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Rapport d'essai / *Test report*

N° 275414-R4-E **JDE : 110612**

DELIVRE A / *ISSUED TO* : **SOLEM**
ZAE LA PLAINE
5 rue Georges Besse
34830 CLAPIERS - 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* : **RF WATERING SYSTEM**
- Marque / *Trade mark* : **RAIN BIRD**
- Constructeur / *Manufacturer* : **SOLEM**
- Type / *Model* : **TBOSII-MRRUS**
- N° de série / *serial number* : **7**
- FCCID **YWW-TBOS2MRRUS1**

Date des essais / *Test date* : Du 1er au 14 Décembre 2011 et 17 Janvier 2012 /
From December 01st to 14th, 2011 and January 17th, 2012

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 / Nicolas BILLAUD

Ce document comporte /*Composition of document :* 29 pages.

MOIRANS, LE 17 JANVIER 2012 / *JANUARY 17TH, 2012*

Ecrit par / *Written by,*
Anthony MERLIN

Approuvé par / *Approved by,*
Jacques LORQUIN

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SUMMARY

1. TEST PROGRAM

Standard: **- FCC Part 15, Subpart C 15.247**
- ANSI C63.4 (2003)

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	**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-10GHz*	**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 15.247 (a) (2)	**At least 500kHz**			**PASS**
Maximum Peak Output Power 15.247 (b)	**Limit: 30dBm** Conducted or Radiated measurement			**PASS**
Band Edge Measurement 15.247 (d)	**Limit: -20dBc or Radiated emissions limits in restricted bands**			**PASS**
Power spectral Density 15.247 (e)	**Limit: 8dBm/3kHz**			**PASS**

***§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.
****: Conducted emission test is the same results that old version of EUT, because there is none modification hardware just add of channel by software.**

2. SYSTEM TEST CONFIGURATION

2.1. JUSTIFICATION

The system was configured for testing in a typical fashion (as a customer would normally use it).

2.2. HARDWARE IDENTIFICATION

- **Equipment under test (EUT):**

TBOSII-MRRUS Serial number: 7
- Internal max frequencies: 32MHz

- **Input/output:**

- 1 x Connector 10pins
- 1 x SMA reverse connector

- **Auxiliaries used for testing:**

- 1 x Station ESP/LXME, Sn: 3231670, power supplied (P+N+E)

- **I/O cables used for testing:**

- 1 x Antenna cable SMA with antenna, shielded, length: .8m
- 1 x Power supply cable, unshielded, length: 2m

- **Equipment information:**

- External antenna connector: NO, internal connector for conducted tests.
- Radiated fundamental frequency band: [915.5-926.5]MHz, twelve channel
- Antenna type: Integral
- Stand By mode: Yes
- Normal power source: 24VAC supplied by ESP/LXME.
- Modulation Type: FSK +/- 140kHz
- Modulation Technology: DSSS
- Transfer rate: 38400 bps
- Maximum Antenna Gain: 2 dBi

2.3. EUT CONFIGURATION

A special configuration of the EUT permits:
- Permanent emission of the carrier frequency with modulation – TX mode
- Permanent emission of the carrier frequency without modulation – TX mode
- Permanent reception of the carrier frequency – RX mode
- Carrier frequency OFF – Standby mode

MRR is tested in stand-alone mode and in ESP/LXME station, this test report presents worst case tests results.

2.4. EQUIPMENT MODIFICATIONS

None

2.5. SPECIAL ACCESSORIES

None

3. CONDUCTED EMISSION DATA

3.1. CLIMATIC CONDITIONS

Date of test : June 8th, 2011
Test performed by : Nathalie GAGNAIRE
Atmospheric pressure : 985mB
Relative humidity : 50%
Ambient temperature : 24°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 110V/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. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

3.4. 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

3.5. 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.

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

RESULT: PASS

4. RADIATED EMISSION DATA

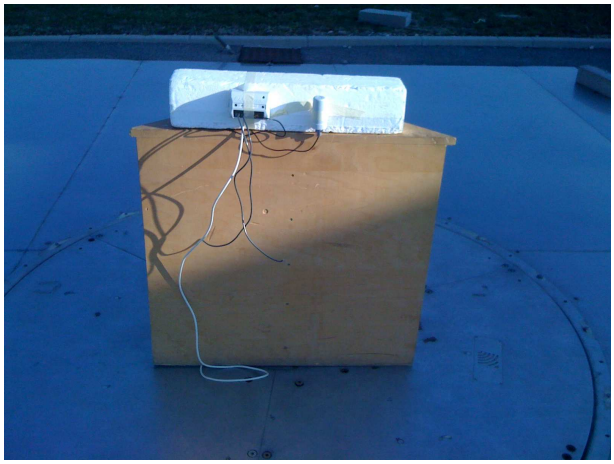
4.1. CLIMATIC CONDITIONS

Test performed by	: A.MERLIN / N.BILLAUD		
Date of test	: December 01st, 2011 and	December 06th, 2011	January 17th, 2012
Ambient temperature	: 24.1C	21.9℃	21℃
Relative humidity	: 30%	33%	35%

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.

MRR in the ESP/LXME station



MRR in stand alone

4.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

4.4. TEST SEQUENCE AND RESULTS

4.4.1. Pre-characterization at 3 meters [9kHz-30MHz]

A pre-scan of all the setup has been performed in a 3 meters semi anechoic chamber.
The distance between EUT and antenna is 3 meters. For Pre-characterization, the loop antenna was rotated during the test for maximized the emission measurement. Measurement performed on 3 axis of EUT.
Frequency band investigated is 9kHz to 30MHz.

The pre-characterization graphs are obtained in PEAK detection.

See graph for 9kHz-30MHz band: *MRR in ESP/LXME station (worst case)* **Emr#1** (See annex 1)

4.4.2. Pre-characterization [30MHz-12GHz]

For frequency band 30MHz to 1GHz, a pre-scan of all the setup has been performed in a 3 meters semi anechoic chamber.
The distance between EUT and antenna is 3 meters. Test is performed in horizontal (H) and vertical (V) polarization with a log-periodic antenna. The EUT is being rotated on 360° and on 3 axis during the measurement. The pre-characterization graphs are obtained in PEAK detection.
For frequency band 1GHz to 12GHz, a search is performed in the semi-anechoic chamber in order to determine frequencies radiated by the EUT.

See graphs for 30MHz-1GHz:

H polarization	*MRR in ESP/LXME station (worst case)*	**Emr#2**	(See annex 1)
V polarization	*MRR in ESP/LXME station (worst case)*	**Emr#3**	(See annex 1)

4.4.3. 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)

4.4.4. Characterization on 10 meters open site from 30MHz to 12GHz

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 and 1MHz from 1GHz to 12GHz.
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 clause 3.2

Worst case final data result: *MRR in ESP/LXME station (worst case)*

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	138.800	40.0	34.0	-6.0	0	V	100	14.1	
2	139.212	40.0	24.6	-15.4	0	H	100	14.1	
3	146.608	40.0	33.1	-6.9	0	H	400	13.6	

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

Frequency band 1GHz to 12GHz
Measurements are performed using a PEAK and Average detection. (RBW = 1MHz)

Carrier frequency: 915.5MHz *MRR in ESP/LXME station (worst case)*

N°	Frequency (GHz)	Limite Peak (dBµV/m)	Mesure Peak (dBµV/m)	Margin (Mes-Lim) (dB)	Limite Average (dBµV/m)	Mesure Average (dBµV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	AXIS
1	1831.00*	74.00	61.93	**-12.07**	54.00	59.73	**5.73**	170	H	100	-3.50	XY
2	2746.50	74.00	57.58	**-16.42**	54.00	52.36	**-1.64**	160	H	100	-0.90	XY
3	3662.00	74.00	51.25	**-22.75**	54.00	35.46	**-18.54**	170	V	100	1.10	Z
4	4577.50	74.00	51.70	**-22.30**	54.00	36.41	**-17.59**	160	H	100	2.50	XY
5	5493.00*	74.00	56.20	**-17.80**	54.00	41.32	**-12.68**	240	V	100	5.40	Z
6	6408.50*	74.00	54.91	**-19.09**	54.00	41.55	**-12.45**	160	H	100	5.80	XY

*: Out Of Restricted Band

Carrier frequency: 921.5MHz *MRR in ESP/LXME station (worst case)*

N°	Frequency (GHz)	Limite Peak (dBµV/m)	Mesure Peak (dBµV/m)	Margin (Mes-Lim) (dB)	Limite Average (dBµV/m)	Mesure Average (dBµV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	AXIS
1	1843.00*	74.00	62.46	**-11.54**	54.00	60.72	**6.72**	160	H	100	-3.40	XY
2	2764.50	74.00	56.00	**-18.00**	54.00	51.44	**-2.56**	290	H	100	-0.80	XY
3	3686.00	74.00	50.51	**-23.49**	54.00	39.84	**-14.16**	240	V	100	1.60	Z
4	4607.50	74.00	51.05	**-22.95**	54.00	37.70	**-16.30**	240	V	100	2.50	XY
5	5529.00*	74.00	55.00	**-19.00**	54.00	40.71	**-13.29**	240	V	100	5.40	XY
6	6450.50*	74.00	54.83	**-19.17**	54.00	45.92	**-8.08**	160	H	100	5.80	XY

*: Out Of Restricted Band

Carrier frequency: 926.5MHz *MRR in ESP/LXME station (worst case)*

N°	Frequency (GHz)	Limite Peak (dBµV/m)	Mesure Peak (dBµV/m)	Margin (Mes-Lim) (dB)	Limite Average (dBµV/m)	Mesure Average (dBµV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	AXIS
1	1853.00*	74.00	61.98	**-12.02**	54.00	60.20	**6.20**	160	H	100	-3.30	XY
2	2779.50	74.00	55.31	**-18.69**	54.00	50.73	**-3.27**	290	H	100	-0.80	XY
3	3706.00	74.00	49.77	**-24.23**	54.00	36.85	**-17.15**	240	V	100	1.60	XY
4	4632.50	74.00	50.99	**-23.01**	54.00	37.62	**-16.38**	240	V	100	2.50	XY
5	5559.00*	74.00	54.79	**-19.21**	54.00	44.76	**-9.24**	150	V	100	5.40	XY
6	6485.50*	74.00	56.57	**-17.43**	54.00	47.24	**-6.76**	160	H	100	5.80	XY

*: Out Of Restricted Band

Note: Measures have been done at 3m distance.

RESULTS: PASS

4.5. FIELD STRENGTH CALCULATION

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

FS = RA + AF + CF – AG

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

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

5. BANDWIDTH (15.247)

5.1. TEST CONDITIONS

Test performed by : A.MERLIN / N.BILLAUD
Date of test : December 09th, 2011
Ambient temperature : 24.0°C
Relative humidity : 32%
Atmospheric pressure : 996mb

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 and using 100kHz RBW and VBW>RBW, the span greater than RBW.
The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

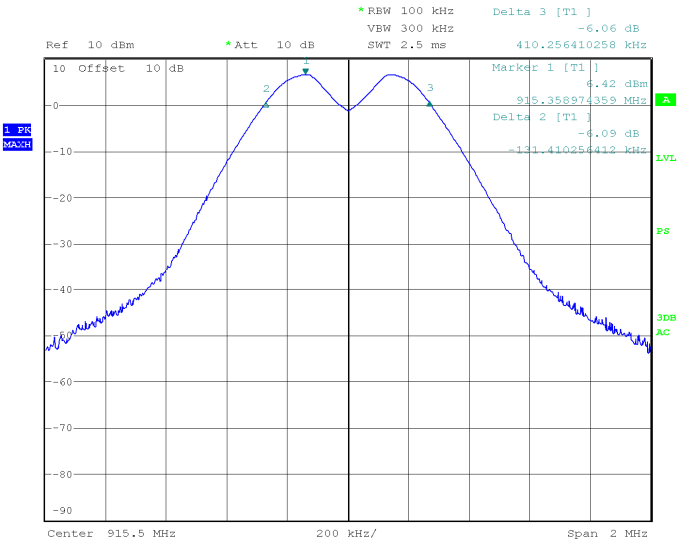
Radiated measurement:
The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency and using 100kHz RBW and VBW>RBW, the span greater than RBW.
The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete, a delta marker is used to measure the frequency difference as the emission bandwidth.

5.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

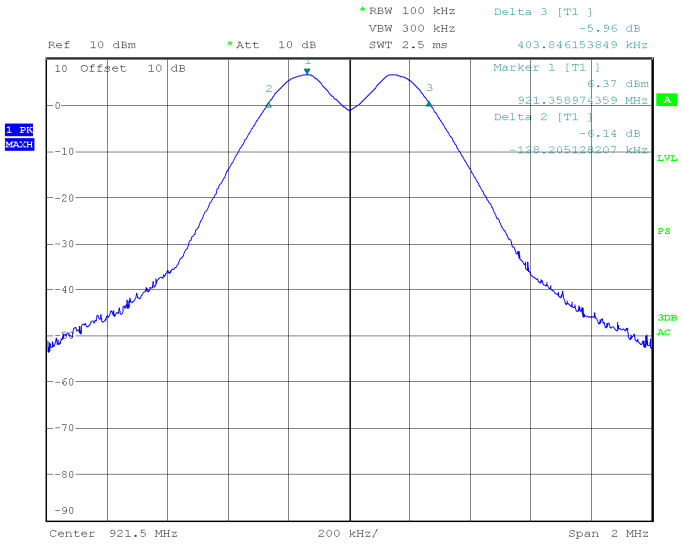
None

5.5. RESULTS

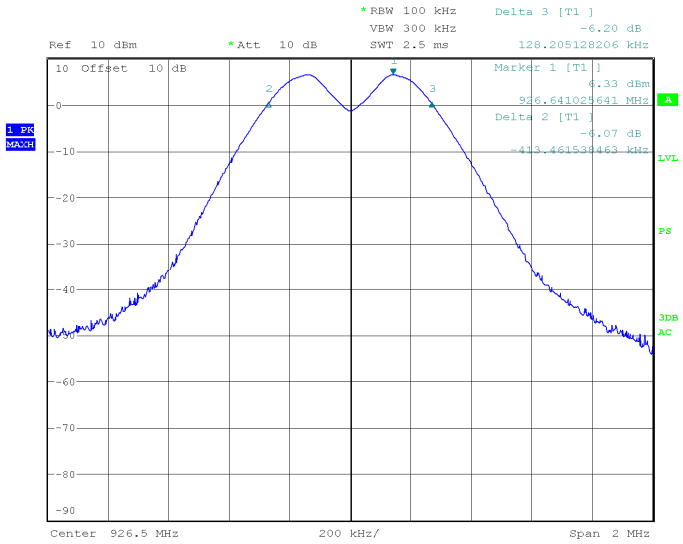
Channel Frequency (MHz)	6dB Bandwidth (kHz)	PASS / FAIL
915.500	541	PASS
921.500	531	PASS
926.500	541	PASS



Lower frequency



Middle frequency



Upper frequency

6. MAXIMUM PEAK OUTPUT POWER (15.247)

6.1. TEST CONDITIONS

Test performed by : A.MERLIN / N.BILLAUD
Date of test : December 09th, 2011
Ambient temperature : 24.0°C
Relative humidity : 32%
Atmospheric pressure : 996mb

6.2. EQUIPMENT CONFIGURATION

Modulation: FSK

6.3. SETUP

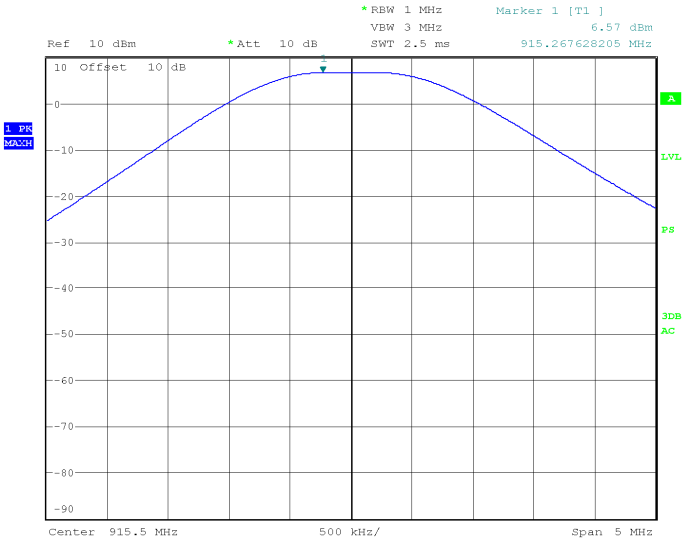
Conducted measurement:
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency and using 1MHz RBW and 3MHz VBW (greater than 6dB bandwidth)
The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

6.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

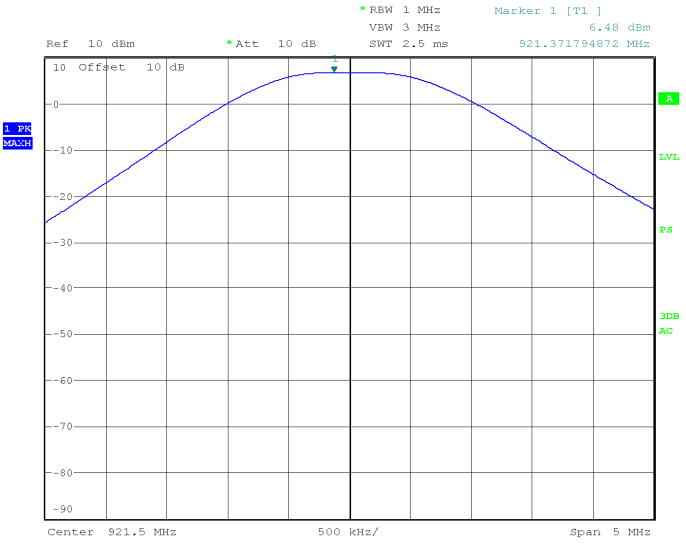
None

Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)	PASS / FAIL
915.500	6.6	30	PASS
921.500	6.5	30	PASS
926.500	6.5	30	PASS

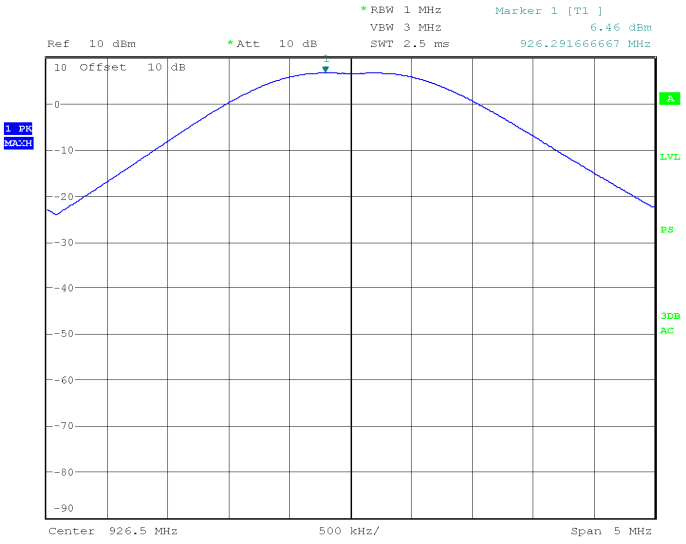
Antenna Gain: 2dBi



Lower frequency



Middle frequency



Upper frequency

7. BAND EDGE MEASUREMENT (15.247)

7.1. TEST CONDITIONS

Test performed by : A.MERLIN / N.BILLAUD
Date of test : December 14th, 2011
Ambient temperature : 24.5°C
Relative humidity : 31%

7.2. 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.

7.3. EQUIPMENT CONFIGURATION

Modulation: FSK
Channel frequency: [915.5MHz-926.5]MHz

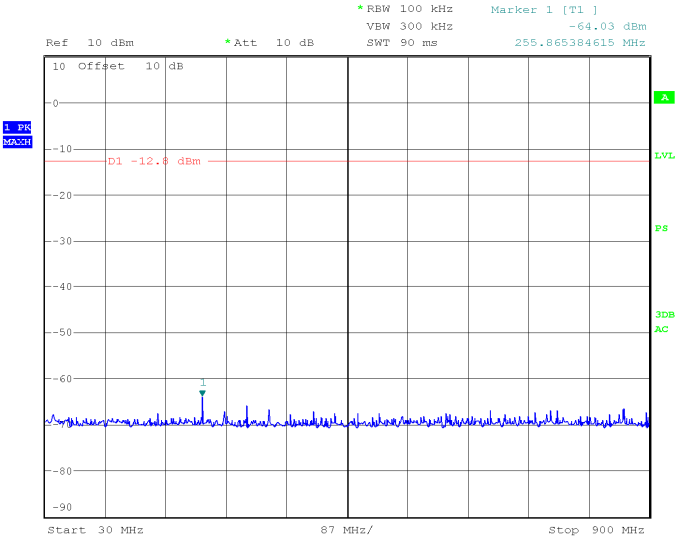
7.4. SETUP

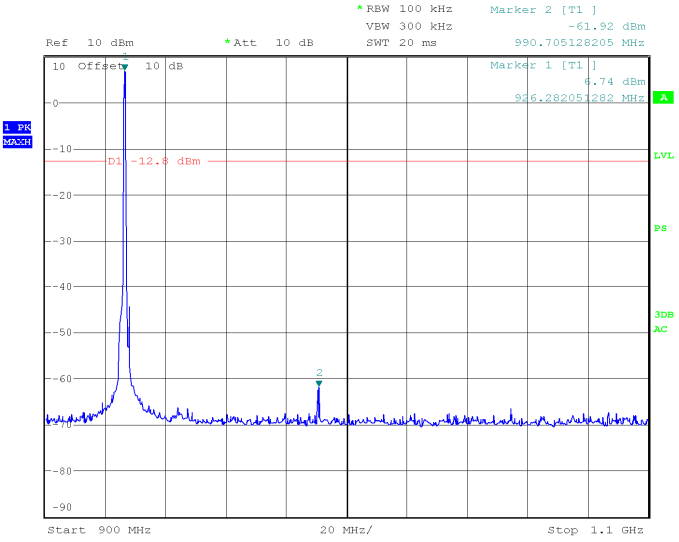
The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with Peak Output Power measurement. The EUT is turn ON; the graphs of the restrict frequency band are recorded with a display line indicating the highest level and other the 20dB offset below to show compliance with 15.247 (d) and 15.205. The emissions in restricted bands are compared to 15.209 limits.
RBW: 100kHz
VBW: 300kHz

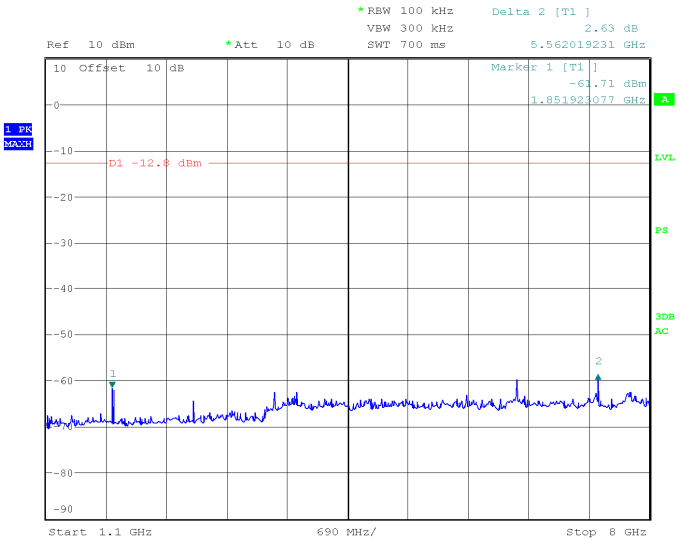
7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

7.6. RESULTS


RBW 100 kHz
VBW 300 kHz
SWT 90 ms
Marker 1 [T1]
-64.03 dBm
255.865384615 MHz
Ref 10 dBm
Att 10 dB
10 Offset 10 dB
D1 -12.8 dBm
Start 30 MHz
87 MHz/
Stop 900 MHz


RBW 100 kHz
VBW 300 kHz
SWT 20 ms
Marker 2 [T1]
-61.92 dBm
990.705128205 MHz
Marker 1 [T1]
6.74 dBm
926.282051282 MHz
Ref 10 dBm
Att 10 dB
10 Offset 10 dB
D1 -12.8 dBm
Start 900 MHz
20 MHz/
Stop 1.1 GHz


RBW 100 kHz
VBW 300 kHz
SWT 700 ms
Delta 2 [T1]
2.63 dB
5.562019231 GHz
Marker 1 [T1]
-61.71 dBm
1.851923077 GHz
Ref 10 dBm
Att 10 dB
10 Offset 10 dB
D1 -12.8 dBm
Start 1.1 GHz
690 MHz/
Stop 8 GHz

7.7. MEASUREMENT IN RESTRICTED BAND

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	255.401	46.0	30.1	**-15.9**	110	V	150	15.3	

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

8. POWER SPECTRAL DENSITY (15.247)

8.1. TEST CONDITIONS

Test performed by : A.MERLIN / N.BILLAUD
Date of test : December 12th, 2011
Ambient temperature : 22.5°C
Relative humidity : 32%
Atmospheric pressure : 990mb

8.2. SETUP

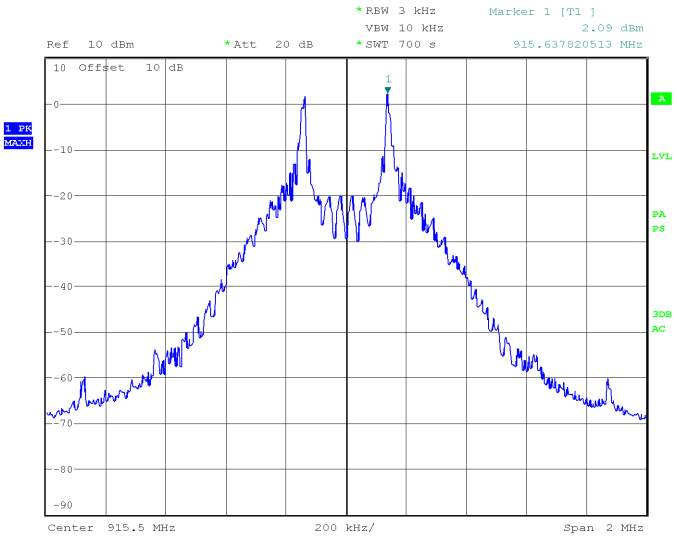
Conducted measurement:
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency and using 3kHz RBW and VBW>RBW.
The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

8.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

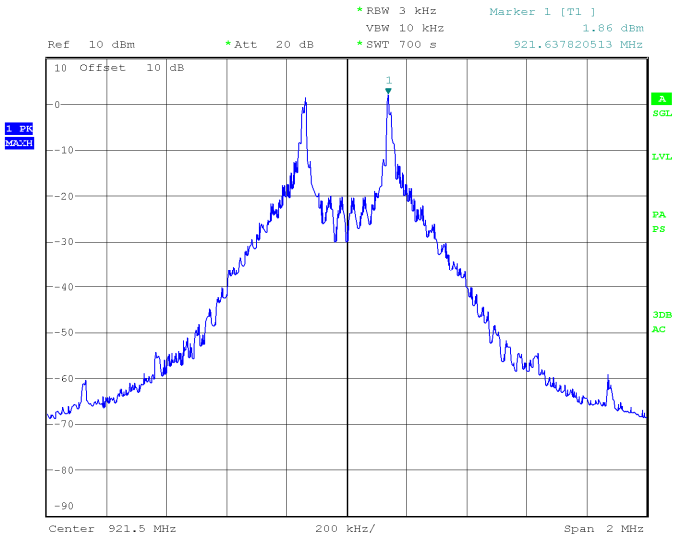
None

Channel Frequency (MHz)	Power Spectral Density (dBm)	PSD Limit (dBm)	PASS / FAIL
915.500	2.1	8	PASS
921.500	1.9	8	PASS
926.500	1.9	8	PASS

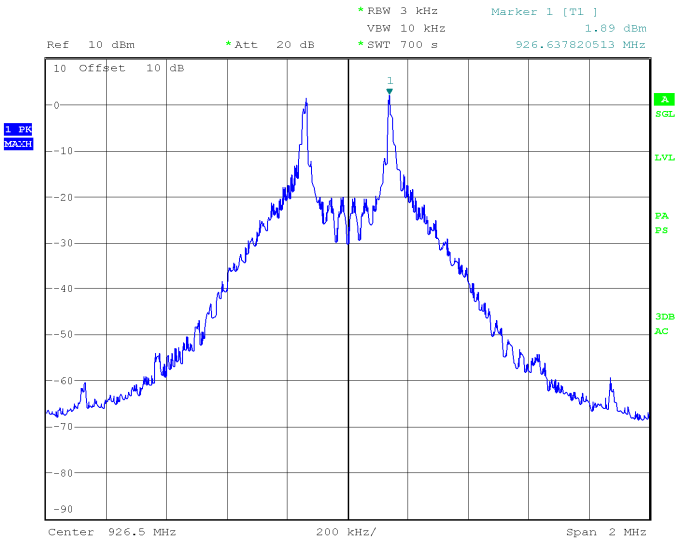
Antenna Gain: 2dBi



Lower frequency



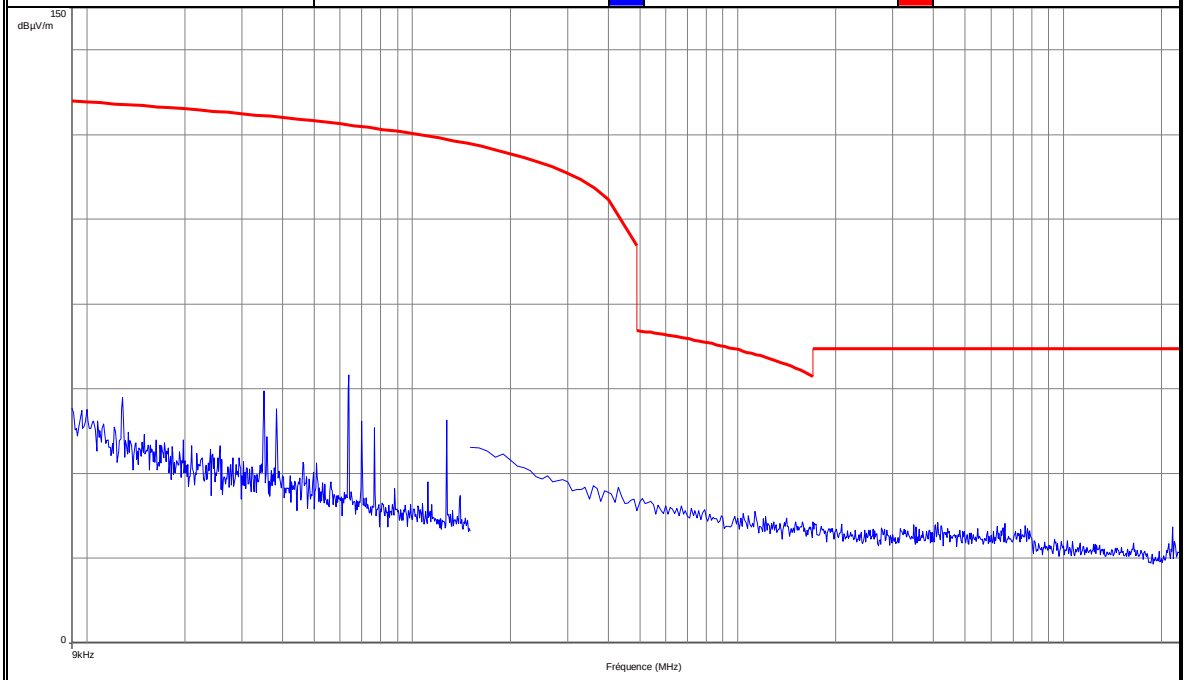
Middle frequency



Upper frequency

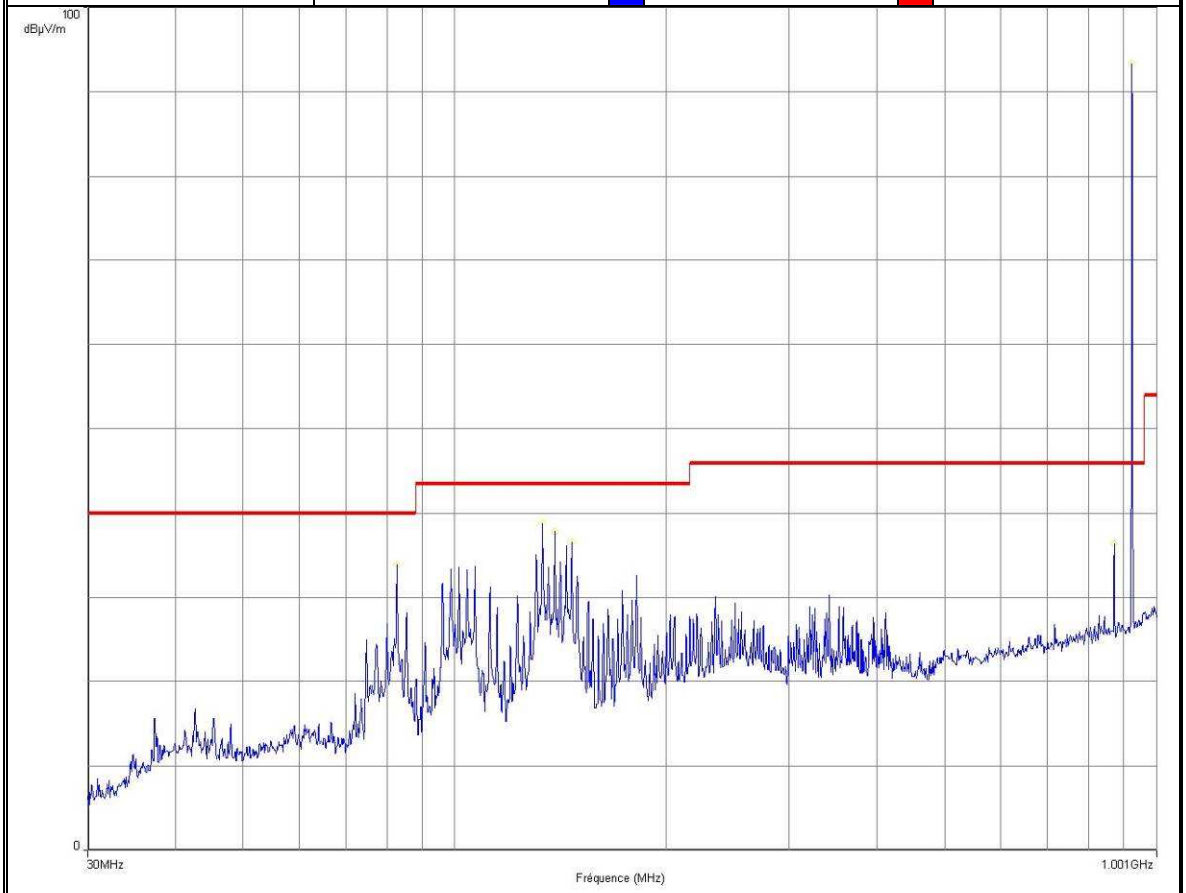
9. ANNEX 1 (GRAPHS)

RADIATED EMISSION		Test configuration:
Graph name:	**Emr#1**	**Axis XY (Worst case)**
Antenna position:	**Circular**	**TX mode (Worst case)**
Azimuth:	**0° - 360°**	
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure** / **QPeak Limit@3m**



Frequency (MHz)	Peak (dBµV/m)
No frequency observed	

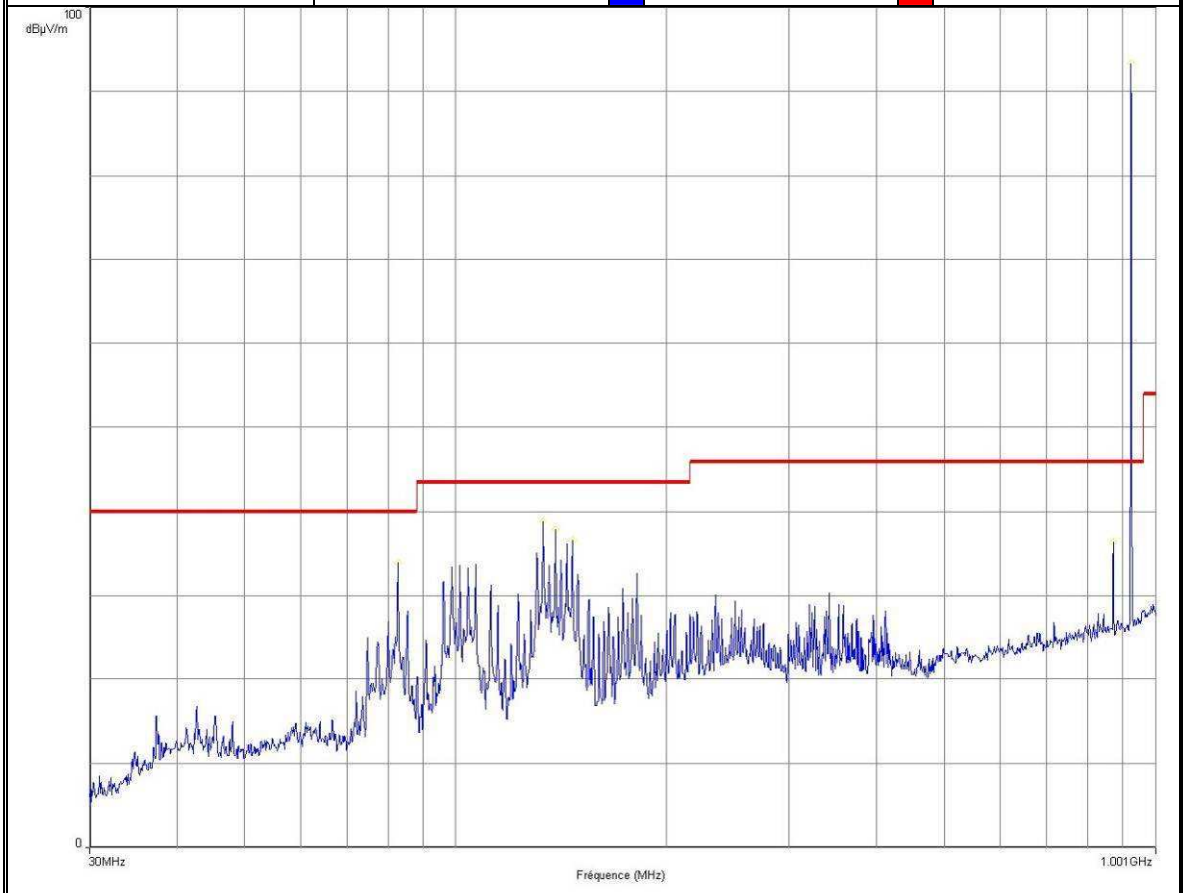
RADIATED EMISSION		Test configuration:
Graph name:	**Emr#2**	**Axis z (Worst case)**
Antenna position:	**Horizontal**	**TX mode (Worst case)**
Azimuth:	**0° - 360°**	
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure** / **QPeak Limit@3m**



Frequency (MHz)	Peak (dBµV/m)
82.720	33.9
133.440	38.8
138.800	37.8
146.840	36.6
869.680	36.3
922.560*	93.4

***Carrier frequency**

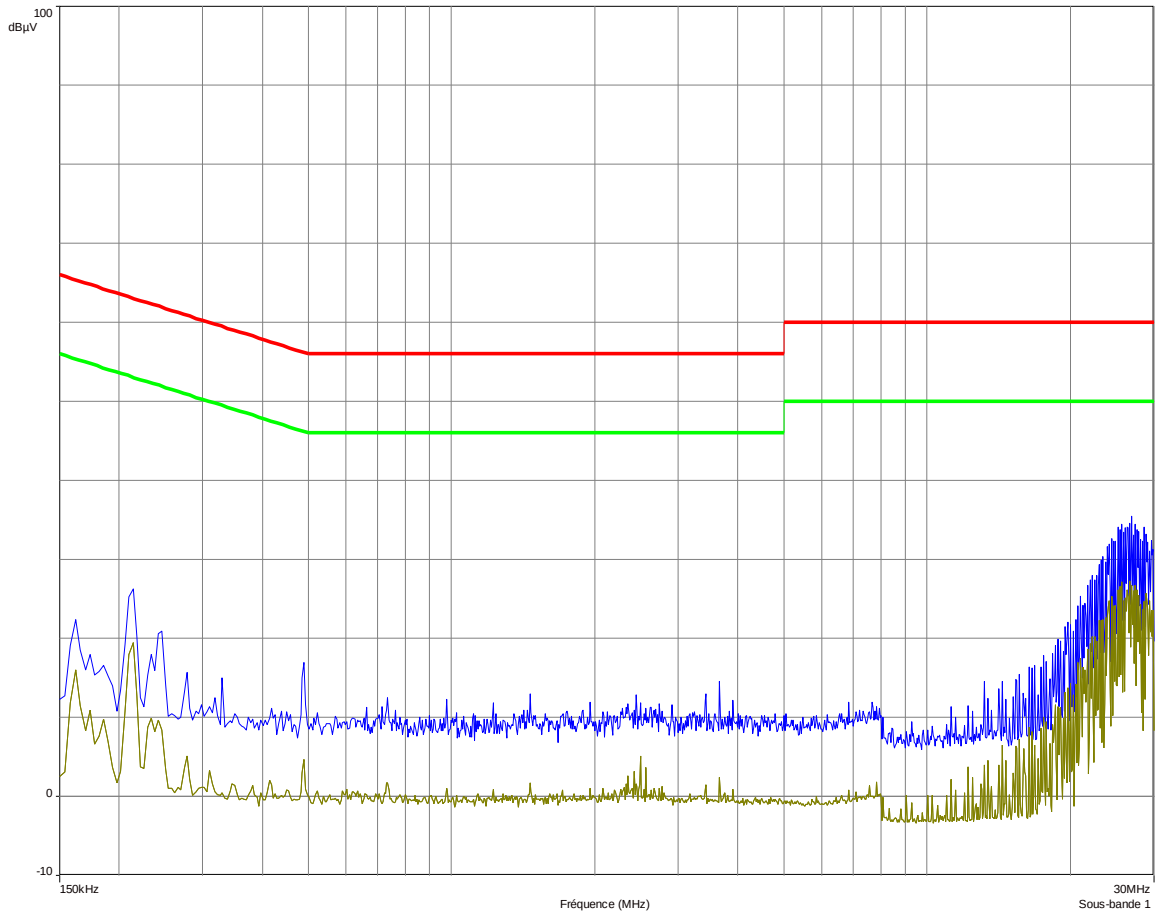
RADIATED EMISSION		Test configuration:
Graph name:	**Emr#3**	**Axis Z (Worst case)**
Antenna position:	**Vertical**	**TX mode (Worst case)**
Azimuth:	**0° - 360°**	
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure** / **QPeak Limit@3m**



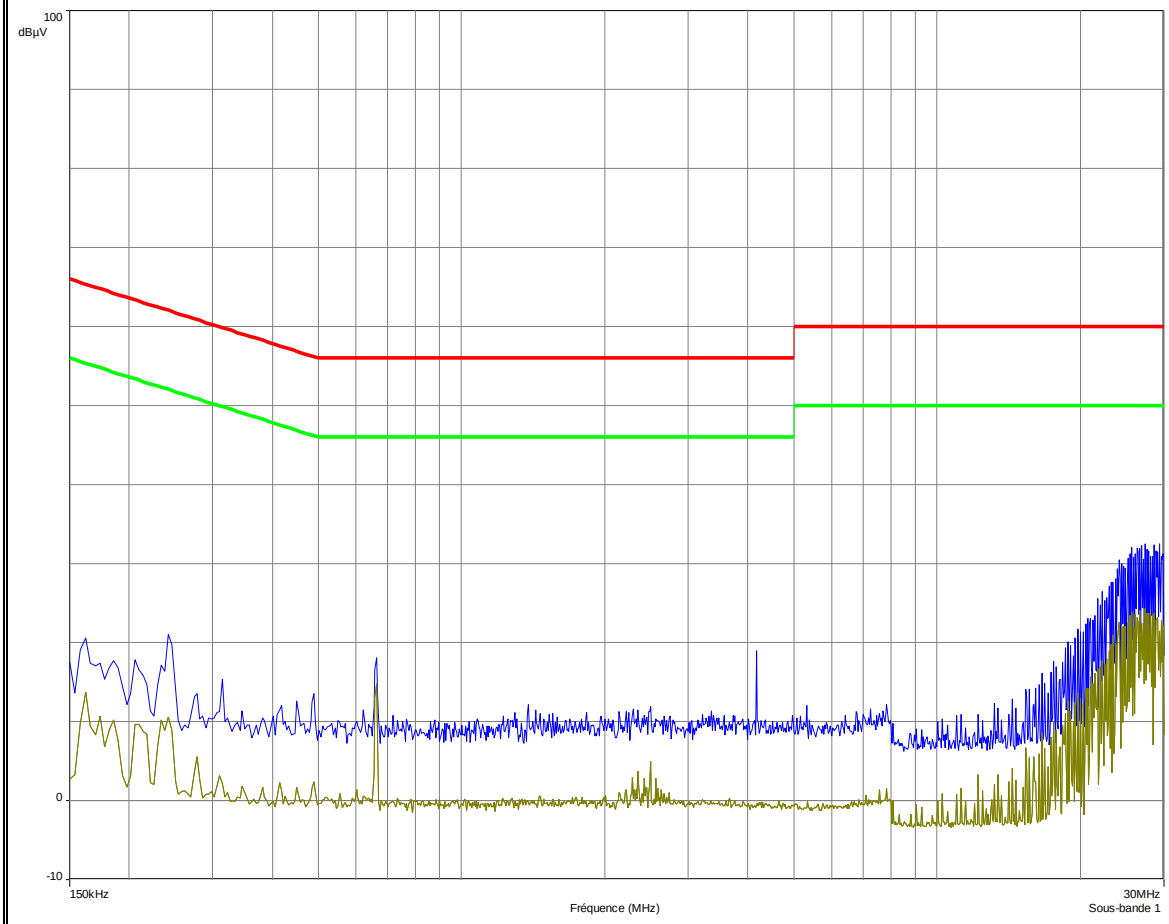
Frequency (MHz)	Peak (dBµV/m)
82.720	33.9
133.440	38.8
138.800	37.8
146.840	36.6
869.680	36.3
922.560*	93.4

***Carrier frequency**

CONDUCTED EMISSIONS		Test configuration:			
Graph name:	**Emc#1**				
Voltage / Frequency	**110V / 60Hz**				
Line/Port	**Line 1**		**Peak Measure**		**QPeak Limit**
RBW / VBW :	**9kHz / 30kHz**		**Average Measure**		**Average Limit**



CONDUCTED EMISSIONS		Test configuration:			
Graph name:	**Emc#2**				
Voltage / Frequency	**110V / 60Hz**				
Line/Port	**Neutral**		**Peak Measure**		**QPeak Limit**
RBW / VBW :	**9kHz / 30kHz**		**Average Measure**		**Average Limit**



10. TEST EQUIPMENT LIST

USED	N°LCIE	TYPE	COMPANY	REF
CONDUCTED EMISSION DATA				
x	A5329198	Cable	-	-
x	D3044010	Faraday Cage	RAY PROOF	-
x	A3169049	Conducted emission comb generator	BARDET	-
x	C2320123	LISN	RHODE & SCHWARZ	ENV216
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8
x	A4049061	Transient limiter	HEWLETT PACKARD	11947A
RADIATED EMISSION DATA				
x	A7085008	Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D
x	A7102024	Amplifier 8 GHz	HEROTEK	A1080304A
x	A7102026	Amplifier 8-26GHz	ALDETEC	ALS01452
x	C2040051	Antenna Bi-log	CHASE	CBL6111A
x	C2040052	Antenna Loop	ELECTRO-METRICS	EM-6879
x	C2040146	Antenna Bi-Log XWing	TESEQ	CBL6144
x	C2042027	Antenna horn	EMCO	3115
x	A7122167	Attenuator 10dB 18GHz 2W	JFW	-
x	A5329038	Cable N/N	-	-
x	A5329061	Cable	SUCOFLEX	106G
x	A5329188	Cable OATS (Mast at 10m)	UTIFLEX	-
x	A5329199	Cable OATS (Mast at 10m)	UTIFLEX	-
x	A5329207	Cable	UTIFLEX	-
x	D3044015	Semi-Anechoic chamber #2	SIEPEL	-
x	D3044016	Semi-Anechoic chamber #1	SIEPEL	-
x	D3044017	Semi-Anechoic chamber #3	SIEPEL	-
x	A3169050	Radiated emission comb generator	BARDET	-
x	A7484035	High Pass (1-15GHz)	WAINRIGHT	WHKX 1.03/15G-10SS
x	F2000409	OATS	-	-
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8
x	A4060018	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E
x	B4204052	Thermo-hygrometer	HUGER	-
x	F2000371	Turntable chamber (Cage#3)	ETS Lingren	Model 2165
x	F2000372	Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066
x	F2000392	Antenna mast (OATS)	ETS Lindgren	2071-2
x	F2000393	Turntable controller (Cage#2-3)	ETS Lingren	Model 2066
x	F2000403	Turntable (OATS)	ETS Lindgren	Model 2187
x	F2000404	Turntable chamber (Cage#2)	ETS Lingren	Model 2165
x	F2000406	Turntable chamber (Cage#1)	MATURO Gmbh	TT 2.0 SI
x	F2000407	Antenna mast (Cage#1)	MATURO Gmbh	AM 4.0
x	F2000408	Turntable controller (Cage#1)	MATURO Gmbh	Control Unit
BANDWIDTH				
x	A7122167	Attenuator 10dB 18GHz 2W	JFW	-
x	A5329041	Cable SMA/SMA	-	-
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8
MAXIMUM PEAK OUTPUT POWER				
x	A7122167	Attenuator 10dB 18GHz 2W	JFW	-
x	A5329041	Cable SMA/SMA	-	-
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8
BANDEDGE MEASUREMENT				
x	A7122167	Attenuator 10dB 18GHz 2W	JFW	-
x	A5329041	Cable SMA/SMA	-	-
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8
POWER SPECTRAL DENSITY				
x	A7122167	Attenuator 10dB 18GHz 2W	JFW	-
x	A5329041	Cable SMA/SMA	-	-
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8

11. UNCERTAINTIES CHART

Type de mesure / *Kind of measurement*	**Incertitude élargie laboratoire / *Wide uncertainty laboratory* (k=2) ± x**	**Incertitude limite du CISPR / *CISPR uncertainty limit* ± y**
Mesure des perturbations conduites en tension sur le réseau d'énergie *Measurement of conducted disturbances in voltage on the power port*	3.57 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication *Measurement of conducted disturbances in voltage on the telecommunication port.*	3.28 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.47 dB	3.6 dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	2.90 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans *Measurement of radiated electric field on the Moirans open area test site*	5.07 dB	5.2 dB

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