TEST REPORT

N°: 143160-689135-C(FILE#916702) **Version : 02**

Subject	**Electromagnetic compatibility and Radio spectrum Matters (ERM) tests according to standards: FCC CFR 47 Part 15, Subpart C RSS-247 Issue 1.0**
Issued to	**INGENICO** **9 Avenue de la Gare Rovaltain TGV** **26300 – VALENCE - FRANCE**
Apparatus under test	
Product	**Payment terminal**
Trade mark	**INGENICO**
Manufacturer	**INGENICO**
Model under test	**Desk/5000 CL/Eth/Mod/WiFi/BT**
Reference	**TCA33310133A**
Serial number	**160287313331013301014523 & 160287313331013301016014**
FCCID	**XKB-D5000CLWIBT**
IC	**2586D-D5000CLWIBT**
Conclusion	See Test Program chapter
Test date	August 31, 2016 to September 30, 2016
Test location	MOIRANS
IC Test site	6500A-1 & 6500A-3
Composition of document	50 pages
Document issued on	December 19, 2016

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	September 30, 2016	Gaetan DESCHAMPS	Creation of the document
02	December 19, 2016	Gaetan DESCHAMPS	Modification of the document further to review

SUMMARY

1. TEST PROGRAM

Standard:

- **FCC Part 15, Subpart C 15.247**
- **ANSI C63.10 (2013)**
- **RSS-247 Issue 1.0 – May 2015**
- **RSS-Gen Issue 4 – Nov 2014**
- **558074 D01 DTS Measurement Guidance v03r05**

EMISSION TEST	LIMITS			RESULTS
Limits for conducted disturbance at mains ports 150kHz-30MHz	**Frequency**	**Quasi-peak value (dBµV)**	**Average value (dBµV)**	☐ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
	150-500kHz	66 to 56	56 to 46	
	0.5-5MHz	56	46	
	5-30MHz	60	50	
Radiated emissions 9kHz-30MHz *CFR 47 §15.209 (a)* *CFR 47 §15.247 (d)* *RSS-247 §5.5*	**Measure at 300m** 9kHz-490kHz : 67.6dBµV/m /F(kHz) **Measure at 30m** 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) 1.705MHz-30MHz : 29.5 dBµV/m			☐ **PASS** ☐ **FAIL** ☑ **NA** ☐ **NP**
Radiated emissions 30MHz-25GHz* *CFR 47 §15.209 (a)* *CFR 47 §15.247 (d)* *RSS-247 §5.5* ***Highest frequency :510MHz*** ***(Declaration of provider)***	**Measure at 3m** 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m Above 960MHz : 54.0 dBµV/m			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Bandwidth 6dB *CFR 47* §15.247 (a) (2) *RSS-247 §5.2*	**At least 500kHz**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Power spectral Density *CFR 47 §15.247 (e)* *RSS-247 §5.2*	**Limit: 8dBm/3kHz**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Maximum Peak Output Power *CFR 47 §15.247 (b)* *RSS-247 §5.4*	**Limit: 30dBm** Conducted or Radiated measurement			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Band Edge Measurement *CFR 47 §15.209 (a)* *CFR 47 §15.247 (d)* *RSS-247 §5.5*	**Limit: -20dBc or** **Radiated emissions limits in restricted bands**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Occupied bandwidth *RSS-Gen §4.6.1*	**No limit**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Receiver Spurious Emission** *RSS-Gen §4.10*	**See RSS-Gen §4.10**			☐ **PASS** ☐ **FAIL** ☑ **NA** ☐ **NP**

***§15.33:** The highest internal source of a testing device is defined like more the highest frequency generated or used in the testing device or on which the testing device works or agrees.
- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must be only performed until 1GHz.
- If the highest frequency of the internal sources of the testing device ranges between 108 MHz and 500 MHz, measurement must be only performed until 2GHz.
- If the highest frequency of the internal sources of the testing device ranges between 500 MHz and 1 GHz, measurement must be only performed until 5GHz.

If the highest frequency of the internal sources of the testing device is above 1 GHz, measurement must be only performed until 5 times the highest frequency or 40 GHz, while taking smallest of both.

2. SYSTEM TEST CONFIGURATION

2.1. JUSTIFICATION

The EUT can be used with different configuration :

- ✓ **Initial functionnalities**
  - Cless Interface (RFID)
  - Bluetooth chipset: CSR8811 (CSR)
  - SAM1 & SAM2 readers
  - Host or slave (µUSB connector)
  - USB Host (Type A connector)
  - RS232 (COM1)
  - Modem RTC
  - Ethernet
- ✓ **With option card (internal)**
  - RS232-COM2
  - Jack Audio
  - SAM3
  - Bluetooth chipset: CSR8811 (CSR)
  - Chipset Marvell 88W8782
- ✓ **1 power supply**
  - PSM32W-080L6IN-R-

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
Desk/5000 CL/Eth/Mod/WiFi/BT
Serial Number: 160287313331013301014523 & 160287313331013301016014

Photography of EUT

Power supply:
During all the tests, EUT is supplied by V_{nom}: 8VDC
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Mark	Comments
Supply1	☑ AC ☐ DC ☐ Battery	100-240VAC to 8VDC, 50/60Hz 0.9 A to 4A	PSM32W-080L6IN-R- / PHIHONG	-

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	Input AC, 2 wires	1.8	☑	☐	☑	
	Output DC, Jack	1.8	☑	☐	☑	
Twist cable to Magicbox	Power supply Jack	2	☑	☐	☑	Supply Terminal
	RJ11					COM0
	RJ45					Ethernet line
	RJ11					Modem line
SAM1	SAM card	/	/	/	☑	/
SAM2	SAM card	/	/	/	☑	/
SAM3	SAM card	/	/	/	☑	/
CAM0	SAM card	/	/	/	☑	/
USB	USB port (Micro-B)	1	☑	☑	☑	/
USB HOST	USB port (Type A)	1	☑	☑	☑	/
MicroSD	Micro SD port	/	/	/	☑	/
COM2	Mini USB	1	☐	☑	☑	/
Audio	Audio Jack 3.5mm	1	☐	☑	☑	/
SIM1	SIM CARD	/	/	/	☑	/
SIM2	SIM CARD	/	/	/	☑	/

Inputs/outputs & Cable: Magicbox 51/2014 CUST P/N: 296165425 INGELEC P/N : MUL0885C						
Access	**Type**	**Length used (m)**	**Declared <3m**	**Shielded**	**Under test**	**Comments**
Supply Magicbox	Power supply Jack	1.5	☑	☐	☑	/
COM0	RJ11	3	☐	☐	☑	/
Ethernet	RJ45	5	☐	☐	☑	/
Modem	RJ11	5	☐	☐	☑	/
Magicbox cable twisted	Twist cable	2	☑	☐	☑	/

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Access point	ASUS	-	-
TOSHIBA Laptop	Satellite	-	-

Equipment information:

Type:	**WIFI**			
Frequency band:	[2400 – 2483.5] MHz			
Sub-band REC7003:	Annex 3 (a)			
Standard:	☑ 802.11b	☑ 802.11g	☑ 802.11n HT20	☑ 802.11n HT40
Spectrum Modulation:	☑ DSSS		☑ OFDM	
Number of Channel:	13			
Spacing channel:	5 MHz			
Channel bandwidth:	☑ 20MHz		☑ 40MHz	
Antenna Type:	☑ Integral	☐ External	☐ Dedicated	
Antenna connector:	☐ Yes	☑ No	☑ Temporary for test	
Transmit chains:	☑ 1	☐ 2	☐ 3	☐ 4
	☑ Single antenna	☐ Symmetrical	☐ Asymmetrical	
	Gain 1: 0.8 dBi	Gain 2: dBi	Gain 3: dBi	Gain 4: dBi	Accumuled Gain: dBi
Beam forming gain:	☐ Yes: dB		☑ No	
Receiver chains	☑ 1	☐ 2	☐ 3	☐ 4
Type of equipment:	☐ Stand-alone	☑ Plug-in	☐ Combined	
Ad-Hoc mode:	☐ Yes		☑ No	
Adaptivity mode:	☑ Yes (Load Based)	☐ Off mode	☐ No	
	Clear Channel Assessment Time		20 µs or more	
Duty cycle:	☑ Continuous duty	☐ Intermittent duty	☐ 100% duty	
Equipment type:	☑ Production model		☐ Pre-production model	
Operating temperature range:	Tmin:	☑ -20°C	☐ 0°C	☐ X°C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☑ 55°C	☐ X°C
Type of power source:	☑ AC power supply	☐ DC power supply	☐ Battery	
Operating voltage range:	Vnom:	☑ 230V/50Hz	☐ Vdc	
Geo-location capability:	☐ Yes (The geographical location determined by the equipment is not accessible to the end user as defined in section 4.3.2.12.2 of ETSI EN 300 328 V1.9.1 standard)		☑ No	

CHANNEL PLAN	
802.11b / 802.11g / 802.11n HT20	
Channel	Frequency (MHz)
Cmin: 1	**2412**
2	2417
3	2422
4	2427
5	2432
Cmid: 6	**2437**
7	2442
8	2447
9	2452
10	2457
Cmax: 11	**2462**

CHANNEL PLAN	
802.11n HT40	
Channel	Frequency (MHz)
Cmin: 3	**2422**
4	2427
5	2432
Cmid: 6	**2437**
7	2442
8	2447
Cmax: 9	**2452**

2.3. EUT CONFIGURATION

There are 2 configuration tests:

- Configuration digital device (only used in §3 and §4):

The EUT is set in the following modes during tests:
Backlight : **Yes**
Printer : **Yes** -> Ticket **No**
Modem : **Yes**
Cless : **No**
WIFI : **Yes**
Bluetooth : **No**
Ethernet : **Yes**
Sam1 : **Yes**
Sam2 : **Yes**
Sam3 : **Yes**
Cam0 : **Yes**
Com0 : **Yes**
Com2 : **Yes**
USB : **Yes** (reloop cable between host and slave)
MMC : **No**
Swipe: **No**

- Configuration radio device(used in §4, §5, §6, §7, §8 and §9):

The EUT is set in the following modes during tests:
- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
- Permanent emission with modulation on a fixed channel in the data rate that produced the lowest power
- Permanent emission without modulation on a fixed channel in the data rate that produced the highest power
- Permanent reception
- Emission-reception with a duty cycle above 30% in the data rate that produced the highest output power

To set the commands in EUT, the product should be connected with her base in Ethernet and then the following commands with the specific test software “DutApiBRIDGEETH8782” are used to set the product:

There are 2 order powers (see §2.4):

- **Command 20:**

For TX mode:

802.11b :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 12 1 : Set canal 1
- 22 1 20 0: Set the calibration on the canal 1 with the order power at 20dBm and the “0”is used to specify 802.11b.
- 17 1 1: Sets the device for continuous transmission of a modulated waveform with data rate at 1Mbps.

802.11g :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 12 1 : Set canal 1
- 22 1 20 1: Set the calibration on the canal 1 with the order power at 20dBm and the “1”is used to specify 802.11g.
- 17 1 6: Sets the device for continuous transmission of a modulated waveform with data rate at 6Mbps.

802.11nHT20 :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 112 0: For HT20
- 12 1 : Set canal 1
- 22 1 20 1: Set the calibration on the canal 1 with the order power at 20dBm
- 17 1 15: Sets the device for continuous transmission of a modulated waveform with data rate at 6.5Mbps in MCS0.

802.11nHT40 :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 112 1: For HT40
- 12 3 : Set canal 3
- 22 3 20 1: Set the calibration on the canal 3 with the order power at 20dBm
- 17 1 15: Set the device for continuous transmission of a modulated waveform with data rate at 13.5Mbps in MCS0.

For RX mode:

802.11b :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 12 1 : Set canal 1
- 22 1 20 0: Set the calibration on the canal 1 with the order power at 20dBm and the “0”is used to specify 802.11b.
- 31: Rx Start and packet counter actived.

- **Command 13:**

For TX mode:

802.11b :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 12 1 : Set canal 1
- 22 1 13 0: Set the calibration on the canal 1 with the order power at 20dBm and the “0”is used to specify 802.11b.
- 17 1 1: Sets the device for continuous transmission of a modulated waveform with data rate at 1Mbps.

802.11g :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 12 1 : Set canal 1
- 22 1 13 1: Set the calibration on the canal 1 with the order power at 13dBm and the “1”is used to specify 802.11g.
- 17 1 6: Sets the device for continuous transmission of a modulated waveform with data rate at 6Mbps.

802.11nHT20 :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 112 0: For HT20
- 12 1 : Set canal 1
- 22 1 13 1: Set the calibration on the canal 1 with the order power at 13dBm
- 17 1 15: Sets the device for continuous transmission of a modulated waveform with data rate at 6.5Mbps in MCS0.

802.11nHT40 :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 112 1: For HT40
- 12 3 : Set canal 3
- 22 3 13 1: Set the calibration on the canal 3 with the order power at 13dBm
- 17 1 15: Set the device for continuous transmission of a modulated waveform with data rate at 13.5Mbps in MCS0.

For RX mode:

802.11b :

- 1 : Connexion
- 30 0 : WIFI 2.4GHZ
- 12 1 : Set canal 1
- 22 1 13 0: Set the calibration on the canal 1 with the order power at 13dBm and the “0”is used to specify 802.11b.
- 31: Rx Start and packet counter actived.

Firmware / Software version of EUT: SDK_OS 03.20.08

2.4. EQUIPMENT MODIFICATIONS

☐ None
☑ Modification: There are 2 order powers that have been tested. The first in worst case and the second as the original command:

- Command 20: Worst case, tested in the test §5 Bandwitdh, §7 Power Spectral Density, §9 Occupied bandwidth.
  ⇨ §4 Radiated emission Data doesn't comply with this command power, so provider reduced power command for following tests.
- Command 13: Reduced command, for the test §3 Conducted and §4 Radiated emission Data, §6 Maximum Conducted Output Power, § 8 Band edge Measurement.

2.5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

FS = RA + AF + CF – AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.
FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m
The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(32dBµV/m)/20] = 39.8 µV/m.

2.6. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period

3. CONDUCTED EMISSION DATA

3.1. ENVIRONMENTAL CONDITIONS

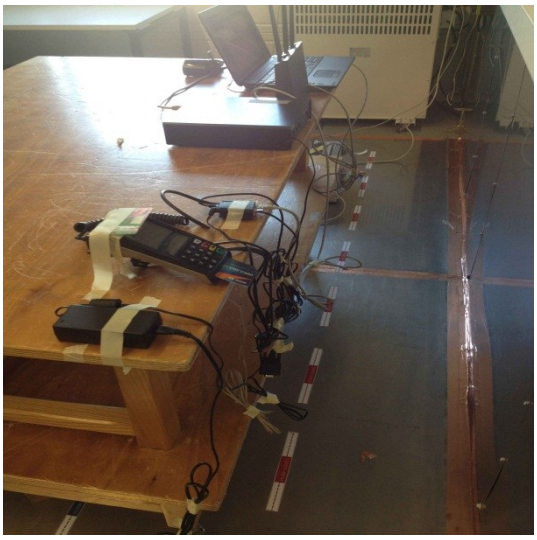
Date of test	:	September 23, 2016
Test performed by	:	Jonathan Sarto
Atmospheric pressure (hPa)	:	1003
Relative humidity (%)	:	32
Ambient temperature (°C)	:	20

3.2. TEST SETUP

Mains terminals

The EUT and auxiliaries are set:
☑ 80cm above the ground on the non-conducting table (Table-top equipment)
☐ 10cm above the ground on isolating support (Floor standing equipment)
The distance between the EUT and the LISN is 80cm. The EUT is 40cm away for the vertical ground plane.

The EUT is powered by V_{nom}.
The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.



Test setup

3.3. TEST METHOD

The product has been tested according to ANSI C63.10 and FCC Part 15 subpart C. The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 limits. Measurement bandwidth was 9kHz from 150kHz to 30MHz. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50µH. The Peak data are shown on plots in annex 1. Quasi-Peak and Average measurements are detailed in a table with frequencies and levels measured. Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.
Measurements are performed on the phase (L1) and neutral (N) of power line voltage. Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.

3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable + self	-	-	A5329585	04/16	04/17
Conducted emission comb generator	BARDET	-	A3169049	-	-
LISN	RHODE & SCHWARZ	ENV216	C2320123	02/16	02/17
LISN	RHODE & SCHWARZ	ENV216	C2320291	11/15	11/16
Load 50Ω	-	-	A7152030	04/16	04/17
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	08/16	08/17
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
Transient limiter	RHODE & SCHWARZ	ESH3-Z2	A7122204	01/16	01/17

3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

3.6. TEST RESULTS

Measurements are performed on the phase (L1) and neutral (N) of the power line.
Results: (PEAK detection)

Measure on L1:	graph **Emc#1**	(see annex 1)
Measure on N:	graph **Emc#2**	(see annex 1)

3.7. CONCLUSION

Conducted emission data measurement performed on the sample of the product **Desk/5000 CL/Eth/Mod/WiFi/BT**, SN: 160287313331013301014523, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

4. RADIATED EMISSION DATA

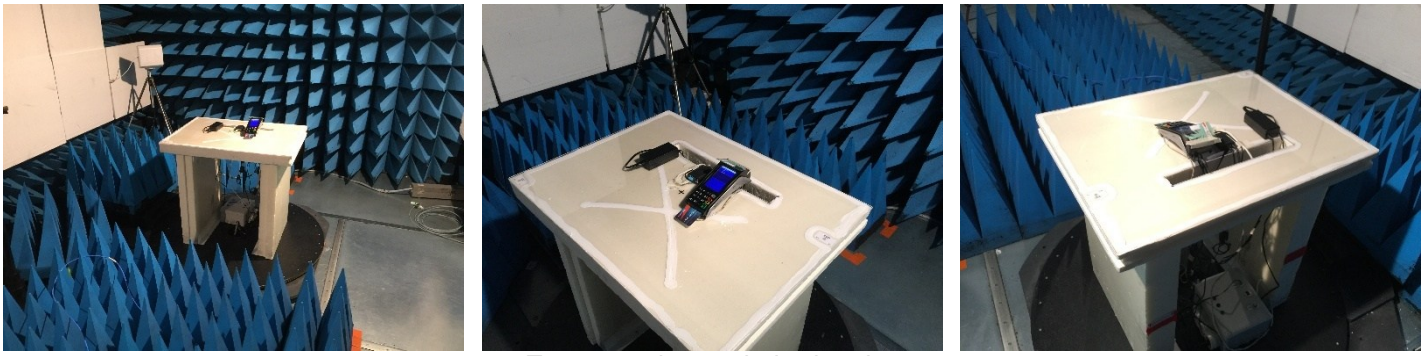
4.1. ENVIRONMENTAL CONDITIONS

Date of test	:	August 2, 2016
Test performed by	:	Gaëtan DESCHAMPS
Atmospheric pressure (hPa)	:	999
Relative humidity (%)	:	32
Ambient temperature (°C)	:	23

4.1. TEST SETUP

The installation of EUT is identical for pre-characterization measures in a 3 meters semi- anechoic chamber and for measures on the 10 meters Open site.
The EUT and auxiliaries are set:
☑ 80cm above the ground on the non-conducting table (Table-top equipment) - Below 1GHz
☑ 150cm above the ground on the non-conducting table (Table-top equipment) - Above 1GHz
☐ 10cm above the ground on isolating support (Floor standing equipment)
The EUT is powered by V_{nom}.

Test setup on OATS



Test setup in anechoic chamber
(Below 1GHz)

Test setup in anechoic chamber
(Above 1GHz)

4.2. TEST METHOD

The product has been tested according to ANSI C63.10, FCC part 15 subpart C.

Pre-characterisation measurement: (9kHz – 5GHz)
A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 5GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test to maximize the emission measurement. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration.
The pre-characterization graphs are obtained in PEAK detection and PEAK/AVERAGE from 1GHz to 2GHz.

Characterization on 10 meters open site from 9kHz to 1GHz:
Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC. The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart C limits. Measurement bandwidth was 9kHz below 30MHz and 120kHz from 30 MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test to maximize the emission measurement. The height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.
Frequency list has been created with anechoic chamber pre-scan results.

Characterization on 3 meters full anechoic chamber from 1GHz to 25GHz:
The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC part 15 subpart C limits. Measurement bandwidth was 1MHz from 1GHz to 25GHz.
Test is performed in horizontal (H) and vertical (V) polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.The height antenna is
☐ On mast, varied from 1m to 4m
☑ Fixed and centered on the EUT (EUT smaller than the beamwidth of the measurement antenna, ANSI C63.10 §6.6.5)
Frequency list has been created with anechoic chamber pre-scan results.

4.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Amplifier 1-13GHz	LCIE SUD EST	-	A7102067	04/16	04/17
Antenna Bi-log	CHASE	CBL6111A	C2040051	06/16	06/18
Antenna horn 18GHz	EMCO	3115	C2042027	11/15	11/16
Cable Measure @3m 18GHz	-	-	A5329038	08/15	08/16
Cable Measure @3m	-	-	A5329206	04/16	04/17
Cable Measure @1m	STORMFLEX	0	A5329680	01/16	01/17
Cable Measure Analyzer-Amplifier SMA	STORMFLEX	0	A5329681	05/16	05/17
Cable Measure @1m	STORMFLEX	0	A5329682	01/16	01/17
Semi-Anechoic chamber #3	SIEPEL	-	D3044017	03/16	03/19
Radiated emission comb generator	BARDET	-	A3169050	-	-
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088	-	-
OATS	-	-	F2000409	06/15	06/16
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	04/16	04/17
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	04/16	04/17
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371	-	-
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372	-	-
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392	-	-
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403	-	-
Table	MATURO Gmbh	-	F2000437	-	-
Table	LCIE	-	F2000461	-	-
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444	-	-

4.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

4.5. TEST RESULTS

4.5.1. Pre-characterization at 3 meters [30MHz-1GHz]

See graphs for 30MHz-1GHz:

Graph identifier	Polarization	Mode	EUT position	Comments
Emr# 1	H/V	TX	Axis XY	See annex 1

4.5.2. Pre-characterization at 3 meters [1GHz-5GHz]

See graphs for 1GHz-5GHz:

Graph identifier	Polarization	Mode	EUT position	Comments
Emr# 2	H/V	TX	Axis XY	See annex 1

4.5.3. Characterization on 10 meters open site from 30MHz to 1GHz

Worst case final data result in Configuration digital device:

Frequency list has been created with semi-anechoic chamber pre-scan results.
Measurements are performed using a QUASI-PEAK detection.

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Gain/Loss Factor (dB)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Remark
37.531	23.5	QP	V	360	100	-	16.0	39.5	40.0	**-0.5**	
40.680	25.2	QP	V	360	100	-	14.3	39.5	40.0	**-0.5**	
81.204	18.7	QP	V	135	120	-	8.9	27.6	40.0	**-12.4**	
467.497	22.9	QP	V	280	100	-	21.3	44.2	46.0	**-1.8**	
743.700	12.0	QP	V	170	250	-	26.6	38.6	46.0	**-7.4**	
960.000	15.6	QP	H	61	100	-	30.2	45.8	46.0	**-0.2**	

Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e)
(M@3m = M@10m+10.5dB)

4.5.4. Characterization on 3meters anechoic chamber from 1GHz to 25GHz

Worst case final data result in Configuration Radio device:

The frequency list is created from the results obtained during the pre-characterization in anechoic chamber.
Measurements are performed using a PEAK and AVERAGE detection.

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Gain/Loss Factor (dB)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Remark
4824.000	49.2	Pk	V	120	150	-	4.6	53.8	74.0	**-20.2**	
4874.000	49.3	Pk	V	120	150	-	4.7	54.0	74.0	**-20.0**	
4924.000	49.2	Pk	V	120	150	-	4.8	54.0	74.0	**-20.0**	
4824.000	33.4	Av	V	120	150	-	4.6	38.0	54.0	**-16.0**	
4874.000	33.6	Av	V	120	150	-	4.7	38.3	54.0	**-15.7**	
4924.000	33.5	Av	V	120	150	-	4.8	38.3	54.0	**-15.7**	

Note: Measures have been done at 3m distance.

4.6. CONCLUSION

Radiated emission data measurement performed on the sample of the product **Desk/5000 CL/Eth/Mod/WiFi/BT**, SN: 160287313331013301014523, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

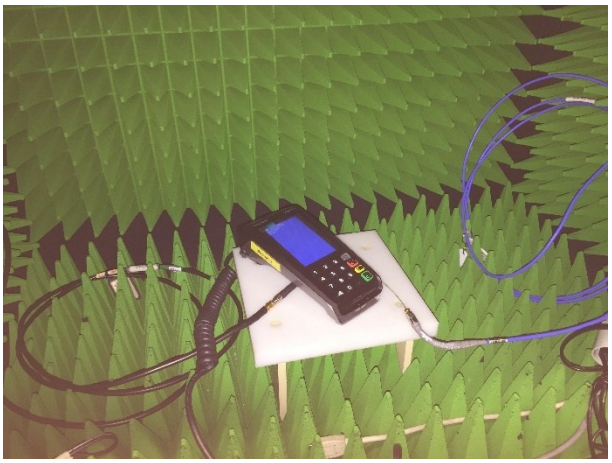
5. BANDWIDTH (15.247)

5.1. TEST CONDITIONS

Date of test	:	September 2, 2016
Test performed by	:	Gaëtan DESCHAMPS
Atmospheric pressure (hPa)	:	999
Relative humidity (%)	:	23
Ambient temperature (°C)	:	32

5.2. SETUP

☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
Offset: Attenuator+cable 10.3dB



☐ ***Radiated measurement:***
The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete, a delta marker is used to measure the frequency difference as the emission bandwidth.

Measurement Procedure: §8.1 Option 1 (DTS Measurement Guidance)
1. Set resolution bandwidth (RBW) = 100kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer.

5.3. TEST EQUIPMENT LIST

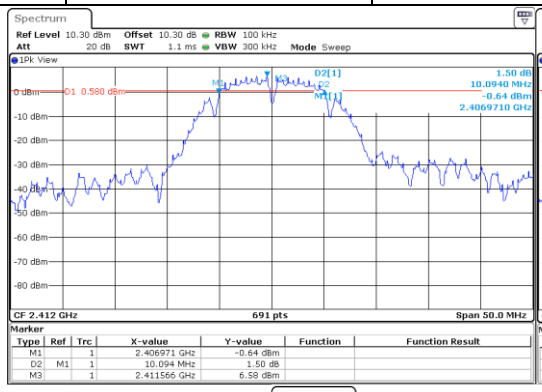
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable Measure Analyzer-Amplifier SMA	STORMFLEX	0	A5329681	05/16	05/17
Attenuator 10dB	AEROFLEX	-	A7122268	06/16	06/17
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

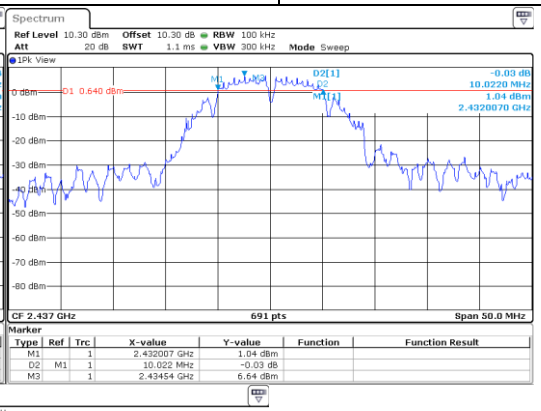
5.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

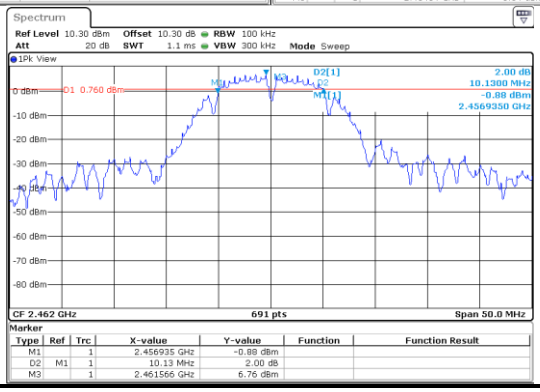
☑ None ☐ Divergence:

5.5. TEST SEQUENCE AND RESULTS

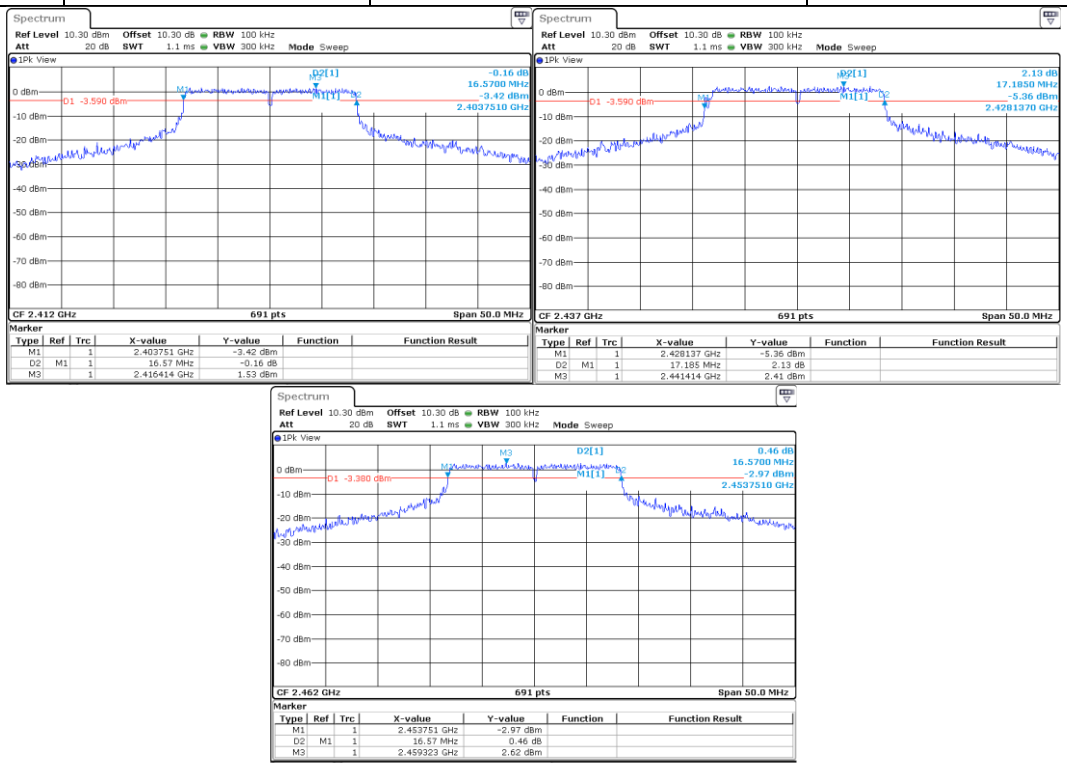
802.11b			
Channel	**Channel Frequency (MHz)**	**6dB Bandwidth (MHz)**	**Bandwidth Limit (MHz)**
Cmin	2412	**10.09**	**>0.5**
Cmid	2437	**10.02**	**>0.5**
Cmax	2462	**10.13**	**>0.5**



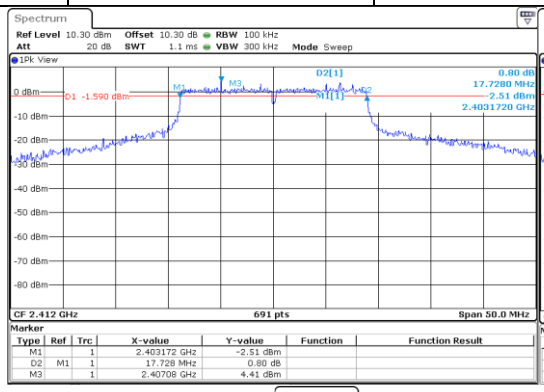


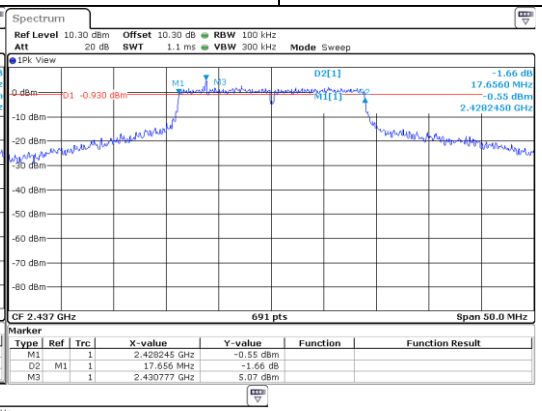


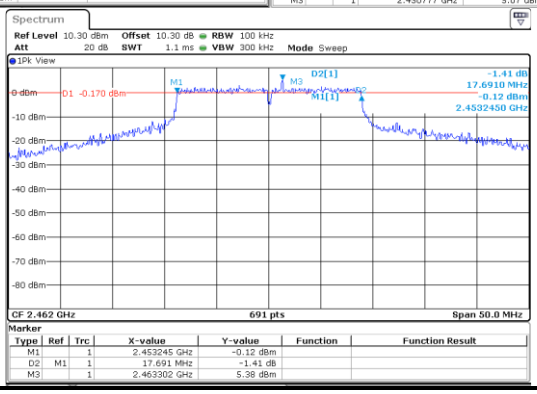
802.11g			
Channel	**Channel Frequency (MHz)**	**6dB Bandwidth (MHz)**	**Bandwidth Limit (MHz)**
Cmin	2412	**16.57**	**>0.5**
Cmid	2437	**17.18**	**>0.5**
Cmax	2462	**16.57**	**>0.5**



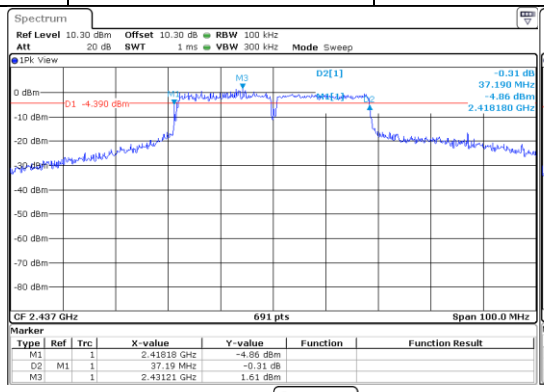
802.11nHT20			
Channel	**Channel Frequency (MHz)**	**6dB Bandwidth (MHz)**	**Bandwidth Limit (MHz)**
Cmin	2412	**17.72**	**>0.5**
Cmid	2437	**17.65**	**>0.5**
Cmax	2462	**17.69**	**>0.5**

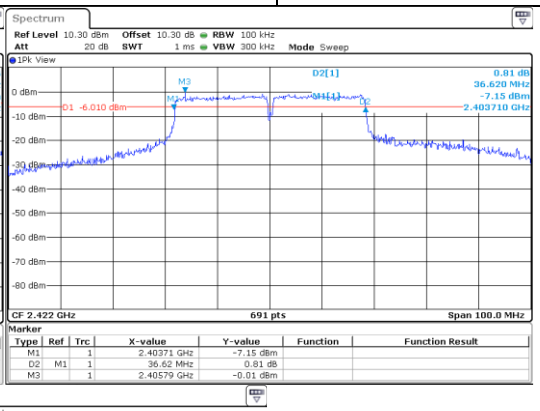


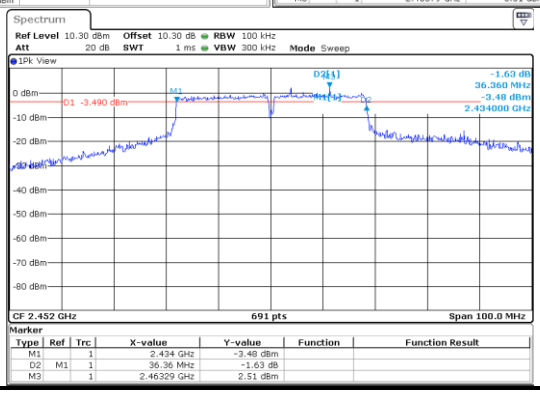




802.11nHT40			
Channel	**Channel Frequency (MHz)**	**6dB Bandwidth (MHz)**	**Bandwidth Limit (MHz)**
Cmin	2422	**36.62**	**>0.5**
Cmid	2437	**37.19**	**>0.5**
Cmax	2452	**36.36**	**>0.5**







5.6. CONCLUSION

Bandwidth measurement performed on the sample of the product **Desk/5000 CL/Eth/Mod/WiFi/BT**, SN: 160287313331013301014523, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

6. MAXIMUM CONDUCTED OUTPUT POWER (15.247)

6.1. TEST CONDITIONS

Date of test	:	September 2, 2016
Test performed by	:	Gaëtan DESCHAMPS
Atmospheric pressure (hPa)	:	999
Relative humidity (%)	:	23
Ambient temperature (°C)	:	32

6.2. SETUP

☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.
Offset: Attenuator+cable 11.7dB

☐ ***Radiated measurement:***
The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency.
The product has been tested at a distance of 3 meters from the antenna. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following table. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where:
- E is the measured maximum fundamental field strength in V/m.
- G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.
- d is the distance in meters from which the field strength was measured.
- P is the power in watts for which you are solving:

$$P = \frac{(Ed)^2}{30G}$$

Maximum peak conducted output power

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

- ☐ ***RBW ≥ DTS bandwidth §9.1.1 (DTS Measurement Guidance)***

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 x RBW.
c) Set span ≥ 3 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

- ☐ ***Integrated band power method***

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

a) Set the RBW = 1 MHz.
b) Set the VBW ≥ 3 x RBW
c) Set the span ≥ 1.5 x DTS bandwidth.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges

- ☑ KDB 558074 D01 DTS Meas Guidance v03r05 § 9.2.2.2 (Method AVGSA-1)

a) Set span to at least 1.5 times the OBW.
b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
c) Set VBW ≥ 3 x RBW.
d) Number of points in sweep ≥ 2 x span / RBW.
e) Sweep time = auto.
f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall
be set to "free run".
h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

6.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/16	06/17
Cable 40GHz 2m coudé	-	-	A5329720	05/16	05/17
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

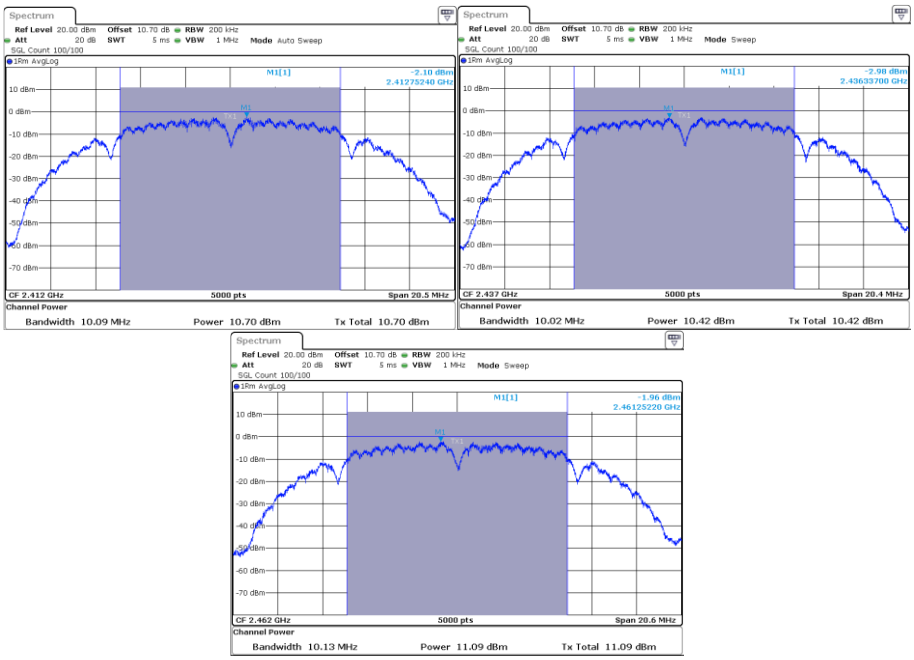
6.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

6.5. TEST SEQUENCE AND RESULTS

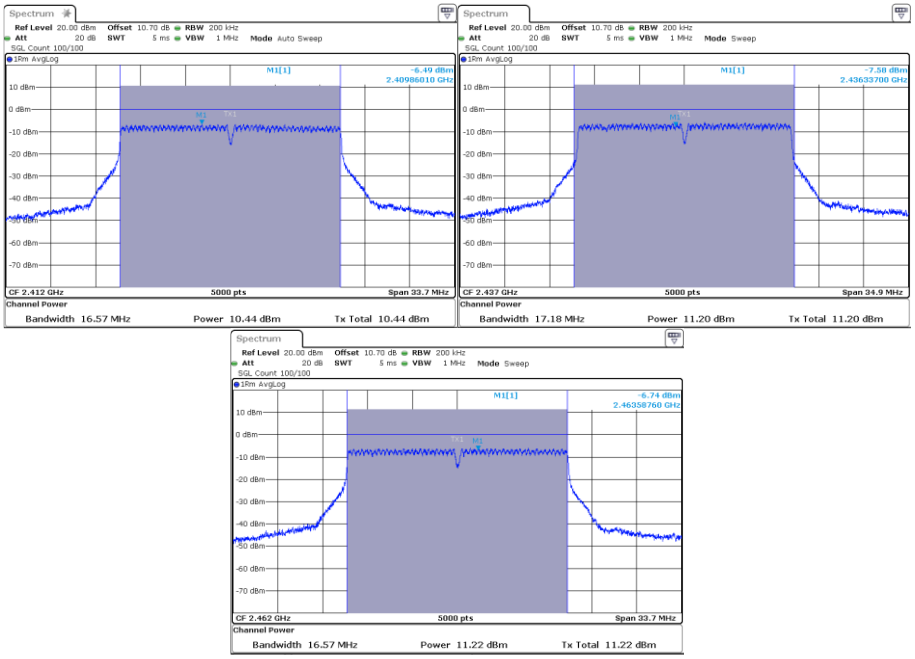
Modulation:
802.11b

Channel	Channel Frequency (MHz)	Average Output Power (dBm)	Power Limit (dBm)
Cmin	2412	**10.70**	30.0
Cmid	2437	**10.42**	30.0
Cmax	2462	**11.09**	30.0



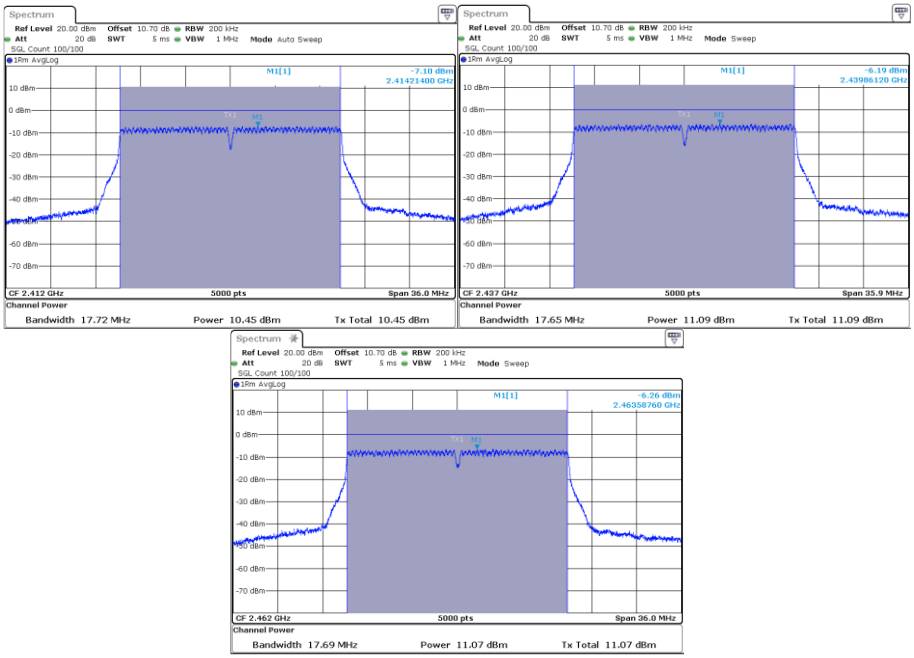
802.11g

Channel	Channel Frequency (MHz)	Average Output Power (dBm)	Power Limit (dBm)
Cmin	2412	**10.44**	30.0
Cmid	2437	**11.20**	30.0
Cmax	2462	**11.22**	30.0



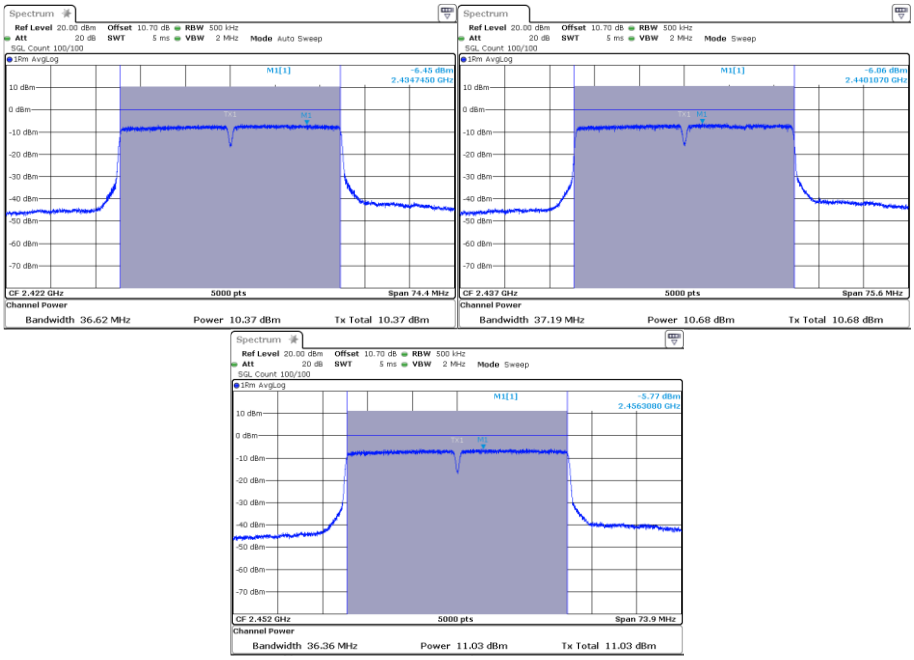
802.11nHT20

Channel	Channel Frequency (MHz)	Average Output Power (dBm)	Power Limit (dBm)
Cmin	2412	**10.45**	30.0
Cmid	2437	**11.09**	30.0
Cmax	2462	**11.07**	30.0



802.11nHT40

Channel	Channel Frequency (MHz)	Average Output Power (dBm)	Power Limit (dBm)
Cmin	2422	**10.37**	30.0
Cmid	2437	**10.68**	30.0
Cmax	2452	**11.03**	30.0



6.6. CONCLUSION

Maximum Output Power measurement performed on the sample of the product **Desk/5000 CL/Eth/Mod/WiFi/BT**, SN: 160287313331013301014523, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

7. POWER SPECTRAL DENSITY (15.247)

7.1. TEST CONDITIONS

Date of test	:	September 22, 2016
Test performed by	:	Gaëtan DESCHAMPS
Atmospheric pressure (hPa)	:	1003
Relative humidity (%)	:	30
Ambient temperature (°C)	:	20

7.2. SETUP

☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.
Offset: Attenuator+cable 11.7dB

☐ ***Radiated measurement:***
The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency.
The product has been tested at a distance of 3 meters from the antenna. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following table. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where:
- E is the measured maximum fundamental field strength in V/m.
- G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.
- d is the distance in meters from which the field strength was measured.
- P is the power in watts for which you are solving:

$$P = \frac{(Ed)^2}{30G}$$

- ☐ ***Measurement Procedure PKPSD: §10.2 (DTS Measurement Guidance)***

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

- ☑ ***KDB 558074 D01 DTS Meas Guidance v03r05 § 10.3 (Method AVGPSD-1)***

a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

7.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/16	06/17
Cable 40GHz 2m coudé	-	-	A5329720	05/16	05/17
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

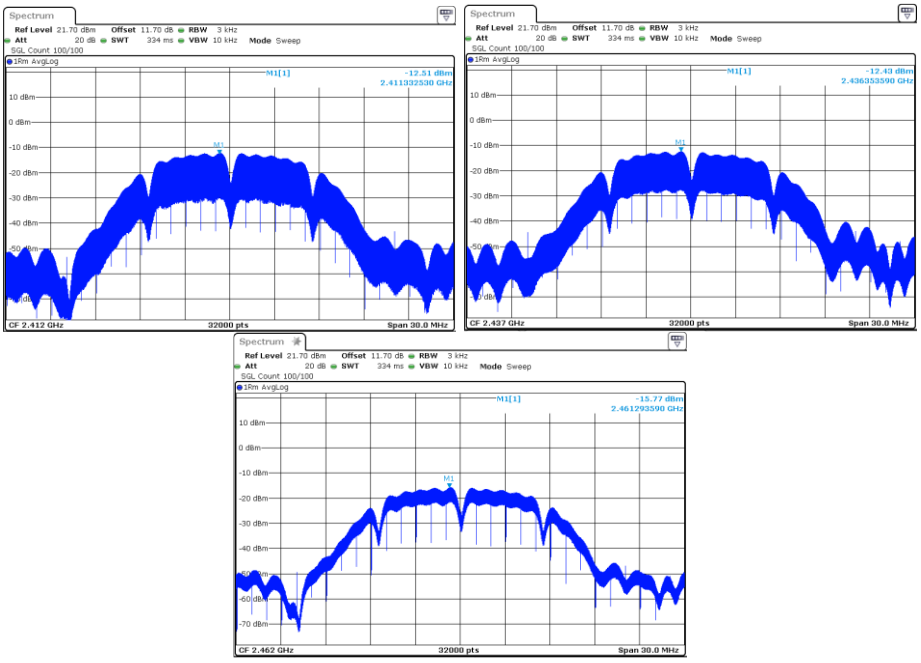
7.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

7.5. TEST SEQUENCE AND RESULTS

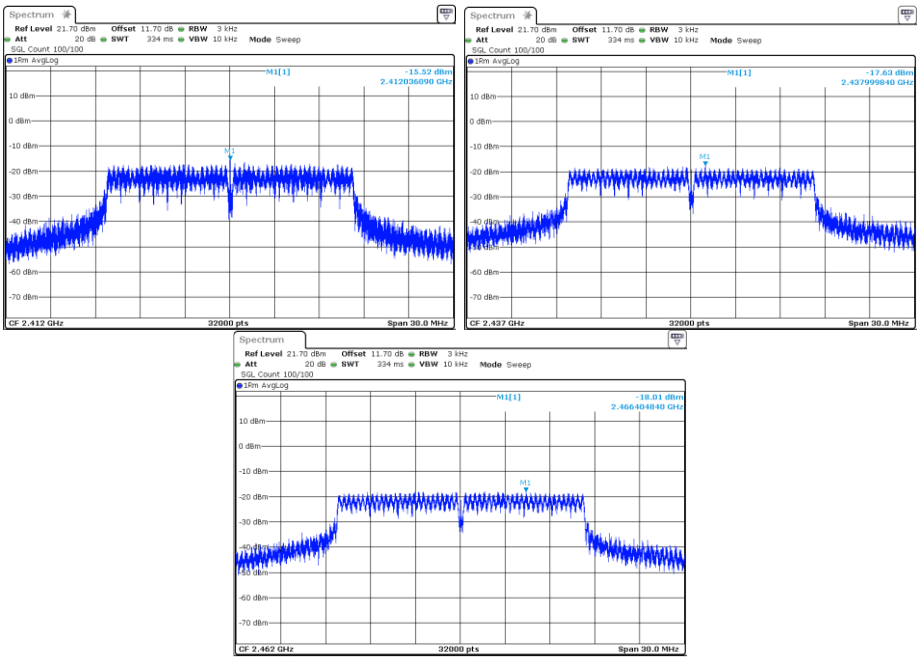
Modulation:
802.11b

Channel	Channel Frequency (MHz)	Power Spectral Density (dBm)	PSD Limit (dBm)
Cmin	2412	**-12.51**	8.0
Cmid	2437	**-12.43**	8.0
Cmax	2462	**-15.77**	8.0



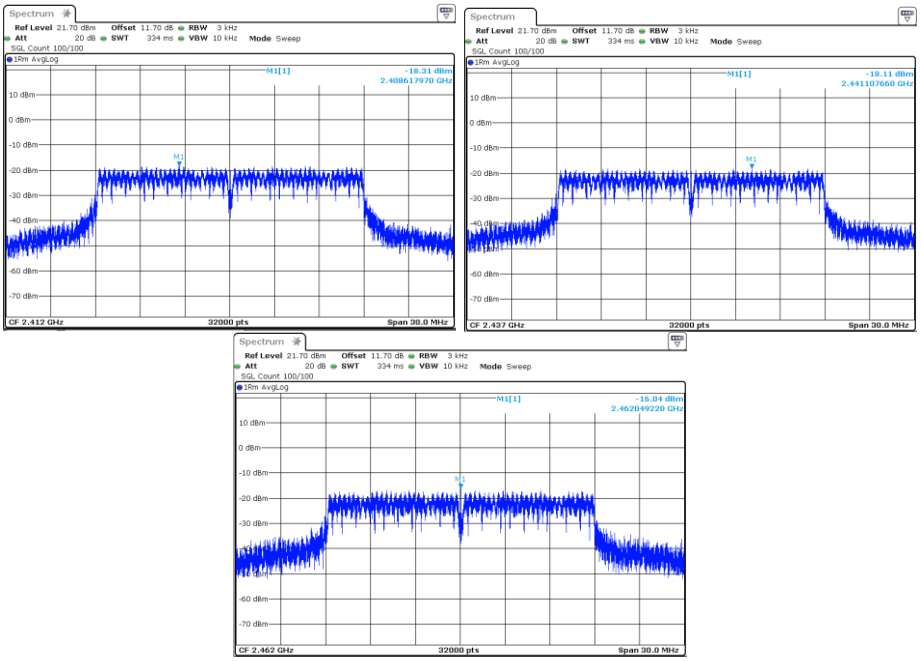
802.11g

Channel	Channel Frequency (MHz)	Power Spectral Density (dBm)	PSD Limit (dBm)
Cmin	2412	**-15.52**	8.0
Cmid	2437	**-17.63**	8.0
Cmax	2462	**-18.01**	8.0



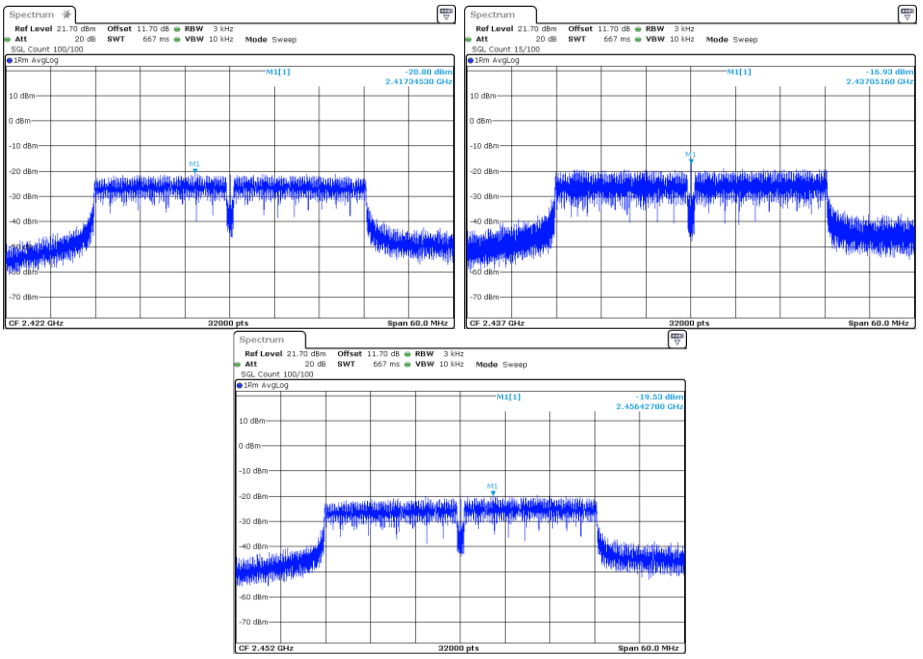
802.11nHT20

Channel	Channel Frequency (MHz)	Power Spectral Density (dBm)	PSD Limit (dBm)
Cmin	2412	**-18.31**	8.0
Cmid	2437	**-18.11**	8.0
Cmax	2462	**-16.04**	8.0



802.110nHT40

Channel	Channel Frequency (MHz)	Power Spectral Density (dBm)	PSD Limit (dBm)
Cmin	2422	**-20.80**	8.0
Cmid	2437	**-16.93**	8.0
Cmax	2452	**-19.53**	8.0



7.6. CONCLUSION

Power Spectral Density measurement performed on the sample of the product **Desk/5000 CL/Eth/Mod/WiFi/BT**, SN: 160287313331013301014523, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

8. BAND EDGE MEASUREMENT (15.247)

8.1. TEST CONDITIONS

Date of test : September 26, 2016
Test performed by : Gaëtan DESCHAMPS
Atmospheric pressure (hPa) : 1010
Relative humidity (%) : 31
Ambient temperature (°C) : 21

8.2. LIMIT

RF antenna conducted test: § 11 (DTS Measurement Guidance)
Set RBW = 100 kHz, Video bandwidth (VBW) > RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 30 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB. *For -30dBc limit, lowest power output level is considered, worst case.*

Radiated emission test: § 12 (DTS Measurement Guidance)
Applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. For measurements above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See results in Radiated emissions section before.

8.3. SETUP

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with maximum conducted (average) Output Power measurement. The EUT is turn ON; the graphs of the restrict frequency band are recorded with a display line indicating the highest level and other the 30dB offset below to show compliance with 15.247 (d) and 15.205. The emissions in restricted bands are compared to 15.209 limits.
RBW: 100kHz
VBW: 300kHz

8.4. TEST EQUIPMENT LIST

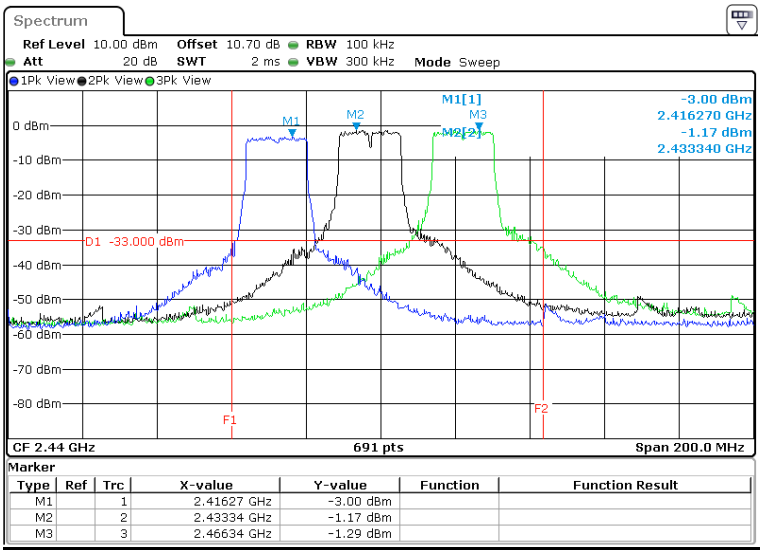
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/16	06/17
Cable 40GHz 2m coudé	-	-	A5329720	05/16	05/17
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

8.6. TEST SEQUENCE AND RESULTS

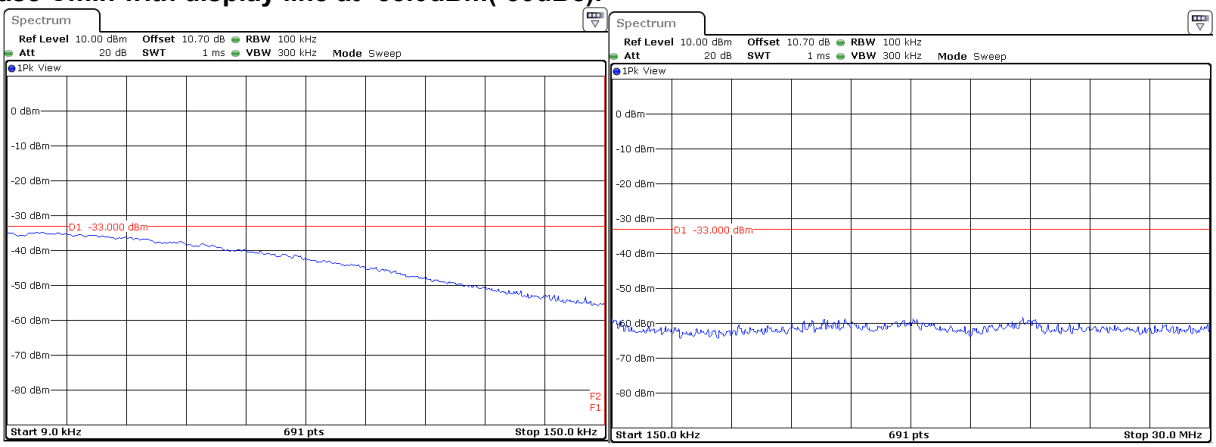
Offset: Attenuator+cable 10.7dB
GRAPH / MODULATION.
802.11g:

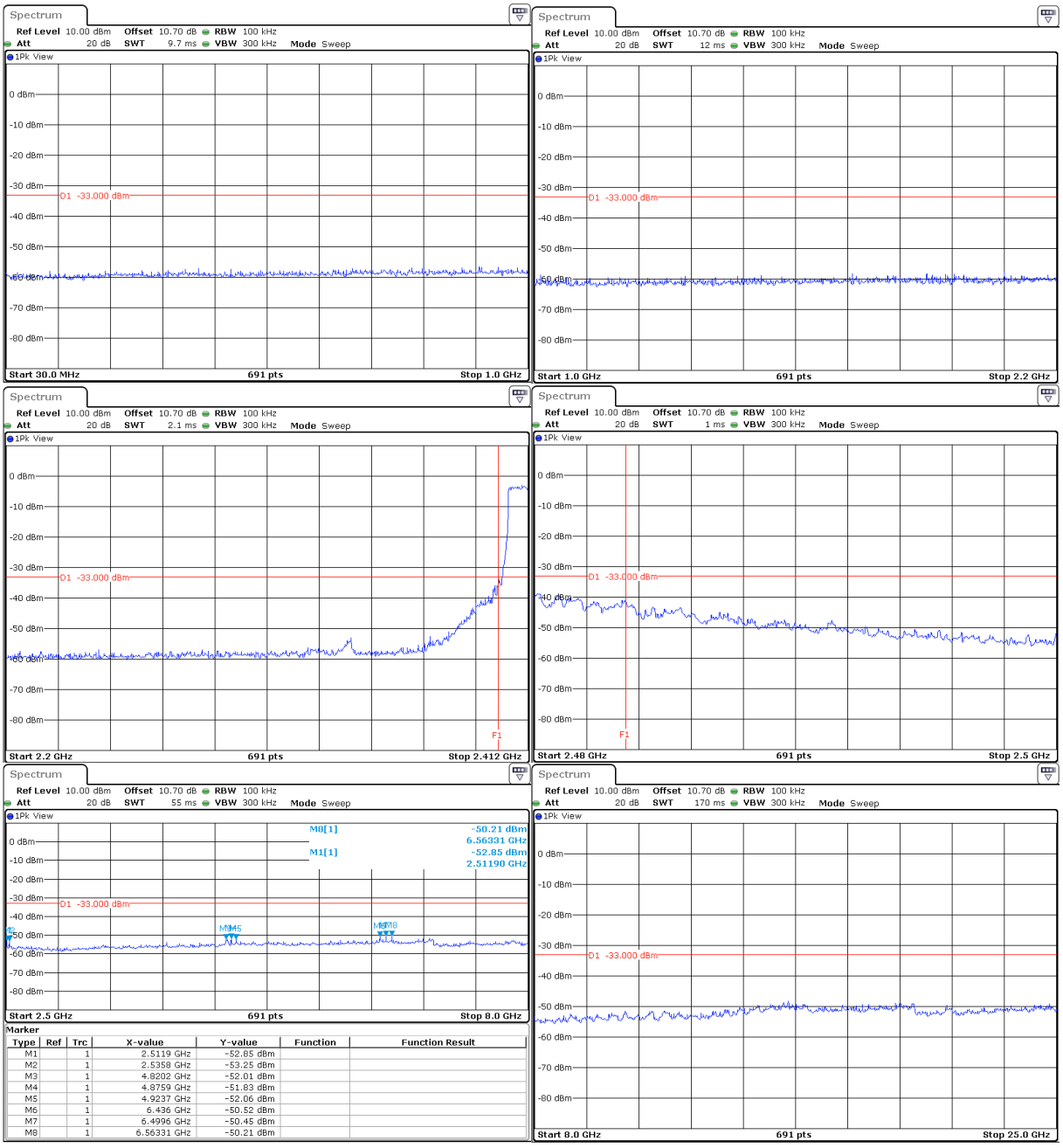


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41627 GHz	-3.00 dBm		
M2		2	2.43334 GHz	-1.17 dBm		
M3		3	2.46634 GHz	-1.29 dBm		

Worst case Cmin with display line at -33.0dBm(-30dBc).





8.7. CONCLUSION

Band Edge Measurement performed on the sample of the product **Desk/5000 CL/Eth/Mod/WiFi/BT**, SN: 160287313331013301014523, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

9. OCCUPIED BANDWIDTH

9.1. TEST CONDITIONS

Date of test : September 23, 2016
Test performed by : Gaëtan DESCHAMPS
Atmospheric pressure (hPa) : 1003
Relative humidity (%) : 32
Ambient temperature (°C) : 20

9.2. SETUP

☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
Offset: Attenuator+cable 11.7dB

☐ ***Radiated measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Measurement Procedure:

a) RBW shall be in the range of 1% to 5% of the anticipated occupied bandwidth
b) Set the video bandwidth (VBW) ≥ 3 x RBW
c) SPAN = Capture all products of the modulation process
d) Detector = Peak.
e) Trace mode = max hold.
f) Sweep = auto couple.
g) Allow the trace to stabilize.
h) OBW 99% function of spectrum analyzer used

9.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/16	06/17
Cable 40GHz 2m coudé	-	-	A5329720	05/16	05/17
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

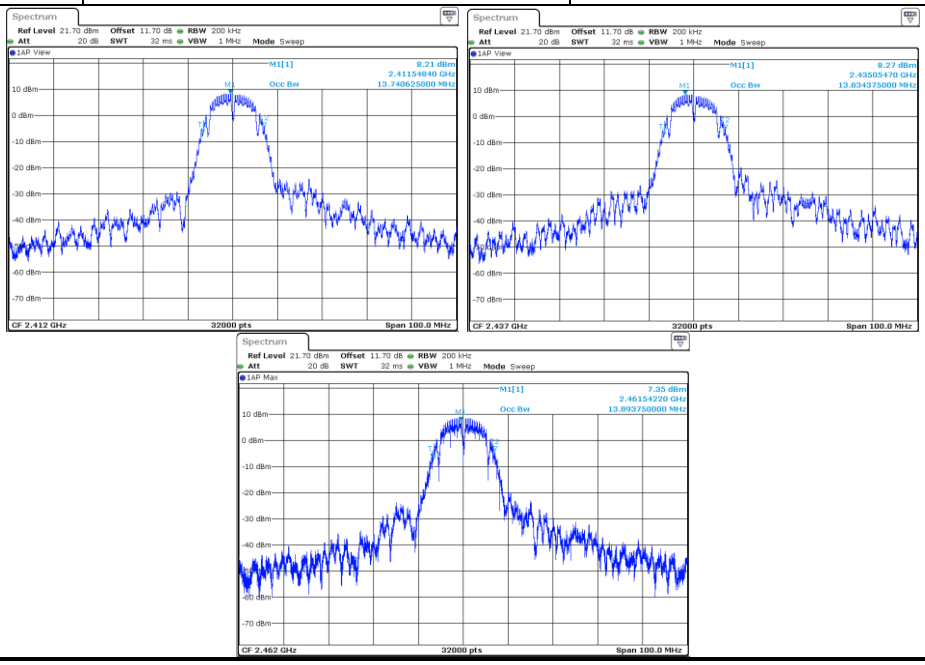
9.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

9.5. TEST SEQUENCE AND RESULTS

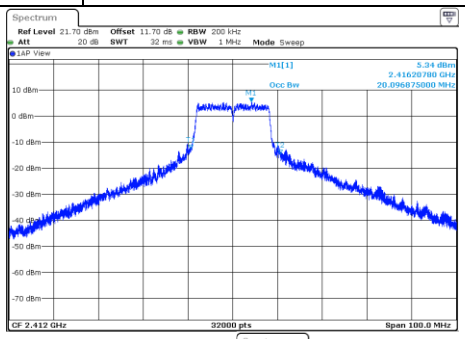
Modulation:
802.11b

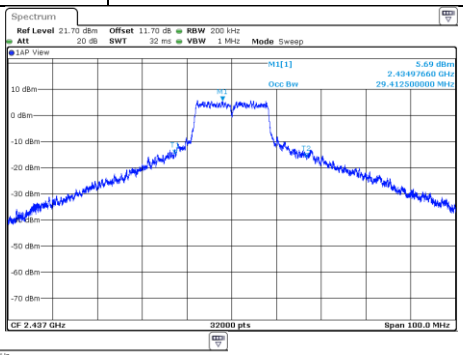
Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)
Cmin	2412	**13.74**
Cmid	2437	**13.83**
Cmax	2462	**13.89**

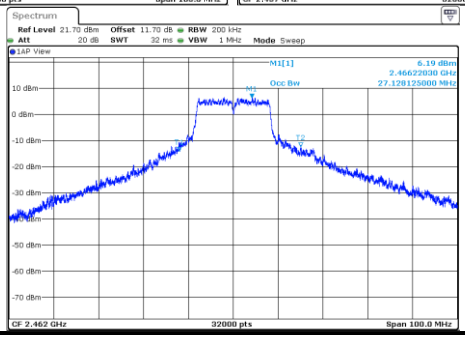


Modulation:
802.11g

Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)
Cmin	2412	**20.09**
Cmid	2437	**29.41**
Cmax	2462	**27.12**

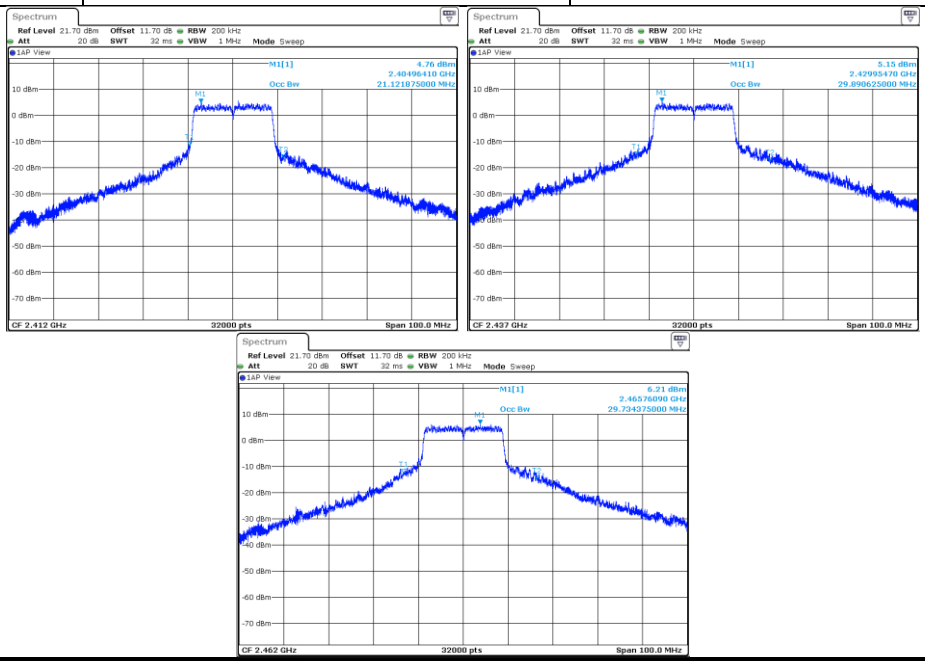






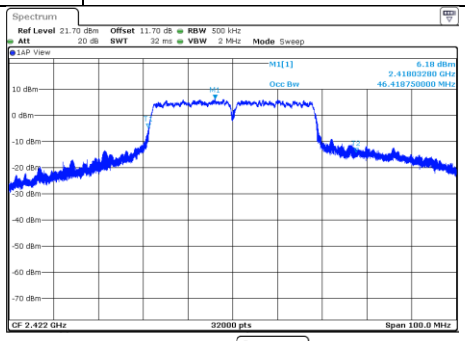
Modulation:
802.11nHT20

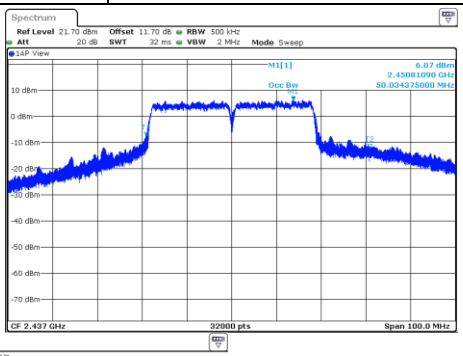
Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)
Cmin	2412	**21.12**
Cmid	2437	**29.89**
Cmax	2462	**29.73**

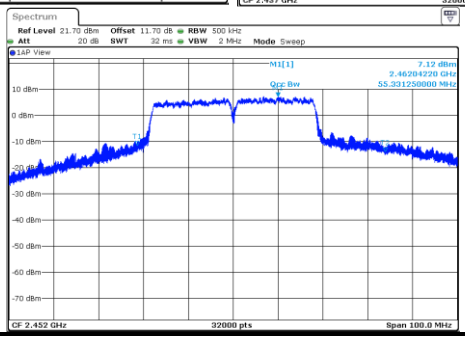


Modulation:
802.11nHT40

Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)
Cmin	2422	**46.41**
Cmid	2437	**50.03**
Cmax	2452	**55.33**

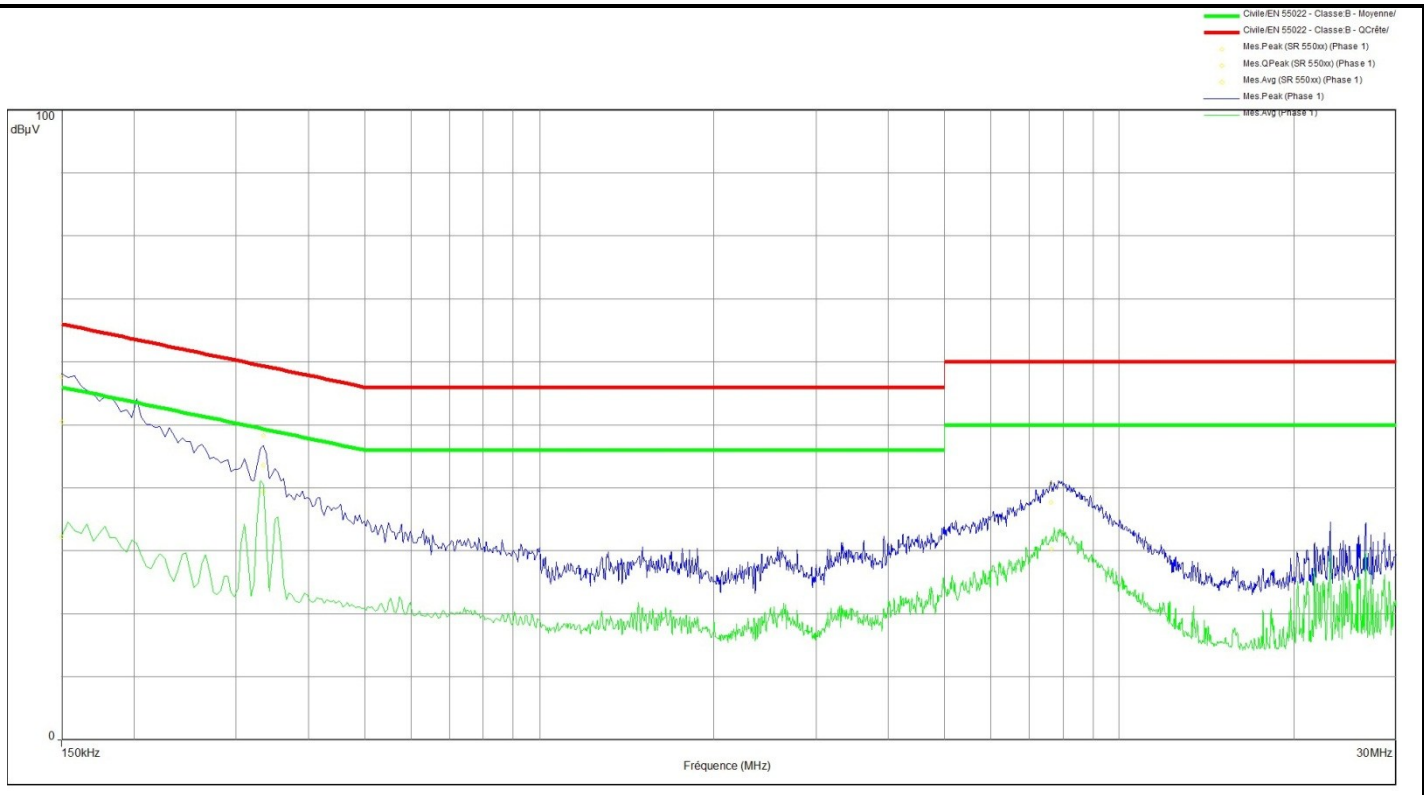






10. ANNEX 1 (GRAPHS)

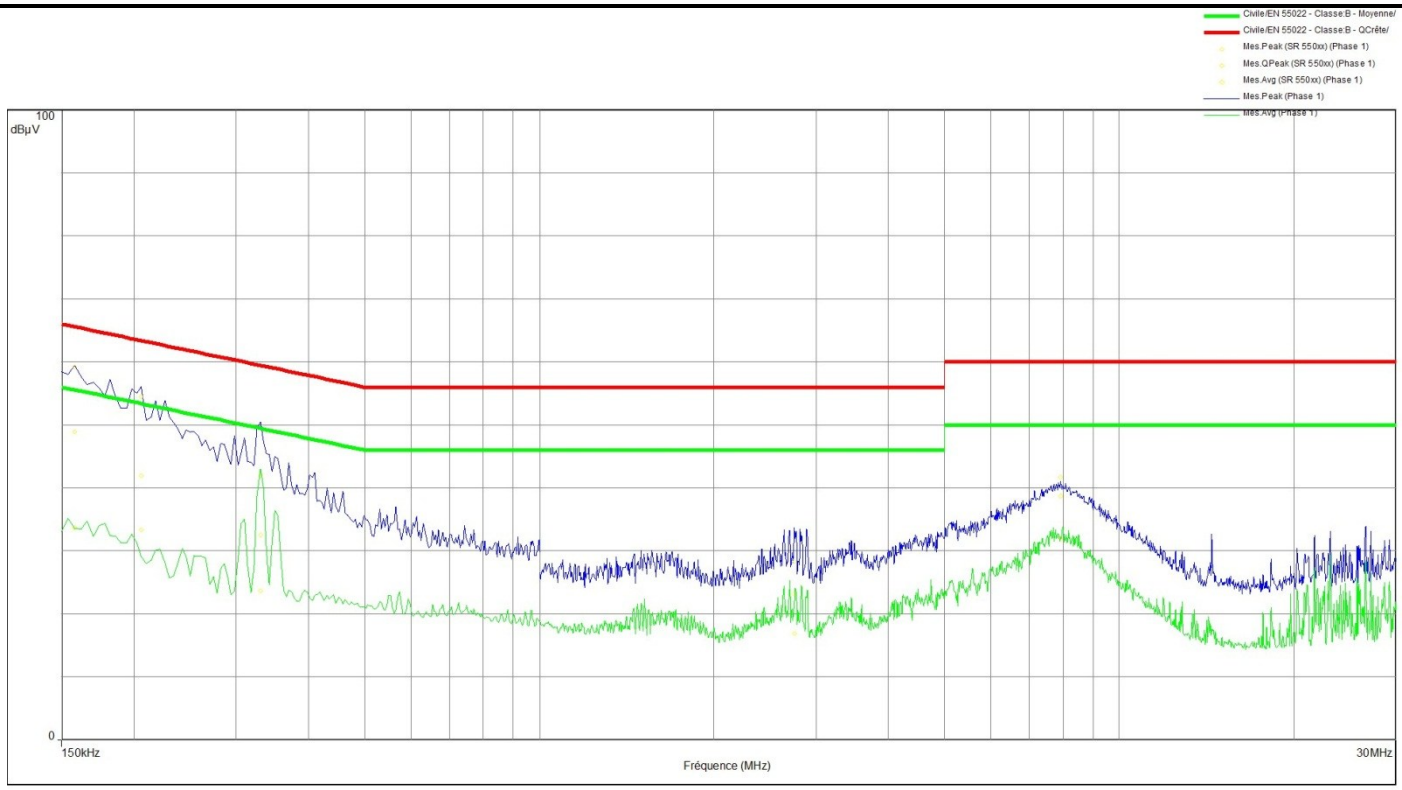
CONDUCTED EMISSIONS			
Graph name:	Emc#1	**Test configuration:**	
Limit:	EN 55022	Phase FCC	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line
0.150	57.7	50.5	66.0	-15.5	32.2	56.0	-23.8	Phase 1
0.334	48.3	43.7	59.4	-15.7	39.4	49.4	-10.0	Phase 1
7.632	40.8	37.6	60.0	-22.4	30.2	50.0	-19.8	Phase 1

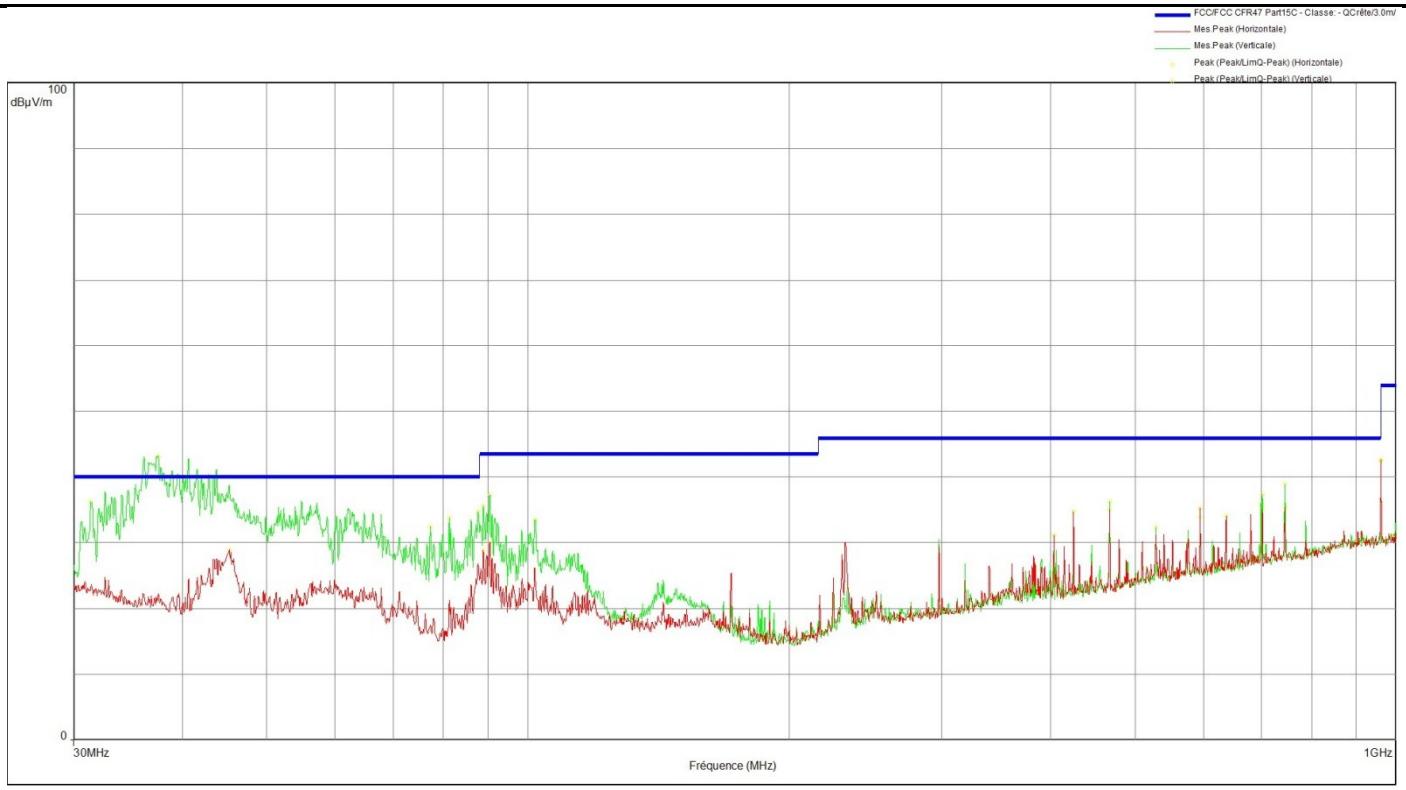
CONDUCTED EMISSIONS			
Graph name:	Emc#2	**Test configuration:**	
Limit:	EN 55022	Neutral FCC	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line
0.158	59.2	48.8	65.6	-16.8	33.6	55.6	-21.9	Phase 1
0.206	54.4	41.9	63.4	-21.5	33.3	53.4	-20.0	Phase 1
0.330	42.0	32.6	59.4	-26.9	23.7	49.4	-25.8	Phase 1
2.752	28.3	23.2	56.0	-32.8	16.9	46.0	-29.1	Phase 1
7.908	41.7	38.7	60.0	-21.3	31.9	50.0	-18.1	Phase 1

RADIATED EMISSIONS			
Graph name:	Emr#1	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Configuration 1 <1GHz	
Class:			
Frequency range: [30MHz - 1GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz

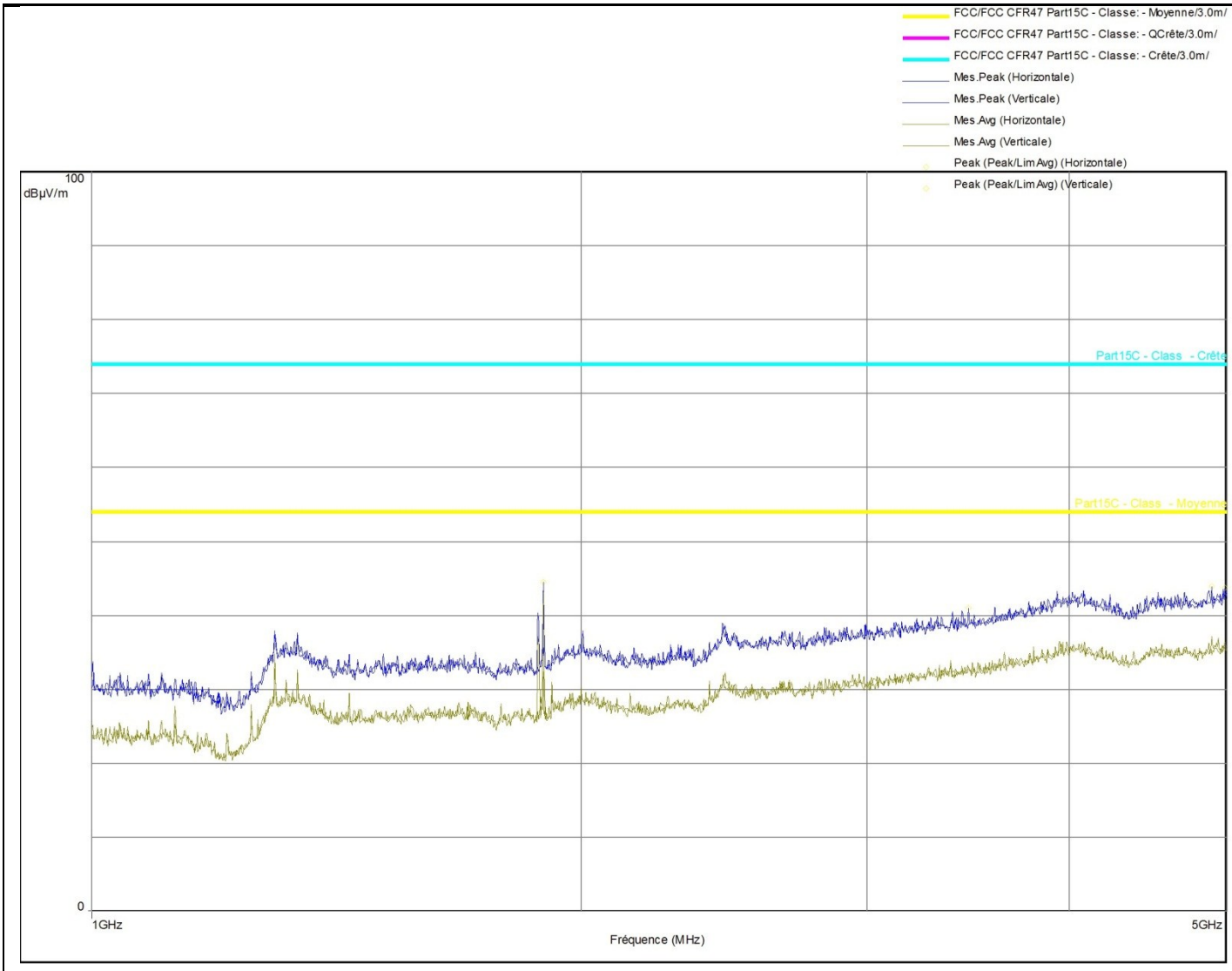


Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization
45.317	28.9	40.0	-11.1	Horizontal
88.871	29.0	43.5	-14.5	Horizontal
90.367	30.0	43.5	-13.5	Horizontal
403.760	31.1	46.0	-14.9	Horizontal
425.000	34.8	46.0	-11.2	Horizontal
467.520	35.1	46.0	-10.9	Horizontal
595.000	35.3	46.0	-10.7	Horizontal
637.480	34.1	46.0	-11.9	Horizontal
701.240	35.1	46.0	-10.9	Horizontal
743.760	35.4	46.0	-10.6	Horizontal
960.000	42.7	46.0	-3.3	Horizontal
31.377	36.2	40.0	-3.8	Vertical
37.531	43.2	40.0	3.2	Vertical
77.209	32.4	40.0	-7.6	Vertical

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization
81.204	33.8	40.0	-6.2	Vertical
87.630	34.8	40.0	-5.2	Vertical
88.871	35.6	43.5	-7.9	Vertical
90.367	37.3	43.5	-6.2	Vertical
101.927	33.4	43.5	-10.1	Vertical
467.520	36.4	46.0	-9.6	Vertical
528.880	32.3	46.0	-13.7	Vertical
595.040	33.9	46.0	-12.1	Vertical
698.880	36.0	46.0	-10.0	Vertical
701.240	37.4	46.0	-8.6	Vertical
743.720	38.9	46.0	-7.1	Vertical
960.000	42.5	46.0	-3.5	Vertical

RADIATED EMISSIONS			
Graph name:	Emr#2	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Configuration FCC >1GHz	
Class:			
Frequency range: [1GHz - 5GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Polarization
1897.250	44.5	54.0	-9.5	Horizontal
4894.100	43.9	54.0	-10.1	Horizontal
3468.250	41.0	54.0	-13.0	Vertical
4986.950	43.8	54.0	-10.2	Vertical

11. UNCERTAINTIES CHART

Type de mesure / *Kind of measurement*	**Incertitude élargie laboratoire / *Wide uncertainty laboratory* (k=2) ± x**	**Incertitude limite du CISPR / *CISPR uncertainty limit* ± y**
Mesure des perturbations conduites en tension sur le réseau d'énergie *Measurement of conducted disturbances in voltage on the power port*	3.51 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication *Measurement of conducted disturbances in voltage on the telecommunication port.*	3.26 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.45 dB	3.6 dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	3.09 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans *Measurement of radiated electric field on the Moirans open area test site*	5.20 dB	6.3 dB

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par la norme, la conformité de l'échantillon est établie directement par les niveaux limites applicables. / *The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the standard. The conformity of the sample is directly established by the applicable limits values.*