



L C I E

Rapport d'essai / Test report

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DELIVRE A / ISSUED TO

: SOLEM

ZAE la Plaine 5 rue Georges Besses
34830 CLAPIER - FRANCE

Objet / Subject

: Essais de compatibilité électromagnétique conformément aux normes
FCC CFR 47 Part 15, Subpart B et C.
*Electromagnetic compatibility tests according to the standards
FCC CFR 47 Part 15, Subpart B and C*

Matériel testé / Apparatus under test :

- Produit / Product : Module irrigation ou automatique / Irrigation or automatic module
- Marque / Trade mark : SOLEM
- Constructeur / Manufacturer : SOLEM
- Type / Model : WF-IS-6 AND WF-OL-4
- N° de série / serial number : 58B96102005A & 68B96101002A
- FCC ID : YWW-WFS
- IC ID : 9319A-WFS

Date des essais / Test date

: Du 2 au 11 Décembre 2013 / From December 2nd to 11th, 2013

Lieu d'essai / Test location

: LCIE SUD-EST
ZI Centr'Alp – 170 rue de Chatagnon
38430 MOIRANS - FRANCE

Test réalisé par / Test performed by

: Anthony MERLIN / Gaëtan DESCHAMPS

Ce document comporte / Composition of document : 57 pages.

MOIRANS, LE 28 FEVRIER 2014 / FEBRUARY 28TH, 2014

Ecrit par / Written by,
Anthony MERLIN

Approuvé par / Approved by
Jacques LEROUX



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1. TEST PROGRAM

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)
Limits for conducted disturbance at mains ports 150kHz-30MHz	Frequency	Quasi-peak value (dBμV)	Average value (dBμV)	PASS
	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-210 §A8.5	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
Radiated emissions 30MHz-25GHz* CFR 47 §15.209 (a) CFR 47 §15.247 (d) RSS-210 §A8.5	Measure at 3m 30MHz-88MHz : 40 dBμV/m 88MHz-216MHz : 43.5 dBμV/m 216MHz-960MHz : 46.0 dBμV/m Above 960MHz : 54.0 dBμV/m			PASS
Bandwidth 6dB CFR 47 §15.247 (a) (2) RSS-210 §A8.2	At least 500kHz			PASS
Maximum Peak Output Power CFR 47 §15.247 (b) RSS-210 §A8.4 (4)	Limit: 30dBm Conducted or Radiated measurement			PASS
Band Edge Measurement CFR 47 §15.209 (a) CFR 47 §15.247 (d) RSS-210 §A8.5	Limit: -20dBc or Radiated emissions limits in restricted bands			PASS
Power spectral Density CFR 47 §15.247 (e) RSS-210 §A8.2	Limit: 8dBm/3kHz			PASS
Occupied bandwidth RSS-Gen §4.6.1	No limit			PASS
Receiver Spurious Emission** RSS-Gen §4.10	See RSS-Gen §4.10			NA

***§15.33:** The highest internal source of a testing device is defined like more the highest frequency generated or used in the testing device or on which the testing device works or agrees.

- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must be only performed until 1GHz.
- If the highest frequency of the internal sources of the testing device ranges between 108 MHz and 500 MHz, measurement must be only performed until 2GHz.

- If the highest frequency of the internal sources of the testing device ranges between 500 MHz and 1 GHz, measurement must be only performed until 5GHz.

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



2. SYSTEM TEST CONFIGURATION

2.1. JUSTIFICATION

The system was configured for testing in a typical fashion (as a customer would normally use it).
WF-IS and WF-OL uses same WIFI module, only modification is number of way and type:

- WF-IS-2, 2 stations
- WF-IS-4, 4 stations
- WF-IS-6, 6 stations
- WF-OL-4, 4 relays

Power supply is the same; to show compliance to standard, all tests are performed on WF-IS-6 (worst case) and partial and WF-OL-4.

2.2. HARDWARE IDENTIFICATION

Equipment under test (EUT):

WF-IS-6 AND WF-OL-4

Serial number: **58B96102005A & 68B96101002A**

- Internal max frequencies: 44MHz

Power supply:

- AC / AC Adaptor: GPU482400750WA00, Sn : None

- Rating: 120VAC/60Hz to 24VAC – 50Hz 0.75A

During all the tests, EUT is supplied by this adaptor.

Input/output and cable:

- 1 x Power supply, 2 wires, unshielded, to adaptor, length: 1.5m
- 6 x 2 ways Master, slave and sensor (WF-IS-6)
- 4 x 2 ways (WF-OL)

Auxiliaries used for testing:

- Laptop ASUS, provided by customer

Equipment information: (Declared by provider)

- Frequency band: [2400.0 – 2483.5] MHz
- Standard: ☒Wifi 802.11b ☐Bluetooth ☐Zigbee
- Spectrum Modulation: ☐FHSS ☒DSSS
- Number of channel: 11
- Channel separation: ☒5MHz ☐2MHz ☐1MHz
- Channel bandwidth: ☐10MHz ☒20MHz ☐1MHz
- Channel tested: Full test on C1: 2412MHz, C6: 2437MHz and C11:2462MHz
- RF mode: ☒TX/RX ☐RX ☐Standby
- Antenna type: PCB
- Antenna gain: 1dBi
- Antenna connector: ☐Permanent external ☐Permanent internal
- ☒None ☒Temporary (only for tests)
- Normal power source: 24VAC + Adaptor AC/AC supply network



2.3. EUT CONFIGURATION

Special configuration is provided by manufacturer:

- Permanent emission with modulation on different channel
- Permanent link with laptop
- Permanent using to relays or I/O with change of LED status with auxiliary.

Worst configuration is used and presented in this test report.

2.4. EQUIPMENT MODIFICATIONS

None

2.5. SPECIAL ACCESSORIES

None

**3. CONDUCTED EMISSION DATA****3.1. CLIMATIC CONDITIONS**

Date of test : December 6th, 2013
Test performed by : A.MERLIN / G.DESCHAMPS
Atmospheric pressure : 1000hPa
Relative humidity : 26%
Ambient temperature : 21°C

3.2. SETUP FOR CONDUCTED EMISSIONS MEASUREMENT

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 150 kHz to 30 MHz.

Measurement is made with a Rohde & Schwarz ESU8 receiver in peak mode. 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.

3.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Cable	-	-	A5329578
Conducted emission comb generator	BARDET	-	A3169049
LISN	RHODE & SCHWARZ	ENV216	C2320123
Receiver	ROHDE & SCHWARZ	ESHS10	A2640013
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011
Transient limiter	HEWLETT PACKARD	11947A	A4049061

3.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

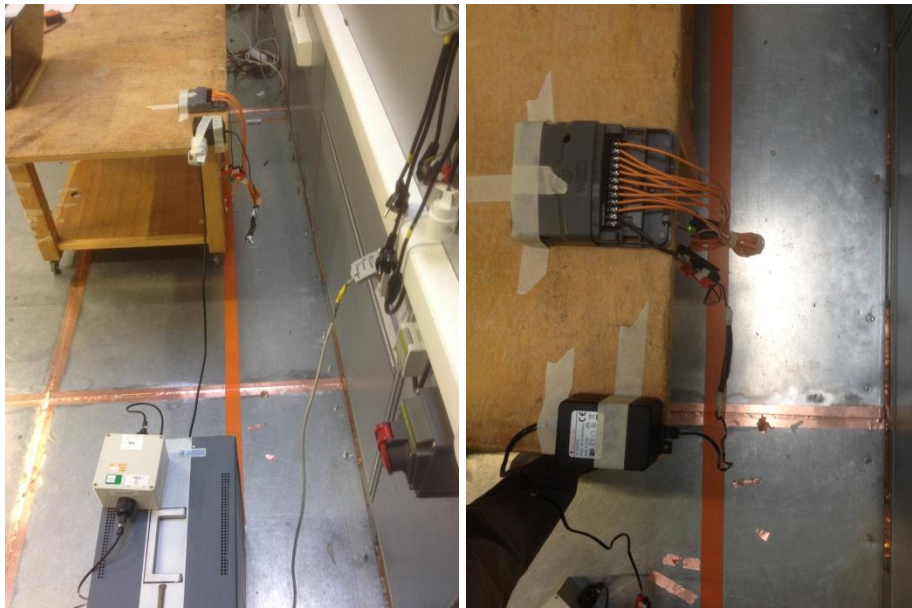
None

3.5. TEST SETUP

The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm.

Auxiliaries are powered by another LISN.

The cable has been shorted to 1meter length. The EUT is powered trough the LISN (measure).



Conducted emission test setup

3.6. TEST SEQUENCE AND RESULTS

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.

WF-IS-6: (worst case presented)

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

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

3.7. CONCLUSION

RESULTS:

☒ PASS

☐ FAIL

4. RADIATED EMISSION DATA

4.1. CLIMATIC CONDITIONS

Date of test : December 3rd, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 1006hPa
Relative humidity : 24%
Ambient temperature : 22°C

4.2. TEST SETUP

The installation of EUT is identical for pre-characterization measurement in a 3 meters semi anechoic chamber and for measures on a 10 meters Open site.



Radiated emission test setup / WF-IS-6



Radiated emission test setup / WF-OL-4





4.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Amplifier 8-26GHz	ALDETEC	ALS01452	A7102026
Amplifier 1-13GHz	LCIE SUD EST	-	A7102067
Antenna Bi-log	CHASE	CBL6111A	C2040051
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Antenna Bi-log	CHASE	CBL6111A	C2040172
Antenna horn	EMCO	3115	C2042027
Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	C2042028
Antenna horn	EMCO	3115	C2042029
Cable N/N	-	-	A5329038
Cable	SUCOFLEX	106G	A5329061
Cable N/N	-	-	A5329206
Cable (OATS)	-	-	A5329623
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Radiated emission comb generator	BARDET	-	A3169050
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088
OATS	-	-	F2000409
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Receiver 20Hz-26.5GHz	ROHDE & SCHWARZ	ESIB26	A2642021
Receiver 20-1000MHz	ROHDE & SCHWARZ	ESVS30	A2642006
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403
Table	MATURO GmbH	-	F2000437
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444

4.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None



4.5.3. Characterization on 10 meters open site below 30 MHz

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 §15.109 limits and C §15.209.

Antenna height was 1m for both horizontal and vertical polarization. Antenna was rotated around its vertical axis. 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 in following tables.

Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	Qpeak (dBµV/m)	Qpeak-Limit (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)
No frequency observed						

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

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

The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart B §15.109 limits and C §15.209 limits. Measurement bandwidth was 120kHz from 30 MHz to 1GHz. 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 tables.

Worst case final data result:

WF-OL-4

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	32.652	40.0	25.8	-14.2	200	V	100	19.1	
2	37.395	40.0	34.3	-5.7	0	V	100	16.3	
3	86.200	40.0	15.7	-24.3	50	V	100	10.7	
4	136.352	43.5	29.6	-13.9	80	V	110	14.4	

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

WF-IS-6

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	33.876	40.0	31.4	-8.6	20	V	100	18.4	
2	39.170	40.0	33.1	-6.9	300	V	100	15.3	
3	45.521	40.0	24.4	-15.6	0	V	100	12.1	
4	85.104	40.0	17.0	-23.0	200	V	100	10.5	
5	92.203	43.5	33.9	-9.6	0	V	100	11.4	
6	142.715	43.5	18.6	-24.9	110	V	110	14.1	
7	116.963	43.5	25.6	-17.9	230	H	210	14.0	
8	170.174	43.5	15.3	-28.2	0	V	100	12.3	
9	137.632	43.5	21.3	-22.2	0	V	200	14.4	
10	250.000	46.0	20.8	-25.2	0	H	300	14.8	
11	263.058	46.0	29.1	-16.9	90	V	220	15.1	
12	767.480	46.0	29.0	-17.0	0	V	100	26.5	
13	906.560	46.0	38.8	-7.2	0	H	100	28.3	

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



4.5.5. Characterization on 3 meters 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. 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 tables.

Frequency band 1GHz to 25GHz (worst case presented)

Measurements are performed using a PEAK and Average detection. (RBW = 1MHz)

No	Frequency (GHz)	Limit Average (dBμV/m)	Measure Average (dBμV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. factor (dB)	Comments
1	2235.170	54.0	39.5	-14.5	10	H	100	29.7	
2	2213.000	54.0	37.9	-16.1	20	H	100	29.6	
3	2282.000	54.0	39.3	-14.7	20	H	100	29.9	
4	2390.000	54.0	40.6	-13.4	10	H	100	30.4	
5	2500.000	54.0	36.9	-17.1	0	H	100	30.9	
6	4824.000	54.0	43.0	-11.0	20	H	100	36.4	
7	4874.000	54.0	44.2	-9.8	0	H	100	36.5	
8	4924.000	54.0	43.2	-10.8	50	H	100	36.6	
9	7311.000	54.0	44.8	-9.2	10	H	100	39.9	
10	7386.000	54.0	44.5	-9.5	15	H	100	40.0	
11	12060.000	54.0	47.4	-6.6	20	H	100	12.0	
12	12185.000	54.0	47.1	-6.9	15	H	100	11.7	
13	12310.000	54.0	45.9	-8.1	0	H	100	11.4	
14	2310.000	54.0	35.8	-18.2	10	H	100	30.0	

No	Frequency (GHz)	Limit Peak (dBμV/m)	Measure Peak (dBμV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. factor (dB)	Comments
1	2235.170	74.0	66.6	-7.4	10	H	100	29.7	
2	2213.000	74.0	61.9	-12.1	20	H	100	29.6	
3	2282.000	74.0	63.8	-10.2	20	H	100	29.9	
4	2390.000	74.0	72.6	-1.4	10	H	100	30.4	
5	2500.000	74.0	63.5	-10.5	0	H	100	30.9	
6	4824.000	74.0	66.0	-8.0	20	H	100	36.4	
7	4874.000	74.0	62.0	-12.0	0	H	100	36.5	
8	4924.000	74.0	60.4	-13.6	50	H	100	36.6	
9	7311.000	74.0	59.0	-15.0	10	H	100	39.9	
10	7386.000	74.0	58.0	-16.0	15	H	100	40.0	
11	12060.000	74.0	59.8	-14.2	20	H	100	12.0	
12	12185.000	74.0	58.9	-15.1	15	H	100	11.7	
13	12310.000	74.0	58.6	-15.4	0	H	100	11.4	
14	2310.000	74.0	59.3	-14.7	10	H	100	30.0	

Note: Measures have been done at 3m distance.

4.6. CONCLUSION

RESULTS:

☒ PASS

☐ FAIL

**4.7. 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.

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

**5. BANDWIDTH (15.247)****5.1. TEST CONDITIONS**

Date of test : December 11th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 10013
Relative humidity : 23%
Ambient temperature : 21°C

5.2. LIMIT

The 6 dB bandwidth must be greater than 500 kHz.

5.3. 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.

Measurement Procedure:

1. Set resolution bandwidth (RBW) = 1-5 % of the emission bandwidth (EBW).
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. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer.

5.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Attenuator 10dB	JFW	-	A7122166
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011

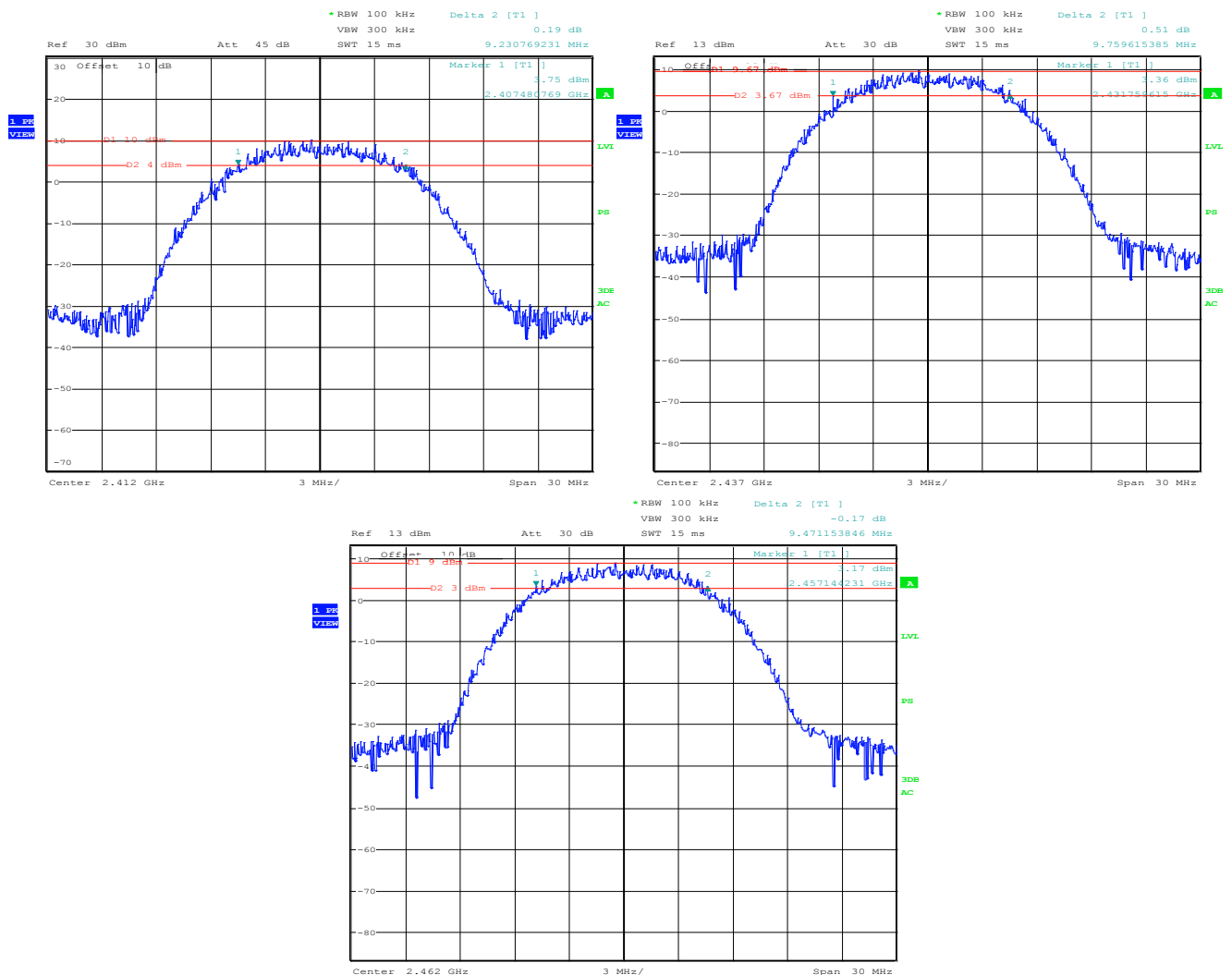
5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

5.6. TEST SEQUENCE AND RESULTS

WF-IS-6 (worst case or same result)

Channel	Channel frequency (MHz)	6dB Bandwidth (MHz)	PASS / FAIL
1	2412	9.230	PASS
6	2437	9.759	PASS
11	2462	9.471	PASS



5.7. CONCLUSION

RESULTS:

☒ PASS

☐ FAIL

**6. MAXIMUM PEAK OUTPUT POWER (15.247)****6.1. TEST CONDITIONS**

Date of test : December 11th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 10013
Relative humidity : 23%
Ambient temperature : 21°C

6.2. SETUP**Conducted measurement:**

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.

Maximum peak conducted output power

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

- ☐ **RBW \geq DTS bandwidth**

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

- Set the RBW \geq DTS bandwidth.
- Set VBW $\geq 3 \times$ RBW.
- Set span $\geq 3 \times$ RBW
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

- ☒ **Integrated band power method**

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

- Set the RBW = 1 MHz.
- Set the VBW $\geq 3 \times$ RBW
- Set the span $\geq 1.5 \times$ DTS bandwidth.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges

6.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Attenuator 10dB	JFW	-	A7122166
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078

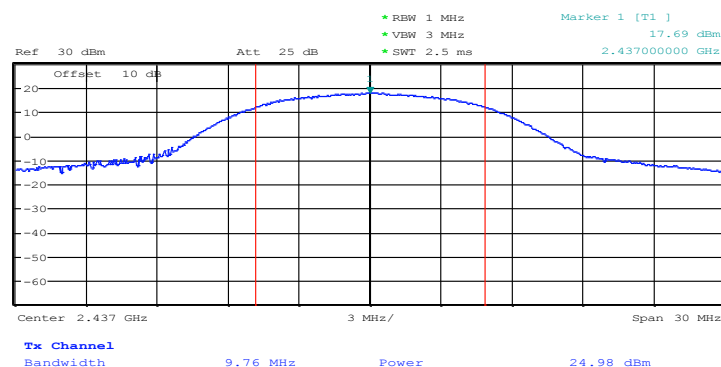
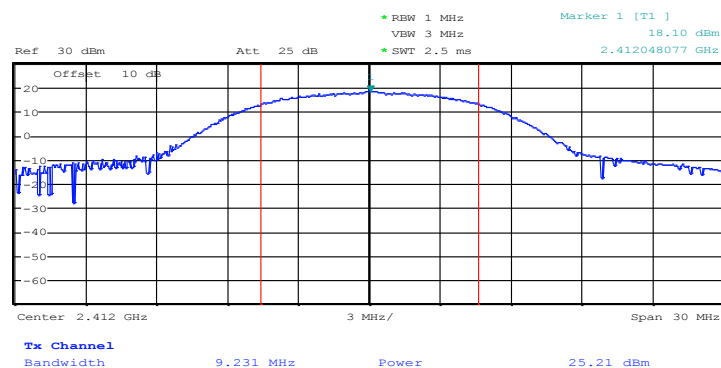
6.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

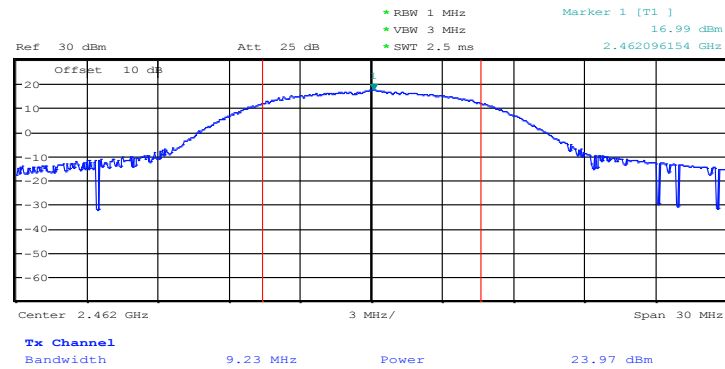
☒ None ☐ Divergence:

6.5. TEST SEQUENCE AND RESULTS

WF-IS-6:

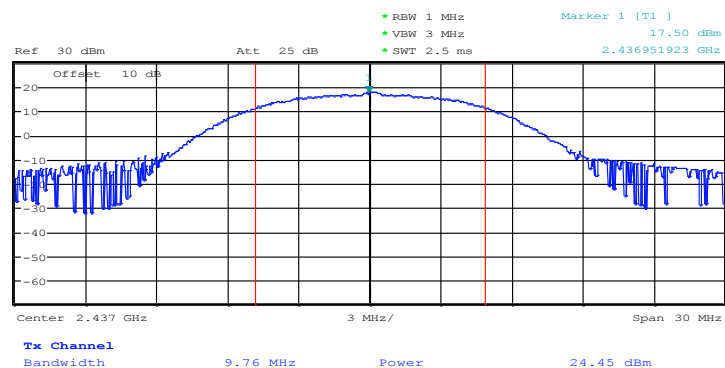
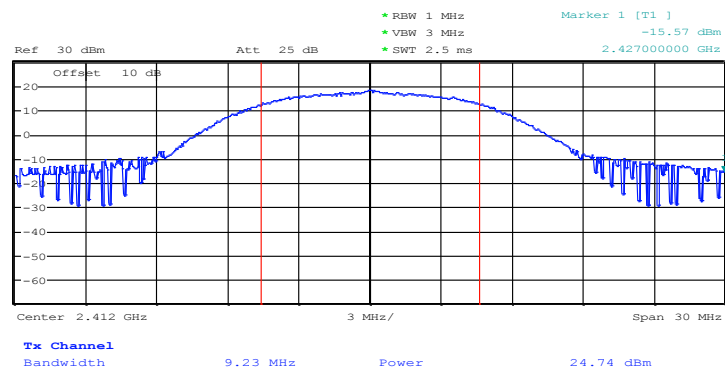
Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)	PASS / FAIL
1	2412	25.3	30.0	PASS
6	2437	25.0	30.0	PASS
11	2462	24.0	30.0	PASS

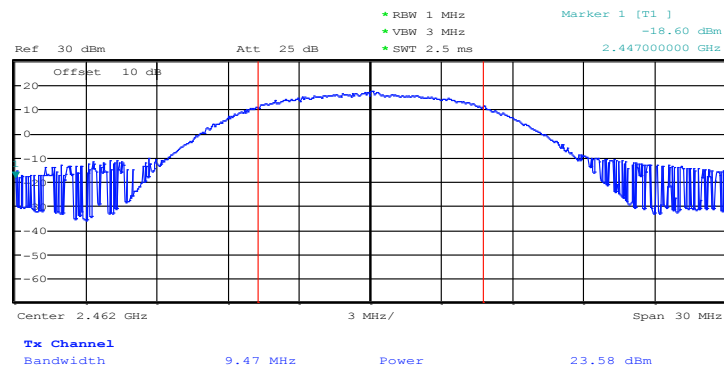




WF-OL-4:

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)	PASS / FAIL
1	2412	24.8	30.0	PASS
6	2437	24.5	30.0	PASS
11	2462	23.6	30.0	PASS





6.6. CONCLUSION

RESULTS:

☒ PASS

☐ FAIL

**7. POWER SPECTRAL DENSITY (15.247)****7.1. TEST CONDITIONS**

Date of test : December 3rd, 2013
Test performed by : A.MERLIN / G.DESCHAMPS
Atmospheric pressure : 1006hPa
Relative humidity : 24%
Ambient temperature : 21°C

7.2. SETUP☒ **Conducted measurement:**

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.

☐ **Radiated measurement:**

The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency.

The product has been tested at a distance of 3 meters from the antenna. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following table. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

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

Where:

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

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



☒ **Measurement Procedure PKPSD:**

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW \geq 300 kHz.
4. Set the span to 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3 \text{ kHz}/100 \text{ kHz} = -15.2 \text{ dB})$.
11. The resulting peak PSD level must be $\leq 8 \text{ dBm}$.

☐ **Measurement Procedure AVGPSD:**

1. Use this procedure when the maximum average conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
2. Set the analyzer span to 5-30% greater than the EBW.
3. Set the RBW = 100 kHz.
4. Set the VBW \geq 300 kHz.
5. Detector = power average (RMS).
6. Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$ (use of a greater number of measurement points than this minimum requirement is recommended).
7. Manually set the sweep time to: $\geq 10 \times (\text{number of measurement points in sweep}) \times (\text{transmission symbol period})$.
8. Perform the measurement over a single sweep.
9. Use the peak marker function to determine the maximum level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent level in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where: $BWCF = 10\log(3 \text{ kHz}/100 \text{ kHz} = -15.2 \text{ dB})$.
11. The resulting PSD level must be $\leq 8 \text{ dBm}$.

**7.3. TEST EQUIPMENT LIST**

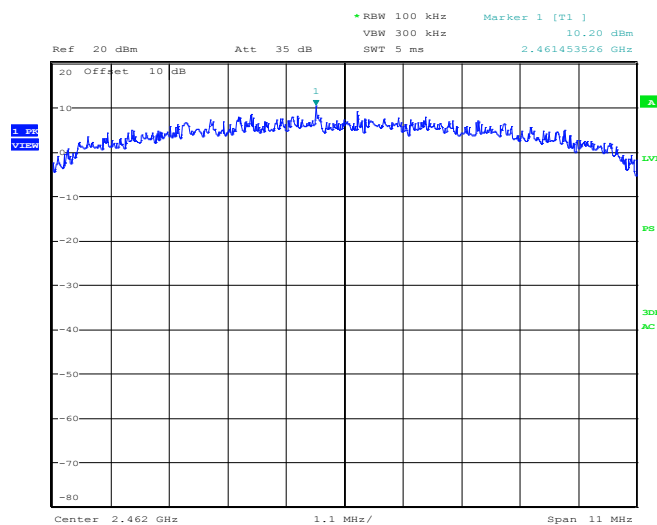
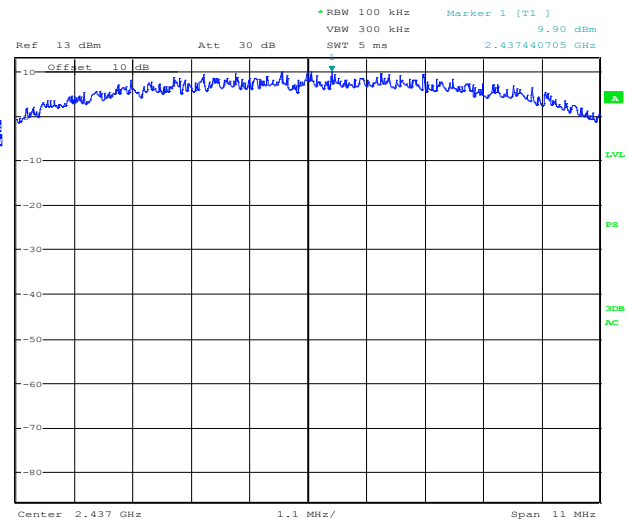
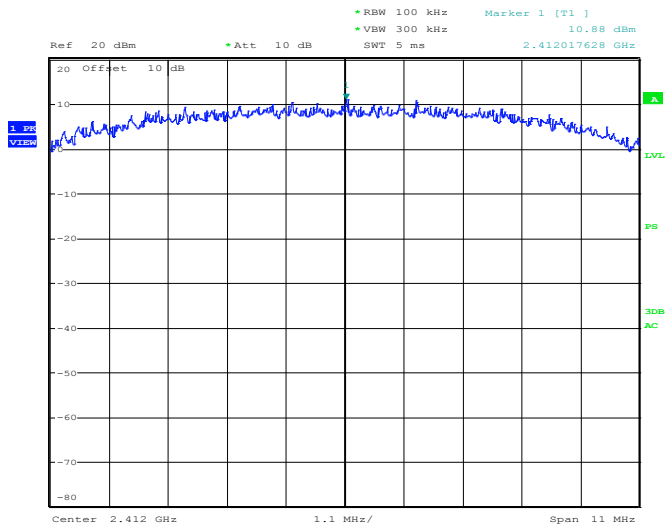
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Attenuator 10dB	JFW	-	A7122166
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078

7.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION☒ None☐ Divergence:**7.5. TEST SEQUENCE AND RESULTS**

WF-IS-6 (worst case or same results)

Channel	Channel Frequency (MHz)	Power Spectral Density (dBm)	PSD Limit (dBm)	PASS / FAIL
1	2412	-4.3	8.0	PASS
6	2437	-5.3	8.0	PASS
11	2462	-5.0	8.0	PASS

Note: $BWCF = 10\log(3\text{ kHz}/100\text{ kHz} = -15.2\text{ dB})$



7.6. CONCLUSION

RESULTS:

☒ PASS

☐ FAIL

**8. BAND EDGE MEASUREMENT (15.247)****8.1. TEST CONDITIONS**

Date of test : December 3rd, 2013
Test performed by : A.MERLIN / G.DESCHAMPS
Atmospheric pressure : 998mb
Relative humidity : 48%
Ambient temperature : 23°C

8.2. 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.

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.

8.3. EQUIPMENT CONFIGURATION

Channel frequency: Channel 1 / 6 / 11 – 802.11b

8.4. 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



8.5. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Amplifier 8 GHz	HEROTEK	A1080304A	A7102024
Amplifier 8-26GHz	ALDETEC	ALS01452	A7102026
Antenna Bi-log	CHASE	CBL6111A	C2040051
Antenna Bi-log	CHASE	CBL6111A	C2040172
Antenna horn	EMCO	3115	C2042027
Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	C2042028
Antenna horn	EMCO	3115	C2042029
Attenuator 10dB	JFW	-	A7122166
Cable N/N	-	-	A5329038
Cable	-	-	A5329059
Cable	SUCOFLEX	106G	A5329061
Cable N/N	-	-	A5329206
Cable SMA	-	-	A5329580
Cable (OATS)	-	-	A5329623
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Radiated emission comb generator	BARDET	-	A3169050
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088
High Pass (4.8-18GHz)	BL Microwave	SH4800-1800	A7484034
Band Rejector (2.4GHz/9kHz-6GHz)	BL Microwave	BR2445-200-7CSJ	A7484043
OATS	-	-	F2000409
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	A4060018
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403
Table	LCIE	-	F2000438
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444

8.6. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

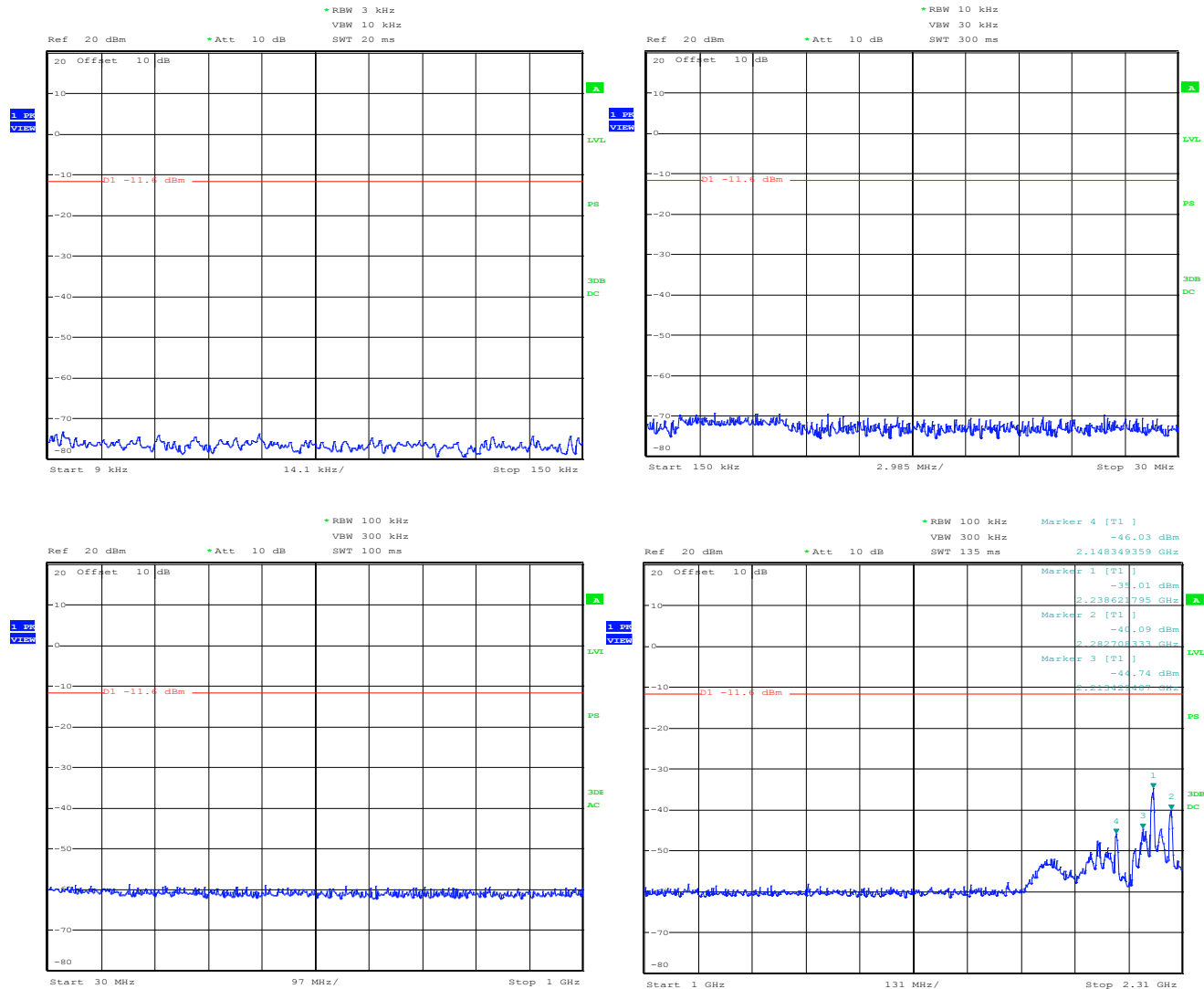
☒ None

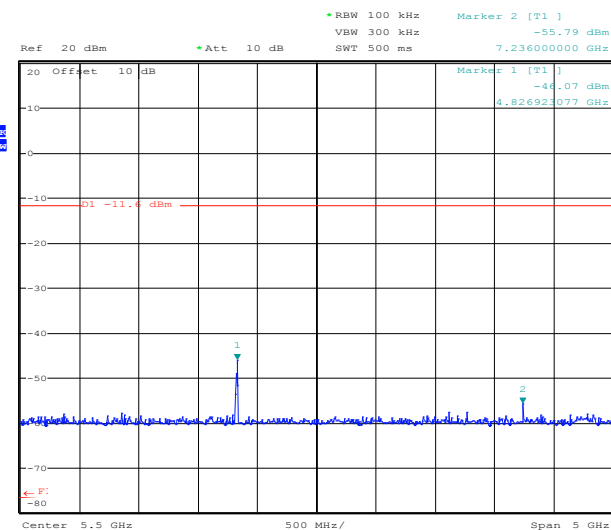
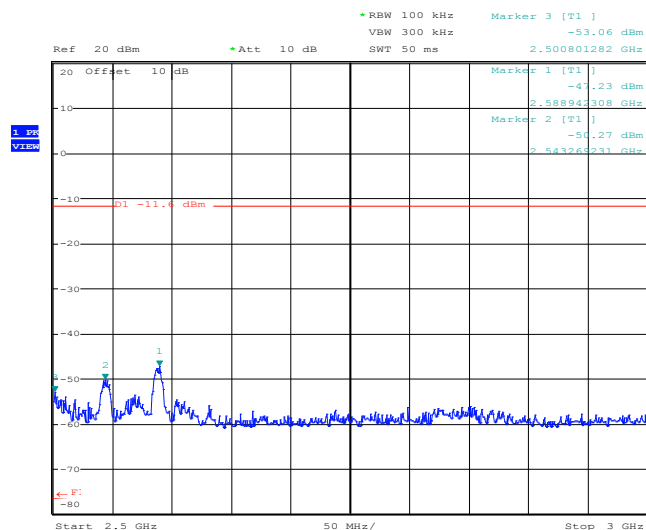
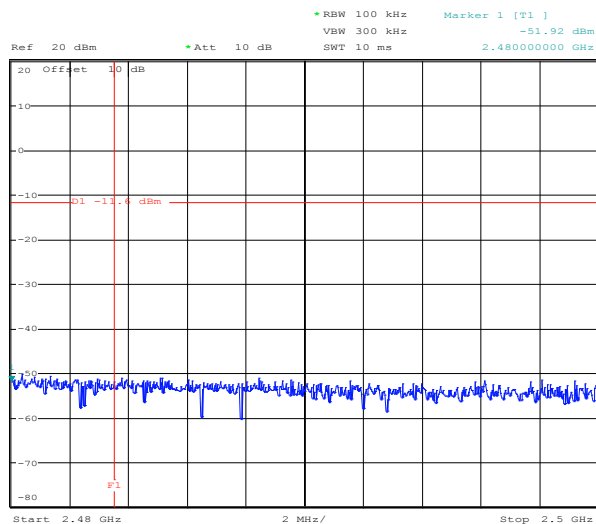
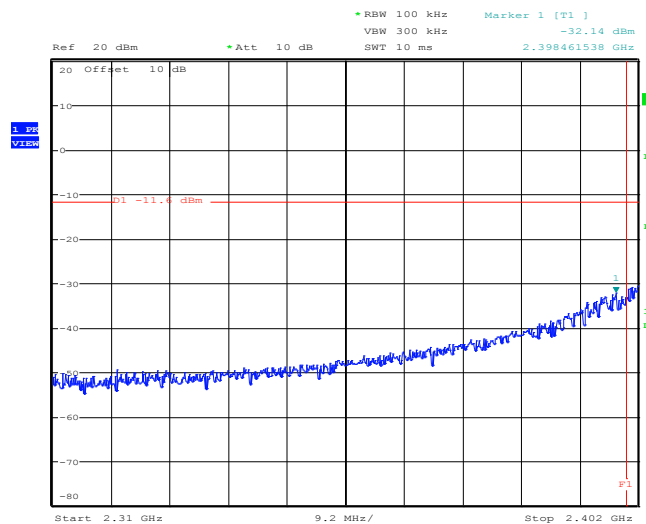
☐ Divergence:

8.7. TEST SEQUENCE AND RESULTS

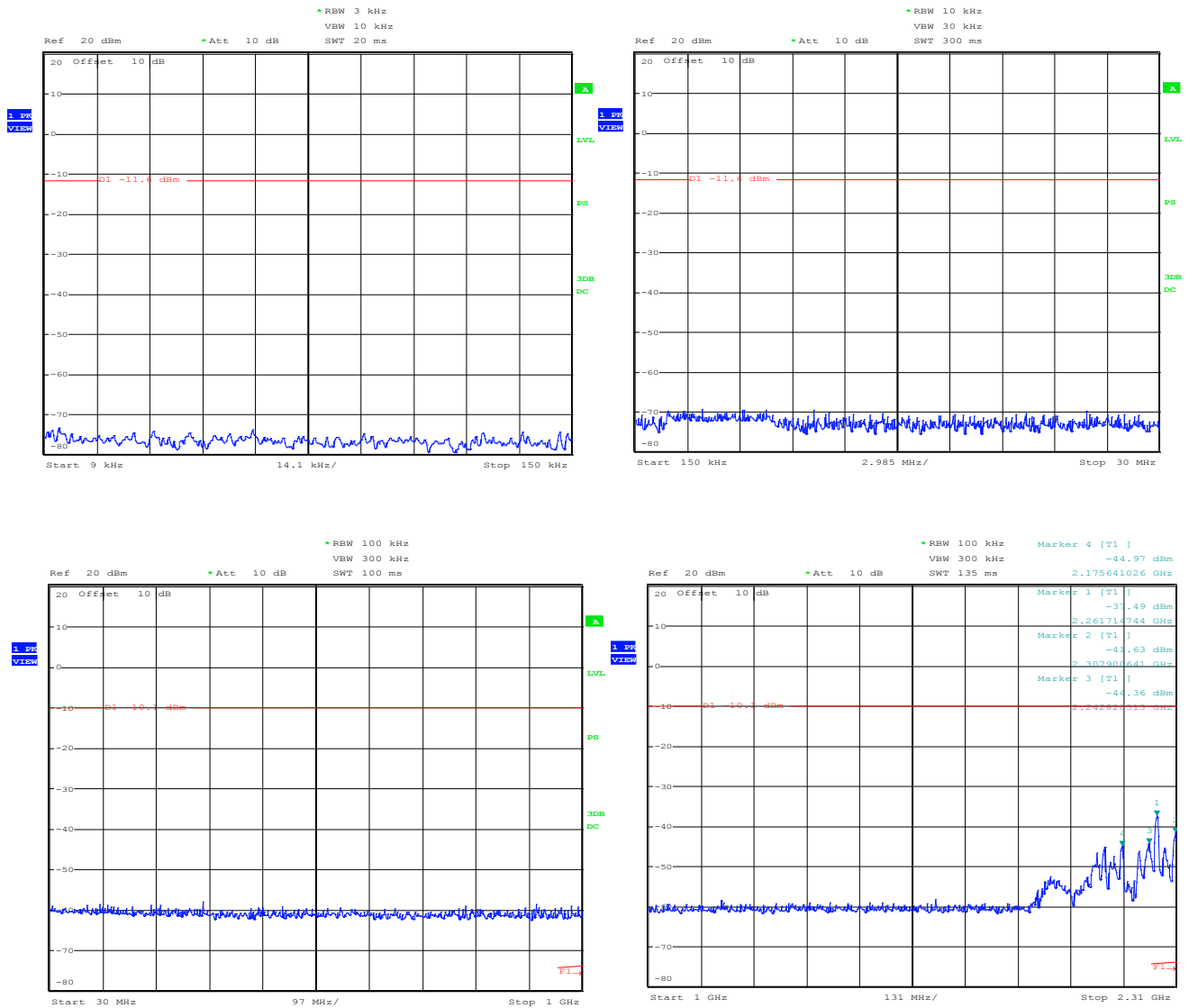
WF-IS-6 (worst case or same results)

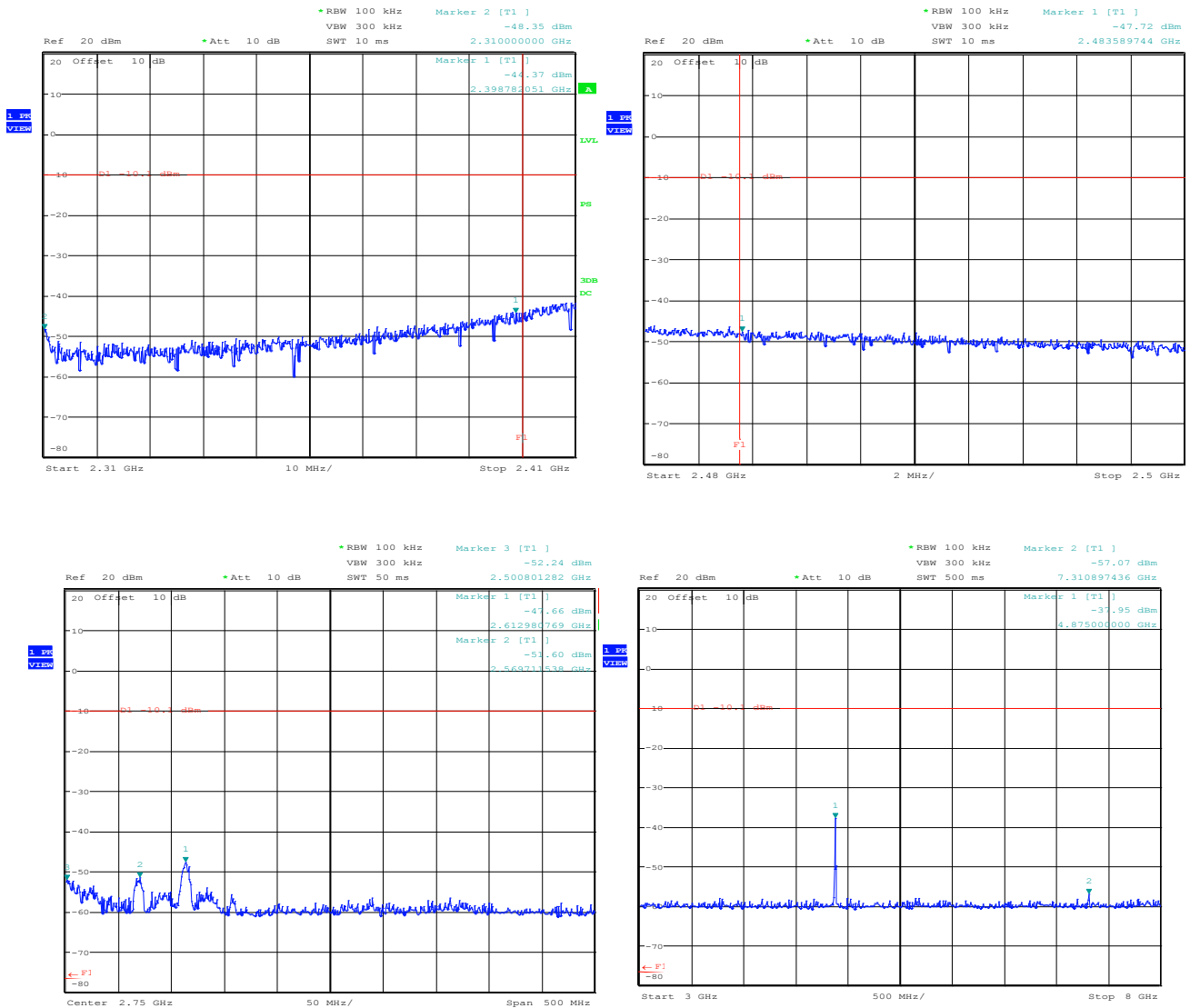
Channel 1 :



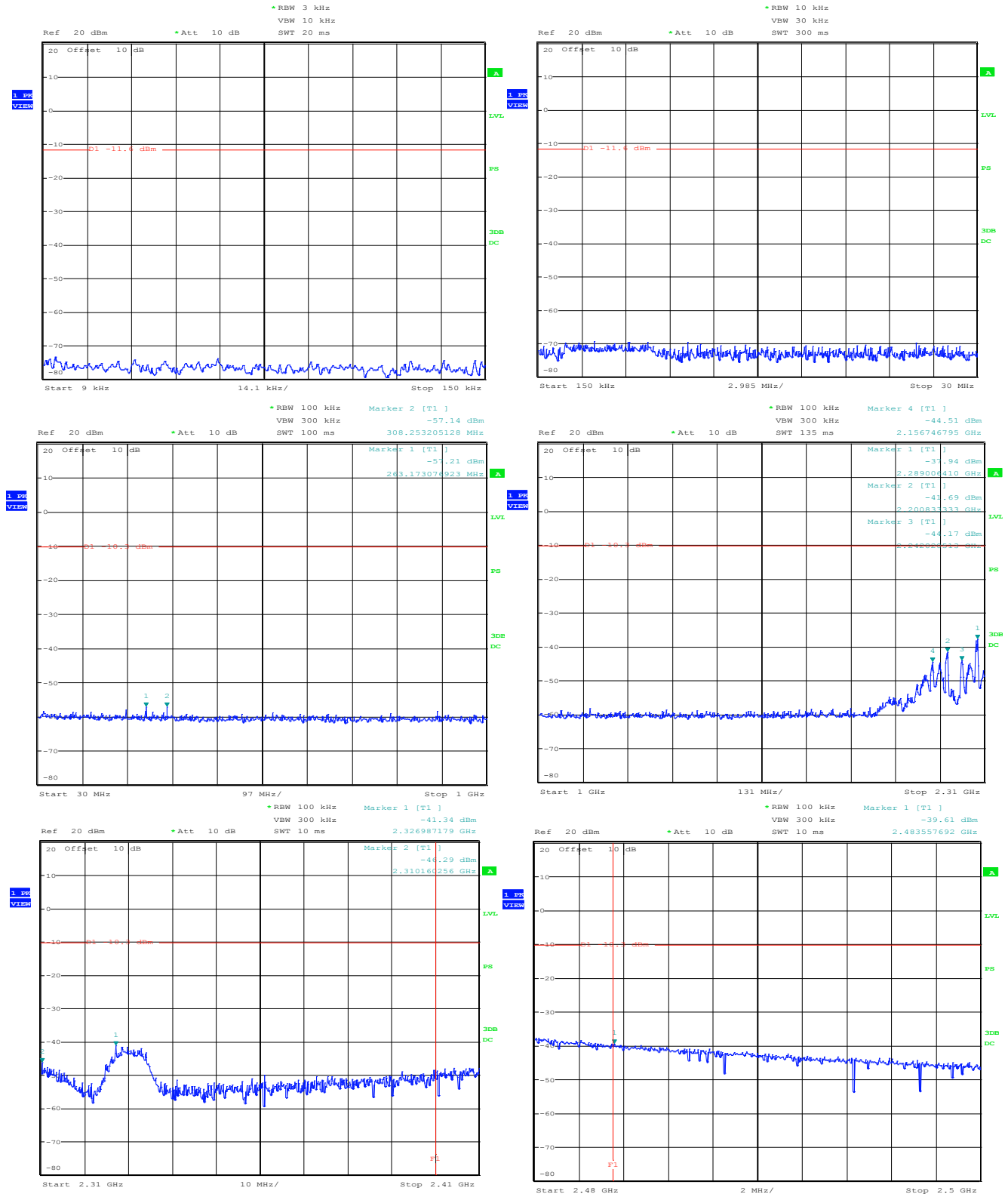


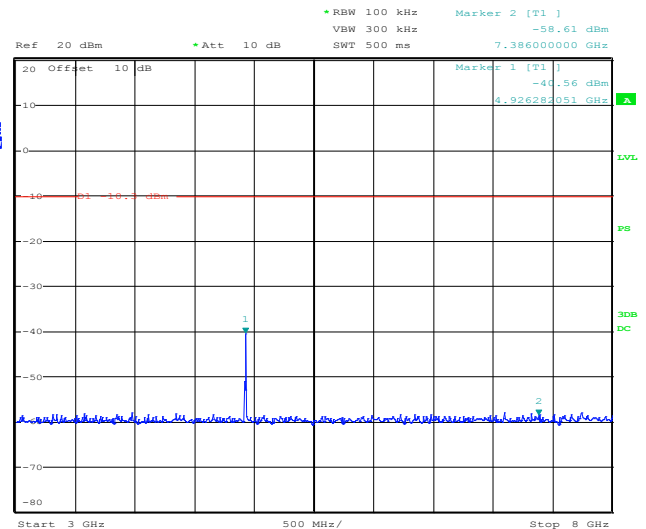
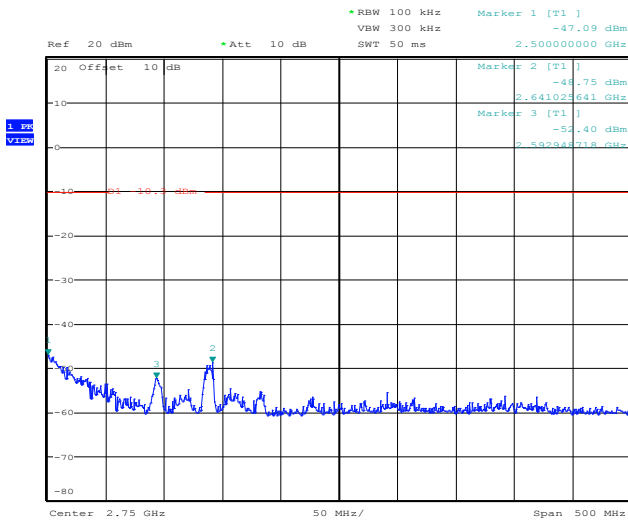
Channel 6 :





Channel 11 :





8.8. Conclusion

RESULTS:

☒ PASS

☐ FAIL

**9. OCCUPIED BANDWIDTH****9.1. TEST CONDITIONS**

Date of test : December 11th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 1004mb
Relative humidity : 41%
Ambient temperature : 21°C

9.2. SETUP☒ **Conducted measurement:**

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

☐ **Radiated measurement:**

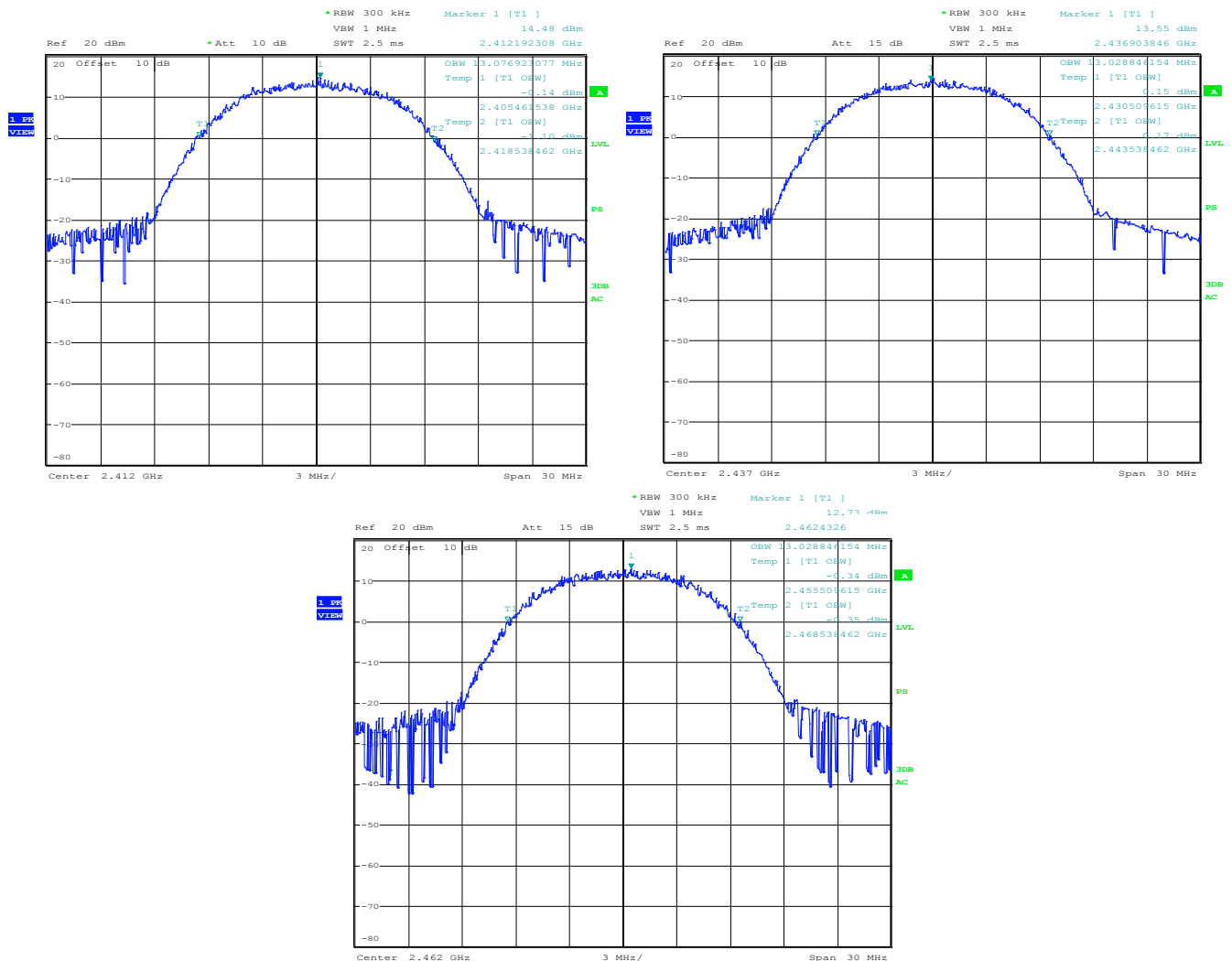
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

9.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Attenuator 10dB	JFW	-	A7122166
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078

9.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION☒ None☐ Divergence:

9.5. TEST RESULTS



Measured occupied bandwidth is **13.077MHz (worst case)**

Measurement settings:

RBW used should not be lower than 1% of the selected span

RBW = 300kHz / Video BW = 1MHz / SPAN = 30.0MHz / MaxHold / PEAK

The occupied bandwidth is measured with OBW function of spectrum analyzer.



10. ANNEX 1 (GRAPHS)

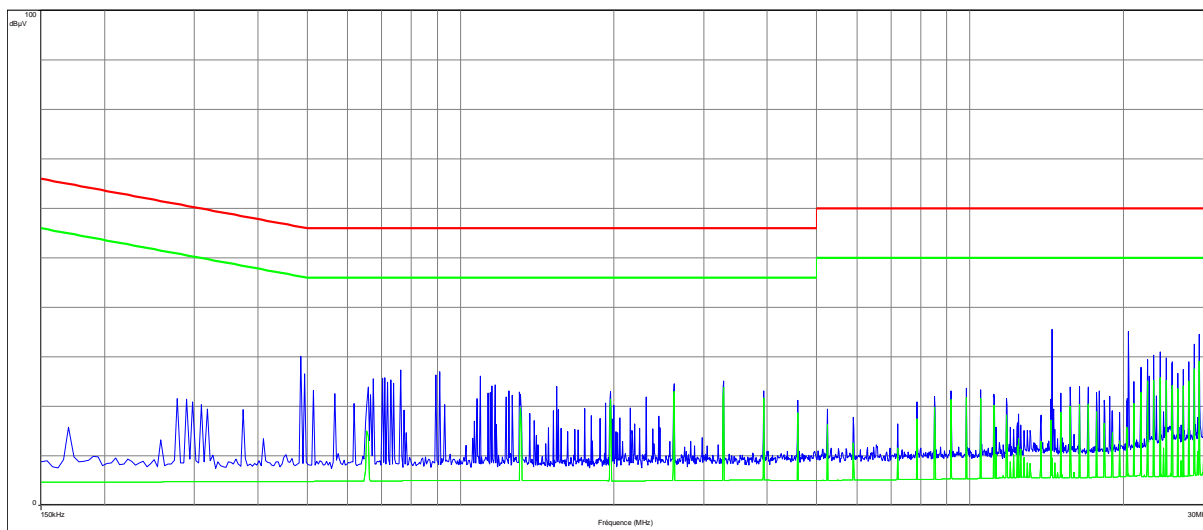
CONDUCTED EMISSIONS

Graph name :	Emc#1	Test configuration:
Limit :	EN 55022	
Class :	B	

PARAMETERS

Voltage / Frequency :	120VAC/60Hz
Line :	Phase 1
RBW :	10kHz
VBW :	30kHz
Frequency :	150kHz- 1MHz

— Civile/EN 55022 - Classe:B - Moyenne/
— Civile/EN 55022 - Classe:B - QCrête/
— Mes.Peak (Phase 1)
— Mes.Avg (Phase 1)





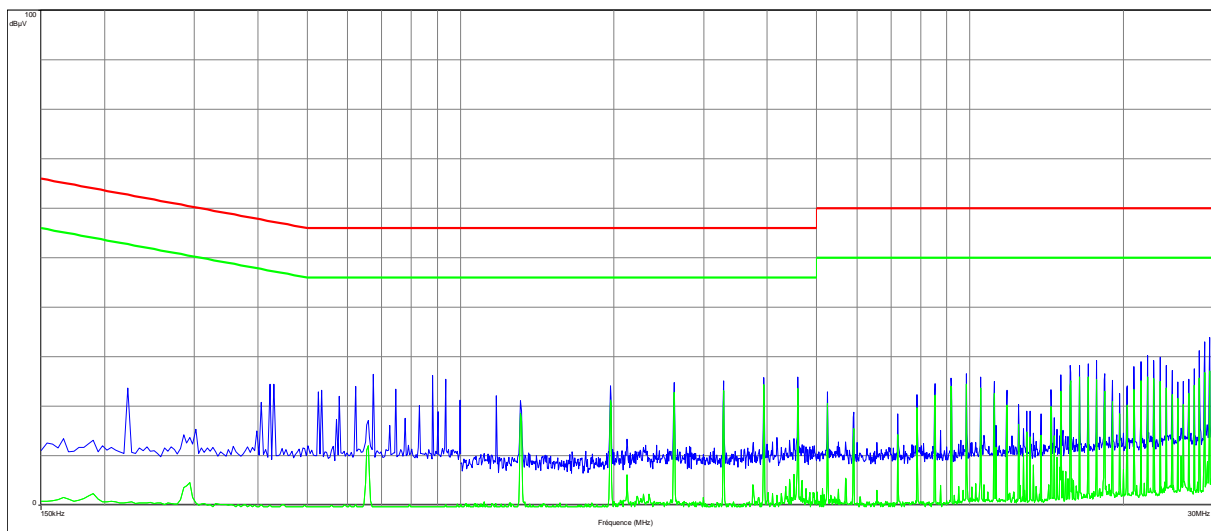
Operator: gd

Date: 06/12/2013 10:13:36

CONDUCTED EMISSIONS		
Graph name :	Emc#2	Test configuration:
Limit :	EN 55022	
Class :	B	

PARAMETERS	
Voltage / Frequency :	120VAC/60Hz
Line :	Neutre
RBW :	10kHz
VBW :	30kHz
Frequency :	150kHz- 1MHz

— Civile/EN 55022 - Classe:B - Moyenne/
 — Civile/EN 55022 - Classe:B - QCrête/
 — Mes.Peak (Neutre)
 — Mes.Avg (Neutre)



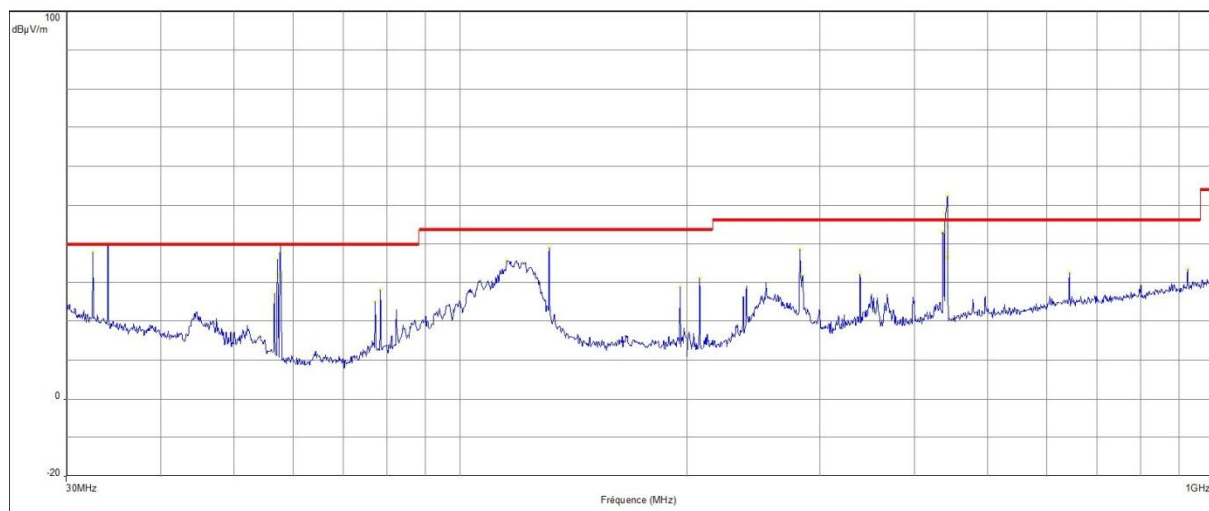
**RADIATED EMISSIONS**

Graph name :	Emr#1	Test configuration:
Limit :	FCC CFR47 Part15C	WF-OL (H) - Wifi C1
Class :		

PARAMETERS

Antenna polarization:	Horizontal
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Horizontale)
- Peak (Peak/LimQ-Peak) (Horizontale)





Frequency (MHz)	Peak Level (dB μ V/m)
32.482	37.83
34.08	40.17
56.656	27.22
57.115	35.97
57.2	32.27
57.251	27.62
57.472	31.88
57.523	31.37
57.625	37.54
57.676	39.44
57.744	30.08
77.107	25.05
78.28	28.12
115.204	35.65
131.048	39.08
195.682	28.81
207.76	31.2
282.16	38.57
282.6	33.44
282.92	31.04
284.12	31.4
284.44	31.87
339.4	32.13
436.84	42.98
437.56	38.81
438.04	42.54
439.56	44.64
439.92	36.36
440.16	45.98
440.32	47.84
440.72	47.99
441.12	38.24
441.68	49.62
442.08	36.41
442.4	36.65
442.56	37.94
442.88	44.31
443.2	52.53
642.48	32.6
922.08	33.47

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.

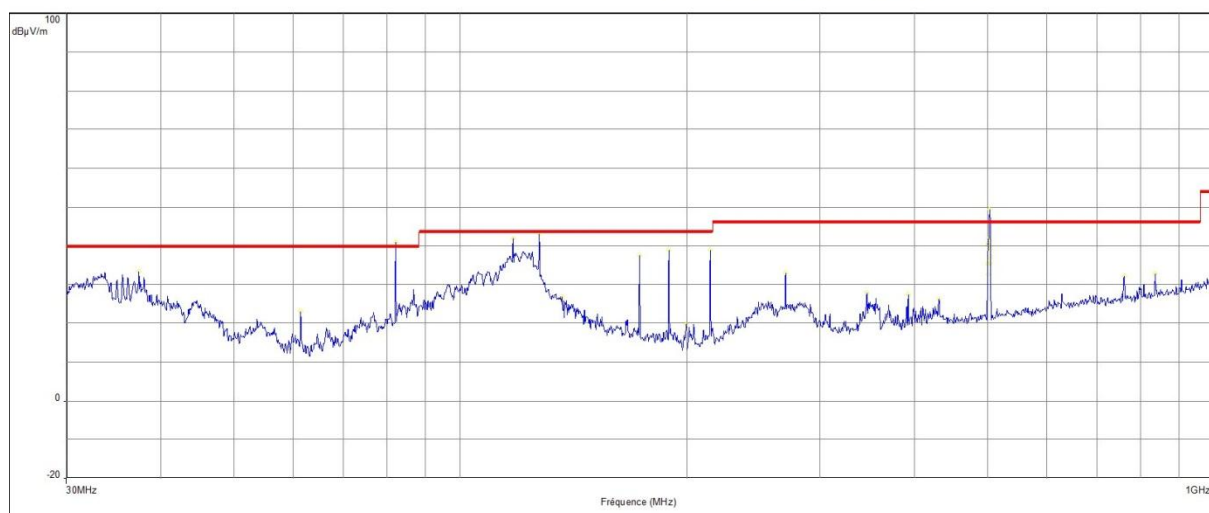
**RADIATED EMISSIONS**

Graph name :	Emr#2	Test configuration:
Limit :	FCC CFR47 Part15C	WF-OL (V) - Wifi C1
Class :		

PARAMETERS

Antenna polarization:	Vertical
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Verticale)
- Peak (Peak/LimPeak) (Verticale)



Frequency (MHz)	Peak (dB μ V/m)
37.395	33.42
61.348	23.19
81.969	40.89
117.295	41.85
127.121	43.04
136.352	26.82
136.964	25.82
172.817	37.48
189.171	38.88
199.15	19.59
214.56	39.03
270.12	32.87
346.2	27.69
393.28	27.36
432.04	26.28
501.04	35.35
501.16	32.54
501.56	40.57
503.12	42.12
503.32	39.44
503.76	39.45
504.04	41.35
504.2	39.01
504.36	49.41
504.72	37.48
504.92	36.87
505.2	35.5
760.44	32.12
836	32.73

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.

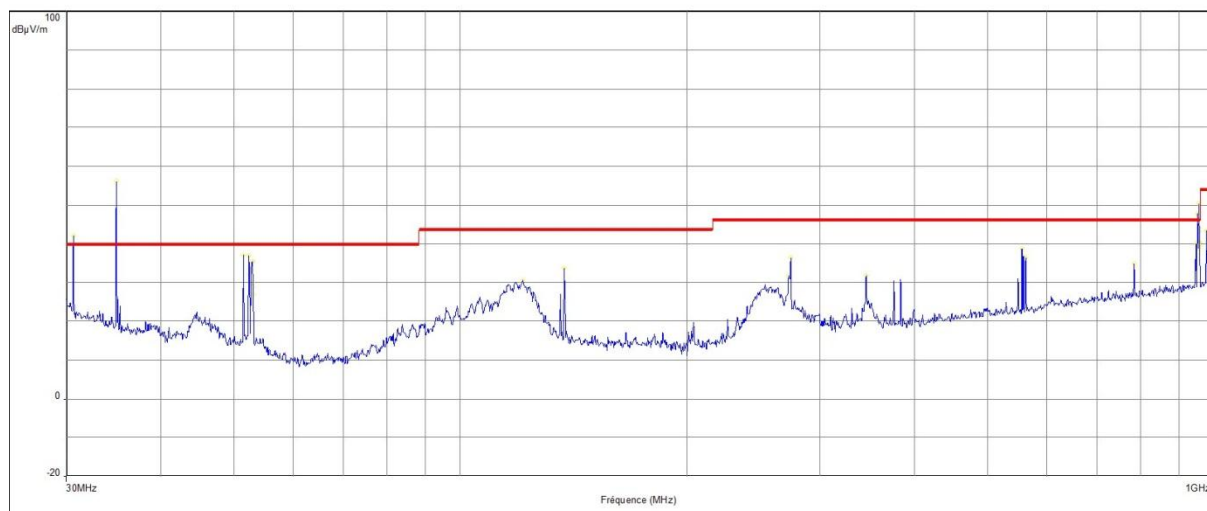
**RADIATED EMISSIONS**

Graph name :	Emr#3	Test configuration:
Limit :	FCC CFR47 Part15C	WF-OL (H) - Wifi C6
Class :		

PARAMETERS

Antenna polarization:	Horizontal
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Horizontale)
- Peak (Peak/LimQ-Peak) (Horizontale)





Frequency (MHz)	Peak (dB μ V/m)
30.595	42.1
34.913	56.05
51.522	37.08
52.389	36.88
52.474	33.58
52.525	32.13
52.763	33.06
52.831	35.32
52.865	30.13
52.916	35.39
52.984	28.8
53.069	26.94
121.001	30.58
137.168	33.79
272.84	31.75
274.6	36.34
345.64	31.8
556.28	38.8
558.32	36.82
562.8	36.44
784.4	34.87
946.32	39.68
949.88	40.48
950.8	47.86
951.44	36.13
953.44	38.75
953.92	37.85
954.24	44.24
954.6	50.3
955	47.29
955.24	39.39
955.48	43.21
955.64	40.31
956.32	40.27
978.16	43.34
983.12	40.11
985.92	40.85
987.28	43.07

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.



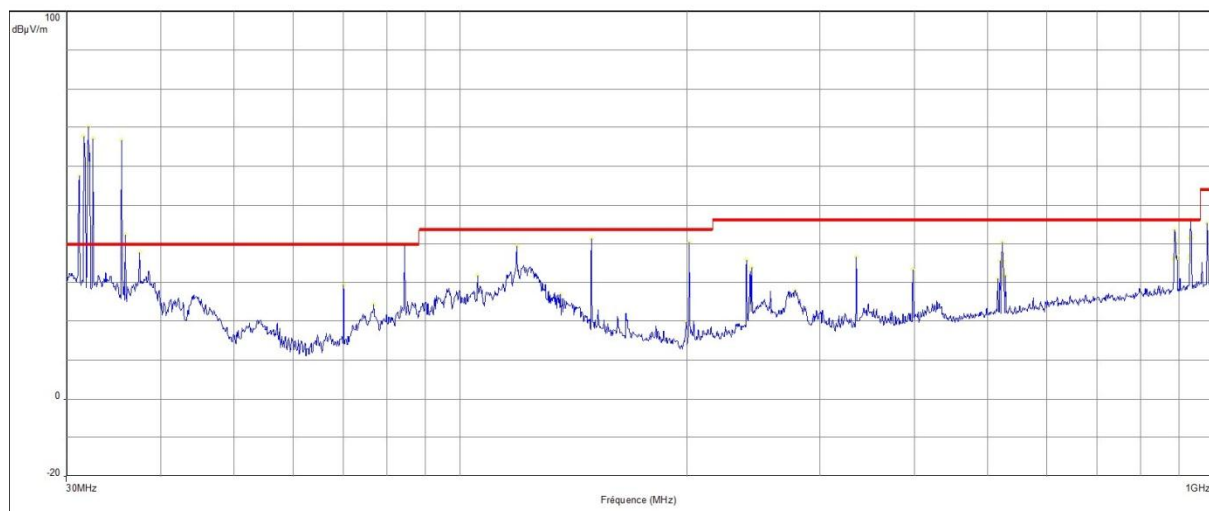
RADIATED EMISSIONS

Graph name :	Emr#4	Test configuration:
Limit :	FCC CFR47 Part15C	WF-OL (V) - Wifi C6
Class :		

PARAMETERS

Antenna polarization:	Vertical
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Verticale)
- Peak (Peak/LimPeak) (Verticale)





Frequency (MHz)	Peak (dB μ V/m)
31.173	57.54
31.615	67.71
31.7	64.99
31.751	60.66
31.989	63.03
32.108	70.05
32.159	61.28
32.227	63.53
32.516	67.1
35.474	66.77
35.61	36.73
35.882	42.2
37.531	37.76
69.984	29.26
76.699	24.24
84.247	39.7
105.446	31.71
118.689	39.29
135.757	26.97
149.136	41.33
199.15	19.64
201.12	40.33
239.36	35.88
242.52	32.89
243.44	33.96
277.48	27.98
335.36	36.55
398.36	33.28
517.12	30.97
520.04	35.64
520.76	30.77
522.68	35.55
528.64	31.79
886.08	36.06
888.12	43.55
928.24	36.3
930.92	41.19
931.4	46.13
931.72	37.07
932.08	41.53
932.28	42.19
933.56	42.29
979.04	45.4
981.4	40.07

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.



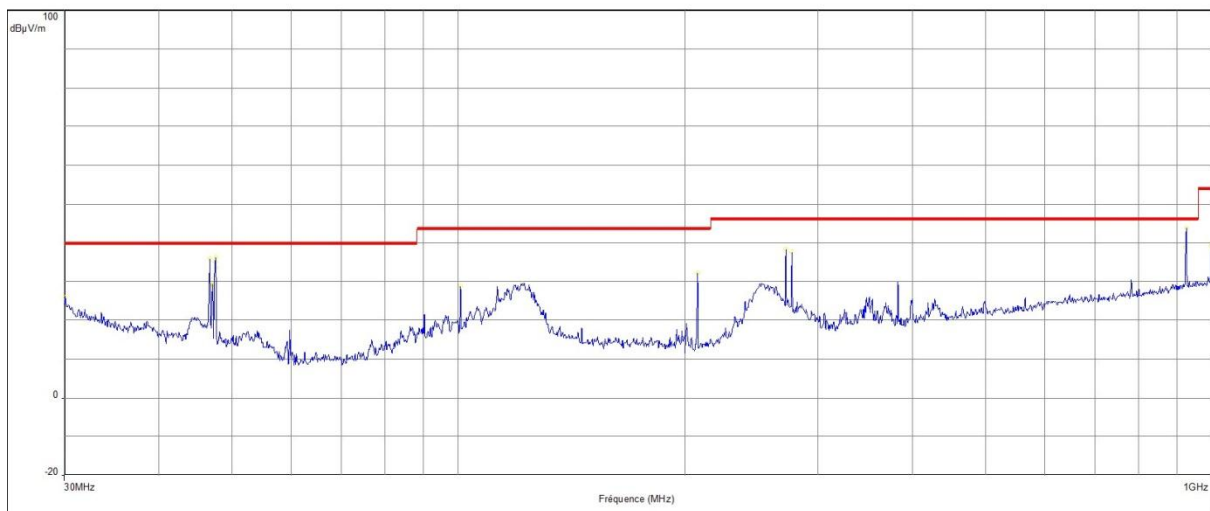
RADIATED EMISSIONS

Graph name :	Emr#5	Test configuration:
Limit :	FCC CFR47 Part15C	WF-OL (H) - Wifi C11
Class :		

PARAMETERS

Antenna polarization:	Horizontal
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Horizontale)
- Peak (Peak/LimQ-Peak) (Horizontale)



Frequency (MHz)	Peak (dBµV/m)
30.068	25.84
46.728	35.91
47.068	26.3
47.187	29.05
47.221	29.19
47.442	31.02
47.51	35
47.612	33.51
47.663	36.25
100.686	28.72
121.494	29.47
207.92	32.17
271.6	38.28
277.08	37.51
921.92	38.91
925.24	43.74
998.8	39.16

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.

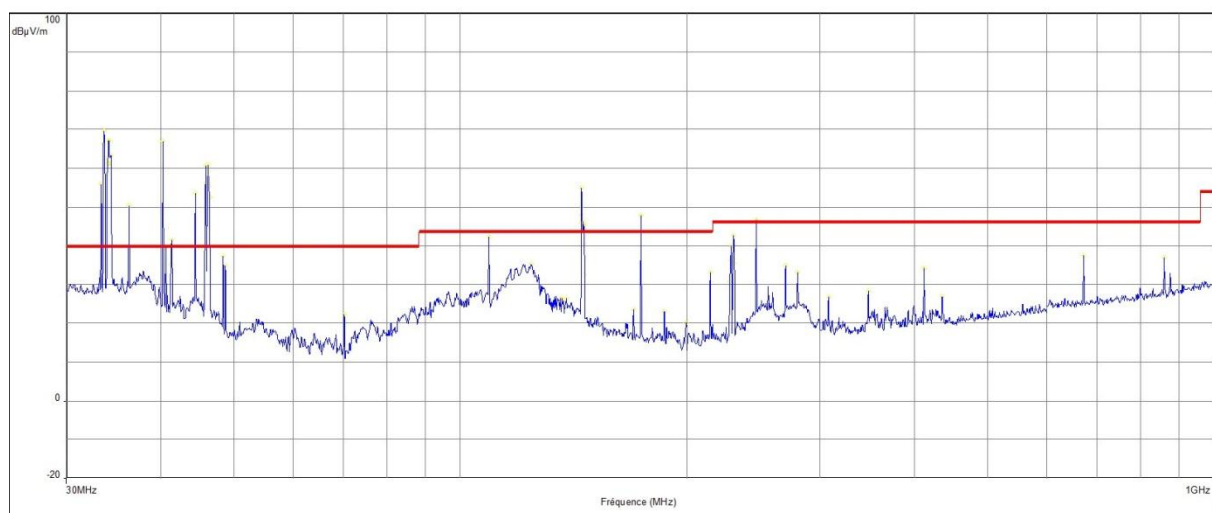
**RADIATED EMISSIONS**

Graph name :	Emr#6	Test configuration:
Limit :	FCC CFR47 Part15C	WF-OL (V) - Wifi C11
Class :		

PARAMETERS

Antenna polarization:	Vertical
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Verticale)
- Peak (Peak/LimPeak) (Verticale)





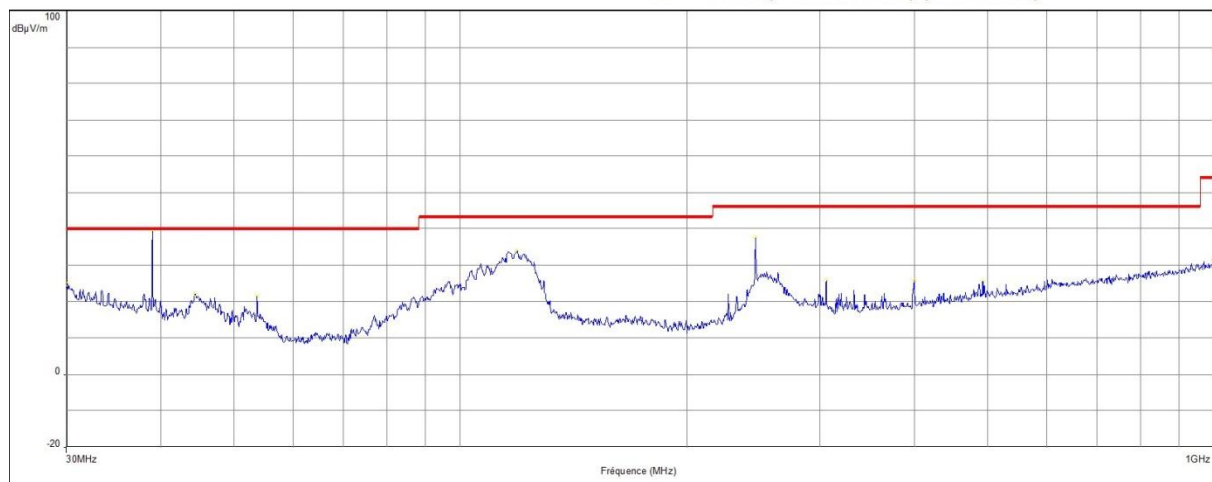
Frequency (MHz)	Peak (dB μ V/m)
33.366	55.97
33.604	66.27
34.148	66.97
34.199	61.22
34.233	62.83
34.352	63.37
36.307	50.32
40.234	67.01
40.659	39.64
41.271	39.87
41.322	35
41.373	41.49
44.45	53.62
45.793	49.81
45.878	60.55
45.929	56.14
46.167	55.35
46.218	60.83
46.286	59.07
46.354	55.37
46.422	52.47
48.445	37.48
48.785	34.91
70.103	22.25
109.05	42.25
124.112	35.27
135.689	26.32
136.403	26.39
138.188	26.44
144.648	54.95
145.464	43.67
145.6	45.15
169.723	23.57
173.667	47.92
186.366	23.18
199.167	20.01
214.52	33.08
227.84	30.8
230.36	42.53
230.6	40.24
247.12	46.74
269.76	34.83
280.16	33.09
307.92	26.7
347.72	28.23
412.2	34.1
436.2	26.75
671.76	37.46
858.32	36.86

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.



RADIATED EMISSIONS		
Graph name :	Emr#7	Test configuration:
Limit :	FCC CFR47 Part15C	WF-IS-6 (H) - Wifi C1
Class :		
PARAMETERS		
Antenna polarization:	Horizontal	
Azimuth :	0° - 360°	
RBW :	100kHz	
VBW :	300kHz	
Frequency :	30MHz - 1GHz	

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Niveau (Suspect Manuel) (Horizontale)
- Mes.Peak (Horizontale)
- Peak (Peak/LimPeak) (Horizontale)



Frequency (MHz)	Peak (dBμV/m)
38.976	39.43
53.715	21.51
118.808	34.03
246.16	37.64
306	25.86
399.8	25.68
493.12	25.77
998.04	31.18

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.

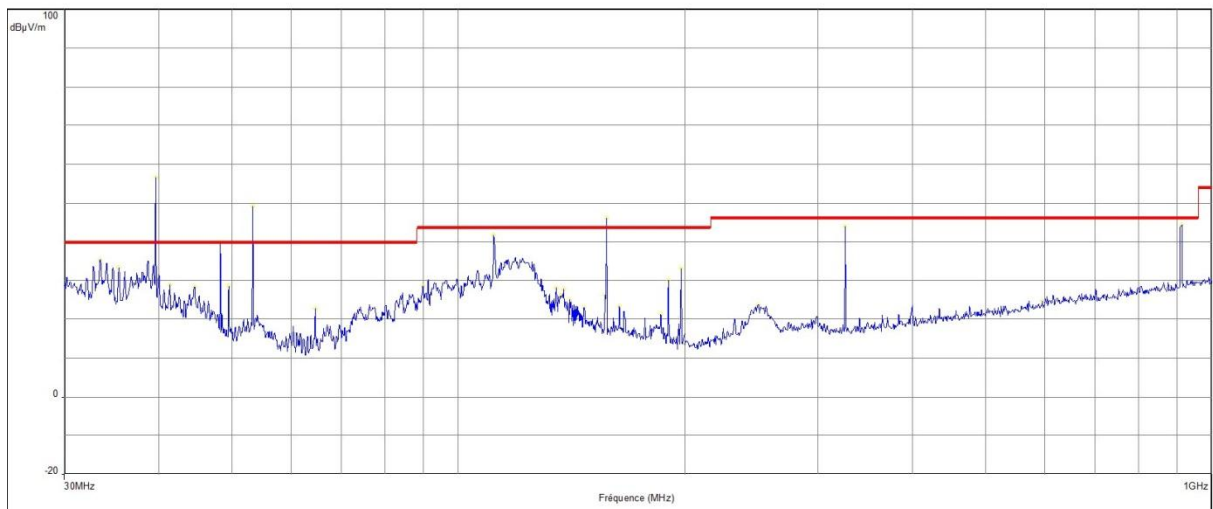
**RADIATED EMISSIONS**

Graph name :	Emr#8	Test configuration:
Limit :	FCC CFR47 Part15C	WF-IS-6 (V) - Wifi C1
Class :		

PARAMETERS

Antenna polarization:	Vertical
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Verticale)
- Peak (Peak/LimPeak) (Verticale)





Frequency (MHz)	Peak (dB μ V/m)
33.434	35.28
35.423	33.27
39.656	56.56
41.373	28.81
44.637	28.41
48.326	39.81
49.584	28.5
53.273	49.2
64.561	22.63
89.704	28.49
111.464	41.61
111.532	40.09
134.924	28.11
135.808	25.89
136.505	26.03
137.151	26.14
137.814	27.71
140.432	25.08
146.926	23.04
156.633	26.17
156.905	25.23
157.109	46.09
163.348	23.55
185.397	21.43
190.055	29.97
197.093	20.43
197.467	33.17
249.48	23.7
326	43.98
596.52	24.64
911.08	44.33

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.

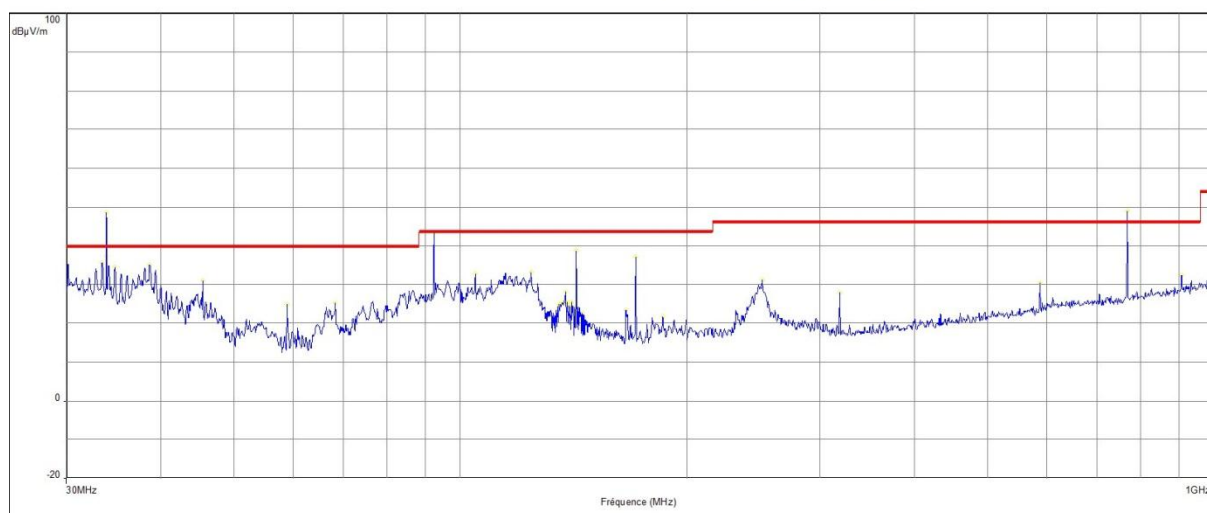
**RADIATED EMISSIONS**

Graph name :	Emr#9	Test configuration:
Limit :	FCC CFR47 Part15C	WF-IS-6 (V) - Wifi C6
Class :		

PARAMETERS

Antenna polarization:	Vertical
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Verticale)
- Peak (Peak/LimPeak) (Verticale)





Frequency (MHz)	Peak (dB μ V/m)
33.451	35.66
33.876	48.57
33.91	37.45
34.777	34.53
38.67	35.04
45.521	30.94
58.883	24.84
68.165	25.29
92.203	43.45
104.715	32.8
124.01	33.05
135.23	24.89
135.859	24.92
136.522	25.29
137.185	25.63
137.848	28.14
138.511	25.36
139.14	24.52
139.803	24.26
140.449	25.34
141.775	23.99
142.523	38.76
145.056	22.65
165.949	23.39
170.777	37.18
185.771	21.79
251.4	31.12
318.64	28
587.24	30.45
767.48	49.05
906.6	32.29

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.

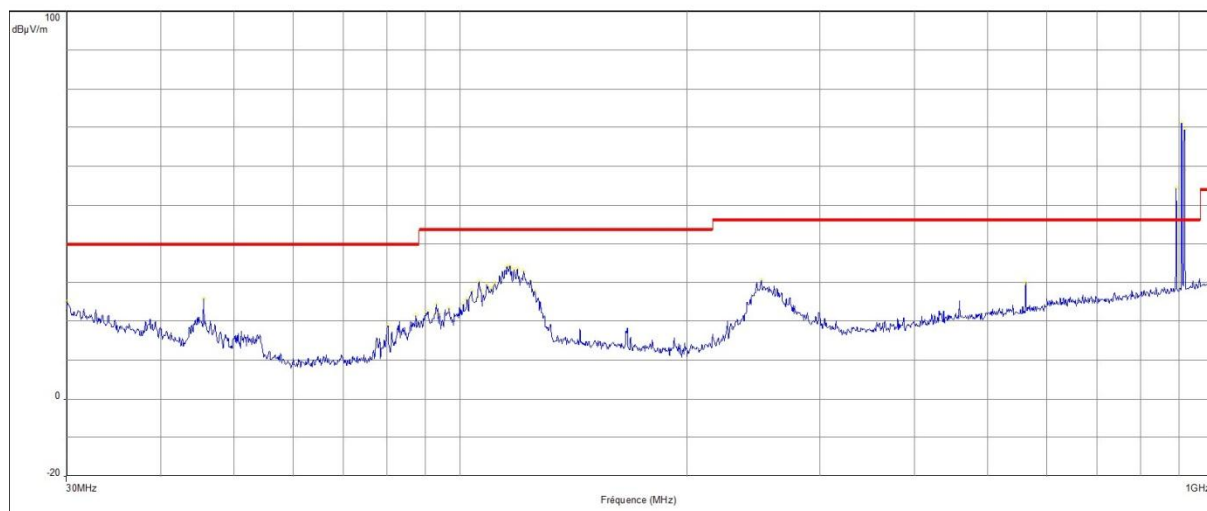
**RADIATED EMISSIONS**

Graph name :	Emr#10	Test configuration:
Limit :	FCC CFR47 Part15C	WF-IS-6 (H) - Wifi C6
Class :		

PARAMETERS

Antenna polarization:	Horizontal
Azimuth :	0° - 360°
RBW :	100kHz
VBW :	300kHz
Frequency :	30MHz - 1GHz

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Mes.Peak (Horizontale)
- Peak (Peak/LimPeak) (Horizontale)





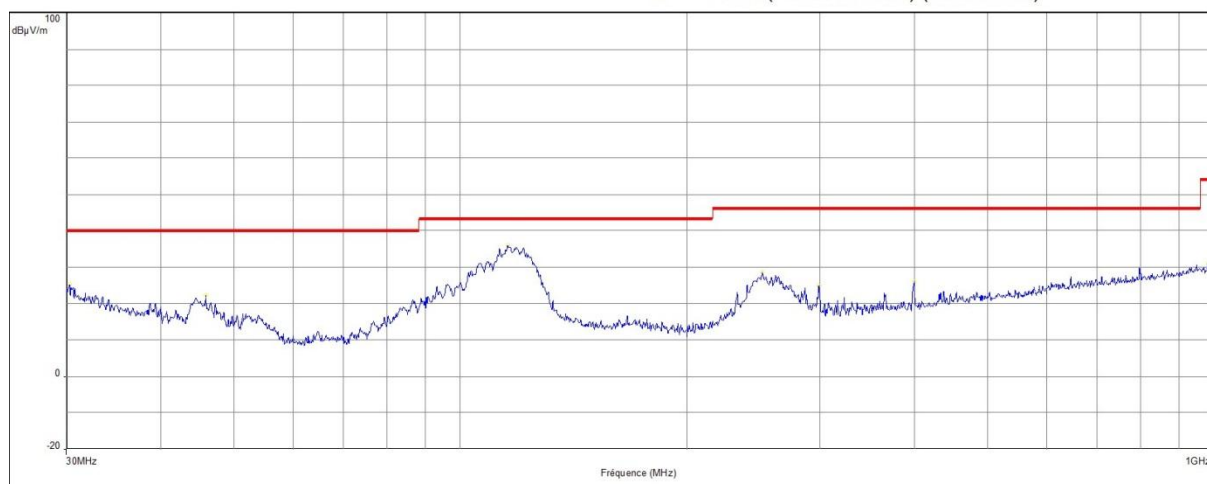
Frequency (MHz)	Peak (dB μ V/m)
30.051	24.76
45.572	25.83
80.082	18.89
87.29	21.48
90.129	22.1
90.486	22.46
92.73	22.01
92.866	24.29
93.784	21.94
96.64	23.2
100.873	24.46
102.097	25.59
102.726	25.48
103.372	27.71
105.429	26.26
105.82	30.34
106.313	28.15
108.438	29.49
109.237	27.72
109.951	28.22
110.614	28.73
111.124	29.58
115.289	34.09
115.493	33.46
116.207	33.68
116.394	34.27
117.72	33.41
118.961	33.46
121.154	32.92
124.129	30.17
125.387	27.83
250.76	30.65
562.48	29.85
891.4	54.35
906.56	71.14
912.88	59.07
913.2	69.43

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.



RADIATED EMISSIONS		
Graph name :	Emr#11	Test configuration:
Limit :	FCC CFR47 Part15C	WF-IS-6 (H) - Wifi C11
Class :		
PARAMETERS		
Antenna polarization:	Horizontal	
Azimuth :	0° - 360°	
RBW :	100kHz	
VBW :	300kHz	
Frequency :	30MHz - 1GHz	

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Niveau (Suspect Manuel) (Horizontale)
- Mes.Peak (Horizontale)
- Peak (Peak/LimPeak) (Horizontale)



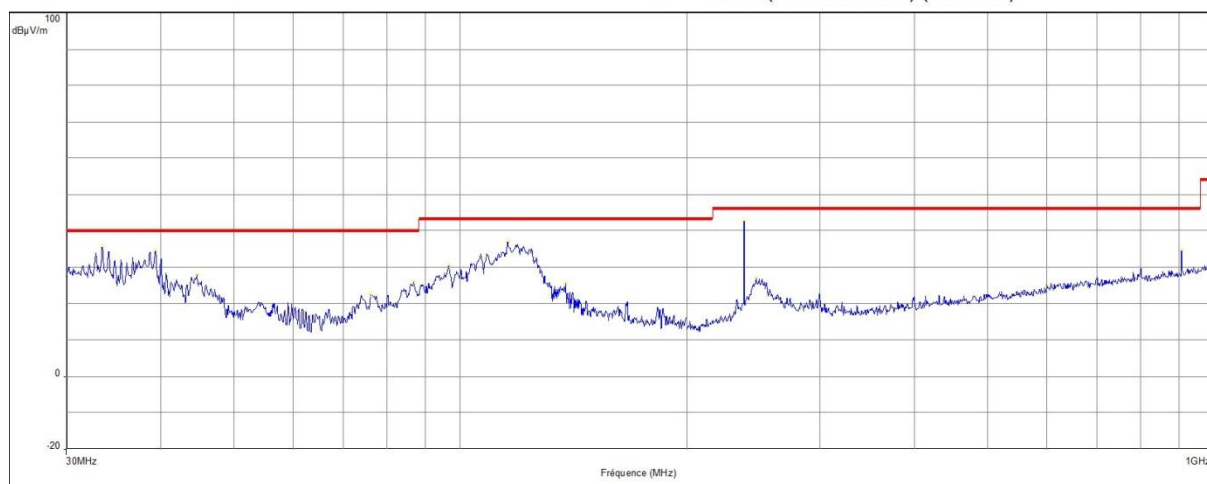
Frequency (MHz)	Peak (dBμV/m)
30.255	25.3
115.51	35.92
251.36	28.66
299	25.06
399.84	26
981.68	30.94

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.



RADIATED EMISSIONS		
Graph name :	Emr#12	Test configuration:
Limit :	FCC CFR47 Part15C	WF-IS-6 (V) - Wifi C11
Class :		
PARAMETERS		
Antenna polarization:	Vertical	
Azimuth :	0° - 360°	
RBW :	100kHz	
VBW :	300kHz	
Frequency :	30MHz - 1GHz	

- FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/
- FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/
- Niveau (Suspect Manuel) (Verticale)
- Mes.Peak (Verticale)
- Peak (Peak/LimPeak) (Verticale)



Frequency (MHz)	Peak (dBμV/m)
33.451	35.48
39.401	34.58
115.493	37.05
137.814	25.46
237.72	42.85
246.68	26.84
599.6	24.52
906.56	34.64

Note: All transients phenomena due to relay are measured / checked on OATS, only others are presented in this test report.

**11. UNCERTAINTIES CHART**

Type de mesure / Kind of measurement	Incertitude élargie laboratoire / Wide uncertainty laboratory (k=2) ± x	Incertitude limite du CISPR / CISPR uncertainty limit ± y
Mesure des perturbations conduites en tension sur le réseau d'énergie <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.