



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

FCC part 15
FCC part 15.247
RSS-247_Issue 2, February 2017
ANSI C 63.10: 2013
ANSI C 63.4: 2014

Company: **ELA INNOVATION**
Address.....: 297 RUE MAURICE BEJART
34080 MONTPELLIER
FRANCE

Test item description: **BLUE SLIM FAMILY**
Trade Mark: BLUE SLIM FAMILY
Manufacturer: ELA INNOVATION
Model/Type reference.....: IDF03XXX
FCC ID.....: RVVBSLIMPF1
IC: 20429-BSLIMPF1
Ratings.....: 2,6Vdc to 3Vdc

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

Report Reference No.....: **RR410-19-104019-2A**
Test procedure: FCC IC Certification
Diffusion.....: MR LEBRUN
Applicant's name: ELA INNOVATION
Date of issue.....: February 19, 2020
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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:

Revision	Date	Modified pages	Modifications
0	February 19, 2020	/	Creation

1. GENERAL INFORMATION

This document submits the results of Radio tests performed on the equipment **BLUE SLIM FAMILY** (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 December the 16th to the 18th of 2019					
APPLICANT'S GENERAL INFORMATIONS:					
Company name : ELA INNOVATION Company address. : 297 RUE MAURICE BEJART 34080 MONTPELLIER FRANCE Person(s) present during the tests. : Mr BIBI Responsible. : MR LEBRUN					
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 15.247

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

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 W

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.



3.3. EUT General view

Front View



Back View

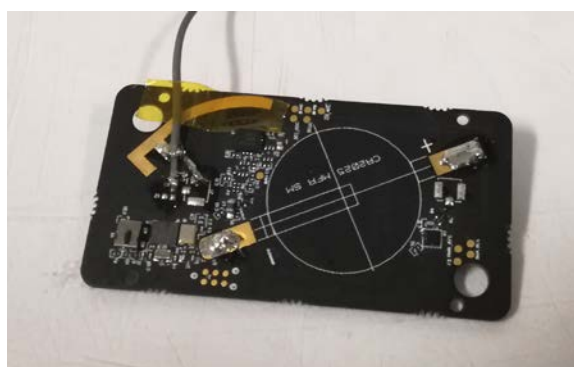


3.4. EUT Electronic board

Front View



Back View



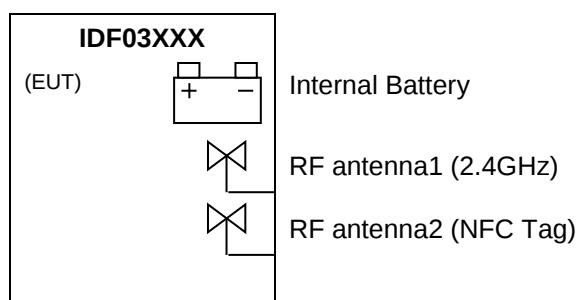
3.5. EUT Mechanical and Electrical Design

Power supply. : 3Vdc
Power supply range..... : 2,6Vdc to 3Vdc
Power type..... : Battery
Power (W)..... : Not communicated
Nominal current (A). : Not communicated
Dimensions (L x W x H) (mm). : 56 x 30.6 x 2.4 mm
Weight (g). : 6g
Temperature range (°C). : -20°C to +55°C
Ground bounding strap..... : No

Comments:

N/A

3.6. EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	
1	Internal Battery	DC	N/A	N/A	3Vdc
2	RF antenna 1	RF	N/A	N/A	PCB printed antenna used for QUUPPA and BLUETOOTH
3	RF antenna 2	RF	N/A	N/A	PCB printed antenna used for NFC

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

3.7. EUT Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	<i>Transceiver</i>
Technology	<i>QUUPPA/BLUETOOTH</i>
Environmental profile.....	<i>Data transmissions</i>
Temperature range.....	<i>-20°C to +55°C</i>
Antenna type	<i>Internal Antenna</i>
Antenna Gain.....	<i>Not communicated</i>
Comments:	
b) TRANSMITTER PARAMITERS (Tx)	
Frequency bands.....	<i>2400Mhz to 2483.5Mhz</i>
RF Power.....	<i>+4dBm</i>
Number of channels / Separation.....	<i>81 channels each 1MHz</i>
Modulation type	<i>GFSK</i>
Duty cycle	<i>Not communicated</i>
Tested frequency.....	<i>2401MHz (Low Channel)</i>
	<i>2441MHz (Mid Channel)</i>
	<i>2481MHz (High Channel)</i>
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	<i>2400Mhz to 2483.5Mhz</i>
Category/Class	<i>Not communicated</i>
Bandwidth	<i>Not communicated</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 **Not communicated**, 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 "statement on product": §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: (1) This device may not cause harmful interference, and (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.

During tests the marking plate was not present on EUT.
Hereunder an example of marking plate provided by the customer.



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 Not communicated, 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: <i>“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.”</i> §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: <i>“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:</i> <i>—Reorient or relocate the receiving antenna.</i> <i>—Increase the separation between the equipment and receiver.</i> <i>—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.</i> <i>—Consult the dealer or an experienced radio/TV technician for help.”</i>

5. OPINION(S) AND INTERPRETATION(S)

TEST(S) PERFORMED	DEVIATION(S) TO TEST METHOD(S)
FCC part 15.247 and RSS-247	N/A
FCC part 15.109, 15.209, 15.205, 15.215 RSS-247, RSS Gen	N/A

Comments: N/A

6. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
Conducted emissions Transmitter radiated spurious emissions at frequencies <30MHz - Tx Mode / 0° / All Channels - Tx Mode / 45° / All Channels - Tx Mode / 90° / All Channels Transmitter radiated spurious emissions at frequencies >30MHz - Tx mode - All Channels for Freq < 1Ghz - Tx mode - Low Channel for Freq > 1Ghz - Tx mode - Mid Channel for Freq > 1Ghz - Tx mode - High Channel for Freq > 1Ghz Operation within the band 902-928MHz, 2400-2483.5MHz and 5725-5850MHz - Frequency hopping and digitally modulated - Frequency hopping system - Digital modulation system - Maximum peak conducted output power - For hopping system in the 2400-2483.5 MHz and 5725-5850 MHz bands - For hopping system in the 902-928MHz band - For system using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands - Operation with directional antenna gains > 6 dBi - Out-of-band emissions - Power spectral density conducted - Hybrid system - Frequency hopping additional requirements - Frequency hopping intelligence - RF exposure compliance		N/A PASS PASS PASS PASS PASS PASS PASS - N/A PASS - N/A N/A PASS N/A PASS PASS N/A N/A N/A N/A PASS	Powered by internal batteries ANSI C63.10: 2013 ANSI C63.10: 2013 15.247 / RSS 247 a) a) (1) a) (2) b) b) (1) b) (2) b) (3) / EUT has its dedicated internal PCB antenna, due to this, this measurement was done in radiated. Integral antenna d) e) f) g) h) 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 account of uncertainty associated with the results.

TEST(S) PERFORMED	MODIFICATION(S)
FCC part 15.247 and RSS-247, FCC part 15.109, 15.209 and RSS Gen	N/A

7. RF EXPOSURE

Maximum EIRP with = 1.625 mW (eirp) at 2481MHz

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

PSD= $EIRP / (4 * \pi * R^2) = 1.625 / (4 * \pi * (20 \text{ cm})^2) = 0.0003 \text{ mW/cm}^2$

Limit= 1 mW/cm²

8. 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	$\pm 3.8\%$	$\pm 5\%$
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	$\pm 4.0\text{ dB}$	$\pm 4\text{ dB}$
Transitoire		
Amplitude	$\pm 8.5\%$	$\pm 20\%$
At the frequency	$\pm 166\text{ Hz}$	$\pm 250\text{ Hz}$
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	$\pm 5.4\text{ dB}$	$\pm 6\text{ dB}$
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	$\pm 2.9\text{ dB}$	/
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).

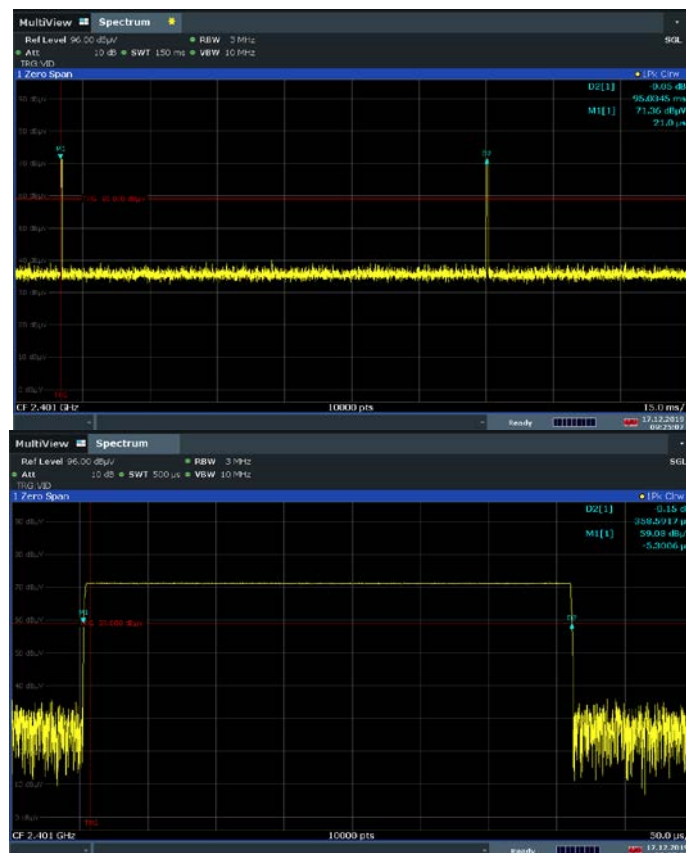
9. TEST CONDITIONS AND RESULTS

9.1. Duty Cycle of Test Signal

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.10 : 2013 §11
Test description:	EUT is directly connected to a spectrum analyser using attenuators.

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Attenuator	Radiall	R412710124	16491	25/06/2019	25/08/2021
Cable	N	3m	16426	04/05/2019	04/07/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Spectrum analyzer	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020

DUTY CYCLE OF TEST SIGNAL - GRAPH			
EUT mode:	Continuous modulated Tx	T (°C):	22.2
Test Date:	17/12/2019	H (%):	44.5
Test Operator:	OAT	P (hPa):	998



Duty Cycle = $0.358/95.035 = 0.0037$ (0.37%)

Duty Factor = $10 * \log(1/0.0037) = 24.32$

Duty cycle test mode is < 98%. A **24.32dB** duty factor shall be considered.

9.2. Transmitter radiated spurious emissions at frequencies <30MHz

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.4: 2014 & ANSI C63.10: 2013
Test description: 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	EMI4598	PASS
Tx Mode / 45° / All Channels	9kHz-30MHz	15.209	EMI4599	PASS
Tx Mode / 90° / All Channels	9kHz-30MHz	15.209	EMI4600	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.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Rohde & Schwarz	HFH2-Z2	5825(*)	21/09/2017	21/05/2020
Cable	MegaPhase	N-3m	14853	12/02/2018	12/04/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Shielded enclosure	COMTEST	SAC 3m	14494		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12269	27/11/2017	27/01/2020
Turntable	Maturo	NCD	14657		

BAT-EMC software version: V3.18.0.26

Blank cells = Permanent validity

(*) Under derogation EQS DER 000 S41 00068

TEST SETUP PHOTO(S)



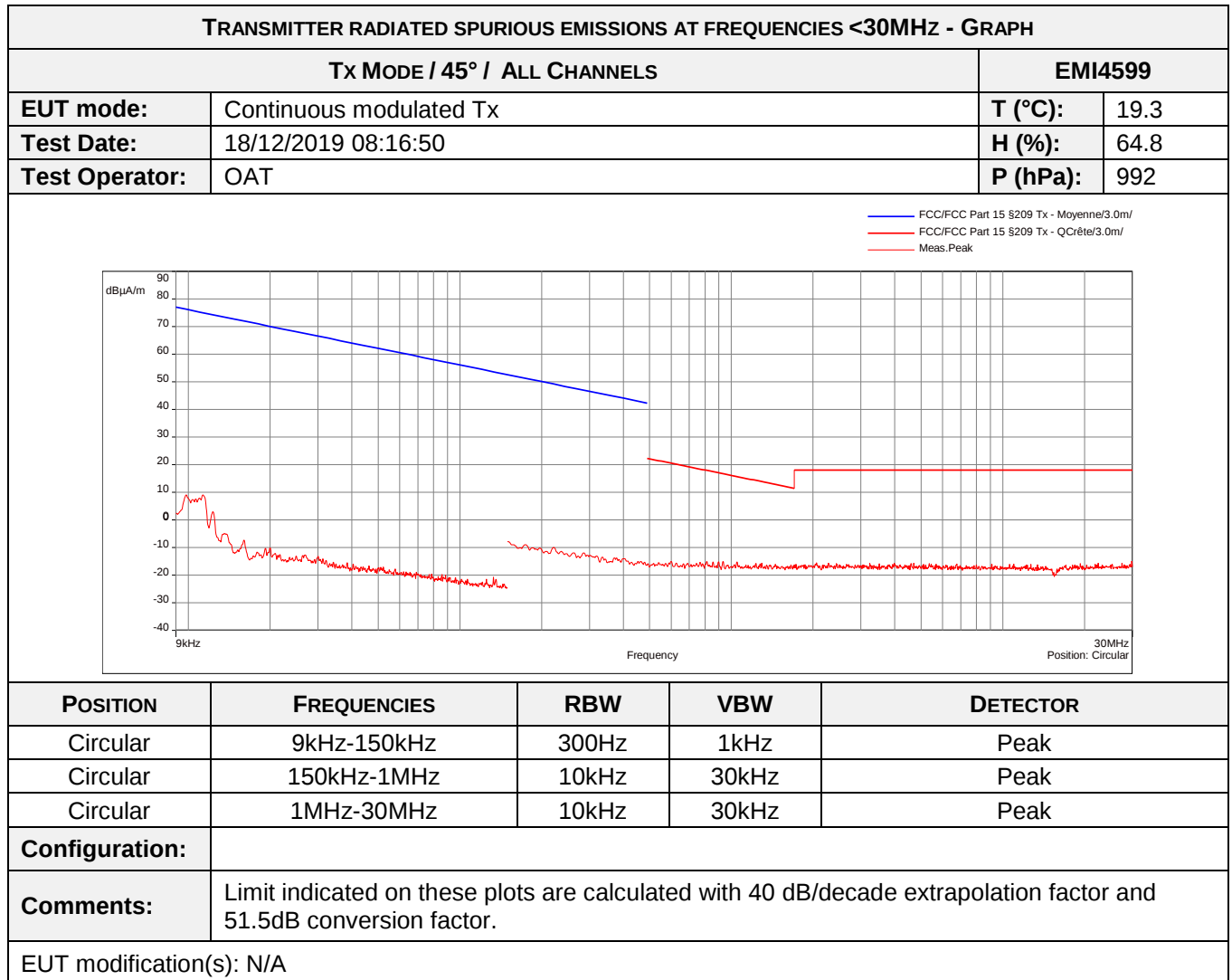
TRANSMITTER RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS							
Frequency (MHz)	Polarization	Level Peak (dB μ V/m)	Level Avg (dB μ V/m)	Limit Qpeak (dB μ V/m)	Limit Peak (dB μ V/m)	Limit Avg (dB μ V/m)	Margin dB
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

No spurious emissions were detected.

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHz - GRAPH				
Tx MODE / 0° / ALL CHANNELS		EMI4598		
EUT mode:	Continuous modulated Tx	T (°C):	19.3	
Test Date:	18/12/2019 08:12:39	H (%):	64.8	
Test Operator:	OAT	P (hPa):	992	
FCC/FCC Part 15 §209 Tx - Moyenne/3.0m/ FCC/FCC Part 15 §209 Tx - QCrête/3.0m/ Meas.Peak 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 dBμA/m 9kHz Frequency 30MHz Position: Circular				
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak
Configuration:				
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.			
EUT modification(s): N/A				

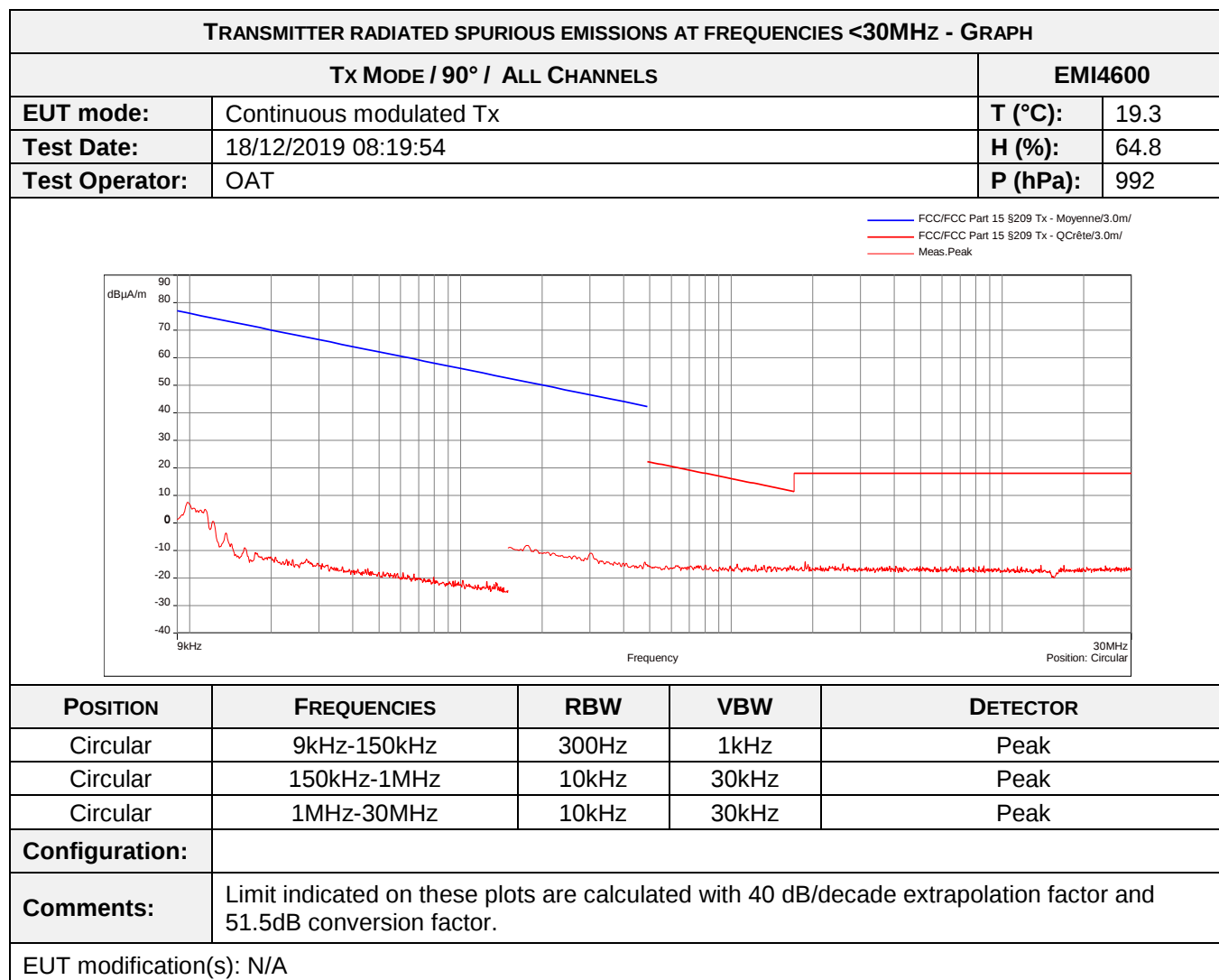
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHz - TABULATED RESULTS			
Tx MODE / 0° / ALL CHANNELS			EMI4598
Frequency (MHz)	Antenna Position	Level (dB μ A/m)	Limit (dB μ A/m)
N/A	N/A	N/A	N/A

No spurious emissions were detected.



TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHz - TABULATED RESULTS			
Tx MODE / 45° / ALL CHANNELS			EMI4599
Frequency (MHz)	Antenna Position	Level (dBμA/m)	Limit (dBμA/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 / 90° / ALL CHANNELS			EMI4600
Frequency (MHz)	Antenna Position	Level (dBµA/m)	Limit (dBµA/m)
N/A	N/A	N/A	N/A

No spurious emissions were detected.

9.3. Transmitter radiated spurious emissions at frequencies >30MHz

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.10: 2013
General test setup: EUT is set on an insulating support at 80cm above the ground reference plane (150cm for f >1GHz). 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	EMI4597	PASS
Tx mode - Low Channel for Freq > 1Ghz	1GHz-18GHz		EMI4554	PASS
Tx mode - Mid Channel for Freq > 1Ghz	1GHz-18GHz		EMI4575	PASS
Tx mode - High Channel for Freq > 1Ghz	1GHz-18GHz		EMI4574	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	0824	13/06/2018	13/08/2021
Antenna	Rohde & Schwarz	HL223	3126	13/06/2018	13/08/2021
Cable	MegaPhase	F135N1N28	16664	25/10/2019	25/12/2021
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	MegaPhase	N-3m	14853	12/02/2018	12/04/2020
Cable	MegaPhase	N-5m	14855	12/02/2018	12/04/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Filter	Micro-Tronics	HPM 15162	10273	11/01/2019	11/03/2021
Filter	Micro-Tronics	HPM18865	12843	08/06/2018	08/08/2020
Filter	Wainwright	WRCGV	9771	07/01/2019	07/03/2021

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
	Instruments	2402/2480- 2380/2500- 40/10EE-200W			
Preamplifier	Techniwave	APS16-0087	14040	25/06/2019	25/08/2020
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Shielded enclosure	RAY PROOF	C.V2	1423		
Shielded enclosure	COMTEST	SAC 3m	14494		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	7562	25/01/2019	25/03/2021
Thermohygrometer	Testo	608-H2	12269	27/11/2017	27/01/2020
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 FOR FREQ < 1GHz


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



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



TEST SETUP PHOTO(S) - FOR 200MHZ <FREQ< 1GHZ



TEST SETUP PHOTO(S) - FOR 1GHZ <FREQ

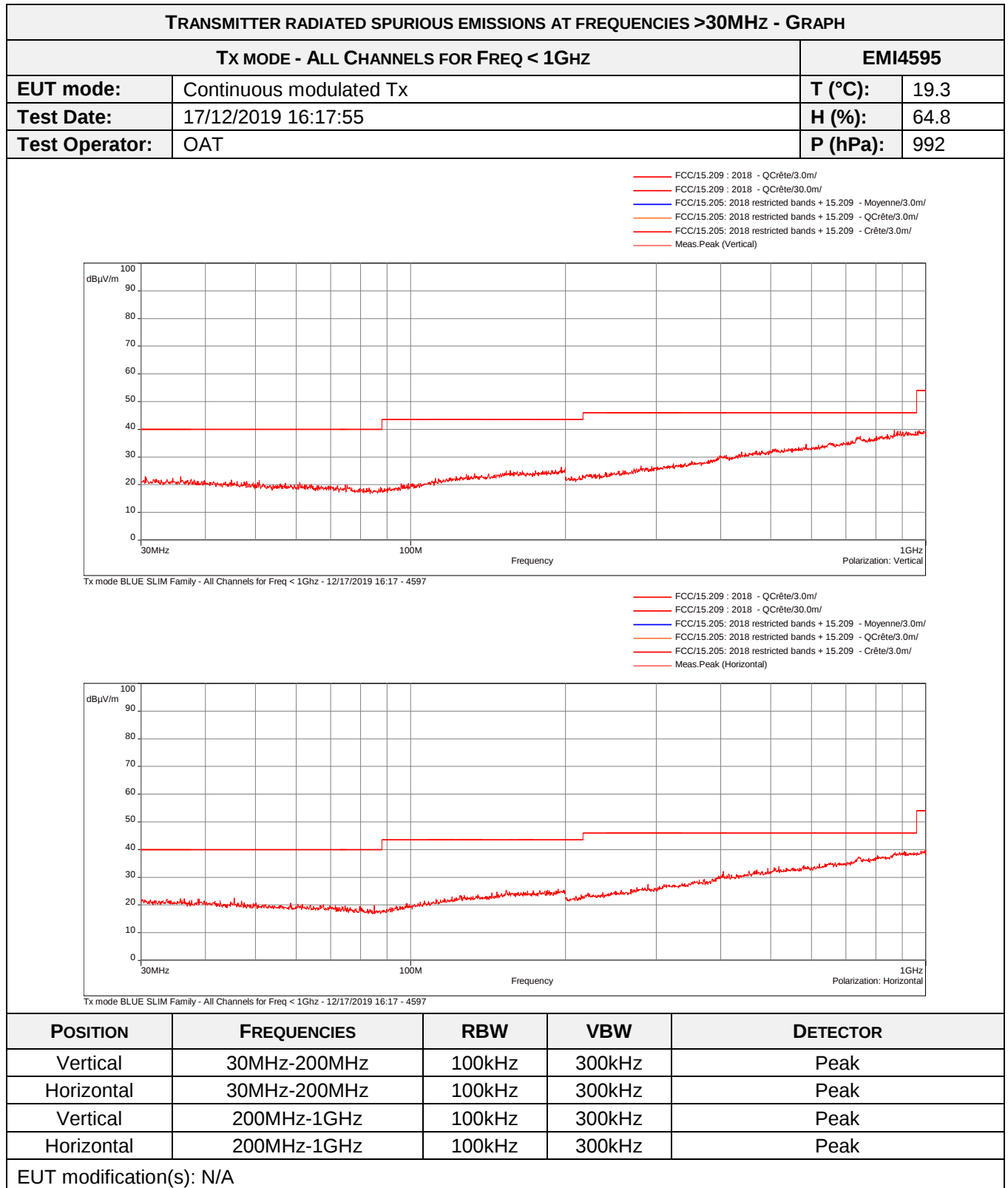


TRANSMITTER RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
TX MODE - LOW CHANNEL					
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Level Avg (dBμV/m)	Limit Avg (dBμV/m)	Margin dB
2273.327	Vertical	47.52	N/P	54	6.48
2297.530	Vertical	47.69	N/P	54	6.31
2337.334	Vertical	48.73	N/P	54	5.27
2377.538	Vertical	46.5	N/P	54	7.5
2497.150	Vertical	44.47	N/P	54	9.53
2273.127	Horizontal	53.69	37.26	54	16.74
2297.530	Horizontal	52.67	36.93	54	17.07
2313.131	Horizontal	52.79	36.86	54	17.14
2336.734	Horizontal	54.2	38.16	54	15.84
2337.134	Horizontal	54.06	39.11	54	14.89
2353.135	Horizontal	51.22	37.26	54	16.74
2377.338	Horizontal	50.35	36.45	54	17.55
2497.150	Horizontal	51.08	35.27	54	18.73
4800.180	Vertical	45.74	N/P	54	8.26
4801.680	Horizontal	42.76	N/P	54	11.24
TX MODE - MID CHANNEL					
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Level Avg (dBμV/m)	Limit Avg (dBμV/m)	Margin dB
2313.331	Vertical	47.9	N/P	54	6.1
2353.335	Vertical	49.01	N/P	54	4.99
2377.338	Vertical	49.31	N/P	54	4.69
2291.529	Horizontal	48.85	35.46	54	18.54
2312.731	Horizontal	55.7	37.59	54	16.41
2329.333	Horizontal	55.06	37.01	54	16.99
2335.534	Horizontal	53.42	35.83	54	18.17
2340.134	Horizontal	54.19	35.9	54	18.1
2352.935	Horizontal	55.21	36.73	54	17.27
2369.137	Horizontal	52.02	36.47	54	17.53
2377.538	Horizontal	53.07	37.24	54	16.76
2496.950	Horizontal	46.95	35.09	54	18.91
4881.188	Vertical	46.59	N/P	54	7.41
7323.432	Vertical	48.06	N/P	54	5.94
4881.188	Horizontal	52.36	N/P	54	1.64
7323.432	Horizontal	50.65	N/P	54	3.35

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

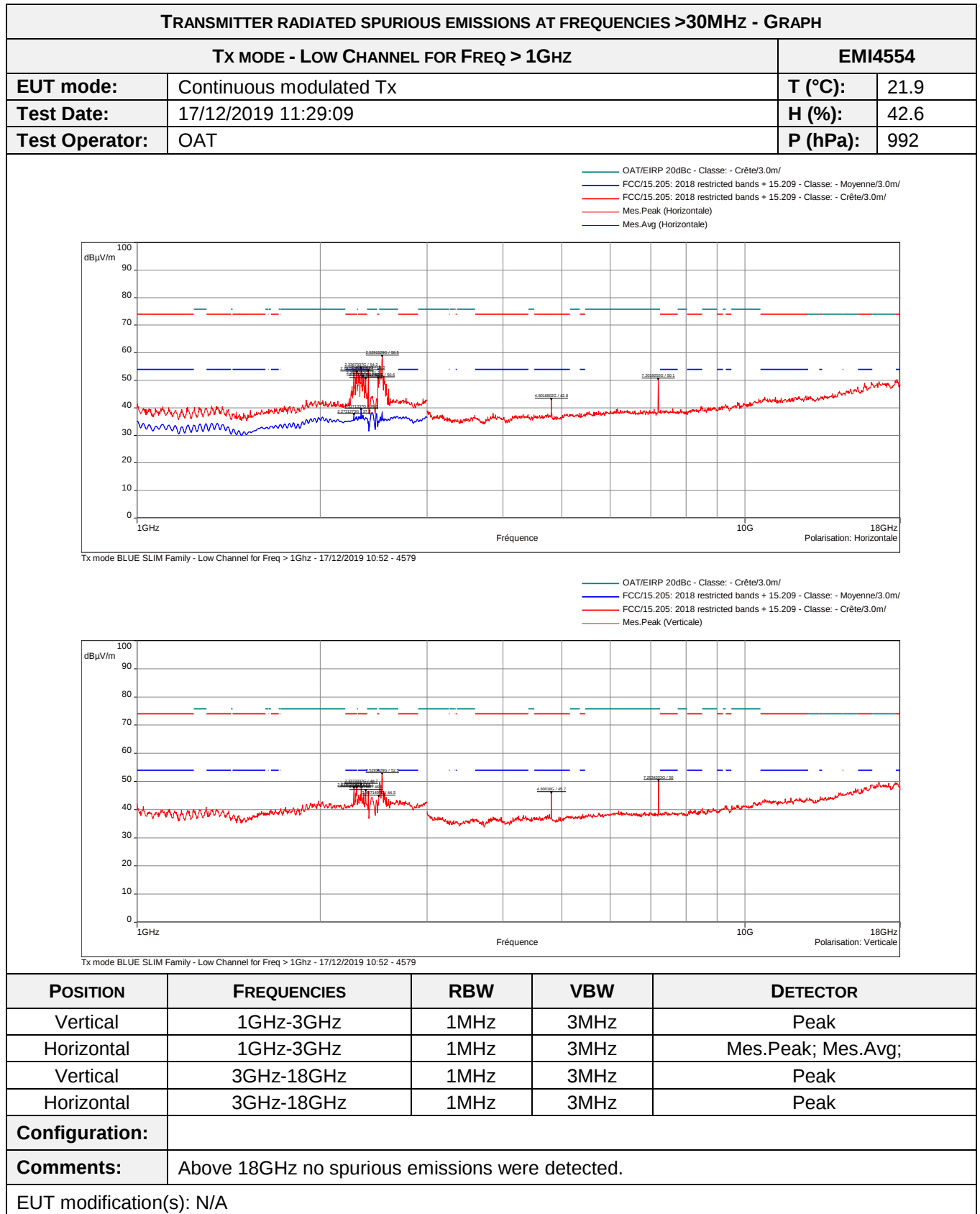
TRANSMITTER RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
TX MODE - HIGH CHANNEL					
Frequency (MHz)	Polarization	Level Peak (dB μ V/m)	Level Avg (dB μ V/m)	Limit Avg (dB μ V/m)	Margin dB
2276.328	Vertical	44.42	N/P	54	9.58
2353.135	Vertical	48.78	N/P	54	5.22
2377.138	Vertical	48.91	N/P	54	5.09
2260.126	Horizontal	46.78	35.13	54	18.87
2328.733	Horizontal	49.17	36.42	54	17.58
2337.334	Horizontal	50.76	36.47	54	17.53
2353.135	Horizontal	57.99	39.41	54	14.59
2368.737	Horizontal	54.23	37.01	54	16.99
2377.138	Horizontal	54.17	37.71	54	16.29
2491.749	Horizontal	51.6	34.75	54	19.25
2713.571	Horizontal	45.07	36.37	54	17.63
4960.696	Vertical	46.32	N/P	54	7.68
7443.444	Vertical	49.3	N/P	54	4.7
4962.196	Horizontal	49.88	N/P	54	4.12
7443.444	Horizontal	50.4	N/P	54	3.6

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



TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHz - TABULATED RESULTS			
TX MODE - ALL CHANNELS FOR FREQ < 1GHz			EMI4595
Frequency (MHz)	Polarization	Level (dBμV/m)	Limit (dBμV/m)
N/A	N/A	N/A	N/A

No spurious emissions were detected.



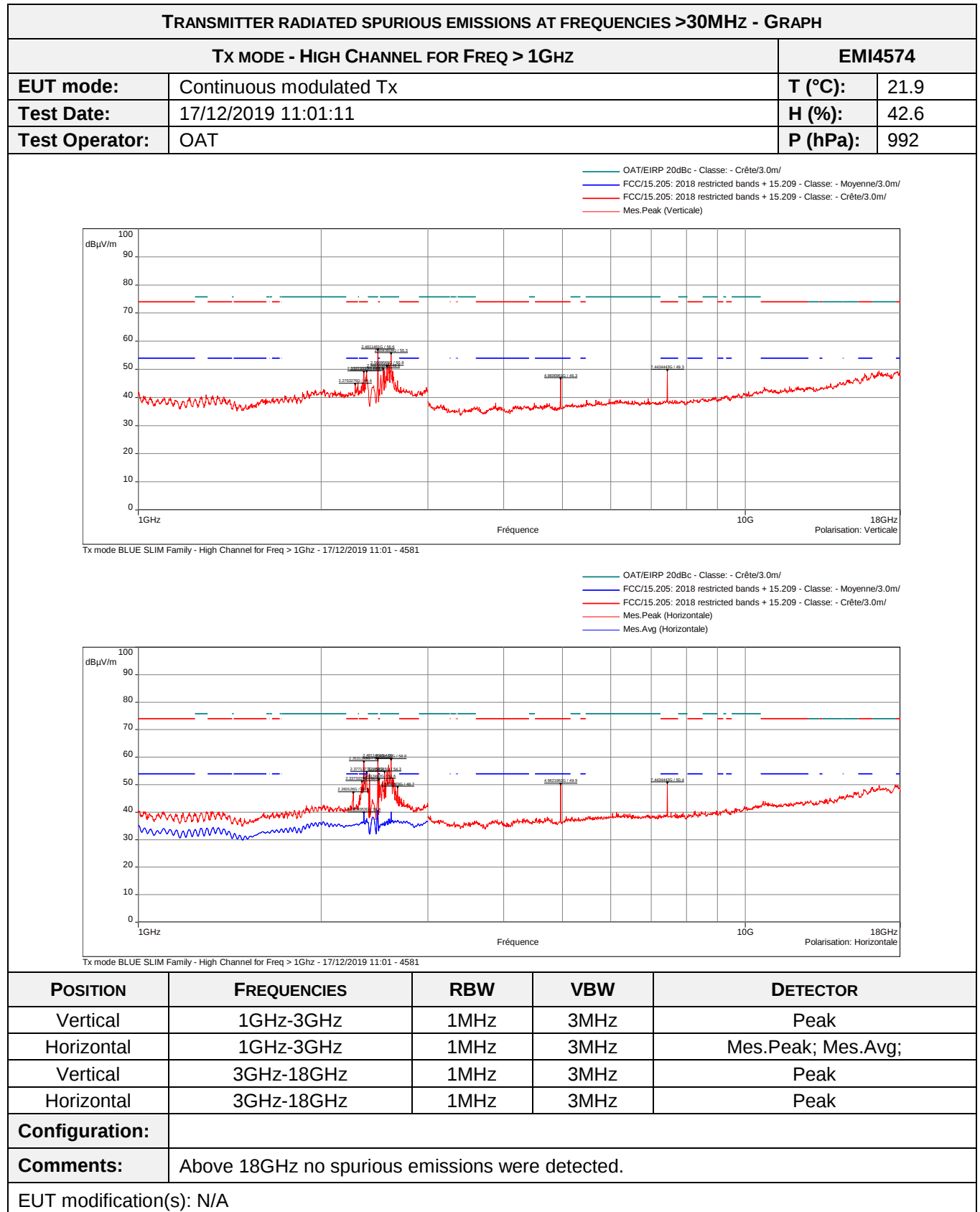
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHz - TABULATED RESULTS					
TX MODE - LOW CHANNEL FOR FREQ > 1GHz				EMI4554	
U _{Start} (start of the test):	N/P	U _{End} (end of the test):		N/P	
Voltage drop:	N/P	Limit:		+/- 5%	
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Level Avg (dBμV/m)	Limit Avg (dBμV/m)	Margin dB
2273.327	Vertical	47.52	N/P	54	6.48
2297.530	Vertical	47.69	N/P	54	6.31
2337.334	Vertical	48.73	N/P	54	5.27
2377.538	Vertical	46.5	N/P	54	7.5
2497.150	Vertical	44.47	N/P	54	9.53
2273.127	Horizontal	53.69	37.26	54	16.74
2297.530	Horizontal	52.67	36.93	54	17.07
2313.131	Horizontal	52.79	36.86	54	17.14
2336.734	Horizontal	54.2	38.16	54	15.84
2337.134	Horizontal	54.06	39.11	54	14.89
2353.135	Horizontal	51.22	37.26	54	16.74
2377.338	Horizontal	50.35	36.45	54	17.55
2497.150	Horizontal	51.08	35.27	54	18.73
4800.180	Vertical	45.74	N/P	54	8.26
4801.680	Horizontal	42.76	N/P	54	11.24

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

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TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHz - TABULATED RESULTS					
TX MODE - MID CHANNEL FOR FREQ > 1GHz				EMI4575	
U _{Start} (start of the test):	N/P	U _{End} (end of the test):		N/P	
Voltage drop:	N/P	Limit:		+/- 5%	
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Level Avg (dBμV/m)	Limit Avg (dBμV/m)	Margin dB
2313.331	Vertical	47.9	N/P	54	6.1
2353.335	Vertical	49.01	N/P	54	4.99
2377.338	Vertical	49.31	N/P	54	4.69
2291.529	Horizontal	48.85	35.46	54	18.54
2312.731	Horizontal	55.7	37.59	54	16.41
2329.333	Horizontal	55.06	37.01	54	16.99
2335.534	Horizontal	53.42	35.83	54	18.17
2340.134	Horizontal	54.19	35.9	54	18.1
2352.935	Horizontal	55.21	36.73	54	17.27
2369.137	Horizontal	52.02	36.47	54	17.53
2377.538	Horizontal	53.07	37.24	54	16.76
2496.950	Horizontal	46.95	35.09	54	18.91
4881.188	Vertical	46.59	N/P	54	7.41
7323.432	Vertical	48.06	N/P	54	5.94
4881.188	Horizontal	52.36	N/P	54	1.64
7323.432	Horizontal	50.65	N/P	54	3.35

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



TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS					
TX MODE - HIGH CHANNEL FOR FREQ > 1GHZ				EMI4574	
U _{Start} (start of the test):	N/P	U _{End} (end of the test):		N/P	
Voltage drop:	N/P	Limit:		+/- 5%	
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Level Avg (dBμV/m)	Limit Avg (dBμV/m)	Margin dB
2276.328	Vertical	44.42	N/P	54	9.58
2353.135	Vertical	48.78	N/P	54	5.22
2377.138	Vertical	48.91	N/P	54	5.09
2260.126	Horizontal	46.78	35.13	54	18.87
2328.733	Horizontal	49.17	36.42	54	17.58
2337.334	Horizontal	50.76	36.47	54	17.53
2353.135	Horizontal	57.99	39.41	54	14.59
2368.737	Horizontal	54.23	37.01	54	16.99
2377.138	Horizontal	54.17	37.71	54	16.29
2491.749	Horizontal	51.6	34.75	54	19.25
2713.571	Horizontal	45.07	36.37	54	17.63
4960.696	Vertical	46.32	N/P	54	7.68
7443.444	Vertical	49.3	N/P	54	4.7
4962.196	Horizontal	49.88	N/P	54	4.12
7443.444	Horizontal	50.4	N/P	54	3.6

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

9.4. Band-edge compliance

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 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
Band edge / Low Channel	2.3835GHz- 2.4035GHz	15.247	EMI4571	PASS
Band edge / High Channel	2.4785GHz- 2.4985GHz	15.247	EMI4570	PASS

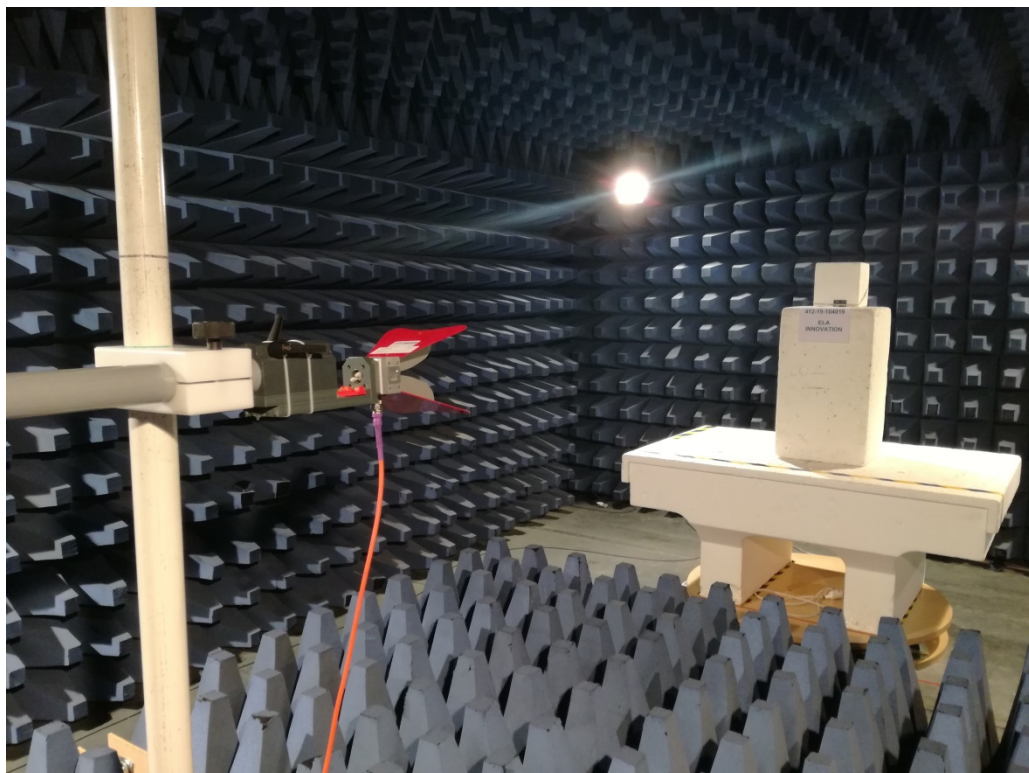
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	See Graph(es)
Relative Humidity	20 to 75 %	See Graph(es)
Atmospheric pressure	N/A	See Graph(es)
TEST METHOD DEVIATION: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	24/07/2019	24/09/2022
Cable	MegaPhase	TM18-N1N1-118	12841	09/05/2018	09/07/2020
Cable	MegaPhase	TM18-N1N1-197	12840	09/05/2018	09/07/2020
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Shielded enclosure	RAY PROOF	C.V2	1423		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26

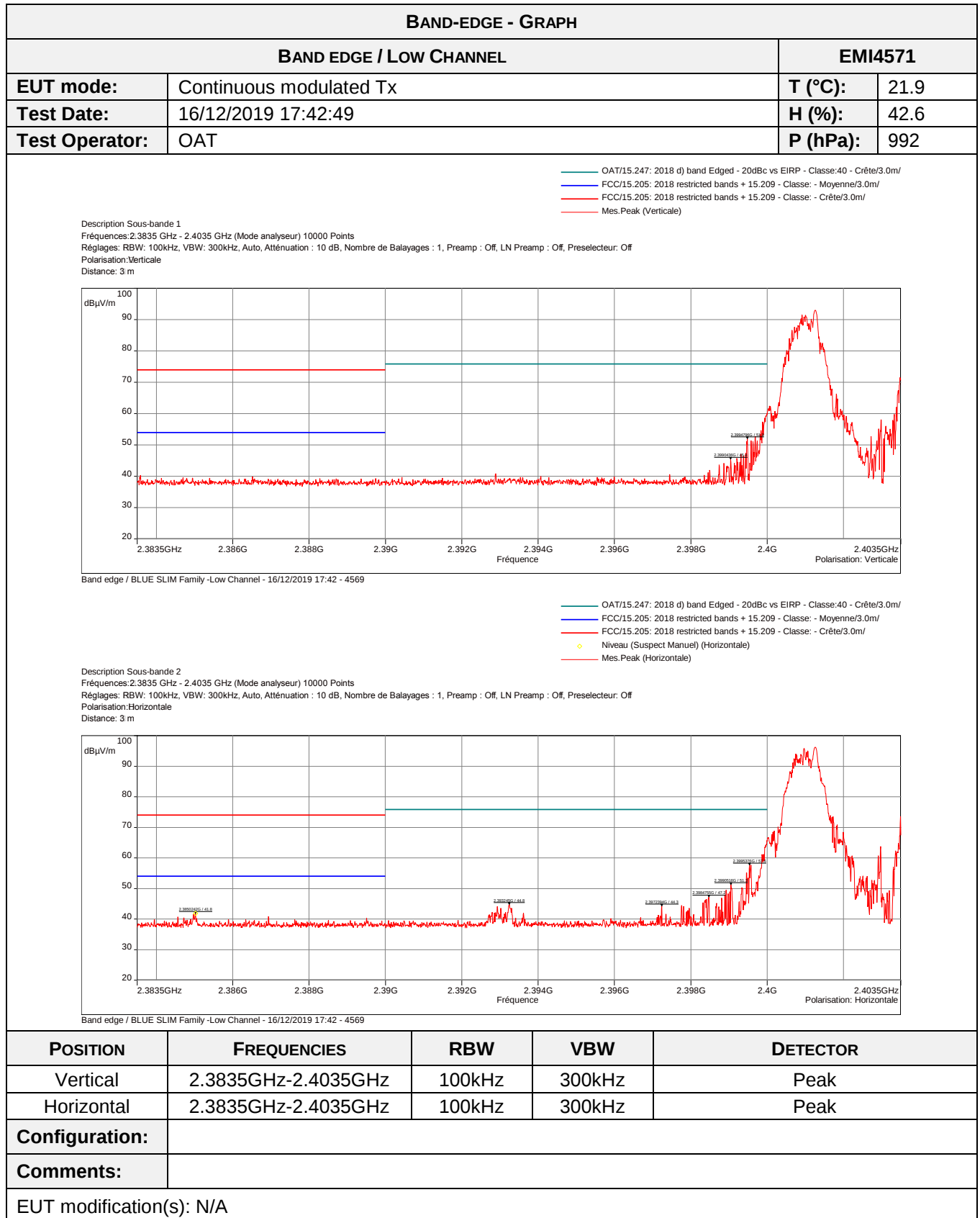
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TEST SETUP PHOTO(S)



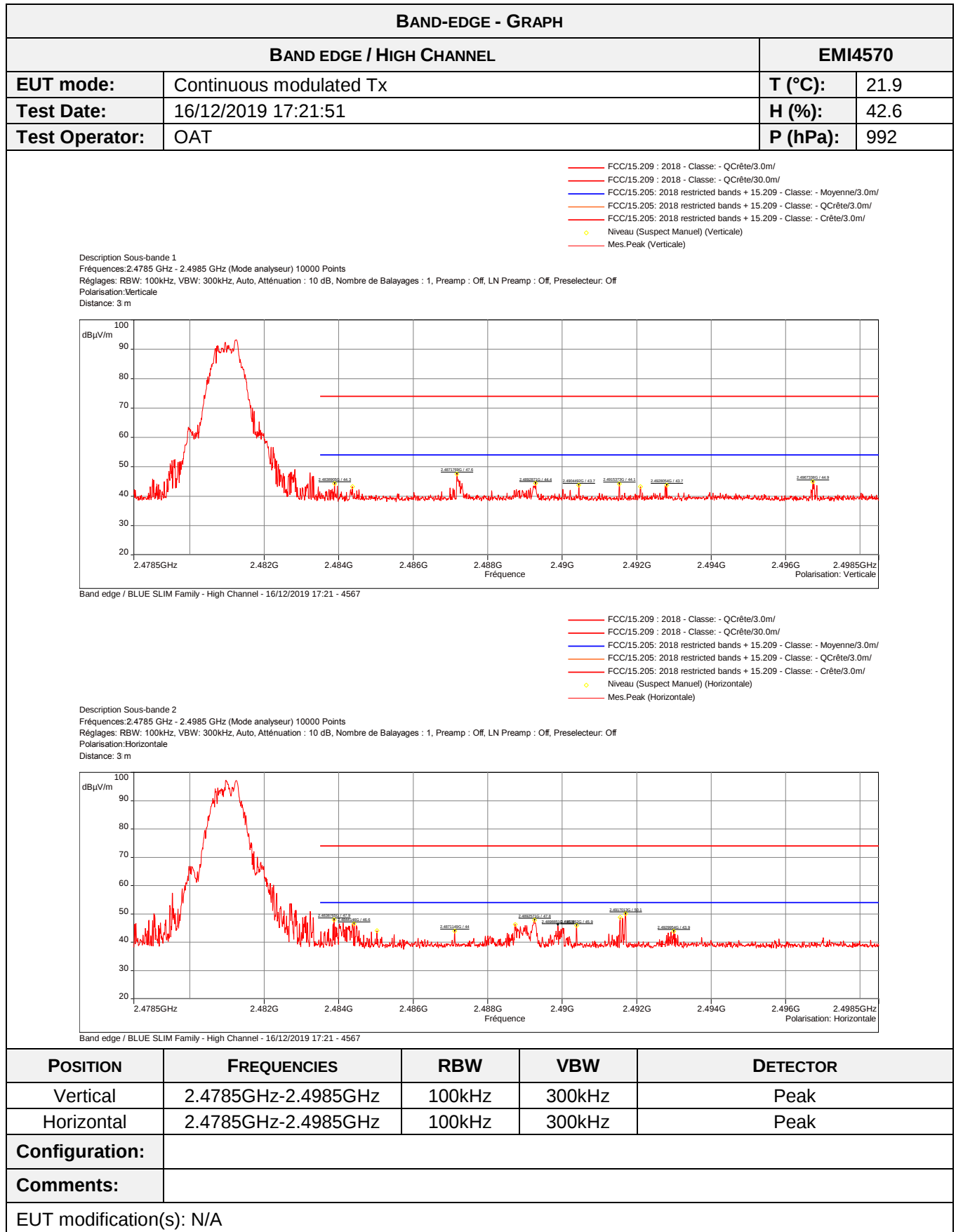
BAND-EDGE - TABULATED RESULTS					
Frequency (MHz)	Polarization	Level Peak (dBμV/m)	Limit Avg (dBμV/m)	Limit Peak (dBμV/m)	Margin dB
2385.024	Horizontal	41.82	54	74	12.18
2399.537	Horizontal	57.59	N/A	75.83	3.59
2483.891	Vertical	44.25	54	74	9.75
2484.369	Vertical	43.27	54	74	10.73
2487.177	Vertical	47.56	54	74	6.44
2489.287	Vertical	44.43	54	74	9.57
2490.449	Vertical	43.75	54	74	10.25
2491.537	Vertical	44.14	54	74	9.86
2492.103	Vertical	43.21	54	74	10.79
2492.805	Vertical	43.72	54	74	10.28
2496.734	Vertical	44.86	54	74	9.14
2483.877	Horizontal	47.87	54	74	6.13
2484.415	Horizontal	46.58	54	74	7.42
2485.029	Horizontal	44.09	54	74	9.91
2487.115	Horizontal	43.99	54	74	10.01
2488.737	Horizontal	46.36	54	74	7.64
2489.257	Horizontal	47.81	54	74	6.19
2490.385	Horizontal	45.91	54	74	8.09
2491.557	Horizontal	48.75	54	74	5.25
2491.701	Horizontal	50.1	54	74	3.9
2492.995	Horizontal	43.9	54	74	10.1

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



BAND-EDGE - TABULATED RESULTS					
BAND EDGE / LOW CHANNEL				EMI4571	
Frequency (MHz)	Polarization	Level Peak (dB μ V/m)	Limit Avg (dB μ V/m)	Limit Peak (dB μ V/m)	Margin dB
2385.024	Horizontal	41.82	54	74	12.18
2399.537	Horizontal	57.59	N/A	75.83	3.59

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



BAND-EDGE - TABULATED RESULTS					
BAND EDGE / HIGH CHANNEL				EMI4570	
Frequency (MHz)	Polarization	Level Peak (dB μ V/m)	Limit Avg (dB μ V/m)	Limit Peak (dB μ V/m)	Margin dB
2483.891	Vertical	44.25	54	74	9.75
2484.369	Vertical	43.27	54	74	10.73
2487.177	Vertical	47.56	54	74	6.44
2489.287	Vertical	44.43	54	74	9.57
2490.449	Vertical	43.75	54	74	10.25
2491.537	Vertical	44.14	54	74	9.86
2492.103	Vertical	43.21	54	74	10.79
2492.805	Vertical	43.72	54	74	10.28
2496.734	Vertical	44.86	54	74	9.14
2483.877	Horizontal	47.87	54	74	6.13
2484.415	Horizontal	46.58	54	74	7.42
2485.029	Horizontal	44.09	54	74	9.91
2487.115	Horizontal	43.99	54	74	10.01
2488.737	Horizontal	46.36	54	74	7.64
2489.257	Horizontal	47.81	54	74	6.19
2490.385	Horizontal	45.91	54	74	8.09
2491.557	Horizontal	48.75	54	74	5.25
2491.701	Horizontal	50.1	54	74	3.9
2492.995	Horizontal	43.9	54	74	10.1

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

9.5. Maximum peak conducted power of the intentional radiator

a) NORMAL TESTS CONDITIONS

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.10: 2013
Test description: EUT is set on an insulating support at 150cm above the ground reference plane. Measurement are done on a normalized test site by the substitution method. The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected. 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	2.4GHz-2.402GHz	1W (30dBm)	EMI4544	PASS
EIRP - Mid Channel	2.44GHz-2.442GHz	1W (30dBm)	EMI4546	PASS
EIRP - High Channel	2.48GHz-2.482GHz	1W (30dBm)	EMI4545	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: EUT has its dedicated internal PCB antenna, due to this, this measurement was done in radiated by the substitution method as described in Annex G of ANSI C63.10.		
Supplementary information: N/A		

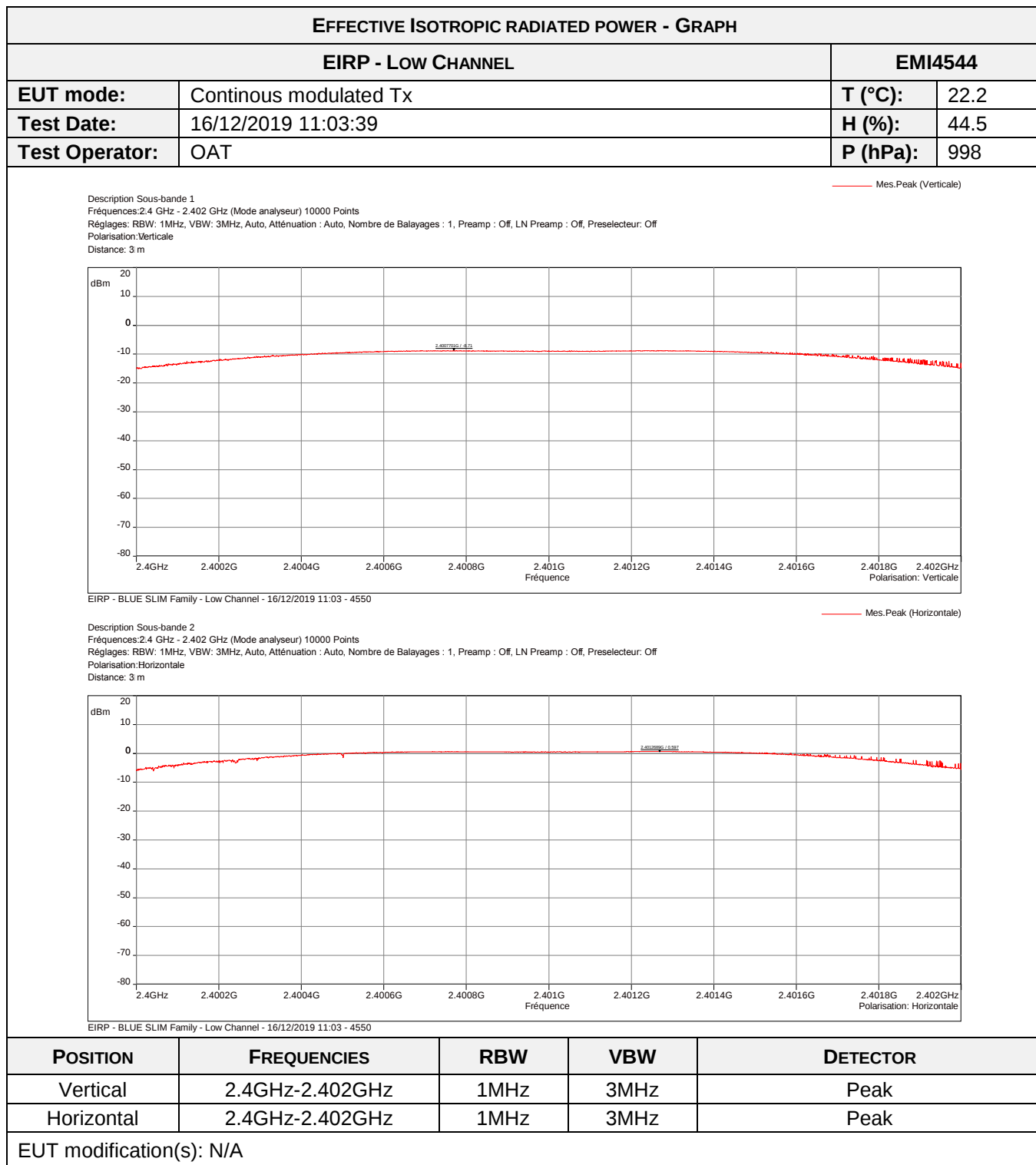
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	24/07/2019	24/09/2022
Attenuator	EMITECH	SUB.V2-H	14495	25/09/2019	25/11/2020
Attenuator	EMITECH	SUB.V2-V	14496	25/09/2019	25/11/2020
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	MegaPhase	N-5m	14855	12/02/2018	12/04/2020
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Cable	MegaPhase	TM18-N1N1-118	12842	09/05/2018	09/07/2020
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Shielded enclosure	RAY PROOF	C.V2	1423		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	7562	25/01/2019	25/03/2021
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)

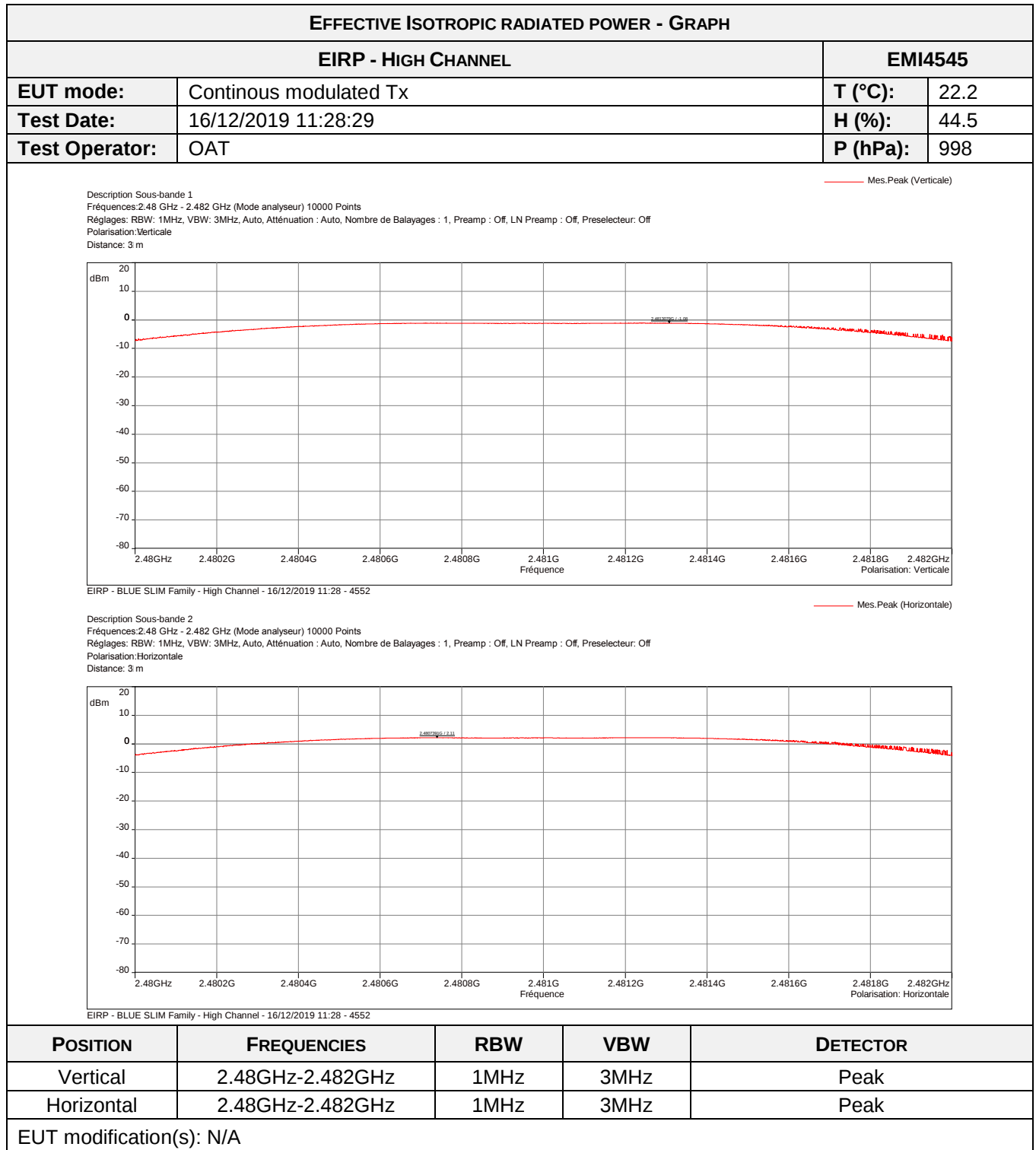




EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - Low CHANNEL			EMI4544
Frequency (MHz)	Polarization	EIRP Level (dBm)	Limit (dBm)
2401	Vertical	-8.71	30
2401	Horizontal	0.59	30



EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - MID CHANNEL			EMI4546
Frequency (MHz)	Polarization	EIRP Level (dBm)	Limit (dBm)
2441	Vertical	-0.98	30
2441	Horizontal	1.75	30



EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - HIGH CHANNEL			EMI4545
Frequency (MHz)	Polarization	EIRP Level (dBm)	Limit (dBm)
2481	Vertical	-1.08	30
2481	Horizontal	2.11	30

b) EXTREMES TESTS CONDITIONS

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247
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 / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4499	PASS
Low channel / 25°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4500	PASS
Mid channel / 25°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4501	PASS
Mid channel / 25°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4601	PASS
High channel / 25°C / 3.0dc	Tx-CW	1W (30dBm)	EMI4602	PASS
High channel / 25°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4603	PASS
Low channel / -20°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4604	PASS
Low channel / -20°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4605	PASS
Mid channel / -20°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4606	PASS
Mid channel / -20°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4710	PASS
High channel / -20°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4711	PASS
High channel / -20°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4712	PASS
Low channel / 55°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4713	PASS
Low channel / 55°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4714	PASS
Mid channel / 55°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4715	PASS
Mid channel / 55°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4716	PASS
High channel / 55°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4717	PASS
High channel / 55°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4718	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	24.1 °C
Relative Humidity	20 to 75 %	51.5 %
Atmospheric pressure	N/A	1002 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	16491	25/06/2019	25/08/2021
Cable	N	3m	16429	04/05/2019	04/07/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Spectrum analyzer	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020
Thermometer contactless	GHM Greisinger	GMH 3710	12968	11/02/2019	11/04/2020

Blank cells = Permanent validity

TEST SETUP PHOTO(S)



EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS				
TEST CASE	FREQUENCY	LEVEL (dBm)	LIMIT	RESULT TAB.
Low channel / 25°C / 3.0Vdc	2401 MHz	0.6	1W (30dBm)	EMI4499
Low channel / 25°C / 2.6Vdc	2401 MHz	0.61	1W (30dBm)	EMI4500
Mid channel / 25°C / 3.0Vdc	2441 MHz	1.75	1W (30dBm)	EMI4501
Mid channel / 25°C / 2.6Vdc	2441 MHz	1.75	1W (30dBm)	EMI4601
High channel / 25°C / 3.0dc	2481 MHz	2.11	1W (30dBm)	EMI4602
High channel / 25°C / 2.6Vdc	2481 MHz	2.11	1W (30dBm)	EMI4603
Low channel / -20°C / 3.0Vdc	2401 MHz	1.82	1W (30dBm)	EMI4604
Low channel / -20°C / 2.6Vdc	2401 MHz	1.83	1W (30dBm)	EMI4605
Mid channel / -20°C / 3.0Vdc	2441 MHz	3.04	1W (30dBm)	EMI4606
Mid channel / -20°C / 2.6Vdc	2441 MHz	3.04	1W (30dBm)	EMI4710
High channel / -20°C / 3.0Vdc	2481 MHz	3.49	1W (30dBm)	EMI4711
High channel / -20°C / 2.6Vdc	2481 MHz	3.48	1W (30dBm)	EMI4712
Low channel / 55°C / 3.0Vdc	2401 MHz	-0.02	1W (30dBm)	EMI4713
Low channel / 55°C / 2.6Vdc	2401 MHz	-0.03	1W (30dBm)	EMI4714
Mid channel / 55°C / 3.0Vdc	2441 MHz	1.18	1W (30dBm)	EMI4715
Mid channel / 55°C / 2.6Vdc	2441 MHz	1.17	1W (30dBm)	EMI4716
High channel / 55°C / 3.0Vdc	2481 MHz	1.50	1W (30dBm)	EMI4717
High channel / 55°C / 2.6Vdc	2481 MHz	1.49	1W (30dBm)	EMI4718

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	18/12/2019	-

9.6.6dB Bandwidth For Digitally Modulation Systems

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.10: 2013
Test description: 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.	

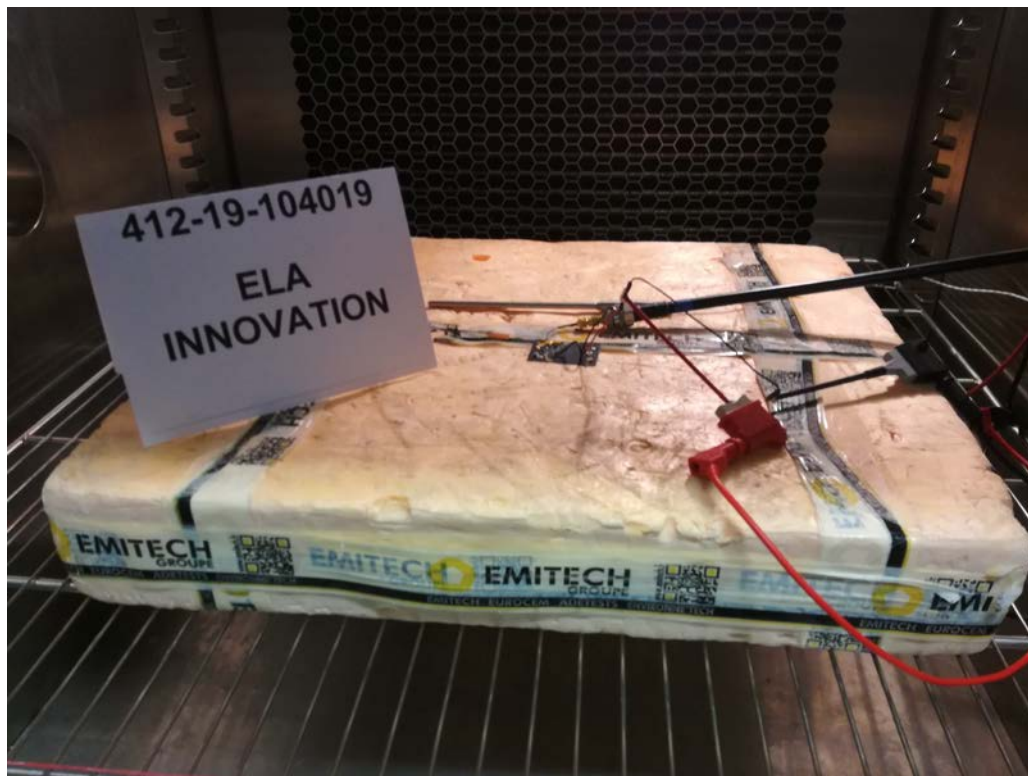
TESTED CHANNEL	RESULT	SEVERITY	RESULT TAB.	VERDICT
6dB Bandwidth - Low channel	668.3kHz	>500kHz	EMI4567	PASS
6dB Bandwidth - Mid channel	671.3kHz	>500kHz	EMI4568	PASS
6dB Bandwidth - High channel	683.3kHz	>500kHz	EMI4569	PASS
20dB Bandwidth - Low channel	1.220 MHz	>500kHz	EMI4467	PASS
20dB Bandwidth - Mid channel	1.223 MHz	>500kHz	EMI4468	PASS
20dB Bandwidth - High channel	1.229 MHz	>500kHz	EMI4469	PASS

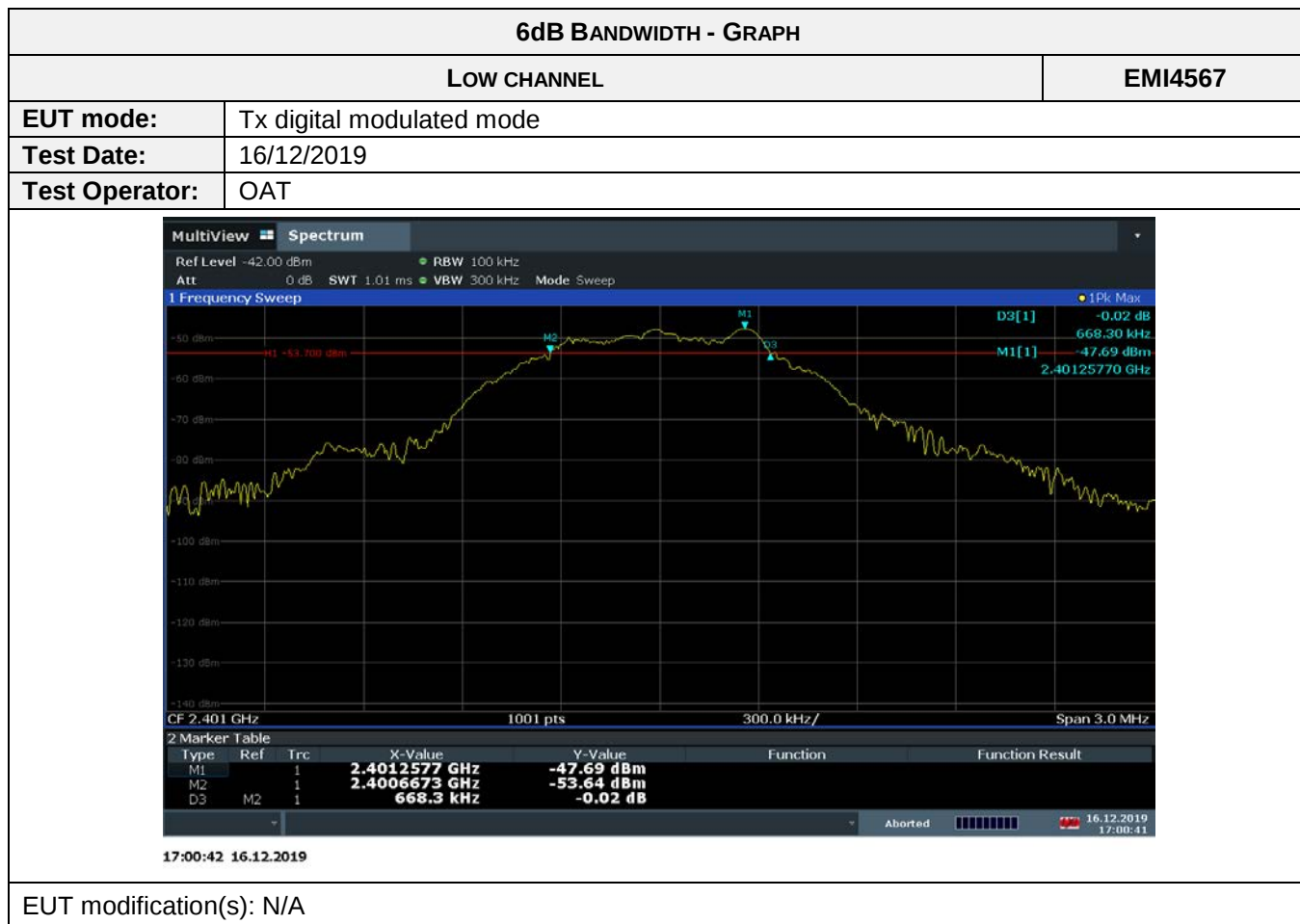
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	24.1 °C
Relative Humidity	20 to 75 %	51.5 %
Atmospheric pressure	N/A	1002 hpa
TEST METHOD DEVIATION: N/A		
Supplementary information: EUT power supply is replaced by a stabilized power supply.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Attenuator	Radiall	R412710124	16491	25/06/2019	25/08/2021
Cable	N	3m	16429	04/05/2019	04/07/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Spectrum analyzer	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020

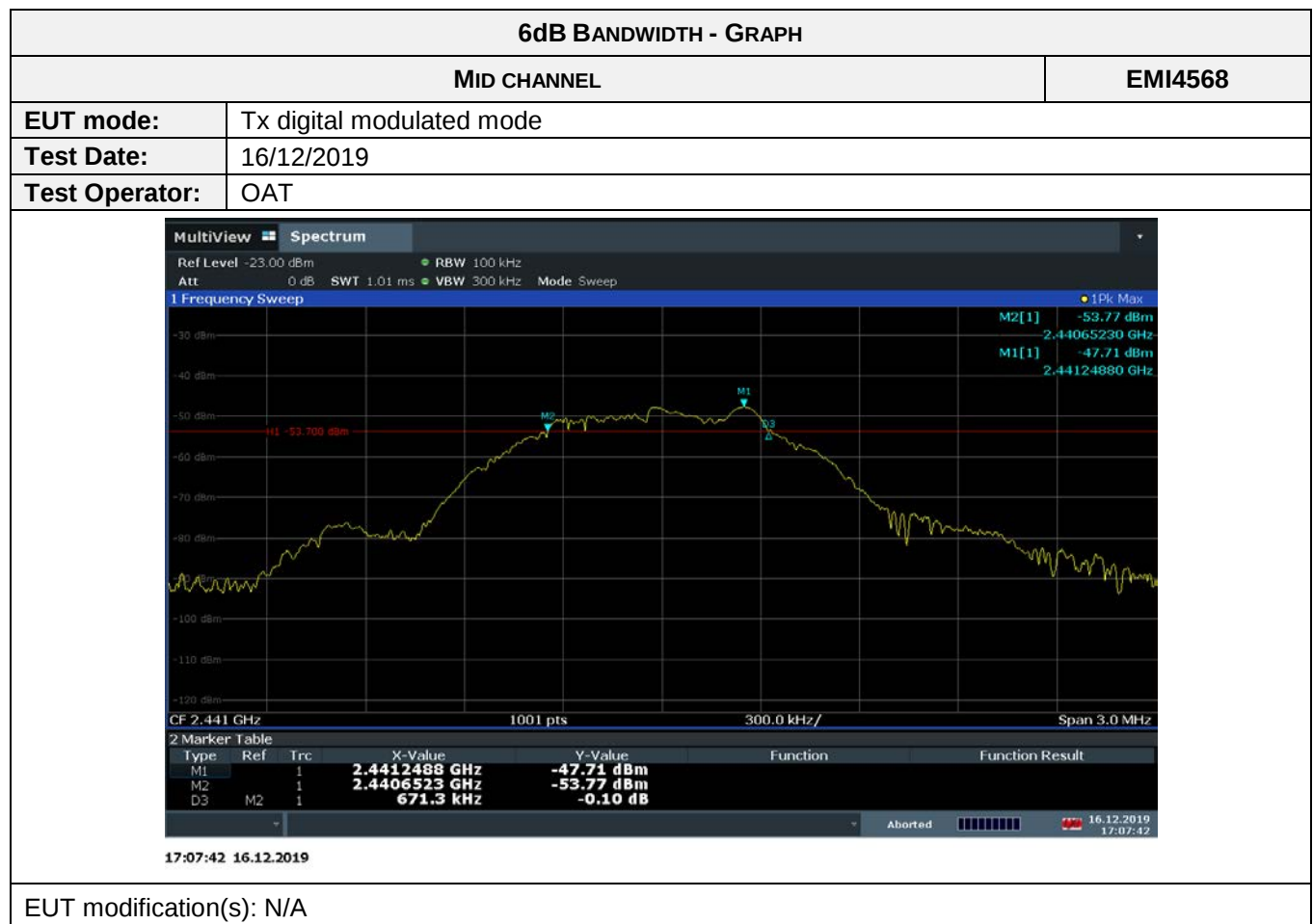
Blank cells = Permanent validity

TEST SETUP PHOTO(S)





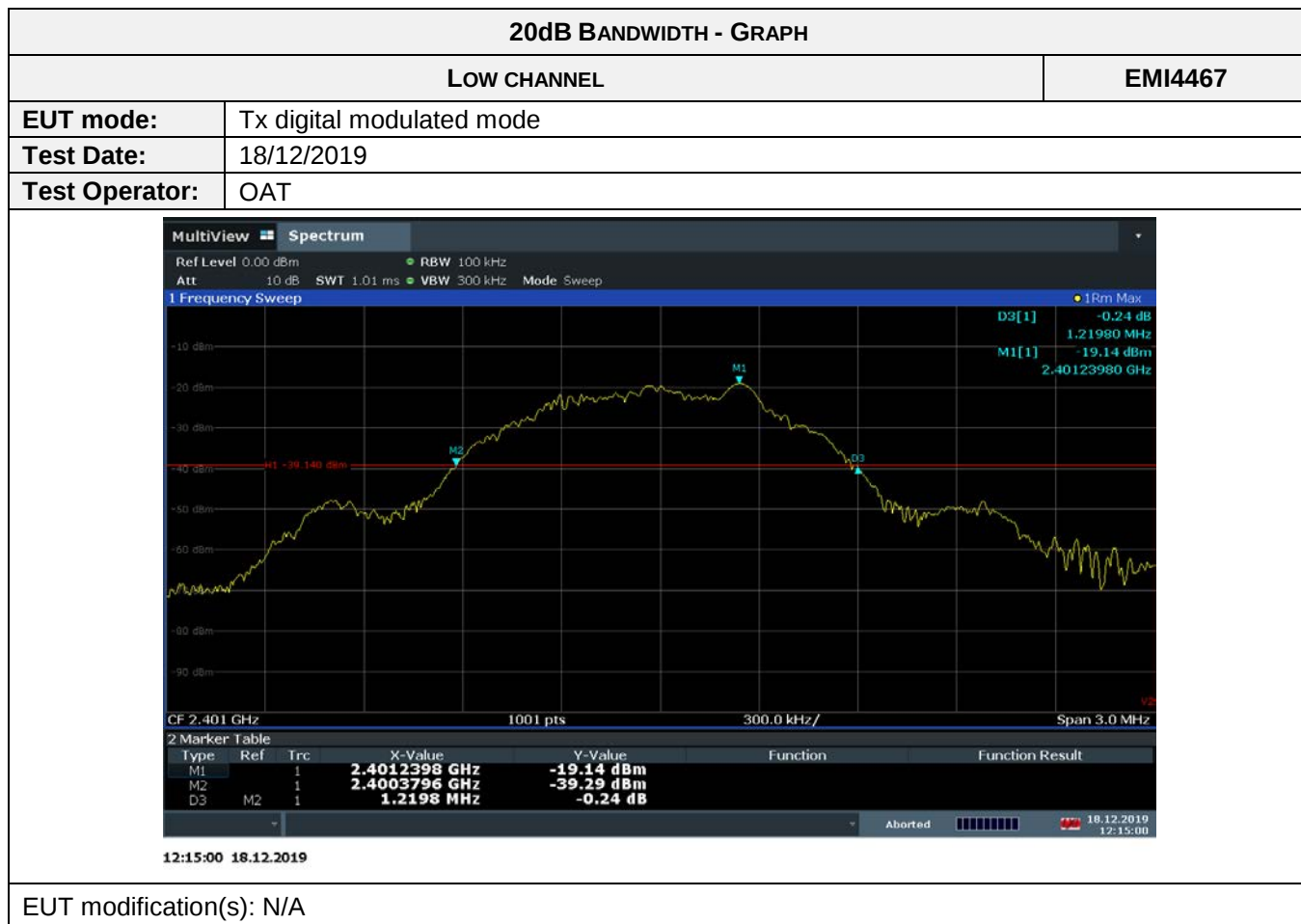
6dB BANDWIDTH - TABULATED RESULTS			
LOW CHANNEL			EMI4567
U _{Start} (start of the test):	3Vdc	U _{End} (end of the test):	3Vdc
Voltage drop:	0%	Limit:	+/- 1%
f _{Low} (MHz)	f _{High} (MHz)	Result (f _{high} -f _{low})	Limit
-	-	668.3kHz	>500kHz



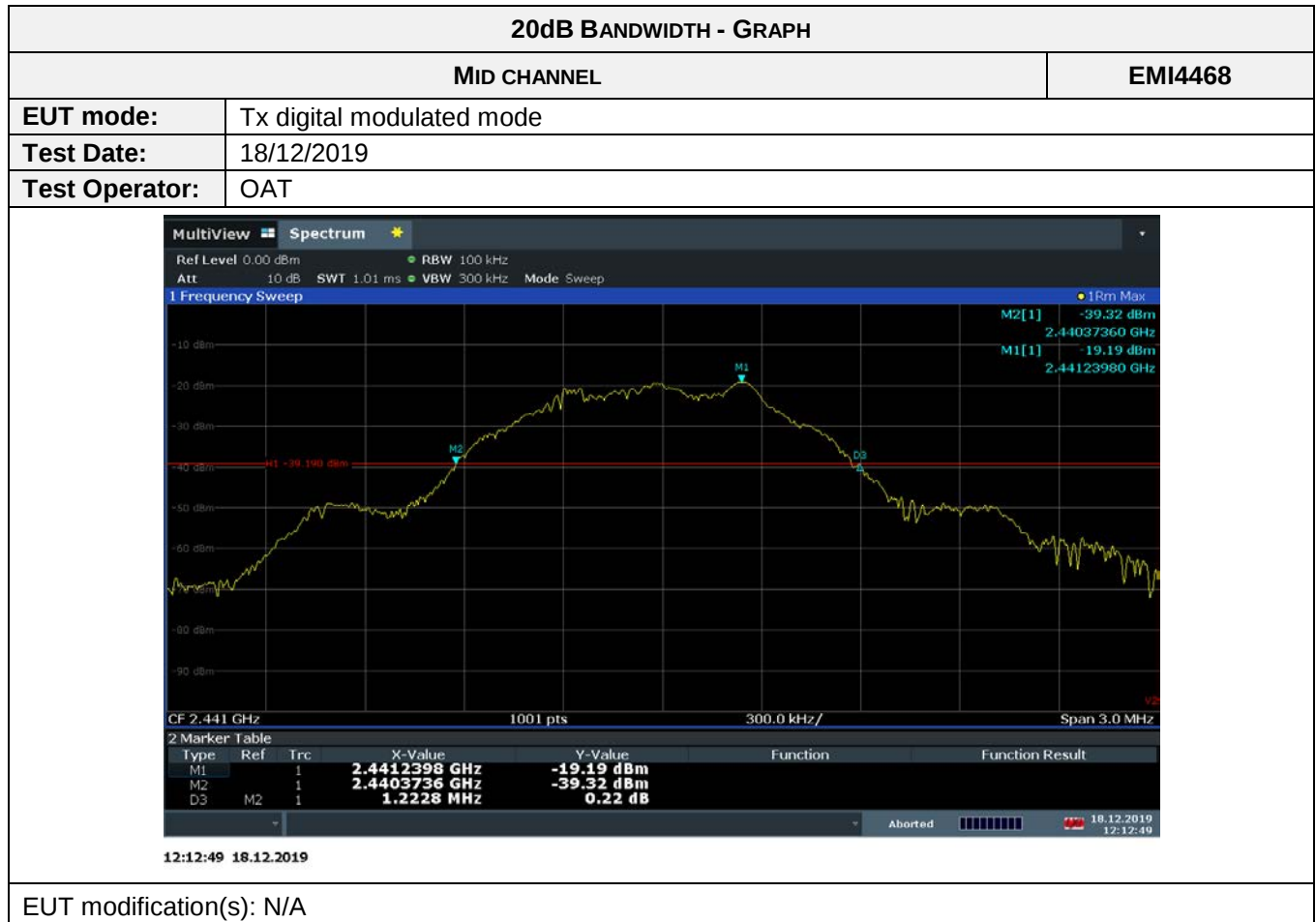
6dB BANDWIDTH - TABULATED RESULTS			
MID CHANNEL			EMI4568
U_{Start} (start of the test):	3Vdc	U_{End} (end of the test):	3Vdc
Voltage drop:	0%	Limit:	+/- 1%
f_{Low}	f_{High}	Result (f_{high}-f_{low})	Limit
-	-	671.3kHz	>500kHz

EUT modification(s): N/A

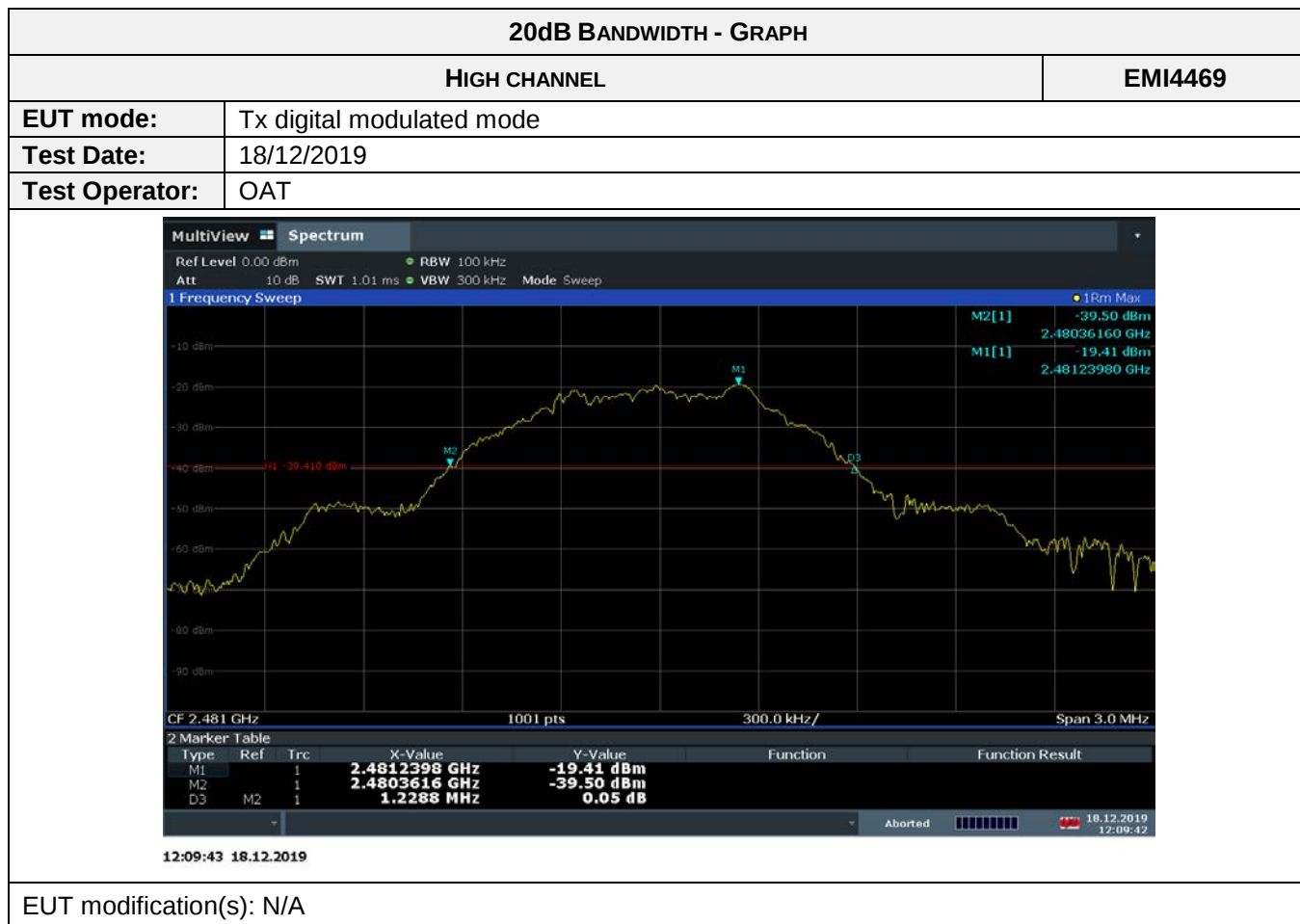
683.3kHz



20dB BANDWIDTH - TABULATED RESULTS			
LOW CHANNEL			EMI4467
U_{Start} (start of the test):	3.0Vdc	U_{End} (end of the test):	3.0Vdc
Voltage drop:	0%	Limit:	+/- 1%
f_{Low} (MHz)	f_{High} (MHz)	Result (f_{high}-f_{low})	Limit
-	-	1.220 MHz	>500kHz



20dB BANDWIDTH - TABULATED RESULTS			
MID CHANNEL			EMI4468
U_{Start} (start of the test):	3.0Vdc	U_{End} (end of the test):	3.0Vdc
Voltage drop:	0%	Limit:	+/- 1%
f_{Low}	f_{High}	Result (f_{high}-f_{low})	Limit
-	-	1.223 MHz	>500kHz



20dB BANDWIDTH - TABULATED RESULTS			
HIGH CHANNEL			EMI4469
U_{Start} (start of the test):	3.0Vdc	U_{End} (end of the test):	3.0Vdc
Voltage drop:	0%	Limit:	+/- 1%
f_{Low}	f_{High}	Result (f_{high}-f_{low})	Limit
-	-	1.229 MHz	>500kHz

9.7. 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 set on an insulating support at 150cm above the ground reference plane. Measurement are done on a normalized test site by the substitution method. The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected. For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

TESTED CHANNEL	RESULT	SEVERITY	RESULT TAB.	VERDICT
PSD/3KHz - Low Channel	-3.84dBm/3kHz	8dBm/3kHz	EMI4559	PASS
PSD/3KHz - Mid Channel	-2.43dBm/3kHz	8dBm/3kHz	EMI4556	PASS
PSD/3KHz - High Channel	-1.69dBm/3kHz	8dBm/3kHz	EMI4558	PASS

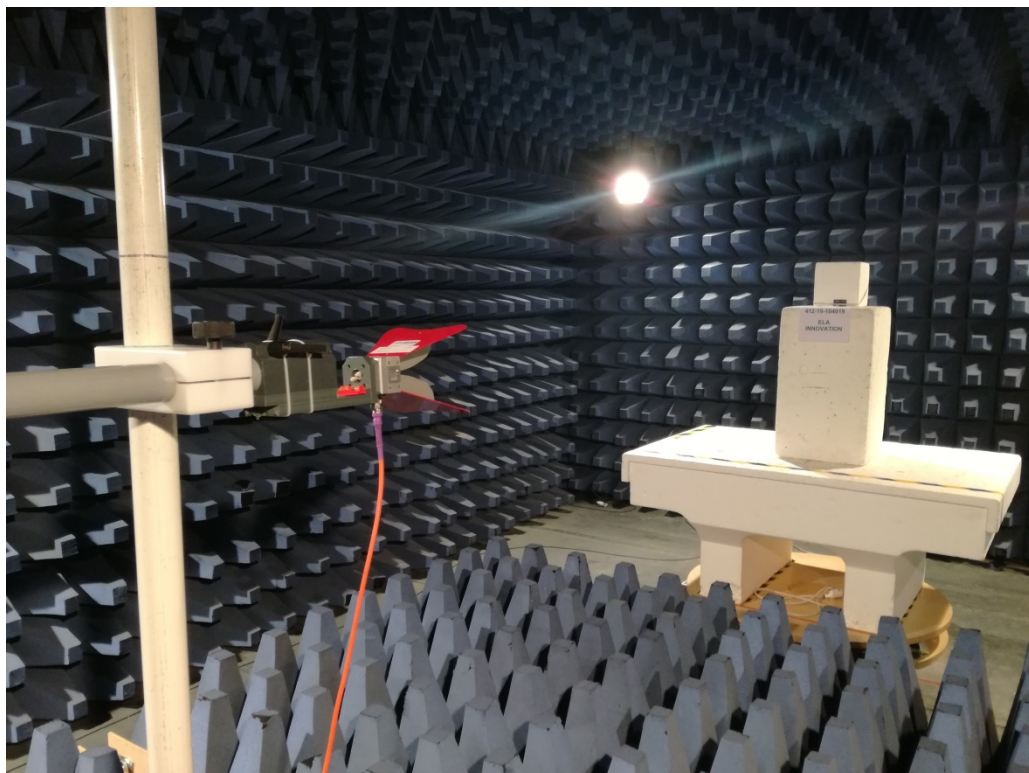
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	See Graph(es)
Relative Humidity	20 to 75 %	See Graph(es)
Atmospheric pressure	N/A	See Graph(es)
Test method deviation: N/A		
Supplementary information: N/A		

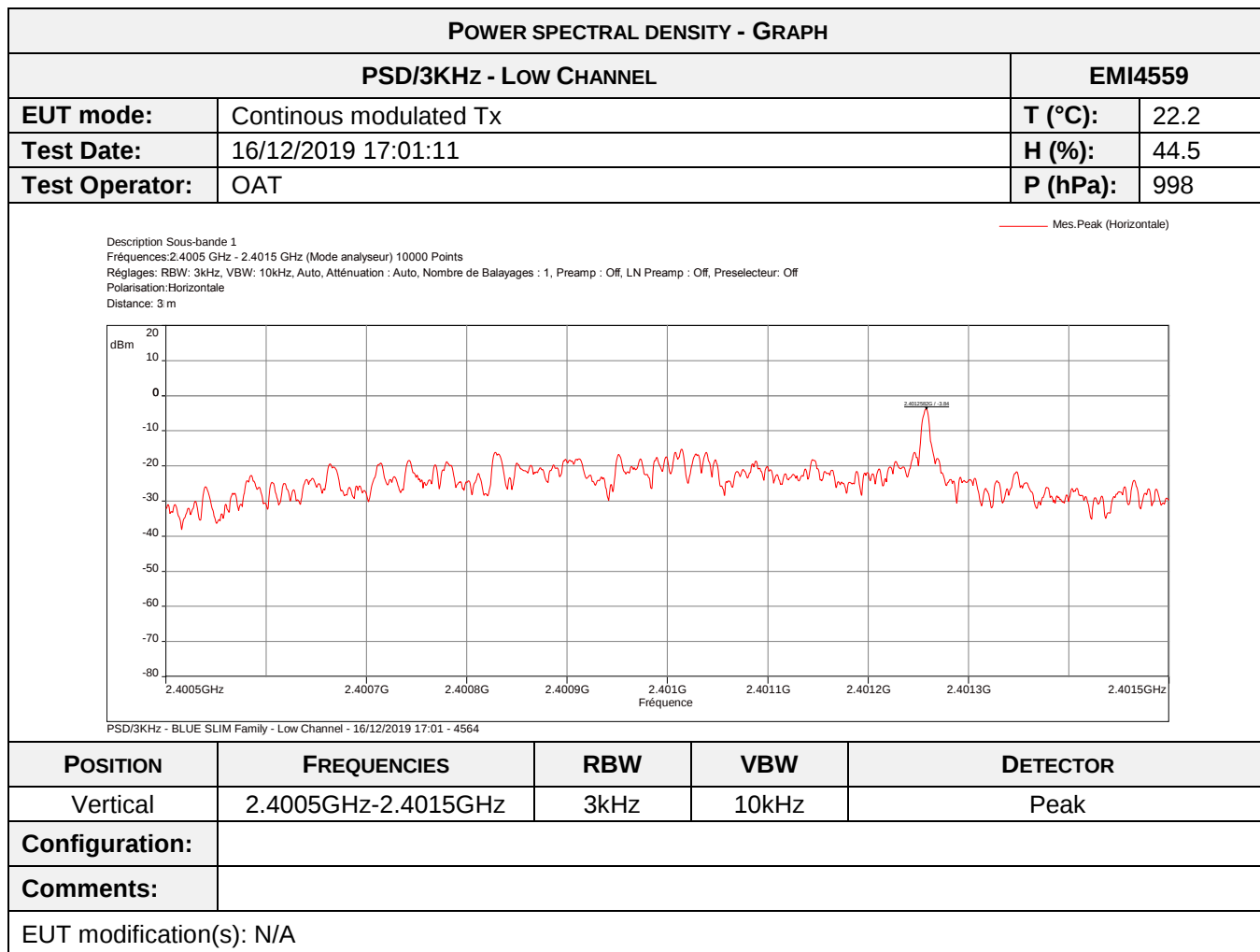
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	24/07/2019	24/09/2022
Attenuator	EMITECH	SUB.V2-H	14495	25/09/2019	25/11/2020
Attenuator	EMITECH	SUB.V2-V	14496	25/09/2019	25/11/2020
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	MegaPhase	N-5m	14855	12/02/2018	12/04/2020
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Cable	MegaPhase	TM18-N1N1-118	12842	09/05/2018	09/07/2020
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Shielded enclosure	RAY PROOF	C.V2	1423		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	7562	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26

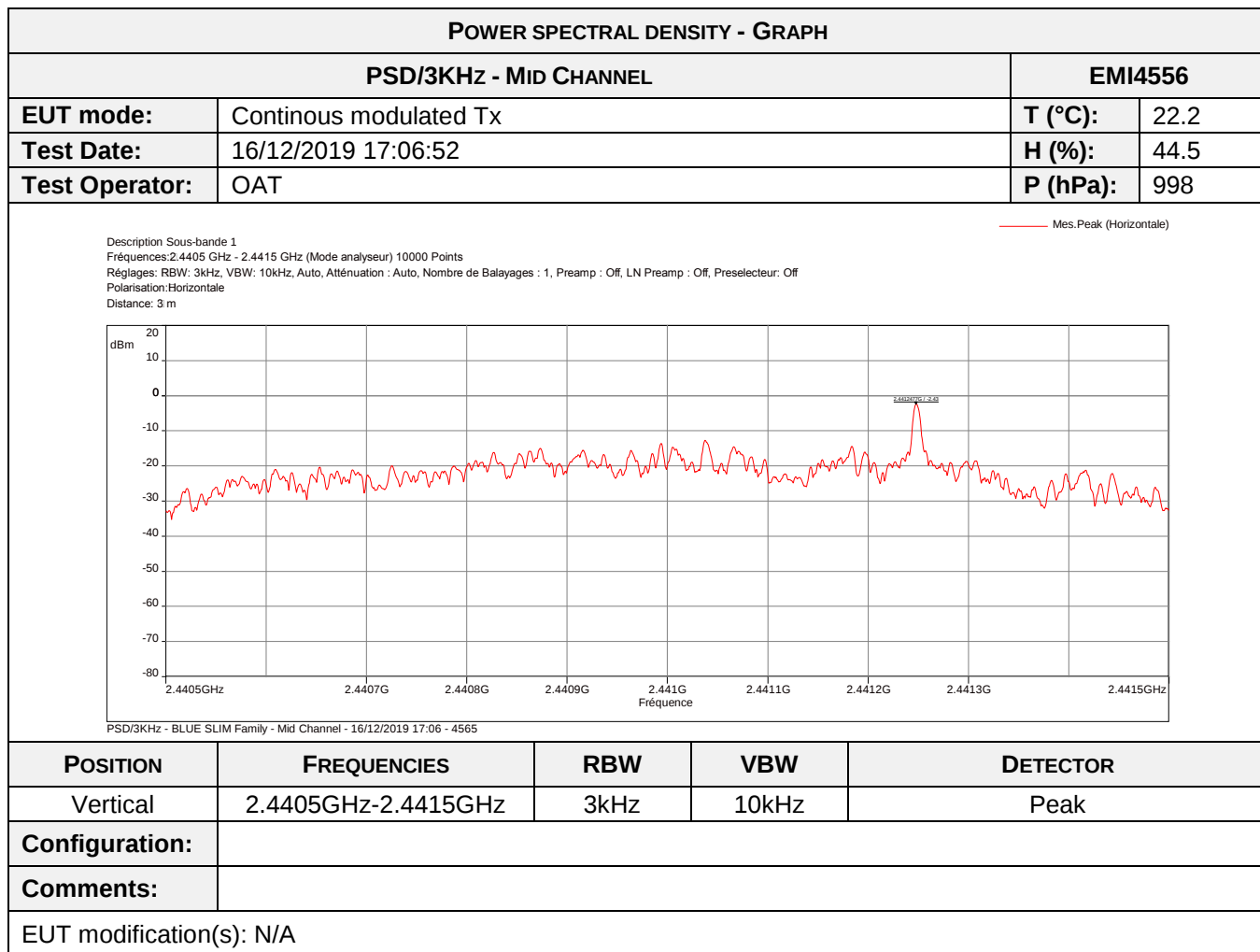
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TEST SETUP PHOTO(S)

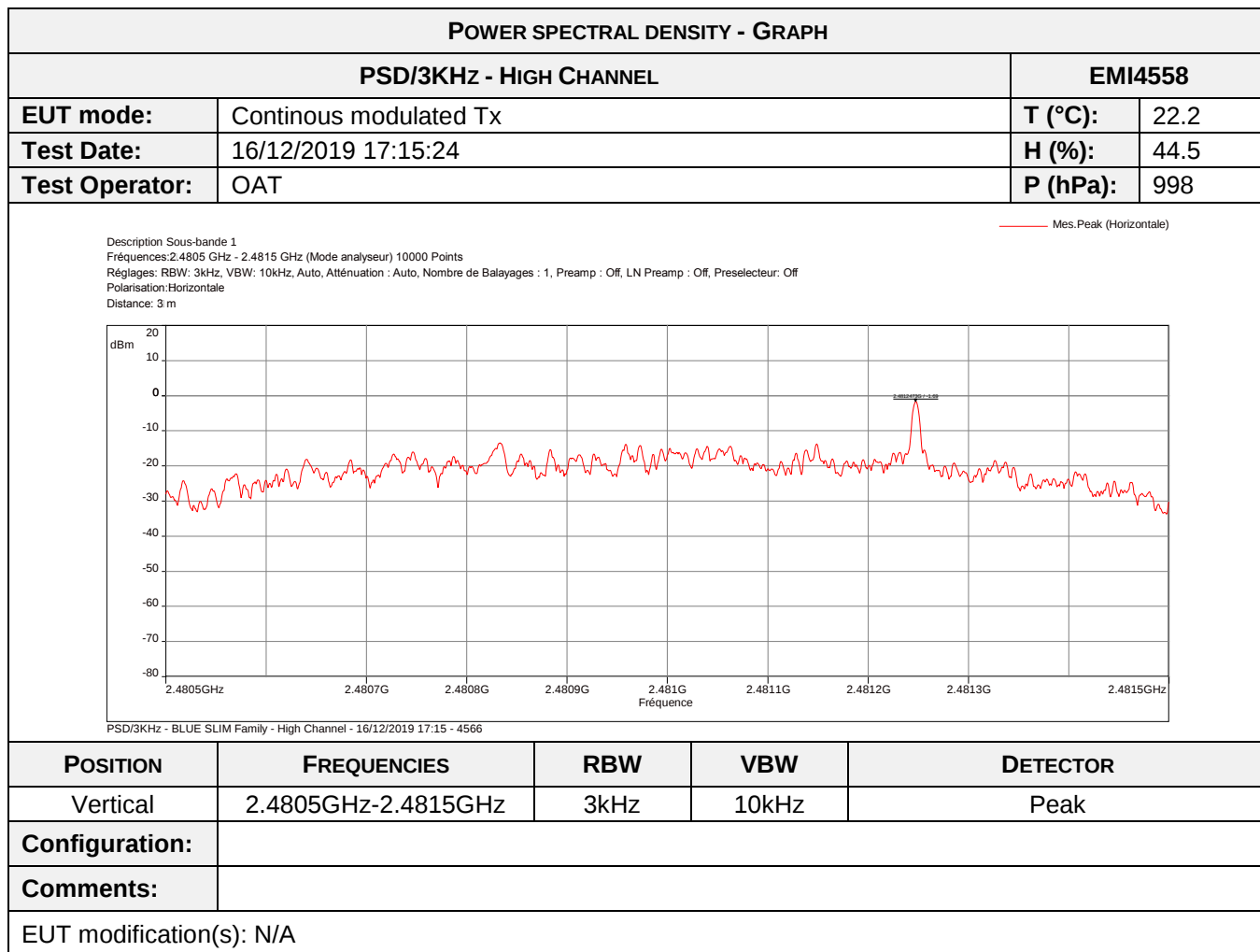




POWER SPECTRAL DENSITY - TABULATED RESULTS			
PSD/3KHz - LOW CHANNEL			EMI4559
U _{Start} (start of the test):	N/P	U _{End} (end of the test):	N/P
Voltage drop:	N/P	Limit:	+/- 5%
Frequency (MHz)	Polarization	Level	Limit
2401	Horizontal	-3.84dBm/3kHz	8dBm/3kHz



POWER SPECTRAL DENSITY - TABULATED RESULTS			
PSD/3KHz - MID CHANNEL			EMI4556
U _{Start} (start of the test):	N/P	U _{End} (end of the test):	N/P
Voltage drop:	N/P	Limit:	+/- 5%
Frequency (MHz)	Polarization	Level	Limit
2441	Horizontal	-2.43dBm/3kHz	8dBm/3kHz



POWER SPECTRAL DENSITY - TABULATED RESULTS			
PSD/3KHz - HIGH CHANNEL			EMI4558
U _{Start} (start of the test):	N/P	U _{End} (end of the test):	N/P
Voltage drop:	N/P	Limit:	+/- 5%
Frequency (MHz)	Polarization	Level	Limit
2481	Horizontal	-1.69dBm/3kHz	8dBm/3kHz

9.8. Occupied Bandwidth

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.10: 2013
Test description: The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β , which, in cases of symmetrical spectra, splits up into $\beta/2$ on each side of the spectrum. Unless otherwise specified, $\beta/2$ is taken as 0,5 %. The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions. EUT is connected to the measuring receiver via 50 Ω attenuator(s).	

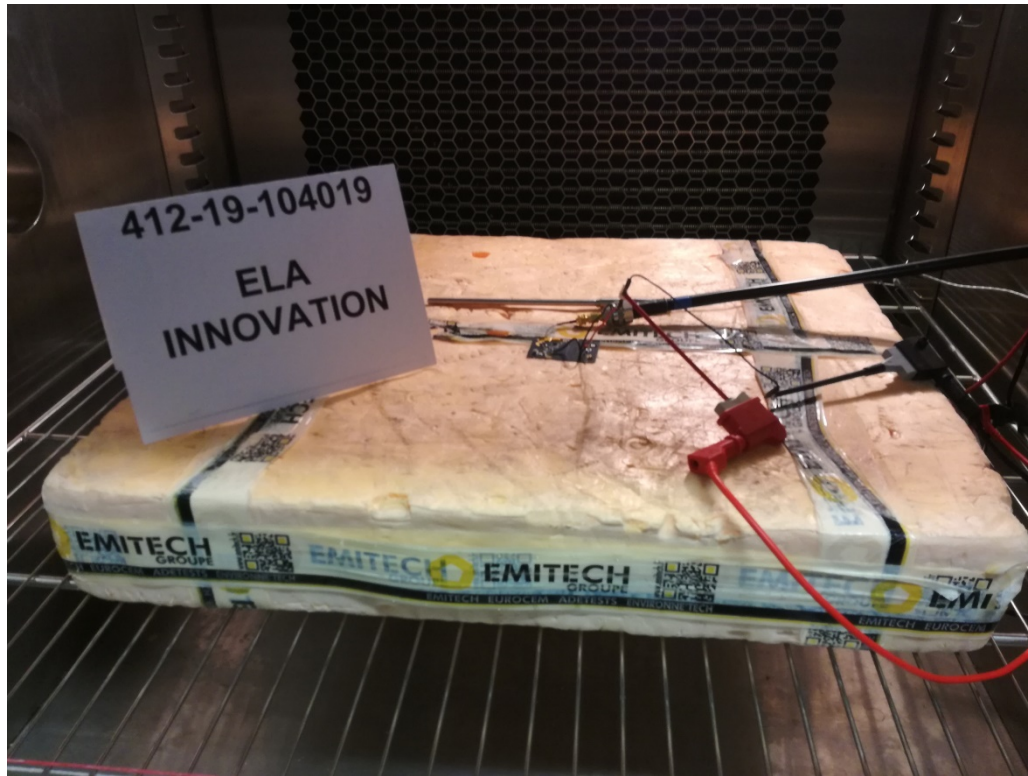
TESTED CHANNEL	OBW	SEVERITY	RESULT TAB.	VERDICT
Low channel	1.074 MHz	> 500kHz	EMI4502	PASS
Mid channel	1.068 MHz	> 500kHz	EMI4610	PASS
High channel	1.078 MHz	> 500kHz	EMI4609	PASS

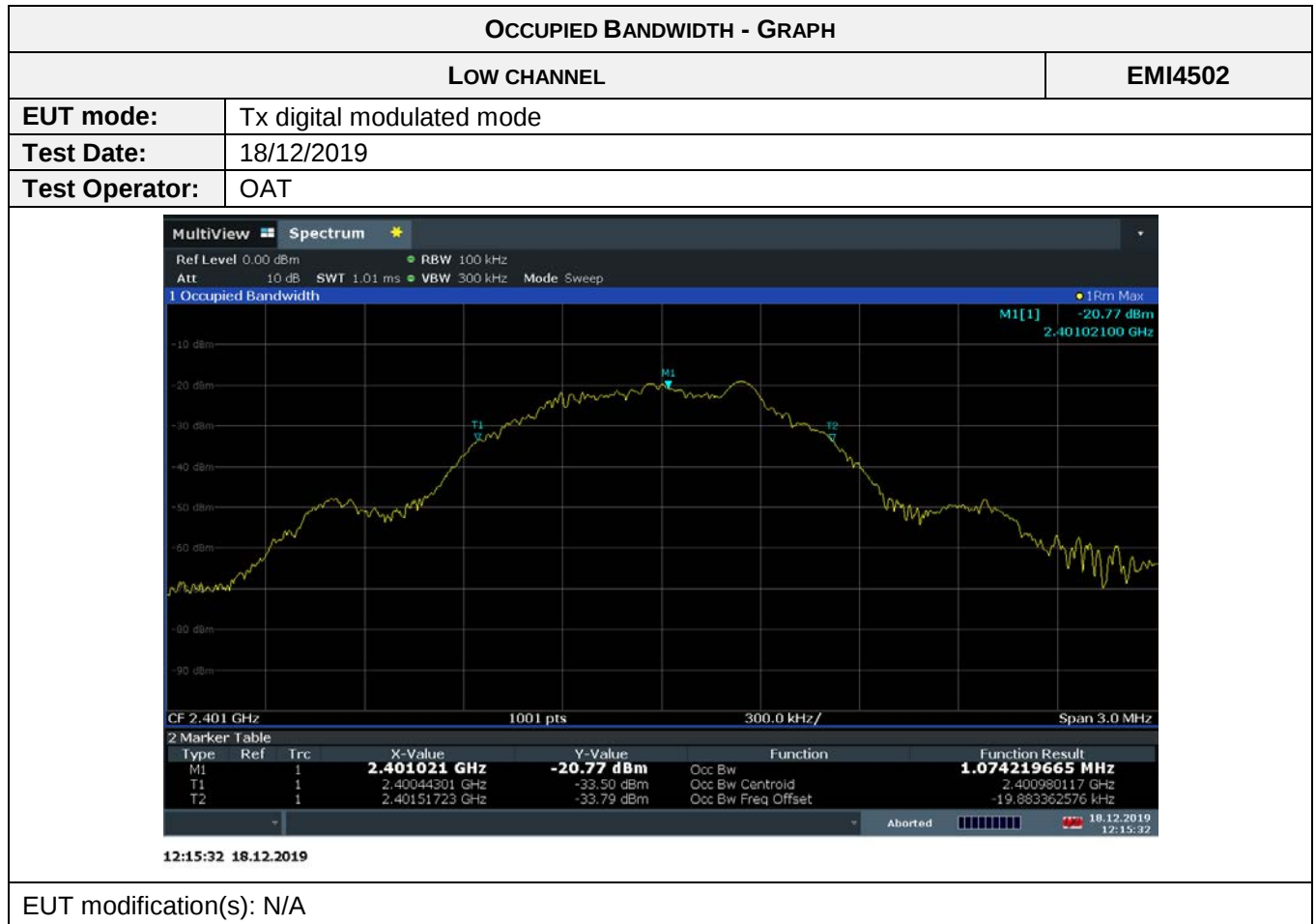
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	24.1 °C
Relative Humidity	20 to 75 %	51.5 %
Atmospheric pressure	N/A	1002 hPa
Test method deviation: N/A		
Supplementary information: EUT power supply is replaced by a stabilized power supply.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Attenuator	Radiall	R412710124	16491	25/06/2019	25/08/2021
Cable	N	3m	16429	04/05/2019	04/07/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020
Thermometer contactless	GHM Greisinger	GMH 3710	12968	11/02/2019	11/04/2020

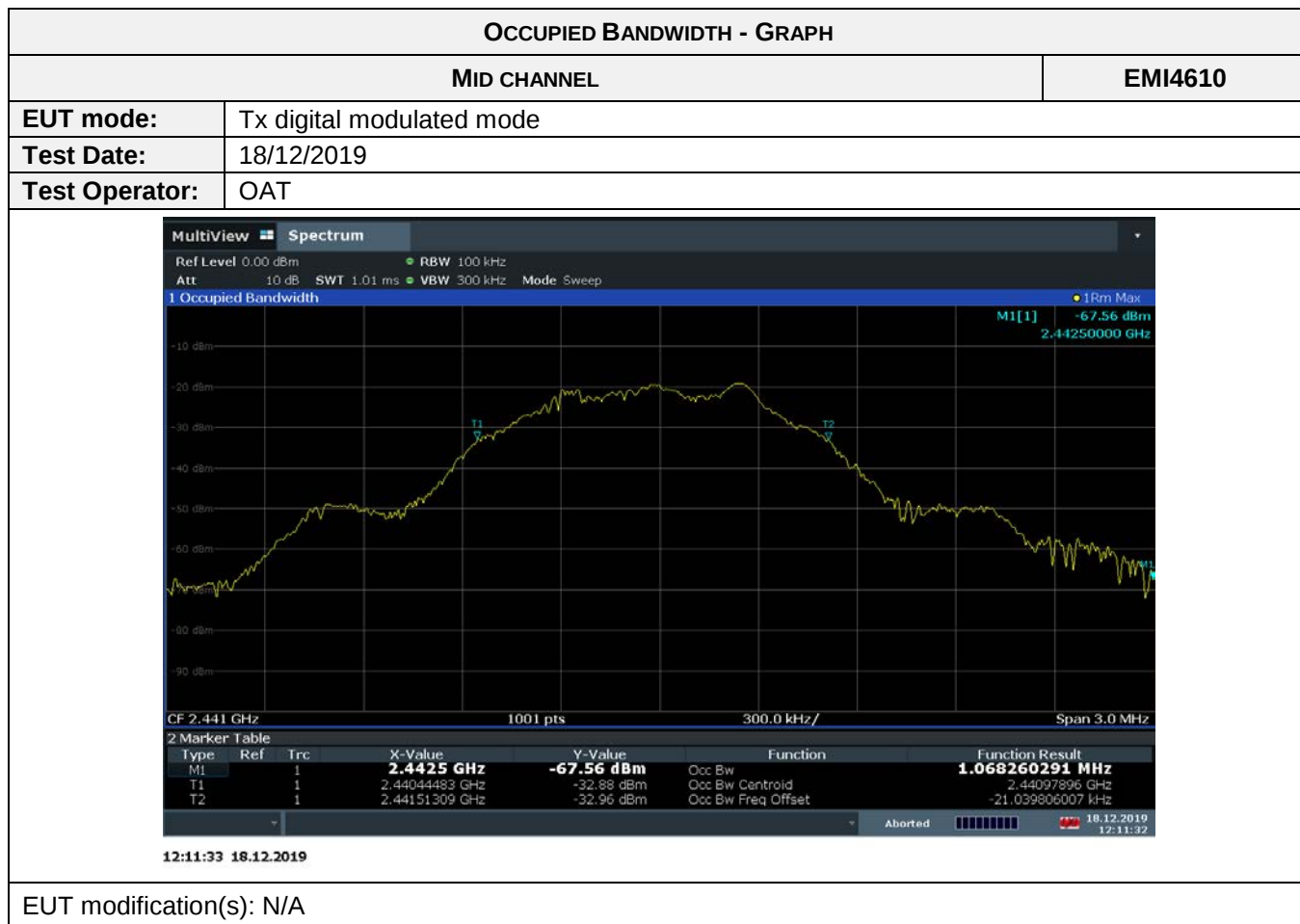
Blank cells = Permanent validity

TEST SETUP PHOTO(S)

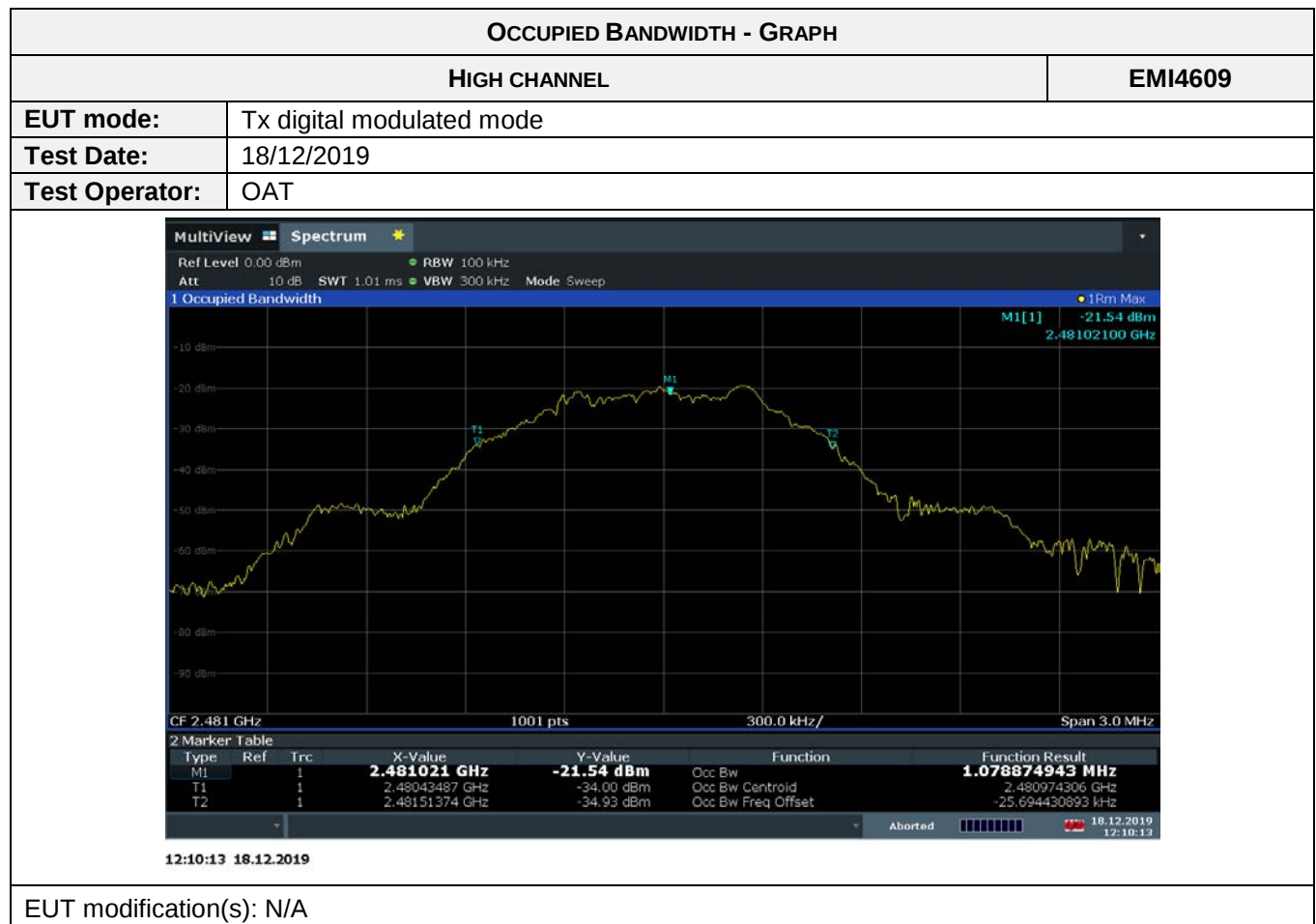




OCCUPIED BANDWIDTH - TABULATED RESULTS			
LOW CHANNEL			EMI4502
U_{Start} (start of the test):	3Vdc	U_{End} (end of the test):	3Vdc
Voltage drop:	0%	Limit:	+/- 1%
f_{Low} (MHz)	f_{High} (MHz)	OBW (f_{high}-f_{low})	Limit
2400.443	2400.517	1.074 MHz	>500kHz



OCCUPIED BANDWIDTH - TABULATED RESULTS			
MID CHANNEL			EMI4610
U _{Start} (start of the test):	3Vdc	U _{End} (end of the test):	3Vdc
Voltage drop:	0%	Limit:	+/- 1%
f _{Low} (MHz)	f _{High} (MHz)	OBW (f _{high} -f _{low})	Limit
2440.445	2441.513	1.068 MHz	>500kHz



OCCUPIED BANDWIDTH - TABULATED RESULTS			
HIGH CHANNEL			EMI4609
U_{Start} (start of the test):	3Vdc	U_{End} (end of the test):	3Vdc
Voltage drop:	0%	Limit:	+/- 1%
f_{Low} (MHz)	f_{High} (MHz)	OBW (f_{high}-f_{low})	Limit
2480.435	2481.514	1.078 MHz	>500kHz

9.9. Measurement of Frequency Stability

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. It is connected to the measuring receiver via 50Ω attenuator(s). RBW=100Hz	

TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Low channel / 25°C/ 3.0Vdc	Tx-CW	2400MHz <F< 2483.5MHz	EMI4503	PASS
Low channel / 25°C/ 2.6Vdc	Tx-CW		EMI4504	PASS
Low channel / -40°C/ 3.0Vdc	Tx-CW		EMI4611	PASS
Low channel / -40°C/ 2.6Vdc	Tx-CW		EMI4612	PASS
Low channel / 85°C/ 3.0Vdc	Tx-CW		EMI4613	PASS
Low channel / 85°C/ 2.6Vdc	Tx-CW		EMI4614	PASS
High channel / 25°C/ 3.0Vdc	Tx-CW		EMI4616	PASS
High channel / 25°C/ 2.6Vdc	Tx-CW		EMI4617	PASS
High channel / -40°C/ 3.0Vdc	Tx-CW		EMI4618	PASS
High channel / -40°C/ 2.6Vdc	Tx-CW		EMI4619	PASS
High channel / 85°C/ 3.0Vdc	Tx-CW		EMI4620	PASS
High channel / 85°C/ 2.6Vdc	Tx-CW		EMI4621	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	24.1 °C
Relative Humidity	20 to 75 %	51.5 %
Atmospheric pressure	N/A	1002 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	16491	25/06/2019	25/08/2021
Cable	N	3m	16429	04/05/2019	04/07/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Spectrum analyzer	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020
Thermometer contactless	GHM Greisinger	GMH 3710	12968	11/02/2019	11/04/2020

Blank cells = Permanent validity

TEST SETUP PHOTO(S)



FREQUENCY ERROR - TABULATED RESULTS				
TEST CASE	FREQUENCY (MHz)	FREQUENCY ERROR (kHz)	LIMIT	RESULT TAB.
Low channel / 25°C/ 3.0Vdc	2400.981345	N/A	2400MHz <F< 2483.5MHz	EMI4503
Low channel / 25°C/ 2.6Vdc	2400.980975	-0.37		EMI4504
Low channel / -40°C/ 3.0Vdc	2400.994894	13.549		EMI4611
Low channel / -40°C/ 2.6Vdc	2400.994794	13.449		EMI4612
Low channel / 85°C/ 3.0Vdc	2400.967780	-13.565		EMI4613
Low channel / 85°C/ 2.6Vdc	2400.967590	-13.755		EMI4614
High channel / 25°C/ 3.0Vdc	2480.980335	N/A		EMI4616
High channel / 25°C/ 2.6Vdc	2480.980150	-0.185		EMI4617
High channel / -40°C/ 3.0Vdc	2480.994224	13.889		EMI4618
High channel / -40°C/ 2.6Vdc	2480.994364	14.029		EMI4619
High channel / 85°C/ 3.0Vdc	2480.966633	-13.702		EMI4620
High channel / 85°C/ 2.6Vdc	2480.966480	-13.855		EMI4621

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	18/12/2019	-

End of test report