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

RADIO TEST REPORT

FCC 47 CFR PART 15.247

Company ..... :	**UWINLOC**
Address..... :	CAMPUS MILLENNIALS IMPASSE LOUIS PUEYO BAT2 - RDC 31700 BLAGNAC FRANCE
Test item description. ..... :	**BEACON V2**
Trade Mark. ..... :	UBEACON
Manufacturer. ..... :	UWINLOC
Type reference. ..... :	6115
Model. ..... :	UBEA-V2.1-4GHz-US
FCC ID. ..... :	2APEGBEACON
Ratings..... :	100-240Vac/50-60Hz
Testing Laboratory ..... :	**EMITECH MONTPELLIER laboratory**
Address..... :	145 rue de Massacan BP80025 34741 VENDARGUES Cedex FRANCE
Report Reference No. ..... :	**R410-18-101238-1A**
Test procedure. ..... :	FCC Certification
Diffusion. ..... :	Mr CHAN
Applicant's name. ..... :	UWINLOC
Date of issue. ..... :	06/08/2018
Total number of pages..... :	75
Revision. ..... :	0
Modified page(s). ..... :	Creation
Compiled by. ..... :	Fabien MOINACHE
Approved by (+ signature). ..... :	David MONTAULON (Technical Manager)

REPORT INDEX:

1. GENERAL INFORMATIONS

This document submits the results of Electromagnetic Compatibility tests performed on the equipment **BEACON V2 (UBEA-V2.1-4GHz-US)** (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 Laboratory	EMITECH MONTPELLIER laboratory
Address	145 rue de Massacan BP80025 34741 VENDARGUES Cedex FRANCE
Test procedure	FCC Certification
Tested by	Fabien MOINACHE and Morgan PATEY
Test supervisor	None
Date of receipt of test item	N/A
Date (s) of performance of tests	March from 20th to 23th of 2018 and June 28th of 2018
APPLICANT'S GENERAL INFORMATIONS:	
Company name	UWINLOC
Company address	CAMPUS MILLENNIALS IMPASSE LOUIS PUEYO BAT2 - RDC 31700 BLAGNAC FRANCE
Person(s) present during the tests	Mr SAUMAGNE
Responsible	Mr CHAN

GENERAL REMARKS:

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.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(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)
Test object was not subjected to all tests	I (Inconclusive)

DEFINITIONS AND ABBREVIATIONS:

E.U.T.	Equipement under test	AE	Ancillary equipment
RBW	Resolution bandwidth	VBW	Video bandwidth
OATS	Open area test site	FAR	Full anechoic room
RF	Radio frequency	NTR	Nothing to report

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:
The following referenced documents are necessary for the application of the present test report. **FCC 47 CFR PART 15: 2017** Code of federal regulations – Title 47 telecommunication Part 15- Radio frequency devices **FCC part 15.247** Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850MHz. (frequency hopping and digitally modulated) **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
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

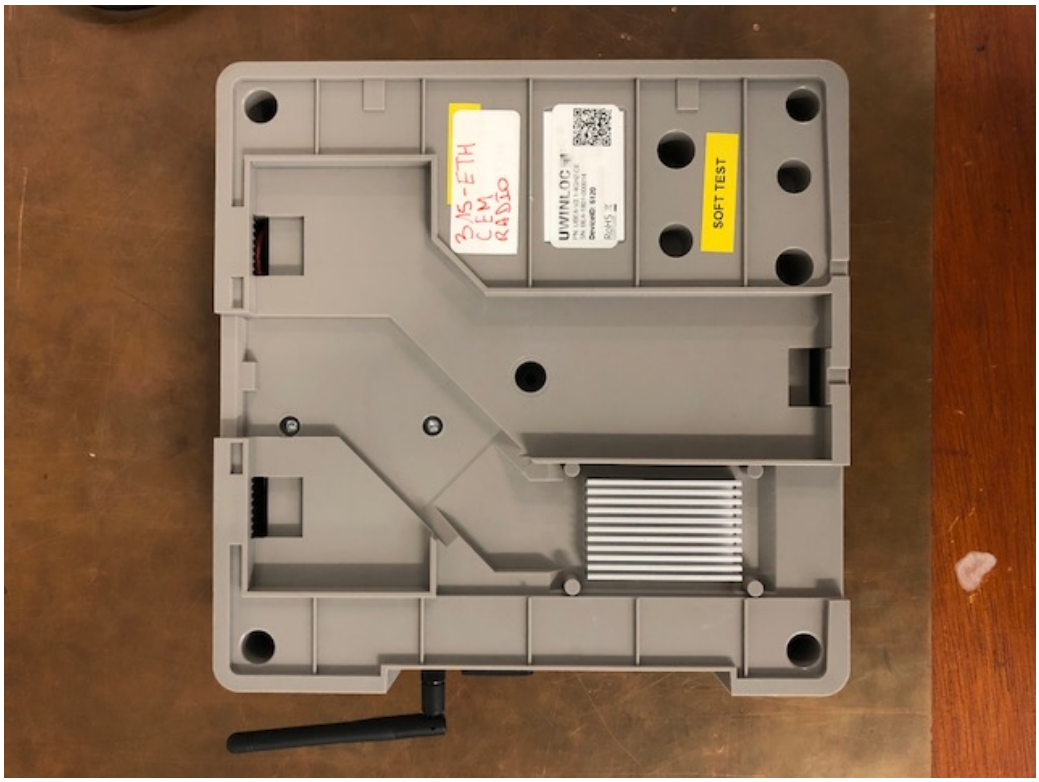
Test item description.	:	BEACON V2
Model/Type reference.	:	6115
Trade Mark.	:	UBEACON
Model.	:	UBEA-V2.1-4GHz-US
FCC ID.	:	2APEGBEACON
Serial number (S/N).	:	BEA-1801-000002
Part number (P/N).	:	UBEA-V2.1-4Ghz-US
Software version.	:	beacon-V2.3-MS1
Firmware version.	:	315
Type of sample.	:	Pre-serial
Function(s).	:	The Uwinloc system consists of Tags and Beacons. Tags are tele-powered and store energy, as soon as they have enough energy, they emit a UWB signal, received by the Beacons, decrypted and transmitted to the server wi-fi or ethernet.
Manufacturer name.	:	UWINLOC

General product information:

N/A

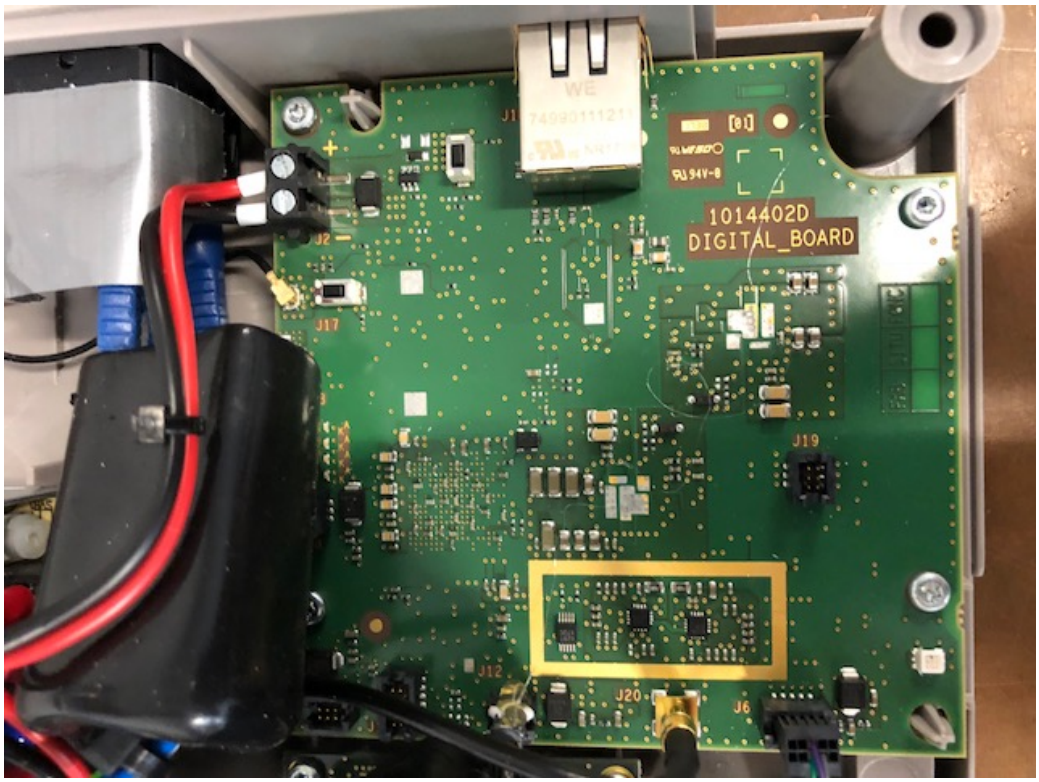
3.2. EUT external view (top)

3.3. EUT external view (bottom)

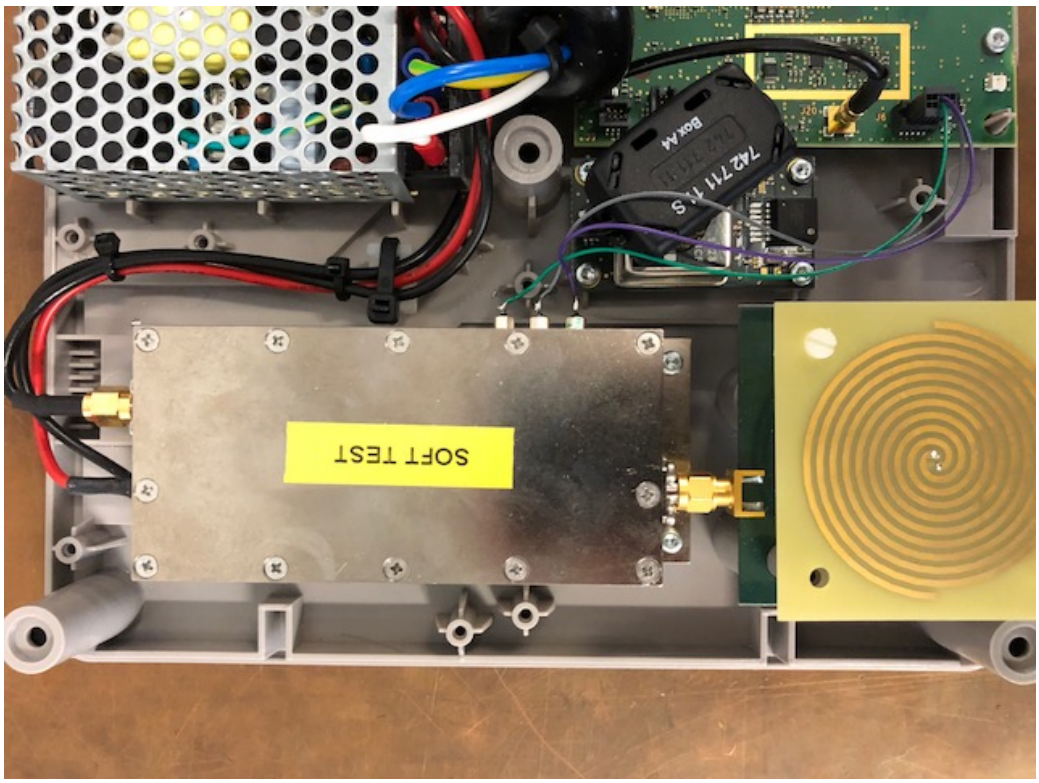


3.4. EUT internal view

3.5. EUT electronic board

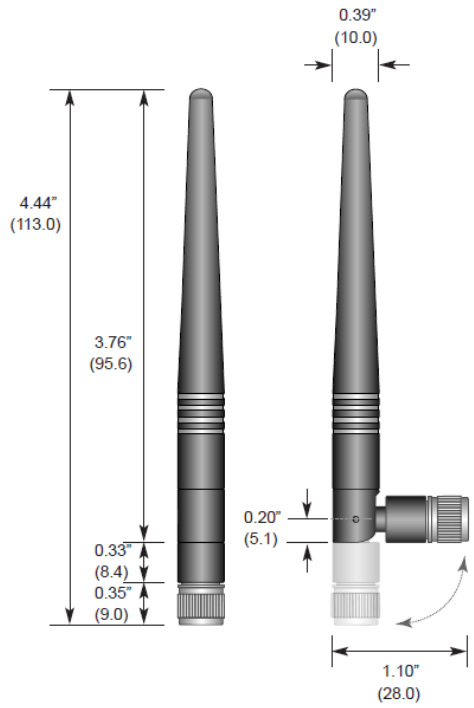


3.6. EUT internal view (UWB part)



3.7. EUT Wi-Fi antenna

Product Dimensions



Description

The RCT 1/2-wave 2.4GHz antenna delivers outstanding performance and orientation flexibility in a compact physical package. The antenna's innovative articulating base allows it to tilt and swivel for optimum orientation. The RCT mounts quickly via an SMA or FCC Part 15 compliant RP-SMA connector.

Features

- Tilts and rotates
- Very low VSWR
- Excellent performance
- Omni-directional pattern
- Fully weatherized
- Rugged and damage-resistant
- RP-SMA or SMA connector

Electrical Specifications

Center Freq.	2.45GHz
Bandwidth	120MHz
Wavelength	1/2-wave
VSWR	<1.9 typ. at center
Impedance	50 ohms
Gain	2.20dBi
Connector	RP-SMA or SMA

Electrical specifications and plots measured on 4.00" x 4.00" reference ground plane

Ordering Information

- ANT-2.4-CW-RCT-RP (with RP-SMA connector)
- ANT-2.4-CW-RCT-SS (with SMA connector)

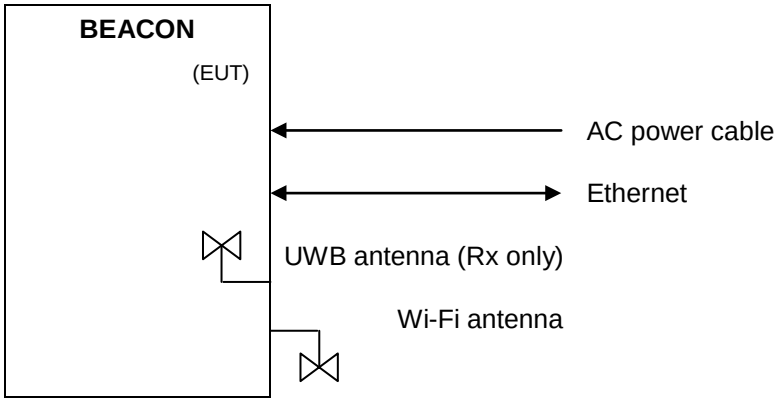
3.8. EUT Mechanical and Electrical Design

Power supply. ..... : 100-240Vac/50-60Hz
Power supply range. ..... : 100-240Vac/50-60Hz
Power type. ..... : Single phase with earth
Power (W). ..... : 15
Nominal current (A). ..... : 2.5
Dimensions (L x W x H) (m). ..... : 227*227*64 mm
Weight (kg). ..... : 1.3
Temperature range (°C). ..... : Not communicated
Ground bounding strap. ..... : No

Comments:

N/A

3.9. EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	
1	AC power supply	AC	<2m	2P+T	
2	Ethernet	TP	>3m	Shielded	
3	UWB antenna	RF		Integral	
4	Wi-Fi antenna	RF		External	Provided and glued with the equipment

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

3.10. EUT EMC & Radio Specifications

Electromagnetic environment. ..... : Light Industry
Professionnal use ? ..... : YES
Typical mounting ..... : Table/Wall equipment

Comments:

N/A

a) EUT OPERATION MODES:

MODE #	DESCRIPTION
1	Tx permanent modulated mode (WiFi emission)
2	Ethernet link (Data transfert)
3	N/A
4	N/A
5	N/A

b) GENERAL INFORMATIONS

According to manufacturer's declarations :

EUT type..... : Transmitter
Technology ..... : Wi-FI (Tx/Rxmode), UWB (Rxmode) & Ethernet
Environmental profile..... : Data transmission
Temperature range..... : Not communicated
Antenna type ..... : Integral for UWB Rx and External for WI-Fi Tx/Rx mode
Antenna Gain..... : 2.2 dBi (Wi-Fi)

Comments:

In order to avoid Wi-Fi user replacement, Wi-Fi antenna is glued on the device

c) TRANSMITTER PARAMITTERS (TX)

Frequency bands. ..... : 2400-2483.5MHz
RF Power..... : Max standard: 1W (see report for EUT value)
Number of channels / Separation..... : 11
Modulation type ..... : b), g) and n) (Digital modulation)
Duty cycle ..... : Not communicated / see test report for additional information
Tested frequency..... : 2412 MHz (Low channel)
2437 MHz (Mid channel)
2462 MHz (High channel)

d) RECEIVER PARAMETERS (RX)

Frequency bands. ..... : 2400-2483.5MHz (Wi-Fi) and 4.1GHz (UWB)
Category/Class ..... : N/A
Bandwidth..... : N/A

4. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
SUBPART A - GENERAL			
Labeling requirements		**PASS**	**15.19 / See certification documents**
Information to user		**PASS**	**15.21 / See certification documents**
Home-built devices		**N/A**	**15.23**
Kits		**N/A**	**15.25**
Special Accessories		**PASS**	**15.27 / See certification documents**
Inspection by the Commission		**N/A**	**15.29**
Measurement standards		**PASS**	**15.31**
Test procedure for CPU boards and computer power supplies		**N/A**	**15.32**
Frequency range of radiated measurements		**PASS**	**15.33**
Measurement detector functions and bandwidths		**PASS**	**15.35**
Transition provisions for compliance with the rules		**PASS**	**15.37 / See certification documents**
SUBPART B – UNINTENTIONAL RADIATORS			
Equipment authorization			**15.101**
- Verification		N/A	
- Declaration of Conformity		N/A	
CPU boards and power supplies used in personal computers		**N/A**	**15.102**
Exempted device		**N/A**	**15.103**
Information to the user		**PASS**	**15.105 / See certification documents**
Conducted limits	**Class B**	**PASS**	**15.107**
Radiated emission limits	**Class A**	**PASS**	**15.109**
Antenna power conduction limits for receivers		**N/A**	**15.111**
Power line carrier systems		**N/A**	**15.113**
TV interface devices, including cable system terminal devices		**N/A**	**15.115**
TV broadcast receivers		**N/A**	**15.117**
Cable ready consumer electronics equipment		**N/A**	**15.118**
Program blocking technology requirements for TV receivers		**N/A**	**15.120**
Scanning receivers and frequency converters used with scanning receivers		**N/A**	**15.121**
Labeling of digital cable ready products		**N/A**	**15.123**
SUBPART C –INTENTIONAL RADIATORS			

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
Equipment authorization requirement		**PASS**	**15.201 / Transmitter part is subject to Certification procedure**
Certified operating frequency range		**N/A**	**15.202**
Antenna requirement		**PASS**	**15.203 / Dedicated and glued antenna**
External radio frequency power amplifiers and antenna modifications		**N/A**	**15.204**
Restricted bands of operation		**PASS**	**15.204**
Conducted limits	**Class B**	**PASS**	**15.207**
Radiated emission limits; general requirements	**Class B**	**PASS**	**15.209**
Tunnel radio systems		**N/A**	**15.211**
Modular transmitters		**N/A**	**15.212**
Cable locating equipment		**N/A**	**15.213**
Cordless telephones		**N/A**	**15.214**
Additional provisions to the general radiated emission limits		**PASS**	**15.215**
Operation within the band 902-928MHz, 2400-2483.5MHz and 5725-5850MHz			**15.247**
- **Frequency hopping and digitally modulated**		**-**	**a)**
- Frequency hopping system		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)
- **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 with the requirements of the reference document(s) listed in §2 of this test report and, where applicable, with deviation(s) specified in this document.

To declare, or not, the compliance with the specifications, it was not explicitly taken account of uncertainty associated with the results.

Opinion(s) and interpretation(s): N/A

5. RF EXPOSURE

Conducted measurement = 18dBm
Maximum antenna gain = 2.2dBi
Maximum EIRP with antenna gain of 2.2dBi = 104.7 mW (eirp) at 2462MHz

In accordance with KDB 447498 D01 General RF Exposure Guidance v06:
PSD= EIRP/(4*π*R2)=104.7/(4*π*(20 cm)²)= 0.020 mW/cm²
Limit= 1 mW/cm²

6. 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	± 1.2 %	± 5 %
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	± 2.7 dB	± 6 dB
Supply voltages	± 3 %	± 3 %
Temperature	± 1 °C	± 1°C
Humidity	± 5 %	± 5 %
Time / Duty cycle	± 4.4 %	± 5 %
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	± 2.7 dB	/
30MHz – 1GHz	± 5.2 dB	/
1GHz – 18GHz	± 5.3 dB	/
18GHz – 26GHz	± 5.5 dB	/
26GHz – 40GHz	± 5.5 dB	/

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

7. TEST CONDITIONS AND RESULTS

7.1. Conducted voltage emission (measurement)

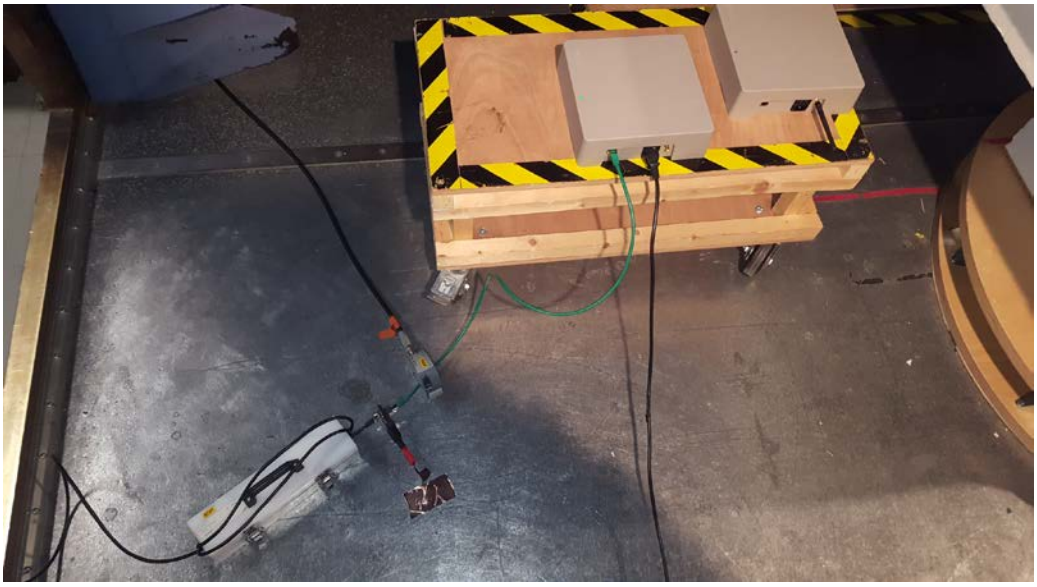
Reference standard:	CFR 47 FCC part 15 (2017) 15.107, 15.207
Test method:	ANSI C63.4: 2004
General test setup: EUT is set on an insulating support at 40cm above the ground reference plane. All power was connected to the system through Artificial Mains Network (AMN). The AMN is placed at 80cm from the boundary of the EUT and bonded to a ground reference plane.	

TESTED CABLE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Power supply 110Vac/60Hz / WiFi	150kHz-30MHz	Class B	EMI5792	**PASS**
Power supply 110Vac/60Hz / Ethernet	150kHz-30MHz	Class B	EMI5840	**PASS**

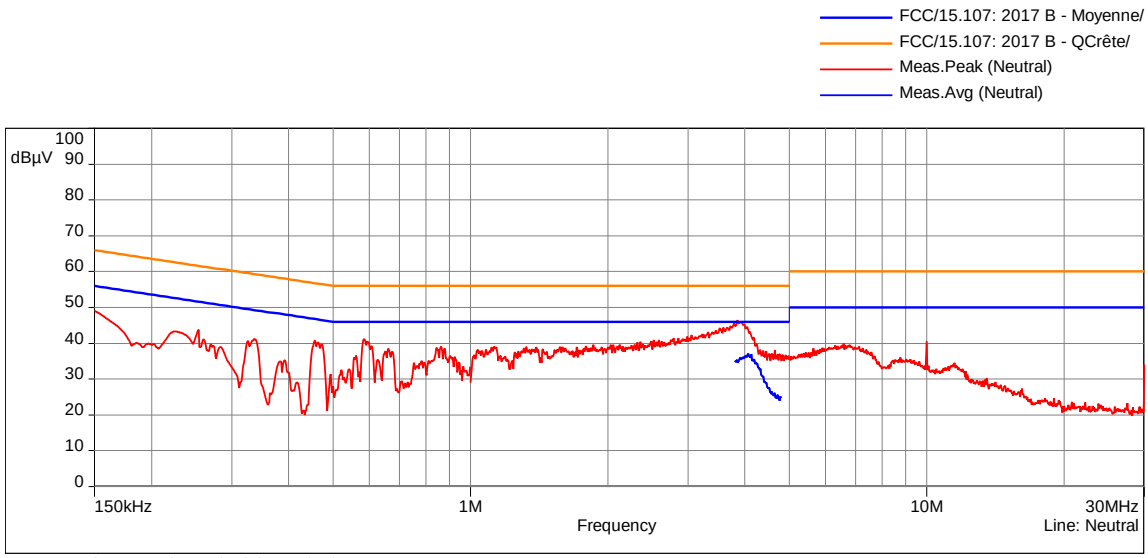
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	30 to 60 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
AC power source	KIKUSUI	PCR4000L	3074	17/03/2017	17/05/2018
Cable	EMITECH	Current absorber sheath	9491	12/02/2018	12/04/2020
Cable	C&C	N-3m	14333	15/12/2016	15/02/2019
Cable	MICRO-COAX	N-5m	10530	12/10/2017	12/12/2019
LISN	PMM	L2-16	1209	08/02/2018	08/04/2020
PE choke	EMITECH	CISPR 16-2-1 : 2008	10081		
PE choke	Emitech	CISPR 16-2-1 : 2008	11042		
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Software	Nexio	BAT EMC v3.17.0.22	0000		
Surges Suppressor	Hewlett Packard	11947A	0238	11/09/2017	11/11/2019
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

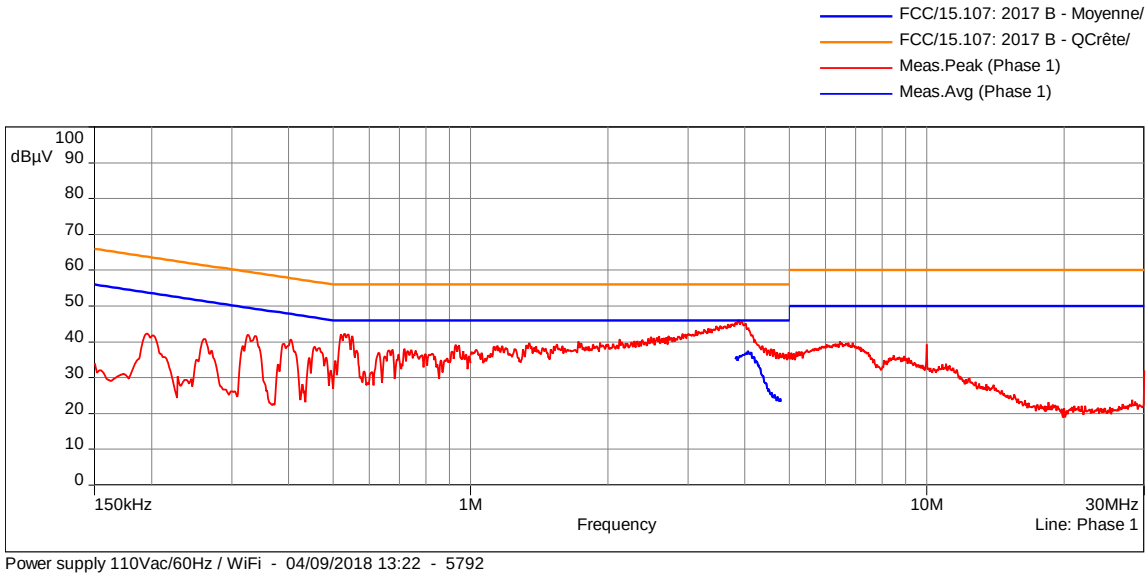
Blank cells = Permanent validity

TEST SETUP PHOTO(S) - POWER SUPPLY 110VAC/60HZ / WIFI


CONDUCTED VOLTAGE EMISSION (MEASUREMENT) - GRAPH			
POWER SUPPLY 110VAC/60HZ / WI-FI		EMI5792	
EUT mode:	# 1	**T (°C):**	20.1
Test Date:	23/03/2018 09:12:19	**H (%):**	23.5
Test Operator:	FMO	**P (hPa):**	1011



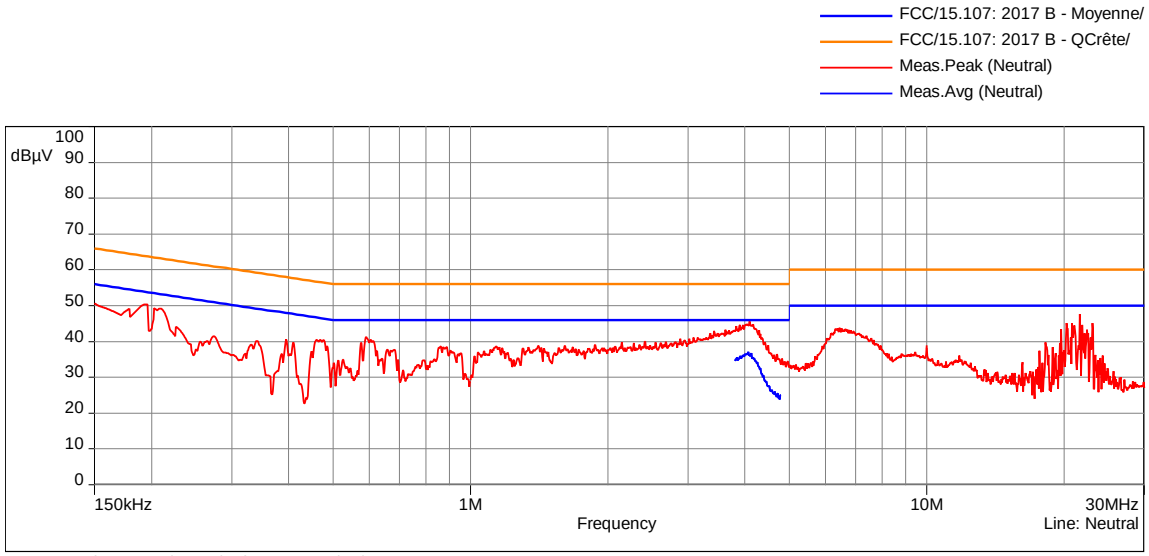
Power supply 110Vac/60Hz / WiFi - 04/09/2018 13:22 - 5792



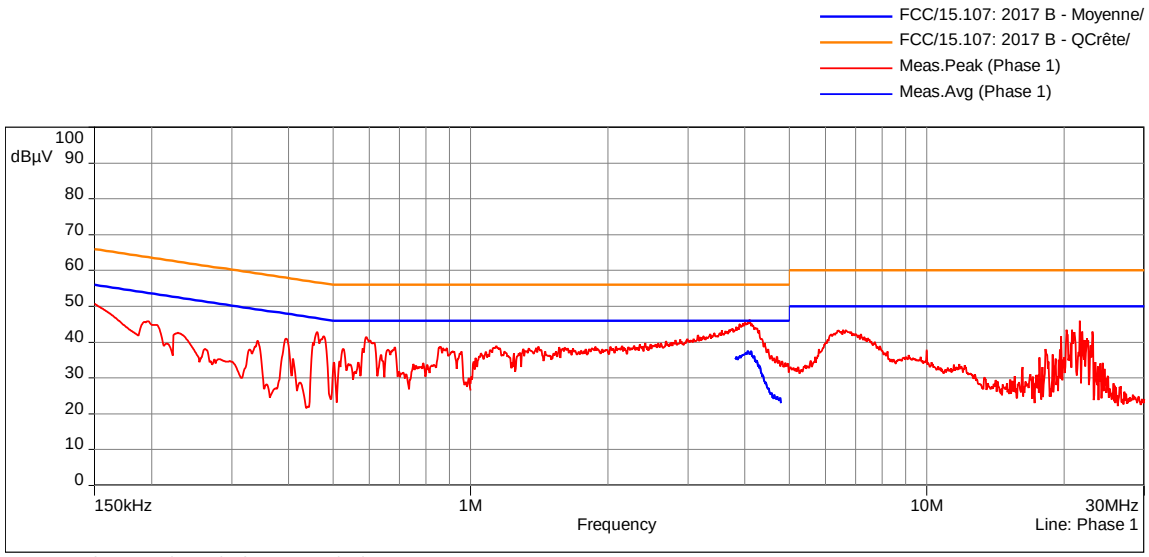
Power supply 110Vac/60Hz / WiFi - 04/09/2018 13:22 - 5792

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	3.8MHz-4.8MHz	10kHz	30kHz	Mes.Avg;
Phase 1	3.8MHz-4.8MHz	10kHz	30kHz	Mes.Avg;
Measure with:	L.I.S.N.			
Comments:	N/A			

CONDUCTED VOLTAGE EMISSION (MEASUREMENT) - GRAPH			
POWER SUPPLY 110VAC/60HZ / ETHERNET		EMI5840	
EUT mode:	# 2	**T (°C):**	20.1
Test Date:	23/03/2018 08:56:09	**H (%):**	23.5
Test Operator:	FMO	**P (hPa):**	1011



Power supply 110Vac/60Hz / Ethernet - 03/23/2018 08:56 - 5840



Power supply 110Vac/60Hz / Ethernet - 03/23/2018 08:56 - 5840

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
Phase 1	3.8MHz-4.8MHz	10kHz	30kHz	Mes.Avg;
Neutral	3.8MHz-4.8MHz	10kHz	30kHz	Mes.Avg;
Measure with:	L.I.S.N.			
Comments:	N/A			
EUT modification(s): N/A				

7.2. 6dB bandwidth

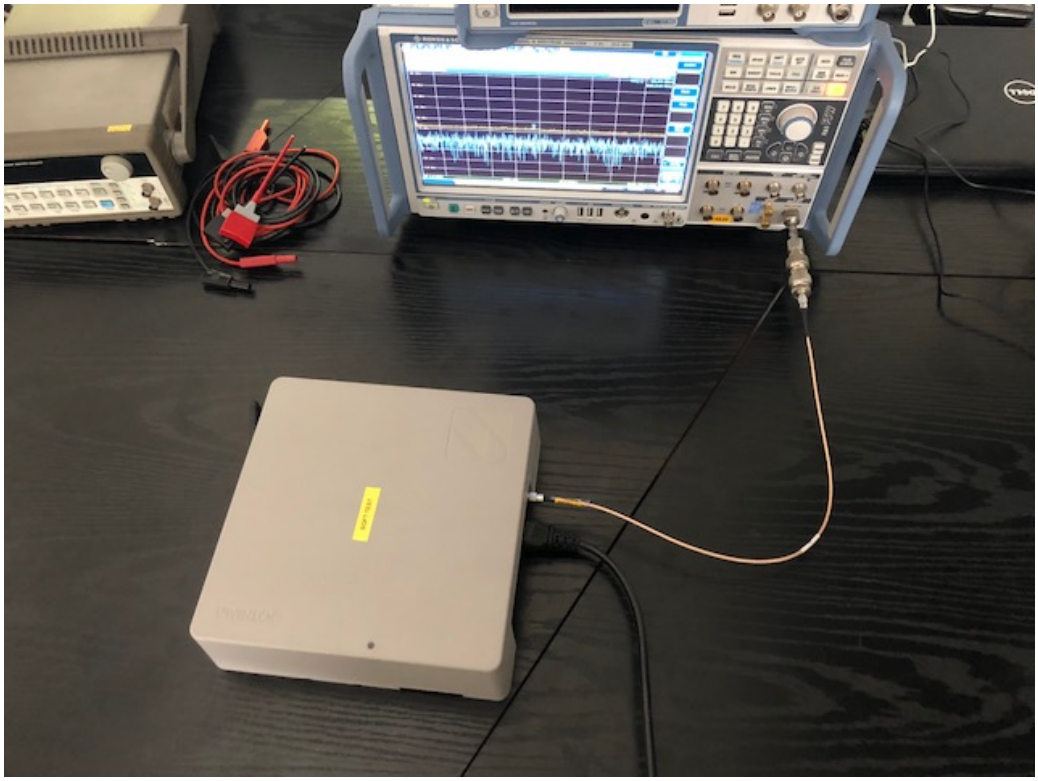
Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247
Test description: a) (2): Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. EUT is connected to the measuring receiver via 50Ω attenuator(s). Tests are done in max-hold mode in order to capture all channels.	

TESTED PARAMETER	SEVERITY	VERDICT
6dB Bandwidth Low channel / mod. b)	>500kHz	**PASS**
6dB Bandwidth Mid channel / mod. b)	>500kHz	**PASS**
6dB Bandwidth High channel / mod. b)	>500kHz	**PASS**
6dB Bandwidth Low channel / mod. g)	>500kHz	**PASS**
6dB Bandwidth Mid channel / mod. g)	>500kHz	**PASS**
6dB Bandwidth High channel / mod. g)	>500kHz	**PASS**
6dB Bandwidth Low channel / mod. n)	>500kHz	**PASS**
6dB Bandwidth Mid channel / mod. n)	>500kHz	**PASS**
6dB Bandwidth High channel / mod. n)	>500kHz	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	23.9 °C
Relative Humidity	20 to 75 %	40.8 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Attenuator	Techniwave	TWSMA-20dB-18G-SMA	14679	21/09/2017	21/11/2019
Cable	Radiall	SMA-0,5m	14889	23/02/2018	23/04/2020
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

Blank cells = Permanent validity

TEST SETUP PHOTO(S) - POWER SUPPLY 110VAC/60HZ / WIFI


6dB Bandwith - Graph	
Low channel / Mod. b)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

10:09:08 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
Low channel / Mod. b)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2412 MHz	100kHz	7.156 MHz	>500kHz

6dB Bandwith - Graph	
Mid channel / Mod. b)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

11:29:01 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
Mid channel / Mod. b)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2437 MHz	100kHz	7.154 MHz	>500kHz

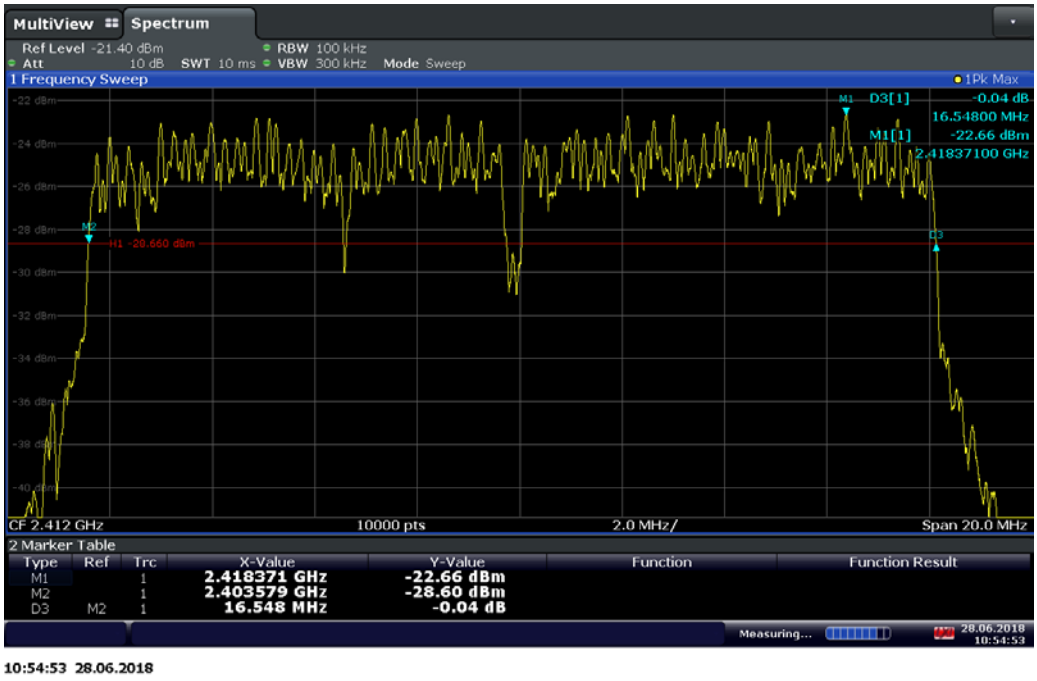
6dB Bandwith - Graph	
High channel / Mod. b)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

12:02:10 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
High channel / Mod. b)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2462 MHz	100kHz	7.156 MHz	>500kHz

6dB Bandwith - Graph	
Low channel / Mod. g)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

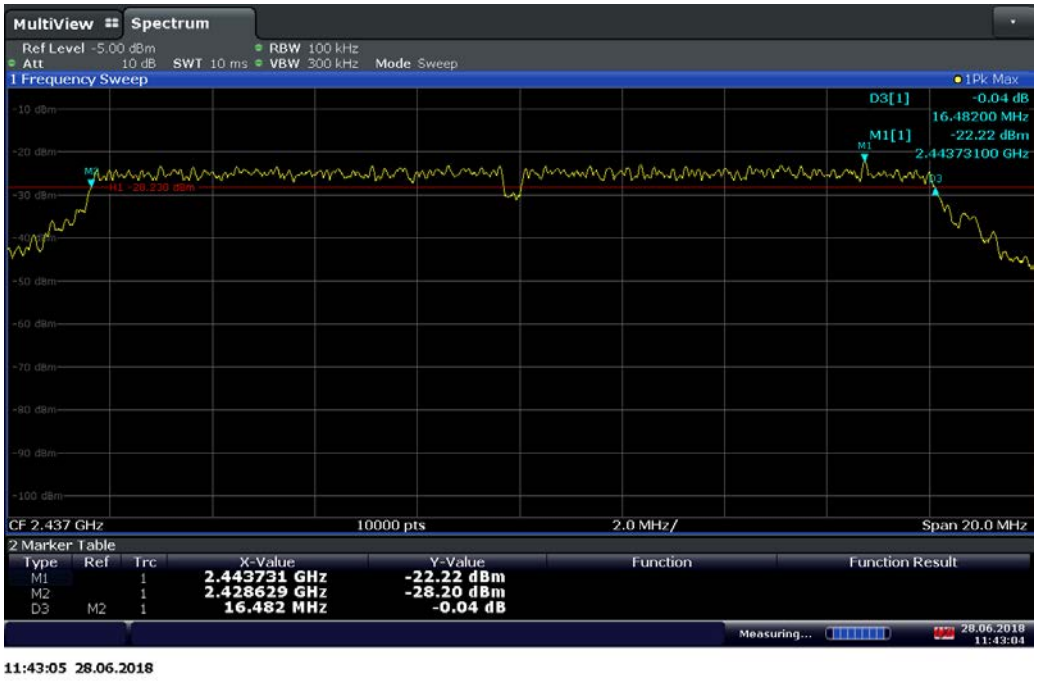


10:54:53 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
Low channel / Mod. g)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2412 MHz	100kHz	16.548 MHz	>500kHz

6dB Bandwith - Graph	
Mid channel / Mod. g)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

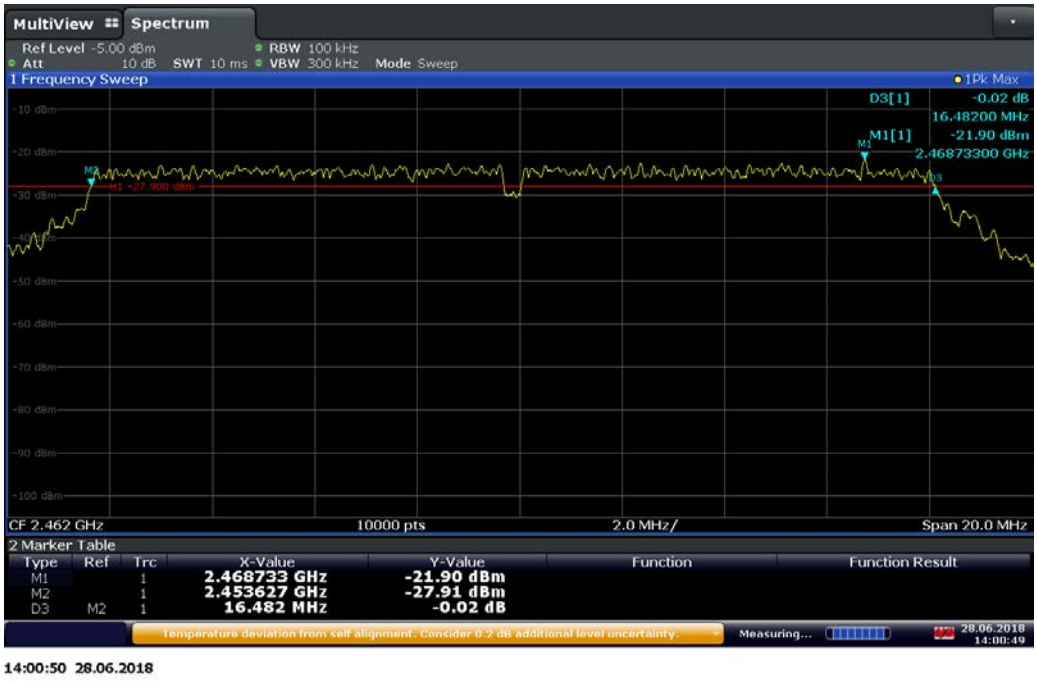


11:43:05 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
Mid channel / Mod. g)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2437 MHz	100kHz	16.482 MHz	>500kHz

6dB Bandwith - Graph	
High channel / Mod. g)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

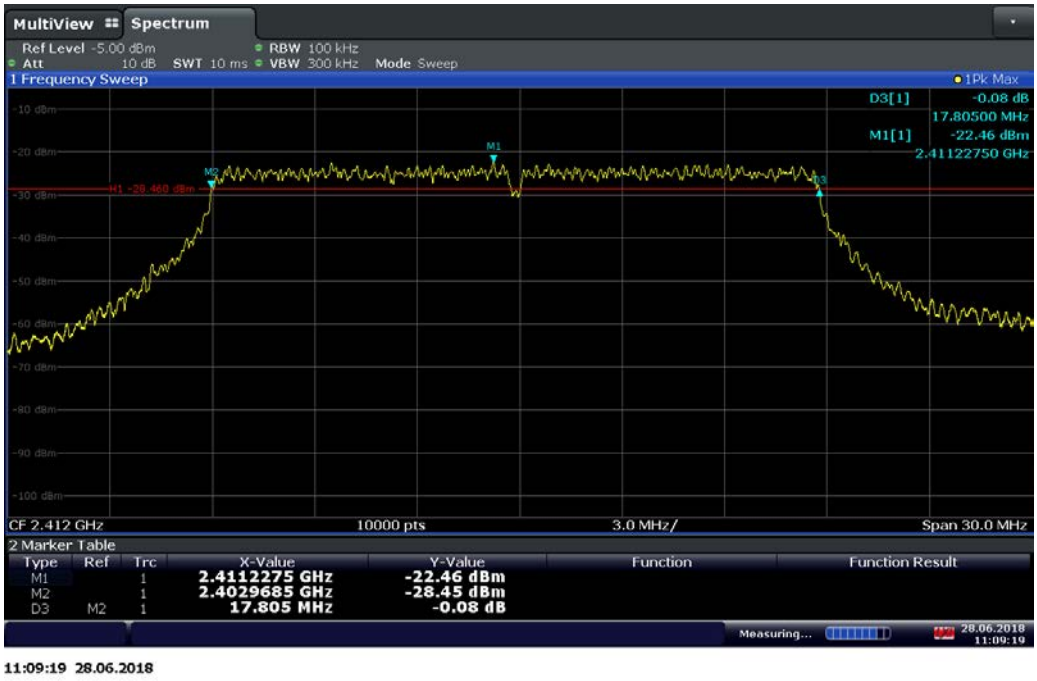


14:00:50 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
High channel / Mod. g)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2462 MHz	100kHz	16.482 MHz	>500kHz

6dB Bandwith - Graph	
Low channel / Mod. n)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

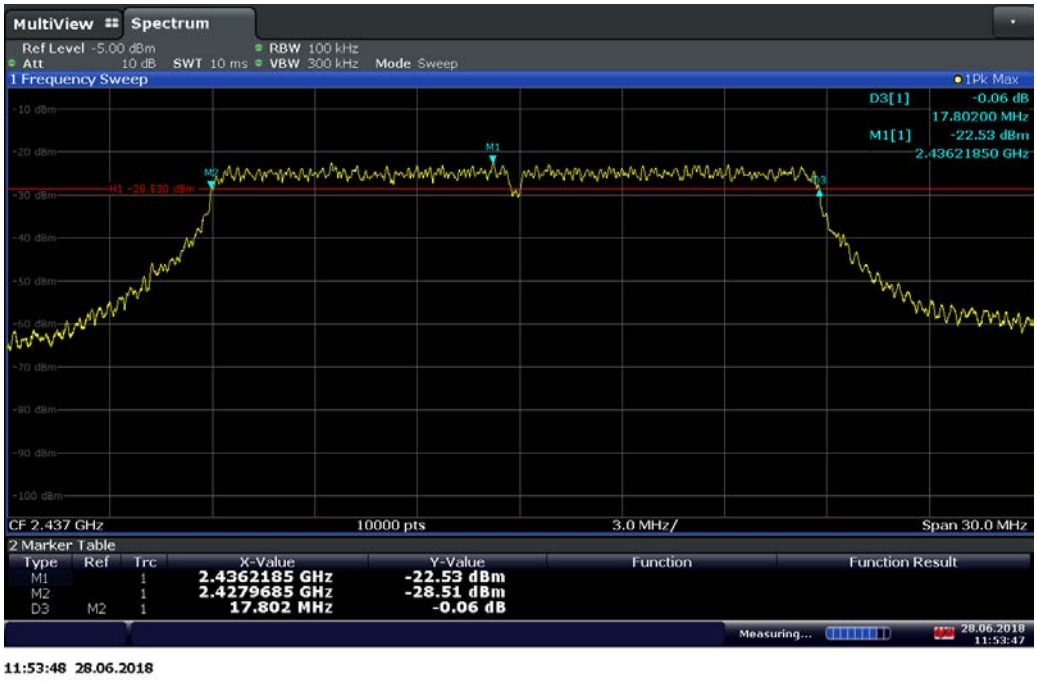


11:09:19 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
Low channel / Mod. n)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2412 MHz	100kHz	17.805 MHz	>500kHz

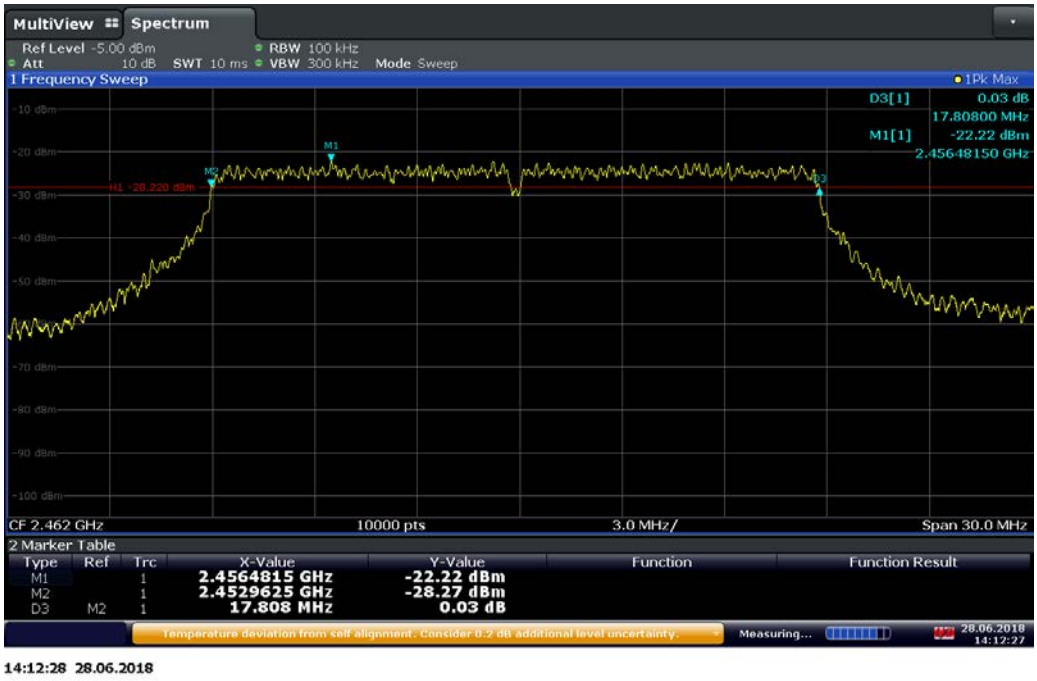
6dB Bandwith - Graph	
Mid channel / Mod. n)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA



Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
Mid channel / Mod. n)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2437 MHz	100kHz	17.802 MHz	>500kHz

6dB Bandwith - Graph	
High channel / Mod. n)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA



14:12:28 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

6dB Bandwith - Tabulated Results			
High channel / Mod. n)			
Frequency	**RBW**	**6 dB Bandwith**	**Limit**
2462 MHz	100kHz	17.808 MHz	>500kHz

7.3. Occupied Bandwidth

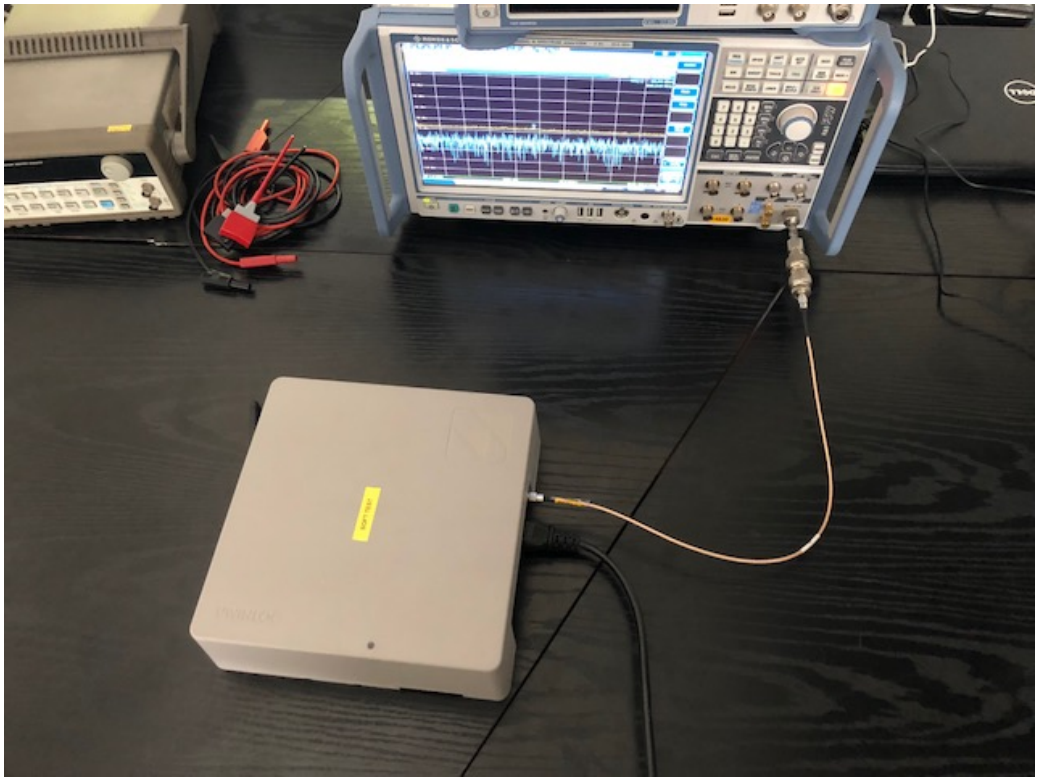
Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247
Test description: The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β, which, in cases of symmetrical spectra, splits up into 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 PARAMETER	SEVERITY	VERDICT
OBW / Low channel / mod. b)	>500kHz	**PASS**
OBW / Mid channel / mod. b)	>500kHz	**PASS**
OBW / High channel / mod. b)	>500kHz	**PASS**
OBW / Low channel / mod. g)	>500kHz	**PASS**
OBW / Mid channel / mod. g)	>500kHz	**PASS**
OBW / High channel / mod. g)	>500kHz	**PASS**
OBW / Low channel / mod. n)	>500kHz	**PASS**
OBW / Mid channel / mod. n)	>500kHz	**PASS**
OBW / High channel / mod. n)	>500kHz	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	23.9 °C
Relative Humidity	20 to 75 %	40.8 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Attenuator	Techniwave	TWSMA-20dB-18G-SMA	14679	21/09/2017	21/11/2019
Cable	Radiall	SMA-0,5m	14889	23/02/2018	23/04/2020
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

Blank cells = Permanent validity

TEST SETUP PHOTO(S) - POWER SUPPLY 110VAC/60HZ / WIFI


OCCUPIED BANDWIDTH - GRAPH	
LOW CHANNEL / MOD. B)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

10:24:53 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
LOW CHANNEL / MOD. B)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2412 MHz	300 kHz	11.414 MHz	> 500kHz

OCCUPIED BANDWIDTH - GRAPH	
MID CHANNEL / MOD. B)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

11:36:26 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
MID CHANNEL / MOD. B)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2437 MHz	300 kHz	11.400 MHz	> 500kHz

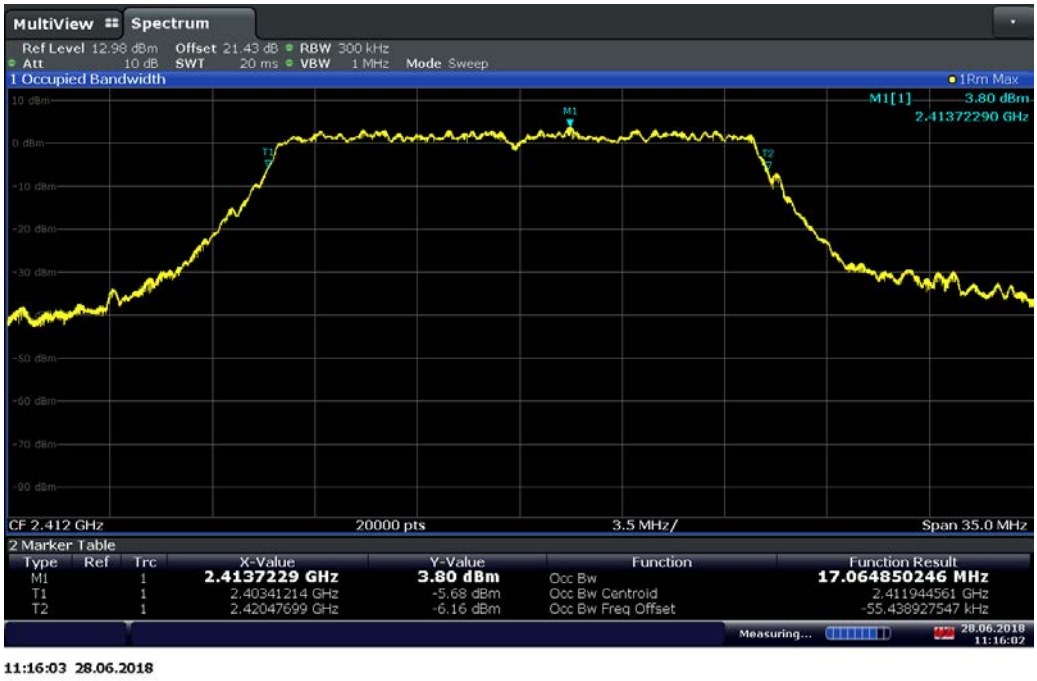
OCCUPIED BANDWIDTH - GRAPH	
HIGH CHANNEL / MOD. B)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

13:50:48 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
HIGH CHANNEL / MOD. B)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2462 MHz	300 kHz	11.436 MHz	> 500kHz

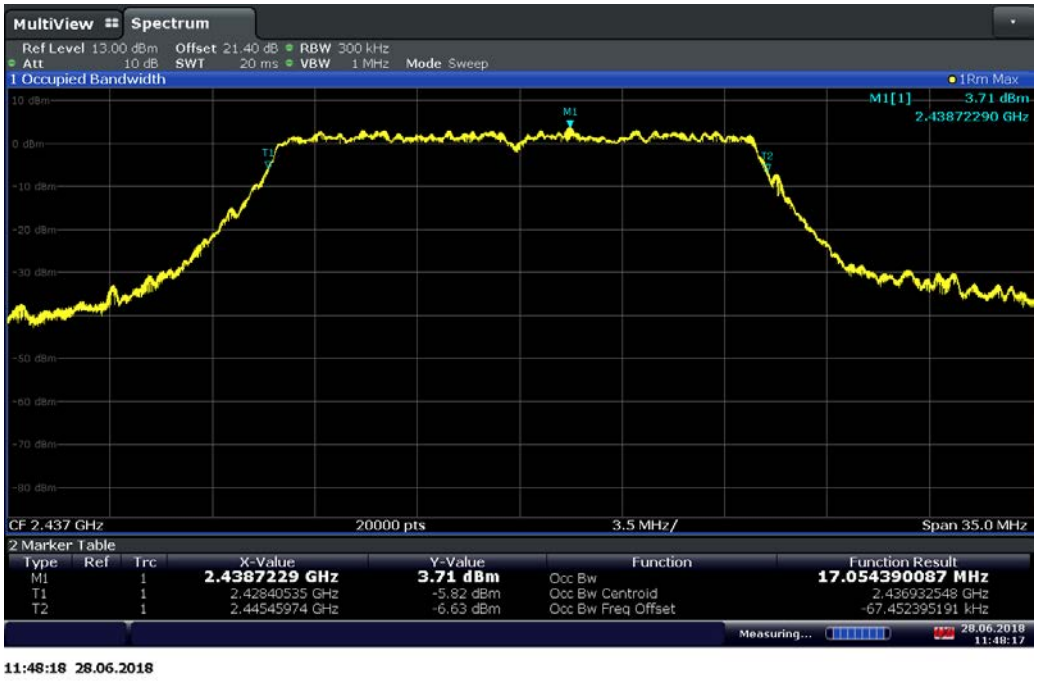
OCCUPIED BANDWIDTH - GRAPH	
LOW CHANNEL / MOD. G)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA



Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
LOW CHANNEL / MOD. G)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2412 MHz	300 kHz	17.064 MHz	> 500kHz

OCCUPIED BANDWIDTH - GRAPH	
MID CHANNEL / MOD. G)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

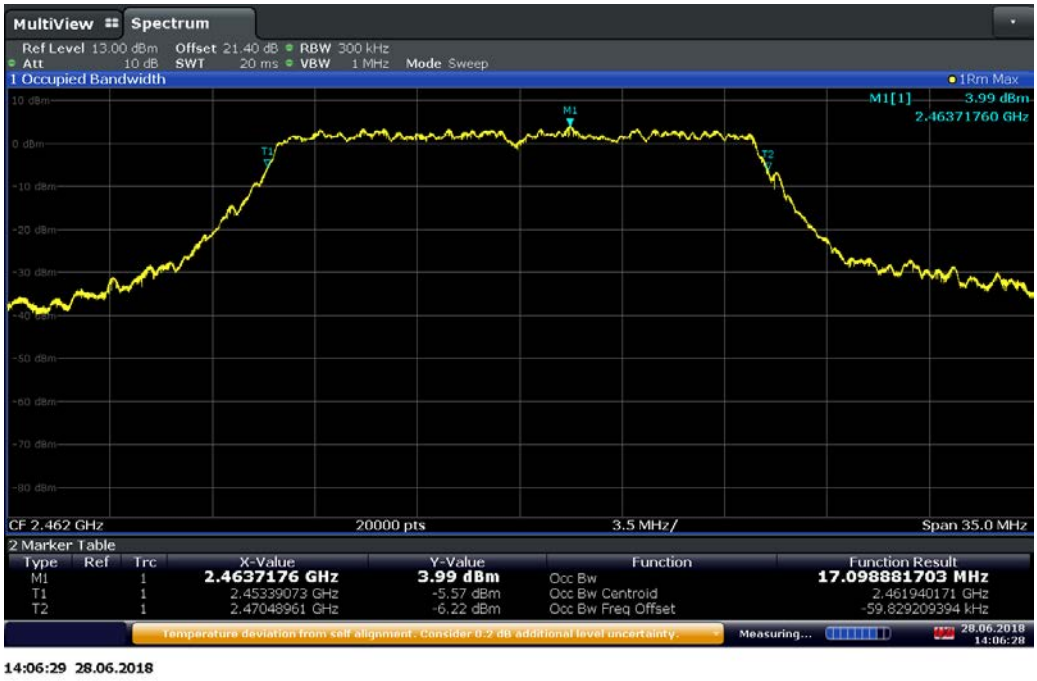


11:48:18 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
MID CHANNEL / MOD. G)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2437 MHz	300 kHz	17.054 MHz	> 500kHz

OCCUPIED BANDWIDTH - GRAPH	
HIGH CHANNEL / MOD. G)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

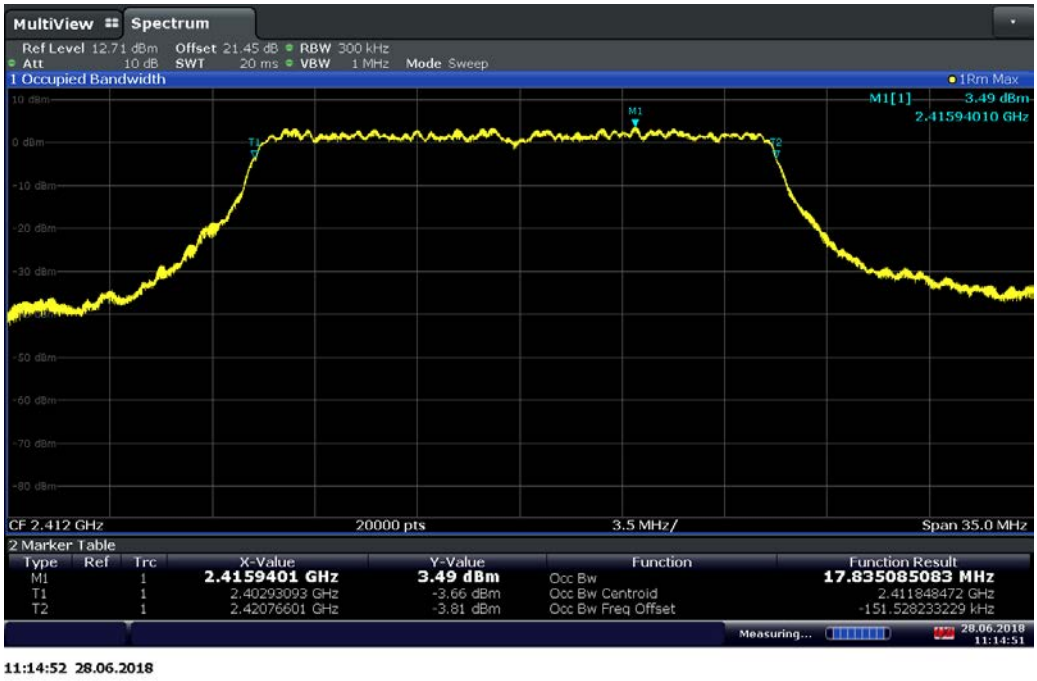


14:06:29 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
HIGH CHANNEL / MOD. G)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2462 MHz	300 kHz	17.098 MHz	> 500kHz

OCCUPIED BANDWIDTH - GRAPH	
LOW CHANNEL / MOD. N)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

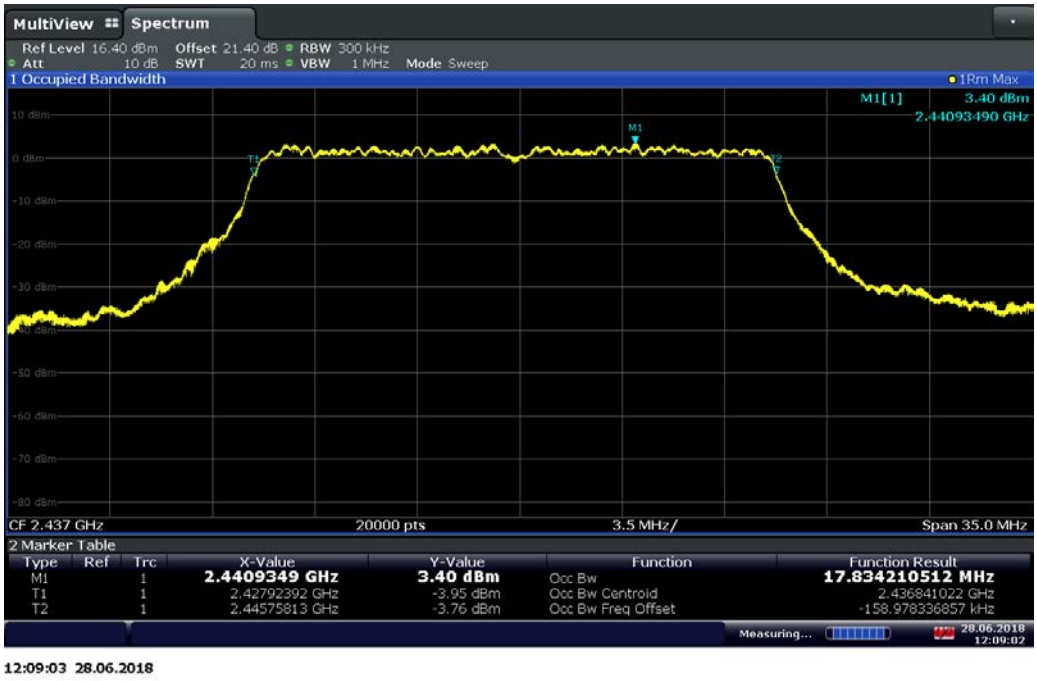


11:14:52 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
LOW CHANNEL / MOD. N)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2412 MHz	300 kHz	17.835 MHz	> 500kHz

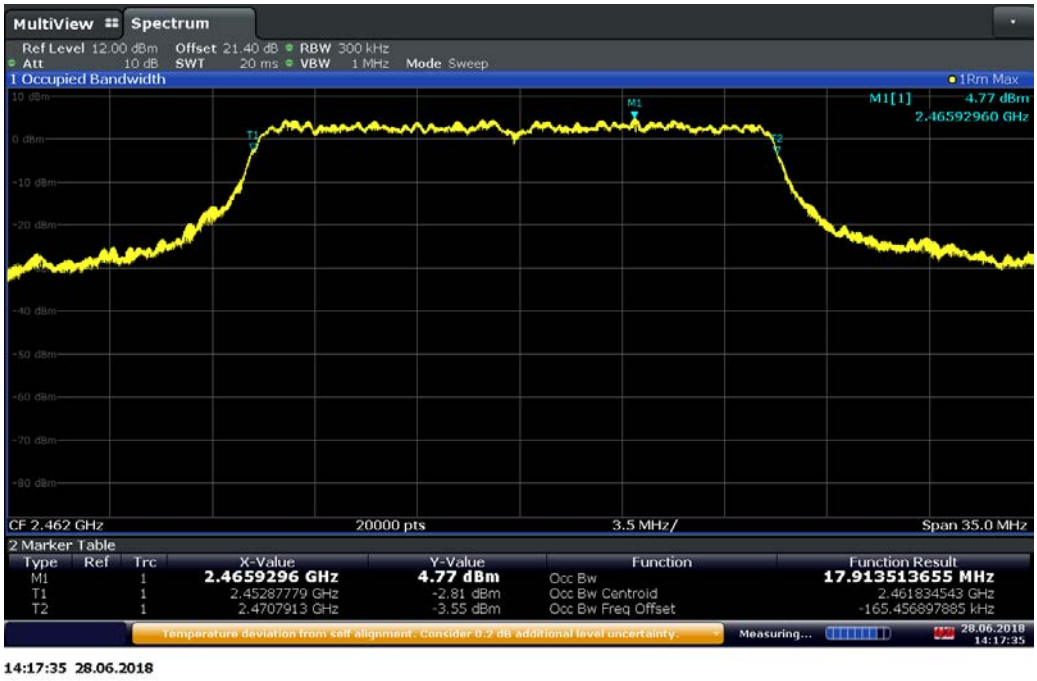
OCCUPIED BANDWIDTH - GRAPH	
MID CHANNEL / MOD. N)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA



Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
MID CHANNEL / MOD. N)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2437 MHz	300 kHz	17.834 MHz	> 500kHz

OCCUPIED BANDWIDTH - GRAPH	
HIGH CHANNEL / MOD. N)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA



14:17:35 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

OCCUPIED BANDWIDTH - TABULATED RESULTS			
HIGH CHANNEL / MOD. N)			
Frequency	**RBW**	**OBW 99%**	**Limit**
2462 MHz	300 kHz	17.913 MHz	> 500kHz

7.4. Maximum peak conducted power of the intentional radiator

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247

Test description: b) (3)

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

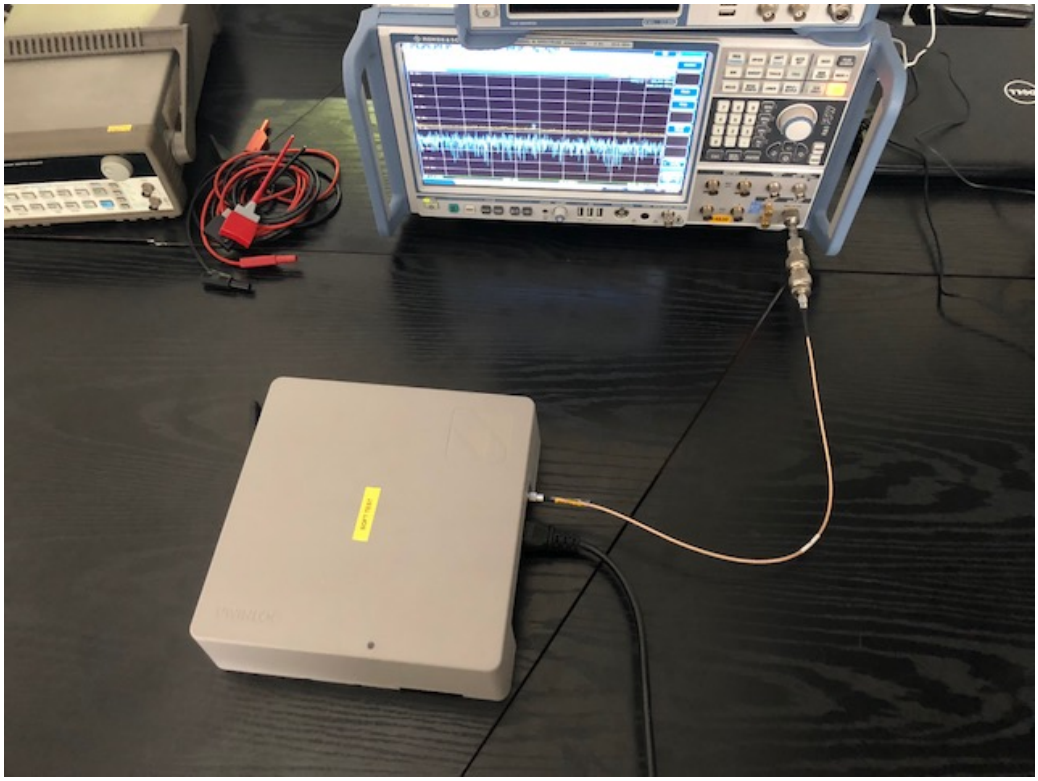
EUT is connected to the measuring receiver via 50Ω attenuator(s).Only the highest levels are recorded.

TESTED PARAMETER	SEVERITY	VERDICT
Low channel / mod. b)	≤1W	**PASS**
Mid channel / mod. b)	≤1W	**PASS**
High channel / mod. b)	≤1W	**PASS**
Low channel / mod. g)	≤1W	**PASS**
Mid channel / mod. g)	≤1W	**PASS**
High channel / mod. g)	≤1W	**PASS**
Low channel / mod. n)	≤1W	**PASS**
Mid channel / mod. n)	≤1W	**PASS**
High channel / mod. n)	≤1W	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	23.2 °C
Relative Humidity	20 to 75 %	46.6 %
Atmospheric pressure	N/A	1012 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Attenuator	Techniwave	TWSMA-20dB-18G-SMA	14679	21/09/2017	21/11/2019
Cable	Radiall	SMA-0,5m	14889	23/02/2018	23/04/2020
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

Blank cells = Permanent validity

TEST SETUP PHOTO(S) - POWER SUPPLY 110VAC/60HZ / WIFI


MAXIMUM PEAK CONDUCTED POWER - TABULATED RESULTS				
MOD. B)				
Test Date:	28/06/2018			
Test Operator:	MPA			
Frequency (MHz)	**$P_{conducted}$ (dBm)**	**$Gain_{dBi}$**	**P_{eirp} (dBm)**	**Limit (dBm)**
2412	15.6	2.2	17.8	30dBm / 36dBm$_{eirp}$
2437	15.5	2.2	17.7	30dBm / 36dBm$_{eirp}$
2462	16	2.2	18.2	30dBm / 36dBm$_{eirp}$

MAXIMUM PEAK CONDUCTED POWER - TABULATED RESULTS				
MOD. G)				
Test Date:	28/06/2018			
Test Operator:	MPA			
Frequency (MHz)	**$P_{conducted}$ (dBm)**	**$Gain_{dBi}$**	**P_{eirp} (dBm)**	**Limit (dBm)**
2412	17.6	2.2	19.8	30dBm / 36dBm$_{eirp}$
2437	17.7	2.2	19.9	30dBm / 36dBm$_{eirp}$
2462	17.9	2.2	20.1	30dBm / 36dBm$_{eirp}$

MAXIMUM PEAK CONDUCTED POWER - TABULATED RESULTS	
MOD. N)	
Test Date:	28/06/2018
Test Operator:	MPA

MAXIMUM PEAK CONDUCTED POWER - TABULATED RESULTS				
MOD. N)				
Frequency (MHz)	**$P_{conducted}$ (dBm)**	**$Gain_{dBi}$**	**P_{eirp} (dBm)**	**Limit (dBm)**
2412	17.9	2.2	20.1	30dBm / 36dBm$_{eirp}$
2437	17.8	2.2	20	30dBm / 36dBm$_{eirp}$
2462	18	2.2	20.2	30dBm / 36dBm$_{eirp}$

$P_{erp} = P_{conducted}$ + antenna $Gain_{dBd}$; $Gain_{dBd} = Gain_{dBi}$ - 2.15dB
$P_{erp} = P_{conducted}$ + $Gain_{dBi}$ - 2.15dB
$P_{eirp} = P_{erp}$ + 2.15dB
$P_{eirp} = P_{conducted}$ + $Gain_{dBi}$
In case of a dedicated antenna the antenna gain (in dB, i.e. relative to a dipole) is declared by the manufacturer.

For Maximum Peak Conducted measurement:
Using the formula $E_{(V/m)} = \sqrt{(30P_{dBm}G_{dBi})}/d_{(m)}$ where P is the conducted power and G the maximum antenna gain.
Equivalent maximum E-field should be approximatively of 115.43dBµV/m.

7.5. 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 PARAMETER	SEVERITY	VERDICT
Low channel / mod. b)	>20dBc	**PASS**
High channel / mod. b)	>20dBc	**PASS**
Low channel / mod. g)	>20dBc	**PASS**
High channel / mod. g)	>20dBc	**PASS**
Low channel / mod. n)	>20dBc	**PASS**
High channel / mod. n)	>20dBc	**PASS**

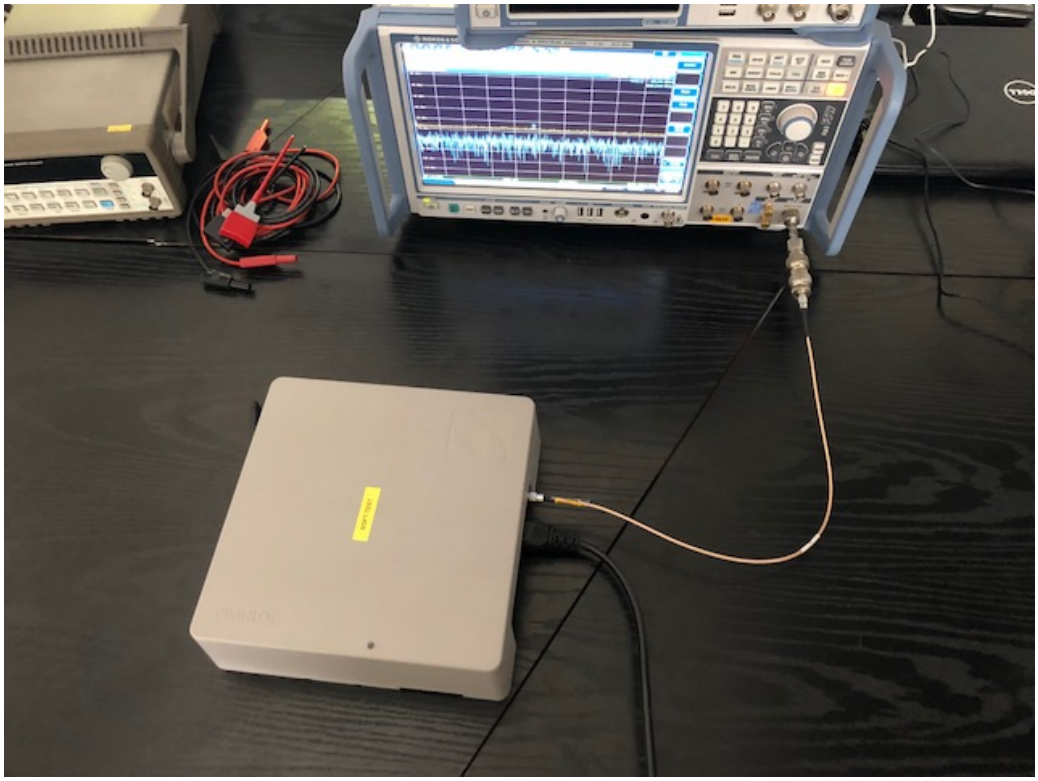
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Attenuator	Techniwave	TWSMA-20dB-18G-SMA	14679	21/09/2017	21/11/2019
Cable	Radiall	SMA-0,5m	14889	23/02/2018	23/04/2020
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Software	Nexio - BAT-EMC	V3.17.0.25	0000		
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

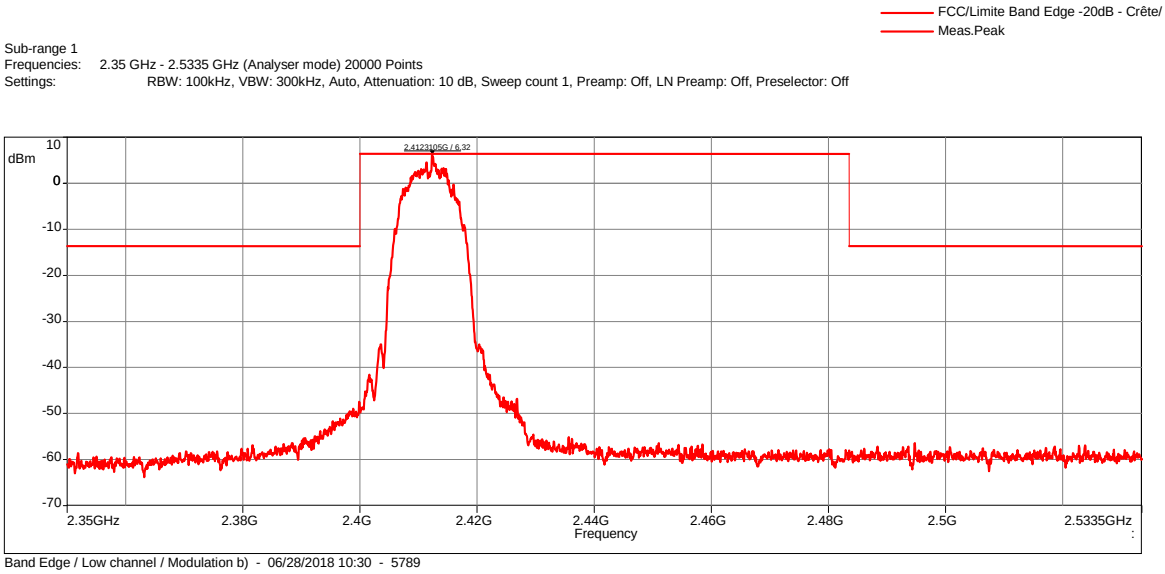
Blank cells = Permanent validity

TEST SETUP PHOTO(S) - POWER SUPPLY 110VAC/60HZ / WIFI



BAND EDGE - GRAPH

LOW CHANNEL / MOD. B)		EMI5789	
EUT mode:	#1	**T (°C):**	23.2
Test Date:	28/06/2018 10:30:02	**H (%):**	49.6
Test Operator:	MPA	**P (hPa):**	1012

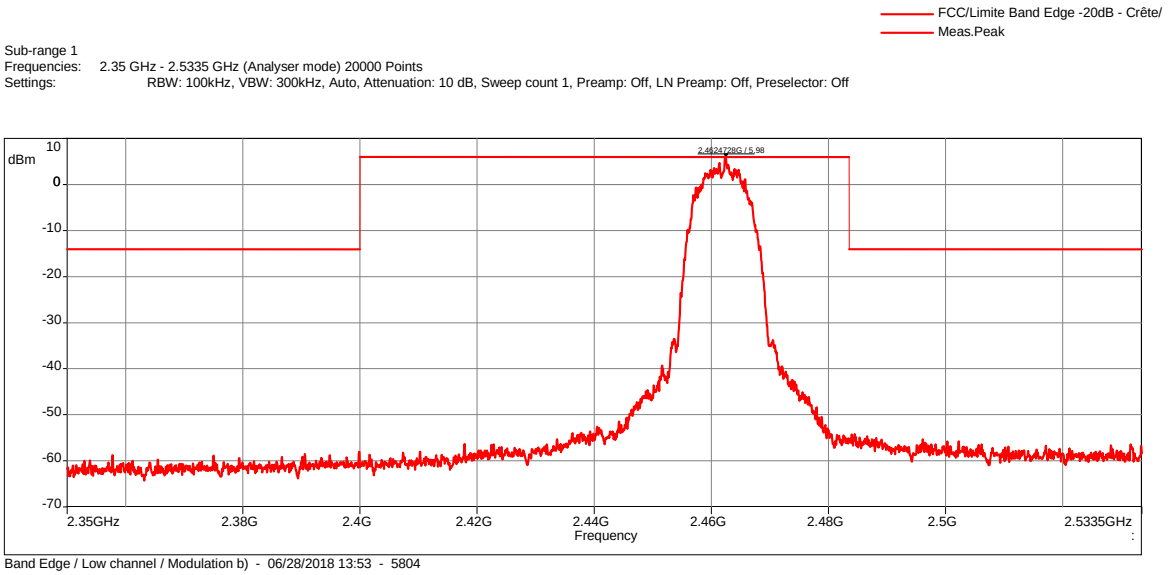


POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2.35GHz-2.5335GHz	100kHz	300kHz	Peak

Configuration:	N/A
Comments:	N/A

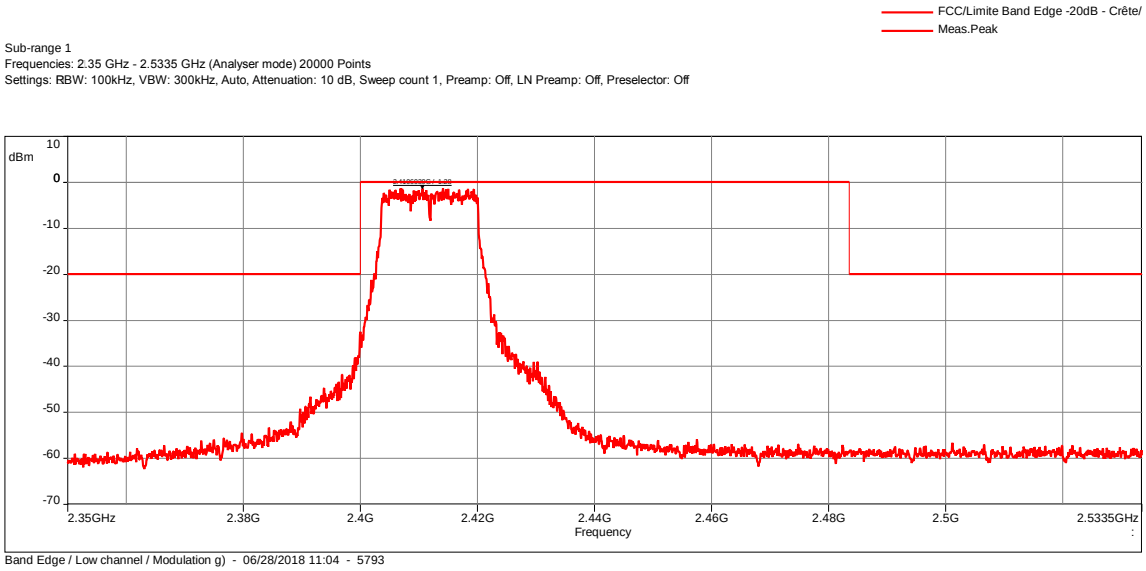
EUT modification(s): N/A

BAND EDGE - GRAPH			
HIGH CHANNEL / MOD. B)		EMI5804	
EUT mode:	#1	**T (°C):**	23.2
Test Date:	28/06/2018 13:53:40	**H (%):**	49.6
Test Operator:	MPA	**P (hPa):**	1012



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2.35GHz-2.5335GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			
EUT modification(s): N/A				

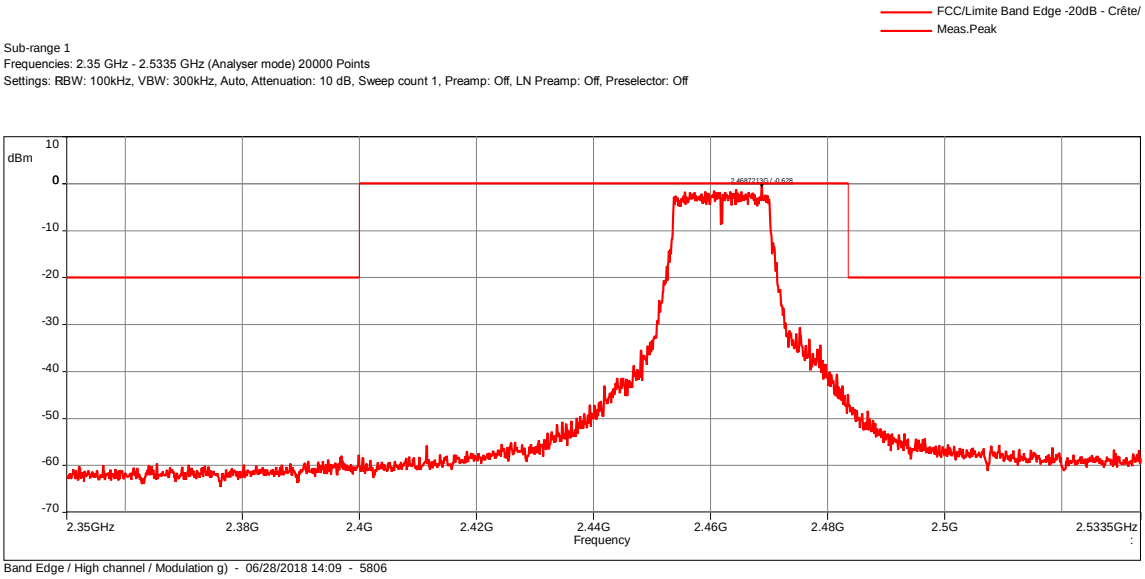
BAND EDGE - GRAPH			
LOW CHANNEL / MOD. G)		EMI5793	
EUT mode:	#1	**T (°C):**	23.2
Test Date:	28/06/2018 11:04:42	**H (%):**	49.6
Test Operator:	MPA	**P (hPa):**	1012



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2.35GHz-2.5335GHz	100kHz	300kHz	Peak

EUT modification(s): N/A

BAND EDGE - GRAPH			
HIGH CHANNEL / MOD. G)		EMI5806	
EUT mode:	#1	**T (°C):**	23.2
Test Date:	28/06/2018 14:09:25	**H (%):**	49.6
Test Operator:	MPA	**P (hPa):**	1012

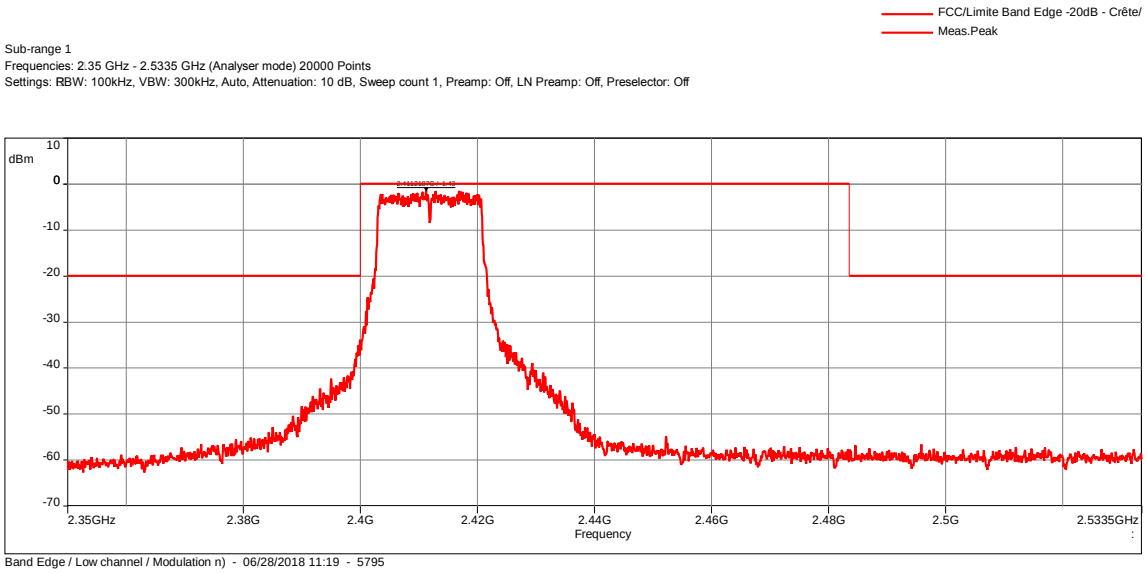


Band Edge / High channel / Modulation g) - 06/28/2018 14:09 - 5806

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2.35GHz-2.5335GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			

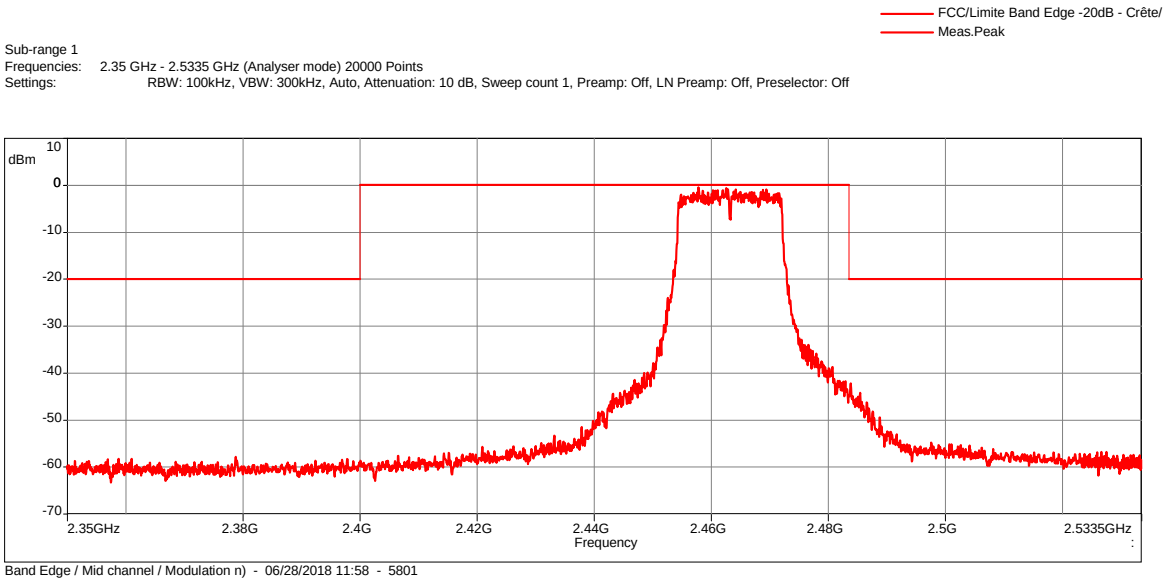
EUT modification(s): N/A

BAND EDGE - GRAPH			
LOW CHANNEL / MOD. N)		EMI5795	
EUT mode:	#1	**T (°C):**	23.2
Test Date:	28/06/2018 11:19:21	**H (%):**	49.6
Test Operator:	MPA	**P (hPa):**	1012



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2.35GHz-2.5335GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			
EUT modification(s): N/A				

BAND EDGE - GRAPH			
HIGH CHANNEL / MOD. N)		EMI5801	
EUT mode:	#1	**T (°C):**	23.2
Test Date:	28/06/2018 11:58:25	**H (%):**	49.6
Test Operator:	MPA	**P (hPa):**	1012



Band Edge / Mid channel / Modulation n) - 06/28/2018 11:58 - 5801

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
RF port	2.35GHz-2.5335GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			
EUT modification(s): N/A				

7.6. Power spectral density

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.247 and RSS-247

Test description: e)

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

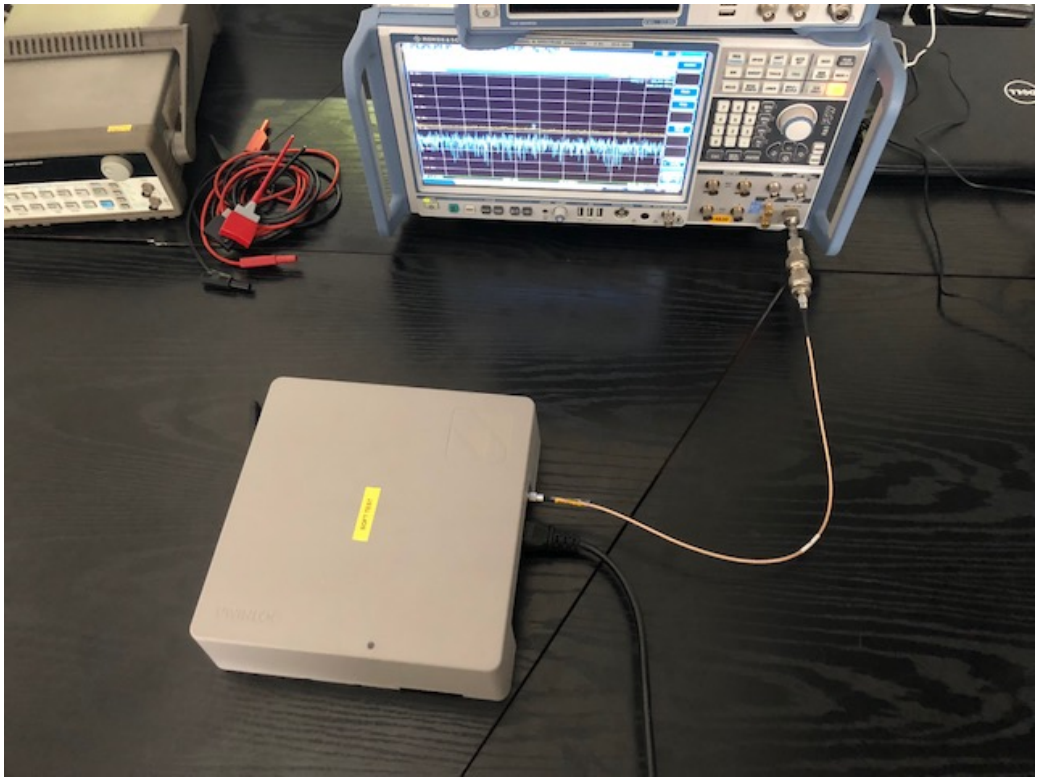
EUT is connected to the measuring receiver via 50Ω attenuator(s).Only the highest levels are recorded.

TESTED PARAMETER	SEVERITY	VERDICT
Low channel / mod. b)	8dBm/3kHz	**PASS**
Mid channel / mod. b)	8dBm/3kHz	**PASS**
High channel / mod. b)	8dBm/3kHz	**PASS**
Low channel / mod. g)	8dBm/3kHz	**PASS**
Mid channel / mod. g)	8dBm/3kHz	**PASS**
High channel / mod. g)	8dBm/3kHz	**PASS**
Low channel / mod. n)	8dBm/3kHz	**PASS**
Mid channel / mod. n)	8dBm/3kHz	**PASS**
High channel / mod. n)	8dBm/3kHz	**PASS**

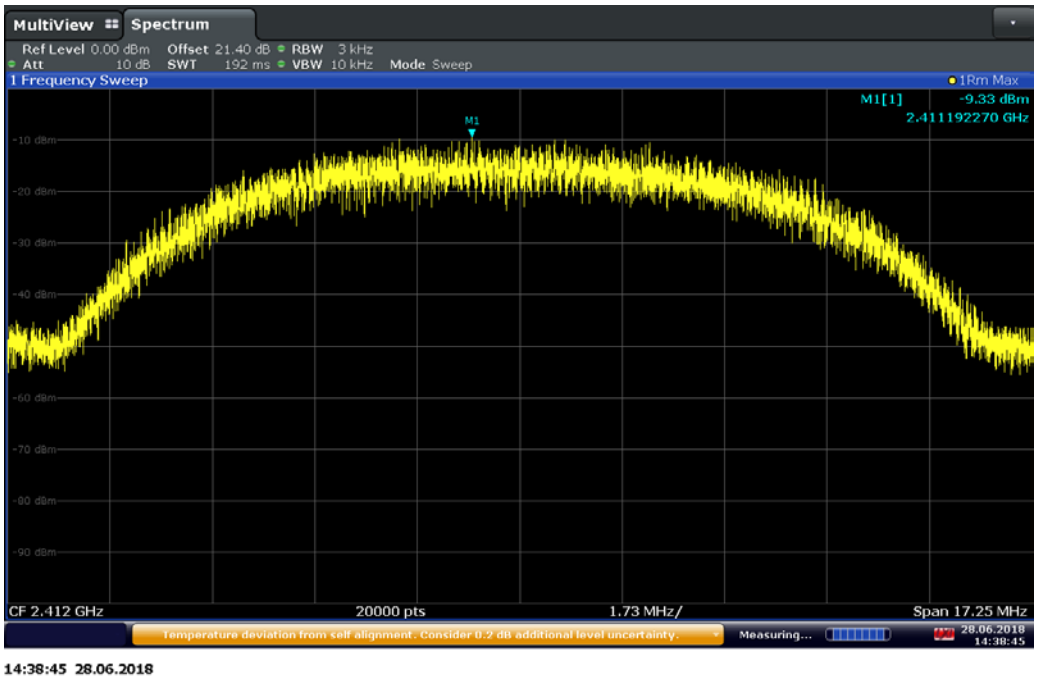
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Attenuator	Techniwave	TWSMA-20dB-18G-SMA	14679	21/09/2017	21/11/2019
Cable	Radiall	SMA-0,5m	14889	23/02/2018	23/04/2020
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

Blank cells = Permanent validity

TEST SETUP PHOTO(S) - POWER SUPPLY 110VAC/60HZ / WIFI


POWER SPECTRAL DENSITY - GRAPH	
LOW CHANNEL / MOD. B)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

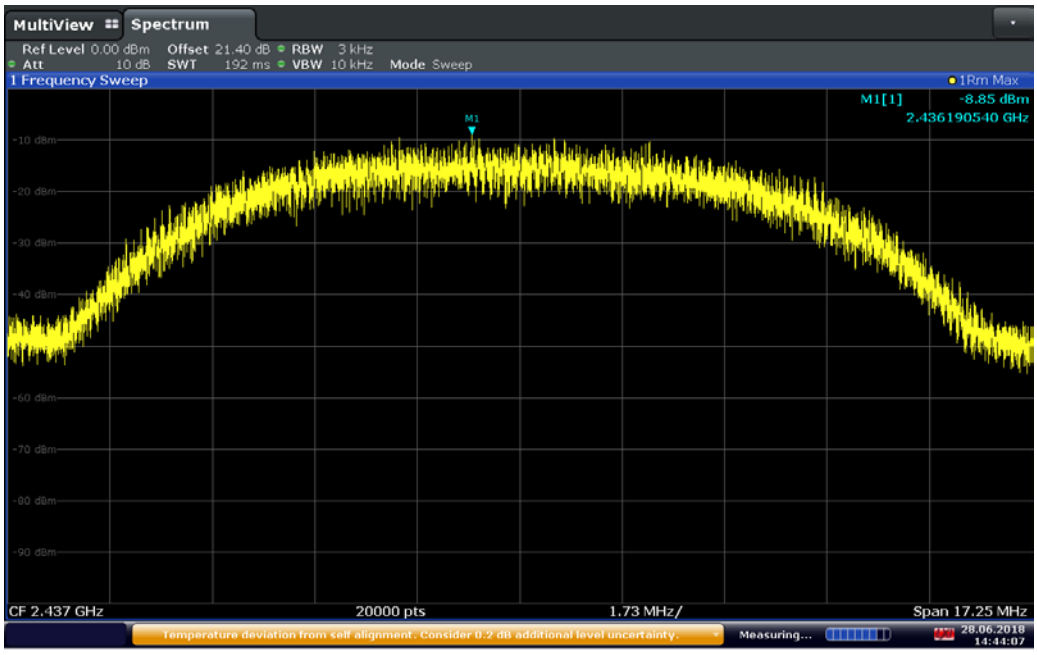


14:38:45 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
LOW CHANNEL / MOD. B)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2412 MHz	3kHz	-9.33	<8

POWER SPECTRAL DENSITY - GRAPH	
MID CHANNEL / MOD. B)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

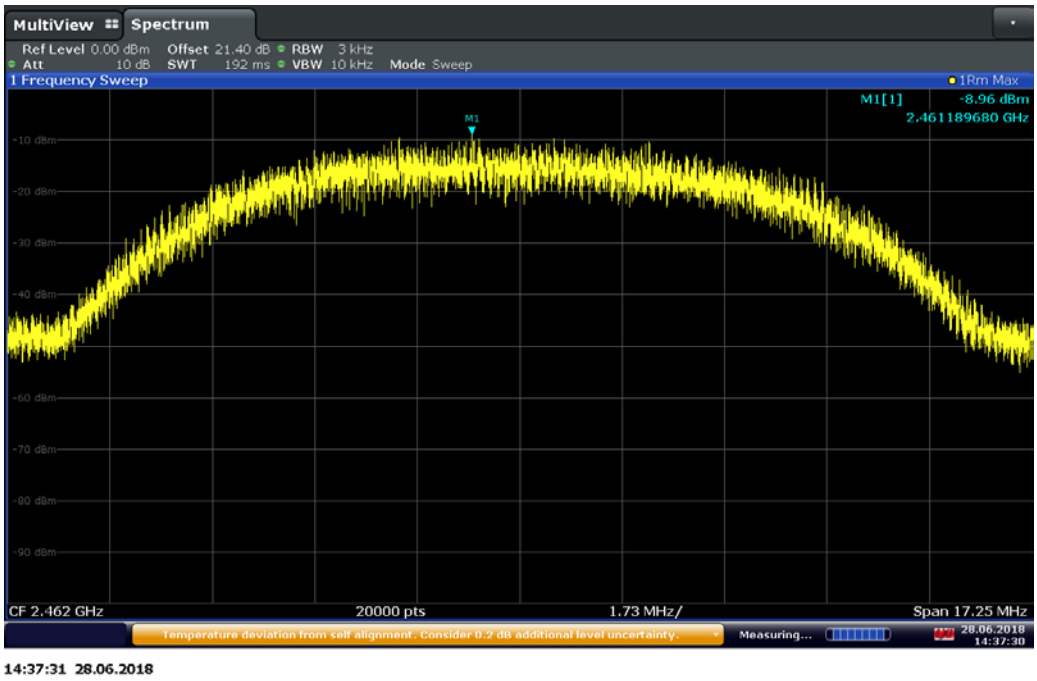


14:44:07 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
MID CHANNEL / MOD. B)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2437 MHz	3kHz	-8.85	<8

POWER SPECTRAL DENSITY - GRAPH	
HIGH CHANNEL / MOD. B)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

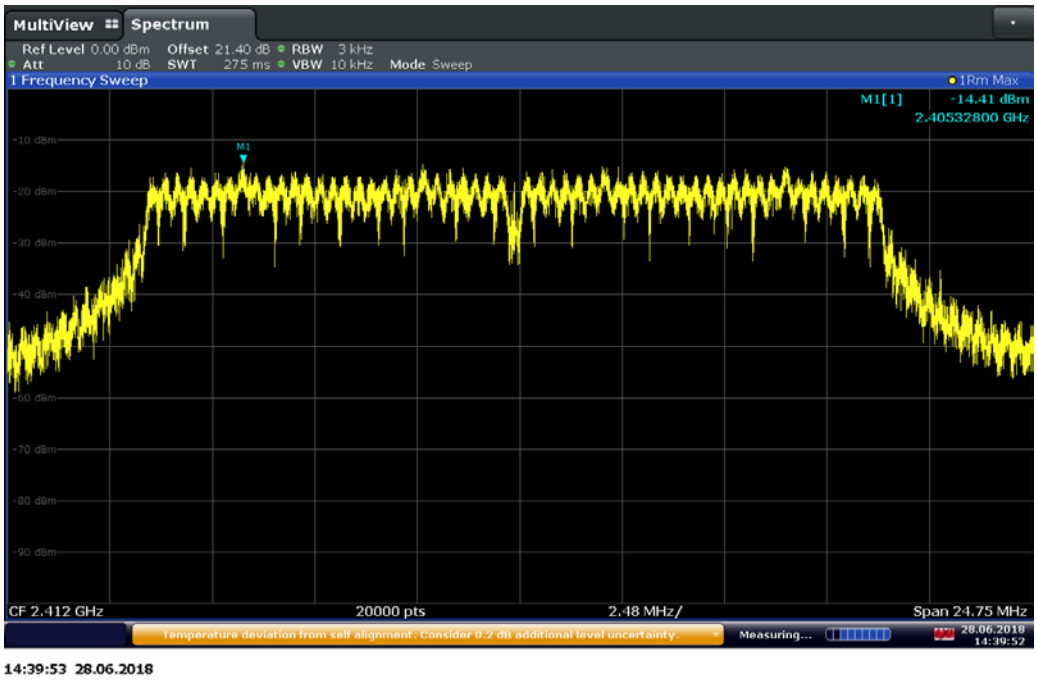


14:37:31 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
HIGH CHANNEL / MOD. B)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2462 MHz	3kHz	-8.96	<8

POWER SPECTRAL DENSITY - GRAPH	
LOW CHANNEL / MOD. G)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

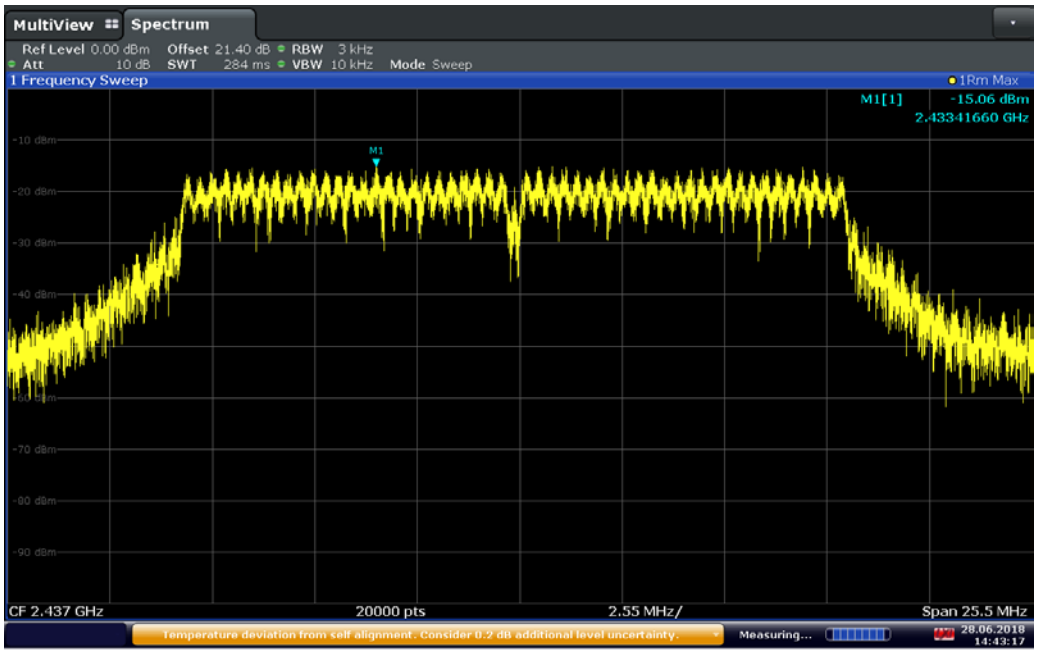


14:39:53 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
LOW CHANNEL / MOD. G)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2412 MHz	3kHz	-14.41	<8

POWER SPECTRAL DENSITY - GRAPH	
MID CHANNEL / MOD. G)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

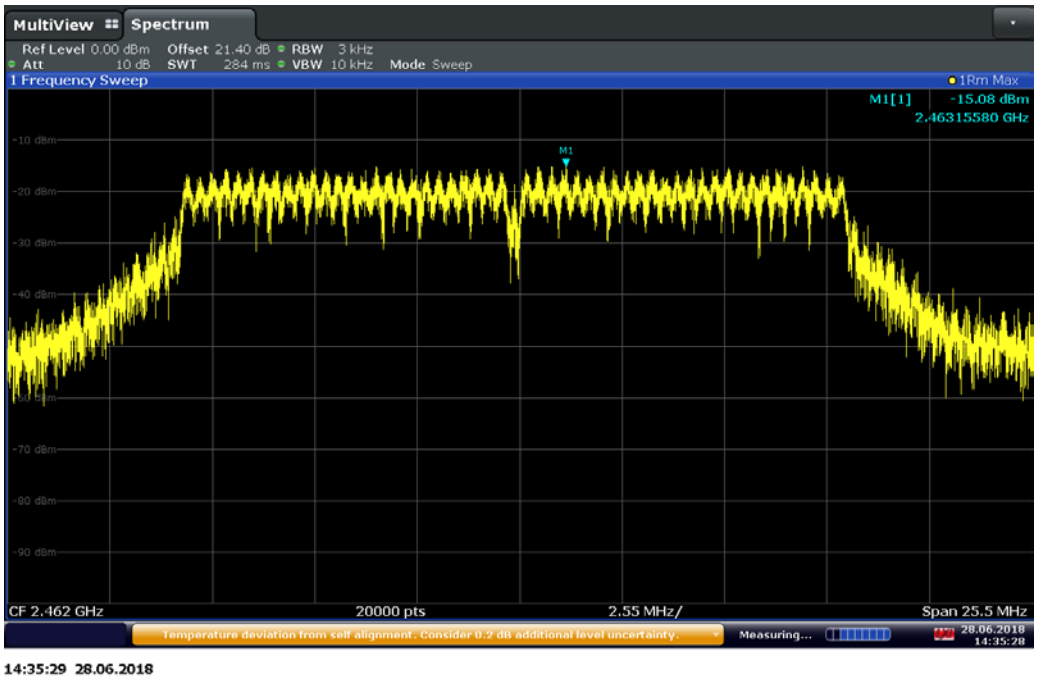


14:43:17 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
MID CHANNEL / MOD. G)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2437 MHz	3kHz	-15.06	<8

POWER SPECTRAL DENSITY - GRAPH	
HIGH CHANNEL / MOD. G)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

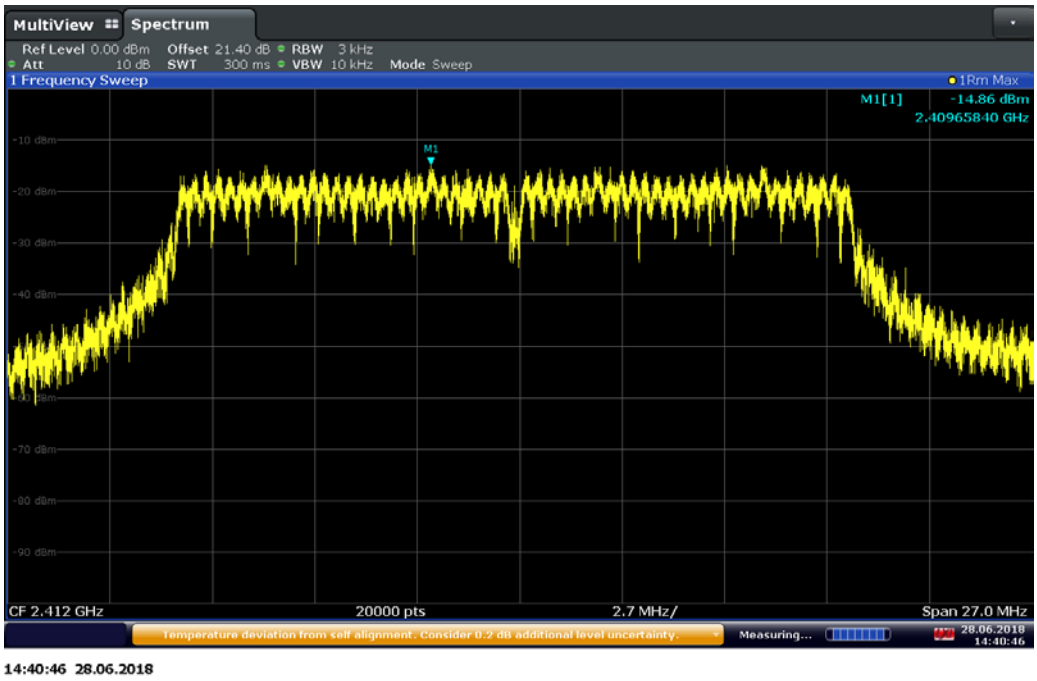


14:35:29 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
HIGH CHANNEL / MOD. G)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2462 MHz	3kHz	-15.08	<8

POWER SPECTRAL DENSITY - GRAPH	
LOW CHANNEL / MOD. N)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

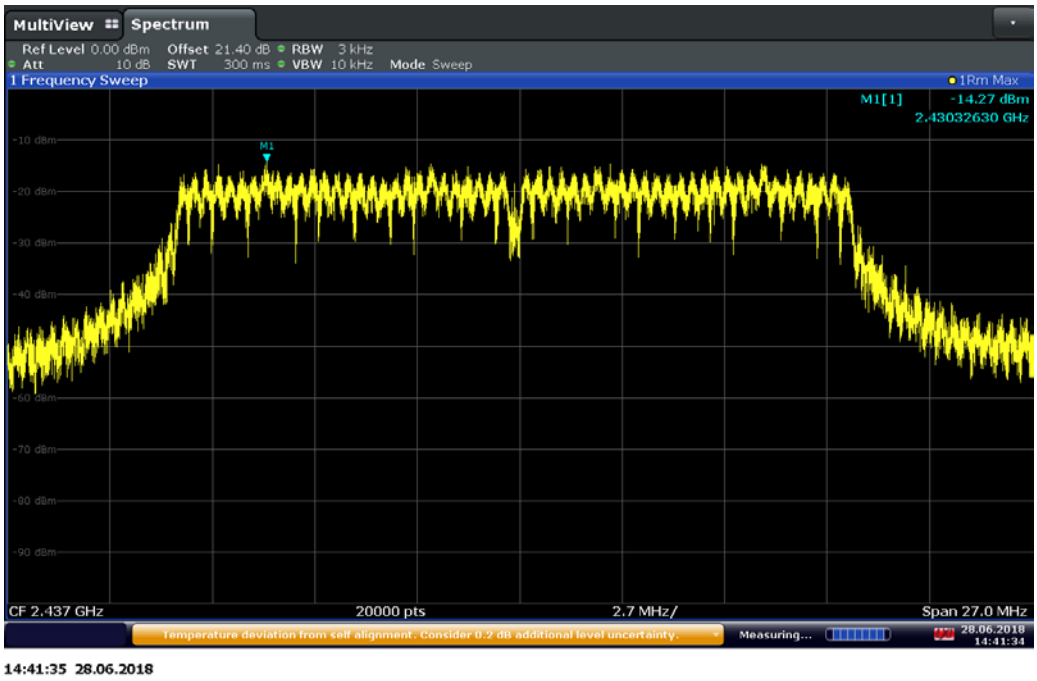


14:40:46 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
LOW CHANNEL / MOD. N)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2412 MHz	3kHz	-14.86	<8

POWER SPECTRAL DENSITY - GRAPH	
MID CHANNEL / MOD. N)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA

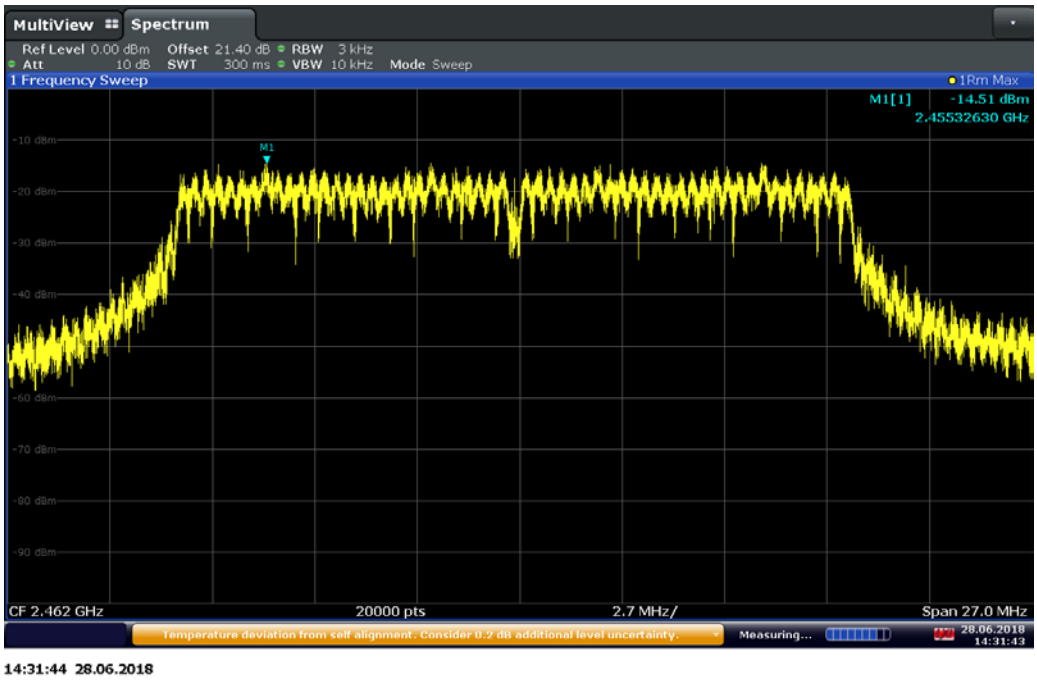


14:41:35 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
MID CHANNEL / MOD. N)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2437 MHz	3kHz	-14.27	<8

POWER SPECTRAL DENSITY - GRAPH	
HIGH CHANNEL / MOD. N)	
EUT mode:	#1
Test Date:	28/06/2018
Test Operator:	MPA



14:31:44 28.06.2018

Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

POWER SPRECTRAL DENSITY - TABULATED RESULTS			
HIGH CHANNEL / MOD. N)			
Frequency	**RBW**	**Level (dBm/3kHz)**	**Limit (dBm/3kHz)**
2462 MHz	3kHz	-14.51	<8

7.7. Radiated spurious emissions

Reference standard:	FCC part 15 Radio part 15.247 and RSS-247
Test method:	FCC part 15.109, 15.209, 15.205, 15.215 RSS-247, CNR Gen

General test setup: For f <30MHz, EUT is set on an insulating support at 80cmcm above the ground reference plane.

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

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

For f > 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.

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
Ethernet mode	9kHz-150kHz	15.209	See below	**PASS**
Ethernet mode	150kHz-30MHz	15.209	See below	**PASS**
Ethernet mode	30MHz-1GHz	15.209	See below	**PASS**
Ethernet mode	1GHz-18GHz	15.209	See below	**PASS**
Wi-Fi mode	9kHz-150kHz	15.209	See below	**PASS**
Wi-Fi mode	150kHz-30MHz	15.209	See below	**PASS**
Wi-Fi mode	30MHz-1GHz	15.209	See below	**PASS**
Wi-Fi mode	1GHz-18GHz	15.209	See below	**PASS**

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

Test method deviation: N/A

Supplementary information:

From 9 kHz to 30MHz: limit indicated on the curves is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

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

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

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	16/03/2016	16/05/2019
Antenna	Electro Metrics	BIA-30HF	1107	25/05/2015	25/07/2018
Antenna	Rohde & Schwarz	HFH2-Z2	5825	20/09/2017	20/11/2019
Antenna	Rohde & Schwarz	HL223	1137	25/04/2015	25/06/2018
Antenna	Rohde & Schwarz	HL223	1137	13/06/2018	13/08/2021
Antenna mast	Maturo	NCD	14656		
Cable	TechniWAVE	N-0.23m	14891	23/02/2018	23/04/2020
Cable	TechniWAVE	N-0.23m	14893	23/02/2018	23/04/2020
Cable	Huber Suhner	N-10m	8472	16/02/2017	16/04/2019
Cable	SUCOFLEX	N-3m	14379	18/01/2017	18/03/2019
Cable	SUCOFLEX	N-5,5m	14381	18/01/2017	18/03/2019
Cable	SUCOFLEX	N-6,5m	14380	18/01/2017	18/03/2019
Filter	Micro-Tronics	HPM 15162	10273	05/10/2016	05/12/2018
Filter	Wainwright Instruments	WRCG 2400/2483	9771	05/10/2016	05/12/2018
Preamplifier	IMPULSE	CA118-546ACN	9169	13/10/2017	13/12/2018
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Shielded enclosure	COMTEST	SAC 3m	14494	14/02/2017	14/04/2020
Software	Nexio	BAT EMC v3.17.0.22	0000		
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Testo	608-H2	12269	27/11/2017	27/01/2020
Turntable	Maturo	NCD	14657		

Blank cells = Permanent validity

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
WI-FI MODE				EMI5795	
Frequency MHz	Polarization	Level peak dBµV/m	Level Qpeak dBµV/m	Limit dBµV/m	Margin dB
30.71407	Verticale	41.73	35.71	40	-4.29
35.38954	Verticale	37.71	31.86	40	-8.14
44.12841	Verticale	36.7	32.99	40	-7.01
106.8137	Verticale	33.95	28.8	43.5	-14.7
110.01	Verticale	32.94	28.35	43.5	-15.15
159.961	Verticale	35.71	32.56	43.5	-10.94
174.0724	Verticale	35.81	31.97	43.5	-11.53
200	Verticale	36.75	34.11	43.5	-9.39
45.64156	Horizontale	29.04	24.48	40	-15.52
107.1027	Horizontale	31.87	26.94	43.5	-16.56
149.998	Horizontale	32.84	29.42	43.5	-14.08
159.978	Horizontale	39.47	36.28	43.5	-7.22
179.989	Horizontale	35.91	33.07	43.5	-10.43
190.02	Horizontale	34.39	29.7	43.5	-13.8
200	Horizontale	43.55	41.56	43.5	-1.94
200	Verticale	36.56	33.83	43.5	-9.67
219.922	Verticale	31.62	27.68	46	-18.32

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
WI-FI MODE				EMI5795	
239.924	Verticale	31.62	28.21	46	-17.79
249.925	Verticale	30.98	27.06	46	-18.94
259.926	Verticale	28.93	24.71	46	-21.29
299.93	Verticale	34.45	30.92	46	-15.08
349.935	Verticale	41.59	38.69	46	-7.31
399.94	Verticale	33.22	28.92	46	-17.08
434.9035	Verticale	37.23	32.67	46	-13.33
449.945	Verticale	39.95	36.33	46	-9.67
486.9887	Verticale	39.15	35.02	46	-10.98
492.4292	Verticale	39.53	35.42	46	-10.58
512.7513	Verticale	38.98	34.63	46	-11.37
521.8722	Verticale	38.2	33.59	46	-12.41
524.4324	Verticale	39.25	33.63	46	-12.37
527.3127	Verticale	38.17	33.4	46	-12.6
549.955	Verticale	37.31	32.3	46	-13.7
559.956	Verticale	36.88	32.05	46	-13.95
599.96	Verticale	35.29	30.09	46	-15.91
900.07	Verticale	41.13	35.34	46	-10.66
200	Horizontale	41.73	41.13	40	-2.37
209.921	Horizontale	37.71	30.84	40	-12.66
219.922	Horizontale	36.7	39.34	40	-6.66
229.923	Horizontale	33.95	36.1	43.5	-9.9
239.924	Horizontale	32.94	42.66	43.5	-3.34
249.925	Horizontale	35.71	43.95	43.5	-2.05
259.926	Horizontale	35.81	42.24	43.5	-3.76
269.927	Horizontale	36.75	40.44	43.5	-5.56
279.928	Horizontale	29.04	39.08	40	-6.92
289.929	Horizontale	31.87	34.24	43.5	-11.76
299.93	Horizontale	32.84	36.36	43.5	-9.64
349.935	Horizontale	39.47	34.17	43.5	-11.83
559.956	Horizontale	35.91	32.05	43.5	-13.95
599.96	Horizontale	34.39	34.13	43.5	-11.87
699.97	Horizontale	43.55	37.19	43.5	-8.81

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

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
WI-FI MODE / LOW CHANNEL				EMI5783	
Frequency MHz	**Polarization**	**Peak level dBµV/m**	**Avg level dBµV/m**	**Avg Limit dBµV/m**	**Margin dB**
3215	Horizontal	49.1	48.4	54	-5.6
4824	Horizontal	52.3	48.5	54	-5.5
3215	Vertical	55.1	52.3	54	-1.7
4824	Vertical	48.5	44.1	54	-9.9

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

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
WI-FI MODE / MID CHANNEL				EMI5810	
Frequency MHz	Polarization	Peak level dBµV/m	Avg level dBµV/m	Avg Limit dBµV/m	Margin dB
3249	Horizontal	48	47.1	54	-6.9
4874	Horizontal	54	50.1	54	-3.9
3249	Vertical	54.6	51.7	54	-2.3
4874	Vertical	47.5	44.3	54	-9.7

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

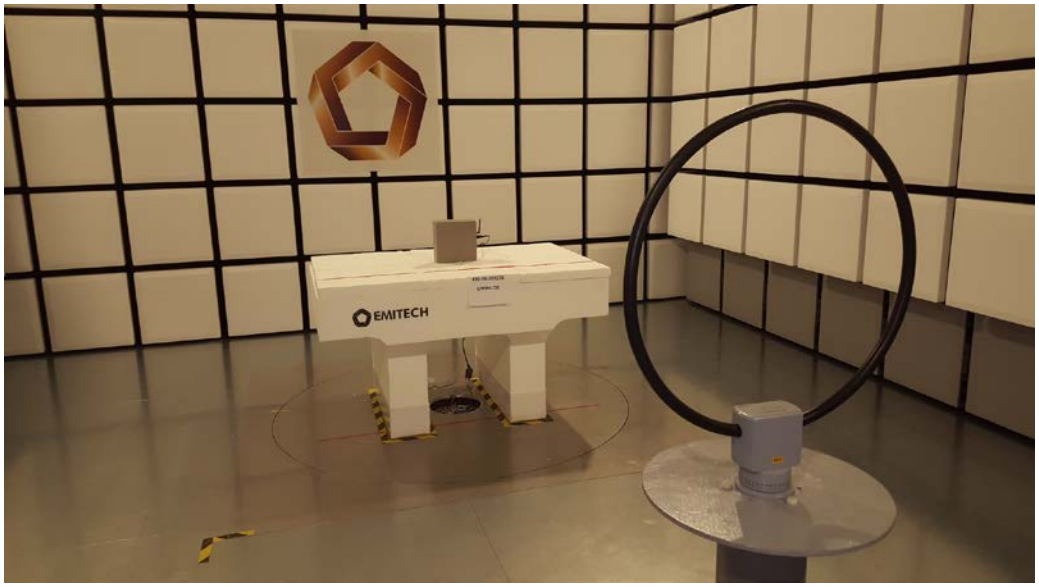
RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
WI-FI MODE / HIGH CHANNEL				EMI5809	
Frequency MHz	Polarization	Peak level dBµV/m	Avg level dBµV/m	Avg Limit dBµV/m	Margin dB
3282	Horizontal	48.7	48.3	54	-5.7
4924	Horizontal	54	50.5	54	-3.5
3282	Vertical	54	53.8	54	-0.2
4924	Vertical	44.5	43.3	54	-10.7

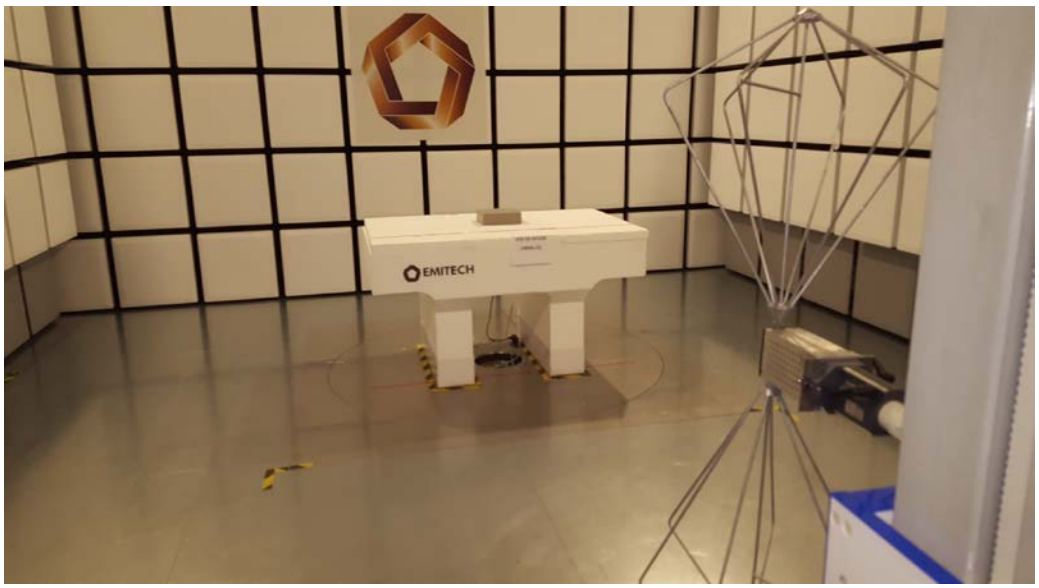
Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
ETHERNET MODE				EMI5830	
Frequency MHz	Polarization	Level peak dBµV	Level Qpeak dBµV	Limit dBµV/m	Margin dB
31.615	Verticale	32.83	27.87	50	-4.29
34.080	Verticale	30.30	23.52	50	-8.14
41.629	Verticale	48.40	46.12	50	-7.01
49.127	Verticale	36.82	33.47	50	-14.7
50	Verticale	45.40	43.69	50	-15.15

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

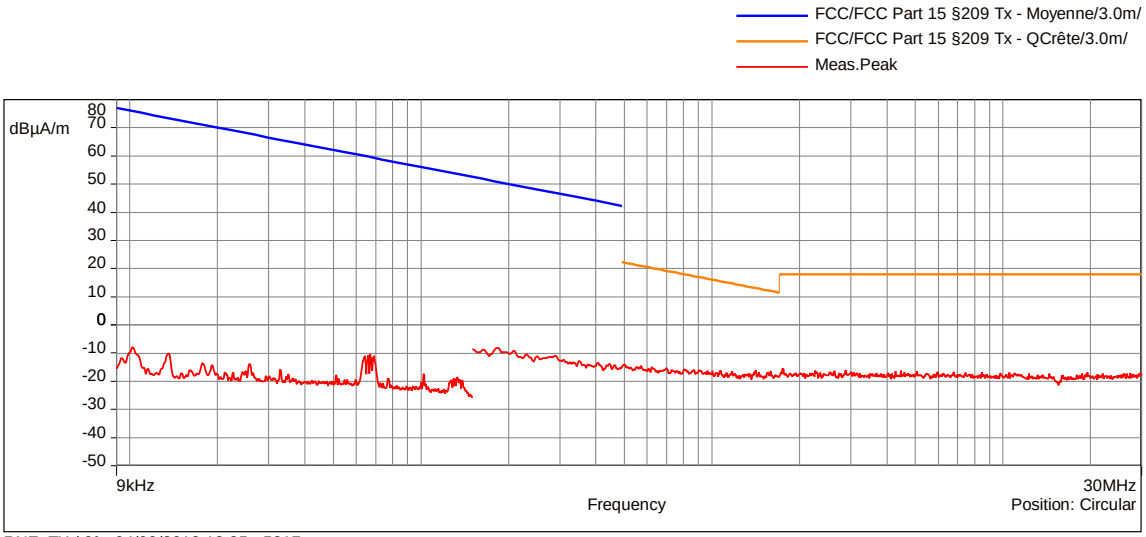
TEST SETUP PHOTO(S)





TEST SETUP PHOTO(S)


RADIATED SPURIOUS SMISSIONS - GRAPH			
0°		**EMI5817**	
EUT mode:	#1 & #2	**T (°C):**	18.4
Test Date:	21/03/2018 13:53:08	**H (%):**	28.9
Test Operator:	FMO	**P (hPa):**	1008

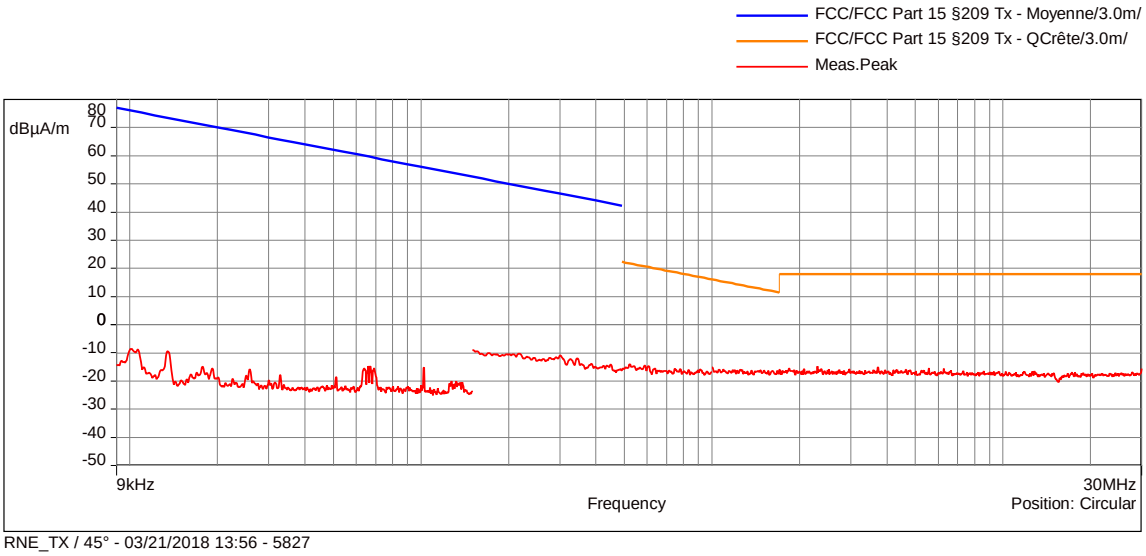


RNE_TX / 0° - 04/09/2018 13:35 - 5817

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

EUT modification(s): N/A

RADIATED SPURIOUS SMISSIONS - GRAPH			
45°		**EMI5827**	
EUT mode:	#1 & #2	**T (°C):**	18.4
Test Date:	21/03/2018 13:56:47	**H (%):**	28.9
Test Operator:	FMO	**P (hPa):**	1008



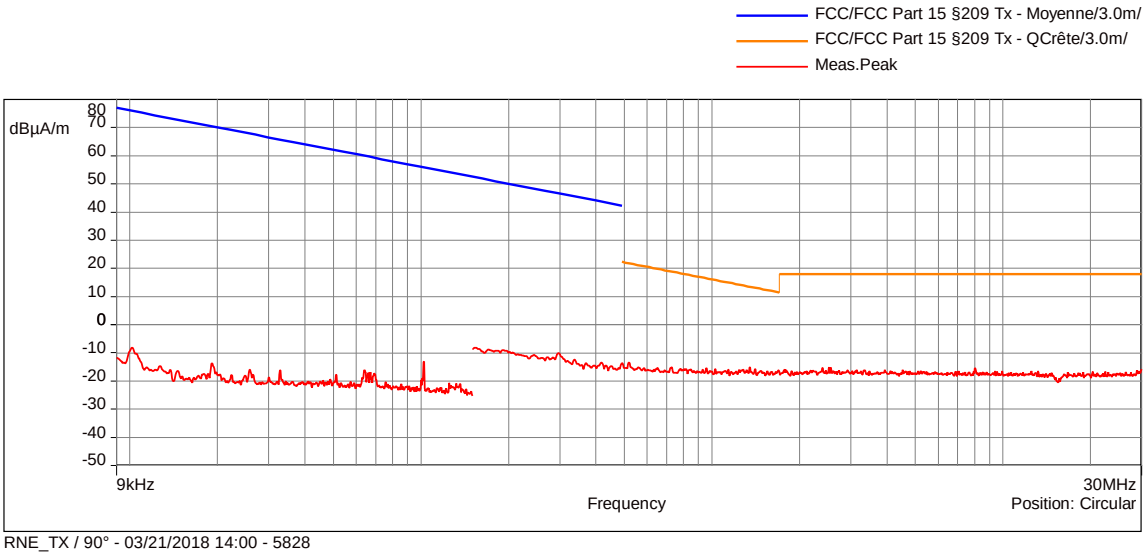
RNE_TX / 45° - 03/21/2018 13:56 - 5827

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak

Configuration:	This plot is valid for all configurations
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.

EUT modification(s): N/A

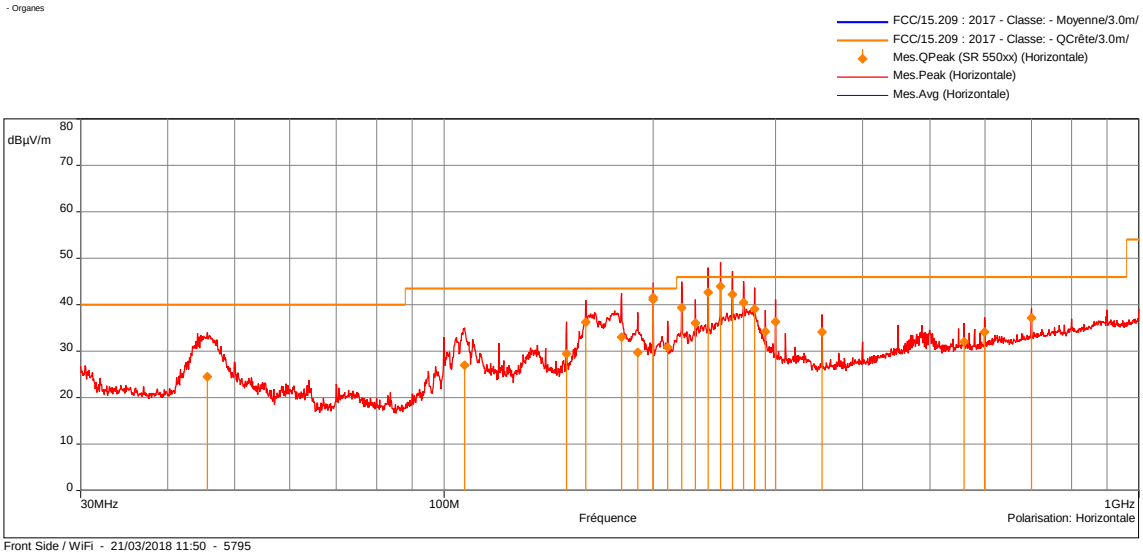
RADIATED SPURIOUS SMISSIONS - GRAPH			
90°		**EMI5828**	
EUT mode:	#1 & #2	**T (°C):**	18.4
Test Date:	21/03/2018 14:00:52	**H (%):**	28.9
Test Operator:	FMO	**P (hPa):**	1008



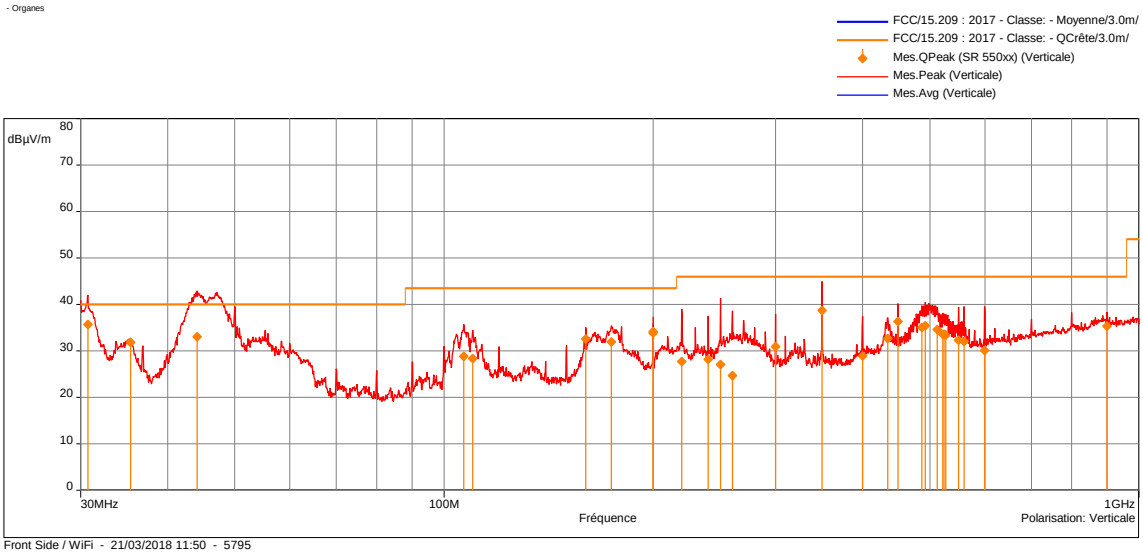
RNE_TX / 90° - 03/21/2018 14:00 - 5828

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

RADIATED SPURIOUS EMISSIONS - GRAPH			
WI-FI MODE		EMI5795	
EUT mode:	# 1	**T (°C):**	13.7
Test Date:	21/03/2018 11:50:27	**H (%):**	30.7
Test Operator:	FMO	**P (hPa):**	1008



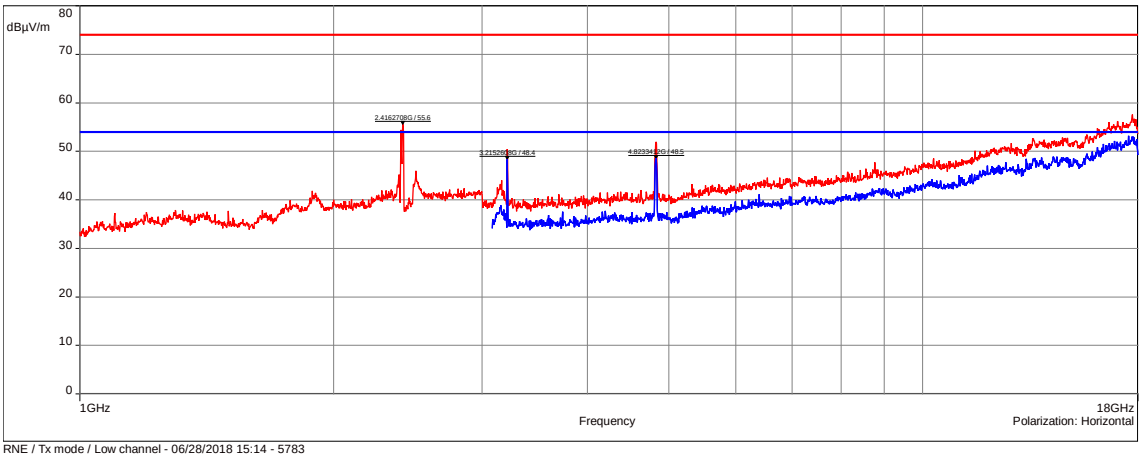
Front Side / WiFi - 21/03/2018 11:50 - 5795



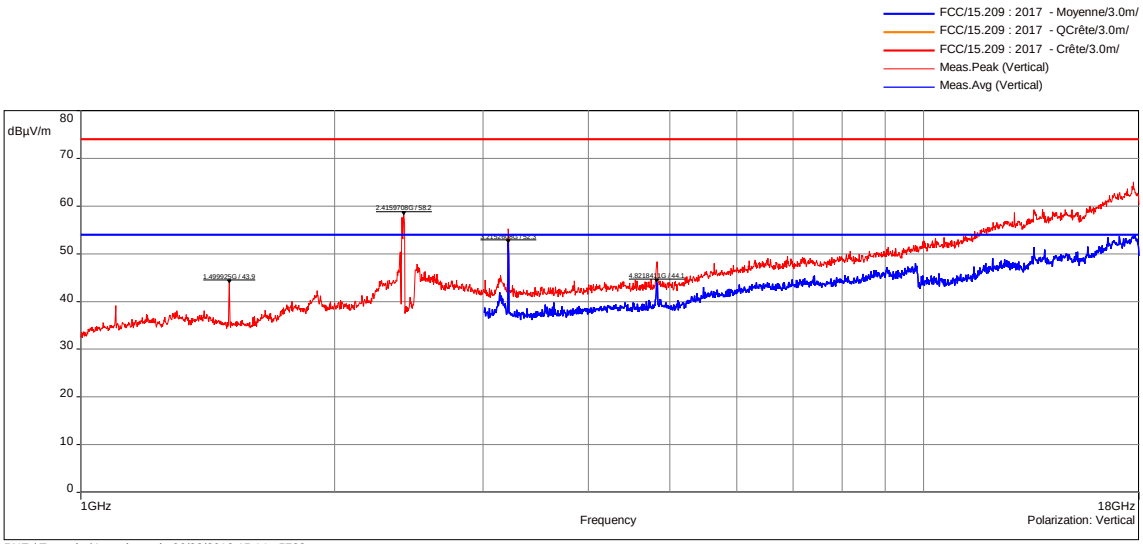
Front Side / WiFi - 21/03/2018 11:50 - 5795

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-200MHz	100kHz	300kHz	Peak & QPeak(120kHz)
Horizontal	30MHz-200MHz	100kHz	300kHz	Peak & QPeak(120kHz)
Vertical	200MHz-1GHz	100kHz	300kHz	Peak & QPeak(120kHz)
Horizontal	200MHz-1GHz	100kHz	300kHz	Peak & QPeak(120kHz)
Measure with:	N/A			
Comments:	This plot is valid for the 3 channels			
EUT modification(s): N/A				

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) - GRAPH			
WI-FI MODE / LOW CHANNEL		EMI5783	
EUT mode:	#1	**T (°C):**	23.9
Test Date:	28/06/2018 15:14:05	**H (%):**	40.8
Test Operator:	MPA	**P (hPa):**	1010



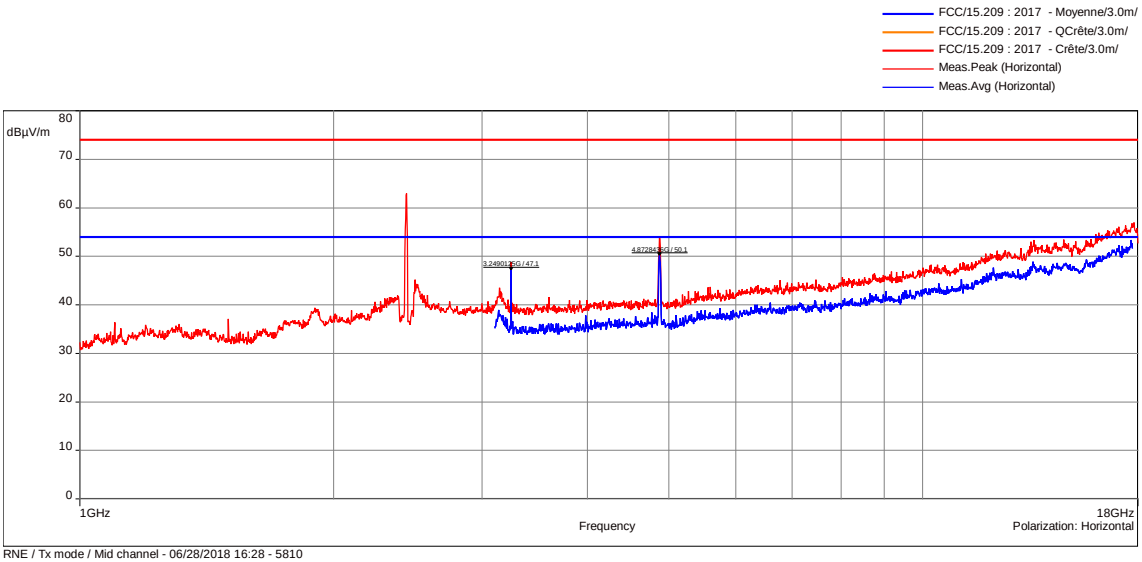
RNE / Tx mode / Low channel - 06/28/2018 15:14 - 5783



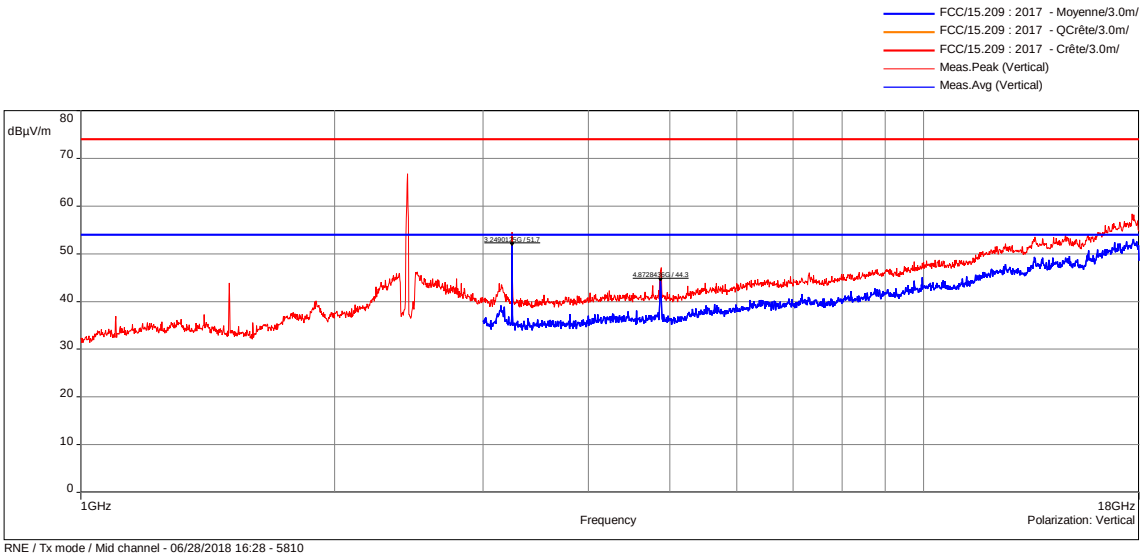
RNE / Tx mode / Low channel - 06/28/2018 15:14 - 5783

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Horizontal	3GHz-18GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Configuration:	Test is done with mod. type n) wich present the highest level and the higher frequency occupation.			
Comments:	Carrier frequency is rejected by a notch filter.			
EUT modification(s): N/A				

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) - GRAPH			
WI-FI MODE / MID CHANNEL		EMI5810	
EUT mode:	#1	**T (°C):**	23.9
Test Date:	28/06/2018 16:28:56	**H (%):**	40.8
Test Operator:	MPA	**P (hPa):**	1010



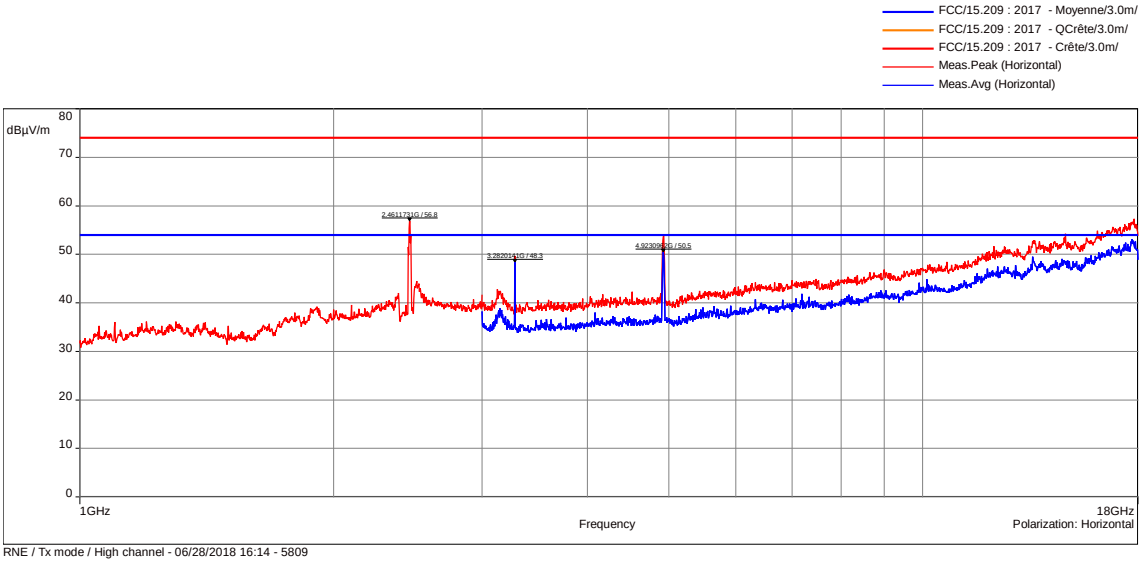
RNE / Tx mode / Mid channel - 06/28/2018 16:28 - 5810



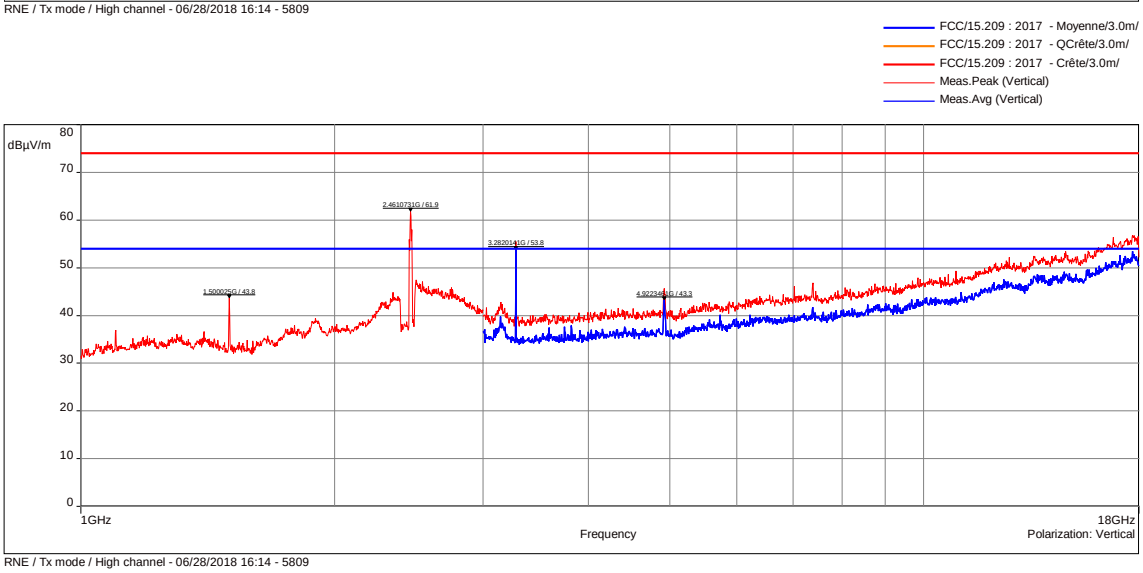
RNE / Tx mode / Mid channel - 06/28/2018 16:28 - 5810

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Horizontal	3GHz-18GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Configuration:	Test is done with mod. type n) wich present the highest level and the higher frequency occupation.			
Comments:	Carrier frequency is rejected by a notch filter.			
EUT modification(s): N/A				

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) - GRAPH			
WI-FI MODE / HIGH CHANNEL		EMI5809	
EUT mode:	#1	**T (°C):**	23.9
Test Date:	28/06/2018 16:14:06	**H (%):**	40.8
Test Operator:	MPA	**P (hPa):**	1010



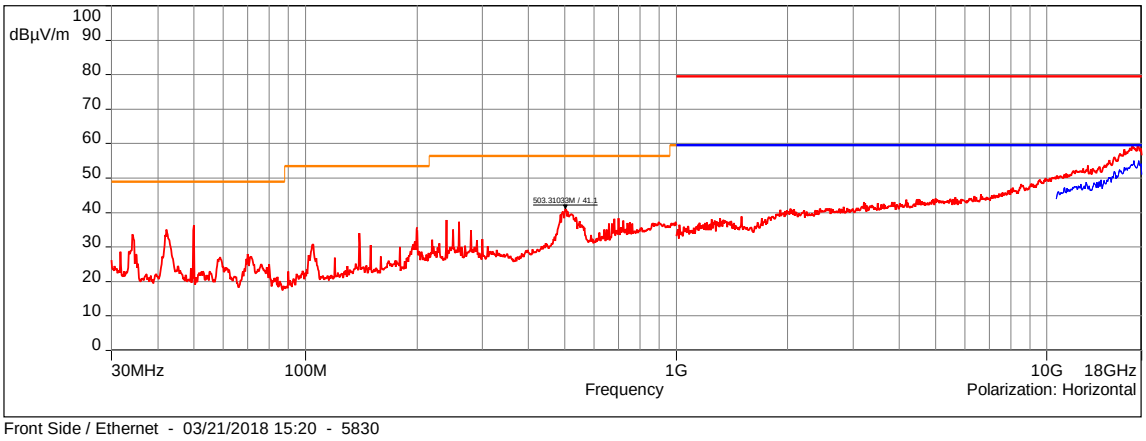
RNE / Tx mode / High channel - 06/28/2018 16:14 - 5809



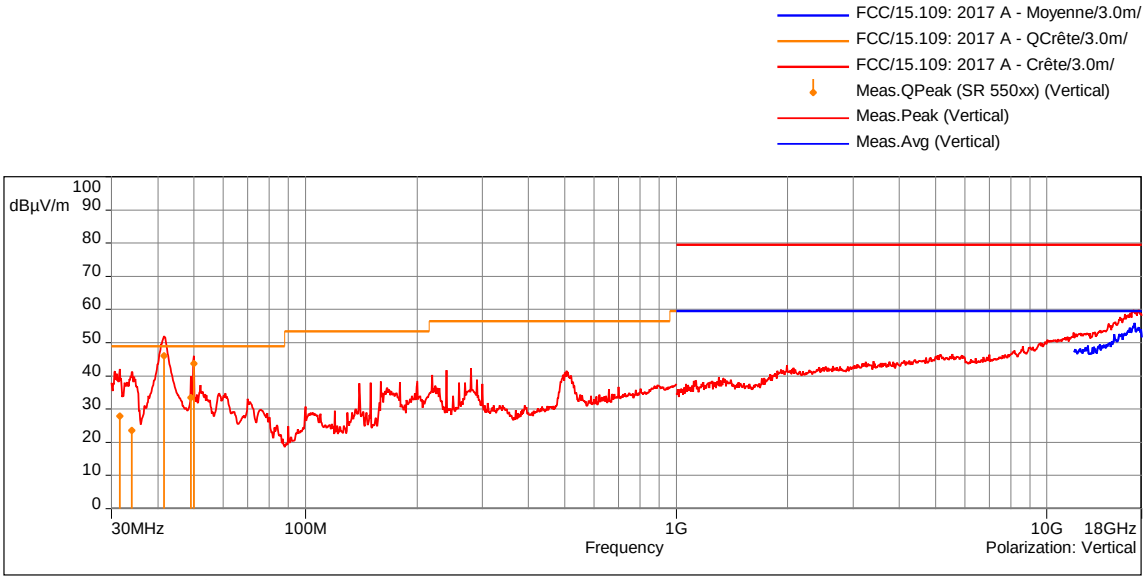
RNE / Tx mode / High channel - 06/28/2018 16:14 - 5809

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-18GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Horizontal	3GHz-18GHz	1MHz	3MHz	Mes.Peak; Mes.Avg;
Configuration:	Test is done with mod. type n) wich present the highest level and the higher frequency occupation.			
Comments:	Carrier frequency is rejected by a notch filter.			
EUT modification(s): N/A				

RADIATED SPURIOUS EMISSIONS - GRAPH			
ETHERNET		EMI5830	
EUT mode:	# 2	**T (°C):**	13.7
Test Date:	21/03/2018 15:20:04	**H (%):**	30.7
Test Operator:	FMO	**P (hPa):**	1008



Front Side / Ethernet - 03/21/2018 15:20 - 5830



Front Side / Ethernet - 03/21/2018 15:20 - 5830

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-200MHz	100kHz	300kHz	Peak & QPeak(120kHz)
Horizontal	30MHz-200MHz	100kHz	300kHz	Peak & QPeak(120kHz)
Vertical	200MHz-1GHz	100kHz	300kHz	Peak
Horizontal	200MHz-1GHz	100kHz	300kHz	Peak
Vertical	1GHz-18GHz	1MHz	3MHz	Peak and Avg
Horizontal	1GHz-18GHz	1MHz	3MHz	Peak and Avg
Measure with:	Measurements maximized at 360 ° in peak maxhold mode.			
Comments:	N/A			
EUT modification(s): N/A				

End of test report