Release July, 2017

TEST REPORT

N°: 163969-743777-A (File#1033145) **Version : 02**

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

Issued to

INGENICO
9 avenue de la gare
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FRANCE

Apparatus under test

Product	Payment Terminal
Trade mark	**INGENICO**
Manufacturer	**INGENICO**
Model under test	**Self/5000 CL**
Serial number	**19227731303114411067 4587**
FCCID	**XKB-SELFXCL**
IC	**2586D-SELFXCL**

Conclusion See Test Program chapter

Test date October 15, 2019 to October 17, 2019
Test location Fontenay aux roses
IC Test site 6230B-1
Composition of document 31 pages

Document issued on **November 22, 2019**

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	November 22, 2019	Majid MOURZAGH	Creation of the document
02	November 22, 2019	Majid MOURZAGH	Modification of description p1

SUMMARY

1. TEST PROGRAM

Standard: **- FCC Part 15, Subpart B and C**
- ANSI C63.10 (2013)
- RSS-210 Issue 9
- RSS-Gen Issue 5

EMISSION TEST	LIMITS			RESULTS (Comments)
Limits for conducted disturbance at mains ports 150kHz-30MHz *CFR 47 §15.207 and 15.107*	**Frequency**	**Quasi-peak value (dBµV)**	**Average value (dBµV)**	☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
	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** ☐ **FAIL** ☐ **NA** ☐ **NP**
Radiated emissions 30MHz-25GHz* *CFR 47 §15.209 (a) and 15.109* *CFR 47 §15.225* *RSS-Gen §4.9* ***Highest frequency :*** ***(Declaration of provider)***	**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** ☐ **FAIL** ☐ **NA** ☐ **NP**
Fundamental field strength limit *CFR 47 §15.225* *RSS-210 §B.6*	**Operation within the band** **13.110-14.010 MHz**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Fundamental frequency tolerance *CFR 47 §15.225* *RSS-210 §B.6*	**Operation within the band** **13.110-14.010 MHz**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Band edge compliance *CFR 47 §15.225* *RSS-210 §B.6*	**Operation within the band** **13.110-14.010 MHz**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Occupied bandwidth *RSS-Gen Issue 5 §6.7*	**No limit**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Receiver Spurious Emission** *RSS-Gen Issue 5 §7.3*	**See RSS-Gen §7.3**			☐ **PASS** ☐ **FAIL** ☑ **NA** ☐ **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. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
Self/5000 CL
Serial Number: 19227731303114411067 4587

Photography of EUT

Power supply:
During all the tests, EUT is supplied by V_{nom}: 12VDC
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	☐ AC ☑ DC ☐ Battery	9-16VDC	/	/

Voltage table used:

Type	Measurement performed:	
☑ AC	☑ **120VAC/60Hz**	☑ **240VAC/50Hz**
☑ DC	☑ **9-16VDC**	☐ **-....VDC**

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	2 wires	0.30	☐	☐	☑	/
COM0	RS232	1.8	☐	☐	☑	/
COM2	RS232	1.8	☐	☐	☑	/
Host USB1	USB	1.5	☐	☑	☑	/
Host USB2	USB	1.5	☐	☑	☑	/
ETH	RJ45 (Ethernet)	1.8	☐	☐	☑	/
Access6	SAM1	-	☐	☐	☑	/
Access7	SAM2	-	☐	☐	☑	/
Access8	µSD	-	☐	☐	☑	/
Access9	CAM0	-	☐	☐	☑	/
Slave USB	USB	1	☐	☑	☑	/

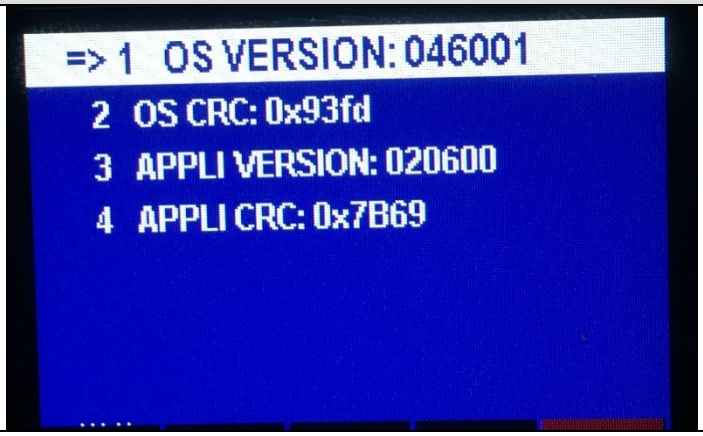
Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Contactless card	Type A	296113752	INGENICO
Cam card	/	/	Cam0
AC/DC power source	KEYSIGHT	AC6802A -	A7042305
DC Power supply	AFX	LCIE : A7042292	Used during conducted emission data
Laptop	DELL E6430	/	/

Equipment information:

Frequency band:	☑ [13.553–13.567]MHz	☐ [125]kHz	☐ [-] MHz	
RF mode:	☐ Transmitter	☑ Transceiver	☐ Receiver	☐ Standby
Type:	☑ RFID	☐ EAS	☐ Other:	
Bandwidth:	☐ Narrowband (ISO15693, ISO18000-3…)		☑ Wideband (ISO14443, NFC…)	
Product class – Annex B.2	☑ 1	☐ 2	☐ 3	☐ 4
Channelized system:	☑ No	☐ Yes, channel spacing: kHz		
Equipment intended for use as a	☑ Fixed	☐ Mobile	☐ Portable	
Type of equipment:	☑ Stand-alone	☐ Plug-in	☐ Combined	
Antenna Type:	☐ External		☑ Internal	
Antenna connector:	☐ Permanent external	☐ Permanent internal	☑ None	☐ Temporary (only for tests)
Antenna Gain:	0 dBi			
Duty cycle:	☑ Continuous duty	☐ Intermittent duty	☐ Continuous operation	
Equipment type:	☑ Production model		☐ Prototype	
Temperature range:	Tmin:	☑ -20°C	☐ 0°C	☐ °C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☐ 55°C	☑ +65 °C
Type of power source:	☐ AC power supply	☑ DC power supply	☐ Battery (Select type)	
Test source voltage:	Vmin:	☐ 207V/50Hz	☑ 9 VDC	
	Vnom:	☐ 230V/50Hz	☑ 12 VDC	
	Vmax	☐ 253V/50Hz	☑ 16 VDC	

2.2. EUT CONFIGURATION

Hardware information

RFID ON

2.3. EQUIPMENT MODIFICATIONS

☑ None ☐ Modification:

2.4. FIELD STRENGTH CALCULATION

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

FS = RA + AF + CF – AG

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

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

2.5. 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	:	October 15, 2019
Test performed by	:	Majid Mourzagh
Atmospheric pressure (hPa)	:	1001
Relative humidity (%)	:	41
Ambient temperature (°C)	:	21

3.2. TEST SETUP

Mains terminals

The EUT and auxiliaries are set:

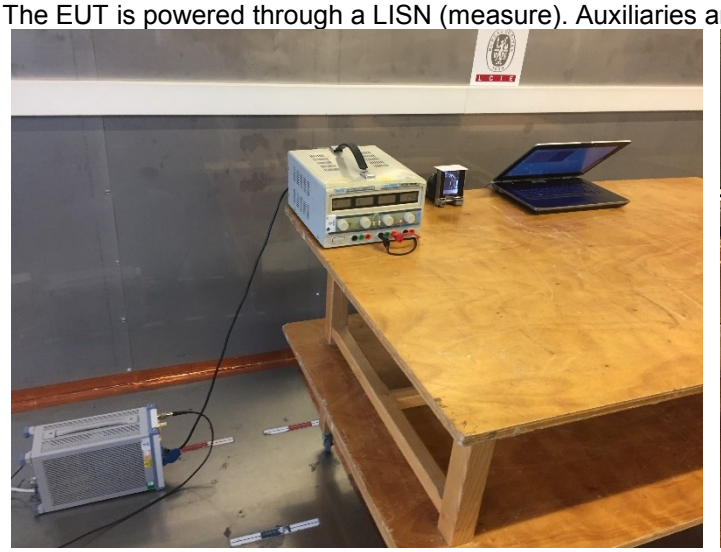
☑ 80cm above the ground on the non-conducting table (Table-top equipment)

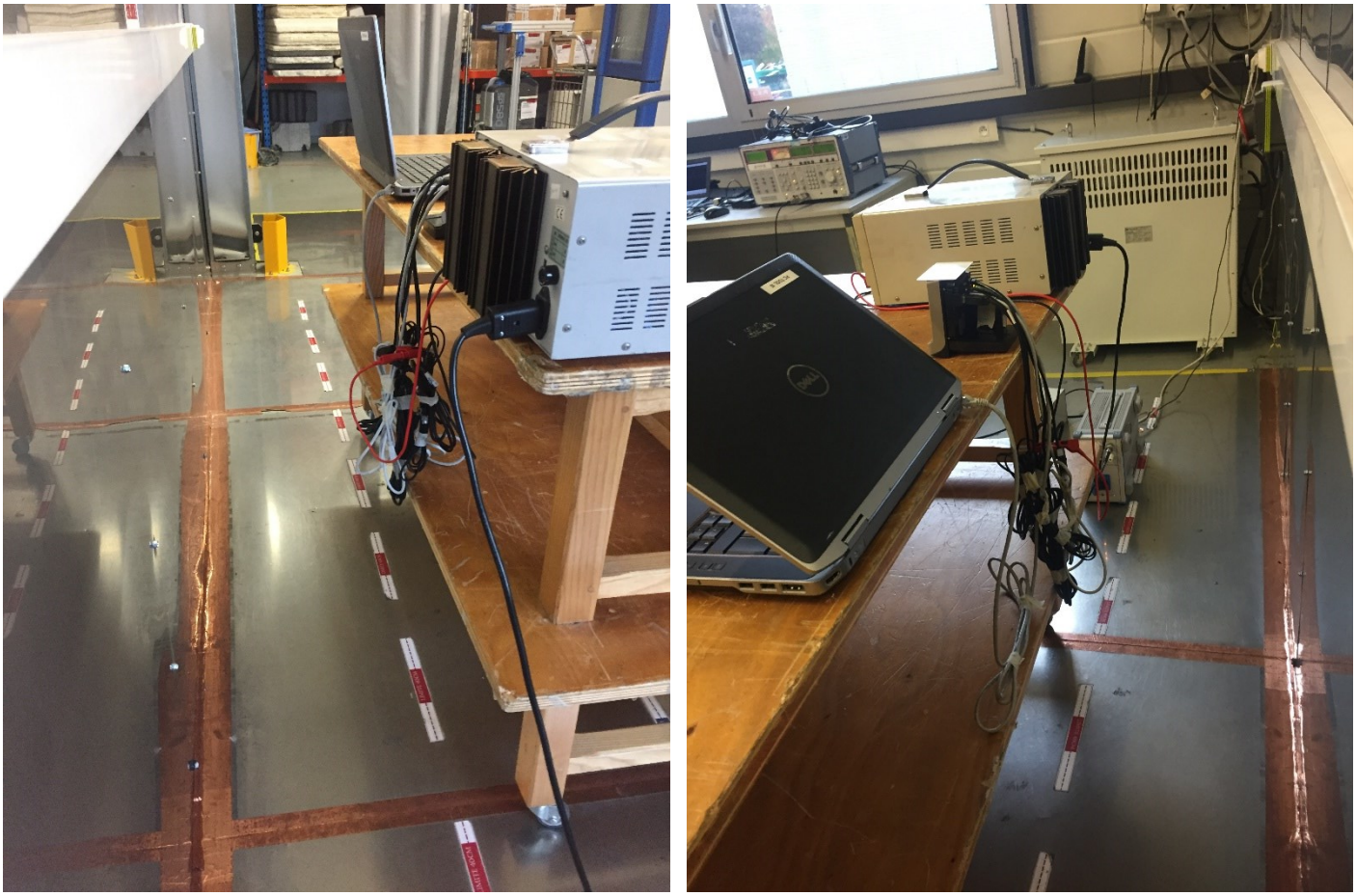
☐ 10cm above the ground on isolating support (Floor standing equipment)

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 V_{nom}.

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





Test setup

3.3. TEST METHOD

The product has been tested according to ANSI C63.10 and FCC Part 15 subpart B and C. The product has been tested with a voltage sets (see the table voltage in §2.2) 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 (for example). Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.

3.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Calibration date**	**Calibration due date**
BAT EMC	NEXIO	v3.9.0.10	L1000115		
Cable + self	_	_	A5329578	10/18	10/19
EMC comb generator	LCIE SUD EST	_	A3169098		
LISN	ROHDE & SCHWARZ	ENV216	C2320291	02/19	02/20
Spectrum Analyzer 9kHz - 30MHz	ROHDE & SCHWARZ	ESHS10	A2642028	11/17	11/19
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	02/19	02/20

3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

3.6. TEST RESULTS

AC tests Results on 12VDC:

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

Results: (PEAK detection)

Graph identifier		Line	Comments	
Emc#	1	Phase	120VAC/60Hz *(With Power supply DC)*	See Annex
Emc#	2	Neutral	120VAC/60Hz *(With Power supply DC)*	See Annex
Emc#	3	Phase	240VAC/50Hz *(With Power supply DC)*	See Annex
Emc#	4	Neutral	240VAC/50Hz*(With Power supply DC)*	See Annex

3.7. CONCLUSION

The sample of the equipment Self/**5000 CL**, Sn: 19227731303114411067 4587, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part 15 Subpart B and C, for conducted emissions.

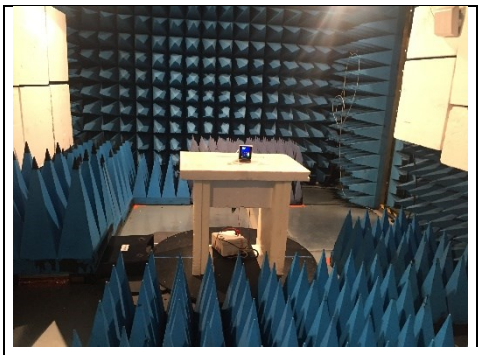
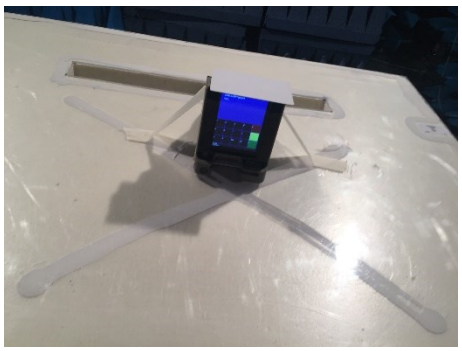
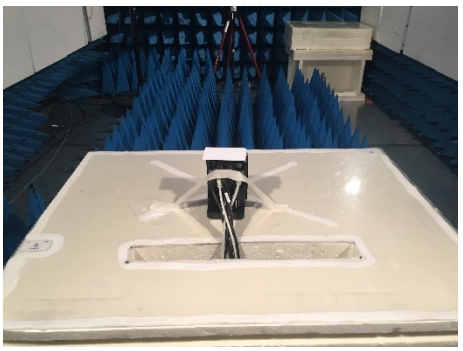
4. RADIATED EMISSION DATA (15.209)

4.1. ENVIRONMENTAL CONDITIONS

Date of test	:	October 15, 2019
Test performed by	:	Majid Mourzagh
Atmospheric pressure (hPa)	:	1001
Relative humidity (%)	:	41
Ambient temperature (°C)	:	21

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 V_{nom}.

Axis Z in anechoic chamber



Axis Z on OATS

4.3. TEST METHOD

The product has been tested according to ANSI C63.10, FCC Part 15 Subpart B and 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 6GHz. 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 B and 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 B and 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

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Calibration date**	**Calibration due date**
Amplifier 9kHz - 40GHz	LCIE SUD EST	_	A7102082	10/18	10/19
Antenna Bi-Log	CHASE	UPA6192	C2040221	01/18	01/20
BAT EMC	NEXIO	v3.9.0.10	L1000115		
Cable SMA	_	6GHz	A5329637	02/19	02/20
Comb EMR HF	YORK	CGE01	A3169114		
Cable N	-	18GHz	A5329907	02/19	02/20
Cable N	-	18GHz	A5329562	02/19	02/20
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	01/19	01/20
Emission Cable (SMA 3.3m)	TELEDYNE	26GHz	A5329875	01/19	01/20
Emission Cable (SMA 30cm)	TELEDYNE	26GHz	A5329873	01/19	01/20
Radiated emission comb generator	BARDET	_	A3169050		
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	12/17	12/19
Table C3	LCIE	_	F2000461		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Antenna Bi-log	CHASE	CBL6111A	C2040051	06/19	06/20
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052	06/19	06/21
Emission Cable	SUCOFLEX	6GHz	A5329061	02/19	02/20
Cable (OATS)	-	1GHz	A5329623	03/19	03/20
Radiated emission comb generator	BARDET	-	A3169050	-	-
OATS	-	-	F2000409	02/19	02/20
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	12/17	12/19
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 Z	/	See annex 1
Emr#	2	180°	Axis Z	/	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 Z	/	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#	4	Vertical / Horizontal	Axis Z	/	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**	**48**	**36**	**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 (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 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.

Worst case :

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Remark
27.120	10.5				100	42.3	52.8		**52.8**	Axis Z
40.680	24.4	QP	V	90	110	14.0	38.4	40.0	**-1.6**	Axis Z
54.240	21.1	QP	V	90	100	8.2	29.3	40.0	**-10.7**	Axis Z
67.800	30.6	QP	V	100	100	7.5	38.1	40.0	**-1.9**	Axis Z
480.000	18.9	QP	H	0		21.9	40.8	46.0	**-5.2**	Axis Z

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

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.

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
No significant frequency observed									

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
No significant frequency observed									

Note: Measures have been done at 3m distance.

4.7. CONCLUSION

The sample of the equipment Self/**5000 CL**, Sn: **19227731303114411067 4587**, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part 15 Subpart B and C, for radiated emissions.

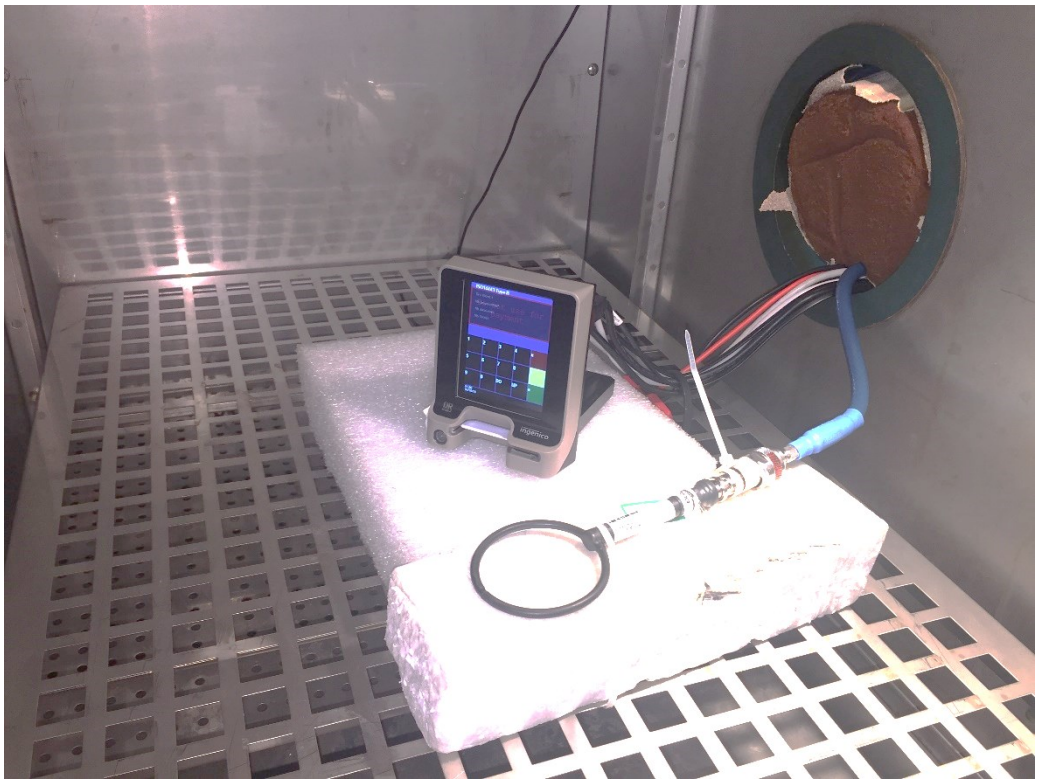
5. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)

5.1. ENVIRONMENTAL CONDITIONS

Date of test	:	October 17, 2019
Test performed by	:	Majid Mourzagh
Atmospheric pressure (hPa)	:	994
Relative humidity (%)	:	44
Ambient temperature (°C)	:	24

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 ±0.01% of the operating frequency when the temperature is varied from -30°C to +65°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.

5.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040215	06/19	06/21
Cable SMA	-	18GHz	A5329863	11/18	11/19
Cable SMA	-	18GHz	A5329864	11/18	11/19
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	03/18	03/20
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	06/18	06/20
Thermometer	VAISALA	HMT337	B4204104	03/19	03/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20

5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

5.6. TEST RESULTS

Temperature / Voltage	-30°C	20°C	+65°C
Mains voltage: 12DC			
Frequency Drift (MHz)	+ 0.000104	**13.559524**	+ 0.000007
Carrier level (dBc)	- 0.60	**48.000000**	- 1.58
Mains voltage: 9VDC			
Frequency Drift (MHz)	+ 0.000110	- 0.000005	+ 0.000006
Carrier level (dBc)	- 0.69	+ 0.83	- 1.58
Mains voltage: 16VDC			
Frequency Drift (MHz)	- 0.000190	+ 0.000000	+ 0.000007
Carrier level (dBc)	- 0.73	+ 0.84	- 1.58

Frequency drift measured is -190Hz when the temperature is varied from -30°C to +65°C and voltage is varied.

5.1. CONCLUSION

The sample of the equipment **Self/5000 CL**, Sn: **19227731303114411067 4587**, tested in the configuration presented in this test report **satisfies** to requirements of the standard FCC Part 15 Subpart B and C, for fundamental frequency tolerance.

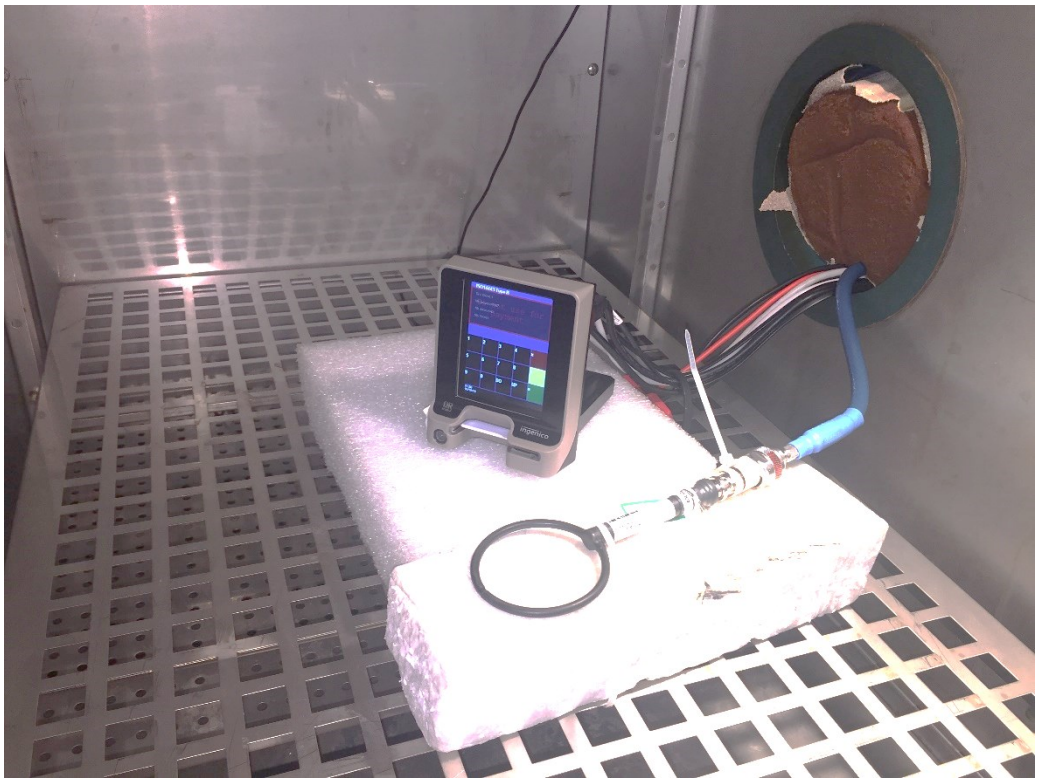
6. BAND-EDGE COMPLIANCE §15.209

6.1. ENVIRONMENTAL CONDITIONS

Date of test	:	October 16, 2019
Test performed by	:	Majid Mourzagh
Atmospheric pressure (hPa)	:	995
Relative humidity (%)	:	41
Ambient temperature (°C)	:	23

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.

Frequency band 13.553-13.567MHz
Following plots show radiated emission level in the frequency band 13.55.-13.567MHz with a RBW of 1kHz. The graphs are obtained with a measuring receiver.

6.4. TEST EQUIPMENT LIST

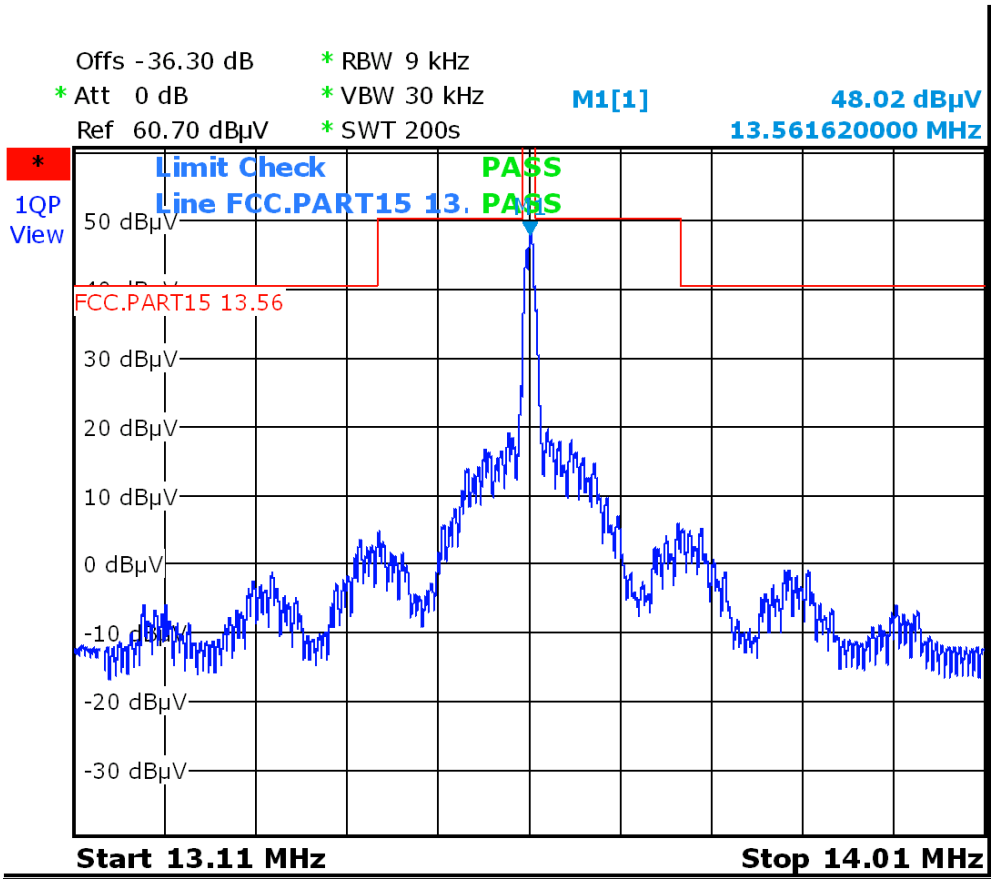
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040215	06/19	06/21
Cable SMA	-	18GHz	A5329863	11/18	11/19
Cable SMA	-	18GHz	A5329864	11/18	11/19
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	03/18	03/20
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	06/18	06/20
Thermometer	VAISALA	HMT337	B4204104	03/19	03/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20

6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

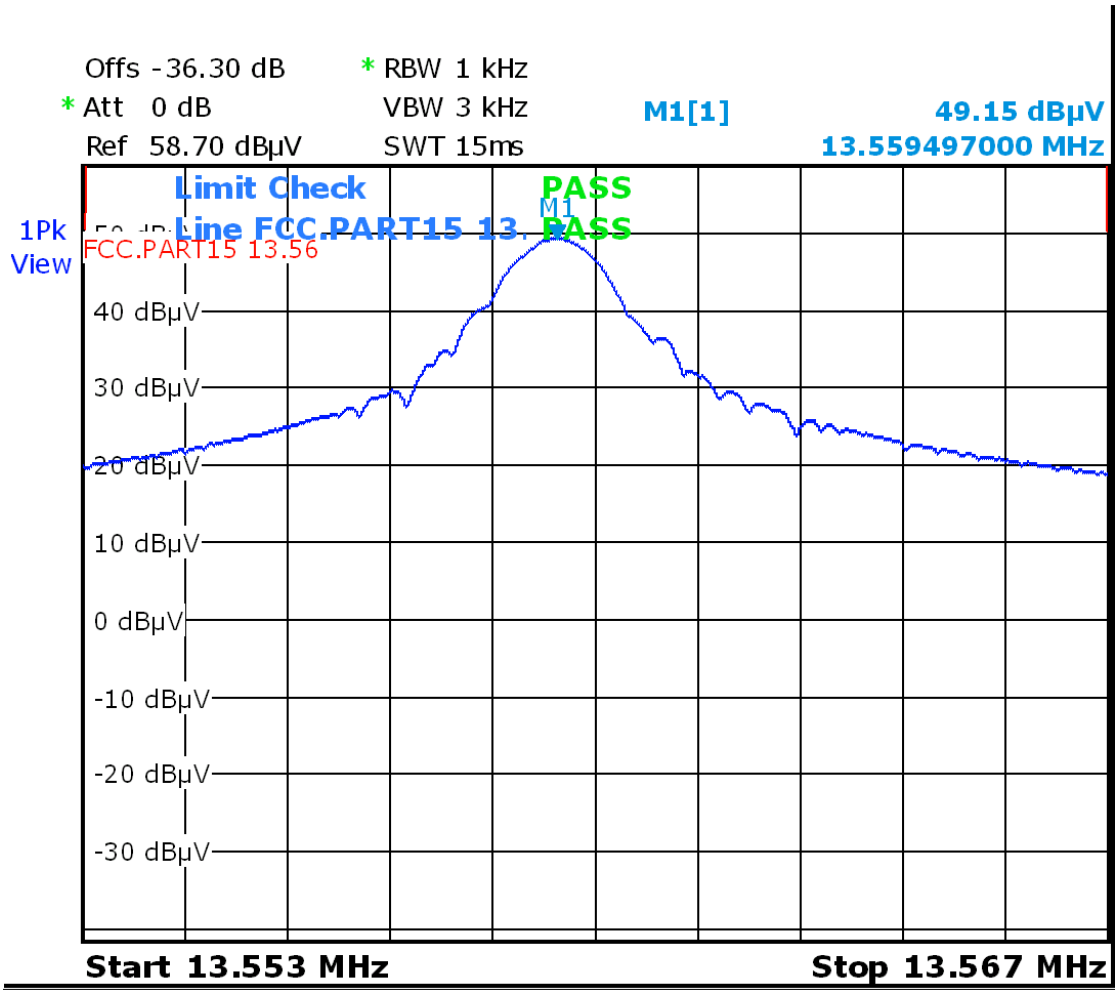
☑ None ☐ Divergence:

6.6. TEST RESULTS

Frequency band 13.110-14.010MHz



Frequency band 13.553-13.567MHz



6.7. CONCLUSION

The sample of the equipment Self/**5000 CL**, Sn: 19227731303114411067458 7, tested in the configuration presented in this test report **satisfies** to requirements of the standard FCC Part 15 Subpart B and C, for band-edge compliance.

7. OCCUPIED BANDWIDTH

7.1. ENVIRONMENTAL CONDITIONS

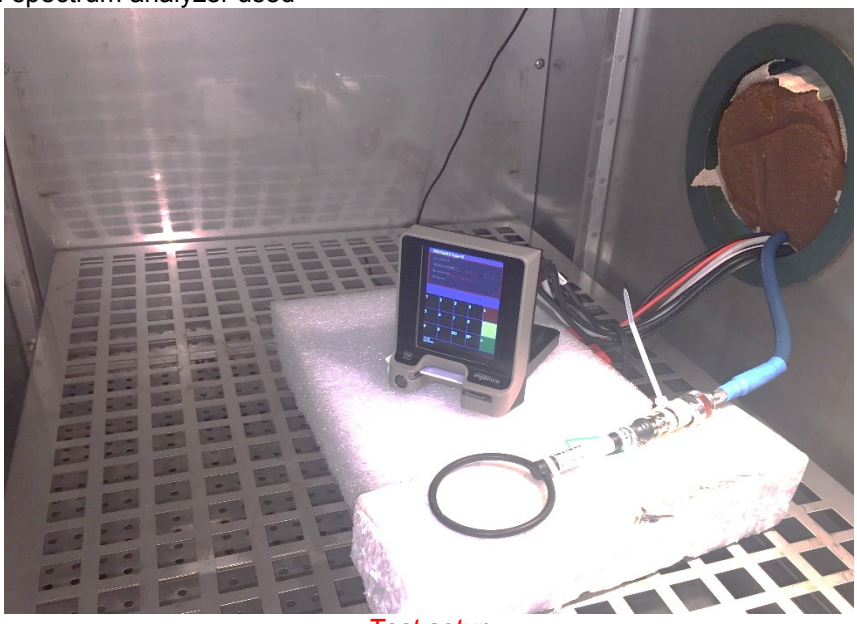
Date of test	:	October 16, 2019
Test performed by	:	Majid Mourzagh
Atmospheric pressure (hPa)	:	995
Relative humidity (%)	:	41
Ambient temperature (°C)	:	23

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) ≥ 3 x 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



Test setup

7.3. TEST EQUIPMENT LIST

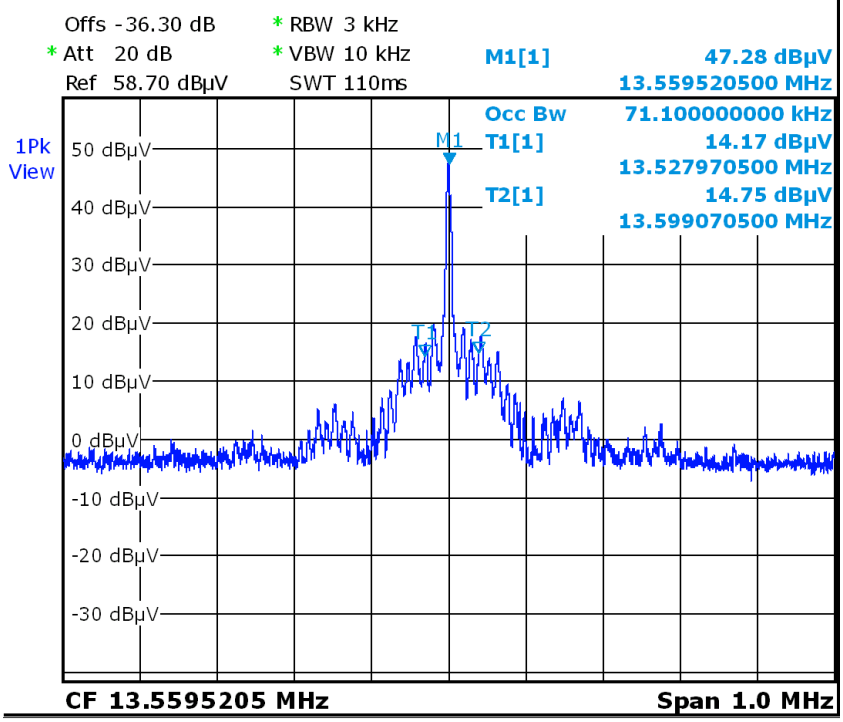
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040215	06/19	06/21
Cable SMA	-	18GHz	A5329863	11/18	11/19
Cable SMA	-	18GHz	A5329864	11/18	11/19
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	03/18	03/20
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	06/18	06/20
Thermometer	VAISALA	HMT337	B4204104	03/19	03/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20

7.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

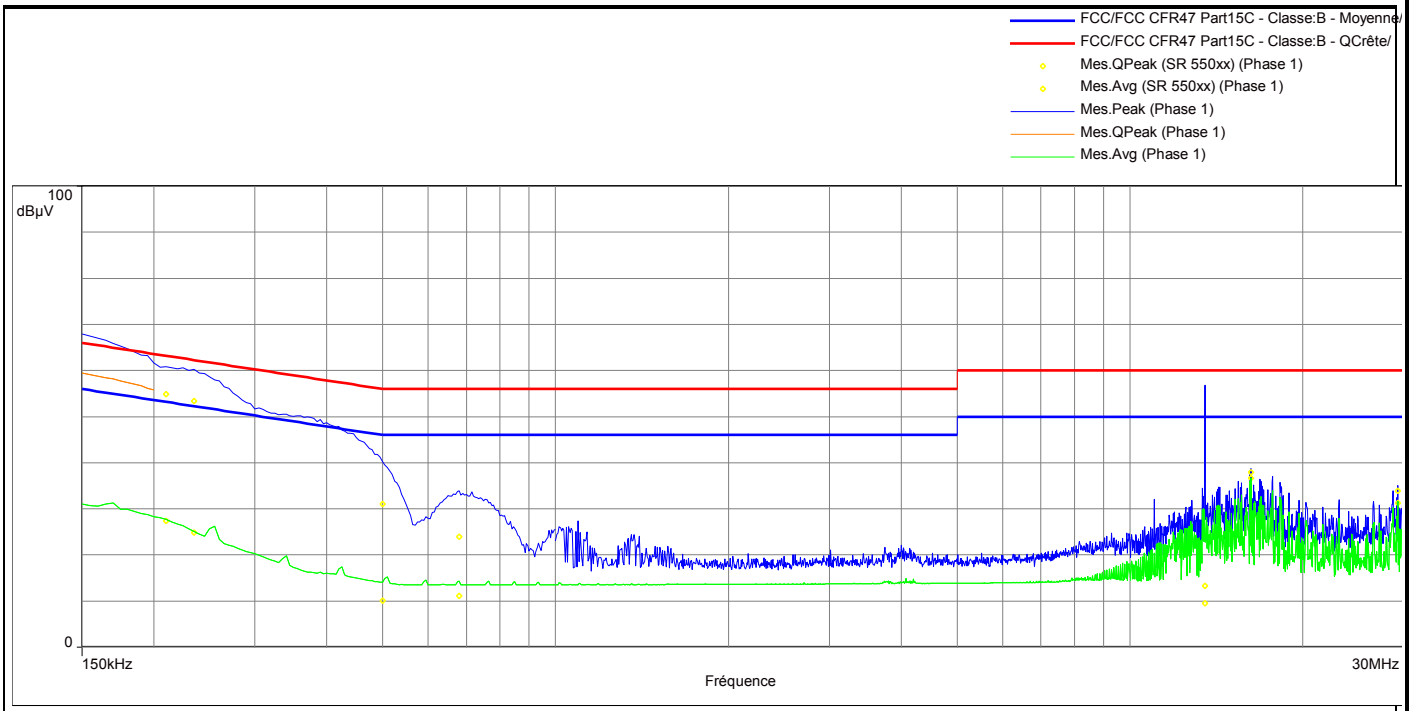
7.5. TEST SEQUENCE AND RESULTS

Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)
Nom	13.56	**0.071100**



8. ANNEX 1 (GRAPHS)

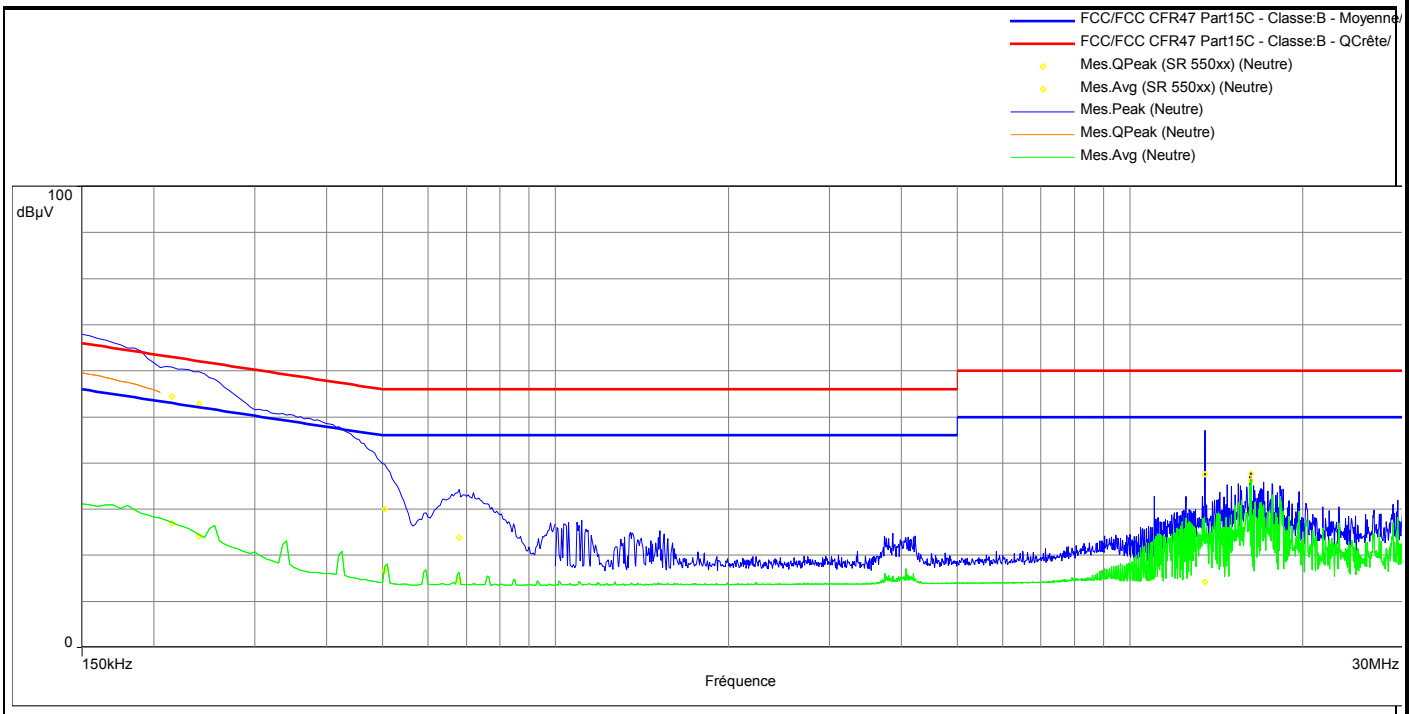
CONDUCTED EMISSIONS			
Graph name:	Emc#1	**Test configuration:**	
Limit:	FCC CFR47 Part15C	Test-120V/60Hz-Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC / 60Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.210	54.9	63.2	-8.3	27.4	53.2	-25.8	Phase 1	19.5
0.235	53.3	62.3	-8.9	24.8	52.3	-27.4	Phase 1	19.5
0.500	31.1	56.0	-24.9	10.1	46.0	-35.9	Phase 1	19.5
0.680	24.0	56.0	-32.0	11.1	46.0	-34.9	Phase 1	19.5
13.500	13.2	60.0	-46.8	9.5	50.0	-40.5	Phase 1	20.5
16.225	38.0	60.0	-22.0	36.6	50.0	-13.4	Phase 1	20.7
29.235	33.9	60.0	-26.1	31.3	50.0	-18.7	Phase 1	21.5

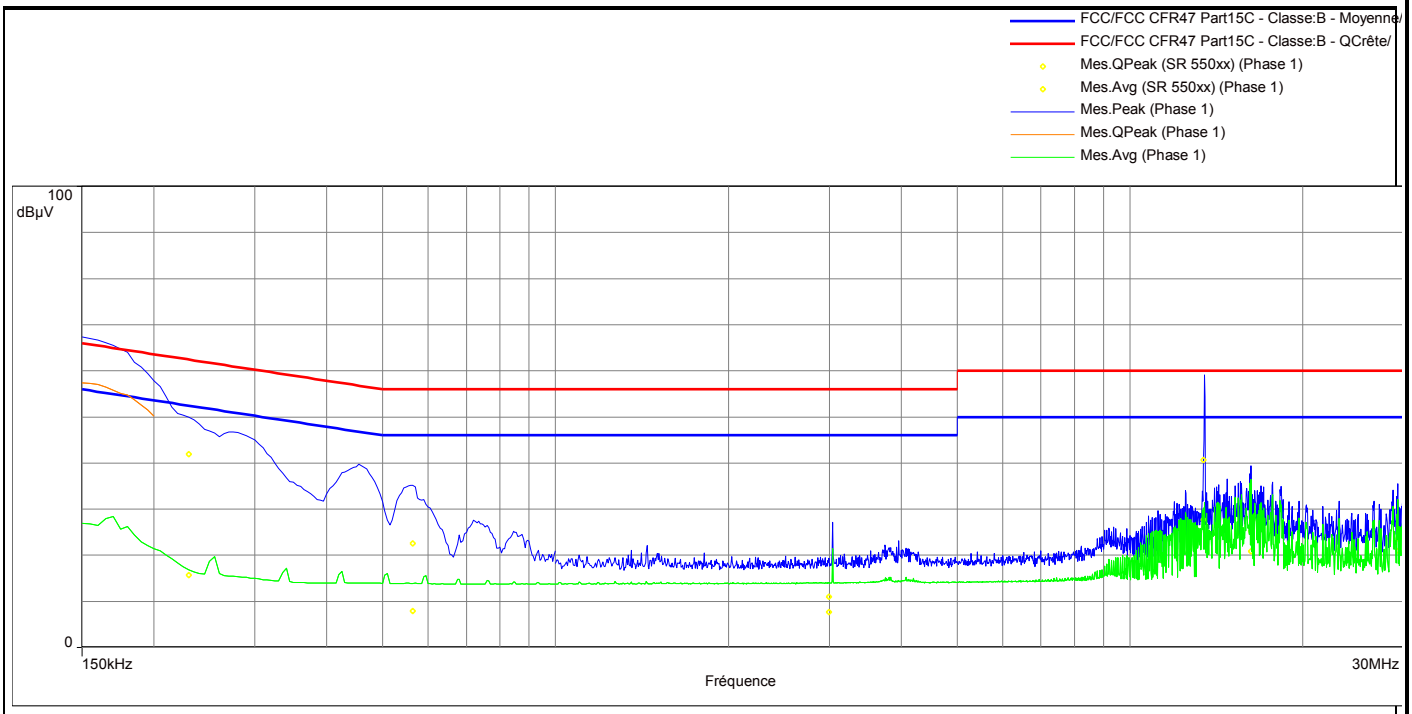
CONDUCTED EMISSIONS			
Graph name:	Emc#2	**Test configuration:**	
Limit:	FCC CFR47 Part15C	Test-120V/60Hz-Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC / 60Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.215	54.5	63.0	-8.6	27.0	53.0	-26.0	Neutre	19.5
0.240	52.9	62.1	-9.2	24.2	52.1	-27.9	Neutre	19.5
0.505	30.0	56.0	-26.0	16.6	46.0	-29.4	Neutre	19.5
0.680	23.8	56.0	-32.2	14.6	46.0	-31.4	Neutre	19.5
13.510	37.6	60.0	-22.4	14.2	50.0	-35.8	Neutre	20.5
16.225	37.7	60.0	-22.3	36.2	50.0	-13.8	Neutre	20.7

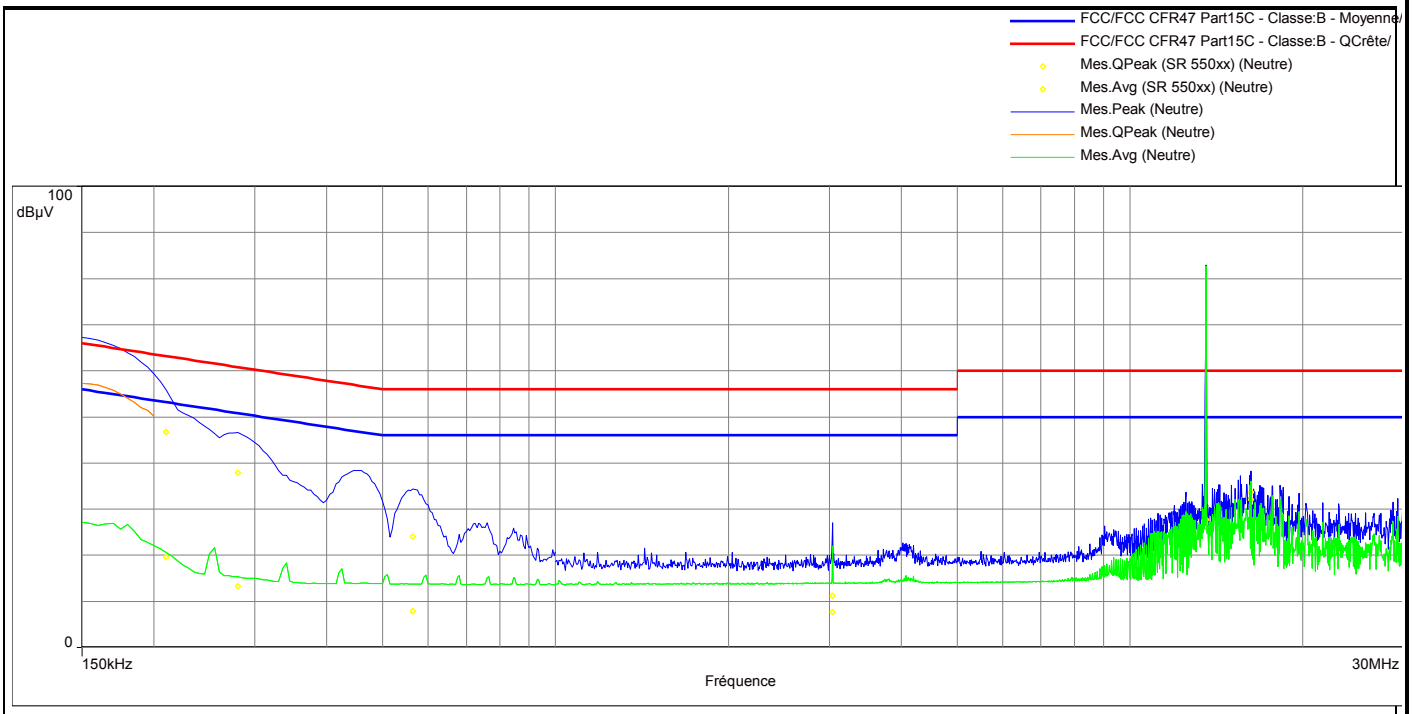
CONDUCTED EMISSIONS			
Graph name:	Emc#3	**Test configuration:**	
Limit:	FCC CFR47 Part15C	Test-240V/50Hz-Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC / 50Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.230	41.9	62.4	-20.5	15.7	52.4	-36.8	Phase 1	19.5
0.565	22.5	56.0	-33.5	7.9	46.0	-38.1	Phase 1	19.5
2.995	11.0	56.0	-45.0	7.7	46.0	-38.3	Phase 1	19.7
13.435	40.7	60.0	-19.3	27.8	50.0	-22.2	Phase 1	20.5
16.230	25.3	60.0	-34.7	20.9	50.0	-29.1	Phase 1	20.7
29.285	23.6	60.0	-36.4	21.0	50.0	-29.0	Phase 1	21.5

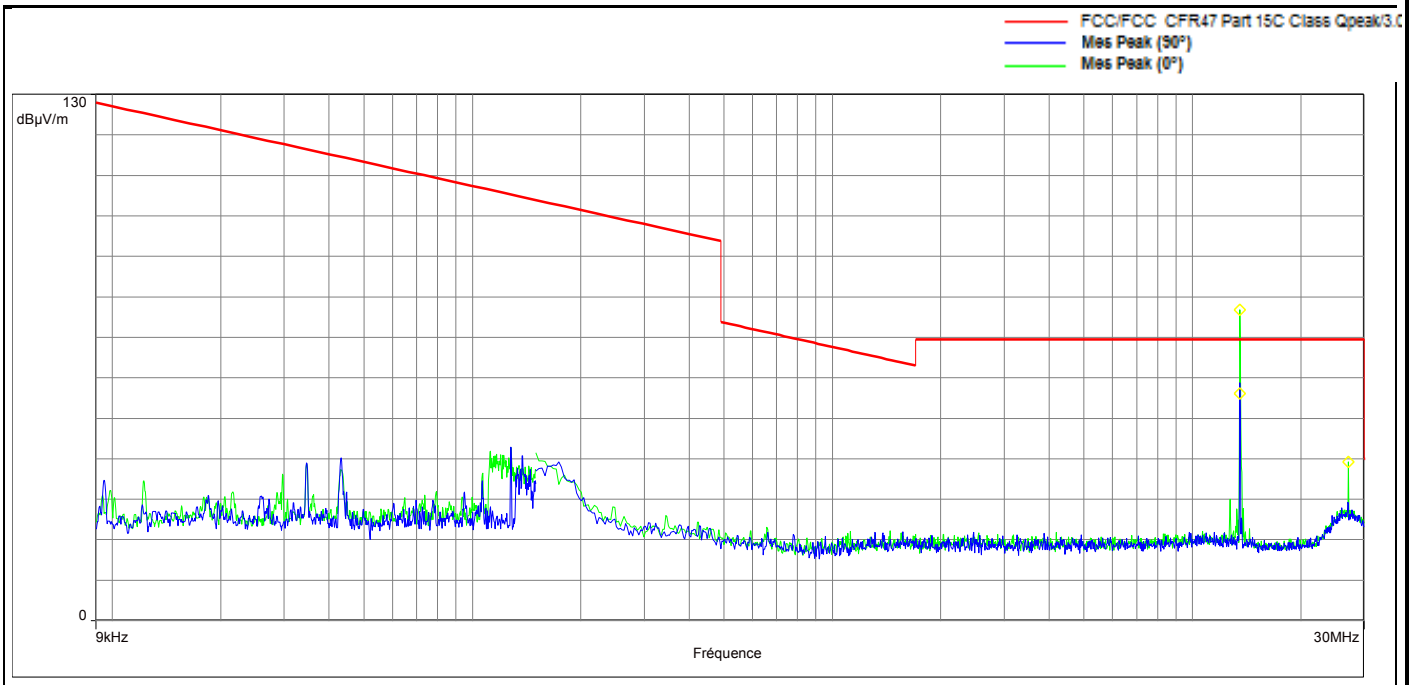
CONDUCTED EMISSIONS			
Graph name:	Emc#4	**Test configuration:**	
Limit:	FCC CFR47 Part15C	Test-240V/50Hz-Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC / 50Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.210	46.7	63.2	-16.5	19.6	53.2	-33.6	Neutre	19.5
0.280	37.9	60.8	-22.9	13.3	50.8	-37.5	Neutre	19.4
0.565	24.0	56.0	-32.0	7.9	46.0	-38.1	Neutre	19.5
3.035	11.2	56.0	-44.8	7.6	46.0	-38.4	Neutre	19.7
13.560	27.7	60.0	-32.3	26.1	50.0	-23.9	Neutre	20.5
16.225	33.7	60.0	-26.3	32.1	50.0	-17.9	Neutre	20.7

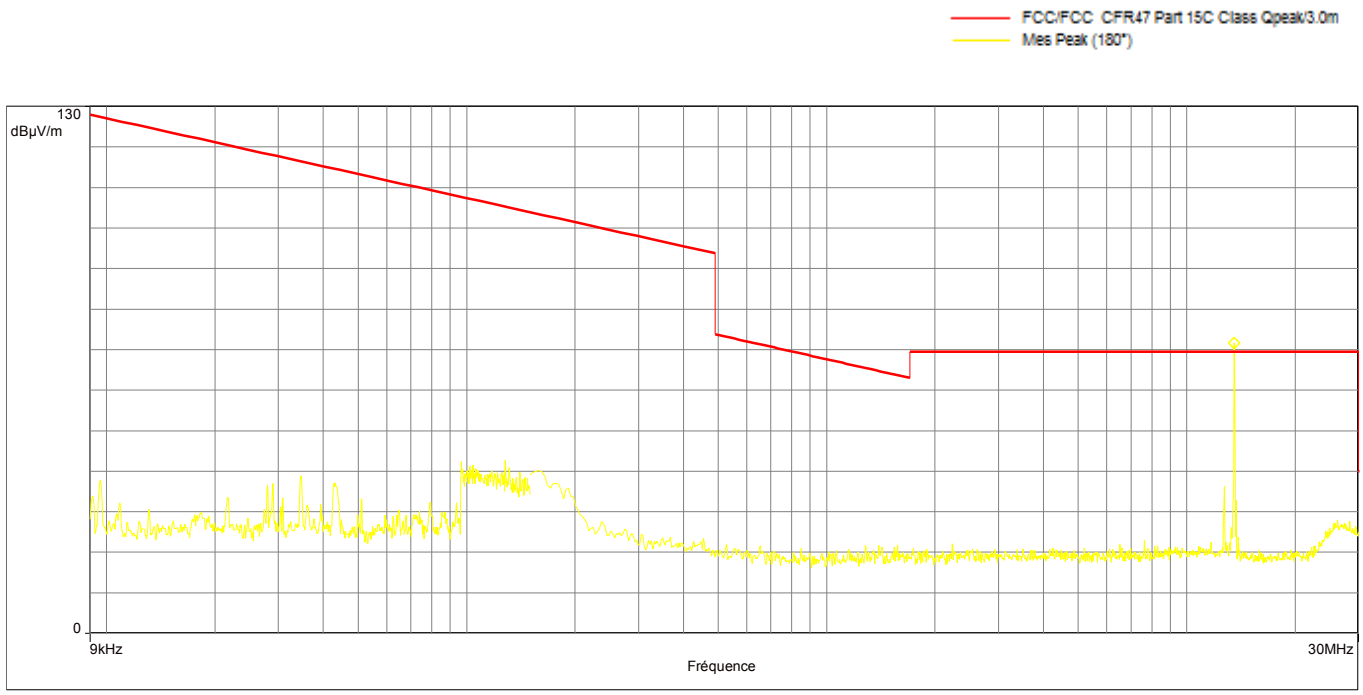
RADIATED EMISSIONS			
Graph name:	Emr#1	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(0°/90°) AxisZ Self5000	
Class:			
Frequency range: [9kHz - 30MHz]			
Antenna polarization:	0° / 90°	**RBW :**	300Hz / 10KHz
Azimuth:	0° - 360°	**VBW :**	1kHz / 30KHz



Spurious emissions

Frequency (MHz)	Peak Level (dBµV/m)	Polarization
13.565	56.1	Horizontal
13.562	76.8	Vertical
27.119	39.2	Vertical

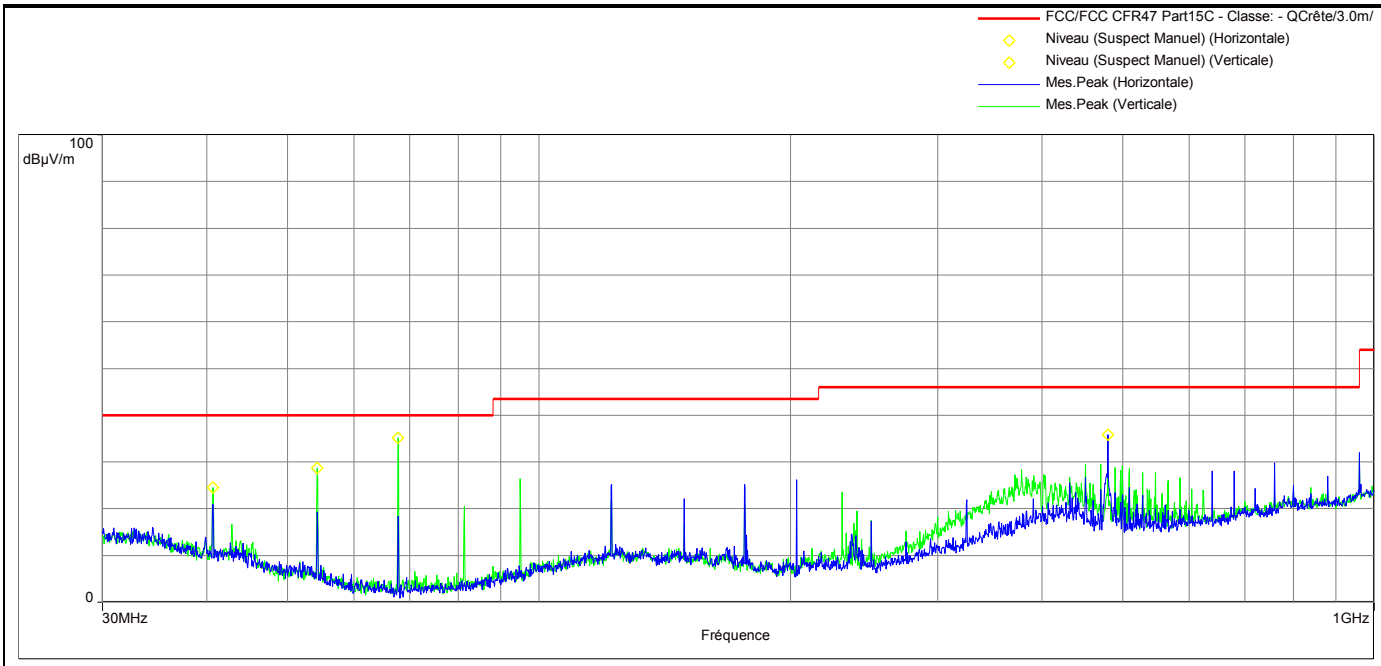
RADIATED EMISSIONS			
Graph name:	Emr#2	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(180°) AxisZ Self5000	
Class:			
Frequency range: [9kHz - 30MHz]			
Antenna polarization:	180°	**RBW :**	300Hz / 10KHz
Azimuth:	0° - 360°	**VBW :**	1kHz / 30KHz



Spurious emissions

Frequency (MHz)	Peak Level (dBµV/m)	Polarization
13.562	71.6	Horizontal

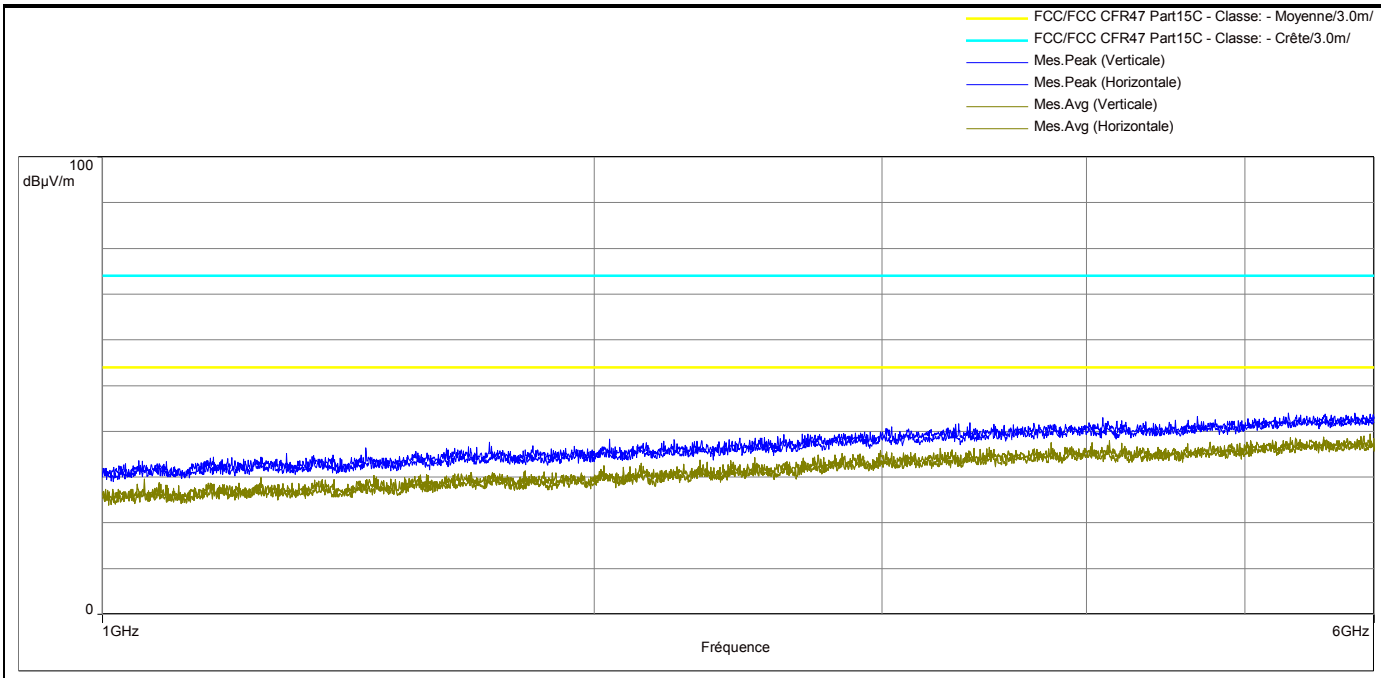
RADIATED EMISSIONS			
Graph name:	Emr#3	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V)[0.03-1]GHz AxisZ Self5000	
Class:			
Frequency range: [30MHz - 1GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



Spurious emissions

Frequency (MHz)	Peak Level (dBµV/m)	Polarization
480.000	35.8	Horizontal
40.676	24.5	Vertical
54.242	28.7	Vertical
67.791	35.1	Vertical

RADIATED EMISSIONS			
Graph name:	Emr#4	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V)[1-6]GHz AxisZ Self5000	
Class:			
Frequency range: [1GHz - 6GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

No significative frequency observed

9. UNCERTAINTIES CHART

Type de mesure / *Kind of measurement*	**Incertitude élargie laboratoire / *Wide uncertainty laboratory* (k=2) ± x**	**Incertitude limite du CISPR / *CISPR uncertainty limit* ± y**
Mesure des perturbations conduites en tension sur le réseau d'énergie *Measurement of conducted disturbances in voltage on the power port*	3.51 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication *Measurement of conducted disturbances in voltage on the telecommunication port.*	3.26 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.45 dB	3.6 dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	3.09 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans *Measurement of radiated electric field on the Moirans open area test site*	5.20 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.*