



Test report issued under the responsibility of:
EMITECH LYON laboratory
MRA US-EU Designation Number: FR0013
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RADIO TEST REPORT

FCC part 15.247
RSS-247_Issue 2, February 2017

Company: **MICROOLED**
Address.....: BHT2
17 rue Felix Esclangon
38000 GRENOBLE - FRANCE

Test item description: **Connected glasses with Head Up Display**
Trade Mark: Activelook
Manufacturer: Microoled
Model/Type reference.....: ISP4520-US
FCC ID.....: 2AY23-2001
IC: 27140-2001
Ratings.....: 3.2Vdc to 4.2Vdc

Testing Laboratory: **EMITECH LYON laboratory**
Address.....: ZI de Mi-Plaine
7 rue Georges Méliès
69680 CHASSIEU - France

Report Reference No.: **R120-20-105 636-1_A**
Test procedure: FCC IC Certification
Diffusion.....: Mr ARBET-PONT
Applicant's name: MICROOLED
Date of issue.....: 13/08/2021
Total number of pages.....: 66
Revision.....: 1
Modified page(s).....: See lines in the margin
Compiled by.....: T VINAY
Approved by (+ signature).....: David MONTAULON (Technical Manager)



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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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This document submits the results of Radio tests performed on the equipment **Connected glasses with Head Up Display** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

Testing Laboratory : EMITECH LYON laboratory
Address..... : ZI de Mi-Plaine
7 rue Georges Méliès
69680 CHASSIEU
FRANCE
Test procedure. : FCC IC Certification
Tested by : T VINAY
Test supervisor : None
Date of receipt of test item..... : N/A
Date (s) of performance of tests : From 24st February to 26th February of 2021
March the 2nd of 2021
April the 23rd of 2021

Company name : MICROOLED
Company address : BHT2
 17 rue Felix Esclangon
 38000 GRENOBLE
 FRANCE
Person(s) present during the tests : No representative for company attended the tests.
Responsible : Mr Mathias ARBET-PONT

**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.**

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Test case does not apply to the test object.: N/A
 Information not communicated.....: N/C
 Test case not performed.....: N/P
 Test object does meet the requirement.....: P (Pass)
 Test object does not meet the requirement.: F (Fail)
 Test object was not subjected to all tests.....: I (Inconclusive)

E.U.T.	Equipment under test	AE	Ancillary equipment
RBW	Resolution bandwidth	VBW	Video bandwidth
OATS	Open area test site	FAR	Full anechoic room
RF	Radio frequency	NTR	Nothing to report
SRD	Short Range Device	GPS	Global Positioning System

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:

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

FCC part 15

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 part 15.247

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850MHz. (frequency hopping and digitally modulated)

RSS-247_Issue 2, February 2017

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

RSS/CNR-Gen, Issue 5, March 2019

Exigences générales et information relatives à la certification du matériel de radiocommunication

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

3. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

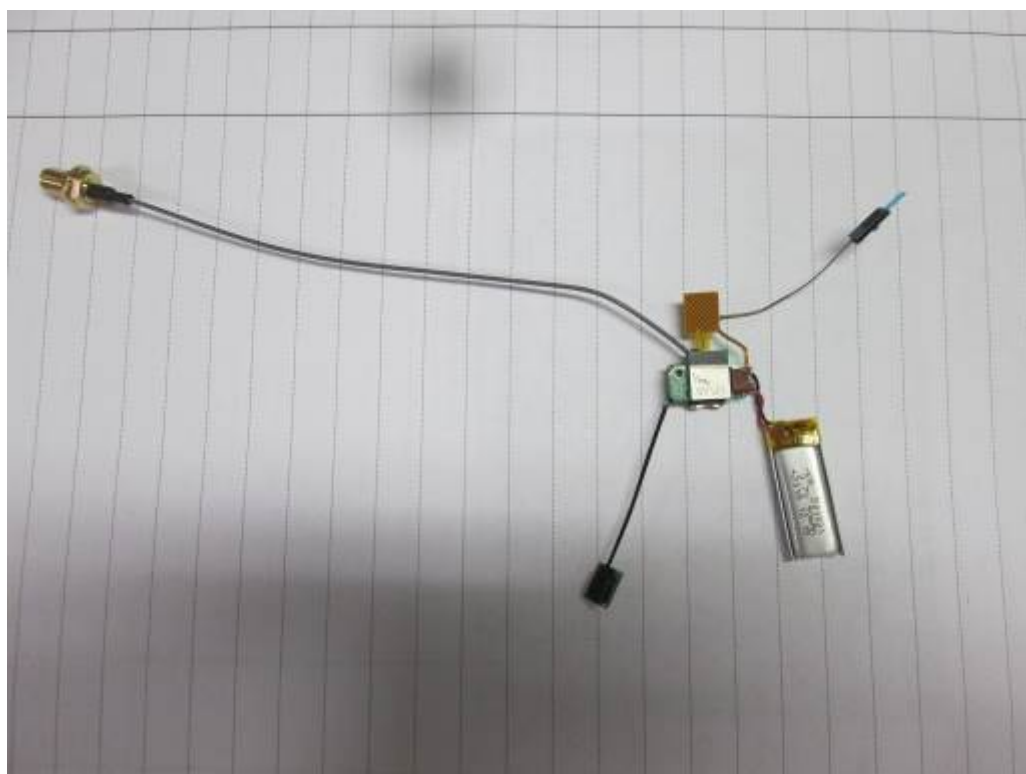
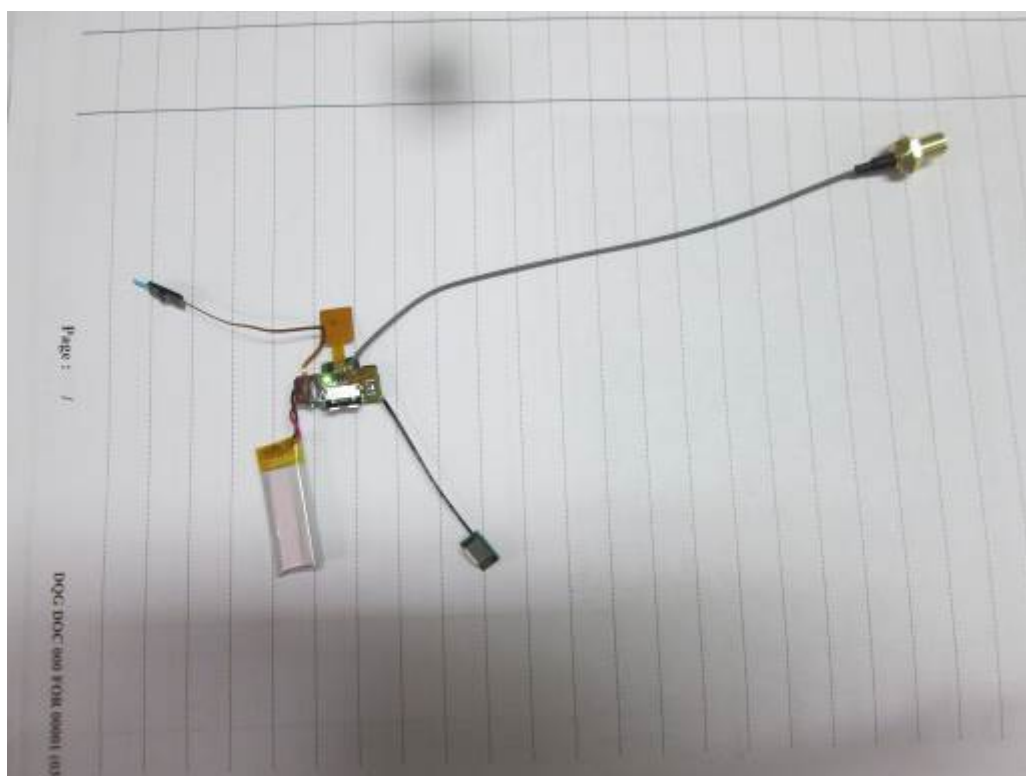
Test item description. : Connected glasses with Head Up Display
Model/Type reference..... : ISP4520-EU
Trade Mark. : Activelook
FCC ID..... : 2AY23-2001
IC. : 27140-2001
Serial number (S/N)..... : Not communicated
Part number (P/N). : Not communicated
Software version..... : Not communicated
Firmware version. : Not communicated
Type of sample. : Standard equipment
Function(s)..... : Data communication through Bluetooth Low Energy with a
smartphone.
Data display on a Head Up Display
Measurement of brightness and proximity sensors
Manufacturer name. : MICROOLED
Address..... : BHT2
17 rue Felix Esclangon
38000 GRENOBLE
FRANCE
General product information:
N/A

3.2. EUT General view





3.3. Internal view



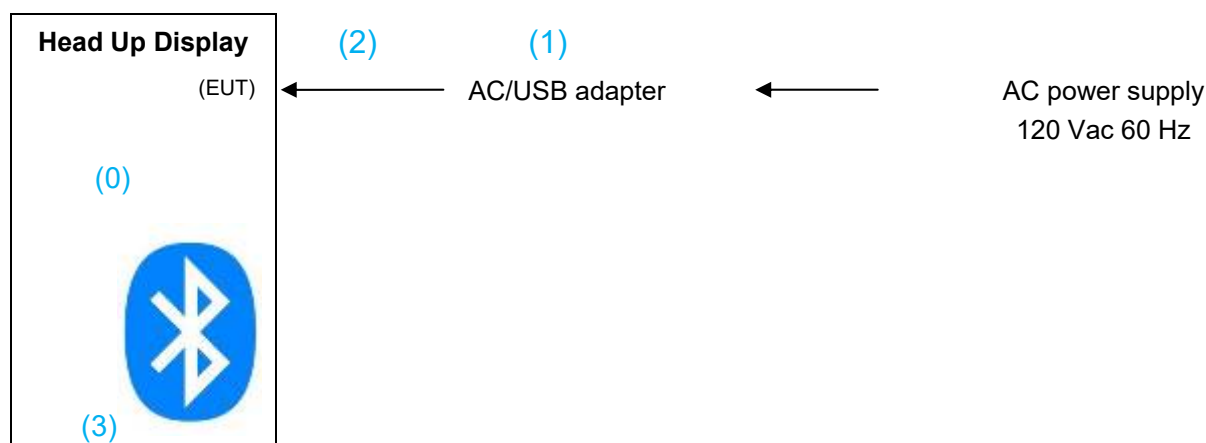
3.4. EUT Mechanical and Electrical Design

Power supply.....: 3.7 Vdc (internal battery) charged by USB (5Vdc)
 Power supply range.....: 3.2Vdc to 4.2Vdc
 Power type.....: Battery
 Power (W).....: Not communicated
 Nominal current (A).: Not communicated
 Dimensions (L x W x H) (m).: 0.14x0.18x0.05
 Weight (kg).: 00.025 / 0.035
 Temperature range (°C).: -20 to +50
 Ground bounding strap.....: No

Comments:

N/A

3.5. EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	
1	AC/USB adapter	AC/USB	N/A	Output : USB Input : 1 phase	Not provided by the manufacturer
2	USB cord	USB	0.5 m	USB	Provided by the manufacturer
3	RF antenna	RF	N/A	N/A	Internal

AC/DC : AC/DC Converter port

I/O.....: Input or Output port

N/E: Non Electrical port

AC.....: Alternative current port

TP: Telecommunication port

DC: Discontinuous current port

RF.....: Radio frequency 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
Smartphone AC/USB ADAPTER	SAMSUNG	Galaxy J6	Provided by the customer Provided by EMITECH

AC/USB ADAPTER (EA)


3.7. EUT Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	: Transceiver
Technology	: BLE
Environmental profile.....	: Data transmission
Temperature range.....	: -20/+50 °C
Antenna type	: Integral
Antenna Gain.....	: 6dBi (Max)
Comments:	
N/A	
b) TRANSMITTER PARAMITERS (Tx)	
Frequency bands	: 2400 – 2483.5 MHz
RF Power.....	: 1mW max (standard value)
Number of channels / Separation.....	: 40 / 2MHz
Modulation type	: GFSK
Duty cycle	: N/C
Tested frequency.....	: 2402 MHz, 2426MHz, 2480 MHz (DSSS)
c) RECEIVER PARAMETERS (Rx)	
Frequency bands	: 2400 – 2483.5 MHz (DSSS)
Category/Class	: pointless
Bandwidth.....	: pointless

4. 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			

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		NA	a)
- Digital modulation system		PASS	a) 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/A	b)
- For system using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands		PASS	b) 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/A	g) See certification documents
- Frequency hopping intelligence		N/A	h) See certification documents
- 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. RF EXPOSURE

Conducted measurement = -1.75dBm

Maximum antenna gain = 6dBi

Maximum EIRP with antenna gain of 6dBi = 2.661 mW (eirp) at 2426 MHz

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

Minimal distance (mm) = (EIRP(mW)*sqrt(Frequency(GHz)))/3(Head)=1.38mm

6. 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	$\pm 0.8\text{dB}$	$\pm 1 \text{ dB}$
Power spectral density	$\pm 2.3\text{dB}$	$\pm 3 \text{ dB}$
Occupied bandwidth		
RF power	$\pm 1.2 \%$	$\pm 5 \%$
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 (PAR / PIRE / RNE)		
$f \leq 62.5 \text{ MHz}$	$\pm 5.1 \text{ dB}$	$\pm 6 \text{ dB}$
62.5 MHz - 1 GHz	$\pm 5.1 \text{ dB}$	$\pm 6 \text{ dB}$
1 GHz - 18 GHz	$\pm 5.2 \text{ dB}$	$\pm 6 \text{ dB}$
18 GHz – 26 GHz	$\pm 5.1 \text{ dB}$	$\pm 6 \text{ dB}$
26 GHz – 40 GHz	$\pm 5.4 \text{ dB}$	$\pm 6 \text{ dB}$
PIRE and power spectral density with diode	$\pm 5.4 \text{ dB}$	$\pm 6 \text{ dB}$
Radiated emission (magnetic field)		
9kHz – 30MHz	$\pm 2.7 \text{ dB}$	$\pm 6 \text{ dB}$
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	$\pm 4.4 \%$	$\pm 5 \%$
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	$\pm 2.7 \text{ dB}$	/
30MHz – 1GHz	$\pm 5.2 \text{ dB}$	/
1GHz – 18GHz	$\pm 5.3 \text{ dB}$	/
18GHz – 26GHz	$\pm 5.5 \text{ dB}$	/
26GHz – 40GHz	$\pm 5.5 \text{ dB}$	/

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

7. TEST CONDITIONS AND RESULTS

7.1. Conducted emission (measurement)

Reference standard:	CFR 47 FCC Part 15
Test method:	Part 15.107 a & ANSI C63.4 : 2014
General test setup: The E.U.T. is set on an insulating support at 80cm above the horizontal ground reference plane. The E.U.T. is placed at 40 cm far from the vertical ground reference plane The AC power supply cable is connected to the AC Source through Artificial Mains Network (AMN). The AMN is placed at 80 cm from the E.U.T. and is bonded to a ground reference plane.	

TESTED CABLE	OPERATING MODE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
120 Vac 60 Hz Power Supply	#1	150kHz-30MHz	Part 15.107 a	EMI4491	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	See Graphs
Relative Humidity	30 to 60 %	See Graphs
Atmospheric pressure	N/A	See Graphs
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC Source	Haefely	PHF555 (V4.06)	6290	09/02/2021	09/04/2023
Barometer	Ranchet	50224	5199		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	15787	24/09/2020	24/09/2022
Receiver	Agilent Technologies	N9010A (A.16.17)	11316	12/05/20520	12/07/2021
Cable			15305	05/05/2020	05/07/2022
Cable			15907	02/02/2021	02/04/2023
LISN	Rohde & Schwarz	ESH2-Z5	5000	06/05/2020	06/07/2022
Surge Suppressor	EMITECH	23dB	6126	03/02/2021	03/04/2024

BAT-EMC software version: V3.18.0.26

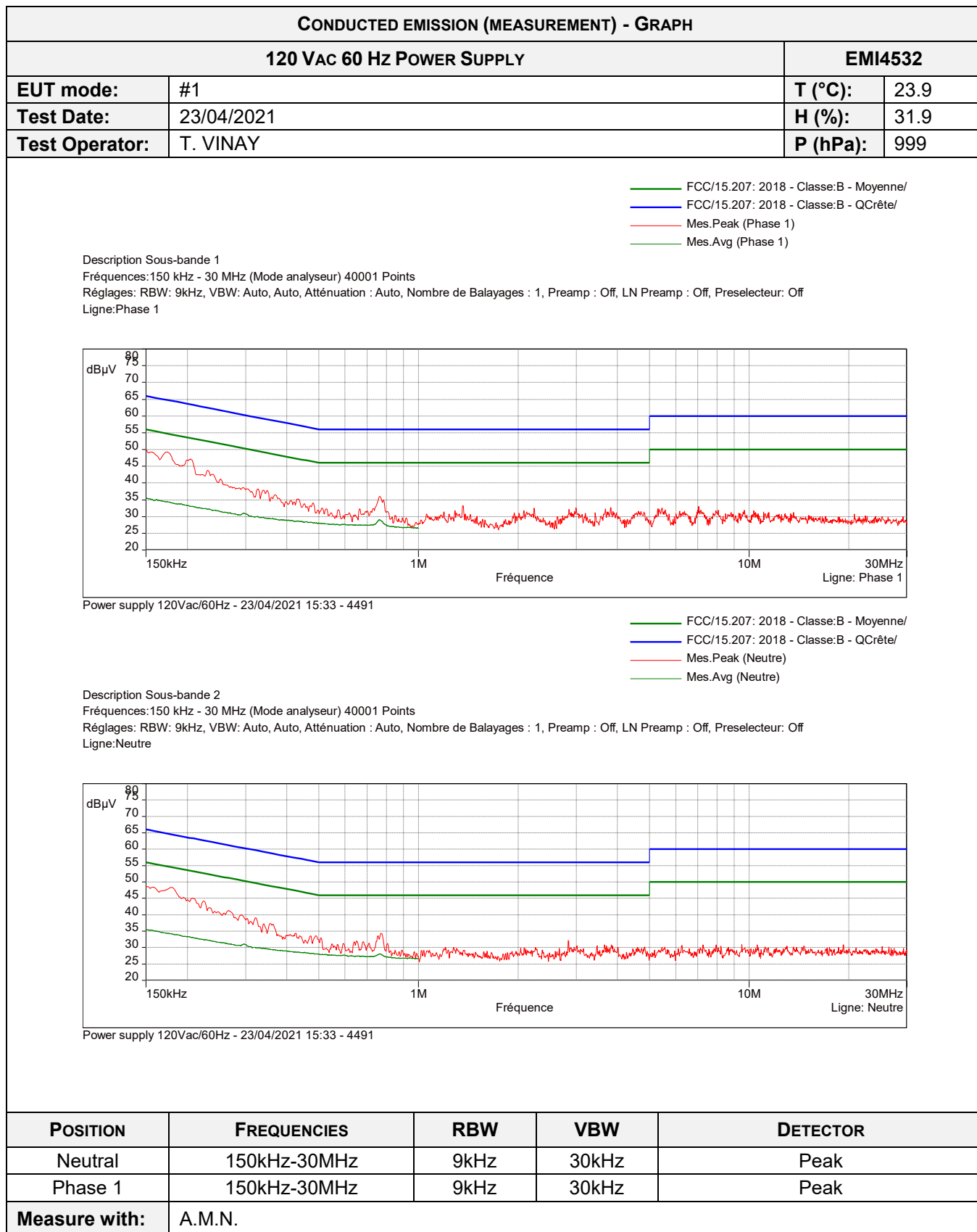
Blank cells = Permanent validity

TEST SETUP PHOTOS - 120 VAC 60 Hz POWER SUPPLY



TEST SETUP PHOTOS - 120 VAC 60 Hz POWER SUPPLY





Comments:	Operating mode #2: The E.U.T. is OFF when the battery is charging. AC Power supply of the AC/USB adapter: 120 Vac 60 Hz From 150 kHz to 30 MHz: • The measurement (in Peak detection) complies with the limit in Quasi-Peak detection of the CFR 47 FCC Part 15 (part 15.107 a) • The measurement (in Peak detection) complies with the limit in Average detection of the CFR 47 FCC Part 15 (part 15.107 a)
EUT modification: N/A	

7.2. Occupied Bandwidth

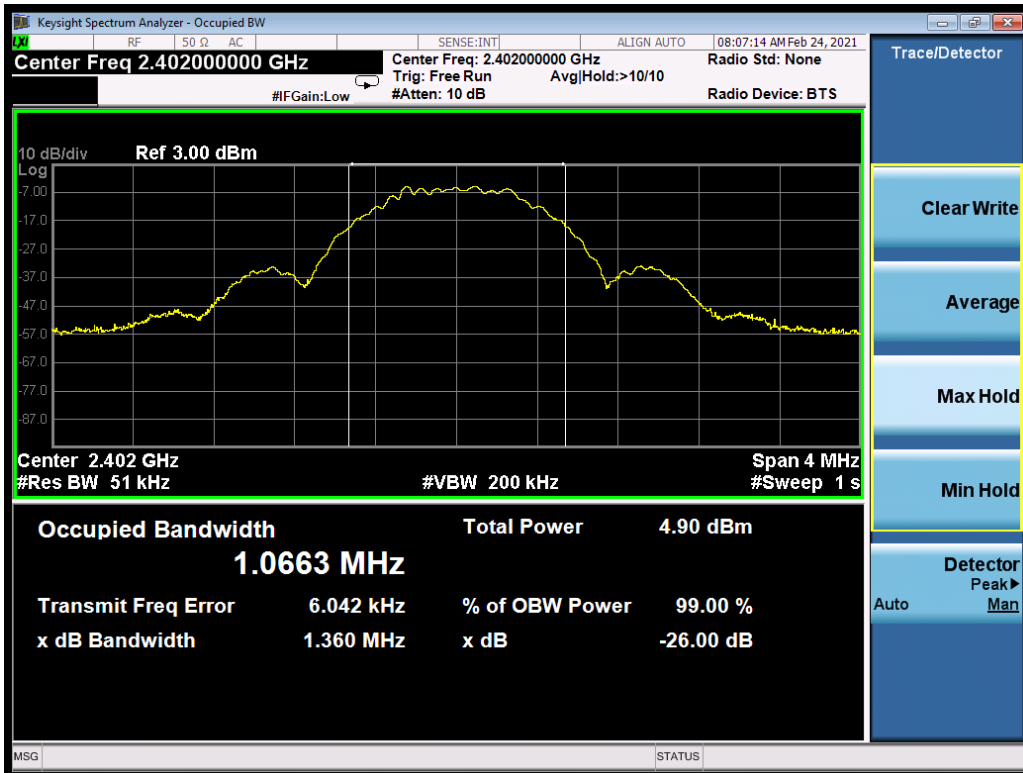
Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247
Test description: The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β, which, 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).	

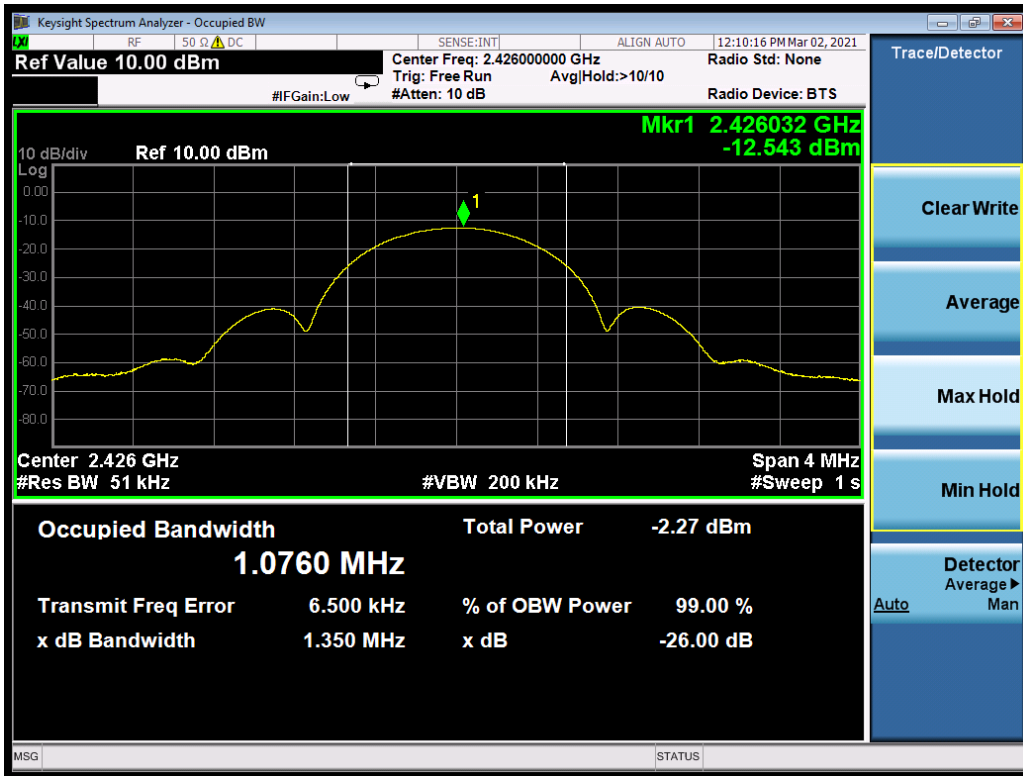
TESTED PARAMETER	OBW	SEVERITY	RESULT TAB.	VERDICT
BLE, lowest channel	1.0663 MHz	>500kHz	/	PASS
BLE, central channel	1.0760 MHz	>500kHz	/	PASS
BLE, highest channel	1.0797 MHz	>500kHz	/	PASS

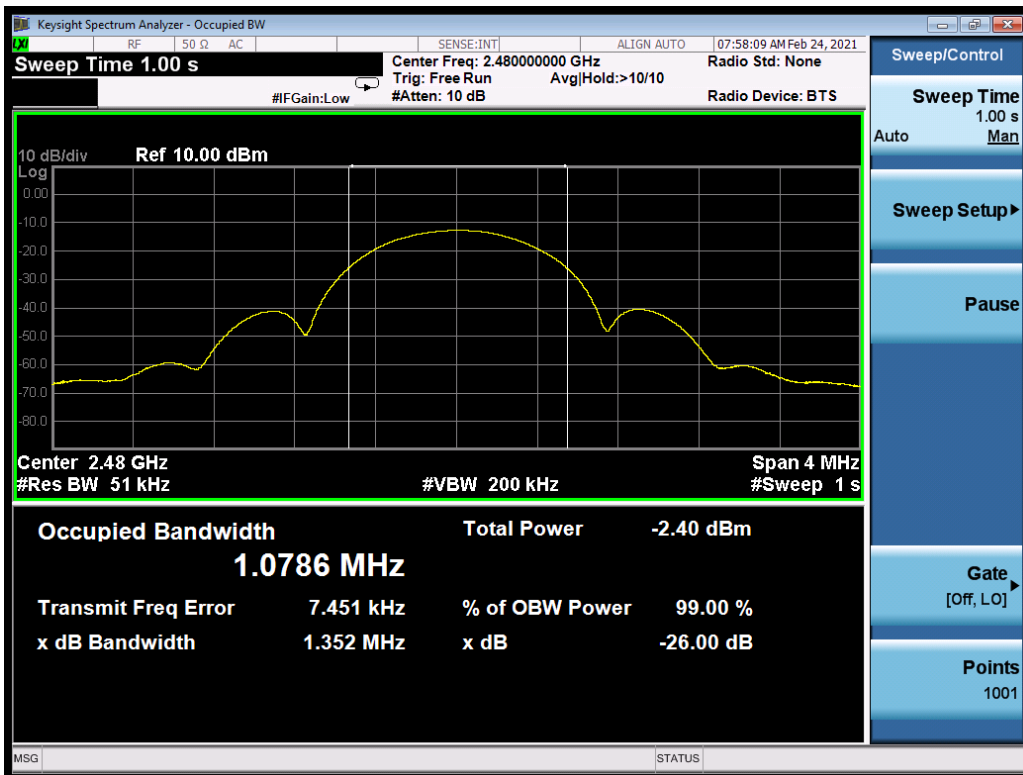
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	22.2 °C
Relative Humidity	20 to 75 %	42.5 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Barometer	Ranchet	50224	5199		
Thermohygrometer	Testo	608-H1	7564	21/06/2019	21/08/2021
Spectrum analyzer	Agilent Technologies	N9010A	11316	14/05/2020	14/07/2021
Cable	H&S	SF104N	15929	10/02/2021	10/04/2023
Shielded enclosure	CP61010	Lindgren Rayproof	6447		

Blank cells = Permanent validity

OCCUPIED BANDWIDTH - GRAPH	
BLE, LOWEST CHANNEL	
EUT mode:	Tx digital modulated mode
Test Date:	24/02/2021
Test Operator:	TVI
 Keysight Spectrum Analyzer - Occupied BW Center Freq 2.40200000 GHz Center Freq: 2.402000000 GHz Trig: Free Run #Atten: 10 dB Radio Std: None Radio Device: BTS 10 dB/div Ref 3.00 dBm Center 2.402 GHz #Res BW 51 kHz #VBW 200 kHz Span 4 MHz #Sweep 1 s Occupied Bandwidth 1.0663 MHz Total Power 4.90 dBm Transmit Freq Error 6.042 kHz % of OBW Power 99.00 % x dB Bandwidth 1.360 MHz x dB -26.00 dB MSG STATUS Trace/Detector Clear Write Average Max Hold Min Hold Detector Peak Auto Man	
Results:	The system has an OBW of 1066.3 kHz
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - GRAPH	
BLE, CENTRAL CHANNEL	
EUT mode:	Tx digital modulated mode
Test Date:	02/03/2021
Test Operator:	TVI
 The screenshot shows a Keysight Spectrum Analyzer interface. The main display is a log-scale plot of power spectral density (PSD) in dBm/Hz versus frequency. The center frequency is 2.426 GHz, and the span is 4 MHz. The occupied bandwidth (OBW) is 1.076 MHz. The total power is -2.27 dBm. The plot shows a complex signal with multiple peaks and valleys. A green marker 'Mkr1' is placed at 2.426032 GHz with a power of -12.543 dBm. The interface includes various control buttons on the right side, such as 'Trace/Detector', 'Clear Write', 'Average', 'Max Hold', 'Min Hold', and 'Detector'. The bottom status bar shows 'MSG' and 'STATUS'.	
Results:	The system has an OBW of 1076.0 kHz
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - GRAPH	
BLE, HIGHEST CHANNEL	
EUT mode:	Tx digital modulated mode
Test Date:	24/02/2021
Test Operator:	TVI
 The screenshot shows a Keysight Spectrum Analyzer interface. The main display is a graph of Occupied Bandwidth (OBW) in dBm versus frequency. The graph shows a signal with a peak around 2.48 GHz. The y-axis ranges from -80.0 to 10.0 dBm, and the x-axis ranges from 2.46 GHz to 2.50 GHz. The graph is titled 'Sweep Time 1.00 s'. Below the graph, the following parameters are displayed: Center 2.48 GHz, #Res BW 51 kHz, #VBW 200 kHz, Span 4 MHz, #Sweep 1 s. The Occupied Bandwidth is 1.0786 MHz. The Total Power is -2.40 dBm. The Transmit Freq Error is 7.451 kHz. The x dB Bandwidth is 1.352 MHz. The % of OBW Power is 99.00 %. The x dB is -26.00 dB. The Gate is [Off, LO]. The Points are 1001.	
Results:	The system has an OBW of 1078.6 kHz
EUT modification(s): N/A	

7.3. 6dB, 20dB bandwidth, Carrier Frequency separation and Number of Channels

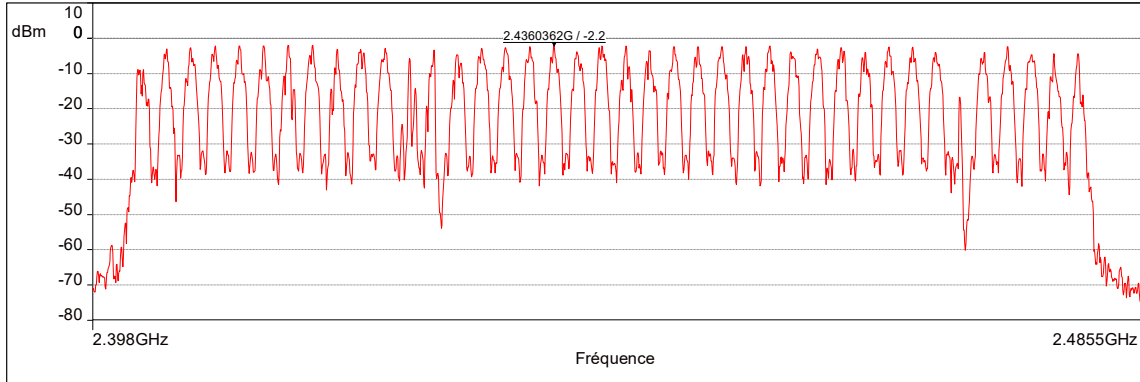
Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247
Test description: a) (2): Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. 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	40	informative	/	PASS
6dB Bandwidth	> 678.150 kHz	>500kHz	/	PASS
20dB Bandwidth	> 1211.850 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
Barometer	Ranchet	50224	5199		
Thermohygrometer	Testo	608-H1	7564	21/06/2019	21/08/2021
Spectrum analyzer	Agilent Technologies	N9010A	11316	14/05/2020	14/07/2021
Cable	H&S	SF104N	15929	10/02/2021	10/04/2023
Shielded enclosure	CP61010	Lindgren Rayproof	6447		

Blank cells = Permanent validity

NUMBER OF CHANNELS FOR DIGITALLY MODULATED SYSTEMS - GRAPH				
BLE			EMI4531	
EUT mode:	Tx digital modulated mode		T (°C):	22.6
Test Date:	24/02/2021		H (%):	40.9
Test Operator:	TVI		P (hPa):	910
Description Sous-bande 1 Fréquences:2.398 GHz - 2.4855 GHz (Mode analyseur) 40001 Points Réglages: RBW: 100kHz, VBW: Auto, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off Polarisation:H/V Distance: 3 m Mes. Peak  Band Edge BLE bis / Communication - 24/02/2021 14:28 - 4531				
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2.398GHz-2.4855GHz	100kHz	300kHz	Peak max hold
Configuration:	N/A			
Comments:	Informative: The system uses 40 channels			
EUT modification(s): N/A				



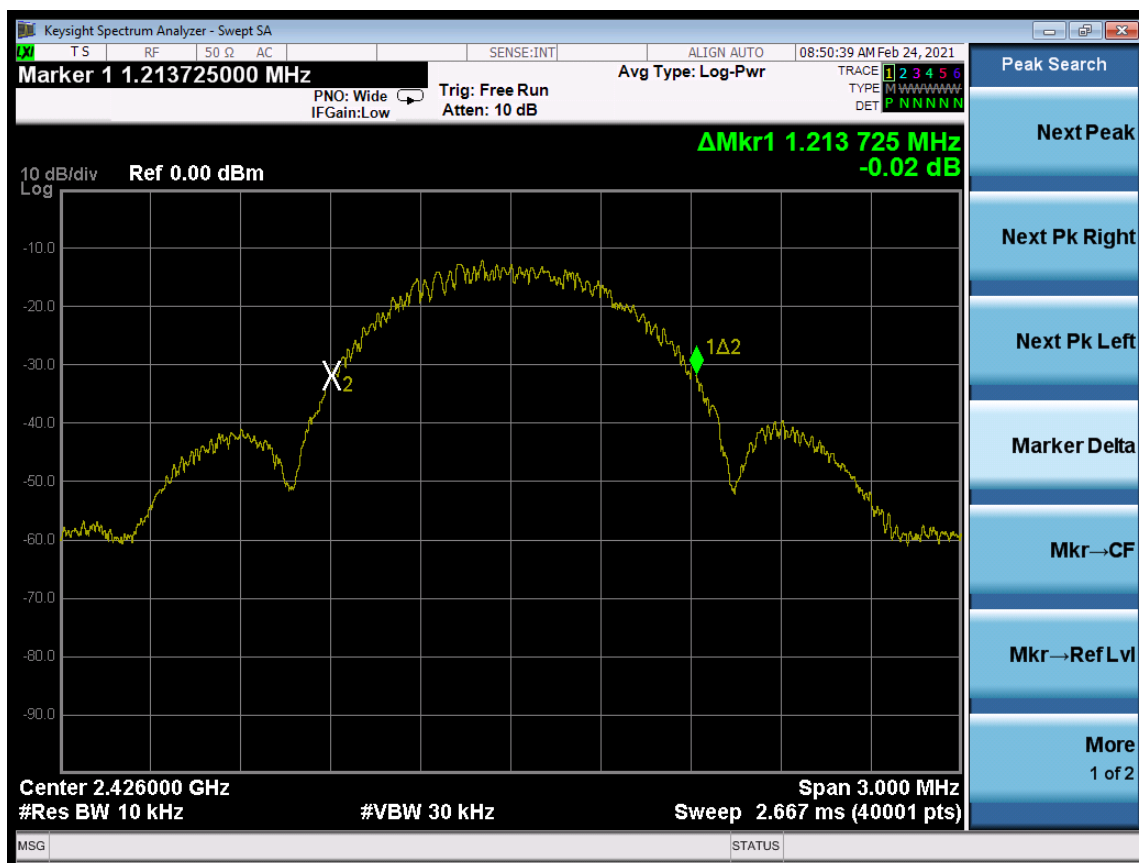
20dB BANDWIDTH FOR DIGITALLY MODULATED SYSTEMS - GRAPH			
BLE, LOWEST CHANNEL			/
EUT mode:	Tx digital modulated mode	T (°C):	22.6
Test Date:	24/02/2021	H (%):	40.9
Test Operator:	TVI	P (hPa):	910



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2402MHz	10kHz	30kHz	Peak max hold
Configuration:	N/A			
Comments:	The 20dB bandwidth is 1211.850 kHz			
EUT modification(s): N/A				

6dB BANDWIDTH FOR DIGITALLY MODULATED SYSTEMS - GRAPH				
BLE, CENTRAL CHANNEL			-	
EUT mode:	Tx digital modulated mode		T (°C):	22.6
Test Date:	24/02/2021		H (%):	40.9
Test Operator:	TVI		P (hPa):	910
Keysight Spectrum Analyzer - Swept SA T S RF 50 Ω AC SENSE:INT ALIGN AUTO 08:49:00 AM Feb 24, 2021 Marker 1 680.775000 kHz PNO: Wide Trig: Free Run Avg Type: Log-Pwr TRACE 1 2 3 4 5 6 IFGain:Low Atten: 10 dB TYPE M W W W W W W W W W DET P N N N N N 10 dB/div Log Ref 0.00 dBm				

20dB BANDWIDTH FOR DIGITALLY MODULATED SYSTEMS - GRAPH			
BLE, CENTRAL CHANNEL			/
EUT mode:	Tx digital modulated mode	T (°C):	22.6
Test Date:	24/02/2021	H (%):	40.9
Test Operator:	TVI	P (hPa):	910



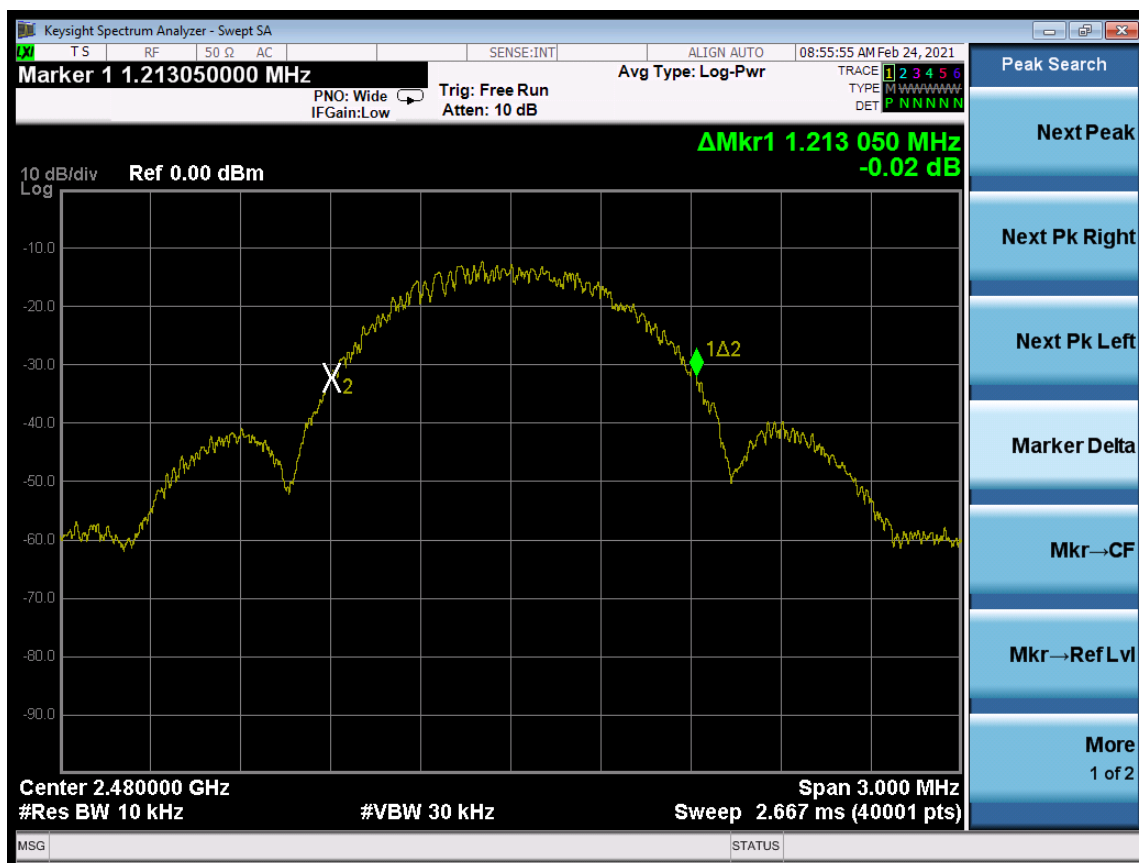
POSITION	FREQUENCIES	RBW	910	DETECTOR
RF port	2426MHz	10kHz	30kHz	Peak max hold
Configuration:	N/A			
Comments:	The 20dB bandwidth is 1213.725 kHz			
EUT modification(s): N/A				

6dB BANDWIDTH FOR DIGITALLY MODULATED SYSTEMS - GRAPH			
BLE, HIGHEST CHANNEL			/
EUT mode:	Tx digital modulated mode	T (°C):	22.6
Test Date:	24/02/2021	H (%):	40.9
Test Operator:	TVI	P (hPa):	910



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2480MHz	10kHz	30kHz	Peak max hold
Configuration:	N/A			
Comments:	The 6dB bandwidth is 701.175 kHz			
EUT modification(s): N/A				

20dB BANDWIDTH FOR DIGITALLY MODULATED SYSTEMS - GRAPH			
BLE, HIGHEST CHANNEL			/
EUT mode:	Tx digital modulated mode	T (°C):	22.6
Test Date:	24/02/2021	H (%):	40.9
Test Operator:	TVI	P (hPa):	910



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2480MHz	10kHz	30kHz	Peak max hold
Configuration:	N/A			
Comments:	The 20dB bandwidth is 1213.050 kHz			
EUT modification(s): N/A				

7.4. Maximum peak conducted power of the intentional radiator

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-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
Low channel – BLE	-1.84 dBm	1W (30dBm)	/	PASS
Central channel – BLE	-1.75 dBm	1W (30dBm)	/	PASS
High channel – BLE	-1.98 dBm	1W (30dBm)	/	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	22.6 °C
Relative Humidity	20 to 75 %	40.9 %
Atmospheric pressure	N/A	910 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Barometer	Ranchet	50224	5199		
Thermohygrometer	Testo	608-H1	7564	21/06/2019	21/08/2021
Spectrum analyzer	Agilent Technologies	N9010A	11316	14/05/2020	14/07/2021
Cable	H&S	SF104N	15929	10/02/2021	10/04/2023
Shielded enclosure	CP61010	Lindgren Rayproof	6447		

Blank cells = Permanent validity

PUISSANCE MOYENNE CONDUITE - TABULATED RESULTS				
BLE				-
Frequency (MHz)	P _{conducted} (dBm)	Gain _{dBi}	P _{eirp} (dBm)	Limit _{eirp} (dBm)
2402	-1.84	6dBi (Max)	4.16	36
2426	-1.75	6dBi (Max)	4.25	36
2480	-1.98	6dBi (Max)	4.02	36

$$P_{\text{erp}} = P_{\text{conducted}} + \text{antenna Gain}_{\text{dBd}} ; \text{Gain}_{\text{dBd}} = \text{Gain}_{\text{dBi}} - 2.15\text{dB}$$

$$P_{\text{erp}} = P_{\text{conducted}} + \text{Gain}_{\text{dBi}} - 2.15\text{dB}$$

$$P_{\text{eirp}} = P_{\text{erp}} + 2.15\text{dB}$$

$$P_{\text{eirp}} = P_{\text{conducted}} + \text{Gain}_{\text{dBi}}$$

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 $E_{(\text{V/m})} = \sqrt{(30P_{\text{dBm}}G_{\text{dBi}})/d_{(\text{m})}}$ where P is the conducted power and G the maximum antenna gain.

Equivalent maximum E-field should be approximatively of 99.3 dB μ V/m.

7.5. Power spectral density

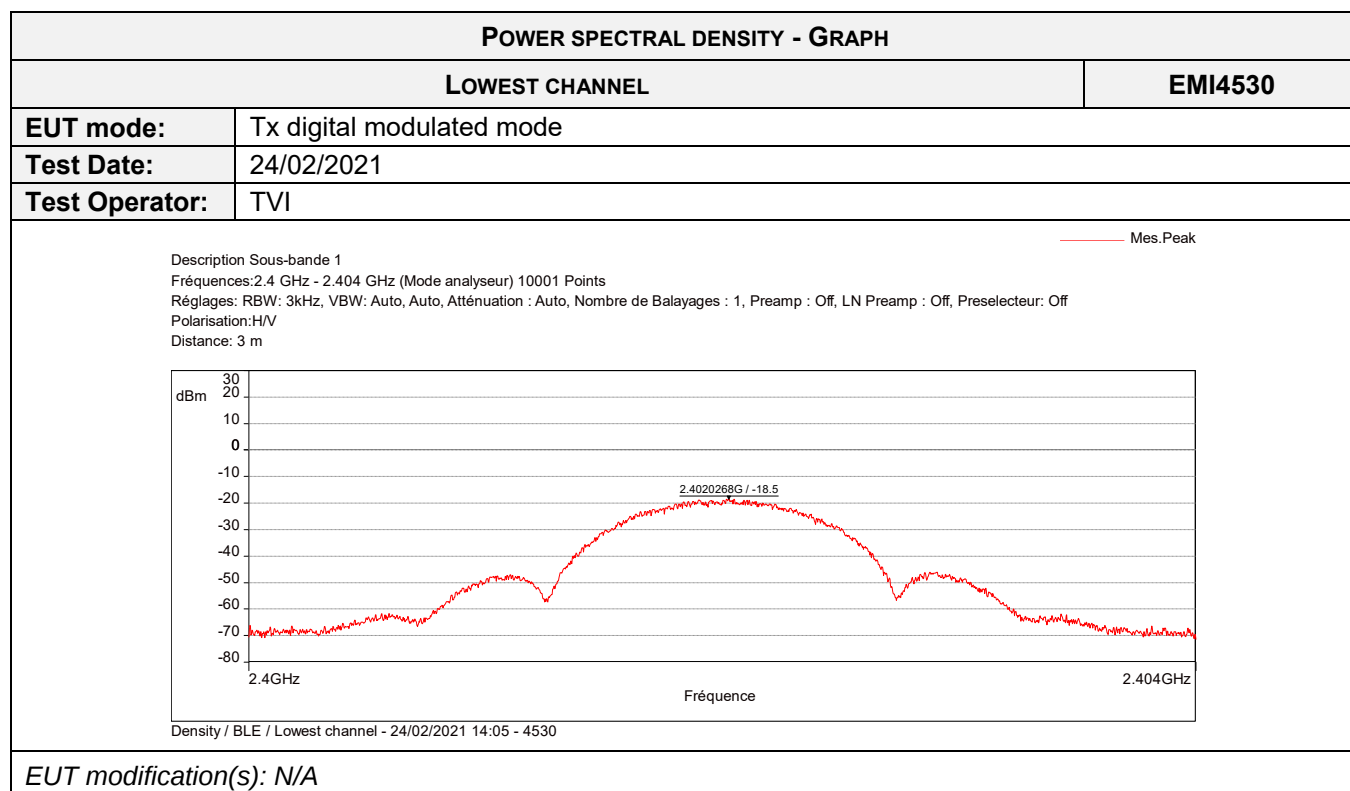
Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247
Test description: e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time 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
Lowest channel	BLE	8dBm/3kHz	EMI4530	PASS
Central channel	BLE	8dBm/3kHz	EMI4529	PASS
Highest channel	BLE	8dBm/3kHz	EMI4502	PASS

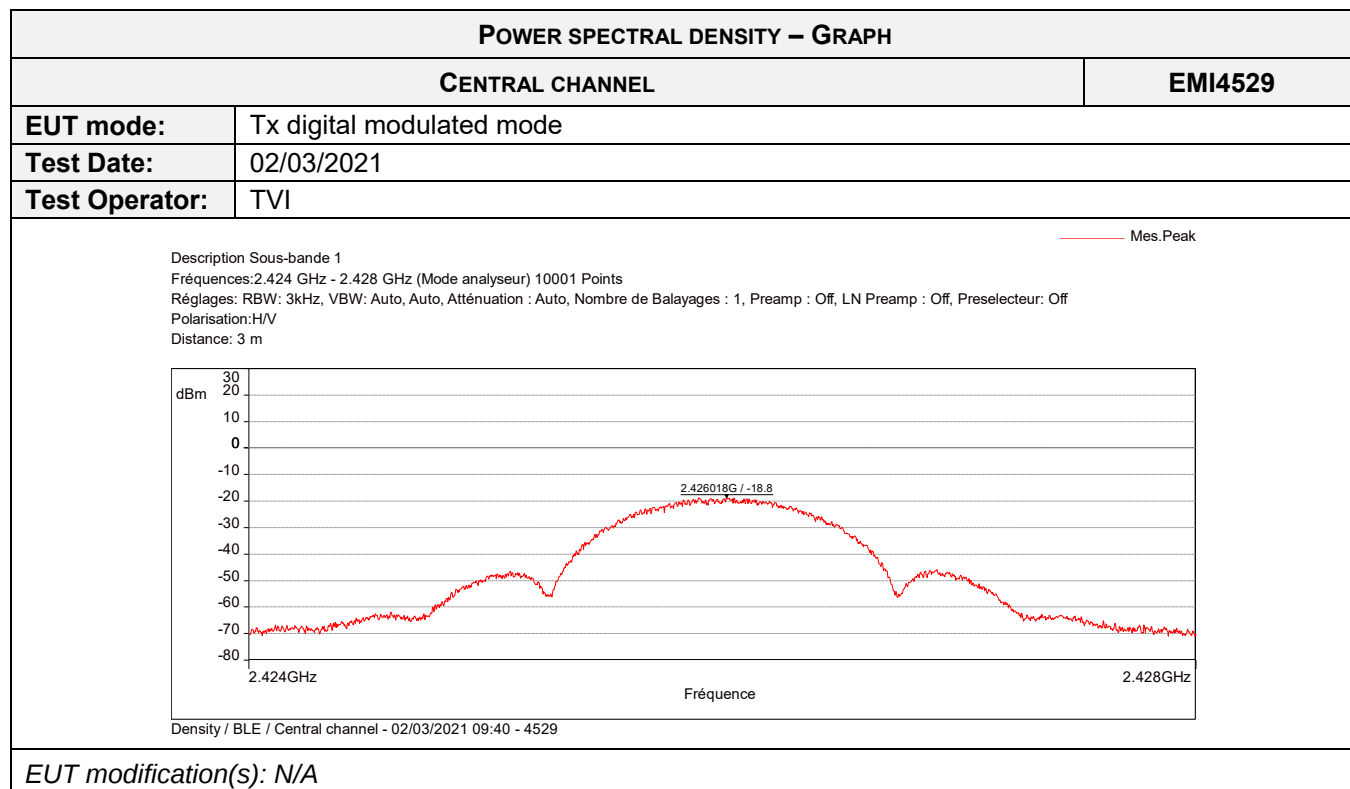
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	22.6 °C
Relative Humidity	20 to 75 %	40.9 %
Atmospheric pressure	N/A	910 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Barometer	Ranchet	50224	5199		
Thermohygrometer	Testo	608-H1	7564	21/06/2019	21/08/2021
Spectrum analyzer	Agilent Technologies	N9010A	11316	14/05/2020	14/07/2021
Cable	H&S	SF104N	15929	10/02/2021	10/04/2023
Shielded enclosure	CP61010	Lindgren Rayproof	6447		

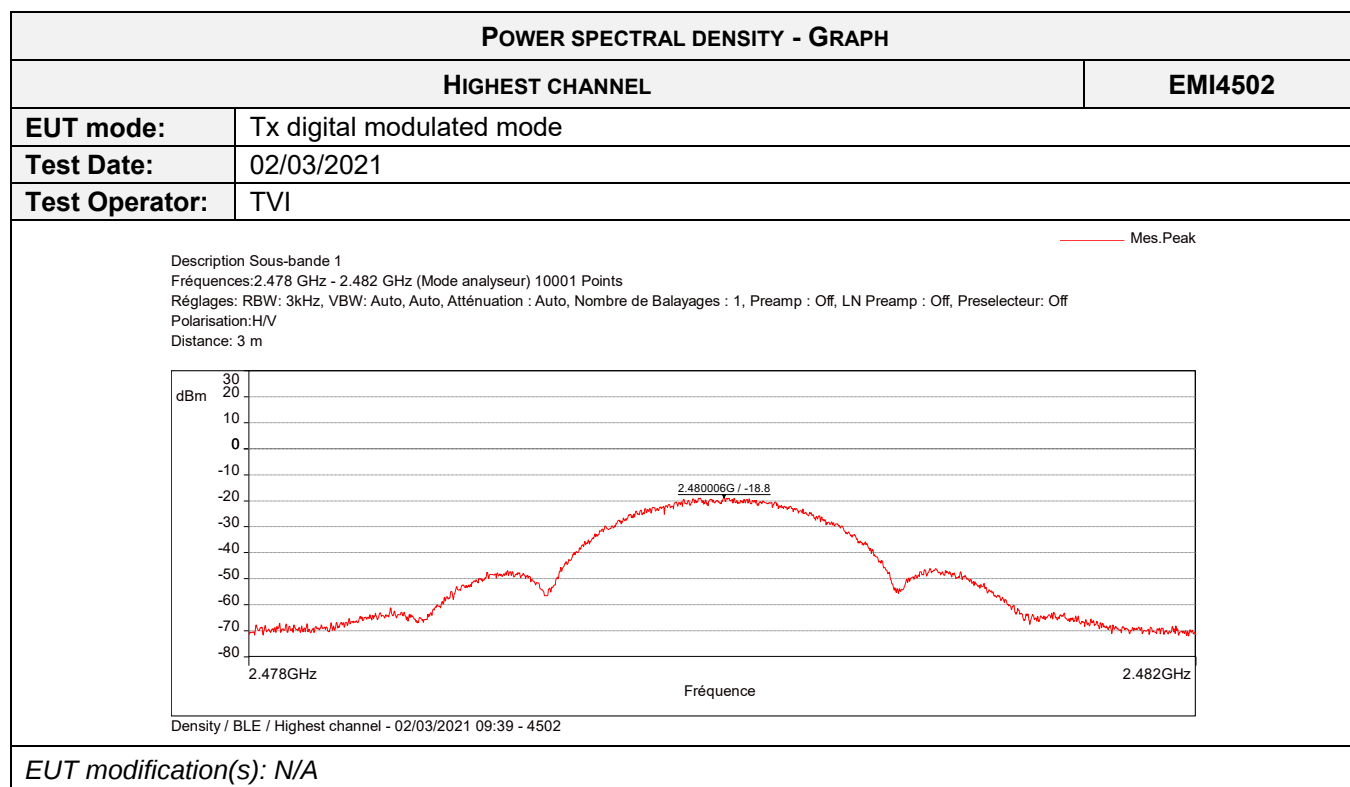
Blank cells = Permanent validity



MAXIMUM EFFECTIVE RADIATED POWER SPECTRAL DENSITY - TABULATED RESULTS			
LOW CHANNEL			EM4530
Frequency	Frequency Fc	Level (dBm/3kHz)	Limit (dBm/3kHz)
2402MHz	2402.0268MHz	-18.5	8



MAXIMUM EFFECTIVE RADIATED POWER SPECTRAL DENSITY - TABULATED RESULTS			
CENTRAL CHANNEL			EMI4529
Frequency	Frequency Fc	Level (dBm/3kHz)	Limit (dBm/3kHz)
2426MHz	2426.018MHz	-18.8	8



MAXIMUM EFFECTIVE RADIATED POWER SPECTRAL DENSITY - TABULATED RESULTS			
HIGHEST CHANNEL			EM4502
Frequency	Frequency Fc	Level (dBm/3kHz)	Limit (dBm/3kHz)
2480MHz	2480.006MHz	-18.8	8

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

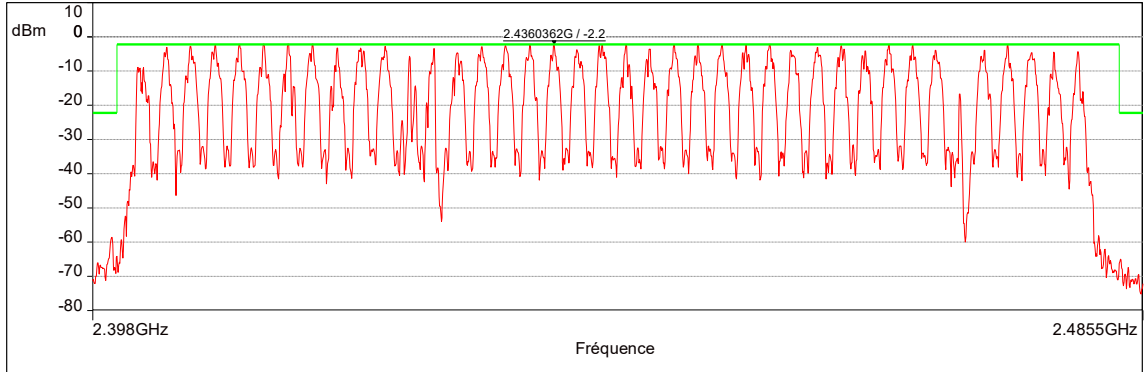
Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 subclause d) and RSS-247
Test description: d) In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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
BLE	2398 – 2485.5 MHz	-20dBc	EMI4531	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	22.6 °C
Relative Humidity	20 to 75 %	40.9 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: N/A hPa		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Barometer	Ranchet	50224	5199		
Thermohygrometer	Testo	608-H1	7564	21/06/2019	21/08/2021
Spectrum analyzer	Agilent Technologies	N9010A	11316	14/05/2020	14/07/2021
Cable	H&S	SF104N	15929	10/02/2021	10/04/2023
Shielded enclosure	CP61010	Lindgren Rayproof	6447		

Blank cells = Permanent validity

BAND EDGE COMPLINACE - GRAPH				
BLE		EMI4531		
EUT mode:	Tx digital modulated mode	T (°C):	22.6	
Test Date:	24/02/2021	H (%):	40.9	
Test Operator:	TVI	P (hPa):	1010	
Description Sous-bande 1 Fréquences:2.398 GHz - 2.4855 GHz (Mode analyseur) 40001 Points Réglages: RBW: 100kHz, VBW: Auto, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off Polarisation:H/V Distance: 3 m FCC/15.247: 2018 - Classe:Tx - RMS/3.0m/ Mes.Peak  Band Edge BLE bis / Communication - 24/02/2021 14:28 - 4531				
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2398MHz-2485.5MHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	No Out of Band Emissions			
EUT modification(s): N/A				

7.7. 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
BLE Tx	9kHz-30MHz	15.209	See below	PASS
BLE Tx	30MHz-1GHz	15.209	See below	PASS
BLE Tx	1GHz-12.5GHz	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 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	Schaffner	HLA6120	6963	10/04/2020	10/06/2022
Cable	H&S	BNC	16008	14/01/2019	14/03/2021
Cable	H&S	BNC	16009	14/01/2019	14/03/2021
Cable	H&S	N-3m	15202	05/05/2020	05/07/2022
Cable	H&S	N-7m	15200	05/05/2020	05/07/2022
Receiver	Agilent Technologies	N9010A (A.16.17)	11316	12/05/2020	12/07/2021
Software	Nexio		0000		
Attenuator	Weinschel Associates	WA1W/6-3-34	14006	03/10/2018	03/12/2021
Log-per antenna	EMCO	3146A	5609	26/08/2020	26/10/2023
Biconic antenna	Rohde & Schwarz	HK116	6118	26/08/2020	26/10/2023
Preamplifier	RFPA	RF30400-27-LNA	6136	04/05/2020	04/07/2021
Cable	/	N-10m	7537	03/02/2021	03/04/2023
Cable	HYTEM	N-10m	7655	03/02/2021	03/04/2023
Preamplifier	Agilent Technologies	8449B	10262	04/05/2020	04/07/2021
Cable	H&S	SF104N	15909	02/02/2021	02/04/2023
Horn Antenna	Schwarzbeck	BBHA 9120B	6970	17/01/2018	17/03/2021
Barometer	Ranchet	50224	5199		
Thermohygrometer	Testo	608-H1	7564	21/06/2019	21/08/2021
Cable	H&S	N-1m	15929	02/02/2021	02/04/2023
Cable	H&S	N-3m	15892	02/02/2021	02/04/2023
Horn Antenna	ETS lindgren	3160-09	14690	25/09/2017	22/05/2021 (*)
Cable	Huber + Suhner	K-5m	14460	25/06/2019	25/08/2021
Preamplifier	Wright Technologie	ASL40-B3015	14851	12/08/2020	12/10/2021
Cable	Huber + Suhner	K-1m	14522	25/06/2019	25/08/2021

Blank cells = Permanent validity

(*) Derogation EQSDER000S4100077

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS				
TX MODE / LOWEST, CENTRAL & HIGHEST CHANNELS				
Frequency (MHz)	Position / Polarization	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)
42.6	1 / Vertical	22.0	40.0	18.0
542.6	1 / Vertical	32.7	46.0	13.3
912.3	1 / Vertical	43.8	46.0	2.2
31.6	1 / Horizontal	23.6	40.0	16.4
912.0	1 / Horizontal	45.0 (QPeak)	46.0	1.0
395.6	2 / Vertical	31.5	46.0	14.5
545.9	2 / Vertical	33.3	46.0	12.7
912.0	2 / Vertical	45.9	46.0	0.1
992.0	2 / Vertical	45.0	54.0	9.0
402.9	2 / Horizontal	31.7	46.0	14.3
912.3	2 / Horizontal	43.8	46.0	2.2
401.5	3 / Vertical	31.1	46.0	14.9
928.0	3 / Vertical	43.3	46.0	2.7
402.0	3 / Horizontal	31.2	46.0	14.8

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS				
TX MODE / LOWEST, CENTRAL & HIGHEST CHANNELS				
Frequency (MHz)	Position / Polarization	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)
928.0	3 / Horizontal	45.8 (QPeak)	46.0	0.2
1190	1 / Vertical	42.1	54.0	11.9
6520	1 / Vertical	38.9 (Average)	54.0	15.1
12109	1 / Vertical	45.0 (Average)	54.0	9.0
1008	1 / Horizontal	44.8	54.0	9.2
7207	1 / Horizontal	40.4 (Average)	54.0	13.6
11454	1 / Horizontal	45.2 (Average)	54.0	8.8
1008.6	2 / Vertical	40.7	54.0	13.3
7256.0	2 / Vertical	40.4 (Average)	54.0	13.6
11074.8	2 / Vertical	44.6 (Average)	54.0	9.2
1008.6	2 / Horizontal	37.0	54.0	17.0
3703	2 / Horizontal	43.1	54.0	10.9
7254.0	2 / Horizontal	40.4 (Average)	54.0	13.6
11452	2 / Horizontal	44.8 (Average)	54.0	9.2
1012	3 / Vertical	35.5	54.0	8.5
7247	3 / Vertical	40.4 (Average)	54.0	13.6
11111	3 / Vertical	44.6 (Average)	54.0	8.4
1008	3 / Horizontal	39.6	54.0	14.4
1056	3 / Horizontal	39.8	54.0	14.2
7240.0	3 / Horizontal	40.3 (Average)	54.0	13.7
12108	3 / Horizontal	44.9 (Average)	54.0	9.1

V= Vertical H=Horizontal

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

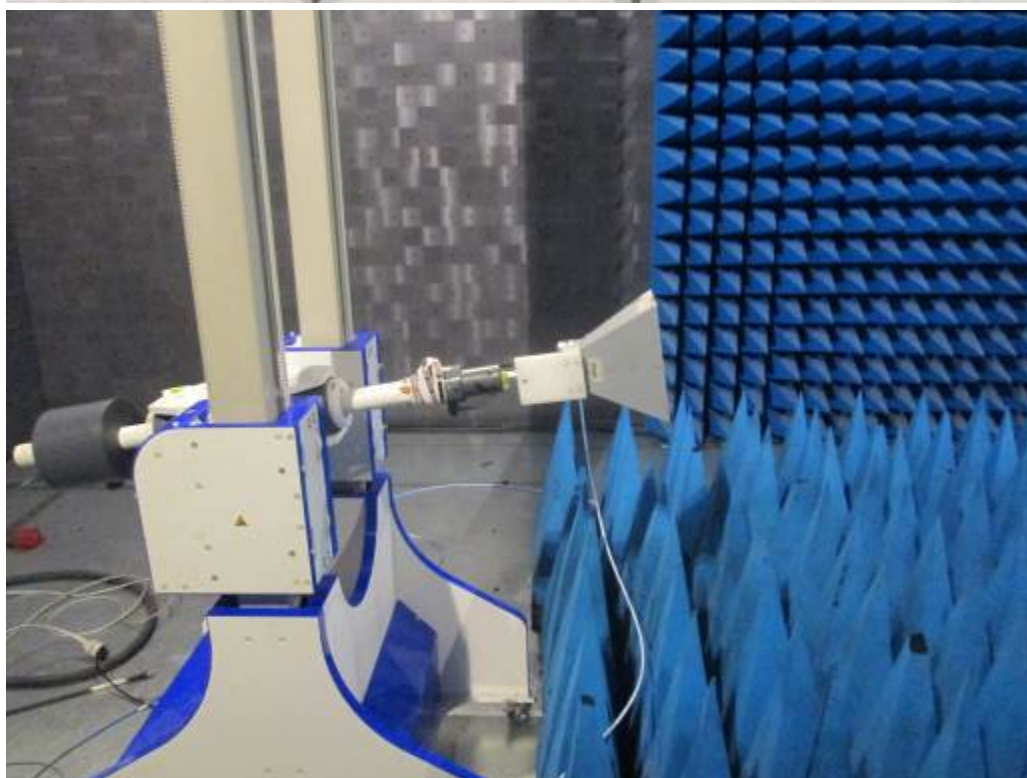
Note 1 : The limit outside the restricted bands are 20 dB below the carrier power.

The lowest power of the carrier is 84.7 dBμV/m, so limit is 64.7 dBμV/m.

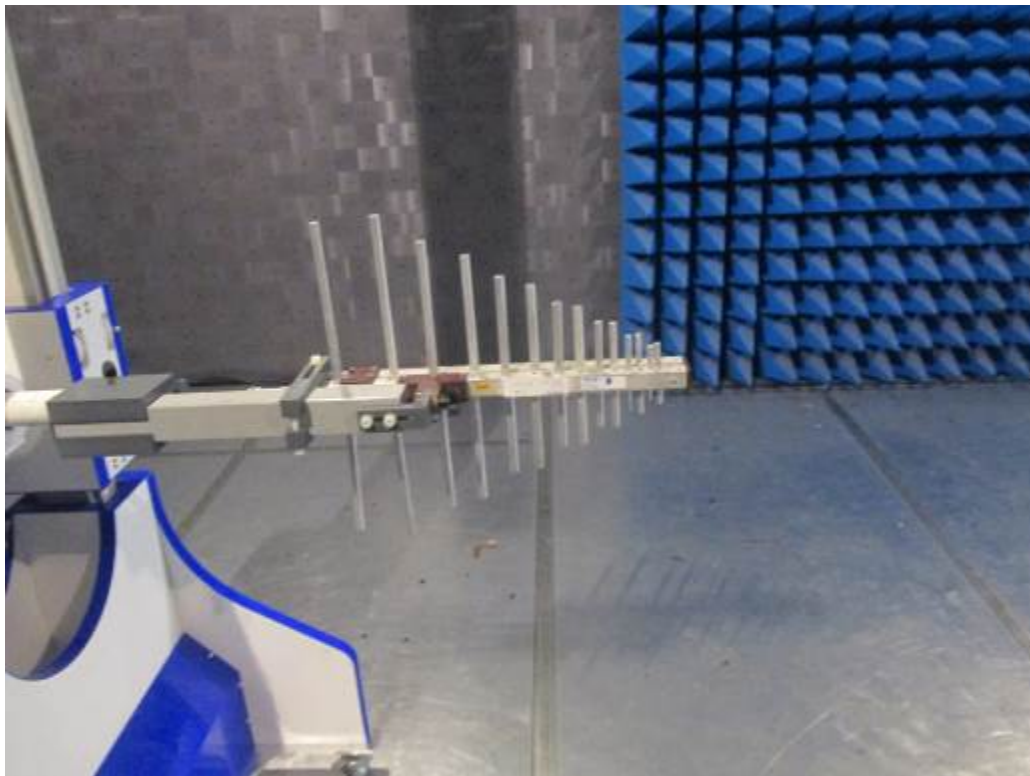
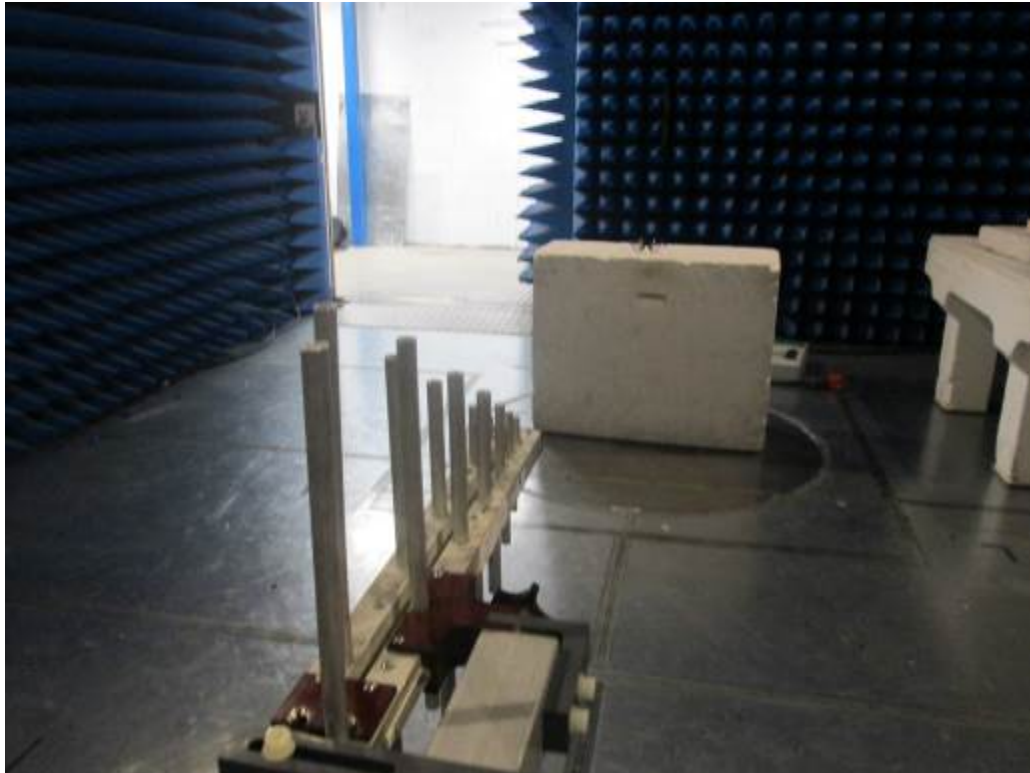
TEST SETUP PHOTO(S) RADIATED EMISSIONS (F<30MHz)



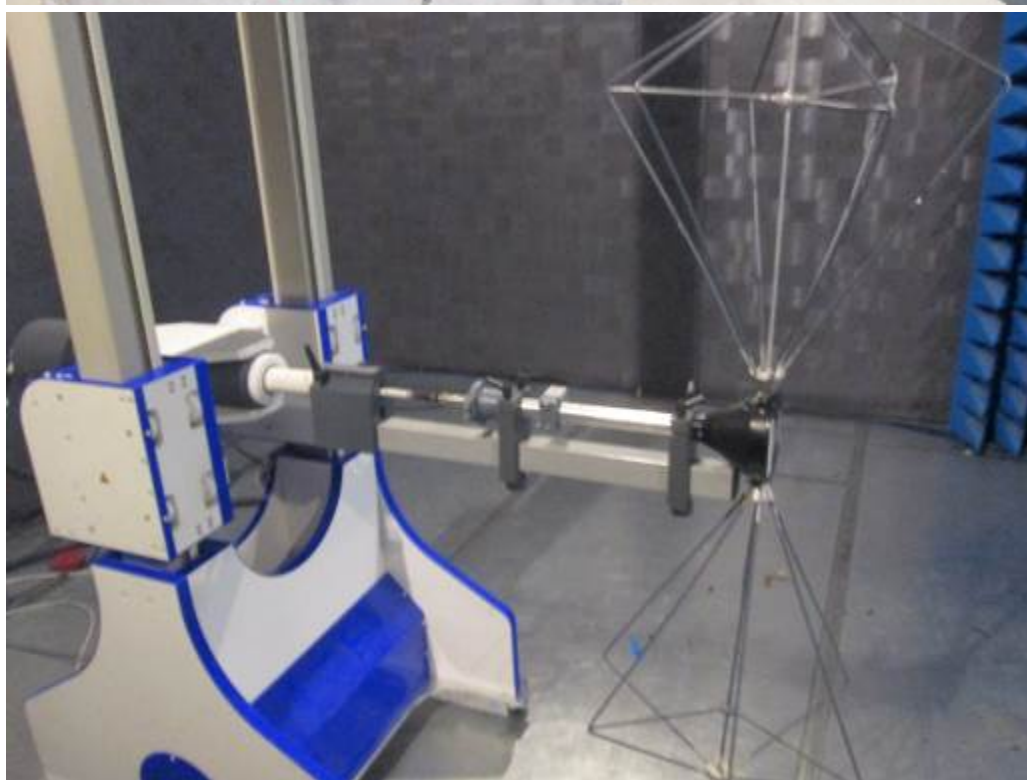
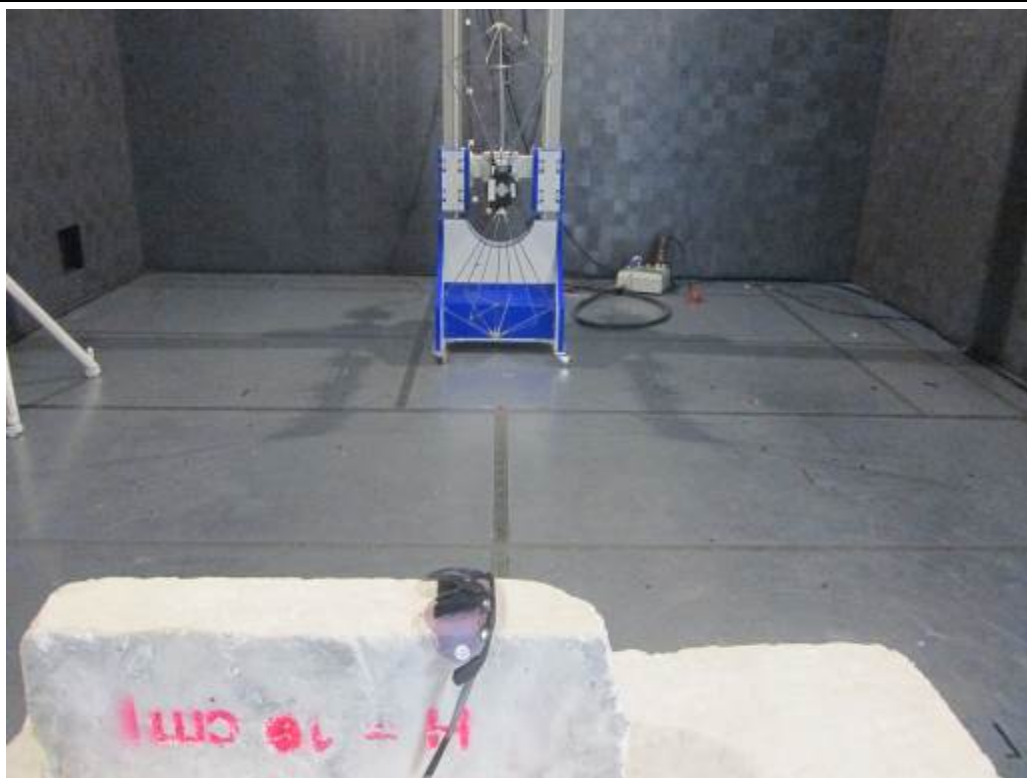
TEST SETUP PHOTO(S) RADIATED EMISSIONS (F>1GHz)



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



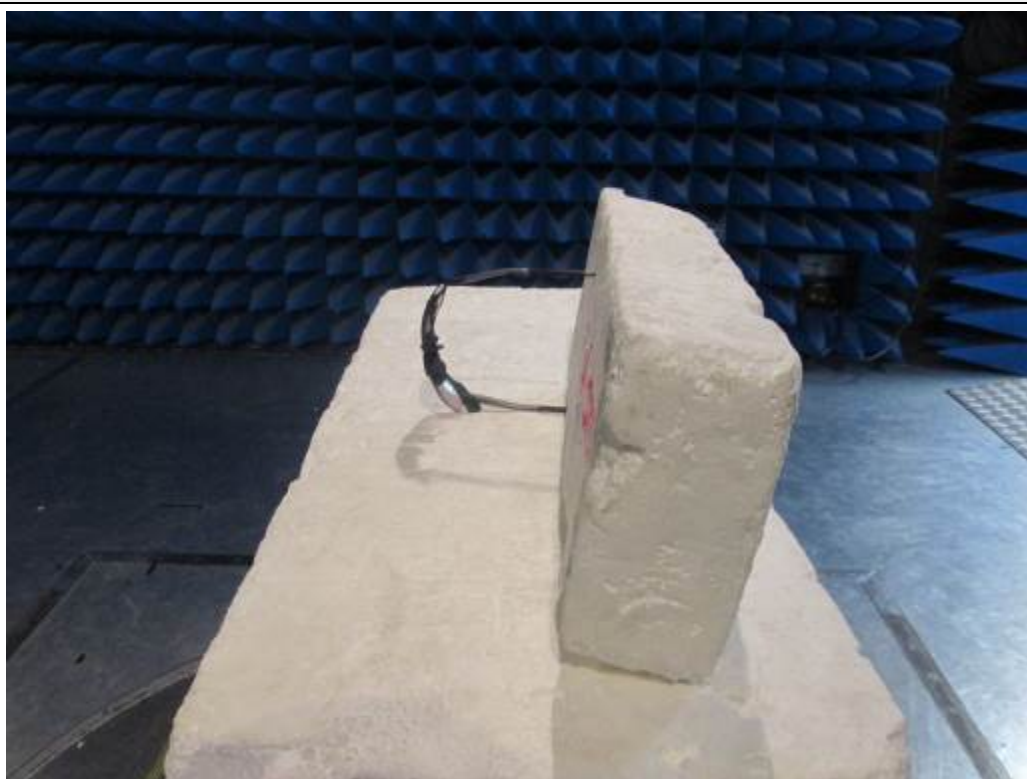
TEST SETUP PHOTO(S) RADIATED EMISSIONS (30MHz>F>300MHz)



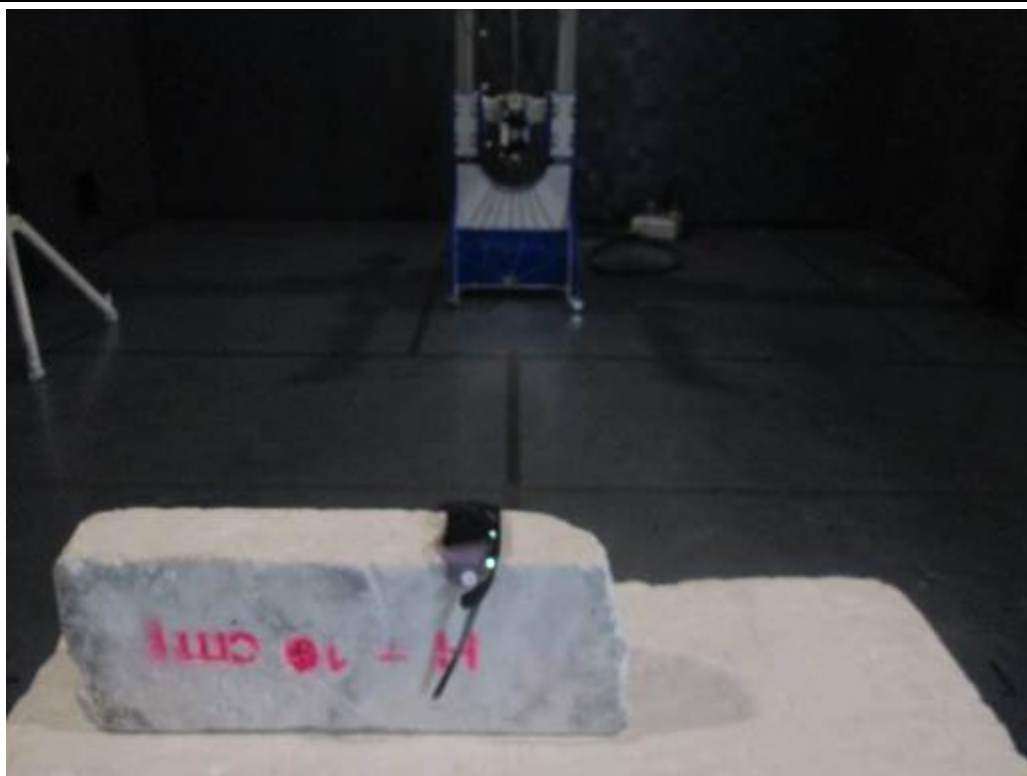
TEST SETUP PHOTO(S) RADIATED EMISSIONS – POSITION 1

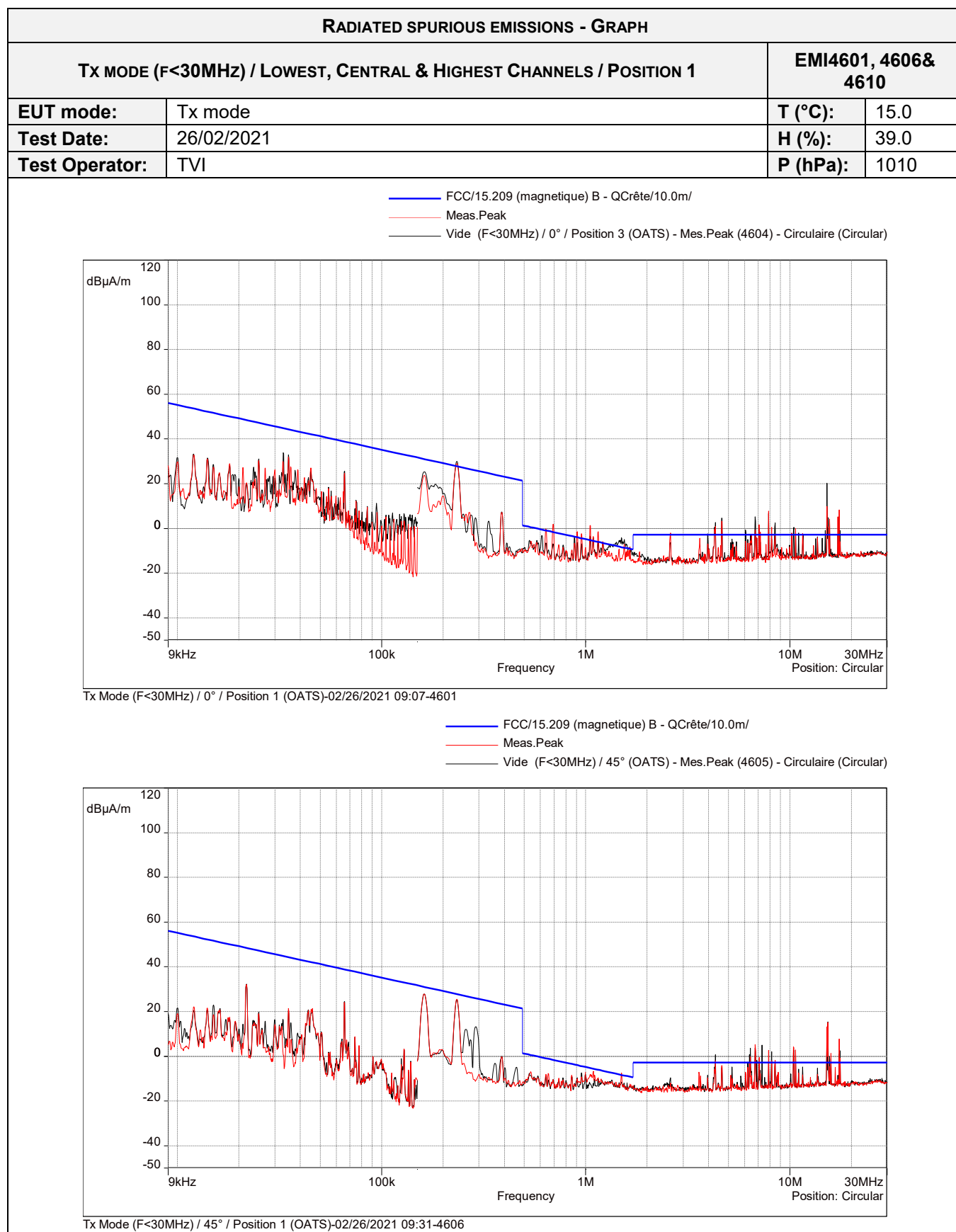


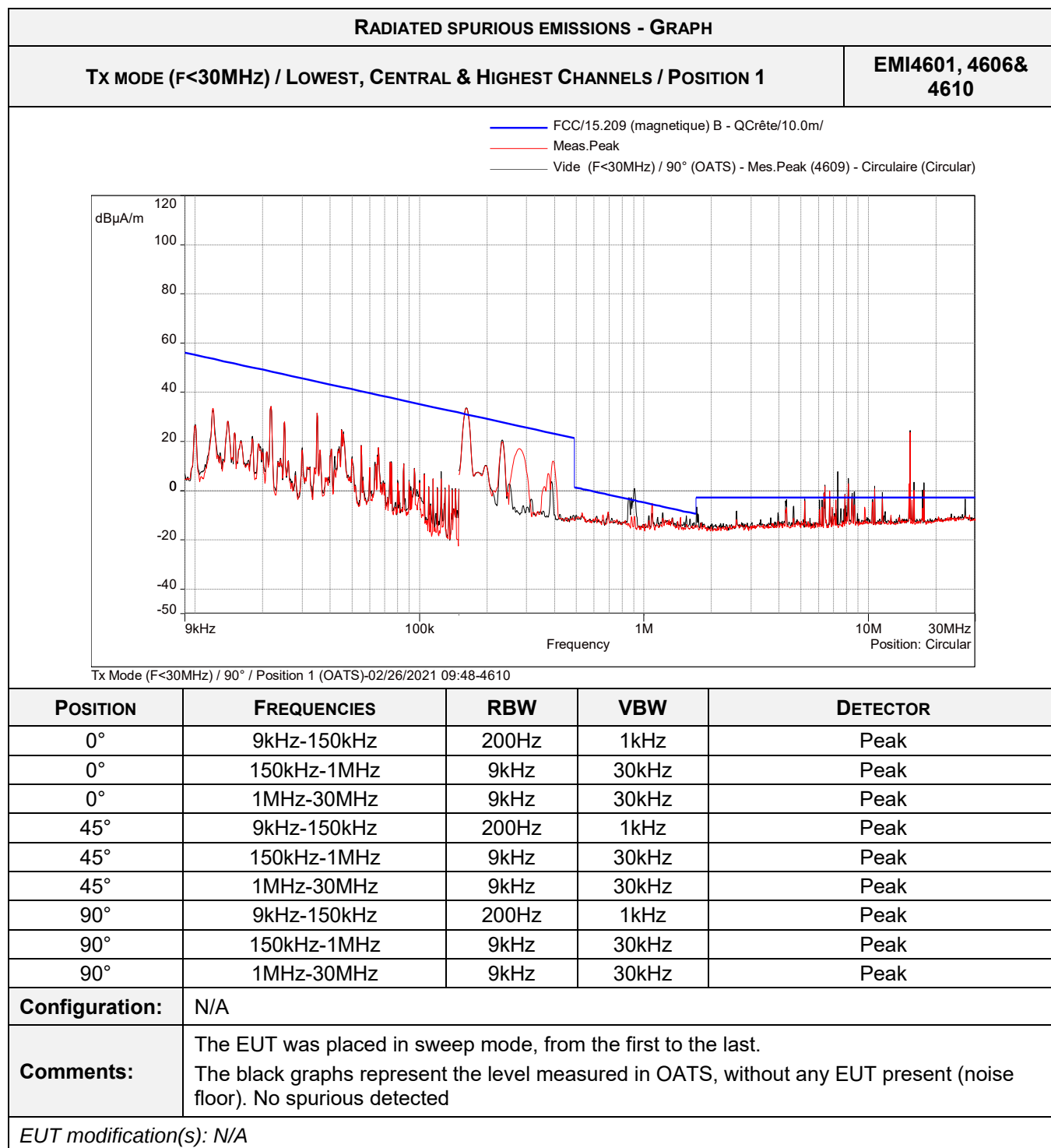
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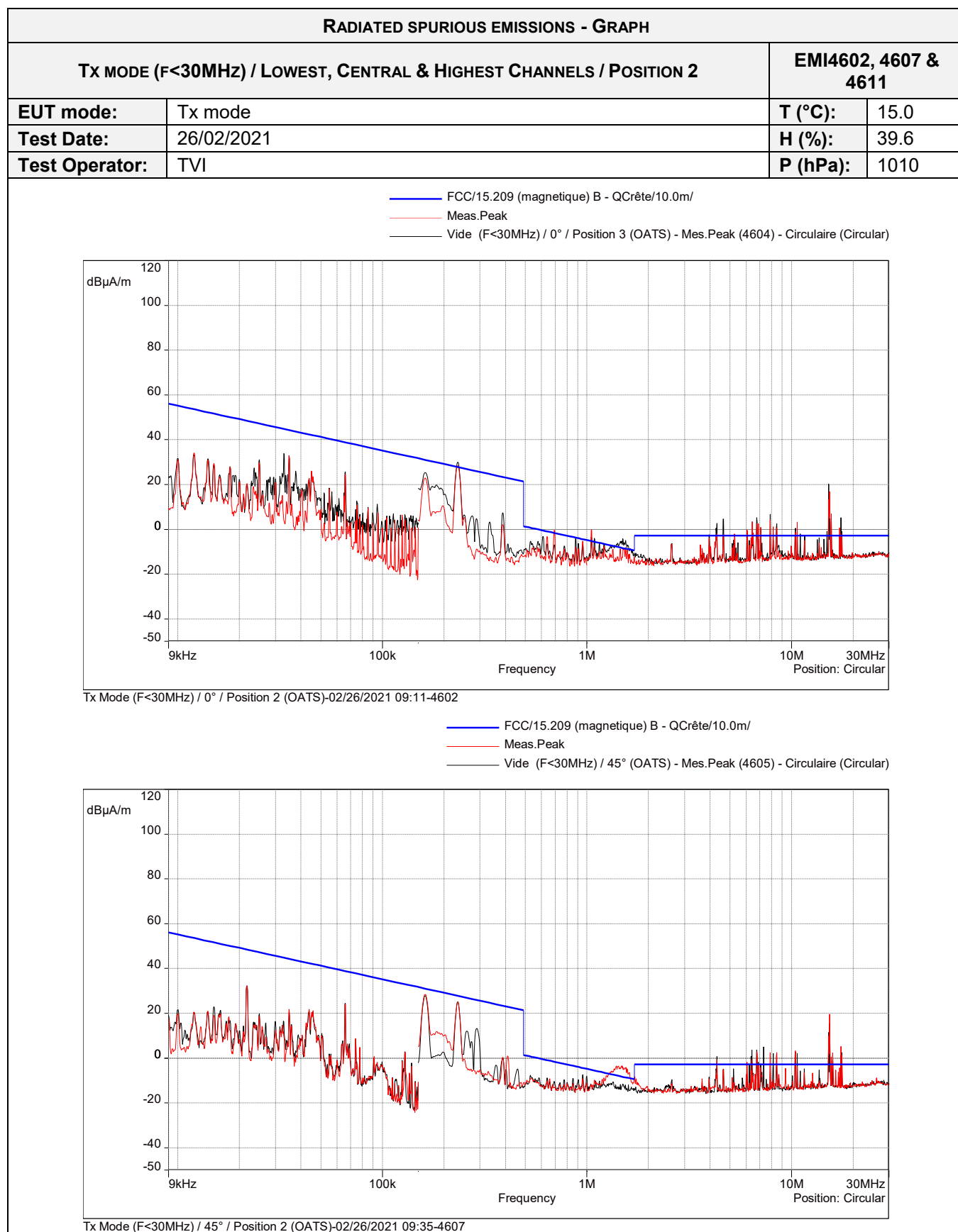


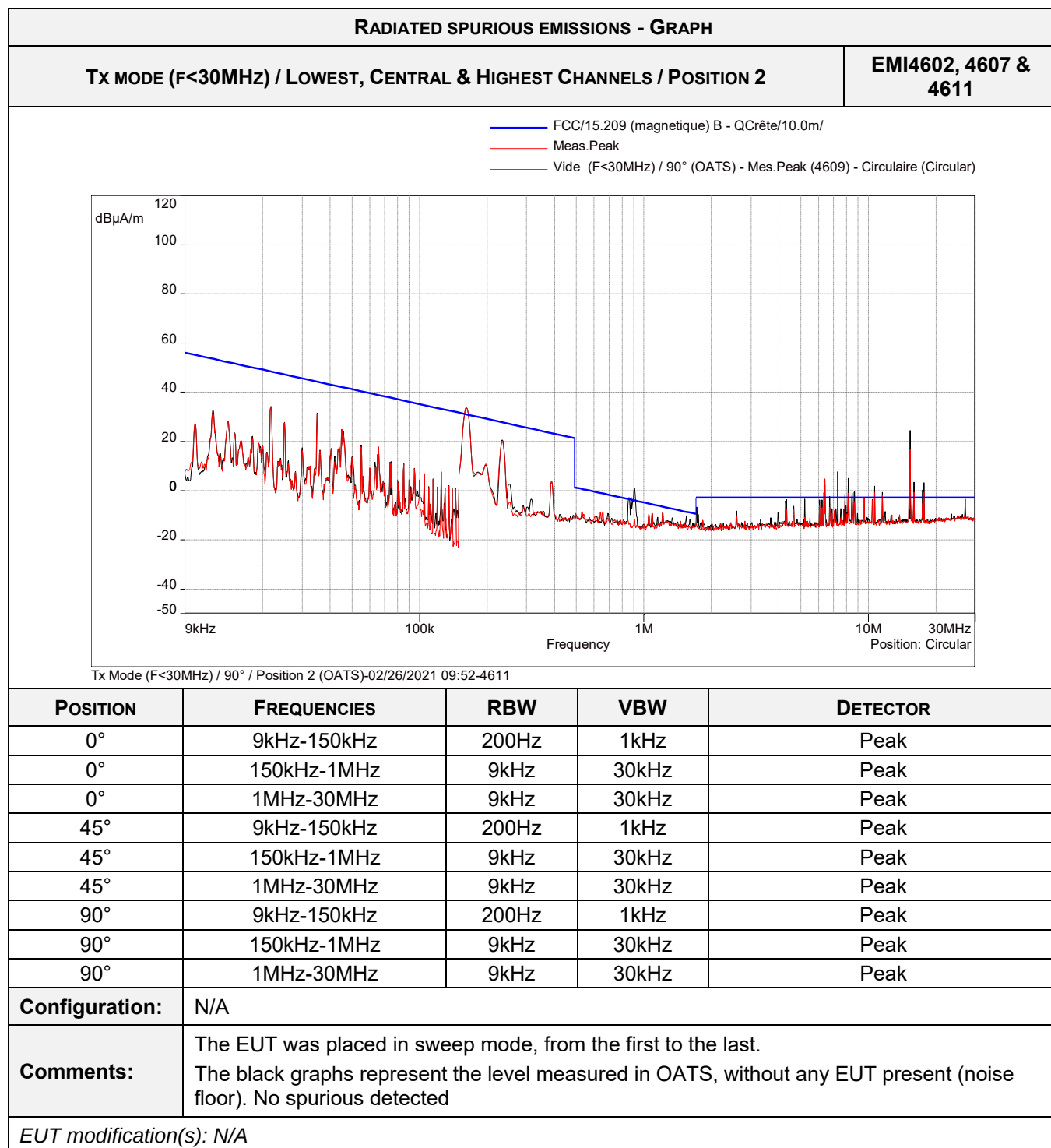
TEST SETUP PHOTO(S) RADIATED EMISSIONS – POSITION 3

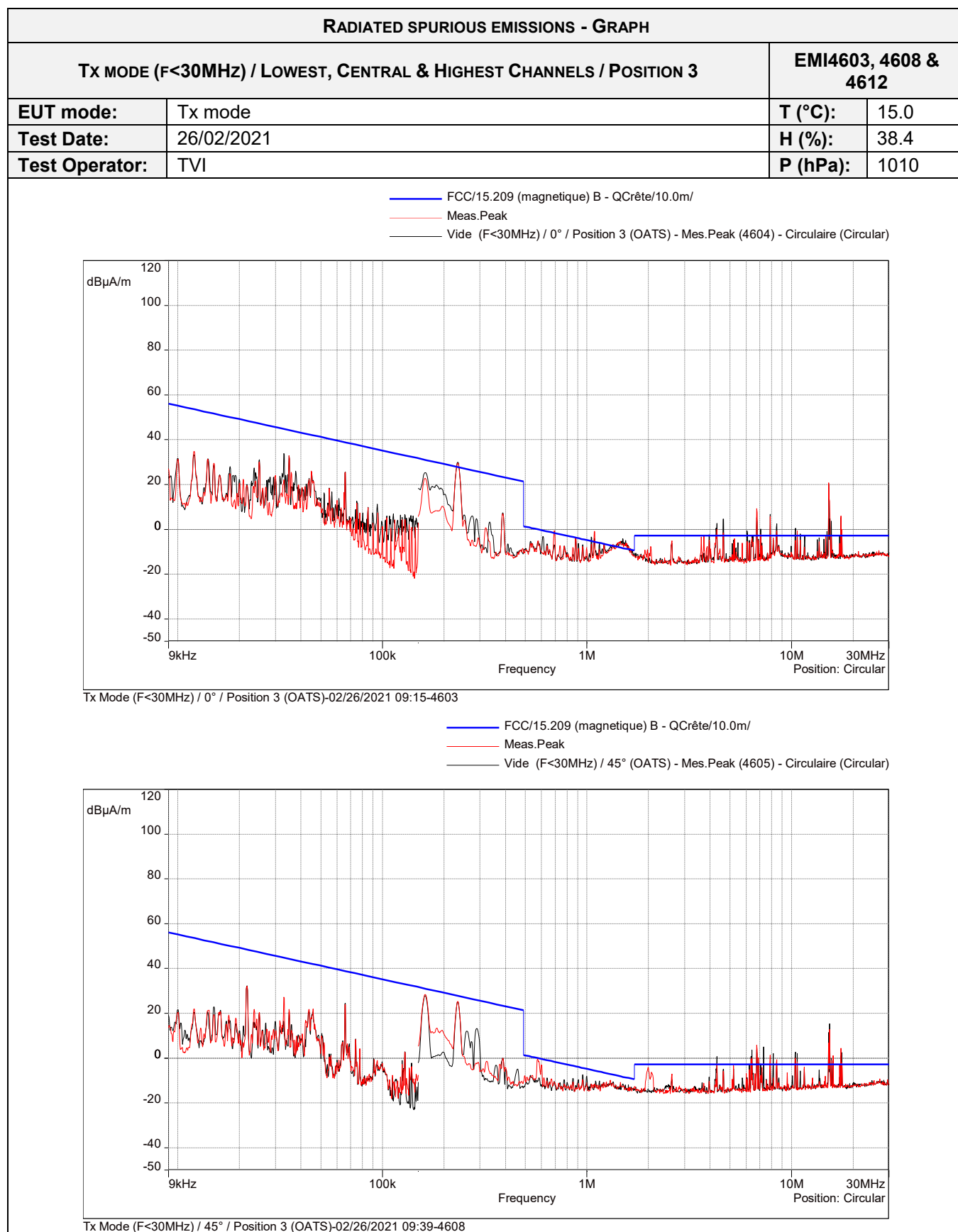


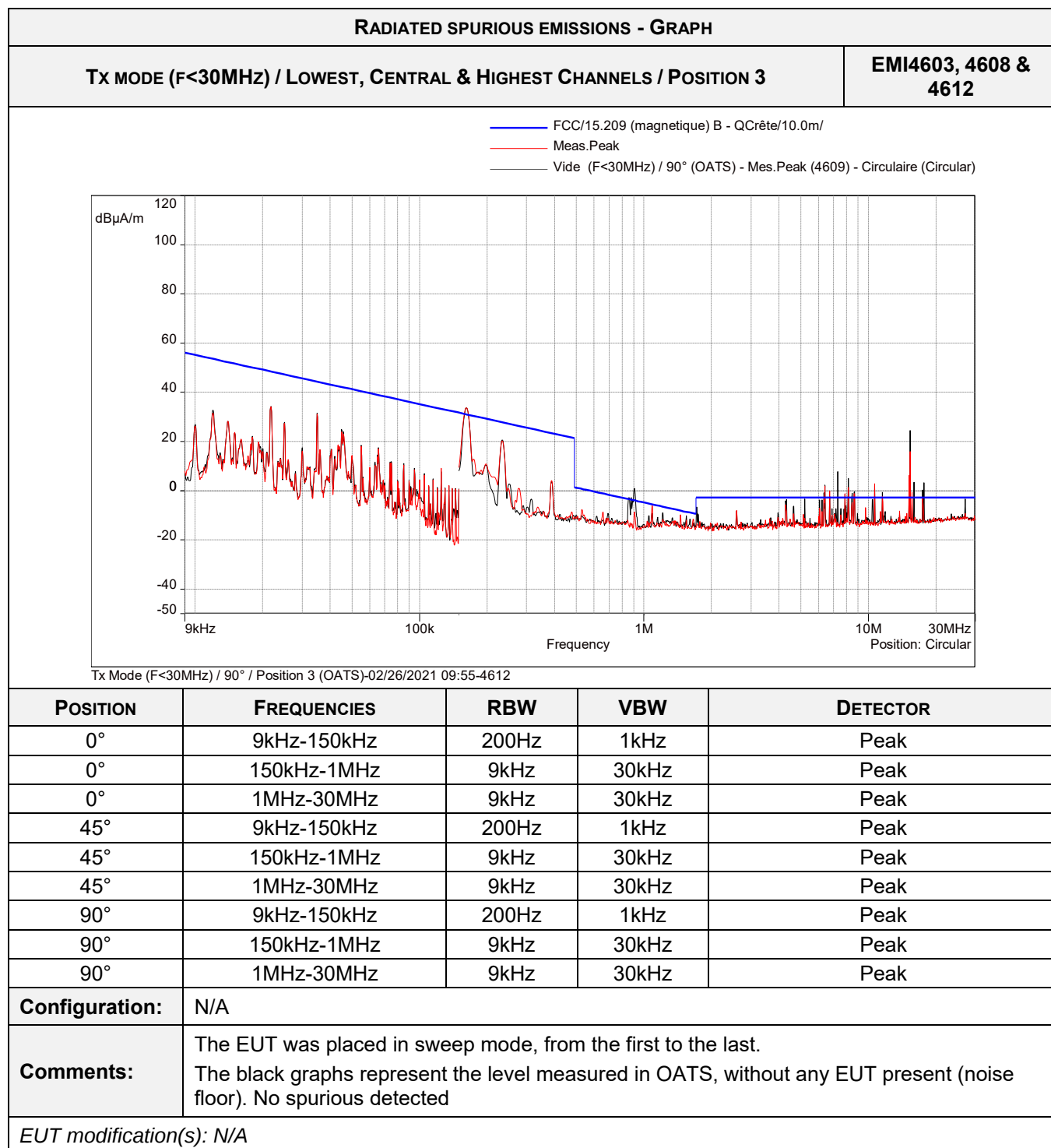


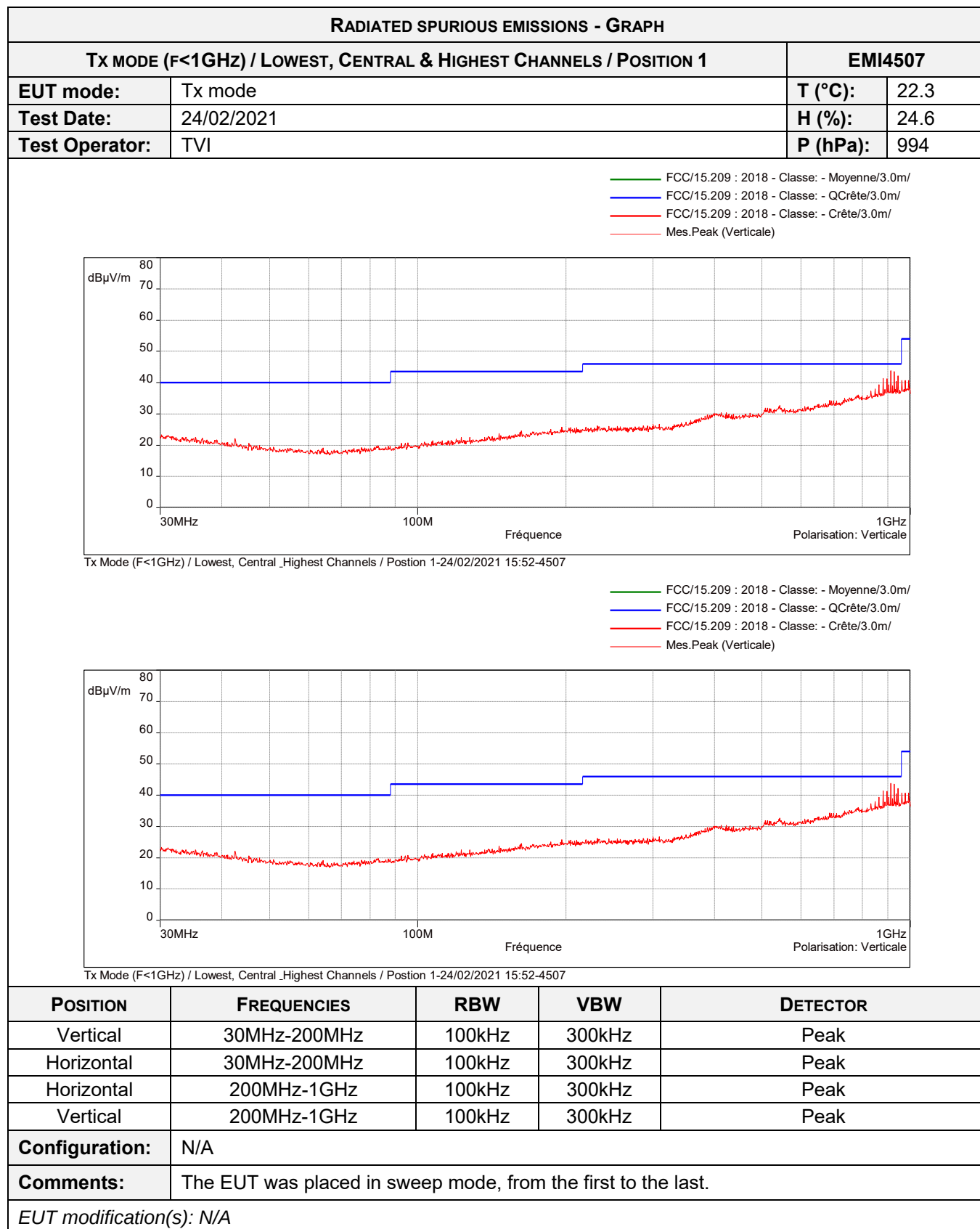


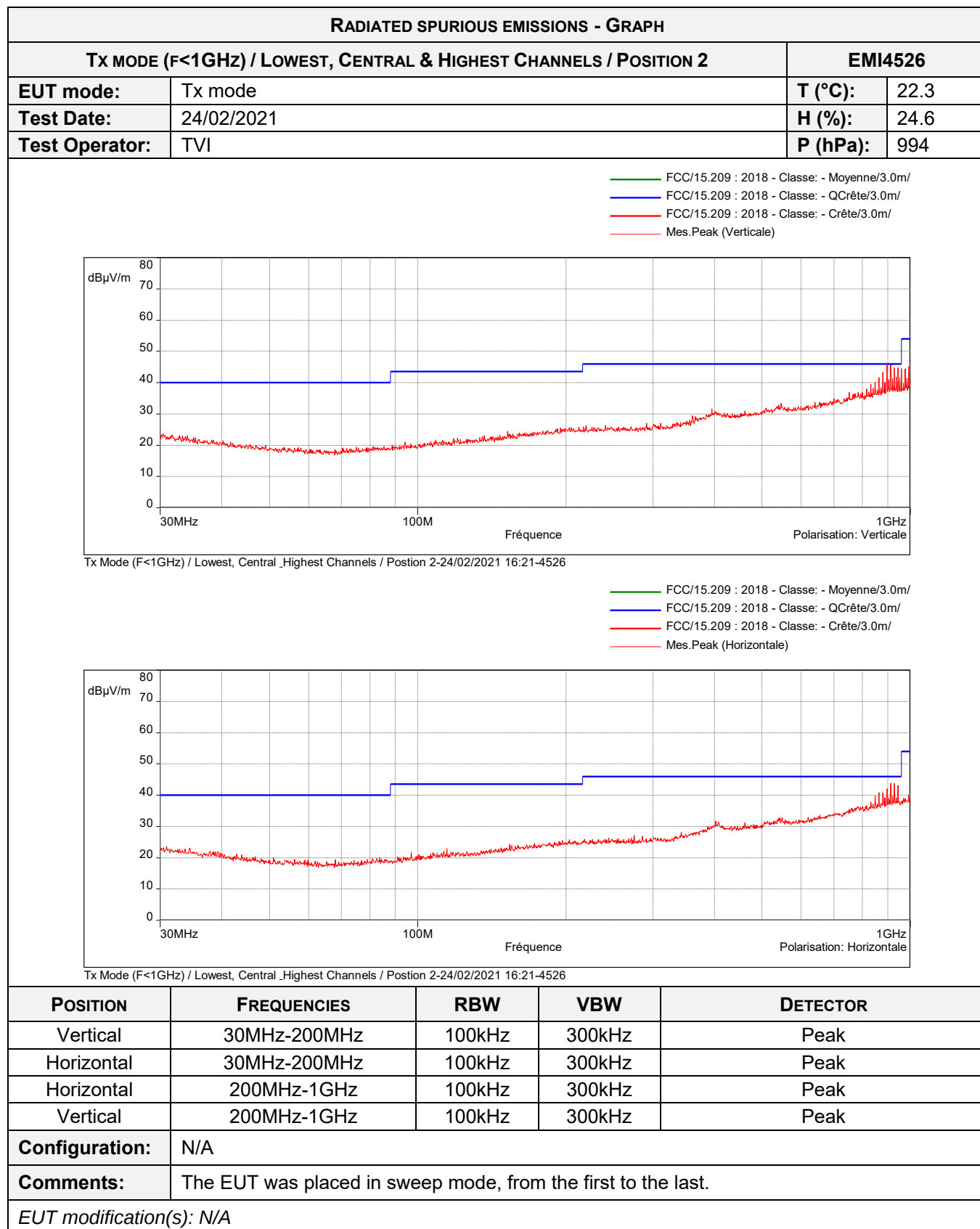


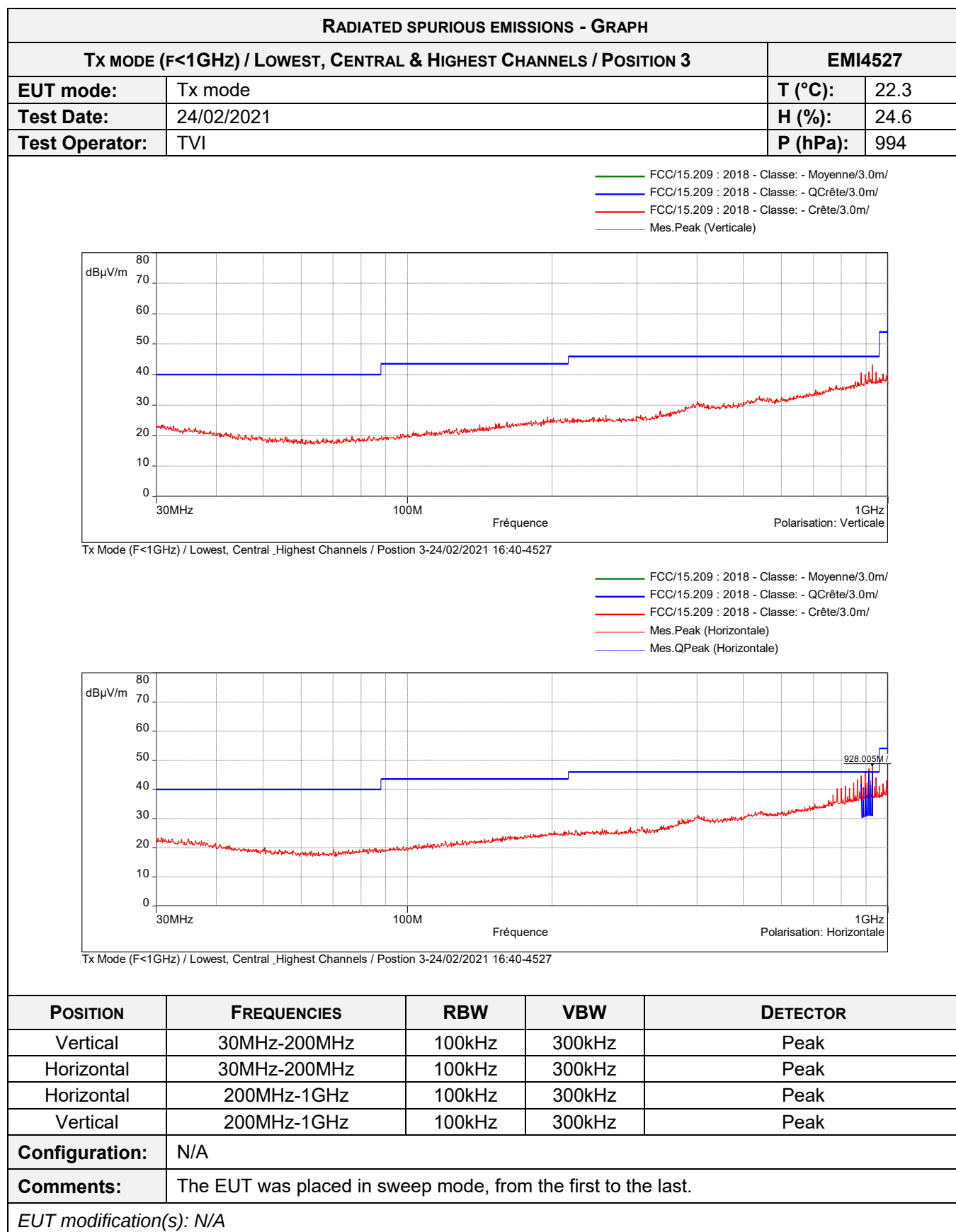


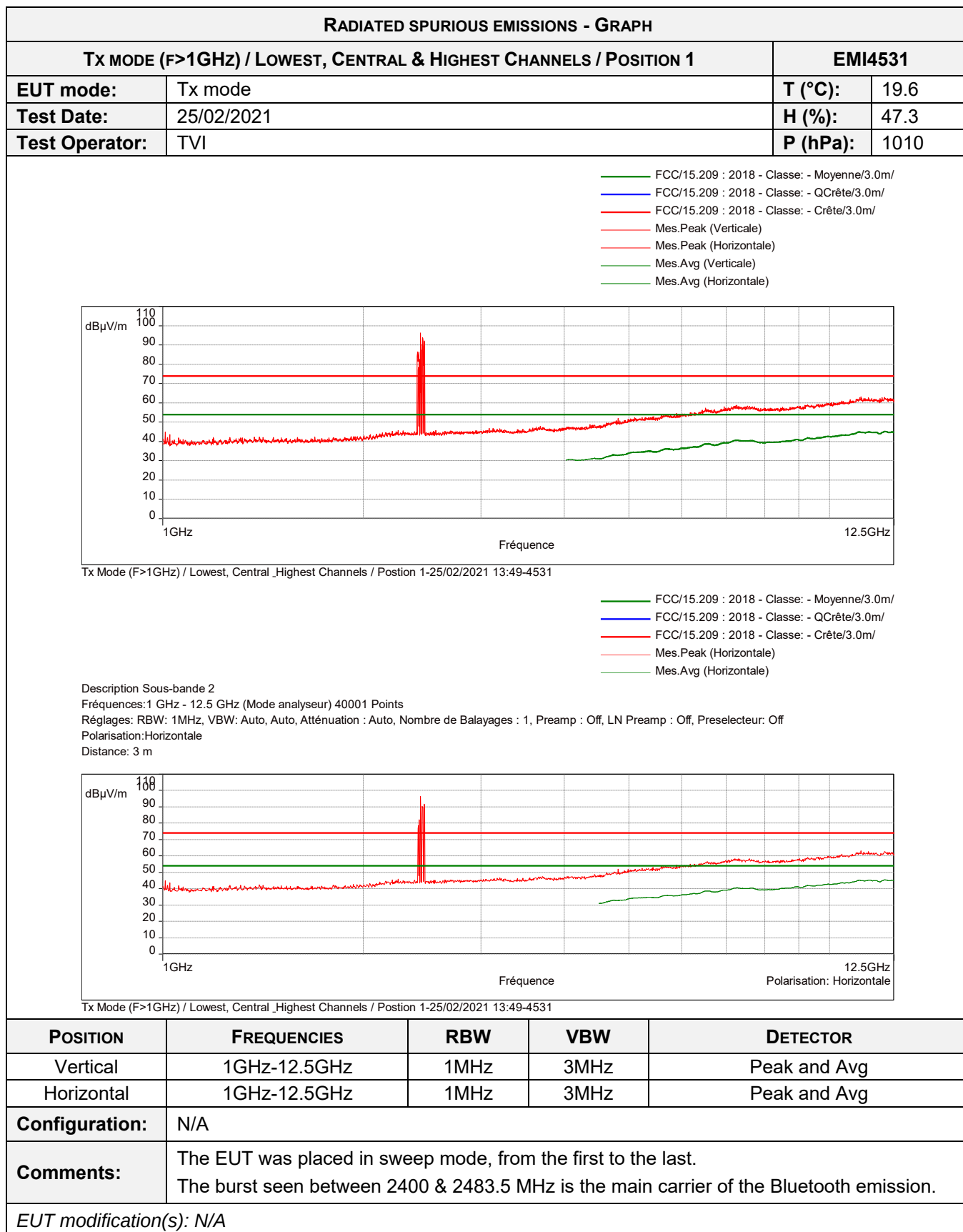


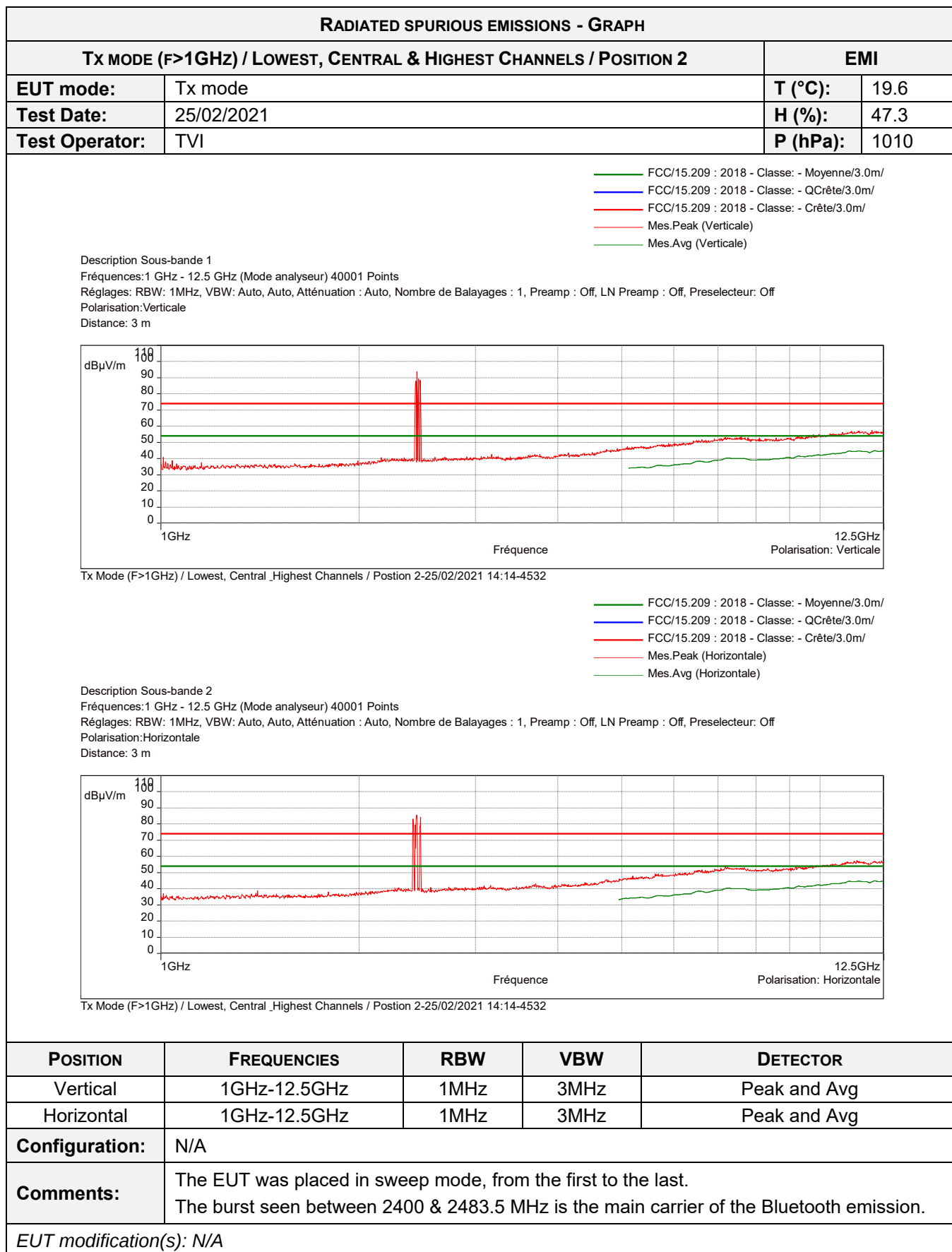


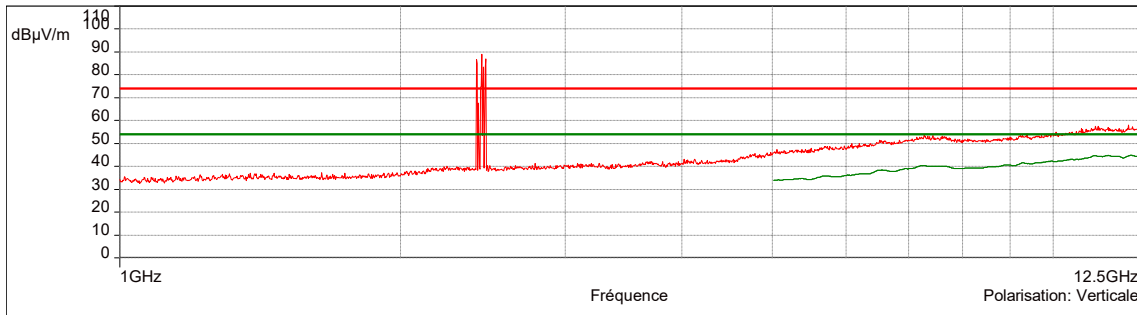
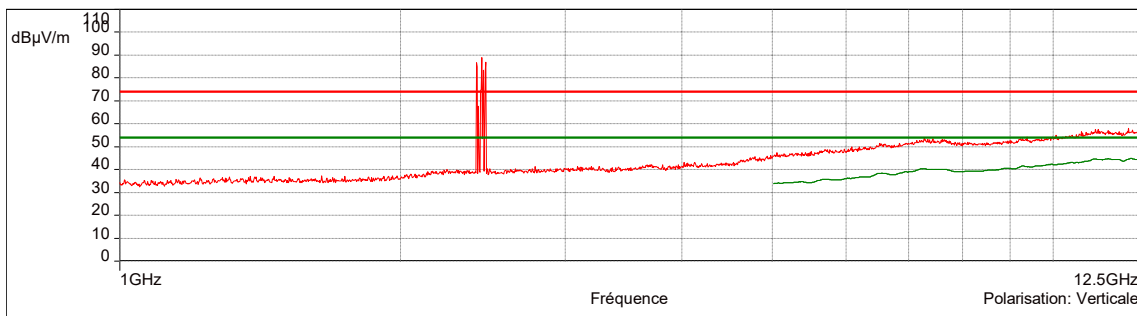










RADIATED SPURIOUS EMISSIONS - GRAPH					
TX MODE (F>1GHz) / LOWEST, CENTRAL & HIGHEST CHANNELS / POSITION 3				EMI4533	
EUT mode:	Tx mode			T (°C):	19.6
Test Date:	25/02/2021			H (%):	47.3
Test Operator:	TVI			P (hPa):	1010
FCC/15.209 : 2018 - Classe: - Moyenne/3.0m/ FCC/15.209 : 2018 - Classe: - QCrête/3.0m/ FCC/15.209 : 2018 - Classe: - Crête/3.0m/ Mes.Peak (Verticale) Mes.Avg (Verticale) Description Sous-bande 1 Fréquences:1 GHz - 12.5 GHz (Mode analyseur) 40001 Points Réglages: RBW: 1MHz, VBW: Auto, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off Polarisation:Verticale Distance: 3 m  Tx Mode (F>1GHz) / Lowest, Central_Highest Channels / Postion 3-25/02/2021 14:40-4533 FCC/15.209 : 2018 - Classe: - Moyenne/3.0m/ FCC/15.209 : 2018 - Classe: - QCrête/3.0m/ FCC/15.209 : 2018 - Classe: - Crête/3.0m/ Mes.Peak (Verticale) Mes.Avg (Verticale) Description Sous-bande 1 Fréquences:1 GHz - 12.5 GHz (Mode analyseur) 40001 Points Réglages: RBW: 1MHz, VBW: Auto, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off Polarisation:Verticale Distance: 3 m  Tx Mode (F>1GHz) / Lowest, Central_Highest Channels / Postion 3-25/02/2021 14:40-4533					
POSITION	FREQUENCIES	RBW	VBW	DETECTOR	
Vertical	1GHz-12.5GHz	1MHz	3MHz	Peak and Avg	
Horizontal	1GHz-12.5GHz	1MHz	3MHz	Peak and Avg	
Configuration:	N/A				
Comments:	The EUT was placed in sweep mode, from the first to the last. The burst seen between 2400 & 2483.5 MHz is the main carrier of the Bluetooth emission.				
EUT modification(s): N/A					

RADIATED SPURIOUS EMISSIONS – GRAPH				
Tx MODE (F>12.5GHz) / LOWEST, CENTRAL & HIGHEST CHANNELS			/	
EUT mode:	Tx mode		T (°C):	23.4
Test Date:	24/03/2021		H (%):	42.7
Test Operator:	TVI		P (hPa):	1000
Keysight Spectrum Analyzer - Swept SA RF 50 Ω AC INT REF ALIGN AUTO 12:32:49 PM Mar 24, 2021 Marker 1 16.812000000000 GHz PNO: Fast IFGain:Low Trig: Free Run Atten: 10 dB Avg Type: Log-Pwr AvgHold:>100/100 TRACE 1 2 3 4 5 6 TYPE M W W W W W W W W W DET P N N N N N N 10 dB/div Log Ref 0.00 dBm Mkr1 16.812 0 GHz -55.344 dBm Start 12.500 GHz #Res BW 1.0 MHz VBW 50 MHz Stop 18.000 GHz Sweep 13.80 ms (1001 pts) MSG STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl More 1 of 2				
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical & Horizontal	12.5GHz-18GHz	1MHz	3MHz	Peak
Configuration:	N/A			
Comments:	The EUT was placed in sweep mode, from the first to the last. The measurement was performed 30 cm away from the EUT : No spurious was detected, therefore no measurement at 3 meters were necessary.			
EUT modification(s): N/A				

RADIATED SPURIOUS EMISSIONS – GRAPH				
TX MODE (F>18GHz) / LOWEST, CENTRAL & HIGHEST CHANNELS			/	
EUT mode:	Tx mode		T (°C):	23.4
Test Date:	24/03/2021		H (%):	42.7
Test Operator:	TVI		P (hPa):	1000
Keysight Spectrum Analyzer - Swept SA RF 50 Ω AC INT REF ALIGN AUTO 12:59:47 PM Mar 24, 2021 Center Freq 21.50000000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 10 dB Avg Type: Log-Pwr AvgHold:>100/100 TRACE 1 2 3 4 5 6 TYPE M W W W W W W W W W DET P N N N N N N 10 dB/div Log Ref 0.00 dBm				

7.8. 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) and RSS Gen
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).	

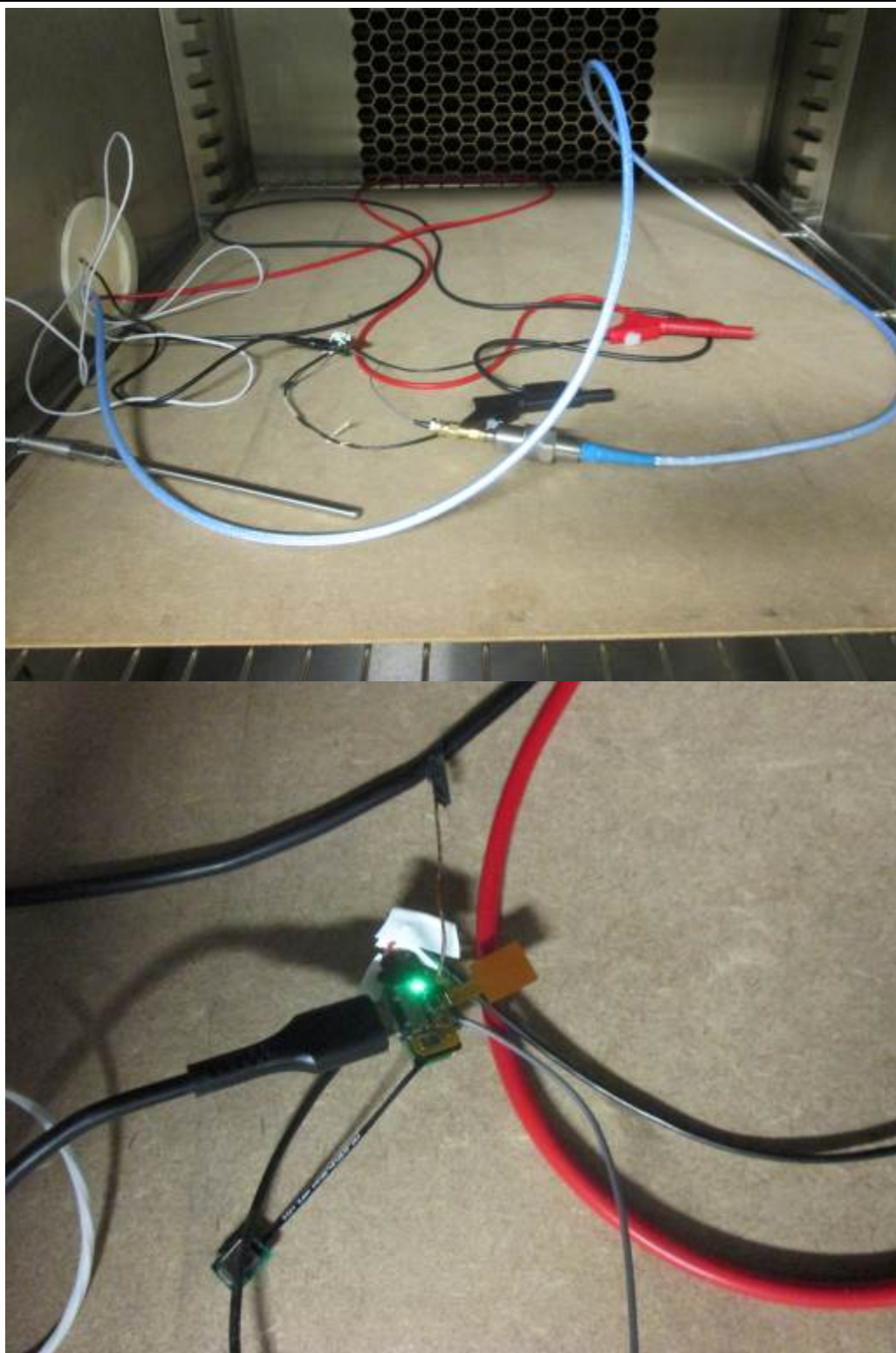
TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Tx mode	Permanent emission mode	BLE	-	PASS

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
Climatic chamber	CLIMATIS	EXCAL	12398	04/03/2020	04/05/2022
Temperature probe	GHM Greisinger	GHM 3710	12967	31/01/2020	31/03/2021
Voltmeter	Agilent Technologies	34401A	16683	26/10/2019	26/12/2021
Power supply	TTI	CPX400DP	16678		
Spectrum analyzer	Agilent Technologies	N9010A	11316	12/05/2020	12/07/2021
Cable	H&S	N-3.5m	15907	26/10/2019	26/12/2021

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	3.7	2402.001539	-
Extremes tests conditions / Low channel	-20	3.7	2401.984741	-16.798
Extremes tests conditions / Low channel	50	3.7	2402.001521	-0.018
Extremes tests conditions / Low channel	25	3.2	2402.004717	3.178
Extremes tests conditions / Low channel	25	4.2	2402.004736	3.197
Normal conditions / Central channel	25	3.7	2426.002149	-
Extremes tests conditions / Central channel	-20	3.7	2425.984656	-17.493
Extremes tests conditions / Central channel	50	3.7	2426.001821	-0.328
Extremes tests conditions / Central channel	25	3.2	2426.004827	2.678
Extremes tests conditions / Central channel	25	4.2	2426.004823	2.674
Normal conditions / High channel	25	3.7	2479.982153	-
Extremes tests conditions / High channel	-20	3.7	2479.983622	1.469
Extremes tests conditions / High channel	50	3.7	2479.995948	13.795
Extremes tests conditions / High channel	25	3.2	2480.004950	22.797
Extremes tests conditions / High channel	25	4.2	2480.004945	22.792

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	TVI	26/02/2021	-

End of test report