TEST REPORT

N°: 139534-681293-A (REF #871259) **Version : 01**

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** **Rovaltain TGV – Quartier de la Gare** **26300 Alixan - FRANCE**
Apparatus under test	
Product	**Payment terminal**
Trade mark	**INGENICO**
Manufacturer	**INGENICO**
Model	**IMP352-01T2005A and IMP322-01T2004A**
Model under test	**IMP352-01T2005A**
Serial number	**14016PP20133523**
FCCID	**XKB-IMP3X2**
IC	**2586D-IMP3X2**
Conclusion	See Test Program chapter
Test date	January 11, 2016 to January 18, 2016
Test location	MOIRANS
IC Test site	6500A-1 & 6500A-3
Composition of document	48 pages
Document issued on	January 26, 2016

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	January 26, 2016	Gaëtan Deschamps	Creation of the document

SUMMARY

1. SYSTEM TEST CONFIGURATION

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**

EMISSION TEST	LIMITS			RESULTS (Comments)
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 :*** ***(Declaration of provider)***	**Measure at 3m** 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m 960MHz-1GHz : 54.0 dBµV/m 1GHz – 25GHz: 54.0 dBµV/m (AV) 74.0 dBµV/m (PK)			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Maximum Peak Output Power *CFR 47 §15.247 (b)* *RSS-247 §5.4*	**Limit: 21dBm** Conducted or Radiated measurement			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Hopping Channel Separation *CFR 47 §15.247 (a) (1)* *RSS-247 §5.1*	**Minimum between:** Two-third 20dB Bandwidth or 25kHz Whichever is greater			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Number of Hopping Frequencies *CFR 47 §15.247 (a) (1) (iii)* *RSS-247 §5.1*	**At least 15 channels used**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Time of Occupancy (Dwell Time) *CFR 47 §15.247 (a) (1) (iii)* *RSS-247 §5.1*	**Maximum 0.4 sec within 31.6sec**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Band Edge Measurement *CFR 47 §15.209 (a)* *CFR 47 §15.247 (d)* *RSS-247 §5.5*	**Limit: -20dBc**			☑ **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.

****Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

2. SYSTEM TEST CONFIGURATION

2.1. INFORMATION EUT

There are different hardware versions (with or without barcode) with different activation software:

- IMP322-01T2004A (No barcode / With Contact less / With Bluetooth)
- IMP352-01T2005A (With barcode / With Contact less / With Bluetooth) Full options (EUT)

For this report the Full option is tested because the others hardware versions are the same family range.

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
IMP352-01T2005A
Serial Number: 14016PP20133523

Photography of EUT

Power supply:
During all the tests, EUT is supplied by V_{nom}: 5VDC
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Part number / Model	Comments
Supply1	☑ AC ☐ DC ☐ Battery	100-240VAC to 5VDC, 50-60Hz and 300mA to 1A	192049372 / PSM05R-050I	Used in configuration 1 (see §2.2)
Supply2	☑ AC ☐ DC ☐ Battery	100-240VAC to 5VDC, 50-60Hz and 300mA to 2A	192050007 / PSM10R-050I	Used in configuration 2 (see §2.2)
Battery	☐ AC ☐ DC ☑ Battery	3.7Vdc	296118442	Internal

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	Mini USB	1.2	☑	☑	☑	-
Supply2	Jack	1.2	☑	☑	☑	-
Access1	COM 0	-	☑	☐	☐	-

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Ipod	Touch	-	-
Contact less Card	-	-	-
COM 0 Card	-	-	-

Equipment information:

Bluetooth Classic Type:	☐ **v1.2**	☐ **v2.0**	☑ **v2.1+EDR**	☐ **v3.0+HS**		
	☐ **v4.0**	☐ **v4.1**	☐ **v4.2**			
Frequency band:	[2400 – 2483.5] MHz					
Spectrum Modulation:	☑ FHSS					
Number of Channel:	Maximum:	79	Minimum:	20		
Spacing channel:	1MHz					
Channel bandwidth:	1MHz					
Antenna Type:	☑ Integral	☐ External	☐ Dedicated			
Antenna connector:	☐ Yes	☑ No	☐ Temporary for test			
Transmit chains:	☑ 1					
	Single antenna					
	Gain 1: 0dBi	Gain 2: XdBi				
Beam forming gain:	No					
Receiver chains	1					
Ad-Hoc mode:	☐ Yes	☑ No				
Dwell time:	400ms					
Duty cycle:	☑ Continuous duty	☐ Intermittent duty	☐ 100% duty			
Equipment type:	☑ Production model	☐ Pre-production model				
Type of power source:	☑ AC power supply	☐ DC power supply	☐ Battery			
Operating voltage range:	Vnom:	☑ 230V/50Hz	☐ XVdc			

2.1. EUT CONFIGURATION

The EUT is set in the following modes during tests with the CBT Bluetooth tester:
- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
- Permanent reception
All tests are performed at Cmin, Cmid and Cmax.

There are two configurations tests.
Configuration 1:
The EUT is powered by supply1, the contact less is activated with read/write on COM 0 and Bluetooth mode (communication between EUT and IPod or CBT Bluetooth tester).

Configuration 2:
The EUT is powered by supply2 in mode reload only. This mode is tested only in Conducted emission data and radiated emission data.

2.2. EQUIPMENT MODIFICATIONS

☑ None ☐ Modification:

2.3. 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.

2.4. 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

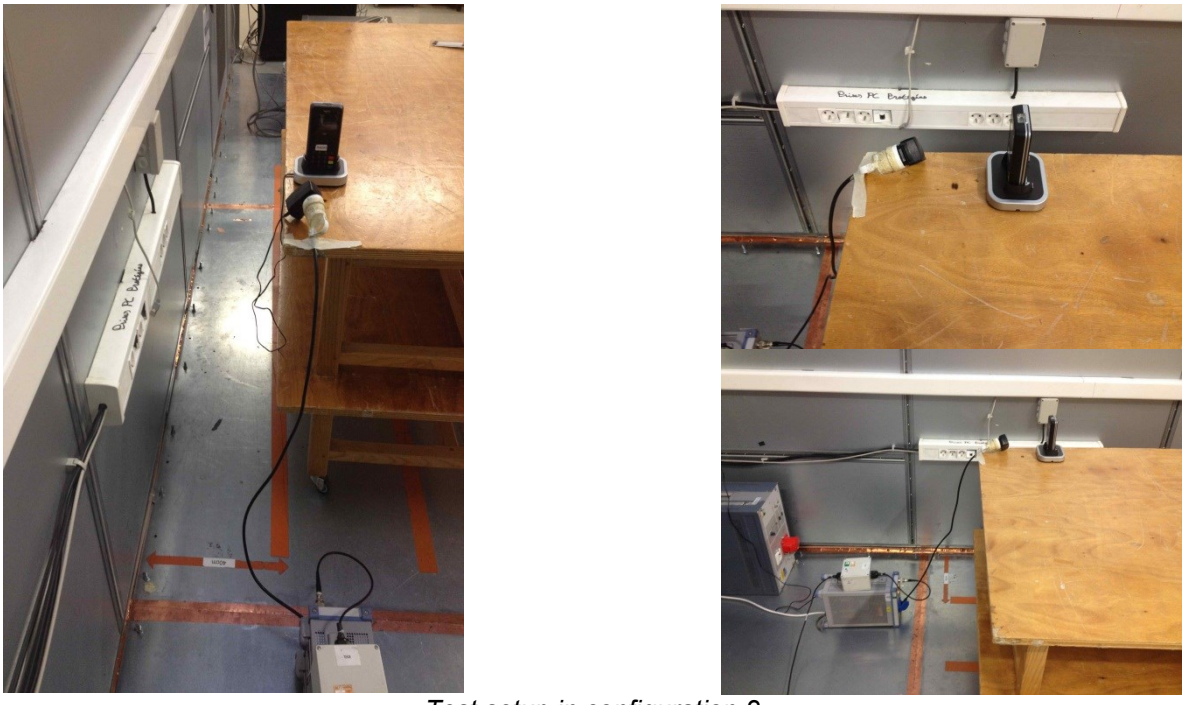
Date of test	:	January 18, 2016
Test performed by	:	Jonathan Sarto
Atmospheric pressure (hPa)	:	999
Relative humidity (%)	:	30
Ambient temperature (°C)	:	22

3.2. TEST SETUP

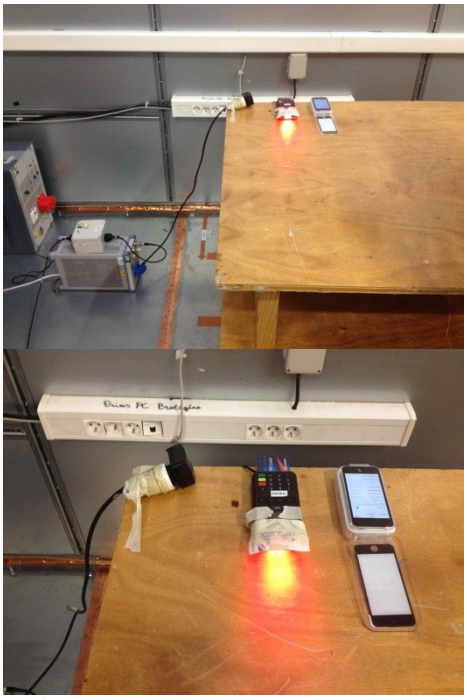
Mains terminals

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 in configuration 2



Test setup in configuration 1

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 subpart C 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	-	-	A5329578	07/15	07/16
Conducted emission comb generator	BARDET	-	A3169049	-	-
LISN	RHODE & SCHWARZ	ENV216	C2320291	11/15	11/16
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	04/15	04/16
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
Transient limiter	HEWLETT PACKARD	11947A	A4049061	02/15	02/16

3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

3.6. TEST RESULTS

Supply1 ***(Configuration 1)***
Measurements are performed on the phase (L1) and neutral (N) of the power line.
Results: (PEAK detection)

Graph identifier	Line	Comments	
Emc# 1	Phase	-	See annex 1
Emc# 2	Neutral	-	See annex 1

Supply2 ***(Configuration 2)***
Measurements are performed on the phase (L1) and neutral (N) of the power line.
Results: (PEAK detection)

Graph identifier	Line	Comments	
Emc# 3	Phase	-	See annex 1
Emc# 4	Neutral	-	See annex 1

3.7. CONCLUSION

Conducted emission data measurement performed on the sample of the product **IMP352-01T2005A**, SN: **14016PP20133523**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

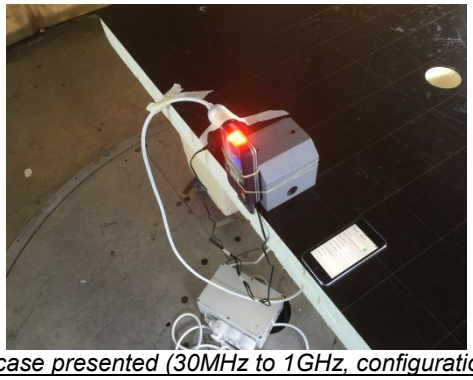
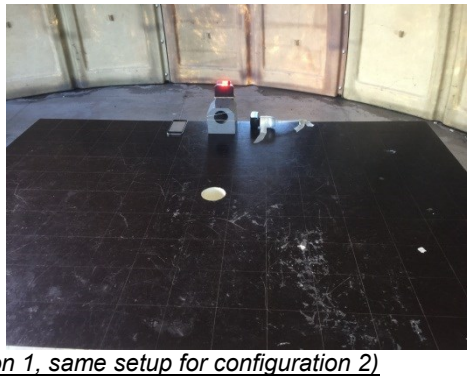
4. RADIATED EMISSION DATA

4.1. ENVIRONMENTAL CONDITIONS

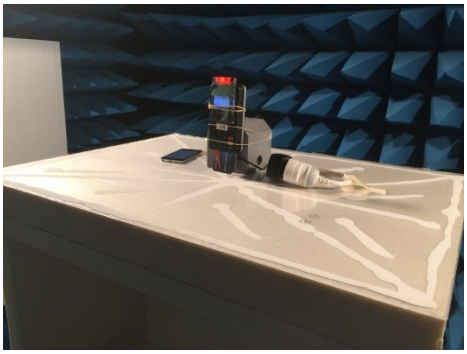
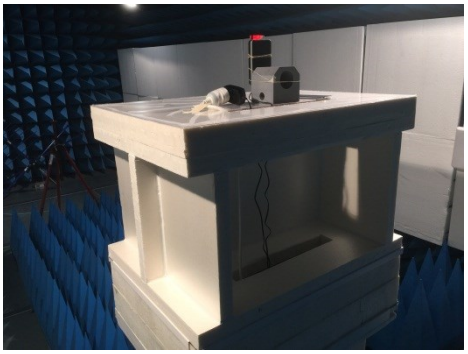
Date of test	:	January 5, 2016
Test performed by	:	Gaëtan DESCHAMPS
Atmospheric pressure (hPa)	:	999
Relative humidity (%)	:	30
Ambient temperature (°C)	:	22

4.2. 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}.

General Test setup on OATS worst case presented (30MHz to 1GHz, configuration 1, same setup for configuration 2)

General Test setup in anechoic chamber worst case presented (1GHz to 6GHz, configuration 1, same setup for configuration 2)

4.1. TEST METHOD

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

Pre-characterisation measurement: (9kHz – 25GHz)
A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 25GHz. 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 25GHz.

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.

4.2. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Bi-log	CHASE	CBL6111A	C2040051	04/14	04/16
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052	11/15	11/17
Antenna Bi-log	CHASE	CBL6111A	C2040172	06/15	06/17
Antenna horn	EMCO	3115	C2042027	11/15	11/16
Cable Measure @3m 18GHz	-	-	A5329038	08/15	08/16
Cable	SUCOFLEX	106G	A5329061	03/15	03/16
Cable Measure @3m	-	-	A5329206	04/15	04/16
Cable (OATS)	-	-	A5329623	10/15	10/16
Semi-Anechoic chamber #3	SIEPEL	-	D3044017	04/13	04/16
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	04/15	04/16
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	01/15	01/16
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	04/15	04/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
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	-	-
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371	-	-
Table	LCIE	-	F2000461	-	-
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444	-	-

4.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

4.4. TEST RESULTS

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

See graphs for 30MHz-1GHz:

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

4.4.2. Pre-characterization at 3 meters [1GHz-6GHz]

See graphs for 1GHz-25GHz:

Graph identifier	Polarization	EUT position	Comments	
Emr# 3	H/V	Axis Z	Configuration 1	See annex 1
Emr# 4	H/V	Axis Z	Configuration 2	See annex 1

Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@30m = M@10m-19.1dB)

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

Worst case final data result:

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

Configuration 1:

No	Frequency (MHz)	Limit QPeak (dBµV/m)	Measure QPeak (dBµV/m)	Margin QPeak (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	39.197	40.0	32.8	**-7.2**	0	V	100	14.7	
2	54.240	40.0	33.8	**-6.2**	85	V	100	8.6	
3	98.799	43.5	29.0	**-14.5**	0	V	100	11.7	
4	117.346	43.5	36.6	**-6.9**	130	V	250	13.5	
5	151.312	43.5	34.6	**-8.9**	195	V	250	13.2	
6	250.000	46.0	37.8	**-8.2**	115	V	305	15.3	
7	338.760	46.0	37.3	**-8.7**	0	H	390	17.4	
8	375.010	46.0	43.8	**-2.2**	240	H	250	18.7	
9	425.040	46.0	38.0	**-8.0**	119	V	395	19.8	
10	531.840	46.0	33.3	**-12.7**	0	H	250	22.8	

Configuration 2:

No	Frequency (MHz)	Limit QPeak (dBµV/m)	Measure QPeak (dBµV/m)	Margin QPeak (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	39.197	40.0	32.8	**-7.2**	0	V	100	14.7	
2	53.545	40.0	36.8	**-3.2**	75	V	100	8.8	
3	67.179	40.0	32.4	**-7.6**	0	V	100	7.8	
4	290.280	46.0	41.3	**-4.7**	300	V	110	16.2	
5	338.480	46.0	34.6	**-11.4**	66	V	250	17.4	
6	387.080	46.0	39.0	**-7.0**	310	H	250	19.2	
7	497.320	46.0	33.4	**-12.6**	0	V	250	21.9	

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

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

Worst case final data result (configuration 1 only):
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.

No	Frequency (MHz)	Limit Peak (dBµV/m)	Measure Peak (dBµV/m)	Margin Peak (dB)	Limit Average (dBµV/m)	Measure Average (dBµV/m)	Margin Average (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	1065.100	74.0	42.3	**-31.7**	54.0	27.9	**-26.1**	0	H	150	25.1	
2	1450.700	74.0	50.2	**-23.8**	54.0	33.4	**-20.6**	360	H	150	27.4	
3	1547.900	74.0	47.6	**-26.4**	54.0	33.8	**-20.2**	0	H	150	27.8	
4	1601.700	74.0	47.4	**-26.6**	54.0	34.0	**-20.0**	180	H	150	28.0	
5	4804.000	74.0	61.3	**-12.7**	54.0	52.5	**-1.5**	210	H	150	36.3	
6	4882.000	74.0	62.5	**-11.5**	54.0	53.9	**-0.1**	210	H	150	36.5	
7	4960.000	74.0	36.7	**-37.3**	54.0	36.7	**-17.3**	210	H	150	36.7	
8	7323.000	74.0	72.5	**-1.5**	54.0	49.8	**-4.2**	220	H	150	40.5	
9	7440.000	74.0	72.6	**-1.4**	54.0	50.3	**-3.7**	0	H	150	40.7	

Note: Measures have been done at 3m distance.

4.5. CONCLUSION

Radiated emission data measurement performed on the sample of the product **IMP352-01T2005A**, SN: **14016PP20133523**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

5. MAXIMUM PEAK OUTPUT POWER (15.247)

5.1. ENVIRONMENTAL CONDITIONS

Date of test : January 8, 2016
Test performed by : Gaëtan DESCHAMPS
Atmospheric pressure (hPa) : 999
Relative humidity (%) : 33
Ambient temperature (°C) : 23

5.2. EQUIPMENT CONFIGURATION

Packet type: DH5
Hopping sequence: ☐ ON ☑ OFF

5.3. TEST 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 and using 3MHz RBW and 10MHz VBW.
The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

☐ ***Radiated measurement:***
The product has been tested at a distance of 3 meters from the antenna and using 3MHz RBW and 10MHz VBW.
Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. 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, utilizing a RBW ≥ the 20 dB bandwidth of the emission, VBW > RBW, peak detector function. Follow the procedures in C63.4-1992 with respect to maximizing the emission.
- 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:

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

5.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable SMA	-	18G	A5329373	10/15	10/16
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

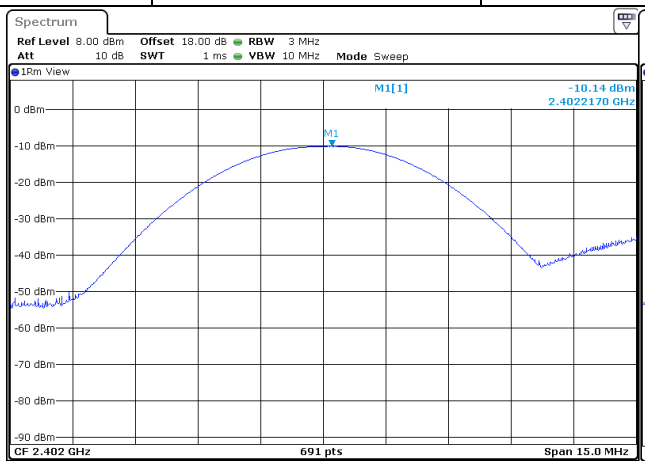
☑ None ☐ Divergence:

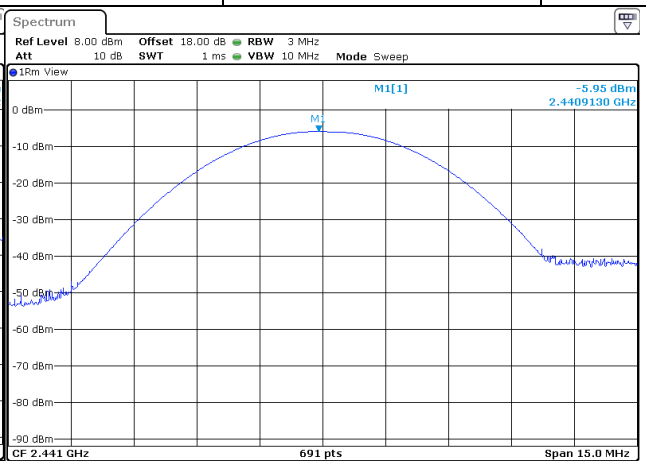
5.6. TEST RESULTS

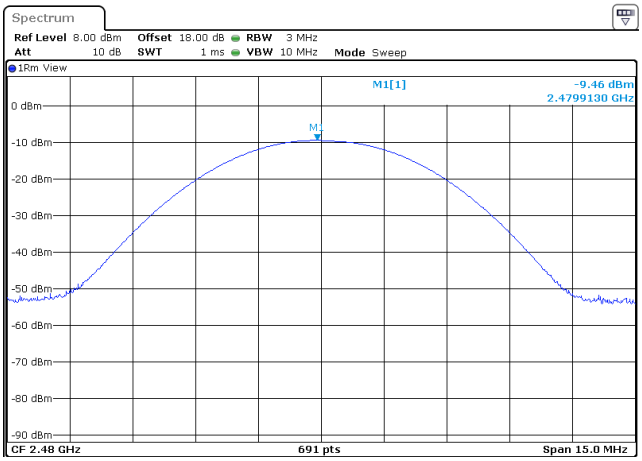
Configuration 1:

Modulation:

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)	PASS
0	**2402**	**-10.14**	**30**	**PASS**
39	**2441**	**-5.95**	**30**	**PASS**
78	**2480**	**-9.37**	**30**	**PASS**







5.7. CONCLUSION

Maximum Peak Output Power measurement performed on the sample of the product **IMP352-01T2005A**, SN: **14016PP20133523**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

6. HOPPING CHANNEL SEPARATION (15.247)

6.1. ENVIRONMENTAL CONDITIONS

Date of test	:	January 8, 2016
Test performed by	:	Gaëtan DESCHAMPS
Atmospheric pressure (hPa)	:	999
Relative humidity (%)	:	33
Ambient temperature (°C)	:	23

6.2. LIMIT

For frequency hopping system, hopping channel carrier frequencies must be separated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

For frequency hopping system operating in the 2400-2483.5MHz, if the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB Bandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

6.3. EQUIPMENT CONFIGURATION

Packet type: 1-DH5, 2-DH5 and 3-DH5
Hopping sequence: ☐ ON ☑ OFF

6.4. SETUP – 20DB BANDWIDTH

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with the Peak Output Power measured. The EUT is turn ON and using the MaxHold function, the frequency separation of two frequencies that were attenuated 20dB from the Peak Output Power level. A delta marker is used to measure the frequency difference as the emission bandwidth.

6.5. SETUP – ADJACENT CHANNEL SEPARATION

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with the Peak Output Power measured. The EUT is turn ON and using the MaxHold function, the separation of two adjacent channels is recorded. A delta marker is used to measure the frequency difference.

6.6. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable SMA	-	18G	A5329373	10/15	10/16
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

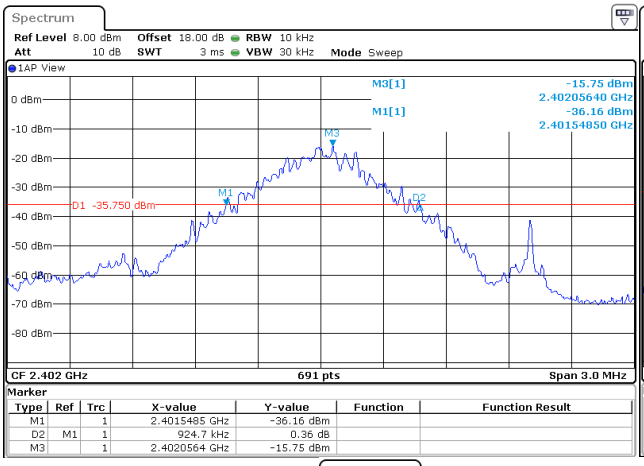
6.7. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

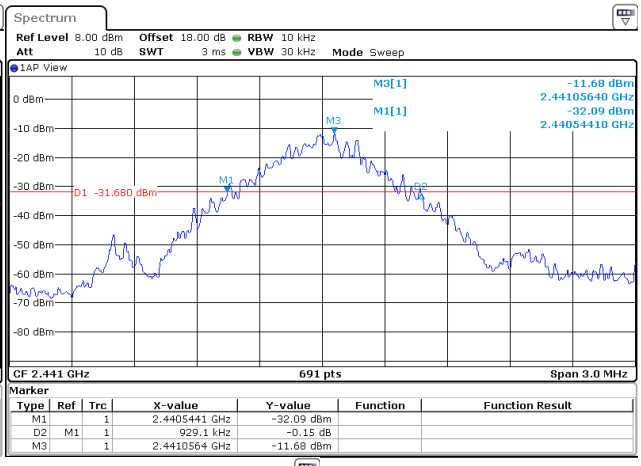
☑ None ☐ Divergence:

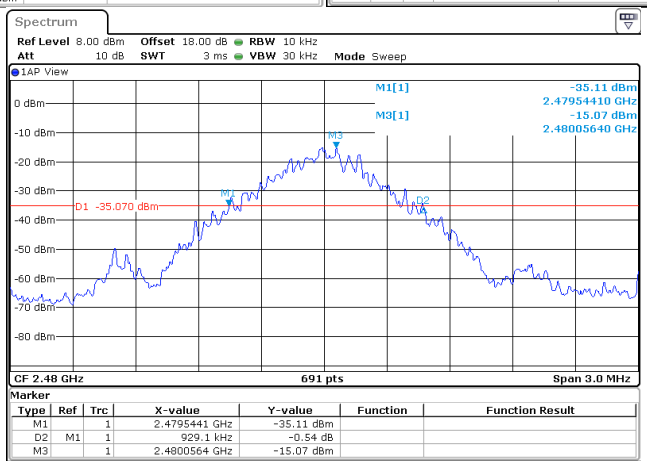
6.8. TEST SEQUENCE AND RESULTS

Configuration 1:
20dB Bandwidth 1-DH5:

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
C0	2402	924.7
C39	2441	929.1
C78	2480	929.1



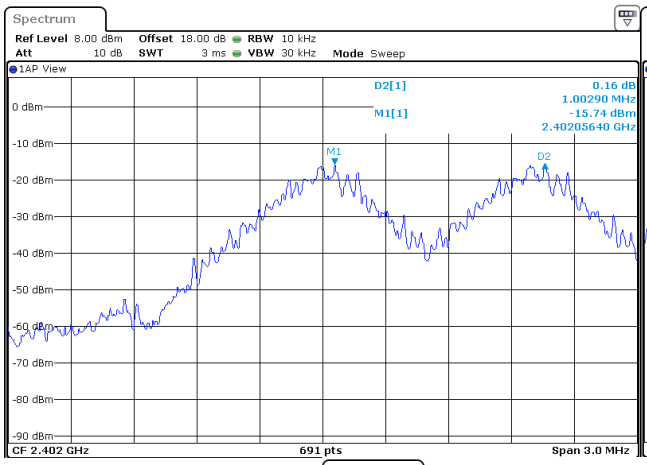


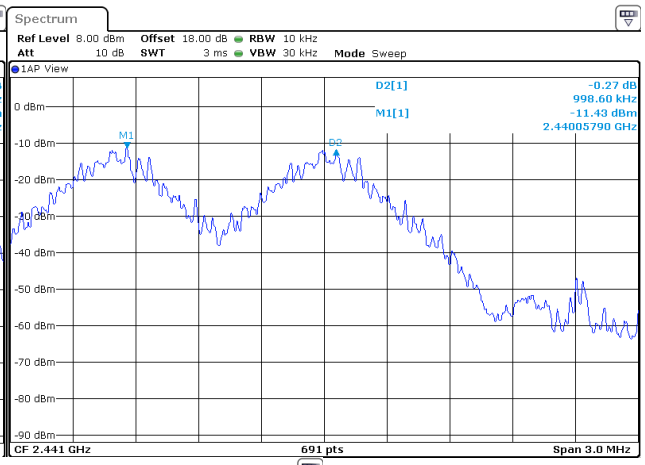


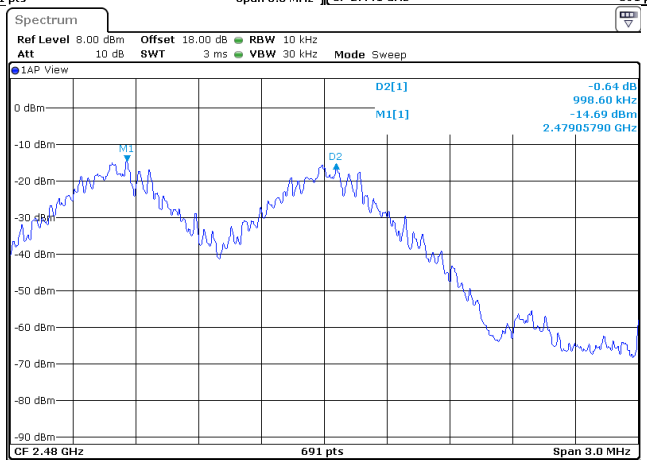
Modulation 1-DH5:

Channel	Channel Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (kHz)	PASS / FAIL
Cmin	2402	1002.9	616.5	PASS
Cmid	2441	998.6	619.4	PASS
Cmax	2480	998.6	619.4	PASS

Limit used: Two-third 20dB Bandwidth

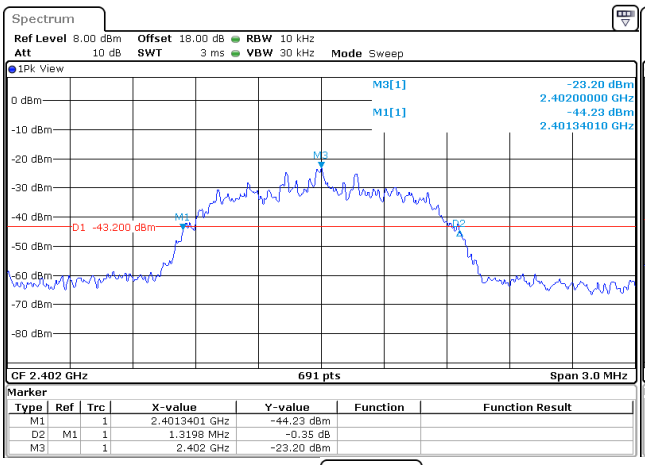


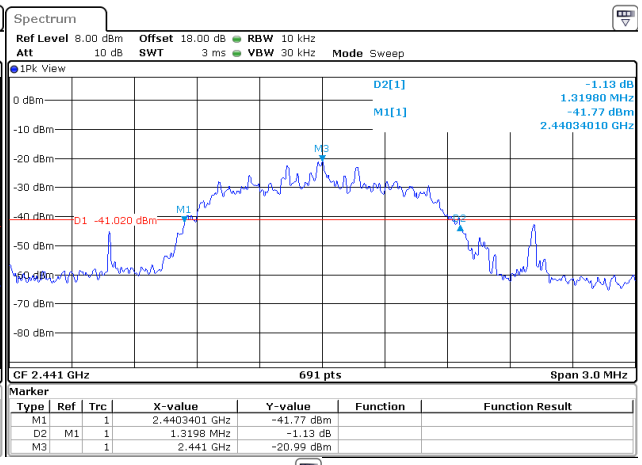


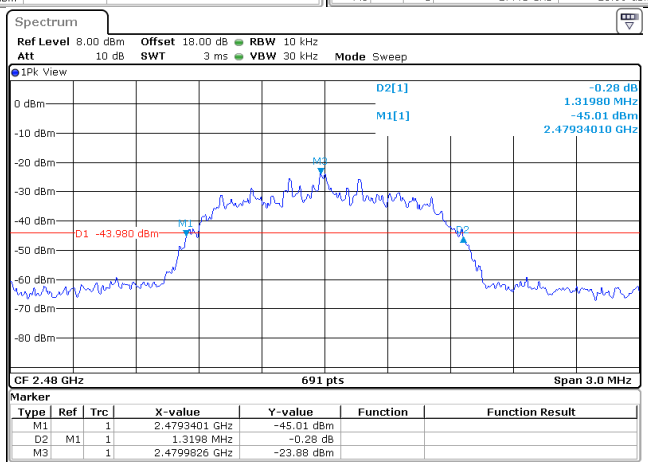


20dB Bandwidth 2-DH5:

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
C0	2402	1319.8
C39	2441	1319.8
C78	2480	1319.8



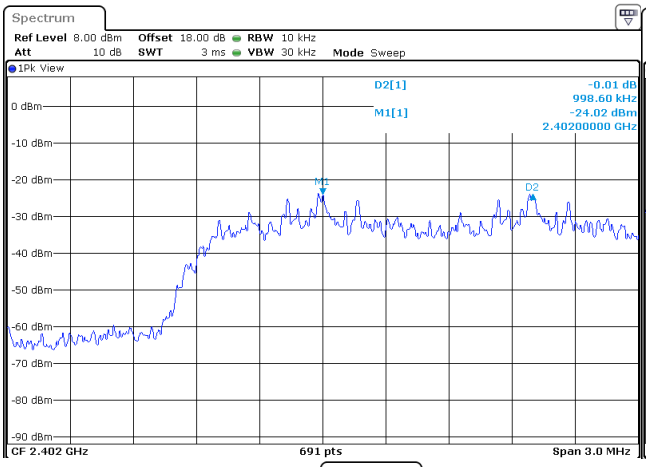


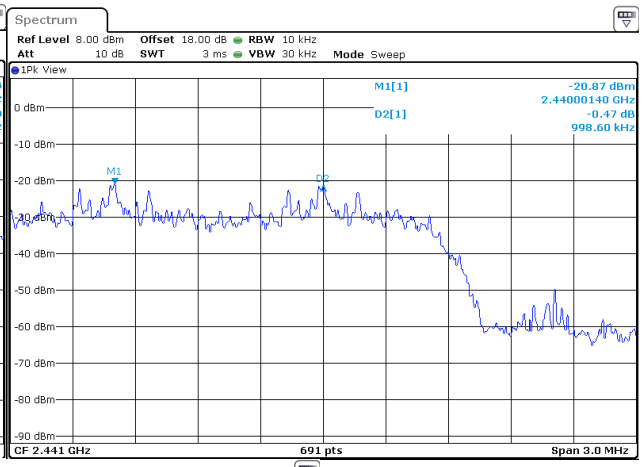


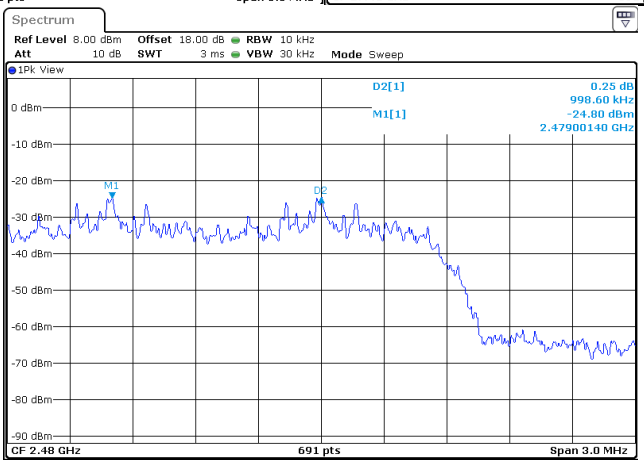
Modulation 2-DH5:

Channel	Channel Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (kHz)	PASS / FAIL
Cmin	2402	998.6	879.9	PASS
Cmid	2441	998.6	879.9	PASS
Cmax	2480	998.6	879.9	PASS

Limit used: Two-third 20dB Bandwidth

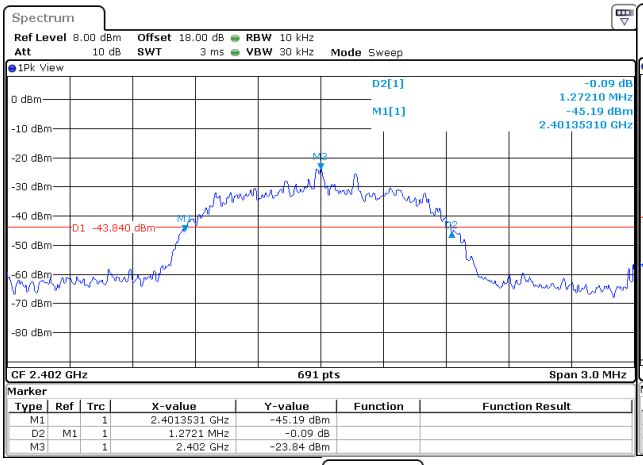


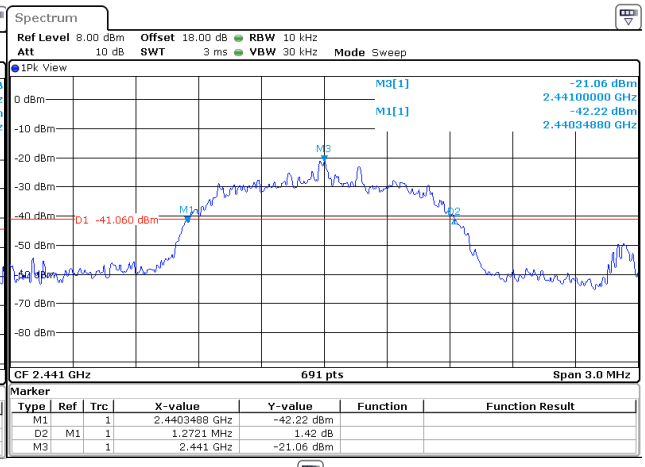


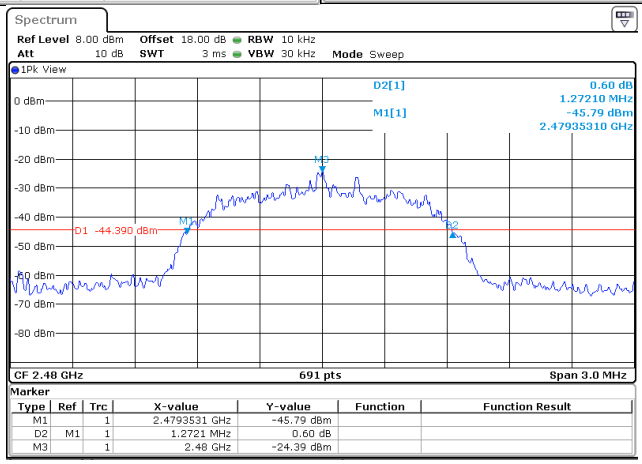


20dB Bandwidth 3-DH5:

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
C0	2402	1272.1
C39	2441	1272.1
C78	2480	1272.1



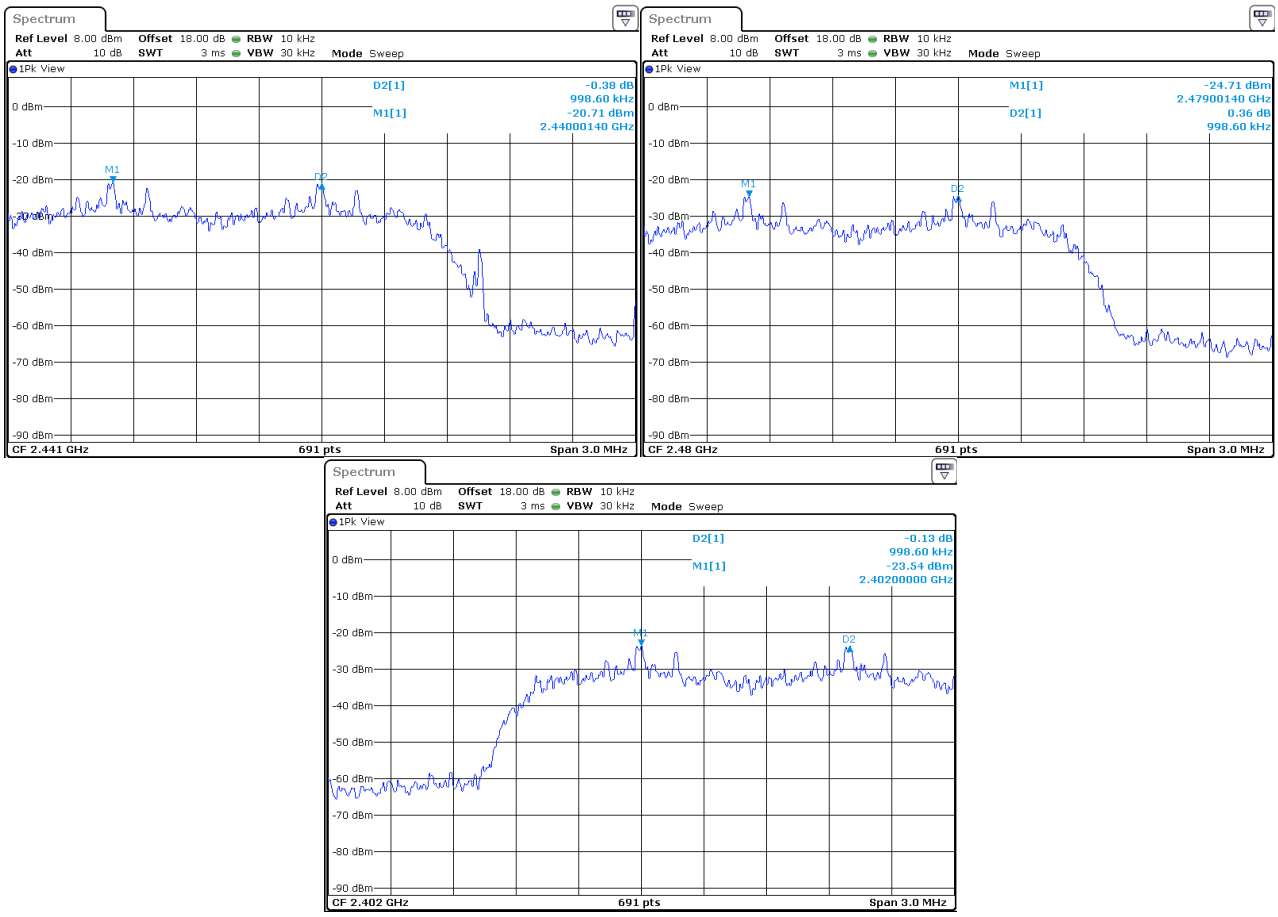




Modulation 3-DH5:

Channel	Channel Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (kHz)	PASS / FAIL
Cmin	**2402**	**998.6**	**848.1**	**PASS**
Cmid	**2441**	**998.6**	**848.1**	**PASS**
Cmax	**2480**	**998.6**	**848.1**	**PASS**

Limit used: Two-third 20dB Bandwidth



6.9. CONCLUSION

Hopping Channel Separation measurement performed on the sample of the product **IMP352-01T2005A**, SN: **14016PP20133523**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

7. NUMBER OF HOPPING FREQUENCIES (15.247)

7.1. ENVIRONMENTAL CONDITIONS

Date of test : January 8, 2016
Test performed by : Gaëtan DESCHAMPS
Atmospheric pressure (hPa) : 999
Relative humidity (%) : 33
Ambient temperature (°C) : 23

7.2. LIMIT

For frequency hopping system operating in the 2400-2483.5MHz, at least 15 channels frequencies must be used and should be equally spaced.

7.3. EQUIPMENT CONFIGURATION

Packet type: 3-DH5
Hopping sequence: ☑ ON ☐ OFF

7.4. SETUP

The EUT is placed in an anechoic chamber. The EUT is turn ON and using the MaxHold function and a delta marker the number of frequencies used for this FHSS system is recorded, see following graphs.
RBW: 100kHz
VBW: 300kHz

7.5. TEST EQUIPMENT LIST

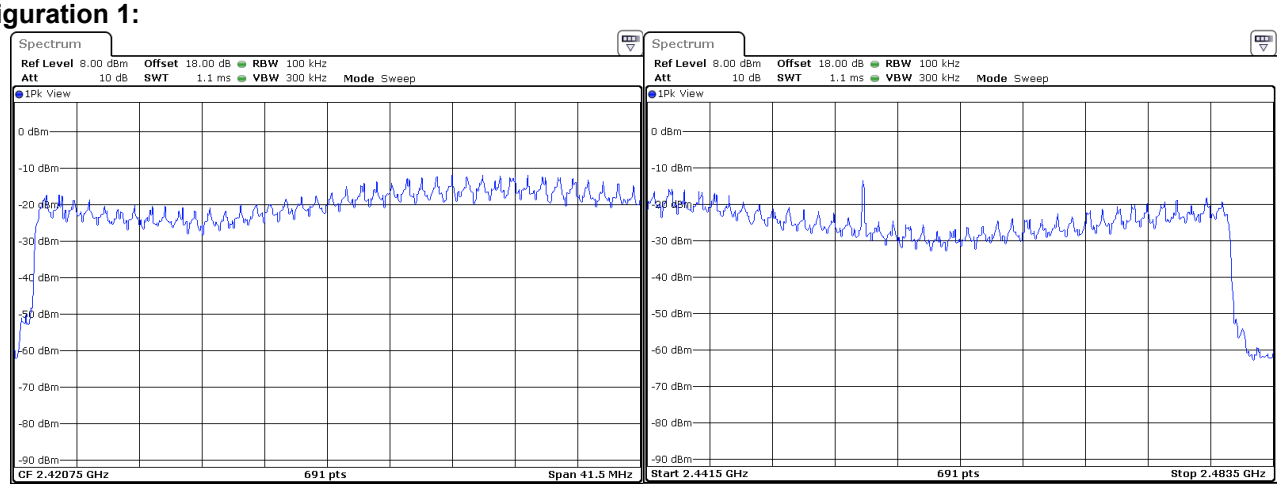
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable SMA	-	18G	A5329373	10/15	10/16
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

7.6. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

7.7. TEST SEQUENCE AND RESULTS

Configuration 1:



Number of frequency used in the hopping sequence: 79

7.8. CONCLUSION

Number of hopping frequencies measurement performed on the sample of the product **IMP352-01T2005A**, SN: **14016PP20133523**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

8. TIME OF OCCUPANCY (DWELL TIME) (15.247)

8.1. ENVIRONMENTAL CONDITIONS

Date of test : January 8, 2016
Test performed by : Gaëtan DESCHAMPS
Atmospheric pressure (hPa) : 999
Relative humidity (%) : 33
Ambient temperature (°C) : 23

8.2. LIMIT

The average time of occupancy on any channel shall not be greater than 0.4 seconds within period of 0.4 seconds multiplied by the number of hopping channels employed.

8.3. EQUIPMENT CONFIGURATION

Packet type: 3-DH1, 3-DH3 and 3-DH5
Hopping sequence: ☑ ON ☐ OFF

8.4. 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.

☐ ***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:
Dwell Time is measured and calculated using the zero SPAN mode on a channel frequency and a SWEEP with an adapter value to measure the number of transmission within a period and the time of transmission
RBW: 100kHz
VBW: 300kHz

8.5. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable SMA	-	18G	A5329373	10/15	10/16
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

8.6. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

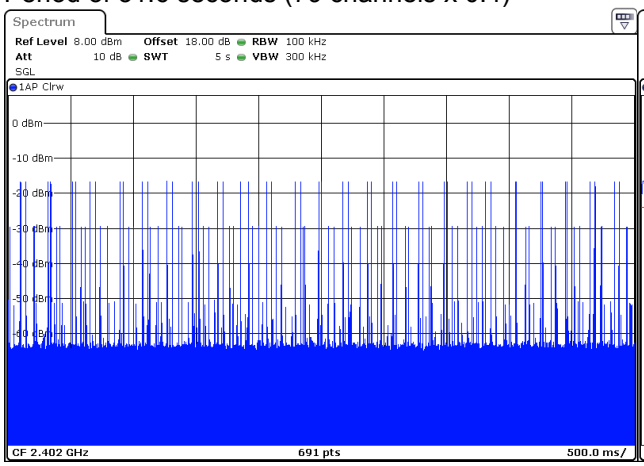
☑ None ☐ Divergence:

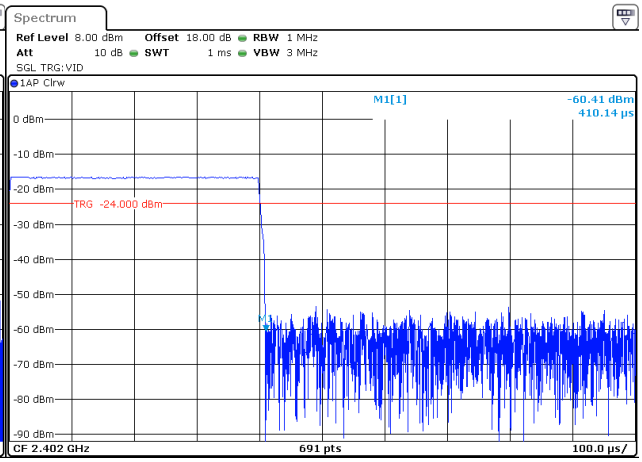
8.7. TEST SEQUENCE AND RESULTS

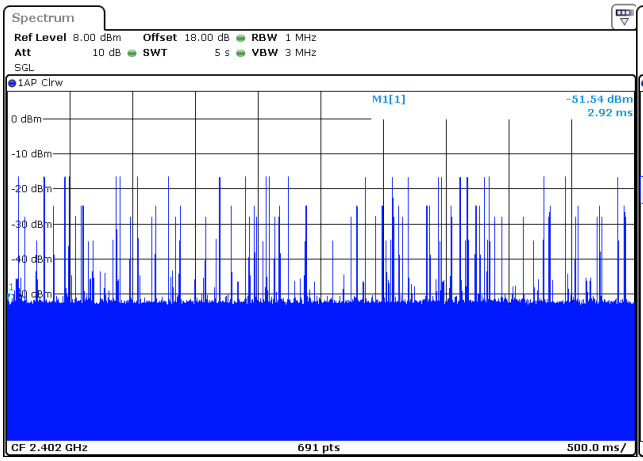
Configuration 1:

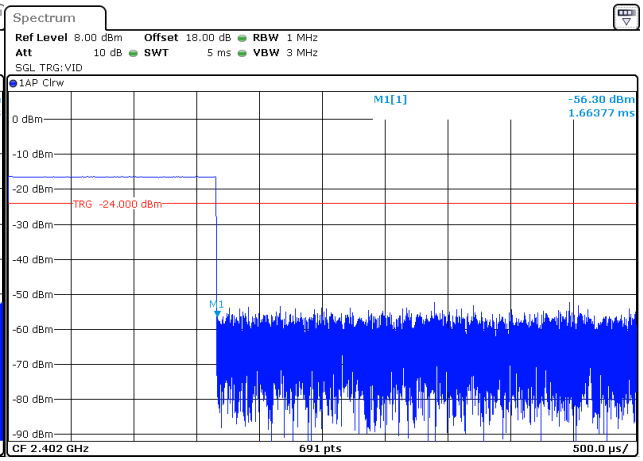
Packet Mode	Number of transmission in the period	Length of transmission time (ms)	Result (ms)	Limit (ms)	PASS / FAIL
3-DH1	53 (times/ 5 sec) * 6.32	0.410	137.34	400	PASS
3-DH3	31 (times/ 5 sec) * 6.32	1.663	325.81	400	PASS
3-DH5	21 (times/ 5 sec) * 6.32	2.917	387.14	400	PASS

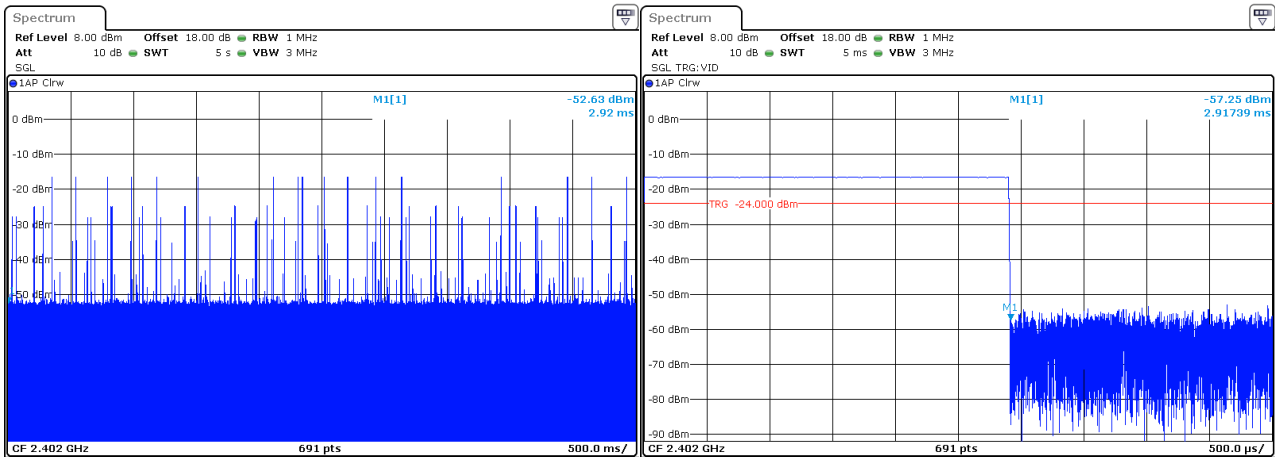
Note: Period of 31.6 seconds (79 channels x 0.4)











8.8. CONCLUSION

Time of occupancy measurement performed on the sample of the product **IMP352-01T2005A**, SN: **14016PP20133523**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

9. BAND EDGE MEASUREMENT (15.247)

9.1. ENVIRONMENTAL CONDITIONS

Date of test : January 8, 2016
Test performed by : Gaëtan DESCHAMPS
Atmospheric pressure (hPa) : 999
Relative humidity (%) : 33
Ambient temperature (°C) : 23

9.2. LIMIT

RF antenna conducted test:
Set RBW = 100 kHz, Video bandwidth (VBW) > RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 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 -20dBc limit, lowest power output level is considered, worst case.*

Radiated emission test:
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.

9.3. EQUIPMENT CONFIGURATION

Packet type: DH5
Hopping sequence: ☑ ON ☐ OFF

9.4. SETUP

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with Peak 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 20dB 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

9.5. TEST EQUIPMENT LIST

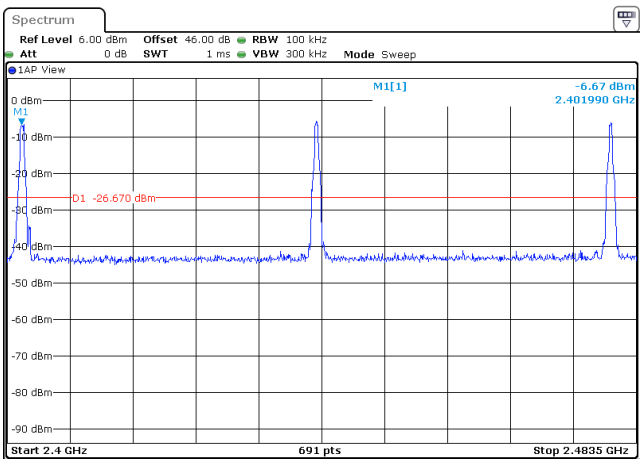
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable SMA	-	18G	A5329373	10/15	10/16
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

9.6. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

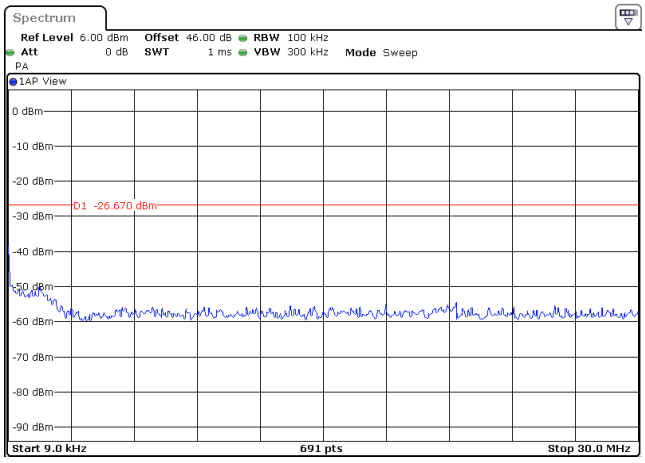
☑ None ☐ Divergence:

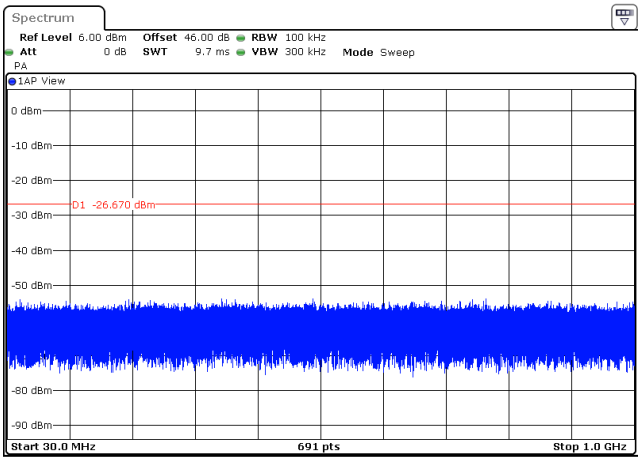
9.7. TEST SEQUENCE AND RESULTS

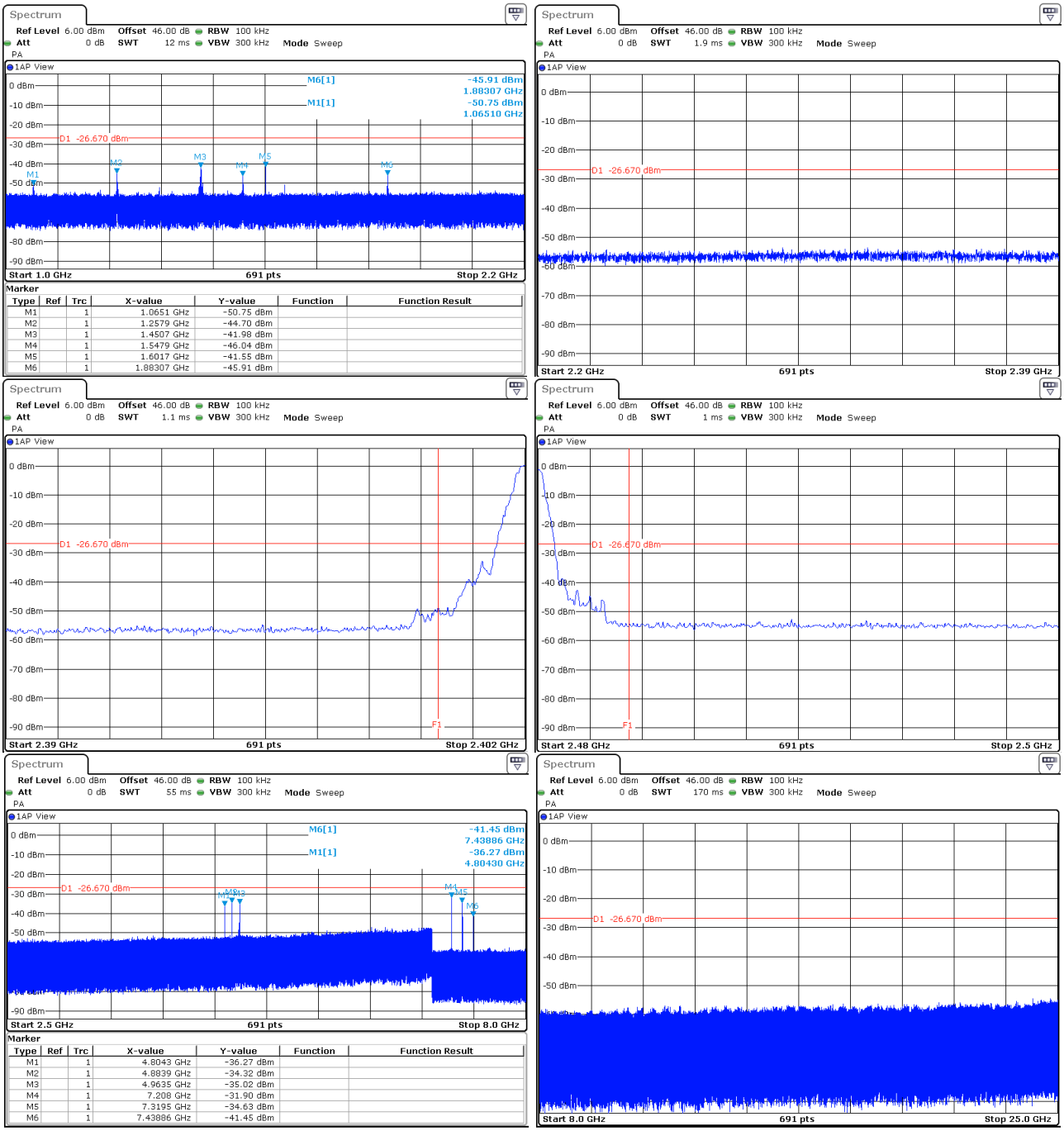
Configuration 1:
GRAPH / MODULATION (DH5):



Worst case in Cmin, polarisation Horizontal, axis Z (EUT) and display line at -26.67dBm.







9.8. CONCLUSION

Band edge measurement performed on the sample of the product **IMP352-01T2005A**, SN: **14016PP20133523**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

10. OCCUPIED BANDWIDTH

10.1. ENVIRONMENTAL CONDITIONS

Date of test : January 8, 2016
Test performed by : Gaëtan DESCHAMPS
Atmospheric pressure (hPa) : 999
Relative humidity (%) : 33
Ambient temperature (°C) : 23

10.2. EQUIPMENT CONFIGURATION

Packet type: DH5
Hopping sequence: ☐ ON ☑ OFF

10.3. 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 18dB

☐ ***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:
1. RBW used in the range of 1% to 5% of the anticipated emission bandwidth
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. OBW 99% function of spectrum analyzer used

10.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable SMA	-	18G	A5329373	10/15	10/16
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

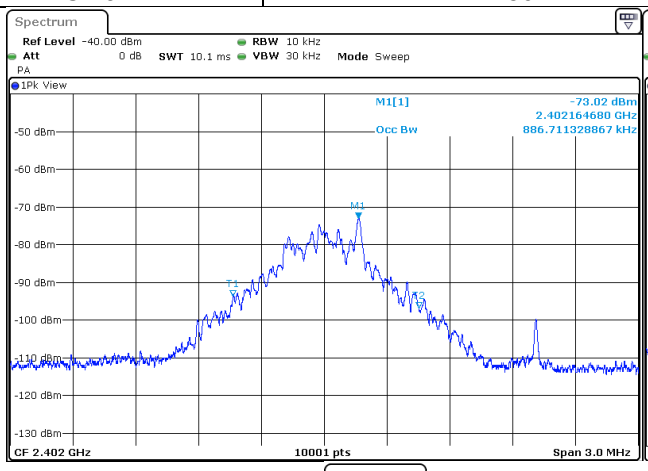
10.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

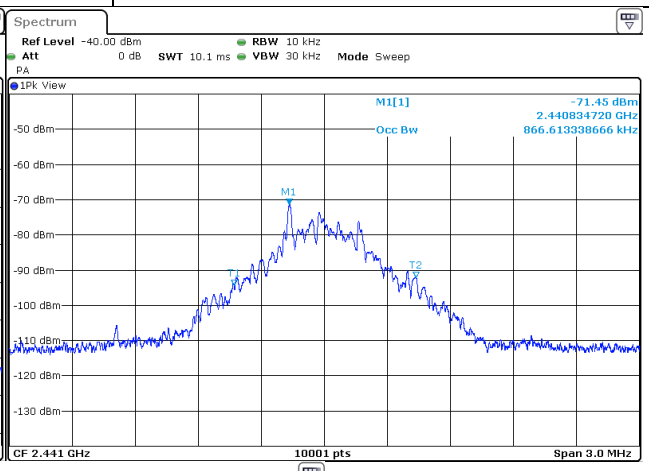
☑ None ☐ Divergence:

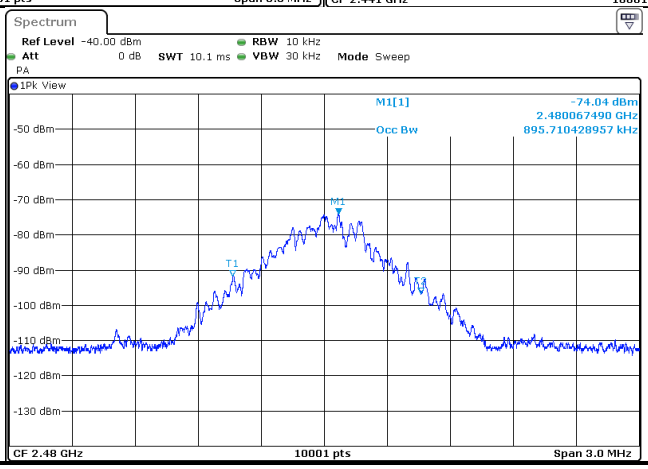
10.6. TEST SEQUENCE AND RESULTS

Configuration 1:

Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (kHz)
Cmin	2402	**886.7**
Cmid	2441	**866.6**
Cmax	2480	**895.7**

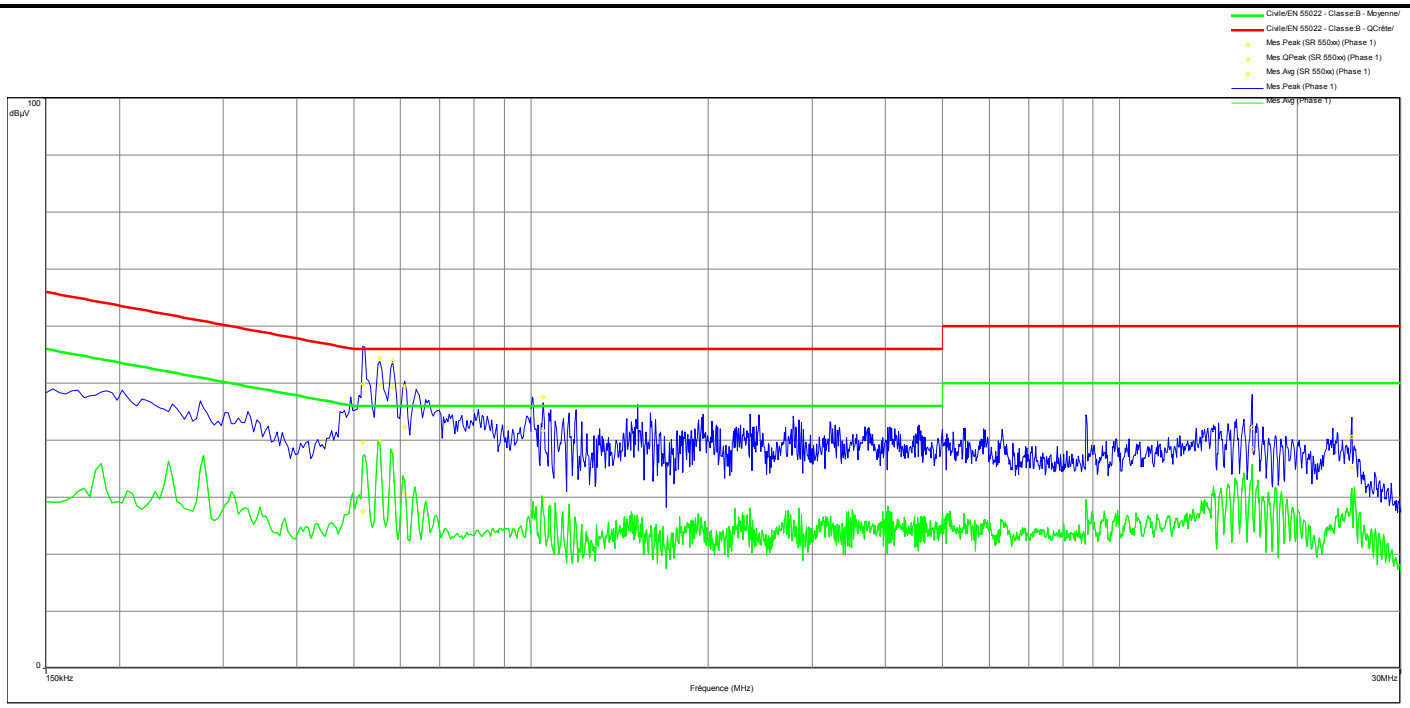






11. ANNEX 1 (GRAPHS)

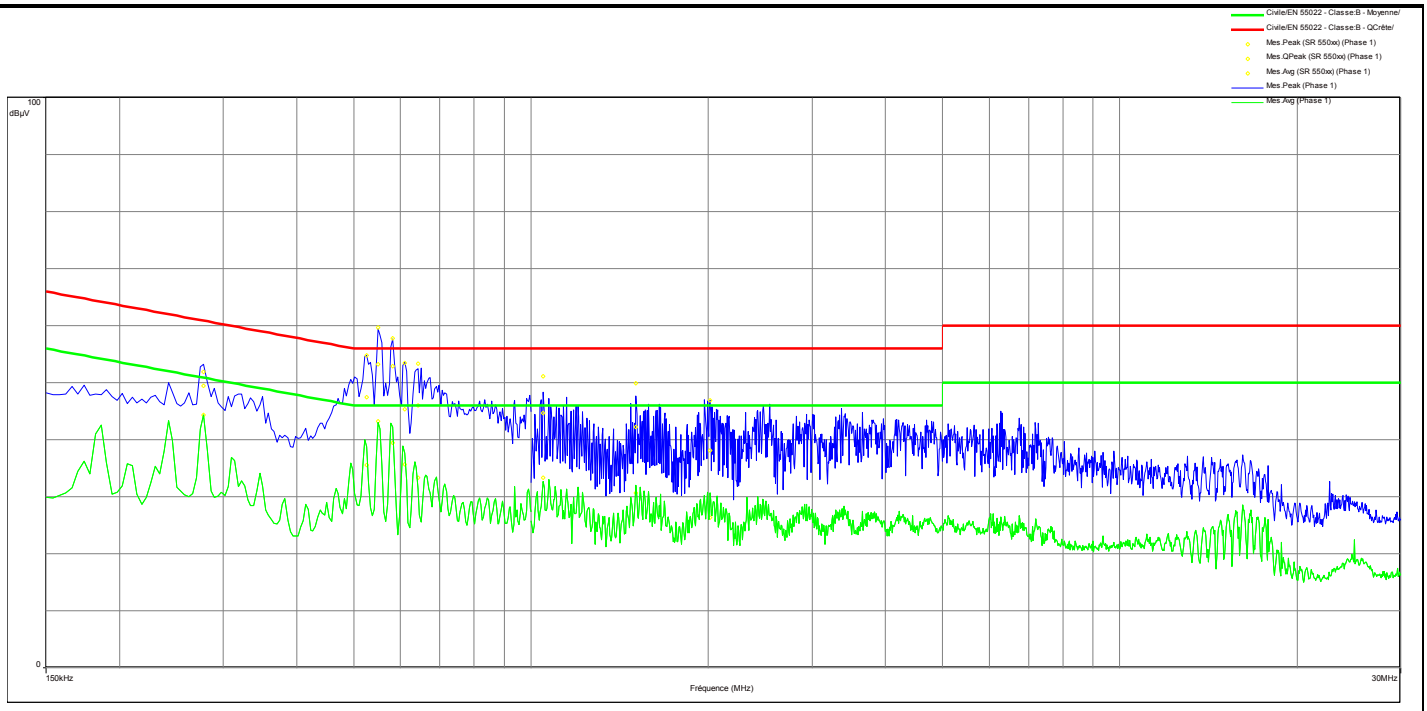
CONDUCTED EMISSIONS			
Graph name:	Emc#1	**Test configuration:**	
Limit:	EN 55022	Phase-Configuration 1	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



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)
0.518	49.87	39.57	56	-16.43	27.42	46	-18.58
0.554	54.35	49.77	56	-6.23	39.8	46	-6.2
0.582	53.94	49.21	56	-6.79	37.54	46	-8.46
0.61	49.41	42.33	56	-13.67	30.65	46	-15.35
1.048	47.57	41.65	56	-14.35	29.55	46	-16.45
16.768	42.24	38.41	60	-21.59	30.7	50	-19.3
24.752	40.6	35.27	60	-24.73	27.14	50	-22.86

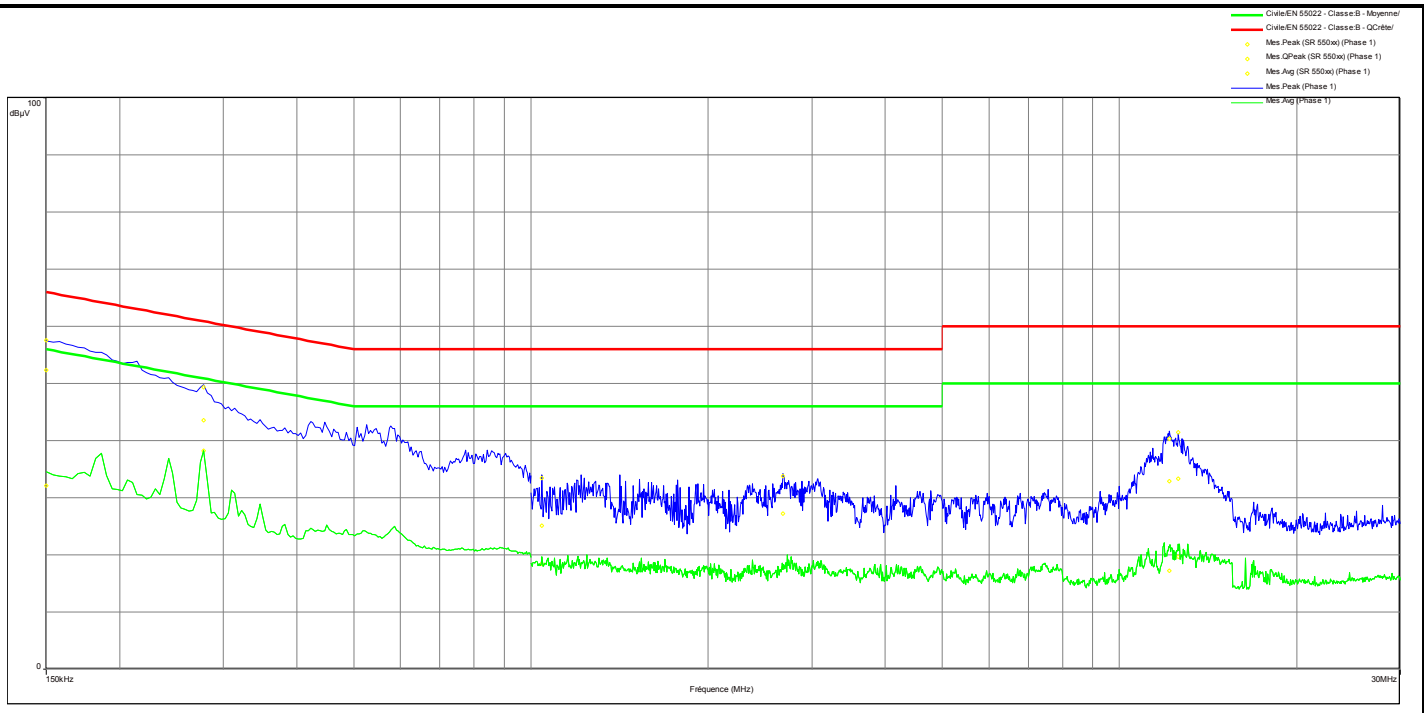
CONDUCTED EMISSIONS			
Graph name:	Emc#2	**Test configuration:**	
Limit:	EN 55022	Neutral-Configuration 1	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz



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)
0.278	51.87	49.49	60.88	-11.39	44.36	50.88	-6.52
0.526	54.74	47.45	56	-8.55	35.54	46	-10.46
0.55	59.69	53.2	56	-2.8	43.23	46	-2.77
0.582	57.75	52.91	56	-3.09	39.42	46	-6.58
0.61	53.49	45.29	56	-10.71	35.71	46	-10.29
0.642	53.35	45.97	56	-10.03	33.34	46	-12.66
1.048	51.13	44.69	56	-11.31	33.34	46	-12.66
1.508	49.86	42.21	56	-13.79	30.71	46	-15.29
2.016	46.89	38.13	56	-17.87	26.38	46	-19.62

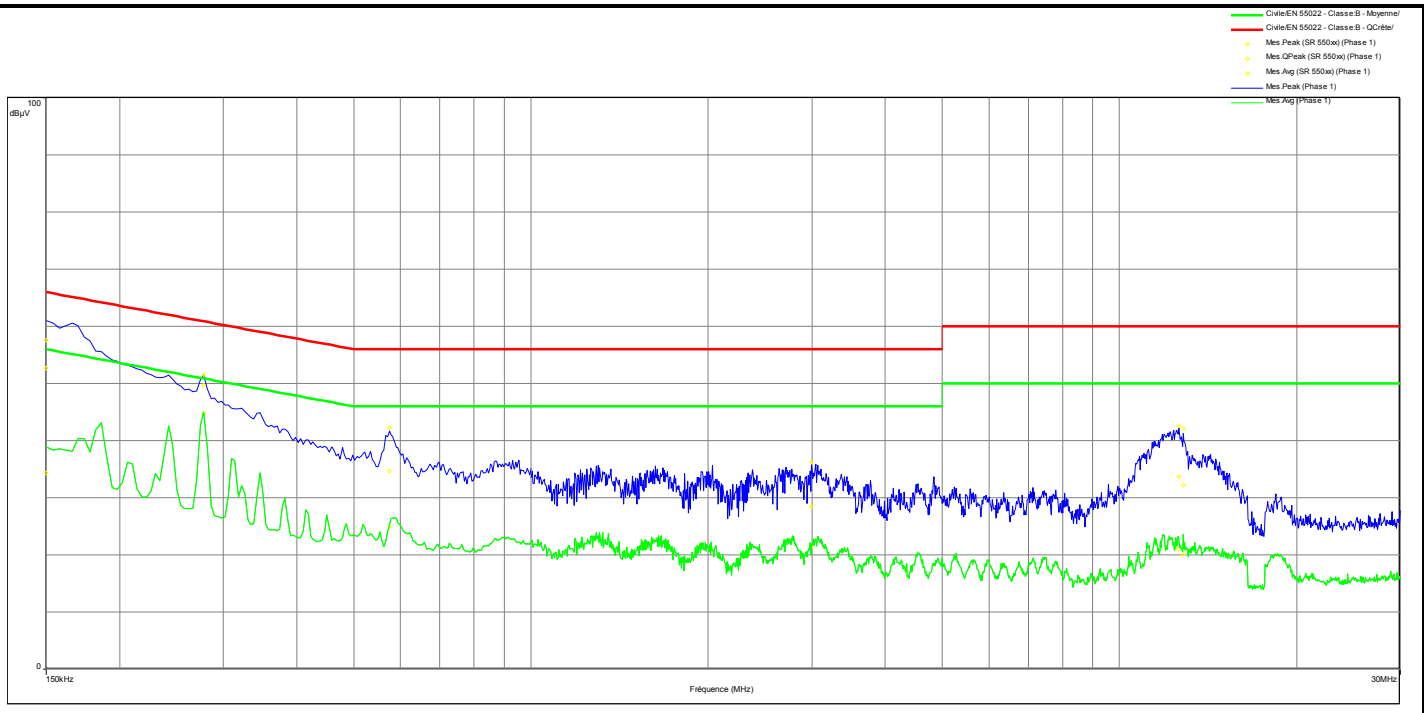
CONDUCTED EMISSIONS			
Graph name:	Emc#3	**Test configuration:**	
Limit:	EN 55022	Phase-Configuration 2	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



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)
0.15	57.55	52.37	66	-13.63	32.12	56	-23.88
0.278	49.35	43.6	60.88	-17.28	38.2	50.88	-12.68
1.044	33.39	25.16	56	-30.84	18.48	46	-27.52
2.68	33.74	27.25	56	-28.75	17.76	46	-28.24
12.148	40.3	32.85	60	-27.15	17.24	50	-32.76
12.576	41.39	33.29	60	-26.71	19.68	50	-30.32

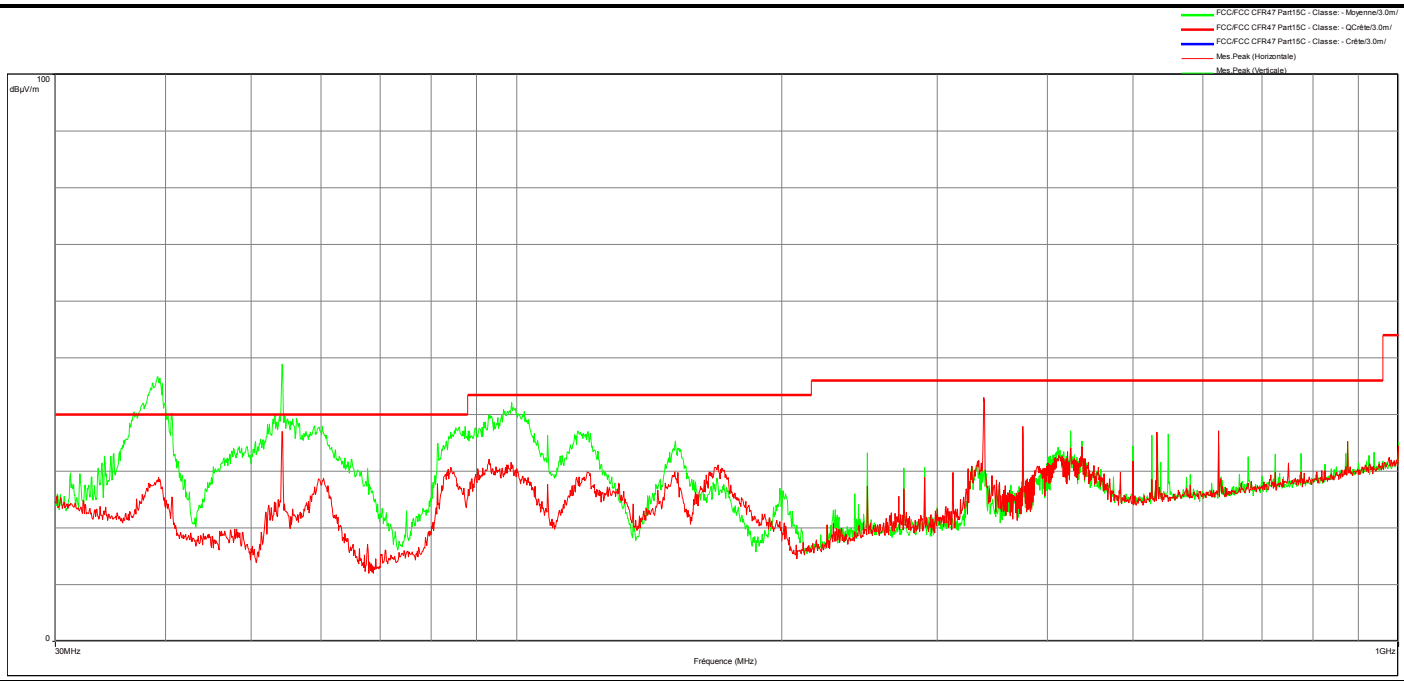
CONDUCTED EMISSIONS			
Graph name:	Emc#4	**Test configuration:**	
Limit:	EN 55022	Neutral-Configuration 2	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz



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)
0.15	57.55	52.7	66	-13.3	34.3	56	-21.7
0.278	51.55	49.71	60.88	-11.17	44.79	50.88	-6.08
0.574	42.23	34.64	56	-21.36	24.85	46	-21.15
2.996	36.23	28.47	56	-27.53	21.41	46	-24.59
12.6	42.52	33.65	60	-26.35	20.99	50	-29.01
12.844	42.09	32.22	60	-27.78	20.14	50	-29.86

RADIATED EMISSIONS			
Graph name:	Emr#3	**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

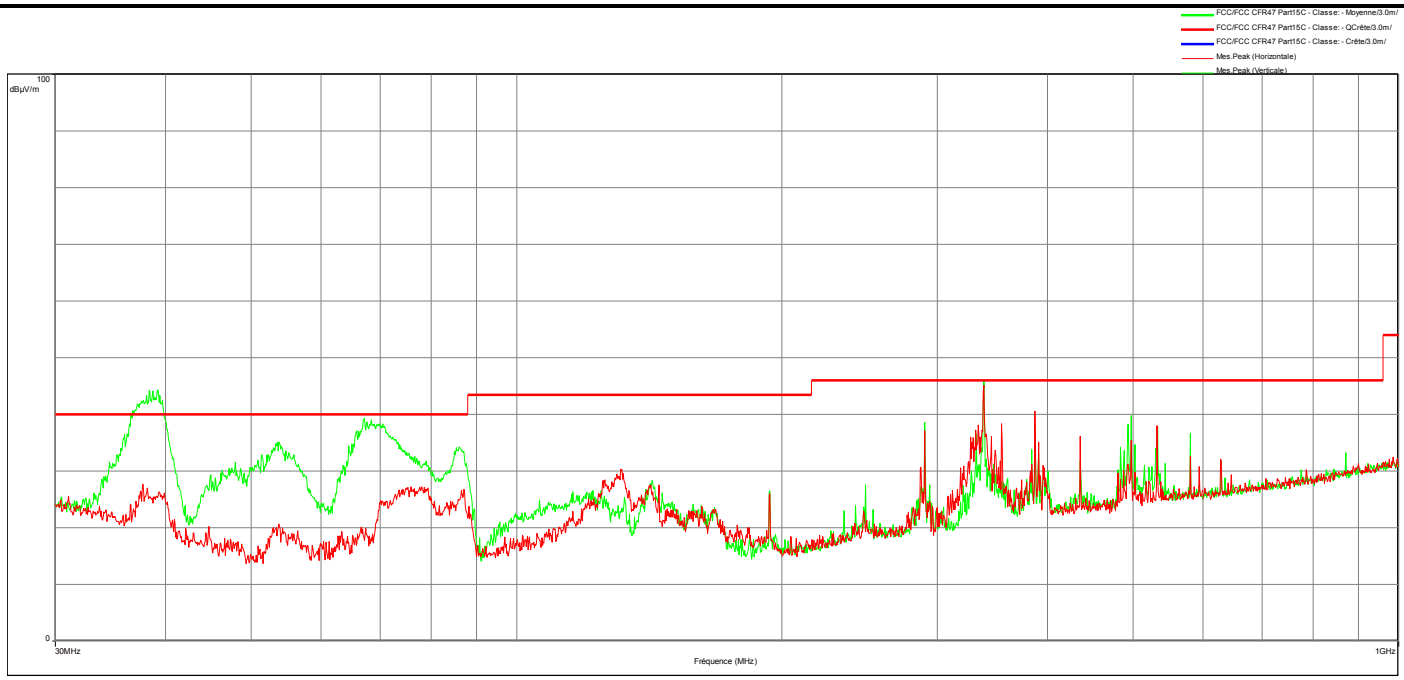


Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Position
39.282	28.84	Horizontal
54.242	36.97	Horizontal
60.43	28.74	Horizontal
93.087	32.14	Horizontal
120.253	29.93	Horizontal
151.074	29.88	Horizontal
169.179	31.06	Horizontal
338	36.16	Horizontal
338.76	42.96	Horizontal
375.04	37.94	Horizontal
437.52	34.31	Horizontal
531.88	36.9	Horizontal
532.44	33.14	Horizontal
625	37.13	Horizontal
875.04	35.19	Horizontal

39.197	46.69	Vertical
54.242	48.88	Vertical
98.799	42.08	Vertical
117.346	37.12	Vertical
151.312	35.36	Vertical
198.827	27.02	Vertical
200.52	26.59	Vertical
250	33.18	Vertical
375.04	36.81	Vertical
425.04	37.1	Vertical
500.04	34.49	Vertical
525.04	36.34	Vertical
532.68	34.32	Vertical
548.28	36.57	Vertical
625	34.81	Vertical
875.04	35.25	Vertical

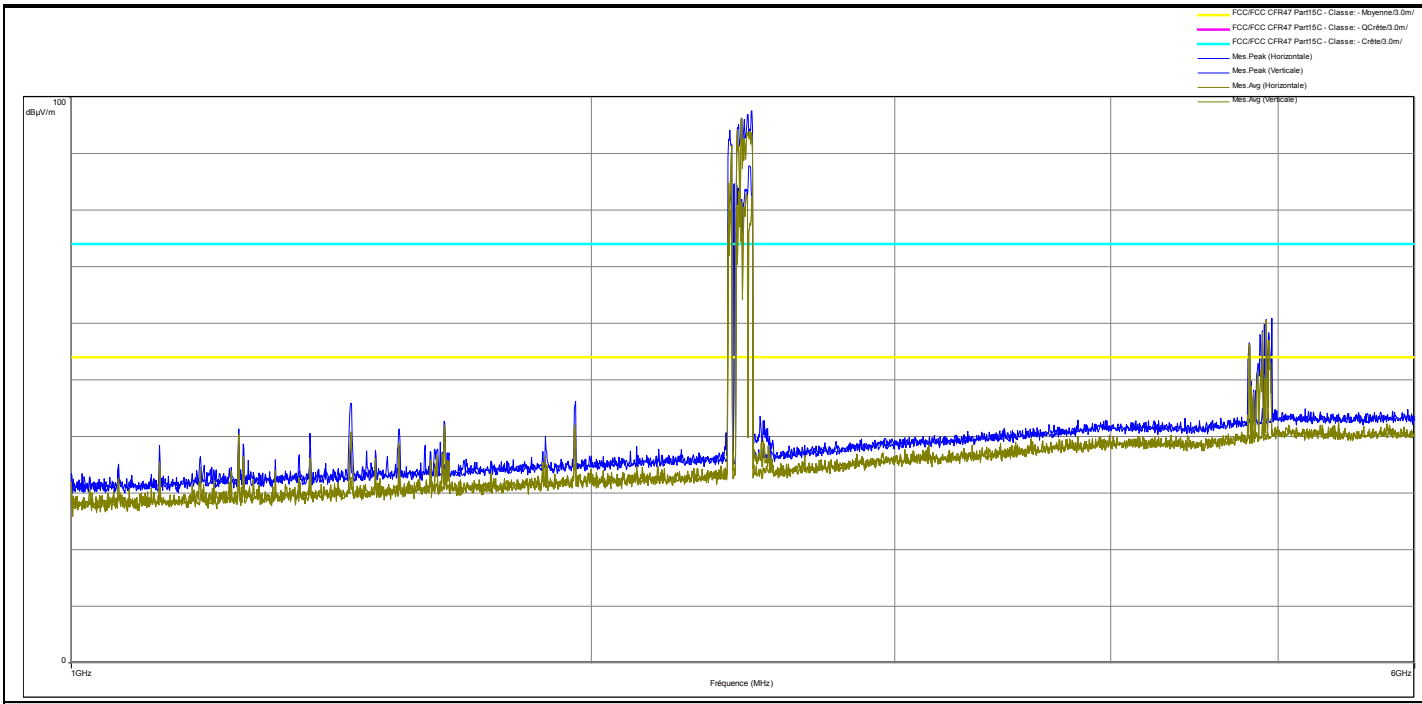
RADIATED EMISSIONS			
Graph name:	Emr#4	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Configuration 2 <1GHz	
Class:			
Frequency range: [30MHz - 1GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Position
37.701	27.64	Horizontal
78.076	27.24	Horizontal
131.133	30.3	Horizontal
193.557	26.04	Horizontal
290.28	37.14	Horizontal
327.24	35.97	Horizontal
333.44	38.15	Horizontal
338.52	45.07	Horizontal
345.36	36.06	Horizontal
348.8	33.62	Horizontal
354.84	38.38	Horizontal
387.08	40.51	Horizontal
390.6	35.15	Horizontal
435.52	36.06	Horizontal
497.12	35.43	Horizontal
531.88	38.03	Horizontal
580.56	32.58	Horizontal
985.84	32.47	Horizontal
39.197	44.28	Vertical
53.545	35.1	Vertical
67.179	39.34	Vertical
124.775	26.58	Vertical
142.455	28.32	Vertical
193.557	26.47	Vertical
290.28	38.59	Vertical
331.88	36.59	Vertical
338.48	45.9	Vertical
383.52	33.76	Vertical
387.08	38.19	Vertical
390.68	33.1	Vertical
483.64	34.23	Vertical
488.72	33.63	Vertical
493.6	38.19	Vertical
497.32	39.83	Vertical
502.2	34.7	Vertical
530.6	33.96	Vertical
532.8	37.78	Vertical
580.64	36.65	Vertical
870.92	33.24	Vertical

RADIATED EMISSIONS			
Graph name:	Emr#5	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Configuration 1 >1GHz	
Class:			
Frequency range: [1GHz - 6GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

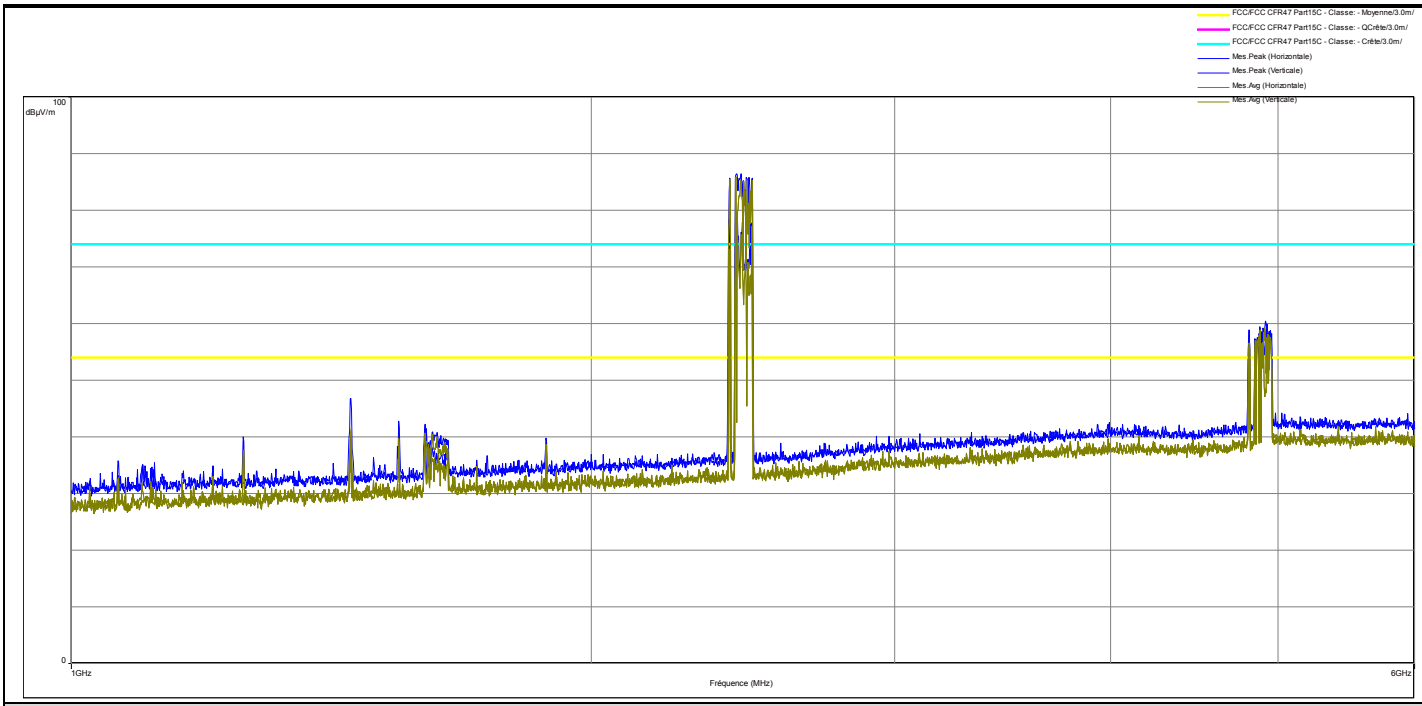


Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Polarization
1451.5	45.93	Horizontal
1644.5	42.62	Horizontal
2406.25*	94.13	Horizontal
2420*	84.62	Horizontal
2435.25*	95.07	Horizontal
2443.25*	96.21	Horizontal
2453.25*	96.03	Horizontal
2465.25*	96.91	Horizontal
2479.25*	97.6	Horizontal
4804*	53.63	Horizontal
4808.25*	55.13	Horizontal
4812.25*	56.51	Horizontal
4815.75*	56.22	Horizontal
4861.75*	51.12	Horizontal
4865.75*	51.58	Horizontal
4870*	52.87	Horizontal
4881.75*	57.95	Horizontal
4886*	52.59	Horizontal
4889.75*	52.16	Horizontal
4898.5*	58.61	Horizontal
4910*	59.8	Horizontal
4914.25*	51.44	Horizontal
4921.75*	60.71	Horizontal
4926*	56.18	Horizontal
4930*	54.2	Horizontal
4938.25*	58.35	Horizontal
4942*	57.19	Horizontal
4945.75*	54.83	Horizontal
4950.25*	53.79	Horizontal
4958.25*	60.91	Horizontal
1250.25	41.39	Vertical
1958.75	46.23	Vertical
2402.25*	79.28	Vertical
2410.25*	83.36	Vertical
2429.25*	84.4	Vertical
2435.5*	83.71	Vertical
2445.25*	81.9	Vertical
2455.25*	83.67	Vertical
2469.25*	87.81	Vertical
4837.75*	48.22	Vertical

*Bluetooth frequencies (EUT)

RADIATED EMISSIONS			
Graph name:	Emr#6	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Configuration 2 >1GHz	
Class:			
Frequency range: [1GHz - 6GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Polarization
1452	46.79	Horizontal
1547.75	42.76	Horizontal
1602.75	42.18	Horizontal
2405*	78.32	Horizontal
2430.25*	79.5	Horizontal
2444*	76.16	Horizontal
2448*	77.91	Horizontal
2460.25*	74.44	Horizontal
2472.25*	78.47	Horizontal
2476.25*	77.83	Horizontal
4805.75*	56.66	Horizontal
4810.25*	58.88	Horizontal
4814*	55.77	Horizontal
4848*	57.21	Horizontal
4852*	56.25	Horizontal
4855.75*	52.91	Horizontal
4860.25*	55.76	Horizontal
4864.75*	57.51	Horizontal
4868.25*	57.43	Horizontal
4872.25*	53.74	Horizontal
4876*	57.91	Horizontal
4880*	59.47	Horizontal
4884.25*	58.98	Horizontal
4892*	58.51	Horizontal
4896.25*	56.77	Horizontal
4900.25*	59.23	Horizontal
4904.25*	58.76	Horizontal
4908.25*	58.04	Horizontal
4912.25*	59.29	Horizontal
4916.5*	60.48	Horizontal
4920.5*	60.11	Horizontal
4924*	56.33	Horizontal
4928*	59.86	Horizontal
4932.25*	51.15	Horizontal
4936.25*	56.97	Horizontal
4940.5*	55.01	Horizontal
4944.25*	55.65	Horizontal
4948.5*	56.18	Horizontal
4952*	58.78	Horizontal
4956.25*	57.73	Horizontal
4960*	52.62	Horizontal
2407.25*	85.64	Vertical
2428.25*	86.45	Vertical
2444*	86.48	Vertical
2460*	85.8	Vertical
2470.25*	85.8	Vertical
2480.25*	85.64	Vertical
4806.25*	55.87	Vertical
4810*	56.78	Vertical
4814.5*	56.44	Vertical
4848.25*	57.34	Vertical
4852.5*	57.21	Vertical
4856*	57.11	Vertical
4860*	56.95	Vertical
4864.5*	57.28	Vertical
4868*	57.05	Vertical
4872.25*	57.69	Vertical
4876*	58.23	Vertical
4880.25*	53.94	Vertical
4884.25*	55.92	Vertical
4888*	56.76	Vertical
4892*	57.48	Vertical
4896.25*	56.05	Vertical
4900*	55.27	Vertical
4904*	56.17	Vertical
4908.5*	54.43	Vertical
4912.5*	55.44	Vertical
4916.25*	57.95	Vertical
4920*	58.68	Vertical
4923.75*	57.59	Vertical
4928.25*	57.54	Vertical
4932*	54.81	Vertical
4936*	58.35	Vertical
4940.5*	52.48	Vertical
4944.25*	58.66	Vertical
4948*	57.62	Vertical
4952*	54.12	Vertical
4956*	57.82	Vertical
4960.5*	58.23	Vertical

*Bluetooth frequencies (EUT)

12. 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*	3.57 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.*	3.28 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.47 dB	3.6 dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	2.90 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*	5.07 dB	5.2 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.*