



# Rapport d'essai / Test report

N° 539318-R2-E

JDE : 118533

**DELIVRE A / ISSUED TO** : **INGENICO**  
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**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 : **Lecteur sans contact / Contactless reader**
- Marque / Trade mark : **INGENICO**
- Constructeur / Manufacturer : **INGENICO**
- Type / Model : **IUC180-11T2305 / IUC180-11T2306 / IUC180-11T2307**
- Type sous test / Model under test : **IUC180-11T2307**
- N° de série / serial number : **12365UN09990003 and 12365UN09990005**
- FCC ID : **XKB-IUC18X-WD**
- IC : **2586D-IUC18XWD**

**Date des essais / Test date** : Du 10 au 21 Janvier 2013 / *From January 10<sup>th</sup> to 21<sup>st</sup>, 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

**Ce document comporte / Composition of document** : 23 pages.

MOIRANS, LE 20 FEVRIER 2013 / FEBRUARY 20TH, 2013

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**1. TEST PROGRAM**

- Standard:**
- FCC Part 15, Subpart B (Digital Devices)
  - FCC Part 15, Subpart C
  - ANSI C63.4 (2003)
  - RSS-Gen Issue 3 – Dec 2010
  - RSS-210 Issue 8 – 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 §15.225 RSS-Gen §4.9	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* CFR 47 §15.209 (a) CFR 47 §15.225 RSS-Gen §4.9	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 limit CFR 47 §15.225 RSS-210 §A2.6	Operation within the band 13.110-14.010 MHz			Not Performed See test report 221171-A1-R2-E
Fundamental frequency tolerance CFR 47 §15.225 RSS-210 §A2.6	Operation within the band 13.110-14.010 MHz			Not Performed See test report 221171-A1-R2-E
Band edge compliance CFR 47 §15.225 RSS-210 §A2.6	Operation within the band 13.110-14.010 MHz			Not Performed See test report 221171-A1-R2-E
Occupied bandwidth RSS-Gen §4.6.1	No limit			Not Performed See test report 221171-A1-R2-E
Receiver Spurious Emission** RSS-Gen §4.10	See RSS-Gen §4.10			Not Applicable

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

- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must be only performed until 1GHz.
- If the highest frequency of the internal sources of the testing device ranges between 108 MHz and 500 MHz, measurement must be only performed until 2GHz.
- If the highest frequency of the internal sources of the testing device ranges between 500 MHz and 1 GHz, measurement must be only performed until 5GHz.

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

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



## 2. SYSTEM TEST CONFIGURATION

### 2.1. JUSTIFICATION

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

The equipment IUC180 can be used with several internal option cards:

- COM2 + MDB Configuration n°2 – IUC180-00T1990
- COM2 + MDB + GPRS modular approval Configuration n°3 – IUC180-00T1989

The Equipment Under Test will be the configuration n°3 to represent others configurations (Worst case)  
IUC180 has to be integrated in unattended devices. The test configuration is given by the manufacturer

***New version from precedent equipment tested, RF part not changed, only partial tests performed.***

### 2.2. HARDWARE IDENTIFICATION

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

**IUC180-11T2307**

Serial number: 12365UN09990003 **and** 12365UN09990005

- Internal max frequencies <500MHz (Declaration of provider)

- **Power supply:**

- DC voltage, 10-45VDC, tested at 12VDC (worst case)

During all the tests, EUT is supplied by an AC/DC adaptor, not supplied with EUT so not tested, PHIHONG PSM36W-120TW, 100-240VAC / 1.5A / 50-60Hz, output 12VDC / 3A.

- **Input/output:**

- 1 x Power supply connector, 2 wires
- 5 x USB
- 1 x LAN
- 2 x COM
- 1 x Earth
- 1 x Jack "Clock"
- 1 x MDB master
- 1 x MDB slave, same connector that power supply
- 2 x SMA connector, GPRS and Bluetooth
- 2 x SAM
- 1 x SIM
- 1 x MicroSD

- **Modular Approval contained:**

- 1 x GPRS module, SAGEMCOM, HILO V2 INGENICO, FCC ID: VW3HILOV2

- **Antennas:**

- 1 x GPRS antenna, GC300M-011-2500, highest gain, only one tested.



• **Auxiliaries used for testing:**

- 1 x Laptop TOSHIBA SATELLITE, PS141E-04YC, Sn: 13594938G
- 2 x SAM
- 1 x SIM
- 1 x Contactless card

• **I/O cables used for testing:**

- 1 x AC power cord, 2 wires, unshielded: 2m
- 1 x DC power supply cable (fixed on mains power unit), unshielded: 1.75m
- 1 x Ethernet cable Type: STP Cat 5e, shielded: 1m
- 5 x USB cables, shielded: 1m
- 2 x RS232 Com cables, RJ11, unshielded, 1.5m (COM 0 & COM 2)
- 1 x MDB-slave '6 pins' <-> MDB-master '8 pins' cable, unshielded, 4 wires, length: 1m
- 1 x Jack cable, unshielded, length: 0.2cm

• **Equipment information – 13.56MHz:**

- |                        |   |  |
|------------------------|---|--|
| - Type:                | <input type="checkbox"/> Bluetooth                                    | <input checked="" type="checkbox"/> Other: 13.56MHz RFID |
| - Frequency band:      | [13.56] MHz   |  |
| - Number of channel:   | 1   |  |
| - RF mode:             | <input checked="" type="checkbox"/> TX/RX <input type="checkbox"/> RX | <input type="checkbox"/> Standby                         |
| - Antenna type:        | Internal  |  |
| - Antenna connector:   | <input type="checkbox"/> Permanent external                           | <input checked="" type="checkbox"/> Permanent internal   |
|                        | <input type="checkbox"/> None   | <input type="checkbox"/> Temporary (only for tests)      |
| - Normal power source: | 12VDC (host)  |  |

### 2.3. EUT CONFIGURATION

**For all tests:**

A generic program test is loaded on EUT, in order to perform in loop following functions:

- Reading / writing SAM card (SAM1 & SAM2)
- Reading / writing  $\mu$ SD card (MMC)
- RX/TX on Serial port (COM0 & COM2)
- RX/TX between MDB master and slave
- Reading Contactless card

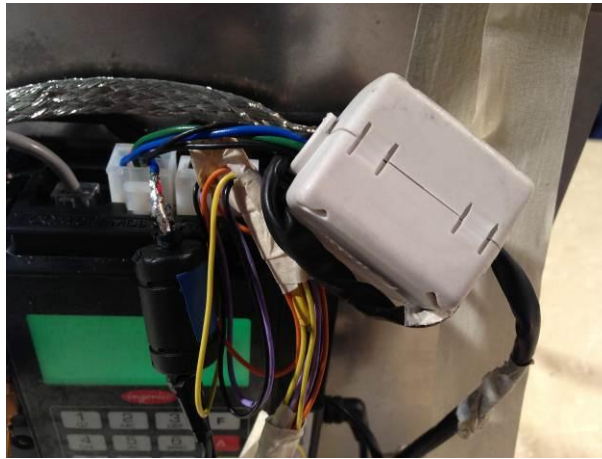
With laptop:

- Continuous Ethernet communication is performed from EUT to Laptop (Ping)

#### 2.4. EQUIPMENT MODIFICATIONS

A ferrite (integrated secondary power supply PHIHONG PSM36W-120TW) is set on two wires which provided 12VDC (MDB slave connector side).

A ferrite type WE 74271222(Two turns) is set on others MDB slave wires



### 3. RADIATED EMISSION DATA

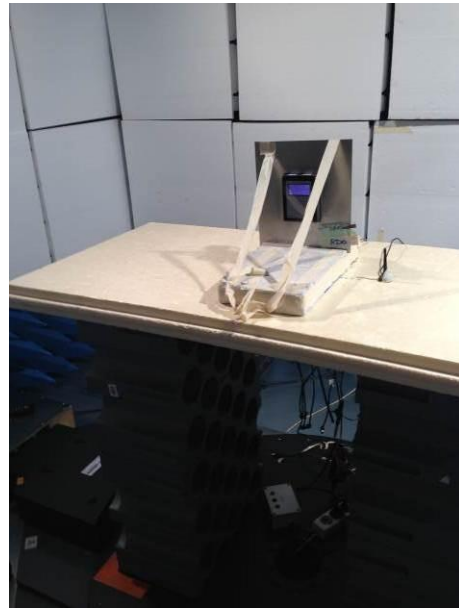
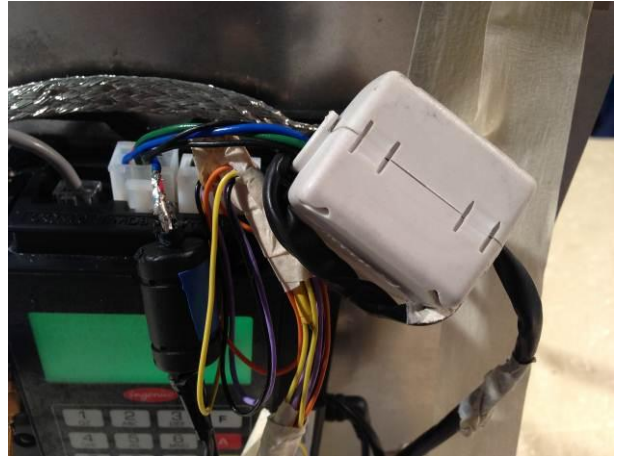
#### 3.1. CLIMATIC CONDITIONS

Date of test : January 21<sup>st</sup>, 2013  
Test performed by : A.MERLIN  
Atmospheric pressure : 993hPa  
Relative humidity : 36%  
Ambient temperature : 21°C

#### 3.1. 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





**3.2. TEST EQUIPMENT LIST**

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna Bi-log	CHASE	CBL6111A	C2040051
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Antenna Bi-log	CHASE	CBL6111A	C2040172
Antenna horn	EMCO	3115	C2042027
Cable N/N	-	-	A5329038
Cable	SUCOFLEX	106G	A5329061
Cable	-	-	A5329183
Cable OATS (Mast at 10m)	UTIFLEX	-	A5329188
Cable	UTIFLEX	-	A5329189
Cable	-	-	A5329191
Cable OATS (Mast at 10m)	UTIFLEX	-	A5329199
Semi-Anechoic chamber #1	SIEPEL	-	D3044016
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Radiated emission comb generator	BARDET	-	A3169050
OATS	-	-	F2000409
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Receiver 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020
Thermo-hygrometer	OREGON	BAR206	B4204078
Antenna mast (OATS)	LCIE	-	F2000288
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372
Turntable controller (Cage#2-3)	ETS Lingren	Model 2066	F2000393
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403
Turntable chamber (Cage#2)	ETS Lingren	Model 2165	F2000404
Turntable chamber (Cage#1)	MATURO Gmbh	TT 2.0 SI	F2000406
Antenna mast (Cage#1)	MATURO Gmbh	AM 4.0	F2000407
Turntable controller (Cage#1)	MATURO Gmbh	Control Unit	F2000408
Table	LCIE	-	F2000438

**3.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION**

None



**3.4. TEST SEQUENCE AND RESULTS**

**3.4.1. 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:**

**Emr#1** (See annex 1)

**3.4.2. 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 26GHz, a search is performed in the semi-anechoic chamber in order to determine frequencies radiated by the EUT (Measuring distance reduced to 1m and 20cm for frequencies from 12GHz to 26GHz).

**See graphs for 30MHz-1GHz:**

H polarization	<i>All functions without RF</i>	<b>Emr#2</b>	(See annex 1)
V polarization	<i>All functions without RF</i>	<b>Emr#3</b>	(See annex 1)
H polarization	<i>RFID + GPRS (worst case)</i>	<b>Emr#4</b>	(See annex 1)
V polarization	<i>RFID + GPRS (worst case)</i>	<b>Emr#5</b>	(See annex 1)

**3.4.3. 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 and FCC part 15 subpart C §15.225 limits in the frequency range 13.553MHz 13.567MHz. 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)
13.56 <sup>*1</sup>	84.0	30.3	-53.7	270	0	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 corresponding of this test report for band edge measurements.



**3.4.4. 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:**

**All configurations:**

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	30.543	40.0	33.4	-6.6	330	V	100	21.0	
2	40.679	40.0	38.7	-1.3	90	V	100	15.1	
3	45.568	40.0	33.9	-6.1	350	V	100	12.6	
4	45.568	40.0	34.2	-5.8	350	V	100	12.6	
5	47.459	40.0	34.8	-5.2	110	V	100	11.8	
6	47.798	40.0	38.4	-1.6	345	V	100	11.6	
7	54.239	40.0	29.8	-10.2	90	V	100	9.2	
8	67.799	40.0	33.0	-7.0	140	V	100	8.5	
9	143.331	43.5	33.4	-10.1	45	V	100	14.6	
10	193.528	43.5	39.1	-4.4	340	V	100	11.8	
11	217.719	46.0	38.2	-7.8	190	V	130	12.3	
12	224.998	46.0	35.7	-10.3	255	V	100	12.7	
13	249.988	46.0	34.8	-11.2	55	H	400	15.1	
14	249.988	46.0	36.2	-9.8	70	V	210	15.1	
15	324.997	46.0	30.7	-15.3	290	V	310	16.8	
16	338.674	46.0	36.5	-9.5	135	H	220	17.3	
17	624.994	46.0	43.7	-2.3	200	V	200	24.1	
18	999.999	54.0	44.3	-9.7	300	H	320	29.7	

\*: 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)

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**



### 3.5. 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 52.5dB $\mu$ 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 $\mu$ V/m.

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

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

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



## 4. CONDUCTED EMISSION DATA

### 4.1. CLIMATIC CONDITIONS

Date of test : January 16<sup>th</sup>, 2013  
Test performed by : Majid MOURZAGH  
Atmospheric pressure : 984hPa  
Relative humidity : 24%  
Ambient temperature : 22°C

### 4.2. 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.

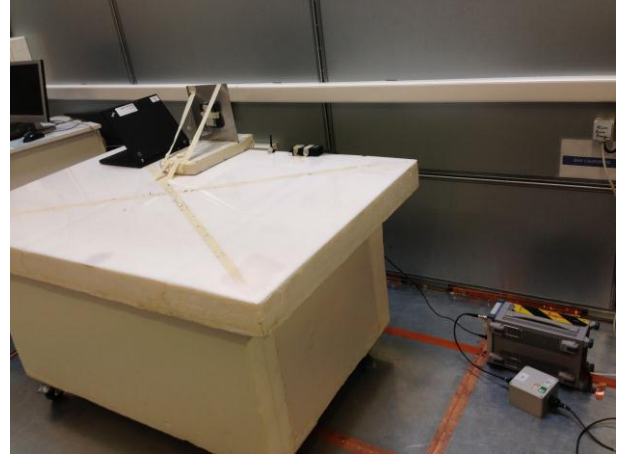
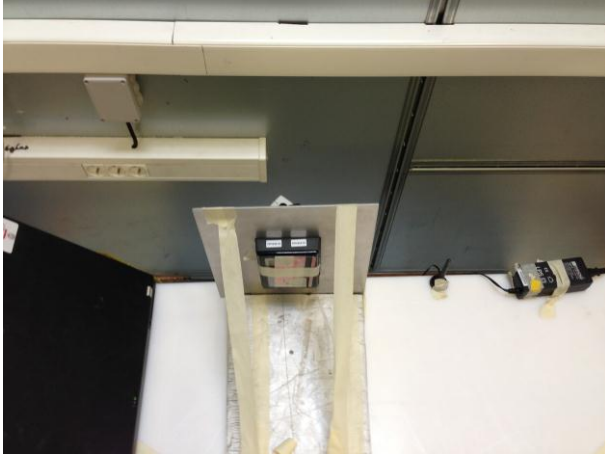
Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

### 4.3. 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).



Conducted emission test setup

**4.4. TEST EQUIPMENT LIST**

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Cable	-	-	A5329578
Conducted emission comb generator	BARDET	-	A3169049
LISN	RHODE & SCHWARZ	ENV216	C2320123
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Thermo-hygrometer	OREGON	BAR916HG-G	B4206011
Transient limiter	RHODE & SCHWARZ	ESH3-Z2	A7122204

**4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION**

None

**4.6. 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.

Measure on L1:	graph Emc#1	<i>All functions, worst cases presented</i>	(see annex 1)
Measure on N:	graph Emc#2	<i>All functions, worst cases presented</i>	(see annex 1)

**RESULT: PASS**



L C I E

**5. ANNEX 1 (GRAPHS)**

**RADIATED EMISSIONS**

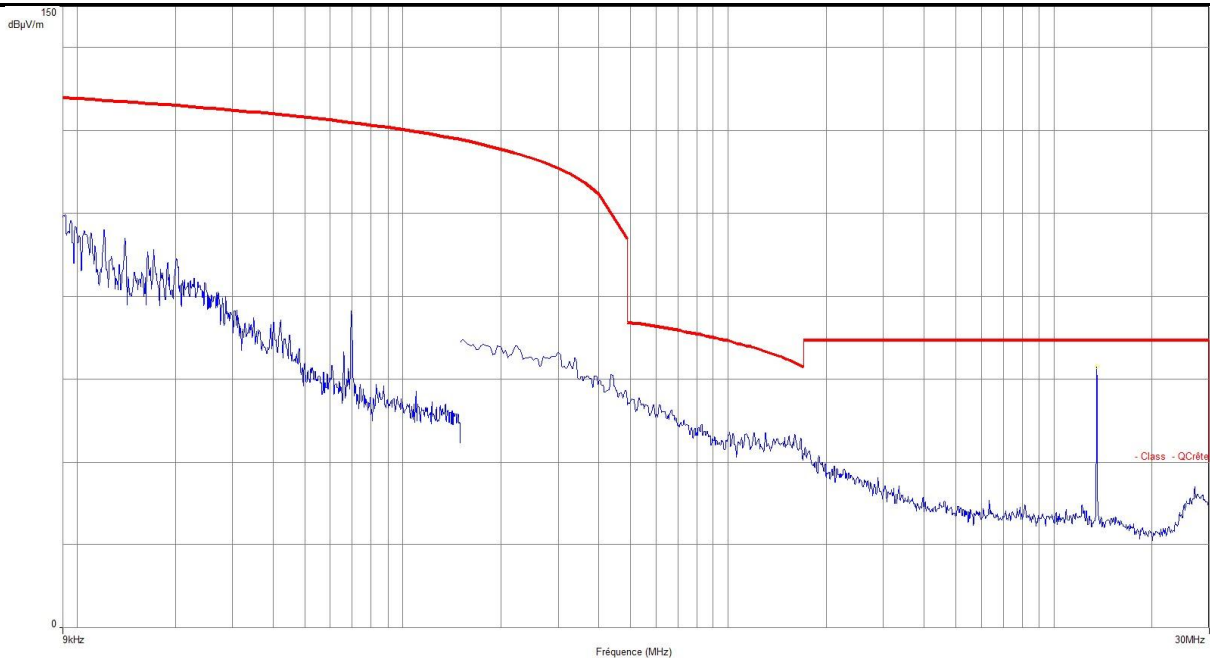
<b>Graph name :</b>	Emr#1	<b>Test configuration:</b>
<b>Limit :</b>	FCC Part15C	All functions
<b>Class :</b>	B	

**PARAMETERS**

<b>Antenna polarization:</b>	0° (worst case)	<b>Legend:</b>
<b>Azimuth :</b>	0° - 360°	<span style="background-color: blue; color: white;">█</span> Peak Measure
<b>RBW :</b>	100Hz	<span style="background-color: red; color: white;">█</span> QPeak Limit@3m
<b>VBW :</b>	300Hz	
<b>Frequency :</b>	9kHz- 150kHz	

**PARAMETERS**

<b>Antenna polarization:</b>	0° (worst case)	<b>Legend:</b>
<b>Azimuth :</b>	0° - 360°	<span style="background-color: blue; color: white;">█</span> Peak Measure
<b>RBW :</b>	10kHz	<span style="background-color: red; color: white;">█</span> QPeak Limit@3m
<b>VBW :</b>	30kHz	
<b>Frequency :</b>	150kHz- 30MHz	



Frequency (MHz)	Peak (dBµV/m)
13.561605*	63.18

\*Carrier frequency





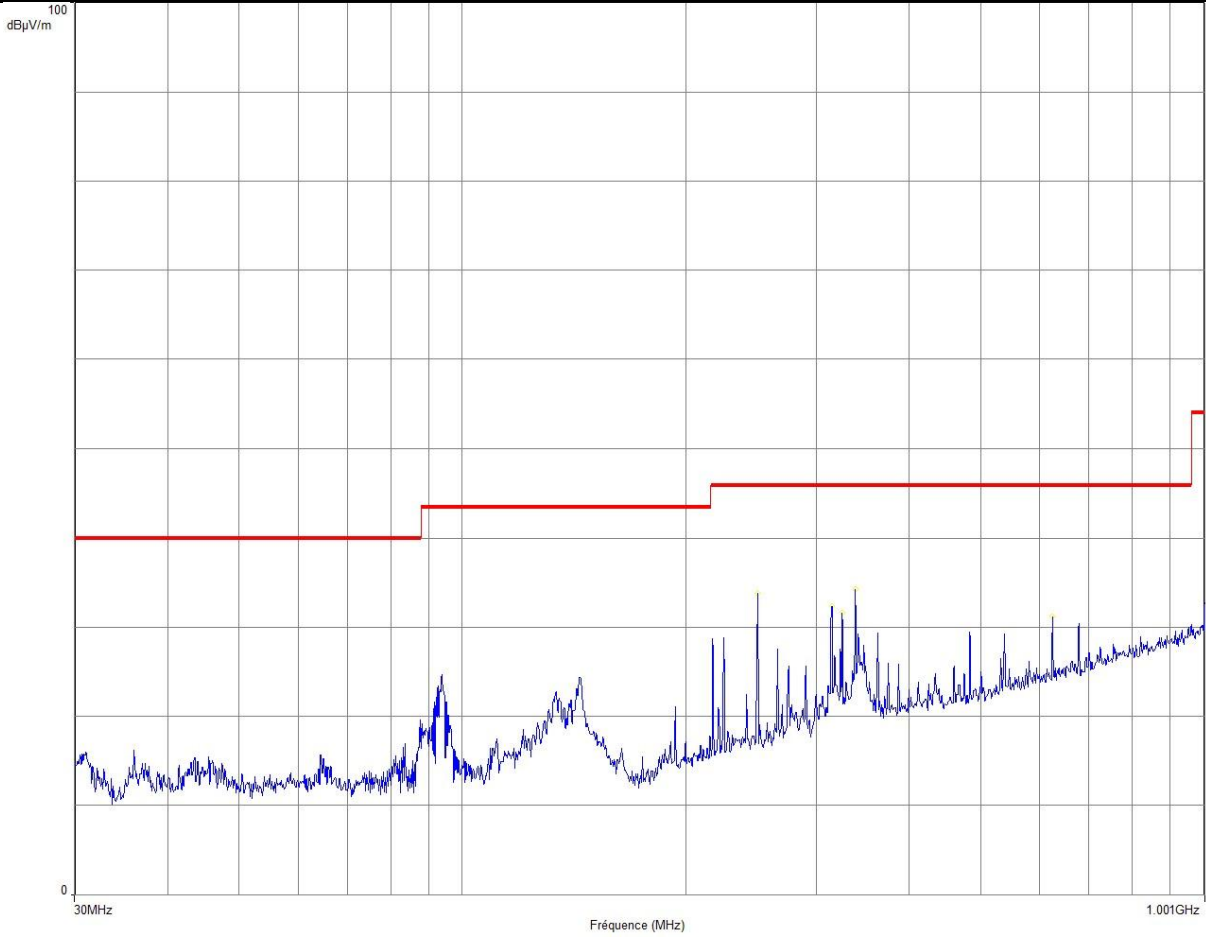
L C I E

**RADIATED EMISSIONS**

<b>Graph name :</b>	Emr#2	<b>Test configuration:</b>
<b>Limit :</b>	FCC Part15B	All functions without RF
<b>Class :</b>	B	

**PARAMETERS**

<b>Antenna polarization:</b>	Horizontale	<b>Legend:</b>
<b>Azimuth :</b>	0° - 360°	<span style="background-color: blue; color: white;">█</span> Peak Measure
<b>RBW :</b>	100kHz	<span style="background-color: red; color: white;">█</span> QPeak Limit@3m
<b>VBW :</b>	300kHz	
<b>Frequency :</b>	30MHz- 1.001GHz	



Frequency (MHz)	Peak (dBµV/m)
249.88	33.82
314.48	32.35
324.88	31.61
338.6	34.35
624.96	31.21



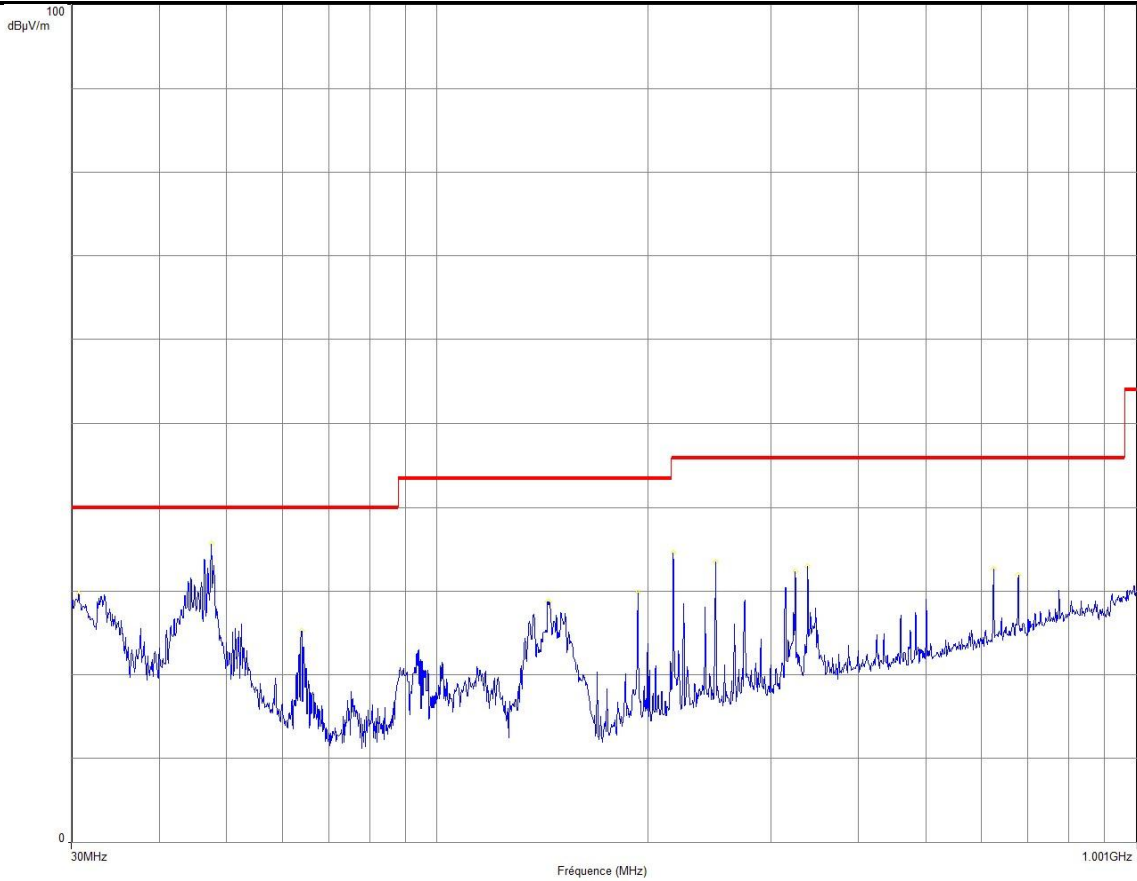
L C I E

**RADIATED EMISSIONS**

<b>Graph name :</b>	Emr#3	<b>Test configuration:</b>
<b>Limit :</b>	FCC Part15B	All functions without RF
<b>Class :</b>	B	

**PARAMETERS**

<b>Antenna polarization:</b>	Verticale	<b>Legend:</b>
<b>Azimuth :</b>	0° - 360°	<span style="display:inline-block; width:15px; height:15px; background-color:blue; border:1px solid black;"></span> Peak Measure
<b>RBW :</b>	100kHz	<span style="display:inline-block; width:15px; height:15px; background-color:red; border:1px solid black;"></span> QPeak Limit@3m
<b>VBW :</b>	300kHz	
<b>Frequency :</b>	30MHz- 1.001GHz	



Frequency (MHz)	Peak (dBµV/m)
30.72	29.8
47.52	35.61
63.92	25.29
143.76	28.75
144.76	28.77
193.52	29.85
217.64	34.62
249.92	33.53
324.96	32.31
338.6	32.95
624.96	32.61
677.32	31.95



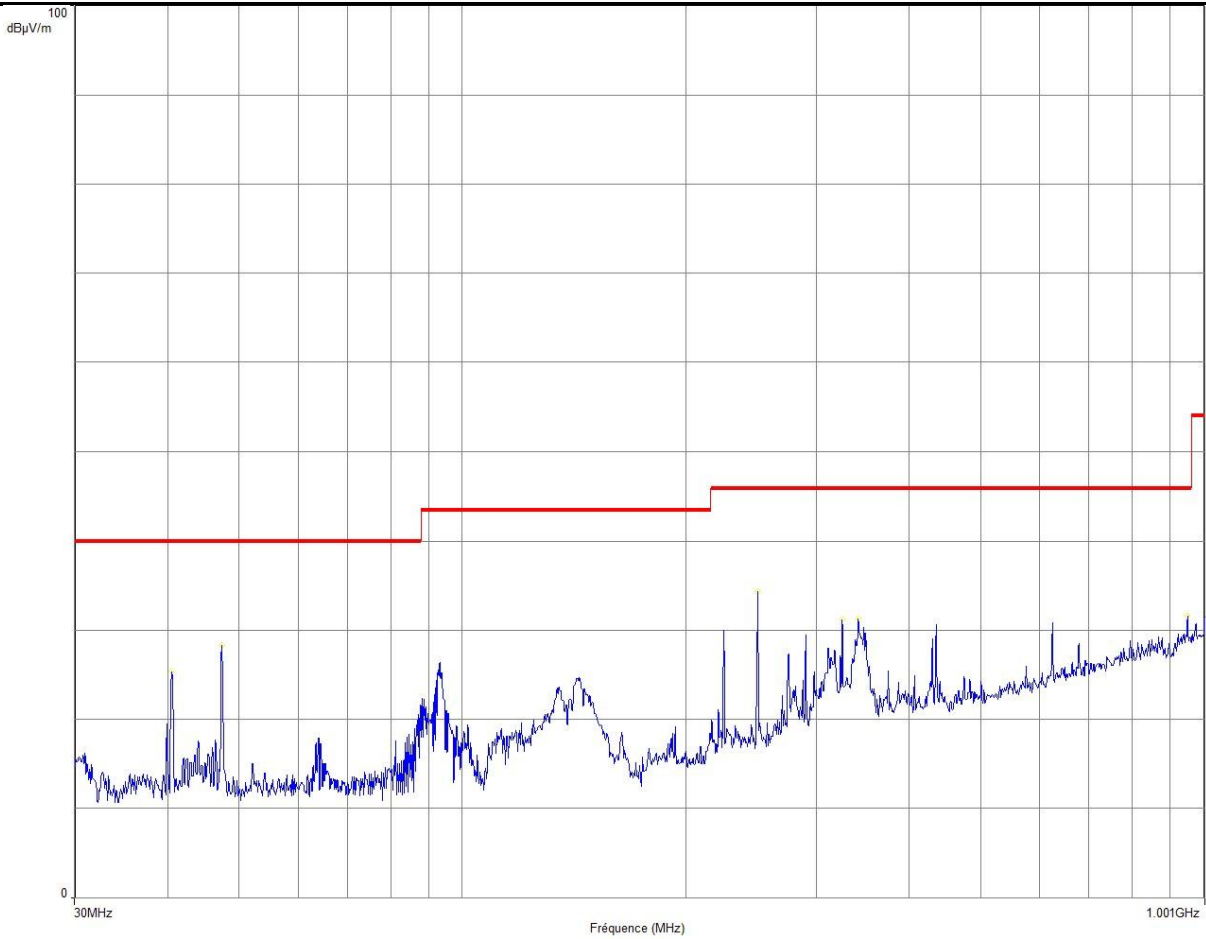
**L C I E**

**RADIATED EMISSIONS**

<b>Graph name :</b>	Emr#4	<b>Test configuration:</b>
<b>Limit :</b>	FCC Part15C	RFID
<b>Class :</b>	B	

**PARAMETERS**

<b>Antenna polarization:</b>	Horizontale	<b>Legend:</b>
<b>Azimuth :</b>	0° - 360°	<span style="background-color: blue; color: white;">█</span> Peak Measure
<b>RBW :</b>	100kHz	<span style="background-color: red; color: white;">█</span> QPeak Limit@3m
<b>VBW :</b>	300kHz	
<b>Frequency :</b>	30MHz- 1.001GHz	



Frequency (MHz)	Peak (dBµV/m)
40.52	25.42
47.36	28.31
249.92	34.33
324.88	31.21
341.4	31.34
949.2	31.62



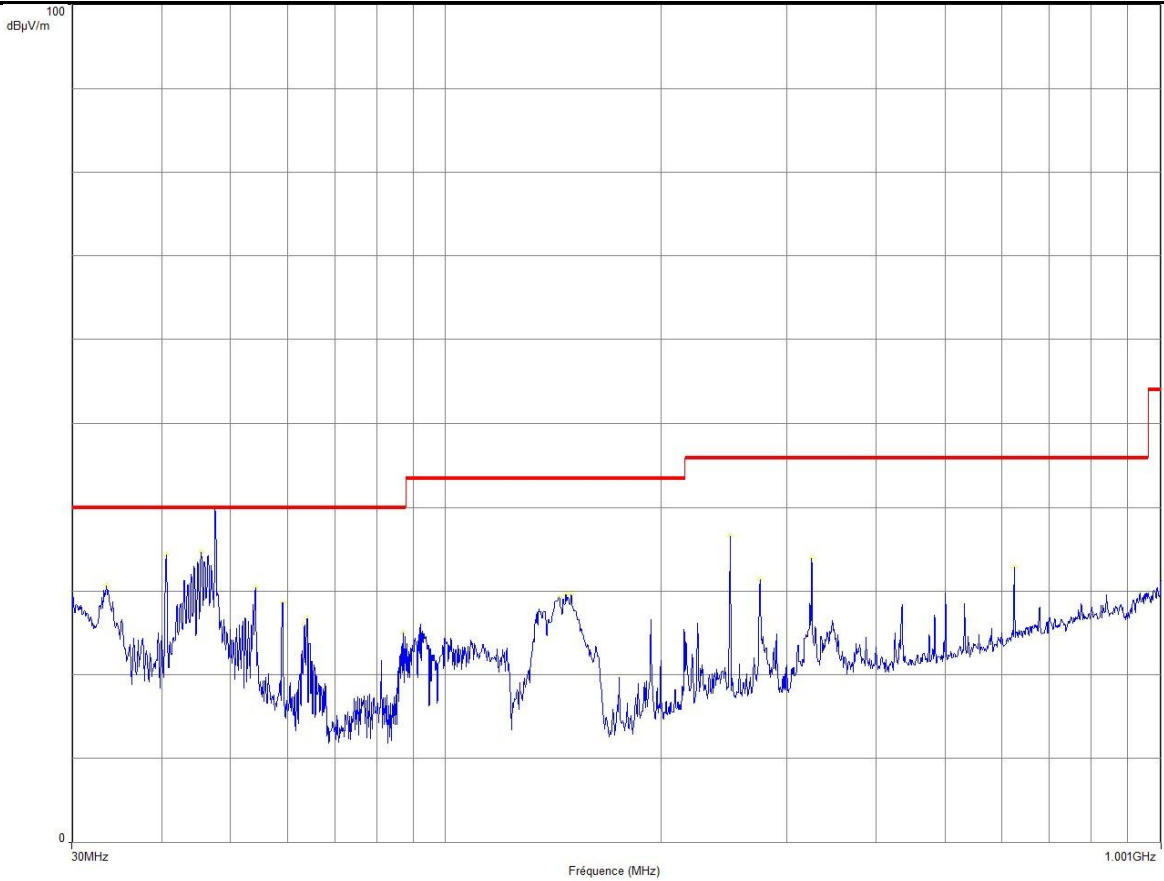
L C I E

**RADIATED EMISSIONS**

<b>Graph name :</b>	Emr#4	<b>Test configuration:</b>
<b>Limit :</b>	FCC Part15C	RFID
<b>Class :</b>	B	

**PARAMETERS**

<b>Antenna polarization:</b>	Verticale	<b>Legend:</b>
<b>Azimuth :</b>	0° - 360°	<span style="display: inline-block; width: 15px; height: 15px; background-color: blue; border: 1px solid black;"></span> Peak Measure
<b>RBW :</b>	100kHz	<span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span> QPeak Limit@3m
<b>VBW :</b>	300kHz	
<b>Frequency :</b>	30MHz- 1.001GHz	

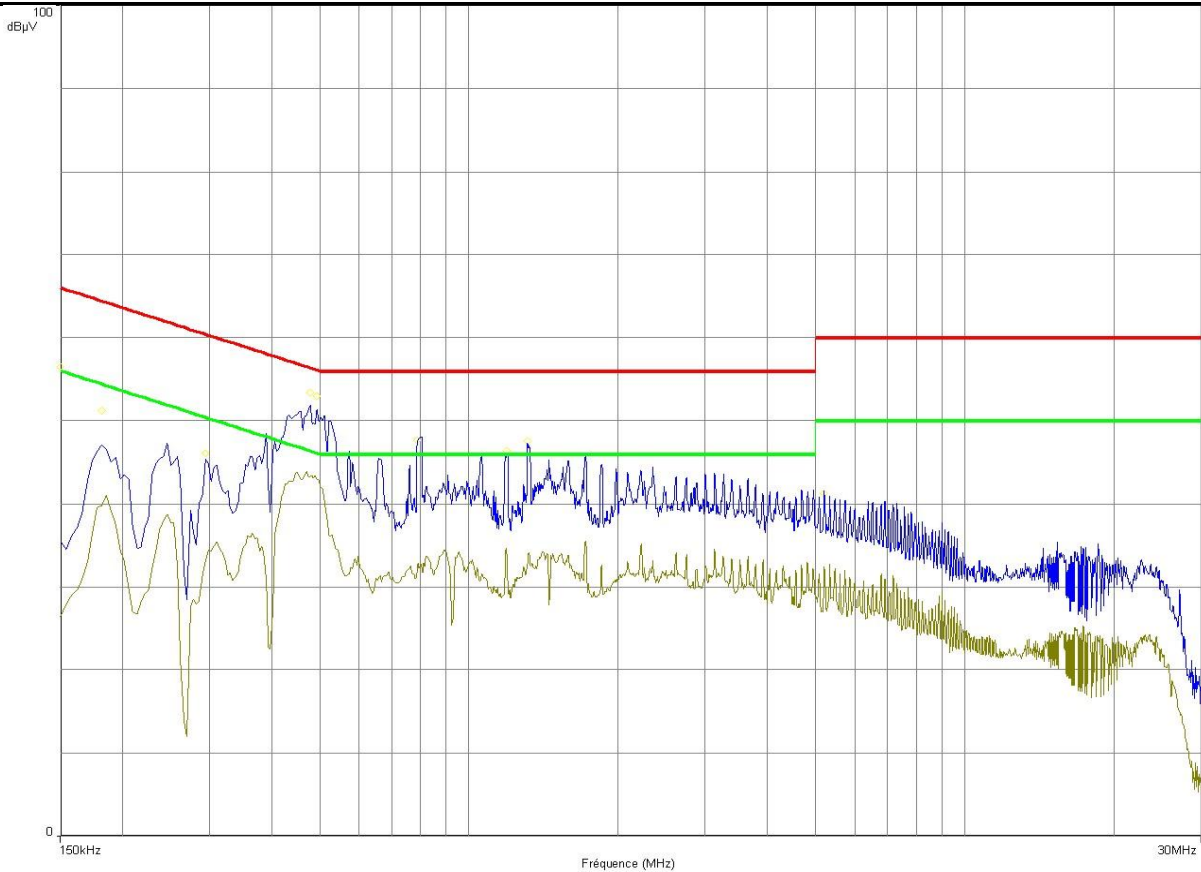


Frequency (MHz)	Peak (dBµV/m)
33.48	30.69
40.6	34.42
45.52	34.74
47.6	40.01
54.16	30.41
59.08	28.67
63.4	26.02
63.92	26.79
87.12	25.04
144.2	29.26
147.24	29.61
149.72	29.65
249.88	36.62
275.04	31.37
324.88	34.01
625	32.81



L C I E

CONDUCTED EMISSIONS		
Graph name :	Emc#1	Test configuration:
Limit :	EN 55022	
Class :	B	
PARAMETERS		
Voltage / Frequency :	110VAC / 60Hz	Legend:
Line :	Phase	Peak Measure
RBW :	9kHz	Average Measure
VBW :	30kHz	QPeak Limit
Frequency :	150kHz- 30MHz	Average Limit

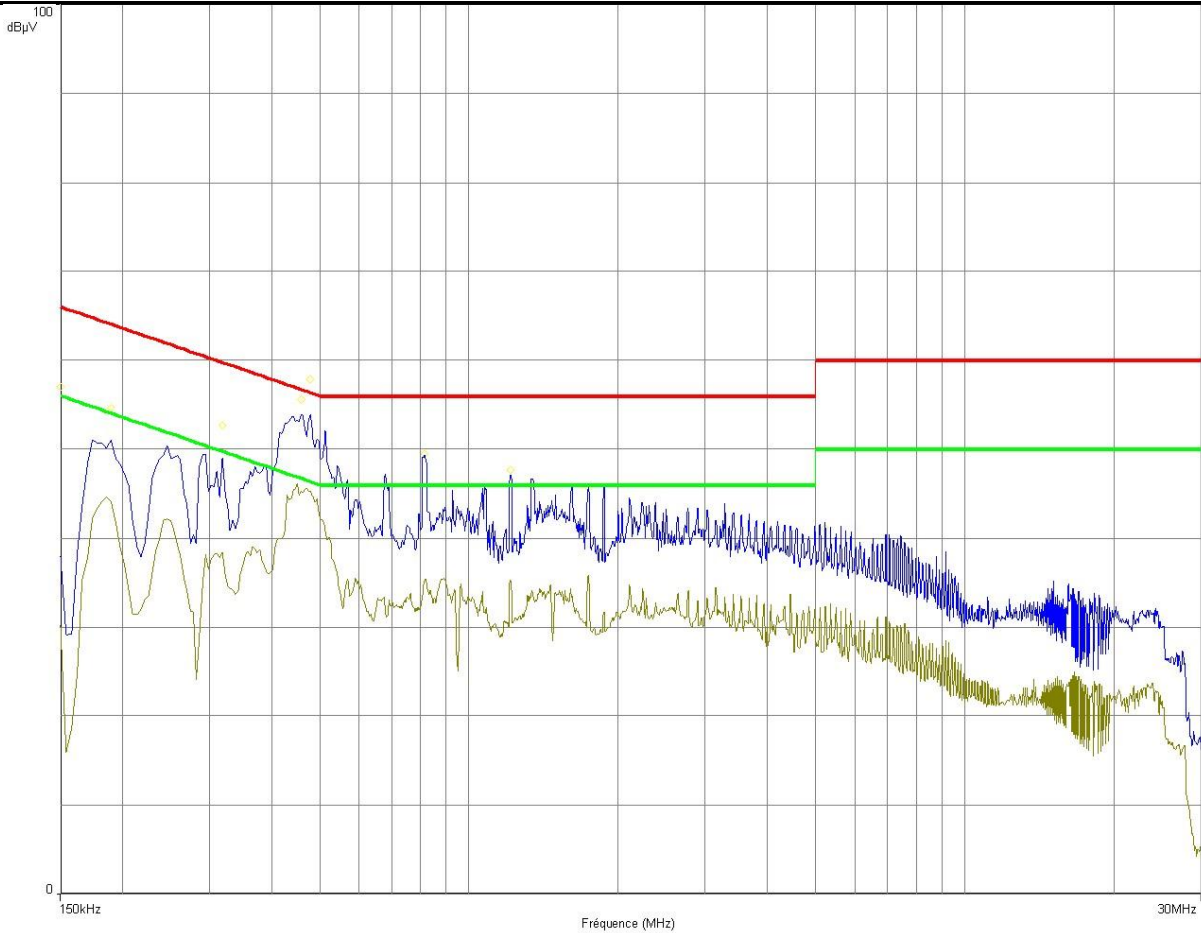


Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	Avg-LimAvg (dBµV)	QPeak (dBµV)	LimQPeak (dBµV)	QPeak-LimQPeak (dBµV)
0.150	46.17	51.89	-5.73	49.47	61.89	-12.42
0.182	40.29	54.39	-14.11	46.48	64.39	-17.92
0.294	32.83	50.41	-17.58	41.63	60.41	-18.78
0.478	42.90	46.37	-3.47	49.23	56.37	-7.14
0.494	42.43	46.10	-3.67	49.40	56.10	-6.70
0.786	30.74	46.00	-15.26	40.77	56.00	-15.23
1.194	29.77	46.00	-16.23	38.80	56.00	-17.20
1.314	32.46	46.00	-13.54	41.40	56.00	-14.60
5.214	27.23	50.00	-22.77	34.74	60.00	-25.26



L C I E

CONDUCTED EMISSIONS		
Graph name :	Emc#2	Test configuration:
Limit :	EN 55022	
Class :	B	
PARAMETERS		
Voltage / Frequency :	110VAC / 60Hz	Legend:
Line :	Neutral	Peak Measure
RBW :	9kHz	Average Measure
VBW :	30kHz	QPeak Limit
Frequency :	150kHz- 30MHz	Average Limit



Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	Avg-LimAvg (dBµV)	QPeak (dBµV)	LimQPeak (dBµV)	QPeak-LimQPeak (dBµV)
0.150	47.67	51.89	-4.22	50.71	61.89	-11.18
0.190	44.80	54.04	-9.24	52.24	64.04	-11.79
0.318	38.29	49.76	-11.47	48.76	59.76	-11.00
0.458	42.99	46.73	-3.74	50.03	56.73	-6.70
0.478	45.45	46.37	-0.93	53.68	56.37	-2.70
0.814	34.06	46.00	-11.94	43.75	56.00	-12.25
1.214	31.97	46.00	-14.03	40.68	56.00	-15.32
1.338	32.38	46.00	-13.62	39.97	56.00	-16.03
1.742	32.29	46.00	-13.71	40.61	56.00	-15.39
0.150	47.67	51.89	-4.22	50.71	61.89	-11.18



**6. 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.