



Test report issued under the responsibility of:
EMITECH MONTPELLIER laboratory
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RADIO TEST REPORT

FCC part 15.249
RSS-210, issue 10, April 2020

Company: **Oberthur Cash Protection**
Address.....: 3 Bis rue du Docteur Quignard
21000 DIJON
FRANCE

Test item description.: **IBNS ATM devices**
Trade Mark.: Oberthur Cash Protection
Manufacturer.: Oberthur Cash Protection
Model/Type reference.....: OCPICSDSCM / OCP_ICSD-ActiveDispense
FCC ID.....: 2AXRGOPICSDSCM
IC.: 26545-OCPICSDSCM
Ratings.....: 2.7Vdc to 3.6Vdc

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

Report Reference No.: **RR410-20-103551-4A**
Test procedure.: FCC IC Certification
Diffusion.....: Mr. EZERZER
Applicant's name.: Oberthur Cash Protection
Date of issue.....: January 18, 2021
Total number of pages.....: 47
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Compiled by.....: Olivier AELBRECHT
Approved by (+ signature).....: David MONTAULON (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 conformity of
the whole manufactured products of the tested sample.*

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REVISION HISTORY:

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0	January 18, 2021	/	Creation

1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **IBNS ATM devices OCP_ICSD-ActiveDispense** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

TESTING PROCEDURE AND TESTING LOCATION:					
Testing Location: EMITECH MONTPELLIER laboratory Address: 145 rue de Massacan 34740 VENDARGUES FRANCE Test procedure.: FCC IC Certification Tested by: Olivier AELBRECHT Test supervisor: None Date of receipt of test item: N/A Date (s) of performance of tests: From October the 5 th of 2020 to October the 7 th of 2020					
APPLICANT'S GENERAL INFORMATIONS:					
Company name: Oberthur Cash Protection Company address.: 3 Bis rue du Docteur Quignard 21000 DIJON FRANCE Person(s) present during the tests.: Mr EZERZER Responsible.: Mr. EZERZER					
GENERAL REMARKS:					
The information in italics is declared by the manufacturer and is under his responsibility The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report the decimal separator is point.					
POSSIBLE TEST CASE VERDICTS:					
Test case does not apply to the test object..: N/A Test case not performed.....: N/P Test object does meet the requirement.....: P (Pass) Test object does not meet the requirement..: F (Fail)					
DEFINITIONS AND ABBREVIATIONS:					
E.U.T.	Equipment under test	AE	Ancillary equipment	Pk	Peak detector
RBW	Resolution bandwidth	VBW	Video bandwidth	QP	Quasi-peak detector
OATS	Open area test site	FAR	Full anechoic room	Av	Average detector
VP	Vertical Polarization	HP	Horizontal Polarization	RMS	Root Mean Square
RF	Radio frequency	NTR	Nothing to report	N/C	Not communicated

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:

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

FCC 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 15.249

Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

RSS-210, issue 10, April 2020

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

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

INFORMATIVE REFERENCES:

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

3. EQUIPMENT TECHNICAL DESCRIPTION

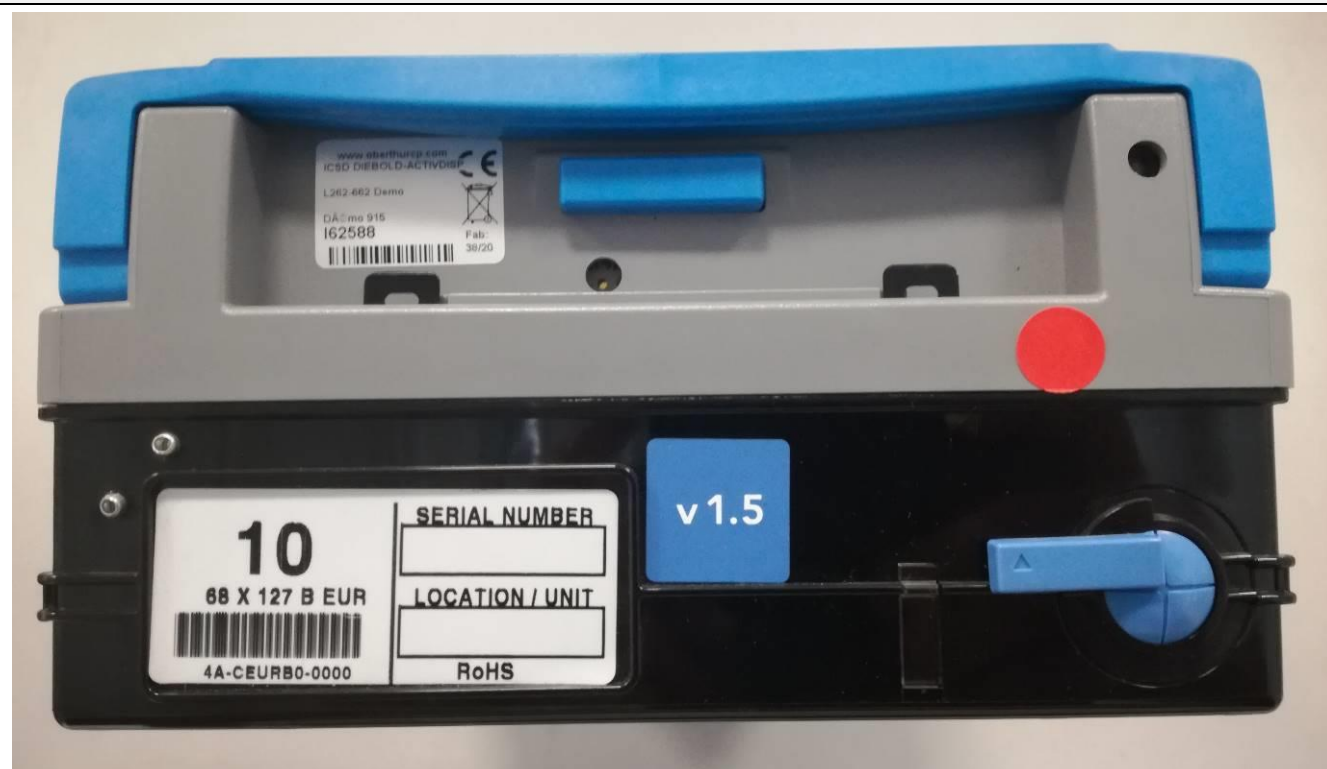
3.1. Test Conditions

Test item description. : IBNS ATM devices
Model/Type reference..... : OCPICSDSCM / OCP_ICSD-ActiveDispense
FCC ID..... : 2AXRGOCPICSDSCM
IC. : 26545-OCPICSDSCM
Trade Mark. : Oberthur Cash Protection
Serial number (S/N)..... : I62588
Part number (P/N). : Not communicated
Software version..... : N/A
Firmware version. : L262 6.71
Type of sample. : Pre-serial
Function(s)..... : IBNS devices: ATM protection range of product
IBNS cassette module, permit to stain banknotes in case of
attack detection
Manufacturer name. : Oberthur Cash Protection
Address..... : 3 Bis rue du Docteur Quignard
21000 DIJON
FRANCE
General product information:
N/A

3.2. EUT General View



3.3. EUT Marking Plate



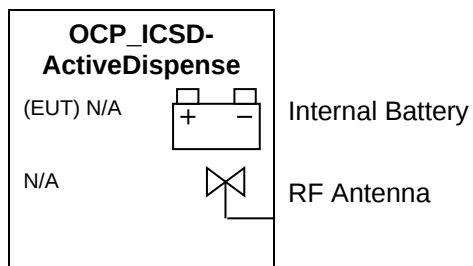
3.4. EUT Mechanical and Electrical Design

Power supply.....: 3.6Vdc
 Power supply range.....: 2.7Vdc to 3.6Vdc
 Power type.....: *Internal battery*
 Power (mW).....: < 2
 Nominal current (µA).: < 500
 Dimensions (L x W x H) (mm).: 420 x 220 x 120 (mm)
 Weight (kg).: 2,1
 Temperature range (°C).: -20°C / +65°C
 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	Métallique / Plastic	N/A
1	Internal Battery	DC	N/A	N/A	N/A
2	RF Antenna	RF	N/A	N/A	PCB printed

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. EUT Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	<i>Transceiver</i>
Technology	<i>SRD</i>
Environmental profile.....	<i>Data transmissions</i>
Temperature range.....	<i>-20°C to 65°C</i>
Antenna type	<i>Internal (PCB printed)</i>
Antenna Gain.....	<i>Not communicated</i>
Comments:	
b) TRANSMITTER PARAMITERS (Tx)	
Frequency bands.....	<i>902 MHz to 928 MHz</i>
RF Power.....	<i>Not communicated</i>
Number of channels / Separation.....	<i>2 channels</i>
Modulation type	<i>GFSK</i>
Duty cycle	<i>Not communicated</i>
Tested frequency.....	<i>915,025 MHz (Low channel)</i> <i>915,625 MHz (High channel)</i>
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	<i>902 MHz to 928 MHz</i>
Category/Class	<i>Not communicated</i>
Bandwidth.....	<i>Not communicated</i>

4. OPINION(S) AND INTERPRETATION(S)

TEST(S) PERFORMED	DEVIATION(S) TO TEST METHOD(S)
FCC part 15.249 and RSS-210	N/A
FCC part 15.109, 15.209, 15.205, 15.215, 15.249 RSS-210, CNR Gen	N/A
FCC part 15 Radio part 15.215 c) and RSS Gen	N/A
FCC part 15.109, 15.209, 15.205, 15.215 RSS-210, CNR Gen	N/A

Comments: N/A

5. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
Conducted emission (measurement) - Power Supply / 110Vac/60Hz	Class B	N/A	FCC part 15.107, 15.207 and RSS-Gen Powered by internal batteries
Transmitter radiated spurious emissions at frequencies <30MHz - Tx Mode / 0° - All Channels - Tx Mode / 45° - All Channels - Tx Mode / 90° - All Channels	15.209 15.209 15.209	PASS PASS PASS	FCC part 15.109, 15.209, 15.205, 15.215 RSS-210, CNR Gen
Transmitter radiated spurious emissions at frequencies >30MHz - Tx mode - All Channels - For Freq < 1GHz - Tx mode - Low Channel - For Freq > 1GHz - Tx mode - High Channel - For Freq > 1GHz	15.209 15.209 15.209	PASS PASS PASS	FCC part 15.109, 15.209, 15.205, 15.215, 15.249 RSS-210, CNR Gen
Band-edge compliance - BandEdge - Low Channel - BandEdge - High Channel	15.249 15.249	PASS PASS	FCC part 15.249 subclause d) and RSS-210
Effective isotropic radiated power - EIRP - Low Channel - EIRP - High Channel	50mV/m 50mV/m	PASS PASS	FCC part 15.249 and RSS-210
Occupied Bandwidth - 99% Bandwidth / Low channel - 99% Bandwidth / High channel - 20dB Bandwidth / Low channel - 20dB Bandwidth / High channel	Flow > 904.6 MHz Fhigh < 925.4 MHz	PASS PASS PASS PASS	FCC part 15 Radio part 15.215 c) and RSS Gen
Frequency error - Low channel - High channel	0.001 % 0.001 %	PASS PASS	FCC part 15 Radio part 15.215 c) and RSS Gen

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.

TEST(S) PERFORMED	MODIFICATION(S)
FCC part 15.249 and RSS-210	N/A
FCC part 15.109, 15.209, 15.205, 15.215, 15.249 RSS-210, CNR Gen	N/A
FCC part 15 Radio part 15.215 c) and RSS Gen	N/A
FCC part 15.109, 15.209, 15.205, 15.215 RSS-210, CNR Gen	N/A

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	$\pm 3.8\%$	$\pm 5\%$
Conducted emission (spurious)		
$f \leq 1\text{ GHz}$	$\pm 0.8\text{ dB}$	
1 GHz - 12.75 GHz	$\pm 1.6\text{ dB}$	$\pm 3\text{ dB}$
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	$\pm 5.2\text{ dB}$	$\pm 6\text{ dB}$
Radiated emission (magnetic field)		
9kHz – 30MHz	$\pm 3\text{ dB}$	$\pm 6\text{ dB}$
Supply voltages	$\pm 3\%$	$\pm 3\%$
Temperature	$\pm 1\text{ }^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$
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	$\pm 5.0\text{ dB}$	/
1GHz – 18GHz	$\pm 5.6\text{ dB}$	/
18GHz – 26GHz	$\pm 5.7\text{ dB}$	/
26GHz – 40GHz	$\pm 5.7\text{ dB}$	/

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

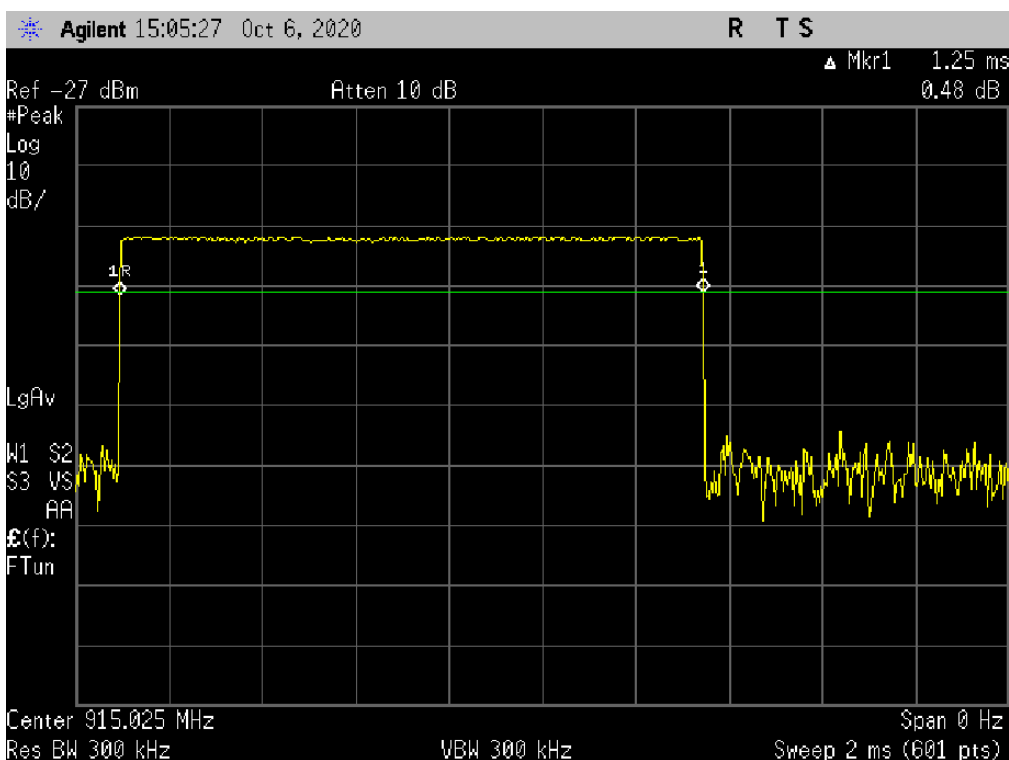
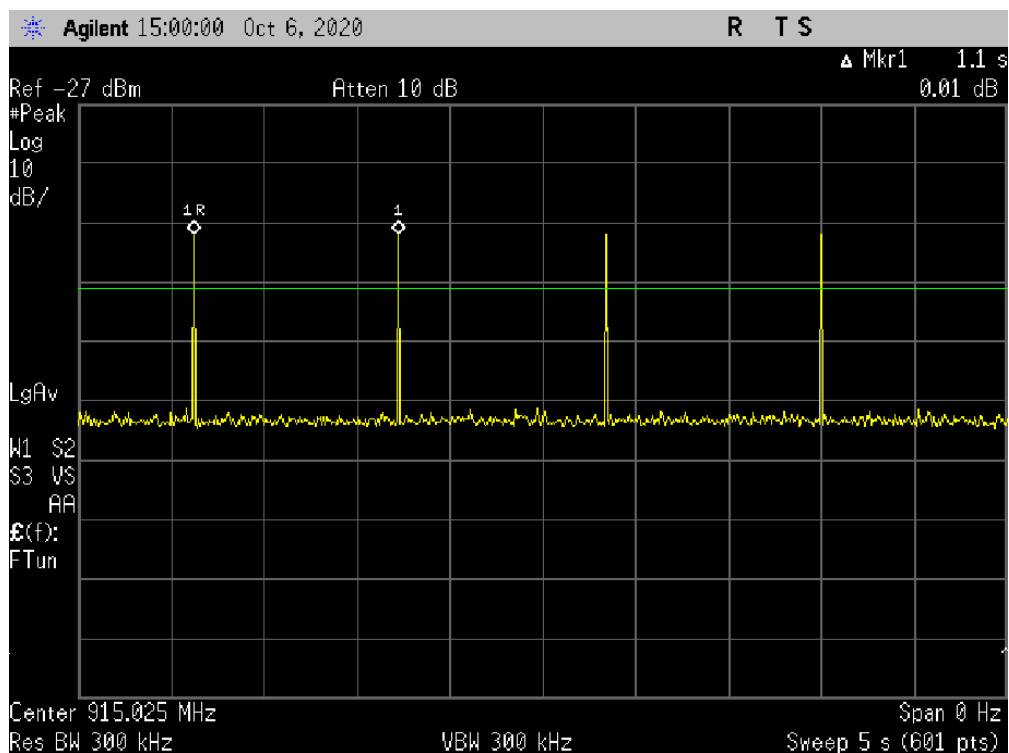
7. TEST CONDITIONS AND RESULTS

7.1. Duty Cycle of Test Signal

Reference standard:	FCC part 15 & RSS 210
Test method:	ANSI C63.10 : 2013 §11
Test description: EUT is set on an insulating support at 150cm above the ground reference plane. Measurement are done on a normalized test site.	

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HL223	3126	13/06/2018	13/08/2021
Cable	MegaPhase	F135N1N28	16666	25/10/2019	25/12/2021
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Receiver	Agilent Technologies	E4440A	5824	24/04/2018	24/12/2020
Shielded enclosure	COMTEST	SAC 3m	14494	02/10/2019	02/12/2022
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12269	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

DUTY CYCLE OF TEST SIGNAL - GRAPH			
EUT mode:	Continuous modulated Tx	T (°C):	18.6
Test Date:	06/10/2020	H (%):	52.2
Test Operator:	OAT	P (hPa):	1003



Duty Cycle = $0.00125/1.1 = 0.0011$ (0.11%)

Duty Factor = $10 * \log(1/0.0011) = 29.59$

Duty cycle test mode is < 98%. A **29.59dB** duty cycle correction factor shall could be considered for average measurement if needed.

7.2. Transmitter radiated spurious emissions at frequencies <30MHz

Reference standard:	FCC part 15 Radio part 15.249 and RSS-210
Test method:	FCC part 15.109, 15.209, 15.205, 15.215 RSS-210, CNR Gen
Test description: : Spurious domain emission limits are limits on emissions at frequencies other than those of the carrier and sidebands associated with normal test modulation. 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 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. All frequencies were investigated, where applicable.	

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Tx Mode / 0° - All Channels	9kHz-30MHz	15.209	EMI4648	PASS
Tx Mode / 45° - All Channels	9kHz-30MHz	15.209	EMI4655	PASS
Tx Mode / 90° - All Channels	9kHz-30MHz	15.209	EMI4656	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: Limit indicated on the curves is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HFH2-Z2	5825	24/04/2020	24/06/2022
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Receiver	Agilent Technologies	E4440A	5824	24/04/2018	24/12/2020
Shielded enclosure	COMTEST	SAC 3m	14494	02/10/2019	02/12/2022
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12269	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

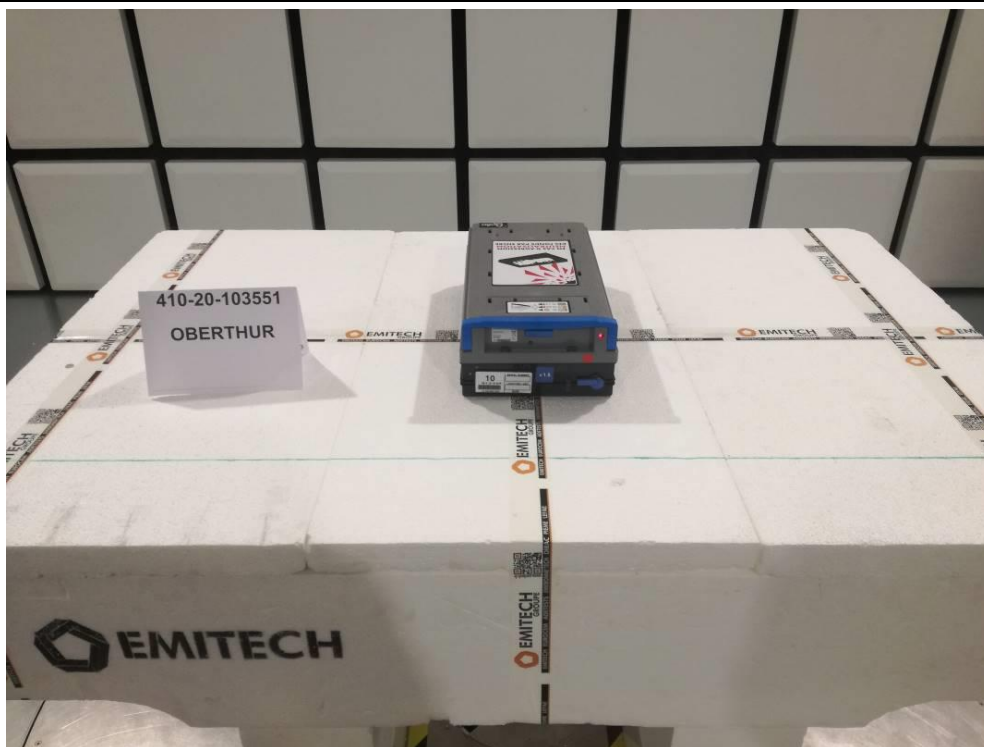
BAT-EMC software version: V3.18.0.26

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TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHz - TABULATED RESULTS			
Frequency (MHz)	Antenna Position	Level (dBμA/m)	Limit (dBμA/m)
N/A	N/A	N/A	N/A

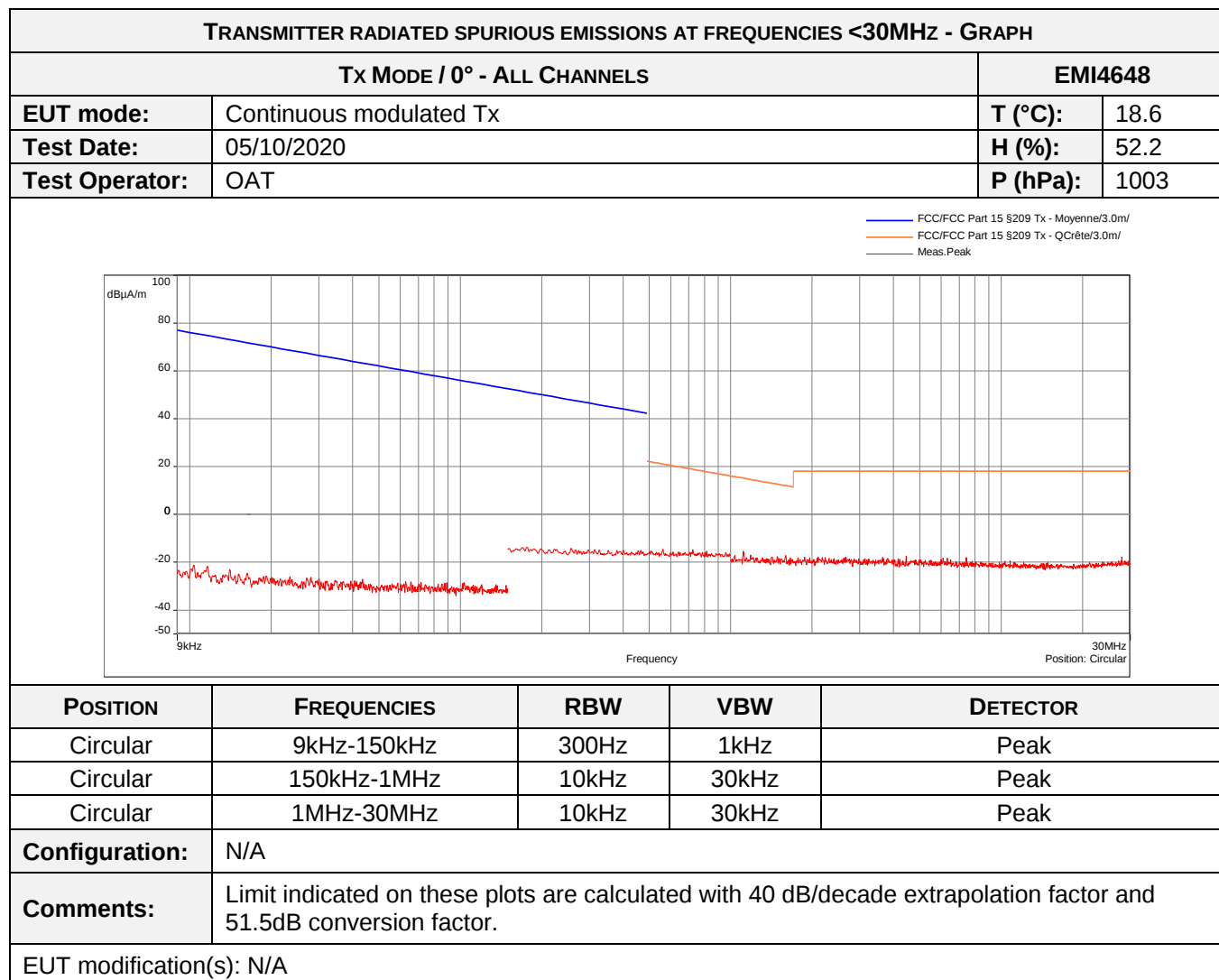
No spurious emissions were detected.

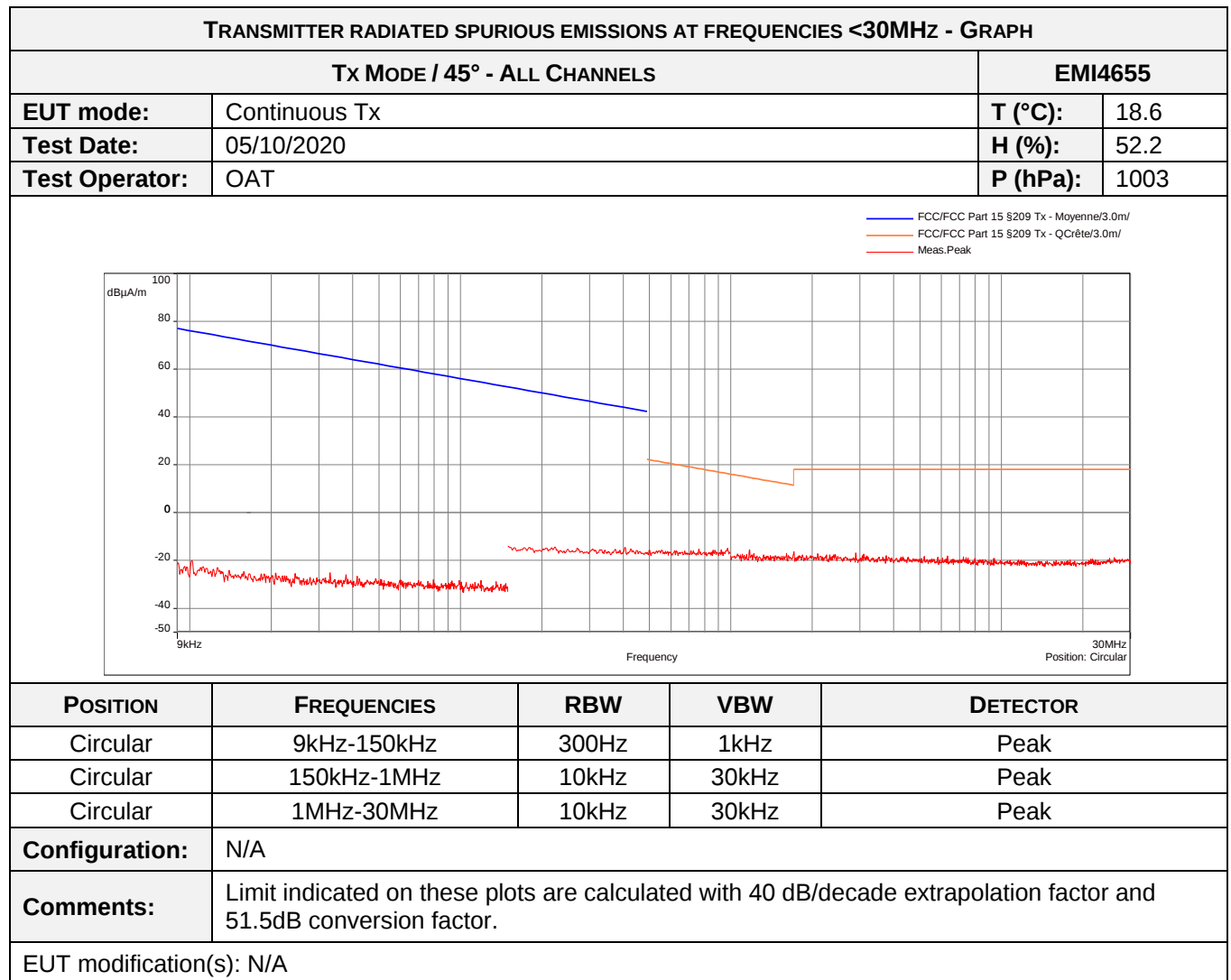
TEST SETUP PHOTO(S) – EUT POSITION

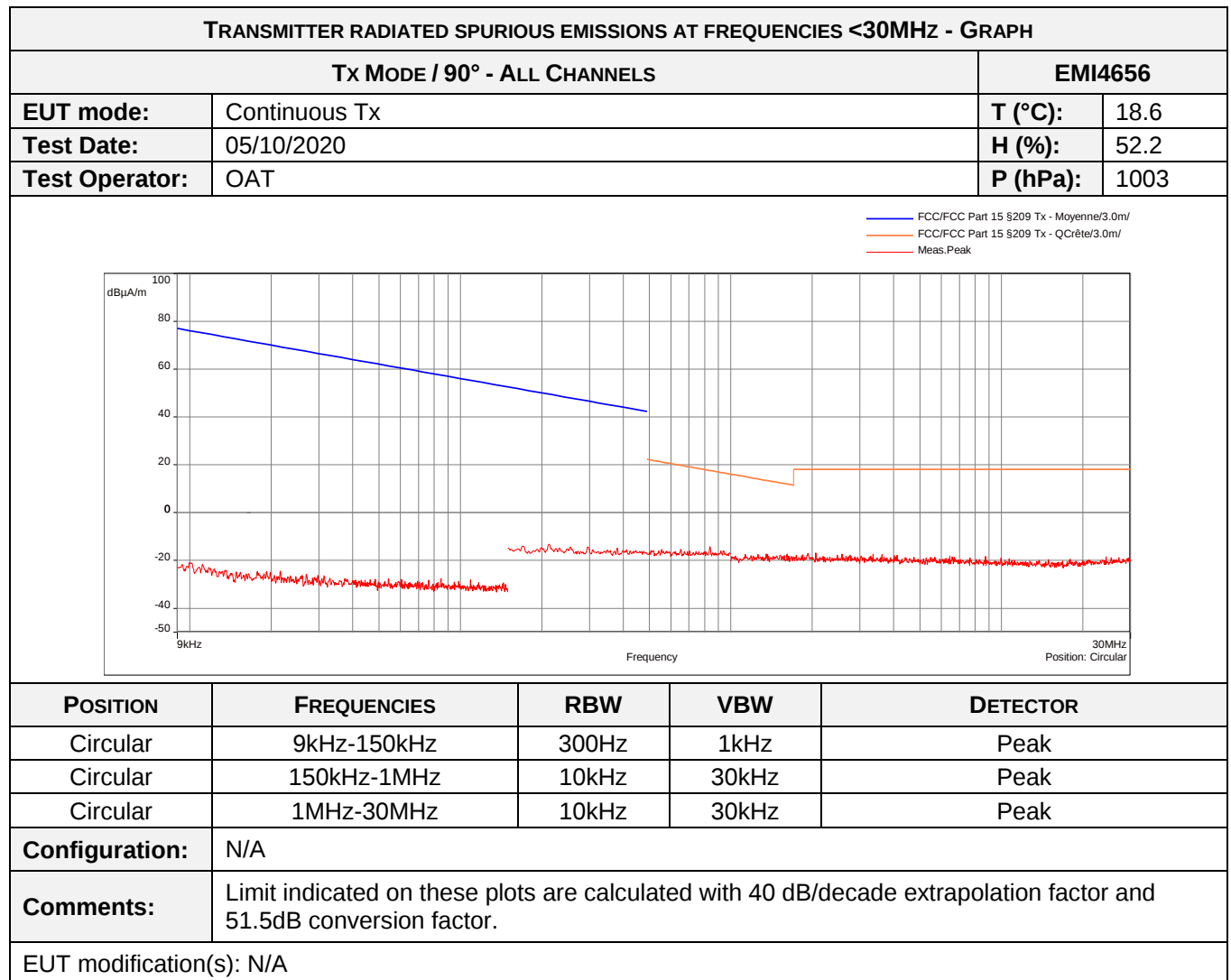


TEST SETUP PHOTO(S)









7.3. Transmitter radiated spurious emissions at frequencies >30MHz

Reference standard:	FCC part 15 Radio part 15.249 and RSS-210
Test method:	FCC part 15.109, 15.209, 15.205, 15.215, 15.249 RSS-210, CNR Gen
General test setup: EUT is set on an insulating support at 80(f<1GHz), 150cm(f>1GHz)cm above the ground reference plane. 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
Tx mode - All Channels - For Freq < 1GHz	30MHz-1GHz	15.209	EMI4654	PASS
Tx mode - Low Channel - For Freq > 1GHz	1GHz-10GHz	15.209	EMI4684	PASS
Tx mode - High Channel - For Freq > 1GHz	1GHz-10GHz	15.209	EMI4685	PASS

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

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	24/07/2019	24/09/2022
Antenna	Electro Metrics	BIA-30HF	1107	13/06/2018	13/08/2021
Antenna	Rohde & Schwarz	HL223	3126	13/06/2018	13/08/2021
Cable	MegaPhase	F135N1N28	16666	25/10/2019	25/12/2021
Cable	MegaPhase	F135N1N28	16667	25/10/2019	25/12/2021
Cable	SUCOFLEX	N-3m	14378	25/06/2019	25/08/2021
Cable	SUCOFLEX	N-3m	14379	25/06/2019	25/08/2021
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Cable	MegaPhase	TM18-N1N1-118	12841	14/08/2020	14/10/2022
Filter	Micro-Tronics	HPM18865	12843	09/06/2018	09/08/2021
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Preamplifier	IMPULSE	CA118-546ACN	9169	20/12/2019	20/02/2021
Receiver	Agilent	E4440A	5824	24/04/2018	24/12/2020

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
	Technologies				
Shielded enclosure	RAY PROOF	C.V2	1423	04/10/2019	04/12/2022
Shielded enclosure	COMTEST	SAC 3m	14494	02/10/2019	02/12/2022
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12268	07/05/2020	07/07/2022
Thermohygrometer	Testo	608-H2	12269	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26

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TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHz - TABULATED RESULTS			
TX MODE - ALL CHANNELS - FOR FREQ < 1GHz			EMI4654
Frequency (MHz)	Polarization	Level (dBμV/m)	Limit (dBμ/m)
N/A	N/A	N/A	N/A

No spurious emissions were detected.

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHz - TABULATED RESULTS				
TX MODE - LOW CHANNEL - FOR FREQ > 1GHz				EMI4684
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Leve Avg computed with duty factor (dBμV/m)	Limit Avg (dBμ/m)
1829.569	Vertical	53.32	23.73	54
1829.569	Horizontal	52.13	22.54	54

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHz - TABULATED RESULTS				
TX MODE - HIGH CHANNEL - FOR FREQ > 1GHz				EMI4685
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Leve Avg computed with duty factor (dBμV/m)	Limit Avg (dBμ/m)
1830.667	Vertical	53.71	24.12	54
1830.667	Horizontal	52.41	22.82	54

TEST SETUP PHOTO(S) – EUT POSITION FOR FREQ < 1GHz



TEST SETUP PHOTO(S) – EUT POSITION FOR FREQ > 1GHz



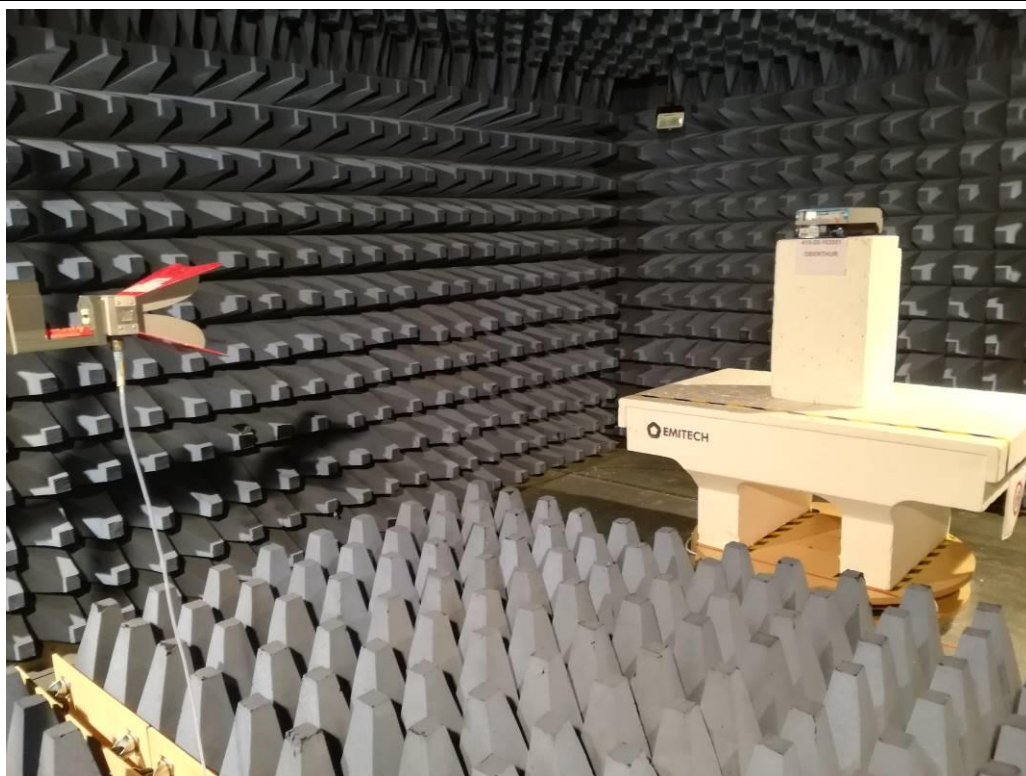
TEST SETUP PHOTO(S) – 30MHz < FOR FREQ < 200MHz

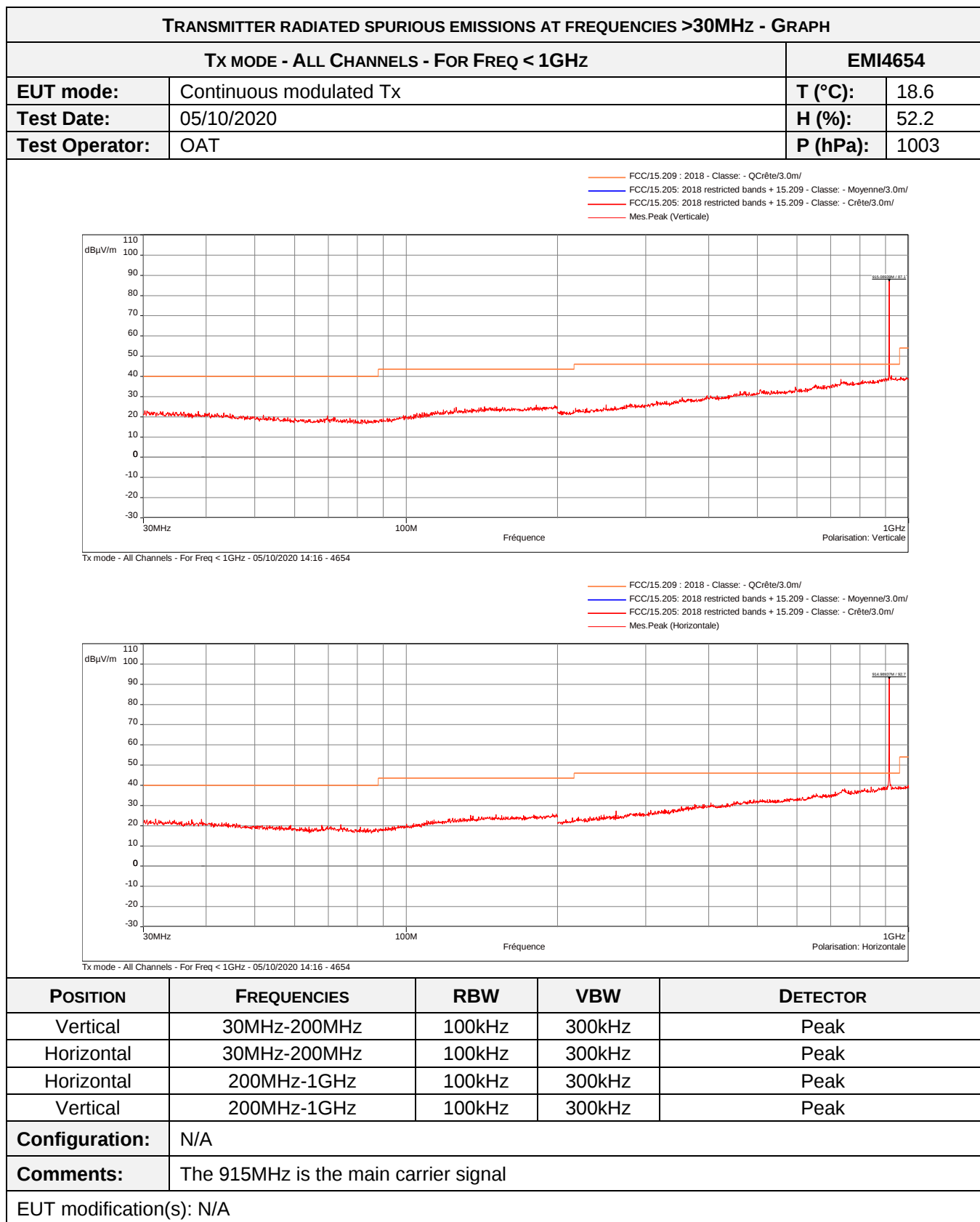


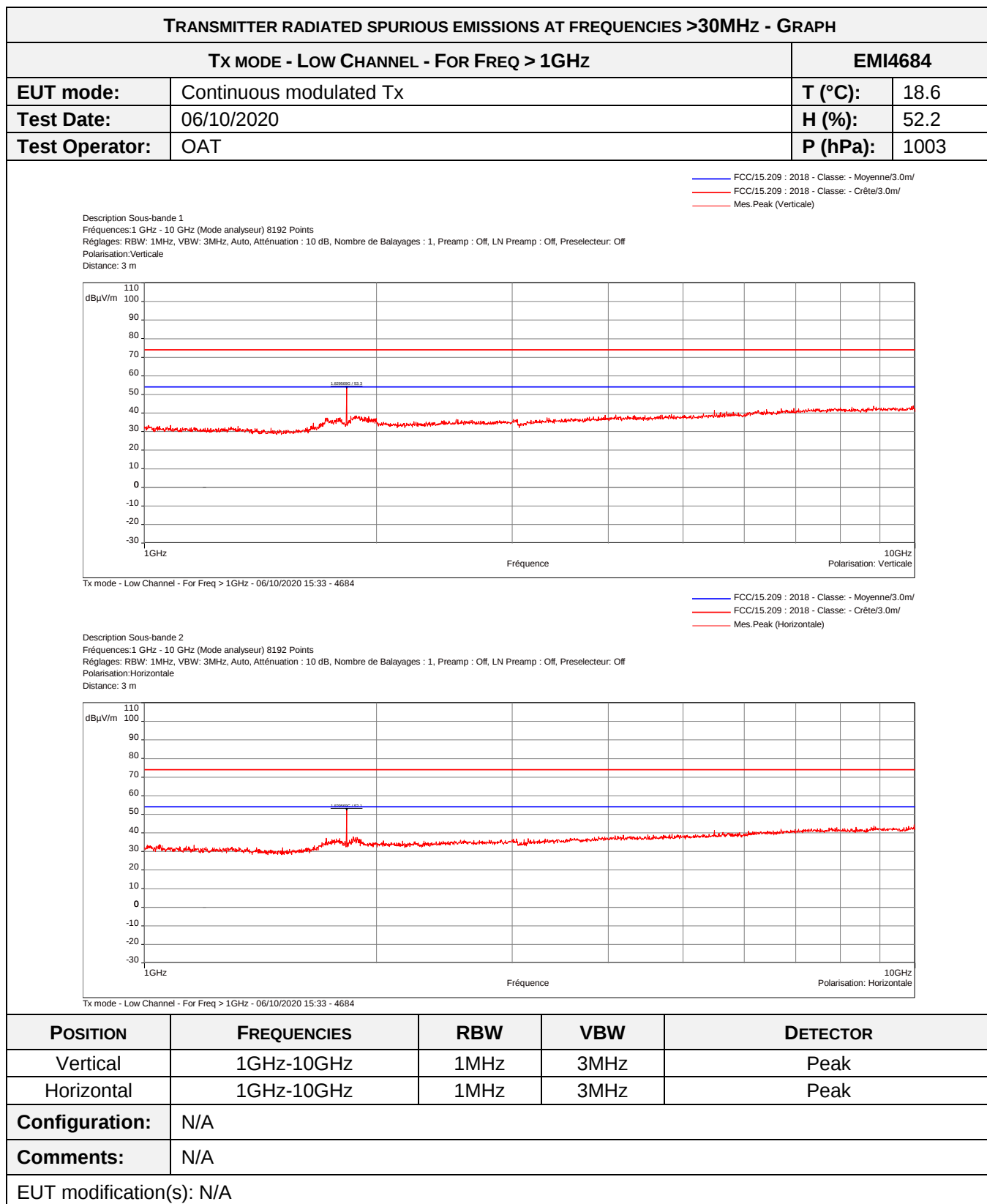
TEST SETUP PHOTO(S) - 200MHz < FOR FREQ < 1GHz

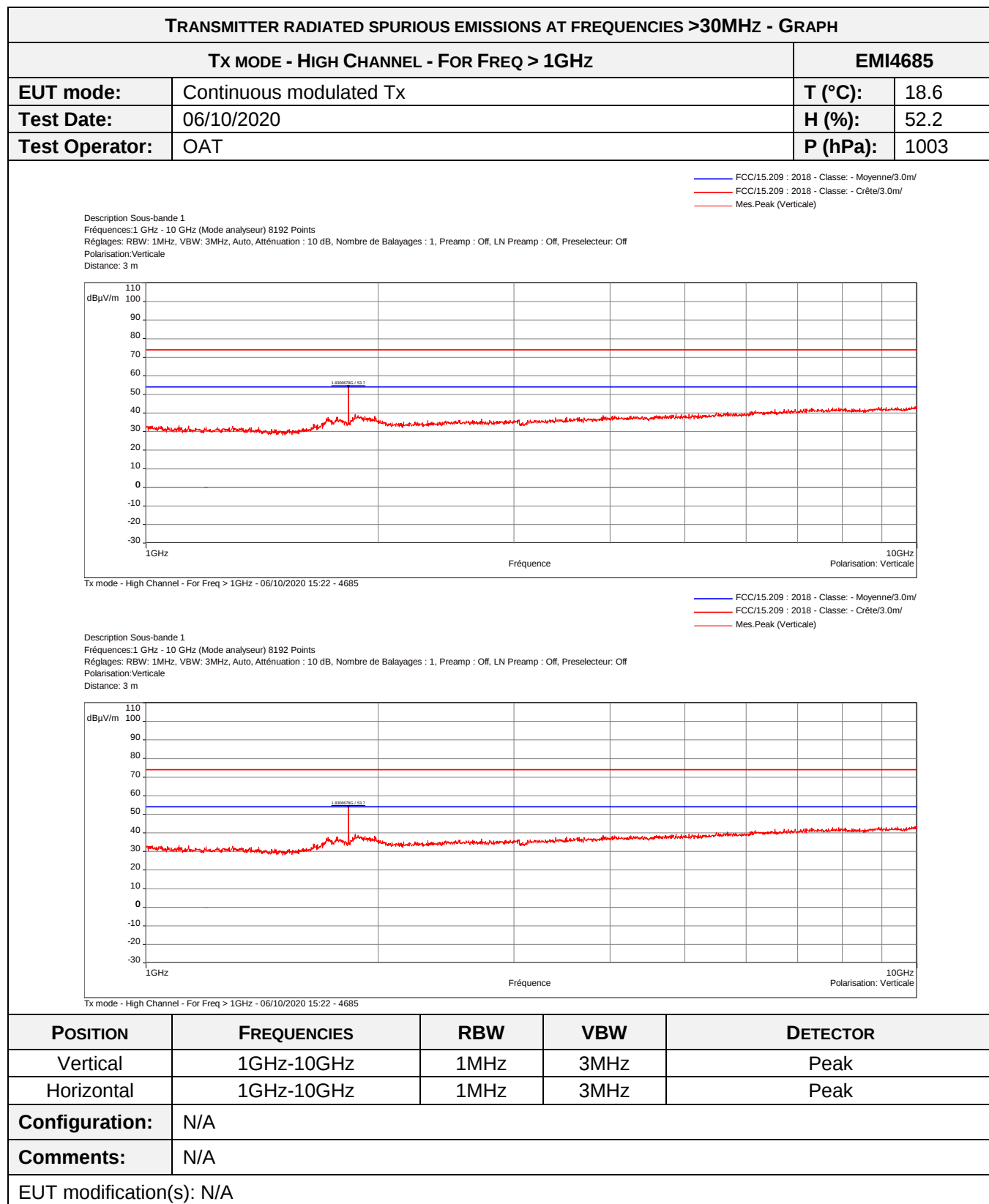


TEST SETUP PHOTO(S) - FOR FREQ > 1GHz









7.4. Band-edge compliance

Reference standard:	FCC part 15 Radio part 15.249 and RSS-210
Test method:	FCC part 15.249 subclause d) and RSS-210
Test description: d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation. EUT is set on an insulating support at 80cm above the ground reference plane (150cm for $f > 1\text{GHz}$). Measurements were 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. 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
BandEdge - Low Channel	901MHz-929MHz	15.249	EMI4675	PASS
BandEdge - High Channel	901MHz-929MHz	15.249	EMI4677	PASS

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

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HL223	3126	13/06/2018	13/08/2021
Cable	MegaPhase	F135N1N28	16666	25/10/2019	25/12/2021
Cable	SUCOFLEX	N-3m	14378	25/06/2019	25/08/2021
Cable	SUCOFLEX	N-3m	14379	25/06/2019	25/08/2021
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Receiver	Agilent Technologies	E4440A	5824	24/04/2018	24/12/2020
Shielded enclosure	COMTEST	SAC 3m	14494	02/10/2019	02/12/2022
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12269	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26

Blank cells = Permanent validity

BAND-EDGE COMPLIANCE- TABULATED RESULTS			
BANDEdge - LOW CHANNEL			EMI4675
Frequency (MHz)	Polarization	Level (dBμV/m)	Limit (dBμ/m)
N/A	N/A	N/A	N/A

No spurious emissions were detected.

BAND-EDGE COMPLIANCE- TABULATED RESULTS			
BAND EDGE - HIGH CHANNEL			EMI4677
Frequency (MHz)	Polarization	Level (dBμV/m)	Limit (dBμ/m)
N/A	N/A	N/A	N/A

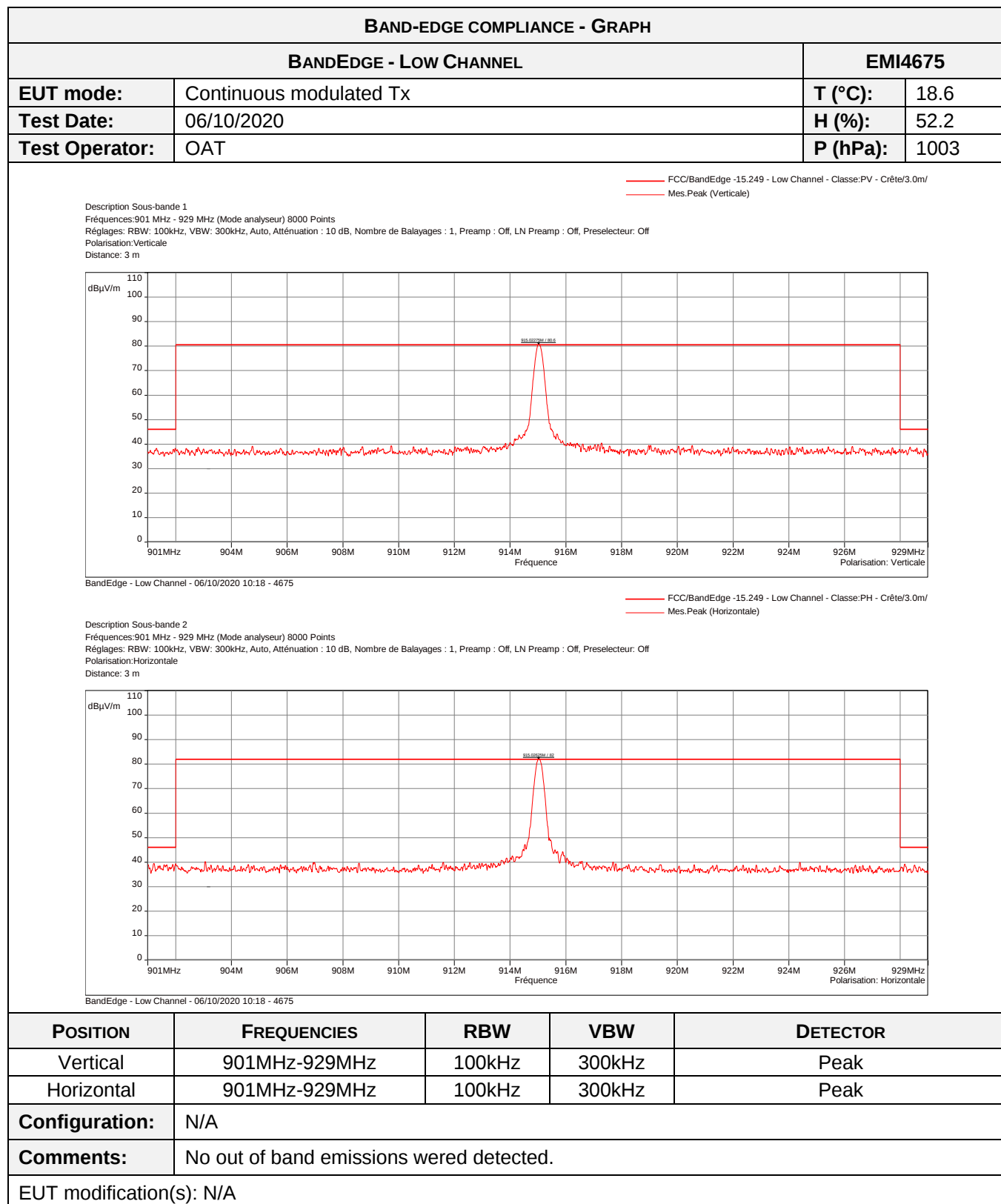
No spurious emissions were detected.

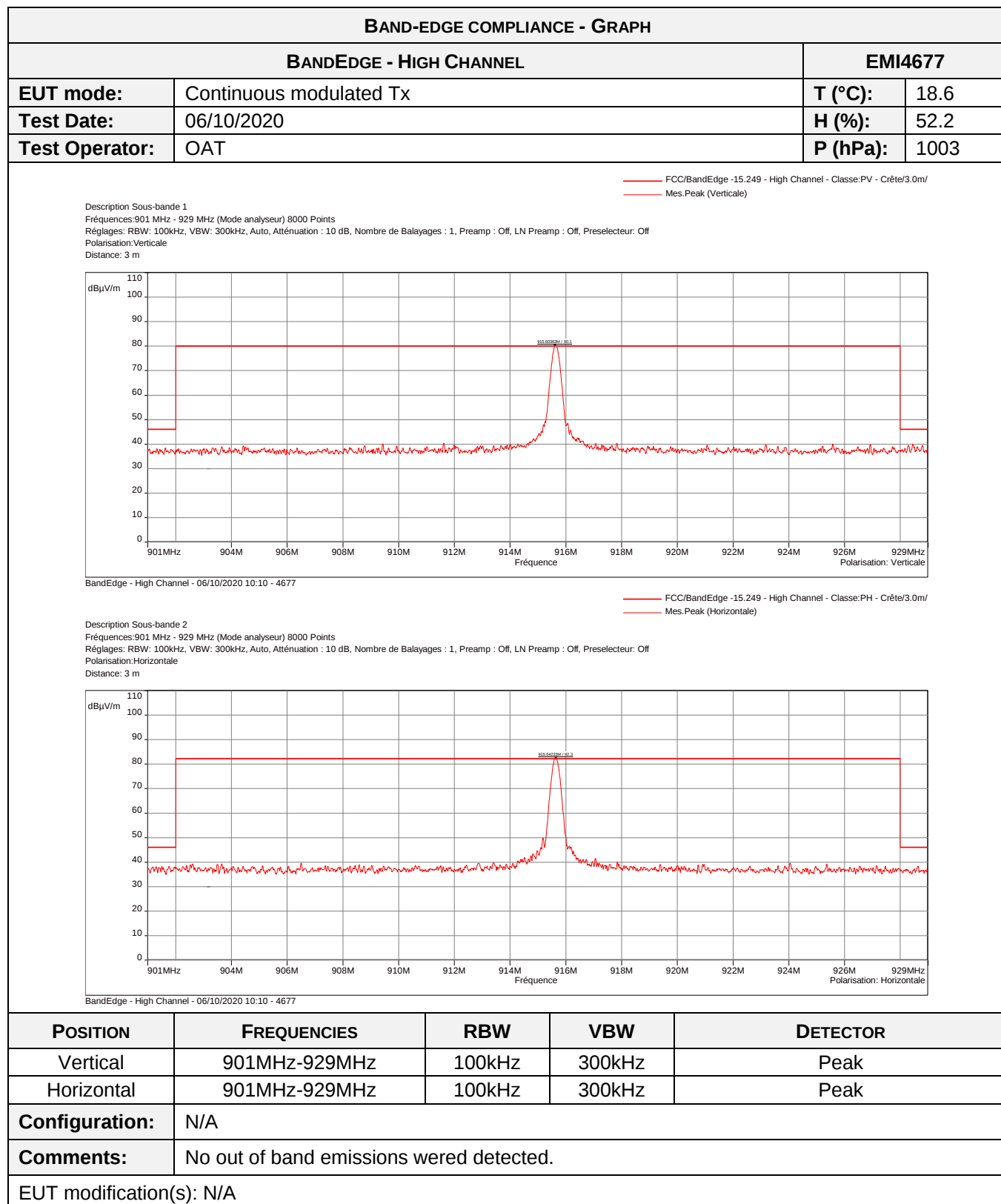
TEST SETUP PHOTO(S) – EUT POSITION



TEST SETUP PHOTO(S)







7.5. Effective isotropic radiated power

a) NORMAL TESTS CONDITIONS

Reference standard:	FCC part 15 Radio part 15.249 and RSS-210
Test method:	FCC part 15.249 and RSS-210
General test setup: EUT is set on an insulating support at 80cm above the ground reference plane. 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 (1m to 4m) in horizontal and vertical polarities. 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
EIRP - Low Channel	914.525MHz- 915.525MHz	50 mV/m (93.98 dBμV/m)	EMI4669	PASS
EIRP - High Channel	915.125MHz- 916.125MHz		EMI4676	PASS

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

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HL223	3126	13/06/2018	13/08/2021
Cable	MegaPhase	F135N1N28	16666	25/10/2019	25/12/2021
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Receiver	Agilent Technologies	E4440A	5824	24/04/2018	24/12/2020
Shielded enclosure	COMTEST	SAC 3m	14494	02/10/2019	02/12/2022
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12269	07/05/2020	07/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26

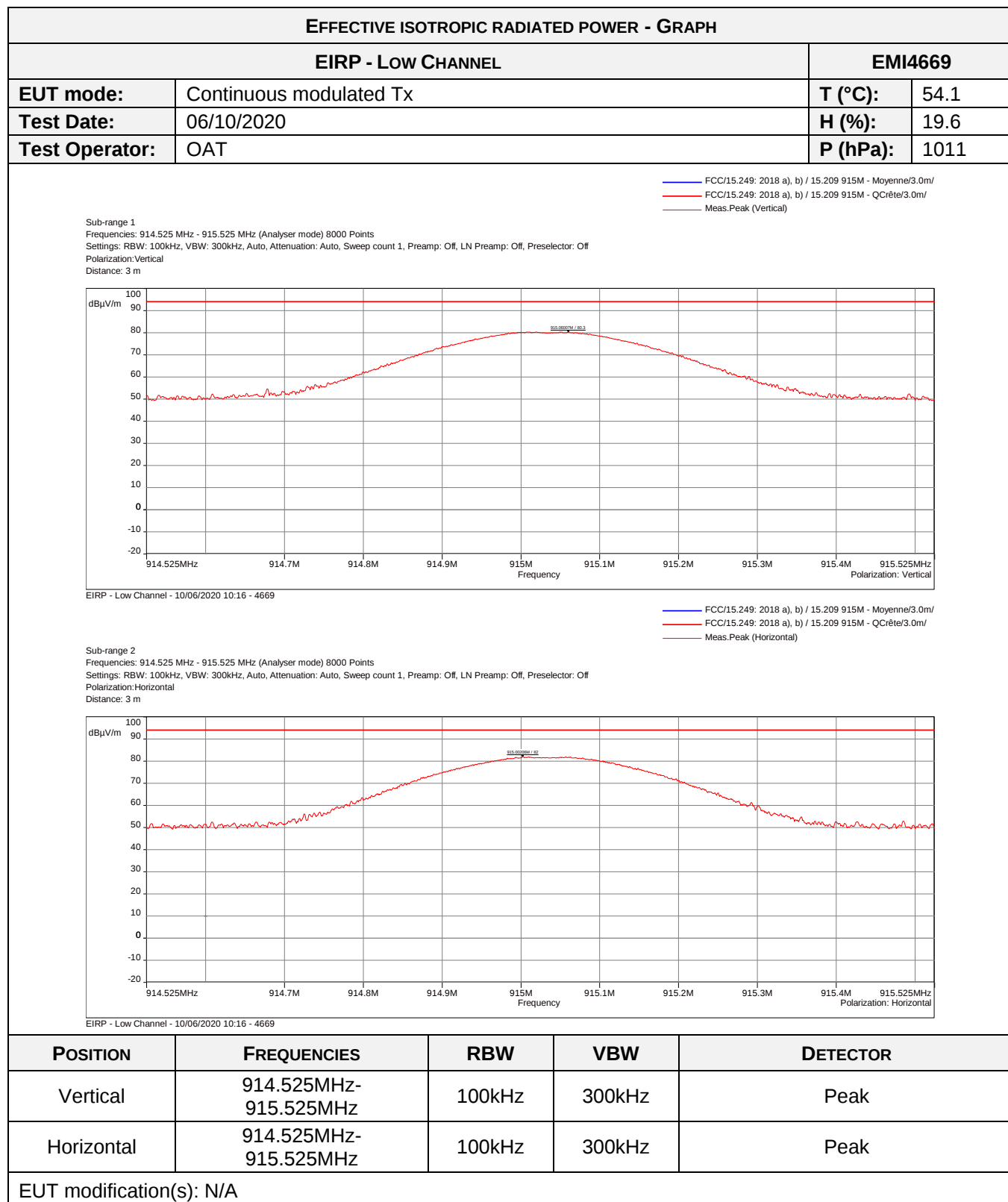
Blank cells = Permanent validity

TEST SETUP PHOTO(S) – EUT POSITION

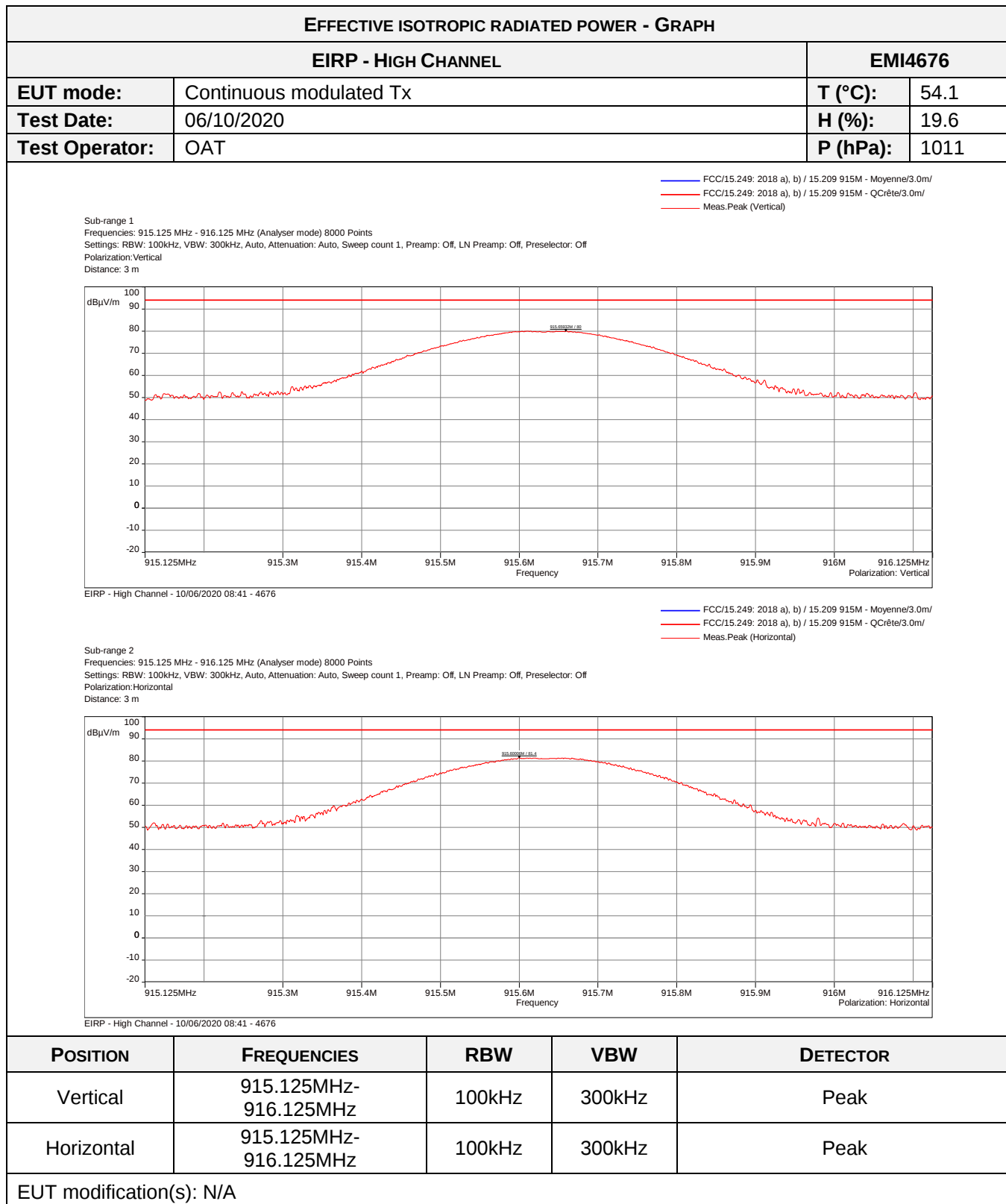


TEST SETUP PHOTO(S)





EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - Low CHANNEL			EMI4669
Frequency (MHz)	Polarization	Level (dBμV/m)	Limit (dBμV/m)
915.025	Vertical	80.3	93.98
915.025	Horizontal	82.0	93.98



EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - HIGH CHANNEL			EMI4676
Frequency (MHz)	Polarization	Level (dBm)	Limit (dBm)
915.625	Vertical	80.0	93.98
915.625	Horizontal	81.4	93.98

b) EXTREMES TESTS CONDITIONS

Reference standard:	FCC part 15 Radio part 15.249 and RSS-210
Test method:	FCC part 15.249 and RSS-210
General test setup: EUT is set inside the climatic enclosure. EIRP measurements are repeated in extreme test conditions with the power levels correlated with the maximum effective radiated power measured in normal conditions.	

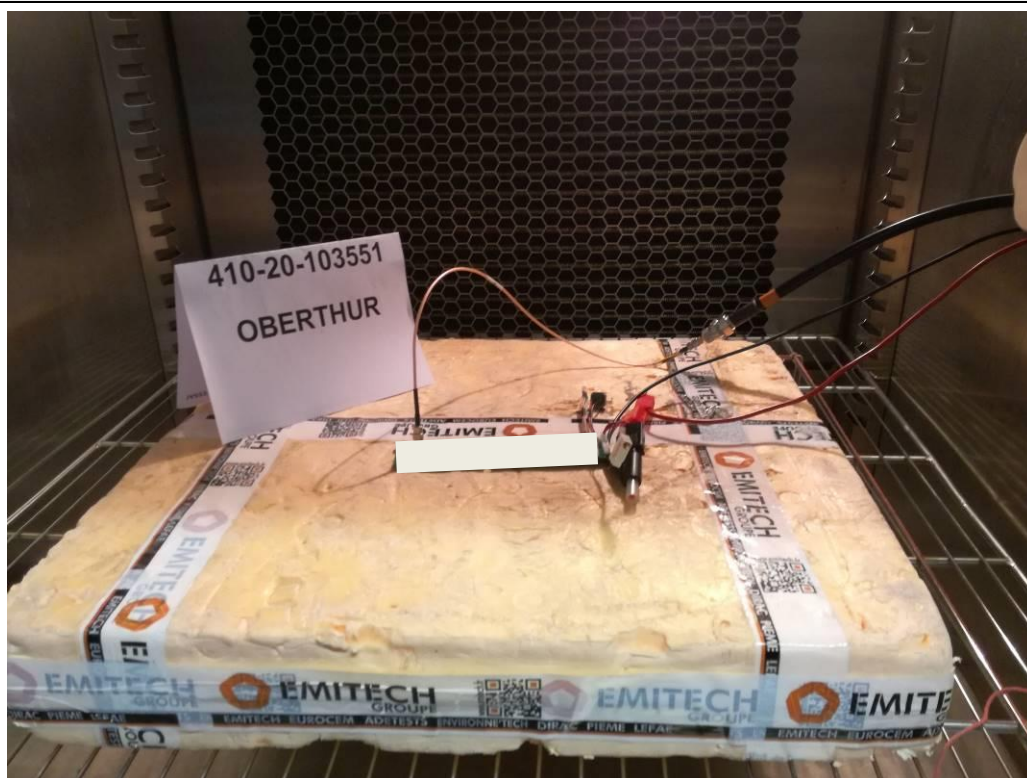
TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Low channel / 25°C / 3.6Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4590	PASS
Low channel / 25°C / 2.7Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4911	PASS
Low channel / 65°C / 3.6Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4912	PASS
Low channel / 65°C / 2.7Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4913	PASS
Low channel / -20°C / 3.6Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4914	PASS
Low channel / -20°C / 2.7Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4915	PASS
High channel / 25°C / 3.6Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4916	PASS
High channel / 25°C / 2.7Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4917	PASS
High channel / 65°C / 3.6Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4918	PASS
High channel / 65°C / 2.7Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4919	PASS
High channel / -20°C / 3.6Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4920	PASS
High channel / -20°C / 2.7Vdc	Continuous modulated Tx	93.98 dBμV/m	EMI4921	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.8 °C
Relative Humidity	20 to 75 %	61.8 %
Atmospheric pressure	N/A	1006 hPa
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
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2022
Cable	N	3m	16414	04/05/2019	04/07/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Digital thermometer	GHM Greisinger	GMH 3710	12968	01/10/2020	01/10/2021
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Power supply	TTI	TSX-1820P	4365		
Receiver	Agilent Technologies	E4440A	5824	24/04/2018	24/06/2022
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

Blank cells = Permanent validity

TEST SETUP PHOTO(S) – EXTREME TEST CONDITIONS



EFFECTIVE RADIATED POWER - TABULATED RESULTS				
TEST CASE	FREQUENCY	LEVEL (dB μ V/m)	LIMIT (dB μ V/m)	RESULT TAB.
Low channel / 25°C / 3.6Vdc	915.025 MHz	82.00	93.98	EMI4590
Low channel / 25°C / 2.7Vdc	915.025 MHz	81.77	93.98	EMI4911
Low channel / 65°C / 3.6Vdc	915.025 MHz	81.39	93.98	EMI4912
Low channel / 65°C / 2.7Vdc	915.025 MHz	80.58	93.98	EMI4913
Low channel / -20°C / 3.6Vdc	915.025 MHz	82.46	93.98	EMI4914
Low channel / -20°C / 2.7Vdc	915.025 MHz	81.61	93.98	EMI4915
High channel / 25°C / 3.6Vdc	915.625 MHz	81.40	93.98	EMI4916
High channel / 25°C / 2.7Vdc	915.625 MHz	80.76	93.98	EMI4917
High channel / 65°C / 3.6Vdc	915.625 MHz	80.84	93.98	EMI4918
High channel / 65°C / 2.7Vdc	915.625 MHz	79.65	93.98	EMI4919
High channel / -20°C / 3.6Vdc	915.625 MHz	81.90	93.98	EMI4920
High channel / -20°C / 2.7Vdc	915.625 MHz	81.07	93.98	EMI4921

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	07/10/2020	-

7.6. Occupied Bandwidth

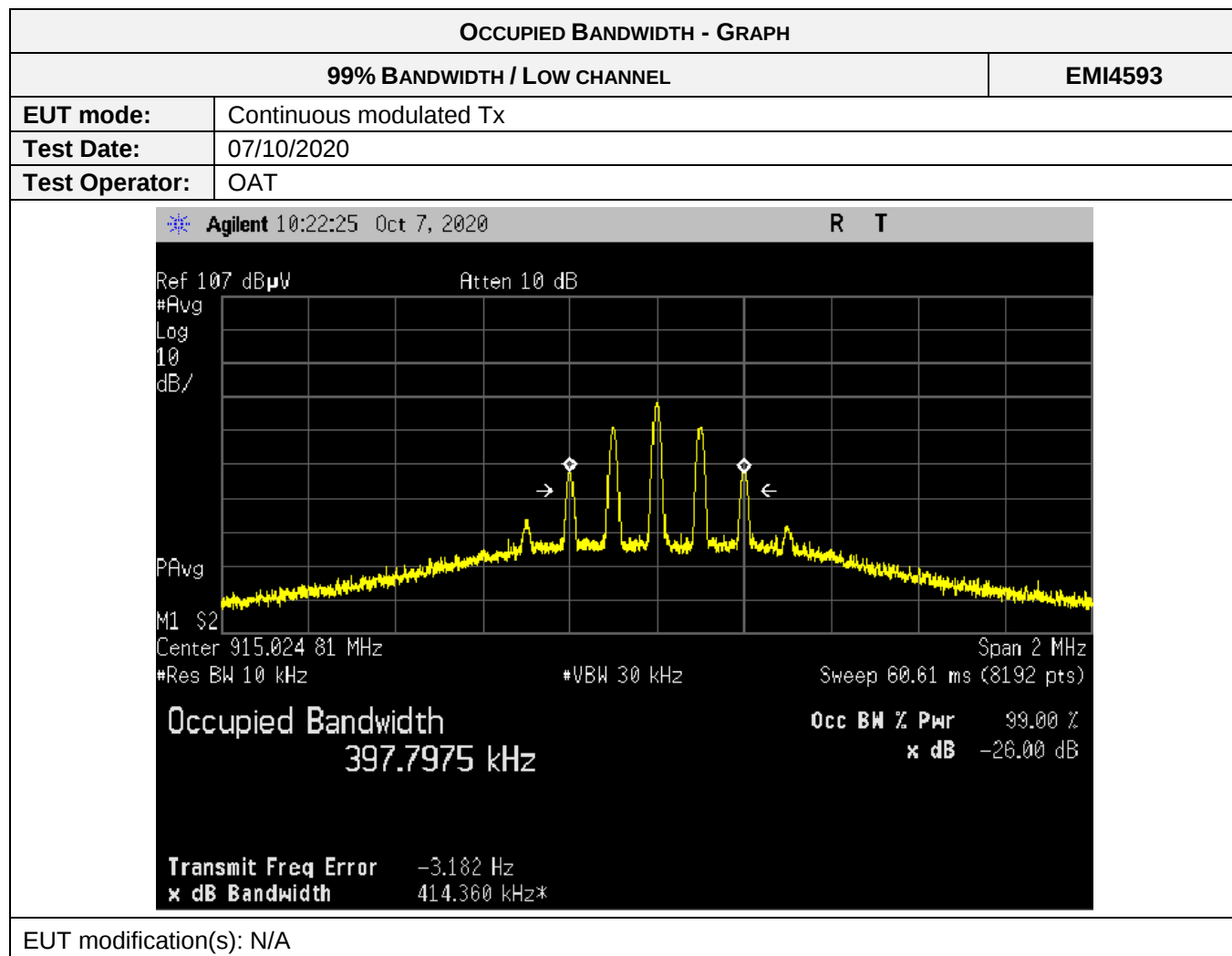
Reference standard:	FCC part 15 Radio part 15.215 c)
Test method:	FCC part 15 Radio part 15.215 c) and RSS Gen
Test description: The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and 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 connected to the measuring receiver via 50Ω attenuator(s).	

TESTED CHANNEL	RESULT	SEVERITY	RESULT TAB.	VERDICT
99% Bandwidth / Low channel	397.7975 kHz	Flow > 904.6MHz Fhigh < 925.4MHz	EMI4593	PASS
99% Bandwidth / High channel	395.8670 kHz	Flow > 904.6MHz Fhigh < 925.4MHz	EMI4934	PASS
20dB Bandwidth / Low channel	399.22 kHz	Flow > 904.6MHz Fhigh < 925.4MHz	EMI4935	PASS
20dB Bandwidth / High channel	399.22 kHz	Flow > 904.6MHz Fhigh < 925.4MHz	EMI4936	PASS

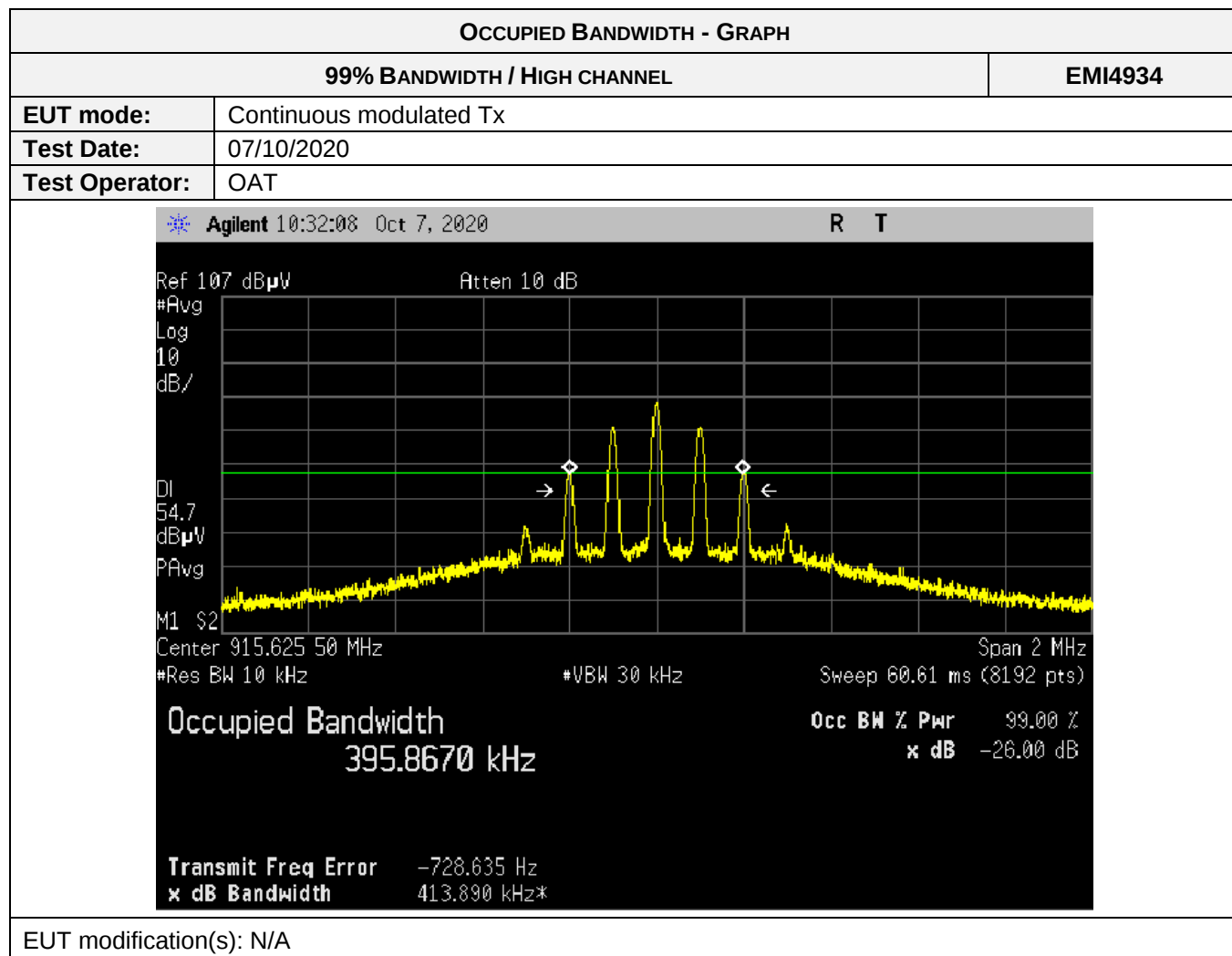
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.8 °C
Relative Humidity	20 to 75 %	61.8 %
Atmospheric pressure	N/A	1006 hPa
Test method deviation: N/A		
Supplementary information: EUT power supply is replaced by a stabilized power supply.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2022
Cable	N	3m	16414	04/05/2019	04/07/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Power supply	TTI	TSX-1820P	4365		
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021
Voltmeter	Agilent Technologies	E4440A	5824	24/04/2018	24/06/2022

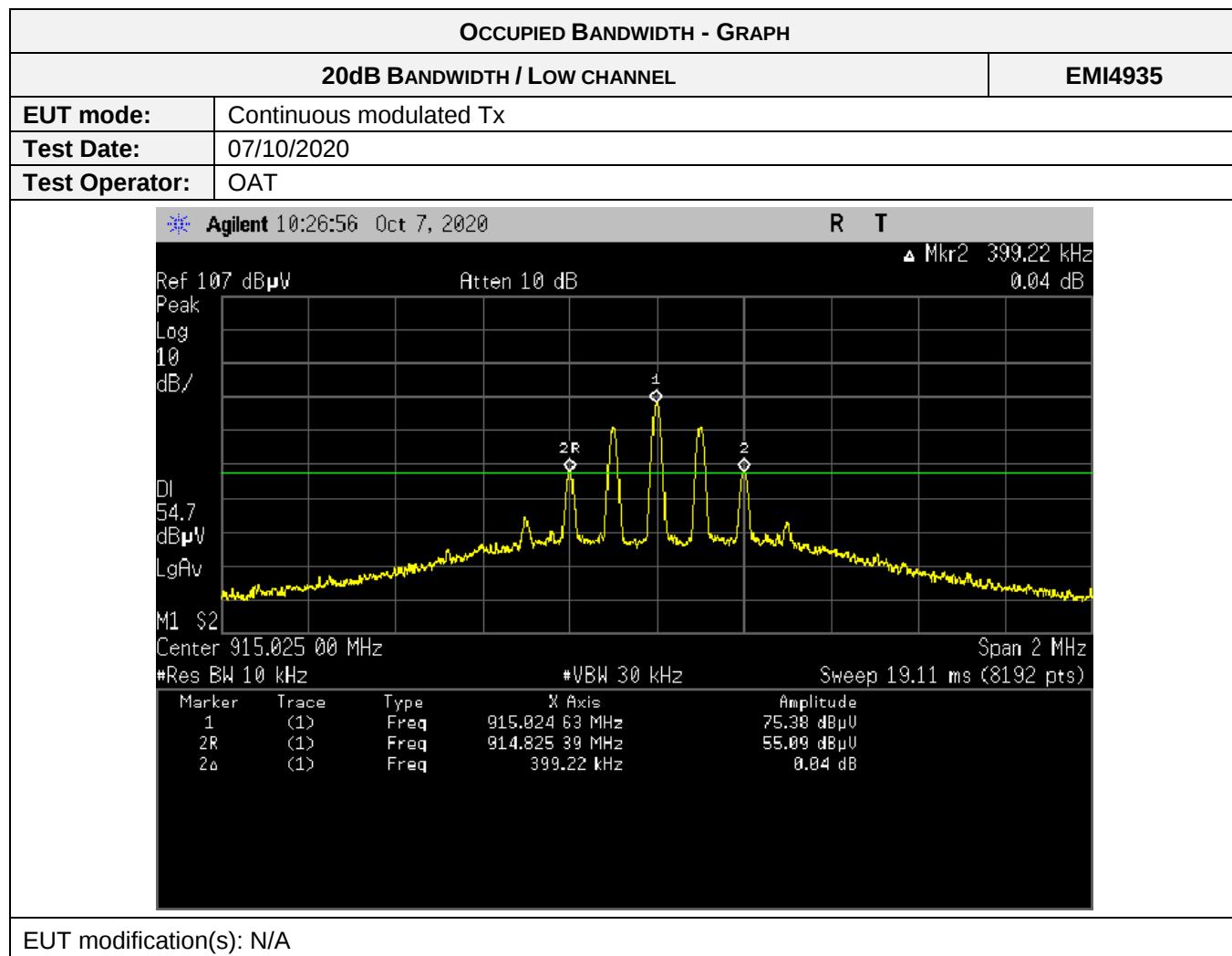
Blank cells = Permanent validity



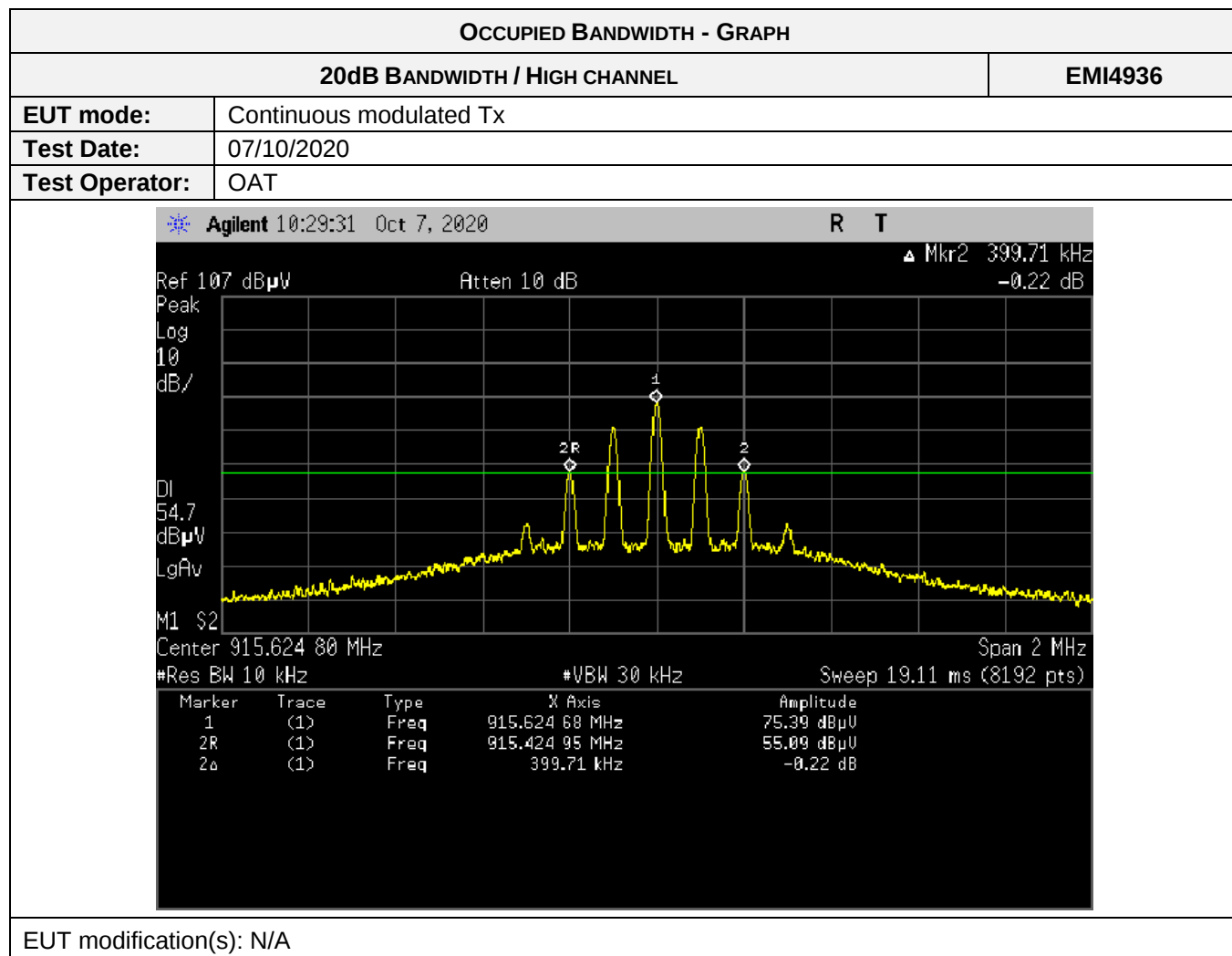
OCCUPIED BANDWIDTH - TABULATED RESULTS			
99% BANDWIDTH / LOW CHANNEL			EMI4593
f _{Low}	f _{High}	99% Bandwidth (f _{high} -f _{low})	Limit
> 904.6MHz	< 925.4MHz	397.7975 kHz	Flow > 904.6MHz Fhigh < 925.4MHz



OCCUPIED BANDWIDTH - TABULATED RESULTS			
99% BANDWIDTH / HIGH CHANNEL			EMI4934
f _{Low}	f _{High}	99% Bandwidth (f _{high} -f _{low})	Limit
> 904.6MHz	< 925.4MHz	395.8670 kHz	Flow > 904.6MHz Fhigh < 925.4MHz



OCCUPIED BANDWIDTH - TABULATED RESULTS			
20dB BANDWIDTH / LOW CHANNEL			EMI4935
f _{Low}	f _{High}	20dB Bandwidth (f _{high} -f _{low})	Limit
914.82539 MHz	915.22461 MHz	399.22 kHz	Flow > 904.6MHz Fhigh < 925.4MHz



OCCUPIED BANDWIDTH - TABULATED RESULTS			
20dB BANDWIDTH / HIGH CHANNEL			EMI4936
f _{Low}	f _{High}	20dB Bandwidth (f _{high} -f _{low})	Limit
915.42495 MHz	915.82466 MHz	399.22 kHz	Flow > 904.6MHz Fhigh < 925.4MHz

7.7. Frequency error

Reference standard:	FCC part 15 Radio part 15.215 c)
Test method:	FCC part 15 Radio part 15.215 c) and RSS Gen
Test description: 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).	

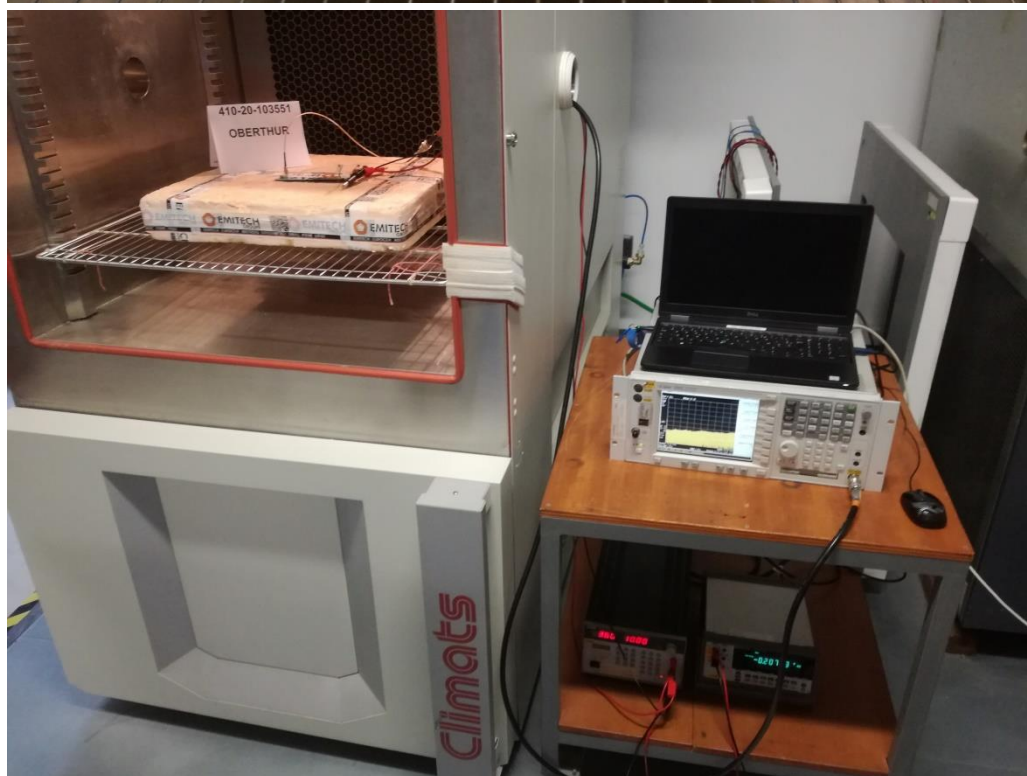
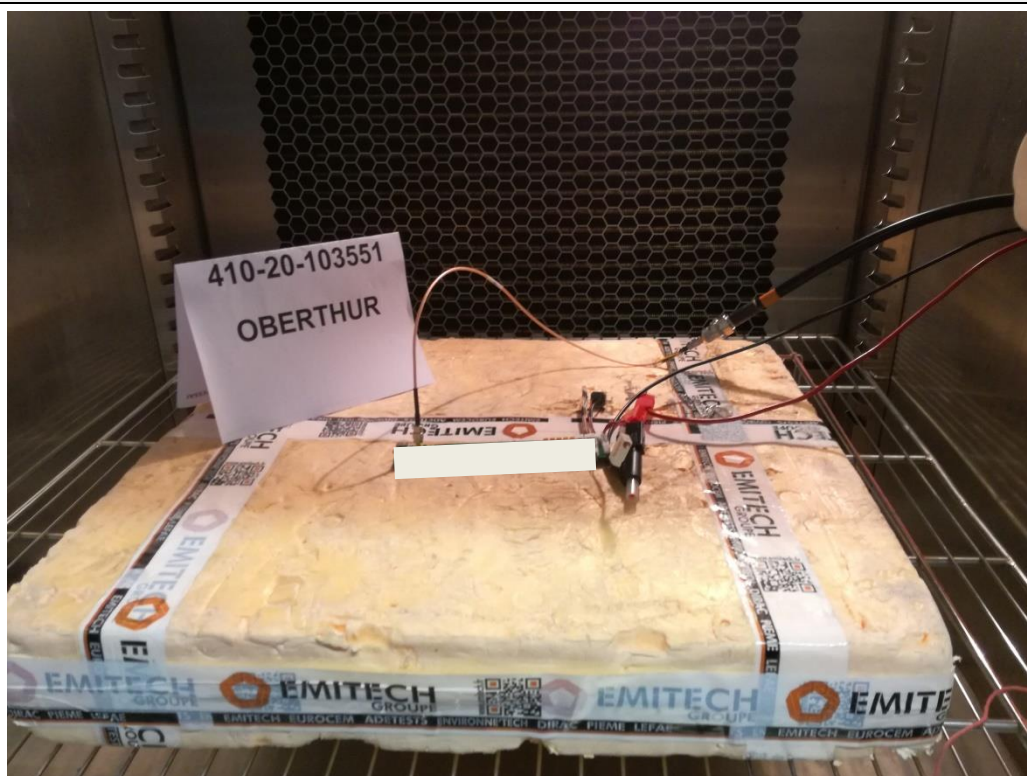
TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Low channel / 25°C/ 3.6Vdc	Continuous unmodulated Tx	0.001 %	EMI4594	PASS
Low channel / 25°C/ 2.7Vdc	Continuous unmodulated Tx	0.001 %	EMI4922	PASS
Low channel / 65°C/ 3.6Vdc	Continuous unmodulated Tx	0.001 %	EMI4923	PASS
Low channel / 65°C/ 2.7Vdc	Continuous unmodulated Tx	0.001 %	EMI4924	PASS
Low channel / -20°C/ 3.6Vdc	Continuous unmodulated Tx	0.001 %	EMI4925	PASS
Low channel / -20°C/ 2.7Vdc	Continuous unmodulated Tx	0.001 %	EMI4927	PASS
High channel / 25°C/ 3.6Vdc	Continuous unmodulated Tx	0.001 %	EMI4928	PASS
High channel / 25°C/ 2.7Vdc	Continuous unmodulated Tx	0.001 %	EMI4929	PASS
High channel / 65°C/ 3.6Vdc	Continuous unmodulated Tx	0.001 %	EMI4930	PASS
High channel / 65°C/ 2.7Vdc	Continuous unmodulated Tx	0.001 %	EMI4931	PASS
High channel / -20°C/ 3.6Vdc	Continuous unmodulated Tx	0.001 %	EMI4932	PASS
High channel / -20°C/ 2.7Vdc	Continuous unmodulated Tx	0.001 %	EMI4933	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.8 °C
Relative Humidity	20 to 75 %	61.8 %
Atmospheric pressure	N/A	1006 hPa
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
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2022
Cable	N	3m	16414	04/05/2019	04/07/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Digital thermometer	GHM Greisinger	GMH 3710	12968	01/10/2020	01/10/2021
Multimeter	FLUKE	8808A	12446	29/09/2020	29/11/2021
Power supply	TTI	TSX-1820P	4365		
Receiver	Agilent Technologies	E4440A	5824	24/04/2018	24/06/2022
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

Blank cells = Permanent validity

TEST SETUP PHOTO(S) – EXTREME TEST CONDITIONS



FREQUENCY ERROR - TABULATED RESULTS				
TEST CASE	FREQUENCY (MHz)	FREQUENCY ERROR	LIMIT	RESULT TAB.
Low channel / 25°C/ 3.6Vdc	915.024809	N/A (Ref.)	0.001 %	EMI4594
Low channel / 25°C/ 2.7Vdc	915.024741	-0.00001 %	0.001 %	EMI4922
Low channel / 65°C/ 3.6Vdc	915.020834	-0.00043 %	0.001 %	EMI4923
Low channel / 65°C/ 2.7Vdc	915.020773	-0.00044 %	0.001 %	EMI4924
Low channel / -20°C/ 3.6Vdc	915.02461	-0.00002 %	0.001 %	EMI4925
Low channel / -20°C/ 2.7Vdc	915.02543	0.00007 %	0.001 %	EMI4927
High channel / 25°C/ 3.6Vdc	915.624600	N/A (Ref.)	0.001 %	EMI4928
High channel / 25°C/ 2.7Vdc	915.624648	0.00001	0.001 %	EMI4929
High channel / 65°C/ 3.6Vdc	915.620491	-0.00045 %	0.001 %	EMI4930
High channel / 65°C/ 2.7Vdc	915.620443	-0.00045 %	0.001 %	EMI4931
High channel / -20°C/ 3.6Vdc	915.02461	0.00034 %	0.001 %	EMI4932
High channel / -20°C/ 2.7Vdc	915.624686	0.00001 %	0.001 %	EMI4933

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	07/10/2020	-

End of test report