Test report issued under the responsibility of:
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006
Canadian CAB Identifier: FR0003

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 PUCK FAMILY**
Trade Mark. ..... :	BLUE PUCK FAMILY
Manufacturer. ..... :	ELA INNOVATION
Model/Type reference..... :	IDF25XXX
FCC ID..... :	RVVBPUCKPF1
IC. ..... :	20429-BPUCKPF1
Ratings..... :	2,6Vdc to 3Vdc

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

Report Reference No..... :	**RR410-19-104019-1A**
Test procedure. ..... :	FCC IC Certification
Diffusion..... :	MR LEBRUN
Applicant's name. ..... :	ELA INNOVATION
Date of issue..... :	February 26, 2020
Total number of pages..... :	67
Revision. ..... :	0
Modified page(s)..... :	Creation
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.

REPORT INDEX:

REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	February 26, 2020	/	Creation

1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **BLUE PUCK 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.	Equipement 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. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

Test item description.	:	BLUE PUCK FAMILY
Model/Type reference.	:	IDF25XXX
Trade Mark.	:	BLUE PUCK FAMILY
Serial number (S/N).	:	Not communicated
Part number (P/N).	:	Not communicated
Software version.	:	*N/A*
Firmware version.	:	*Not communicated*
Type of sample.	:	Pre-serial
Function(s).	:	Depend on business application
Manufacturer name.	:	ELA INNOVATION
Address.	:	297 rue Maurice BEJART 34080 MONTPELLIER FRANCE

General product information:

N/A

3.2. EUT Marking plate

During tests the marking plate was not present on EUT.

Hereunder an example of marking plate provided by the customer.

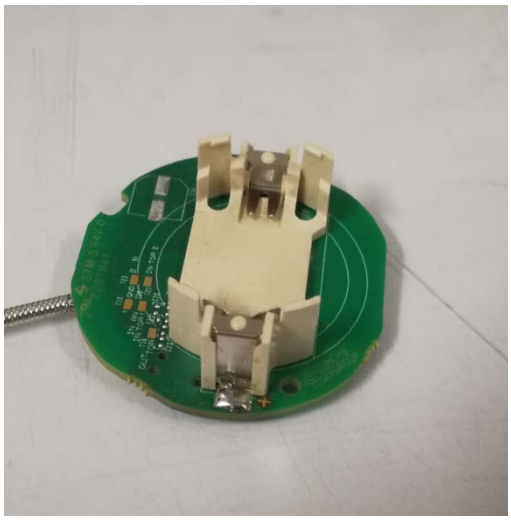
3.3. EUT General view

Front View

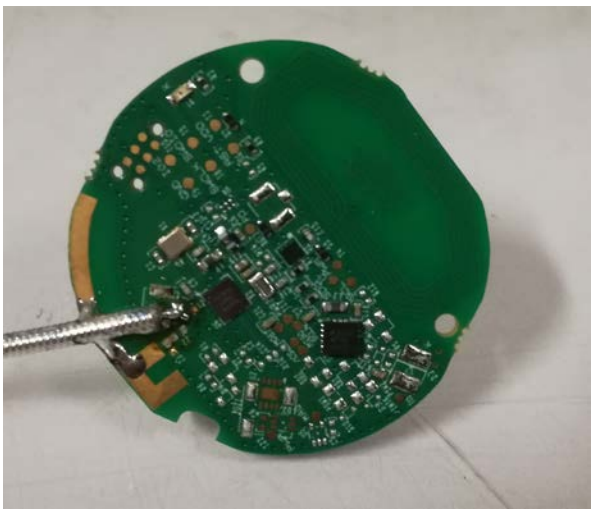
Back View

3.4. EUT Electronic board

Front View



Back View



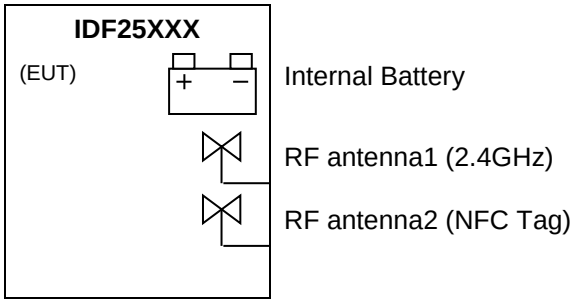
3.5. EUT Mechanical and Electrical Design

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) (m). ..... : *Ø 57 mm base - height 18 mm*
Weight (g). ..... : *36g*
Temperature range (°C). ..... : *-40°C to +85°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..... : *Transceiver*
Technology ..... : *QUUPPA/BLUETOOTH*
Environmental profile..... : *Data transmissions*
Temperature range..... : *-40°C to +85°C*
Antenna type ..... : *Internal Antenna*
Antenna Gain..... : *Not communicated*

Comments:

N/A

b) TRANSMITTER PARAMITTERS (TX)

Frequency bands..... : *2400Mhz to 2483.5Mhz*
RF Power..... : *+4dBm*
Number of channels / Separation..... : *81 channels each 1MHz*
Modulation type ..... : *GFSK*
Duty cycle ..... : *Not communicated*
Tested frequency..... : *2401MHz (Low Channel)*
2441MHz (Mid Channel)
2481MHz (High Channel)

c) RECEIVER PARAMETERS (RX)

Frequency bands..... : *2400Mhz to 2483.5Mhz*
Category/Class ..... : *Not communicated*
Bandwidth..... : *Not communicated*

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:

"This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference."

§15.19(a)(2) - A stand-alone cable input selector switch:

"This device complies with part 15 of the FCC Rules for use with cable television service."

§15.19(a)(3) - All other devices:

"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.

§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:

"This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference."

§15.19(a)(5) - When the device is so small:

The statement of §15.19(a) shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

Compliance information (§2.1077):

The identification, by name, address and telephone number or internet contact information, of the responsible party, as defined in § 2.909 of the standard. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

Identification (§2.1074):

(a) Devices subject only to Supplier's Declaration of Conformity shall be uniquely identified by the party responsible for marketing or importing the equipment within the United States.

(b) Devices subject to authorization under Supplier's Declaration of Conformity may be labeled with the following logo on a voluntary basis as a visual indication that the product complies with the applicable FCC requirements.

(image size: 6.7 x 2.8" ;3.5 x 1.4" ;1.6 x .7")

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

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

b) INFORMATION TO USER (§15.21):
The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that: *"The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment"*

4.2. Subpart B - Unintentional Radiators

In addition to Subpart A, the user notice 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:** *"NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense."* **§15.105(b) - For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:** *"NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:* *—Reorient or relocate the receiving antenna.* *—Increase the separation between the equipment and receiver.* *—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.* *—Consult the dealer or an experienced radio/TV technician for help."*

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

Sample subject to the test complies for tests done with the requirements of the reference document(s) listed in §2 of this test report and, where applicable, with deviation(s) specified in this document.

To declare, or not, the compliance with the specifications, it was not explicitly taken 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 = 3.428 mW (eirp) at 2441MHz

In accordance with KDB 447498 D01 General RF Exposure Guidance v06:
PSD= EIRP/(4*π*R2)= 3.428/(4*π*(20 cm)²)= 0.001 mW/cm²
Limit= 1 mW/cm²

8. MEASUREMENT UNCERTAINTY

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	MINIMAL STANDARD UNCERTAINTY
Radio frequency	± 1 x 10^{-7}	±1 x 10^{-7}
RF power, conducted		
RF power	± 0.8dB	± 1 dB
Power spectral density	± 2.3dB	± 3 dB
Occuped bandwidth		
RF power	± 3.8 %	± 5 %
Maximum frequency deviation		
300 Hz < audio frequency < 6 kHz	± 1.2 %	± 5 %
6 kHz < audio frequency < 25 kHz	± 1.2 %	± 3 dB
Adjacent channel power	± 1.6 dB	± 3 dB
Sensibility of receiver (conducted)	± 2.0 dB	± 3 dB
Blocking	± 4.0 dB	± 4 dB
Transitoire		
Amplitude	± 8.5 %	± 20 %
At the frequency	± 166 Hz	± 250 Hz
Conducted emission (spurious)		
f ≤ 1 GHz	± 0.8 dB	± 3 dB
1 GHz - 12.75 GHz	± 1.6 dB	
Radiated emission (PAR / PIRE / RNE)		
f ≤ 62.5 MHz	± 5.1 dB	± 6 dB
62.5 MHz - 1 GHz	± 5.1 dB	± 6 dB
1 GHz - 18 GHz	± 5.2 dB	± 6 dB
18 GHz – 26 GHz	± 5.1 dB	± 6 dB
26 GHz – 40 GHz	± 5.4 dB	± 6 dB
180-1000 MHz / 1 – 12.75 GHz (EN 301 908-1)	± 3.0 / 2.9 dB	± 3 dB
RF power (EN 300328 / EN 301893)	± 5.3 dB	± 6 dB
PIRE and power spectral density with diode	± 5.2 dB	± 6 dB
Radiated emission (magnetic field)		
9kHz – 30MHz	± 3 dB	± 6 dB
RF level for a given BER	± 0.8 dB	± 1.5 dB
Supply voltages	± 3 %	± 3 %
Temperature	± 1 °C	± 1°C
Humidity	± 5 %	± 5 %
Time / Duty cycle	± 4.4 %	± 5 %
Adaptivity	± 2.9 dB	/
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	± 2.7 dB	/
30MHz – 1GHz	± 5.0 dB	/
1GHz – 18GHz	± 5.6 dB	/
18GHz – 26GHz	± 5.7 dB	/
26GHz – 40GHz	± 5.7 dB	/

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

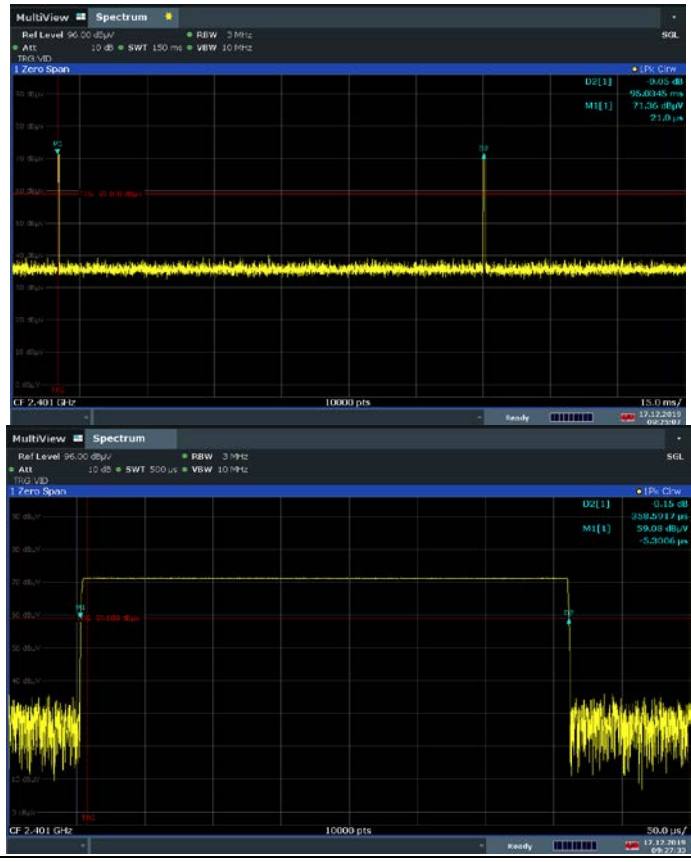
9. TEST CONDITIONS AND RESULTS

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**

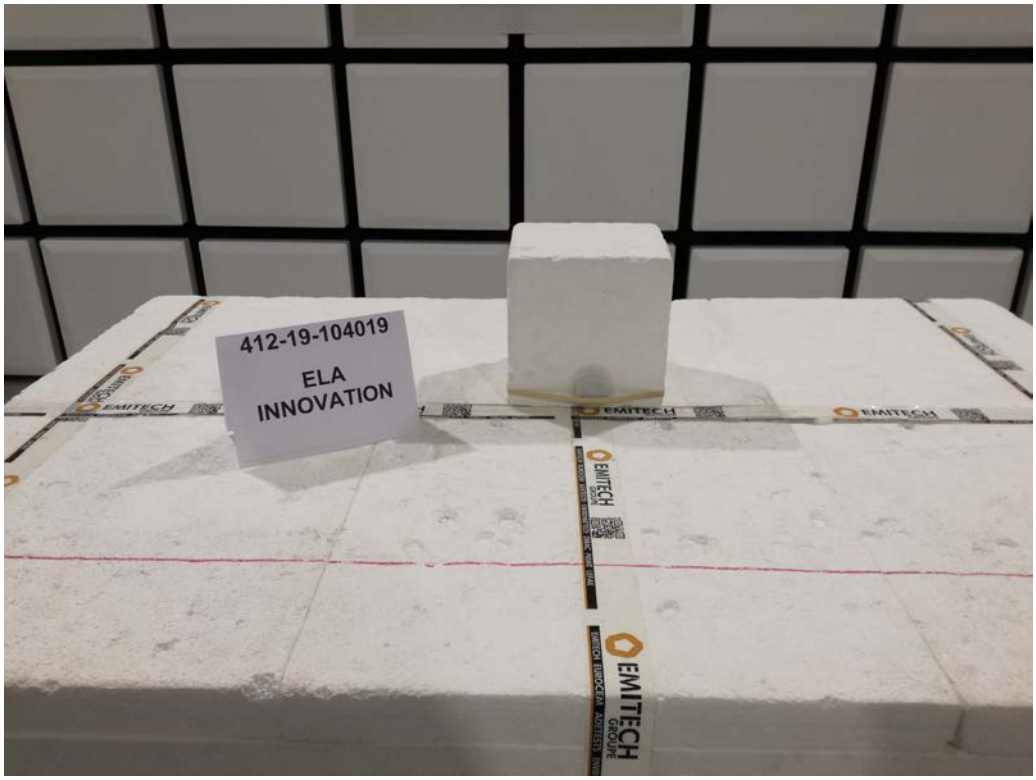
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: From 9 kHz to 30MHz: limit indicated on the curves 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

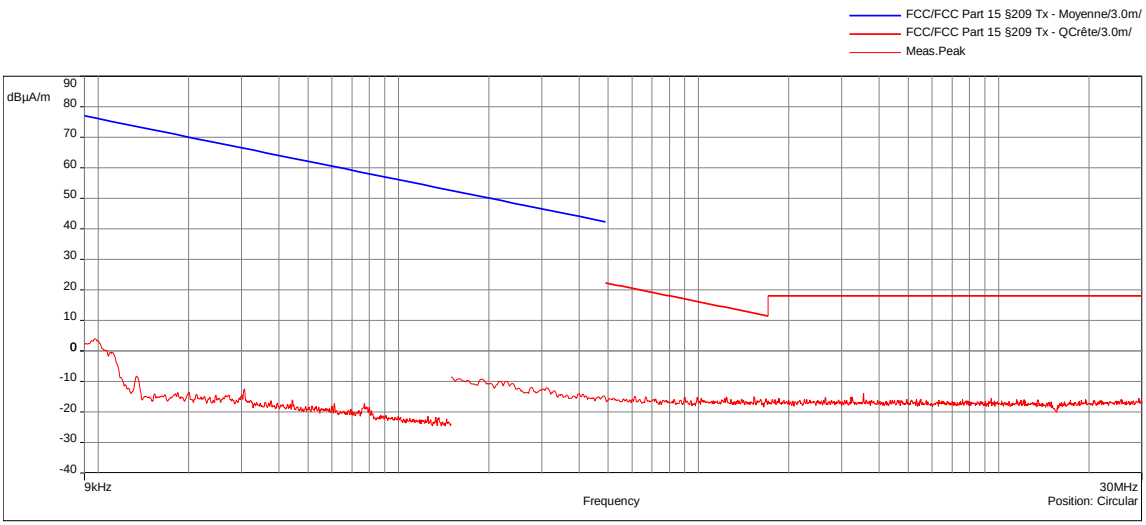
(*) Under derogation EQS DER 000 S41 00068

TEST SETUP PHOTO(S)
   

TRANSMITTER RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS							
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg (dBµV/m)**	**Limit Qpeak (dBµV/m)**	**Limit Peak (dBµV/m)**	**Limit Avg (dBµV/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:	17/12/2019 17:28:57	**H (%):**	64.8
Test Operator:	OAT	**P (hPa):**	992

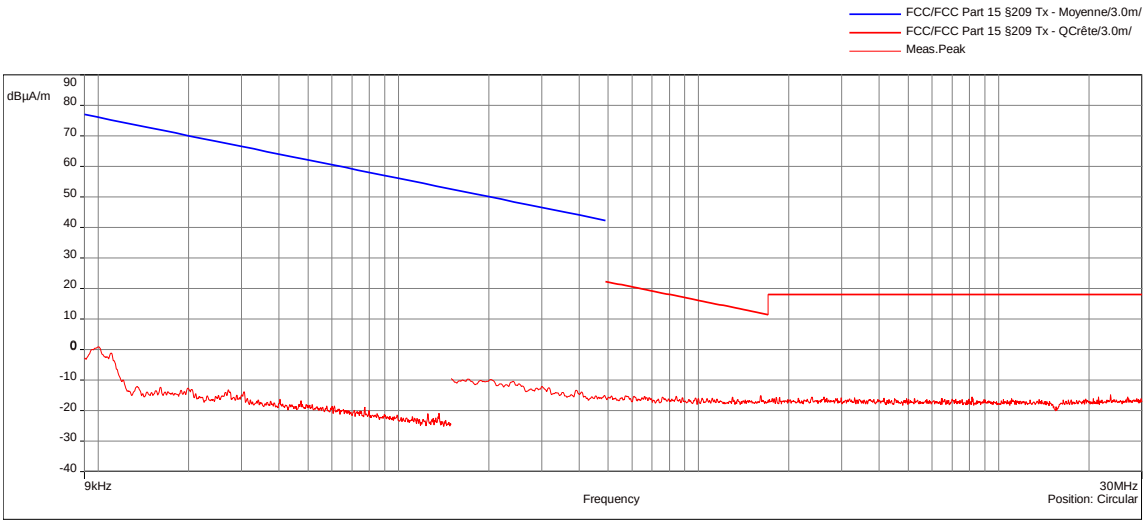


POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak
Configuration:				
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.			
EUT modification(s): N/A				

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - TABULATED RESULTS			
TX MODE / 0° / ALL CHANNELS			**EMI4598**
Frequency (MHz)	**Antenna Position**	**Level (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 - GRAPH			
TX MODE / 45° / ALL CHANNELS		EMI4599	
EUT mode:	Continuous modulated Tx	**T (°C):**	19.3
Test Date:	17/12/2019 17:37:23	**H (%):**	64.8
Test Operator:	OAT	**P (hPa):**	992

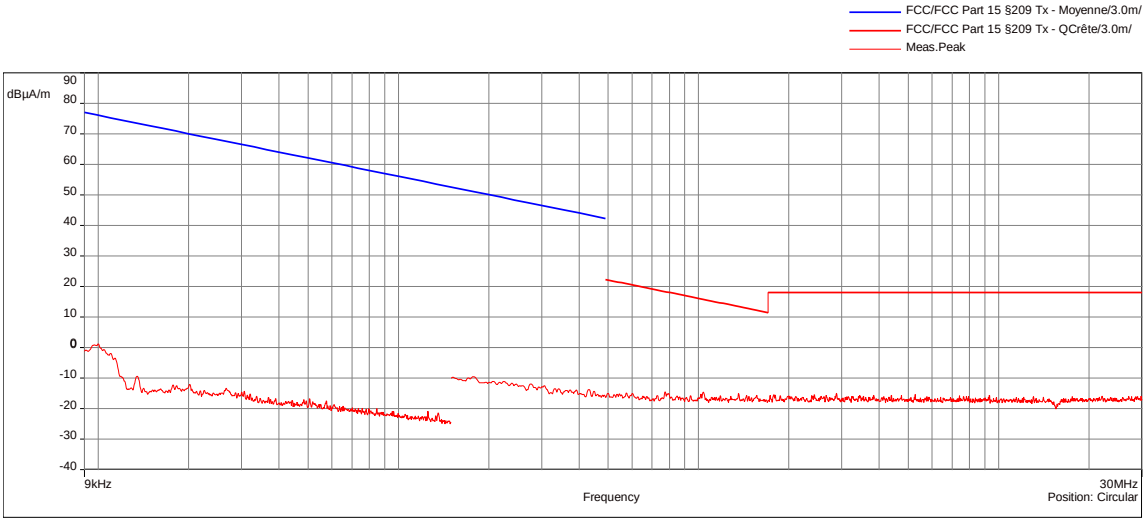


POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak
Configuration:				
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.			
EUT modification(s): N/A				

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - TABULATED RESULTS			
TX MODE / 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 - GRAPH			
TX MODE / 90° / ALL CHANNELS		EMI4600	
EUT mode:	Continuous modulated Tx	**T (°C):**	19.3
Test Date:	17/12/2019 17:40:35	**H (%):**	64.8
Test Operator:	OAT	**P (hPa):**	992



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 / 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 equipements 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

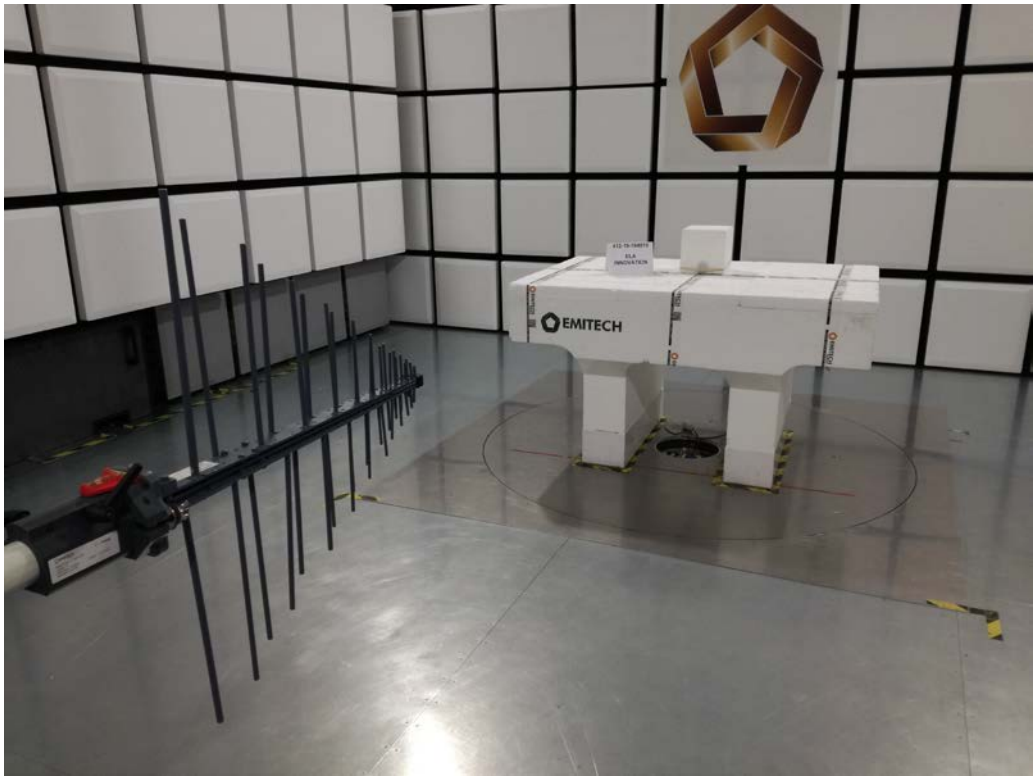
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
	Instruments	2402/2480-2380/2500-40/10EE-200W			
Preamplifier	Techniwave	APS16-0087	14040	25/06/2019	25/08/2020
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Shielded enclosure	RAY PROOF	C.V2	1423		
Shielded enclosure	COMTEST	SAC 3m	14494		
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

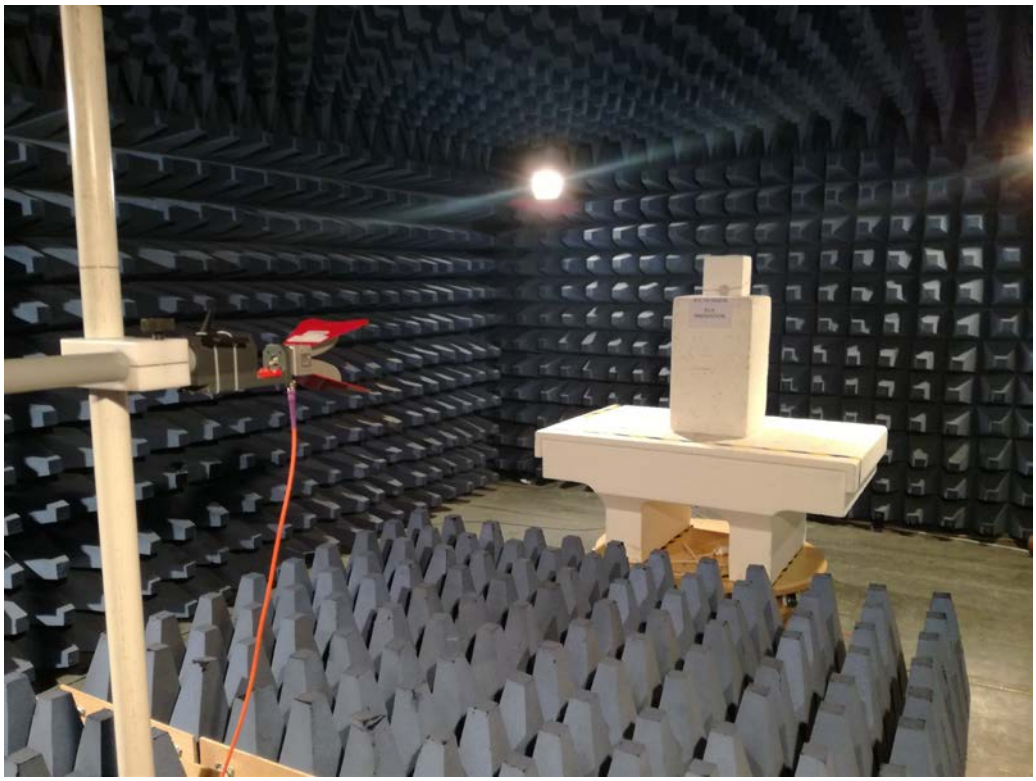
BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

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

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

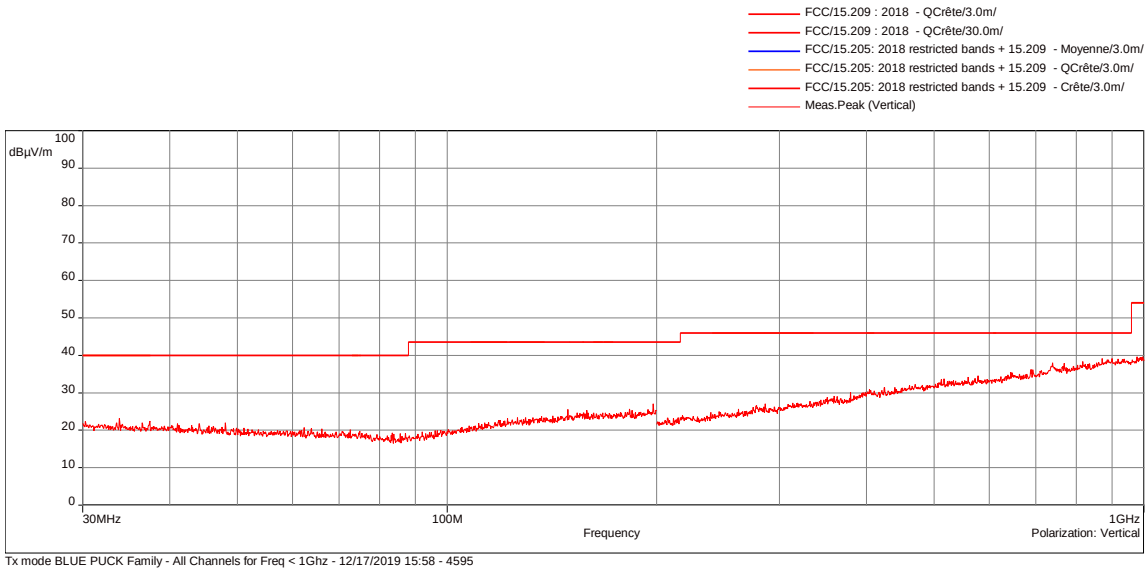

TEST SETUP PHOTO(S) – FOR 30MHZ <FREQ< 200MHZ


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


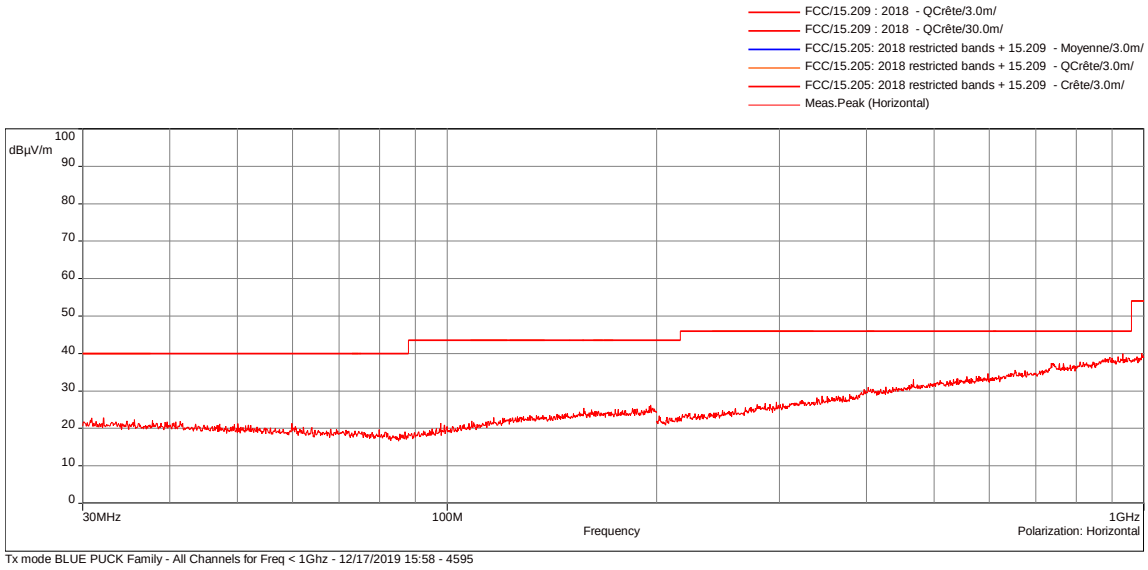
TEST SETUP PHOTO(S) - FOR 1GHZ <FREQ


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**
2272.527	Vertical	55.29	37.13	54	16.87
2289.329	Vertical	52.11	36.38	54	17.62
2313.331	Vertical	53.3	37.47	54	16.53
2344.934	Vertical	51.37	36.43	54	17.57
2361.536	Vertical	52.15	35.91	54	18.09
2376.938	Vertical	53.26	37.04	54	16.96
4801.680	Horizontal	45.97	N/P	54	8.03
TX MODE - MID CHANNEL					
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg (dBµV/m)**	**Limit Avg (dBµV/m)**	**Margin dB**
2271.593	Vertical	54.76	35.21	54	18.79
2291.929	Vertical	51.77	36.1	54	17.9
2313.131	Vertical	53.46	36.84	54	17.16
2328.733	Vertical	51.18	36.26	54	17.74
2361.336	Vertical	51.74	35.55	54	18.45
2380.338	Vertical	52.46	36.24	54	17.76
4881.188	Vertical	42.95	N/P	54	11.05
7321.932	Vertical	52.07	N/P	54	1.93
4881.188	Horizontal	42.06	N/P	54	11.94
7323.432	Horizontal	45.39	N/P	54	8.61
TX MODE - HIGH CHANNEL					
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg (dBµV/m)**	**Limit Avg (dBµV/m)**	**Margin dB**
2329.333	Vertical	51.32	36.08	54	17.92
2337.134	Vertical	51.49	36.04	54	17.96
2345.335	Vertical	53.84	36.01	54	17.99
2353.335	Vertical	55.03	37.01	54	16.99
2369.137	Vertical	53.6	36.8	54	17.2
4962.196	Vertical	40.97	36.24	54	17.76
7443.444	Vertical	46.67	N/P	54	7.33
4960.696	Horizontal	44.46	N/P	54	9.54
7443.444	Horizontal	43.16	N/P	54	10.84

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE - ALL CHANNELS FOR FREQ < 1GHZ		EMI4595	
EUT mode:	Continuous modulated Tx	**T (°C):**	19.3
Test Date:	17/12/2019 15:58:55	**H (%):**	64.8
Test Operator:	OAT	**P (hPa):**	992



Tx mode BLUE PUCK Family - All Channels for Freq < 1Ghz - 12/17/2019 15:58 - 4595



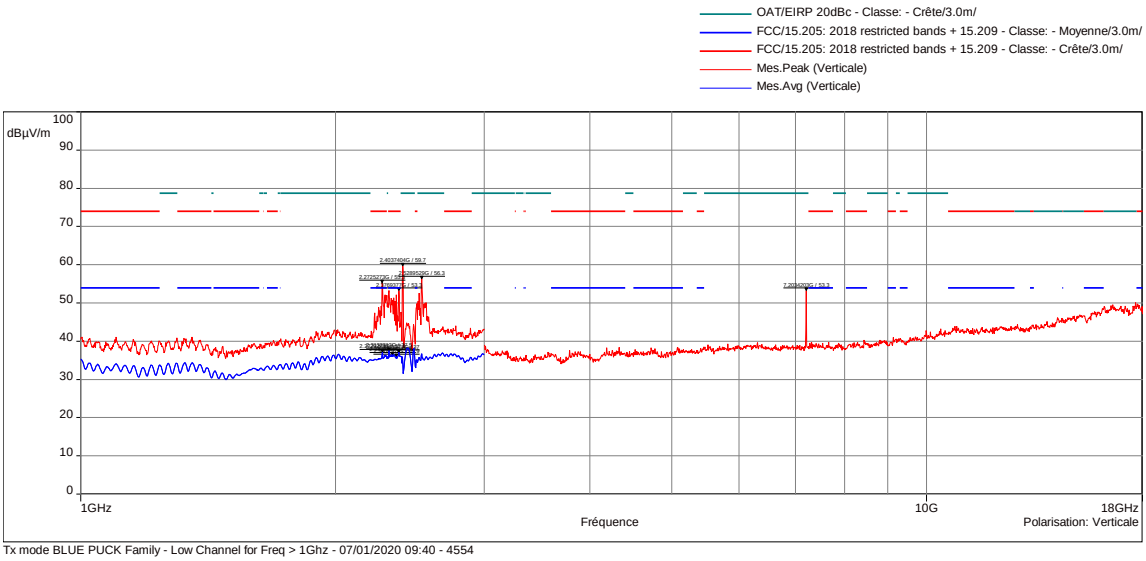
Tx mode BLUE PUCK Family - All Channels for Freq < 1Ghz - 12/17/2019 15:58 - 4595

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-200MHz	100kHz	300kHz	Peak
Horizontal	30MHz-200MHz	100kHz	300kHz	Peak
Vertical	200MHz-1GHz	100kHz	300kHz	Peak
Horizontal	200MHz-1GHz	100kHz	300kHz	Peak
EUT modification(s): N/A				

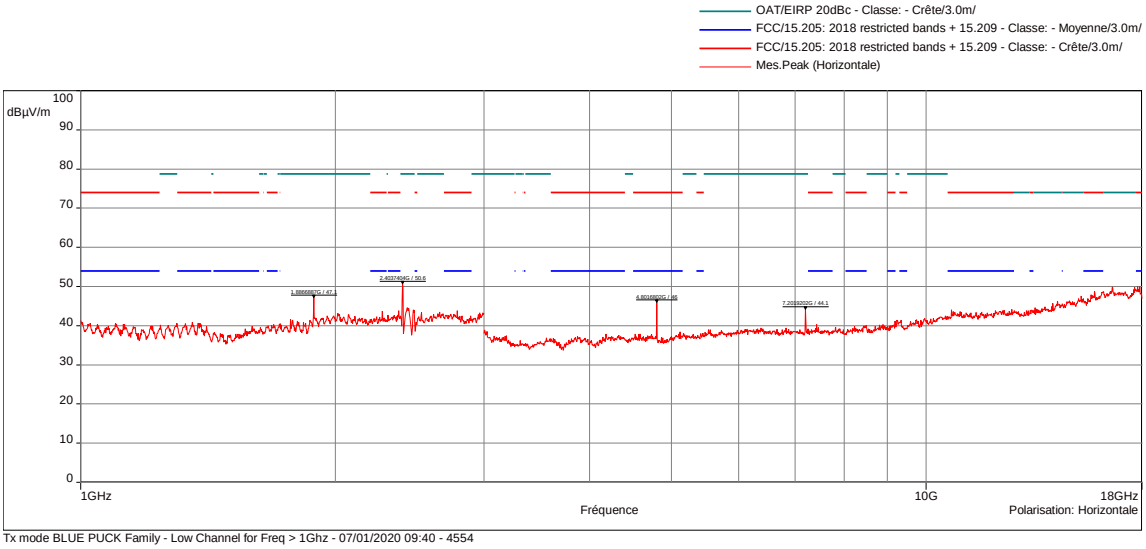
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS			
TX MODE - ALL CHANNELS FOR FREQ < 1GHZ			EMI4595
Frequency (MHz)	**Polarization**	**Level (dBµV/m)**	**Limit (dBµV/m)**
N/A	N/A	N/A	N/A

No spurious emissions were detected.

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE - LOW CHANNEL FOR FREQ > 1GHZ		EMI4554	
EUT mode:	Continuous modulated Tx	**T (°C):**	21.9
Test Date:	17/12/2019 15:17:06	**H (%):**	42.6
Test Operator:	OAT	**P (hPa):**	992



Tx mode BLUE PUCK Family - Low Channel for Freq > 1Ghz - 07/01/2020 09:40 - 4554



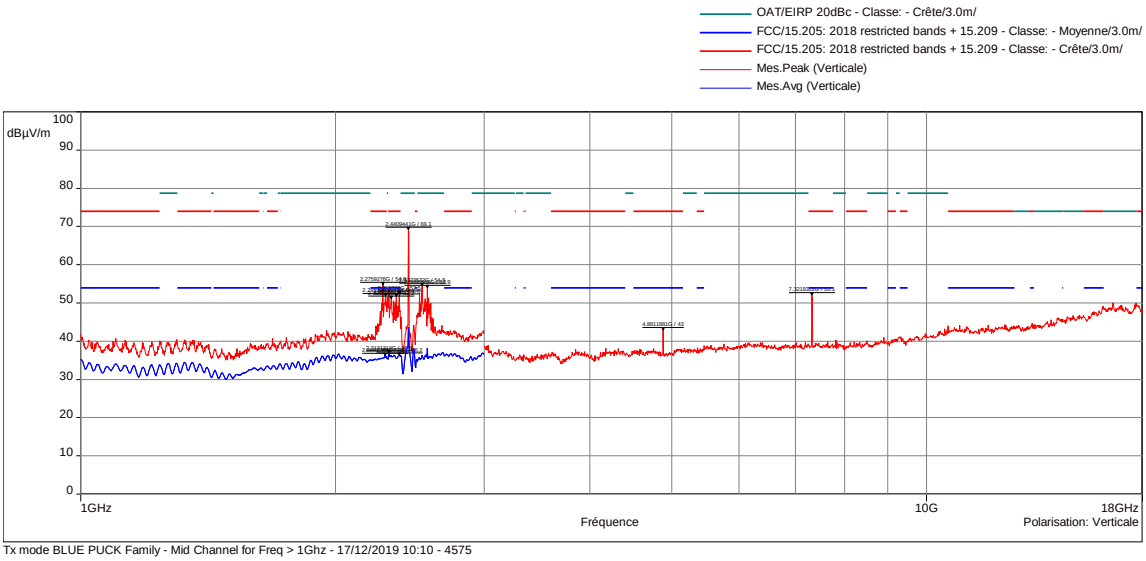
Tx mode BLUE PUCK Family - Low Channel for Freq > 1Ghz - 07/01/2020 09:40 - 4554

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Peak
Horizontal	3GHz-18GHz	1MHz	3MHz	Peak
Configuration:				
Comments:	Above 18GHz no spurious emissions were detected.			
EUT modification(s): N/A				

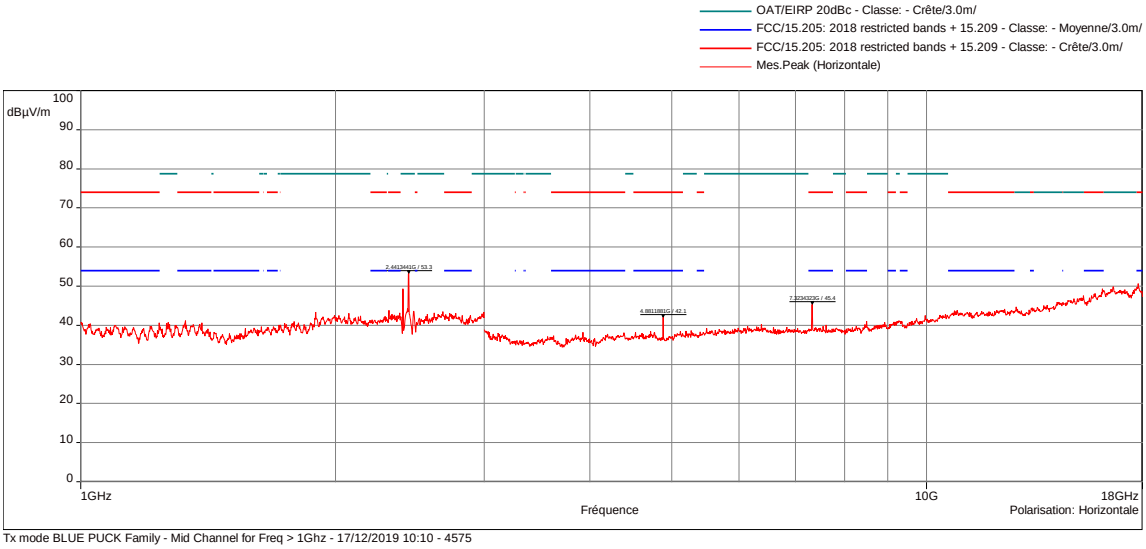
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS					
TX MODE - LOW CHANNEL FOR FREQ > 1GHZ				EMI4554	
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg (dBµV/m)**	**Limit Avg (dBµV/m)**	**Margin dB**
2272.527	Vertical	55.29	37.13	54	16.87
2289.329	Vertical	52.11	36.38	54	17.62
2313.331	Vertical	53.3	37.47	54	16.53
2344.934	Vertical	51.37	36.43	54	17.57
2361.536	Vertical	52.15	35.91	54	18.09
2376.938	Vertical	53.26	37.04	54	16.96
4801.680	Horizontal	45.97	N/P	54	8.03

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 - GRAPH			
TX MODE - MID CHANNEL FOR FREQ > 1GHZ		EMI4575	
EUT mode:	Continuous modulated Tx	**T (°C):**	21.9
Test Date:	17/12/2019 10:10:36	**H (%):**	42.6
Test Operator:	OAT	**P (hPa):**	992



Tx mode BLUE PUCK Family - Mid Channel for Freq > 1Ghz - 17/12/2019 10:10 - 4575



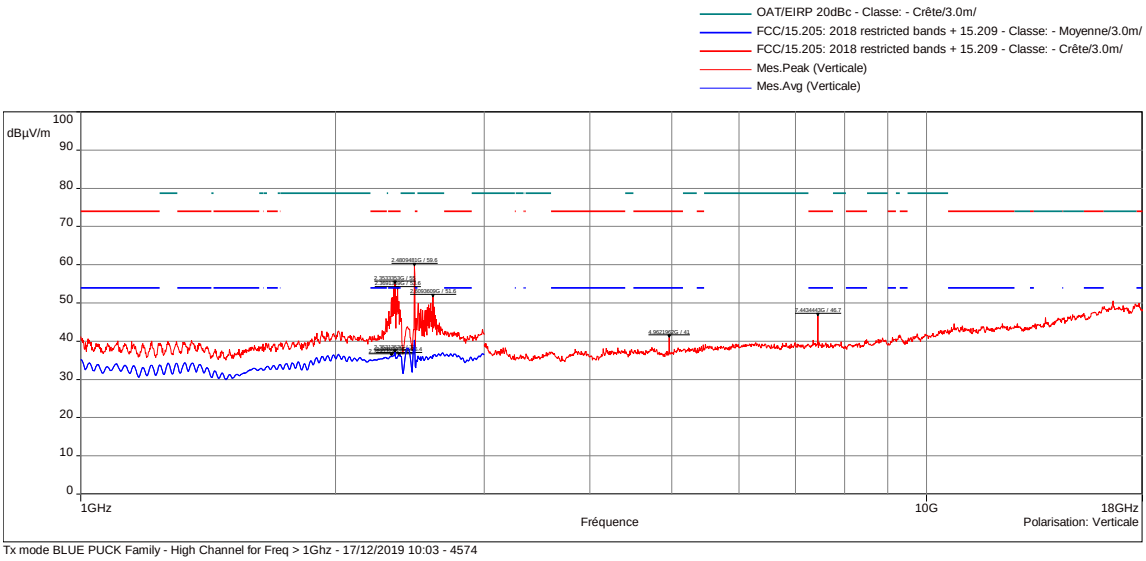
Tx mode BLUE PUCK Family - Mid Channel for Freq > 1Ghz - 17/12/2019 10:10 - 4575

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Peak
Horizontal	3GHz-18GHz	1MHz	3MHz	Peak
Configuration:				
Comments:	Above 18GHz no spurious emissions were detected.			
EUT modification(s): N/A				

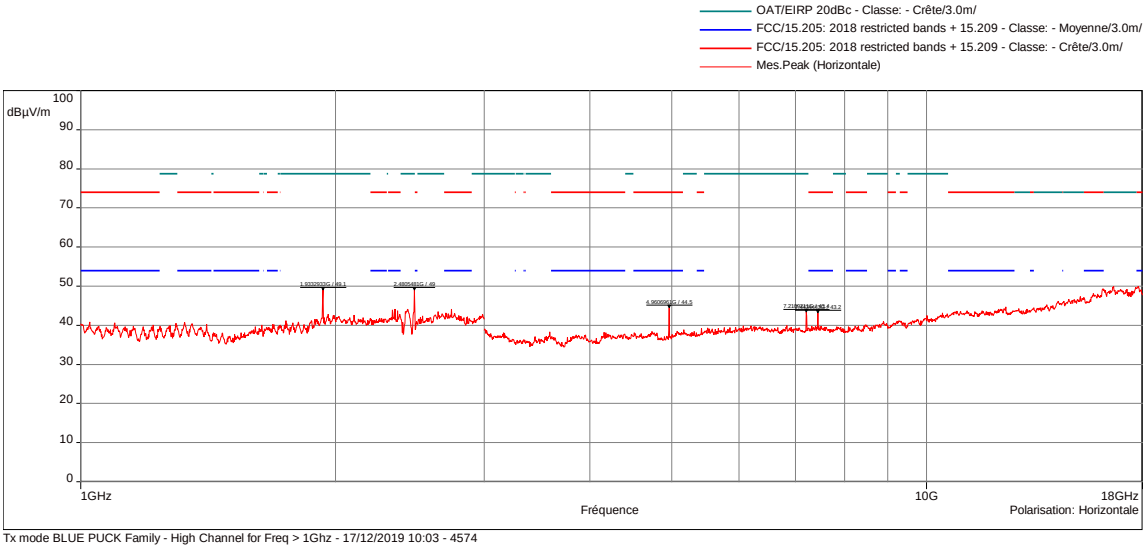
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS					
TX MODE - MID CHANNEL FOR FREQ > 1GHZ				EMI4575	
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg (dBµV/m)**	**Limit Avg (dBµV/m)**	**Margin dB**
2271.593	Vertical	54.76	35.21	54	18.79
2291.929	Vertical	51.77	36.1	54	17.9
2313.131	Vertical	53.46	36.84	54	17.16
2328.733	Vertical	51.18	36.26	54	17.74
2361.336	Vertical	51.74	35.55	54	18.45
2380.338	Vertical	52.46	36.24	54	17.76
4881.188	Vertical	42.95	N/P	54	11.05
7321.932	Vertical	52.07	N/P	54	1.93
4881.188	Horizontal	42.06	N/P	54	11.94
7323.432	Horizontal	45.39	N/P	54	8.61

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 - GRAPH			
TX MODE - HIGH CHANNEL FOR FREQ > 1GHZ		EMI4574	
EUT mode:	Continuous modulated Tx	**T (°C):**	21.9
Test Date:	17/12/2019 10:03:45	**H (%):**	42.6
Test Operator:	OAT	**P (hPa):**	992



Tx mode BLUE PUCK Family - High Channel for Freq > 1Ghz - 17/12/2019 10:03 - 4574



Tx mode BLUE PUCK Family - High Channel for Freq > 1Ghz - 17/12/2019 10:03 - 4574

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Peak
Horizontal	3GHz-18GHz	1MHz	3MHz	Peak
Configuration:				
Comments:	Above 18GHz no spurious emissions were detected.			
EUT modification(s): N/A				

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS					
TX MODE - HIGH CHANNEL FOR FREQ > 1GHZ				EMI4574	
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg (dBµV/m)**	**Limit Avg (dBµV/m)**	**Margin dB**
2329.333	Vertical	51.32	36.08	54	17.92
2337.134	Vertical	51.49	36.04	54	17.96
2345.335	Vertical	53.84	36.01	54	17.99
2353.335	Vertical	55.03	37.01	54	16.99
2369.137	Vertical	53.6	36.8	54	17.2
4962.196	Vertical	40.97	36.24	54	17.76
7443.444	Vertical	46.67	N/P	54	7.33
4960.696	Horizontal	44.46	N/P	54	9.54
7443.444	Horizontal	43.16	N/P	54	10.84

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 >1GHz).

Masurements 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.

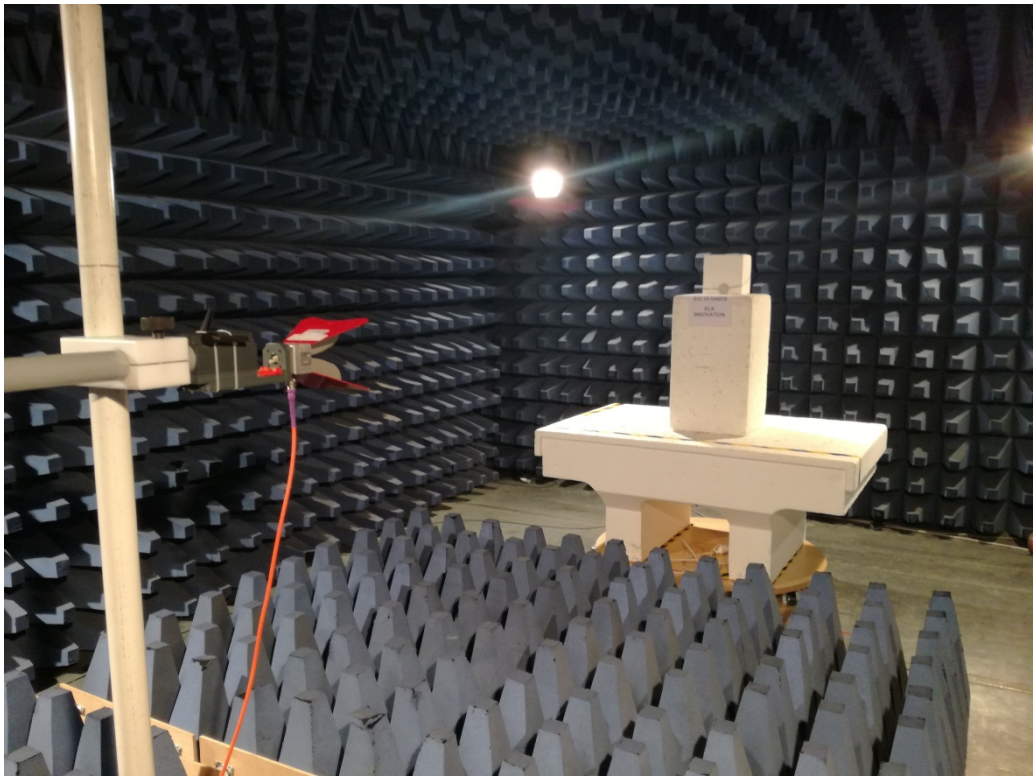
For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded.

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 Blank cells = Permanent validity

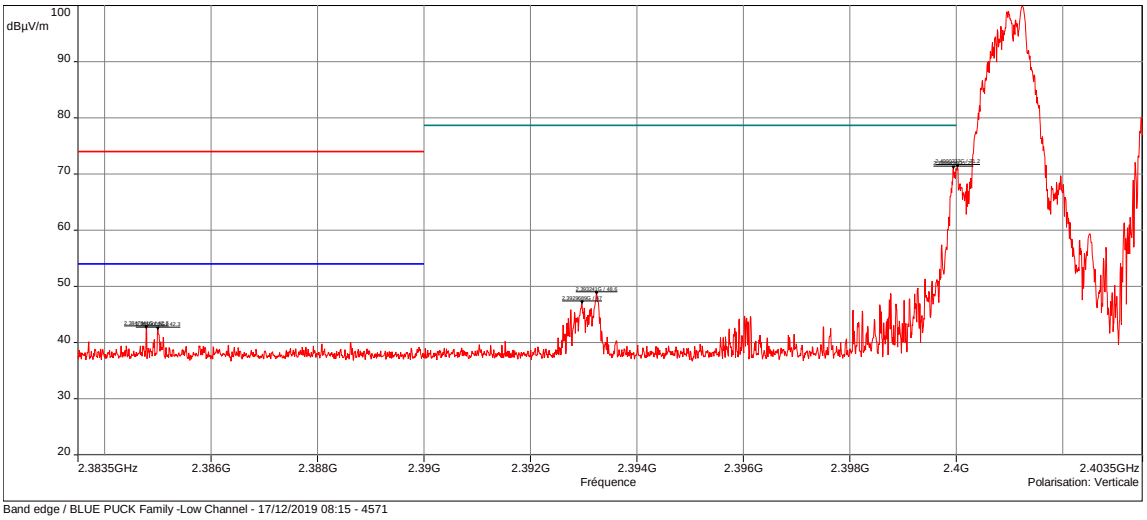
TEST SETUP PHOTO(S)
   

BAND-EDGE - TABULATED RESULTS					
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Limit Avg (dBµV/m)**	**Limit Peak (dBµV/m)**	**Margin dB**
2384.784	Vertical	42.55	54	74	11.45
2385.000	Vertical	42.3	54	74	11.7
2399.943	Vertical	70.95	N/A	78.71	7.76
2483.569	Vertical	48.51	54	74	25.49
2483.973	Vertical	45.5	54	74	28.5
2484.227	Vertical	44.66	54	74	29.34
2484.941	Vertical	43.9	54	74	30.1
2488.721	Vertical	46	54	74	28
2489.225	Vertical	48.99	54	74	25.01
2491.953	Vertical	44.11	54	74	29.89
2492.101	Vertical	43.48	54	74	30.52
2496.974	Vertical	42.27	54	74	31.73

BAND-EDGE - GRAPH			
BAND EDGE / LOW CHANNEL		EMI4571	
EUT mode:	Continuous modulated Tx	**T (°C):**	21.9
Test Date:	17/12/2019 08:15:33	**H (%):**	42.6
Test Operator:	OAT	**P (hPa):**	992

OAT/15.247: 2018 d) band Edged - 20dBc vs EIRP - Classe:40 - Crête/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Moyenne/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Crête/3.0m/
Mes.Peak (Verticale)

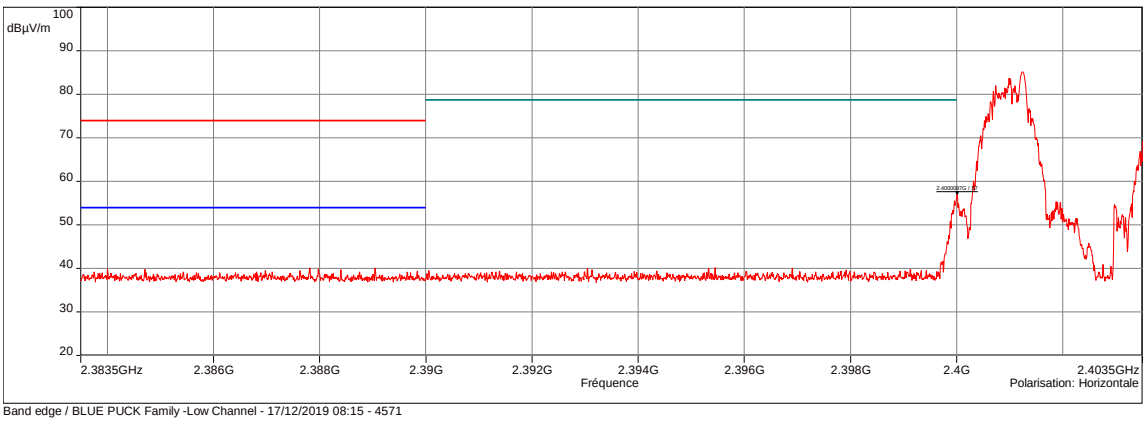
Description Sous-bande 1
Fréquences:2.3835 GHz - 2.4035 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 100kHz, VBW: 300kHz, Auto, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Verticale
Distance: 3 m



Band edge / BLUE PUCK Family -Low Channel - 17/12/2019 08:15 - 4571

OAT/15.247: 2018 d) band Edged - 20dBc vs EIRP - Classe:40 - Crête/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Moyenne/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Crête/3.0m/
Mes.Peak (Horizontale)

Description Sous-bande 2
Fréquences:2.3835 GHz - 2.4035 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 100kHz, VBW: 300kHz, Auto, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Horizontale
Distance: 3 m



Band edge / BLUE PUCK Family -Low Channel - 17/12/2019 08:15 - 4571

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.3835GHz-2.4035GHz	100kHz	300kHz	Peak
Horizontal	2.3835GHz-2.4035GHz	100kHz	300kHz	Peak
Configuration:				
Comments:				
EUT modification(s): N/A				

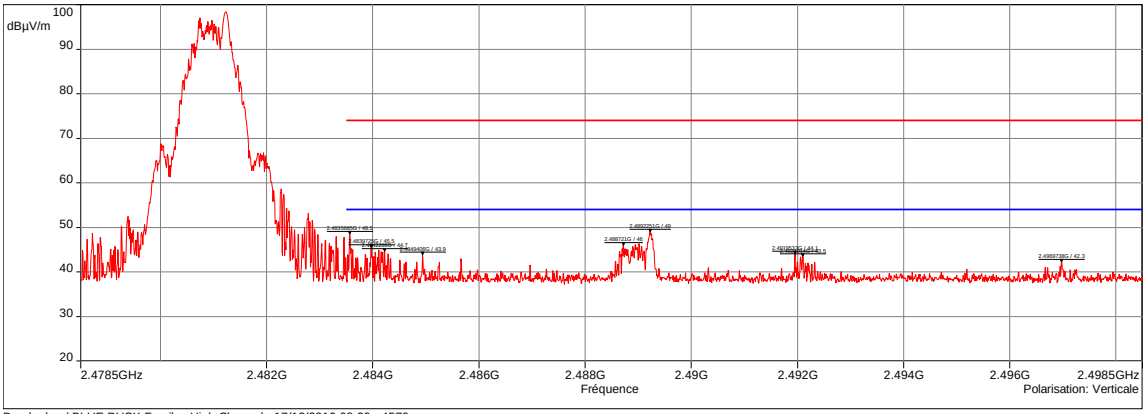
BAND-EDGE - TABULATED RESULTS					
BAND EDGE / LOW CHANNEL				EMI4571	
Frequency (MHz)	Polarization	Level Peak (dBµV/m)	Limit Avg (dBµV/m)	Limit Peak (dBµV/m)	Margin dB
2384.784	Vertical	42.55	54	74	11.45
2385.000	Vertical	42.3	54	74	11.7
2399.943	Vertical	70.95	N/A	78.71	7.76

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

BAND-EDGE - GRAPH			
BAND EDGE / HIGH CHANNEL		EMI4570	
EUT mode:	Continuous modulated Tx	**T (°C):**	21.9
Test Date:	17/12/2019 08:20:51	**H (%):**	42.6
Test Operator:	OAT	**P (hPa):**	992

FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Moyenne/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Crête/3.0m/
Mes.Peak (Verticale)

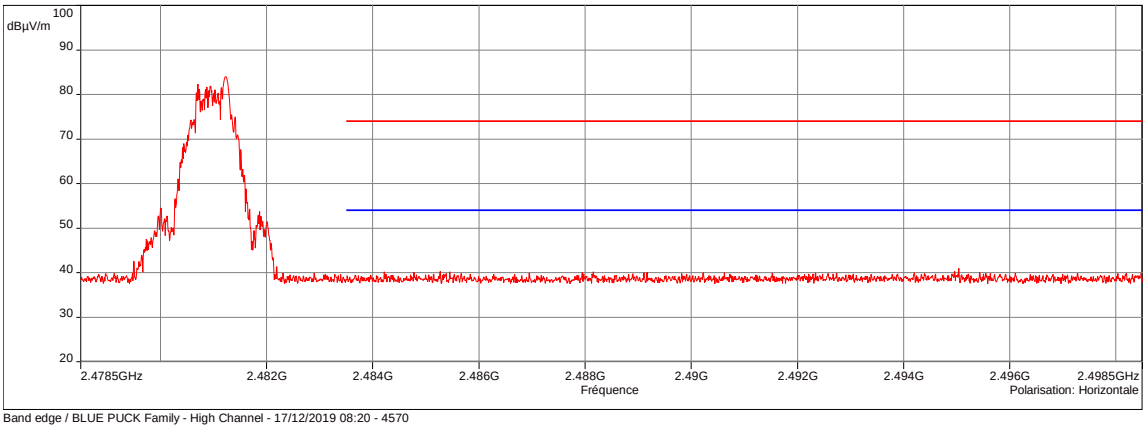
Description Sous-bande 1
Fréquences:2.4785 GHz - 2.4985 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 100kHz, VBW: 300kHz, Auto, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Verticale
Distance: 3 m



Band edge / BLUE PUCK Family - High Channel - 17/12/2019 08:20 - 4570

FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Moyenne/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Classe: - Crête/3.0m/
Mes.Peak (Horizontale)

Description Sous-bande 2
Fréquences:2.4785 GHz - 2.4985 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 100kHz, VBW: 300kHz, Auto, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Horizontale
Distance: 3 m



Band edge / BLUE PUCK Family - High Channel - 17/12/2019 08:20 - 4570

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4785GHz-2.4985GHz	100kHz	300kHz	Peak
Horizontal	2.4785GHz-2.4985GHz	100kHz	300kHz	Peak
Configuration:				
Comments:				
EUT modification(s): N/A				

BAND-EDGE - TABULATED RESULTS					
BAND EDGE / HIGH CHANNEL				EMI4570	
Frequency (MHz)	Polarization	Level Peak (dBµV/m)	Limit Avg (dBµV/m)	Limit Peak (dBµV/m)	Margin dB
2483.569	Vertical	48.51	54	74	25.49
2483.973	Vertical	45.5	54	74	28.5
2484.227	Vertical	44.66	54	74	29.34
2484.941	Vertical	43.9	54	74	30.1
2488.721	Vertical	46	54	74	28
2489.225	Vertical	48.99	54	74	25.01
2491.953	Vertical	44.11	54	74	29.89
2492.101	Vertical	43.48	54	74	30.52
2496.974	Vertical	42.27	54	74	31.73

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

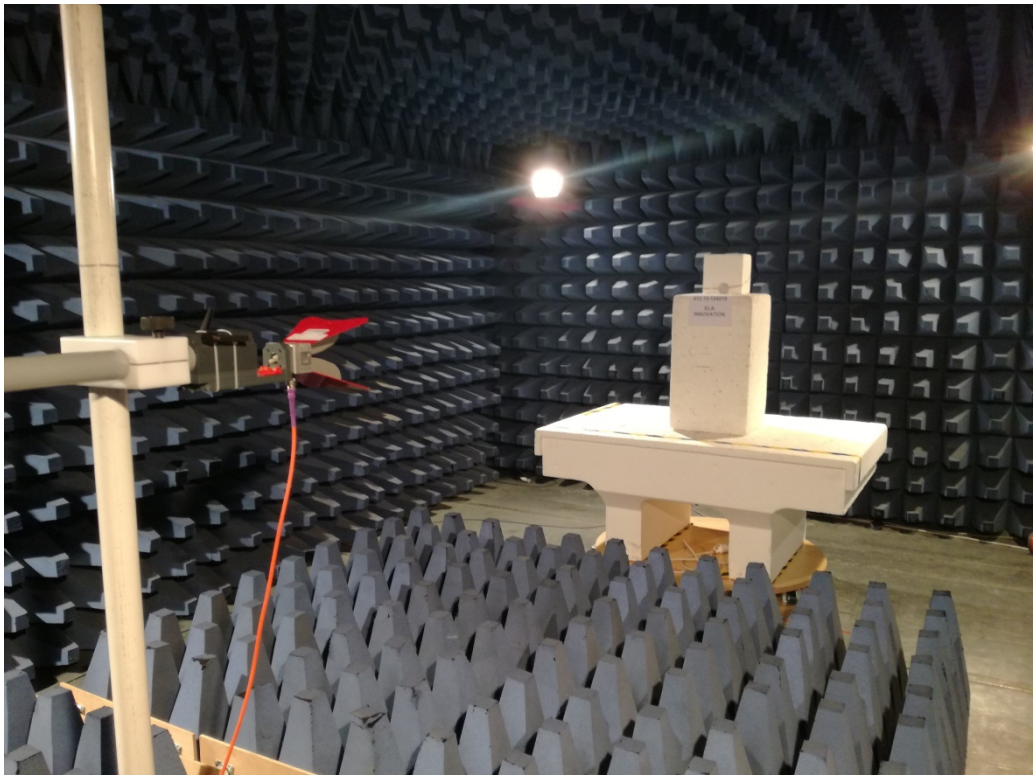
Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.10: 2013
Test description: EUT is set on an insulating support at 150cm above the ground reference plane. Measurement are done on a normalized test site by the substitution method. The test antenna is oriented in the 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 equipements 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 Annnex 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

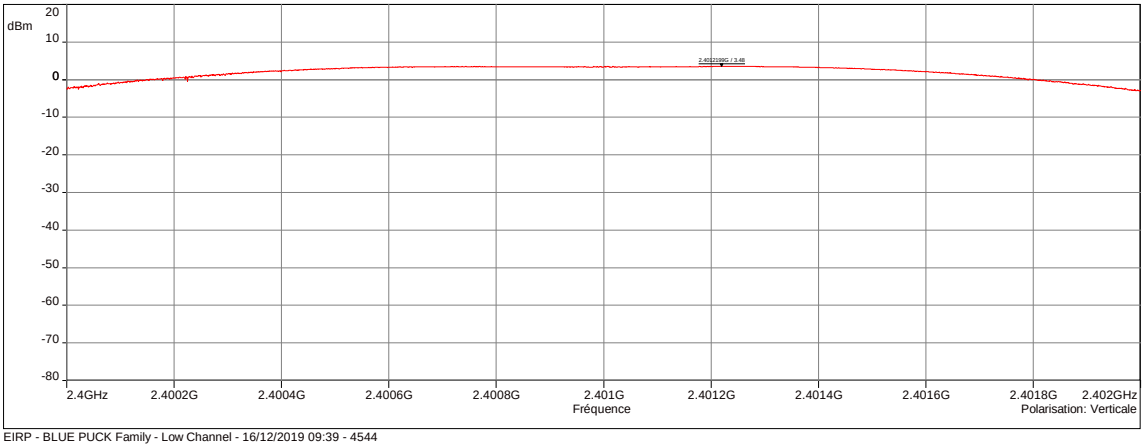
BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

TEST SETUP PHOTO(S)
   

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP - LOW CHANNEL		EMI4544	
EUT mode:	Continous modulated Tx	**T (°C):**	22.2
Test Date:	16/12/2019 09:39:55	**H (%):**	44.5
Test Operator:	OAT	**P (hPa):**	998

Mes.Peak (Verticale)

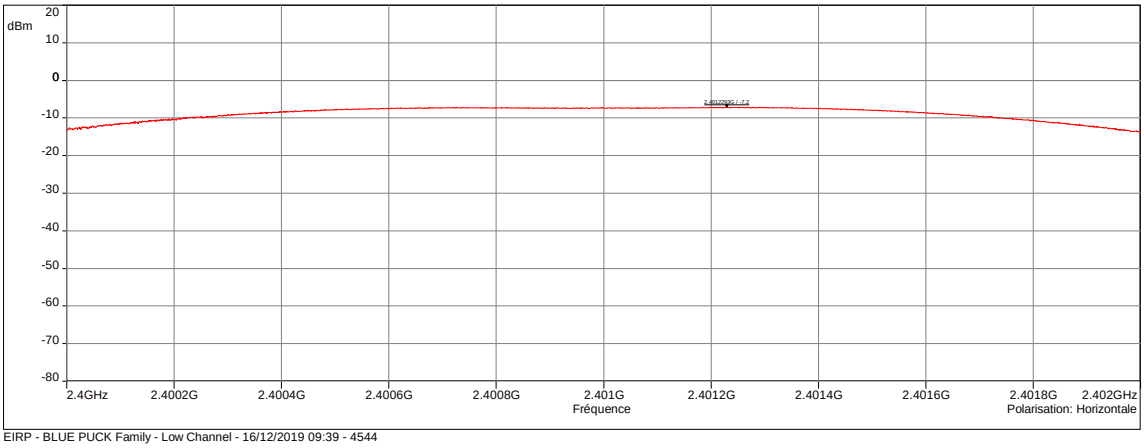
Description Sous-bande 1
Fréquences:2.4 GHz - 2.402 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Verticale
Distance: 3 m



EIRP - BLUE PUCK Family - Low Channel - 16/12/2019 09:39 - 4544

Mes.Peak (Horizontale)

Description Sous-bande 2
Fréquences:2.4 GHz - 2.402 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Horizontale
Distance: 3 m



EIRP - BLUE PUCK Family - Low Channel - 16/12/2019 09:39 - 4544

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4GHz-2.402GHz	1MHz	3MHz	Peak
Horizontal	2.4GHz-2.402GHz	1MHz	3MHz	Peak

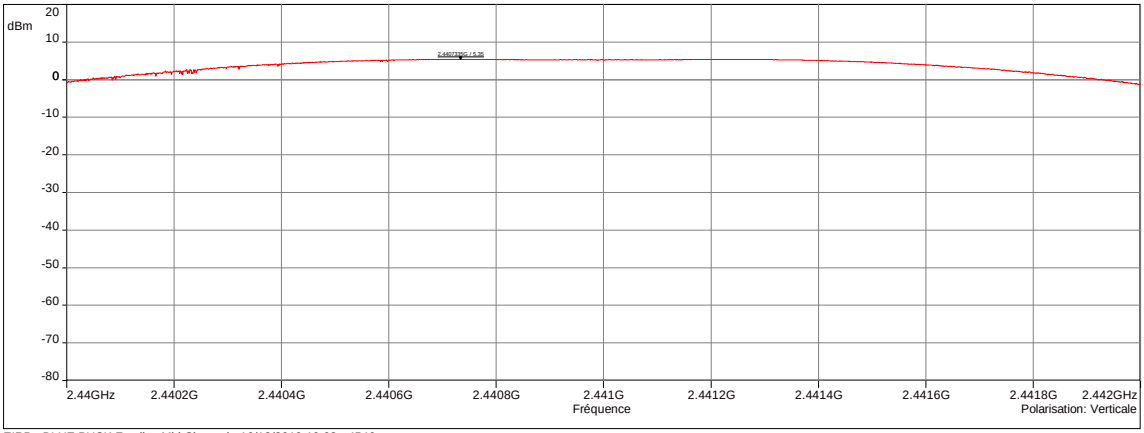
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - LOW CHANNEL			EMI4544
Frequency (MHz)	**Polarization**	**EIRP Level (dBm)**	**Limit (dBm)**
2401	Vertical	**3.48**	30
2401	Horizontal	**-7.2**	30

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP - MID CHANNEL		EMI4546	
EUT mode:	Continous modulated Tx	**T (°C):**	22.2
Test Date:	16/12/2019 10:02:58	**H (%):**	44.5
Test Operator:	OAT	**P (hPa):**	998

Mes.Peak (Verticale)

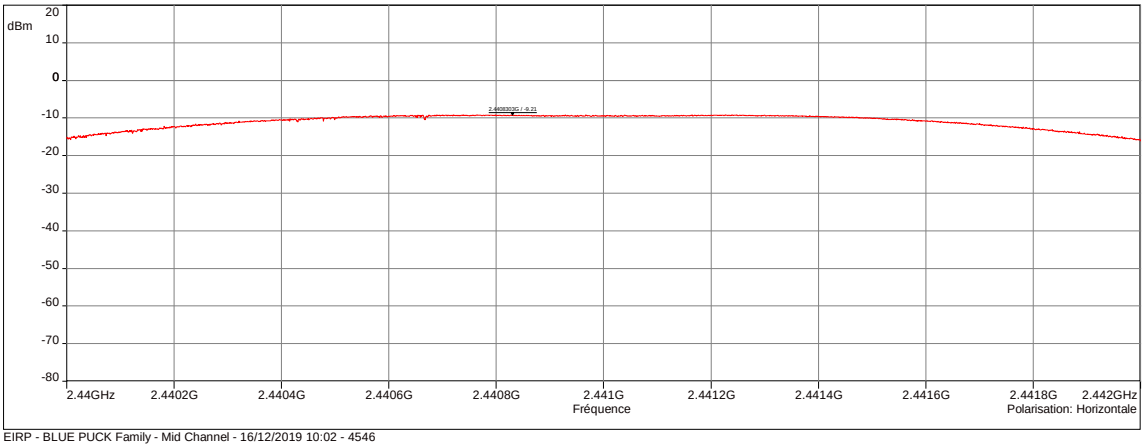
Description Sous-bande 1
Fréquences:2.44 GHz - 2.442 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Verticale
Distance: 3 m



EIRP - BLUE PUCK Family - Mid Channel - 16/12/2019 10:02 - 4546

Mes.Peak (Horizontale)

Description Sous-bande 2
Fréquences:2.44 GHz - 2.442 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Horizontale
Distance: 3 m



EIRP - BLUE PUCK Family - Mid Channel - 16/12/2019 10:02 - 4546

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.44GHz-2.442GHz	1MHz	3MHz	Peak
Horizontal	2.44GHz-2.442GHz	1MHz	3MHz	Peak

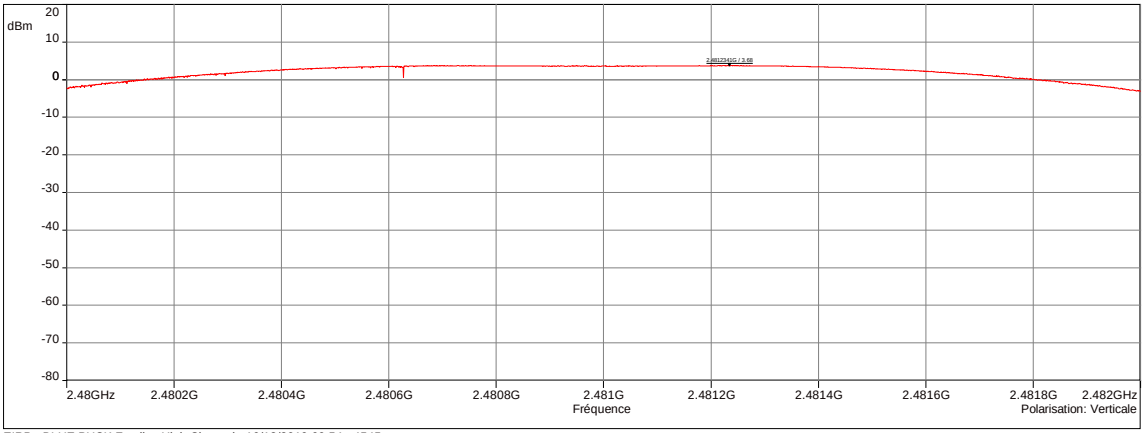
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - MID CHANNEL			EMI4546
Frequency (MHz)	**Polarization**	**EIRP Level (dBm)**	**Limit (dBm)**
2441	Vertical	**5.35**	30
2441	Horizontal	**-9.21**	30

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP - HIGH CHANNEL		EMI4545	
EUT mode:	Continous modulated Tx	**T (°C):**	22.2
Test Date:	16/12/2019 09:54:28	**H (%):**	44.5
Test Operator:	OAT	**P (hPa):**	998

Mes.Peak (Verticale)

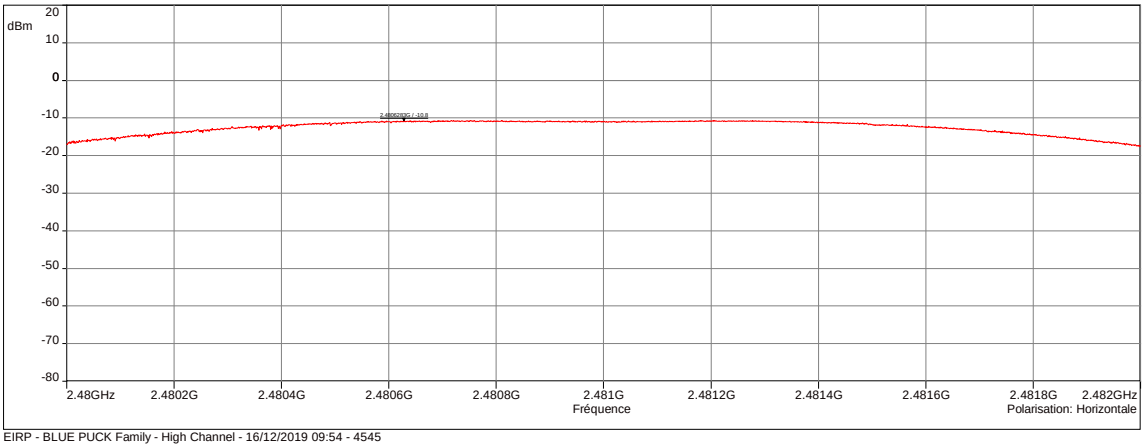
Description Sous-bande 1
Fréquences:2.48 GHz - 2.482 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Verticale
Distance: 3 m



EIRP - BLUE PUCK Family - High Channel - 16/12/2019 09:54 - 4545

Mes.Peak (Horizontale)

Description Sous-bande 2
Fréquences:2.48 GHz - 2.482 GHz (Mode analyseur) 10000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Horizontale
Distance: 3 m



EIRP - BLUE PUCK Family - High Channel - 16/12/2019 09:54 - 4545

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.48GHz-2.482GHz	1MHz	3MHz	Peak
Horizontal	2.48GHz-2.482GHz	1MHz	3MHz	Peak

EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP - HIGH CHANNEL			EMI4545
Frequency (MHz)	**Polarization**	**EIRP Level (dBm)**	**Limit (dBm)**
2481	Vertical	**3.68**	30
2481	Horizontal	**-10.8**	30

b) EXTREMES TESTS CONDITIONS

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	ANSI C63.10: 2013
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 / -40°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4604	**PASS**
Low channel / -40°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4605	**PASS**
Mid channel / -40°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4606	**PASS**
Mid channel / -40°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4710	**PASS**
High channel / -40°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4711	**PASS**
High channel / -40°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4712	**PASS**
Low channel / 85°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4713	**PASS**
Low channel / 85°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4714	**PASS**
Mid channel / 85°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4715	**PASS**
Mid channel / 85°C / 2.6Vdc	Tx-CW	1W (30dBm)	EMI4716	**PASS**
High channel / 85°C / 3.0Vdc	Tx-CW	1W (30dBm)	EMI4717	**PASS**
High channel / 85°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	16426	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

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	3.48	1W (30dBm)	EMI4499
Low channel / 25°C / 2.6Vdc	2401 MHz	3.49	1W (30dBm)	EMI4500
Mid channel / 25°C / 3.0Vdc	2441 MHz	5.35	1W (30dBm)	EMI4501
Mid channel / 25°C / 2.6Vdc	2441 MHz	5.37	1W (30dBm)	EMI4601
High channel / 25°C / 3.0dc	2481 MHz	3.68	1W (30dBm)	EMI4602
High channel / 25°C / 2.6Vdc	2481 MHz	3.70	1W (30dBm)	EMI4603
Low channel / -40°C / 3.0Vdc	2401 MHz	5.13	1W (30dBm)	EMI4604
Low channel / -40°C / 2.6Vdc	2401 MHz	5.18	1W (30dBm)	EMI4605
Mid channel / -40°C / 3.0Vdc	2441 MHz	5.16	1W (30dBm)	EMI4606
Mid channel / -40°C / 2.6Vdc	2441 MHz	5.21	1W (30dBm)	EMI4710
High channel / -40°C / 3.0Vdc	2481 MHz	5.20	1W (30dBm)	EMI4711
High channel / -40°C / 2.6Vdc	2481 MHz	5.26	1W (30dBm)	EMI4712
Low channel / 85°C / 3.0Vdc	2401 MHz	2.27	1W (30dBm)	EMI4713
Low channel / 85°C / 2.6Vdc	2401 MHz	2.27	1W (30dBm)	EMI4714
Mid channel / 85°C / 3.0Vdc	2441 MHz	4.10	1W (30dBm)	EMI4715
Mid channel / 85°C / 2.6Vdc	2441 MHz	4.10	1W (30dBm)	EMI4716
High channel / 85°C / 3.0Vdc	2481 MHz	2.13	1W (30dBm)	EMI4717
High channel / 85°C / 2.6Vdc	2481 MHz	2.14	1W (30dBm)	EMI4718

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

9.6. 20db & 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	671.3kHz	>500kHz	EMI4567	**PASS**
6dB Bandwidth - Mid channel	684.3kHz	>500kHz	EMI4568	**PASS**
6dB Bandwidth - High channel	669.4kHz	>500kHz	EMI4569	**PASS**
20dB Bandwidth - Low channel	1.229 MHz	>500kHz	EMI4467	**PASS**
20dB Bandwidth - Mid channel	1.217 MHz	>500kHz	EMI4468	**PASS**
20dB Bandwidth - High channel	1.238 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	16426	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

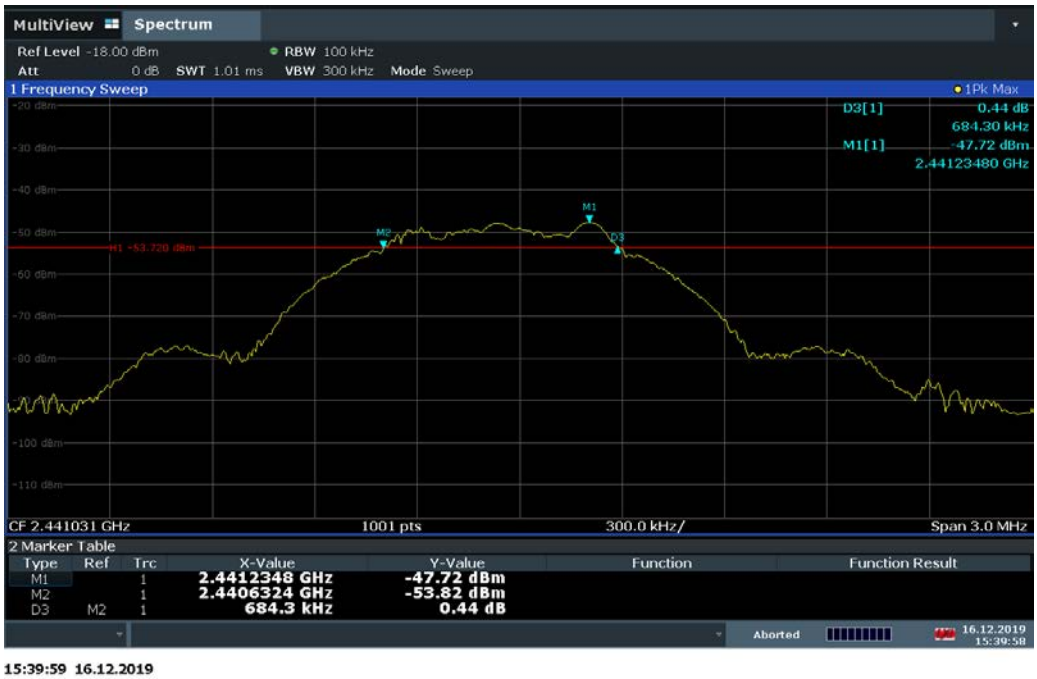
TEST SETUP PHOTO(S)

6dB BANDWIDTH - GRAPH		
LOW CHANNEL		EMI4567
EUT mode:	Tx digital modulated mode	
Test Date:	16/12/2019	
Test Operator:	OAT	

EUT modification(s): N/A

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**
-	-	671.3 kHz	>500kHz

6dB BANDWIDTH - GRAPH		
MID CHANNEL		EMI4568
EUT mode:	Tx digital modulated mode	
Test Date:	16/12/2019	
Test Operator:	OAT	



15:39:59 16.12.2019

EUT modification(s): N/A

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**
-	-	684.3kHz	>500kHz

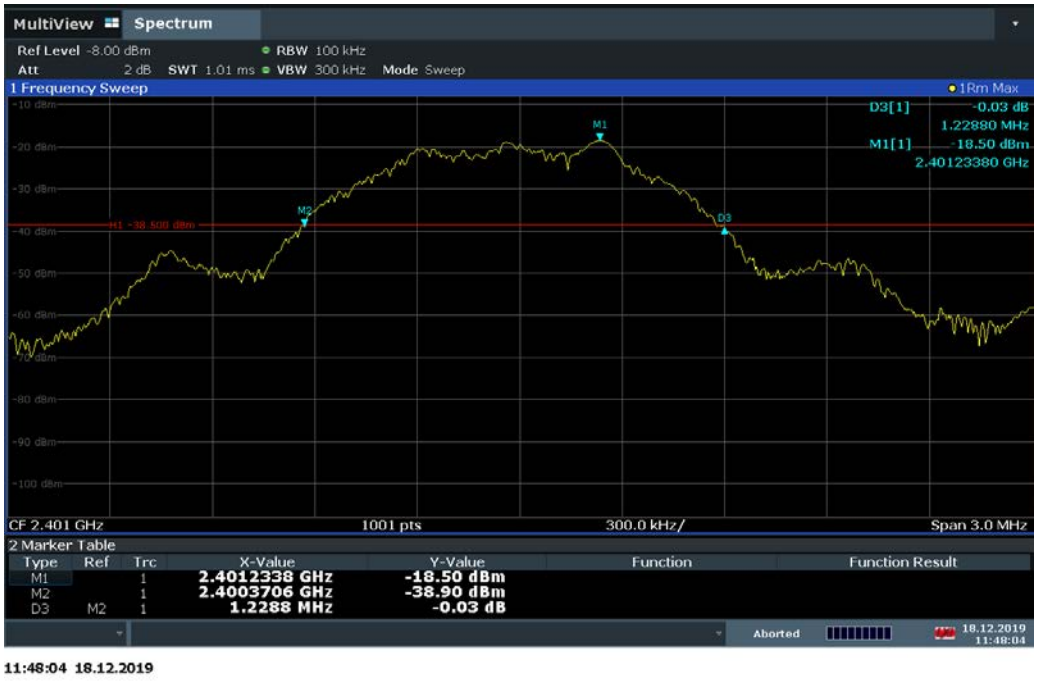
6dB BANDWIDTH - GRAPH		
HIGH CHANNEL		EMI4569
EUT mode:	Tx digital modulated mode	
Test Date:	16/12/2019	
Test Operator:	OAT	

16:15:50 16.12.2019

EUT modification(s): N/A

6dB BANDWIDTH - TABULATED RESULTS			
HIGH CHANNEL			EMI4569
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**
-	-	669.4kHz	>500kHz

20dB BANDWIDTH - GRAPH		
LOW CHANNEL		EMI4467
EUT mode:	Tx digital modulated mode	
Test Date:	18/12/2019	
Test Operator:	OAT	



11:48:04 18.12.2019

EUT modification(s): N/A

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**
-	-	1.229 MHz	>500kHz

20dB BANDWIDTH - GRAPH		
MID CHANNEL		EMI4468
EUT mode:	Tx digital modulated mode	
Test Date:	18/12/2019	
Test Operator:	OAT	

11:50:10 18.12.2019

EUT modification(s): N/A

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**
-	-	1.217 MHz	>500kHz

20dB BANDWIDTH - GRAPH		
HIGH CHANNEL		EMI4469
EUT mode:	Tx digital modulated mode	
Test Date:	18/12/2019	
Test Operator:	OAT	

EUT modification(s): N/A

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**
-	-	1.238 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.

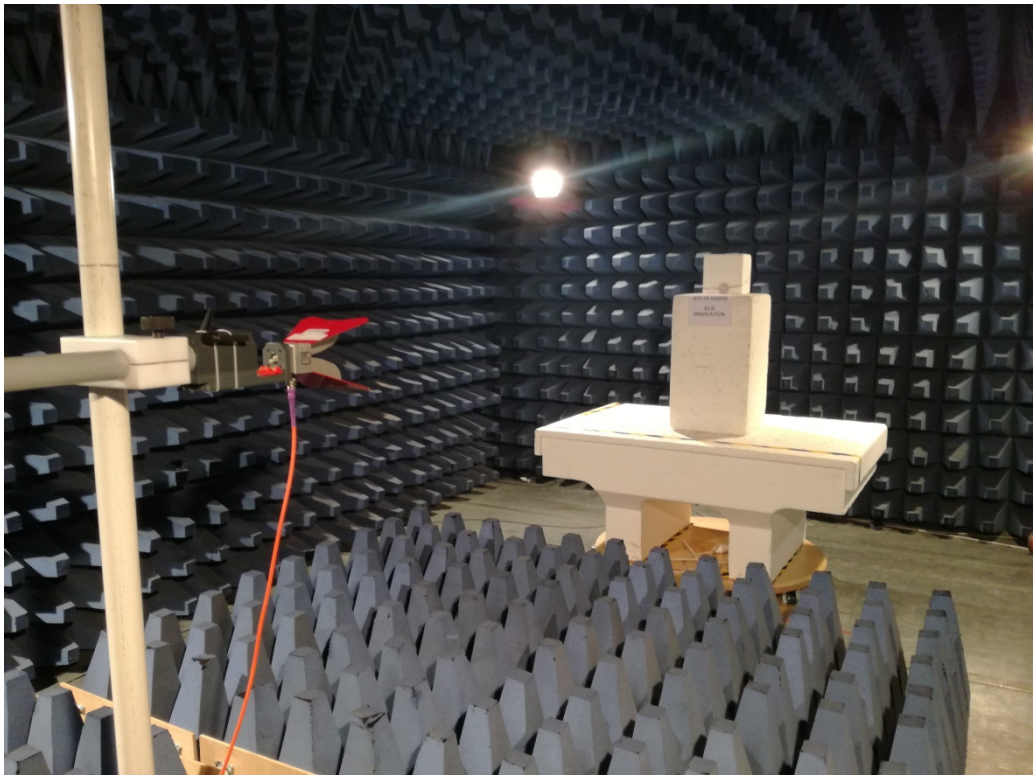
For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded.

TESTED CHANNEL	RESULT	SEVERITY	RESULT TAB.	VERDICT
PSD/3KHz - Low Channel	-0.129dBm/3kHz	8dBm/3kHz	EMI4559	**PASS**
PSD/3KHz - Mid Channel	-1.7dBm/3KHz	8dBm/3kHz	EMI4556	**PASS**
PSD/3KHz - High Channel	-0.14dBm/3KHz	8dBm/3kHz	EMI4558	**PASS**

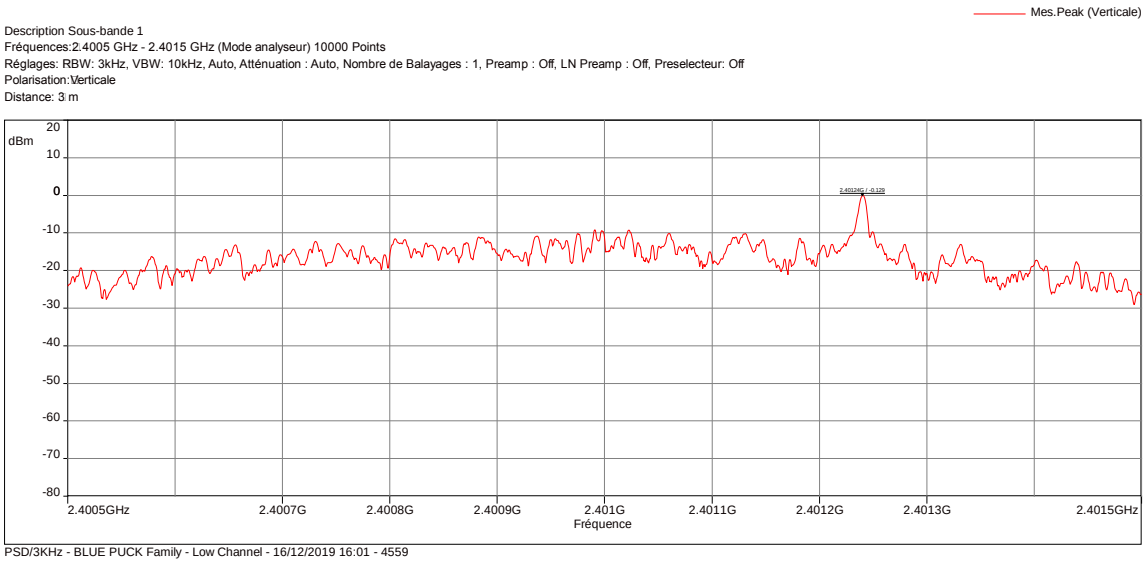
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: N/A		

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 Blank cells = Permanent validity

TEST SETUP PHOTO(S)
   

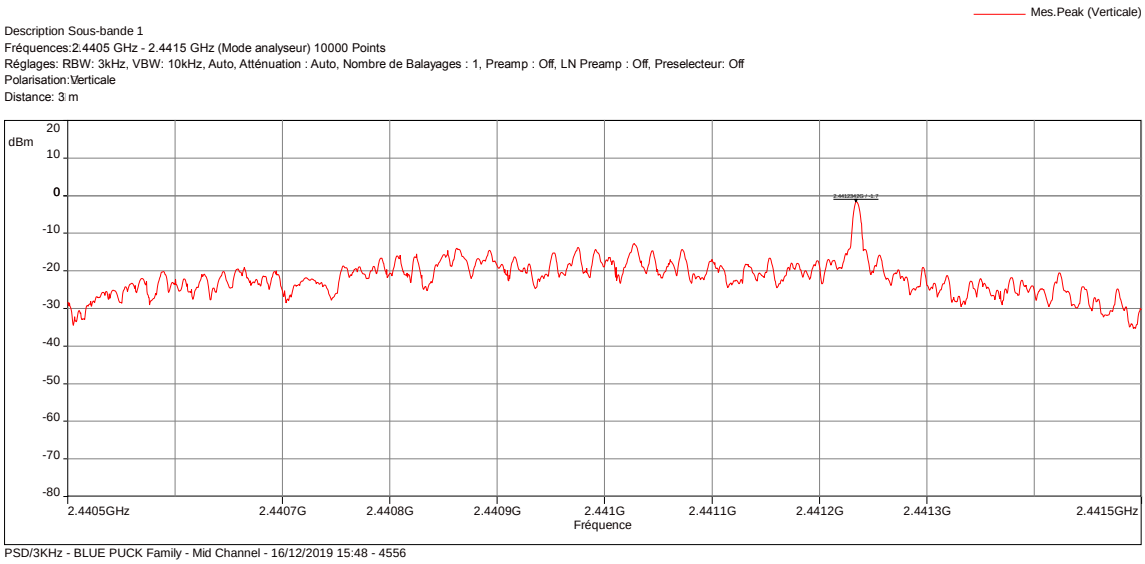
POWER SPECTRAL DENSITY - GRAPH			
PSD/3KHz - LOW CHANNEL		EMI4559	
EUT mode:	Continous modulated Tx	**T (°C):**	22.2
Test Date:	16/12/2019 16:01:54	**H (%):**	44.5
Test Operator:	OAT	**P (hPa):**	998



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4005GHz-2.4015GHz	3kHz	10kHz	Peak
Configuration:				
Comments:				
EUT modification(s): N/A				

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	Vertical	**-0.129dBm/3kHz**	8dBm/3kHz

POWER SPECTRAL DENSITY - GRAPH			
PSD/3KHZ - MID CHANNEL		EMI4556	
EUT mode:	Continous modulated Tx	**T (°C):**	22.2
Test Date:	16/12/2019 15:48:08	**H (%):**	44.5
Test Operator:	OAT	**P (hPa):**	998

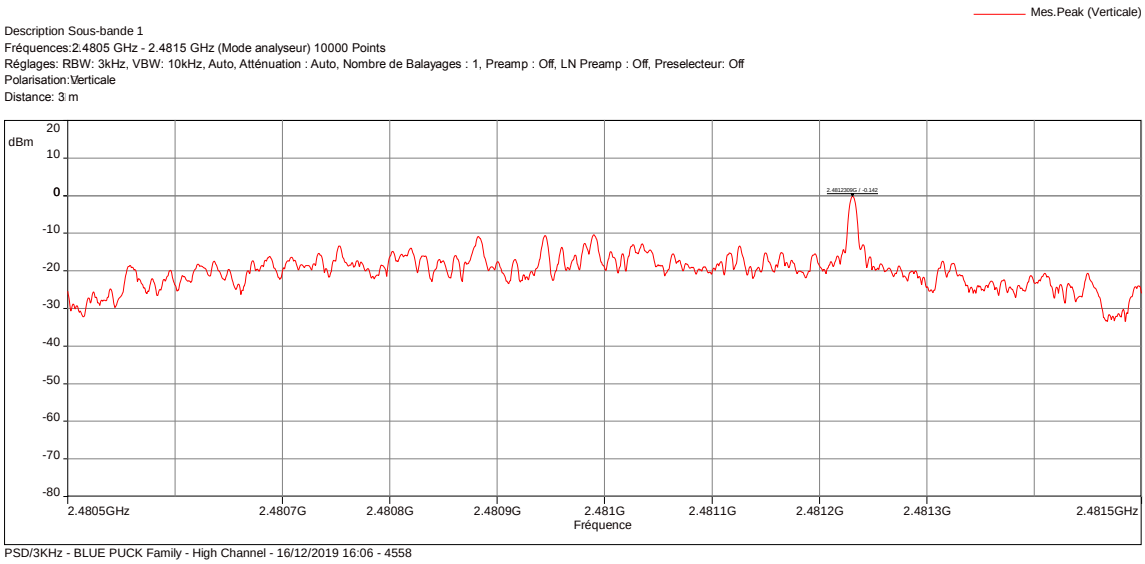


POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4405GHz-2.4415GHz	3kHz	10kHz	Peak
Configuration:				
Comments:				

EUT modification(s): N/A

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	Vertical	**-1.7dBm/3kHz**	8dBm/3kHz

POWER SPECTRAL DENSITY - GRAPH			
PSD/3KHz - HIGH CHANNEL		EMI4558	
EUT mode:	Continous modulated Tx	**T (°C):**	22.2
Test Date:	16/12/2019 16:06:40	**H (%):**	44.5
Test Operator:	OAT	**P (hPa):**	998



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4805GHz-2.4815GHz	3kHz	10kHz	Peak
Configuration:				
Comments:				

EUT modification(s): N/A

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	Vertical	**-0.14dBm/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 β/2 on each side of the spectrum. Unless otherwise specified, β/2 is taken as 0,5 %. The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions. EUT is connected to the measuring receiver via 50Ω attenuator(s).	

TESTED CHANNEL	OBW	SEVERITY	RESULT TAB.	VERDICT
Low channel	1.0821 MHz	> 500kHz	EMI4502	**PASS**
Mid channel	1.0851 MHz	> 500kHz	EMI4610	**PASS**
High channel	1.0682 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	16426	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 - GRAPH		
LOW CHANNEL		EMI4502
EUT mode:	Tx digital modulated mode	
Test Date:	18/12/2019	
Test Operator:	OAT	

11:45:41 18.12.2019

EUT modification(s): N/A

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**
2400.428	2401.510	1.0821 MHz	>500kHz

OCCUPIED BANDWIDTH - GRAPH		
MID CHANNEL		EMI4610
EUT mode:	Tx digital modulated mode	
Test Date:	18/12/2019	
Test Operator:	OAT	

11:50:57 18.12.2019

EUT modification(s): N/A

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**
2440.428	2441.513	1.0851 MHz	>500kHz

OCCUPIED BANDWIDTH - GRAPH		
HIGH CHANNEL		EMI4609
EUT mode:	Tx digital modulated mode	
Test Date:	18/12/2019	
Test Operator:	OAT	

11:52:15 18.12.2019

EUT modification(s): N/A

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**
2480.439	2481.507	1.0682 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	16426	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	2400.975385	N/A	2400MHz <F< 2483.5MHz	EMI4503
Low channel / 25°C/ 2.6Vdc	2400.975210	-0.175		EMI4504
Low channel / -40°C/ 3.0Vdc	2400.947694	-27.691		EMI4611
Low channel / -40°C/ 2.6Vdc	2400.947619	-27.766		EMI4612
Low channel / 85°C/ 3.0Vdc	2400.991640	16.255		EMI4613
Low channel / 85°C/ 2.6Vdc	2400.991570	16.185		EMI4614
High channel / 25°C/ 3.0Vdc	2480.974794	N/A		EMI4616
High channel / 25°C/ 2.6Vdc	2480.974644	-0.150		EMI4617
High channel / -40°C/ 3.0Vdc	2480.944755	-30.039		EMI4618
High channel / -40°C/ 2.6Vdc	2480.944136	-30.658		EMI4619
High channel / 85°C/ 3.0Vdc	2480.990204	15.410		EMI4620
High channel / 85°C/ 2.6Vdc	2480.990309	15.515		EMI4621

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

End of test report