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# Rapport d'essai / Test report

N° 784842-R3-E

JDE : 129756

## DELIVRE A / ISSUED TO

: MARKEM IMAJE INDUSTRIES

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## Objet / Subject

: Essais de compatibilité électromagnétique conformément aux normes  
*Electromagnetic compatibility tests according to the standards*  
**FCC CFR 47 Part 15, Subpart B et C.**  
**RSS-GEN / RSS-210**

## Matériel testé / Apparatus under test

- Produit / Product : Imprimante industriel RFID / *RFID industrial printer*
- Marque / Trade mark : **MARKEM IMAJE INDUSTRIES**
- Constructeur / Manufacturer : **MARKEM IMAJE INDUSTRIES**
- Type sous test / Model under test : **9450 with ACM**
- N° de série / serial number : **FR14280086**

## Date des essais / Test date

: Du 7 au 11 Août 2014 / *From August 7<sup>th</sup> to 11<sup>th</sup>, 2014*

## Lieu d'essai / Test location

: **LCIE SUD-EST**  
ZI Centr'Alp – 170 rue de Chatagnon  
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Test réalisé par / *Test performed by* : Jonathan PAUC

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

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MOIRANS, LE 15 AOÛT 2014 / *AUGUST 15<sup>TH</sup> 2014*

Approuvé par / *Approved by*,  
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**1. TEST PROGRAM**

**Standard:**

- FCC Part 15, Subpart C 15.247
- ANSI C63.4 (2003)
- RSS-210 Issue 8.1 – Feb 2015
- RSS-Gen Issue 4 – Nov 2014

EMISSION TEST	LIMITS			RESULTS (Comments)
	Frequency	Quasi-peak value (dBµV)	Average value (dBµV)	
<b>Limits for conducted disturbance at mains ports</b> 150kHz-30MHz CFR 47 §15.207	150-500kHz	66 to 56	56 to 46	<b>PASS</b>
	0.5-5MHz	56	46	
	5-30MHz	60	50	
<b>Radiated emissions</b> 9kHz-30MHz CFR 47 §15.209 (a) CFR 47 §15.225 RSS-Gen §4.9	<b>Measure at 300m</b> 9kHz-490kHz : 67.6dBµV/m /F(kHz)			<b>PASS</b>
	<b>Measure at 30m</b> 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) 1.705MHz-30MHz : 29.5 dBµV/m			
<b>Radiated emissions</b> 30MHz-1GHz* CFR 47 §15.209 (a) CFR 47 §15.225 RSS-Gen §4.9	<b>Measure at 3m</b> 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m Above 960MHz : 54.0 dBµV/m			<b>PASS</b>
<b>Fundamental field strength limit</b> CFR 47 §15.225 RSS-210 §A2.6	<b>Operation within the band 13.110-14.010 MHz</b>			<b>PASS</b>
<b>Fundamental frequency tolerance</b> CFR 47 §15.225 RSS-210 §A2.6	<b>Operation within the band 13.110-14.010 MHz</b>			<b>PASS</b>
<b>Band edge compliance</b> CFR 47 §15.225 RSS-210 §A2.6	<b>Operation within the band 13.110-14.010 MHz</b>			<b>PASS</b>
<b>Occupied bandwidth</b> RSS-Gen §4.6.1	<b>No limit</b>			<b>See results</b>
<b>Receiver Spurious Emission**</b> RSS-Gen §4.10	<b>See RSS-Gen §4.10</b>			<b>NA</b>

\*§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. HARDWARE IDENTIFICATION**

**Equipment under test (EUT):**

9450 with ACM

Serial number: FR14280086

**Power supply:**

During all the tests, EUT is supplied by  $V_{nom}$ : 230 VAC

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

Name	Type	Rating	Reference / Sn	Comments
Power supply	<input checked="" type="checkbox"/> AC <input type="checkbox"/> DC <input type="checkbox"/> Battery	100-240/50-60Hz	/	/

**Inputs/outputs - Cable:**

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Power supply	3 wires	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Tachymeter input	/	5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Proximity cell input		6	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Status beacon input		3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Printing head (side printer)		3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Printing head (side head)						

**Auxiliary equipment used during test:**

Type	Reference	Sn	Comments
Proximity cells	A35355B	/	/
Beacon PATLITE	A34792	/	model MP
Tachymeter	A35356	/	/

**Equipment information:**

- Type: RFID Other:
- Frequency band: [13.553-13.567 ] MHz
- RF mode: TX/RX Standby
- Antenna type:
- Antenna connector: Permanent external Permanent internal  
None Temporary (only for tests)
- Extreme temperature range: 5°C / 45°C
- Extreme test source voltage: ±10% other:

**2.2. EUT CONFIGURATION**

Firmware / Software version of EUT:

Boot: 1.1 3749

Appli A: R4\_37b 10358

FPGA: 2.0.246

Continuous printing message 24 points and reading in loop of 2 TAGs ink and additive cartridge.

Print message: 32 + 24 dots (Message of production)

Printing speed: 100 mm/second

**2.3. EQUIPMENT MODIFICATIONS**

None

### 3. RADIATED EMISSION DATA (15.209)

#### 3.1. TEST CONDITIONS

Date of test : August 7<sup>th</sup>, 2014  
Test performed by : J.PAUC  
Atmospheric pressure : 997hPa  
Relative humidity : 55%  
Ambient temperature : 23.5°C

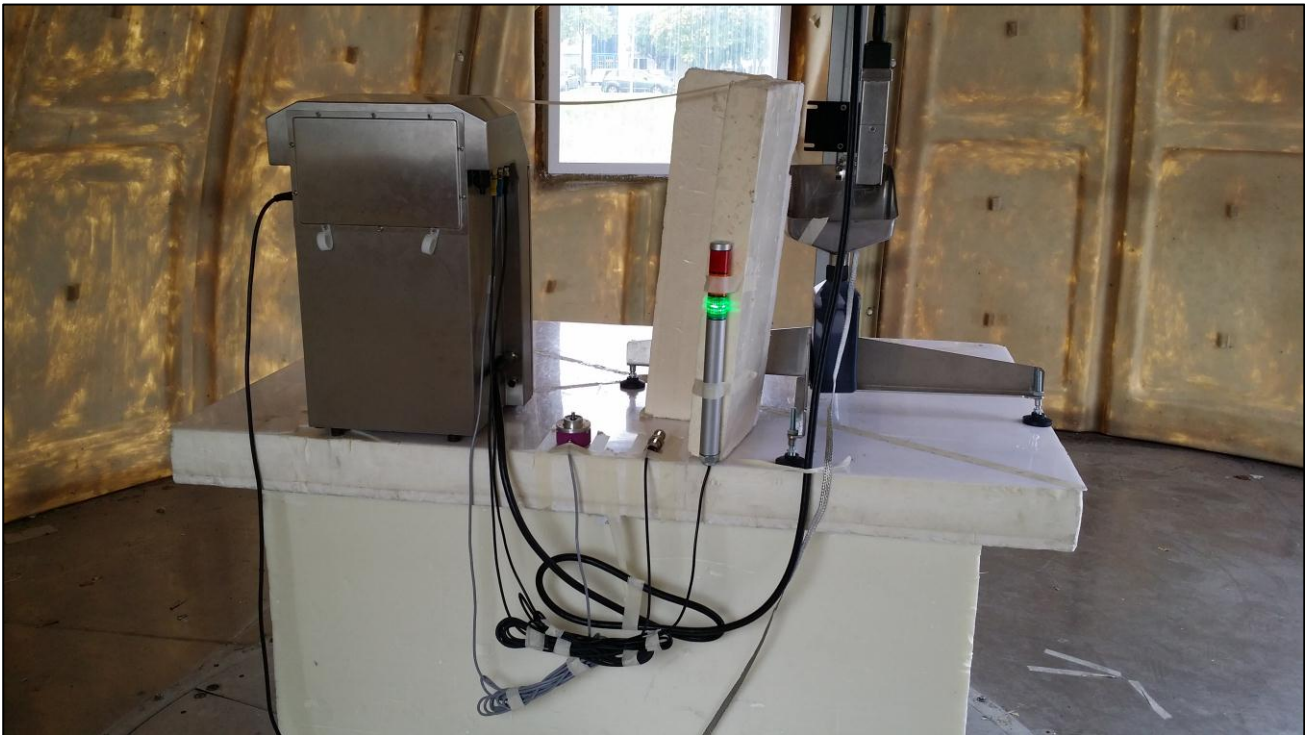
#### 3.2. TEST SETUP

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

The EUT and auxiliaries are set:

- 80cm above the ground on the non-conducting table (Table-top equipment)
- 10cm above the ground on isolating support (Floor standing equipment)

The EUT is powered by 230/50Hz





*Radiated emission test setup*





### 3.3. TEST METHOD

Pre-characterisation measurement: (9kHz – 2GHz)

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 2GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test for maximized the emission measurement. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration.

The pre-characterization graphs are obtained in PEAK detection and PEAK/AVERAGE from 1GHz to 2GHz.

Characterization on 10 meters open site from 9kHz to 1GHz:

The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart C. Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC. The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart C §15.225 limits in the frequency range 13.553MHz 13.567MHz. Measurement bandwidth was 9kHz below 30MHz and 120kHz from 30 MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test for maximized the emission measurement. The height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.

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

Characterization on 3 meters full anechoic chamber from 1GHz to 2GHz:

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 2GHz.

Test is performed in horizontal (H) and vertical (V) polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown. The height antenna is

- On mast, varied from 1m to 4m
- Fixed and centered on the EUT

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







**3.6. TEST SEQUENCE AND RESULTS**

**3.6.1. 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:

0° antenna	<b>Emr#1</b>	(See annex 1)
90° antenna	<b>Emr#2</b>	(See annex 1)

**Optionnal measurement:**

0° antenna	<i>Door open, without cartridges</i>	<b>Emr#3</b>	(See annex 1)
90° antenna	<i>Door open, without cartridges</i>	<b>Emr#4</b>	(See annex 1)

**3.6.2. 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.

See graphs for 30MHz-1GHz:

H polarization	<b>Emr#4</b>	(See annex 1)
V polarization	<b>Emr#5</b>	(See annex 1)

See graphs for 1-2GHz:

H polarization	<b>Emr#6</b>	(See annex 1)
V polarization	<b>Emr#7</b>	(See annex 1)

**3.6.3. 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) @ 10m	Qpeak (dBµV/m) @ 30m	Qpeak-Limit (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)	Commentaire
13.56* <sup>1</sup>	84.0	-8.7	6.7	<b>-77.3</b>	180	0	34.5	Door open, without Cartridges
13.56* <sup>1</sup>	84.0	-14.6	0.8	<b>-83.2</b>	180	0	34.5	Door Close

\*<sup>1</sup>: 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.

**3.6.4. 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 clause 3.2

Frequencies due to RFID are measured following Part15C §15.209 and frequencies due to industrial printer (host equipment) are measured following Part15B §15.109 class A above tenth harmonic of fundamental.

**Worst case final data result:**

Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Factor(dB)	Remark
45.946	40.0	24.2	-15.8	0	V	250	11.2	(2)
49.888	40.0	31.2	-8.8	120	V	100	9.4	(2)
67.848	40.0	35.1	-4.9	0	V	110	7.8	(1)
149.622	43.5	38.2	-5.3	290	H	400	13.5	(1)
182.898	43.5	42.6	-0.9	186	V	250	11.5	(1)
216.120	46.0	43.1	-2.9	210	V	100	12.6	(1)
382.360	46.0	43.5	-2.5	200	V	300	19.2	(1)
500.000	46.0	42.5	-3.5	160	V	180	22.2	(1)
648.320	46.0	39.5	-6.5	60	V	120	25.1	(2)

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

(2): Measure have been done at 3m distance.

**RESULTS: PASS**

Characterization on 3 meters full anechoic chamber from 1GHz to 2GHz:

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. Measurement bandwidth was 1MHz from 1GHz to 2GHz.

Test is performed in horizontal (H) and vertical (V) polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown. The height antenna is

On mast, varied from 1m to 4m

Fixed and centered on the EUT

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

- No characterisation measurements has been performed due to low level observed during pre-characterisation

**RESULTS: PASS****3.7. 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 $\mu$ 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. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)**

**4.1. TEST CONDITIONS**

Date of test : August 11<sup>th</sup>, 2014  
 Test performed by : J.PAUC  
 Atmospheric pressure : 997hPa  
 Relative humidity : 60%  
 Ambient temperature : 24.5°C

**4.2. TEMPERATURE AND VOLTAGE FLUCTUATION**

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency when the temperature is varied from -20°C to +50°C at the nominal power voltage and the primary power voltage is varied from 85% to 115% of the rated supply voltage at 20°C. (See divergence)



**4.3. TEST EQUIPMENT LIST**

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Cable SMA	-	-	A5329580
Cable	UTIFLEX		A5329188
Cable			A5329045
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Climatic chamber	CLIMATS	3776	D1022121



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

Temperature range declared by provider for good function, in user manual, is from 5°C to 45°C. Possible problem with ink limited the temperature of use.

Test performed with door open without cartridge (setup non representative of normal functioning), but used in order to have maximum level of RFID carrier frequency.

**4.5. TEST SETUP**

Frequency of carrier: 13.56 MHz  
 Upper limit: 13.561356 MHz  
 Lower limit: 13.558644 MHz  
 The EUT is set in a climatic chamber.

**4.6. TEST SEQUENCE AND RESULTS**

Voltage	Temperature	5°C	20°C	+45°C
Mains voltage: 110V/60Hz Frequency Drift (MHz) Carrier level (dBc)		+ 0.000117 + 0.38	REF REF	- 0.000107 - 0.05
Mains voltage: 93.5V/60Hz Frequency Drift (MHz) Carrier level (dBc)		+ 0.000111 + 0.33	+ 0.000010 + 0.01	- 0.000110 - 0.06
Mains voltage: 126V/60Hz Frequency Drift (MHz) Carrier level (dBc)		+ 0.000117 + 0.27	+ 0.000008 + 0.03	- 0.000114 - 0.07

Frequency drift measured is **117Hz** when the temperature is varied from 5°C to +45°C and voltage is varied.



**5. BAND-EDGE COMPLIANCE §15.209**

**5.1. TEST CONDITIONS**

Date of test : August 11<sup>th</sup>, 2014  
 Test performed by : J.PAUC  
 Atmospheric pressure : 997hPa  
 Relative humidity : 60%  
 Ambient temperature : 24.5°C

**5.2. TEST EQUIPMENT LIST**

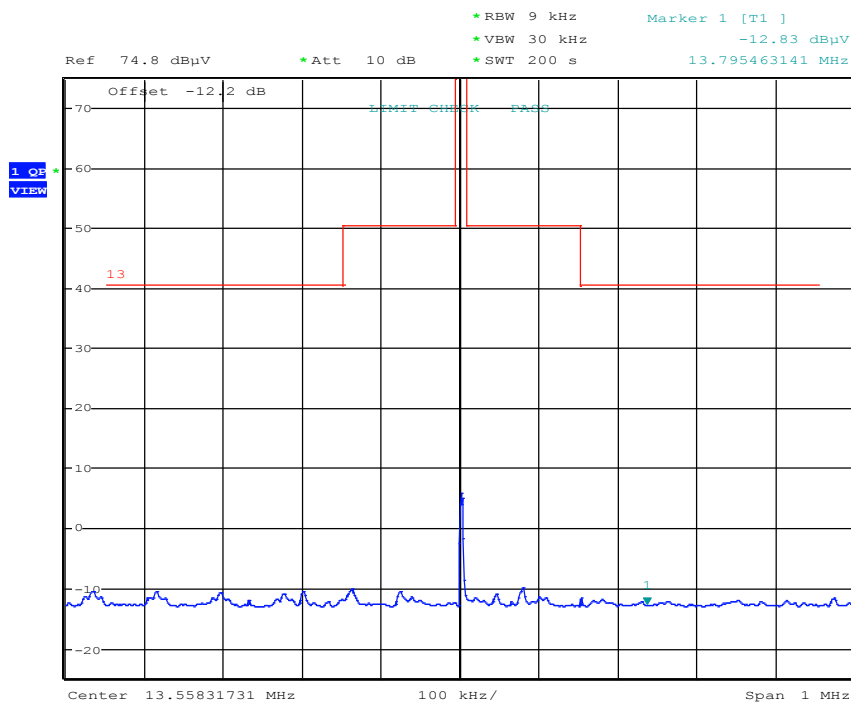
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Cable SMA	-	-	A5329580
Cable	UTIFLEX		A5329188
Cable			A5329045
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019

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

Test performed with door open without cartridge (setup non representative of normal functioning), but used in order to have maximum level of RFID carrier frequency.

**5.4. FREQUENCY BAND 13.110-14.010MHZ / 13.553-13.567MHZ**

Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector.



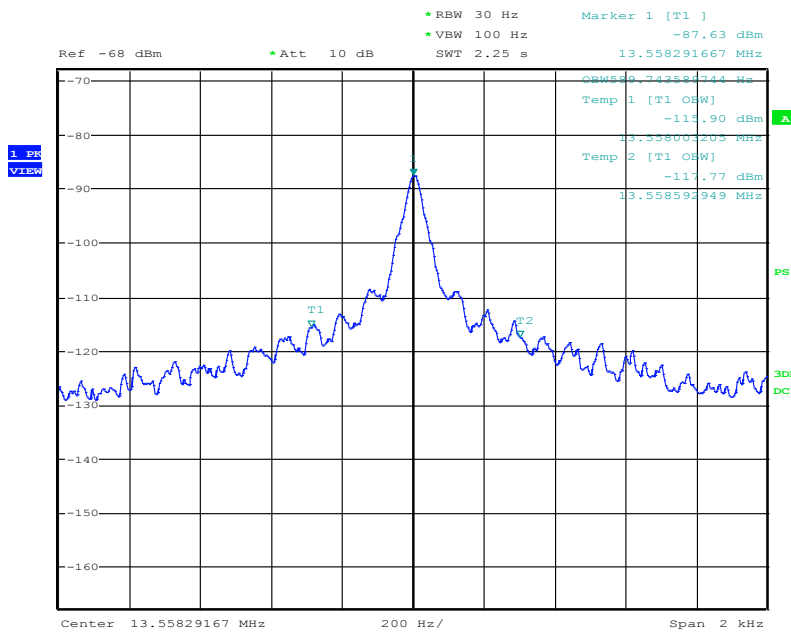


**6. OCCUPIED BANDWIDTH**

**6.1. TEST CONDITIONS**

Date of test : August 08<sup>th</sup>, 2014  
 Test performed by : J.PAUC  
 Atmospheric pressure : 989hPa  
 Relative humidity : 59%  
 Ambient temperature : 23°C

**6.2. TEST RESULTS**



Measured occupied bandwidth is **589Hz**

Measurement settings:

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

RBW = 30Hz / Video BW = 100Hz / SPAN = 2kHz / PEAK / Maxhold / OBW function

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

**6.3. TEST EQUIPMENT LIST**

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Cable SMA	UTIFLEX	-	A5329188
Cable	-	-	A5329045
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019

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

None

## 7. CONDUCTED EMISSION DATA

### 7.1. TEST CONDITIONS

Date of test : August 6<sup>th</sup>, 2014  
Test performed by : Nathalie BUGANZA  
Atmospheric pressure (hPa) : 996  
Relative humidity (%) : 49  
Ambient temperature (°C) : 23

### 7.2. TEST SETUP

#### **Mains terminals**

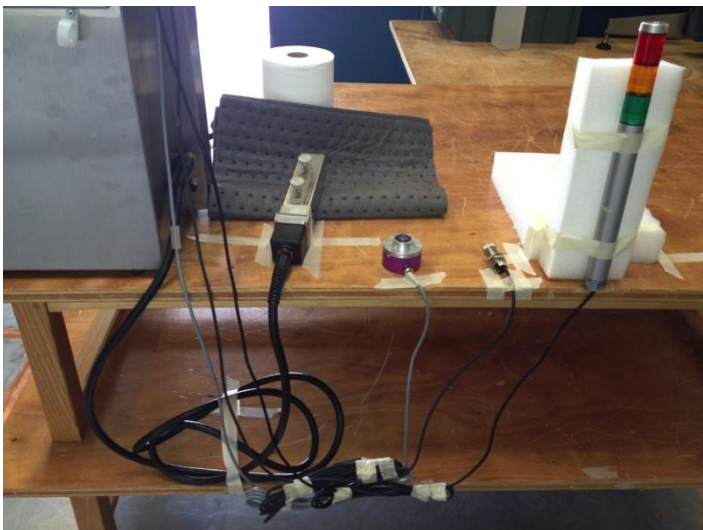
The EUT and auxiliaries are set:

- 80cm above the ground on the non-conducting table (Table-top equipment)
- 10cm above the ground on isolating support (Floor standing equipment)

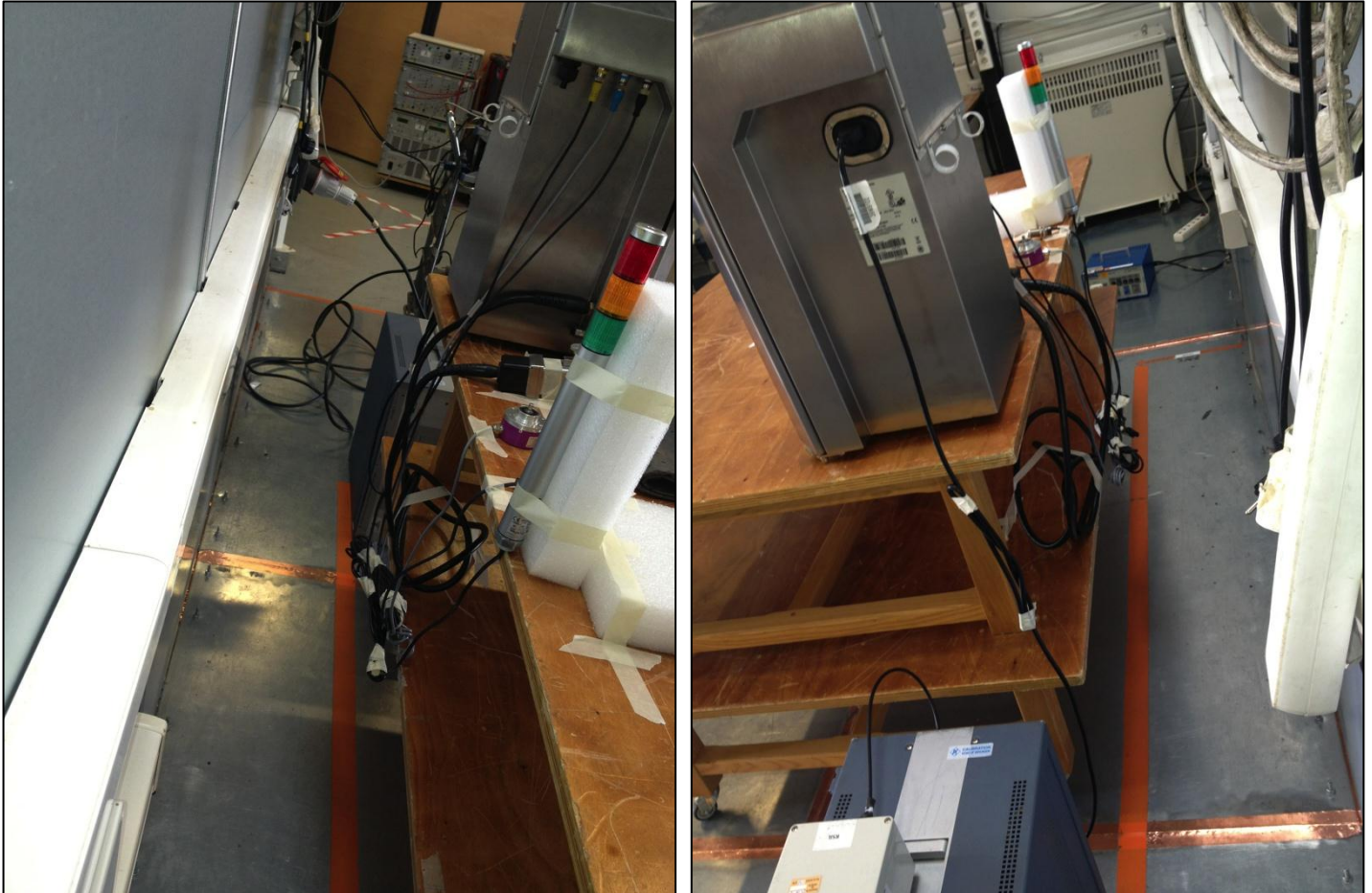
The distance between the EUT and the LISN is 80cm. The EUT is 40cm away for the vertical ground plane.

The EUT is powered by 110/60Hz.

The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.







### 7.3. TEST METHOD

The product has been tested according to ANSI C63.4-(2003) and FCC Part 15 subpart B and C. The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 subpart B §15.107 and C §15.207 limits. Measurement bandwidth was 9kHz from 150kHz to 30MHz. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 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.

Measurements are performed on the phase (L1) and neutral (N) of power line voltage. A measurement is also performed with a 50Ω dummy load replacing the transmitter antenna in order to demonstrate that some 13.56MHz may be cross-coupled to AC line connection. Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.



**7.4. TEST EQUIPMENT LIST**

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Cable	-	-	A5329578
Conducted emission comb generator	BARDET	-	A3169049
LISN tri-phase ESH2-Z5	RHODE & SCHWARZ	33852.19.53	C2320063
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011
Transient limiter	RHODE & SCHWARZ	ESH3-Z2	A7122204

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

None                      Divergence:

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

**RESULTS:**    PASS                      FAIL

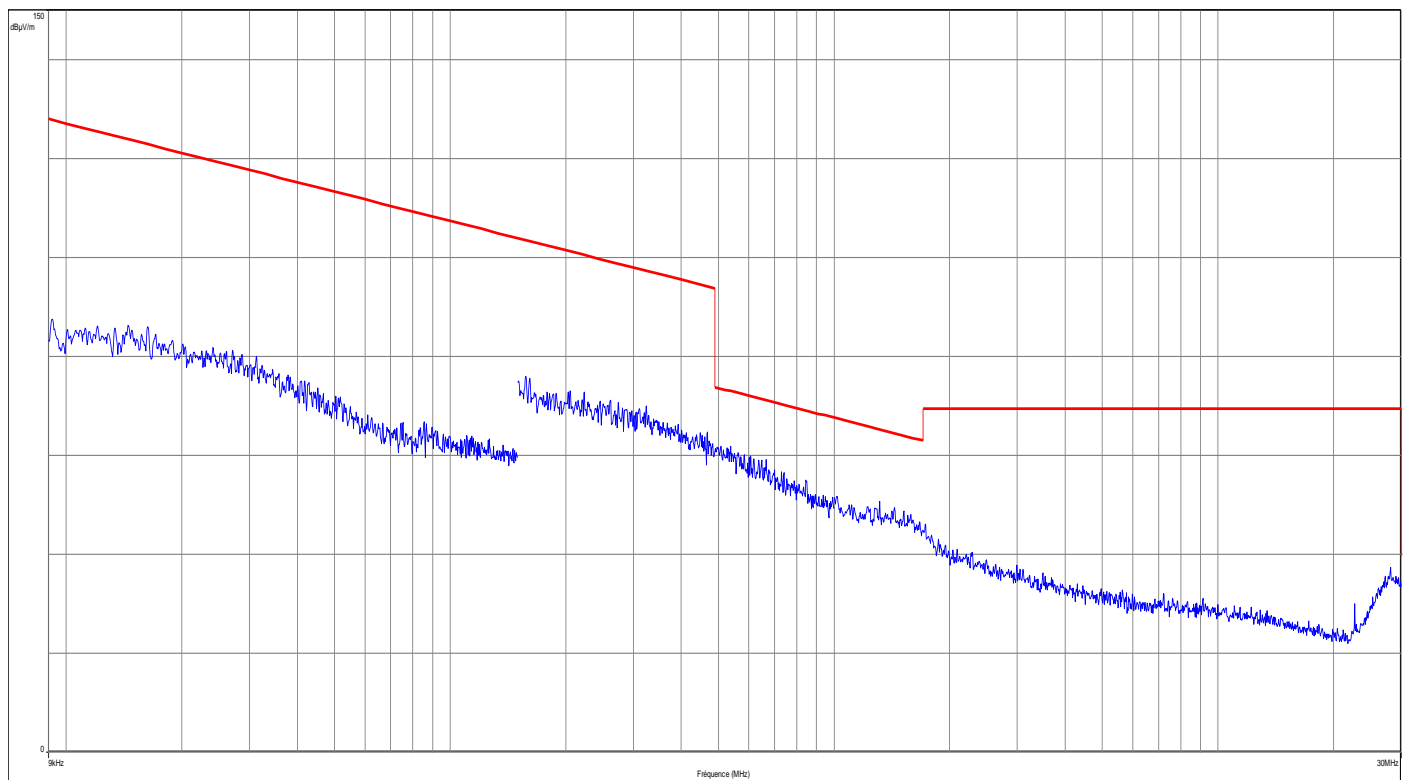


**8. ANNEX 1 (GRAPHS)**

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#1	<b>Test configuration:</b>	
<b>Limit:</b>	FCC CFR47 Part15C	FCC 9k 30M - 0deg	
<b>Frequency range: [9kHz - 30MHz]</b>			
<b>Antenna polarization:</b>	0deg	(9kHz-150kHz)	(150kHz-30MHz)
		<b>RBW :</b> 200Hz	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz	<b>VBW :</b> 300kHz

- 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)



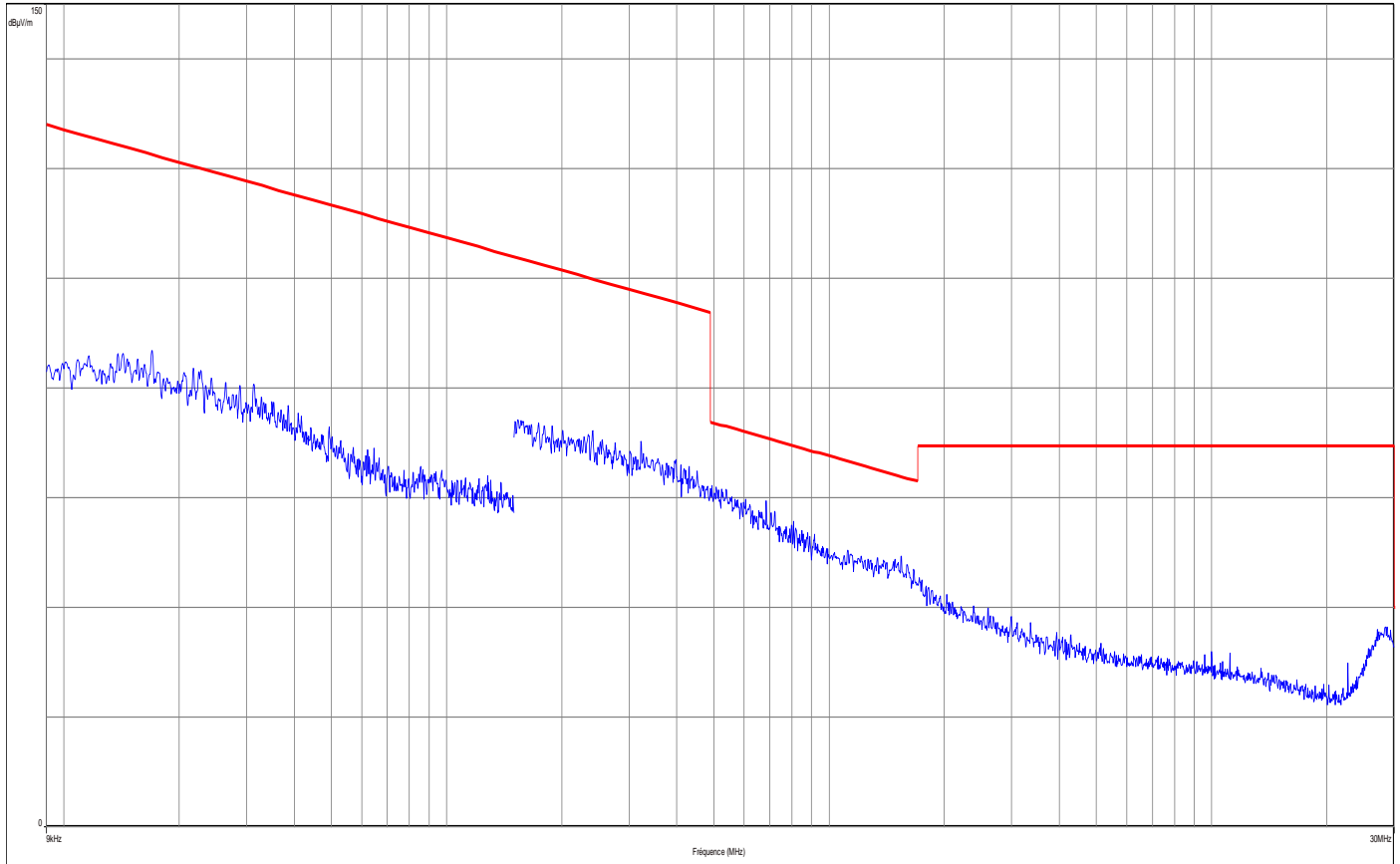


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#2	<b>Test configuration:</b>	
<b>Limit:</b>	FCC CFR47 Part15C	FCC 9k 30M - 90deg	
<b>Frequency range: [9kHz - 30MHz]</b>			
<b>Antenna polarization:</b>	90deg	(9kHz-150kHz)	(150kHz-30MHz)
		<b>RBW :</b> 200Hz	<b>RBW :</b> 200Hz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz	<b>VBW :</b> 1kHz

- 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)

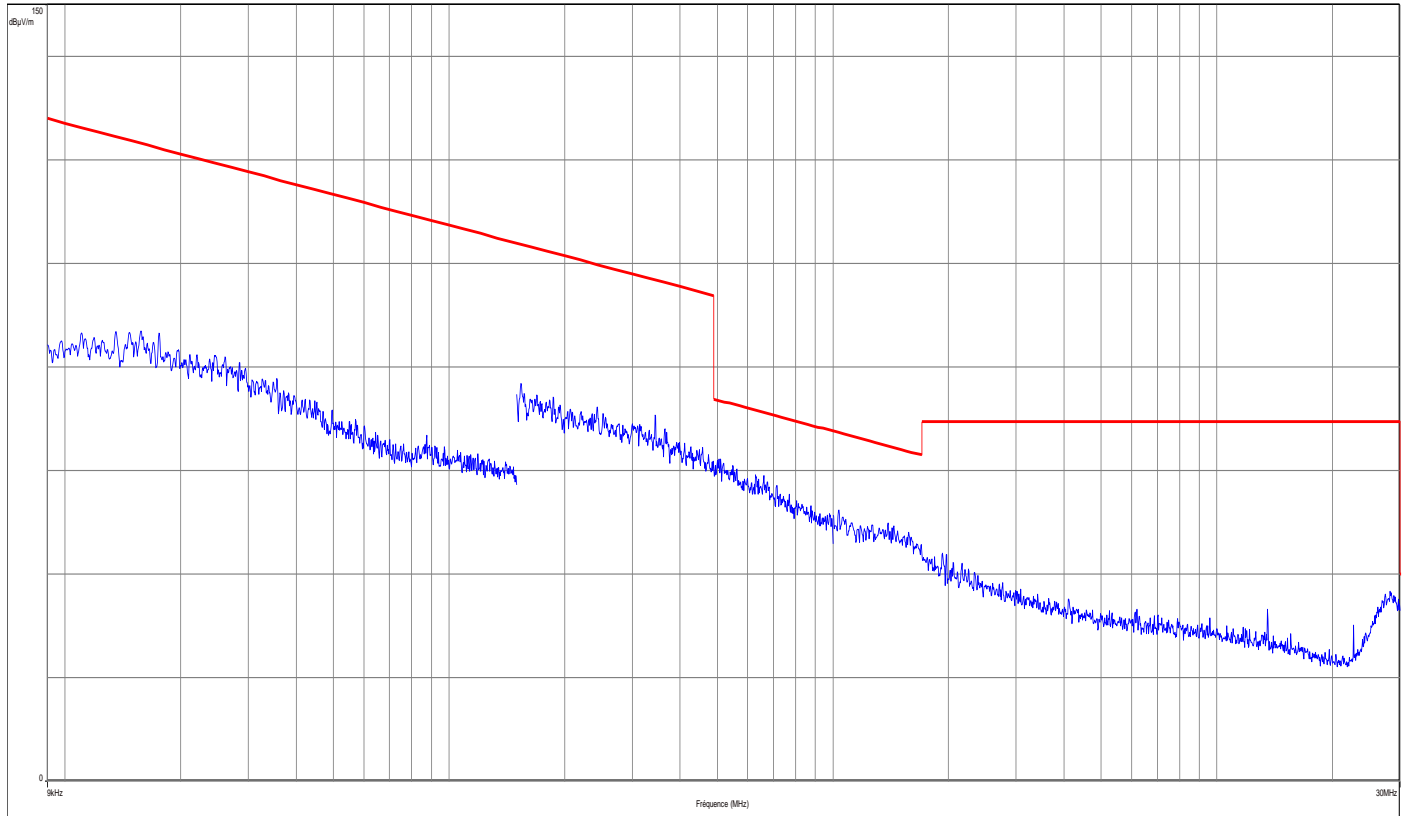




L C I E

RADIATED EMISSIONS			
<b>Graph name:</b>	Emr#3	<b>Test configuration:</b>	
<b>Limit:</b>	FCC CFR47 Part15C	FCC 9k 30M - 0deg without cartridge door open	
<b>Frequency range: [9kHz - 30MHz]</b>			
<b>Antenna polarization:</b>	0deg	(9kHz-150kHz)	(150kHz-30MHz)
		<b>RBW :</b> 200Hz	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz	<b>VBW :</b> 300kHz

- 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)



Frequency (MHz)	Peak Level (dBμV/m)	Remark
13.5599	33.2	*carrier frequency

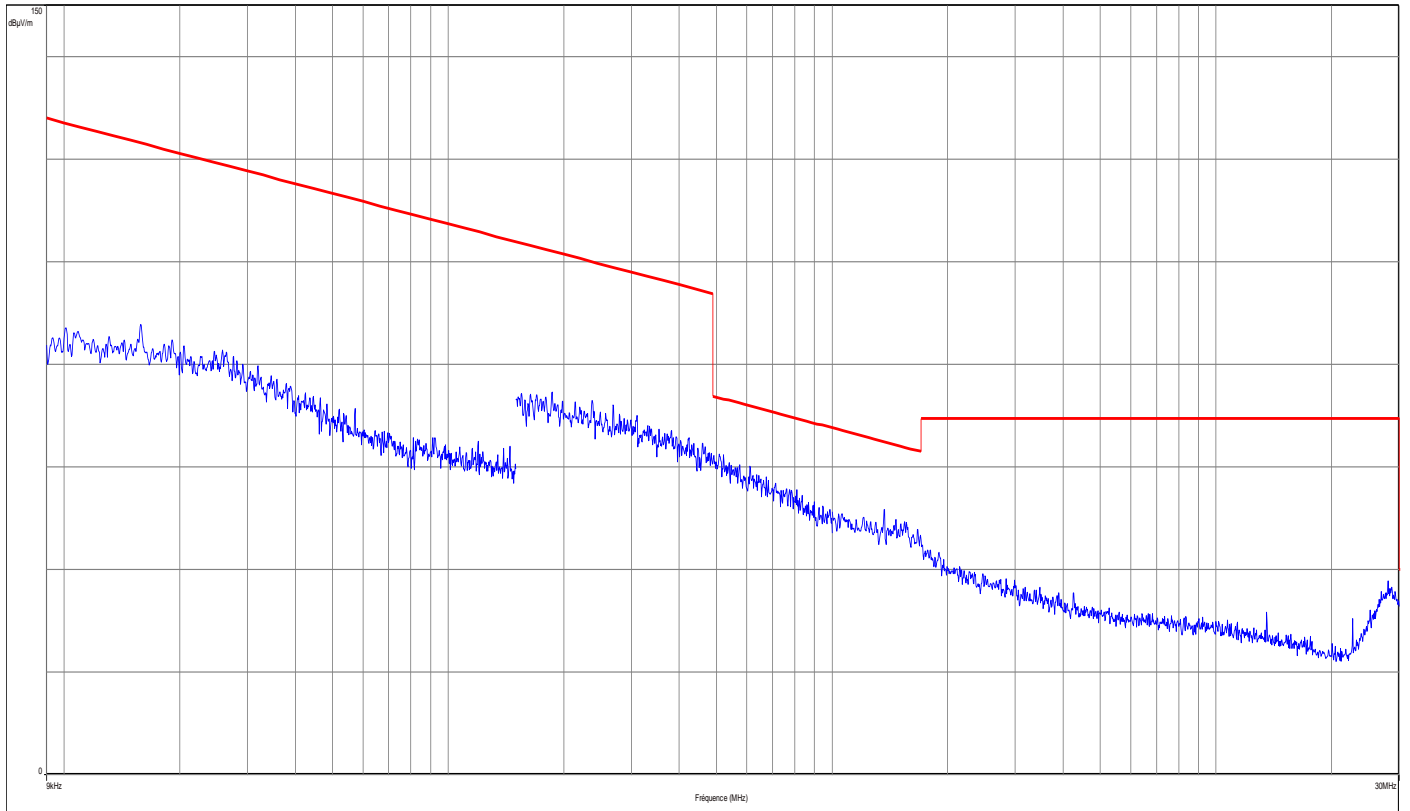


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#4	<b>Test configuration:</b>	
<b>Limit:</b>	FCC CFR47 Part15C	FCC 9k 30M - 90deg without cartridge door open	
<b>Frequency range: [9kHz - 30MHz]</b>			
<b>Antenna polarization:</b>	90deg	<b>RBW :</b> 100kHz	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz	<b>VBW :</b> 300kHz

- 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)



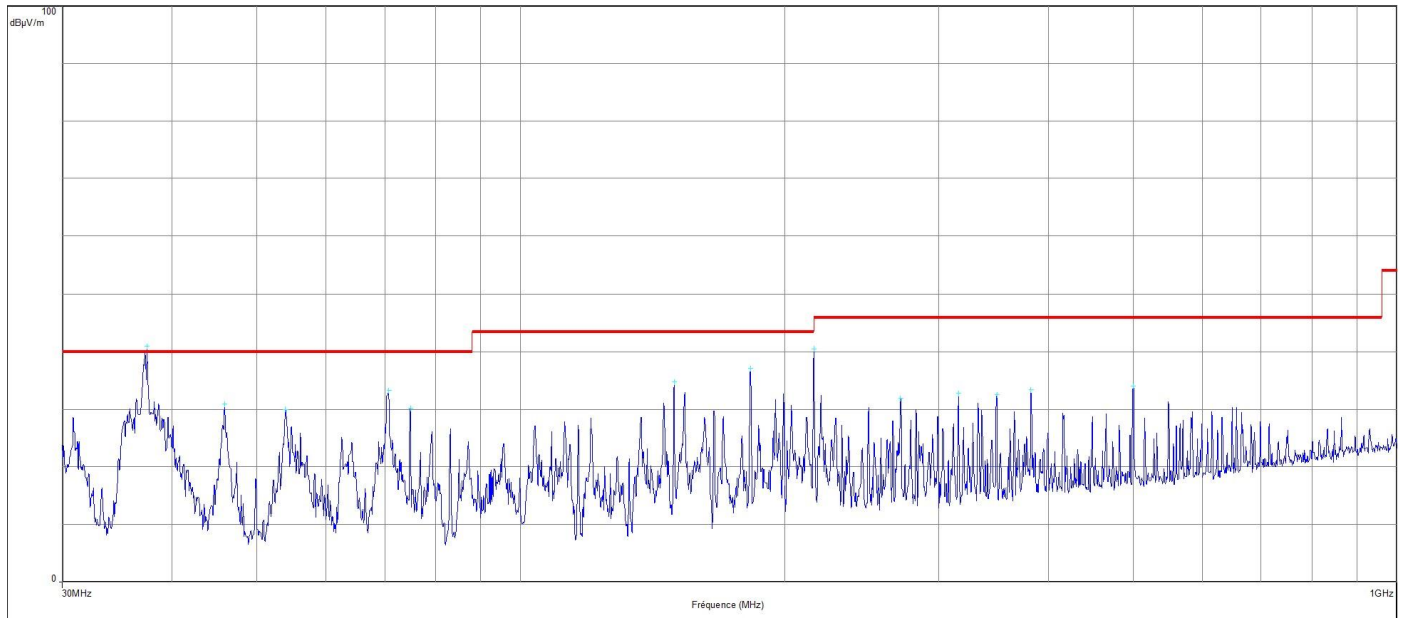


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#5	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC 80M - 1G - (H)
<b>Frequency range: [30MHz - 1GHz]</b>		
<b>Antenna polarization:</b>	Horizontal	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz

- 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 (Finaux Manuel) (Horizontale)
- Mes.Peak (Horizontale)



Frequency (MHz)	Peak Level (dBµV/m)
37.463	41
45.946	30.86
53.936	30.01
70.681	33.22
74.829	30.07
149.629	34.69
182.898	37.12
216.12	40.49
271.16	31.89
315.88	32.7
349.12	32.47
382.36	33.36
500	33.99

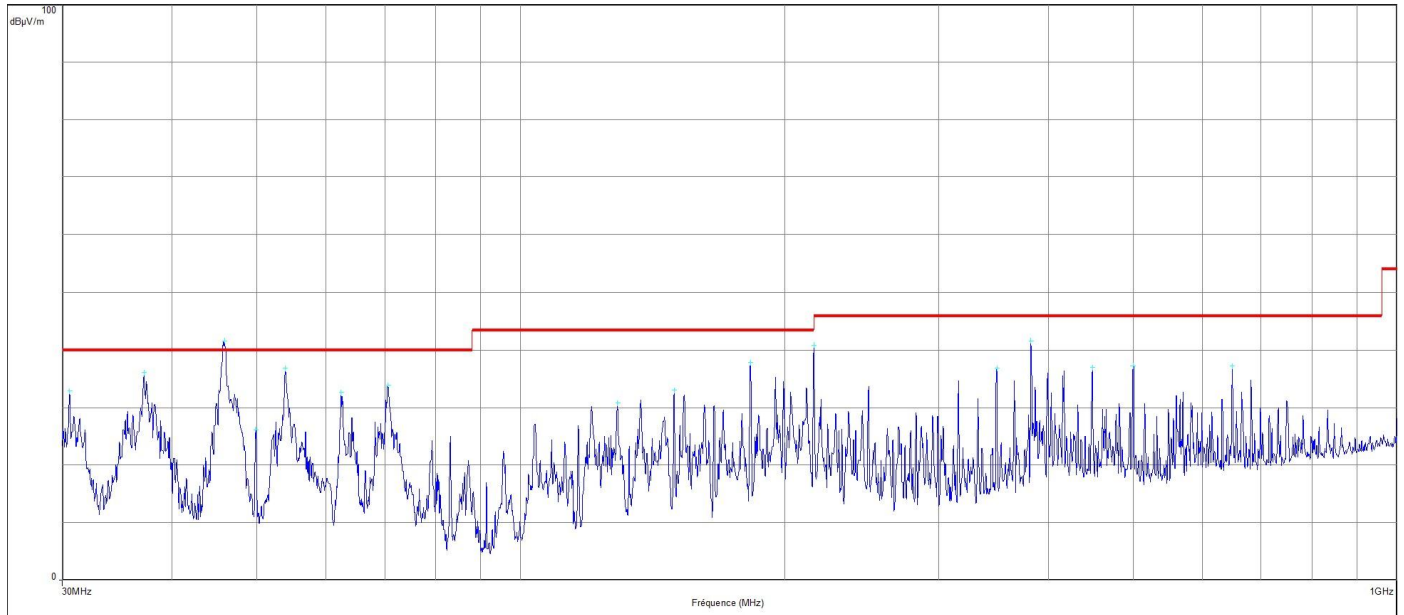


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#6	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC 30M - 1G - (V)
<b>Frequency range: [30MHz - 1GHz]</b>		
<b>Antenna polarization:</b>	Vertical	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz

- 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 (Finaux Manuel) (Verticale)
- Mes.Peak (Verticale)



Frequency (MHz)	Peak Level (dBµV/m)
30.561	32.82
37.191	36.07
45.946	41.55
49.873	26.11
53.919	36.83
62.436	32.56
70.613	33.79
129.025	30.76
149.612	33.01
182.898	37.81
216.12	40.76
349.12	36.79
382.36	41.52
448.88	37.01
500	37.25
648.32	37.19



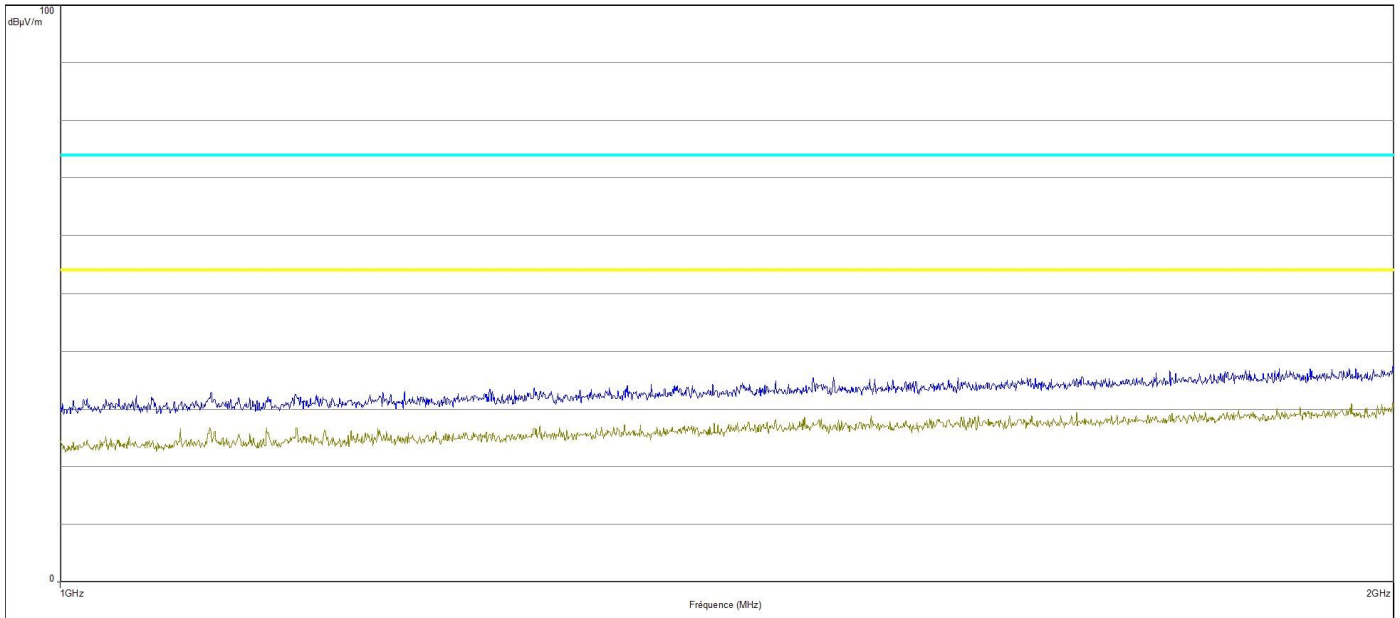


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#7	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC 1G - 2G - (H)
<b>Class:</b>		
<b>Frequency range: [1GHz - 2GHz]</b>		
<b>Antenna polarization:</b>	Horizontal	<b>RBW :</b> 1MHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 3MHz

- 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)
- Mes.Avg (Horizontale)

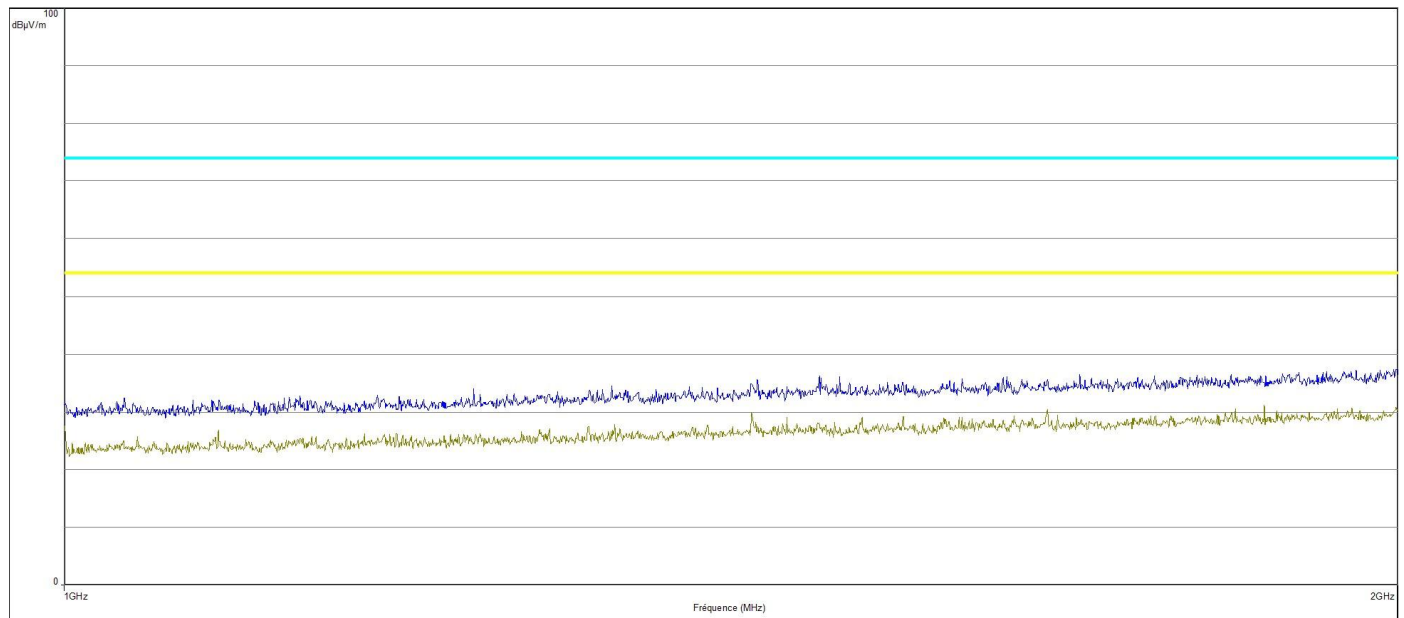




**RADIATED EMISSIONS**

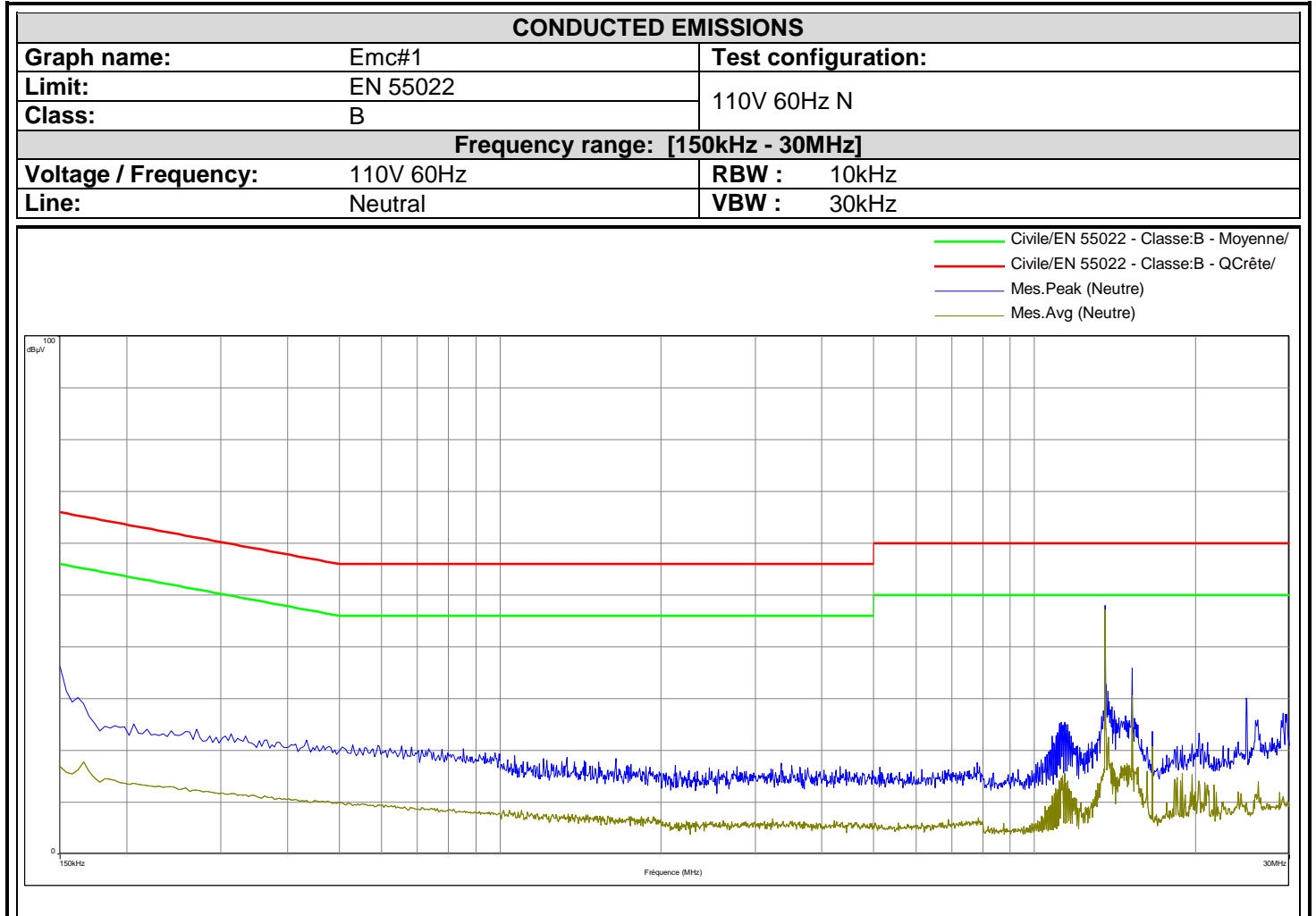
<b>Graph name:</b>	Emr#8	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC 1G- 2G - (V)
<b>Class:</b>		
<b>Frequency range: [1GHz - 2GHz]</b>		
<b>Antenna polarization:</b>	Vertical	<b>RBW :</b> 1MHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 3MHz

- 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)
- Mes.Avg (Verticale)





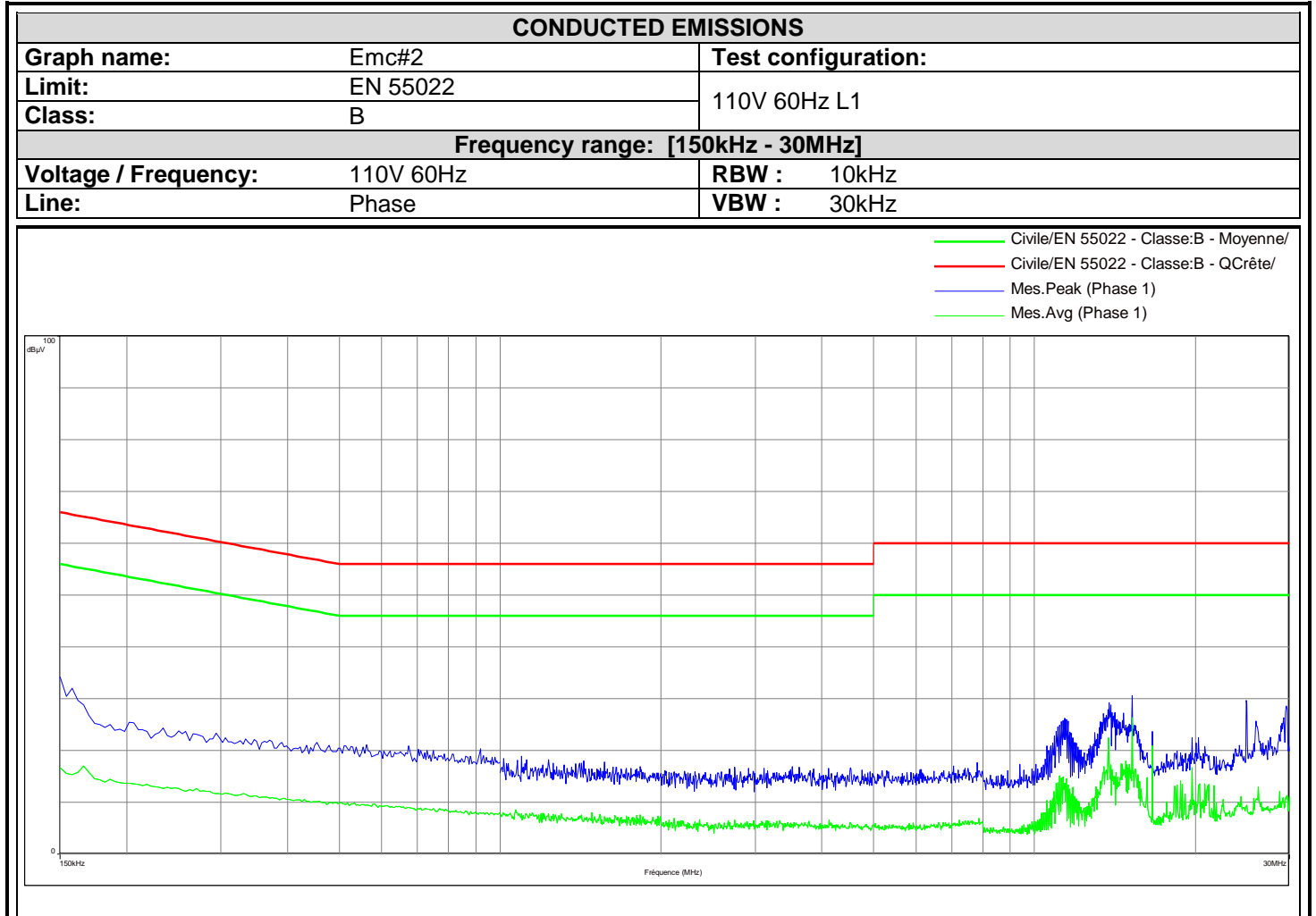
L C I E



Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
13.56	48.28	46.13	60	-13.87	37.46	50	-12.54
15.224	35.4	34.13	60	-25.87	27.61	50	-22.39
24.932	31.08	23.15	60	-36.85	8.52	50	-41.48
27.12	21.04	13.99	60	-46.01	7.76	50	-42.24



L C I E



Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
13.56	48.01	45.78	60	-14.22	37.12	50	-12.88
15.224	30.6	27.78	60	-32.22	22	50	-28
24.928	31.2	21.67	60	-38.33	7.91	50	-42.09
27.12	20.76	13.84	60	-46.16	7.64	50	-42.36



## 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 <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.