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Rapport d'essai / *Test report*

N° 115645-R1-E **JDE :** 106361

DELIVRE A / *ISSUED TO*	: **INGENICO** 1 Rue Claude Chappe B.P.348 07503 GUILHERAND GRANGES - 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*	: Terminal de paiement / *Payement terminal*
• Marque / *Trade mark*	: **INGENICO**
• Constructeur / *Manufacturer*	: **INGENICO**
• Nom commercial / *Marketing name*	**ISMP**
• Type sous test / *Model under test*	: **IMP350-01T1496A & IMP320-01T1492A**
• N° de série / *serial number*	: **PROTO1 & PROTO1**
• FCC ID	: **XKB-IMP3YYW**
Date des essais / *Test date*	: Du 19 au 21 Avril 2011 et 16 Février 2012 / *From April 19th to 21st, 2011 and February 16th, 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

Ce document comporte /*Composition of document* : 36 pages.

MOIRANS, LE 16 FÉVRIER 2012 / FEBRUARY 16TH, 2012

Ecrit par / *Written by,*
Anthony MERLIN

Approuvé par / *Approved by,*
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SUMMARY

1. TEST PROGRAM

Standard: **- FCC Part 15, Subpart B (Digital Devices)**
- ANSI C63.4 (2003)

<table>
<tr><th>EMISSION TEST</th><th colspan="3">LIMITS</th><th>RESULTS (Comments)</th></tr>
<tr><td rowspan="4">Limits for conducted disturbance at mains ports
150kHz-30MHz</td><td>Frequency</td><td>Quasi-peak value (dBµV)</td><td>Average value (dBµV)</td><td rowspan="4">PASS</td></tr>
<tr><td>150-500kHz</td><td>66 to 56</td><td>56 to 46</td></tr>
<tr><td>0.5-5MHz</td><td>56</td><td>46</td></tr>
<tr><td>5-30MHz</td><td>60</td><td>50</td></tr>
<tr><td>Radiated emissions
30MHz-2GHz*</td><td colspan="3">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</td><td>PASS</td></tr>
</table>

Standard: **- FCC Part 15, Subpart C**
- 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-2GHz*	**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**
Fundamental field strength	**Operation within the band** **13.110-14.010 MHz §15.225** **Limit: 84dBµV/m @30m**			**PASS**
Fundamental frequency tolerance	**Operation within the band** **13.110-14.010 MHz §15.225**			**PASS**
Bandedge compliance	**Operation within the band** **13.110-14.010 MHz §15.225**			**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.

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

- **Model:**

Commercial Name : **ISMP**
Reference:

- o **IMP320-01T1492A** *(No barcode / With Contact less / With Bluetooth)*
- o **IMP350-01T1496A** *(With barcode / With Contact less / With Bluetooth)* ***Full options***

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

IMP350-01T1496A Serial number: PROTO1
Base with power supply adaptor:
PHIHONG PSC12A-050, 100-240VAC / 5A / 50-60Hz, output 5VDC / 2A (US plug)
PHIHONG PSC12R-050, 100-240VAC / 5A / 50-60Hz, output 5VDC / 2A (Multi plug)
Micro USB power supply adaptor:
PHIHONG PSAC05R-050, 100-240VAC / 300mA / 50-60Hz, output 5VDC / 1A, No: 05 rev: 01.

Internal max frequencies:

- o Clock: 400MHz
- o RFID 13.56MHz
- o Bluetooth: 2400-2483.5MHz

- **Input/output:**

- 2 x Power supply contacts (Base and Terminal)
- 1 x Mini USB, only used for recharge with power supply PHIHONG PSAC05R-050
- 1 x Dock connector

- **Cables:**

- None

- **Auxiliaries equipment used during test:**

- 1 x IPOD Touch, Apple, Model: A1367, Sn: C3XDV35UDCP7, FCCID: BCG-E2407, IC: 579C-E2407
- 1 x Laptop IBM ThinkPad T60.
- 1 x IMP300-BCSN1476A (Base), FCCID: XKB-IMP3XXCX, sn: Proto1

- **Functions:**

- 1 x Contact less RFID reader at 13.56MHz, disabled during the recharge, tested only in configuration n°2.
- 1 x Bluetooth at 2400-2483.5MHz, always ON.
- 1 x Barcode, not used on base, tested only in configuration n°2.
- 1 x Contact card reader, not used on base, tested only in configuration n°2.

2.3. EUT CONFIGURATION

Configuration n°1:
Terminal on its base for recharge with following parameters (with or without Iphone plugged, worst case results presented):
- Recharge of terminal
- Recharge of Iphone
- Bluetooth, hopping mode
- Contact less OFF
- CAM0 (Contact card) OFF
- Barcode OFF

Configuration n°2:
Software TestCem used on terminal, followings functions are tested in loop during all tests (with or without Iphone plugged, worst case results presented):
- CAM0 (Contact card)
- Contact less
- Barcode
- Bluetooth, hopping mode
- Iphone plugged.

Configuration n°3:
Terminal plugged to power supply PHIHONG PSAC05R-050 for recharge with following parameters (with or without Iphone plugged, worst case results presented):
- Recharge of terminal
- Bluetooth, hopping mode
- Contact less OFF
- CAM0 (Contact card) OFF
- Barcode OFF

2.4. EQUIPMENT MODIFICATIONS

None

2.5. SPECIAL ACCESSORIES

None

3. RADIATED EMISSION DATA

3.1. CLIMATIC CONDITIONS

Date of test	: April 19th, 2011	and	April 20th, 2011	February 16th, 2012
Test performed by	: A.MERLIN			
Atmospheric pressure	: 1011mb		1011mb	1004mb
Relative humidity	: 31%		28%	23%
Ambient temperature	: 22℃		21℃	21℃

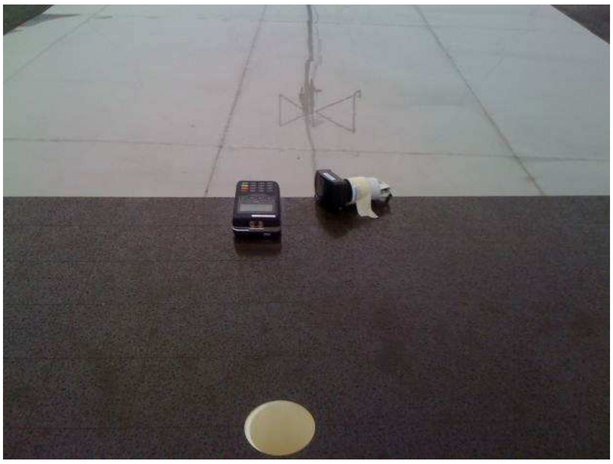
3.2. TEST SETUP

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.



Configuration n°1

Configuration n°2



Configuration n°3

3.3. TEST SEQUENCE AND RESULTS

3.3.1. 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: **Emr#1** *Configuration n°2 – Axis Z* (See annex 1)

3.3.2. Pre-characterization [30MHz-2GHz]

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 2GHz, a search is performed in the semi-anechoic chamber in order to determine frequencies radiated by the EUT (Measuring distance reduced to 1m).

See graphs for 30MHz-1GHz:

H polarization	**Emr#2**	*Configuration n°1*	(See annex 1)
V polarization	**Emr#3**	*Configuration n°1*	(See annex 1)
H polarization	**Emr#4**	*Configuration n°2 – Axis XY*	(See annex 1)
V polarization	**Emr#5**	*Configuration n°2 – Axis XY*	(See annex 1)
H polarization	**Emr#6**	*Configuration n°2 – Axis Z*	(See annex 1)
V polarization	**Emr#7**	*Configuration n°2 – Axis Z*	(See annex 1)
H polarization	**Emr#8**	*Configuration n°3 – Axis XY*	(See annex 1)
V polarization	**Emr#9**	*Configuration n°3 – Axis XY*	(See annex 1)
H polarization	**Emr#10**	*Configuration n°3 – Axis Z*	(See annex 1)
V polarization	**Emr#11**	*Configuration n°3 – Axis Z*	(See annex 1)

3.3.3. 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 §15.225 limits in the frequency range 13.553MHz 13.567MHz. Measurement bandwidth was 9kHz.
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 on clauses 3.2.

Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	Qpeak (dBµV/m)	Qpeak-Limit (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)
13.56*[1]	84	26.7	**-57.3**	90	90	35.3

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

Limits Sub clause §15.225

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
13.553-13.567	15 848 84 dBµV/m	30
13.410-13.553 13.567-13.710	334 50.5 dBµV/m	30
13.110-13.410 13.710-14.010	106 40.5 dBµV/m	30

See chapter 5 of this test report for band edge measurements.

3.3.4. Characterization on 10 meters open site from 30MHz to 2GHz

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 2GHz.
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:

Configuration n°1:

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	41.478	40.0	30.2	**-9.8**	95	V	100	12.9	/
2	42.309	40.0	30.8	**-9.2**	105	V	100	12.5	/
3	44.782	40.0	30.0	**-10.0**	100	V	100	11.7	/
4	142.112	43.5	34.3	**-9.2**	355	V	150	13.9	/
5	219.331	46.0	39.1	**-6.9**	0	V	100	13.3	/
6	225.362	46.0	38.8	**-7.2**	0	V	100	13.7	/
7	353.058	46.0	35.4	**-10.6**	75	V	250	17.9	/
8	557.587	46.0	33.6	**-12.4**	110	V	300	22.7	/
9	580.598	46.0	39.2	**-6.8**	310	V	200	23.1	/

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

Configuration n°2:

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	40.679	40.0	37.6	**-2.4**	0	V	100	13.1	AXIS Z
2	54.25	40.0	39.0	**-1.0**	10	V	100	7.9	AXIS XY
3	67.800	40.0	36.6	**-3.4**	15	V	100	7.4	AXIS XY
4	108.474	43.5	35.0	**-8.5**	15	V	150	13.0	AXIS XY
5	122.033	43.5	37.9	**-5.6**	300	H	200	14.7	AXIS XY
6	176.000	43.5	32.3	**-11.2**	110	H	250	11.9	AXIS XY
7	325.009	46.0	39.2	**-6.8**	160	V	100	17.0	AXIS XY
8	352.542	46.0	40.2	**-5.8**	135	H	200	17.9	AXIS Z
9	375.012	46.0	39.4	**-6.6**	40	H	150	18.6	AXIS Z
10	425.012	46.0	39.2	**-6.8**	115	V	200	19.9	AXIS XY
11	475.014	46.0	45.2	**-0.8**	0	V	250	21.0	AXIS Z
12	500.014	46.0	44.3	**-1.7**	45	V	200	21.6	AXIS XY
13	625.018	46.0	44.0	**-2.0**	25	V	250	23.8	AXIS Z
14	875.012	46.0	41.2	**-4.8**	55	V	200	27.1	AXIS Z

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

Configuration n°3:

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	39.789	40.0	37.9	**-2.1**	110	V	100	13.7	AXIS Z
2	40.879	40.0	33.1	**-6.9**	15	H	150	13.3	AXIS Z
3	41.299	40.0	37.0	**-3.0**	355	V	100	12.9	AXIS Z
4	44.724	40.0	32.7	**-7.3**	0	V	150	11.7	AXIS Z
5	131.051	43.5	34.8	**-8.7**	180	V	100	14.7	AXIS Z
6	223.961	46.0	36.9	**-9.1**	110	V	150	13.6	AXIS Z
7	226.447	46.0	34.9	**-11.1**	200	H	220	13.8	AXIS Z
8	229.745	46.0	32.7	**-13.3**	100	V	200	14.0	AXIS Z
9	233.449	46.0	33.1	**-12.9**	10	H	250	14.2	AXIS Z
10	480.491	46.0	39.9	**-6.1**	350	V	150	21.1	AXIS Z
11	483.697	46.0	39.5	**-6.5**	245	H	200	21.2	AXIS Z
12	580.786	46.0	37.9	**-8.1**	45	V	250	23.1	AXIS Z

*: 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 2GHz
Measurements are performed using a PEAK and Average detection. (RBW = 1MHz)

Configuration n°1:

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

No Significant Frequency observed

Note: Measures have been done at 3m distance.

Configuration n°2:

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

No Significant Frequency observed

Note: Measures have been done at 3m distance.

Configuration n°3:

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

No Significant Frequency observed

Note: Measures have been done at 3m distance.

RESULTS: PASS

3.4. 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.

4. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)

4.1. TEST CONDITIONS

Test performed by : A.MERLIN
Date of test : April 21st, 2011
Ambient temperature : 21°C
Relative humidity : 27%

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency when the temperature is varied from -20°C to +50°C at the no minal power voltage and the primary power voltage is varied from 85% to 115% of the rated supply voltage at 20°C.

4.2. Temperature and voltage fluctuation

Temperature has been set at +20°C, –20°C and +50°C.
The voltage is varied from 3.50VDC to 4.26VDC, last regulation of power supply of RF module (worst case). Minimal voltage declared by INGENICO, below RFID module is disabled.
Frequency of carrier: 13.56 MHz
Upper limit: 13.561356 MHz
Lower limit: 13.558644 MHz
The equipment (RF box) is set in a climatic chamber. Measure is performed on one channel of RF module.

Temperature **Voltage**	**-20°C**	**20°C**	**+50°C**
Mains voltage: 3.7VDC Frequency Drift (MHz) Carrier level (dBc)	 + 0.000005 - 1.40	 **REF** **REF**	 - 0.000060 - 0.00
Mains voltage: 3.5VDC Frequency Drift (MHz) Carrier level (dBc)	 + 0.000005 - 1.70	 + 0.000008 + 0.16	 - 0.000056 + 0.20
Mains voltage: 4.26VDC Frequency Drift (MHz) Carrier level (dBc)	 + 0.000008 - 0.32	 + 0.000009 + 0.32	 - 0.000055 - 0.20

Frequency drift measured is **60 Hz** when the temperature is varied from -20°C to +50°C and voltage is varied from 3.50VDC to 4.26VDC.

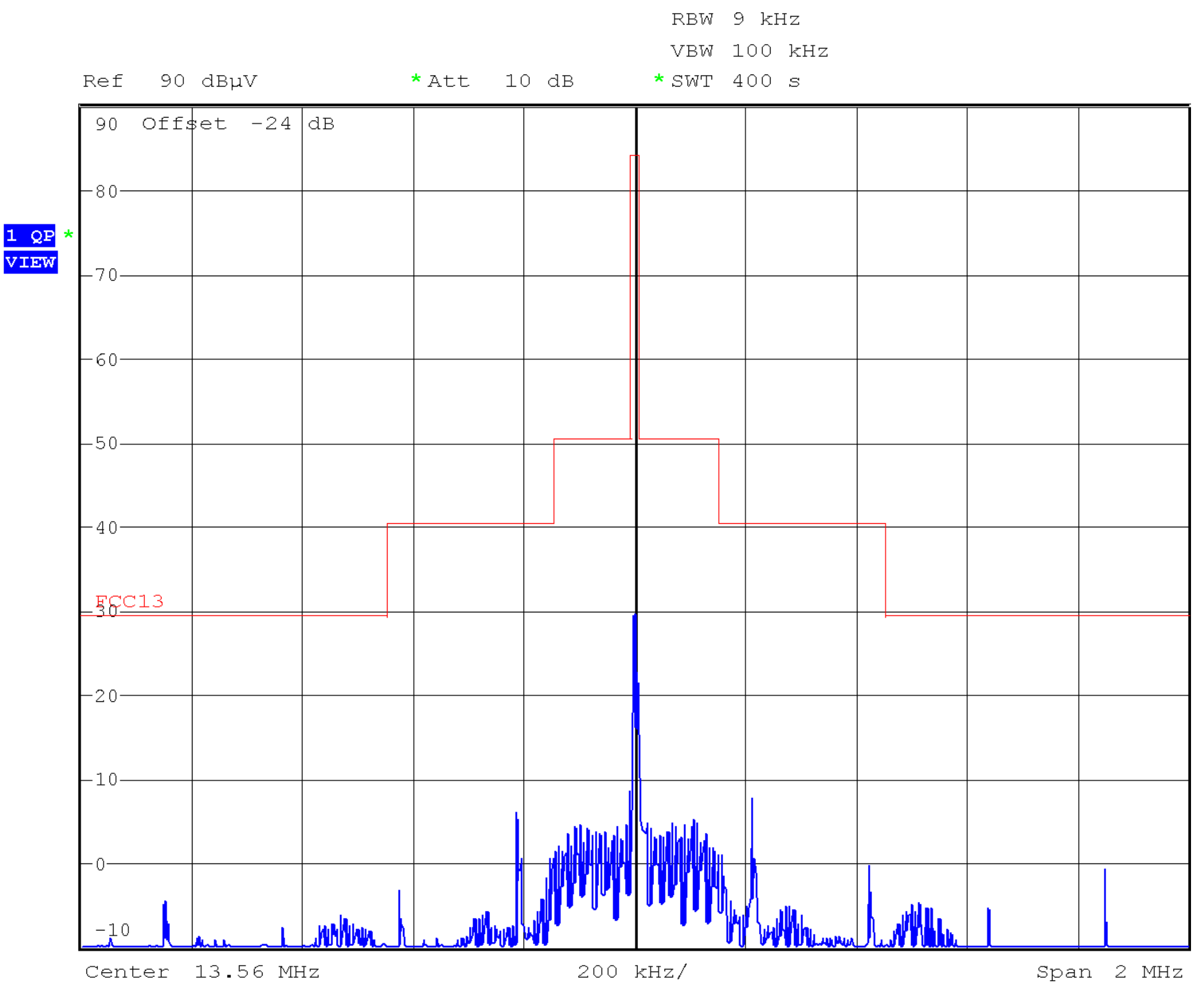
5. BAND-EDGE COMPLIANCE §15.209

5.1. CLIMATIC CONDITIONS

Date of test	: April 21st, 2011
Test performed by	: A.MERLIN
Atmospheric pressure	: 1006mb
Relative humidity	: 27%
Ambient temperature	: 21℃

5.2. Frequency band 13.110-14.010MHz

Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector. The graphs are obtained with a measuring receiver ESU8.



6. CONDUCTED EMISSION DATA

6.1. CLIMATIC CONDITIONS

Date of test	: April 21st, 2011
Test performed by	: A.MERLIN
Atmospheric pressure	: 1006mb
Relative humidity	: 27%
Ambient temperature	: 21℃

6.2. 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.

6.3. 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).


Configuration n°1



Configuration n°3

6.4. 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.

Configuration n°1:

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

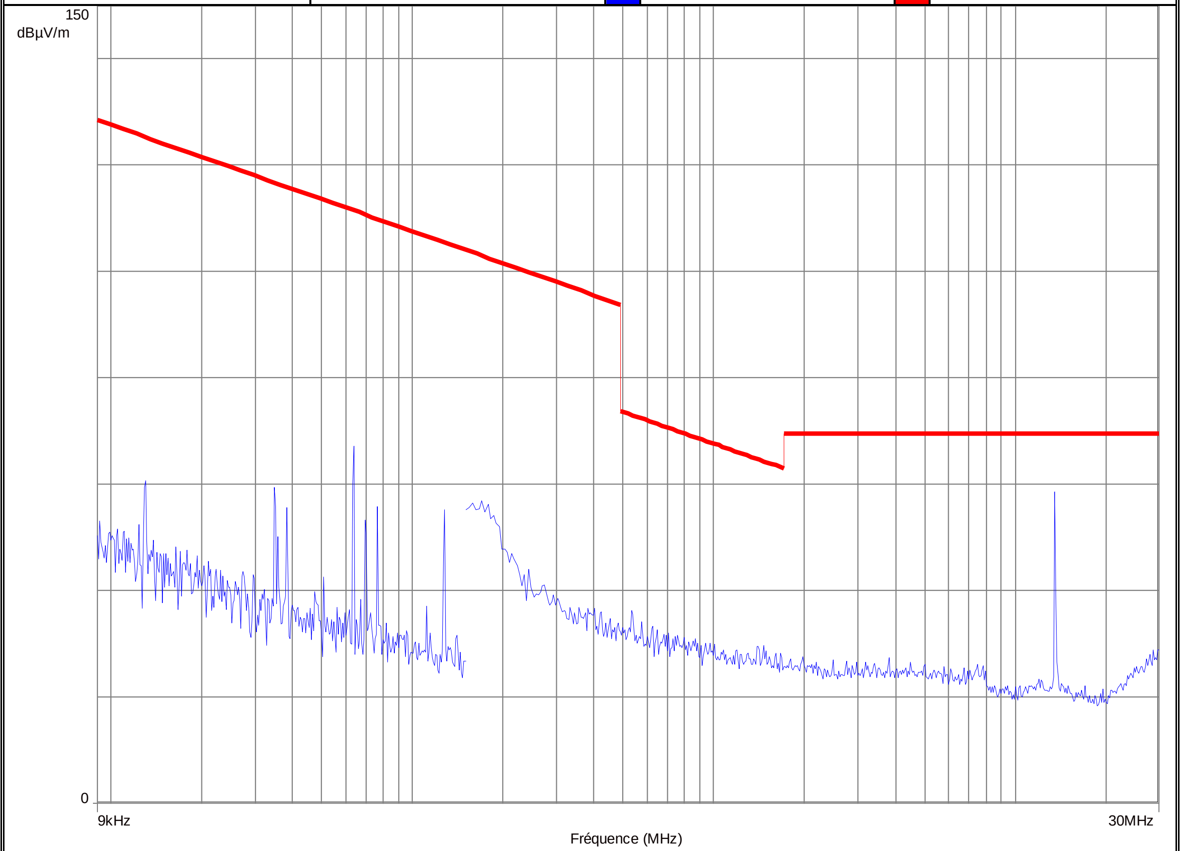
Configuration n°3:

Measure on L1:	graph Emc#3	(see annex 1)
Measure on N:	graph Emc#4	(see annex 1)

RESULT: PASS

7. ANNEX 1 (GRAPHS)

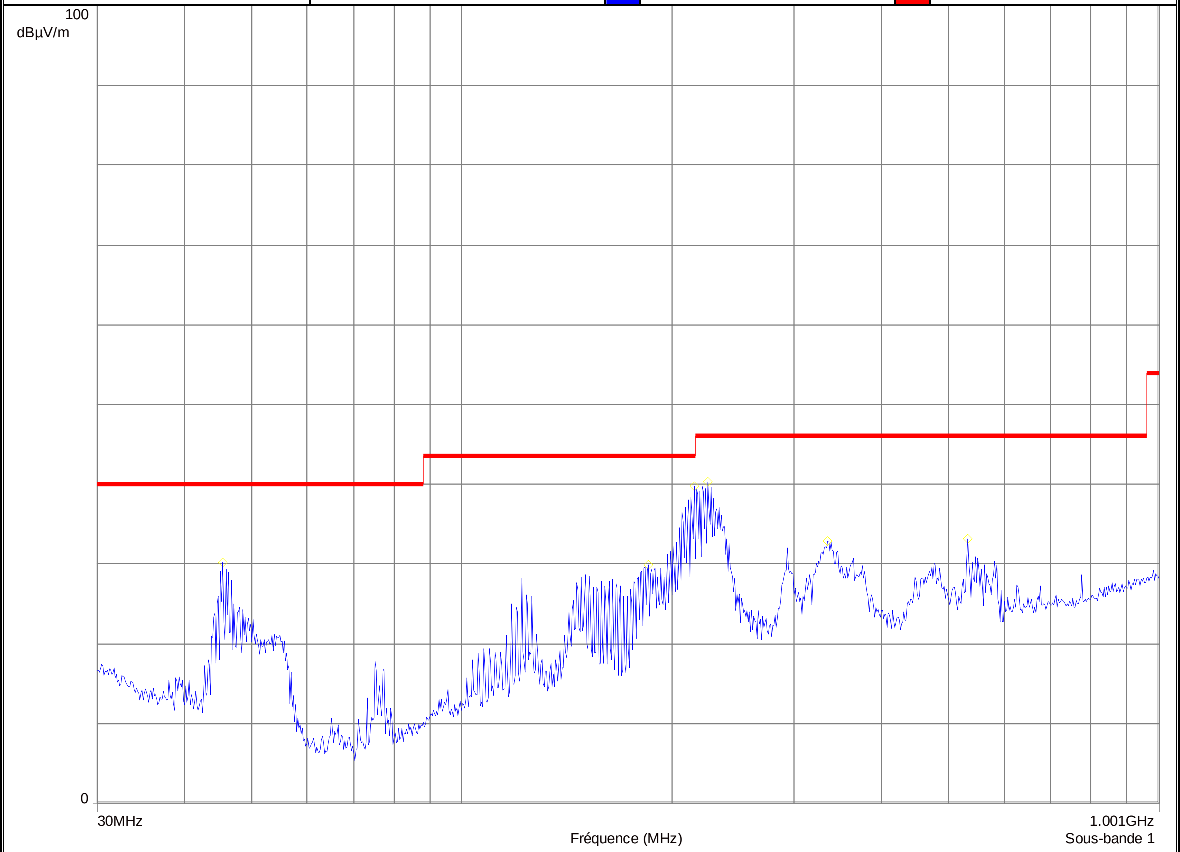
RADIATED EMISSION		Test configuration: Terminal alone Axis Z (Worst case)	
Graph name:	**Emr#1**		
Antenna position:	**0°(Worst case)**		
Azimuth:	**0°- 360°**		
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure**	**QPeak Limit@3m**



Frequency (MHz)	Peak (dBµV/m)
13.558*	58.6

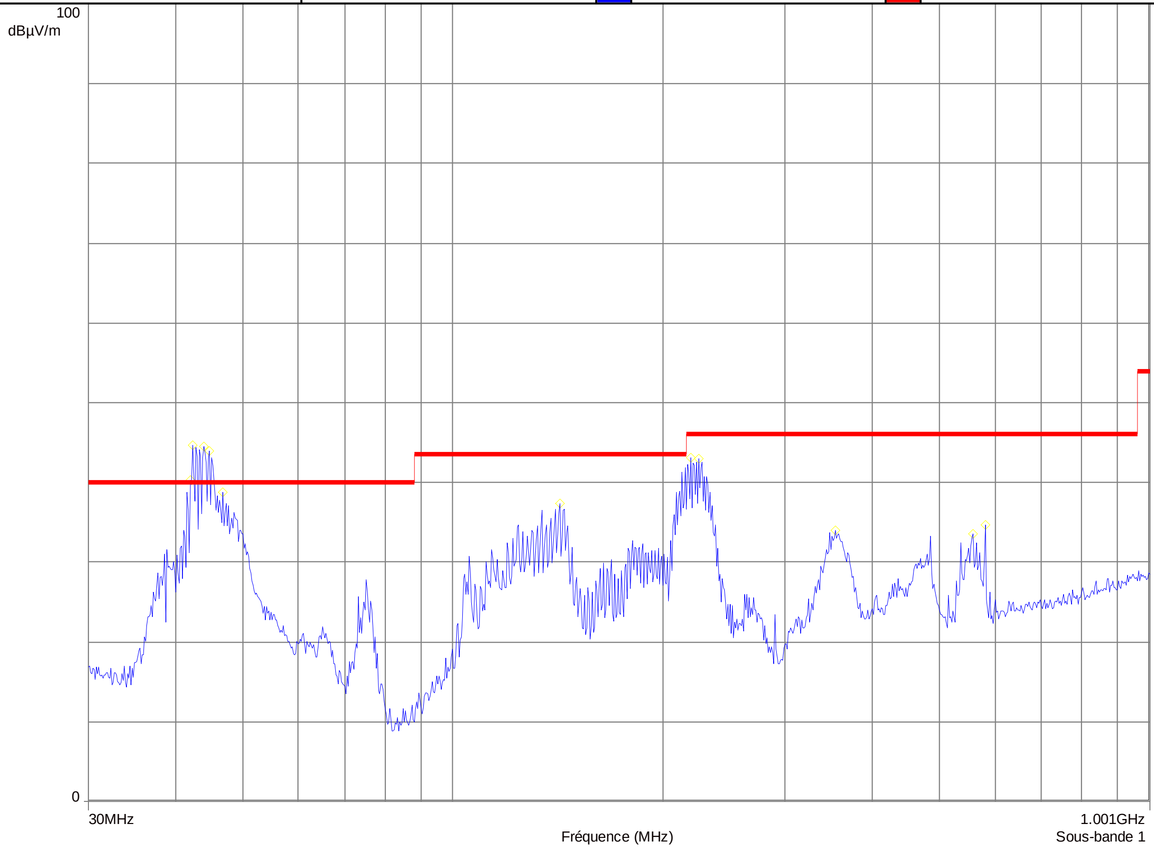
***Carrier frequency**

RADIATED EMISSION		Test configuration: 1	
Graph name:	**Emr#2**		
Antenna position:	**Horizontal**		
Azimuth:	**0°- 360°**		
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure**	**QPeak Limit@3m**



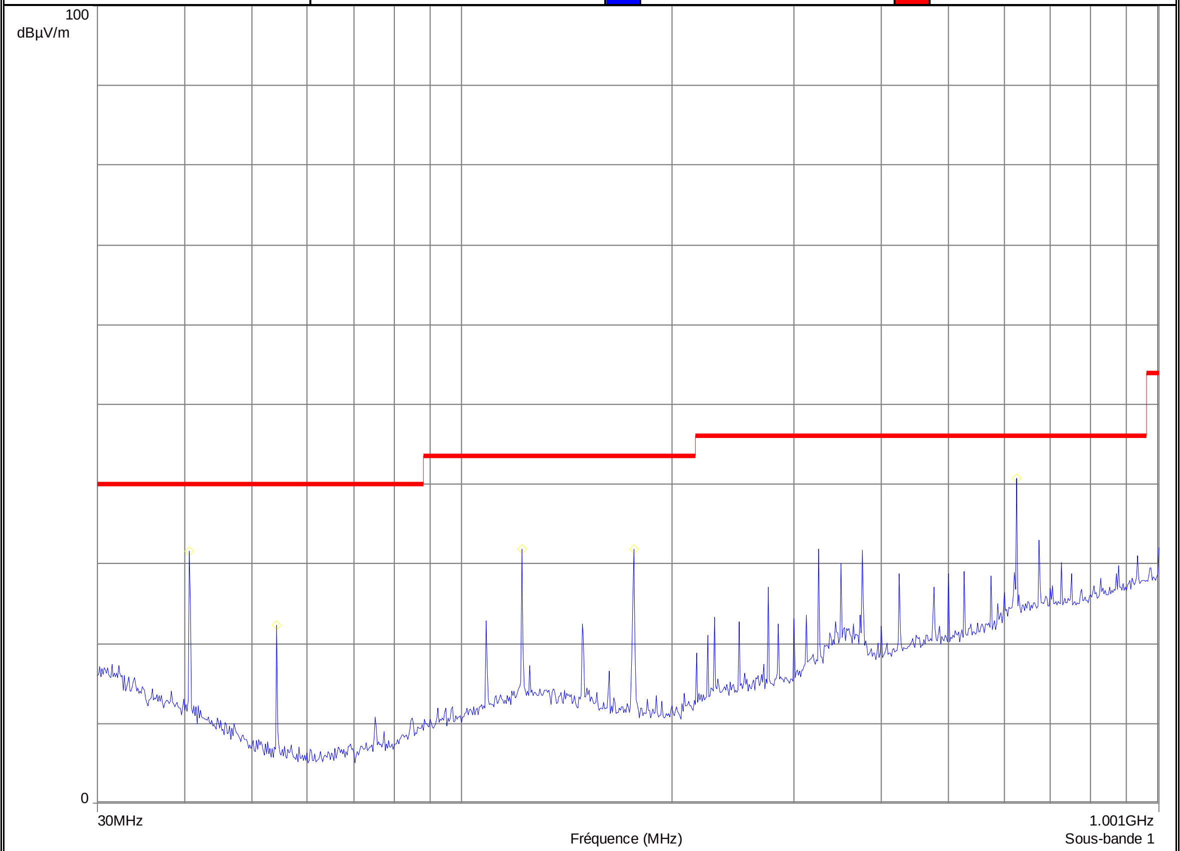
Frequency (MHz)	Peak (dBµV/m)
45.450	30.2
185.000	29.9
215.350	39.8
225.650	40.4
335.150	32.9
530.950	33.1

RADIATED EMISSION		Test configuration:1			
Graph name:	**Emr#3**				
Antenna position:	**Vertical**				
Azimuth:	**0°- 360°**				
RBW/VBW:	**120kHz / 300kHz**		**Peak Measure**		**QPeak Limit@3m**



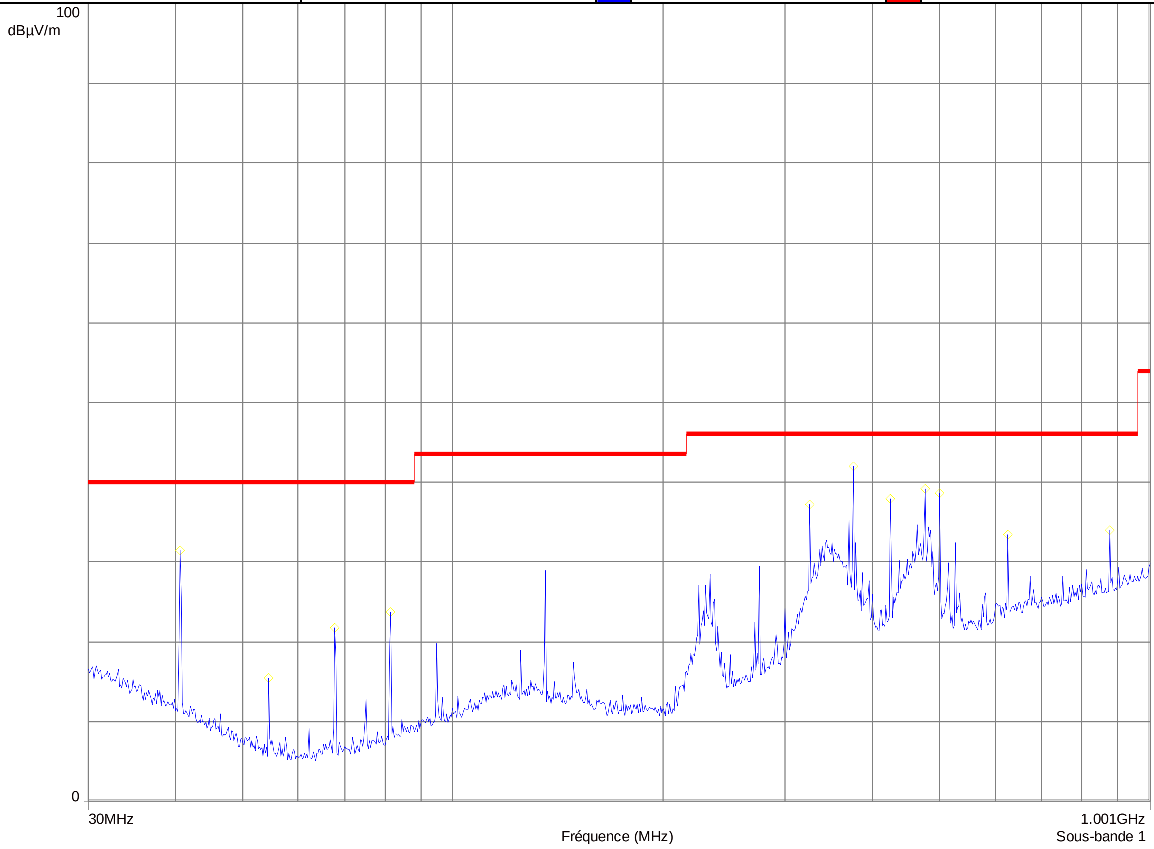
Frequency (MHz)	Peak (dBµV/m)
41.950	40.3
42.350	44.6
43.850	44.6
44.750	44.0
46.750	38.8
142.300	37.3
219.450	43.1
225.500	43.0
353.300	34.0
557.650	33.5
580.600	34.8

RADIATED EMISSION		Test configuration:2 Axis XY
Graph name:	**Emr#4**	
Antenna position:	**Horizontal**	
Azimuth:	**0°- 360°**	
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure** / **QPeak Limit@3m**



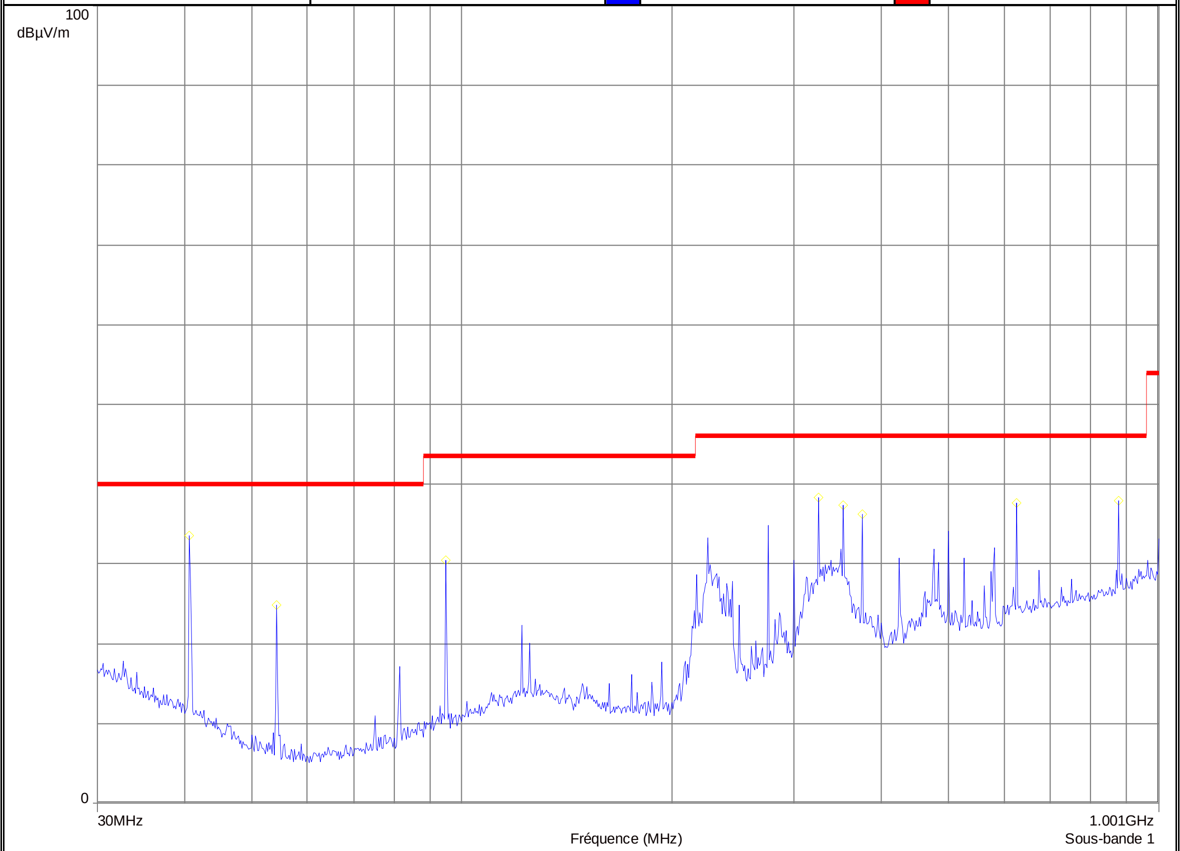
Frequency (MHz)	Peak (dBµV/m)
40.700	31.6
54.250	22.4
122.050	31.9
176.250	31.9
625.050	40.7

RADIATED EMISSION		Test configuration:2 Axis XY	
Graph name:	**Emr#5**		
Antenna position:	**Vertical**		
Azimuth:	**0°- 360°**		
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure**	**QPeak Limit@3m**



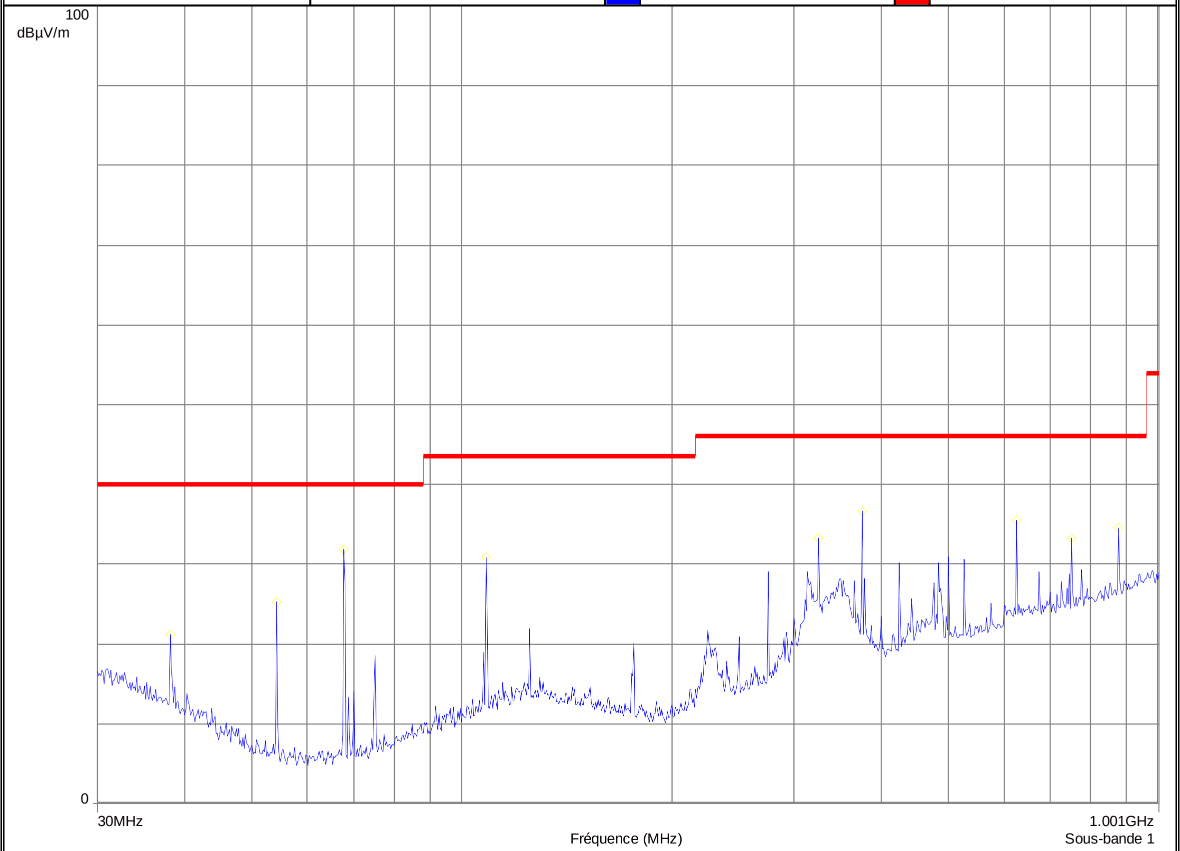
Frequency (MHz)	Peak (dBµV/m)
40.700	31.4
54.350	15.5
67.800	21.8
81.350	23.8
325.000	37.2
375.050	42.0
425.000	37.9
475.000	39.2
500.000	38.6
625.000	33.5
875.050	34.0

RADIATED EMISSION		Test configuration:2 Axis Z	
Graph name:	**Emr#6**		
Antenna position:	**Horizontal**		
Azimuth:	**0°- 360°**		
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure**	**QPeak Limit@3m**



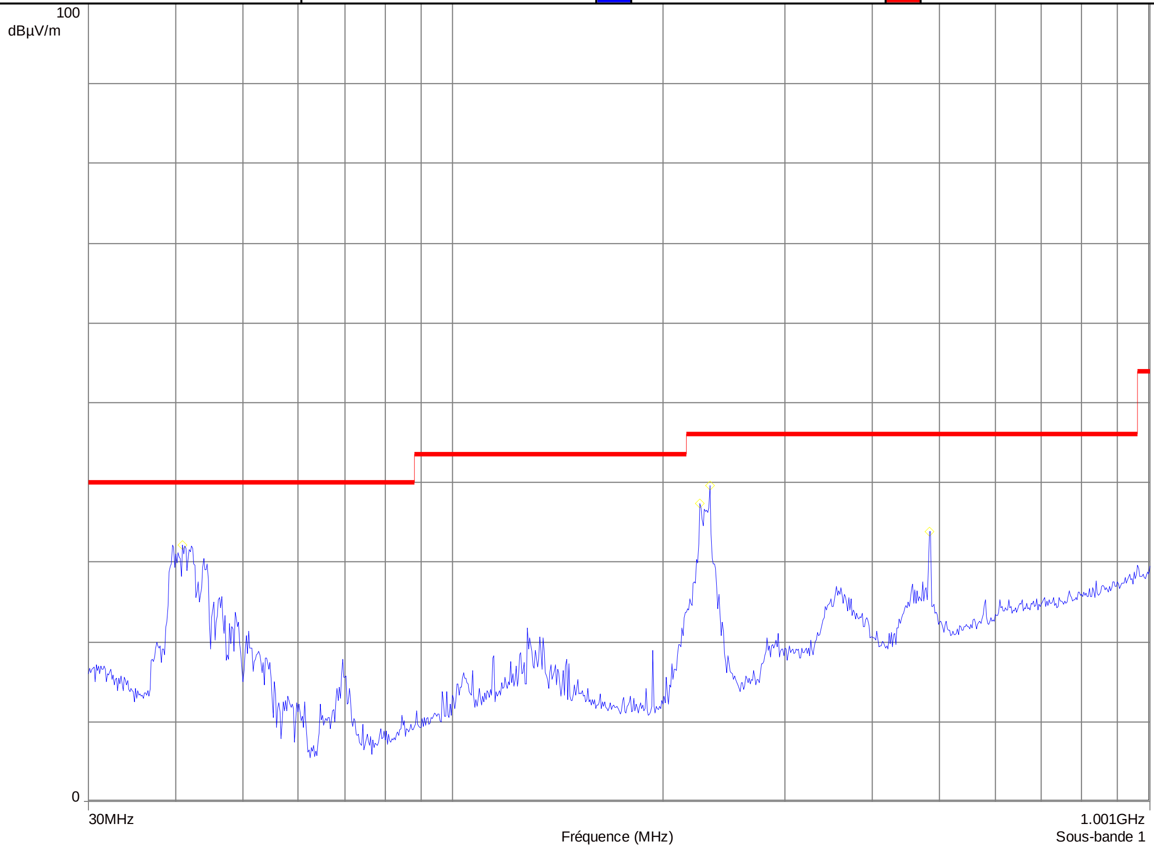
Frequency (MHz)	Peak (dBµV/m)
40.700	33.5
54.250	24.9
94.900	30.4
325.000	38.4
352.550	37.4
375.000	36.2
625.000	37.6
875.050	37.9

RADIATED EMISSION		Test configuration:2 Axis Z	
Graph name:	**Emr#7**		
Antenna position:	**Vertical**		
Azimuth:	**0°- 360°**		
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure**	**QPeak Limit@3m**



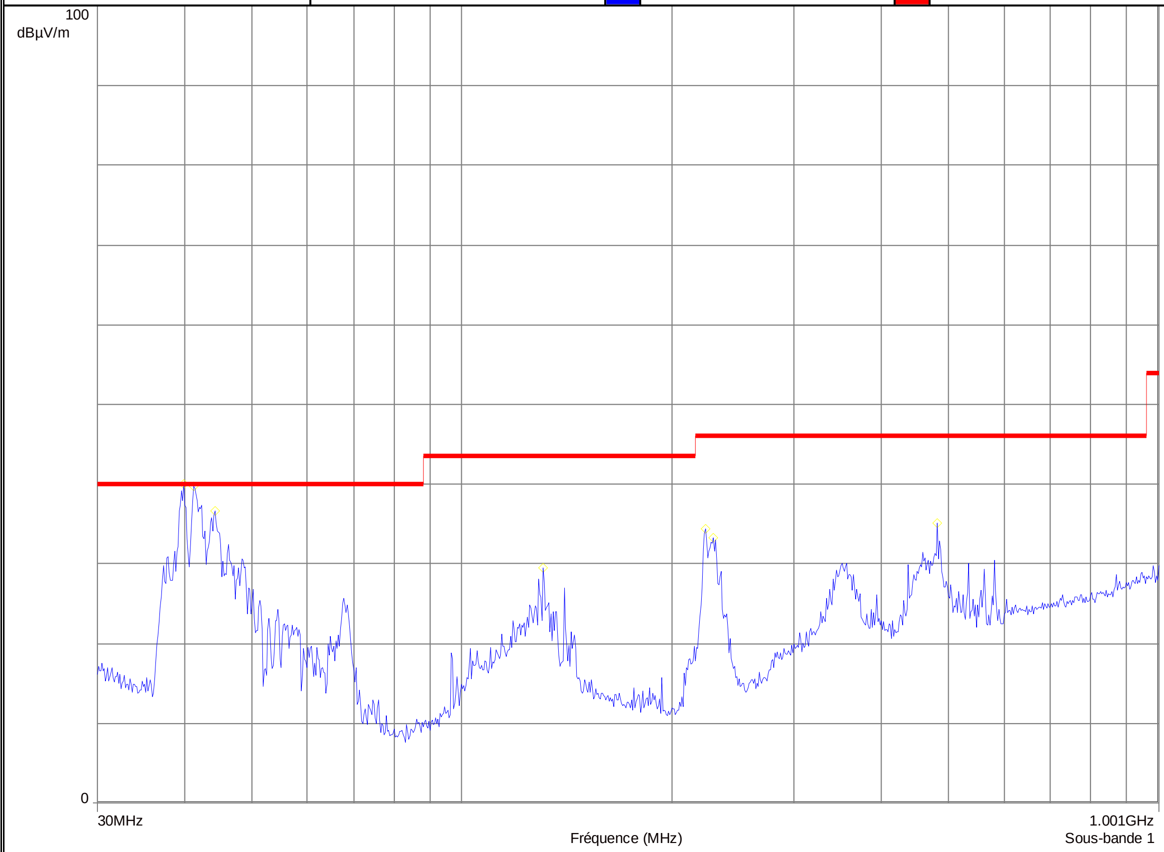
Frequency (MHz)	Peak (dBµV/m)
38.200	21.2
54.250	25.3
67.800	31.9
108.500	30.9
325.000	33.3
375.000	36.7
625.000	35.6
750.000	33.3
875.000	34.6

RADIATED EMISSION		Test configuration:3 Axis XY	
Graph name:	**Emr#8**		
Antenna position:	**Horizontal**		
Azimuth:	**0°- 360°**		
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure**	**QPeak Limit@3m**



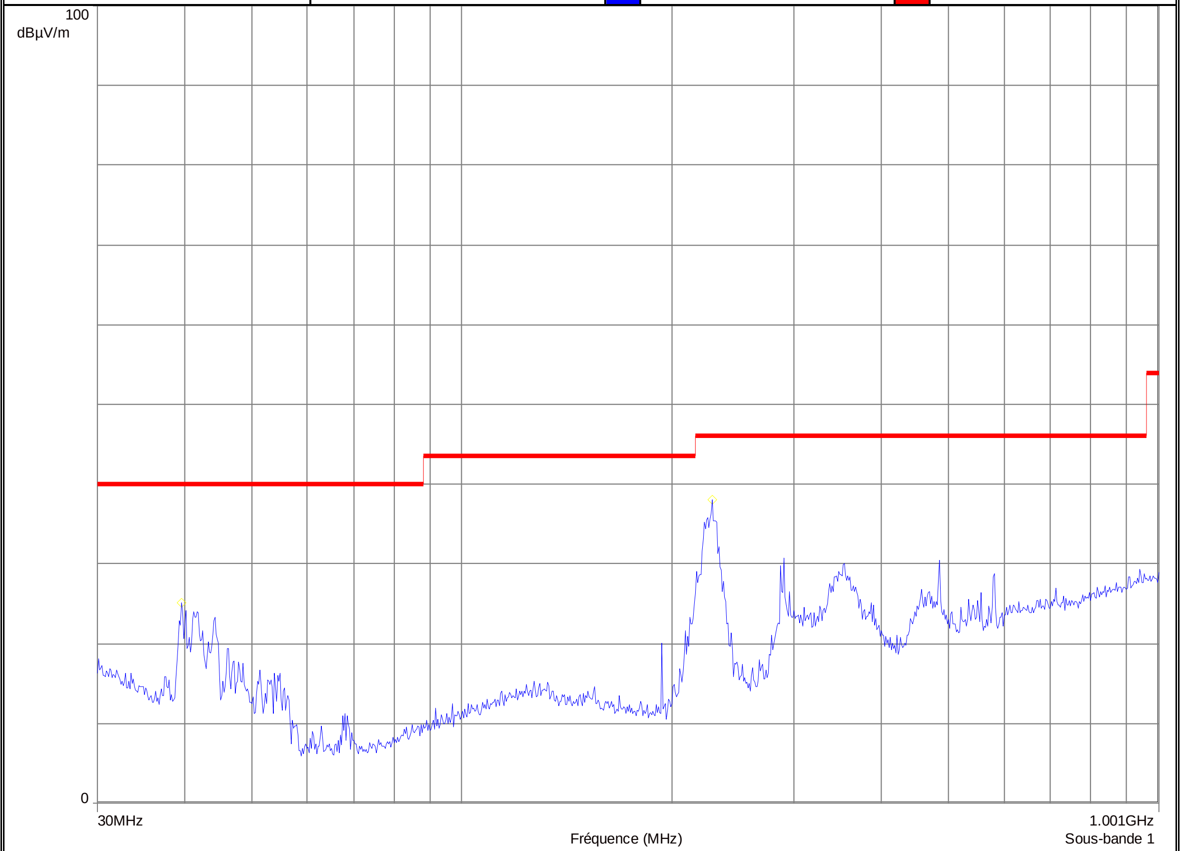
Frequency (MHz)	Peak (dBµV/m)
40.950	32.2
226.450	37.4
233.450	39.6
483.850	33.9

RADIATED EMISSION		**Test configuration:3**			
Graph name:	**Emr#9**	**Axis XY**			
Antenna position:	**Vertical**				
Azimuth:	**0°- 360°**				
RBW/VBW:	**120kHz / 300kHz**		**Peak Measure**		**QPeak Limit@3m**



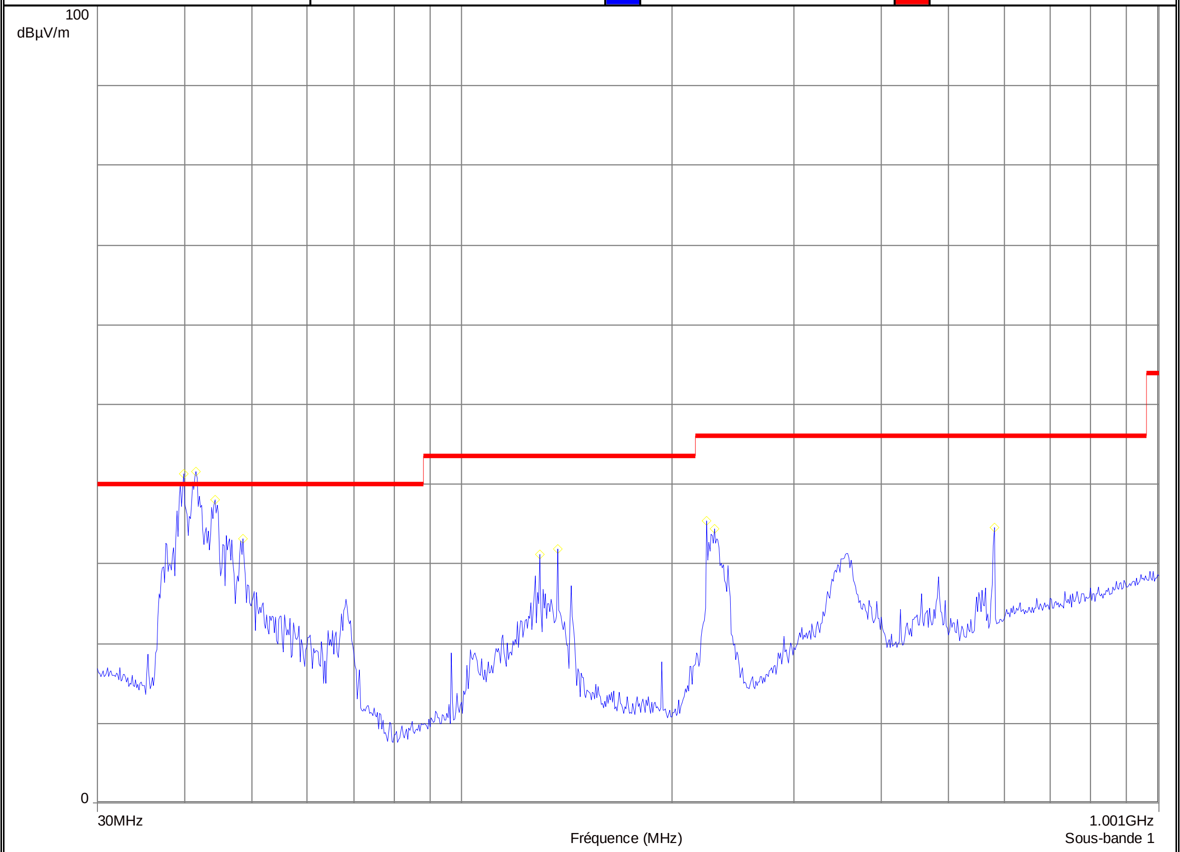
Frequency (MHz)	Peak (dBµV/m)
39.950	40.1
41.300	39.7
44.250	36.6
131.050	29.5
223.950	34.4
229.750	33.3
480.450	35.1

RADIATED EMISSION		**Test configuration:3**
Graph name:	**Emr#10**	**Axis Z**
Antenna position:	**Horizontal**	
Azimuth:	**0°- 360°**	
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure** / **QPeak Limit@3m**



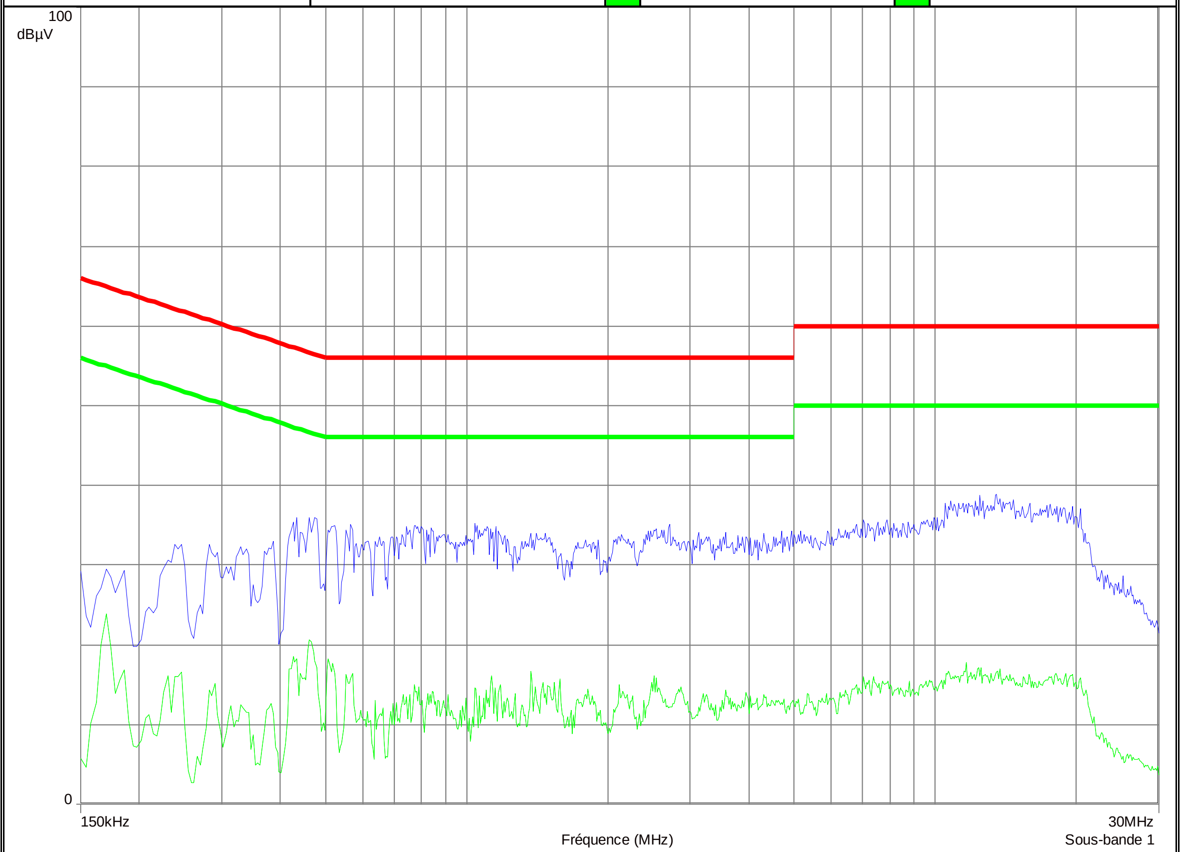
Frequency (MHz)	Peak (dBµV/m)
39.650	25.2
228.550	38.1

RADIATED EMISSION		**Test configuration:3**
Graph name:	**Emr#11**	**Axis Z**
Antenna position:	**Vertical**	
Azimuth:	**0°- 360°**	
RBW/VBW:	**120kHz / 300kHz**	**Peak Measure** / **QPeak Limit@3m**



Frequency (MHz)	Peak (dBµV/m)
39.850	41.4
41.600	41.6
44.200	38.1
48.550	33.1
129.550	31.3
137.150	31.9
224.600	35.4
230.850	34.4
580.800	34.6

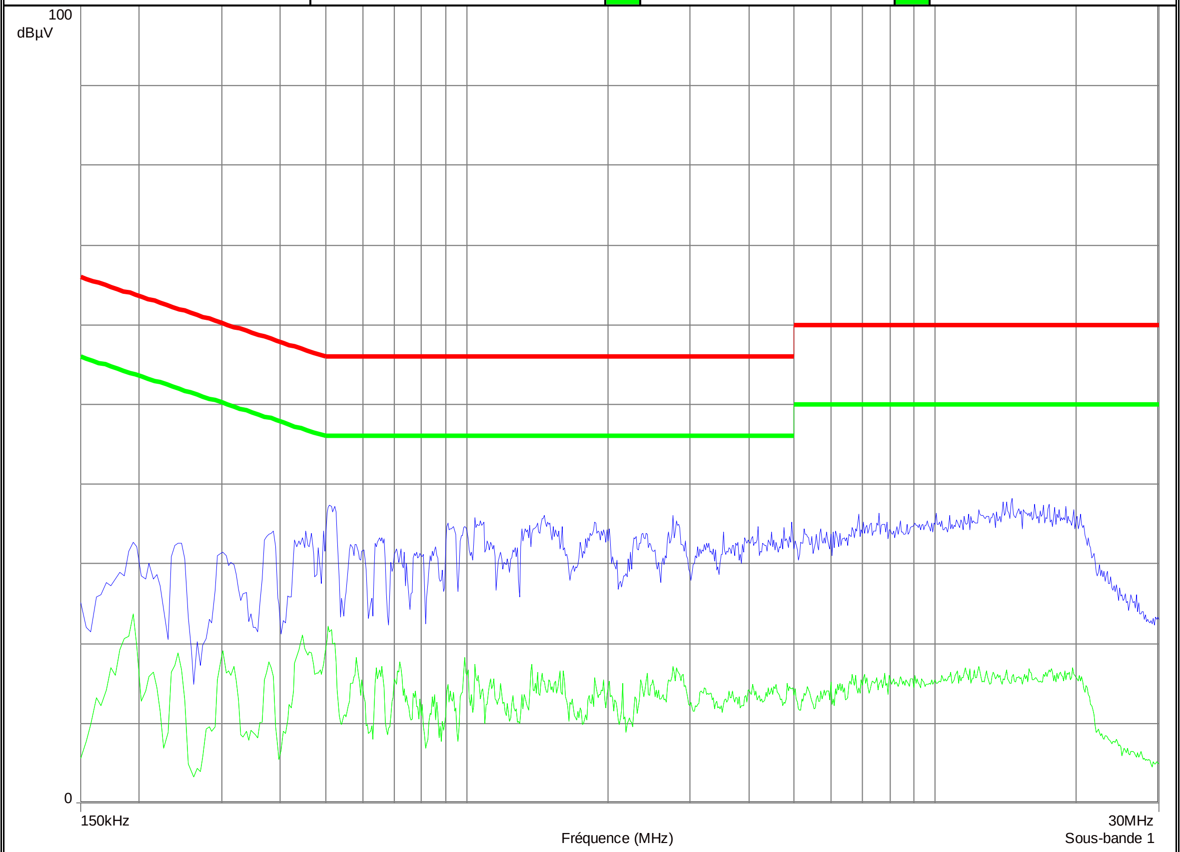
CONDUCTED EMISSIONS		**Test configuration: 1** With + IPOD Touch (Worst case)			
Graph name:	**Emc#1**				
Voltage / Frequency	**110V / 60Hz**				
Line/Port	**Phase 1**		**Peak Measure**		**QPeak Limit**
RBW / VBW :	**9kHz / 30kHz**		**Average Measure**		**Average Limit**



Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	Avg-LimAvg (dBµV)	QPeak (dBµV)	LimQPeak (dBµV)	QPeak-LimQPeak (dBµV)

No frequency observed

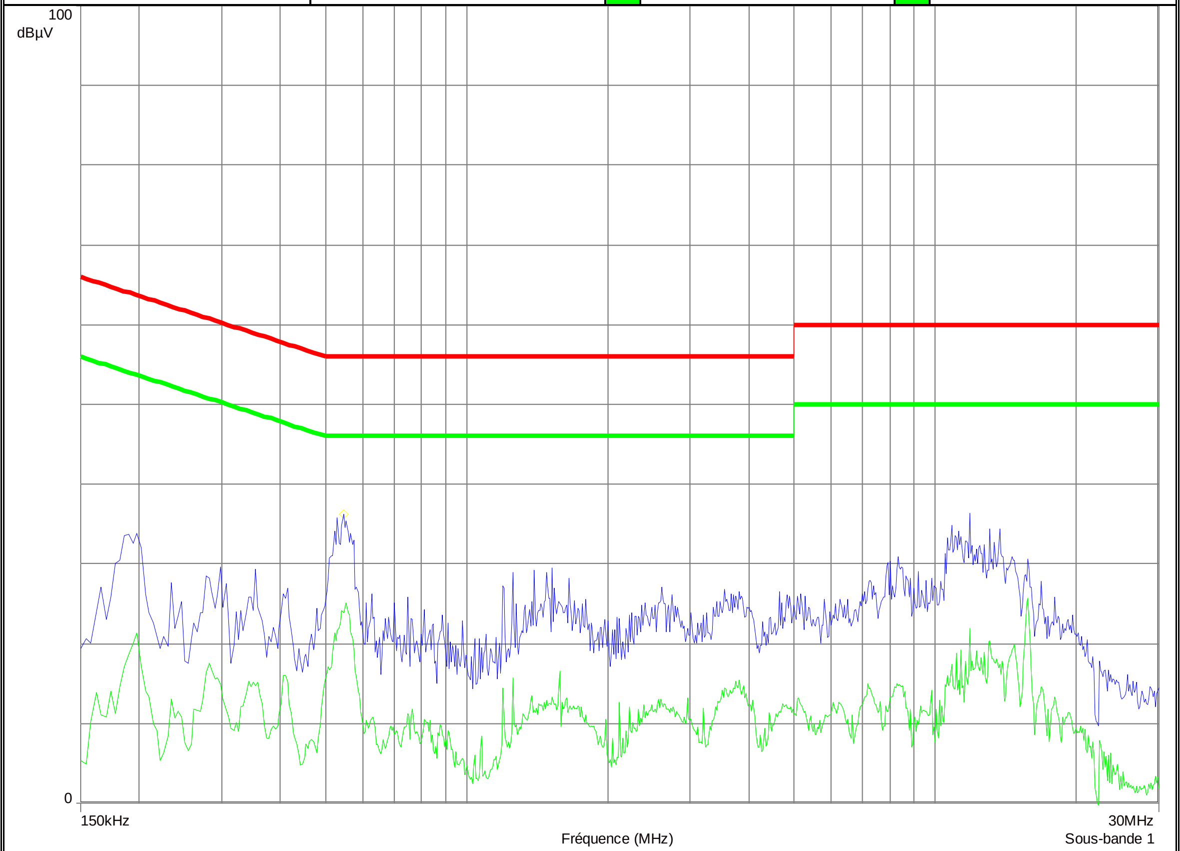
CONDUCTED EMISSIONS		**Test configuration: 1** With + IPOD Touch (Worst case)	
Graph name:	**Emc#2**		
Voltage / Frequency	**110V / 60Hz**		
Line/Port	**Neutral**	**Peak Measure**	**QPeak Limit**
RBW / VBW :	**9kHz / 30kHz**	**Average Measure**	**Average Limit**



Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	Avg-LimAvg (dBµV)	QPeak (dBµV)	LimQPeak (dBµV)	QPeak-LimQPeak (dBµV)

No frequency observed

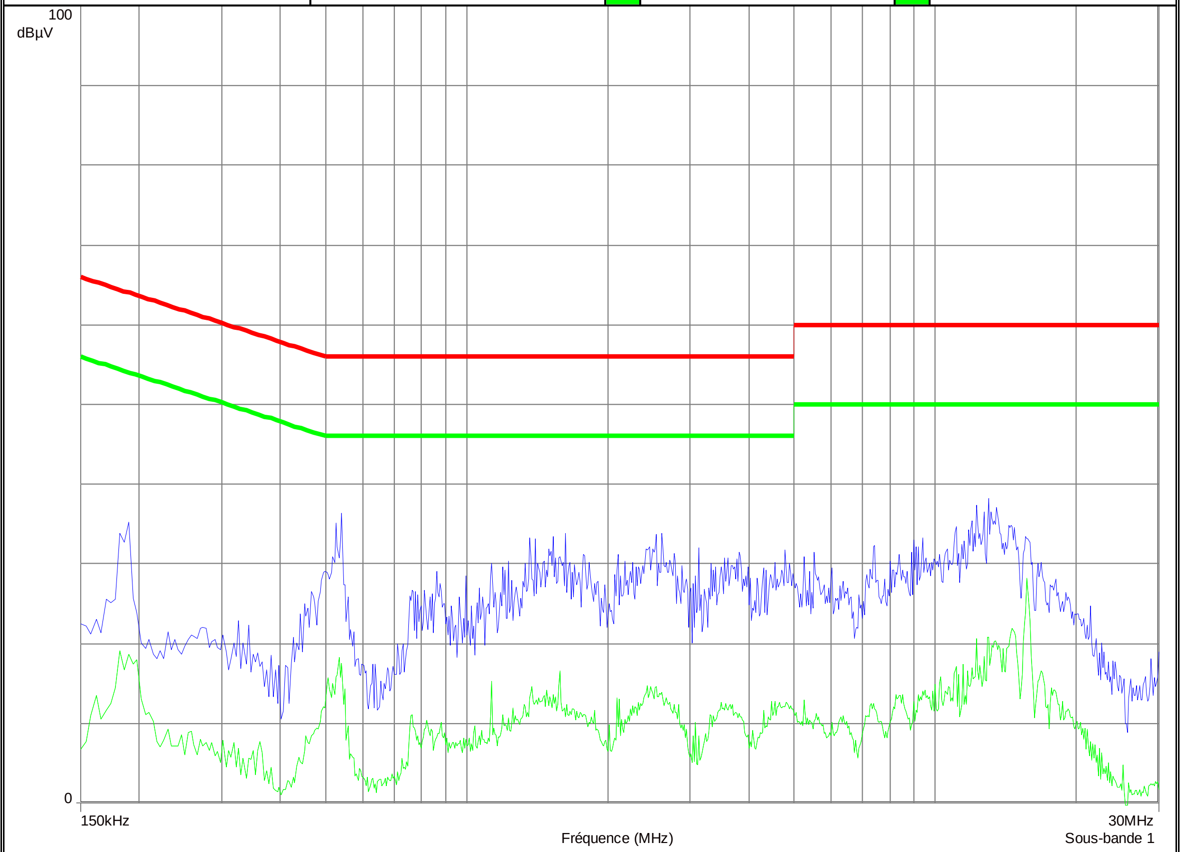
CONDUCTED EMISSIONS		**Test configuration:2** With IPOD Touch (Worst case)			
Graph name:	**Emc#3**				
Voltage / Frequency	**110V / 60Hz**				
Line/Port	**Phase 1**		**Peak Measure**		**QPeak Limit**
RBW / VBW :	**9kHz / 30kHz**		**Average Measure**		**Average Limit**



Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	Avg-LimAvg (dBµV)	QPeak (dBµV)	LimQPeak (dBµV)	QPeak-LimQPeak (dBµV)

No frequency observed

CONDUCTED EMISSIONS		**Test configuration:2** With IPOD Touch (Worst case)	
Graph name:	**Emc#4**		
Voltage / Frequency	**110V / 60Hz**		
Line/Port	**Neutral**	**Peak Measure**	**QPeak Limit**
RBW / VBW :	**9kHz / 30kHz**	**Average Measure**	**Average Limit**



Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	Avg-LimAvg (dBµV)	QPeak (dBµV)	LimQPeak (dBµV)	QPeak-LimQPeak (dBµV)

No frequency observed

8. TEST EQUIPMENT LIST

USED	N°LCIE	TYPE	COMPANY	REF	CAL DATE	CAL DUE
RADIATED EMISSION DATA						
X	C2040051	Antenna Bi-log	CHASE	CBL6111A	08/10	08/12
X	C2040052	Antenna Loop	ELECTRO-METRICS	EM-6879	12/10	12/11
X	C2042027	Antenna horn	EMCO	3115	10/10	10/11
X	A5329038	Cable N/N	-	-	04/11	04/12
X	A5329061	Cable	SUCOFLEX	106G	01/11	01/12
X	A5329188	Cable OATS (Mast at 10m)	UTIFLEX	-	05/10	05/11
X	A5329199	Cable OATS (Mast at 10m)	UTIFLEX	-	05/10	05/11
X	A5329207	Cable	UTIFLEX	-	02/11	02/12
X	D3044017	Semi-Anechoic chamber #3	SIEPEL	-	-	-
X	A3169050	Radiated emission comb generator	BARDET	-	-	-
X	F2000409	OATS	-	-	08/10	08/11
X	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	10/10	10/11
X	B4204052	Thermo-hygrometer	HUGER	-	04/10	04/12
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	-	-
FUNDAMENTAL FREQUENCY TOLERANCE						
x	C2040052	Antenna Loop	ELECTRO-METRICS	EM-6879	12/09	12/10
x	A5329352	Cable N/N	-	-	12/10	12/11
x	D1022117	Climatic chamber	BIA CLIMATIC	CL 6-25	02/11	02/13
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	10/10	10/11
BANDEDGE COMPLIANCE						
x	C2040052	Antenna Loop	ELECTRO-METRICS	EM-6879	12/09	12/10
x	A5329352	Cable N/N	-	-	12/10	12/11
x	D1022117	Climatic chamber	BIA CLIMATIC	CL 6-25	02/11	02/13
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	10/10	10/11
CONDUCTED EMISSION DATA						
x	A7122104	Attenuator 11dB DC-18GHz 1W	HEWLETT PACKARD	8494B	06/10	06/11
x	A5329352	Cable N/N	-	-	12/10	12/11
x	D3044010	Faraday Cage	RAY PROOF	-	01/11	01/12
x	A3169049	Conducted emission comb generator	BARDET	-	-	-
x	A2642019	Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	10/10	10/11

9. 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