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TEST REPORT

N°: 827941-R1-E

JDE : 133540

Subject **Electromagnetic compatibility and Radio spectrum Matters
(ERM) tests according to standards:
FCC CFR 47 Part 15, Subpart B et C
RSS-210 Issue 8**

Issued to **INGENICO**
Rovaltain TGV – Quartier de la Gare
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Apparatus under test

↳ **Product** **Terminal ISMP version Companion**
↳ **Trade mark** **INGENICO**
↳ **Manufacturer** **INGENICO**
↳ **Model** **ISMP2**
↳ **Model under test** **IMP452-11T2854A**
↳ **Serial number** **14344PP00007751 & 14344PP00007752**
↳ **FCCID** **XKB-IMP4B2**
↳ **ICID** **2586D-IMP4B2**

Test date February 12th to 20th, 2015
Test location Moirans
IC Test site 6500A-1 & 6500A-3
Test performed by G.Deschamps
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Written by :
Gaëtan Deschamps
Tests operator



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1. SYSTEM TEST CONFIGURATION

Standard:

- FCC Part 15, Subpart C 15.247
- ANSI C63.4 (2003)
- RSS-210 Issue 8 – Dec 2010
- RSS-Gen Issue 3 – Dec 2010

EMISSION TEST	LIMITS			RESULTS (Comments)
	Frequency	Quasi-peak value (dB μ V)	Average value (dB μ V)	
Limits for conducted disturbance at mains ports 150kHz-30MHz	150-500kHz	66 to 56	56 to 46	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
	0.5-5MHz	56	46	
	5-30MHz	60	50	
Radiated emissions 9kHz-30MHz CFR 47 §15.209 (a) CFR 47 §15.247 (d) RSS-210 §A8.5	Measure at 300m 9kHz-490kHz : 67.6dB μ V/m /F(kHz) Measure at 30m 490kHz-1.705MHz : 87.6dB μ V/m /F(kHz) 1.705MHz-30MHz : 29.5 dB μ V/m			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Radiated emissions 30MHz-25GHz* CFR 47 §15.209 (a) CFR 47 §15.247 (d) RSS-210 §A8.5 Highest frequency :400MHz (Declaration of provider)	Measure at 3m 30MHz-88MHz : 40 dB μ V/m 88MHz-216MHz : 43.5 dB μ V/m 216MHz-960MHz : 46.0 dB μ V/m 960MHz-1GHz : 54.0 dB μ V/m 1GHz – 25GHz: 54.0 dB μ V/m (AV) 74.0 dB μ V/m (PK)			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Maximum Peak Output Power CFR 47 §15.247 (b) RSS-210 §A8.4(1)	Limit: 21dBm Conducted or Radiated measurement			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Hopping Channel Separation CFR 47 §15.247 (a) (1) RSS-210 §A8.1(b)	Minimum between: Two-third 20dB Bandwidth or 25kHz Whichever is greater			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Number of Hopping Frequencies CFR 47 §15.247 (a) (1) (iii) RSS-210 §A8.1(d)	At least 15 channels used			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Time of Occupancy (Dwell Time) CFR 47 §15.247 (a) (1) (iii) RSS-210 §A8.1(d)	Maximum 0.4 sec within 31.6sec			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Band Edge Measurement CFR 47 §15.209 (a) CFR 47 §15.247 (d) RSS-210 §A8.5	Limit: -20dBc			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Occupied bandwidth RSS-Gen §4.6.1	No limit			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Receiver Spurious Emission** RSS-Gen §4.10	See RSS-Gen §4.10			<input type="checkbox"/> PASS <input type="checkbox"/> FAIL <input checked="" type="checkbox"/> NA <input type="checkbox"/> 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. INFORMATIONS

There are 2 models of ISMP2:

	BCR	CLESS	Bluetooth	USB cable	PSU
IMP452-11T2854A (BCR Full Option Companion)	X	X	X	X	X
IMP422-11T2856A (No BCR Low Option Companion)		X	X	X	X

BCR : Barcode Reader embedded

CLESS : 13,56MHz RFID transceiver embedded

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

IMP452-11T2854A

Serial Number: 14344PP00007751 & 14344PP00007752



Photography of EUT

Power supply:

During all the tests, EUT is supplied by V_{nom} : 3.7 VDC

For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Battery	<input type="checkbox"/> AC <input type="checkbox"/> DC <input checked="" type="checkbox"/> Battery	3.7 VDC	296118442 / None	-
PHIHONG	<input type="checkbox"/> AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Battery	100-240 VAC to 5 VDC, 0.3 A to 1 A and 50/60Hz	PSAI05R-050Q / D142700110A1	PHIHONG

**Inputs/outputs - Cable:**

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
PHIHONG	AC/DC	1.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access1	Mini USB		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Contactless card	-	-	
SAM	-	-	Two used.
Contact card	-	-	
iPod	A1509	CCQKTK66FFCJ	-

Radio frequency - Equipment information (2 RF modules):

**RF module:	RFID		
Frequency band:	[13.553 – 13.567] MHz		
Primary function type:	<input checked="" type="checkbox"/> Type I	<input type="checkbox"/> Type II	<input type="checkbox"/> Type III
Exclusion bands:	±3MHz		
Device type – SRD classification:	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3
Antenna type:	<input type="checkbox"/> External:		<input checked="" type="checkbox"/> Internal:
Equipment intended for use as a:	<input type="checkbox"/> Fixed station		<input checked="" type="checkbox"/> Mobile station
RF mode:	<input type="checkbox"/> TX	<input checked="" type="checkbox"/> TX /RX	<input type="checkbox"/> RX
Standby mode :	<input type="checkbox"/> Yes		<input checked="" type="checkbox"/> No

**Comments: See the RFID module tests results on the report: 827941-R2-E

Module tested:

Bluetooth type:	<input type="checkbox"/> v1.2	<input type="checkbox"/> v2.0	<input checked="" type="checkbox"/> v2.1+EDR	<input type="checkbox"/> 3.0+HS
Frequency band:	[2400 – 2483.5] MHz			
Sub-band REC7003:	Annex 3 (a)			
Spectrum Modulation:	<input checked="" type="checkbox"/> FHSS			
Number of Channel:	Maximum:	79	Minimum:	20
Spacing channel:	1MHz			
Channel bandwidth:	1MHz			
Transmit chains:	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
	<input checked="" type="checkbox"/> Single antenna	<input type="checkbox"/> Symmetrical		<input type="checkbox"/> Asymmetrical
	Gain 1: -0.5dBi	Gain 2: dBi	Gain 3: dBi	Gain 4: dBi
Beam forming gain:	<input type="checkbox"/> Yes: dB			<input checked="" type="checkbox"/> No
Receiver chains	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
Type of equipment:	<input checked="" type="checkbox"/> Stand-alone		<input type="checkbox"/> Plug-in	<input type="checkbox"/> Combined
Ad-Hoc mode:	<input type="checkbox"/> Yes			<input checked="" type="checkbox"/> No
Adaptivity mode:	<input type="checkbox"/> Yes (Load Based)		<input type="checkbox"/> Off mode	
	Clear Channel Assessment Time:			<input checked="" type="checkbox"/> No
	q value for Load Based Equipment:			None
	Minimum Channel Occupancy Time:			None
Duty cycle:	<input checked="" type="checkbox"/> Continuous duty		<input type="checkbox"/> Intermittent duty	<input type="checkbox"/> Continuous operation
Equipment type:	<input type="checkbox"/> Production model			<input checked="" type="checkbox"/> Prototype

Temperature range:	Tmin:	<input type="checkbox"/> -20°C	<input type="checkbox"/> 0°C	<input checked="" type="checkbox"/> -10°C
	Tnom:	20°C		
	Tmax:	<input type="checkbox"/> 35°C	<input type="checkbox"/> 55°C	<input checked="" type="checkbox"/> 45°C
Test source voltage:	<input checked="" type="checkbox"/> AC: 198 to 240 V	<input type="checkbox"/> DC:	<input type="checkbox"/> Battery:	VDC / Alkaline



CHANNEL PLAN

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
Cmin: 0	2402	27	2429	54	2456
1	2403	28	2430	55	2457
2	2404	29	2431	56	2458
3	2405	30	2432	57	2459
4	2406	31	2433	58	2460
5	2407	32	2434	59	2461
6	2408	33	2435	60	2462
7	2409	34	2436	61	2463
8	2410	35	2437	62	2464
9	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	Cmid: 39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	Cmax: 78	2480
25	2427	52	2454		
26	2428	53	2455		

DATA RATE

Available for EUT	Modulation type	Max. Data Rate (Mbps)	Packet type	Worst Case Modulation
<input type="checkbox"/>	GFSK	1	1-DM1	<input type="checkbox"/>
<input checked="" type="checkbox"/>	GFSK	1	1-DH1	<input type="checkbox"/>
<input type="checkbox"/>	GFSK	1	1-DM3	<input type="checkbox"/>
<input checked="" type="checkbox"/>	GFSK	1	1-DH3	<input type="checkbox"/>
<input type="checkbox"/>	GFSK	1	1-DM5	<input type="checkbox"/>
<input checked="" type="checkbox"/>	GFSK	1	1-DH5	<input checked="" type="checkbox"/>
<input type="checkbox"/>	GFSK	1	AUX1	<input type="checkbox"/>
<input checked="" type="checkbox"/>	$\pi/4$ DQPSK	2	2-DH1	<input type="checkbox"/>
<input checked="" type="checkbox"/>	$\pi/4$ DQPSK	2	2-DH3	<input type="checkbox"/>
<input checked="" type="checkbox"/>	$\pi/4$ DQPSK	2	2-DH5	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	8DPSK	3	3-DH1	<input type="checkbox"/>
<input checked="" type="checkbox"/>	8DPSK	3	3-DH3	<input type="checkbox"/>
<input checked="" type="checkbox"/>	8DPSK	3	3-DH5	<input checked="" type="checkbox"/>



2.1. EUT CONFIGURATION

The EUT is set in the following modes during tests with simulator / software: SDK 9.19

- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
- Permanent reception

There are 2 configurations tested in pre-characterization and worst case is choice for all the tests:

Configuration 1:

IMP452-11T2854A with IPod and powered by power supply (PHIHONG). The following commands are used to test the EUT:

- Writing/Reading CAM0 (Smart card)
- Writing/Reading SAM 1& SAM2
- TX/RX communication on Contactless Card
- Bluetooth communication between IMP and the IPod

Configuration 2:

IMP452-11T2854A with IPod and powered by Battery. The following commands are used to test the EUT:

- Writing/Reading CAM0 (Smart card)
- Writing/Reading SAM 1& SAM2
- TX/RX communication on Contactless Card
- Bluetooth communication between IMP and the IPod
- Barcode activated (permanence)

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 52.5dB μ V 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 dB μ V/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m.}$$



3. CONDUCTED EMISSION DATA

3.1. ENVIRONMENTAL CONDITIONS

Date of test	:February 17 th , 2015
Test performed by	:G.Deschamps
Atmospheric pressure (hPa)	:1000
Relative humidity (%)	:24
Ambient temperature (°C)	:22

3.2. TEST SETUP

Mains terminals

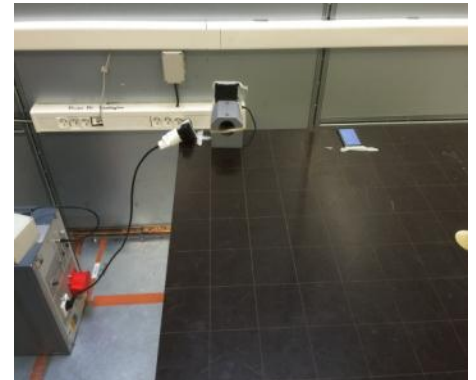
The EUT and auxiliaries are set:

- 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

3.3. TEST METHOD

The product has been tested according to ANSI C63.4-(2003) and FCC Part 15 subpart B and C. The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 subpart B §15.107 and C §15.207 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 $50\Omega / 50\mu\text{H}$. 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	05/14	05/15
Conducted emission comb generator	BARDET	-	A3169049	-	-
LISN tri-phase ESH2-Z5	RHODE & SCHWARZ	33852.19.53	C2320063	11/14	11/15
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	10/13	10/14
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	04/14	04/15
Transient limiter	RHODE & SCHWARZ	ESH3-Z2	A7122204	11/14	11/15

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)

Results for configuration 1:

Graph identifier	Line	Mode	Comments
Emc# 1	L	TX	See annex 1
Emc# 2	N	TX	See annex 1

3.7. CONCLUSION

Conducted emission data measurement performed on the sample of the product **IMP452-11T2854A**, SN: **14344PP00007752**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.



4. RADIATED EMISSION DATA

4.1. ENVIRONMENTAL CONDITIONS

Date of test : February 16th, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 984
Relative humidity (%) : 24
Ambient temperature (°C) : 23

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)
- 10cm above the ground on isolating support (Floor standing equipment)

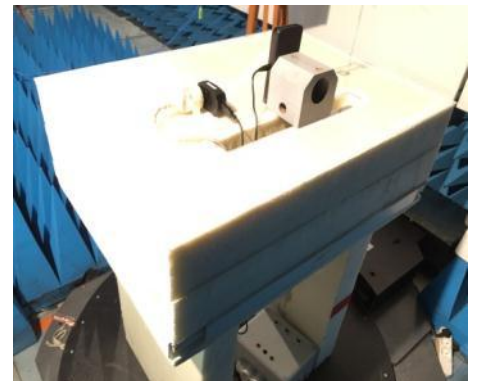
The EUT is powered by V_{nom} .



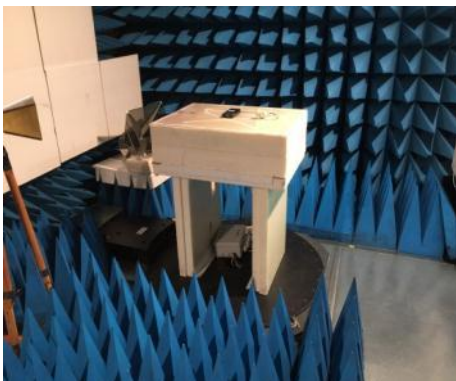
Test setup on OATS (configuration 1 and worst case see in pre-characterization):



Test setup in anechoic chamber (configuration 1, axis XY)



Test setup in anechoic chamber (configuration 1, axis Z)



Test setup in anechoic chamber (configuration 2, axis XY)



Test setup in anechoic chamber (configuration 2, axis Z)

4.3. TEST METHOD

Pre-characterisation measurement: (30MHz – 2GHz)

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 2GHz. 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:

The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart C. 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 §15.225 limits in the frequency range 13.553MHz 13.567MHz. 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 B §15.109 limits and C §15.209 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

Frequency list has been created with anechoic chamber pre-scan results.



4.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Bi-log	CHASE	CBL6111A	C2040051	04/14	04/16
Cable	SUCOFLEX	106G	A5329061	02/14	02/15
Cable (OATS)	-	-	A5329623	10/14	10/15
Cable	MICRO-COAX	-	A5329659	04/14	04/15
OATS	-	-	F2000409	09/14	09/15
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	10/13	10/14
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	-	-

4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

4.6. TEST RESULTS

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

See graphs for 30MHz-1GHz:

Graph identifier	Polarization	Mode	EUT position	EUT configuration	Channel	Comments
Emr# 3	H/V	TX	Axis XY	1	Min	See annex 1
Emr# 4	H/V	TX	Axis Z	1	Min	See annex 1
Emr# 5	H/V	TX	Axis XY	1	Max	See annex 1
Emr# 6	H/V	TX	Axis Z	1	Max	See annex 1
Emr# 7	H/V	TX	Axis XY	2	Min	See annex 1
Emr# 8	H/V	TX	Axis Z	2	Min	See annex 1
Emr# 9	H/V	TX	Axis XY	2	Max	See annex 1
Emr# 10	H/V	TX	Axis Z	2	Max	See annex 1

4.6.2. Pre-characterization at 3 meters [1GHz-2GHz]

See graphs for 1GHz-2GHz:

Graph identifier	Polarization	Mode	EUT position	EUT configuration	Channel	Comments
Emr# 11	H/V	TX	Axis XY	1	Min	See annex 1
Emr# 12	H/V	TX	Axis Z	1	Min	See annex 1
Emr# 13	H/V	TX	Axis XY	1	Max	See annex 1
Emr# 14	H/V	TX	Axis Z	1	Max	See annex 1
Emr# 15	H/V	TX	Axis XY	2	Min	See annex 1
Emr# 16	H/V	TX	Axis Z	2	Min	See annex 1
Emr# 17	H/V	TX	Axis XY	2	Max	See annex 1
Emr# 18	H/V	TX	Axis Z	2	Max	See annex 1



4.6.3. 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.

Results for the 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	40.676	40.0	34.9	-5.1	100	V	100	13.9	Measure at 3m
2	54.225	40.0	32.7	-7.3	280	V	100	8.6	
3	65.037	40.0	36.2	-3.8	270	V	100	7.7	
4	74.693	40.0	34.1	-5.9	0	V	100	8.3	
5	110.342	43.5	29.8	-13.7	30	V	250	12.8	
6	483.800	46.0	32.3	-13.7	0	V	250	21.8	
7	870.720	46.0	39.1	-6.9	0	V	250	28.6	

Results for the 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	375.000	46.0	33.7	-12.3	240	V	400	18.9	
2	425.000	46.0	40.8	-5.2	140	V	260	20.3	
3	475.013	46.0	41.9	-4.1	115	V	300	21.6	
4	500.000	46.0	43.3	-2.7	166	V	350	22.2	
5	525.014	46.0	41.9	-4.1	122	V	275	22.7	
6	550.014	46.0	40.8	-5.2	147	V	282	23.3	
7	600.015	46.0	39.8	-6.2	155	V	275	24.3	
8	650.130	46.0	44.0	-2.0	150	V	100	25.1	Measure at 3m
9	675.019	46.0	40.0	-6.0	0	V	100	25.5	Measure at 3m
10	725.019	46.0	43.6	-2.4	103	V	250	26.3	
11	750.019	46.0	44.6	-1.4	180	V	250	26.6	
12	875.022	46.0	40.3	-5.7	160	V	140	28.7	Measure at 3m

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



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

Worst case final data result:

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 (dB μ V/m)	Measure Peak (dB μ V/m)	Margin Peak (dB)	Limit Average (dB μ V/m)	Measure Average (dB μ V/m)	Margin Average (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	4804.000	74.0	60.1	-13.9	54.0	46.8	-7.2	270	H	100	36.3	
2	4882.000	74.0	61.3	-12.7	54.0	49.9	-4.1	140	H	100	36.5	
3	4960.000	74.0	61.3	-12.7	54.0	51.3	-2.7	140	H	100	36.7	
4	7323.000	74.0	55.5	-18.5	54.0	42.4	-11.6	0	H	100	40.5	
5	7440.000	74.0	56.0	-18.0	54.0	42.7	-11.3	0	H	100	40.7	
6	9608.000	74.0	56.3	-17.7	54.0	42.9	-11.1	0	H	100	42.4	
7	9764.000	74.0	56.5	-17.5	54.0	43.1	-10.9	0	H	100	42.6	
8	9920.000	74.0	56.7	-17.3	54.0	43.3	-10.7	0	H	100	42.8	
9	19216.000	74.0	59.0	-15.0	54.0	45.9	-8.1	0	H	100	43.1	
10	19528.000	74.0	58.7	-15.3	54.0	45.6	-8.4	0	H	100	42.8	
11	19840.000	74.0	58.5	-15.5	54.0	45.4	-8.6	0	H	100	42.6	

Note: Measures have been done at 3m distance.

4.7. CONCLUSION

Radiated emission data measurement performed on the sample of the product **IMP452-11T2854A**, SN: **14344PP00007752**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.



5. MAXIMUM PEAK OUTPUT POWER (15.247)

5.1. ENVIRONMENTAL CONDITIONS

Date of test : Februray 17th, 2015
 Test performed by : G.Deschamps
 Atmospheric pressure (hPa) : 990
 Relative humidity (%) : 41
 Ambient temperature (°C) : 24

5.2. EQUIPMENT CONFIGURATION

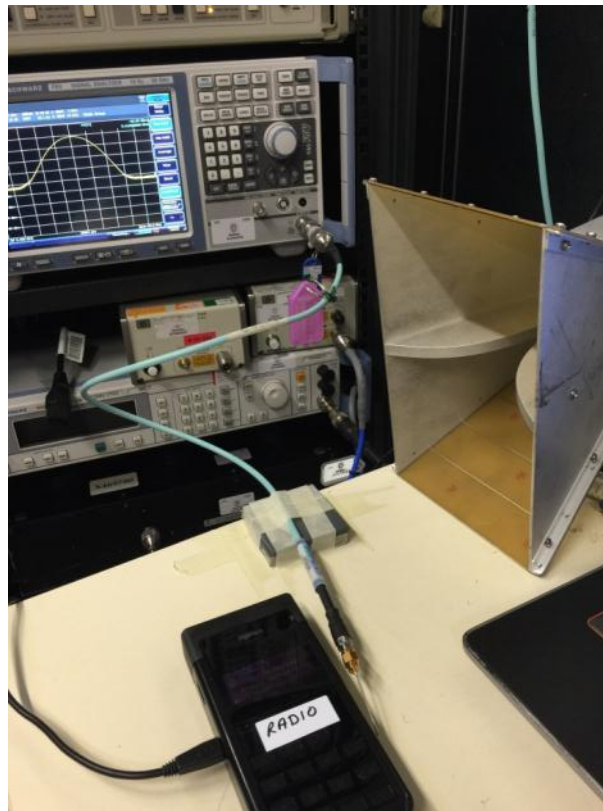
Packet type: 1-DH5
 Hopping sequence: ON OFF

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.



Test setup

Radiated measurement:

The product has been tested at a distance of 3 meters from the antenna and using 3MHz RBW and 10MHz VBW. 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 \geq 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
Antenna horn	EMCO	3115	C2042029	04/13	04/14
Attenuator 10dB	JFW	-	A7122166	09/13	09/14
Cable Measure	-	-	A5329604	04/13	04/14
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	01/14	01/15
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	04/14	04/15
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	-	-
Bluetooth Tester	ROHDE & SCHWARZ	CBT	A2440007	-	-
Cable SMA	-	-	A5329636	09/13	09/14

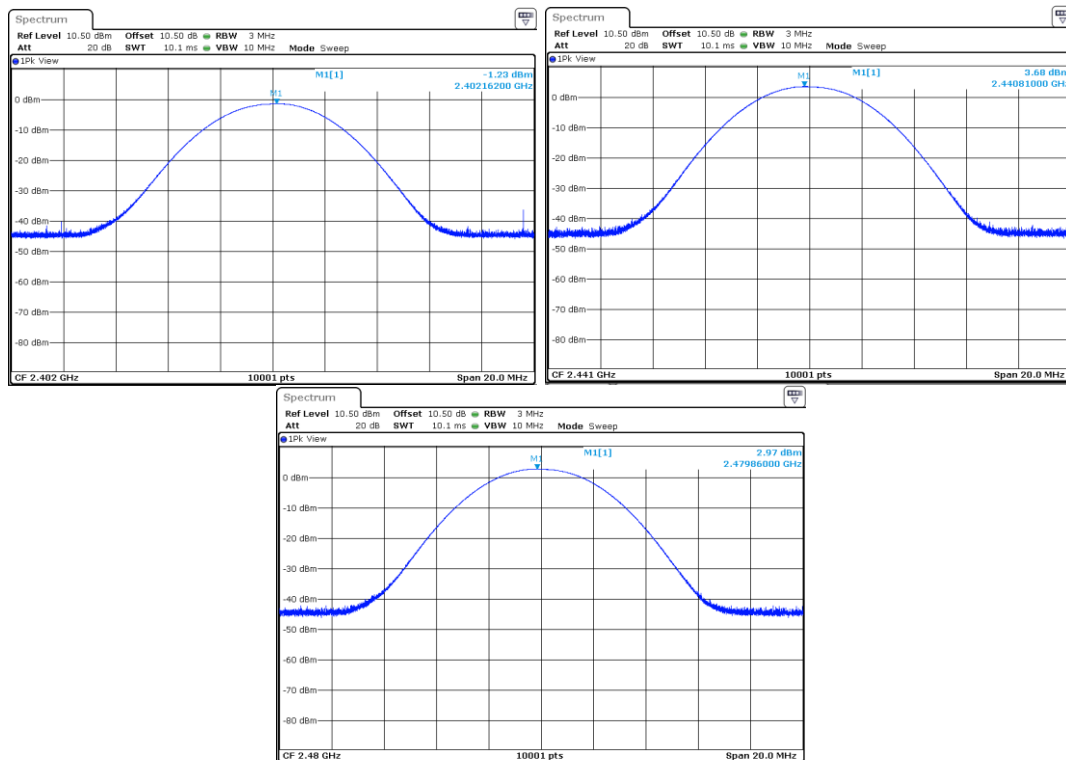
5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:



5.6. TEST RESULTS

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)	PASS/FAIL
0	2402	-1.2	30	PASS
39	2441	3.7	30	PASS
78	2480	3	30	PASS



5.7. CONCLUSION

Maximum Peak Output Power measurement performed on the sample of the product **IMP452-11T2854A**, SN: **14344PP00007751**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.



6. HOPPING CHANNEL SEPARATION (15.247)

6.1. ENVIRONMENTAL CONDITIONS

Date of test : Februray 17th, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 990
Relative humidity (%) : 41
Ambient temperature (°C) : 24

6.2. LIMIT

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

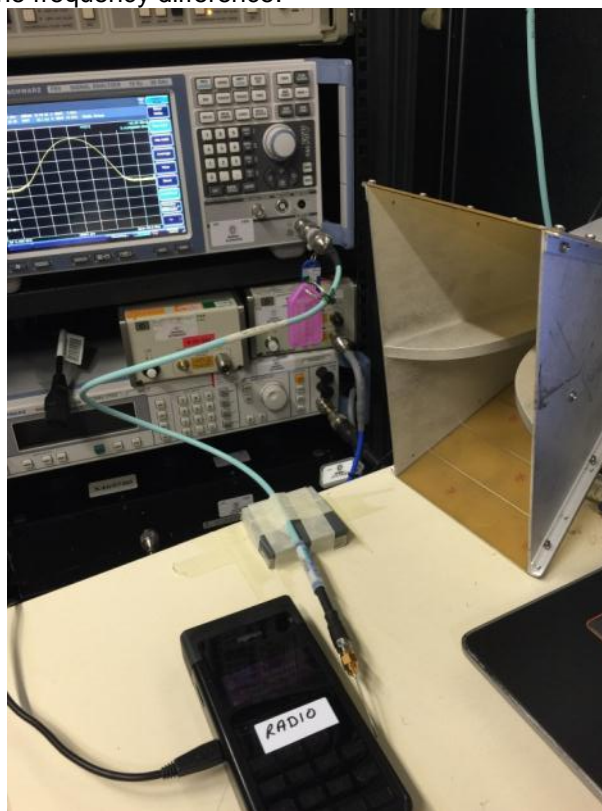
6.4. SETUP – 20DB BANDWIDTH

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.



Test setup

6.6. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna horn	EMCO	3115	C2042029	04/13	04/14
Attenuator 10dB	JFW	-	A7122166	09/13	09/14
Cable Measure	-	-	A5329604	04/13	04/14
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	01/14	01/15
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	04/14	04/15
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	-	-
Bluetooth Tester	ROHDE & SCHWARZ	CBT	A2440007	-	-
Cable SMA	-	-	A5329636	09/13	09/14

6.7. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

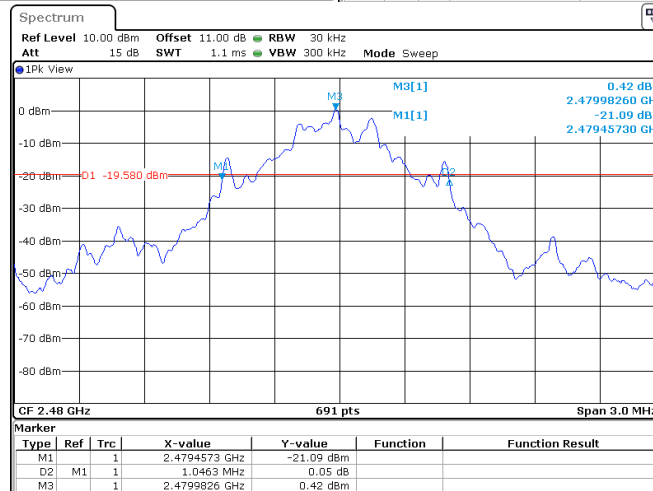
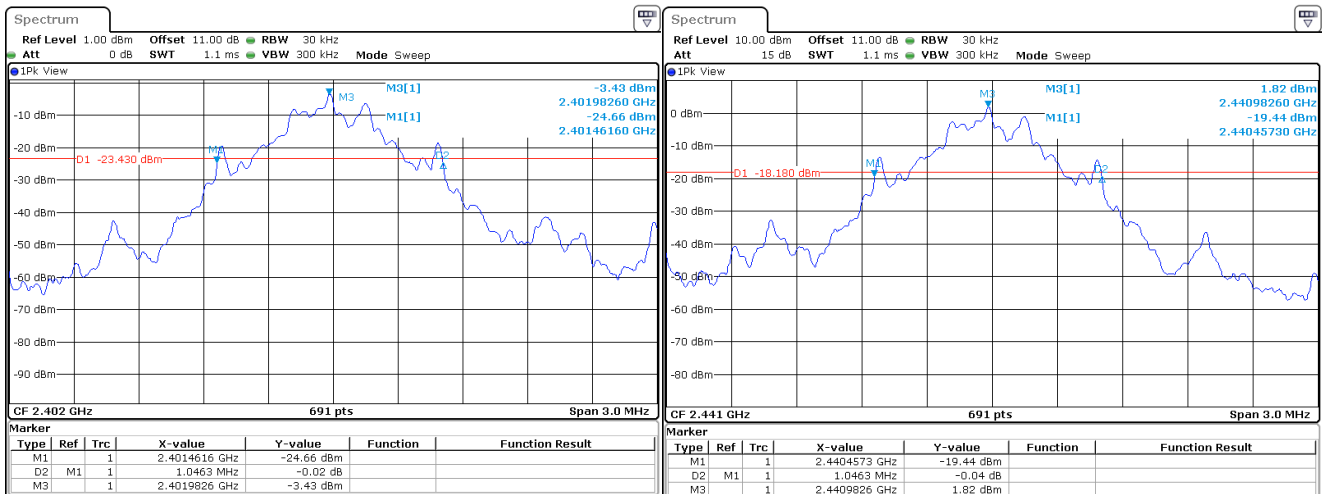
None Divergence:



6.8. TEST SEQUENCE AND RESULTS

20dB Bandwidth 1-DH5:

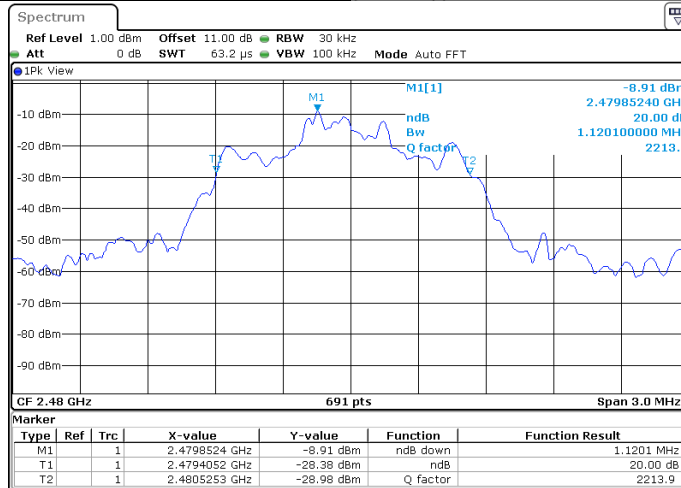
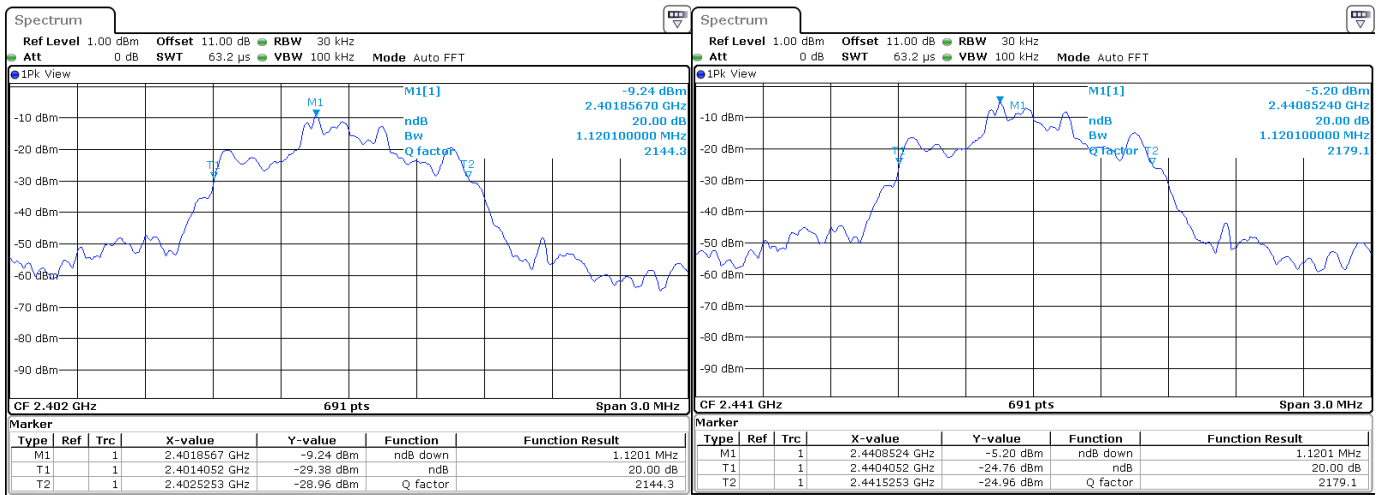
Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
C0	2402	1.046
C39	2441	1.046
C78	2480	1.046





20dB Bandwidth 2-DH5:

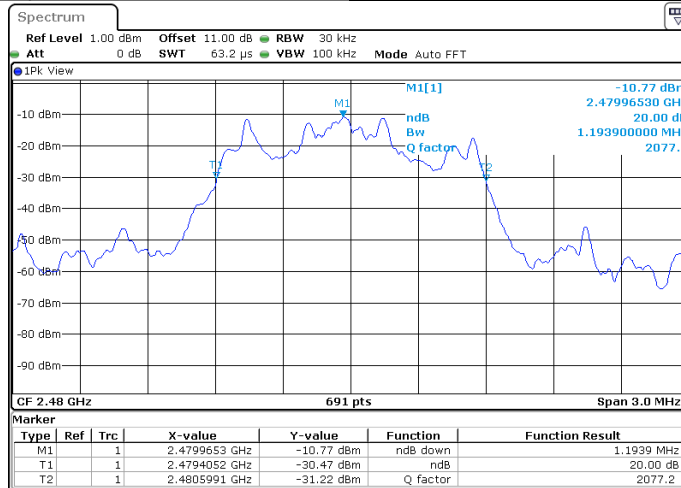
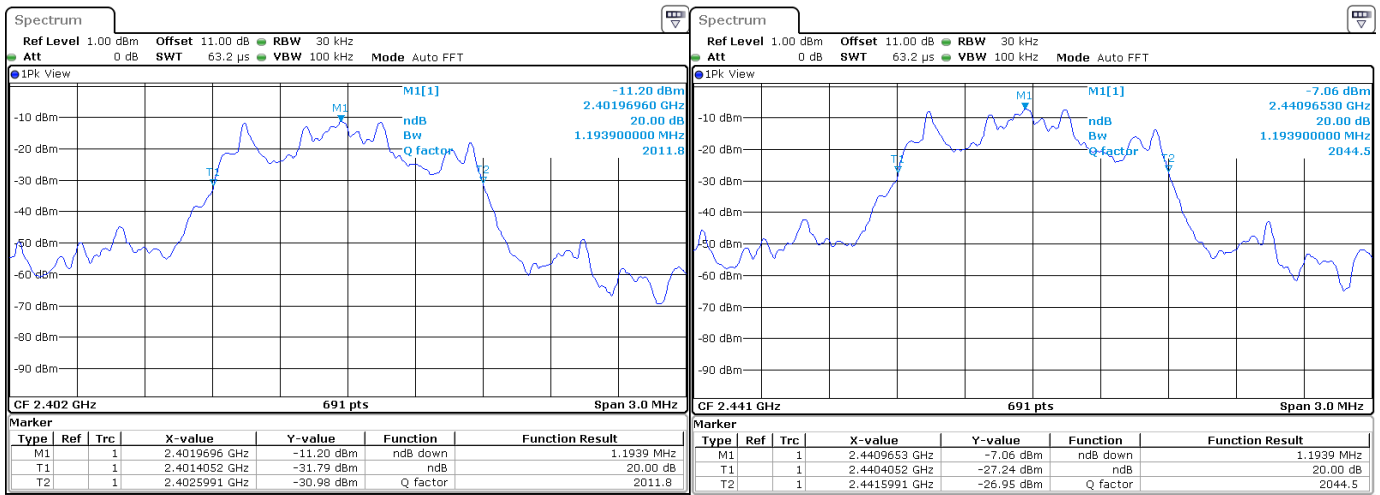
Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
C0	2402	1.120
C39	2441	1.120
C78	2480	1.120





20dB Bandwidth 3-DH5:

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
C0	2402	1.193
C39	2441	1.193
C78	2480	1.193

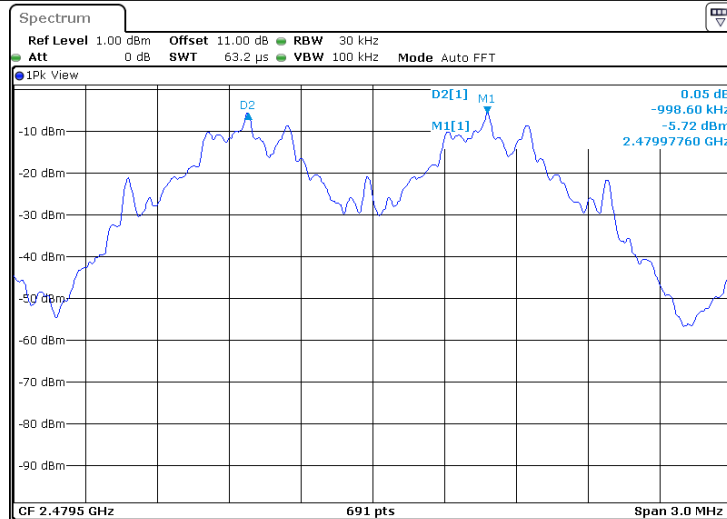
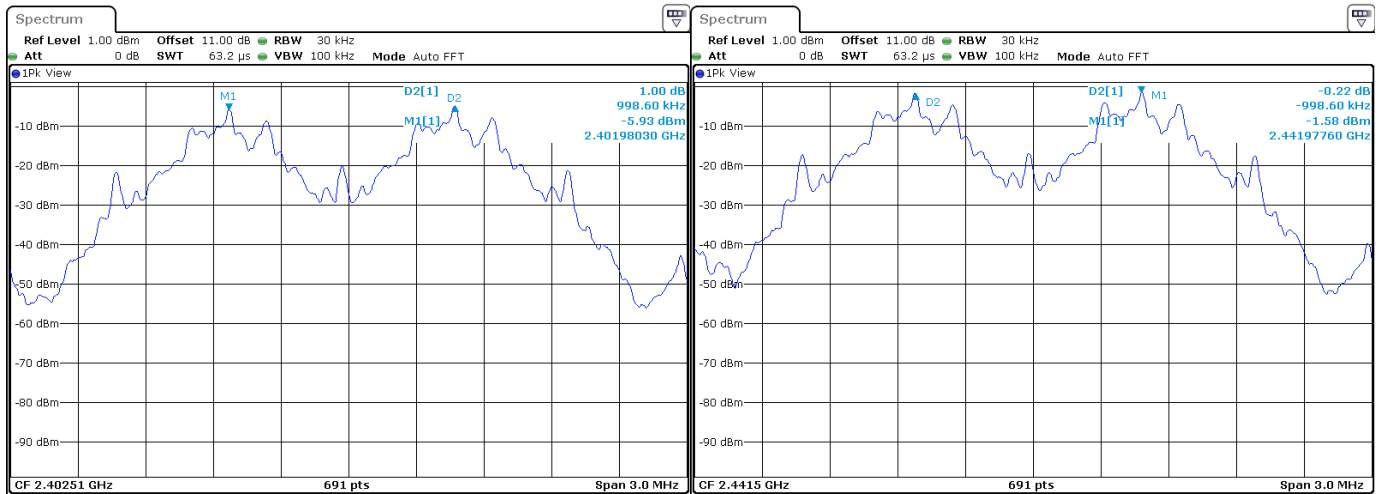




Modulation 1-DH5:

Channel	Channel Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	PASS / FAIL
C0	2402	0.998	1.046	0.697	PASS
C39	2441	0.998	1.046	0.697	PASS
C78	2480	0.998	1.046	0.697	PASS

Limit used: Two-third 20dB Bandwidth

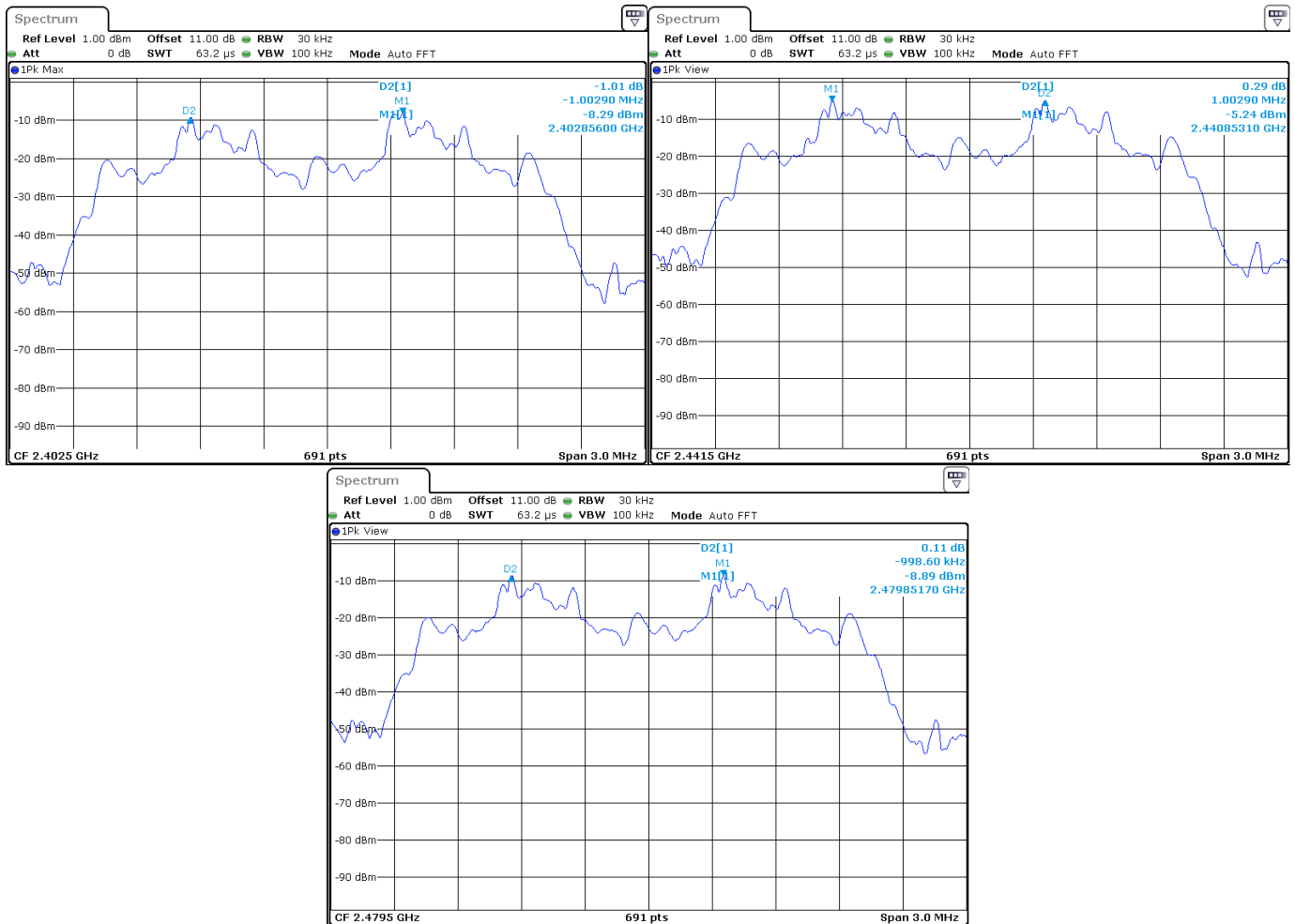




Modulation 2-DH5:

Channel	Channel Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	PASS / FAIL
C0	2402	1.002	1.120	0.746	PASS
C39	2441	1.002	1.120	0.746	PASS
C78	2480	0.998	1.120	0.746	PASS

Limit used: Two-third 20dB Bandwidth

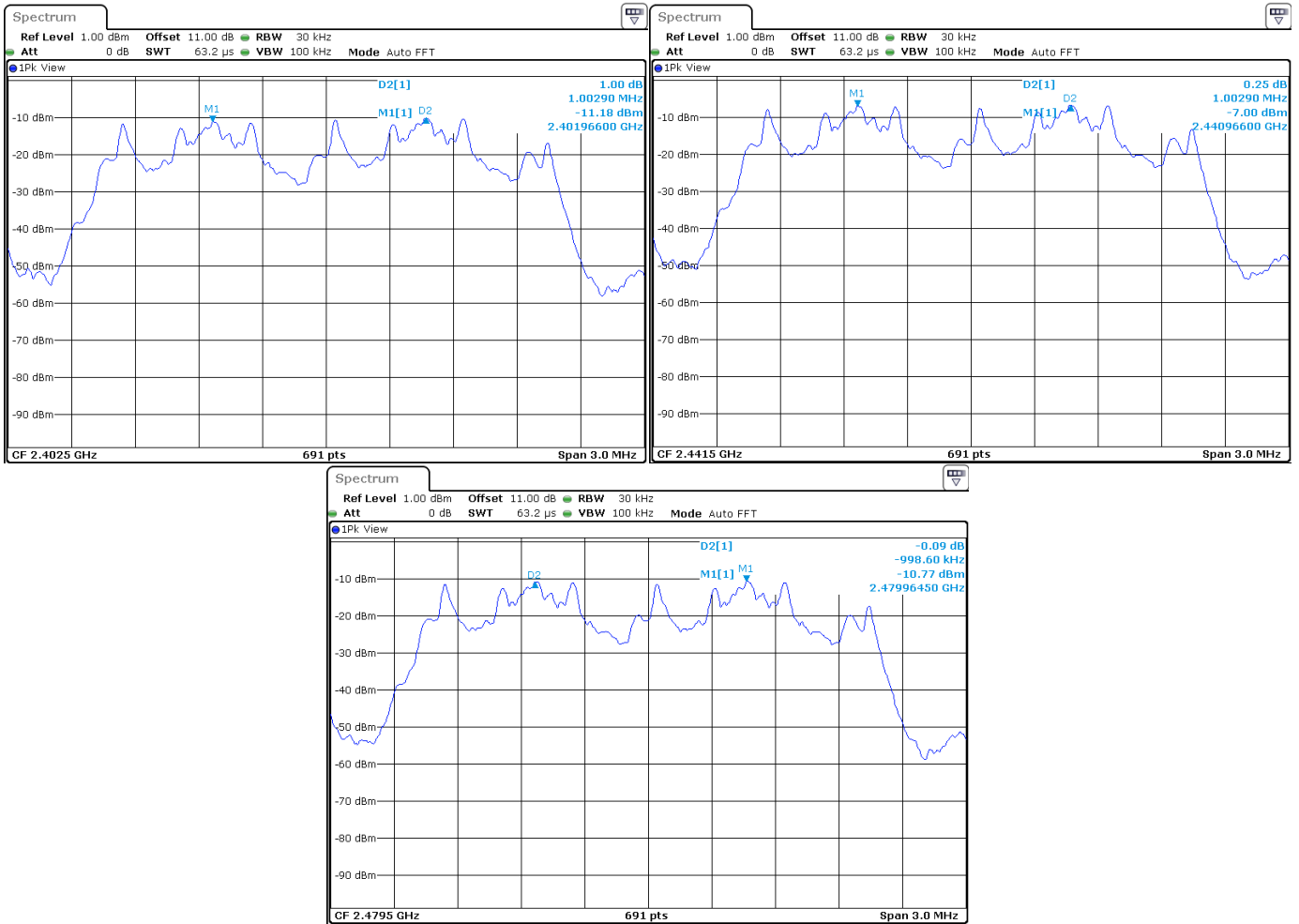




Modulation 3-DH5:

Channel	Channel Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	PASS / FAIL
C0	2402	1.002	1.193	0.795	PASS
C39	2441	1.002	1.193	0.795	PASS
C78	2480	0.998	1.193	0.795	PASS

Limit used: Two-third 20dB Bandwidth



6.9. CONCLUSION

Hopping Channel Separation measurement performed on the sample of the product **IMP452-11T2854A**, SN: **14344PP00007751**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.



7. NUMBER OF HOPPING FREQUENCIES (15.247)

7.1. ENVIRONMENTAL CONDITIONS

Date of test : Februray 17th, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 990
Relative humidity (%) : 41
Ambient temperature (°C) : 24

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.

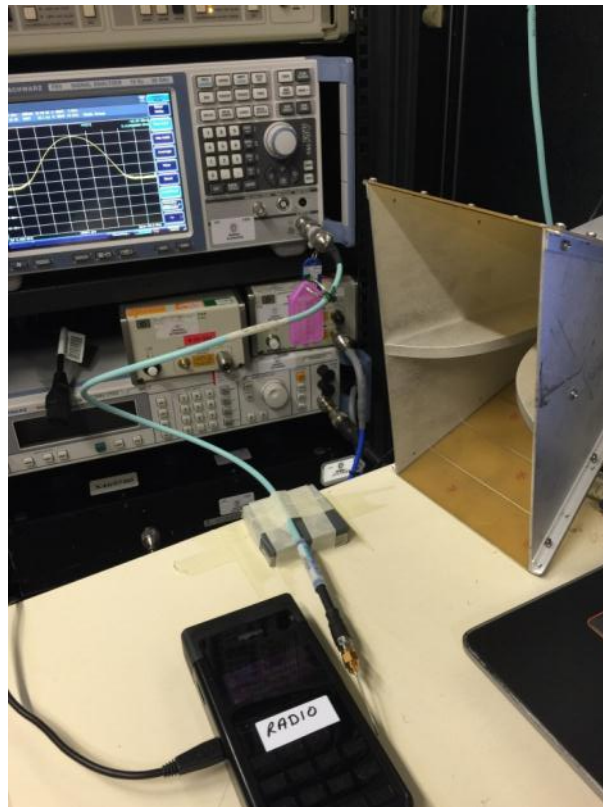
7.3. EQUIPMENT CONFIGURATION

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



Test setup



7.5. TEST EQUIPMENT LIST

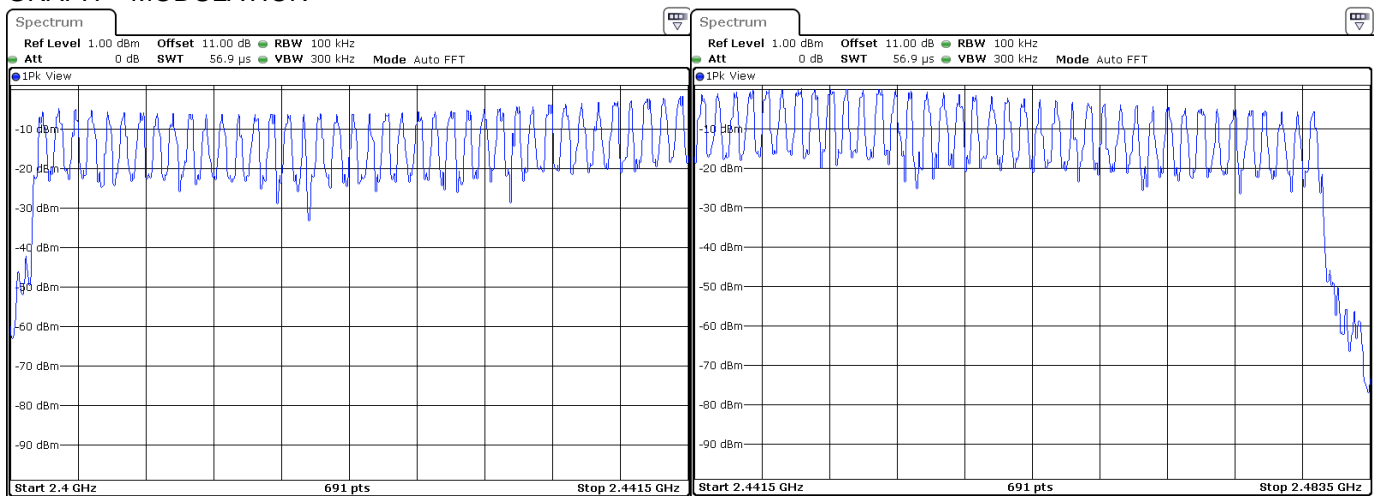
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna horn	EMCO	3115	C2042029	04/13	04/14
Attenuator 10dB	JFW	-	A7122166	09/13	09/14
Cable Measure	-	-	A5329604	04/13	04/14
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	01/14	01/15
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	04/14	04/15
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	-	-
Bluetooth Tester	ROHDE & SCHWARZ	CBT	A2440007	-	-
Cable SMA	-	-	A5329636	09/13	09/14

7.6. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

7.7. TEST SEQUENCE AND RESULTS

GRAPH – MODULATION



Number of frequency used in the hopping sequence: 79

7.8. CONCLUSION

Number of hopping frequencies measurement performed on the sample of the product **IMP452-11T2854A**, SN: **14344PP00007751**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.



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

8.1. ENVIRONMENTAL CONDITIONS

Date of test : Februray 17th, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 990
Relative humidity (%) : 41
Ambient temperature (°C) : 24

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.

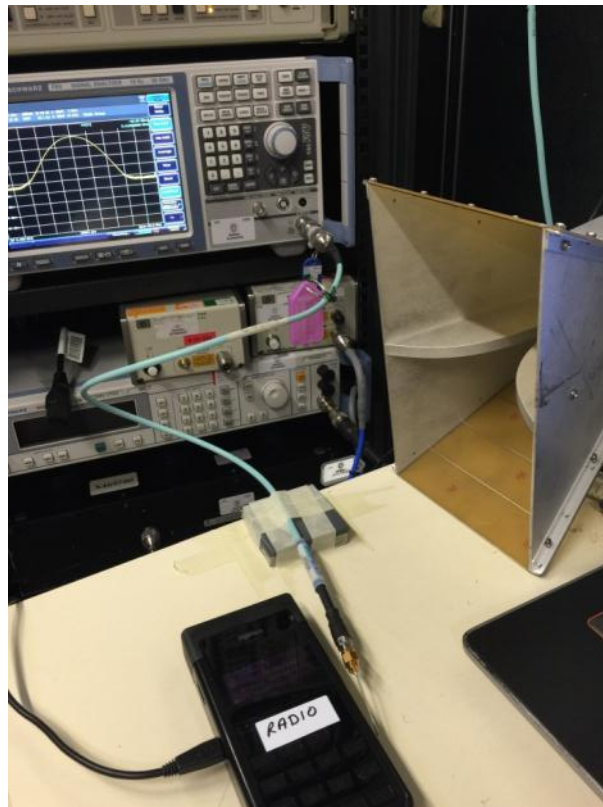
8.3. EQUIPMENT CONFIGURATION

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.



Test setup



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
Antenna horn	EMCO	3115	C2042029	04/13	04/14
Attenuator 10dB	JFW	-	A7122166	09/13	09/14
Cable Measure	-	-	A5329604	04/13	04/14
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	01/14	01/15
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	04/14	04/15
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	-	-
Bluetooth Tester	ROHDE & SCHWARZ	CBT	A2440007	-	-
Cable SMA	-	-	A5329636	09/13	09/14

8.6. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

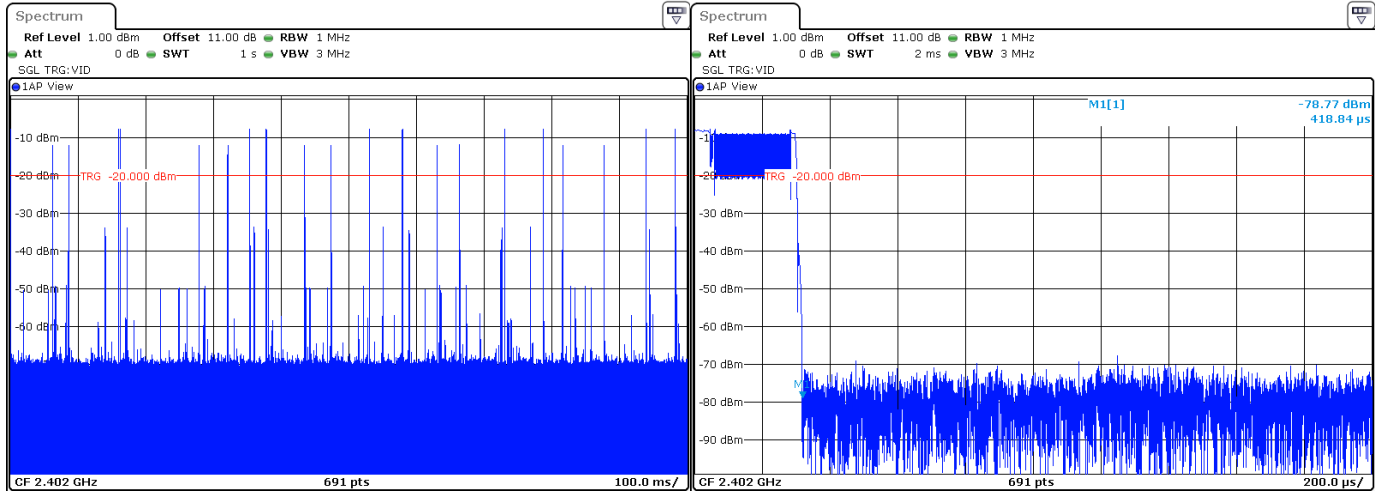
8.7. TEST SEQUENCE AND RESULTS

Packet Mode	Number of transmission in the period	Length of transmission time (ms)	Result (ms)	Limit (ms)	PASS / FAIL
3-DH1	23(times/ 1sec) * 31.6	0.418	303.802	400	PASS
3-DH3	23(times/ 5sec) * 6.32	1.671	242.896	400	PASS
3-DH5	23(times/ 5sec) * 6.32	1.924	279.672	400	PASS

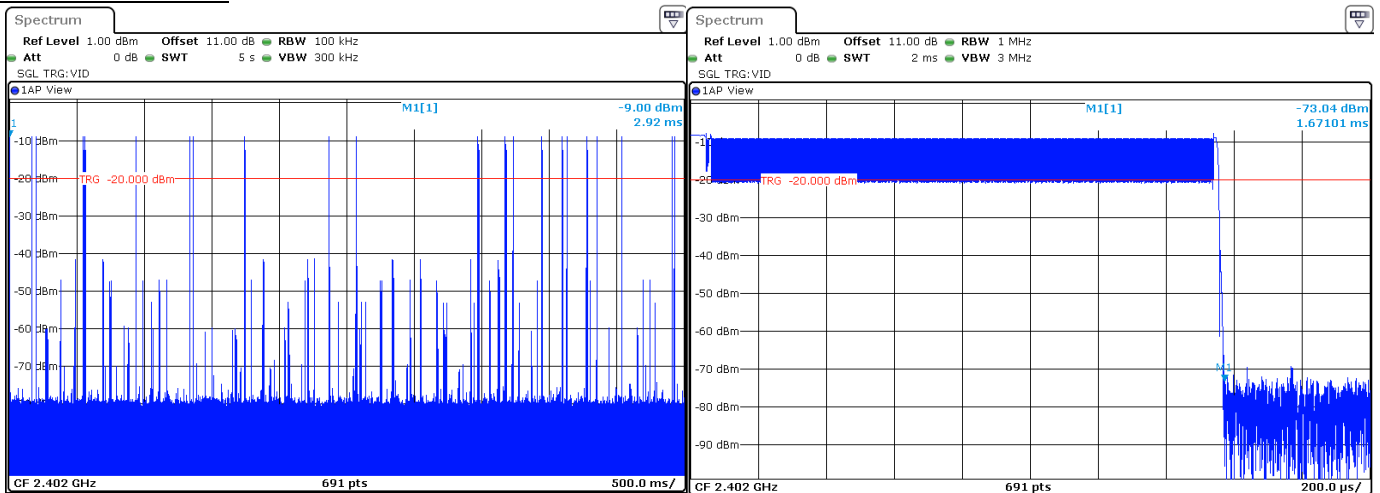
Note: Period of 31.6 seconds (79 channels x 0.4)



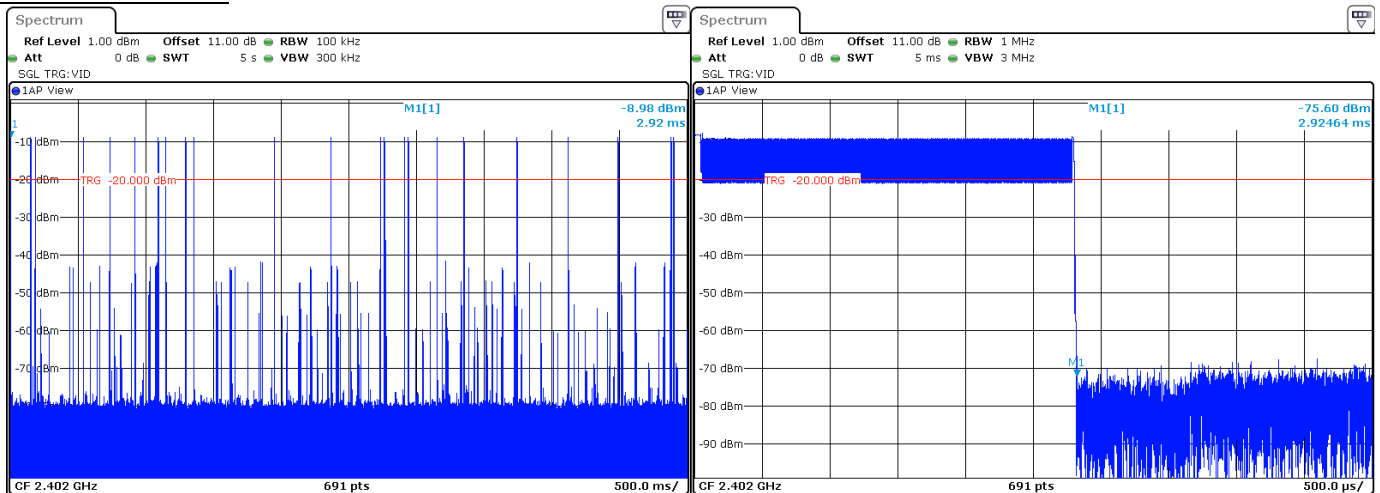
Packet mode: 3-DH1



Packet mode: 3-DH3



Packet mode: 3-DH5





8.8. CONCLUSION

Time of occupancy measurement performed on the sample of the product **IMP452-11T2854A**, SN: **14344PP00007751**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.



9. BAND EDGE MEASUREMENT (15.247)

9.1. ENVIRONMENTAL CONDITIONS

Date of test : Februray 17th, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 990
Relative humidity (%) : 41
Ambient temperature (°C) : 24

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

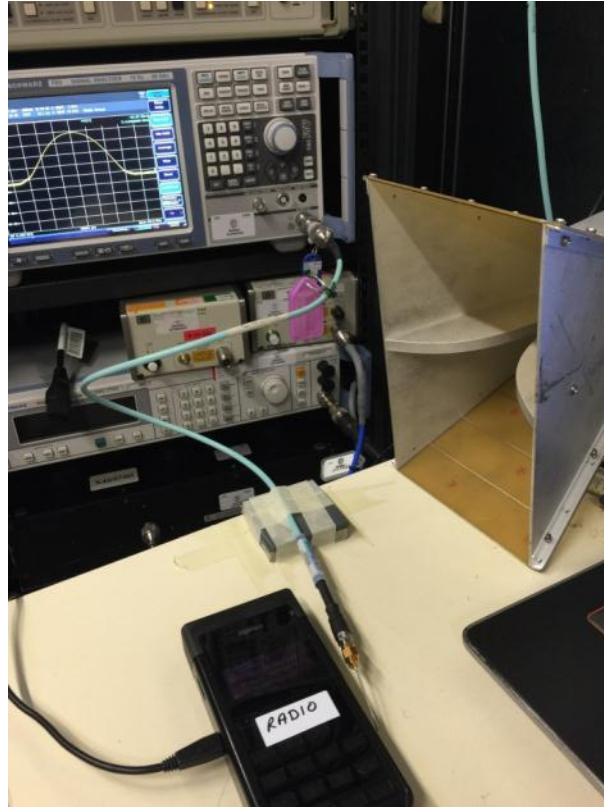
Packet type: 3-DH1
Hopping sequence: ON OFF

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



Test setup



9.5. TEST EQUIPMENT LIST

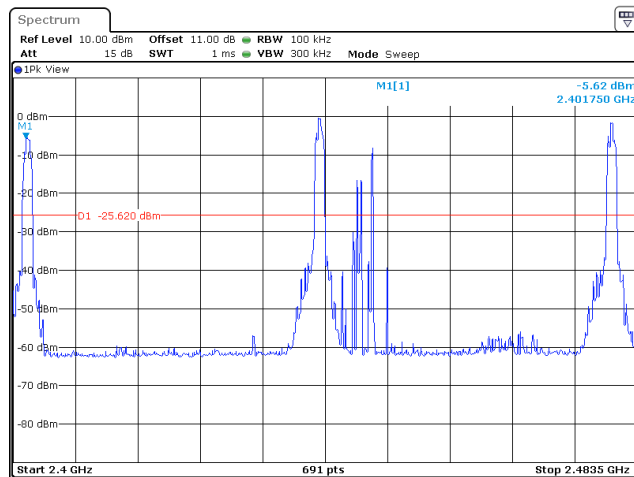
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna horn	EMCO	3115	C2042029	04/13	04/14
Attenuator 10dB	JFW	-	A7122166	09/13	09/14
Cable Measure	-	-	A5329604	04/13	04/14
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	01/14	01/15
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	04/14	04/15
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	-	-
Bluetooth Tester	ROHDE & SCHWARZ	CBT	A2440007	-	-
Cable SMA	-	-	A5329636	09/13	09/14

9.6. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

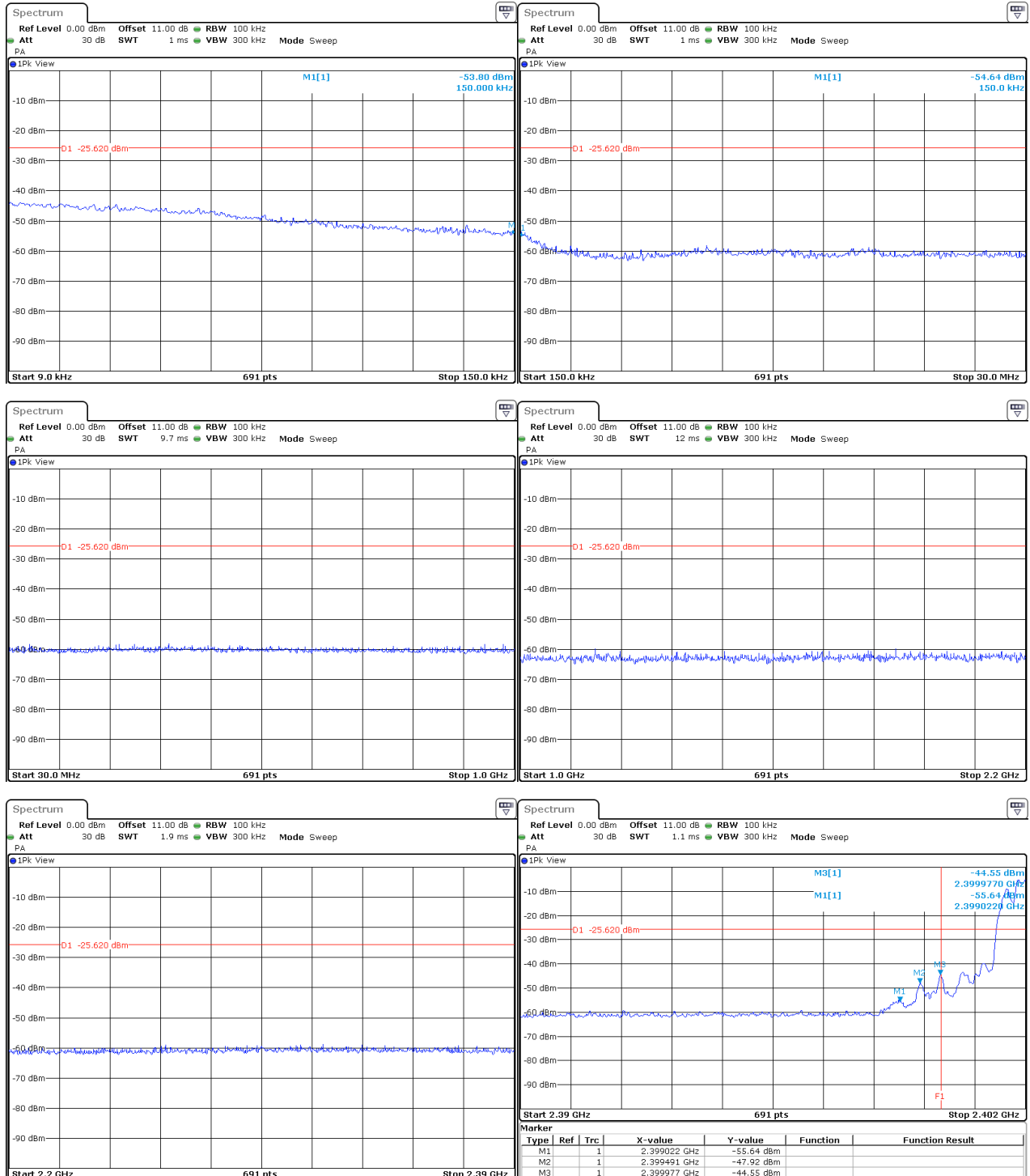
None Divergence:

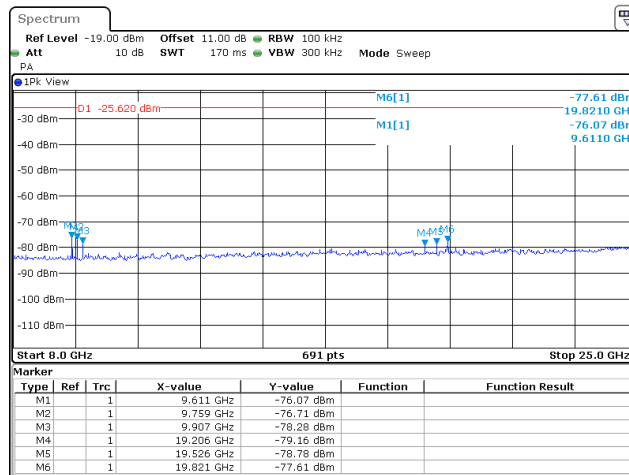
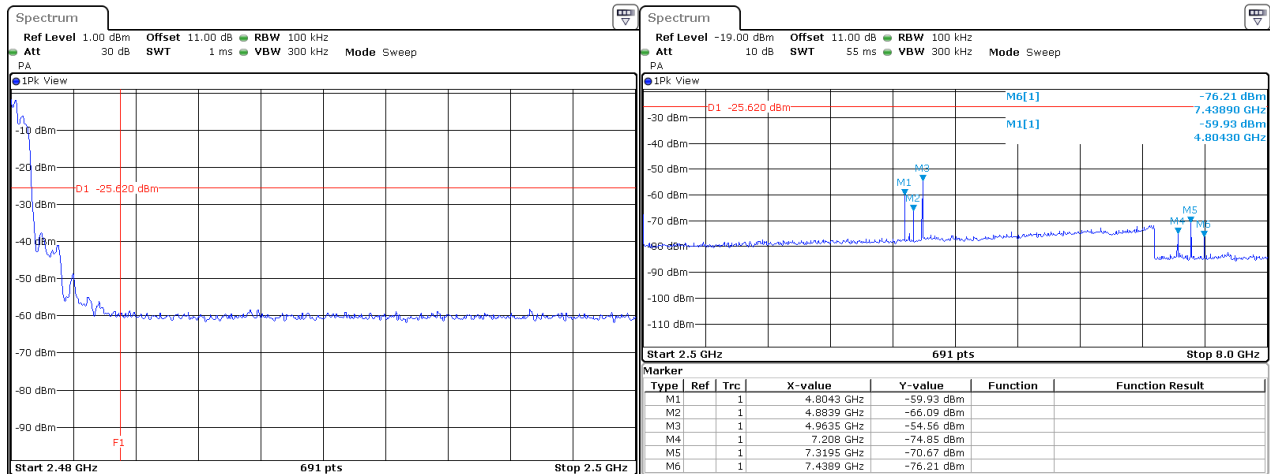
9.7. TEST SEQUENCE AND RESULTS

GRAPH / MODULATION.



Worst case in Cmin and display line at -24.06dBm.





9.8. CONCLUSION

Band edge measurement performed on the sample of the product **IMP452-11T2854A**, SN: **14344PP00007751**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.



10. OCCUPIED BANDWIDTH

10.1. ENVIRONMENTAL CONDITIONS

Date of test
Test performed by
Atmospheric pressure (hPa)
Relative humidity (%)
Ambient temperature (°C)

10.2. EQUIPMENT CONFIGURATION

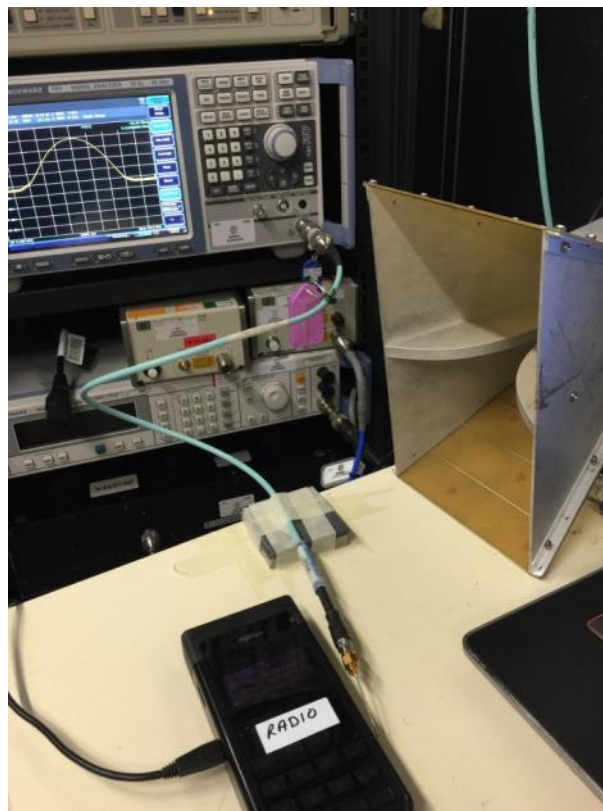
Packet type: 3-DH5
Hopping sequence: ON OFF

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 11dB



Test setup

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 should not be lower than 1% of the selected span
2. Set the video bandwidth (VBW) $\geq 3 \times$ 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
Antenna horn	EMCO	3115	C2042029	04/13	04/14
Attenuator 10dB	JFW	-	A7122166	09/13	09/14
Cable Measure	-	-	A5329604	04/13	04/14
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	01/14	01/15
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	04/14	04/15
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	-	-
Bluetooth Tester	ROHDE & SCHWARZ	CBT	A2440007	-	-
Cable SMA	-	-	A5329636	09/13	09/14

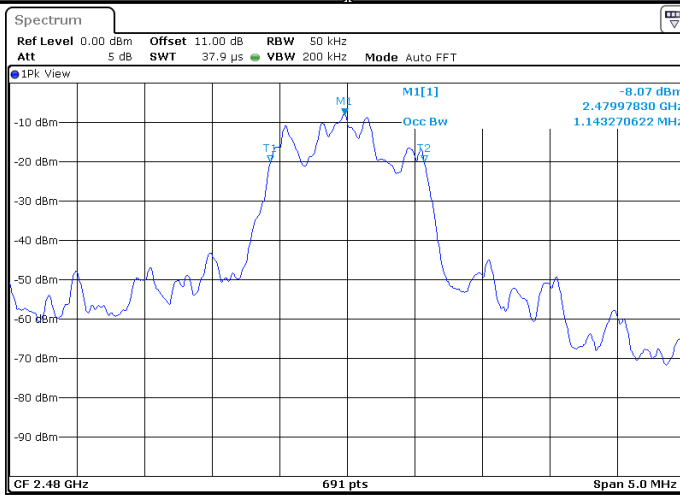
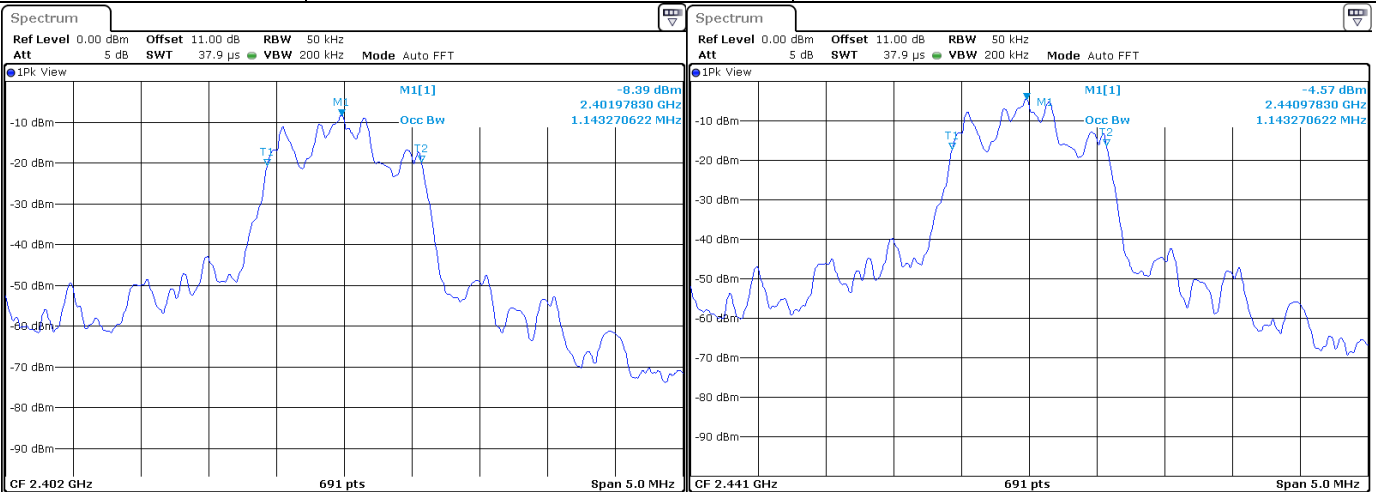
10.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:



10.6. TEST SEQUENCE AND RESULTS

Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)
C0	2402	1.143
C39	2441	1.143
C78	2480	1.143





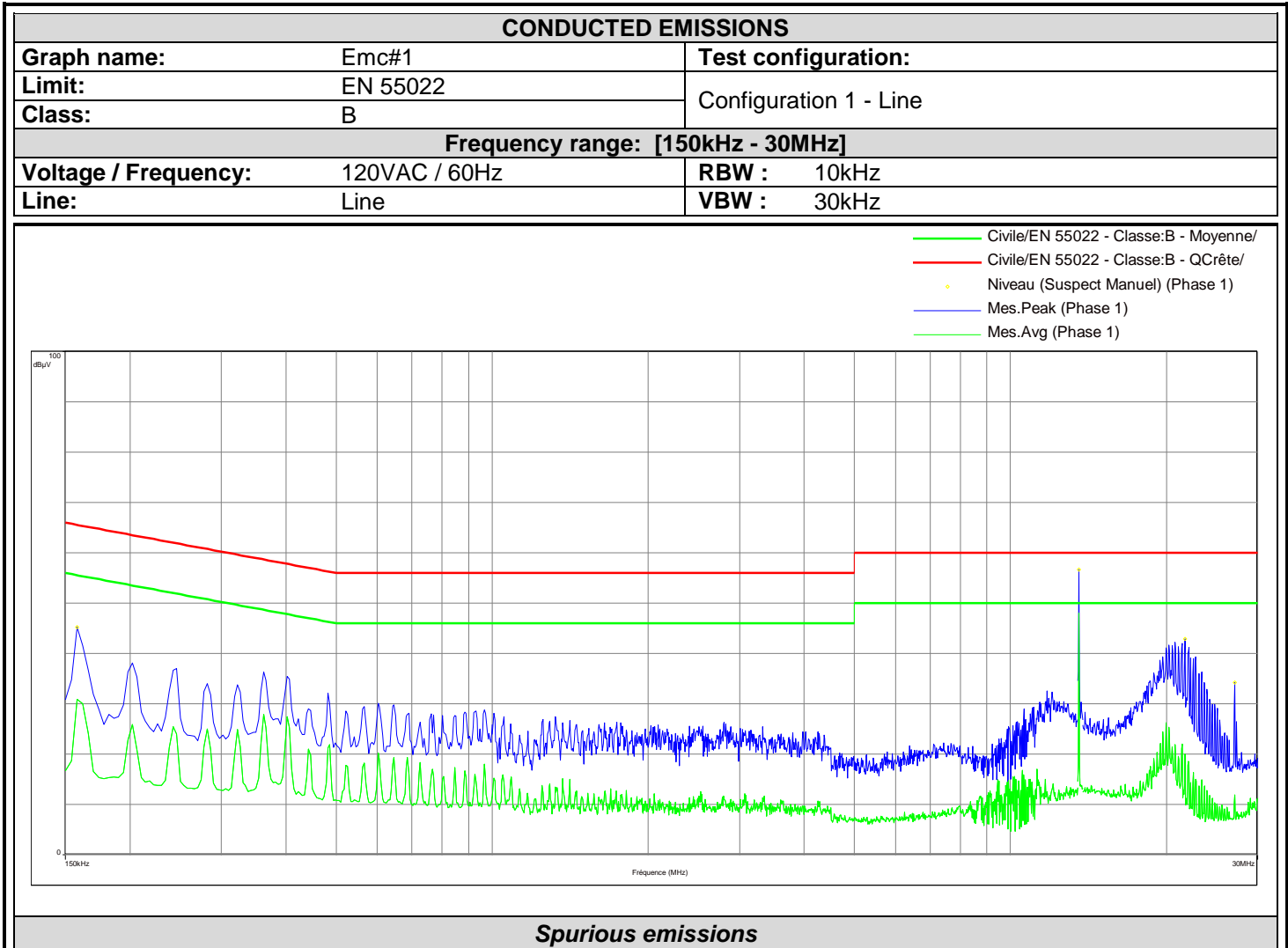
12. UNCERTAINTIES CHART

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 <i>Measurement of conducted disturbances in voltage on the power port</i>	3.57 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication <i>Measurement of conducted disturbances in voltage on the telecommunication port.</i>	3.28 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension <i>Measurement of discontinuous conducted disturbances in voltage</i>	3.47 dB	3.6 dB
Mesure des perturbations conduites en courant <i>Measurement of conducted disturbances in current</i>	2.90 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans <i>Measurement of radiated electric field on the Moirans open area test site</i>	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.



13. ANNEX 1 (GRAPHS)

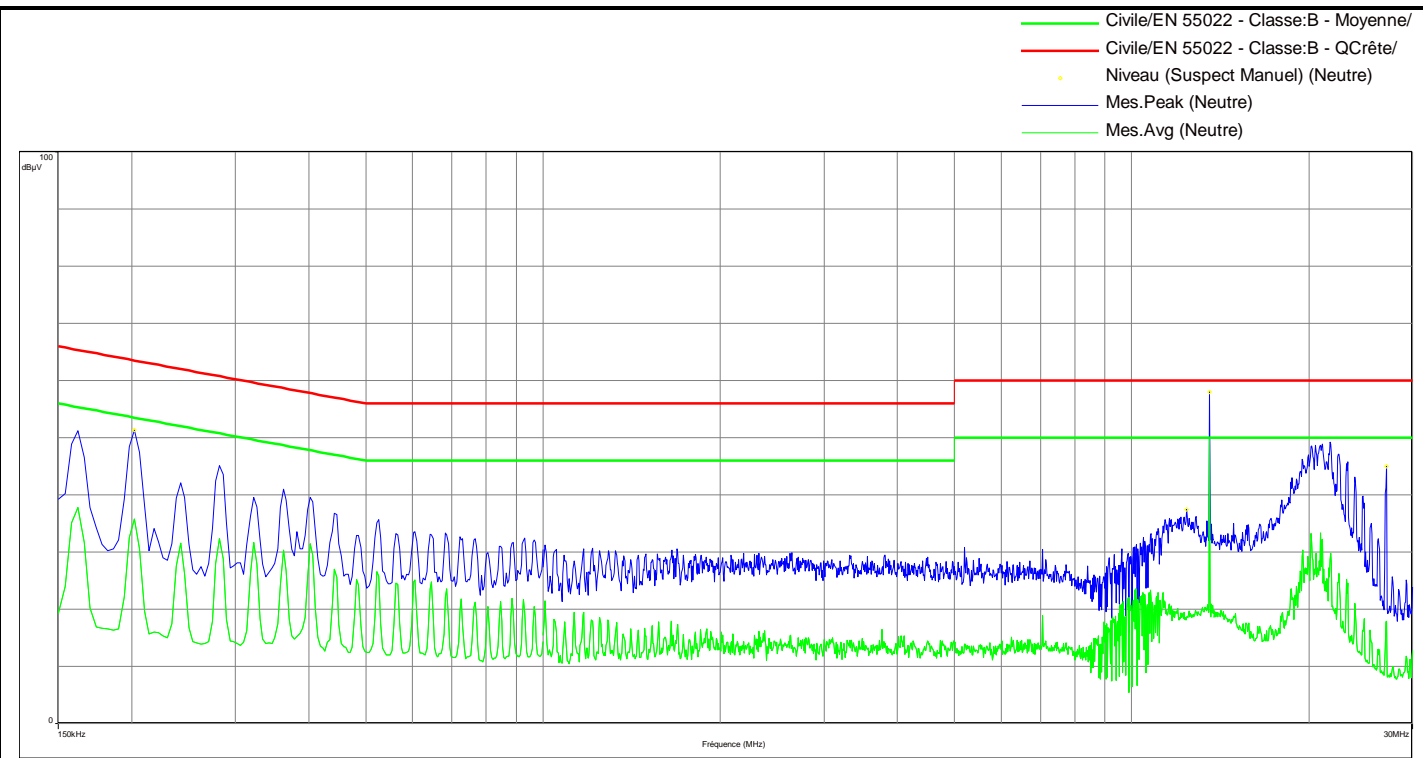


Frequency (MHz)	Peak (dBµV)
0.158	45.19
13.556*	56.72
21.724	42.94
27.108*	34.23

*RFID Frequencies



CONDUCTED EMISSIONS		
Graph name:	Emc#2	Test configuration:
Limit:	EN 55022	Configuration 1 - Neutral
Class:	B	
Frequency range: [150kHz - 30MHz]		
Voltage / Frequency:	120VAC / 60Hz	RBW : 10kHz
Line:	Neutral	VBW : 30kHz



Spurious emissions

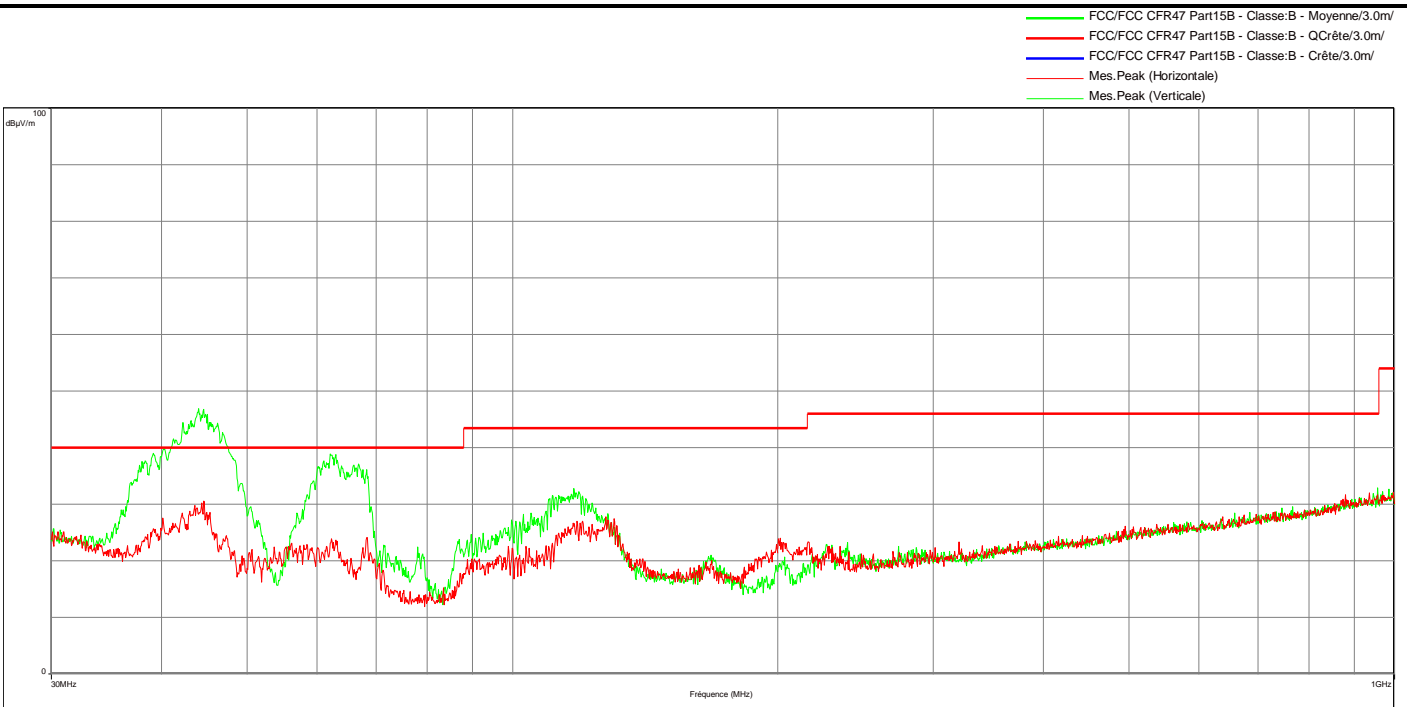
Frequency (MHz)	Peak (dBµV)
0.202	51.29
12.4	37.44
13.56*	58.03
27.084*	44.95

*RFID Frequencies.



RADIATED EMISSIONS

Graph name:	Emr#3	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMin - TX mode - Axis XY
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz

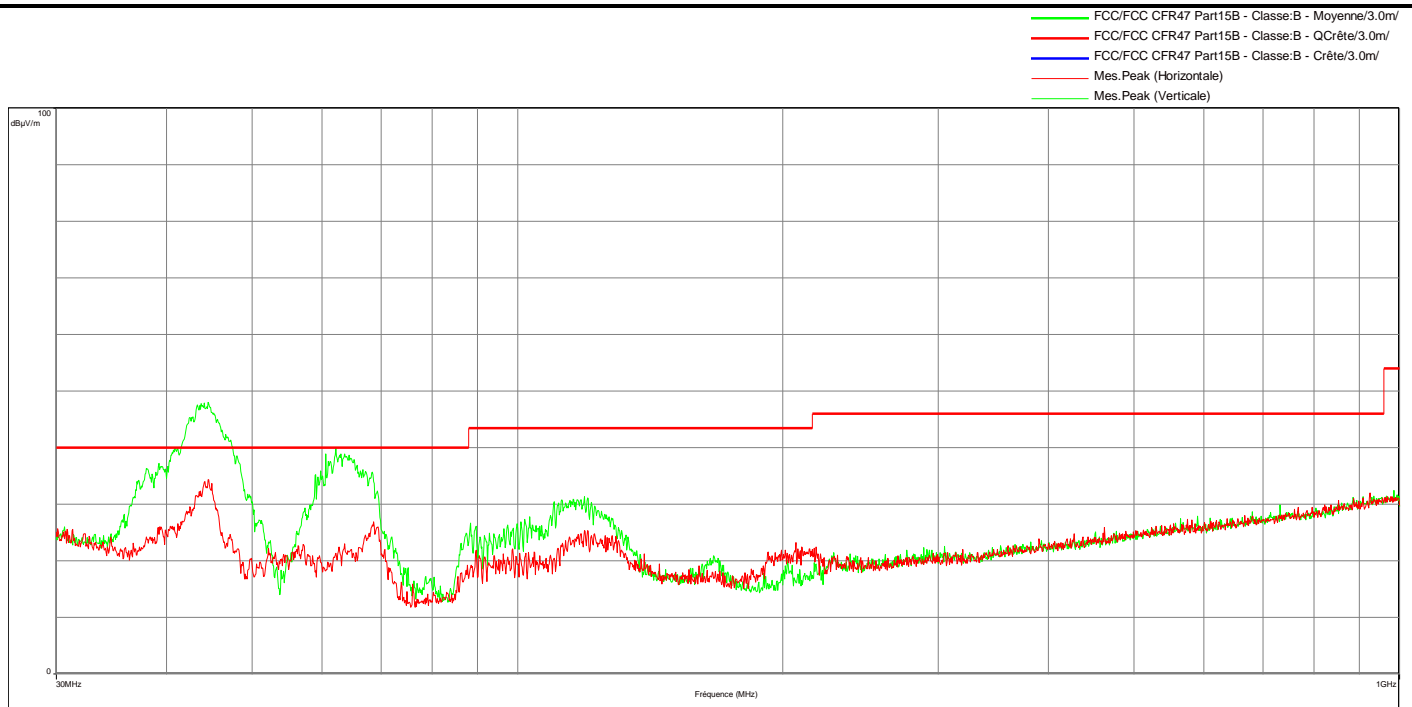


Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#4	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMin - TX mode - Axis Z
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz

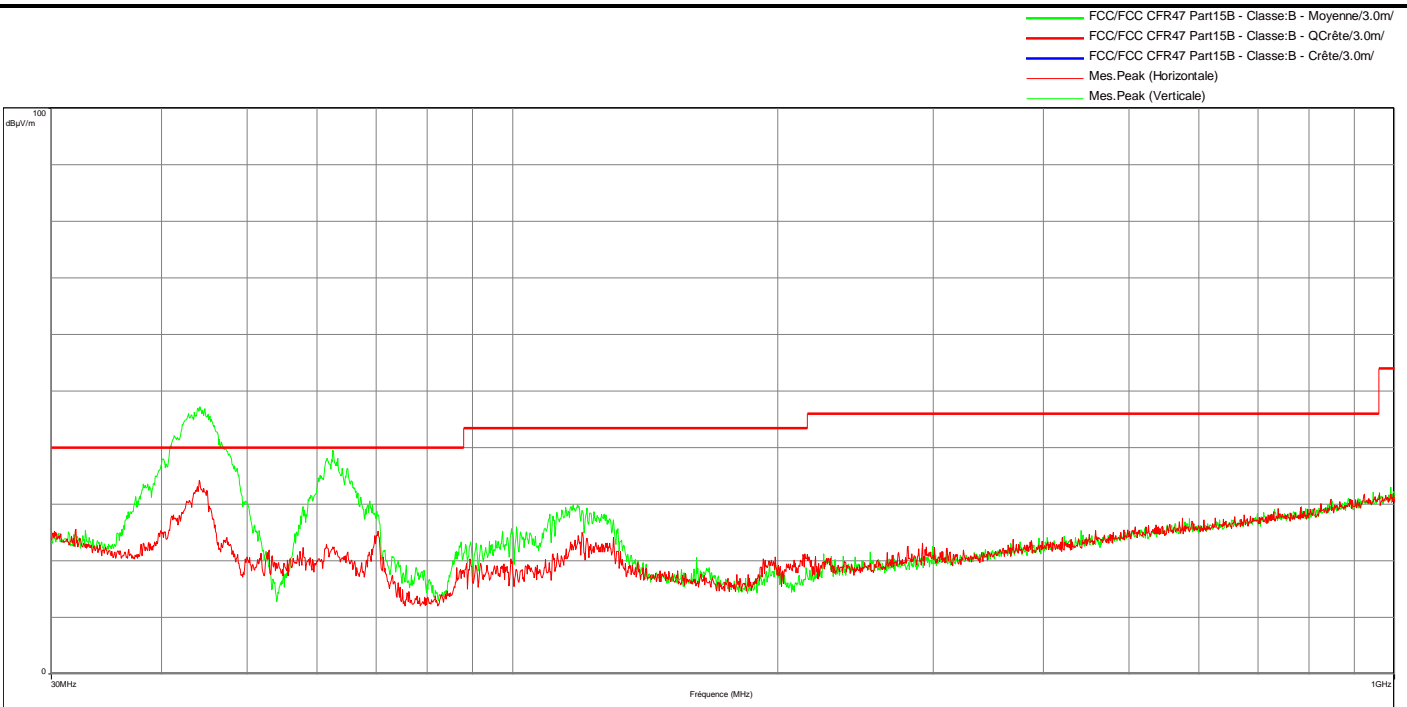


Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#5	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMax - TX mode - Axis XY
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz

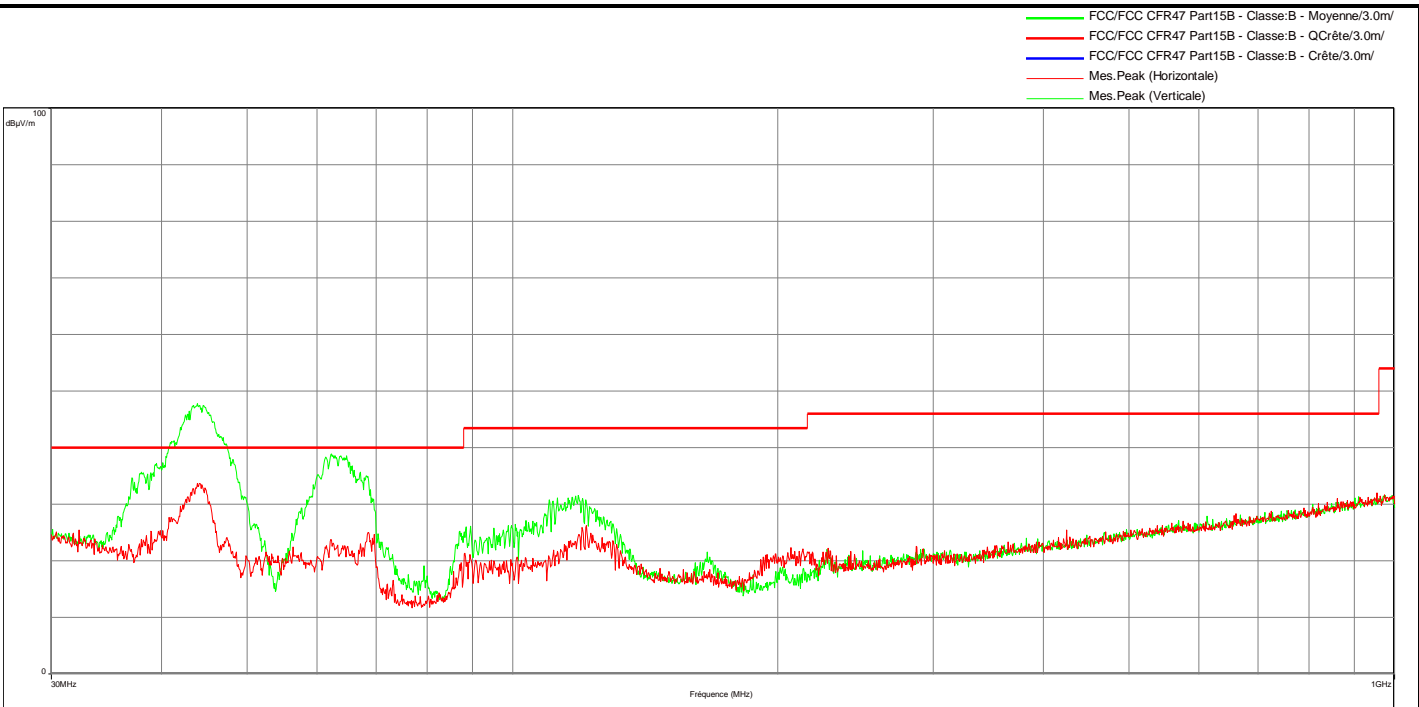


Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#6	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMax - TX mode - Axis Z
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz

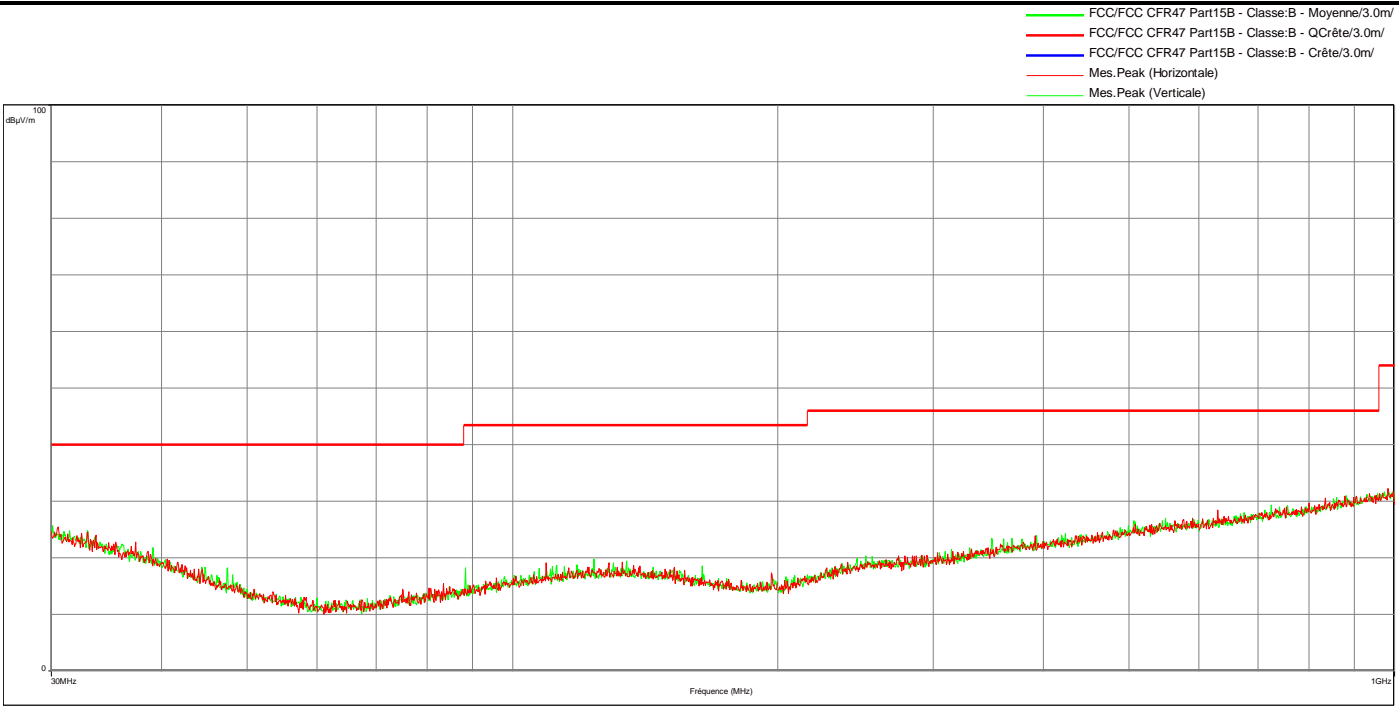


Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#7	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMin - TX mode - Axis XY
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz

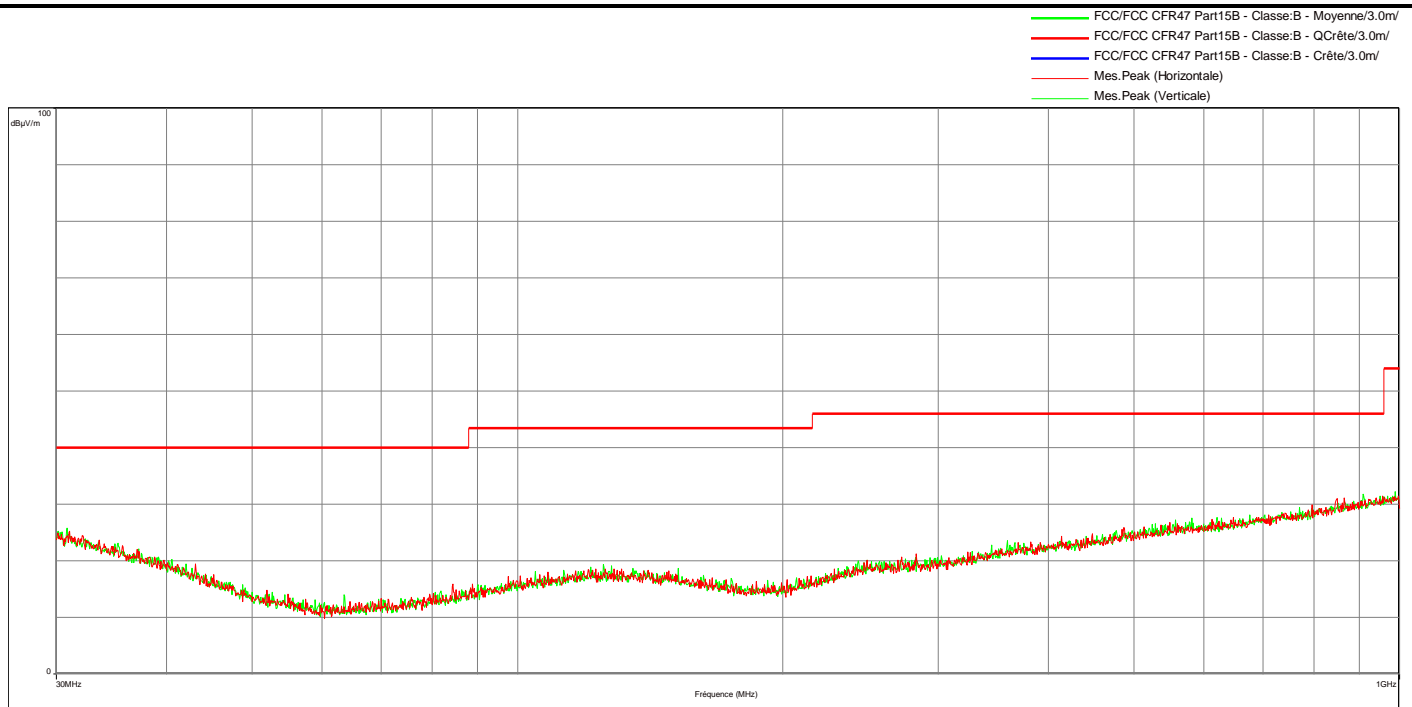


Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#8	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMin - TX mode - Axis Z
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz

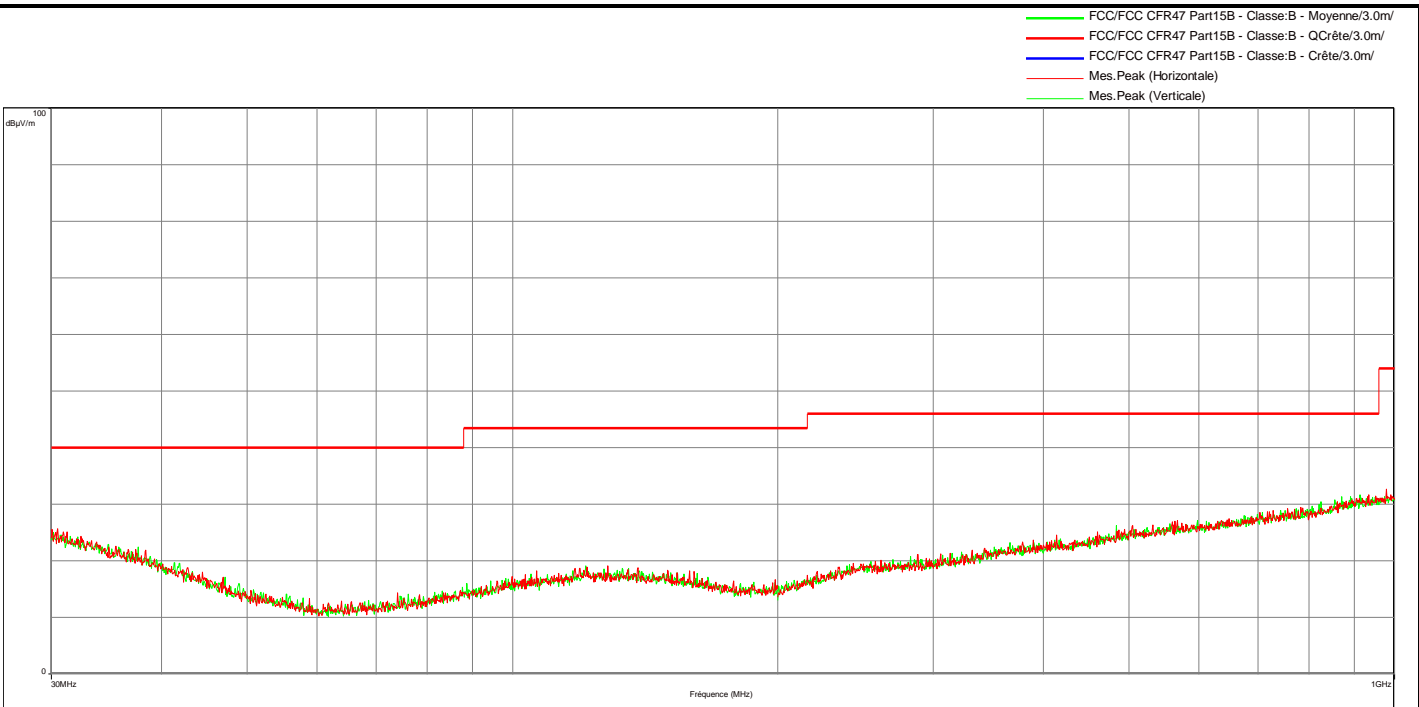


Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#9	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMax - TX mode - Axis XY
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz

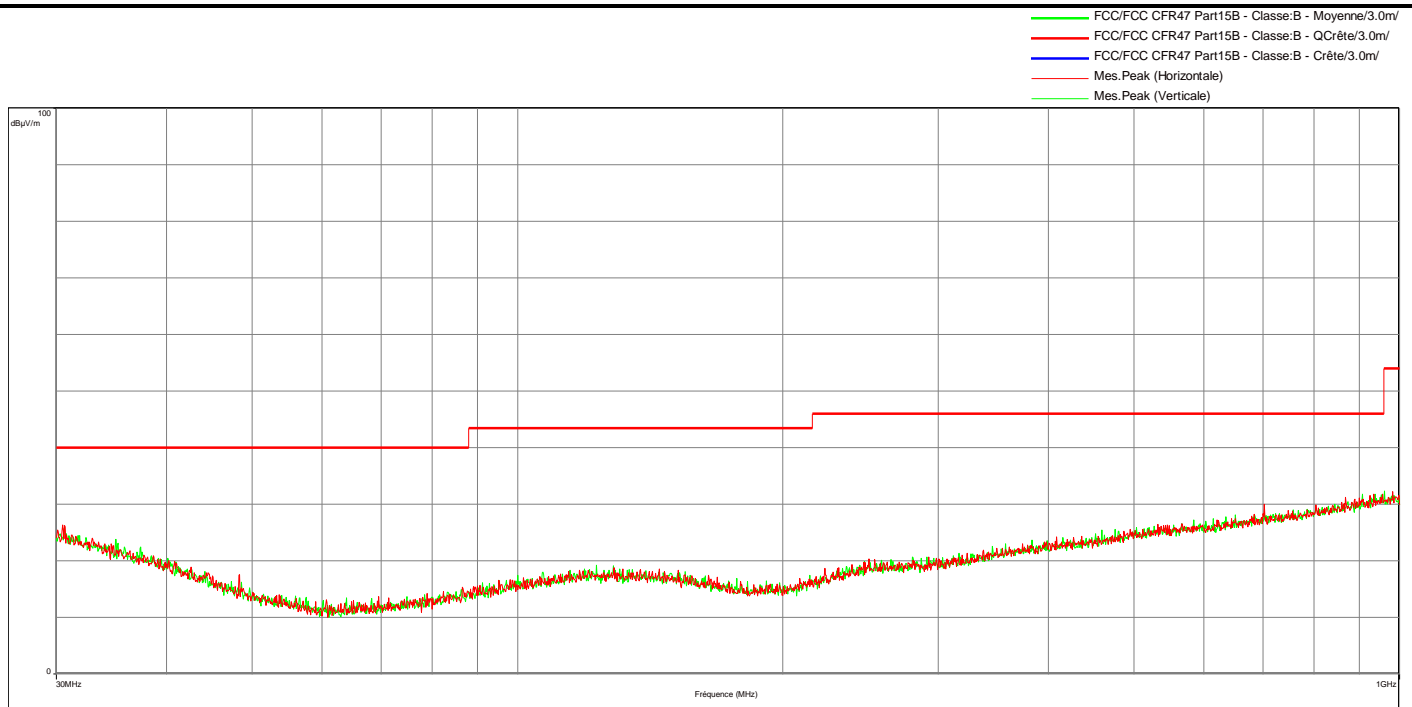


Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#10	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMax - TX mode - Axis Z
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz



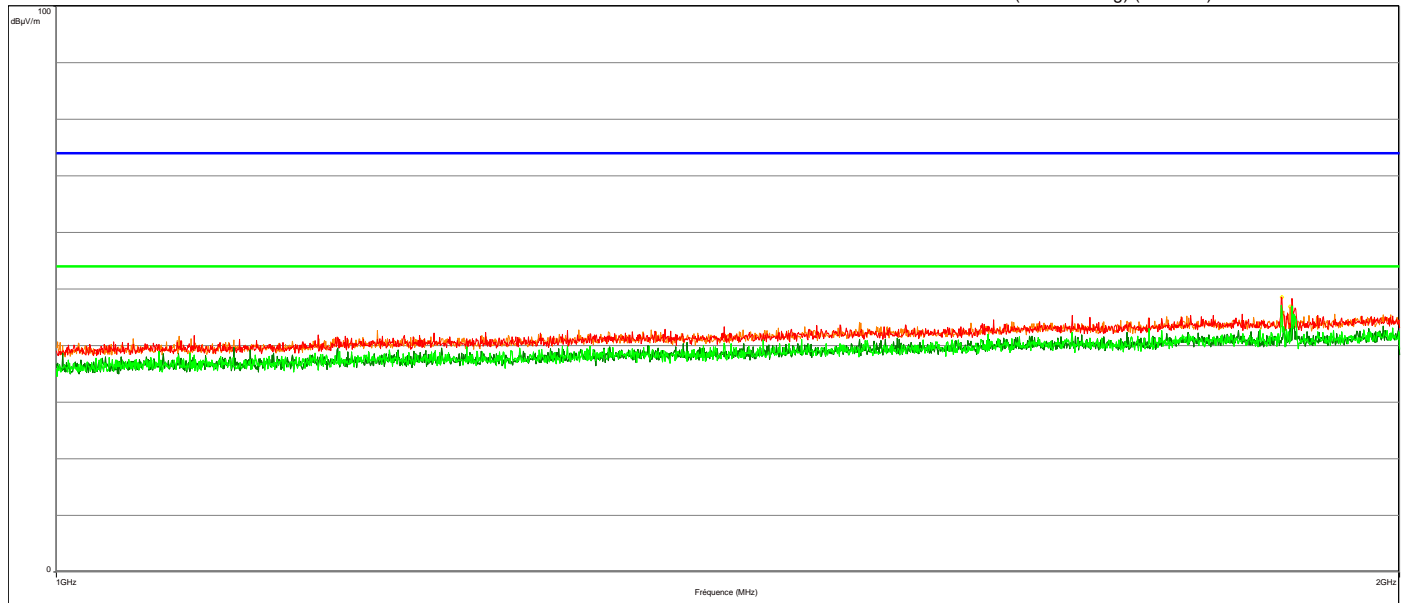
Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#11	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMin - TX mode - Axis XY
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)
- Peak (Peak/LimAvg) (Verticale)



Spurious emissions

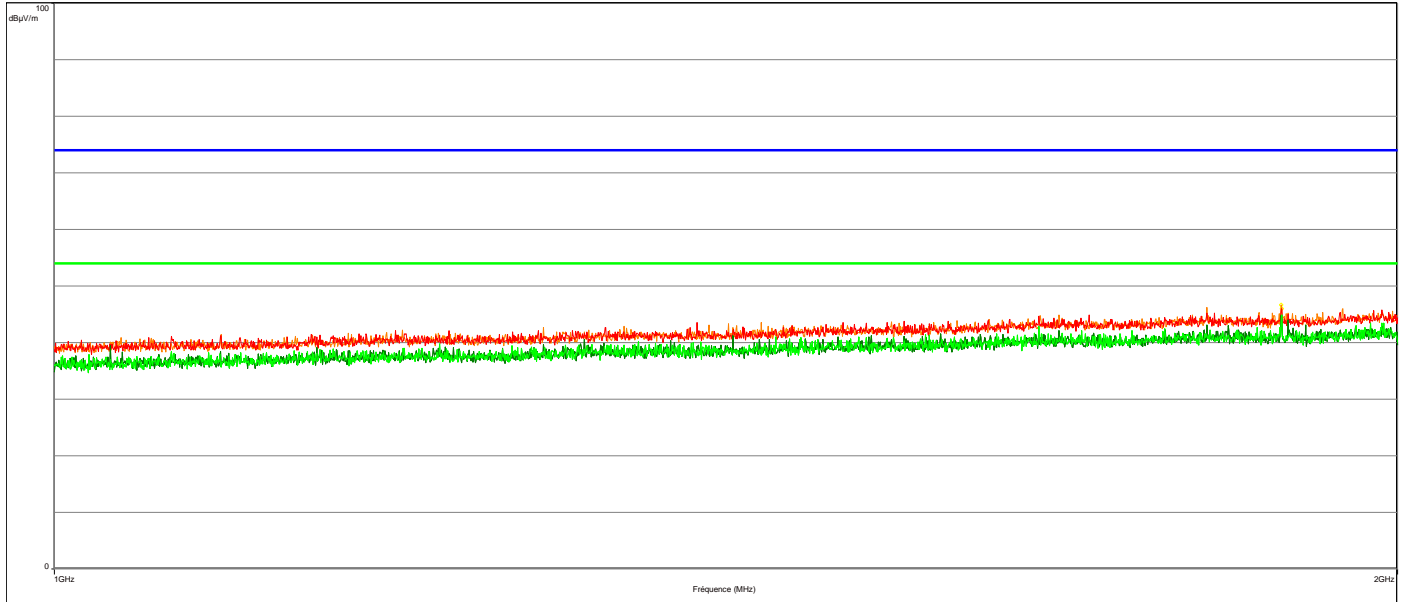
Frequency (MHz)	Peak (dBµV/m)	Polarization
1881.9	48.56	Horizontal
1890	46.91	Vertical



RADIATED EMISSIONS

Graph name:	Emr#12	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMin - TX mode - Axis Z
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)
- Peak (Peak/LimAvg) (Verticale)



Spurious emissions

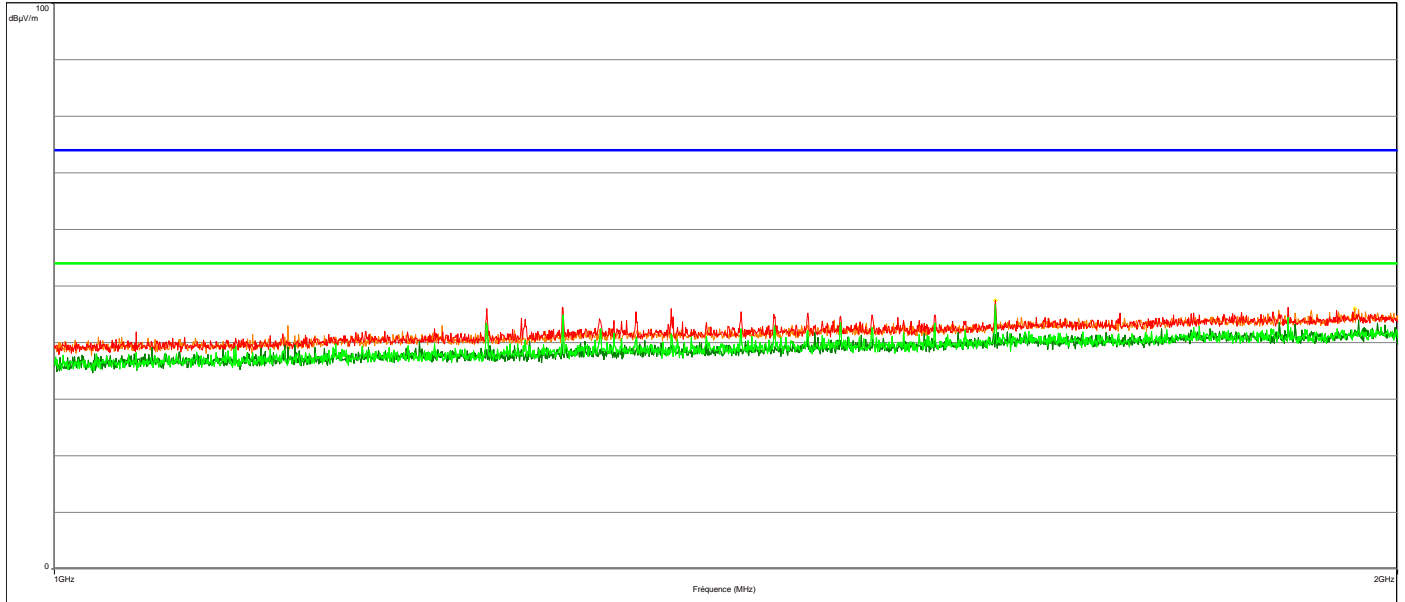
Frequency (MHz)	Peak (dBµV/m)	Polarization
1884.1	46.02	Horizontal
1883.5	46.71	Vertical



RADIATED EMISSIONS

Graph name:	Emr#13	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMax - TX mode - Axis XY
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)
- Peak (Peak/LimAvg) (Verticale)



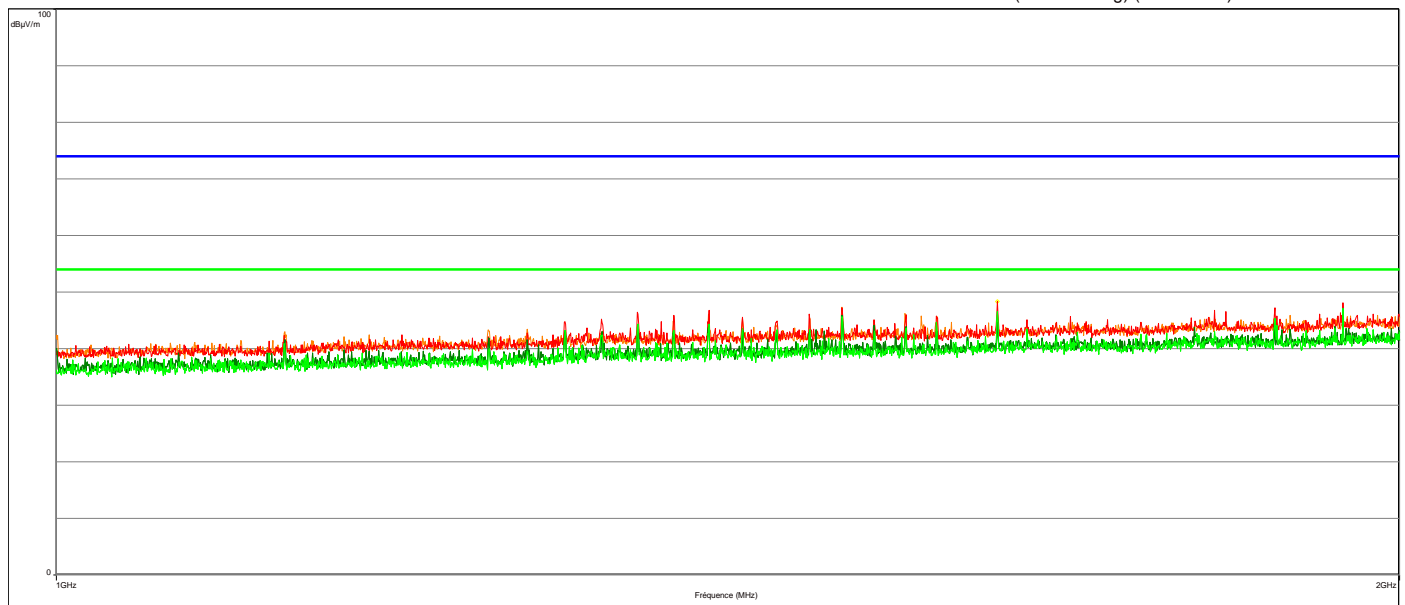
Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#14	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 1 - (H+V) - CMax - TX mode - Axis Z
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)



Spurious emissions

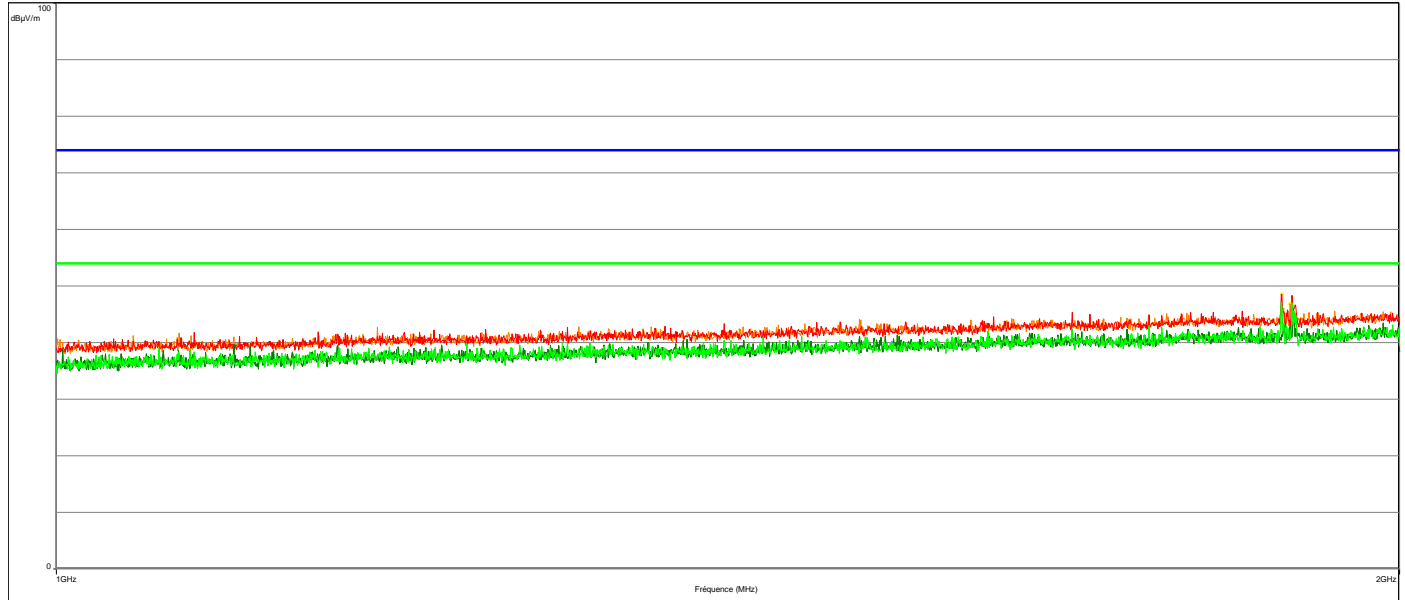
Frequency (MHz)	Peak (dBµV/m)	Polarization
1625.1	48.35	Horizontal



RADIATED EMISSIONS

Graph name:	Emr#15	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMin - TX mode - Axis XY
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)
- Peak (Peak/LimAvg) (Verticale)



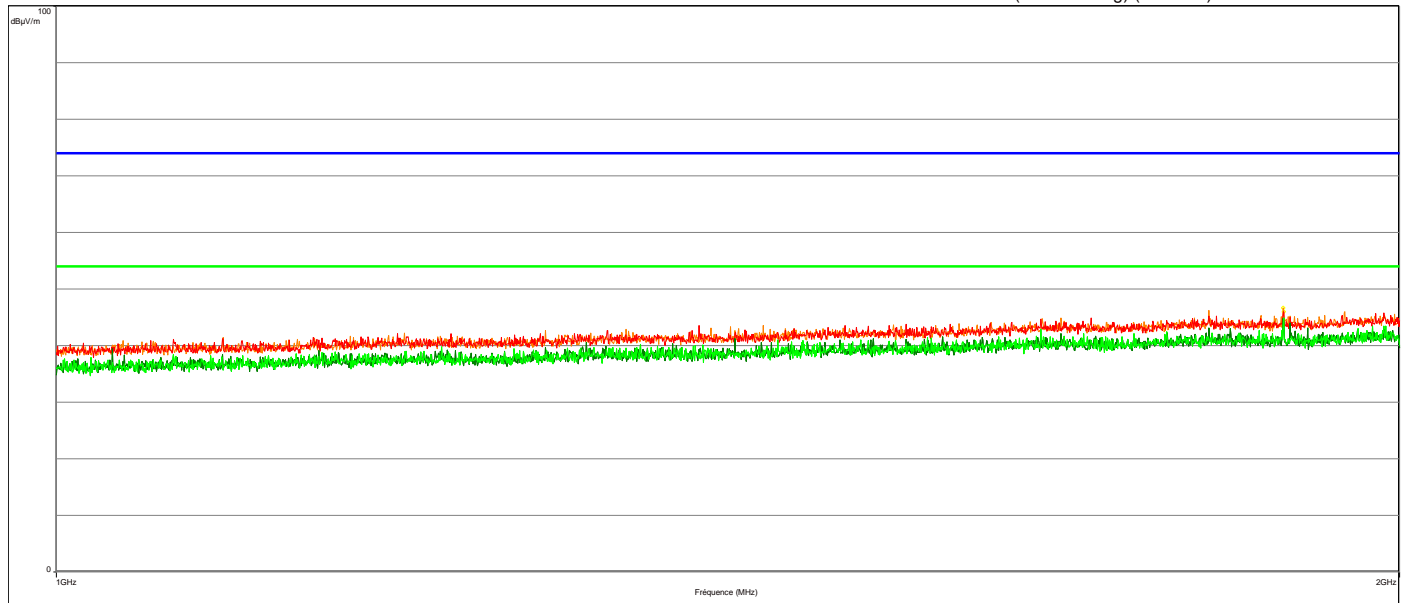
Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#16	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMin - TX mode - Axis Z
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)
- Peak (Peak/LimAvg) (Verticale)



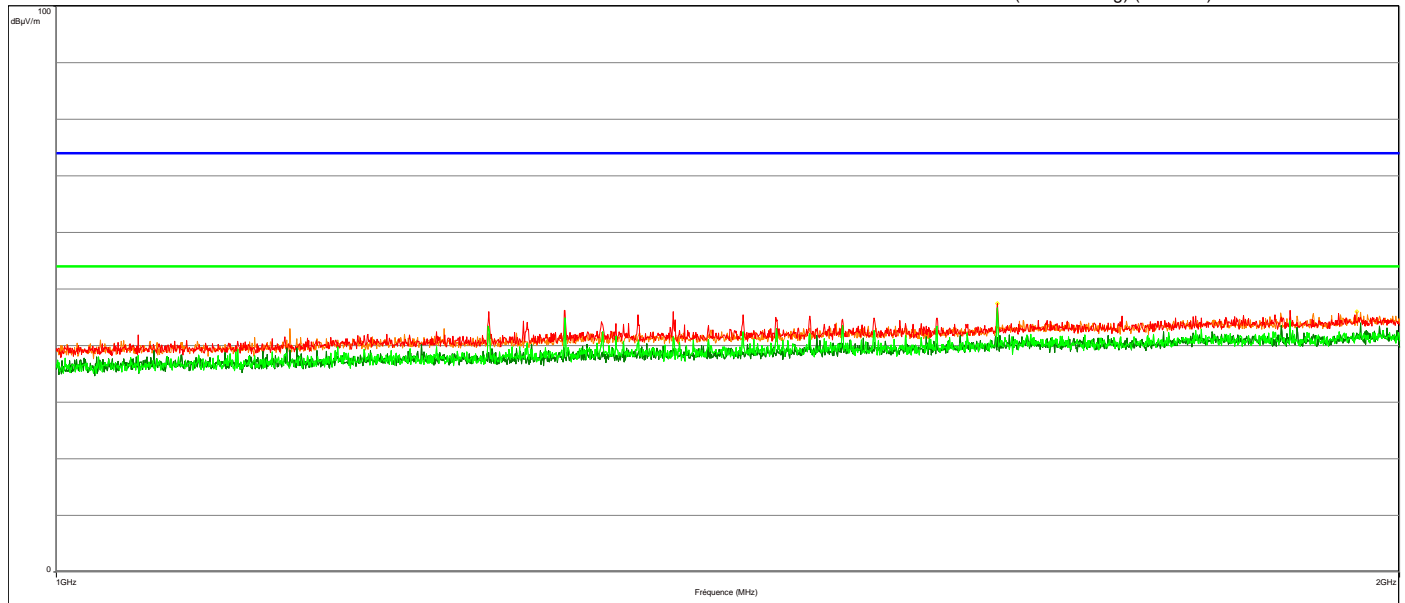
Spurious emissions



RADIATED EMISSIONS

Graph name:	Emr#17	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMax - TX mode - Axis XY
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)
- Peak (Peak/LimAvg) (Verticale)



Spurious emissions

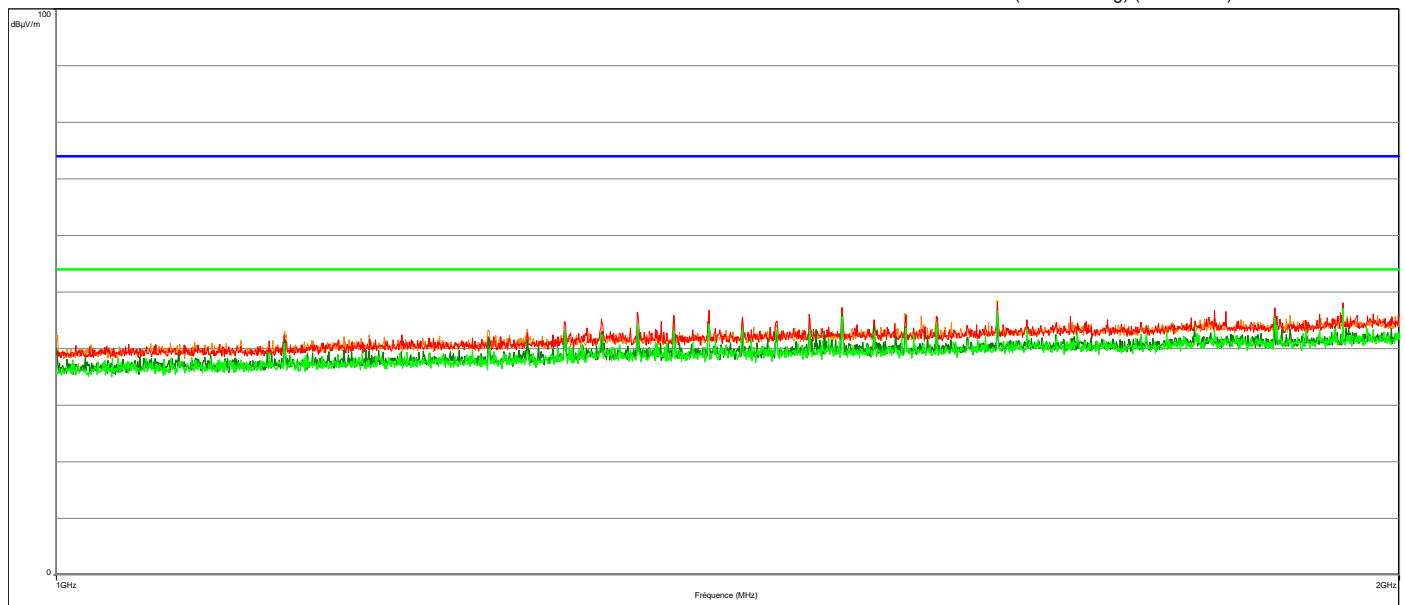
Frequency (MHz)	Peak (dBµV/m)	Polarization
1625.2	47.41	Horizontal
1956.2	46.04	Vertical



RADIATED EMISSIONS

Graph name:	Emr#18	Test configuration:
Limit:	FCC CFR47 Part15B	Configuration 2 - (H+V) - CMax - TX mode - Axis Z
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz

- FCC/FCC CFR47 Part15B - Classe:B - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- Peak (Peak/LimAvg) (Horizontale)



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Polarization
1625.1	48.35	Horizontal