



LCIE

Release July, 2017

# TEST REPORT

N°: 158305-729579-A (FILE#1011014)

Version : 02

**Subject** Electromagnetic compatibility tests according to the standards:  
FCC CFR 47 Part 15, Subpart C  
RSS-210 Issue 9

**Issued to** **INGENICO**  
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**Apparatus under test**

- ↔ Product NFC card reader module
- ↔ Trade mark **INGENICO**
- ↔ Manufacturer **INGENICO**
- ↔ Family range **OPEN1500 POE/BT/RS232 – OPEN2500 POE/BT/RS232**
- ↔ Model under test **OPEN2500 POE/BT/RS232**
- ↔ Serial number 18163000149
- ↔ FCCID **XKB-OPE15CLBT**
- ↔ IC **2586D-OPE15CLBT**

**Conclusion** See Test Program chapter

**Test date** November 5, 2018 to November 20, 2018

**Test location** MOIRANS

**IC Test site** 6500A-1 & 6500A-3

**Sample receipt date** November 2, 2018

**Composition of document** 47 pages

**Document issued on** March 15, 2019

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## PUBLICATION HISTORY

Version	Date	Author	Modification
01	December 4, 2018	Majid MOURZAGH	Creation of the document
02	March 15, 2019	Majid MOURZAGH	Modification of model number

*Each new edition of this test report replaces and cancels the previous edition. The control of the old editions of report is under responsibility of client.*



## SUMMARY

1. TEST PROGRAM.....	4
2. SYSTEM TEST CONFIGURATION .....	5
3. CONDUCTED EMISSION DATA .....	9
4. RADIATED EMISSION DATA (15.209).....	13
5. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E).....	19
6. BAND-EDGE COMPLIANCE §15.209 .....	21
7. OCCUPIED BANDWIDTH .....	23
8. ANNEX 1 (GRAPHS).....	25
9. UNCERTAINTIES CHART .....	47



**1. TEST PROGRAM**

**Standard:**  
 - FCC Part 15, Subpart C  
 - ANSI C63.10 (2013)  
 - RSS-210 Issue 9  
 - RSS-Gen Issue 4

EMISSION TEST	LIMITS			RESULTS (Comments)
	Frequency	Quasi-peak value (dBµV)	Average value (dBµV)	
Limits for conducted disturbance at mains ports 150kHz-30MHz CFR 47 §15.207	150-500kHz	66 to 56	56 to 46	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
	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	<b>Measure at 300m</b> 9kHz-490kHz : 67.6dBµV/m /F(kHz) <b>Measure at 30m</b> 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) 1.705MHz-30MHz : 29.5 dBµV/m			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Radiated emissions 30MHz-25GHz* CFR 47 §15.209 (a) CFR 47 §15.225 RSS-Gen §4.9 <b>600MHz:</b> (Declaration of provider)	<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			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Fundamental field strength limit CFR 47 §15.225 RSS-210 §B.6	Operation within the band <b>13.110-14.010 MHz</b>			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Fundamental frequency tolerance CFR 47 §15.225 RSS-210 §B.6	Operation within the band <b>13.110-14.010 MHz</b>			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Band edge compliance CFR 47 §15.225 RSS-210 §B.6	Operation within the band <b>13.110-14.010 MHz</b>			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Occupied bandwidth RSS-Gen Issue 5 §6.7	No limit			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Receiver Spurious Emission** RSS-Gen Issue 5 §7.3	See RSS-Gen §7.3			<input type="checkbox"/> PASS <input type="checkbox"/> FAIL <input checked="" type="checkbox"/> NA <input type="checkbox"/> NP

\*§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.

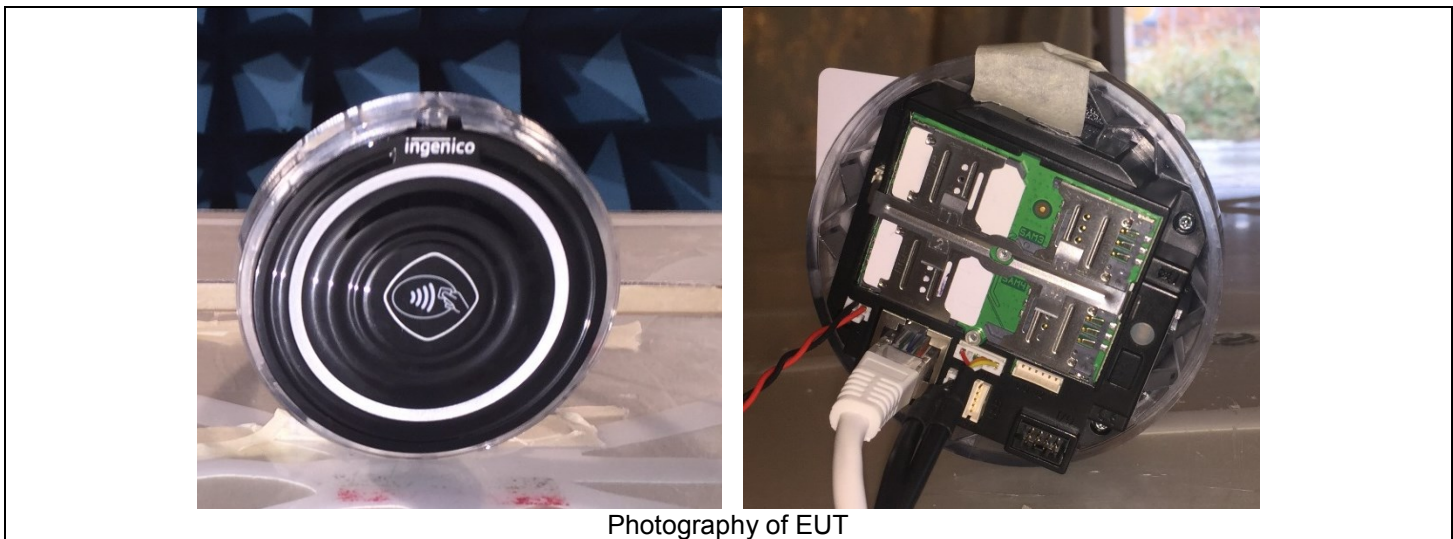
**2. SYSTEM TEST CONFIGURATION**

**2.1. JUSTIFICATION**

All test are performed with 24VDC on supply1  
 Conducted and radiated emission data are also performed with 48VDC on supply2 (POE).  
 Open1500 and OPEN 2500 are same electronics, difference is plastic casing.

**2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):**

**Equipment under test (EUT):**  
 OPEN2500 POE/BT/RS232 **Serial Number:** 18163000149



Photography of EUT

**Power supply:**  
 For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Configuration	Comments
Supply1	<input checked="" type="checkbox"/> DC	12-24VDC	/	Configuration n°1	/
Supply2	<input checked="" type="checkbox"/> DC	48VDC	/	Configuration n°2	Power supply on POE (Power Over Ethernet)

**Inputs/outputs - Cable:**

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	2wires	1.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
Ethernet_cable	RJ45 (Ethernet)	1.8	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
COM0_cable	RS232	1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
USB_Device_cable	USB	0.9	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
Access4	microSD (MMC)		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
Access5	SAM1		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
Access6	SAM2		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/



**Auxiliary equipment used during test:**

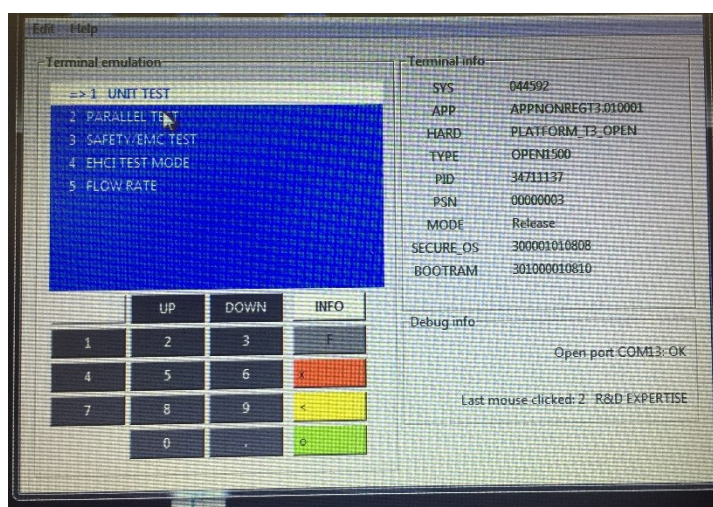
Type	Reference	Sn	Comments
Contactless card	Type A	296113752	INGENICO
POE adapter	TP-LINK / TL-POE200A	2168528003068	48VDC
AC/DC Adapter	TP-LINK Technologies Co	T480050-2C1	Input 100-240Vac Output 48VDC
Laptop	DELL	/	/
Laptop	TOSHIBA	/	/

**Equipment information:**

Frequency band:	<input checked="" type="checkbox"/> [13.553–13.567]MHz	<input type="checkbox"/> [125]kHz	<input type="checkbox"/> [ - ] MHz
Sub-band REC7003:	<input checked="" type="checkbox"/> Annex 9 (j)	<input type="checkbox"/> Annex 9 (a3)	<input type="checkbox"/> Annex ( )
RF mode:	<input type="checkbox"/> Transmitter	<input checked="" type="checkbox"/> Transceiver	<input type="checkbox"/> Receiver <input type="checkbox"/> Standby
Type:	<input checked="" type="checkbox"/> RFID	<input type="checkbox"/> EAS	<input type="checkbox"/> Other:
Bandwidth:	<input type="checkbox"/> Narrowband (ISO15693, ISO18000-3...)		<input checked="" type="checkbox"/> Wideband (ISO14443, NFC...)
Product class – Annex B.2	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input type="checkbox"/> 4
Channelized system:	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes, channel spacing: kHz	
Equipment intended for use as a	<input checked="" type="checkbox"/> Fixed	<input type="checkbox"/> Mobile	<input type="checkbox"/> Portable
Type of equipment:	<input checked="" type="checkbox"/> Stand-alone	<input type="checkbox"/> Plug-in	<input type="checkbox"/> Combined
Antenna Type:	<input type="checkbox"/> External		<input checked="" type="checkbox"/> Internal
Antenna connector:	<input type="checkbox"/> Permanent external	<input type="checkbox"/> Permanent internal	<input checked="" type="checkbox"/> None <input type="checkbox"/> Temporary (only for tests)
Antenna Gain:	0 dBi		
Duty cycle:	<input checked="" type="checkbox"/> Continuous duty	<input type="checkbox"/> Intermittent duty	<input type="checkbox"/> Continuous operation
Equipment type:	<input checked="" type="checkbox"/> Production model		<input type="checkbox"/> Prototype
Temperature range:	Tmin:	<input checked="" type="checkbox"/> -30°C	<input type="checkbox"/> 0°C <input type="checkbox"/> NC
	Tnom:	20°C	
	Tmax:	<input type="checkbox"/> 35°C	<input checked="" type="checkbox"/> 55°C <input type="checkbox"/> NC
Type of power source:	<input type="checkbox"/> AC power supply	<input checked="" type="checkbox"/> DC power supply	<input type="checkbox"/> Battery ( Select type)
Test source voltage:		Configuration n°1 ( Supply1)	Configuration n°2 ( Supply2)
	Vmin:	<input checked="" type="checkbox"/> 10.8VDC	<input checked="" type="checkbox"/> 43.2VDC
	Vnom:	<input checked="" type="checkbox"/> 24 VDC	<input checked="" type="checkbox"/> 48 VDC
	Vmax:	<input checked="" type="checkbox"/> 26.4 VDC	<input checked="" type="checkbox"/> 52.8 VDC

### 2.3. EUT CONFIGURATION

Hardware information		
Firmware (if applicable):	<b>V. :</b>	<b>OS044592</b>
Software (if applicable):	<b>V. :</b>	<b>HTB010001</b>
<b>RFID ON</b>		



### 2.4. EQUIPMENT MODIFICATIONS

None       Modification:



## 2.5. 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.

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

## 2.6. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period



### 3. CONDUCTED EMISSION DATA

#### 3.1. ENVIRONMENTAL CONDITIONS

Date of test : November 19, 2018  
Test performed by : Majid Mourzagh  
Atmospheric pressure (hPa) : 999  
Relative humidity (%) : 45  
Ambient temperature (°C) : 21

#### 3.2. 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 120Vac/60Hz

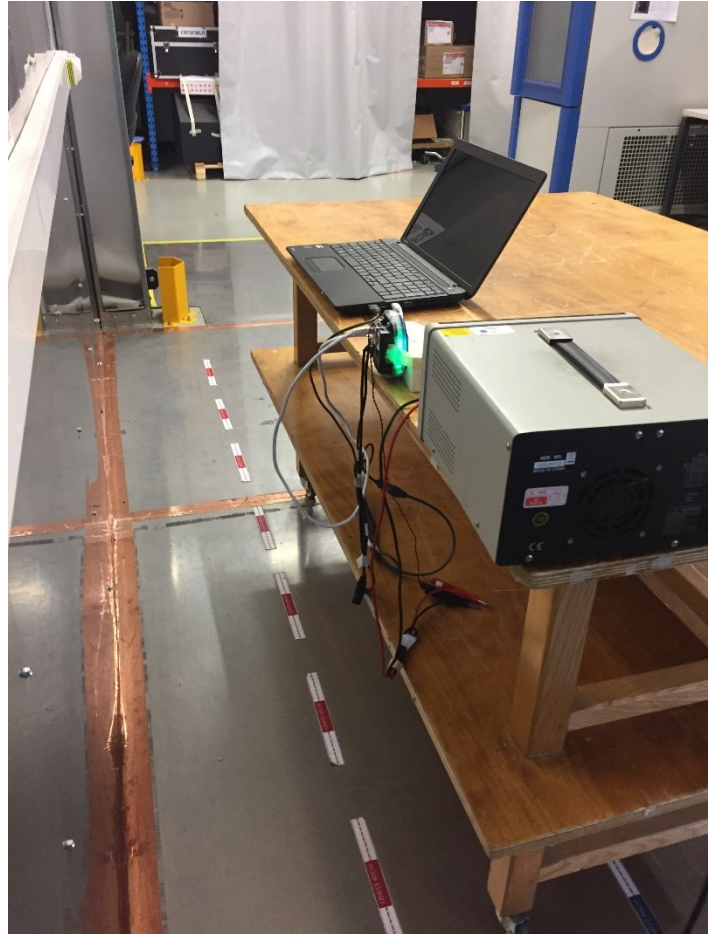
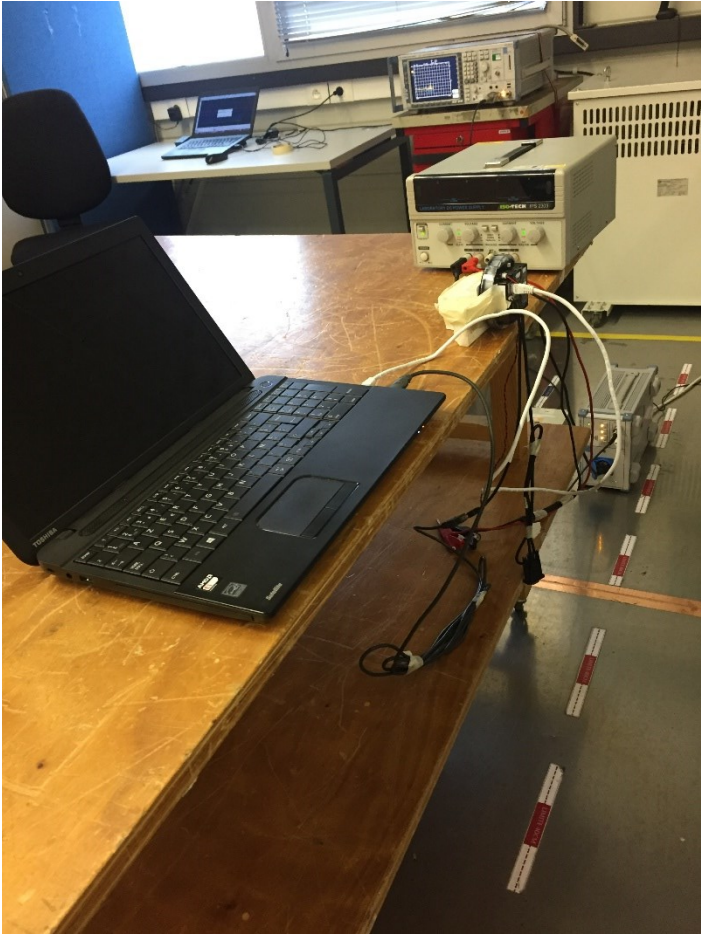
The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.



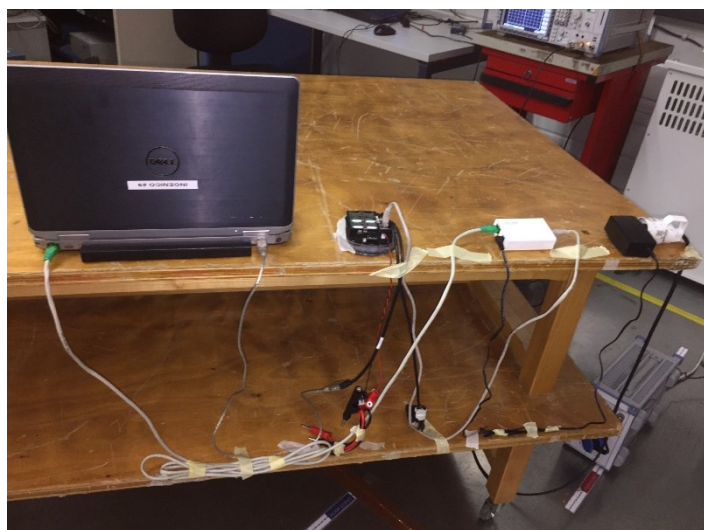
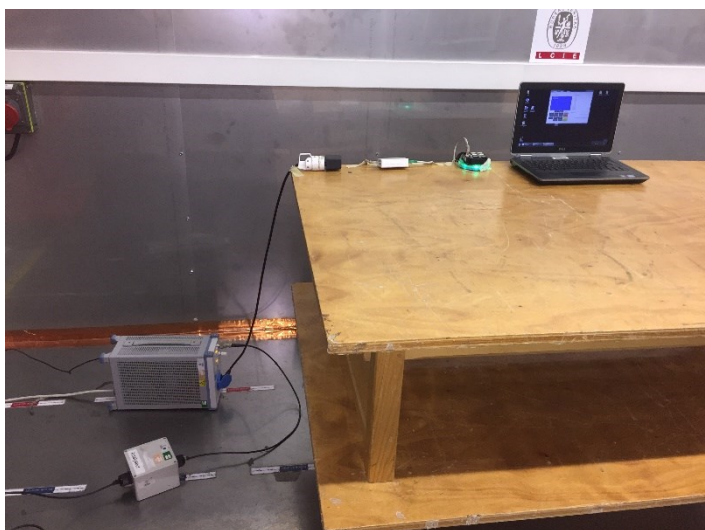
Configuration n°1



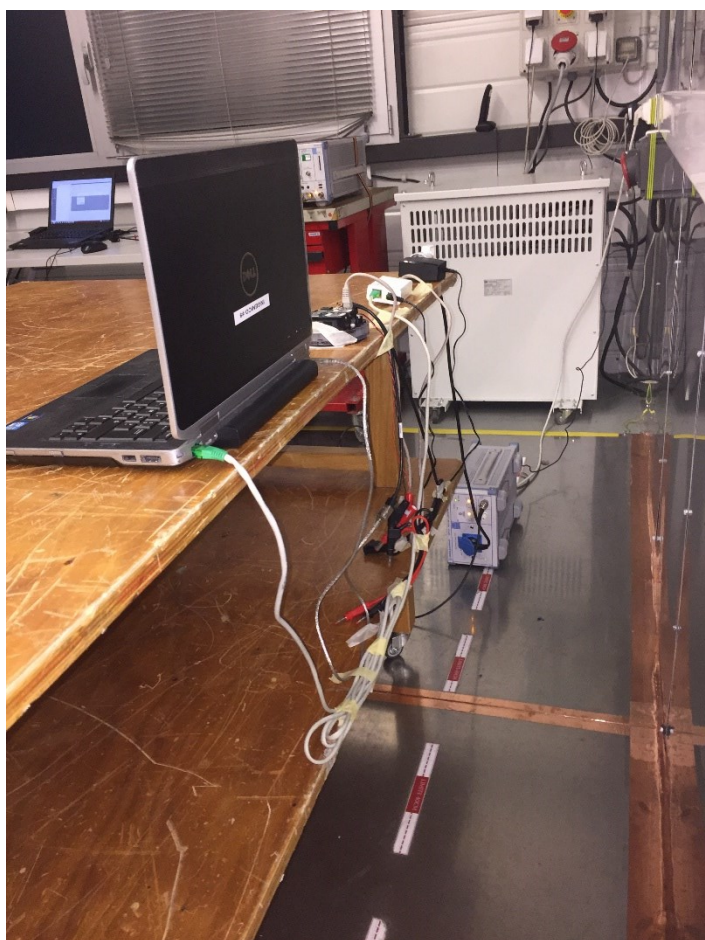
L C I E



Configuration n°1



Configuration n°2



Configuration n°2

Test setup



### 3.3. TEST METHOD

The product has been tested according to ANSI C63.10 and FCC Part 15 subpart C. The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 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. Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.

### 3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable + self	-	-	A5329578	10/18	10/19
EMC comb generator	LCIE SUD EST	-	A3169098	-	-
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	12/17	12/18
Thermo-hygrometer (PM11/2/3)	KIMO	HQ 210	B4206022	10/18	10/20
Transient limiter	RHODE & SCHWARZ	ESH3-Z2	A7122204	02/18	02/19

### 3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None  Divergence:

### 3.6. TEST RESULTS

#### Mains terminals:

#### Supply1

Measurements are performed on the phase (L1) and neutral (N) of the power line.

#### Results: (PEAK detection)

Graph identifier	Line	Comments
Emc# 1	Phase	Configuration n°1
Emc# 2	Neutral	Configuration n°1

Graph identifier	Line	Comments
Emc# 3	Phase	Configuration n°2
Emc# 4	Neutral	Configuration n°2

### 3.7. CONCLUSION

The sample of the equipment OPEN2500 POE/BT/RS232, Sn: 18163000149, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part 15 Subpart C, for conducted emissions.

#### 4. RADIATED EMISSION DATA (15.209)

##### 4.1. ENVIRONMENTAL CONDITIONS

Date of test : November 5, 2018  
 Test performed by : Majid Mourzagh  
 Atmospheric pressure (hPa) : 996  
 Relative humidity (%) : 39  
 Ambient temperature (°C) : 20

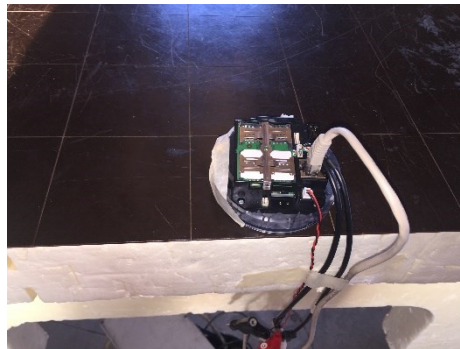
##### 4.2. TEST SETUP

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.

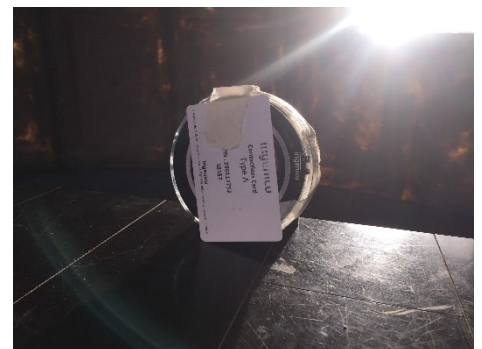
The EUT and auxiliaries are set:

- 80cm above the ground on the non-conducting table (Table-top equipment) - Below 1GHz
- 150cm above the ground on the non-conducting table (Table-top equipment) - Above 1GHz
- 10cm above the ground on isolating support (Floor standing equipment)

The EUT is powered by 24VDC on supply 1 and 48VDC on POE

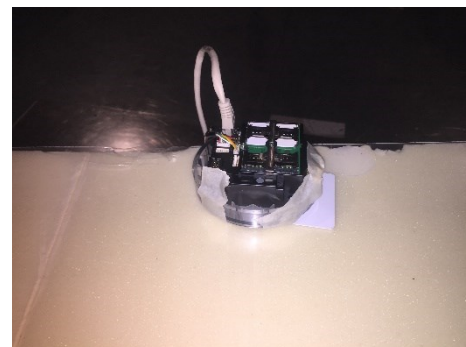


AXIS XY

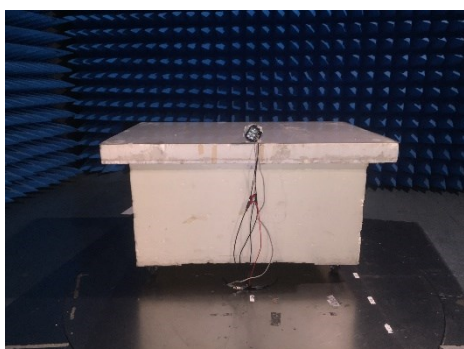


AXIS Z

Test setup on OATS



AXIS XY



AXIS Z

*Test setup on anechoic chamber*

#### 4.3. TEST METHOD

The product has been tested according to ANSI C63.10, FCC Part 15 Subpart C.

Pre-characterisation measurement: (9kHz – 6GHz)

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz 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. 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 6GHz.

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

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 limits. 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 6GHz:

The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC Part 15 Subpart C limits. Measurement bandwidth was 1MHz from 1GHz to 6GHz. 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 (EUT smaller than the beamwidth of the measurement antenna, ANSI C63.10 §6.6.5)

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

#### 4.4. TEST EQUIPMENT LIST

anechoic chamber					
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D	A7085008	12/17	12/18
Antenna Bi-Log	AH System	SAS-521-7	C2040180	09/18	09/20
Cable	-	6GHz	A5329191	06/18	06/19
Emission Cable	MICRO-COAX	18GHz	A5329657	06/18	06/19
Emission Cable	MICRO-COAX	18GHz	A5329658	03/18	03/19
Semi-Anechoic chamber #1	SIEPEL	-	D3044016	09/18	09/19
Radiated emission comb generator	BARDET	-	A3169050	-	-
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088	-	-
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	12/17	12/18
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	06/18	06/19
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Thermo-hygrometer (C1)	OREGON	WMR 80	B4206013	06/18	06/20
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 C1/OATS	LCIE	-	F2000445	-	-

OATS					
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Bi-log	CHASE	CBL6111A	C2040051	01/18	01/19
Emission Cable	SUCOFLEX	6GHz	A5329061	03/18	03/19
Cable (OATS)	-	1GHz	A5329623	03/18	03/19
Radiated emission comb generator	BARDET	-	A3169050	-	-
OATS	-	-	F2000409	10/17	10/18
Receiver 20-1000MHz	ROHDE & SCHWARZ	ESVS30	A2642006	12/17	12/19
Facteur OATS 30M-1GHz	LCIE	V3	L2000035	-	-
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	10/18	10/20
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372	-	-
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392	-	-
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403	-	-
Table C1/OATS	MATURO Gmbh	-	F2000437	-	-

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

None

Divergence:

#### 4.6. TEST RESULTS

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

See graph for 9kHz-30MHz band:

Graph identifier	Polarization	EUT position	Comments
Emr# 1	0°/90	Axis XY	Configuration n°1 See annex 1
Emr# 2	180°	Axis XY	Configuration n°1 See annex 1
Emr# 4	0°/90	Axis Z	Configuration n°1 See annex 1
Emr# 5	180°	Axis Z	Configuration n°1 See annex 1

Graph identifier	Polarization	EUT position	Comments
Emr# 8	0°/90	Axis XY	Configuration n°2 See annex 1
Emr# 9	180°	Axis XY	Configuration n°2 See annex 1
Emr# 11	0°/90	Axis Z	Configuration n°2 See annex 1
Emr# 12	180°	Axis Z	Configuration n°2 See annex 1

##### 4.6.2. Pre-characterization at 3 meters [30MHz-1GHz]

See graphs for 30MHz-1GHz:

Graph identifier	Polarization	EUT position	Comments
Emr# 3	Vertical /Horizontal	Axis XY	Configuration n°1 See annex 1
Emr# 6	Vertical /Horizontal	Axis Z	Configuration n°1 See annex 1

Graph identifier	Polarization	EUT position	Comments
Emr# 10	Vertical /Horizontal	Axis XY	Configuration n°2 See annex 1
Emr# 13	Vertical /Horizontal	Axis Z	Configuration n°2 See annex 1

##### 4.6.3. Pre-characterization at 3 meters [1GHz-6GHz]

See graphs for 1GHz-6GHz:

Graph identifier	Polarization	EUT position	Comments
Emr# 7	Vertical / Horizontal	Axis XY	Configuration n°1 See annex 1
Emr# 7bis	Vertical / Horizontal	Axis Z	Configuration n°1 See annex 1

Graph identifier	Polarization	EUT position	Comments
Emr# 14	Vertical / Horizontal	Axis XY	Configuration n°2 See annex 1
Emr# 14bis	Vertical / Horizontal	Axis Z	Configuration n°2 See annex 1

##### 4.6.4. Characterization on 10 meters open site below 30 MHz

**Worst case final data result:**

Frequency list has been created with semi-anechoic chamber pre-scan results.  
Measurements are performed using a QUASI-PEAK detection.

No	Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	Qpeak (dBµV/m) @ 30m	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
1	13.56	84	38	-46	0	90°	150	35.5	/

Note: 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 ( $\mu\text{V}/\text{m}$ )	Measurement distance (m)
13.553-13.567	15 848 84 dB $\mu\text{V}/\text{m}$	30
13.410-13.553 13.567-13.710	334 50.5 dB $\mu\text{V}/\text{m}$	30
13.110-13.410 13.710-14.010	106 40.5 dB $\mu\text{V}/\text{m}$	30

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

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

##### Worst case final data result:

Frequency list has been created with semi-anechoic chamber pre-scan results.  
Measurements are performed using a QUASI-PEAK detection.

Test Frequency (MHz)	Meter Reading dB( $\mu\text{V}$ )	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dB $\mu\text{V}/\text{m}$ )	Limit (dB $\mu\text{V}/\text{m}$ )	Margin (dB)
40.680	20.5	QP	V	90	100	15.6	36.1	40.0	-3.9
67.800	23.0	QP	V	70	110	8.4	31.4	40.0	-8.6
94.923	20.1	QP	V	70	100	11.8	31.9	43.5	-11.6
122.055	25.6	QP	V	0	100	14.5	40.1	43.5	-3.4
149.170	16.0	QP	V	60	100	14.1	30.1	43.5	-13.4
176.285	18.0	QP	V	80	100	12.0	30.0	43.5	-13.5
203.400	24.3	QP	V	0	110	12.4	36.7	43.5	-6.8
257.640	18.0	QP	V	100	110	16.0	34.0	46.0	-12.0
339.000	11.8	QP	V	0	110	18.0	29.8	46.0	-16.2
480.000	14.8	QP	V	90	110	22.0	36.8	46.0	-9.2
960.000	3.9	QP	V	0	125	31.3	35.2	46.0	-10.8
230.530	20.3	QP	V	90	100	14.4	34.7	46.0	-11.3
366.130	13.1	QP	V	0	100	18.8	31.9	46.0	-14.1
488.160	12.0	QP	H	270	170	22.2	34.2	46.0	-11.8
284.760	13.5	QP	V	270	120	16.6	30.1	46.0	-15.9
583.120	9.8	QP	H	180	120	24.2	34.0	46.0	-12.0

Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e)  
( $M@3m = M@10m + 10.5\text{dB}$ )



#### 4.6.6. Characterization on 3meters anechoic chamber from 1GHz to 6GHz

##### Worst case final data result:

The frequency list is created from the results obtained during the pre-characterization in anechoic chamber. Measurements are performed using a PEAK and AVERAGE detection.

No	Frequency (MHz)	Limit Peak (dB $\mu$ V/m)	Measure Peak (dB $\mu$ V/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
No significant frequency observed									

No	Frequency (MHz)	Limit Average (dB $\mu$ V/m)	Measure Average (dB $\mu$ V/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
No significant frequency observed									

#### 4.7. CONCLUSION

The sample of the equipment OPEN2500 POE/BT/RS232, Sn: 18163000149, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part 15 Subpart C, for radiated emissions.

## 5. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)

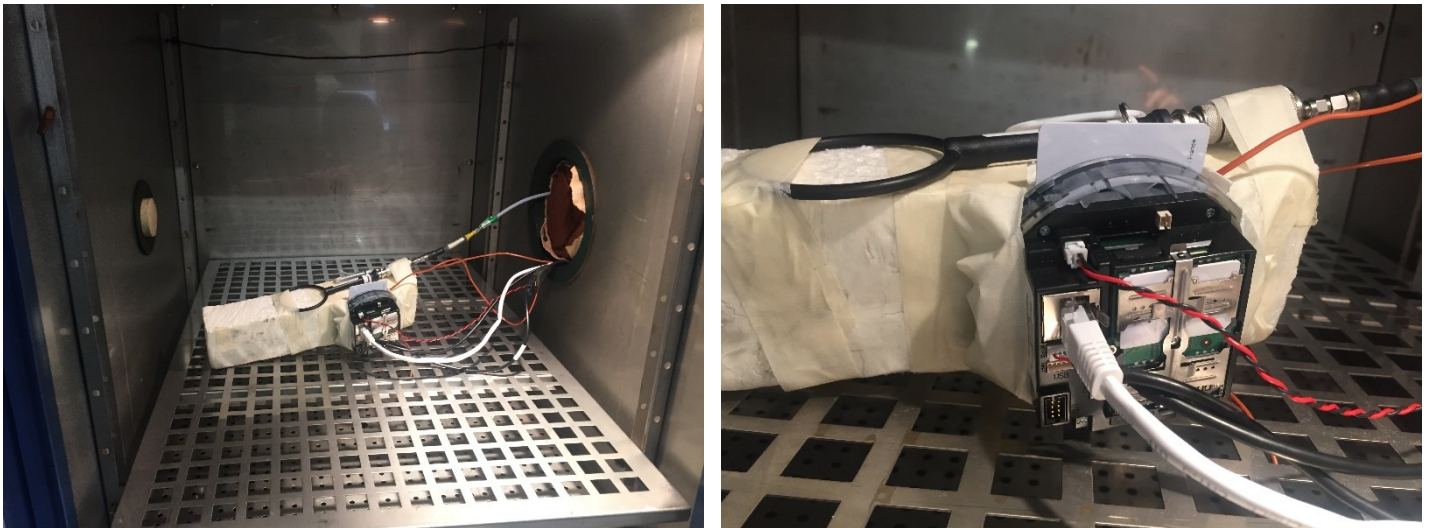
### 5.1. ENVIRONMENTAL CONDITIONS

Date of test : November 12, 2018  
Test performed by : Majid Mourzagh  
Atmospheric pressure (hPa) : 994  
Relative humidity (%) : 38  
Ambient temperature (°C) : 21

### 5.2. TEST SETUP

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.



Test setup

### 5.3. TEST METHOD

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency when the temperature is varied from  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at the nominal power voltage and the primary power voltage is varied from 85% to 115% of the rated supply voltage at  $20^{\circ}\text{C}$ .



#### 5.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040215	11/17	11/19
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	06/18	06/20
Cable SMA	-	18G	A5329373	12/17	12/18
Cable SMA 60cm	STORMFLEX	18GHz	A5329688	02/18	02/19
Thermometer (radio)	FLUKE	52 II	B4043150	08/18	08/19
Thermocouple K (radio)	FLUKE	Type K	B4045004	08/18	08/19
Thermocouple K (radio)	FLUKE	Type K	B4045005	08/18	08/19
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	10/18	10/20

#### 5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None       Divergence:

#### 5.6. TEST RESULTS

Voltage	Temperature			
	-30°C	-20°C	20°C	+50°C
Mains voltage: 24VDC on Supply 1				
Frequency Drift (MHz)	- 0.000044	- 0.000042	<b>13.560317</b>	- 0.000027
Carrier level (dBc)	+ 0.11	+ 0.11	<b>6.040000</b>	- 0.72
Mains voltage: 10.8VDC on Supply 1				
Frequency Drift (MHz)	+ 0.000004	- 0.000091	- 0.000124	- 0.000111
Carrier level (dBc)	+ 0.07	+ 0.06	+ 0.18	- 0.75
Mains voltage: 26.4VDC on Supply 1				
Frequency Drift (MHz)	- 0.000036	- 0.000015	- 0.000010	- 0.000103
Carrier level (dBc)	+ 0.11	+ 0.17	+ 0.35	- 0.79

Frequency drift measured is 91Hz when the temperature is varied from -30°C to +50°C and voltage is varied.

#### 5.1. CONCLUSION

The sample of the equipment OPEN2500 POE/BT/RS232, Sn: 18163000149, tested in the configuration presented in this test report **satisfies** to requirements of the standard FCC Part 15 Subpart C, for fundamental frequency tolerance.

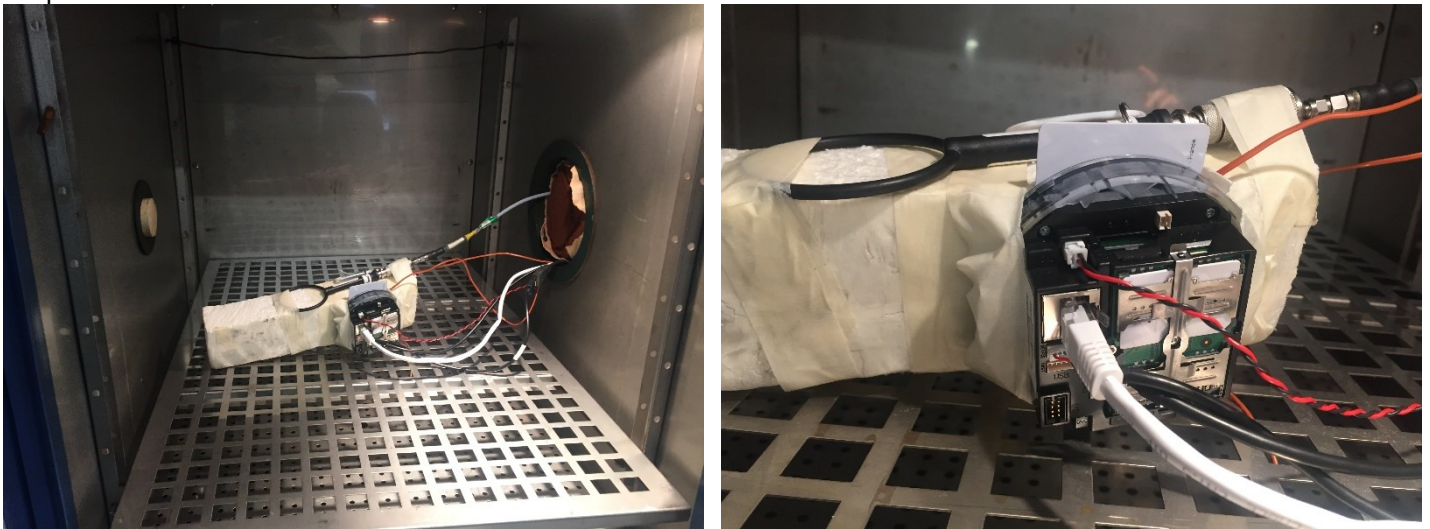
**6. BAND-EDGE COMPLIANCE §15.209**

**6.1. ENVIRONMENTAL CONDITIONS**

Date of test : November 12, 2018  
 Test performed by : Majid Mourzagh  
 Atmospheric pressure (hPa) : 994  
 Relative humidity (%) : 38  
 Ambient temperature (°C) : 21

**6.2. TEST SETUP**

For measurement, the power level calibration of the spectrum analyzer is related to the field strength measured in chapter radiated emission data.



Test setup

**6.3. TEST METHOD**

**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.

**6.4. TEST EQUIPMENT LIST**

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040215	11/17	11/19
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	06/18	06/20
Cable SMA	-	18G	A5329373	12/17	12/18
Cable SMA 60cm	STORMFLEX	18GHz	A5329688	02/18	02/19
Thermometer (radio)	FLUKE	52 II	B4043150	08/18	08/19

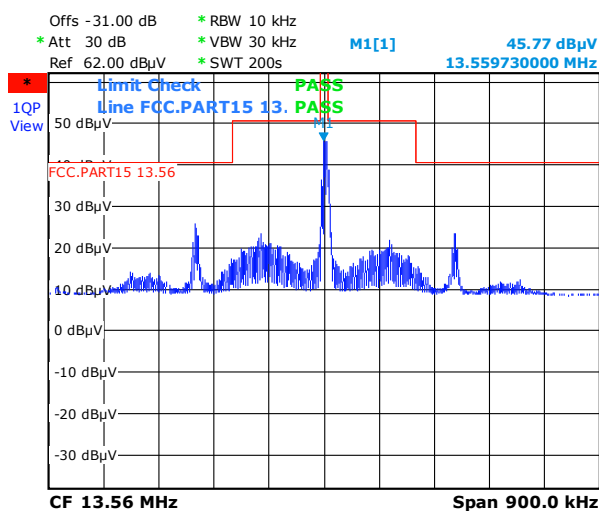


**6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION**

None       Divergence:

**6.6. TEST RESULTS**

**Frequency band 13.110-14.010MHz**



**6.7. CONCLUSION**

The sample of the equipment OPEN2500 POE/BT/RS232, Sn: 18163000149, tested in the configuration presented in this test report **satisfies** to requirements of the standard FCC Part 15 Subpart C, for band-edge compliance.

## 7. OCCUPIED BANDWIDTH

### 7.1. ENVIRONMENTAL CONDITIONS

Date of test : November 12, 2018  
Test performed by : Majid Mourzagh  
Atmospheric pressure (hPa) : 994  
Relative humidity (%) : 38  
Ambient temperature (°C) : 21

### 7.2. TEST SETUP

**Conducted measurement:**

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

Offset: Attenuator+cable 10.3dB

**Radiated measurement:**

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

**Measurement Procedure:**

1. RBW used in the range of 1% to 5% of the anticipated emission bandwidth
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = Max Hold.
5. Sweep = Auto couple.
6. Allow the trace to stabilize.
7. OBW 99% function of spectrum analyzer used





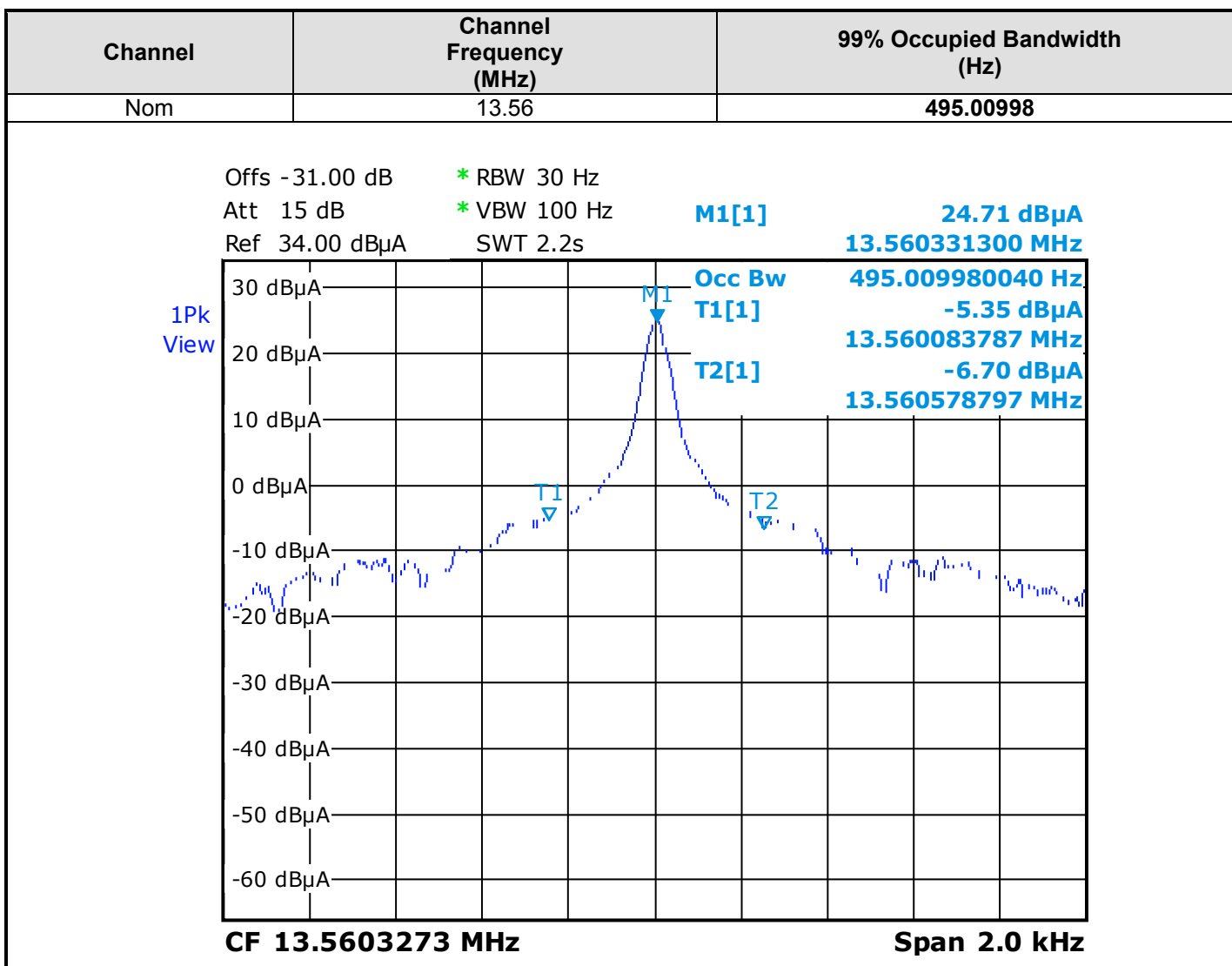
### 7.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040215	11/17	11/19
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	06/18	06/20
Cable SMA	-	18G	A5329373	12/17	12/18
Cable SMA 60cm	STORMFLEX	18GHz	A5329688	02/18	02/19
Thermometer (radio)	FLUKE	52 II	B4043150	08/18	08/19

### 7.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None       Divergence:

### 7.5. TEST SEQUENCE AND RESULTS

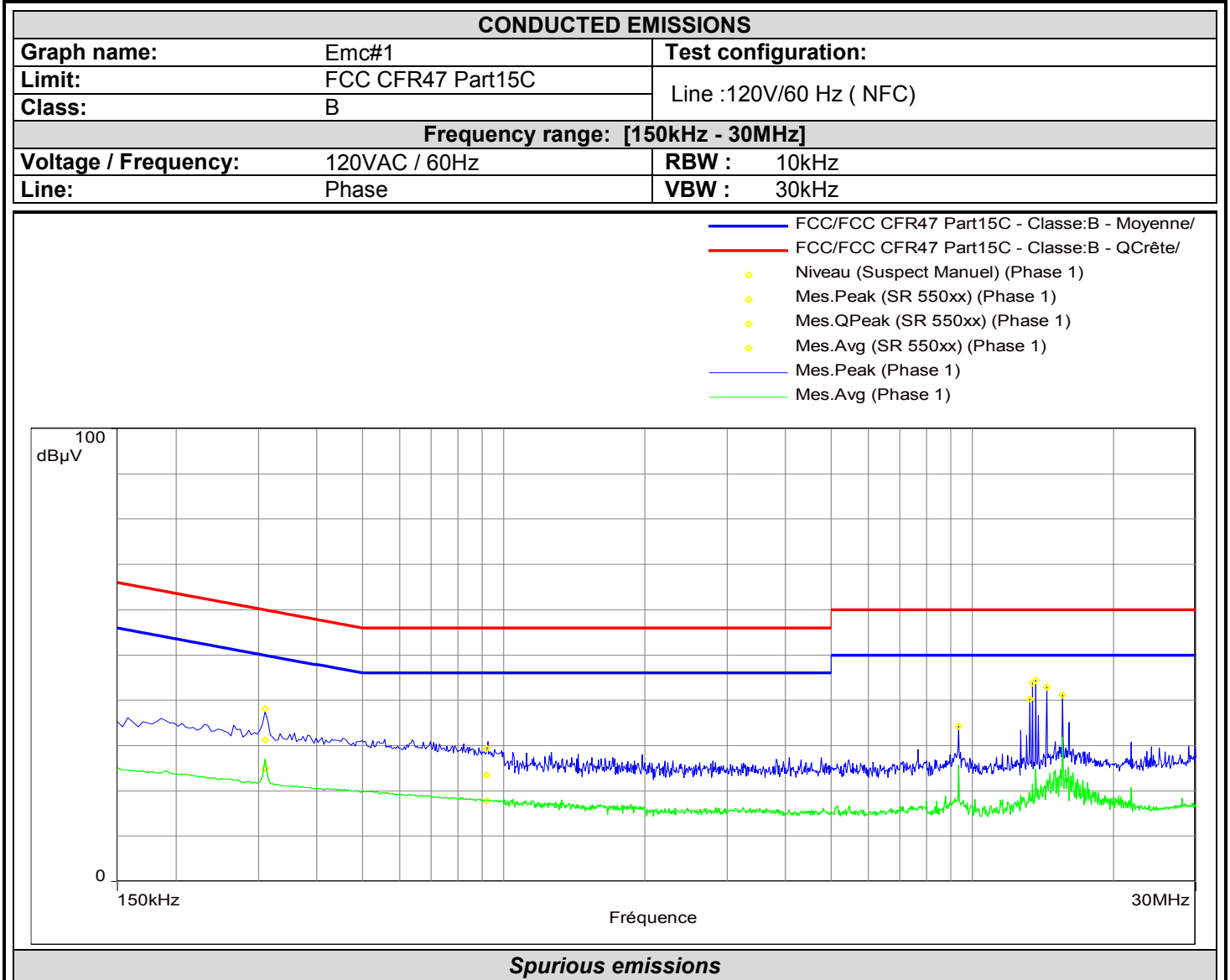






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8. ANNEX 1 (GRAPHS)



Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.310	38.2	31.2	60.0	-28.7	25.0	50.0	-25.0	Phase 1	19.5
0.922	29.4	23.5	56.0	-32.5	17.8	46.0	-28.2	Phase 1	19.5
9.352	34.3	30.2	60.0	-29.8	22.4	50.0	-27.6	Phase 1	20.2
13.272	40.26	25.4	60.0	-34.6	14.4	50.0	-35.6	Phase 1	20.3
13.452	43.82	28.7	60.0	-31.3	16.8	50.0	-33.2	Phase 1	20.4
13.652	42.86	34.9	60.0	-25.1	13.4	50.0	-36.6	Phase 1	20.5
15.588	41.2	36.4	60.0	-23.6	26.3	50.0	-23.7	Phase 1	20.6

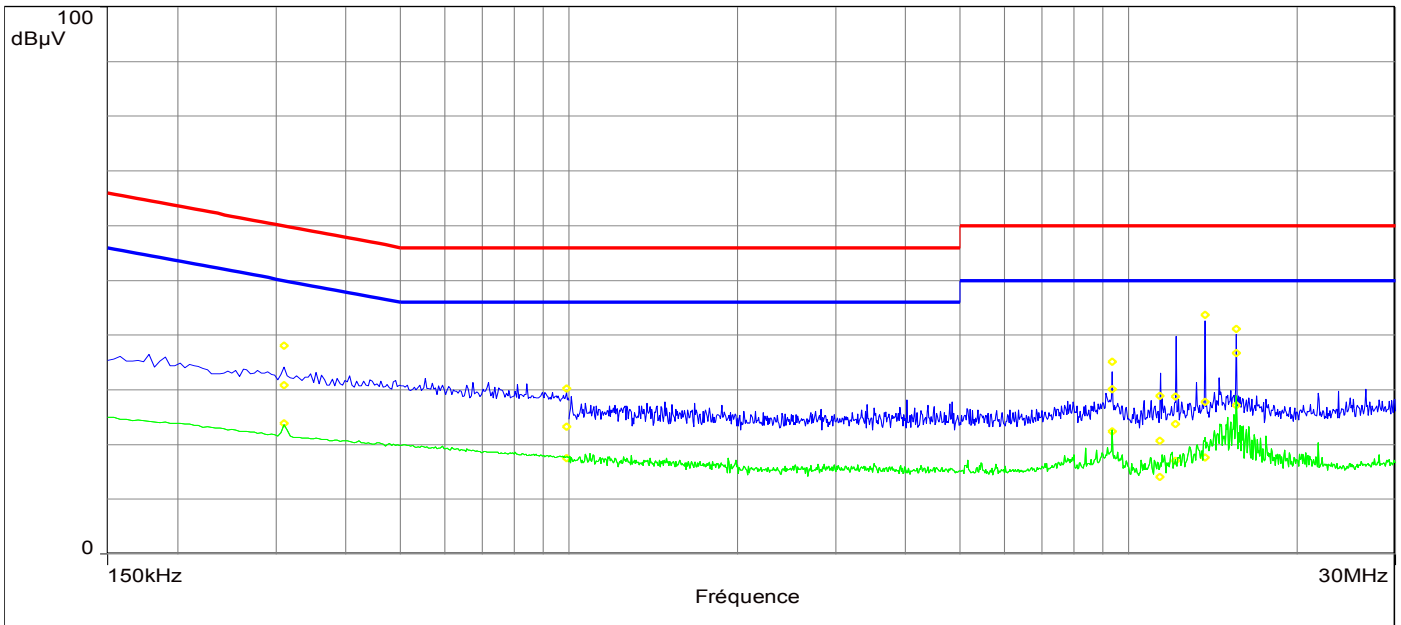


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**CONDUCTED EMISSIONS**

<b>Graph name:</b>	Emc#2	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	Neutral :120V/60 Hz (NFC)
<b>Class:</b>	B	
<b>Frequency range: [150kHz - 30MHz]</b>		
<b>Voltage / Frequency:</b>	120VAC / 60Hz	<b>RBW :</b> 10kHz
<b>Line:</b>	Neutral	<b>VBW :</b> 30kHz

- FCC/FCC CFR47 Part15C - Classe:B - Moyenne/
- FCC/FCC CFR47 Part15C - Classe:B - QCrête/
- ◇ Mes.Peak (SR 550xx) (Neutre)
- ◇ Mes.QPeak (SR 550xx) (Neutre)
- ◇ Mes.Avg (SR 550xx) (Neutre)
- Mes.Peak (Neutre)
- Mes.Avg (Neutre)

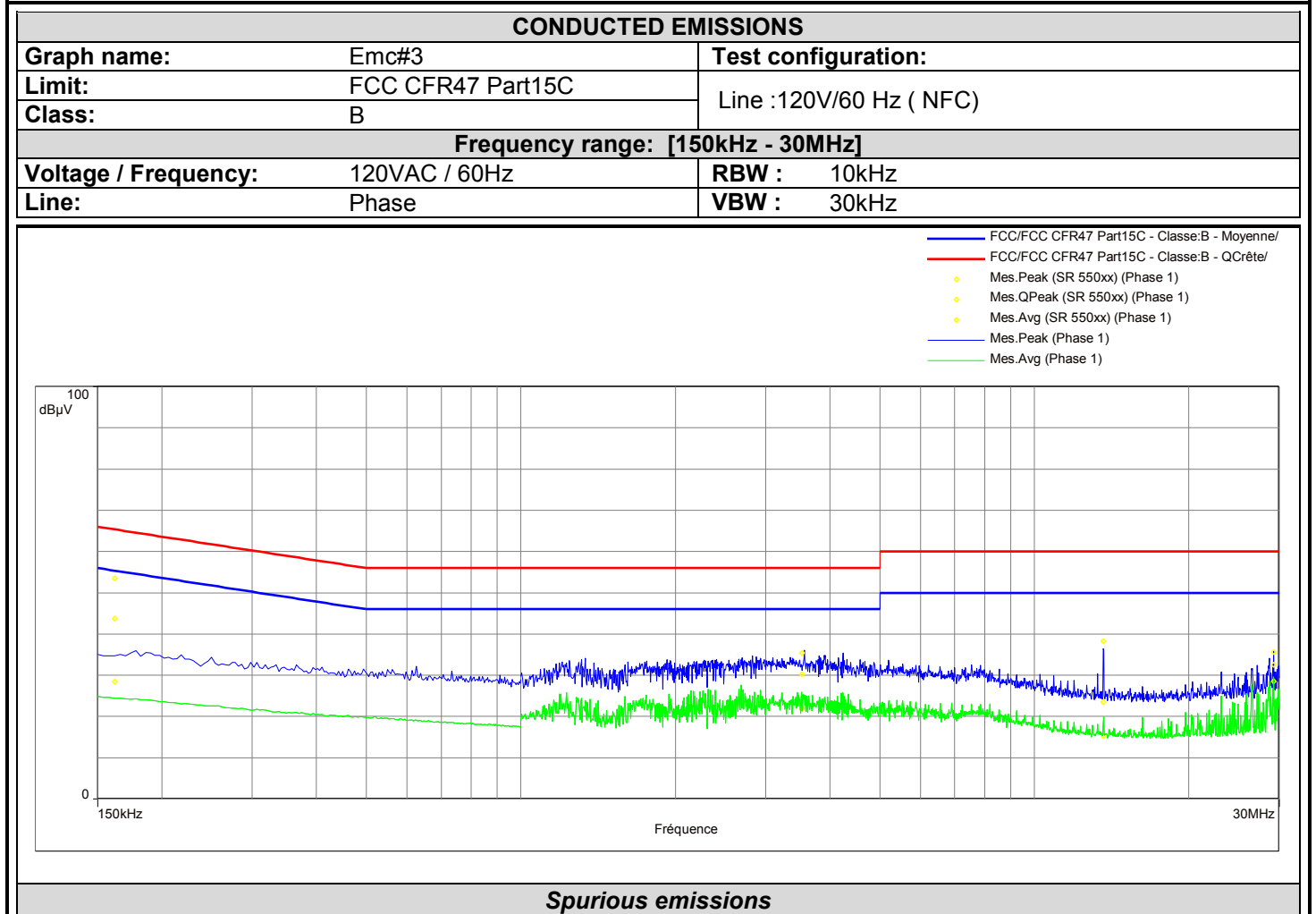


**Spurious emissions**

Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak - LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg - LimAvg (dB)	Line	Correction (dB)
0.310	38.0	30.8	60.0	-29.1	23.9	50.0	-26.1	Neutre	19.5
0.990	30.2	23.3	56.0	-32.7	17.5	46.0	-28.5	Neutre	19.5
9.352	35.1	30.2	60.0	-29.8	22.4	50.0	-27.6	Neutre	20.2
11.368	28.9	20.7	60.0	-39.3	14.1	50.0	-35.9	Neutre	20.3
12.128	28.8	23.8	60.0	-36.2	17.0	50.0	-33.0	Neutre	20.4
13.696	43.7	27.8	60.0	-32.2	17.6	50.0	-32.4	Neutre	20.5
15.576	41.1	36.8	60.0	-23.2	27.2	50.0	-22.8	Neutre	20.6



L C I E

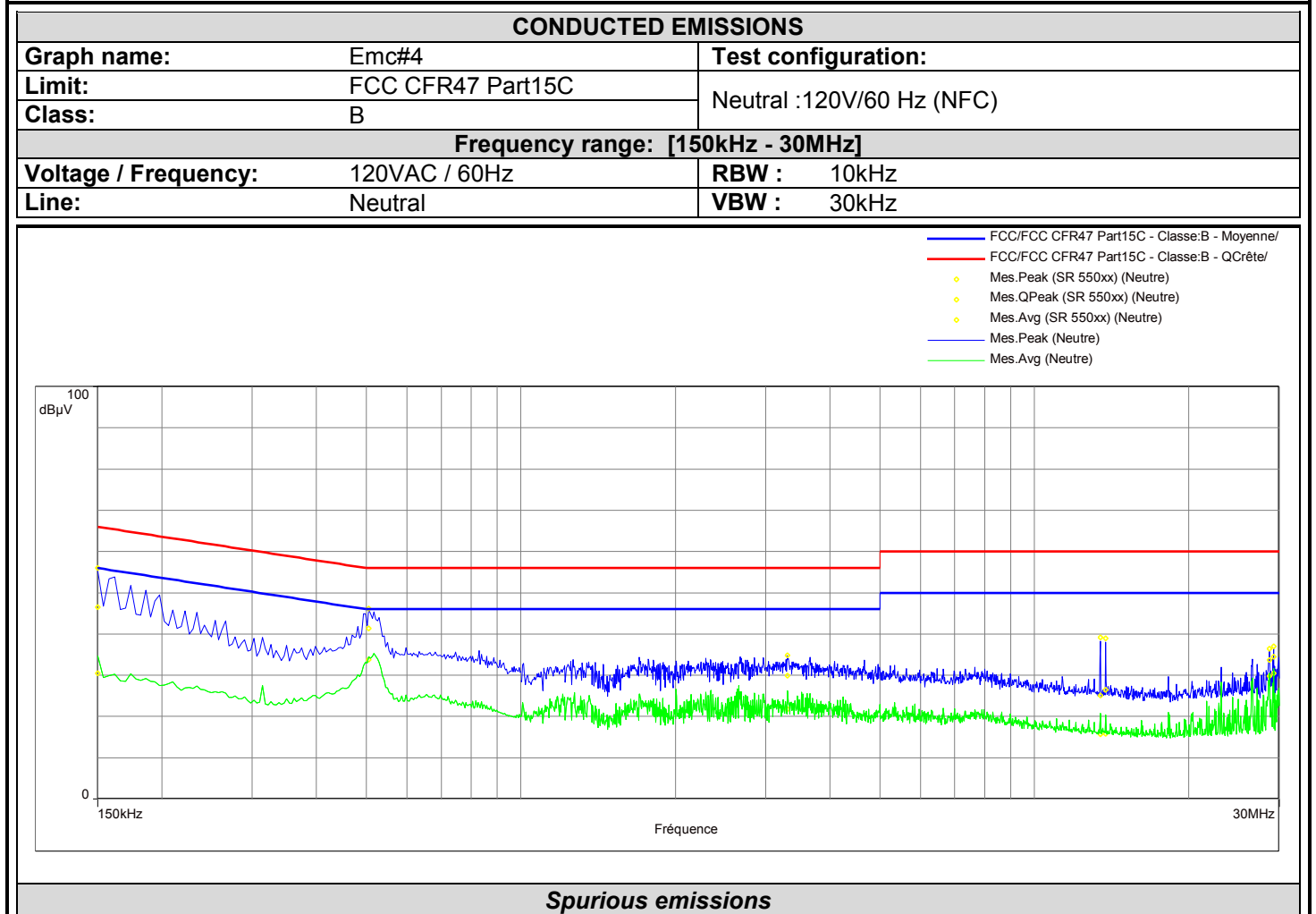


SR 550xx (4)

Fréquence (MHz)	Mes. Peak (dBµV)	Mes. QPeak (dBµV)	LimQP (dBµV)	Mes. QPeak-LimQP (dB)	Mes. Avg (dBµV)	LimAvg (dBµV)	Mes. Avg-LimAvg (dB)	Position	Correction (dB)
0.162	53.54	43.79	65.36	-21.57	28.47	55.36	-26.89	Phase 1	19.43
3.528	35.38	30.28	56.00	-25.72	21.87	46.00	-24.13	Phase 1	19.75
13.624	38.31	23.51	60.00	-36.49	15.25	50.00	-34.75	Phase 1	20.46
29.232	35.62	32.53	60.00	-27.47	28.56	50.00	-21.44	Phase 1	21.39



L C I E



**Spurious emissions**

SR 550xx (7)

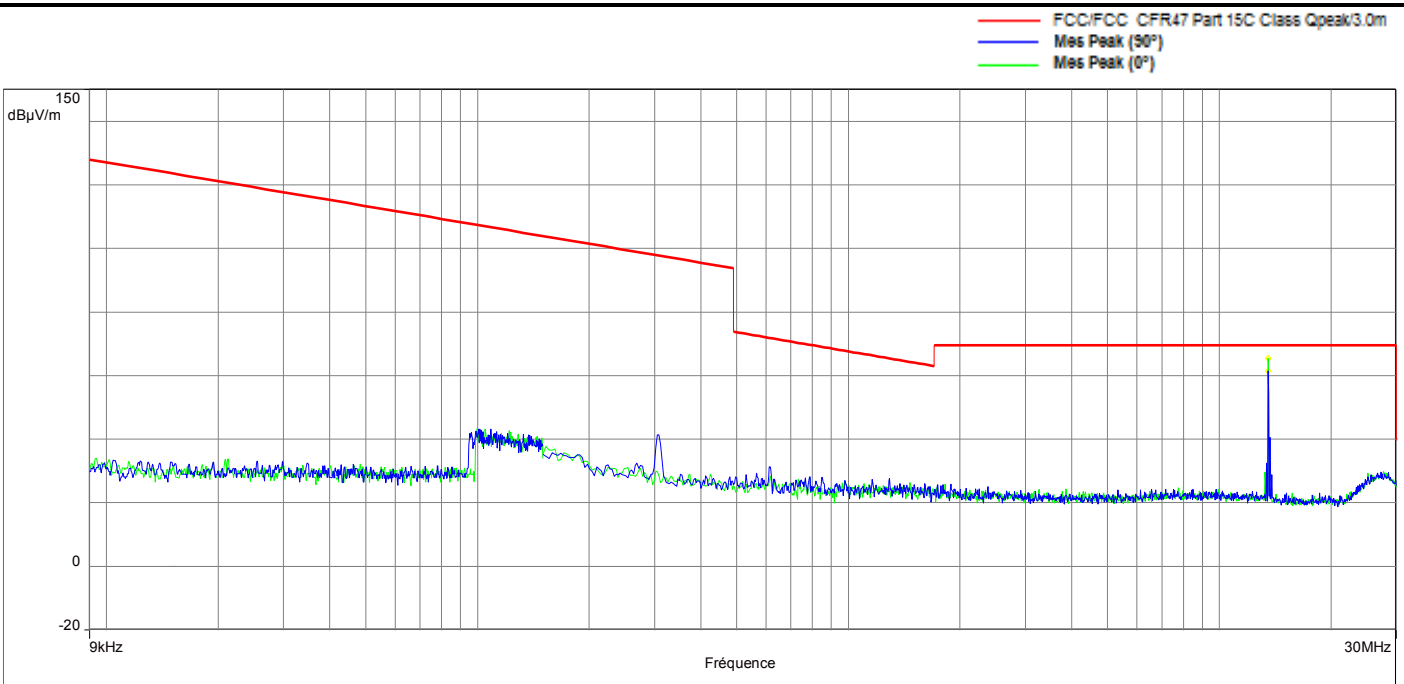
Fréquence (MHz)	Mes. Peak (dBµV)	Mes. QPeak (dBµV)	LimQP (dBµV)	Mes. QPeak-LimQP (dB)	Mes. Avg (dBµV)	LimAvg (dBµV)	Mes. Avg-LimAvg (dB)	Position	Correction (dB)
0.15	56.01	46.47	66.00	-19.53	30.51	56.00	-25.49	Neutre	19.40
0.506	46.16	41.40	56.00	-14.60	33.77	46.00	-12.23	Neutre	19.54
3.308	34.78	29.96	56.00	-26.04	21.79	46.00	-24.21	Neutre	19.73
13.444	39.20	25.09	60.00	-34.91	15.75	50.00	-34.25	Neutre	20.45
13.776	39.00	26.50	60.00	-33.50	15.79	50.00	-34.21	Neutre	20.47
28.684	36.47	33.68	60.00	-26.32	29.77	50.00	-20.23	Neutre	21.36
29.236	37.01	34.49	60.00	-25.51	30.49	50.00	-19.51	Neutre	21.39



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#1	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (0°/90°) -OPEN 2500 + 24VDC Axis XY
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	0° / 90°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz



**Spurious emissions**

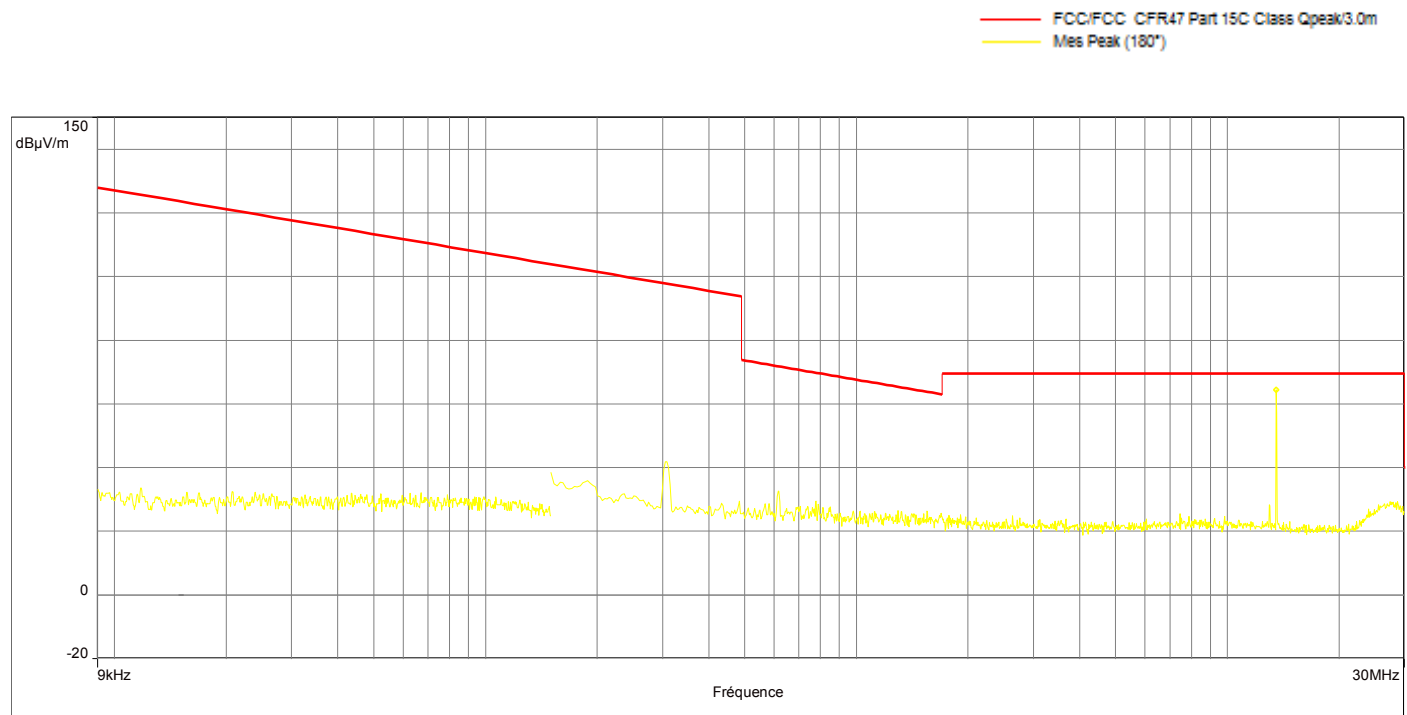
Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Hauteur (m)	Polarization	Correction (dB)
13.562	61.4	69.5	-8.1	1.6	90°	5.7
13.562	65.5	69.5	-4.0	1.6	0°	5.7



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#2	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (180°) -OPEN 2500 + 24 VDC Axis XY
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	180°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz



**Spurious emissions**

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Hauteur (m)	Polarization	Correction (dB)
13.562	64.4	69.5	-5.1	1.6	180°	5.7

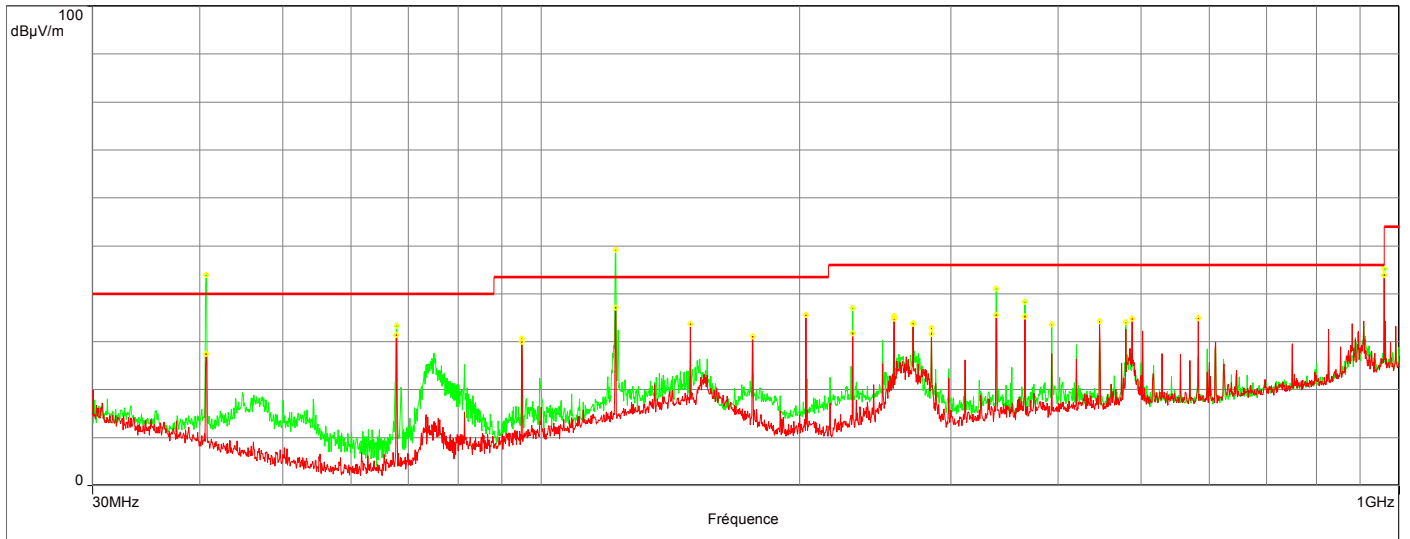


L C I E

### RADIATED EMISSIONS

<b>Graph name:</b>	Emr# 3	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC_Open 2500 + 24VDC (H+V) -Axis XY
<b>Class:</b>		
<b>Frequency range: [30MHz - 1GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz

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



**Spurious emissions**



L C I E

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Hauteur (m)	Polarization
40.676	27.5	1.6	Horizontal
67.791	31.4	1.6	Horizontal
94.923	30.7	1.6	Horizontal
122.055	37.1	1.6	Horizontal
149.170	33.8	1.6	Horizontal
176.302	31.1	1.6	Horizontal
203.400	35.6	1.6	Horizontal
230.520	31.8	1.6	Horizontal
257.640	34.9	1.6	Horizontal
271.200	33.8	1.6	Horizontal
284.760	32.9	1.6	Horizontal
339.000	35.6	1.6	Horizontal
366.120	35.3	1.6	Horizontal
447.480	34.3	1.6	Horizontal
488.160	34.9	1.6	Horizontal
583.120	34.9	1.6	Horizontal
960.000	44.0	1.6	Horizontal
40.676	43.9	1.6	Vertical
67.808	33.4	1.6	Vertical
94.923	30.1	1.6	Vertical
122.055	49.2	1.6	Vertical
230.520	37.0	1.6	Vertical
257.640	35.4	1.6	Vertical
271.200	33.9	1.6	Vertical
284.760	31.6	1.6	Vertical
339.000	41.1	1.6	Vertical
366.120	38.4	1.6	Vertical
393.240	33.7	1.6	Vertical
480.040	34.1	1.6	Vertical
960.040	45.3	1.6	Vertical



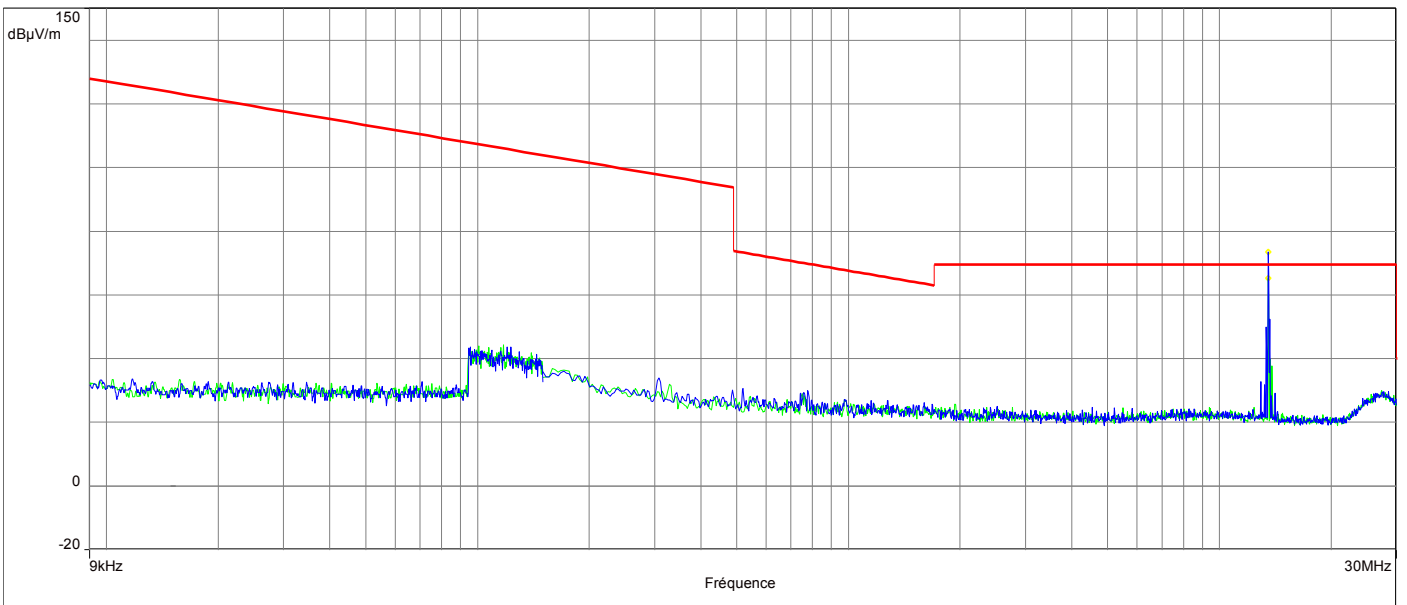


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#4	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (0°/90°) -OPEN 2500 + 24VDC Axis Z
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	0° / 90°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz

— FCC/FCC -CFR47 Part 15C Class Qpeak3.0m  
— Mes Peak (90°)  
— Mes Peak (0°)



*Spurious emissions*

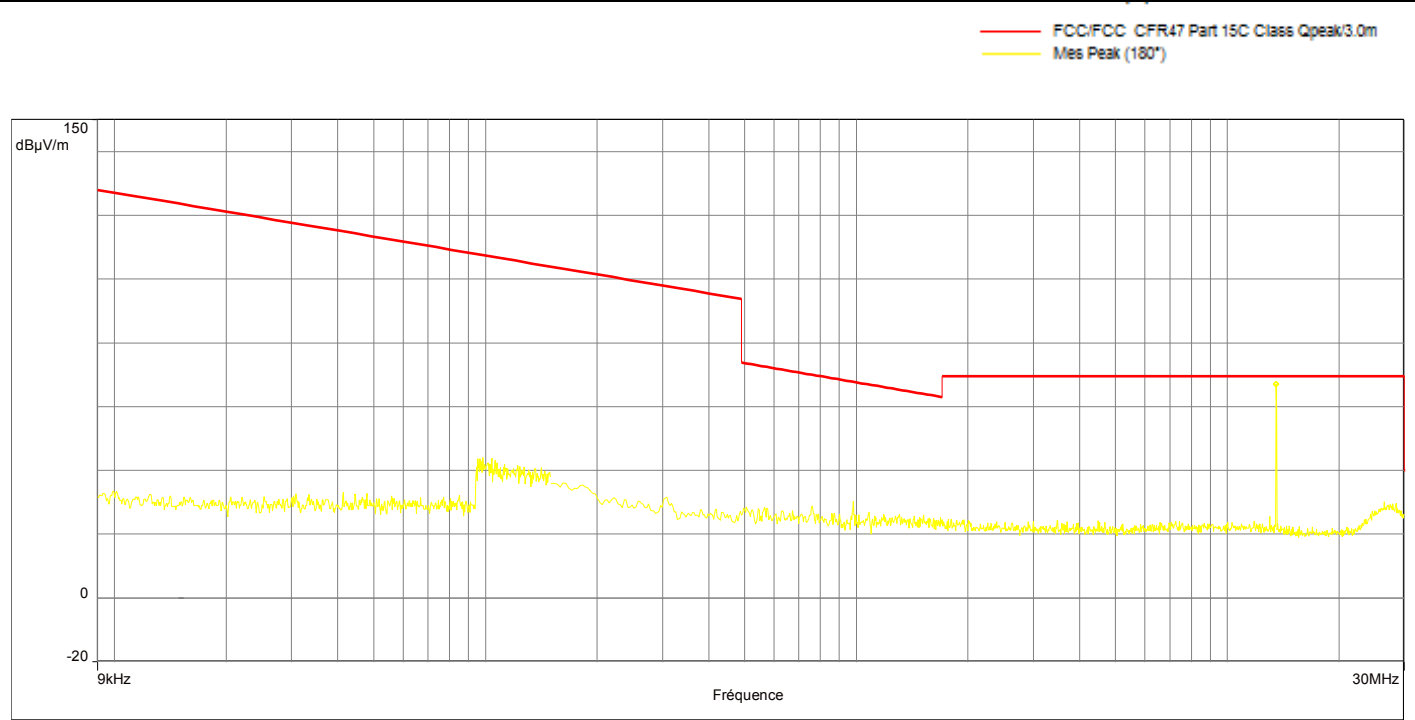
Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Hauteur (m)	Polarization	Correction (dB)
13.562	73.5	69.5	4.0	1.6	90°	5.7
13.562	65.3	69.5	-4.2	1.6	0°	5.7



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#5	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (180°) -OPEN 2500 + 24VDC Axis Z
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	180°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz



**Spurious emissions**

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Hauteur (m)	Polarization	Correction (dB)
13.562	67.2	69.5	-2.4	1.6	180°	5.7

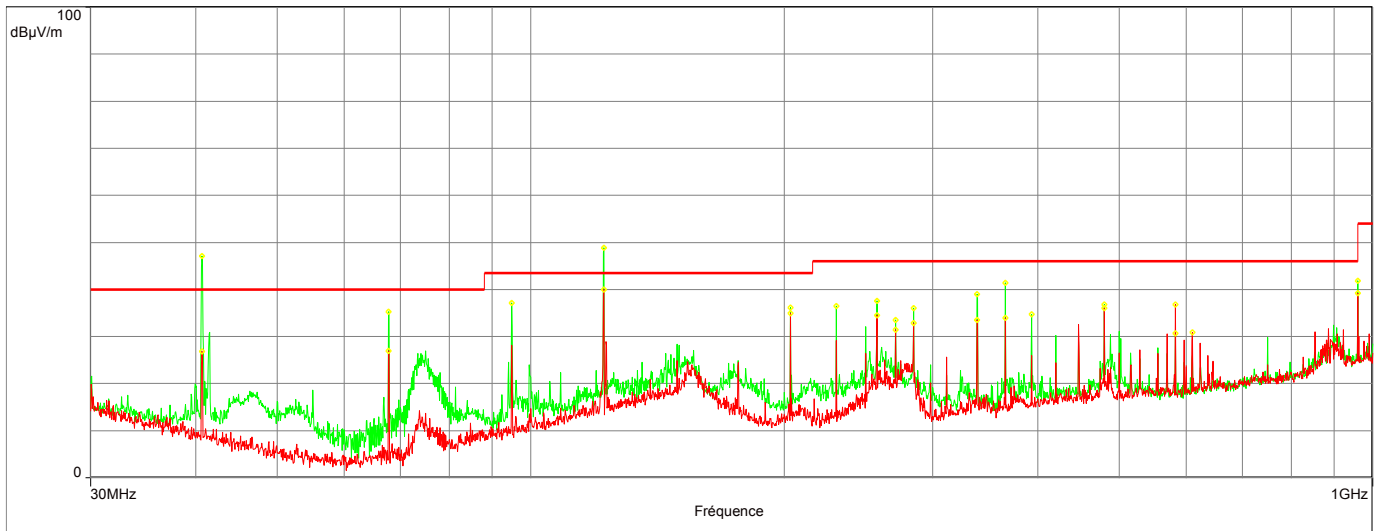


L C I E

### RADIATED EMISSIONS

<b>Graph name:</b>	Emr#6	<b>Test configuration:</b>	
<b>Limit:</b>	FCC CFR47 Part15C	FCC_Open 2500 + 24VDC (H+V) -Axis Z	
<b>Class:</b>			
<b>Frequency range: [30MHz - 1GHz]</b>			
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b>	100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b>	300kHz

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



*Spurious emissions*



L C I E

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Hauteur (m)	Polarization
40.676	26.8	1.6	Horizontal
67.791	27.0	1.6	Horizontal
122.055	40.0	1.6	Horizontal
203.400	34.9	1.6	Horizontal
257.640	34.5	1.6	Horizontal
271.200	31.5	1.6	Horizontal
284.760	32.8	1.6	Horizontal
339.000	33.6	1.6	Horizontal
366.120	33.9	1.6	Horizontal
480.000	36.0	1.6	Horizontal
583.120	36.8	1.6	Horizontal
960.040	39.2	1.6	Horizontal
40.676	47.1	1.6	Vertical
67.791	35.3	1.6	Vertical
94.923	37.1	1.6	Vertical
122.055	48.9	1.6	Vertical
203.400	36.1	1.6	Vertical
230.520	36.5	1.6	Vertical
257.640	37.6	1.6	Vertical
271.200	33.5	1.6	Vertical
284.760	36.0	1.6	Vertical
339.000	39.0	1.6	Vertical
366.160	41.4	1.6	Vertical
393.240	34.7	1.6	Vertical
480.000	36.8	1.6	Vertical
583.120	30.7	1.6	Vertical
960.040	41.8	1.6	Vertical

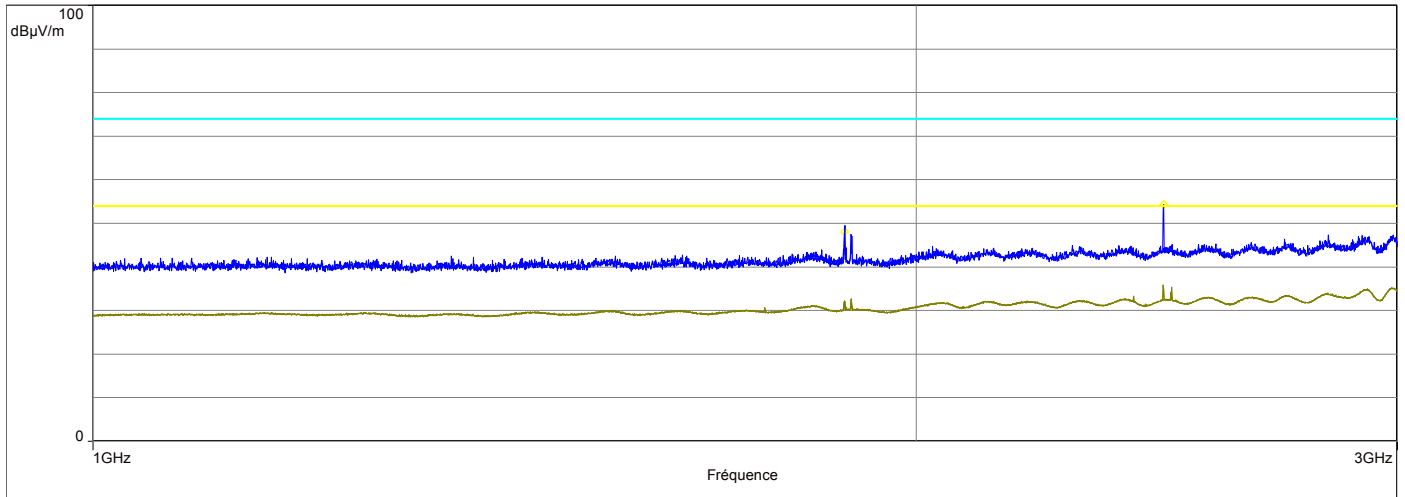


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#7	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC Open 2500 + 24VDC (H+V) -Axis XY [1-3]GHz
<b>Class:</b>		
<b>Frequency range: [1GHz - 3GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & 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 (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- ◇ Peak (Peak/LimAvg) (Horizontale)
- ◇ Peak (Peak/LimAvg) (Verticale)



**Spurious emissions**

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Hauteur (m)	Polarization	Correction (dB)
1883.000	48.0	54.0	-6.0	1.5	Horizontal	27.7
2464.000	54.4	54.0	0.4	1.5	Vertical	28.3

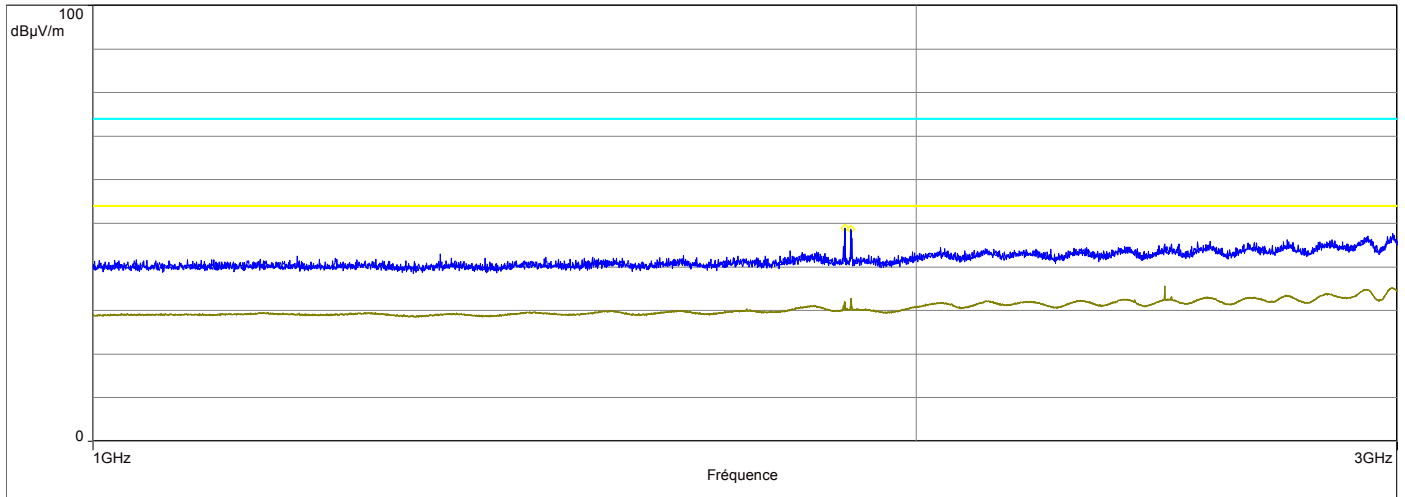


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#7bis	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	ETSI Open 2500 + 24VDC (H+V) -Axis Z [1-3]GHz
<b>Class:</b>		
<b>Frequency range: [1GHz - 3GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & 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 (Horizontale)
- Mes.Peak (Verticale)
- Mes.Avg (Horizontale)
- Mes.Avg (Verticale)
- ◇ Peak (Peak/LimAvg) (Horizontale)
- ◇ Peak (Peak/LimAvg) (Verticale)



**Spurious emissions**

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Hauteur (m)	Polarization	Correction (dB)
1884.000	48.9	54.0	-5.1	1.5	Horizontal	27.7
1893.500	48.7	54.0	-5.3	1.5	Vertical	27.7

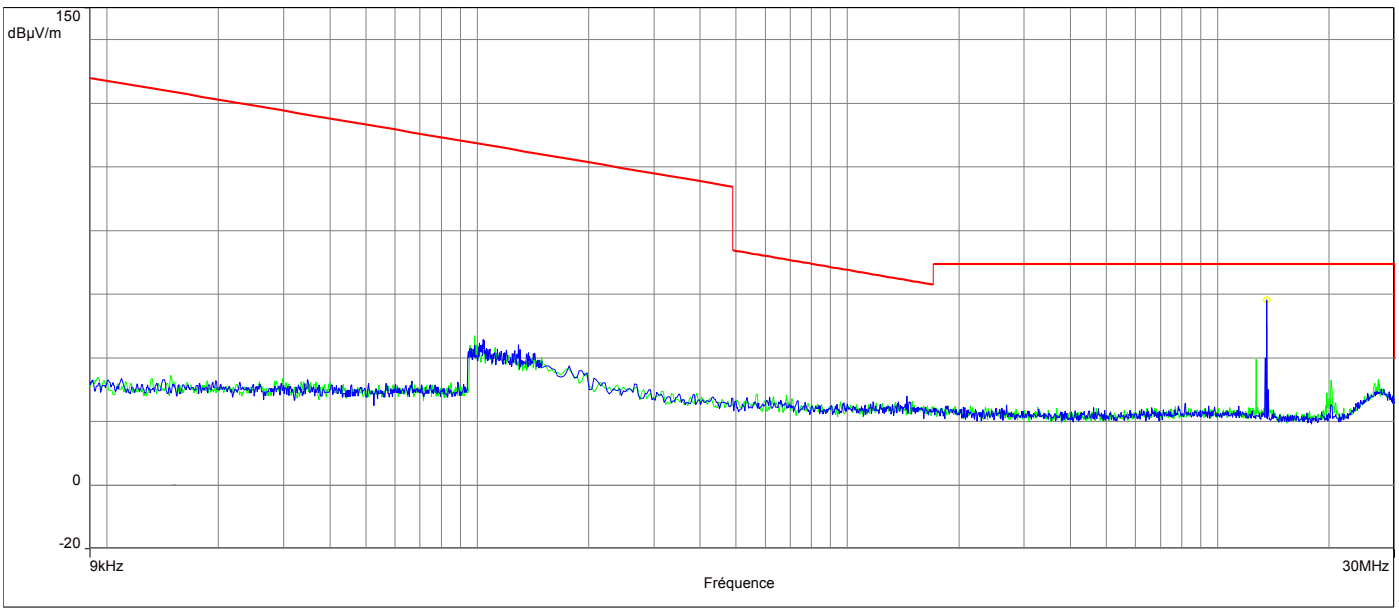


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#8	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (0°/90°) -OPEN 2500 + POE Axis XY
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	0° / 90°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz

— FCC/FCC CFR47 Part 15C Class Qpeak/3.0m  
— Mes Peak (30°)  
— Mes Peak (0°)



**Spurious emissions**

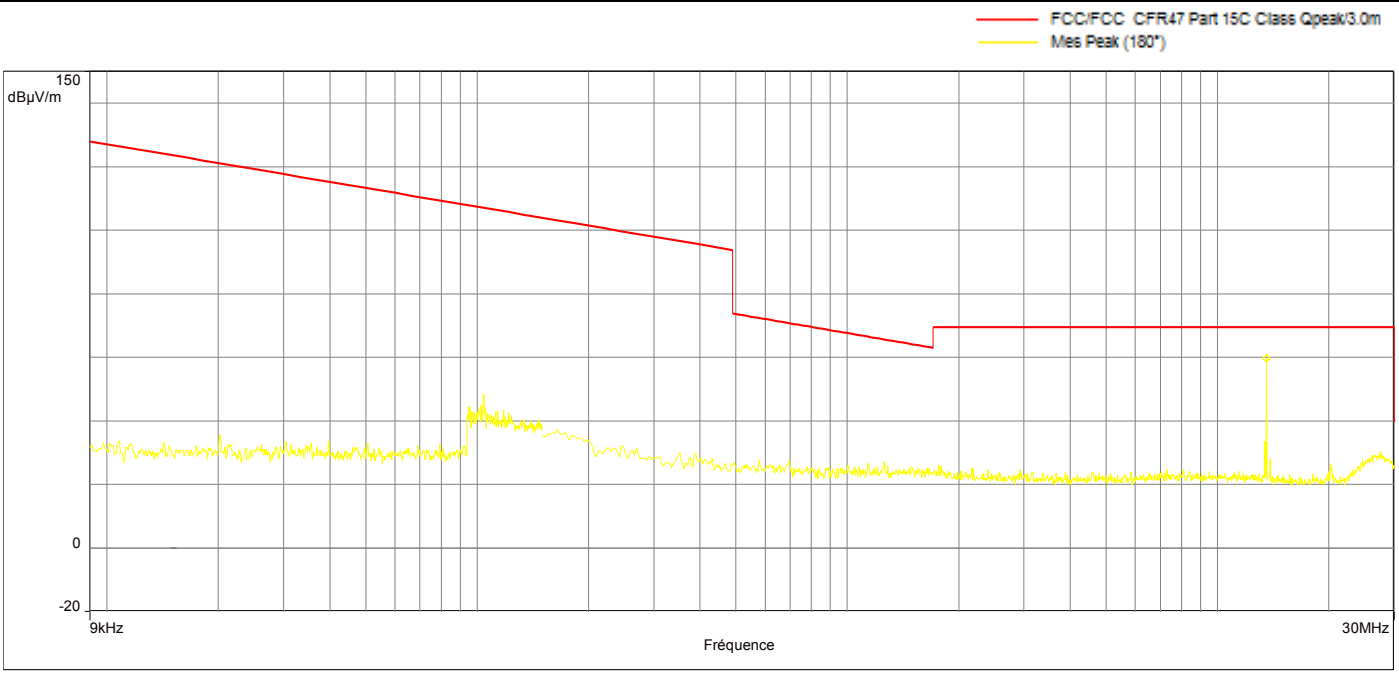
Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.562	58.3	69.5	-11.2	Horizontal	5.7



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#9	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (180°) -OPEN 2500 + PSU Axis XY
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	180°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz



*Spurious emissions*

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.562	59.6	69.5	-9.9	Horizontal	5.7



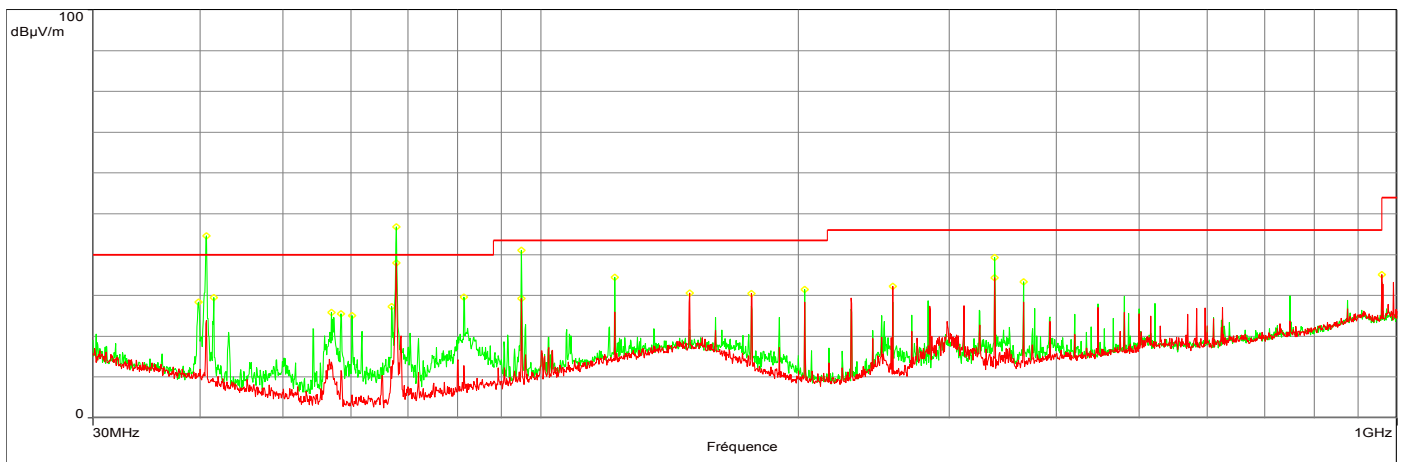


L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#10	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC_Open 2500 + PSU (H+V) -Axis XY
<b>Class:</b>		
<b>Frequency range: [30MHz - 1GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz

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



**Spurious emissions**

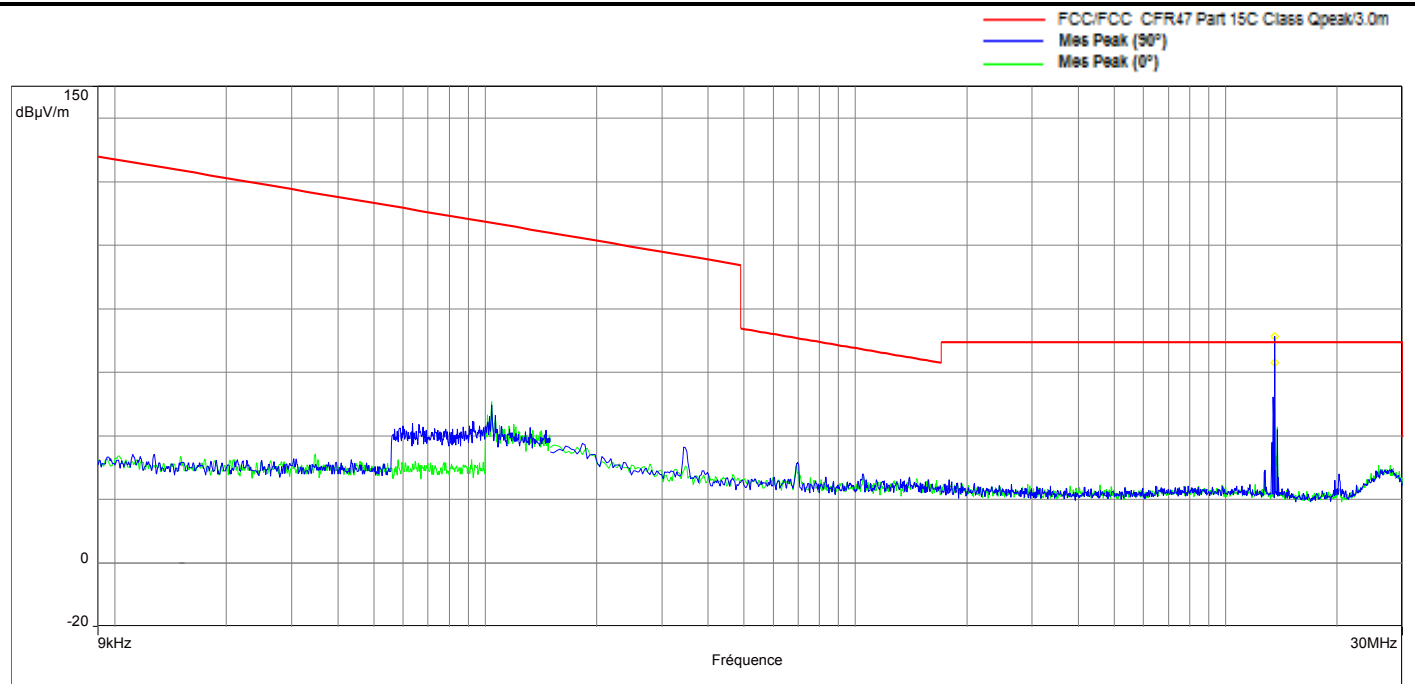
Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Hauteur (m)	Polarization	Correction (dB)
67.791	38.0	40.0	-2.0	1.5	Horizontal	-18.0
94.923	29.2	43.5	-14.3	1.5	Horizontal	-12.8
149.170	30.6	43.5	-12.9	1.5	Horizontal	-4.2
176.285	30.4	43.5	-13.1	1.5	Horizontal	-10.1
257.640	32.3	46.0	-13.7	1.5	Horizontal	-10.9
339.000	34.3	46.0	-11.7	1.5	Horizontal	-9.9
960.000	35.1	46.0	-10.9	1.5	Horizontal	1.0
39.843	28.4	40.0	-11.6	1.5	Vertical	-11.8
40.676	44.6	40.0	4.6	1.5	Vertical	-12.2
41.509	29.5	40.0	-10.5	1.5	Vertical	-12.6
56.945	25.9	40.0	-14.1	1.5	Vertical	-18.2
58.475	25.5	40.0	-14.5	1.5	Vertical	-18.3
60.192	25.1	40.0	-14.9	1.5	Vertical	-18.4
66.992	27.2	40.0	-12.8	1.5	Vertical	-18.1
67.791	46.8	40.0	6.8	1.5	Vertical	-18.0
81.374	29.6	40.0	-10.4	1.5	Vertical	-15.2
94.923	41.1	43.5	-2.4	1.5	Vertical	-12.8
122.055	34.4	43.5	-9.1	1.5	Vertical	-7.4
203.400	31.4	43.5	-12.0	1.5	Vertical	-13.2
339.000	39.3	46.0	-6.7	1.5	Vertical	-9.9
366.120	33.4	46.0	-12.6	1.5	Vertical	-9.4



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#11	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (0°/90°) -OPEN 2500 + POE Axis Z
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	0° / 90°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz



*Spurious emissions*

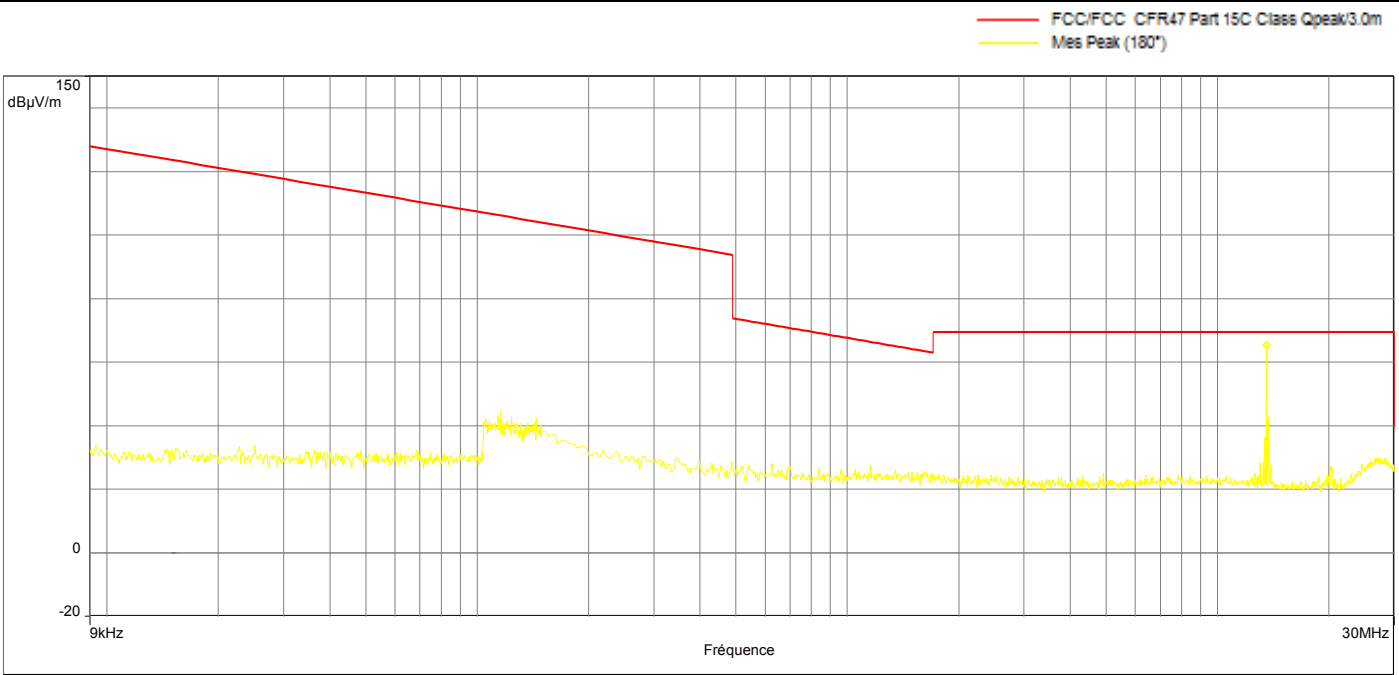
Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.562	71.4	69.5	1.9	Horizontal	5.7
13.562	63.0	69.5	-6.4	Vertical	5.7



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#12	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC - (180°) -OPEN 2500 + POE Axis Z
<b>Class:</b>		
<b>Frequency range: [9kHz - 30MHz]</b>		
<b>Antenna polarization:</b>	180°	<b>RBW :</b> 300Hz / 10KHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 1kHz / 30KHz



**Spurious emissions**

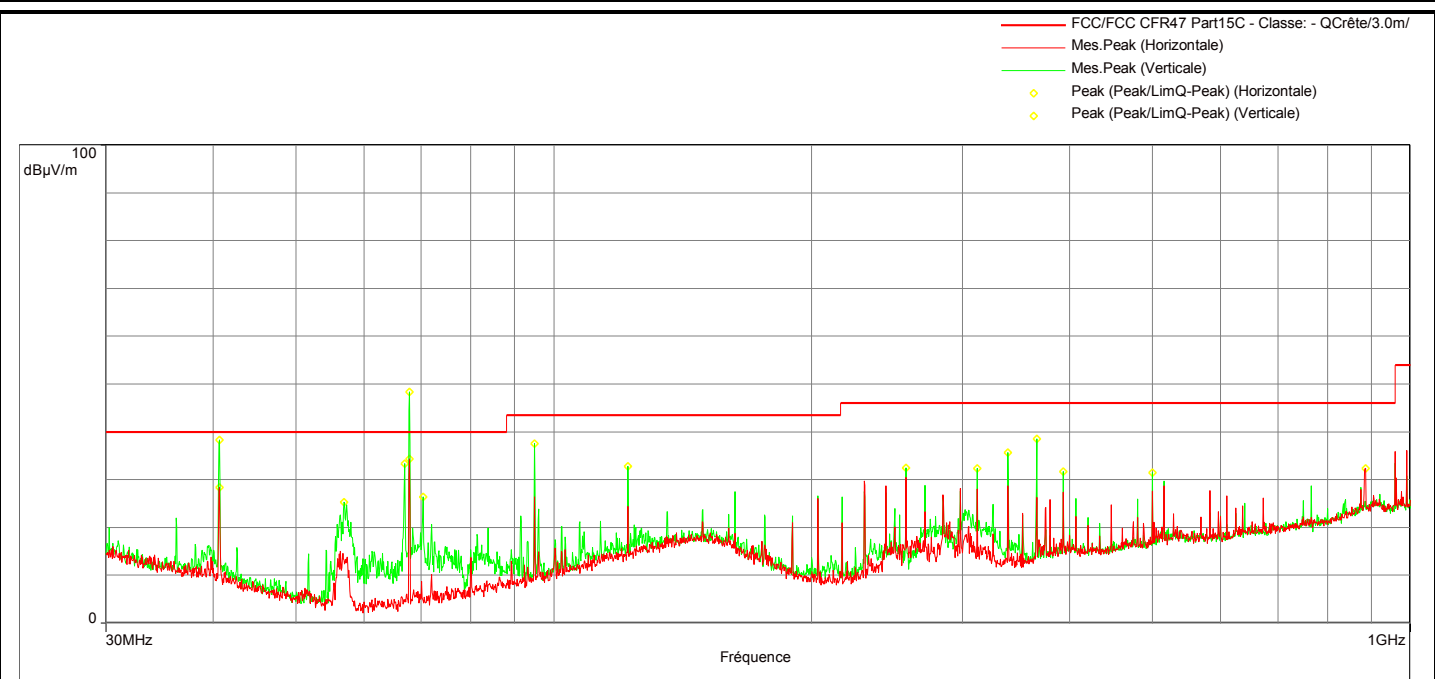
Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.562	65.3	69.5	-4.2	Horizontal	5.7



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#13	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC_Open 2500 + POE (H+V) -Axis Z
<b>Class:</b>		
<b>Frequency range: [30MHz - 1GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz



**Spurious emissions**

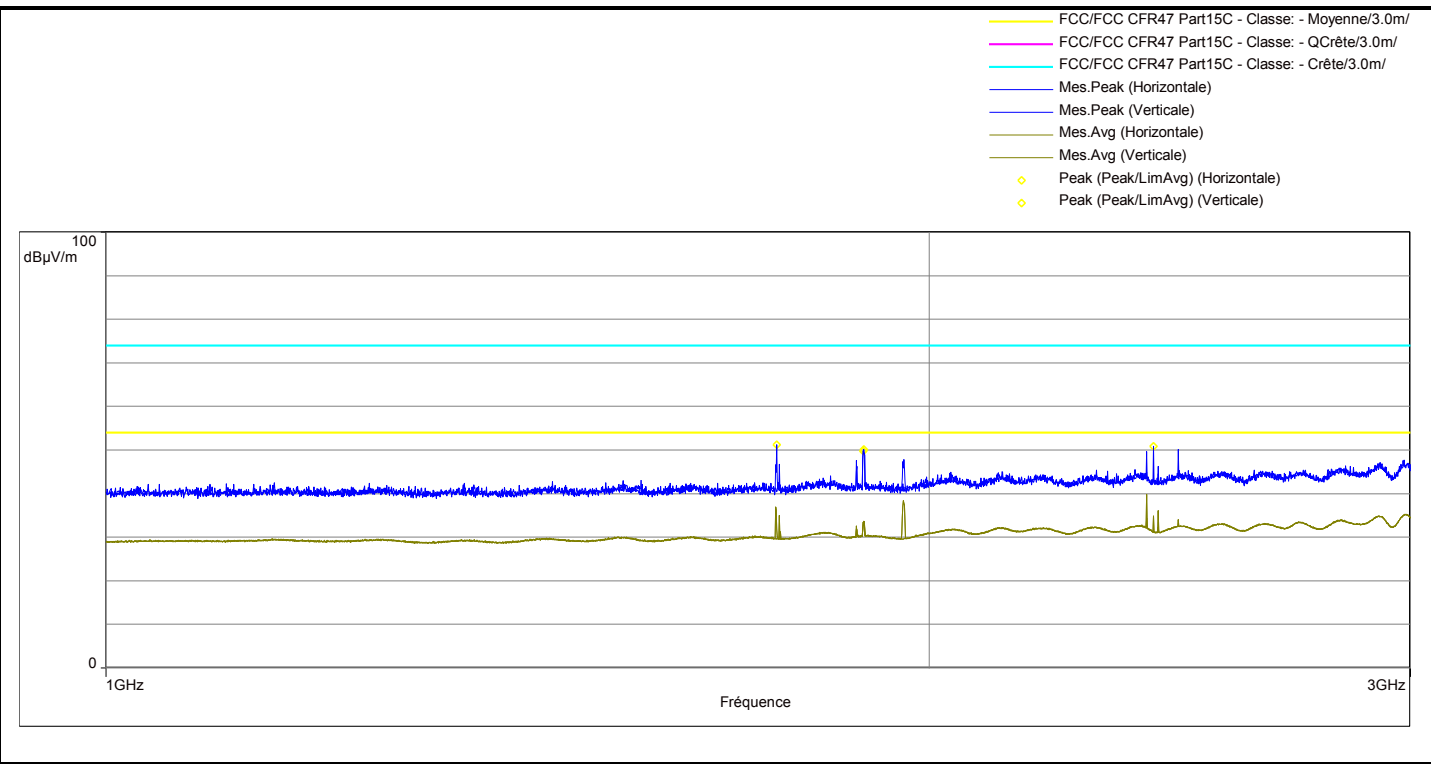
Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Hauteur (m)	Polarization	Correction (dB)
40.676	28.4	40.0	-11.6	1.5	Horizontal	-12.2
67.791	34.3	40.0	-5.7	1.5	Horizontal	-18.0
886.320	32.3	46.0	-13.7	1.5	Horizontal	0.7
40.676	38.3	40.0	-1.7	1.5	Vertical	-12.2
56.877	25.3	40.0	-14.7	1.5	Vertical	-18.1
66.992	33.4	40.0	-6.6	1.5	Vertical	-18.1
67.808	48.3	40.0	8.3	1.5	Vertical	-18.0
70.375	26.4	40.0	-13.6	1.5	Vertical	-17.6
94.923	37.5	43.5	-6.0	1.5	Vertical	-12.8
122.055	32.7	43.5	-10.8	1.5	Vertical	-7.4
257.640	32.5	46.0	-13.5	1.5	Vertical	-10.9
311.880	32.3	46.0	-13.7	1.5	Vertical	-9.3
339.000	35.6	46.0	-10.4	1.5	Vertical	-9.9
366.120	38.5	46.0	-7.5	1.5	Vertical	-9.4
393.240	31.7	46.0	-14.3	1.5	Vertical	-7.7
500.000	31.5	46.0	-14.5	1.5	Vertical	-6.7



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#14	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15C	FCC Open 2500 + POE (H+V) -Axis XY
<b>Class:</b>		
<b>Frequency range: [1GHz - 3GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 1MHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 3MHz



**Spurious emissions**

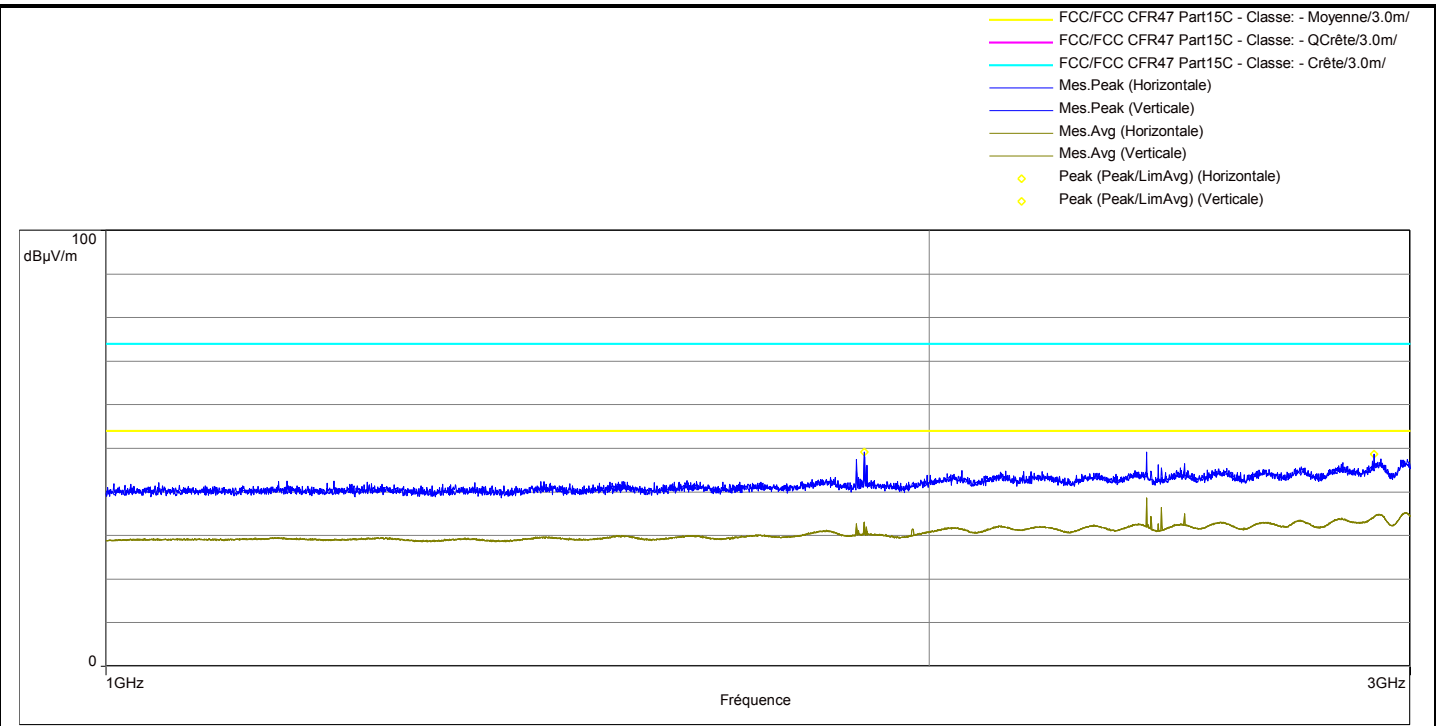
Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Hauteur (m)	Polarization	Correction (dB)
1892.000	49.8	54.0	-4.2	1.5	Horizontal	27.7
1759.000	51.2	54.0	-2.8	1.5	Vertical	27.6
1893.500	50.2	54.0	-3.8	1.5	Vertical	27.7
2416.000	50.8	54.0	-3.2	1.5	Vertical	28.2



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#14bis	<b>Test configuration:</b>	
<b>Limit:</b>	FCC CFR47 Part15C	FCC Open 2500 + POE (H+V) -Axis Z	
<b>Class:</b>			
<b>Frequency range: [1GHz - 3GHz]</b>			
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b>	1MHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b>	3MHz



**Spurious emissions**

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Hauteur (m)	Polarization	Correction (dB)
1894.000	49.2	54.0	-4.8	1.5	Horizontal	27.7
2909.000	48.7	54.0	-5.3	1.5	Vertical	28.8



## 9. UNCERTAINTIES CHART

Type de mesure / <i>Kind of measurement</i>	Incertitude élargie laboratoire / <i>Wide uncertainty laboratory (k=2) ± x</i>	Incertitude limite du CISPR / <i>CISPR uncertainty limit ± y</i>
Mesure des perturbations conduites en tension sur le réseau d'énergie <i>Measurement of conducted disturbances in voltage on the power port</i>	3.51 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>	3.26 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension <i>Measurement of discontinuous conducted disturbances in voltage</i>	3.45 dB	3.6 dB
Mesure des perturbations conduites en courant <i>Measurement of conducted disturbances in current</i>	3.09 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>	5.20 dB	6.3 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.*