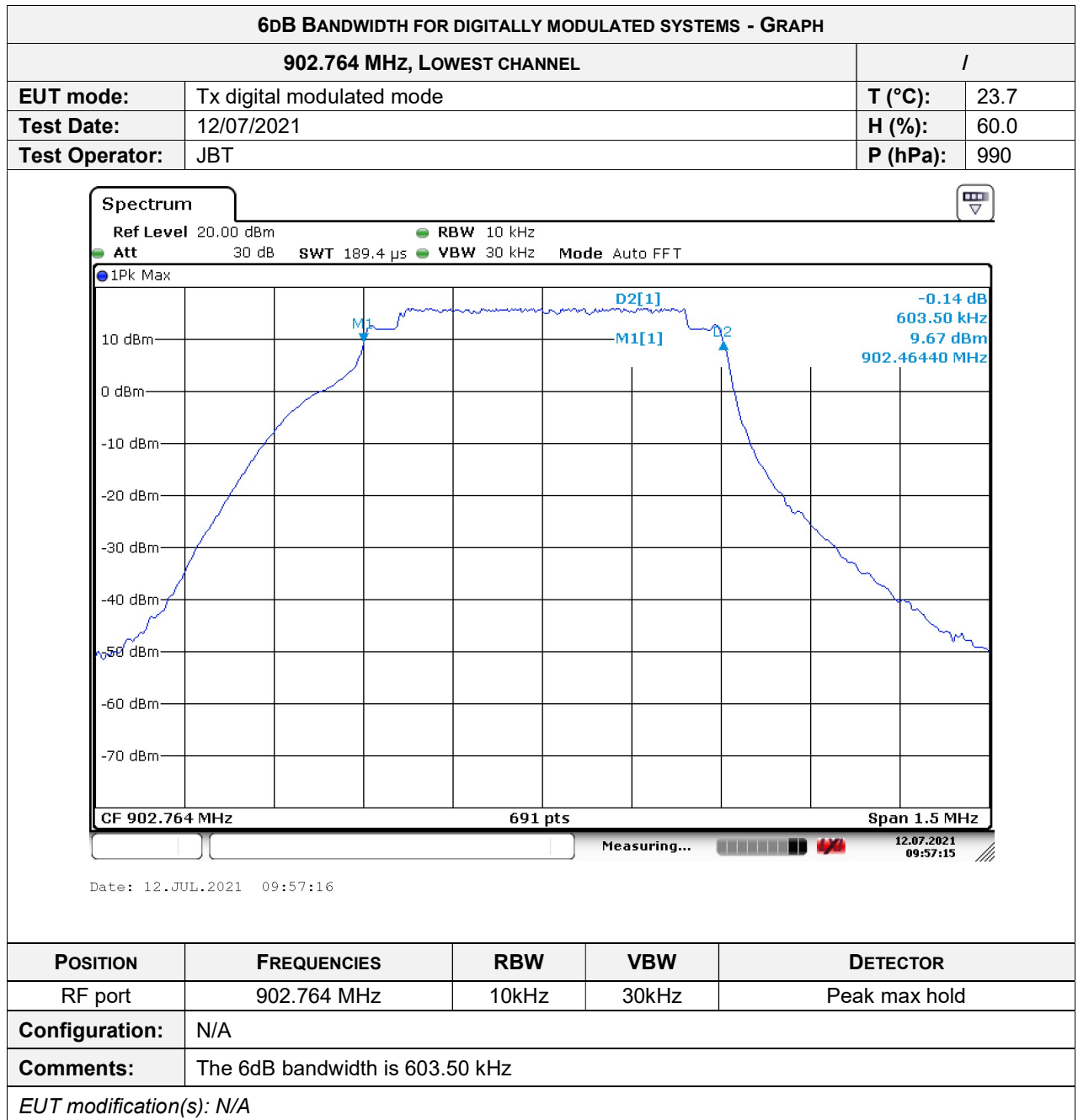
Reference standard:	FCC part 15 Radio part 15.247
Test method:	FCC part 15.247
Test description: a) (2): Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. EUT is connected to the measuring receiver via 50Ω attenuator(s). Tests are done in max-hold mode in order to capture all channels.	

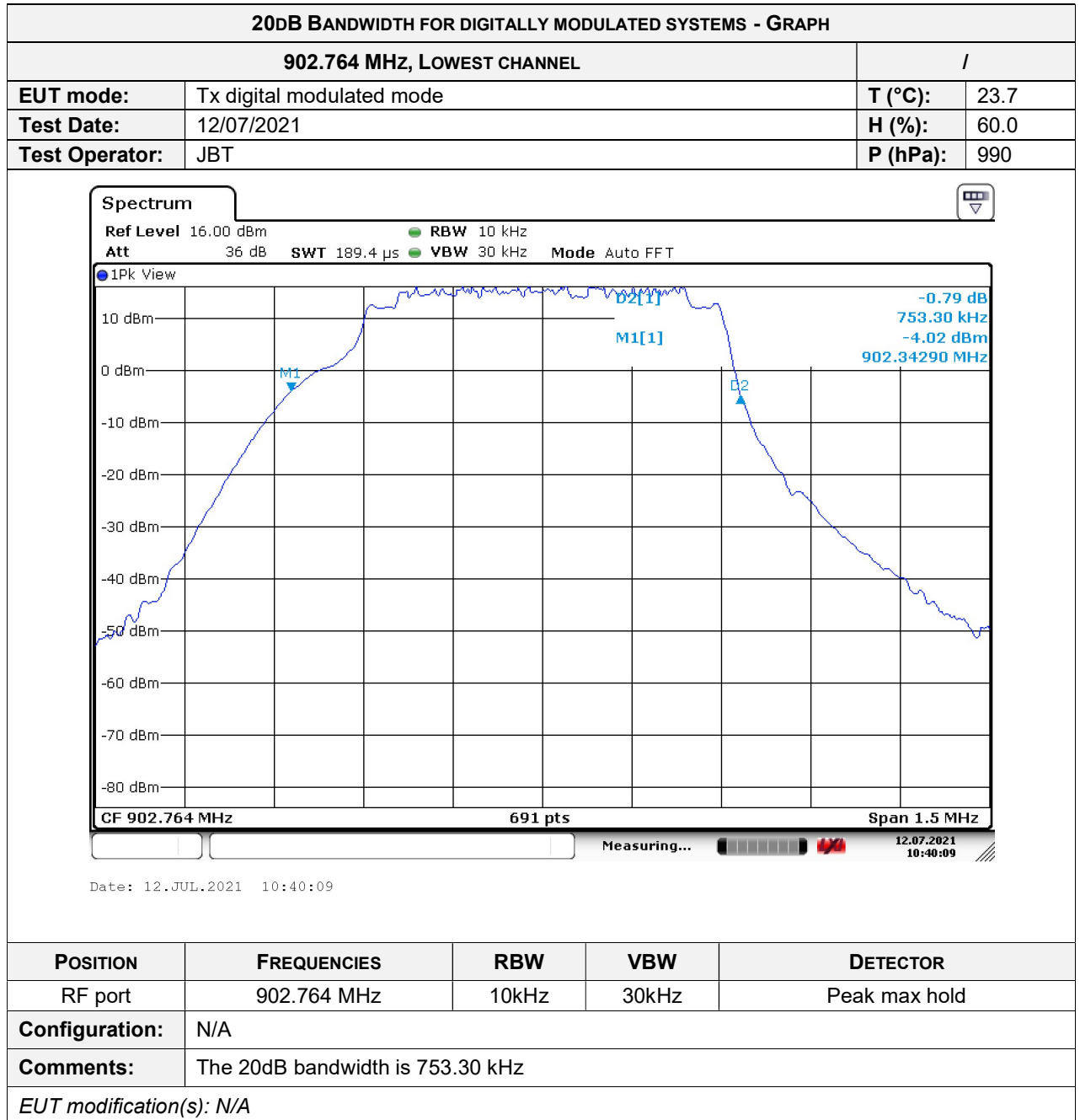
TESTED PARAMETER	RESULT	SEVERITY	RESULT TAB.	VERDICT
Number of channels	20	informative	/	PASS
Channels separation	1.288MHz	informative	/	PASS
6dB Bandwidth	603.5 kHz	>500kHz	/	PASS
20dB Bandwidth	>742.4 kHz	>500kHz	/	PASS

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		

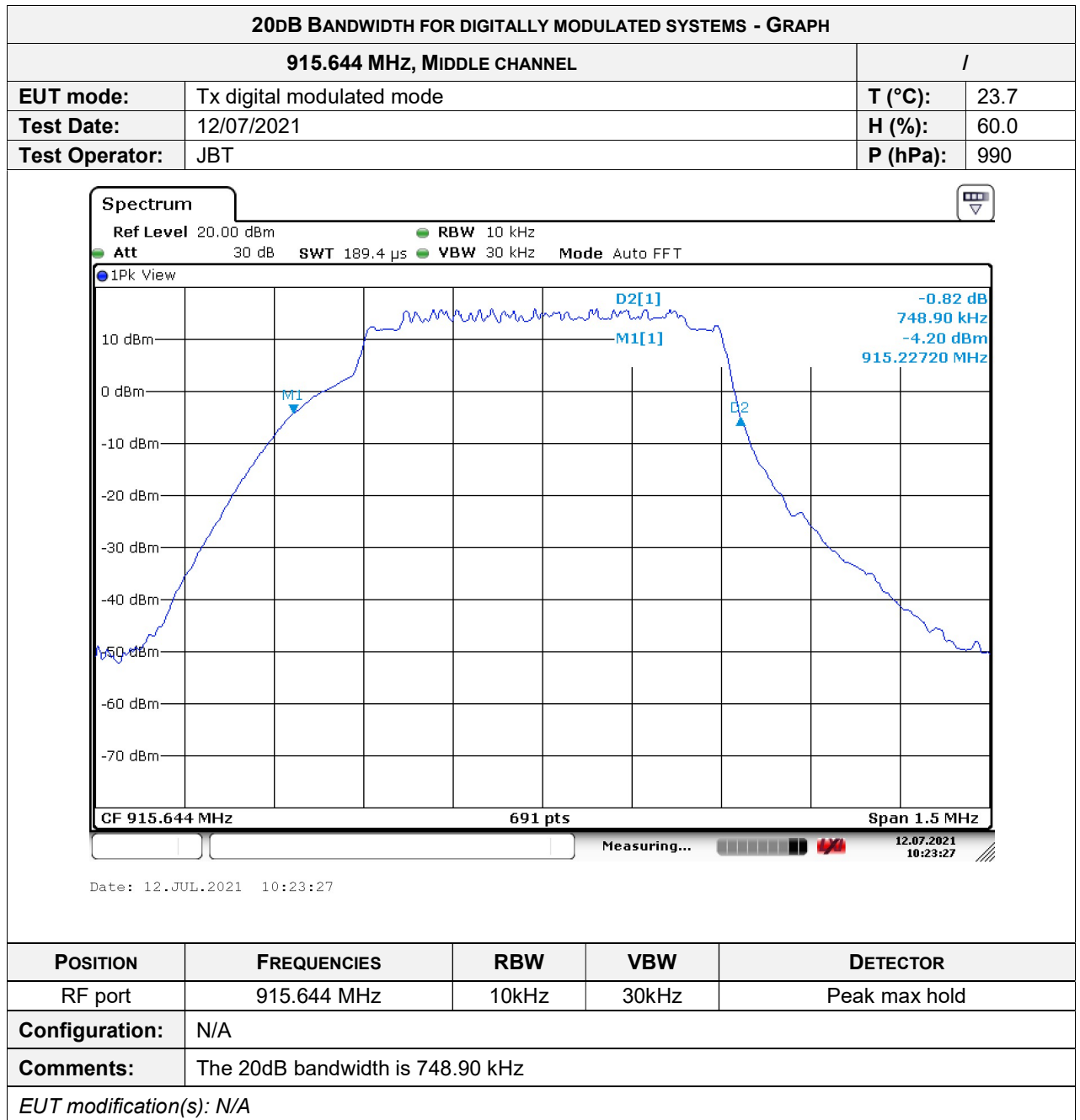
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Spectrum Analyzer	Rohde & Schwarz	FSV40	15776	20/03/2021	20/05/2022
Cable	H&S	N-1m	15931	04/12/2018	04/02/2021
Attenuator	Narda	6dB	6549	18/06/2019	18/08/2021

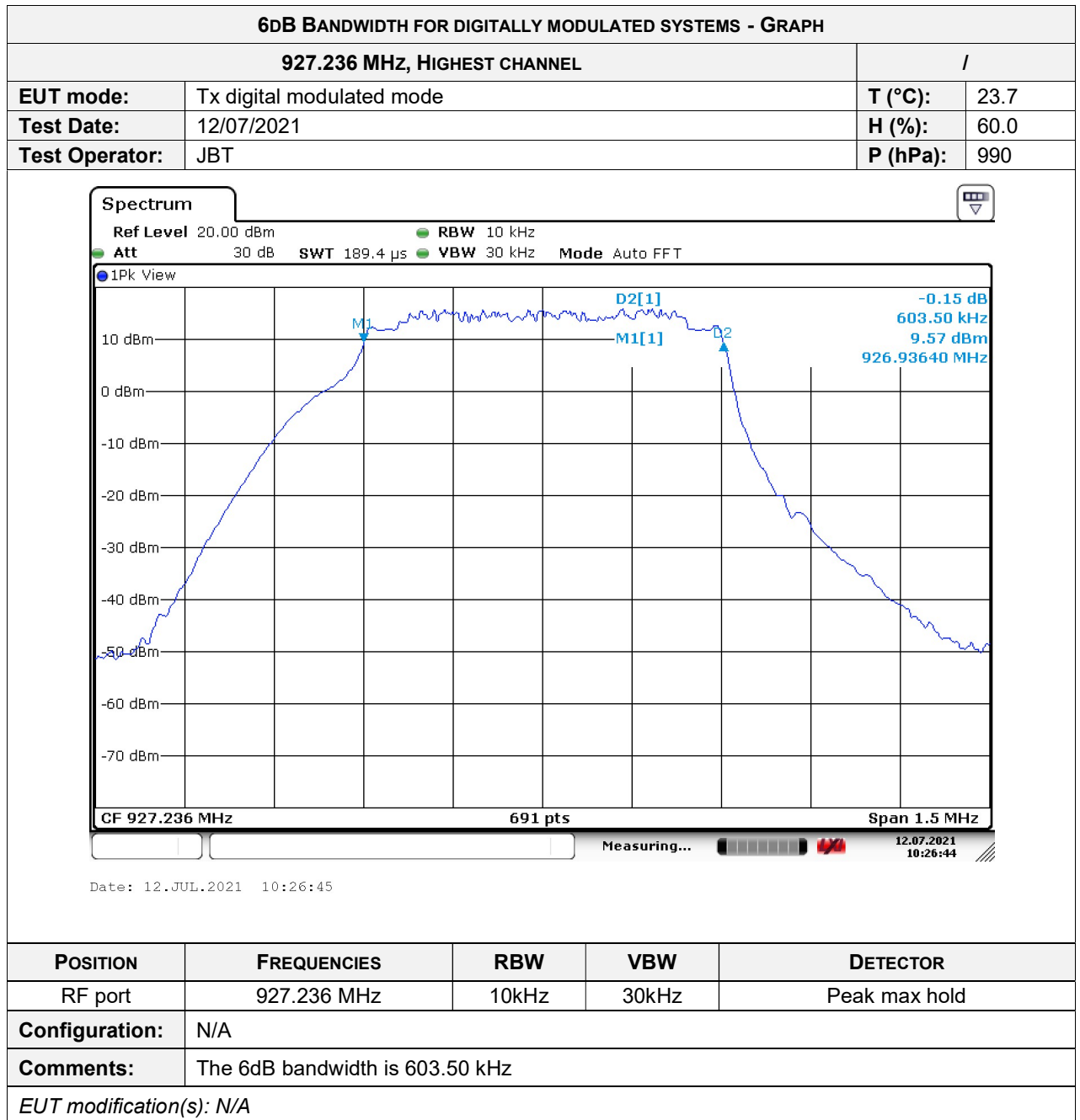
Blank cells = Permanent validity

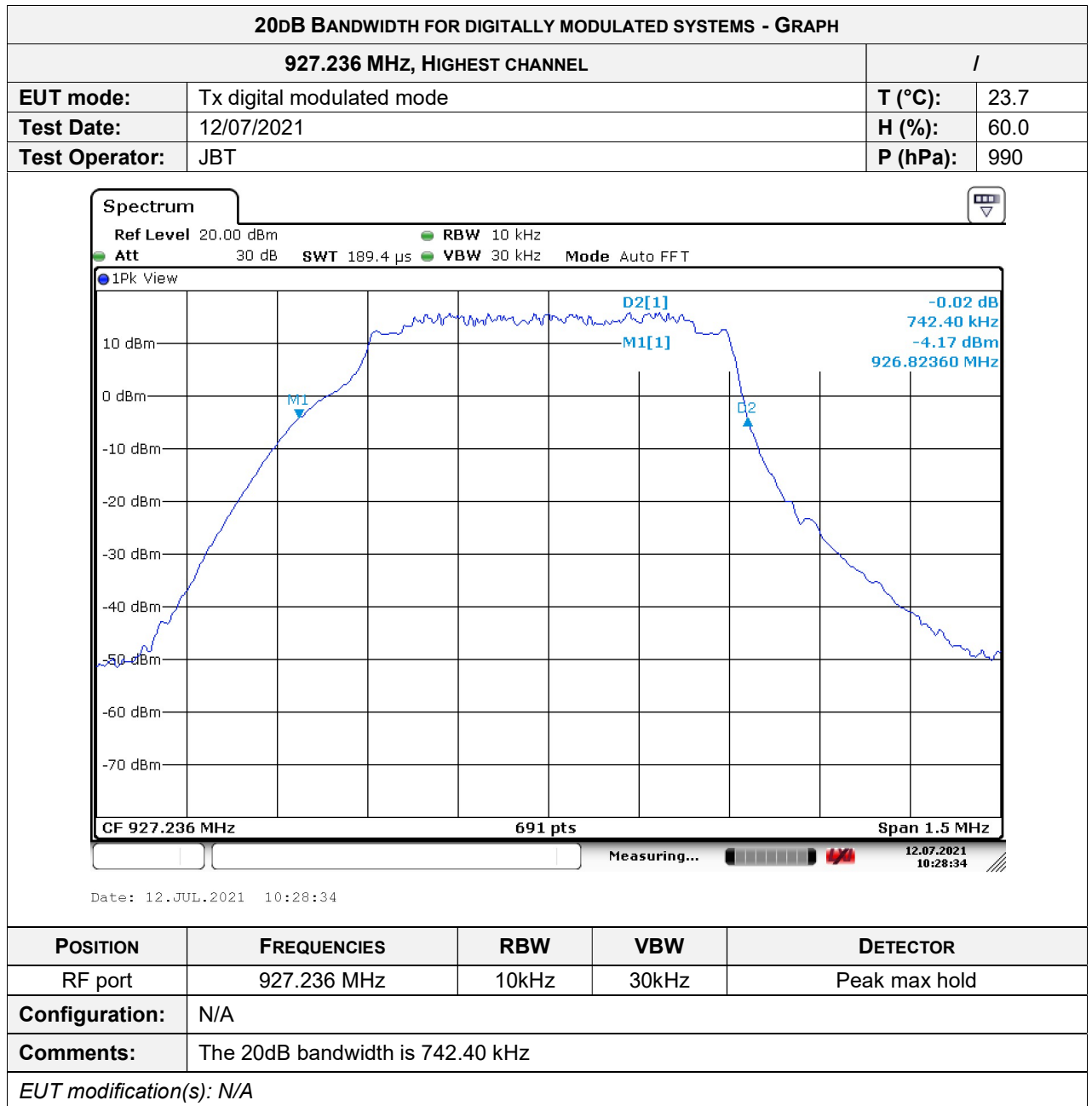












8.3. Maximum peak conducted power of the intentional radiator

Reference standard:	FCC part 15 Radio part 15.247
Test method:	FCC part 15.247
Test description: b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode. EUT is connected to the measuring receiver via 50Ω attenuator(s). Only the highest levels are recorded.	

TESTED CONFIGURATION	RESULTS	SEVERITY	RESULT TAB.	VERDICT
902.764 MHz, Lowest channel	15.81 dBm	1W (30dBm)	/	PASS
915.644 MHz, Middle channel	15.74 dBm	1W (30dBm)	/	PASS
927.236 MHz, Highest channel	15.73 dBm	1W (30dBm)	/	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	23.7 °C
Relative Humidity	20 to 75 %	60.0 %
Atmospheric pressure	N/A	990 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Spectrum Analyzer	Rohde & Schwarz	FSV40	15776	20/03/2021	20/05/2022
Cable	H&S	N-1m	15931	04/12/2018	04/02/2021
Attenuator	Narda	6dB	6549	18/06/2019	18/08/2021

Blank cells = Permanent validity

PUISSANCE MOYENNE CONDUITE - TABULATED RESULTS				
LoRA 500kHz				-
Frequency (MHz)	P _{conducted} (dBm)	Gain _{dBi}	P _{eirp} (dBm)	Limit _{eirp} (dBm)
902.764	15.81	6dBi (Max)	21.81	36
915.644	15.74	6dBi (Max)	21.74	36
927.236	15.73	6dBi (Max)	21.73	36

P_{erp} = P_{conducted} + antenna Gain_{dBi} ; Gain_{dBi} = Gain_{dBi} - 2.15dB

P_{erp} = P_{conducted} + Gain_{dBi} - 2.15dB

P_{eirp} = P_{erp} + 2.15dB

P_{eirp} = P_{conducted} + Gain_{dBi}

In case of a dedicated antenna the antenna gain (in dB, i.e. relative to a dipole) is declared by the manufacturer.

Using the formula $E_{(V/m)} = \sqrt{(30P_{dBm}G_{dBi})/d_{(m)}}$ where P is the conducted power and G the maximum antenna gain. Equivalent maximum E-field should be approximatively of 117.04 dB μ V/m.

8.4. Power spectral density

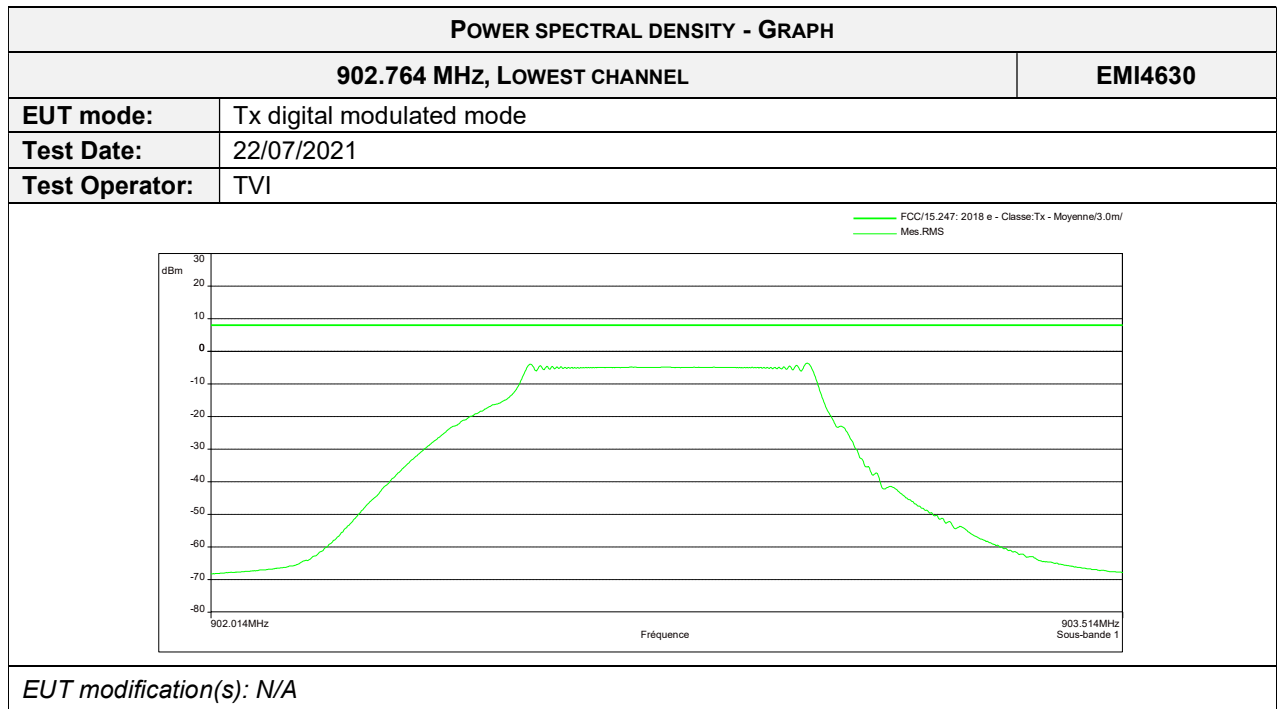
Reference standard:	FCC part 15 Radio part 15.247
Test method:	FCC part 15.247
Test description: e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density. EUT is connected to the measuring receiver via 50Ω attenuator(s). Only the highest levels are recorded.	

TESTED CHANNEL	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Low, central and high channels	Lora 500kHz	8dBm/3kHz	EMI4683	PASS

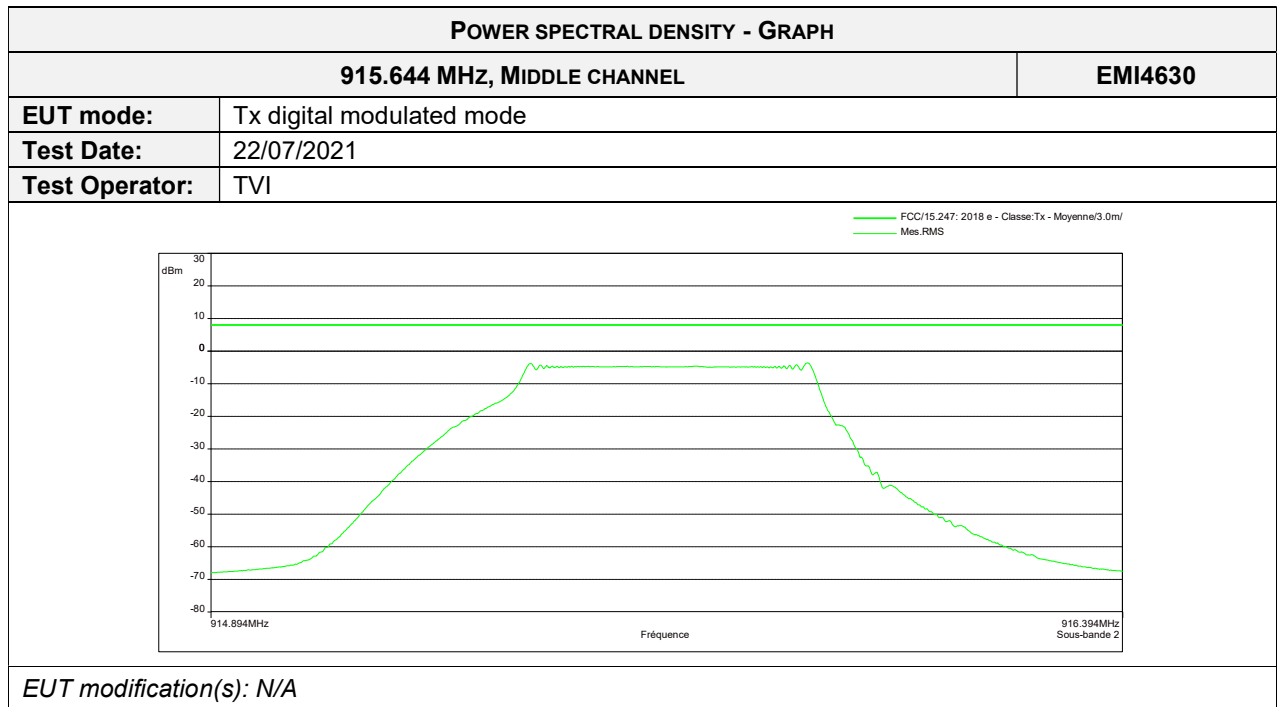
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	25.3 °C
Relative Humidity	20 to 75 %	51.2 %
Atmospheric pressure	N/A	990 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Spectrum Analyzer	Rohde & Schwarz	FSV40	15776	20/03/2021	20/05/2022
Cable	H&S	N-1m	15931	04/12/2018	04/02/2021
Attenuator	Narda	6dB	6549	18/06/2019	18/08/2021

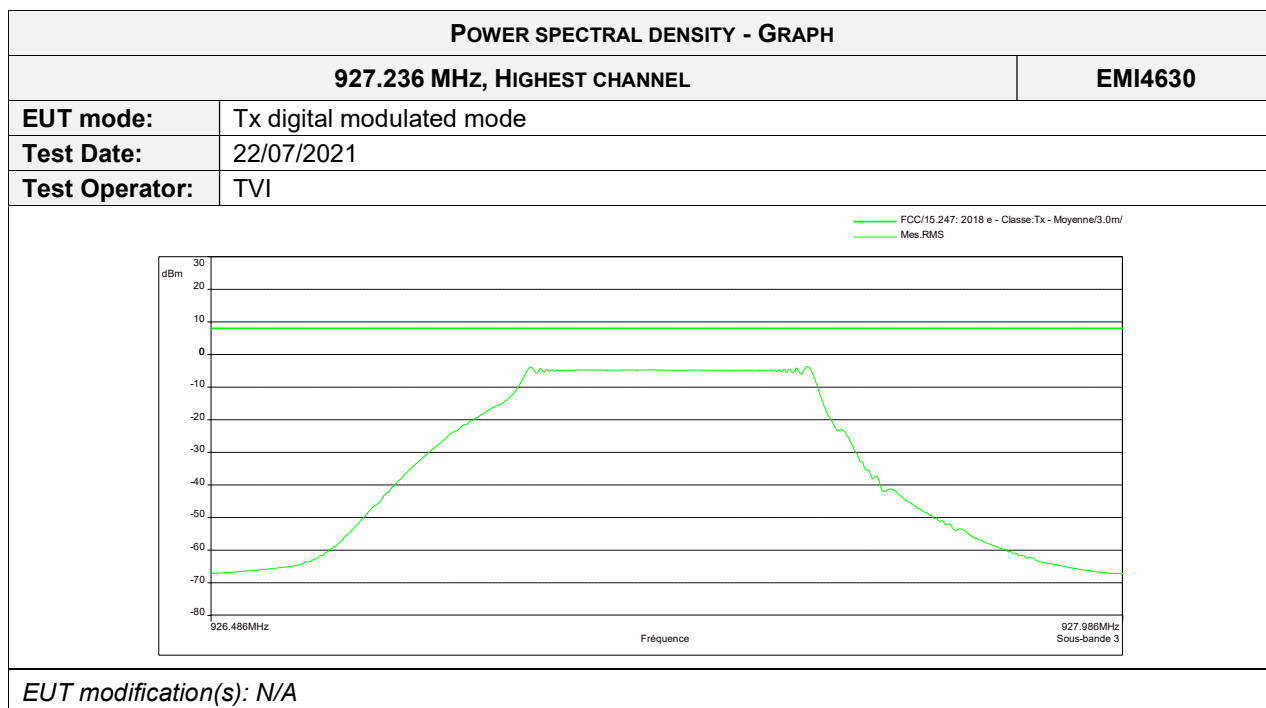
Blank cells = Permanent validity



MAXIMUM EFFECTIVE RADIATED POWER SPECTRAL DENSITY - TABULATED RESULTS			
902.764 MHz, LOWEST CHANNEL			EM4630
Frequency	Frequency Fc	Level (dBm/3kHz)	Limit (dBm/3kHz)
902.764 MHz	902.993 MHz	-3.676	8



MAXIMUM EFFECTIVE RADIATED POWER SPECTRAL DENSITY - TABULATED RESULTS			
915.644 MHz, MIDDLE CHANNEL			EMI4630
Frequency	Frequency Fc	Level (dBm/3kHz)	Limit (dBm/3kHz)
915.644 MHz	915.874 MHz	-3.61 dBm	8



MAXIMUM EFFECTIVE RADIATED POWER SPECTRAL DENSITY - TABULATED RESULTS			
927.236 MHz, HIGHEST CHANNEL			EMI4630
Frequency	Frequency Fc	Level (dBm/3kHz)	Limit (dBm/3kHz)
927.236 MHz	927.465 MHz	-3.77	8

8.5. Band-edge compliance of conducted emissions (Transmitter)

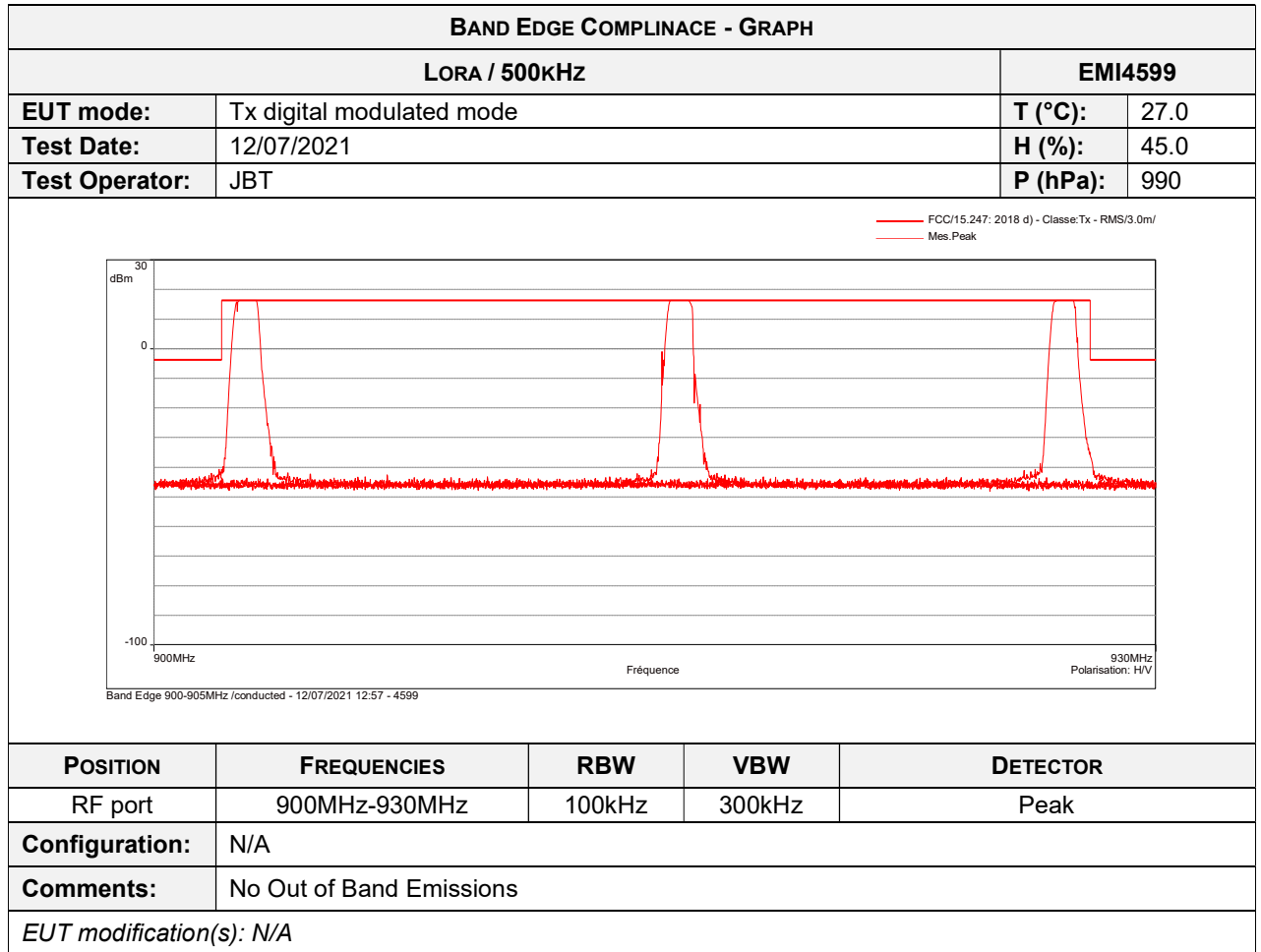
Reference standard:	FCC part 15 Radio part 15.247
Test method:	FCC part 15.247 subclause d)
Test description: d) In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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. EUT is connected to the measuring receiver via 50Ω attenuator(s). Only the highest levels are recorded.	

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
915 MHz	900MHz-930MHz	20dBc	EMI4599	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
Spectrum Analyzer	Rohde & Schwarz	FSV40	15776	20/03/2021	20/05/2022
Cable	H&S	N-1m	15931	04/12/2018	04/02/2021
Attenuator	Narda	6dB	6549	18/06/2019	18/08/2021

Blank cells = Permanent validity



8.6. Radiated spurious emissions

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.109, 15.209, 15.205, 15.215 RSS-247, 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
Lora Tx mode 500kHz, Tx mode	9kHz-30MHz	15.209	See below	PASS
Lora Tx mode 500kHz, Tx mode	30MHz-1GHz	15.209	See below	PASS
Lora Tx mode 500kHz, Tx mode	1GHz-10GHz	15.209	See below	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: 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					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna Log-per	Emco	3146A	5609	27/08/2020	27/08/2023
Antenna Biconique	Rohde & Schwartz	HK116	6118	01/06/2021	01/06/2024
Preamplifier	RFPA	RF30400-27-LNA	6136	03/05/2021	03/05/2022
Loop Antenna	Emco	6502	6155	11/02/2021	11/02/2023
Horn Antenna	Schwarzbeck	9120B	6970	10/06/2021	10/06/2024
Cable	/	N-10m	7537	03/02/2021	03/02/2023
Cable	HYTEM	N-10m	7655	03/02/2021	03/02/2023
Preamplifier	Agilent Technologies	HF	10262	14/06/2021	14/06/2022
Receiver	Agilent Technologies	N9010A	11316	26/05/2021	26/05/2022
Attenuator	Weinschel Associates	3dB	14006	03/10/2018	03/10/2021
Filter	Micro-Tronics	High pass	14038	04/10/2018	04/10/2021
Cable	H&S	N-7m	15200	05/05/2020	05/05/2022
Cable	H&S	N-3m	15202	05/05/2020	05/05/2022
Receiver	Rohde & Schwartz	FSV40	15776	16/03/2021	16/03/2022
Cable	H&S	N-3m	15892	02/02/2021	02/02/2023
Cable	H&S	N-3m	15902	16/03/2021	16/03/2023
Cable	H&S	N-3.5m	15907	02/02/2021	02/02/2023
Cable	H&S	N-3.5m	15908	02/02/2021	02/02/2023
Cable	H&S	N-4.5m	15919	01/02/2021	01/02/2023
Receiver	Rohde & Schwartz	ESIB7	16531	20/07/2019	20/07/2021

Blank cells = Permanent validity

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS				
TX MODE / LOWEST CHANNEL				
Frequency (MHz)	Position / Polarization	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)
84.0	1 / Horizontal	24.7	40.0	15.3
108.0	1 / Horizontal	24.1	43.5	19.4
200.1	1 / Horizontal	35.3 (QPeak)	43.5	8.2
986.1	1 / Horizontal	38.7	54.0	15.3
84.0	1 / Vertical	32.3	40.0	7.7
96.0	1 / Vertical	28.6	43.5	14.9
96.0	2 / Horizontal	28.1	43.5	15.4
108.0	2 / Horizontal	24.3	43.5	19.2
48.2	2 / Vertical	24.3	40.0	15.7
96.0	2 / Vertical	30.1	43.5	13.4
96.0	3 / Vertical	26.5	43.5	17.0
118.1	3 / Vertical	26.6	43.5	16.9
48.0	3 / Horizontal	26.1	40.0	13.9
96.0	3 / Horizontal	30.2	43.5	13.3
108.0	3 / Horizontal	24.7	43.5	18.8
1806	1 / Horizontal	47.3 (Average)	54.0	6.7
9943	1 / Horizontal	42.6 (Average)	54.0	11.4
1806	1 / Vertical	46.1	54.0	7.9
7267	1 / Vertical	53.9	54.0	0.1
1806	2 / Horizontal	47.5 (Average)	54.0	6.5
9977	2 / Horizontal	44.9 (Average)	54.0	9.1
1806	2 / Vertical	47.1	54.0	6.9
9976	2 / Vertical	44.8 (Average)	54.0	9.2
1806	3 / Horizontal	44.4	54.0	9.6
9946	3 / Horizontal	42.8 (Average)	54.0	11.2
1806	3 / Vertical	48.0 (Average)	54.0	6.0
9947	3 / Vertical	42.8 (Average)	54.0	11.2

V= Vertical H=Horizontal

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

Note 1 : The limit outside the restricted bands are 30 dB below the carrier power.

The lowest power of the carrier is 116.96 dB μ V/m, so limit is 86.96 dB μ V/m.

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS				
TX MODE / MIDDLE CHANNEL				
Frequency (MHz)	Position / Polarization	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)
84.0	1 / Horizontal	24.0	40.0	16.0
120.0	1 / Horizontal	24.2	43.5	19.3
200.0	1 / Horizontal	30.4 (QPeak)	43.5	13.1
849.4	1 / Horizontal	39.4	46.0	6.6
84.0	1 / Vertical	29.9	40.0	10.1
96.0	1 / Vertical	28.4	43.5	15.1
96.0	2 / Horizontal	27.2	43.5	16.3
118.1	2 / Horizontal	26.2	43.5	17.3
48.0	2 / Vertical	25.4	40.0	14.6
96.0	2 / Vertical	29.4	43.5	14.1
96.0	3 / Horizontal	26.4	43.5	17.1
108.0	3 / Horizontal	25.3	43.5	18.2
48.0	3 / Vertical	26.0	40.0	14.0
96.0	3 / Vertical	29.8	43.5	13.7
108.0	3 / Vertical	24.3	43.5	19.2
1831	1 / Horizontal	44.1 (Average)	54.0	9.9
9941	1 / Horizontal	42.8 (Average)	54.0	11.2
1831	1 / Vertical	45.6	54.0	8.4
9980	1 / Vertical	42.8 (Average)	54.0	11.2
1831	2 / Horizontal	46.7 (Average)	54.0	7.3
9943	2 / Horizontal	42.8 (Average)	54.0	11.2
1831	2 / Vertical	46.0	54.0	8.0
9915	2 / Vertical	42.8 (Average)	54.0	11.2
1832	3 / Horizontal	43.6	54.0	10.4
9947	3 / Horizontal	42.7 (Average)	54.0	11.3
1831	3 / Vertical	47.2 (Average)	54.0	6.8
9946	3 / Vertical	42.7 (Average)	54.0	11.3

V= Vertical H=Horizontal

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

Note 1 : The limit outside the restricted bands are 30 dB below the carrier power.

The lowest power of the carrier is 116.96 dB μ V/m, so limit is 86.96 dB μ V/m.

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS				
TX MODE / HIGGEST CHANNEL				
Frequency (MHz)	Position / Polarization	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)
84.0	1 / Horizontal	24.1	40.0	15.9
96.0	1 / Horizontal	24.5	43.5	19.0
200.0	1 / Horizontal	30.5 (QPeak)	43.5	13.0
84.0	1 / Vertical	31.4	40.0	8.6
96.0	1 / Vertical	29.1	43.5	14.4
96.0	2 / Horizontal	27.6	43.5	6.9
120.0	2 / Horizontal	25.6	43.5	7.9
48.0	2 / Vertical	25.7	40.0	14.3
96.0	2 / Vertical	29.5	43.5	14.0
96.0	3 / Horizontal	26.8	43.5	16.7
108.0	3 / Horizontal	25.0	43.5	18.5
120.0	3 / Horizontal	24.4	43.5	19.1
48.0	3 / Vertical	28.0	40.0	12.0
96.0	3 / Vertical	30.5	43.5	13.0
108.0	3 / Vertical	24.7	43.5	18.8
1781	1 / Horizontal	43.3	54.0	10.7
1855	1 / Horizontal	43.6 (Average)	54.0	10.4
9975	1 / Horizontal	42.8 (Average)	54.0	11.2
1783	1 / Vertical	43.5	54.0	10.5
1855	1 / Vertical	44.9	54.0	9.1
9981	1 / Vertical	42.7 (Average)	54.0	11.3
1855	2 / Horizontal	46.6	54.0	7.4
9945	2 / Horizontal	42.7 (Average)	54.0	11.3
1855	2 / Vertical	44.1	54.0	9.9
9942	2 / Vertical	42.8	54.0	11.2
1854	3 / Horizontal	42.3	54.0	11.7
9947	3 / Horizontal	42.7 (Average)	54.0	11.3
1855	3 / Vertical	46.6	54.0	7.4
9945	3 / Vertical	42.8 (Average)	54.0	11.2

V= Vertical H=Horizontal

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

Note 1 : The limit outside the restricted bands are 30 dB below the carrier power.

The lowest power of the carrier is 116.96 dBμV/m, so limit is 86.96 dBμV/m.

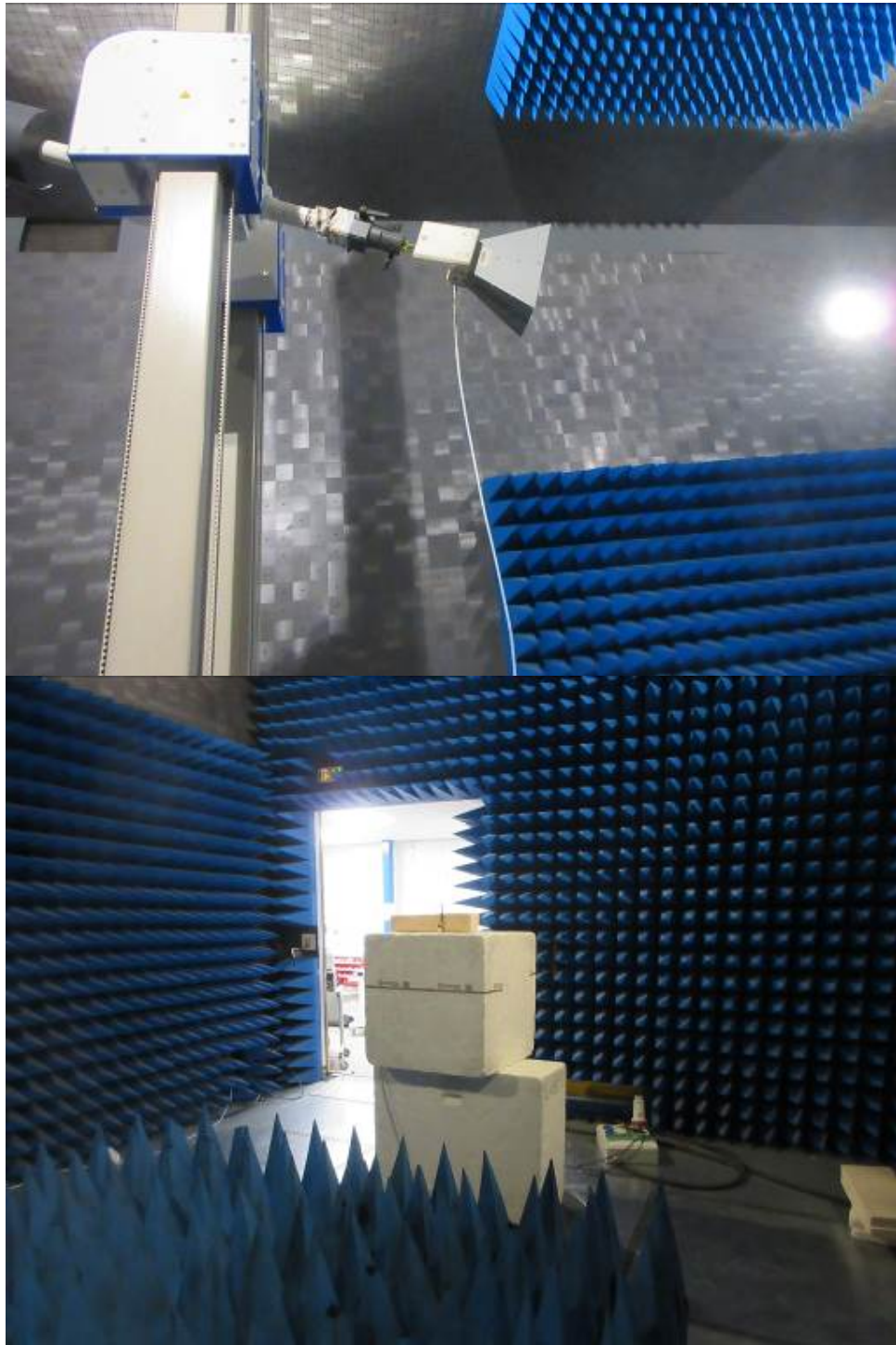
RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS				
RX MODE				
Frequency (MHz)	Position / Polarization	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)
96.0	1 / Horizontal	23.9	43.5	9.6
200.0	1 / Horizontal	30.9 (QPeak)	43.5	12.6
916.6	1 / Horizontal	38.4	46.0	7.6
48.0	1 / Vertical	27.8	40.0	12.2
96.0	1 / Vertical	27.6	43.5	15.9
200.0	1 / Vertical	30.6 (QPeak)	43.5	12.9
96.0	2 / Vertical	26.3	43.5	17.2
108.0	2 / Vertical	23.8	43.5	10.7
200.1	2 / Vertical	29.9 (QPeak)	43.5	13.6
48.0	2 / Horizontal	25.7	40.0	14.3
96.0	2 / Horizontal	28.5	43.5	15.0
108.0	2 / Horizontal	23.1	43.5	20.4
200.1	2 / Horizontal	29.9 (QPeak)	43.5	13.6
96.0	3 / Horizontal	24.2	43.5	19.3
200.0	3 / Horizontal	30.0 (QPeak)	43.5	13.5
48.0	3 / Vertical	25.7	40.0	14.3
96.0	3 / Vertical	29.0	43.5	14.5
200.0	3 / Vertical	30.4 (QPeak)	43.5	13.1
9946	1 / Horizontal	42.8 (Average)	54.0	11.2
9948	1 / Horizontal	42.7 (Average)	54.0	11.3
9946	1 / Vertical	42.7 (Average)	54.0	11.3
9942	2 / Horizontal	42.7 (Average)	54.0	11.3
9946	2 / Vertical	42.7 (Average)	54.0	11.3
9947	3 / Horizontal	42.8 (Average)	54.0	11.2
9949	3 / Vertical	42.7 (Average)	54.0	11.3

V= Vertical H=Horizontal

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

Note 1 : The limit outside the restricted bands are 30 dB below the carrier power.
The lowest power of the carrier is 116.96 dB μ V/m, so limit is 86.96 dB μ V/m.

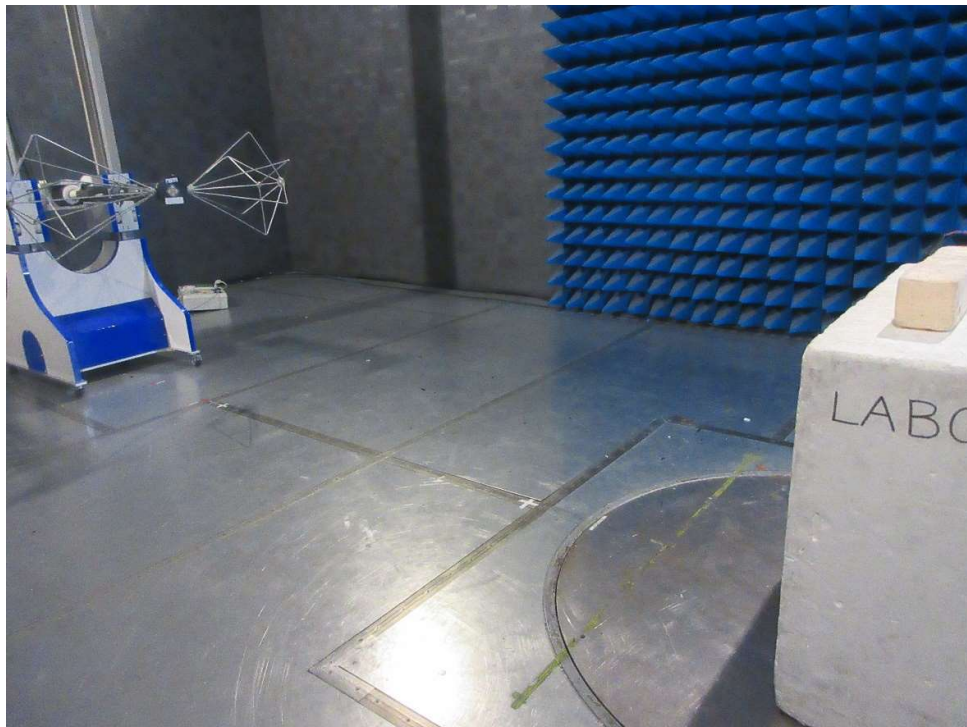
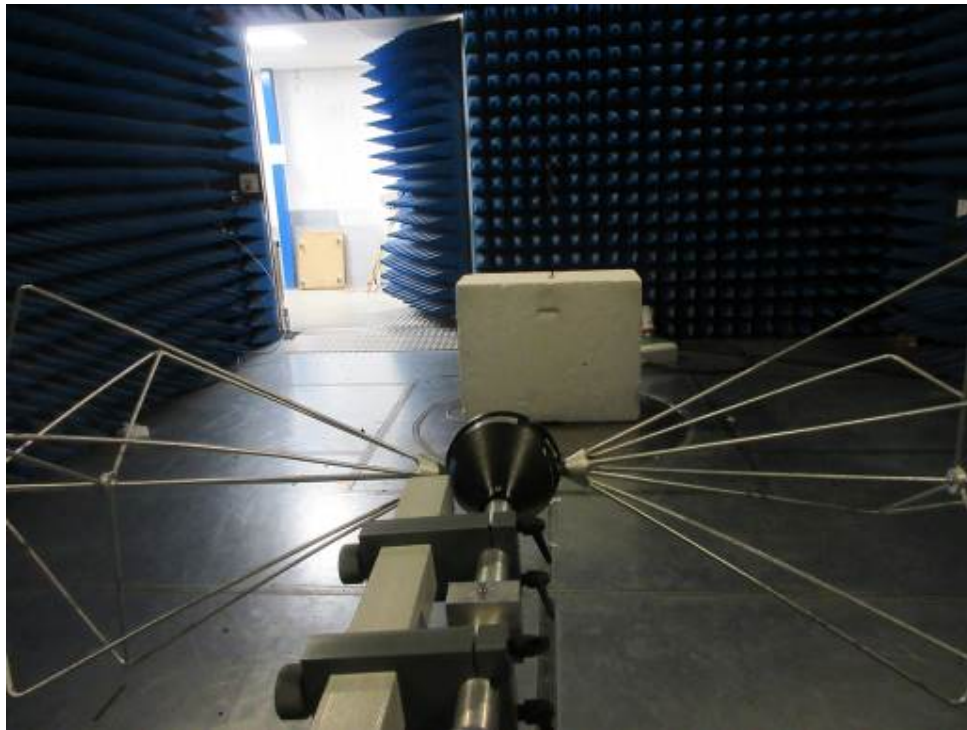
TEST SETUP PHOTO(S) RADIATED EMISSIONS (F>1GHz)



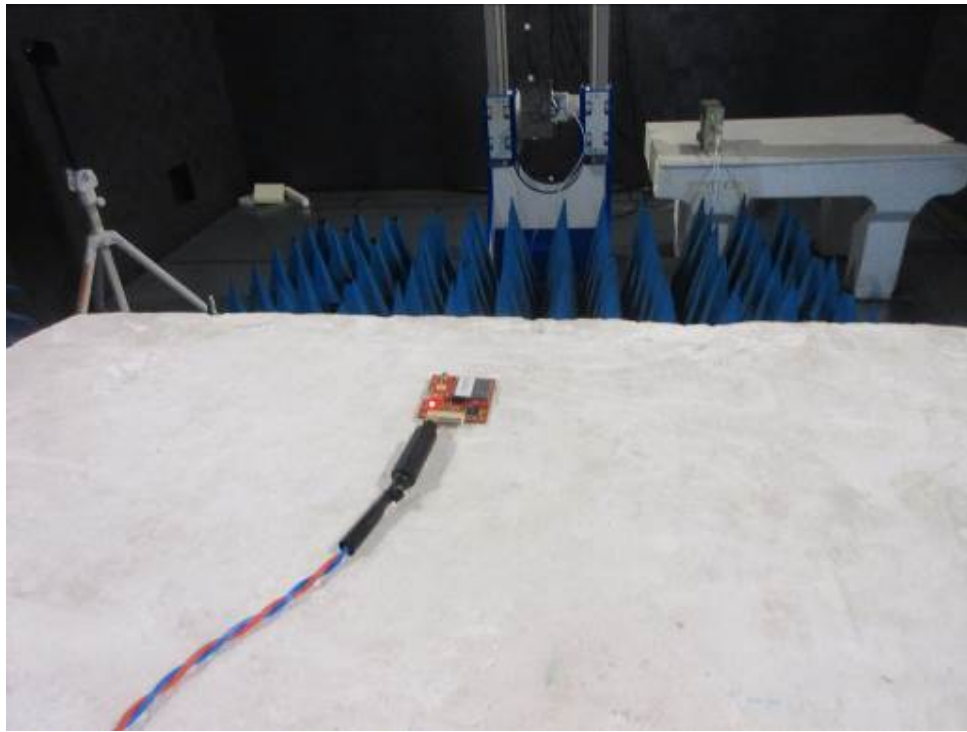
TEST SETUP PHOTO(S) RADIATED EMISSIONS (300MHz>F>1GHz)



TEST SETUP PHOTO(S) RADIATED EMISSIONS (3MHz>F>300MHz)



TEST SETUP PHOTO(S) RADIATED EMISSIONS – POSITION 1

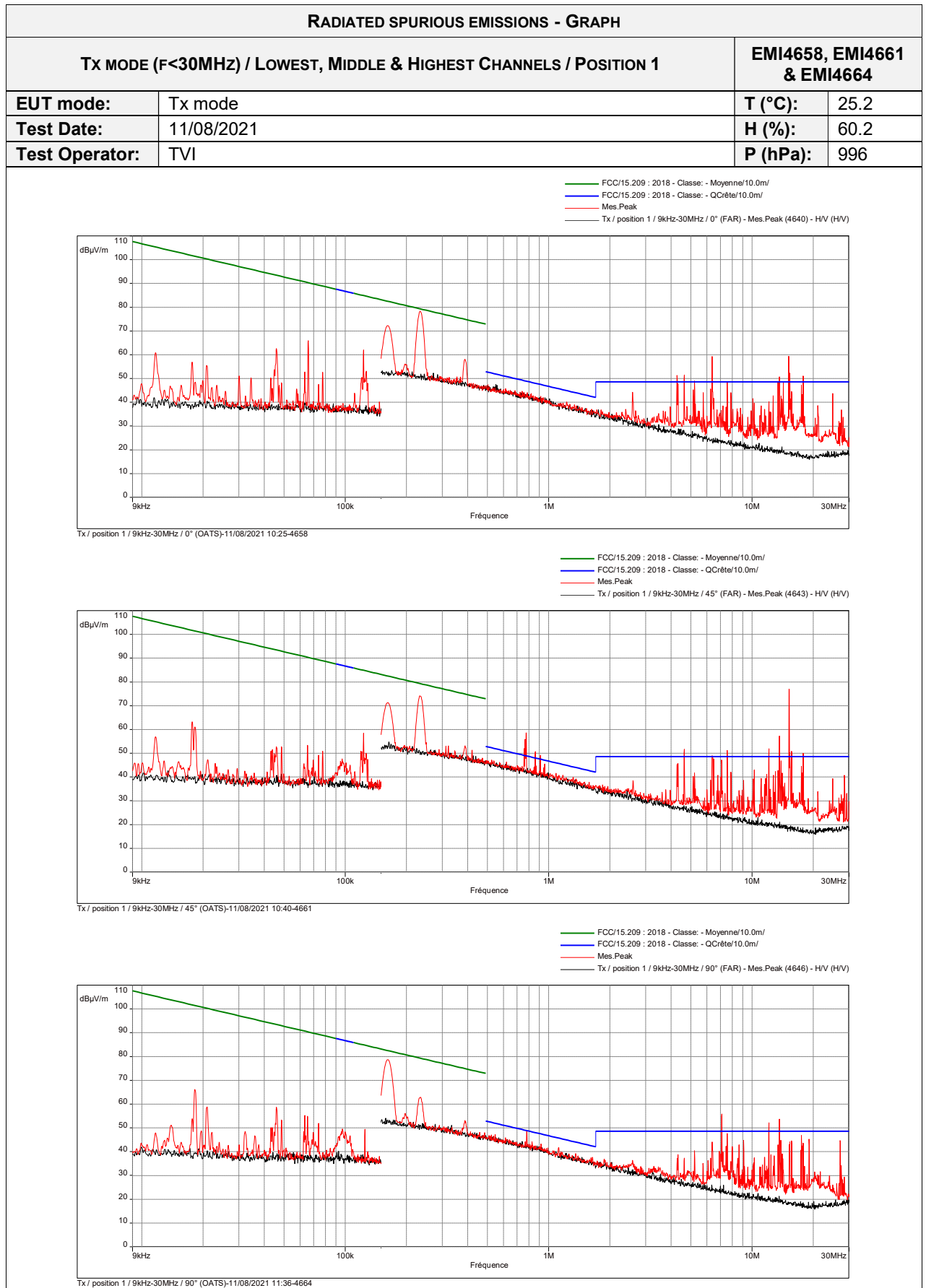


TEST SETUP PHOTO(S) RADIATED EMISSIONS – POSITION 2

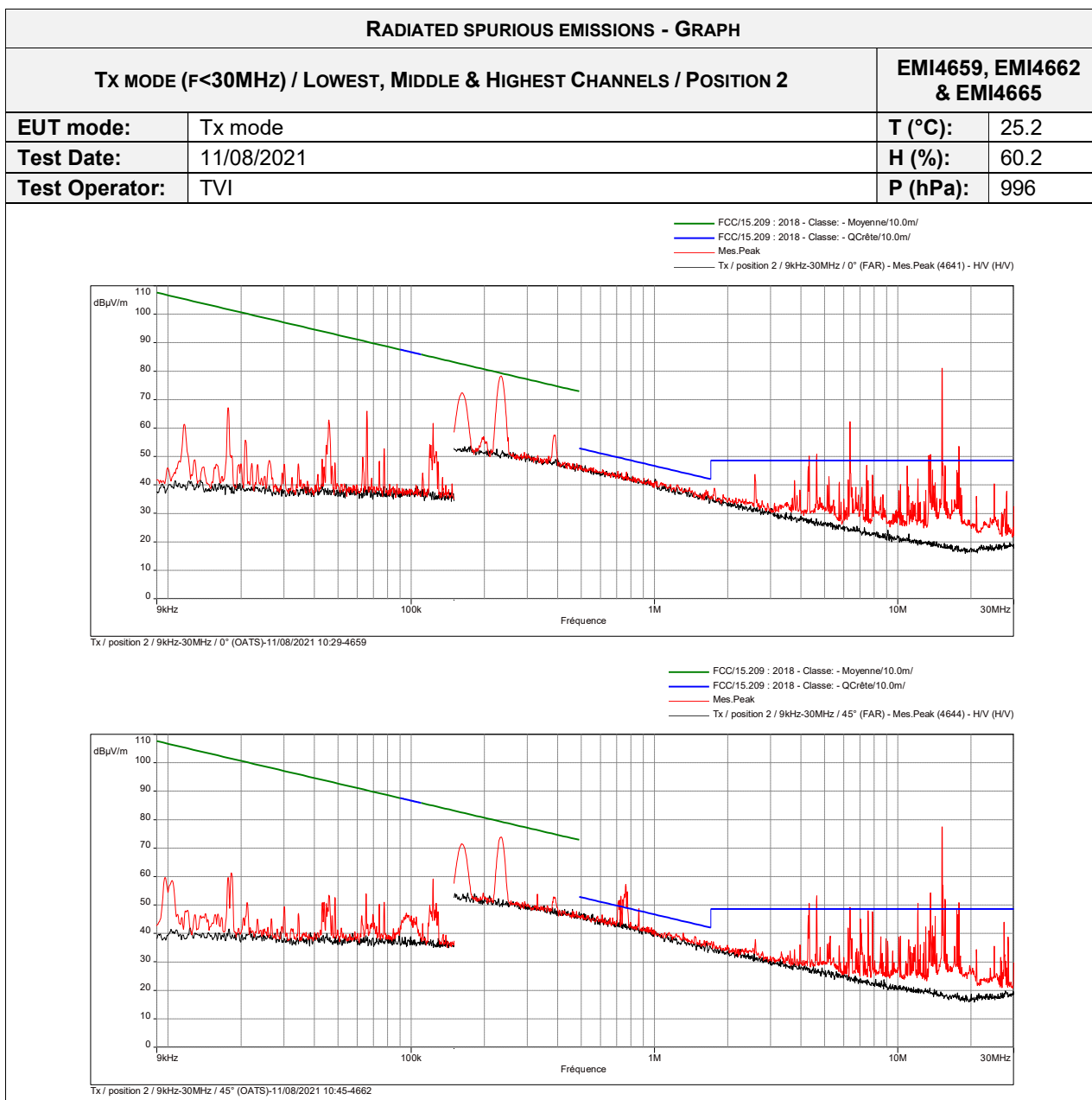


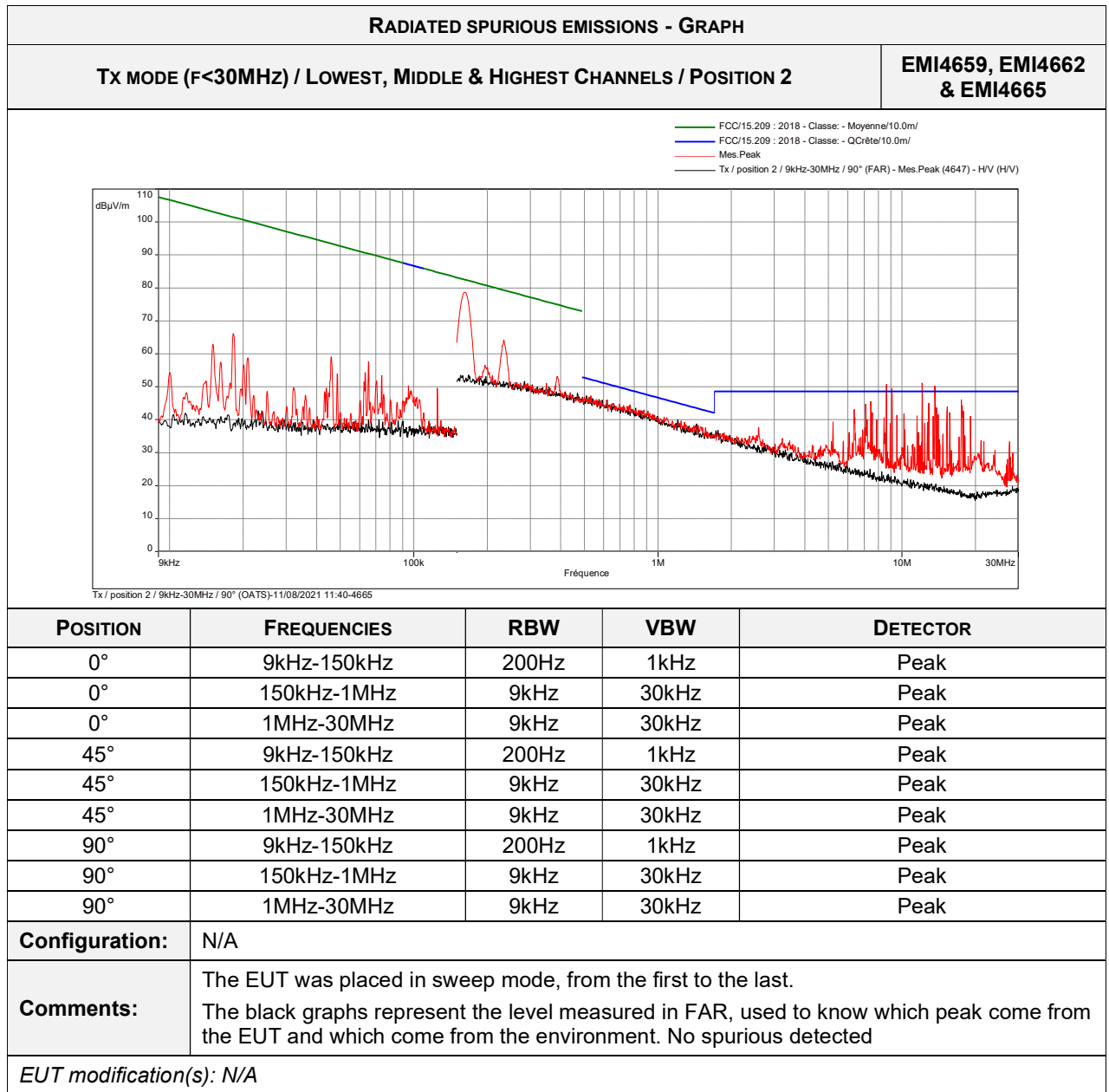
TEST SETUP PHOTO(S) RADIATED EMISSIONS – POSITION 3

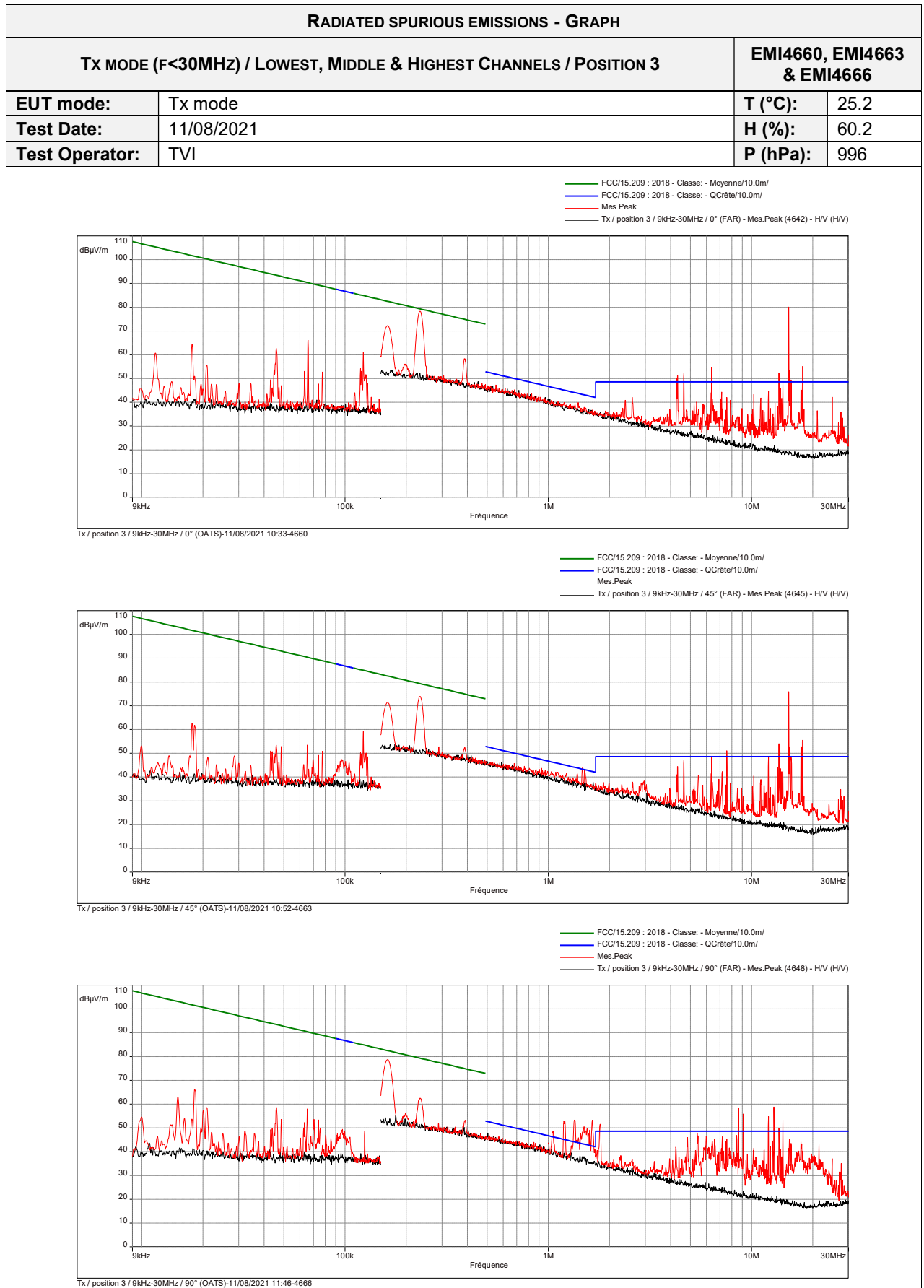




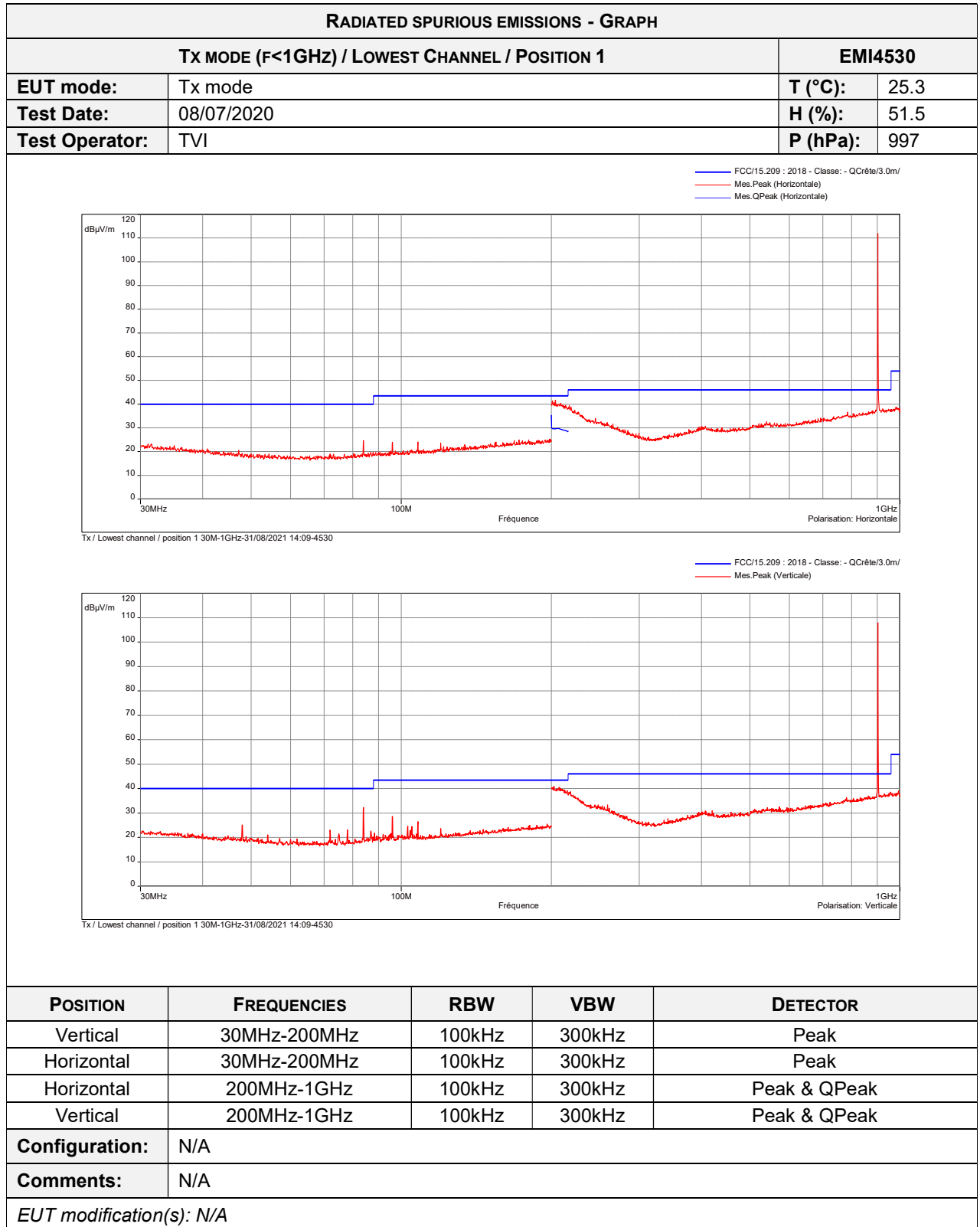
RADIATED SPURIOUS EMISSIONS - GRAPH				
TX MODE (F<30MHz) / LOWEST, MIDDLE & HIGHEST CHANNELS / POSITION 1				EMI4658, EMI4661 & EMI4664
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
0°	9kHz-150kHz	200Hz	1kHz	Peak
0°	150kHz-1MHz	9kHz	30kHz	Peak
0°	1MHz-30MHz	9kHz	30kHz	Peak
45°	9kHz-150kHz	200Hz	1kHz	Peak
45°	150kHz-1MHz	9kHz	30kHz	Peak
45°	1MHz-30MHz	9kHz	30kHz	Peak
90°	9kHz-150kHz	200Hz	1kHz	Peak
90°	150kHz-1MHz	9kHz	30kHz	Peak
90°	1MHz-30MHz	9kHz	30kHz	Peak
Configuration:	N/A			
Comments:	The black graphs represent the level measured in FAR, used to know which peak come from the EUT and which come from the environment. No spurious detected			
EUT modification(s): N/A				

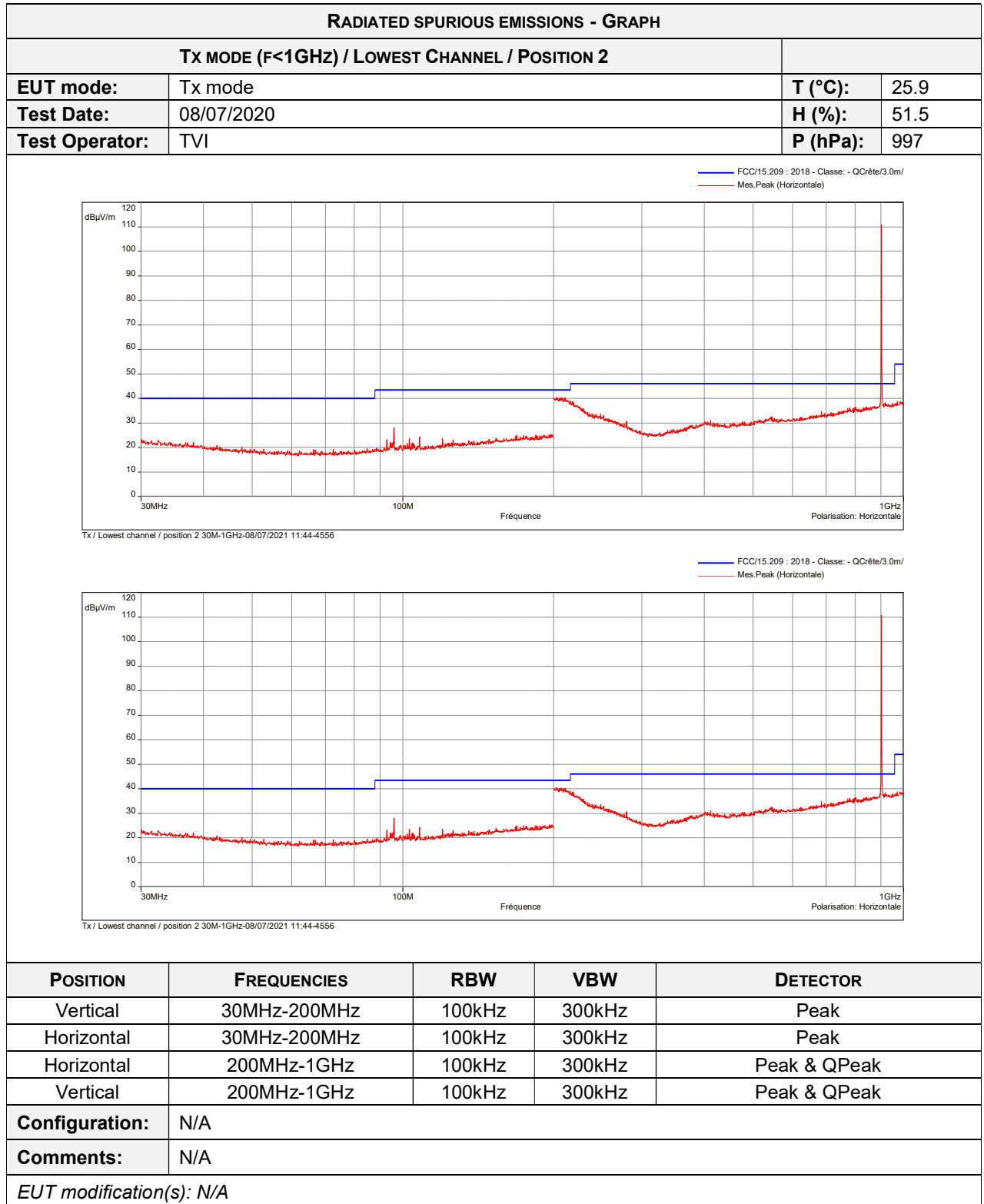


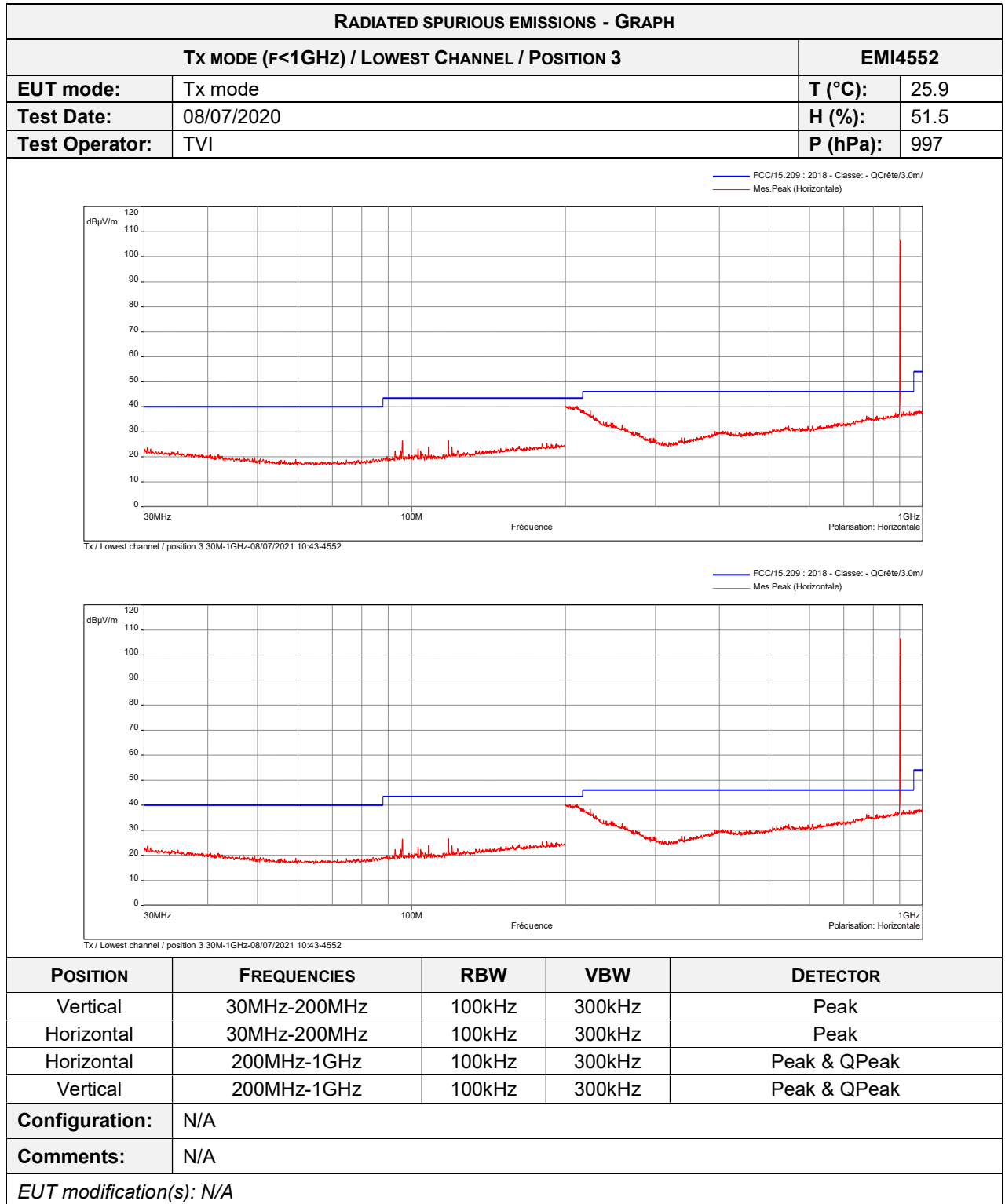


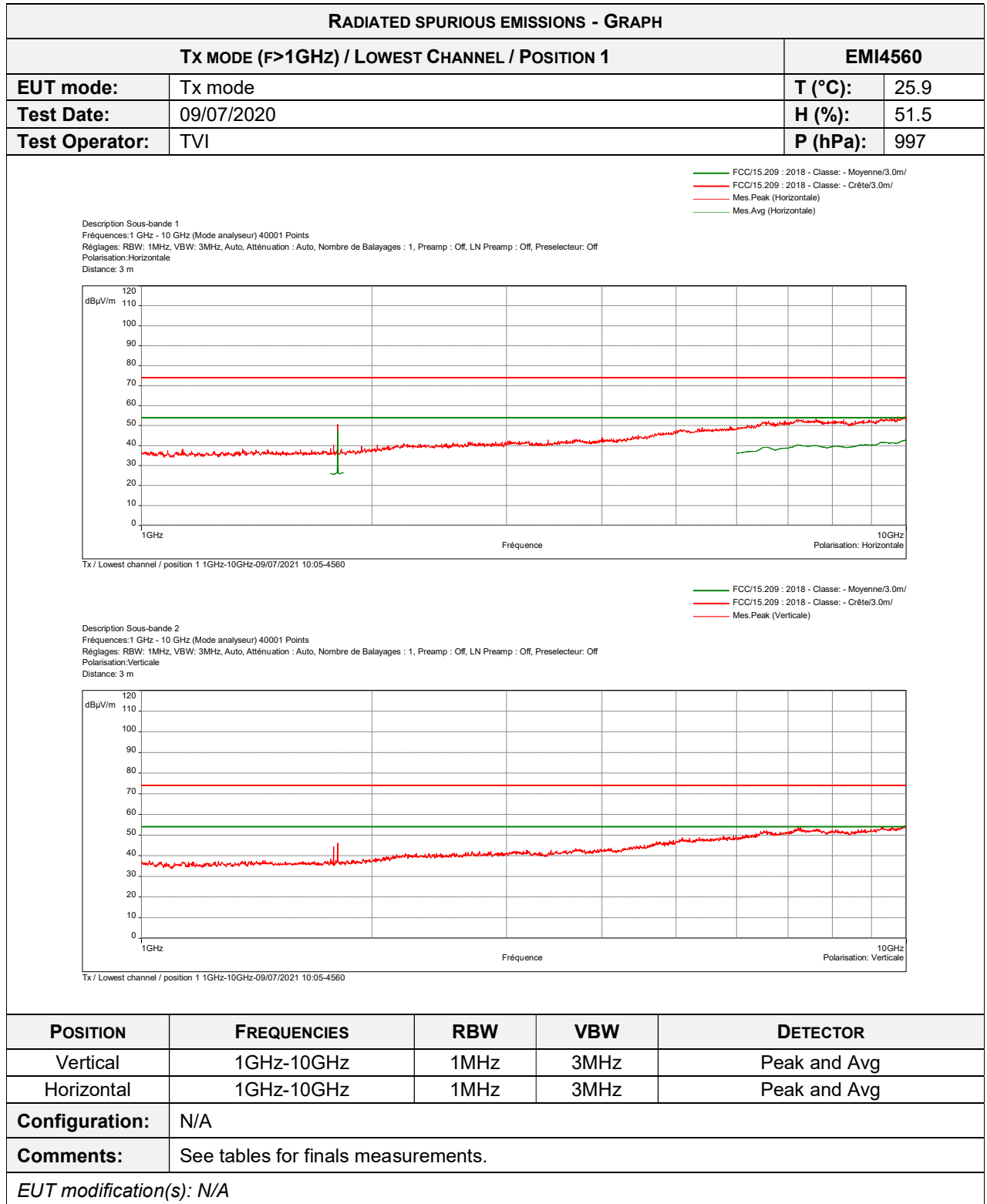


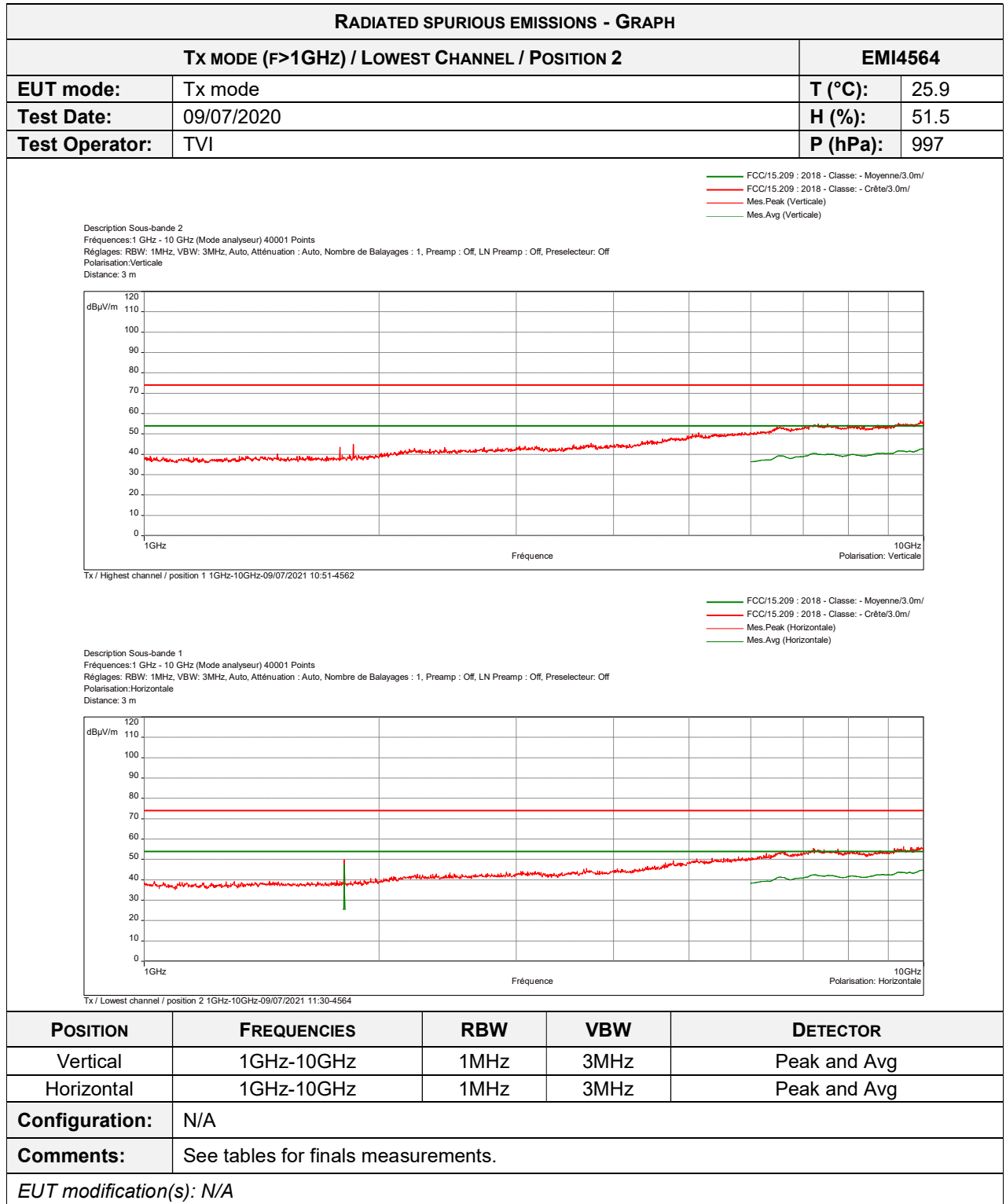
RADIATED SPURIOUS EMISSIONS - GRAPH				
TX MODE (F<30MHz) / LOWEST, MIDDLE & HIGHEST CHANNELS / POSITION 3				EMI4660, EMI4663 & EMI4666
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
0°	9kHz-150kHz	200Hz	1kHz	Peak
0°	150kHz-1MHz	9kHz	30kHz	Peak
0°	1MHz-30MHz	9kHz	30kHz	Peak
45°	9kHz-150kHz	200Hz	1kHz	Peak
45°	150kHz-1MHz	9kHz	30kHz	Peak
45°	1MHz-30MHz	9kHz	30kHz	Peak
90°	9kHz-150kHz	200Hz	1kHz	Peak
90°	150kHz-1MHz	9kHz	30kHz	Peak
90°	1MHz-30MHz	9kHz	30kHz	Peak
Configuration:	N/A			
Comments:	The black graphs represent the level measured in FAR, used to know which peak come from the EUT and which come from the environment. No spurious detected			
EUT modification(s): N/A				

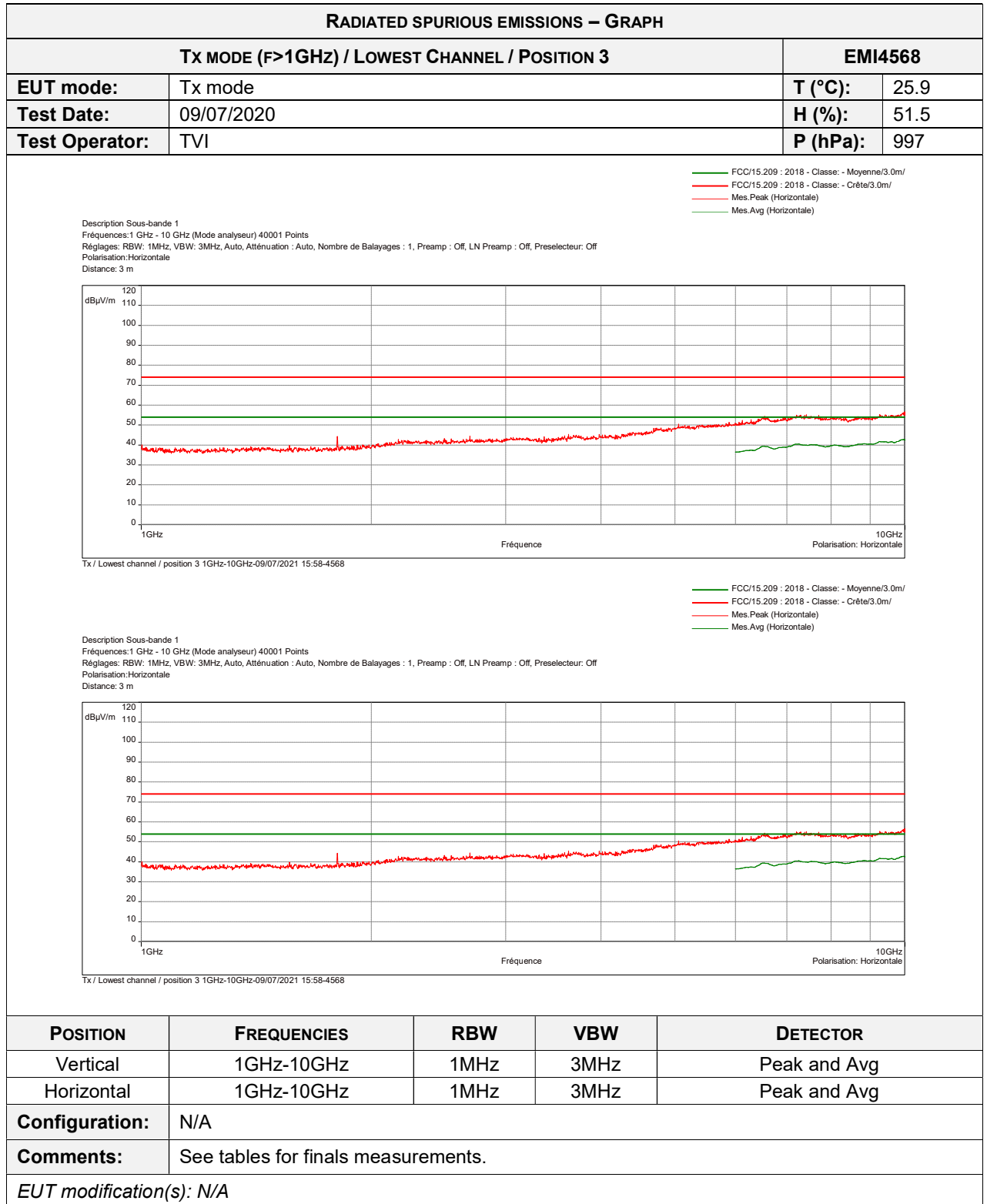


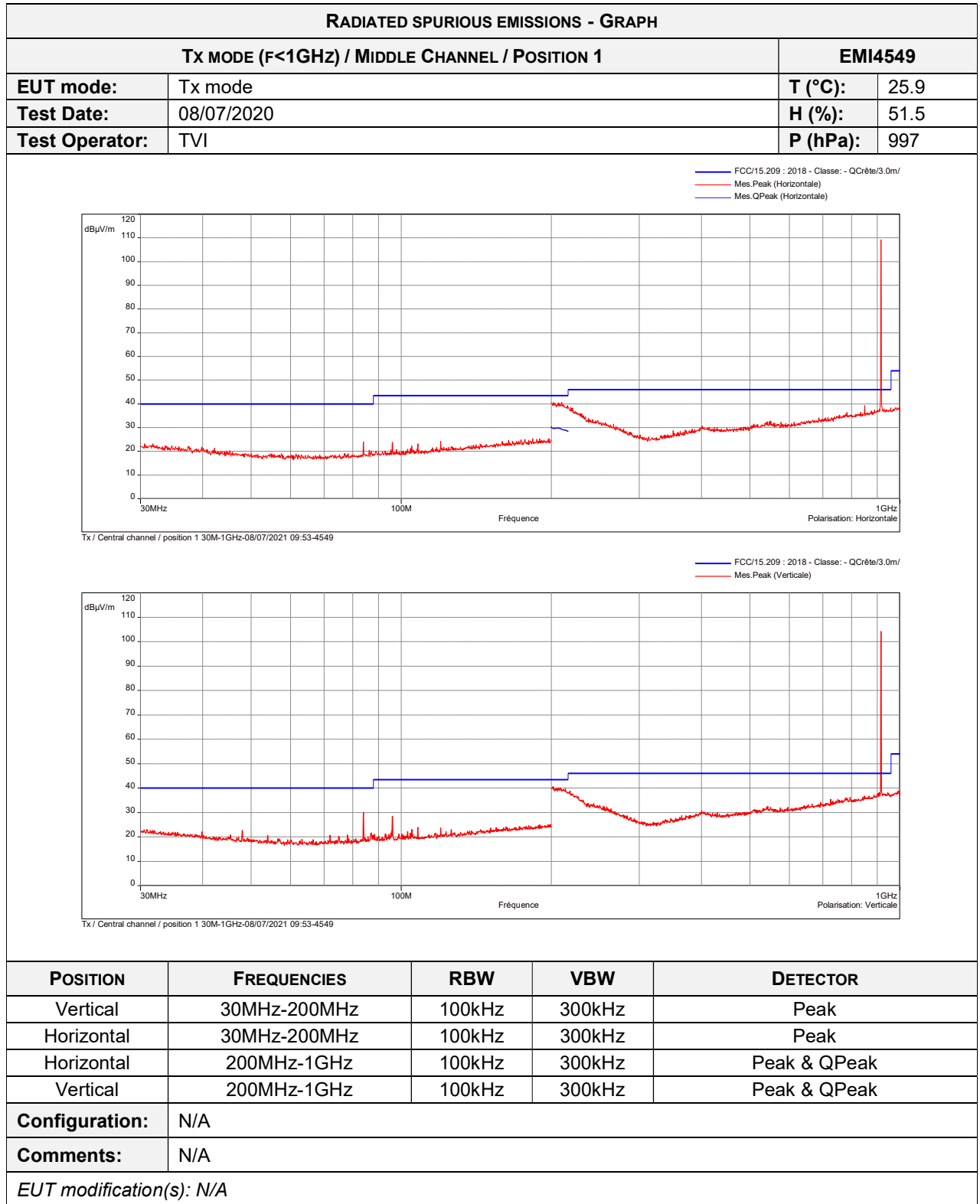


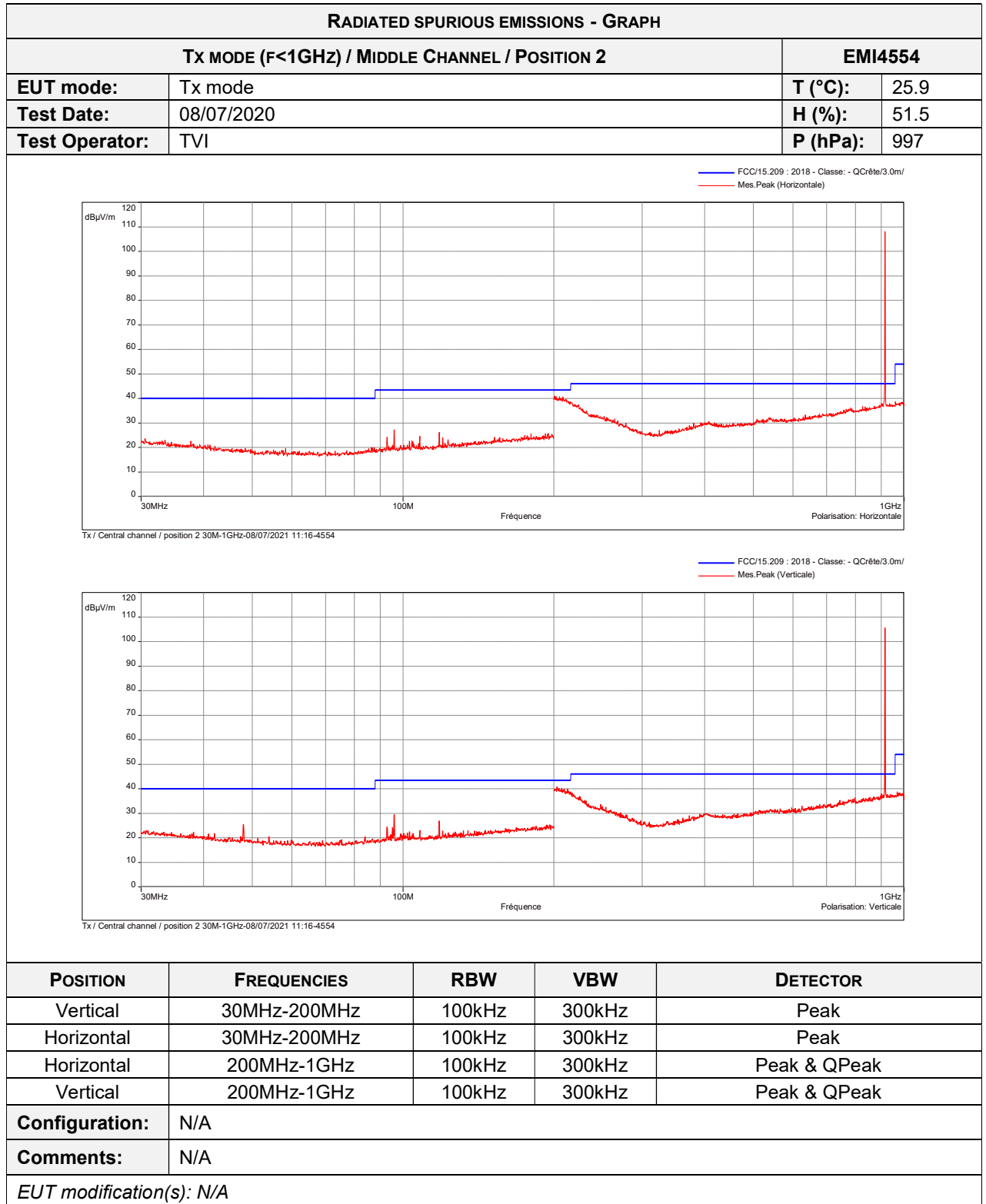


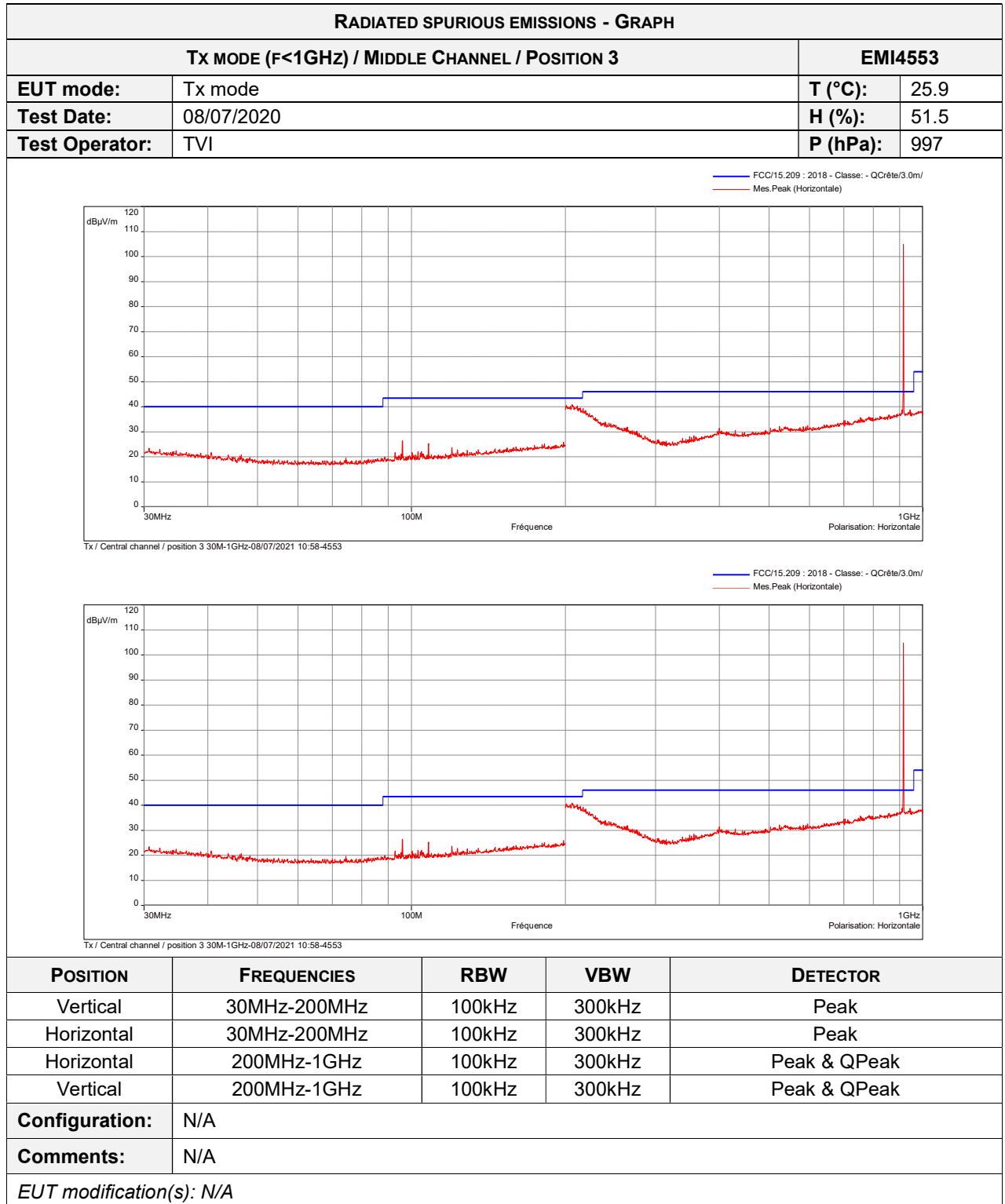


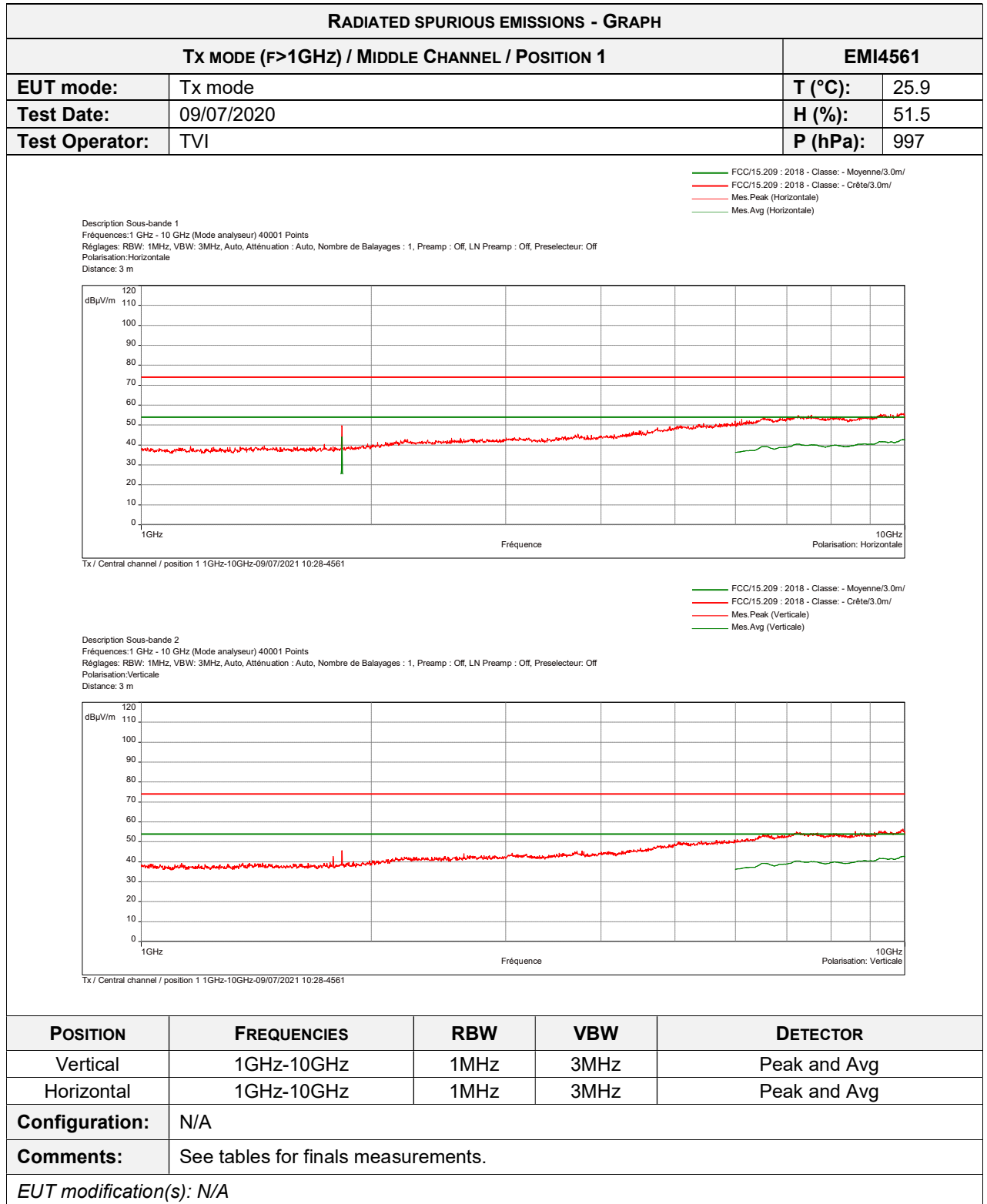


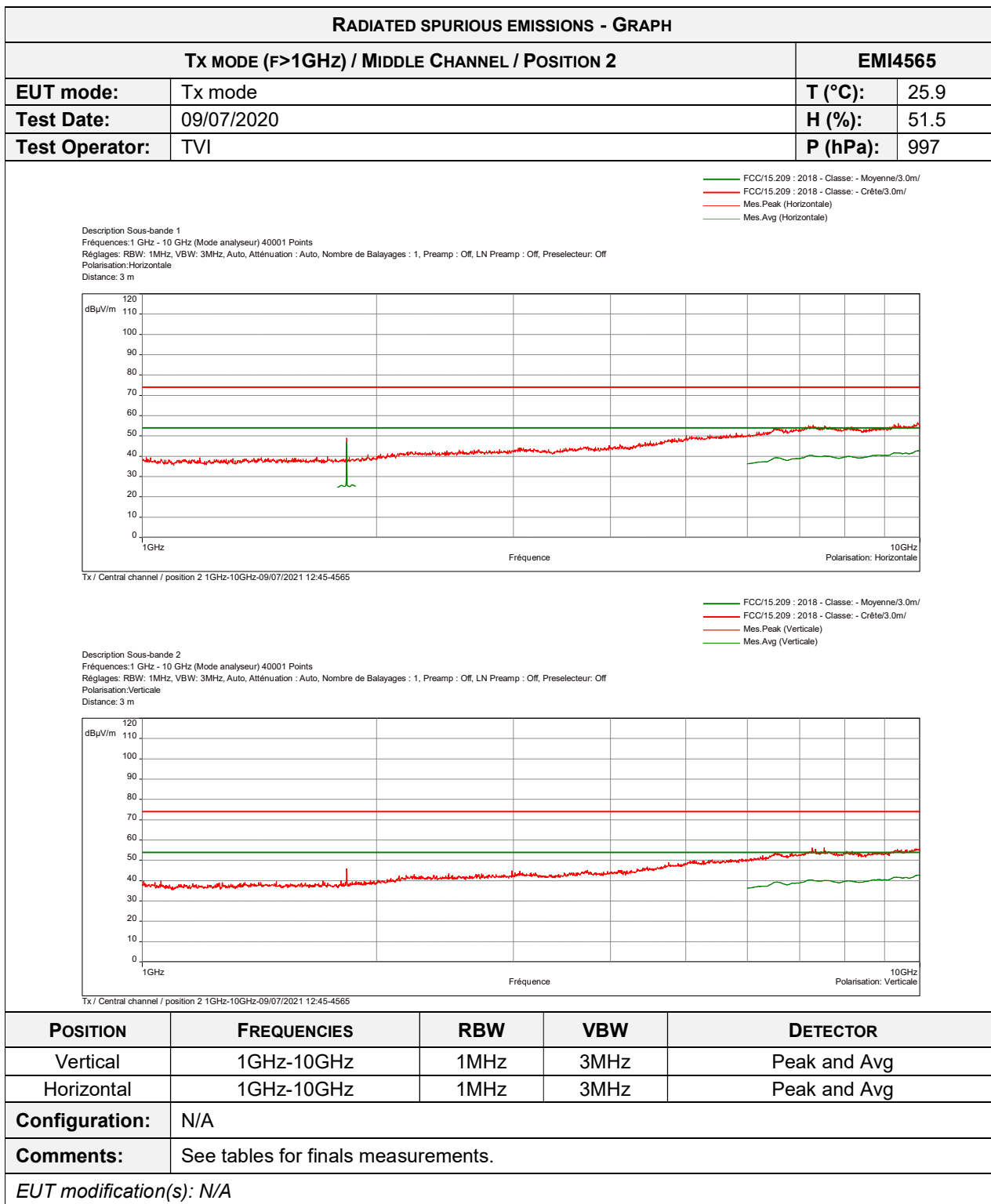


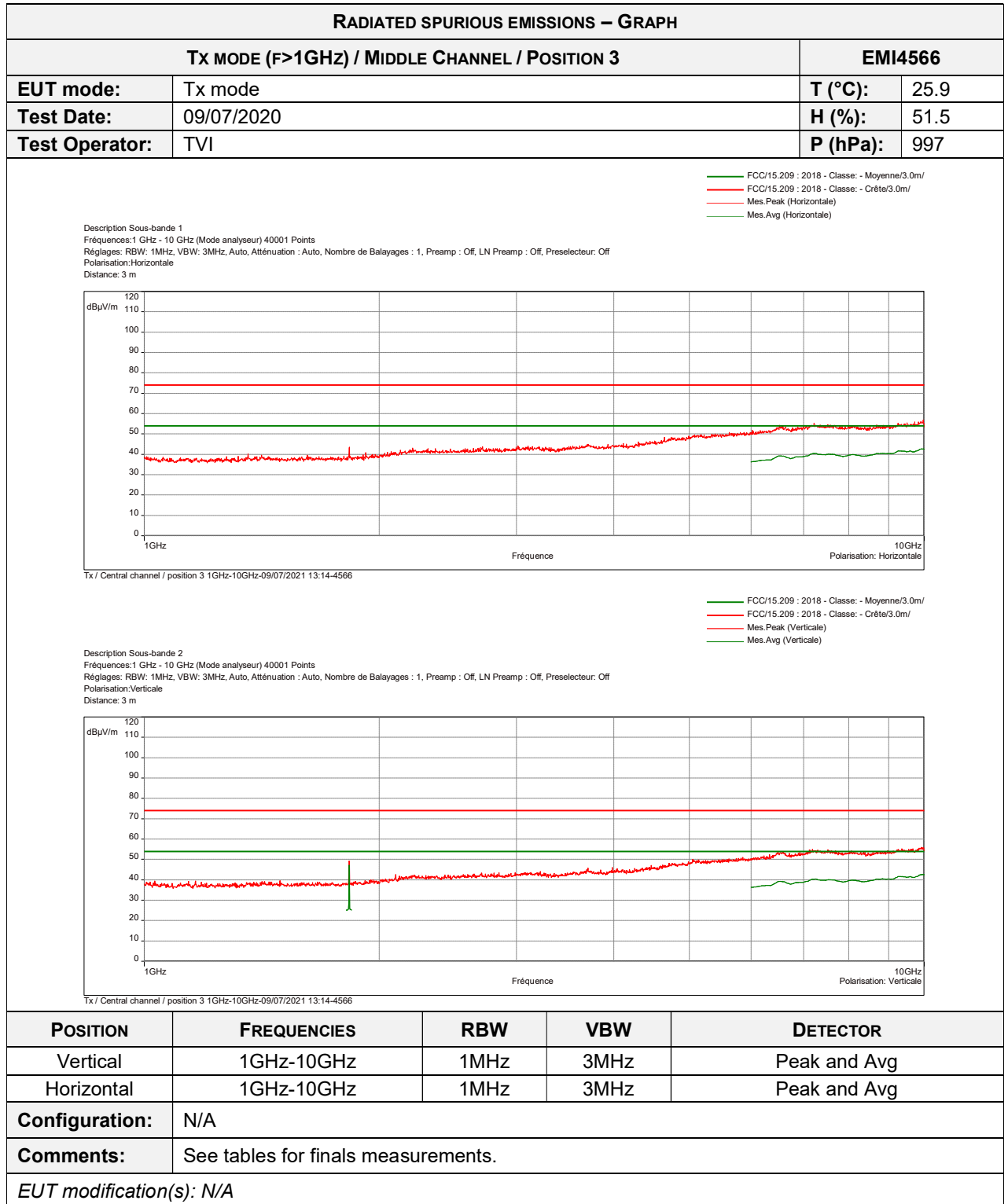


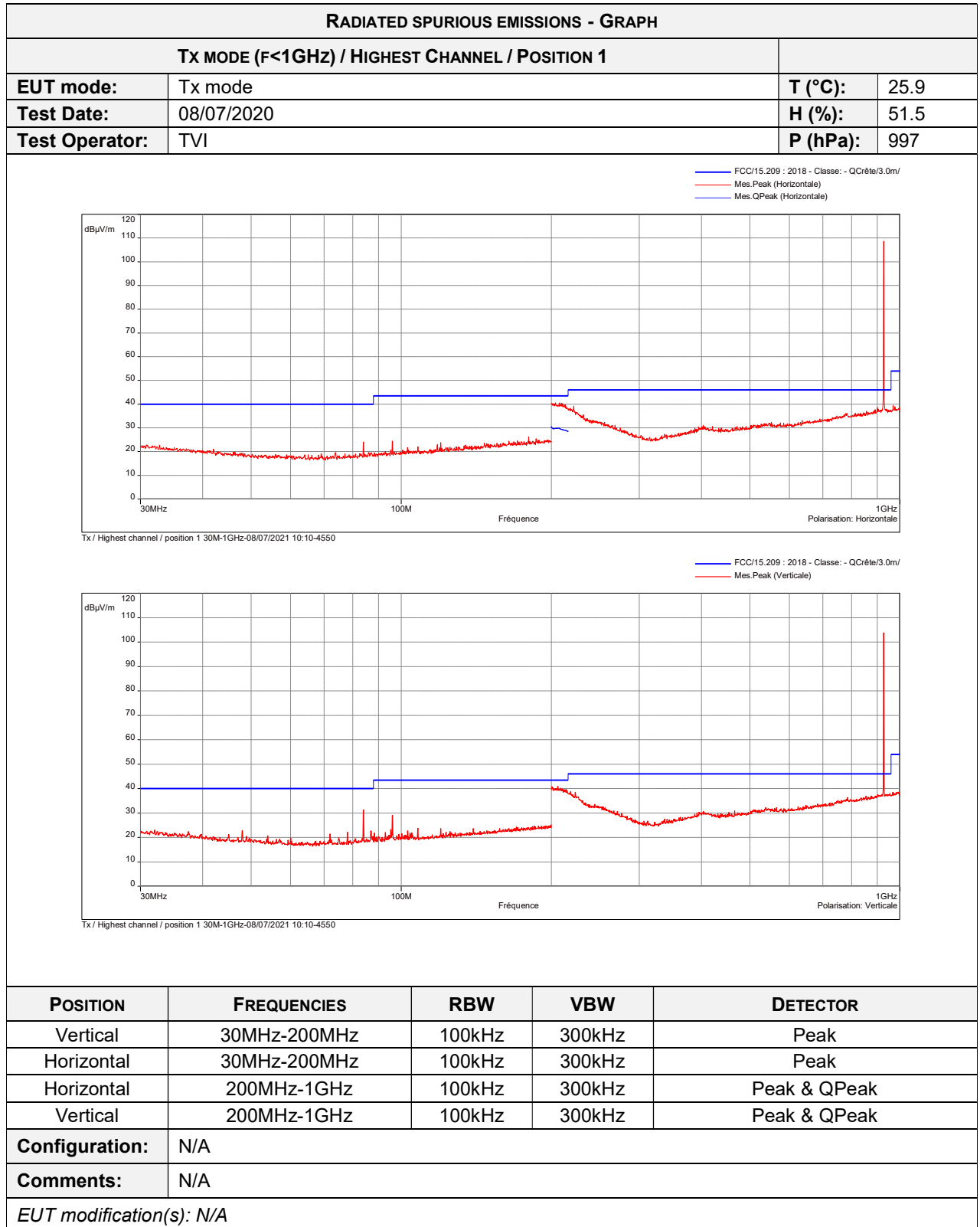


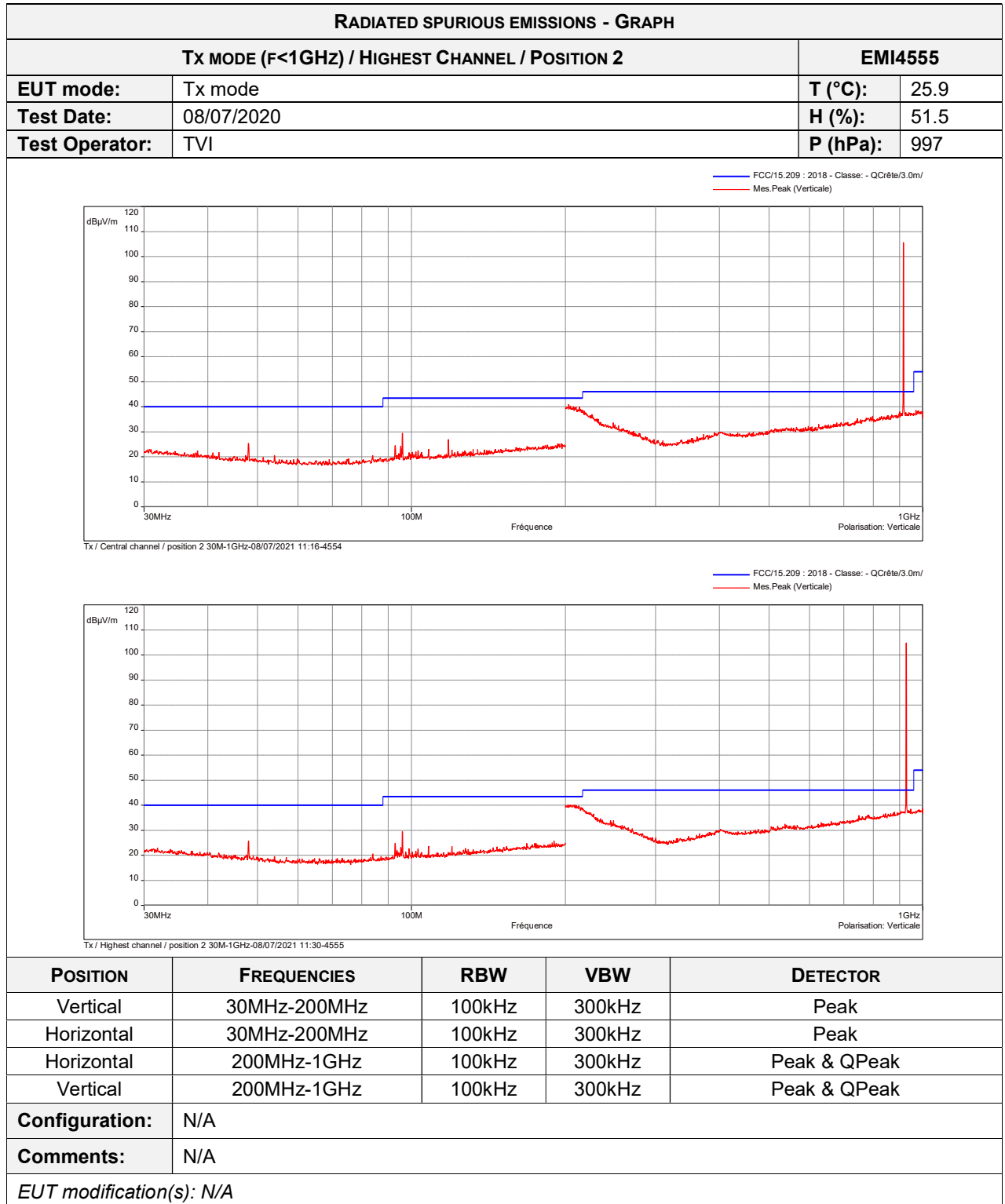


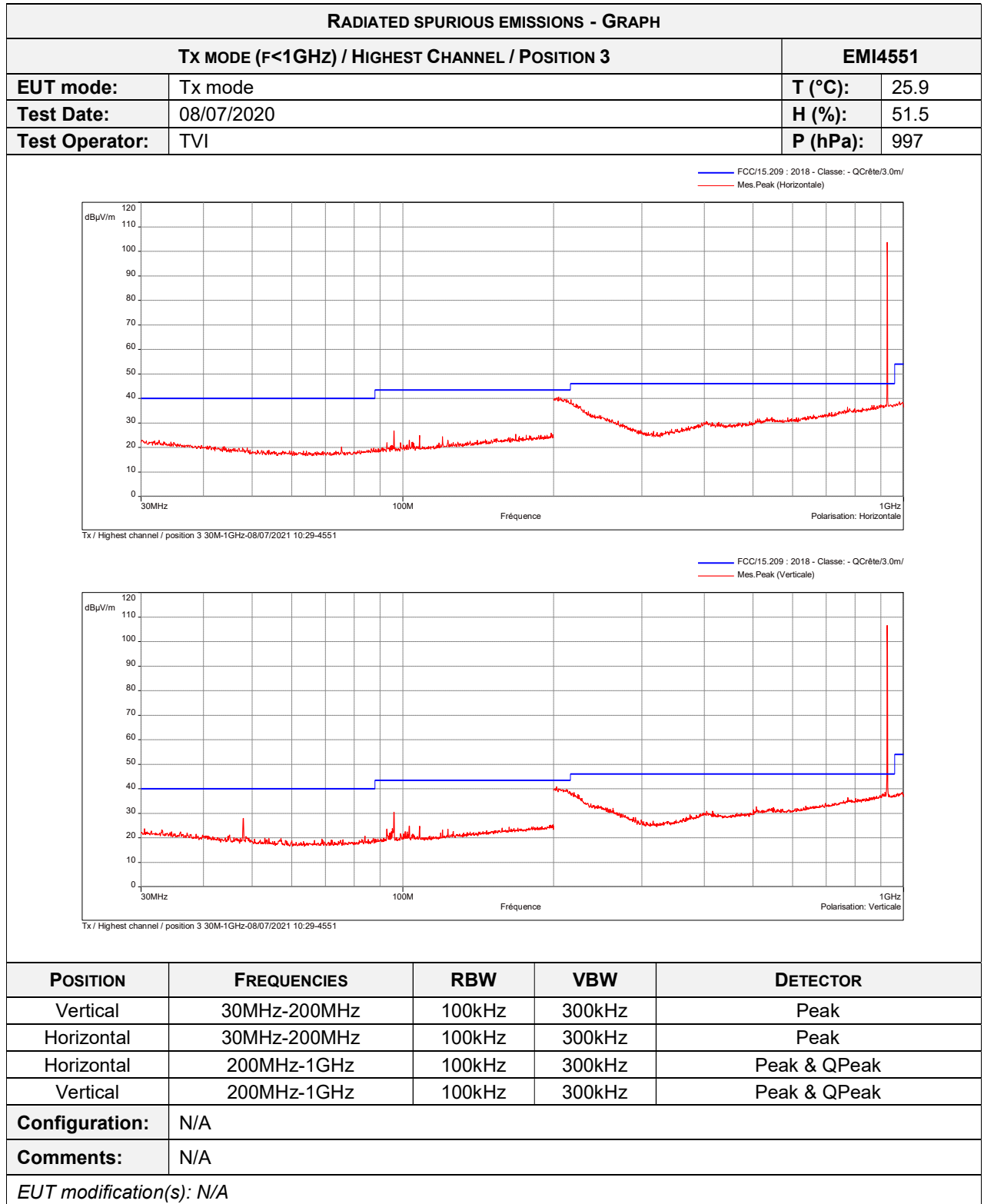


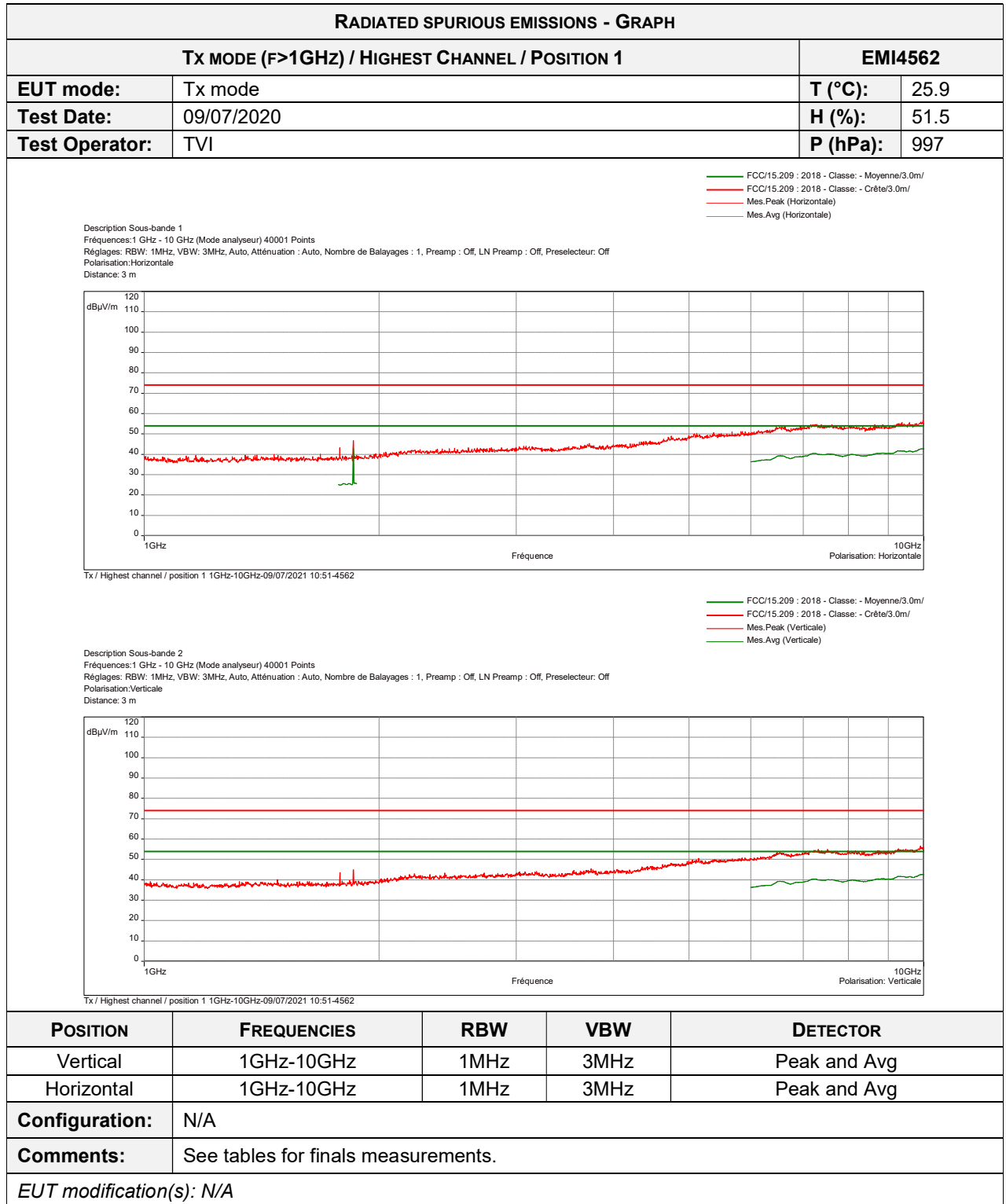


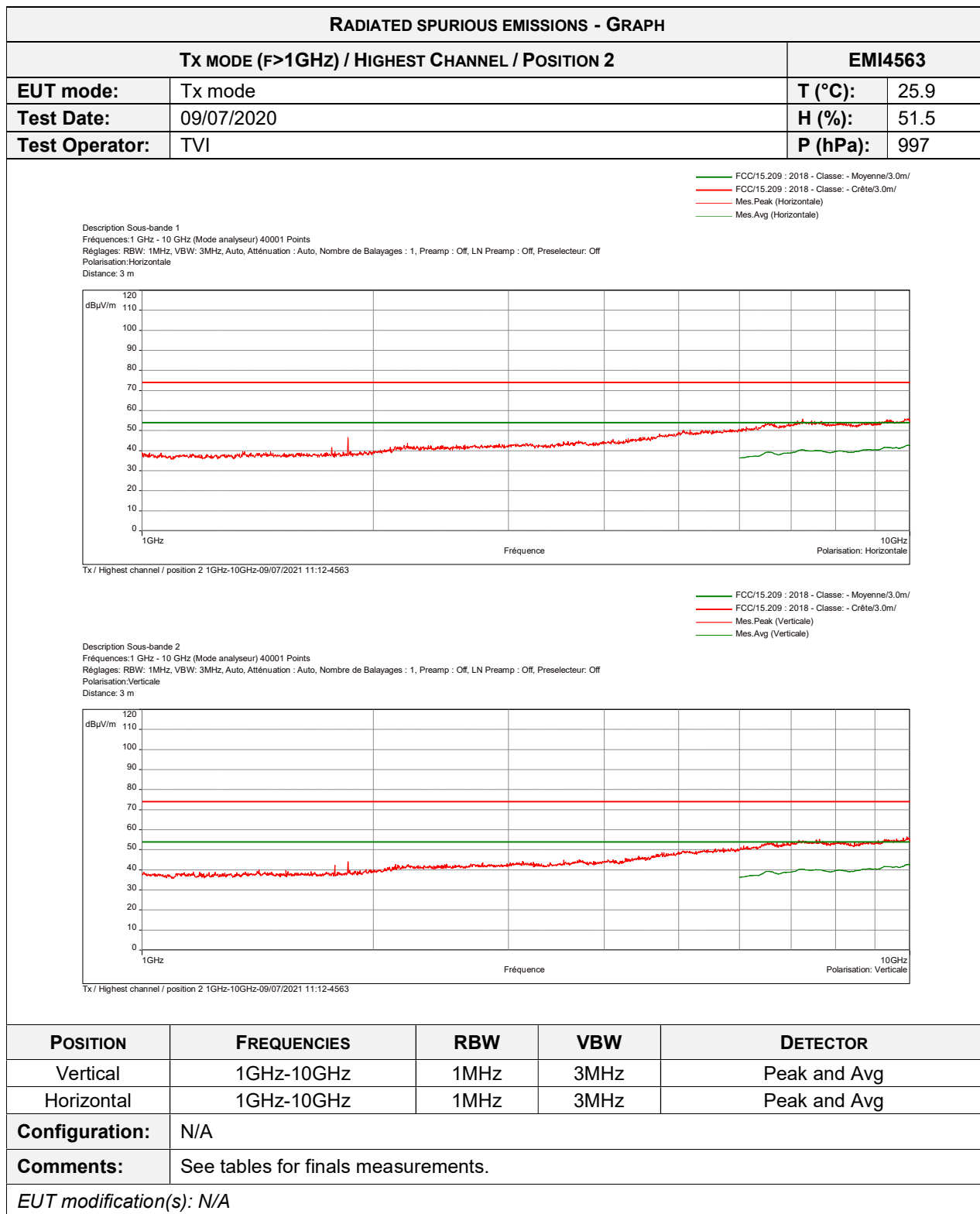


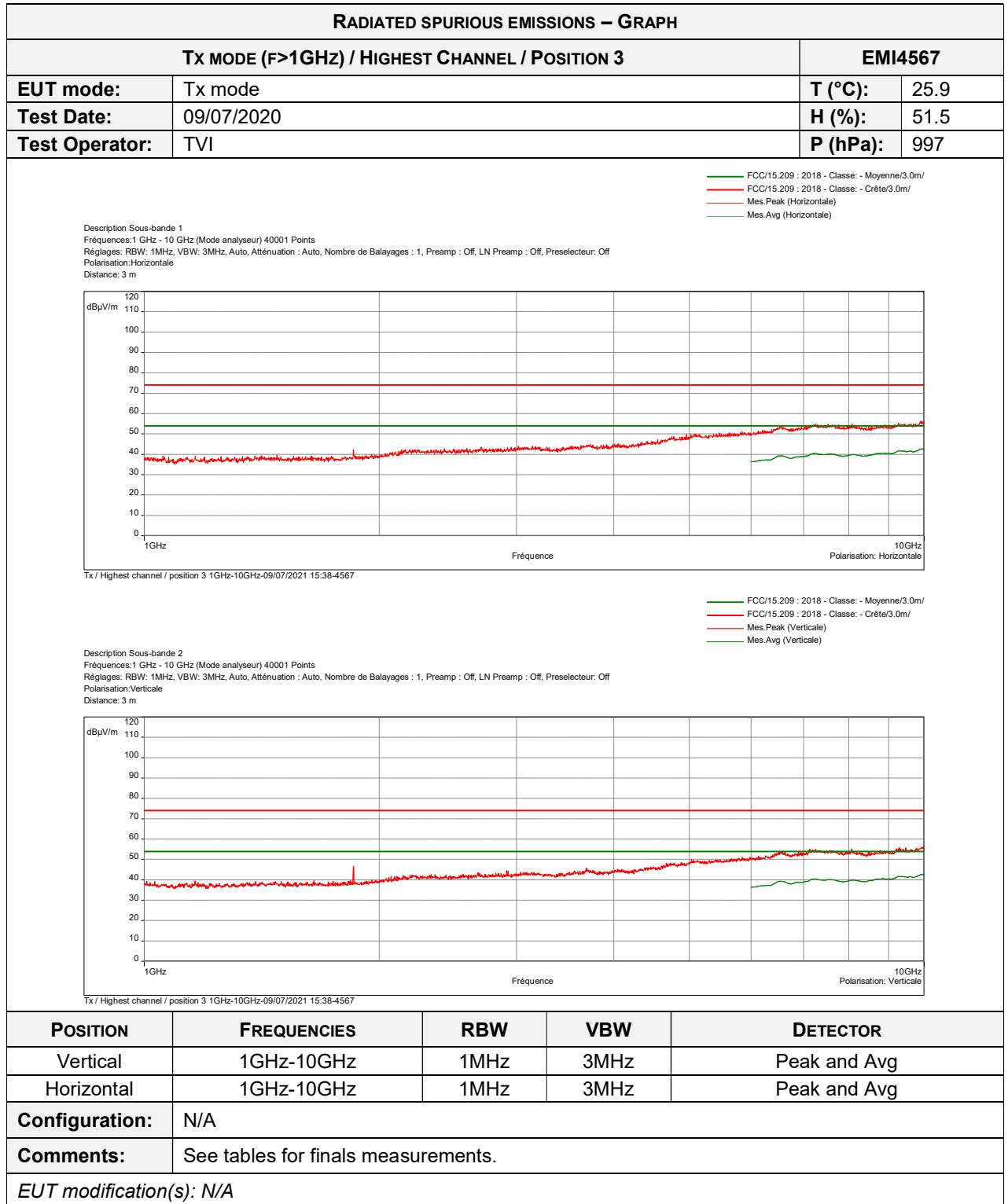


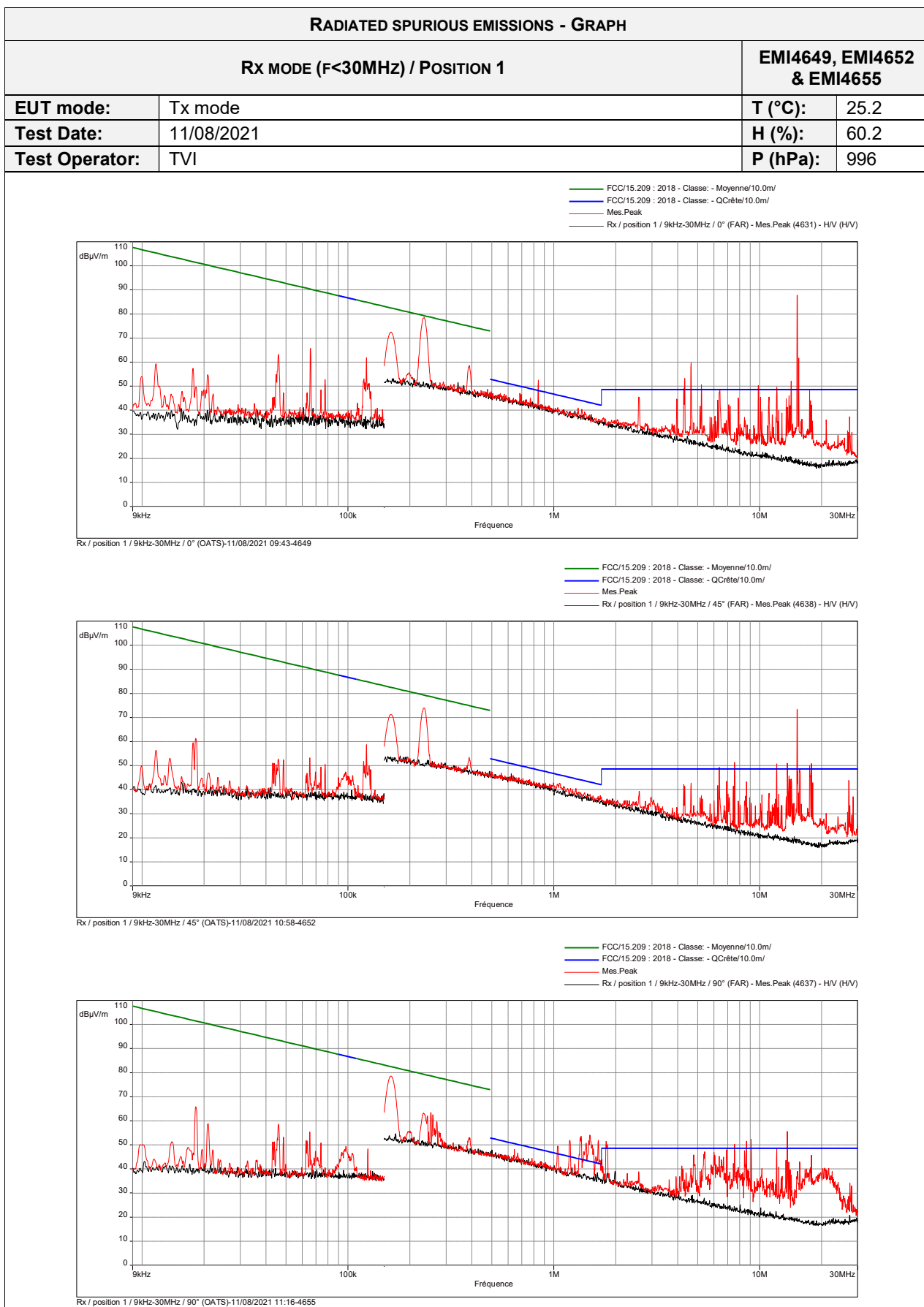




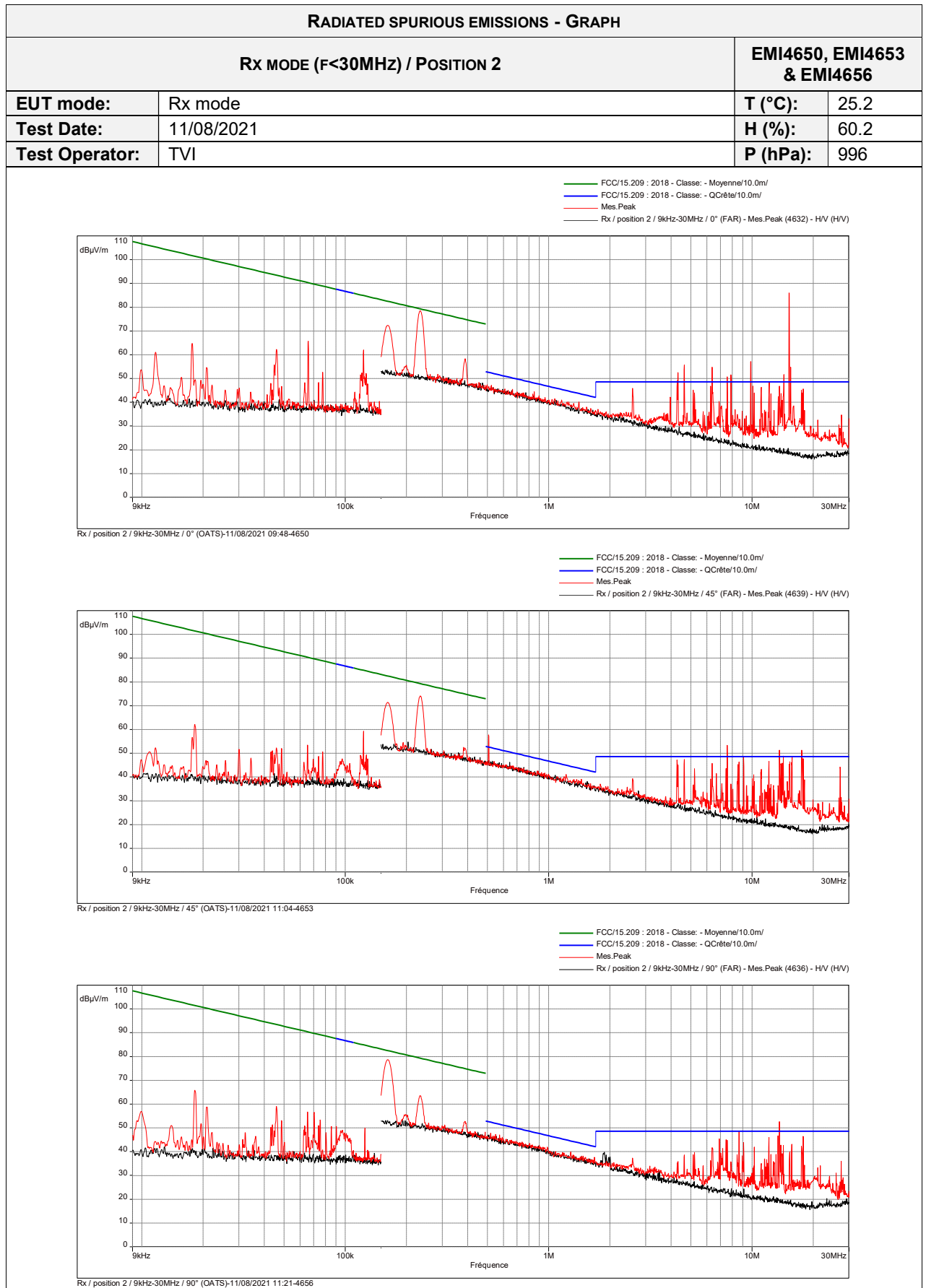




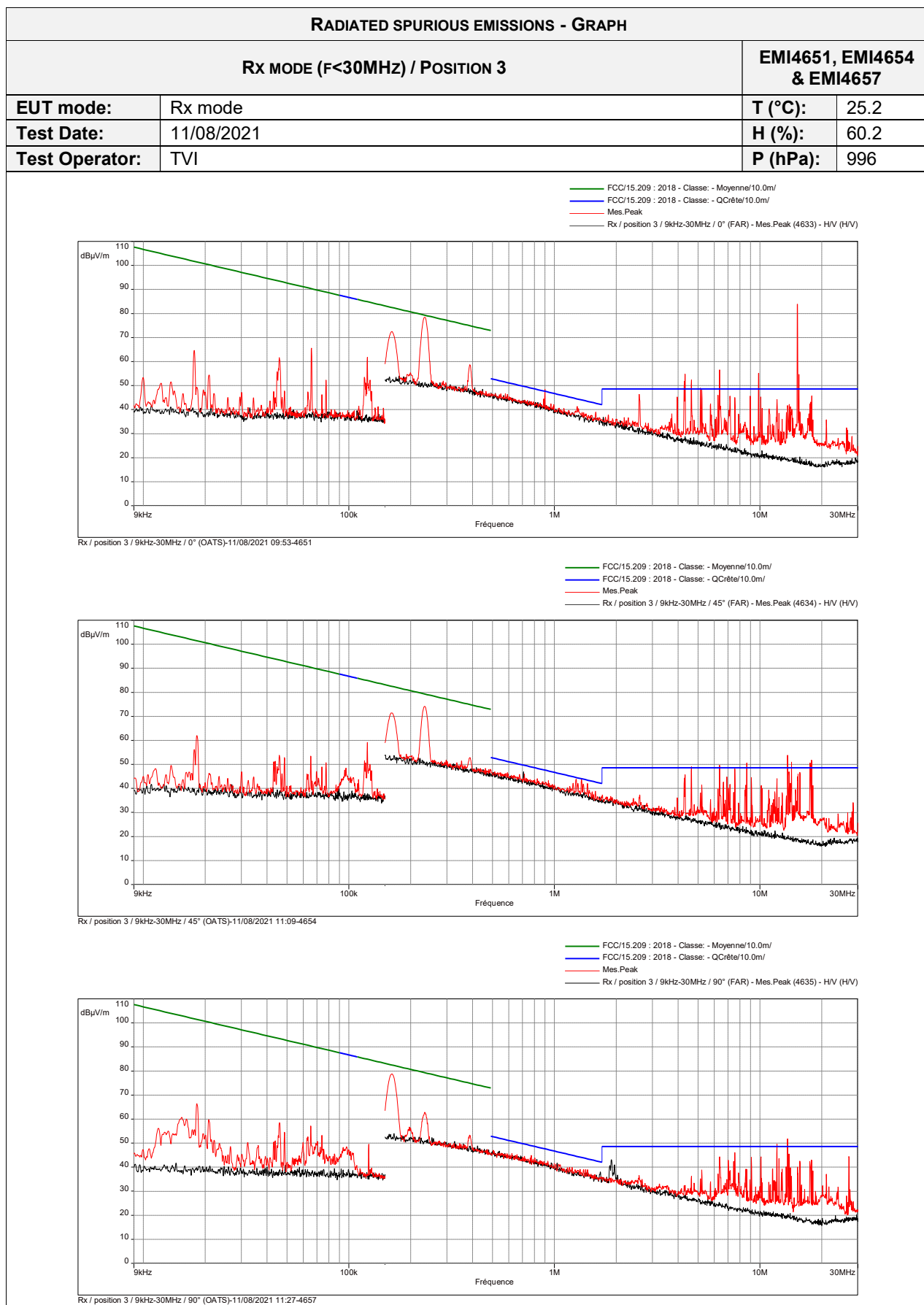




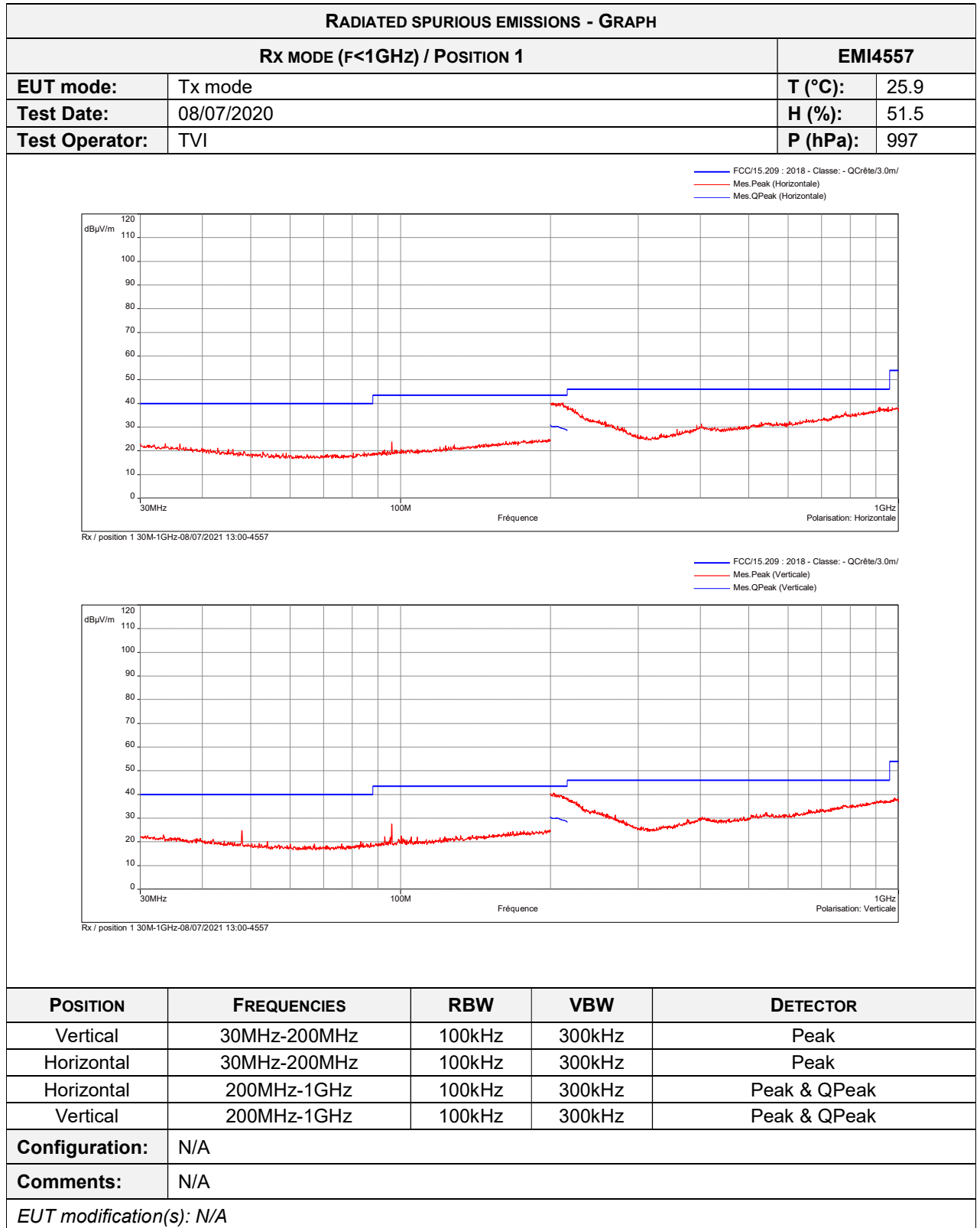
RADIATED SPURIOUS EMISSIONS - GRAPH				
RX MODE (F<30MHz) / POSITION 1				EMI4649, EMI4652 & EMI4655
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
0°	9kHz-150kHz	200Hz	1kHz	Peak
0°	150kHz-1MHz	9kHz	30kHz	Peak
0°	1MHz-30MHz	9kHz	30kHz	Peak
45°	9kHz-150kHz	200Hz	1kHz	Peak
45°	150kHz-1MHz	9kHz	30kHz	Peak
45°	1MHz-30MHz	9kHz	30kHz	Peak
90°	9kHz-150kHz	200Hz	1kHz	Peak
90°	150kHz-1MHz	9kHz	30kHz	Peak
90°	1MHz-30MHz	9kHz	30kHz	Peak
Configuration:	N/A			
Comments:	The black graphs represent the level measured in FAR, used to know which peak come from the EUT and which come from the environment. No spurious detected			
EUT modification(s): N/A				

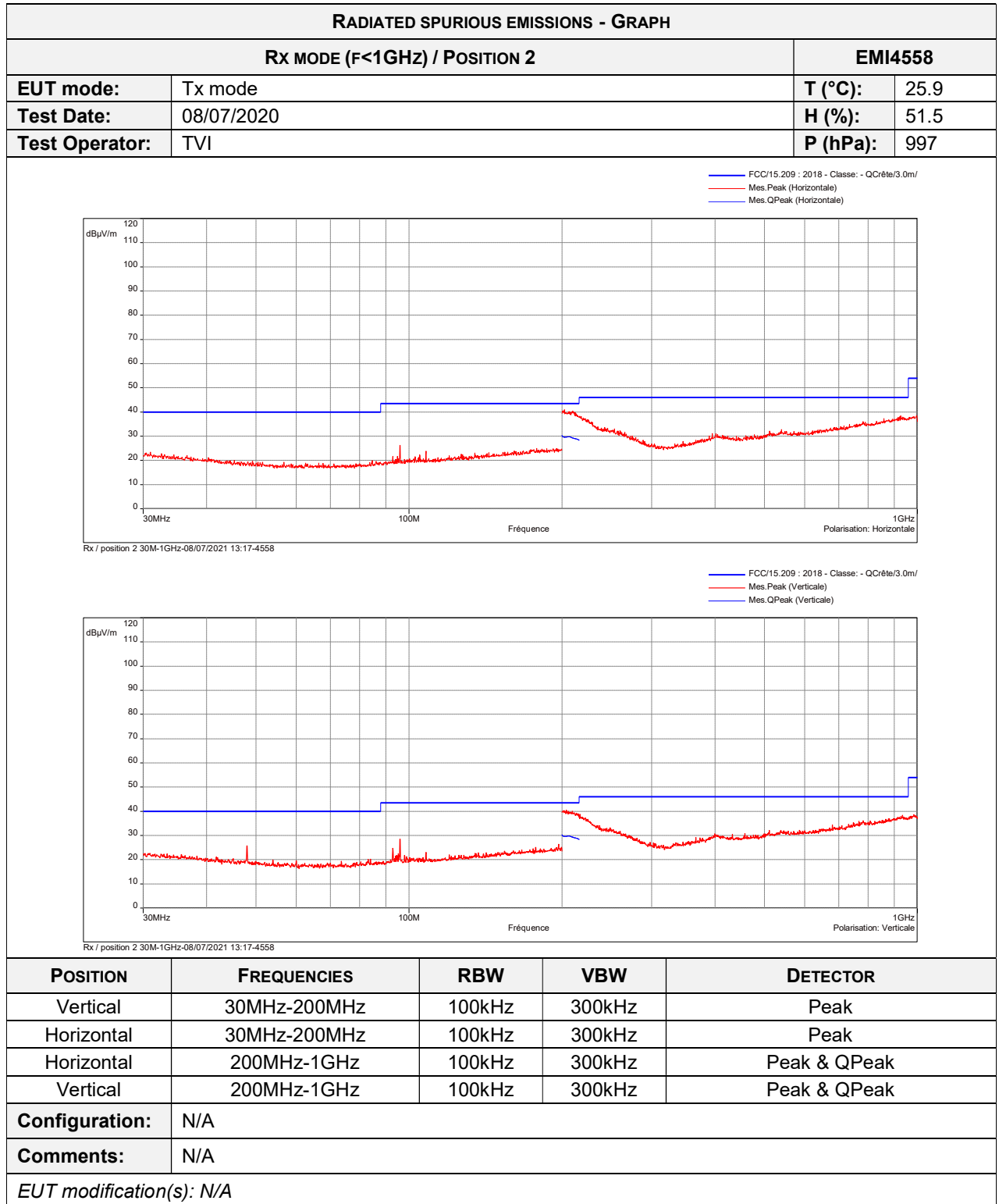


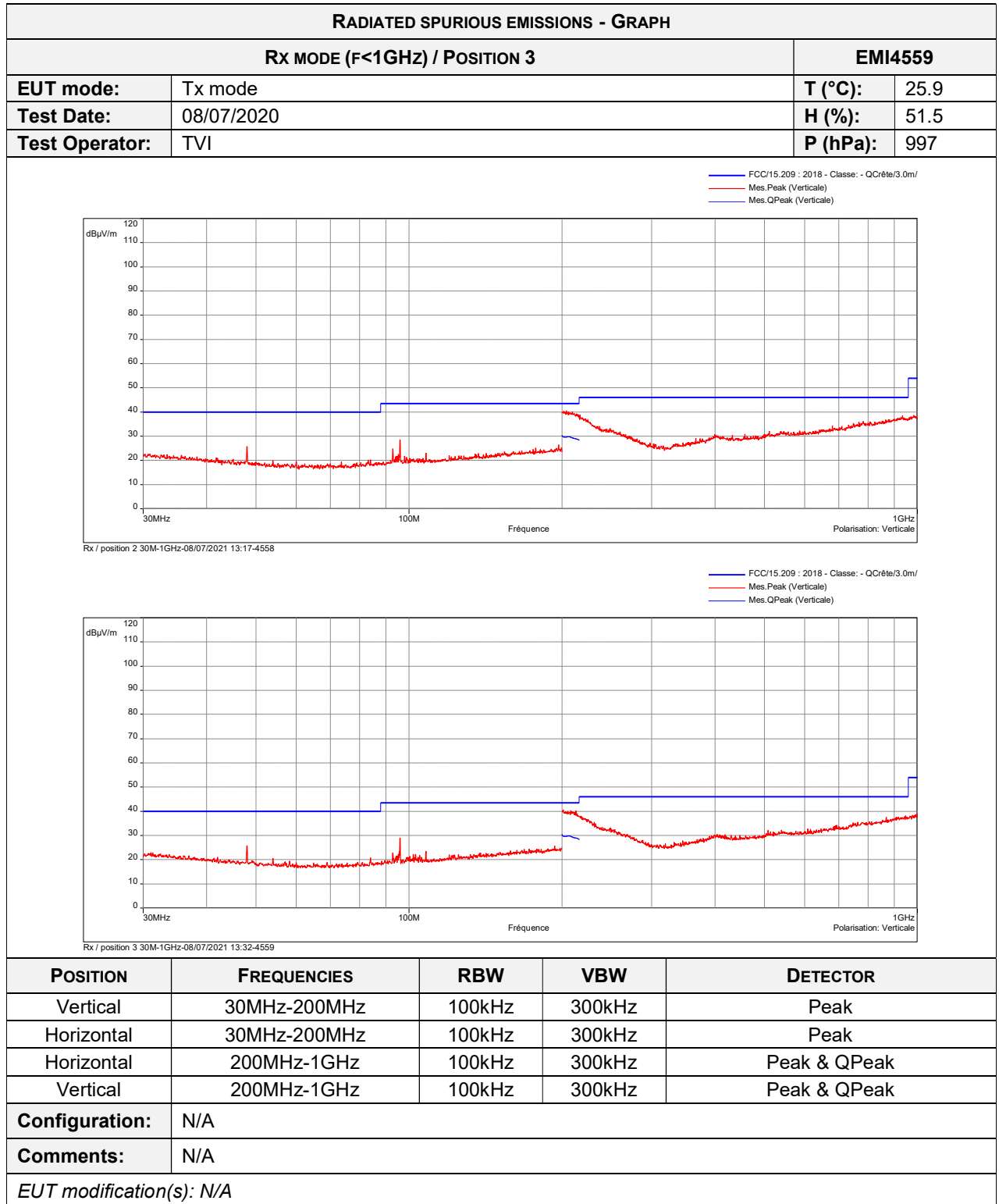
RADIATED SPURIOUS EMISSIONS - GRAPH				
RX MODE (F<30MHz) / POSITION 2				EMI4650, EMI4653 & EMI4656
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
0°	9kHz-150kHz	200Hz	1kHz	Peak
0°	150kHz-1MHz	9kHz	30kHz	Peak
0°	1MHz-30MHz	9kHz	30kHz	Peak
45°	9kHz-150kHz	200Hz	1kHz	Peak
45°	150kHz-1MHz	9kHz	30kHz	Peak
45°	1MHz-30MHz	9kHz	30kHz	Peak
90°	9kHz-150kHz	200Hz	1kHz	Peak
90°	150kHz-1MHz	9kHz	30kHz	Peak
90°	1MHz-30MHz	9kHz	30kHz	Peak
Configuration:	N/A			
Comments:	The black graphs represent the level measured in FAR, used to know which peak come from the EUT and which come from the environment. No spurious detected			
EUT modification(s): N/A				

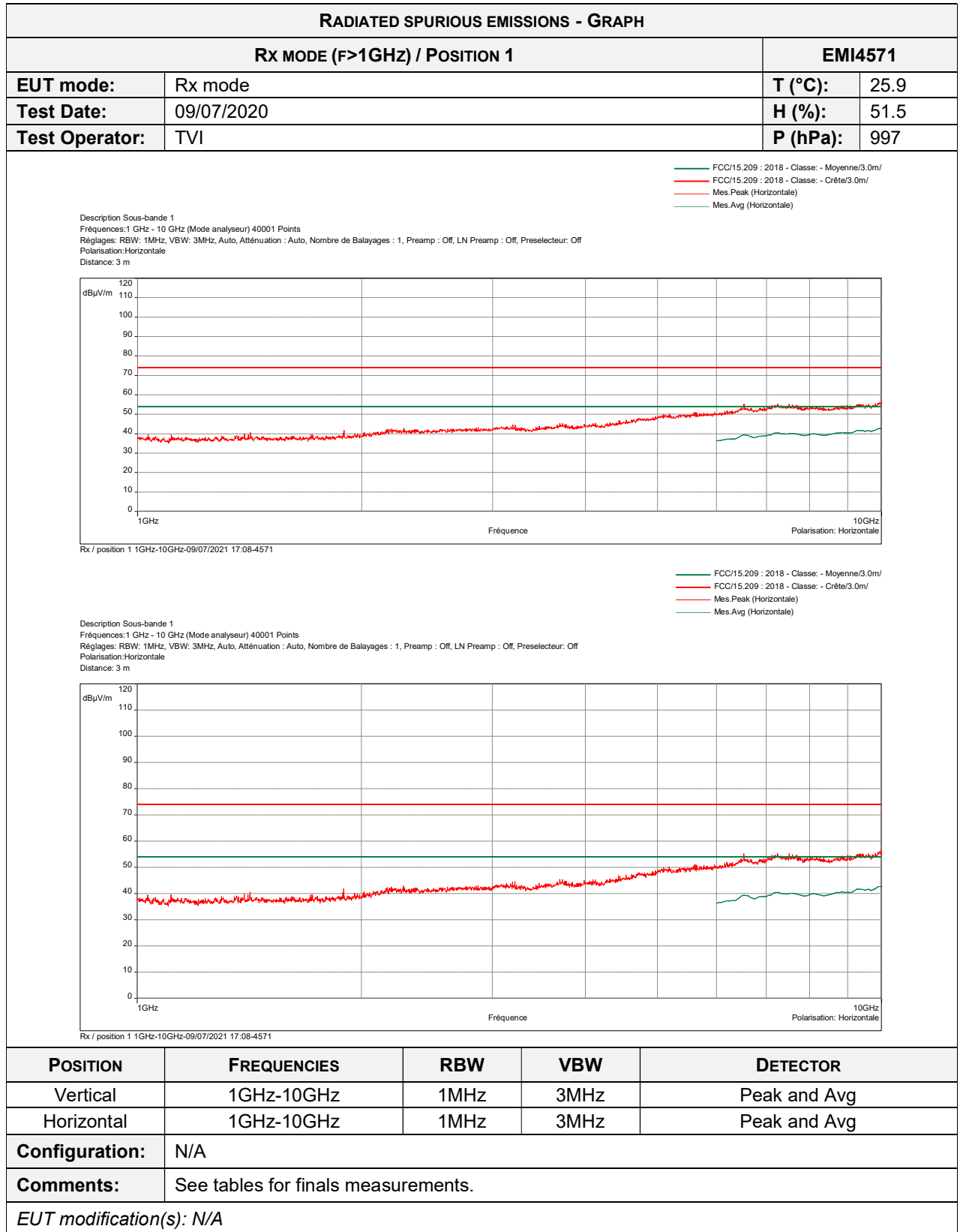


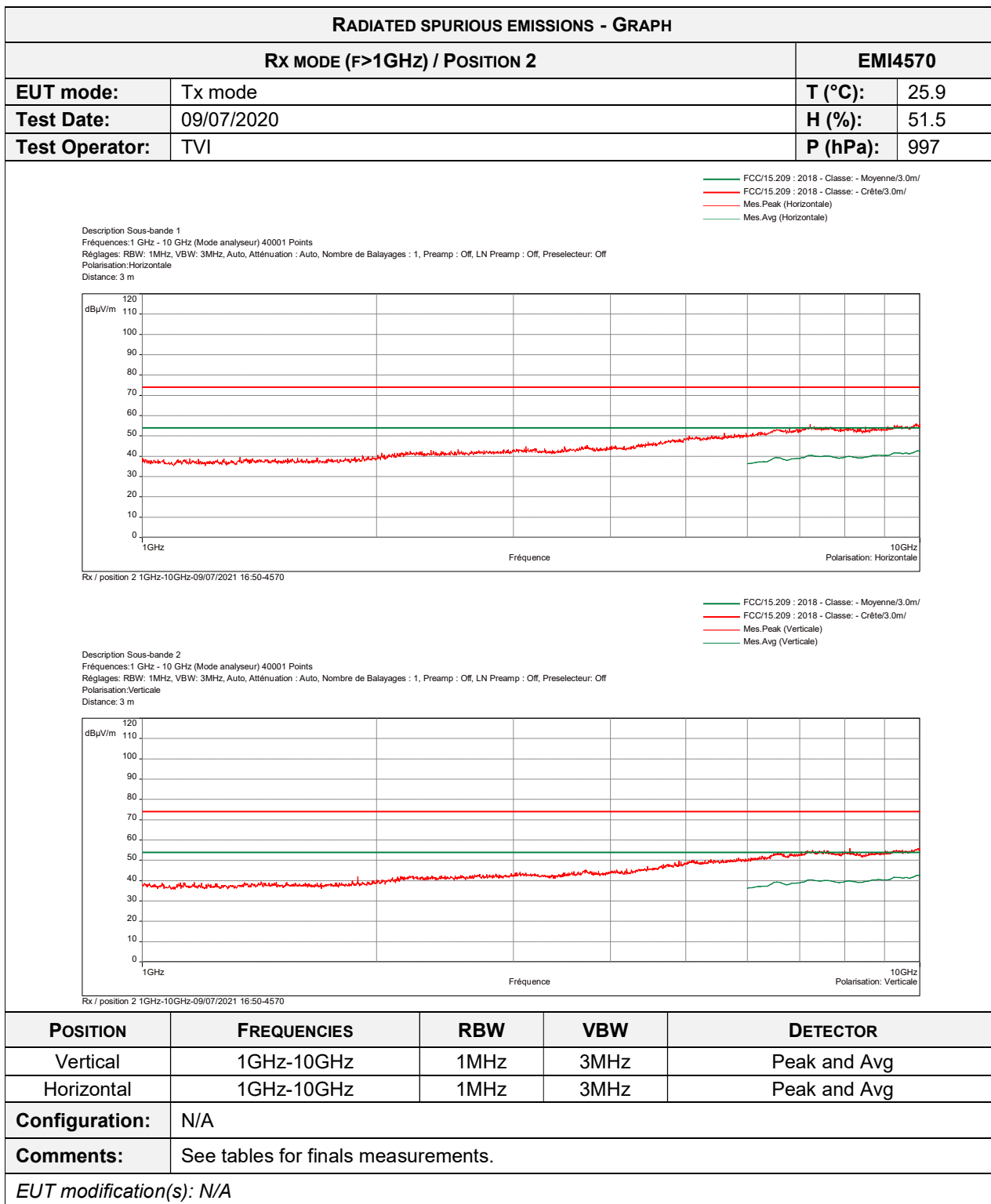
RADIATED SPURIOUS EMISSIONS - GRAPH				
RX MODE (F<30MHz) / POSITION 3				EMI4651, EMI4654 & EMI4657
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
0°	9kHz-150kHz	200Hz	1kHz	Peak
0°	150kHz-1MHz	9kHz	30kHz	Peak
0°	1MHz-30MHz	9kHz	30kHz	Peak
45°	9kHz-150kHz	200Hz	1kHz	Peak
45°	150kHz-1MHz	9kHz	30kHz	Peak
45°	1MHz-30MHz	9kHz	30kHz	Peak
90°	9kHz-150kHz	200Hz	1kHz	Peak
90°	150kHz-1MHz	9kHz	30kHz	Peak
90°	1MHz-30MHz	9kHz	30kHz	Peak
Configuration:	N/A			
Comments:	The black graphs represent the level measured in FAR, used to know which peak come from the EUT and which come from the environment. No spurious detected			
EUT modification(s): N/A				

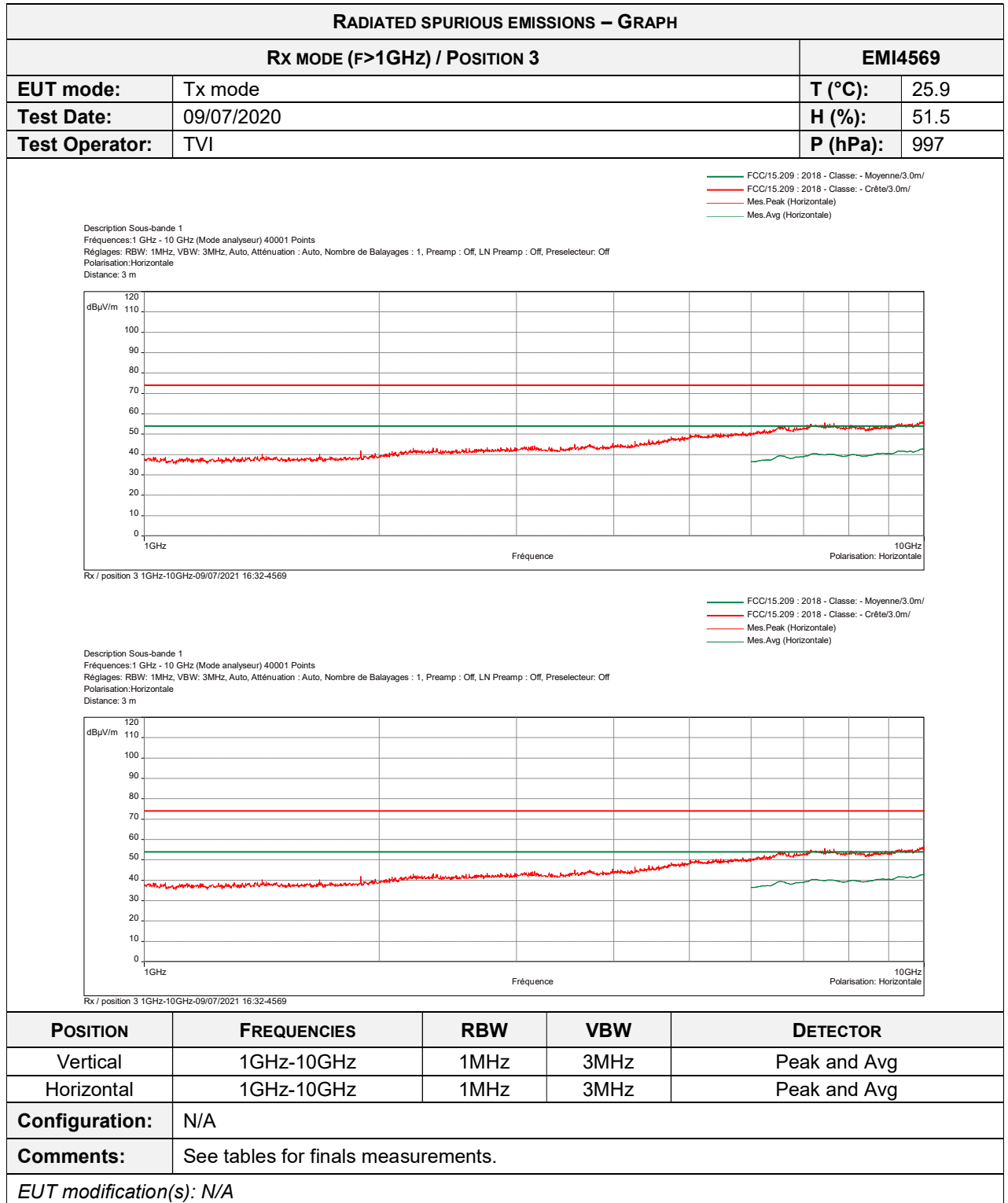












8.7. Measurement of Frequency Stability §15.215 (C) And RSS-GEN

Reference standard:	FCC part 15 Radio part 15.215 c)
Test method:	FCC part 15 Radio part 15.215 c)
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. EUT is connected to the measuring receiver via 50Ω attenuator(s).	

TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Tx mode	Permanent emission mode	902-928 MHz	-	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: EUT power supply is replaced by a stabilized power supply.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Spectrum Analyzer	Rohde & Schwarz	FSV40	15776	20/03/2021	20/05/2022
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	15790	12/11/2018	12/01/2021
Climatic chamber	CLIMATIS	EXCAL 4014-TA	12398	04/03/2020	04/05/2022
Voltmeter	Agilet	34401A	10952	28/04/2021	28/06/2023
Power supply	TTI	TSX3510P	14280		
Cable	Huber + Suhner	SF102K	15900	24/03/2021	24/05/2023
Thermometer	GHM Greisinger	GMH 3710	12967	27/04/2021	27/06/2022

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

TEST SETUP PHOTO(S)

EFFECTIVE RADIATED POWER - TABULATED RESULTS

Test Case	Temperature (°C)	Power supply (Vdc)	Frequency (MHz)	Frequency error (kHz)
Normal conditions / Low channel	25	3.3	902.764	-
Extremes tests conditions / Lowest channel	-20	3.3	902.7636010	-0.3990
Extremes tests conditions / Lowest channel	70	3.3	902.7626510	-1.3490
Extremes tests conditions / Lowest channel	25	3.25	902.7628249	-1.1751
Extremes tests conditions / Lowest channel	25	3.35	902.7628310	-1.1690
Normal conditions / Central channel	25	3.3	915.644	-
Extremes tests conditions / Central channel	-20	3.3	915.6435401	-0.4599
Extremes tests conditions / Central channel	70	3.3	915.6426102	-1.3898
Extremes tests conditions / Central channel	25	3.25	915.6428100	-1.1900
Extremes tests conditions / Central channel	25	3.35	915.6428102	-1.1898
Normal conditions / High channel	25	3.3	927.236	-
Extremes tests conditions / Highest channel	-20	3.3	927.2353129	-0.6871
Extremes tests conditions / Highest channel	70	3.3	927.2347010	-1.2990
Extremes tests conditions / Highest channel	25	3.25	927.2348267	-1.1733
Extremes tests conditions / Highest channel	25	3.35	927.2348967	-1.1033

Note 1 : The voltage of the EUT is provided by an EA, which regulate the voltage of the EUT. Modifying the voltage of provided would only modify the voltage of the EA, and not the EUT.

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	TVI	12/08/2021	-

End of test report