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

FCC part 15.247
RSS-247_Issue 2, February 2017

Company	**OLYTHE**
Address.....	240 RUE LOUIS DE BROGLIE 13100 AIX EN PROVENCE FRANCE

Test item description.	**ALCOHOL BREATHALYZER**
Trade Mark.	OCIGO
Manufacturer.	OLYTHE
Model/Type reference.....	CO000015 / OCIGO-US
FCC ID.....	2AWVH-CO000015
IC	N/C
Ratings.....	3.1Vdc to 3.9Vdc

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

Report Reference No.....	**RR410-20-100967-1A**
Test procedure.	FCC IC Certification
Diffusion.....	Mme Laetitia BACONNIER
Applicant's name.	OLYTHE
Date of issue.....	July 15, 2020
Total number of pages.....	70
Revision.	0
Modified page(s).....	Creation
Compiled by.....	Olivier AELBRECHT
Approved by (+ signature).....	Olivier HEYER (Laboratory Manager)

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REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	July 15, 2020	/	Creation

1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **OCIGO EU**(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 June the 4th to the 10th of 2020

APPLICANT'S GENERAL INFORMATIONS:	
Company name	OLYTHE
Company address.	240 RUE LOUIS DE BROGLIE 13100 AIX EN PROVENCE FRANCE
Person(s) present during the tests.	No representative for company attended the tests.
Responsible.	Mme Laetitia BACONNIER

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 **RSS-Gen, Issue 5, Apr 2018** General Requirements for Compliance of Radio Apparatus **ANSI C 63.10:2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices **ANSI C 63.4:2014** American National Standard for Methods of measurement of Radio-Noise from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz Although the product standard uses obsolete technical standards, the latest versions of standards achievable by the laboratory will be used for testing.
INFORMATIVE REFERENCES:
The following referenced documents are not necessary for the application of the present test report but they assist the user with regard to a particular subject area.

3. EQUIPMENT TECHNICAL DESCRIPTION

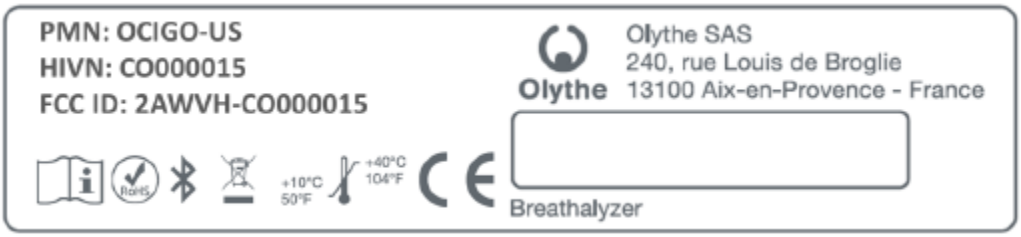
3.1. Test Conditions

Test item description. ..... :	ALCOHOL BREATHALYZER
Model/Type reference..... :	CO000015 / OCIGO-US
FCC ID. ..... :	2AWVH-CO000015
IC ..... :	N/C
Trade Mark. ..... :	OCIGO
Serial number (S/N). ..... :	PS3140456
Part number (P/N). ..... :	Not communicated
Software version. ..... :	*Not communicated*
Firmware version. ..... :	*Not communicated*
Type of sample. ..... :	Pre-serial
Function(s). ..... :	OCIGO is a wirless electronic breathalyzer for measuring the concentartion of alcohol in exhaled air.
Manufacturer name. ..... :	OLYTHE
Address..... :	240 RUE LOUIS DE BROGLIE 13100 AIX EN PROVENCE FRANCE

General product information:

N/A

3.2. EUT Marking Plate



3.3. EUT General View

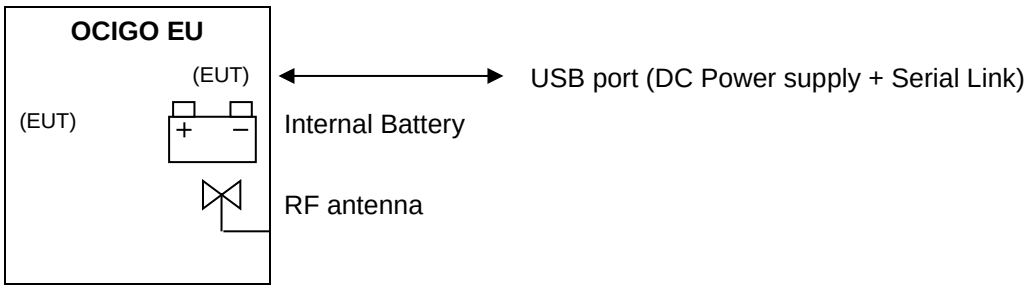
3.4. EUT Mechanical and Electrical Design

Power supply. ..... : *3.7Vdc*
Power supply range. ..... : *3.1Vdc to 3.9Vdc*
Power type. ..... : *Battery*
Power (W). ..... : *1.4W*
Nominal current (A). ..... : *380mA*
Dimensions (L x W x H) (cm). ..... : *25x25x185*
Weight (g). ..... : *60*
Temperature range (°C). ..... : *0°C to 45°c*
Ground bounding strap. ..... : *No*

Comments:

N/A

3.5. EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	
1	USB Port	DC + I/O	N/A	USB	Used for battery charging
2	Internal Battery	DC	N/A	Battery	
3	RF antenna	RF			

AC/DC : AC/DC Converter port
I/O.....: Input or Output port
N/E .....: Non Electrical port
AC..... : Alternative current port
TP ..... : Telecommunication port
DC .....: Discontinuous current port
RF.....: Radio frequency port

3.6. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
Adaptive Fast Charging	SAMSUNG	EP-TA20EWE	Use during test to keep the battery full charged

ADAPTIVE FAST CHARGING (EA)

3.7. EUT Radio Specifications

a) GENERAL INFORMATIONS
According to manufacturer's declarations : EUT type..... : *Transmitter* Technology ..... : *Bluetooth Low Energy (BLE)* Environmental profile..... : *Data transmissions* Temperature range..... : *0°C to 45°C* Antenna type ..... : *Internal Antenna* Antenna Gain..... : *1 dBi* **Comments:** BLE technology was considered as a DTS technology.
b) TRANSMITTER PARAMITTERS (TX)
Frequency bands..... : *2 400 MHz - 2483.5 MHz* RF Power..... : *< 10 dBm* Number of channels / Separation..... : *40 / 2MHz* Modulation type ..... : *GFSK* Duty cycle ..... : *N/A* Tested frequency..... : *2402MHz (Low Channel)* *2442MHz (Mid. Channel)* *2480MHz (HIgh Channel)*
c) RECEIVER PARAMETERS (RX)
Frequency bands..... : *2 400 MHz - 2483.5 MHz* Category/Class ..... : *N/A* Bandwidth..... : *82 MHz*

4. OPINION(S) AND INTERPRETATION(S)

TEST(S) PERFORMED	DEVIATION(S) TO TEST METHOD(S)
FCC part 15.247 and RSS-247	EUT has its dedicated internal antenna, due to this, this measurement was done in radiated by the substitution method.
FCC part 15.109, 15.209, 15.205, 15.215 RSS-247, CNR Gen	N/A

Comments: N/A

5. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
General			
- Labeling requirements	-	**PASS**	15.19
- Information to user	-	**PASS**	15.21
- Measurement standards	-	**PASS**	15.31
- Frequency range of radiated measurements	-	**PASS**	15.33
- Measurement detector functions and bandwidths	-	**PASS**	15.35
- Transition provisions for compliance with the rules	-	**PASS**	15.37
- Conducted power limits	B	**PASS**	15.107/207
Operation within the band 902-928MHz, 2400-2483.5MHz and 5725-5850MHz			**15.247**
- **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**	**c)**
- **Out-of-band emissions**		**PASS**	**d)**
- **Power spectral density conducted**		**PASS**	**e)**
- **Hybrid system**		**N/A**	**f)**
- **Frequency hopping additional requirements**		**N/A**	**g)**
- **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 into account of uncertainty associated with the results.

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

6. RF EXPOSURE

Maximum EIRP with = 0.192. mW (eirp) at 2402MHz

In accordance with KDB 447498 D01 General RF Exposure Guidance v06:
PSD= EIRP/(4*π*R2)= -7.16/(4*π*(20 cm)²)= 0.0001 mW/cm²
Limit= 1 mW/cm²

7. 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 %
Adjacent channel power	± 1.6 dB	± 3 dB
Sensibility of receiver (conducted)	± 2.0 dB	± 3 dB
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
PIRE and power spectral density with diode	± 5.4 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).

8. TEST CONDITIONS AND RESULTS

8.1. Conducted emission (measurement)

Reference standard:	FCC part 15 and RSS-Gen
Test method:	ANSI C63.10: 2013
General test setup: EUT is set on an insulating support at 80cm above the ground reference plane. All power was connected to the system through Artificial Mains Network (AMN). The AMN is placed at 80cm from the boundary of the EUT and bonded to a ground reference plane. Additionnal ground terminals (if any) are connected to earth terminal of the AMN	

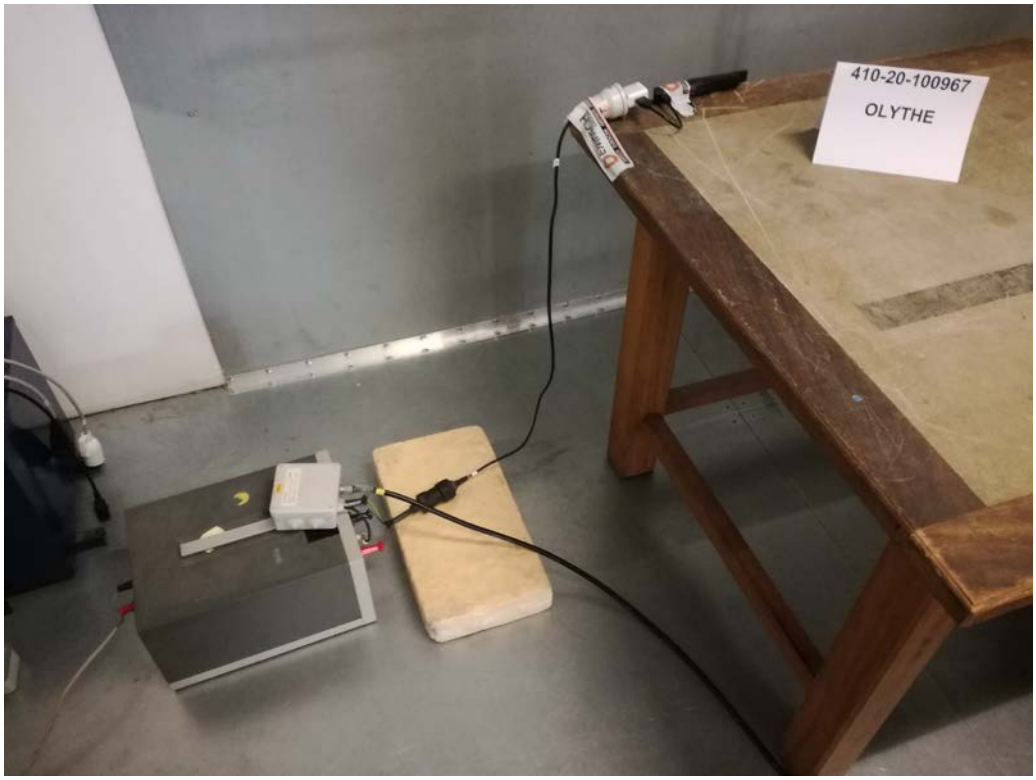
TESTED CABLE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
110Vac/60Hz Power supply	150kHz-30MHz	Class B	EMI4322	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	30 to 60 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: Test done trought a standard power supply charger (See §3.6)		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Cable	EMITECH	Current absorber sheath	10653	19/10/2018	19/12/2020
Cable	/	N-3m 3GHz	16410	04/05/2019	04/07/2021
Ground plane	EMITECH	Test area	11569		
LISN	Emco	3825/2	9041	05/04/2018	05/12/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Receiver	Agilent Technologies	E4440A	5824	18/04/2018	18/06/2020
Receiver	Rohde & Schwarz	ESHS10	3371	28/04/2020	28/06/2021
Software	Nexio		0000		
Surges Suppressor	Hewlett Packard	11947A	0238	20/12/2019	20/02/2023
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022

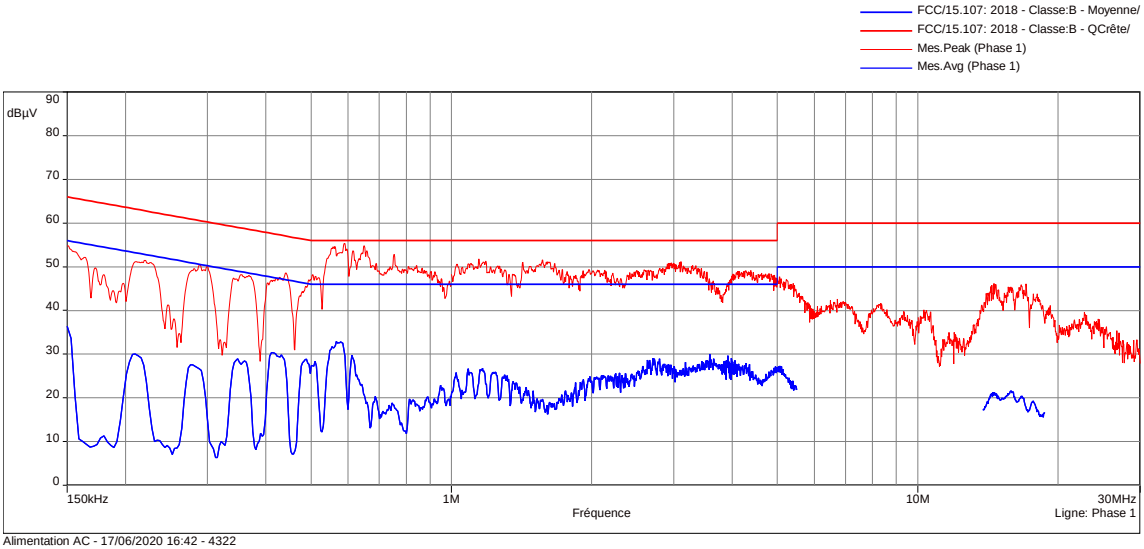
BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

TEST SETUP PHOTO(S) - AC POWER SOURCE

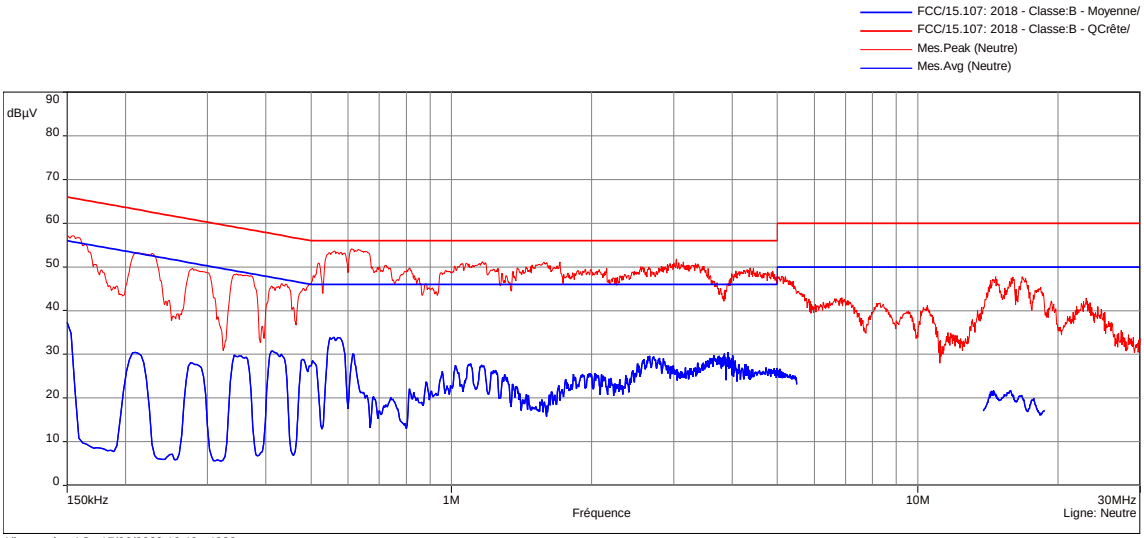


CONDUCTED EMISSION (MEASUREMENT) - TABULATED RESULTS							
110 VAC/60HZ POWER SUPPLY						EMI4322	
Terminal	Test Frequency (MHz)	Meter Reading dB (µV)	Detector (Pk/QP/Av)	Gain/Loss Factor (dB)	Level dB (µV)	Limit dB (µV)	Margin (dB)
Neutral	0.561	/	Pk	/	53.62	56.0	-2.38
Neutral	0.561	/	AV	/	33.92	46.0	-12.08
Neutral	0.631	/	Pk	/	53.96	56.0	-2.04
Neutral	0.631	/	AV	/	23.83	46.0	-22.17
Neutral	1.164	/	Pk	/	51.13	56.0	-4.87
Neutral	1.164	/	AV	/	27.05	46.0	-18.95
Neutral	3.039	/	Pk	/	51.8	56.0	-4.20
Neutral	3.039	/	AV	/	26.02	46.0	-19.98
Phase	0.562	/	Pk	/	54.62	56.0	-1.38
Phase	0.562	/	AV	/	31.50	46.0	-14.50
Phase	0.589	/	Pk	/	55.36	56.0	-0.64
Phase	0.589	/	AV	/	31.29	46.0	-14.71
Phase	0.650	/	Pk	/	54.77	56.0	-1.23
Phase	0.650	/	AV	/	20.49	46.0	-25.51
Phase	0753	/	Pk	/	52.78	56.0	-3.22
Phase	0.753	/	AV	/	18.33	46.0	-27.67
Phase	1.146	/	Pk	/	51.73	56.0	-4.27
Phase	1.146	/	AV	/	24.65	46.0	-21.35
Phase	3.108	/	Pk	/	51.17	56.0	-4.83
Phase	3.108	/	AV	/	25.04	46.0	-20.96
Supplementary information: N/A							

CONDUCTED EMISSION (MEASUREMENT) - GRAPH			
110 VAC/60HZ POWER SUPPLY		EMI4322	
EUT mode:	Tx mode	**T (°C):**	24.6
Test Date:	08/06/2020	**H (%):**	34.9
Test Operator:	OAT	**P (hPa):**	1006



Alimentation AC - 17/06/2020 16:42 - 4322



Alimentation AC - 17/06/2020 16:42 - 4322

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Neutral	150kHz-1MHz	10kHz	30kHz	Peak
Neutral	1MHz-10MHz	10kHz	30kHz	Peak
Neutral	10MHz-30MHz	10kHz	30kHz	Peak
Phase 1	150kHz-1MHz	10kHz	30kHz	Peak
Phase 1	1MHz-10MHz	10kHz	30kHz	Peak
Phase 1	10MHz-30MHz	10kHz	30kHz	Peak
Neutral	150kHz-5.5MHz	10kHz	30kHz	Average
Phase 1	150kHz-5.5MHz	10kHz	30kHz	Average
Neutral	13.8MHz-18.7MHz	10kHz	30kHz	Average
Phase 1	13.8MHz-18.7MHz	10kHz	30kHz	Average
Measure with:	A.M.N.			
EUT modification(s): N/A				

8.2. 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

Test description: : Spurious domain emission limits are limits on emissions at frequencies other than those of the carrier and sidebands associated with normal test modulation**.**

EUT is set on an insulating support at 80cm above the ground reference plane.

Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter in a anechoic chamber. The EUT was rotated 360°in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°).

Final measurements (quasi-peak) were then performed in a 10-meter Open Area Test Site that complies to CISPR 16 in the same measurement conditions.

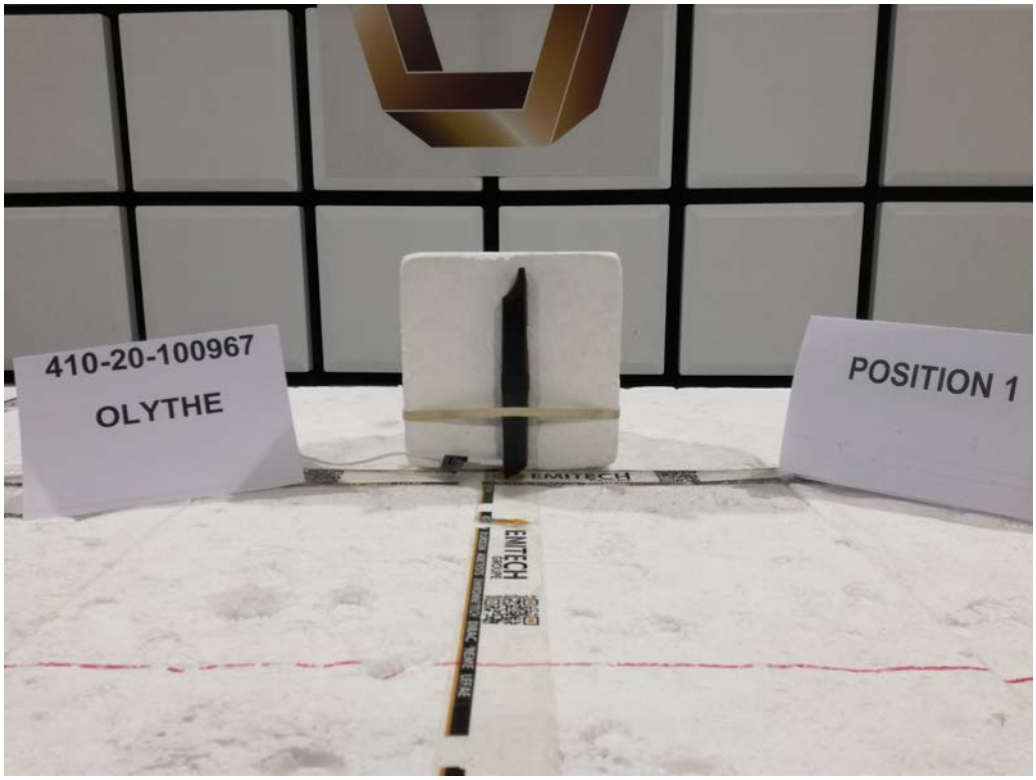
All frequencies were investigated, where applicable.

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Tx mode / 0° / All Channels - All Positions	9kHz-30MHz	15.209	EMI4293	**PASS**
Tx mode / 45° / All Channels - All Positions	9kHz-30MHz	15.209	EMI4311	**PASS**
Tx mode / 90° / All Channels - All Positions	9kHz-30MHz	15.209	EMI4312	**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
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Antenna	Rohde & Schwarz	HFH2-Z2	5825	21/09/2017	21/11/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Cable	MegaPhase	TM18-N1N1-118	12841	09/05/2018	09/07/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Receiver	Agilent Technologies	E4440A	5824	18/04/2018	18/06/2020
Shielded enclosure	COMTEST	SAC 3m	14494		
Software	Nexio		0000		
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022

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

TEST SETUP PHOTO(S) – EUT POSITIONS


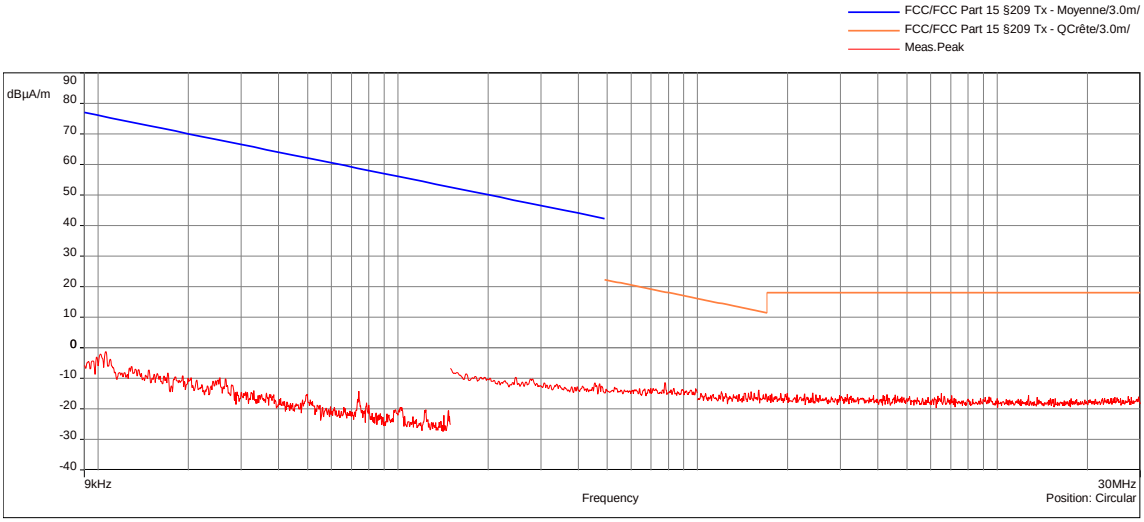
TEST SETUP PHOTO(S) – EUT POSITIONS

TEST SETUP PHOTO(S)

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - 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 - ALL POSITIONS		EMI4293	
EUT mode:	Continuous modulated Tx / Channel Hopping	**T (°C):**	22.2
Test Date:	04/06/2020	**H (%):**	56.6
Test Operator:	OAT	**P (hPa):**	1001



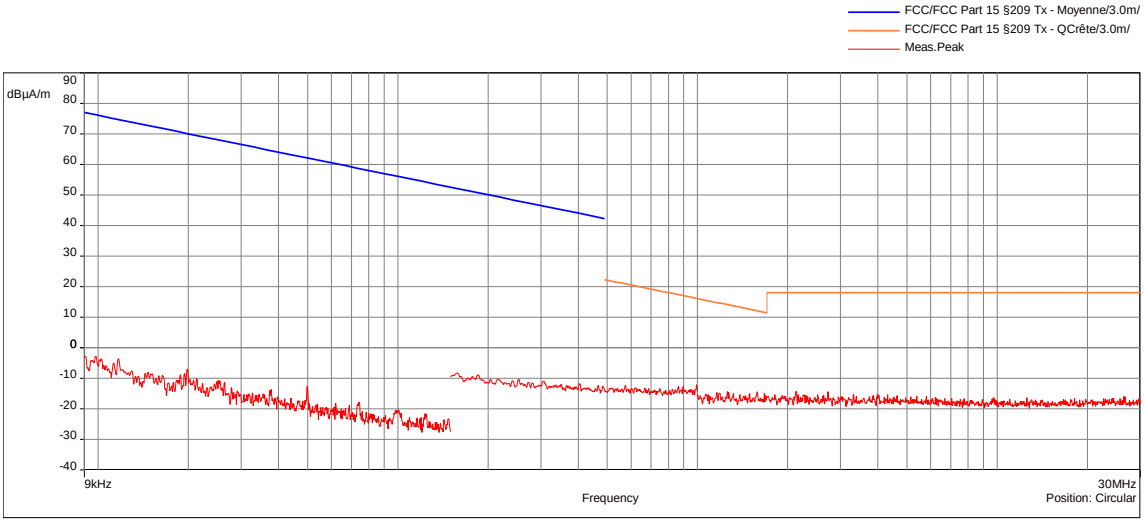
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak
Configuration:				
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.			

EUT modification(s): N/A

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - TABULATED RESULTS			
TX MODE / 0° / ALL CHANNELS - ALL POSITIONS			EMI4293
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 - ALL POSITIONS		EMI4311	
EUT mode:	Continuous modulated Tx / Channel Hopping	**T (°C):**	22.2
Test Date:	04/06/2020	**H (%):**	56.6
Test Operator:	OAT	**P (hPa):**	1001



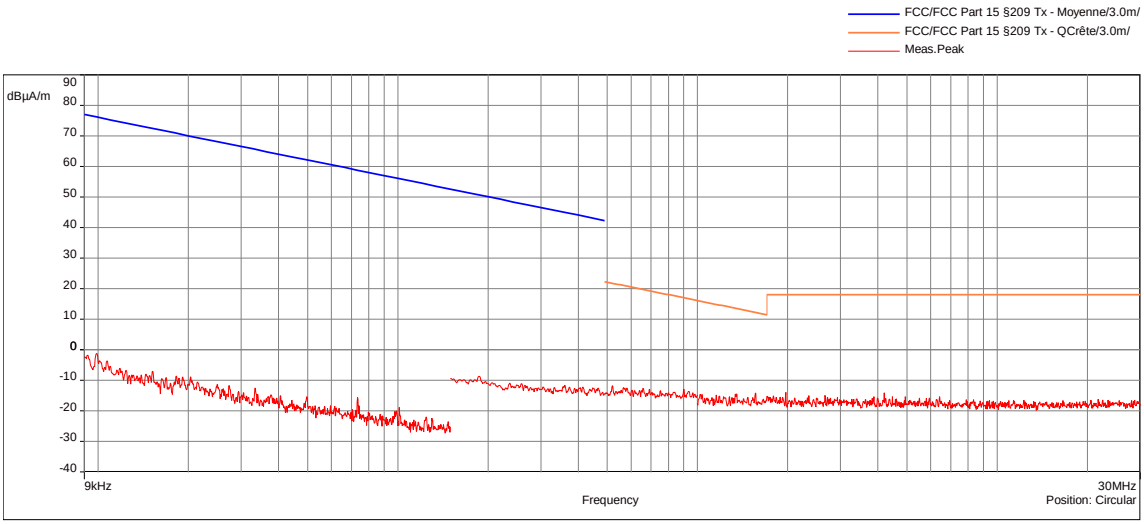
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak
Configuration:				
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.			

EUT modification(s): N/A

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - TABULATED RESULTS			
TX MODE / 45° / ALL CHANNELS - ALL POSITIONS			EMI4311
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 - ALL POSITIONS		EMI4312	
EUT mode:	Continuous modulated Tx / Channel Hopping	**T (°C):**	22.2
Test Date:	04/06/2020	**H (%):**	56.6
Test Operator:	OAT	**P (hPa):**	1001



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 - ALL POSITIONS			EMI4312
Frequency (MHz)	**Antenna Position**	**Level (dBµA/m)**	**Limit (dBµA/m)**
N/A	N/A	N/A	N/A

No spurious emissions were detected.

8.3. 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: For f > 30MHz, 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.

Above 18GHz measurement were performed at a test distance of 1m.

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 For Freq < 1GHz - All channels - All positions	30MHz-1GHz	15.247 & 15.209	EMI4310	**PASS**
Tx mode For Freq > 1GHz - All channels - Position 1	1GHz-18GHz		EMI4297	**PASS**
Tx mode For Freq > 1GHz - All channels - Position 2	1GHz-18GHz		EMI4317	**PASS**
Tx mode For Freq > 1GHz - All channels - Position 3	1GHz-18GHz		EMI4318	**PASS**

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

Test method deviation: N/A

Supplementary information:

From 30MHz to 1GHz Quasi peak limit provided is the limit given in §15.209.

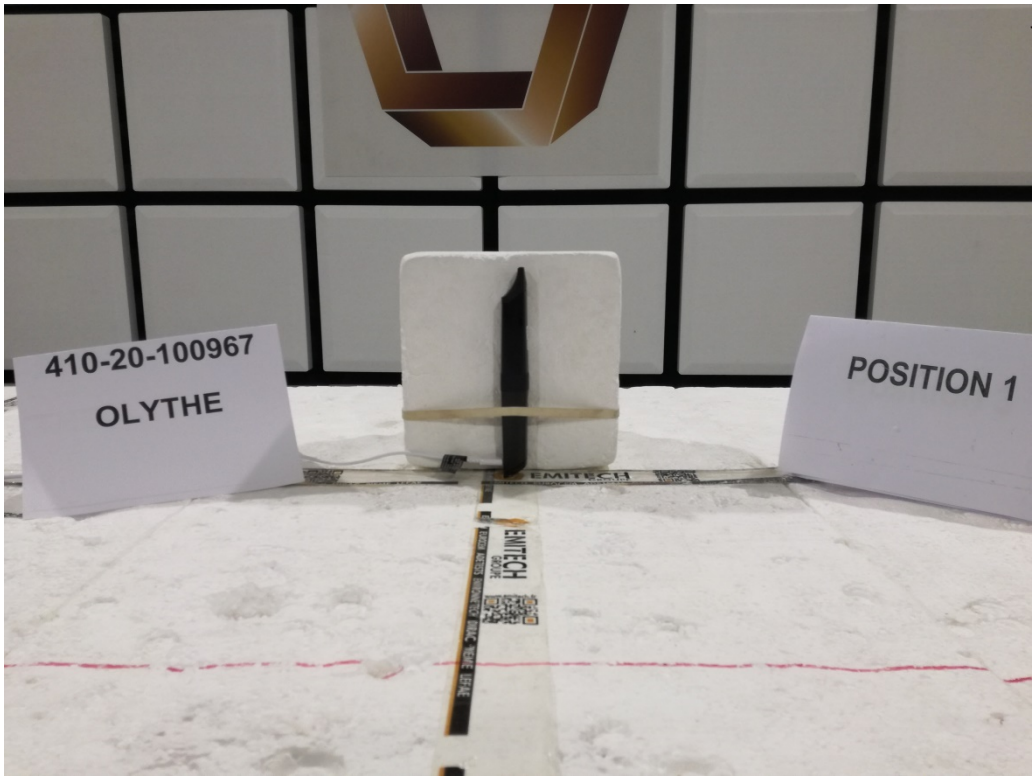
Above 1GHz average limit in restricted bands §15.205 is 54dBµV/m. Otherwise, the limit is 20dB under carrier emission level at 3m without averaging.

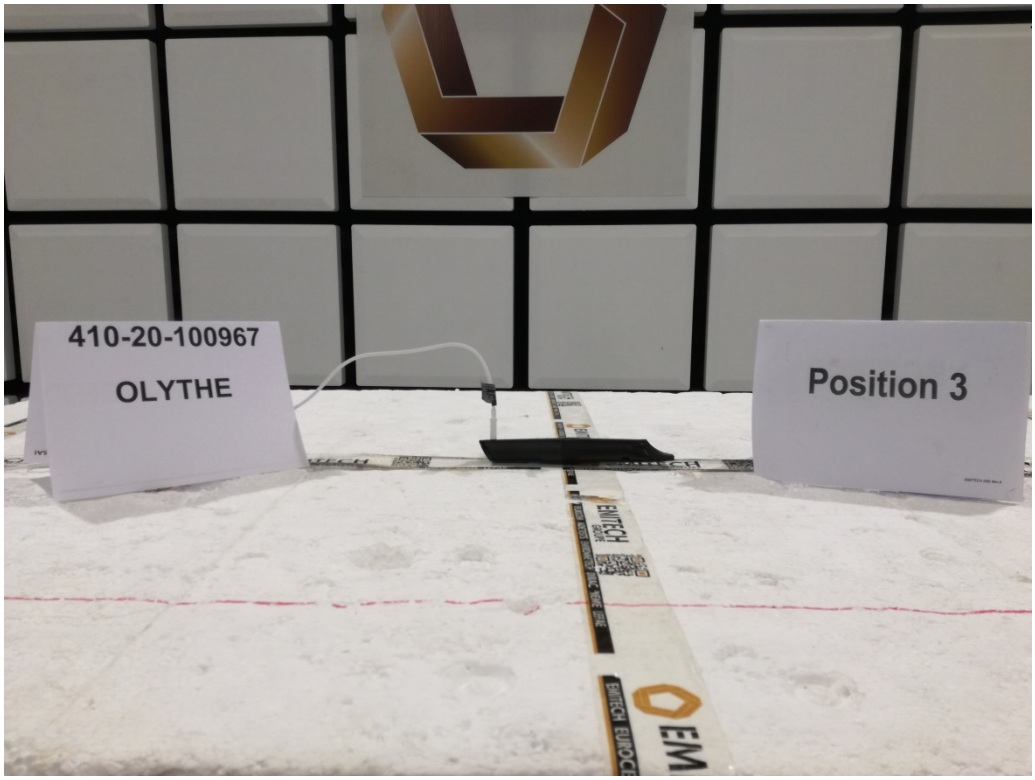
Above 18GHz test distance is 1m, limits are calculated with an extrapolation factor of 20dB/decade as described in the standard.

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
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

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
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-5m	14854	13/02/2018	13/10/2020
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Cable	MegaPhase	TM18-N1N1-118	12841	09/05/2018	09/07/2020
Filter	Micro-Tronics	HPM 15162	10273	12/01/2019	12/03/2022
Filter	Micro-Tronics	HPM18865	12843	09/06/2018	09/08/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Preamplifier	Techniwave	APS16-0087	14040	25/06/2019	25/08/2020
Receiver	Agilent Technologies	E4440A	5824	18/04/2018	18/06/2020
Receiver	Rohde & Schwarz	ESI	9704	03/03/2020	03/05/2021
Shielded enclosure	RAY PROOF	C.V2	1423		
Shielded enclosure	COMTEST	SAC 3m	14494		
Software	Nexio		0000		
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
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

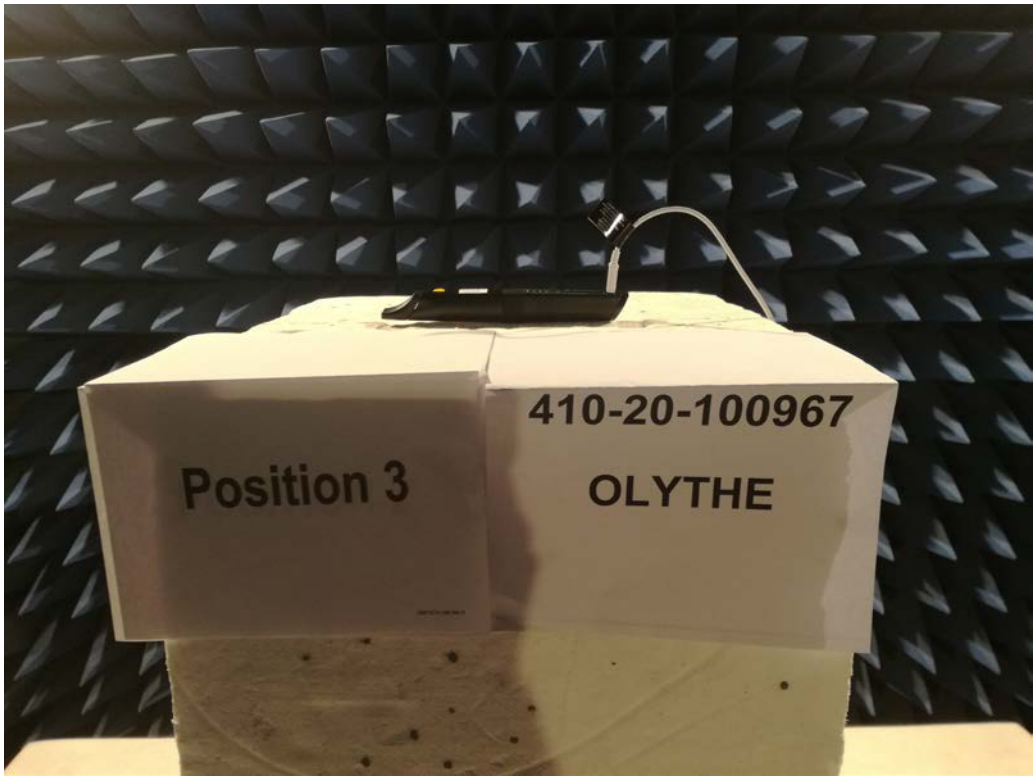
TEST SETUP PHOTO(S) – EUT POSITIONS FOR FREQ < 1GHZ


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


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

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

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

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


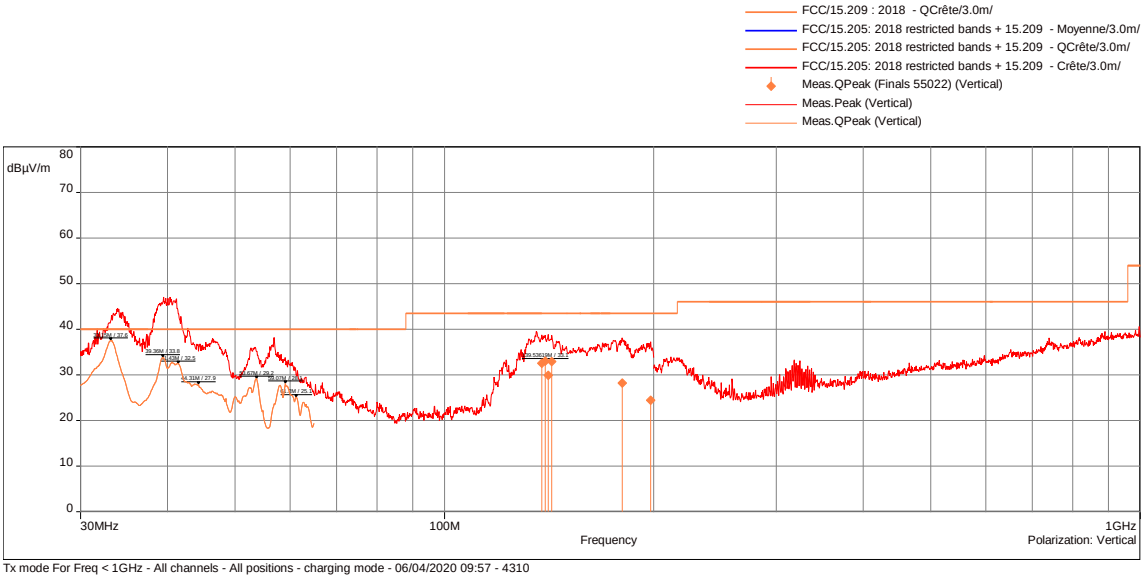
TEST SETUP PHOTO(S) - FOR FREQ > 1GHZ

Transmitter radiated spurious emissions - Tabulated Results					
Tx mode for Freq < 1GHz - All channels - All positions					EMI4310
Frequency (MHz)	Polarization	Level Peak (dBµV/m)	Level QPeak (dBµV/m)	Limit Qpeak (dBµV/m)	Margin dB
33.150	Vertical	41.92	37.59	40.00	-2.41
39.360	Vertical	45.72	33.83	40.00	-6.17
40.560	Vertical	45.56	32.84	40.00	-7.16
41.430	Vertical	43.41	32.47	40.00	-7.53
44.310	Vertical	35.07	27.95	40.00	-12.05
46.380	Vertical	37.17	26.42	40.00	-13.58
50.100	Vertical	28.66	25.24	40.00	-14.76
52.350	Vertical	35.15	27.03	40.00	-12.97
53.670	Vertical	35.07	29.16	40.00	-10.84
57.930	Vertical	33.78	27.62	40.00	-12.38
59.070	Vertical	32.01	28.10	40.00	-11.90
61.200	Vertical	29.88	25.08	40.00	-14.92
138.027	Verticale	36.73	32.56	43.52	-10.96
139.536	Verticale	37.00	33.06	43.52	-10.46
140.918	Verticale	35.42	29.91	43.52	-13.61
142.597	Verticale	36.86	32.98	43.52	-10.54
180.044	Verticale	33.41	28.26	43.52	-15.26
197.960	Verticale	30.22	24.42	43.52	-19.10
182.743	Horizontale	35.01	28.44	43.52	-15.08
183.168	Horizontale	34.91	30.13	43.52	-13.39
185.272	Horizontale	34.68	27.83	43.52	-15.69
186.356	Horizontale	36.09	31.10	43.52	-12.42
186.887	Horizontale	35.76	30.72	43.52	-12.80
188.226	Horizontale	36.60	28.79	43.52	-14.73
188.736	Horizontale	36.88	32.38	43.52	-11.14
189.140	Horizontale	37.48	33.54	43.52	-9.98
190.904	Horizontale	36.99	26.42	43.52	-17.10

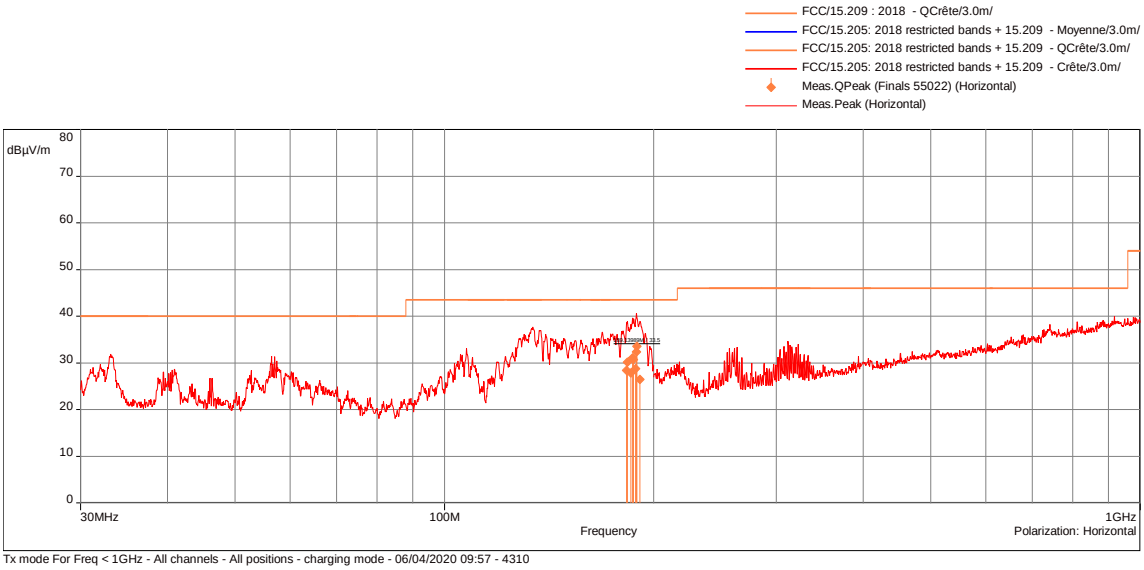
Transmitter radiated spurious emissions at frequencies >30MHz - Tabulated Results					
Tx mode for Freq > 1GHz - All channels - Position 1				EMI4297	
Frequency (MHz)	Polarization	Level Peak (dBµV/m)	Level Avg. (dBµV/m)	Limit Avg. (dBµV/m)	Margin dB
4834.940	Vertical	44.23	N/P	54.00	-9.77
4814.796	Horizontal	42.19	N/P	54.00	-11.81
4957.636	Horizontal	42.25	N/P	54.00	-11.75

Transmitter radiated spurious emissions at frequencies >30MHz - Tabulated Results					
Tx mode for Freq > 1GHz - All channels - Position 1				EMI4297	
Frequency (MHz)	Polarization	Level Peak (dBµV/m)	Level Avg. (dBµV/m)	Limit Avg. (dBµV/m)	Margin dB
4834.940	Vertical	44.23	N/P	54.00	-9.77
4814.796	Horizontal	42.19	N/P	54.00	-11.81
4957.636	Horizontal	42.25	N/P	54.00	-11.75

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE FOR FREQ < 1GHZ - ALL CHANNELS - ALL POSITIONS - CHARGING MODE		EMI4310	
EUT mode:	Continuous modulated Tx / Channel Hopping	**T (°C):**	22.2
Test Date:	04/06/2020	**H (%):**	64.4
Test Operator:	OAT	**P (hPa):**	1001



Tx mode For Freq < 1GHz - All channels - All positions - charging mode - 06/04/2020 09:57 - 4310



Tx mode For Freq < 1GHz - All channels - All positions - charging mode - 06/04/2020 09:57 - 4310

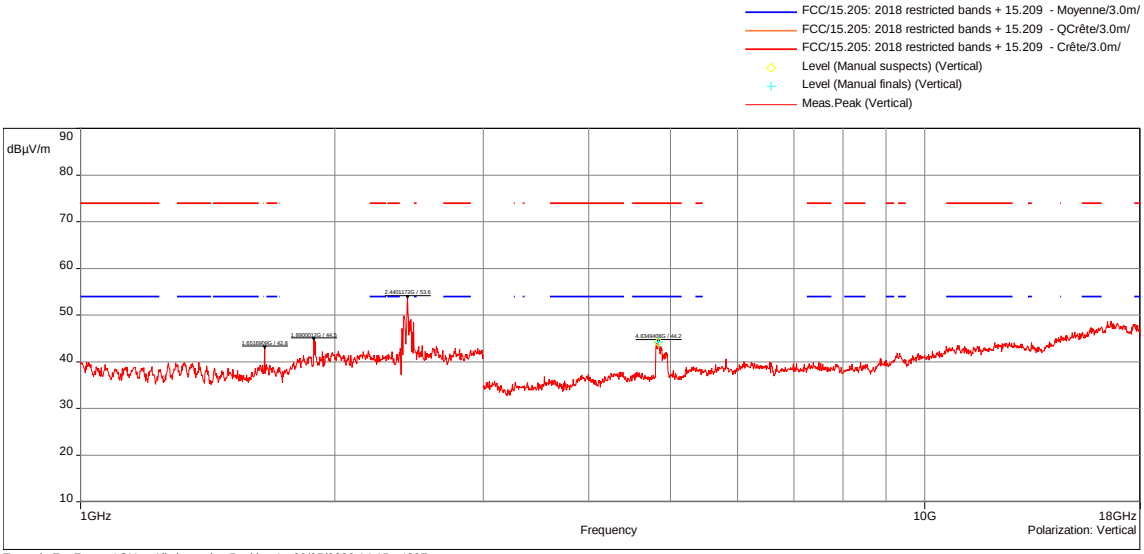
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-200MHz	100kHz	300kHz	Peak; QPeak;
Horizontal	30MHz-200MHz	100kHz	300kHz	Peak; QPeak;
Horizontal	200MHz-1GHz	100kHz	300kHz	Peak
Vertical	200MHz-1GHz	100kHz	300kHz	Peak
Vertical	30MHz-65MHz	120kHz	300kHz	QPeak
Configuration:				
Comments:				

EUT modification(s): N/A

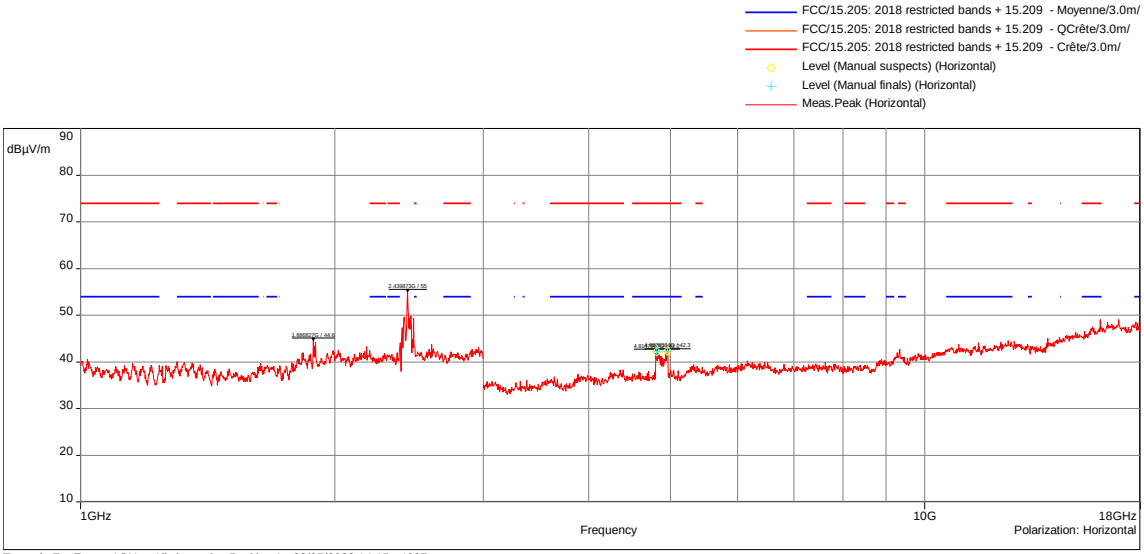
Transmitter radiated spurious emissions at frequencies >30MHz - Tabulated Results					
Tx mode for freq < 1GHz - All channels - All positions				EMI4310	
Frequency (MHz)	Polarization	Level Peak (dBµV/m)	Level QPeak (dBµV/m)	Limit Qpeak (dBµV/m)	Margin dB
33.150	Vertical	41.92	37.59	40.00	-2.41
39.360	Vertical	45.72	33.83	40.00	-6.17
40.560	Vertical	45.56	32.84	40.00	-7.16
41.430	Vertical	43.41	32.47	40.00	-7.53
44.310	Vertical	35.07	27.95	40.00	-12.05
46.380	Vertical	37.17	26.42	40.00	-13.58
50.100	Vertical	28.66	25.24	40.00	-14.76
52.350	Vertical	35.15	27.03	40.00	-12.97
53.670	Vertical	35.07	29.16	40.00	-10.84
57.930	Vertical	33.78	27.62	40.00	-12.38
59.070	Vertical	32.01	28.10	40.00	-11.90
61.200	Vertical	29.88	25.08	40.00	-14.92
138.027	Verticale	36.73	32.56	43.52	-10.96
139.536	Verticale	37.00	33.06	43.52	-10.46
140.918	Verticale	35.42	29.91	43.52	-13.61
142.597	Verticale	36.86	32.98	43.52	-10.54
180.044	Verticale	33.41	28.26	43.52	-15.26
197.960	Verticale	30.22	24.42	43.52	-19.10
182.743	Horizontale	35.01	28.44	43.52	-15.08
183.168	Horizontale	34.91	30.13	43.52	-13.39
185.272	Horizontale	34.68	27.83	43.52	-15.69
186.356	Horizontale	36.09	31.10	43.52	-12.42
186.887	Horizontale	35.76	30.72	43.52	-12.80
188.226	Horizontale	36.60	28.79	43.52	-14.73
188.736	Horizontale	36.88	32.38	43.52	-11.14
189.140	Horizontale	37.48	33.54	43.52	-9.98
190.904	Horizontale	36.99	26.42	43.52	-17.10

Spurious which has more than 15 dB of margin compared to the applicable limit is not necessarily reported

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE FOR FREQ > 1GHZ - ALL CHANNELS - POSITION 1		EMI4297	
EUT mode:	Continuous modulated Tx / Channel Hopping	**T (°C):**	24.3
Test Date:	05/06/2020	**H (%):**	38.9
Test Operator:	OAT	**P (hPa):**	1002



Tx mode For Freq > 1GHz - All channels - Position 1 - 06/05/2020 14:15 - 4297



Tx mode For Freq > 1GHz - All channels - Position 1 - 06/05/2020 14:15 - 4297

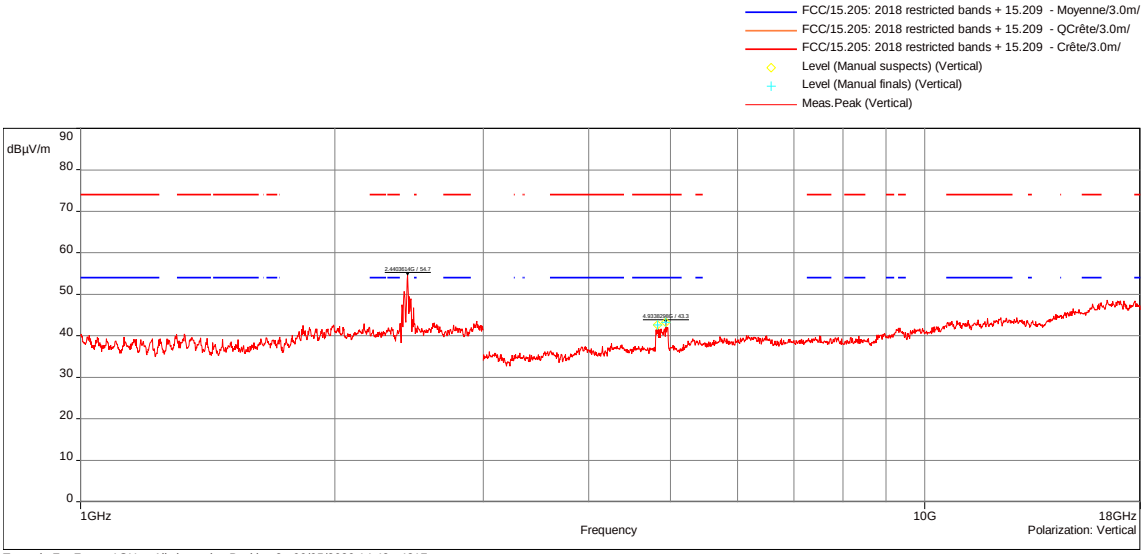
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Peak
Horizontal	3GHz-18GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

EUT modification(s): N/A

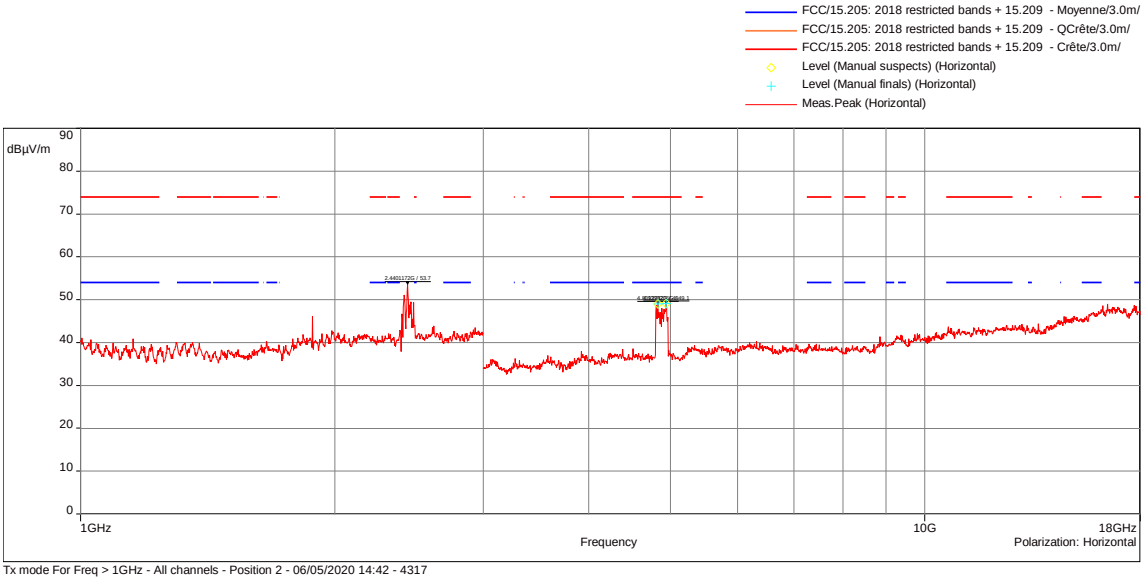
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS					
TX MODE FOR FREQ > 1GHZ - ALL CHANNELS - POSITION 1				EMI4297	
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg. (dBµV/m)**	**Limit Avg. (dBµV/m)**	**Margin dB**
4834.940	Vertical	44.23	N/P	54.00	-9.77
4814.796	Horizontal	42.19	N/P	54.00	-11.81
4957.636	Horizontal	42.25	N/P	54.00	-11.75

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.
Frequency near to 1.8GHz are due to ambient GSM.
No spurious emissions werer detected above 18GHz.

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE FOR FREQ > 1GHZ - ALL CHANNELS - POSITION 2		EMI4317	
EUT mode:	Continuous modulated Tx / Channel Hopping	**T (°C):**	24.3
Test Date:	05/06/2020	**H (%):**	38.9
Test Operator:	OAT	**P (hPa):**	1002



Tx mode For Freq > 1GHz - All channels - Position 2 - 06/05/2020 14:42 - 4317



Tx mode For Freq > 1GHz - All channels - Position 2 - 06/05/2020 14:42 - 4317

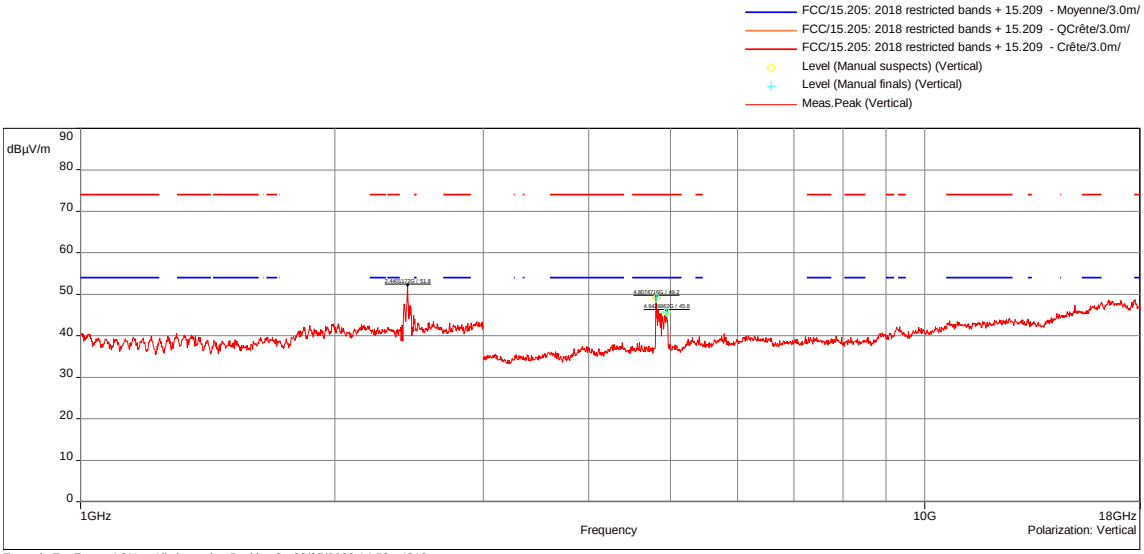
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Peak
Horizontal	3GHz-18GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

EUT modification(s): N/A

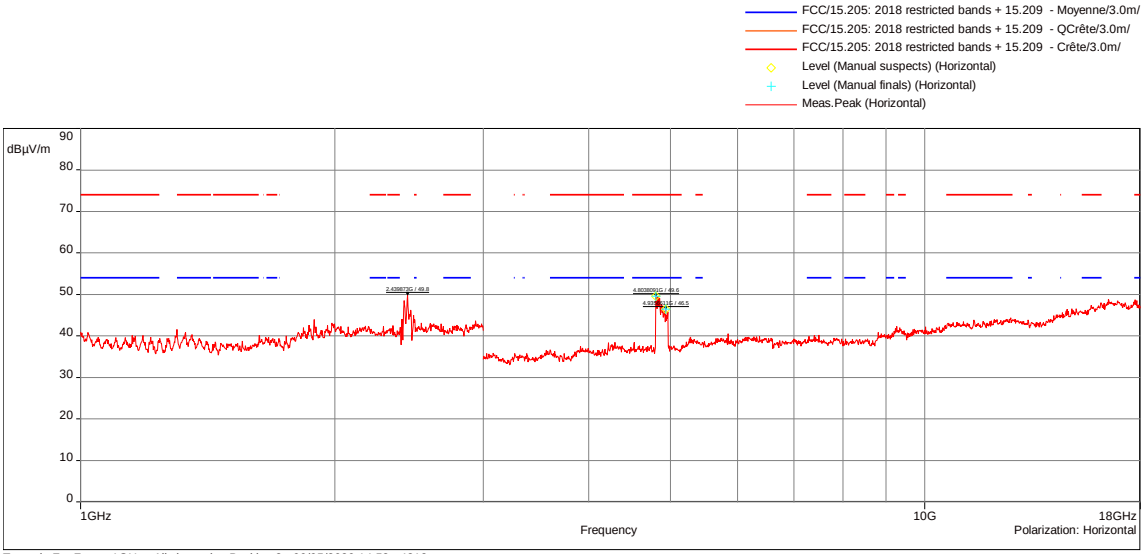
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS					
TX MODE FOR FREQ > 1GHZ - ALL CHANNELS - POSITION 2				EMI4317	
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg. (dBµV/m)**	**Limit Avg. (dBµV/m)**	**Margin dB**
4823.953	Vertical	42.58	N/P	54.00	-11.42
4933.829	Vertical	43.26	N/P	54.00	-10.74
4831.278	Horizontal	49.02	N/P	54.00	-4.98
4939.323	Horizontal	49.14	N/P	54.00	-4.86

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.
Frequency near to 1.8GHz are due to ambient GSM.
No spurious emissions werer detected above 18GHz.

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE FOR FREQ > 1GHZ - ALL CHANNELS - POSITION 3		EMI4318	
EUT mode:	Continuous modulated Tx / Channel Hopping	**T (°C):**	24.3
Test Date:	05/06/2020	**H (%):**	38.9
Test Operator:	OAT	**P (hPa):**	1002



Tx mode For Freq > 1GHz - All channels - Position 3 - 06/05/2020 14:53 - 4318



Tx mode For Freq > 1GHz - All channels - Position 3 - 06/05/2020 14:53 - 4318

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Peak
Horizontal	3GHz-18GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

EUT modification(s): N/A

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - TABULATED RESULTS					
TX MODE FOR FREQ > 1GHZ - ALL CHANNELS - POSITION 3				EMI4318	
Frequency (MHz)	**Polarization**	**Level Peak (dBµV/m)**	**Level Avg. (dBµV/m)**	**Limit Avg. (dBµV/m)**	**Margin dB**
4807.471	Vertical	49.18	N/P	54.00	-4.82
4942.986	Vertical	45.76	N/P	54.00	-8.24
4803.809	Horizontal	49.55	N/P	54.00	-4.45
4935.661	Horizontal	46.50	N/P	54.00	-7.5

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.
No spurious emissions werer detected above 18GHz.

8.4. 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 connected to the measuring receiver via 50Ω attenuator(s).Only the highest levels are recorded.

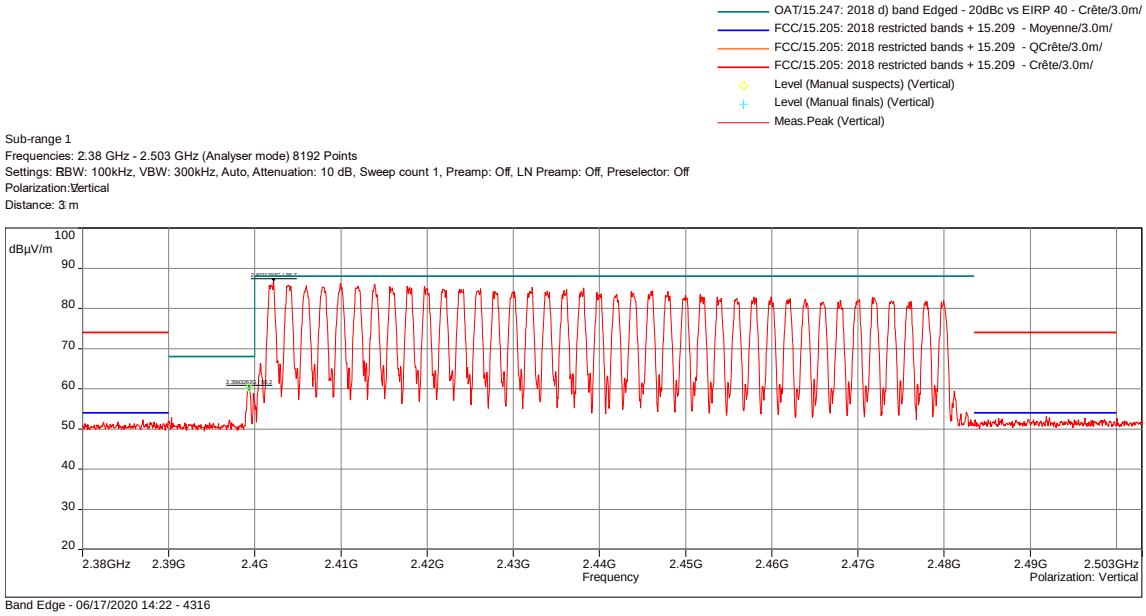
TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Tx mode All channels / All Positions	2.38GHz-2.503GHz	15.247 (20dBc)	EMI4316	**PASS**

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:		
Supplementary information: N/A		

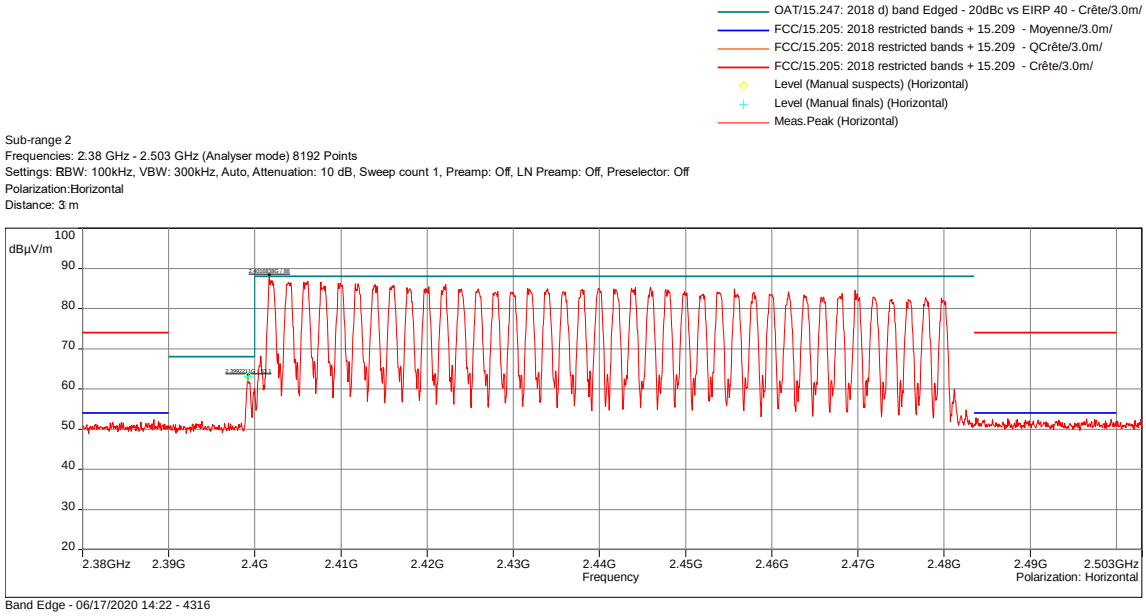
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Antenna	ETS-Lindgren	3117	5456	24/07/2019	24/09/2022
Cable	MegaPhase	N-3m	14852	29/10/2018	29/12/2020
Cable	MegaPhase	N-5m	14854	13/02/2018	13/10/2020
Filter	Micro-Tronics	HPM 15162	10273	12/01/2019	12/03/2022
Filter	Micro-Tronics	HPM18865	12843	09/06/2018	09/08/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Receiver	Agilent Technologies	E4440A	5824	18/04/2018	18/06/2020
Shielded enclosure	RAY PROOF	C.V2	1423		
Software	Nexio		0000		
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H1	7562	25/01/2019	25/03/2021

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

BAND-EDGE COMPLIANCE - GRAPH			
TX MODE ALL CHANNELS / ALL POSITIONS		EMI4316	
EUT mode:	Continuous modulated Tx / All channels	**T (°C):**	24.3
Test Date:	17/06/2020	**H (%):**	38.9
Test Operator:	OAT	**P (hPa):**	1002



Band Edge - 06/17/2020 14:22 - 4316



Band Edge - 06/17/2020 14:22 - 4316

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.38GHz-2.503GHz	100kHz	300kHz	Peak
Horizontal	2.38GHz-2.503GHz	100kHz	300kHz	Peak
Configuration:				
Comments:				
EUT modification(s): N/A				

BAND-EDGE COMPLIANCE - TABULATED RESULTS				
TX MODE ALL CHANNELS / ALL POSITIONS				EMI4316
Frequency (MHz)	Polarization	Level Peak (dBµV/m)	Limit (dBµV/m)	Margin dB
2399.326	Vertical	60.21	68.00	7.79
2399.221	Horizontal	63.07	68.00	4.93

Spurious which has more than 10 dB of margin compared to the applicable limit is not necessarily reported

8.5. Effective isotropic radiated power

a) Normal Tests Conditions

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247,RSS-247 and ANSI C63.4: 2013

Test description: b) (3)

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

For conducted measurement, EUT is connected to the measuring receiver via 50Ω attenuator(s).Only the highest levels are recorded.

For radiated measurement, 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.

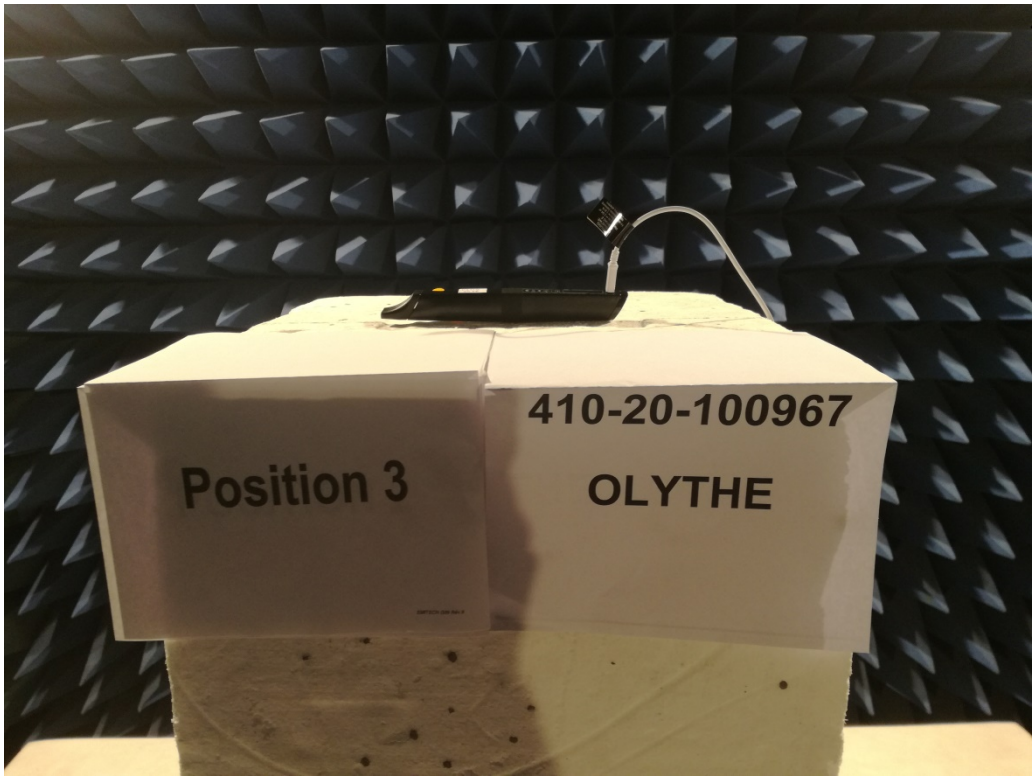
Tested Configuration	Parameter	Severity	Result Tab.	Verdict
EIRP / Low Channel / Position 1	2.3995GHz-2.4045GHz	1W (30dBm)	EMI4367	**PASS**
EIRP / Low Channel / Position 2	2.3995GHz-2.4045GHz	1W (30dBm)	EMI4369	**PASS**
EIRP / Low Channel / Position 3	2.3995GHz-2.4045GHz	1W (30dBm)	EMI4370	**PASS**
EIRP / Mid Channel / Position 1	2.4395GHz-2.4445GHz	1W (30dBm)	EMI4371	**PASS**
EIRP / Mid Channel / Position 2	2.4395GHz-2.4445GHz	1W (30dBm)	EMI4372	**PASS**
EIRP / Mid Channel / Position 3	2.4395GHz-2.4445GHz	1W (30dBm)	EMI4373	**PASS**
EIRP / High Channel / Position 1	2.4775GHz-2.4825GHz	1W (30dBm)	EMI4374	**PASS**
EIRP / High Channel / Position 2	2.4775GHz-2.4825GHz	1W (30dBm)	EMI4375	**PASS**
EIRP / High Channel / Position 3	2.4775GHz-2.4825GHz	1W (30dBm)	EMI4376	**PASS**

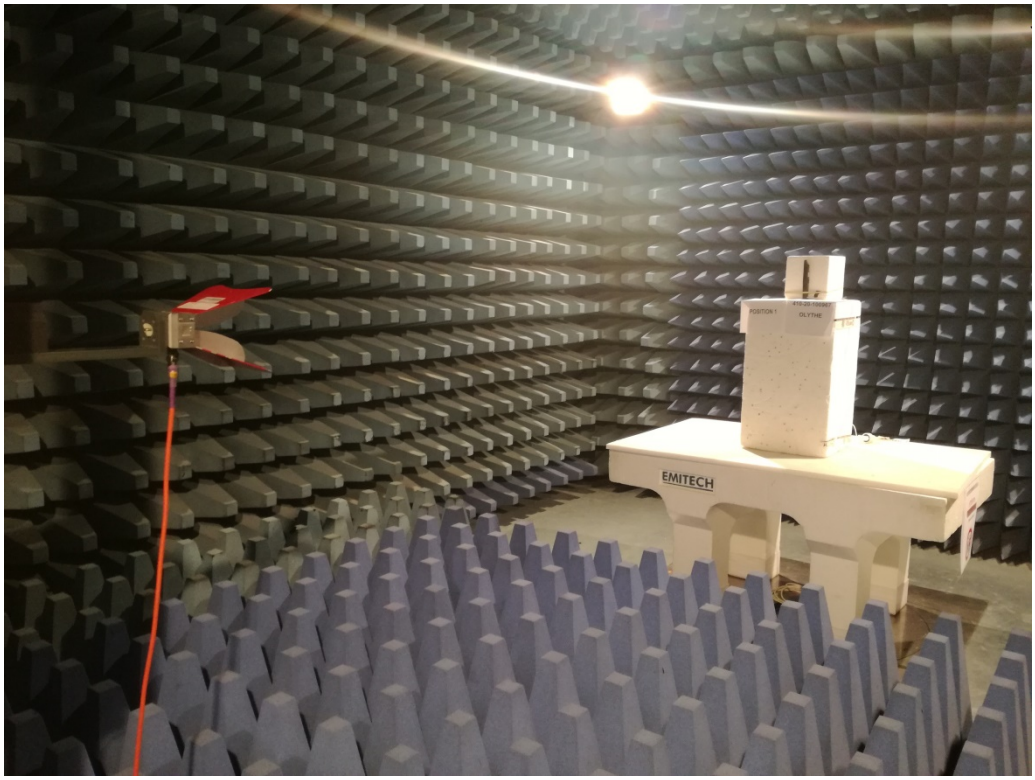
Laboratory parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: EUT has its dedicated internal antenna, due to this, this measurement was done in radiated by the substitution method.		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Antenna	ETS-Lindgren	3117	8387	24/07/2019	24/09/2022
Attenuator	EMITECH	SUB.V1-H	14780	09/01/2019	09/09/2020
Attenuator	EMITECH	SUB.V1-V	14781	09/01/2019	09/09/2020
Cable	MegaPhase	TM18-N1N1-118	12842	10/05/2018	10/01/2021
Cable	MegaPhase	TM18-N1N1-197	12840	10/05/2018	10/01/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Receiver	Rohde & Schwarz	FPL1003	16027	16/01/2019	16/09/2020
Shielded enclosure	RAY PROOF	C.V1	1123		
Software	Nexio		0000		
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

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

TEST SETUP PHOTO(S) – EUT POSITIONS

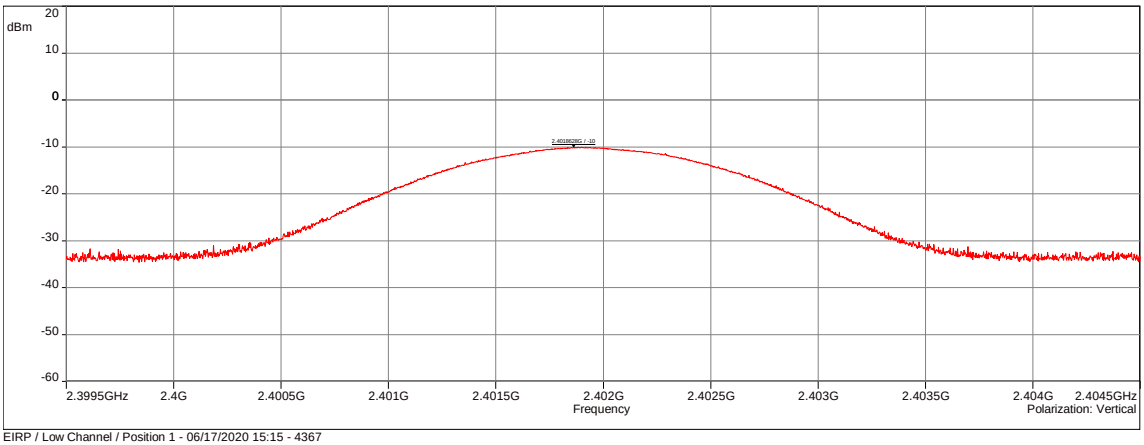
TEST SETUP PHOTO(S) – EUT POSITIONS


TEST SETUP PHOTO(S)


EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / LOW CHANNEL / POSITION 1		EMI4367	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

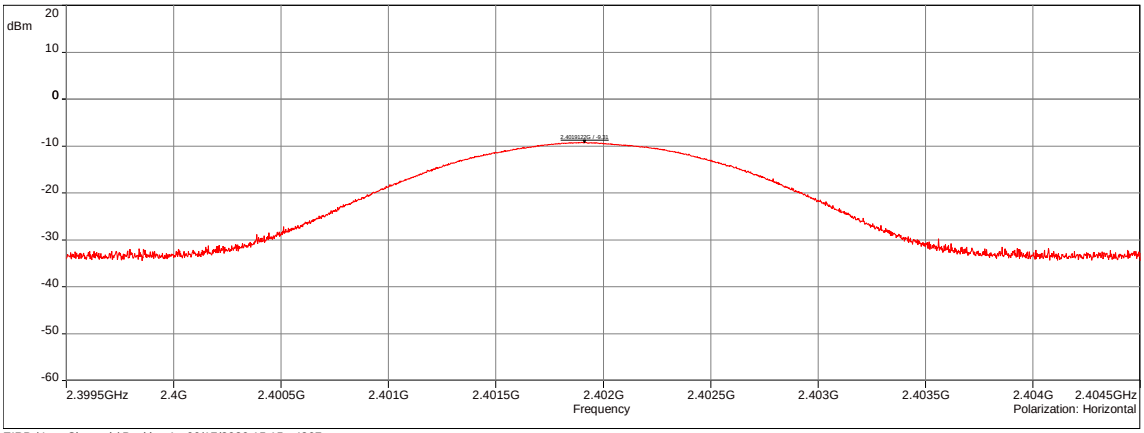
Sub-range 1
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / Low Channel / Position 1 - 06/17/2020 15:15 - 4367

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / Low Channel / Position 1 - 06/17/2020 15:15 - 4367

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.3995GHz-2.4045GHz	1MHz	3MHz	Peak
Horizontal	2.3995GHz-2.4045GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

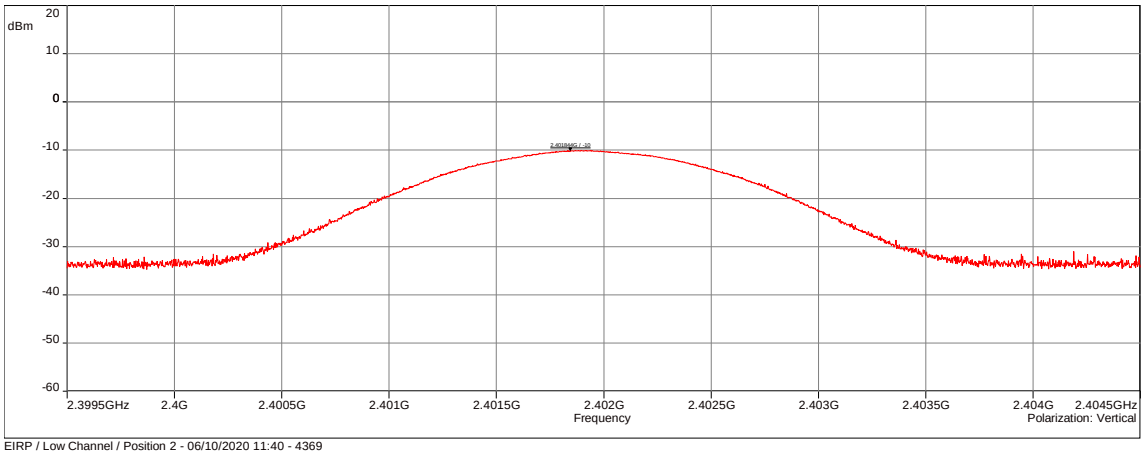
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / LOW CHANNEL / POSITION 1			EMI4367
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2402.000	Vertical	-10.0	30.00
2402.000	Horizontal	-9.31	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / LOW CHANNEL / POSITION 2		EMI4369	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

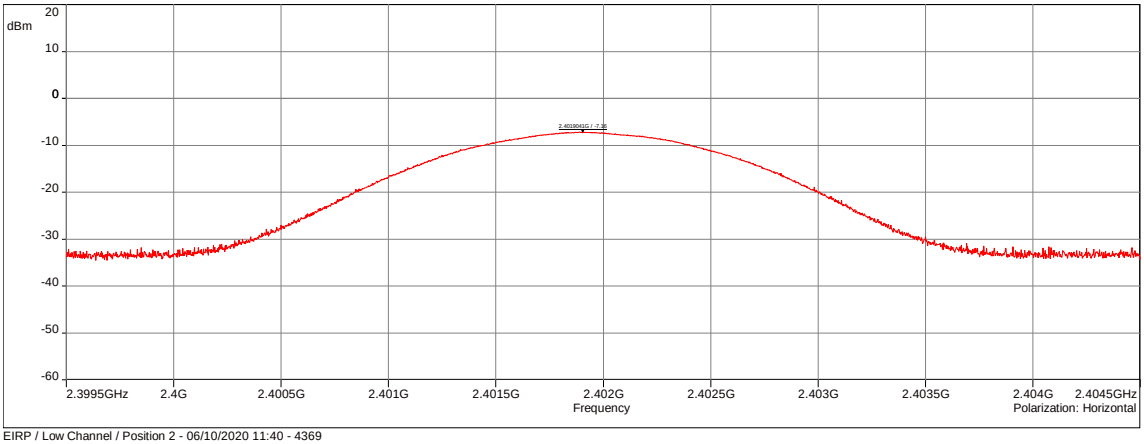
Sub-range 1
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / Low Channel / Position 2 - 06/10/2020 11:40 - 4369

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / Low Channel / Position 2 - 06/10/2020 11:40 - 4369

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.3995GHz-2.4045GHz	1MHz	3MHz	Peak
Horizontal	2.3995GHz-2.4045GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

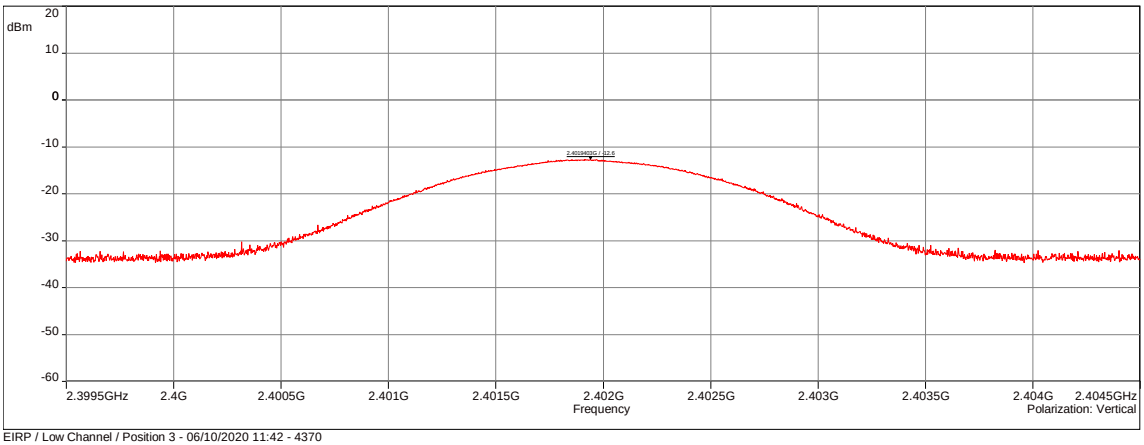
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / LOW CHANNEL / POSITION 2			EMI4369
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2402.000	Vertical	-10.0	30.00
2402.000	Horizontal	-7.61	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / LOW CHANNEL / POSITION 3		EMI4370	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

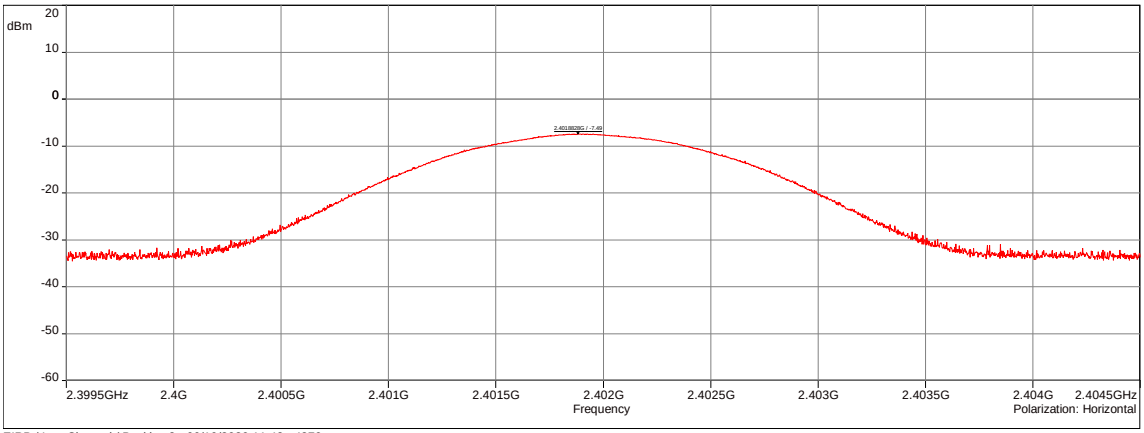
Sub-range 1
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / Low Channel / Position 3 - 06/10/2020 11:42 - 4370

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / Low Channel / Position 3 - 06/10/2020 11:42 - 4370

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.3995GHz-2.4045GHz	1MHz	3MHz	Peak
Horizontal	2.3995GHz-2.4045GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

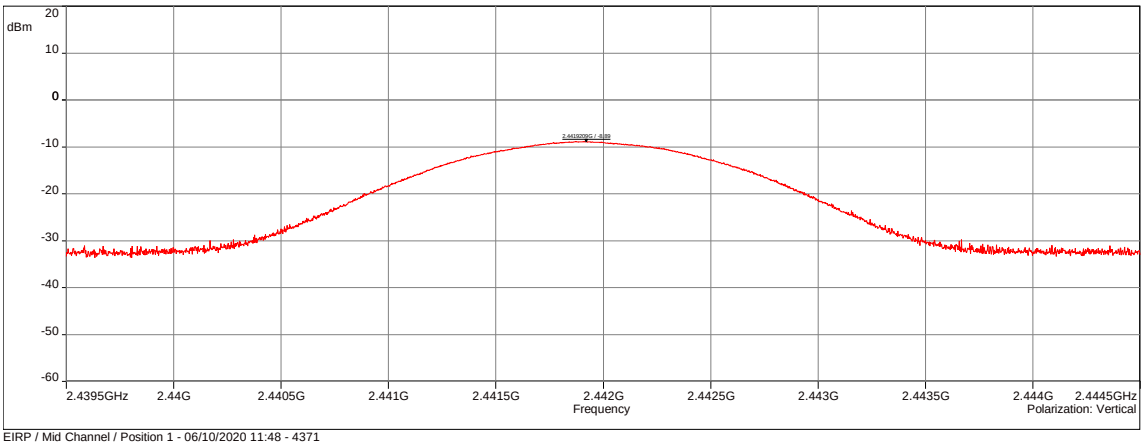
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / LOW CHANNEL / POSITION 3			EMI4370
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2402.000	Vertical	-12.6	30.00
2402.000	Horizontal	**-7.49 (maximum value)**	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / MID CHANNEL / POSITION 1		EMI4371	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

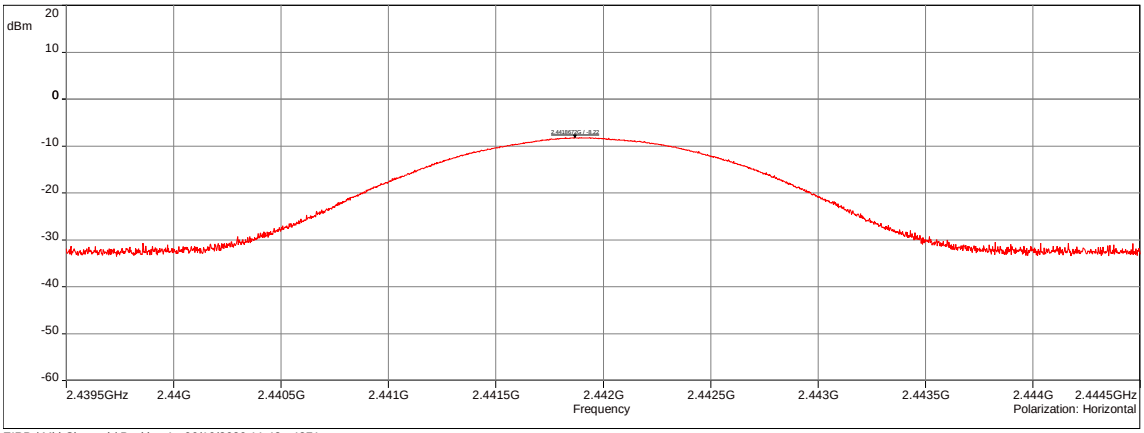
Sub-range 1
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / Mid Channel / Position 1 - 06/10/2020 11:48 - 4371

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / Mid Channel / Position 1 - 06/10/2020 11:48 - 4371

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4395GHz-2.4445GHz	1MHz	3MHz	Peak
Horizontal	2.4395GHz-2.4445GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

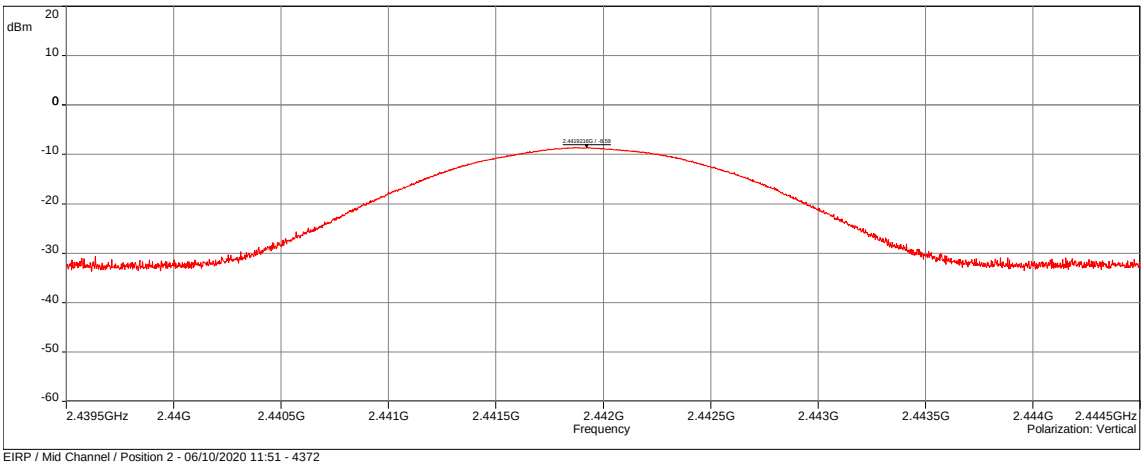
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / MID CHANNEL / POSITION 1			EMI4371
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2442.000	Vertical	-8.22	30.00
2442.000	Horizontal	-8.89	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / MID CHANNEL / POSITION 2		EMI4372	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

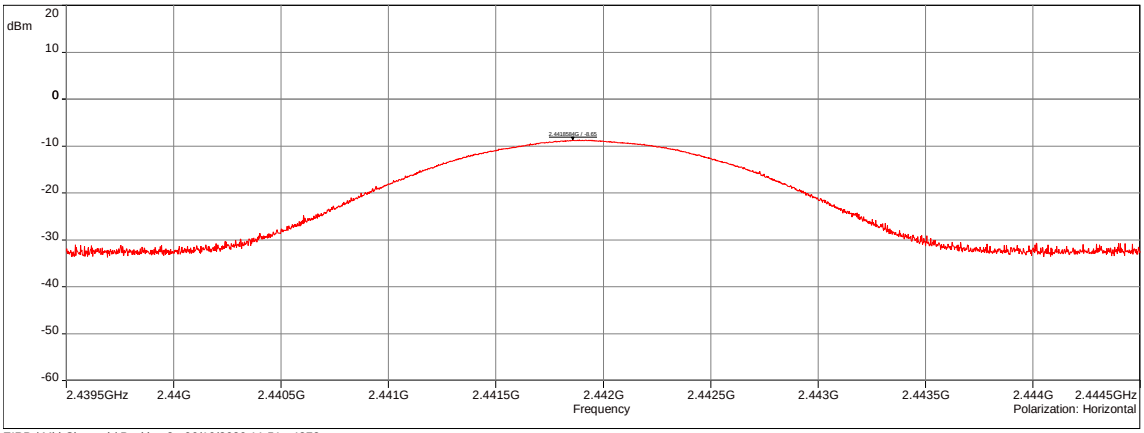
Sub-range 1
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / Mid Channel / Position 2 - 06/10/2020 11:51 - 4372

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / Mid Channel / Position 2 - 06/10/2020 11:51 - 4372

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4395GHz-2.4445GHz	1MHz	3MHz	Peak
Horizontal	2.4395GHz-2.4445GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

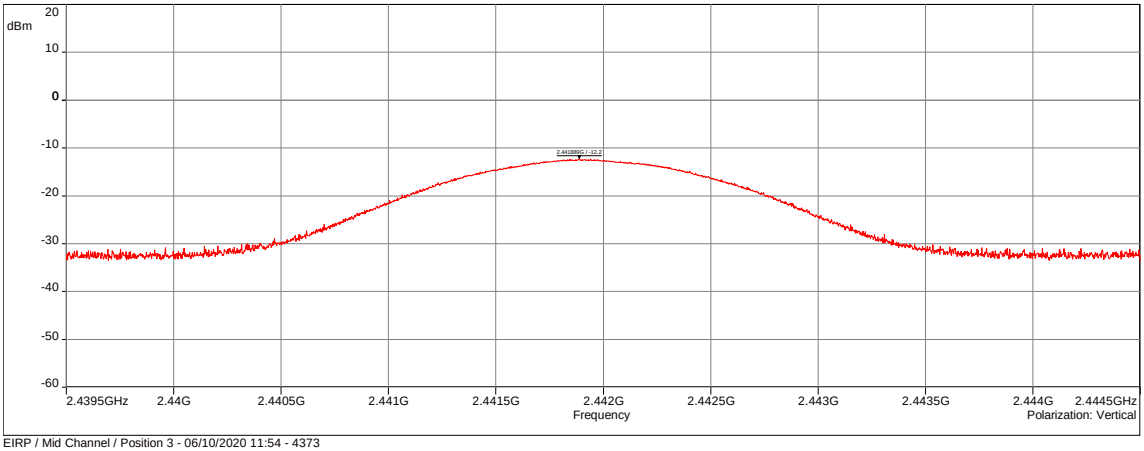
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / MID CHANNEL / POSITION 2			EMI4372
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2442.000	Vertical	-8.59	30.00
2442.000	Horizontal	-8.65	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / MID CHANNEL / POSITION 3		EMI4373	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

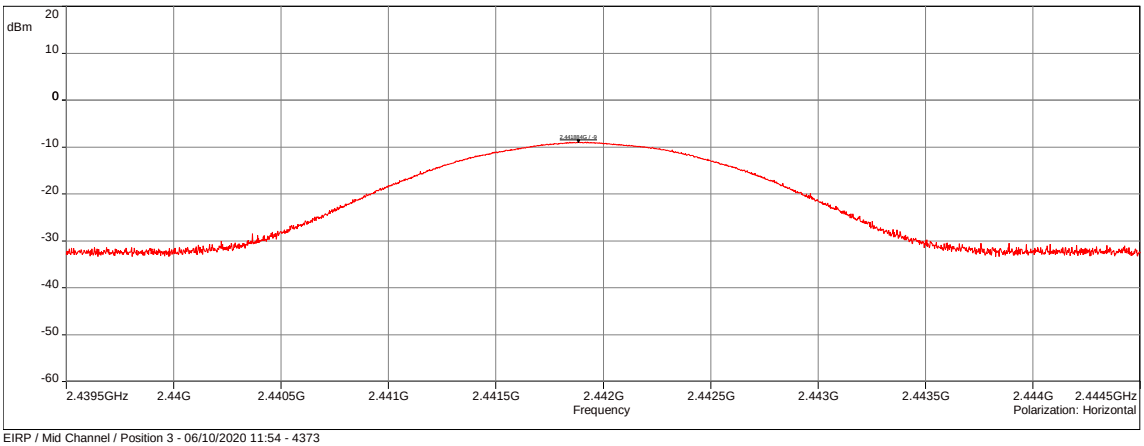
Sub-range 1
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / Mid Channel / Position 3 - 06/10/2020 11:54 - 4373

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / Mid Channel / Position 3 - 06/10/2020 11:54 - 4373

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4395GHz-2.4445GHz	1MHz	3MHz	Peak
Horizontal	2.4395GHz-2.4445GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

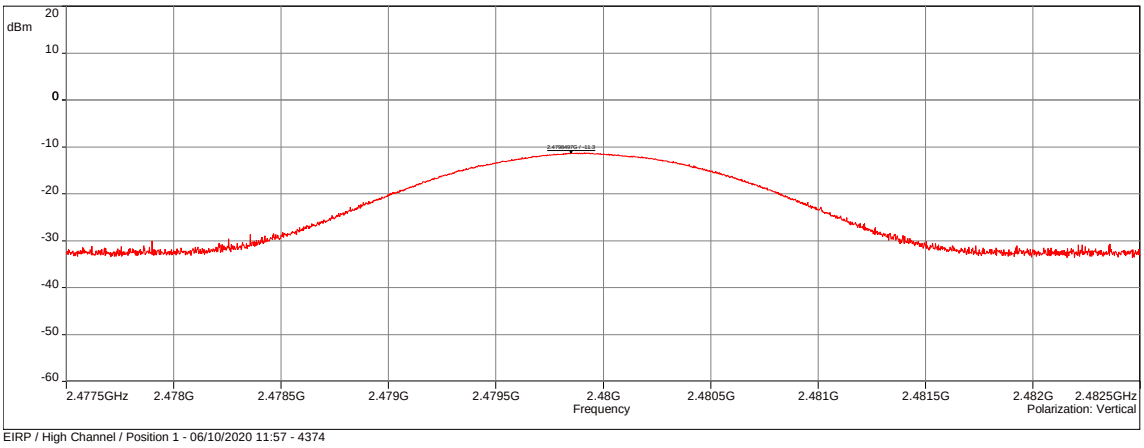
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / MID CHANNEL / POSITION 3			EMI4373
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2442.000	Vertical	-12.2	30.00
2442.000	Horizontal	-9.00	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / HIGH CHANNEL / POSITION 1		EMI4374	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

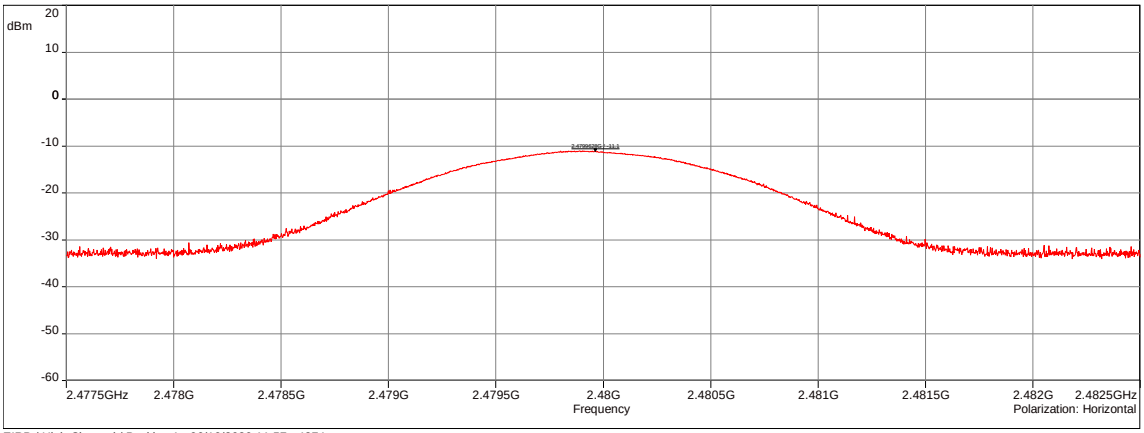
Sub-range 1
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / High Channel / Position 1 - 06/10/2020 11:57 - 4374

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / High Channel / Position 1 - 06/10/2020 11:57 - 4374

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4775GHz-2.4825GHz	1MHz	3MHz	Peak
Horizontal	2.4775GHz-2.4825GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

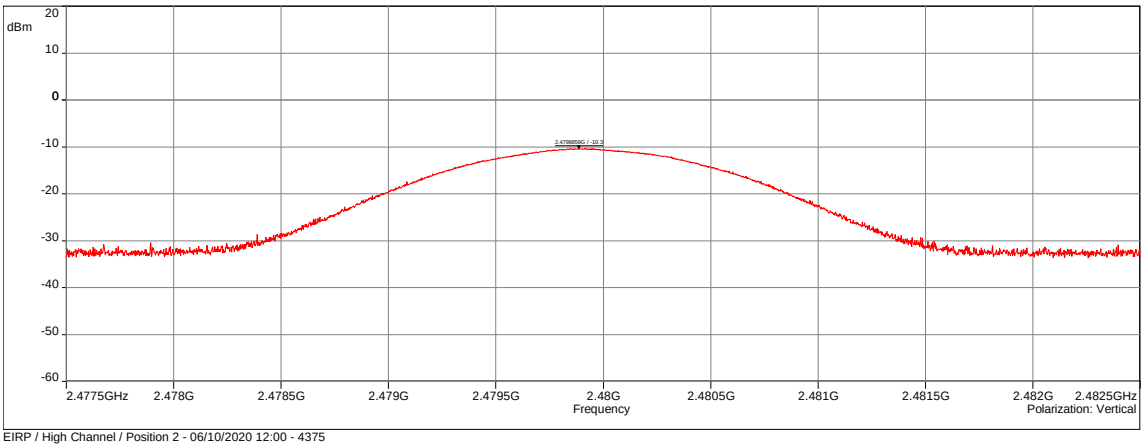
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / HIGH CHANNEL / POSITION 1			EMI4374
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2480.000	Vertical	-11.3	30.00
2480.000	Horizontal	-11.1	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / HIGH CHANNEL / POSITION 2		EMI4375	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

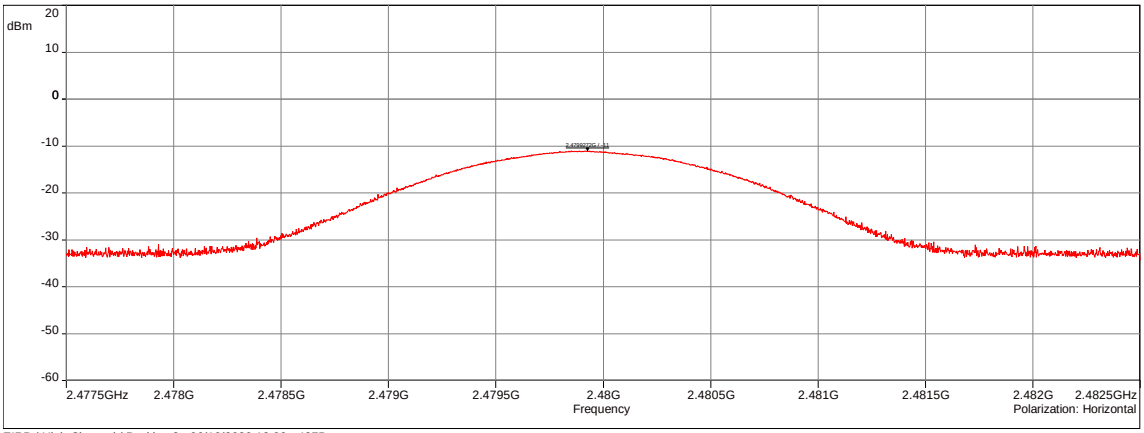
Sub-range 1
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / High Channel / Position 2 - 06/10/2020 12:00 - 4375

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / High Channel / Position 2 - 06/10/2020 12:00 - 4375

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4775GHz-2.4825GHz	1MHz	3MHz	Peak
Horizontal	2.4775GHz-2.4825GHz	1MHz	3MHz	Peak
Configuration:				
Comments:				

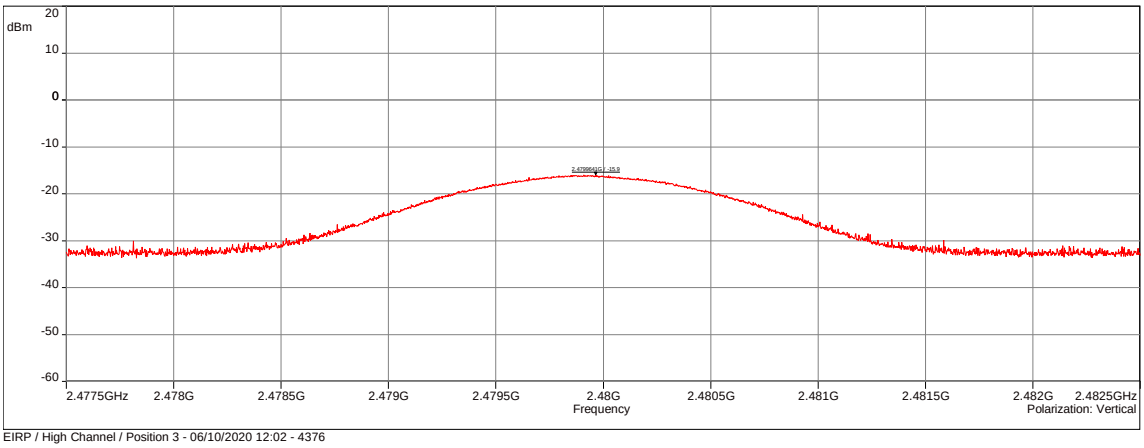
EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / HIGH CHANNEL / POSITION 2			EMI4375
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2480.000	Vertical	-10.3	30.00
2480.000	Horizontal	-11.0	30.00

EFFECTIVE ISOTROPIC RADIATED POWER - GRAPH			
EIRP / HIGH CHANNEL / POSITION 3		EMI4376	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

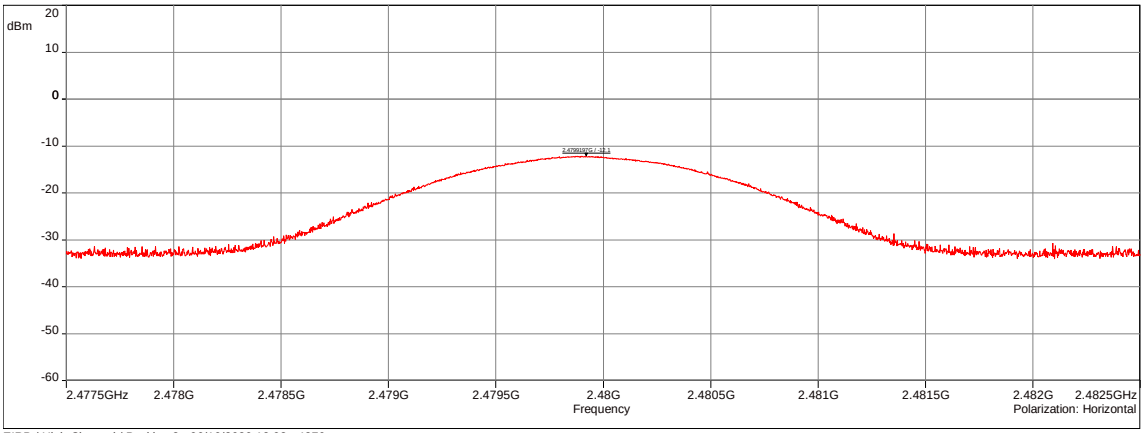
Sub-range 1
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



EIRP / High Channel / Position 3 - 06/10/2020 12:02 - 4376

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



EIRP / High Channel / Position 3 - 06/10/2020 12:02 - 4376

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4775GHz-2.4825GHz	1MHz	3MHz	Peak
Horizontal	2.4775GHz-2.4825GHz	1MHz	3MHz	Peak
Configuration:				
Comments:	PV = -15.9 / PH =-12.1			

EUT modification(s): N/A

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS			
EIRP / HIGH CHANNEL / POSITION 3			EMI4376
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2480.000	Vertical	-15.9	30.00
2480.000	Horizontal	-12.1	30.00

b) Extremes Tests Conditions

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 , RSS-247 & ANSI C63.10: 2013
General test setup: EUT is set inside the climatic enclosure. ERP measurements are repeated in extreme test conditions with the power levels correlated with the maximum Effective isotropic radiated power measured in normal conditions.	

Test Case	EUT Mode	Severity	Result Tab.	Verdict
Low channel / 25°C	Continuous modulated Tx	1W (30dBm)	EMI4324	**PASS**
Mid channel / 25°C	Continuous modulated Tx	1W (30dBm)	EMI4387	**PASS**
High channel / 25°C	Continuous modulated Tx	1W (30dBm)	EMI4390	**PASS**
Low channel / 45°C	Continuous modulated Tx	1W (30dBm)	EMI4385	**PASS**
Mid channel / 45°C	Continuous modulated Tx	1W (30dBm)	EMI4388	**PASS**
High channel / 45°C	Continuous modulated Tx	1W (30dBm)	EMI4391	**PASS**
Low channel / 0°C	Continuous modulated Tx	1W (30dBm)	EMI4386	**PASS**
Mid channel / 0°C	Continuous modulated Tx	1W (30dBm)	EMI4389	**PASS**
High channel / 0°C	Continuous modulated Tx	1W (30dBm)	EMI4392	**PASS**

Laboratory parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 °C	21.9 °C
Relative Humidity	20 to 75 %	39.5 %
Atmospheric pressure	N/A	1006 hPa
Test method deviation: N/A		
Supplementary information:		

Test equipment used					
Category	**Brand**	**Type**	**Identifier**	**Cal. Date**	**Cal. Due**
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2022
Cable	N	3m	16414	04/05/2019	04/07/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Spectrum analyzer	Agilent Technologies	E4440A	5824	24/04/2018	24/06/2020
Thermocouple	/	Type k	14265	29/01/2019	29/03/2021
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Thermometer contactless	GHM Greisinger	GMH 3710	12968	13/02/2019	13/10/2020

Blank cells = Permanent validity

TEST SETUP PHOTO(S)

EFFECTIVE ISOTROPIC RADIATED POWER - TABULATED RESULTS				
TEST CASE	FREQUENCY	LEVEL	LIMIT	RESULT TAB.
Low channel / 25°C	2.402GHz	-7.16 dBm	1W (30dBm)	EMI4324
Mid channel / 25°C	2.442GHz	-8.22 dBm	1W (30dBm)	EMI4387
High channel / 25°C	2.480GHz	-10.3 dBm	1W (30dBm)	EMI4390
Low channel / 45°C	2.402GHz	-6.37 dBm	1W (30dBm)	EMI4385
Mid channel / 45°C	2.442GHz	-7.96 dBm	1W (30dBm)	EMI4388
High channel / 45°C	2.480GHz	-10.57 dBm	1W (30dBm)	EMI4391
Low channel / 0°C	2.402GHz	-3.98 dBm	1W (30dBm)	EMI4386
Mid channel / 0°C	2.442GHz	-5.52 dBm	1W (30dBm)	EMI4389
High channel / 0°C	2.480GHz	-8.08 dBm	1W (30dBm)	EMI4392

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	08/06/2020	-

8.6. 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	735.53 kHz	>500kHz	EMI4382	**PASS**
6dB Bandwidth / Mid channel	616.171 kHz	>500kHz	EMI4383	**PASS**
6dB Bandwidth / High channel	689.35 kHz	>500kHz	EMI4384	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	22.9 °C
Relative Humidity	20 to 75 %	40.6 %
Atmospheric pressure	N/A	1008 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
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Antenna	EMITECH	3.5 cm	4653		
Cable	SMA	1m	15617	12/06/2018	12/08/2020
Cable	Radiall	SMA-0,5m	16559	30/07/2019	30/09/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Shielded enclosure	EMITECH	BLCK1	15622		
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	16/01/2019	16/09/2020
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022

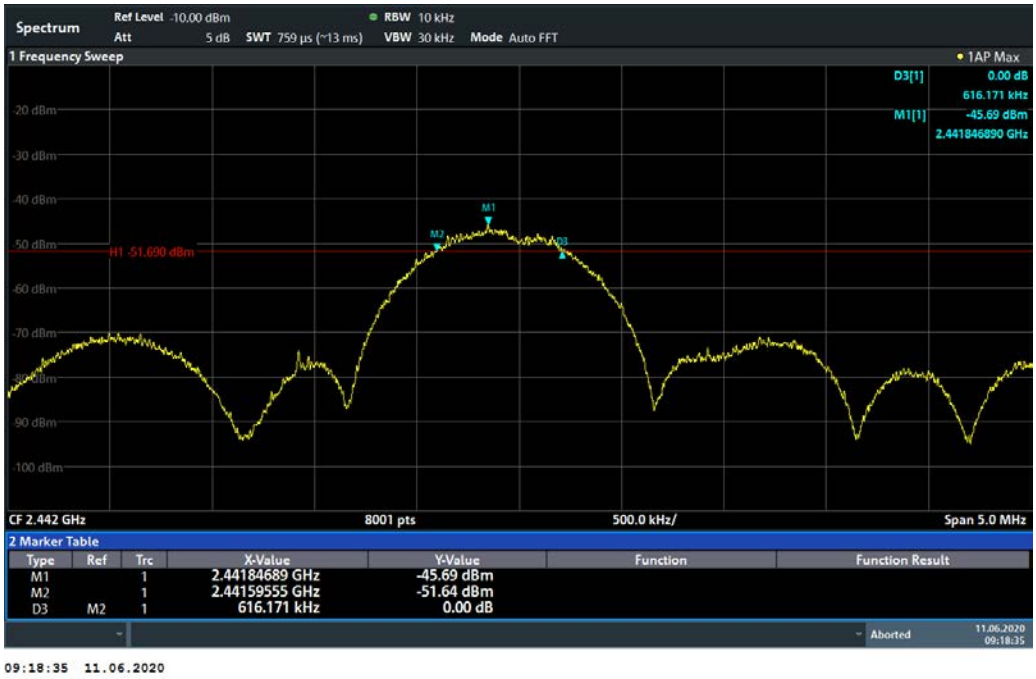
Blank cells = Permanent validity

OCCUPIED BANDWIDTH - GRAPH	
6DB BANDWIDTH / LOW CHANNEL	EMI4382
EUT mode:	Continuous modulated Tx
Test Date:	11/06/2020
Test Operator:	OAT

EUT modification(s): N/A

OCCUPIED BANDWIDTH - TABULATED RESULTS			
6DB BANDWIDTH / LOW CHANNEL			EMI4382
f_{Low}	f_{High}	6dB Bandwidth (kHz)	Limit (kHz)
-	-	735.53	>500

OCCUPIED BANDWIDTH - GRAPH		
6DB BANDWIDTH / MID CHANNEL		EMI4383
EUT mode:	Continuous modulated Tx	
Test Date:	11/06/2020	
Test Operator:	OAT	



EUT modification(s): N/A

OCCUPIED BANDWIDTH - TABULATED RESULTS			
6DB BANDWIDTH / MID CHANNEL			EMI4383
f_{Low}	f_{High}	6dB Bandwidth (kHz)	Limit (kHz)
-	-	616.171	>500

OCCUPIED BANDWIDTH - GRAPH	
6DB BANDWIDTH / HIGH CHANNEL	EMI4384
EUT mode:	Continuous modulated Tx
Test Date:	11/06/2020
Test Operator:	OAT

EUT modification(s): N/A

OCCUPIED BANDWIDTH - TABULATED RESULTS			
6DB BANDWIDTH / HIGH CHANNEL			EMI4384
f_{Low}	f_{High}	6dB Bandwidth (kHz)	Limit (kHz)
-	-	689.35	>500

8.7. 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 % as described in Figure 3 of the standard.

The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions.

For EUT without dedicated or integral antenna, EUT is connected to the measuring receiver via 50Ω attenuator(s). Radiated power limit applies to the maximum measured conducted power value adjusted by the antenna gain.

For EUT with integral or dedicated antenna, measurements are done on a normalized test site by the substitution method. EUT is set on an insulating support at N/Acm above the ground reference plane.

Then EUT is set inside the climatic enclosure. Measurements are repeated in extreme test conditions with the power levels correlated with the maximum Effective isotropic radiated power measured in normal conditions.

TESTED CHANNEL	OBW	SEVERITY	RESULT TAB.	VERDICT
OBW / Low channel	2781.816 kHz	> 500kHz	EMI4327	**PASS**
OBW / Mid channel	1277.967 kHz	> 500kHz	EMI4380	**PASS**
OBW / High channel	1165.657 kHz	> 500kHz	EMI4381	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	22.9 °C
Relative Humidity	20 to 75 %	40.6 %
Atmospheric pressure	N/A	1008 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
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Antenna	EMITECH	3.5 cm	4653		
Cable	SMA	1m	15617	12/06/2018	12/08/2020
Cable	Radiall	SMA-0,5m	16559	30/07/2019	30/09/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Shielded enclosure	EMITECH	BLCK1	15622		
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	16/01/2019	16/09/2020
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022

Blank cells = Permanent validity

OCCUPIED BANDWIDTH - GRAPH	
OBW / LOW CHANNEL	EMI4327
EUT mode:	Continuous modulated Tx
Test Date:	11/06/2020
Test Operator:	OAT

EUT modification(s): N/A

OCCUPIED BANDWIDTH - TABULATED RESULTS			
OBW / LOW CHANNEL			EMI4327
f_{Low} (MHz)	**f_{High} (MHz)**	**OBW (f_{high}-f_{low})**	**Limit (kHz)**
2400.90351	2403.68533	2781.816 kHz	>500

OCCUPIED BANDWIDTH - GRAPH	
OBW / MID CHANNEL	EMI4380
EUT mode:	Continuous modulated Tx
Test Date:	11/06/2020
Test Operator:	OAT

EUT modification(s): N/A

OCCUPIED BANDWIDTH - TABULATED RESULTS			
OBW / MID CHANNEL			EMI4380
f_{Low} (MHz)	f_{High} (MHz)	OBW (f_{high}-f_{low})	Limit (kHz)
2441.232043	2442.510011	1277.967 kHz	>500

OCCUPIED BANDWIDTH - GRAPH	
OBW / HIGH CHANNEL	EMI4381
EUT mode:	Continuous modulated Tx
Test Date:	11/06/2020
Test Operator:	OAT

EUT modification(s): N/A

OCCUPIED BANDWIDTH - TABULATED RESULTS			
OBW / HIGH CHANNEL			EMI4381
f_{Low} (MHz)	**f_{High} (MHz)**	**OBW (f_{high}-f_{low})**	**Limit (kHz)**
2479.330602	2480.49626	1165.657 kHz	>500kHz

8.8. Power spectral density

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

Test description: e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

EUT is connected to the measuring receiver via 50Ω attenuator(s).Only the highest levels are recorded.

TESTED CHANNEL	RESULT	SEVERITY	RESULT TAB.	VERDICT
Low channel / All Positions	-22.4dBm/3kHz	8dBm/3kHz	EMI4378	**PASS**
Mid channel / All Positions	-24.1dBm/3kHz	8dBm/3kHz	EMI6041	**PASS**
High channel / All Positions	-25.7dBm/3kHz	8dBm/3kHz	EMI6042	**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 antenna, due to this, this measurement was done in radiated by the substitution method.		
Supplementary information: N/A		

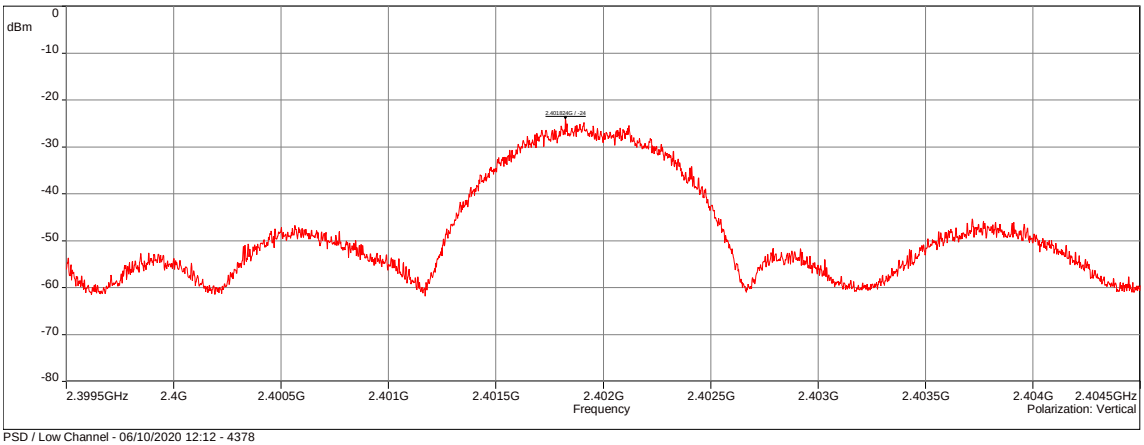
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Antenna	ETS-Lindgren	3117	8387	24/07/2019	24/09/2022
Attenuator	EMITECH	SUB.V1-H	14780	09/01/2019	09/09/2020
Attenuator	EMITECH	SUB.V1-V	14781	09/01/2019	09/09/2020
Cable	MegaPhase	TM18-N1N1-118	12842	10/05/2018	10/01/2021
Cable	MegaPhase	TM18-N1N1-197	12840	10/05/2018	10/01/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Receiver	Rohde & Schwarz	FPL1003	16027	16/01/2019	16/09/2020
Shielded enclosure	RAY PROOF	C.V1	1123		
Software	Nexio		0000		
Thermo-Hygro-Barometer	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

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

POWER SPECTRAL DENSITY - GRAPH			
LOW CHANNEL / ALL POSITIONS		EMI4378	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

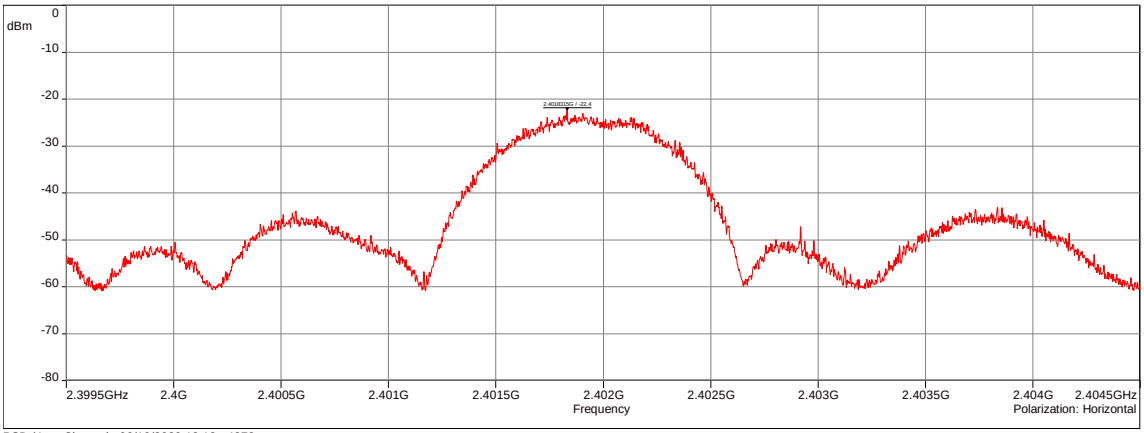
Sub-range 1
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 3kHz, VBW: 9kHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



PSD / Low Channel - 06/10/2020 12:12 - 4378

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.3995 GHz - 2.4045 GHz (Analyser mode) 8000 Points
Settings: RBW: 3kHz, VBW: 9kHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



PSD / Low Channel - 06/10/2020 12:12 - 4378

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.3995GHz-2.4045GHz	3kHz	9kHz	Peak
Horizontal	2.3995GHz-2.4045GHz	3kHz	9kHz	Peak
Configuration:				
Comments:				

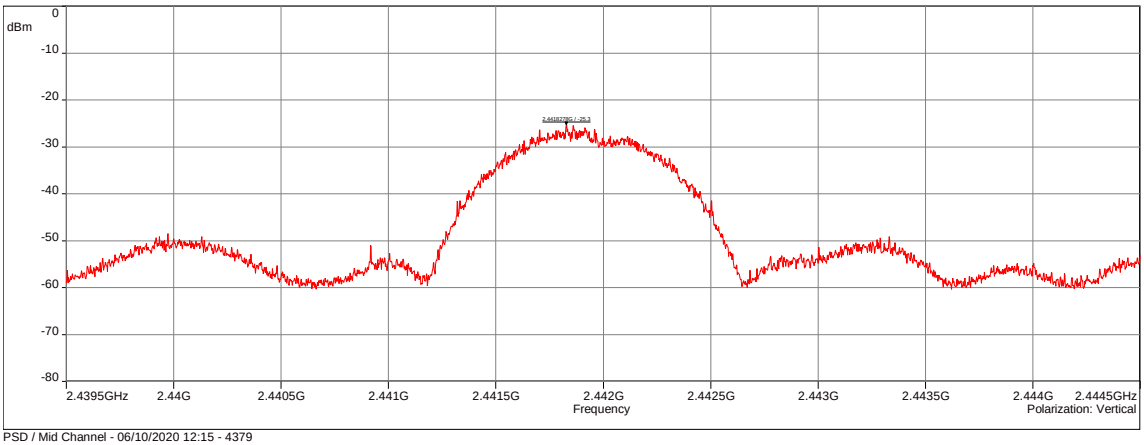
EUT modification(s): N/A

POWER SPECTRAL DENSITY - TABULATED RESULTS			
LOW CHANNEL / ALL POSITIONS			EMI4378
Frequency (MHz)	**Polarization**	**Level (dBm)**	**Limit (dBm)**
2402.000	Vertical	-24.0	8.00
2402.000	Horizontal	-22.4	8.00

POWER SPECTRAL DENSITY - GRAPH			
MID CHANNEL / ALL POSITIONS		EMI4379	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

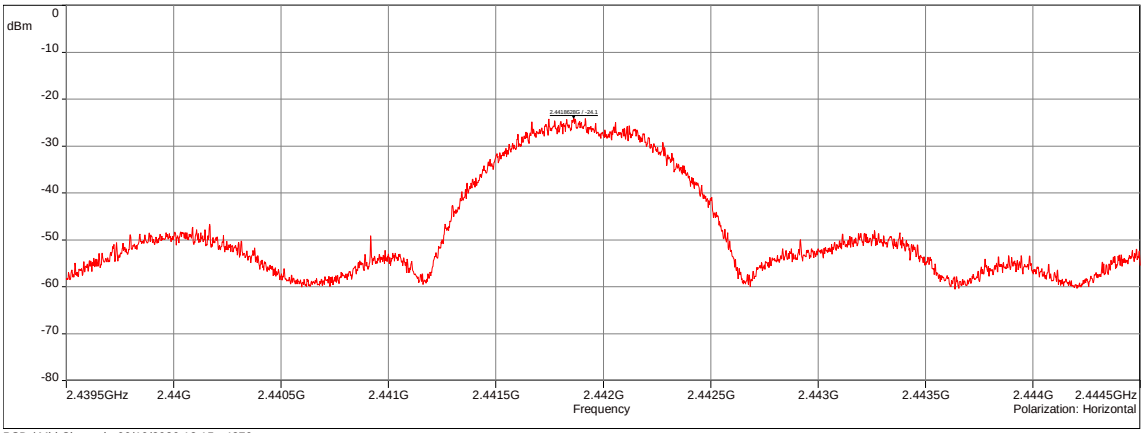
Sub-range 1
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 3kHz, VBW: 9kHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



PSD / Mid Channel - 06/10/2020 12:15 - 4379

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4395 GHz - 2.4445 GHz (Analyser mode) 8000 Points
Settings: RBW: 3kHz, VBW: 9kHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



PSD / Mid Channel - 06/10/2020 12:15 - 4379

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4395GHz-2.4445GHz	3kHz	9kHz	Peak
Horizontal	2.4395GHz-2.4445GHz	3kHz	9kHz	Peak
Configuration:				
Comments:				

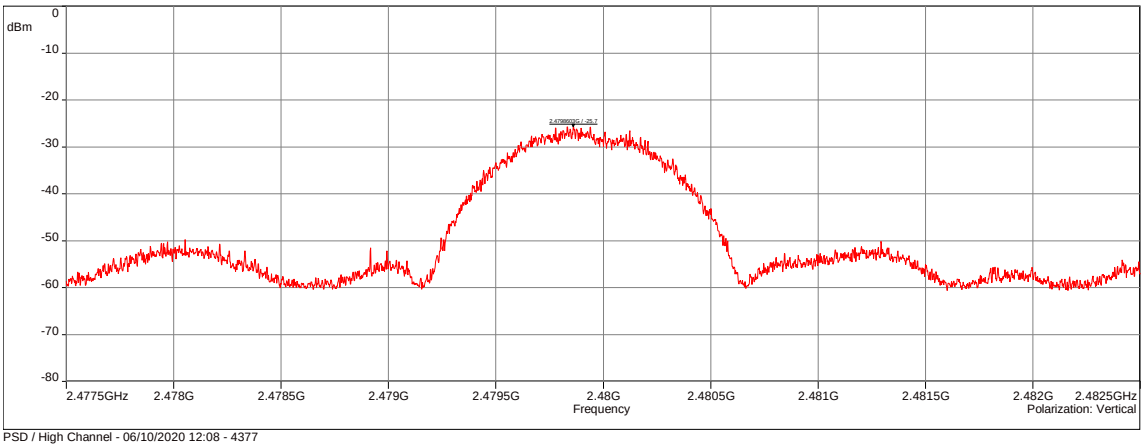
EUT modification(s): N/A

POWER SPECTRAL DENSITY - TABULATED RESULTS			
MID CHANNEL / ALL POSITIONS			EMI4379
Frequency (MHz)	**Polarization**	**Level (dBm/3kHz)**	**Limit (dBm)**
2442.000	Vertical	-25.3	8.00
2442.000	Horizontal	-24.1	8.00

POWER SPECTRAL DENSITY - GRAPH			
HIGH CHANNEL / ALL POSITIONS		EMI4377	
EUT mode:	Continuous modulated Tx	**T (°C):**	23.4
Test Date:	10/06/2020	**H (%):**	41.3
Test Operator:	OAT	**P (hPa):**	1008

Meas.Peak (Vertical)

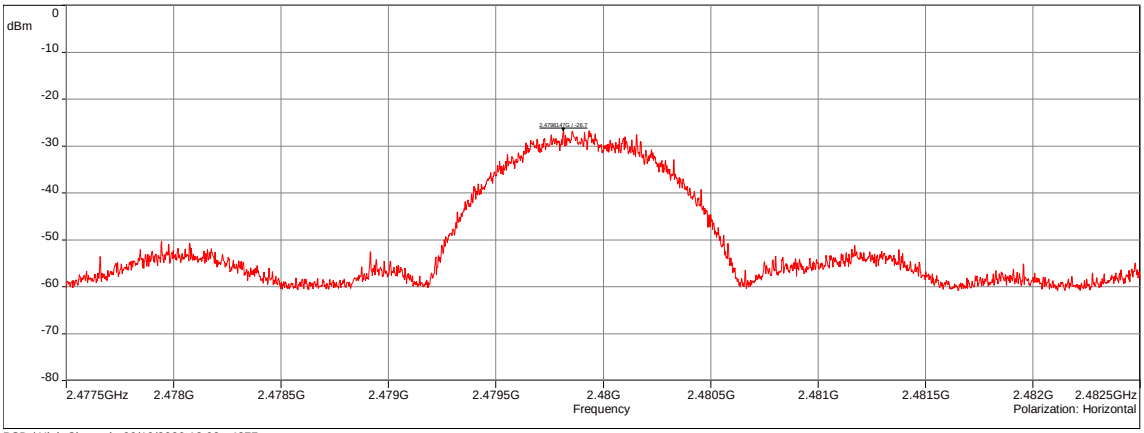
Sub-range 1
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 3kHz, VBW: 9kHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Vertical
Distance: 3 m



PSD / High Channel - 06/10/2020 12:08 - 4377

Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 2.4775 GHz - 2.4825 GHz (Analyser mode) 8000 Points
Settings: RBW: 3kHz, VBW: 9kHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization: Horizontal
Distance: 3 m



PSD / High Channel - 06/10/2020 12:08 - 4377

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	2.4775GHz-2.4825GHz	3kHz	9kHz	Peak
Horizontal	2.4775GHz-2.4825GHz	3kHz	9kHz	Peak
Configuration:				
Comments:				

EUT modification(s): N/A

POWER SPECTRAL DENSITY - TABULATED RESULTS			
HIGH CHANNEL / ALL POSITIONS			EMI4377
Frequency (MHz)	**Polarization**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2480.000	Vertical	-25.7	8.00
2480.000	Horizontal	-26.7	8.00

8.9. Frequency error

Reference standard:	FCC part 15 Radio part 15.215 c)
Test method:	FCC part 15 Radio part 15.215 c) and RSS Gen
Test description: The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. EUT is set inside the climatic enclosure. EUT is connected to the measuring receiver via 50Ω attenuator(s).	

TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Low channel / 25°C	Continous unmodulated TX	2400MHz <F< 2483.5MHz	EMI4328	**PASS**
Mid channel / 25°C		2400MHz <F< 2483.5MHz	EMI4393	**PASS**
High channel / 25°C		2400MHz <F< 2483.5MHz	EMI4394	**PASS**
Low channel / 45°C		2400MHz <F< 2483.5MHz	EMI4395	**PASS**
Mid channel / 45°C		2400MHz <F< 2483.5MHz	EMI4396	**PASS**
High channel / 45°C		2400MHz <F< 2483.5MHz	EMI4397	**PASS**
Low channel / 0°C		2400MHz <F< 2483.5MHz	EMI4398	**PASS**
Mid channel / 0°C		2400MHz <F< 2483.5MHz	EMI4399	**PASS**
High channel / 0°C		2400MHz <F< 2483.5MHz	EMI4400	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.9 °C
Relative Humidity	20 to 75 %	39.5 %
Atmospheric pressure	N/A	1006 hPa
Test method deviation: N/A		
Supplementary information:.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2021
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2022
Cable	N	3m	16414	04/05/2019	04/07/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Spectrum analyzer	Agilent Technologies	E4440A	5824	24/04/2018	24/06/2020
Thermo-Hygro-	LUFFT	OPUS 20	14563	05/02/2020	05/04/2021

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Barometer					
Thermohygrometer	Testo	608-H2	12268	08/05/2020	08/07/2022
Thermometer contactless	GHM Greisinger	GMH 3710	12968	13/02/2019	13/10/2020

Blank cells = Permanent validity

TEST SETUP PHOTO(S)

FREQUENCY ERROR - TABULATED RESULTS			
TEST CASE	FREQUENCY (MHZ)	LIMIT	RESULT TAB.
Low channel / 25°C	2401.918961	2400MHz <F< 2483.5MHz	EMI4328
Mid channel / 25°C	2441.918021	2400MHz <F< 2483.5MHz	EMI4393
High channel / 25°C	2479.916961	2400MHz <F< 2483.5MHz	EMI4394
Low channel / 45°C	2401.916860	2400MHz <F< 2483.5MHz	EMI4395
Mid channel / 45°C	2441.916012	2400MHz <F< 2483.5MHz	EMI4396
High channel / 45°C	2479.916211	2400MHz <F< 2483.5MHz	EMI4397
Low channel / 0°C	2401.931150	2400MHz <F< 2483.5MHz	EMI4398
Mid channel / 0°C	2441.930120	2400MHz <F< 2483.5MHz	EMI4399
High channel / 0°C	2479.928909	2400MHz <F< 2483.5MHz	EMI4400

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	08/06/2020	-

End of test report