



LCIE

TEST REPORT

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Version : 01

Subject Electromagnetic compatibility tests according to the standards:
FCC CFR 47 Part 15, Subpart C
RSS-210 Issue 8.1

Issued to **INGENICO**
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Apparatus under test

- ↪ Product **ICT250**
- ↪ Trade mark **INGENICO**
- ↪ Manufacturer **INGENICO**
- ↪ Model under test **ICT250-01T1099C**
- ↪ Serial number **13358CT21333418**
- ↪ FCCID **XKB-ICT250**
- ↪ IC **2586D-ICT250CL**

Conclusion See page 4

Test date From November 20th to December 3th, 2015

Test location MOIRANS

Composition of document 31 pages

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1. TEST PROGRAM

Standard:

- FCC Part 15, Subpart C
- ANSI C63.10 (2013)
- 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)	
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	Measure at 300m 9kHz-490kHz : 67.6dBµV/m /F(kHz)			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
	Measure at 30m 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) 1.705MHz-30MHz : 29.5 dBµV/m			
Radiated emissions 30MHz-25GHz* CFR 47 §15.209 (a) CFR 47 §15.225 RSS-Gen §4.9 <i>Highest frequency :387MHz (Declaration of provider)</i>	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			<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 §A2.6	Operation within the band 13.110-14.010 MHz			<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 §A2.6	Operation within the band 13.110-14.010 MHz			<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 §A2.6	Operation within the band 13.110-14.010 MHz			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Occupied bandwidth RSS-Gen §4.6.1	No limit			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
Receiver Spurious Emission** RSS-Gen §4.10	See RSS-Gen §4.10			<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. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

ICT250-01T1099C

Serial Number: 13358CT21333418



Photography of EUT

Power supply:

During all the tests, EUT is supplied by V_{nom} : 110VAC

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

Name	Type	Rating	Reference / Sn	Comments
Supply1	<input type="checkbox"/> AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Battery	100-240VAC~50/60Hz 0.6A -> 8VDC 3A	PSM24W-080L6IN-R	Configuration 1 (see EUT configuration §2.2)
Supply2	<input type="checkbox"/> AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Battery	100-240VAC~50/60Hz 0.9A -> 8VDC 4A	PSM32W-080L6IN-R	Configuration 2 (see EUT configuration §2.2)

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	DC	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Supply2	DC	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access1	1 x USB Host	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not used in this test configuration
Access2	1 x USB Slave	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not used in this Test configuration
Access3	1 x COM0 to magicbox	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access4	1 x Ethernet to magic Box	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access5	1 x Modem Line to magicbox	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access6	2 x SAM	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access7	1 x CAM	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access8	1 x Printer	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access9	1 x Contactless	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access10	1 x MMC	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-



MagicBOX 296105416

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	1 x Jack power supply DC to magicbox	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Supply2	1 x Jack power supply DC to magicbox	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Access1	1 x Modem Line	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Access2	1 x RS232	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Access3	1 x Ethernet	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop LENOVO	8896-2FG	L3-B7463	-
Modem line simulator TELTONE	TLS-5B-02	017652	

Equipment information:

Frequency band:	[13.553 –13.567] MHz – 1 channel		
RF mode:	<input type="checkbox"/> Transmitter	<input checked="" type="checkbox"/> Transceiver	<input type="checkbox"/> Receiver <input type="checkbox"/> Standby
Antenna type:	<input type="checkbox"/> External:		<input checked="" type="checkbox"/> Internal:
Antenna gain:	NC		
Extreme temperature range:	<input checked="" type="checkbox"/> Category I (General) -30°C to +55°C	<input type="checkbox"/> Category II (Portable) -10°C to +55°C	<input type="checkbox"/> Category III (Indoor) +5°C to +35°C
Extreme test source voltage:	<input type="checkbox"/> ±10%:	<input checked="" type="checkbox"/> other: 15% (Vmin= 93.5Vac; Vnom= 110Vac; Vmax= 126.5Vac).	

NC: Not Communicated By Customer

2.2. EUT CONFIGURATION

Software : Hardtoolbox V0206

Configuration 1 and Running mode:

Backlight : **Yes**
 Imprimante : **Yes** -> Ticket **No**
 Modem : **Yes** -> Comm test: **No**
 Cless : **Yes**
 Sam1 : **Yes**
 Sam2 : **Yes**
 Cam0 : **Yes**
 Com0 : **Yes** MMC : **Yes**
 USB : **No**
 Mouse : **No**
 Swipe: **No**
 Keyboard : **No**

Test Ethernet between EUT and Laptop: Ping : 192.168.2.2
 EUTpowered by the supply1 see Hardware identification cf. §2.1.



Configuration 2 and Running mode:

Backlight : **Yes**
Imprimante : **Yes** -> Ticket **No**
Modem : **Yes** -> Com test: **No**
Cless : **Yes**
Sam1 : **Yes**
Sam2 : **Yes**
Cam0 : **Yes**
Com0 : **Yes**
MMC : **Yes**
USB : **No**
Mouse : **No**
Swipe: **No**
Keyboard : **No**

Test Ethernet between EUT and Laptop: Ping : 192.168.2.2
EUT powered by the supply2 see Hardware identification cf. §2.1.

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 52.5dB μ 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 μ V/m.

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

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

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

3. RADIATED EMISSION DATA (15.209)

3.1. ENVIRONMENTAL CONDITIONS

Date of test	: November 23 rd , 2015	November 24 th , 2015
Test performed by	: G.Deschamps	G.Deschamps
Atmospheric pressure (hPa)	: 990	994
Relative humidity (%)	: 38	36
Ambient temperature (°C)	: 22	21

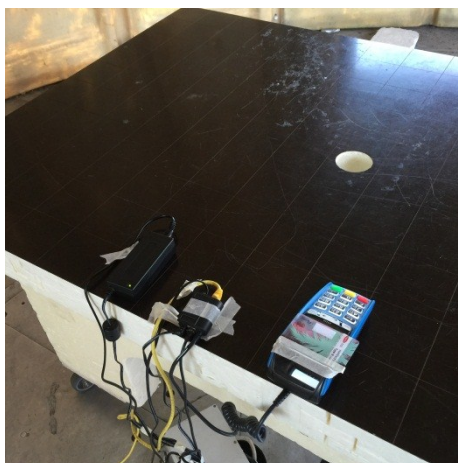
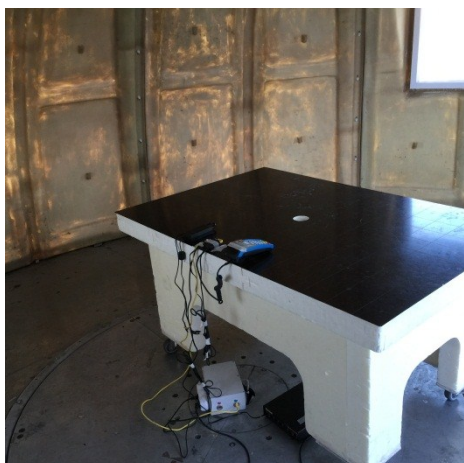
3.2. TEST SETUP

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.

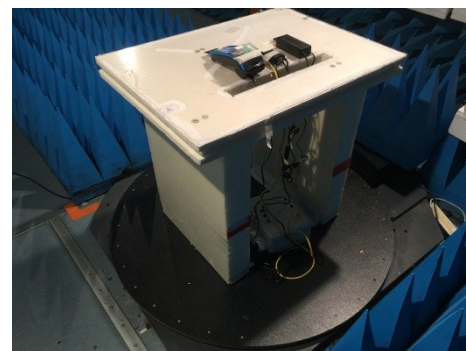
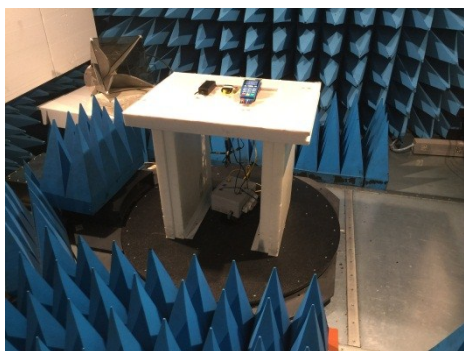
The EUT and auxiliaries are set:

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



Test setup on OATS



Test setup in anechoic chamber (9kHz to 1GHz)



Test setup in anechoic chamber (1GHz to 2GHz)

3.3. TEST METHOD

The product has been tested according to ANSI C63.10, FCC part 15 subpart C.

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:

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 2GHz:

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 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 (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.



3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052	10/15	10/16
Antenna horn	EMCO	3115	C2042027	09/15	09/16
Cable Measure @3m 18GHz	-	-	A5329038	08/15	08/16
Cable Measure @3m	-	-	A5329206	04/15	04/16
Semi-Anechoic chamber #3	SIEPEL	-	D3044017	04/13	04/16
Radiated emission comb generator	BARDET	-	A3169050	-	-
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	04/15	04/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371	-	-
Table	LCIE	-	F2000461	-	-
Antenna Bi-log	CHASE	CBL6111A	C2040051	04/14	04/16
Cable	SUCOFLEX	106G	A5329061	03/15	03/16
Cable (OATS)	-	-	A5329623	10/15	10/16
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088	-	-
OATS	-	-	F2000409	09/15	09/16
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	04/15	04/16
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	MATURO GmbH	-	F2000437	-	-

3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

3.6. TEST RESULTS

3.6.1. 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 1	See annex 1
Emr# 2	0° / 90°	Axis XY	Configuration 2	See annex 1

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

See graphs for 30MHz-1GHz:

Graph identifier	Polarization	EUT position	Comments	
Emr# 3	H/V	Axis XY	Configuration 1	See annex 1
Emr# 4	H/V	Axis XY	Configuration 2	See annex 1



3.6.3. Pre-characterization at 3 meters [1GHz-2GHz]

See graphs for 1GHz-2GHz:

Graph identifier	Polarization	EUT position	Comments	
Emr# 5	H/V	Axis XY	Configuration 1	See annex 1
Emr# 6	H/V	Axis XY	Configuration 2	See annex 1

3.6.4. 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.

Test results with worst case (Configuration 1)

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	31.7	- 52.1	275	0°	100	9.7	
2	27.12	29.5	22.5	- 7	360	0°	115	7.6	-

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

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

3.6.5. 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 results for configuration 1:

No	Frequency (MHz)	Limit QPeak (dBµV/m)	Measure QPeak (dBµV/m)	Margin QPeak (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	38.891	40.0	39.4	-0.6		V		14.9	*
2	40.680	40.0	39.2	-0.8	0	V	100	13.9	
3	47.782	40.0	36.1	-3.9		V		10.4	*
4	53.885	40.0	32.2	-7.8		V		8.7	*
5	54.240	40.0	30.7	-9.3	100	V	100	8.6	*
6	67.800	40.0	31.7	-8.3	0	V	100	7.8	*
7	69.117	40.0	30.3	-9.7		V		7.8	*
8	193.540	43.5	25.7	-17.8	360	H	250	11.2	
9	242.800	46.0	33.7	-12.3	250	V	100	14.6	
10	875.000	46.0	43.4	-2.6	115	H	267	28.4	
11	999.999	54.0	50.5	-3.5	40	H	250	29.9	

*Measure performed at 3m.



Test results for configuration 2:

No	Frequency (MHz)	Limit QPeak (dBµV/m)	Measure QPeak (dBµV/m)	Margin QPeak (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	37.361	40.0	39.4	-0.6		V		15.7	*
2	40.680	40.0	39.6	-0.4	0	V	100	13.9	*
3	47.782	40.0	36.1	-3.9		V		10.4	*
4	53.868	40.0	36.9	-3.1		V		8.7	*
5	54.240	40.0	32.5	-7.5	0	V	100	8.6	*
6	67.800	40.0	32.7	-7.3	0	V	100	7.8	*
7	128.243	43.5	24.3	-19.2	0	H	100	13.8	
8	242.832	46.0	39.1	-6.9	100	V	0	14.6	
9	387.080	46.0	37.1	-8.9	130	V	330	19.2	
10	874.990	46.0	43.4	-2.6	50	V	200	28.4	
11	999.999	54.0	50.3	-3.7	350	V	400	29.9	

*Measure performed at 3m.

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

3.6.6. Characterization on 3meters anechoic chamber from 1GHz to 2GHz

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 results for configuration 1 and 2:

No significant frequency observed, margin PEAK > 20dB and AVERAGE > 10dB (see Annex 1).

3.7. CONCLUSION

The sample of the equipment ICT250-01T1099C, Sn: 13358CT21333418, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part15B and C, for radiated emissions.

4. CONDUCTED EMISSION DATA

4.1. ENVIRONMENTAL CONDITIONS

Date of test : November 20th, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 994
Relative humidity (%) : 36
Ambient temperature (°C) : 21

4.2. TEST SETUP

Mains terminals

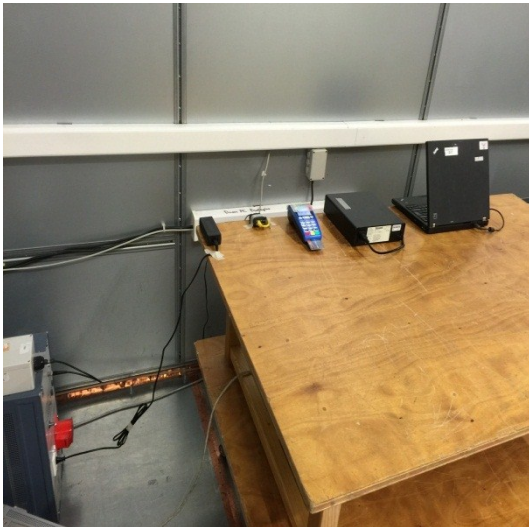
The EUT and auxiliaries are set:

- 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



4.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable + self	-	-	A5329578	07/15	07/16
Conducted emission comb generator	BARDET	-	A3169049	-	-
LISN tri-phase ESH2-Z5	RHODE & SCHWARZ	33852.19.53	C2320062	07/15	07/16
LISN	RHODE & SCHWARZ	ENV216	C2320123	02/15	02/16
Load 50Ω - BNC	AEROFLEX	-	A7152071	04/15	04/16
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	04/15	04/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
Transient limiter	HEWLETT PACKARD	11947A	A4049061	02/15	02/16

4.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

4.5. TEST RESULTS

Mains terminals:

Supply1 (configuration 1)

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

Results: (PEAK detection)

Graph identifier	Line	Comments
Emc# 1	Phase	- See annex 1
Emc# 2	Neutral	- See annex 1

Supply2 (configuration 2)

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

Results: (PEAK detection)

Graph identifier	Line	Comments
Emc# 3	Phase	- See annex 1
Emc# 4	Neutral	- See annex 1

4.6. CONCLUSION

The sample of the equipment ICT250-01T1099C, Sn: 13358CT21333418, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part15B, for conducted emissions.

5. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)

5.1. ENVIRONMENTAL CONDITIONS

Date of test : November 25th, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 999
Relative humidity (%) : 33
Ambient temperature (°C) : 22

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 -30°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°C .



5.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040210	10/15	10/16
Cable SMA	-	18G	A5329373	10/15	10/16
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/13	12/15
Multimeter	FLUKE	87	A1240170	-	-
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

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: 110V/60Hz Frequency Drift (MHz) Carrier level (dBc)		- 0.000110 + 0.16	- 0.000060 + 0.11	13.559431 31.7
Mains voltage: 93,5V/60Hz Frequency Drift (MHz) Carrier level (dBc)		- 0.000110 + 0.14	- 0.000050 + 0.11	+ 0.000000 - 0.02	+ 0.000039 - 0.30
Mains voltage: 126V/60Hz Frequency Drift (MHz) Carrier level (dBc)		- 0.000120 + 0.13	- 0.000050 + 0.11	+ 0.000000 + 0.02	+ 0.000039 - 0.29

Frequency drift measured is **159Hz** when the temperature is varied from -30°C to +50°C and voltage is varied.

5.7. CONCLUSION

The sample of the equipment ICT250-01T1099C, Sn: 13358CT21333418, tested in the configuration presented in this test report **satisfies** to requirements of the standard FCC Part15C, for fundamental frequency tolerance.

6. BAND-EDGE COMPLIANCE §15.209

6.1. ENVIRONMENTAL CONDITIONS

Date of test : November 3rd, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 990
Relative humidity (%) : 33
Ambient temperature (°C) : 22

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.



LCIE

6.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040210	10/15	10/16
Cable SMA	-	18G	A5329373	10/15	10/16
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/13	12/15
Multimeter	FLUKE	87	A1240170	-	-
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

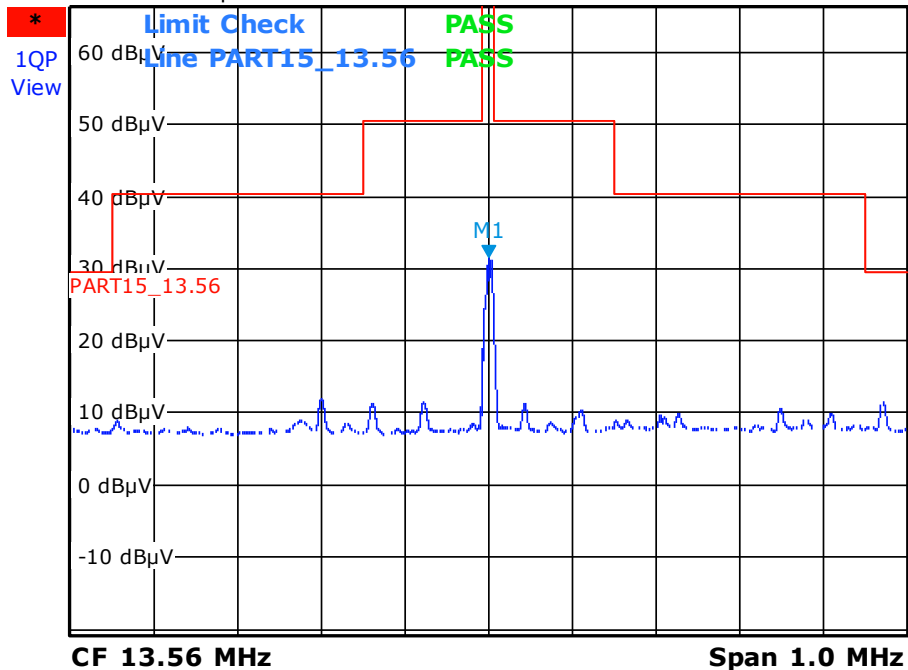
6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

6.6. TEST RESULTS

Frequency band 13.110-14.010MHz

Offs -6.00 dB * RBW 10 kHz
 * Att 0 dB * VBW 30 kHz
 Ref 66.20 dBµV * SWT 200s



6.7. CONCLUSION

The sample of the equipment ICT250-01T1099C, Sn: 13358CT21333418, tested in the configuration presented in this test report **satisfies** to requirements of the standard FCC Part15C, for band-edge compliance.

7. OCCUPIED BANDWIDTH

7.1. ENVIRONMENTAL CONDITIONS

Date of test : November 3rd, 2015
Test performed by : G.Deschamps
Atmospheric pressure (hPa) : 990
Relative humidity (%) : 33
Ambient temperature (°C) : 22

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.

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.



Test setup



Measurement Procedure:

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

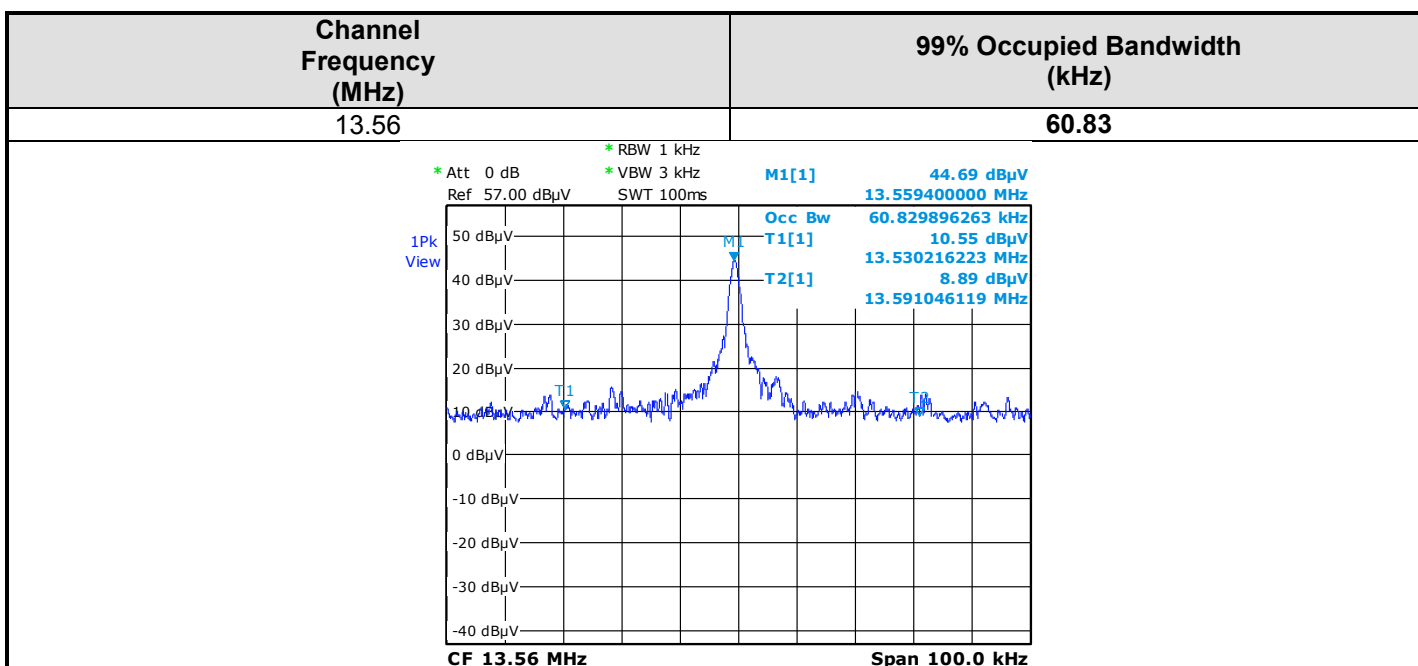
7.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6993	C2040210	10/15	10/16
Cable SMA	-	18G	A5329373	10/15	10/16
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/13	12/15
Multimeter	FLUKE	87	A1240170	-	-
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermometer (radio)	FLUKE	52 II	B4043150	-	-
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16

7.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

7.5. TEST SEQUENCE AND RESULTS



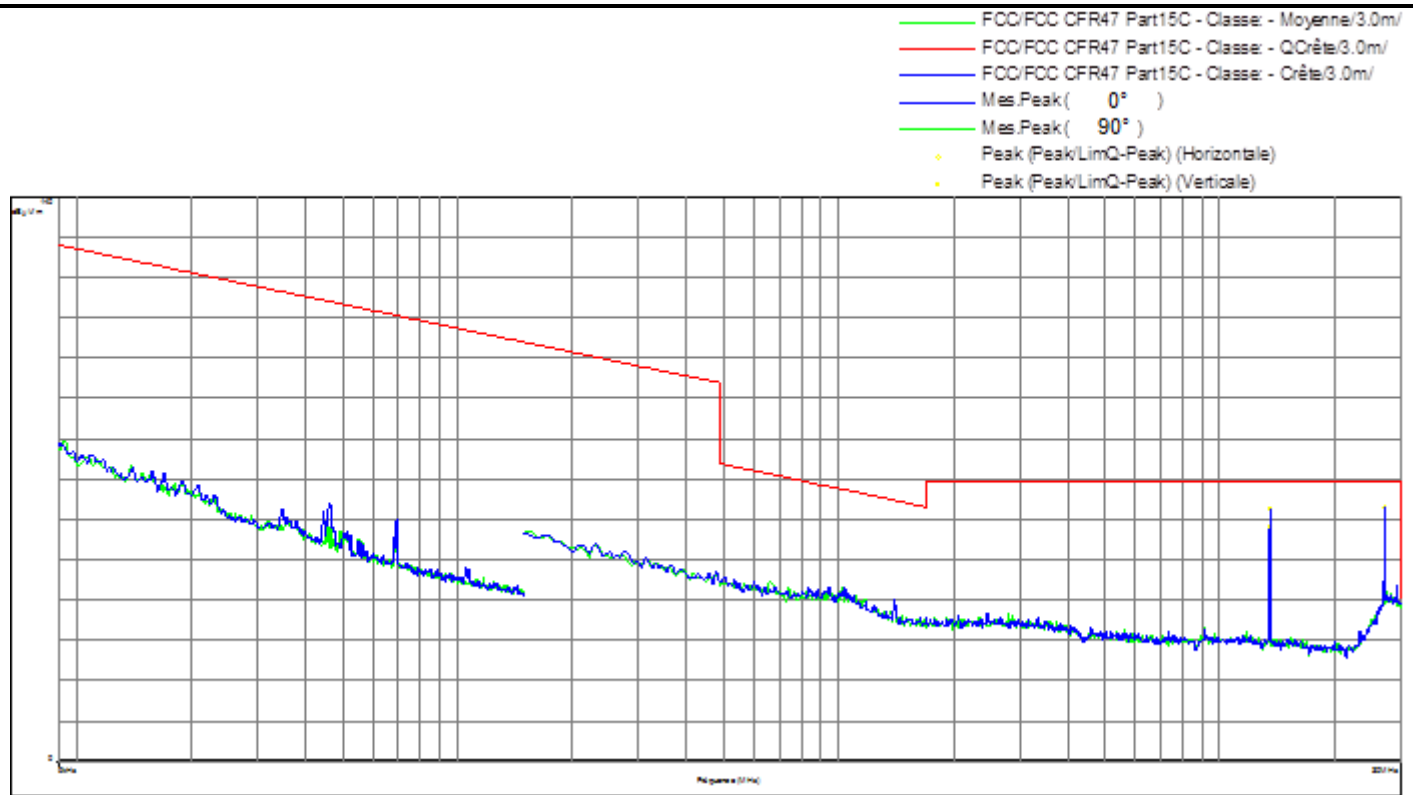


L C I E

8. ANNEX 1 (GRAPHS)

RADIATED EMISSIONS

Graph name:	Emr#1	Test configuration:
Limit:	FCC CFR47 Part15C	(0°+ 90°) - Configuration 1 < 30MHz
Class:		
Frequency range: [9kHz - 30MHz]		
Antenna polarization:	0° / 90°	RBW : 10kHz
Azimuth:	0° - 360°	VBW : 30kHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Polarization
13.55862	62.66	0°
27.119475	63	0°
13.55862	58.29	90°

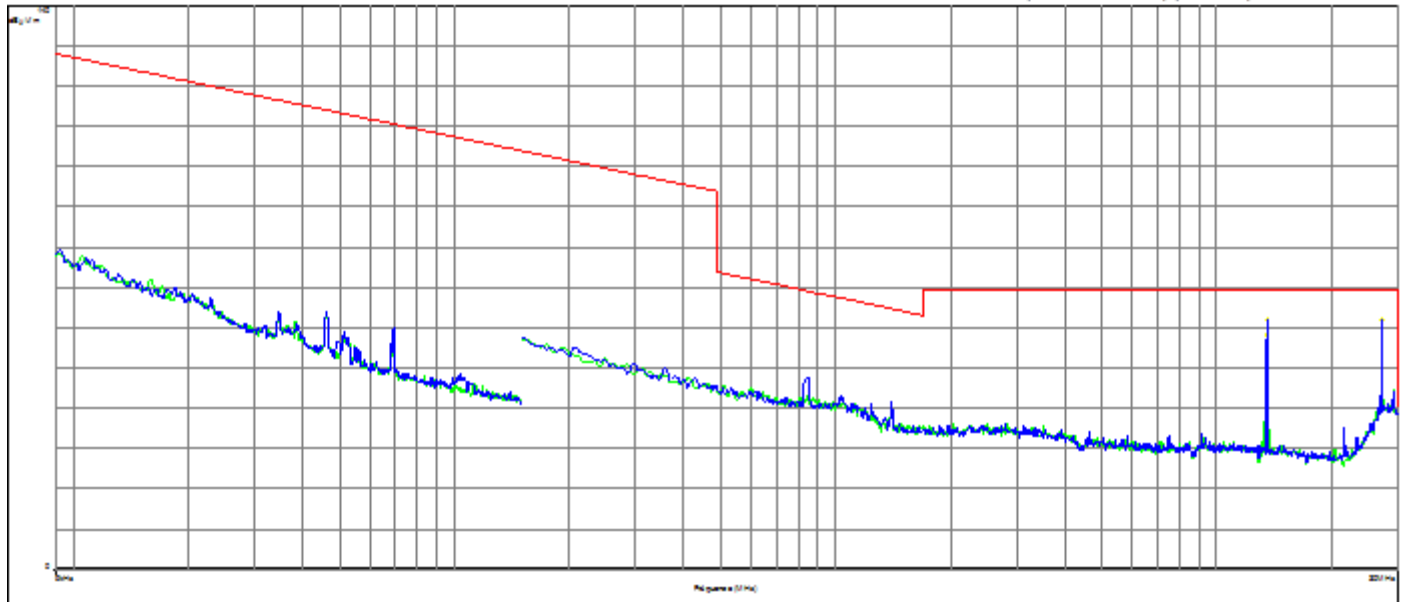


L C I E

RADIATED EMISSIONS

Graph name:	Emr#2	Test configuration:
Limit:	FCC CFR47 Part15C	(0°+ 90°) - Configuration 2 < 30MHz
Class:		
Frequency range: [9kHz - 30MHz]		
Antenna polarization:	0° / 90°	RBW : 10kHz
Azimuth:	0° - 360°	VBW : 30kHz

- 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(0°)
- Mes.Peak(90°)
- Peak (Peak/LimQ-Peak) (Horizontale)
- Peak (Peak/LimQ-Peak) (Verticale)



Spurious emissions

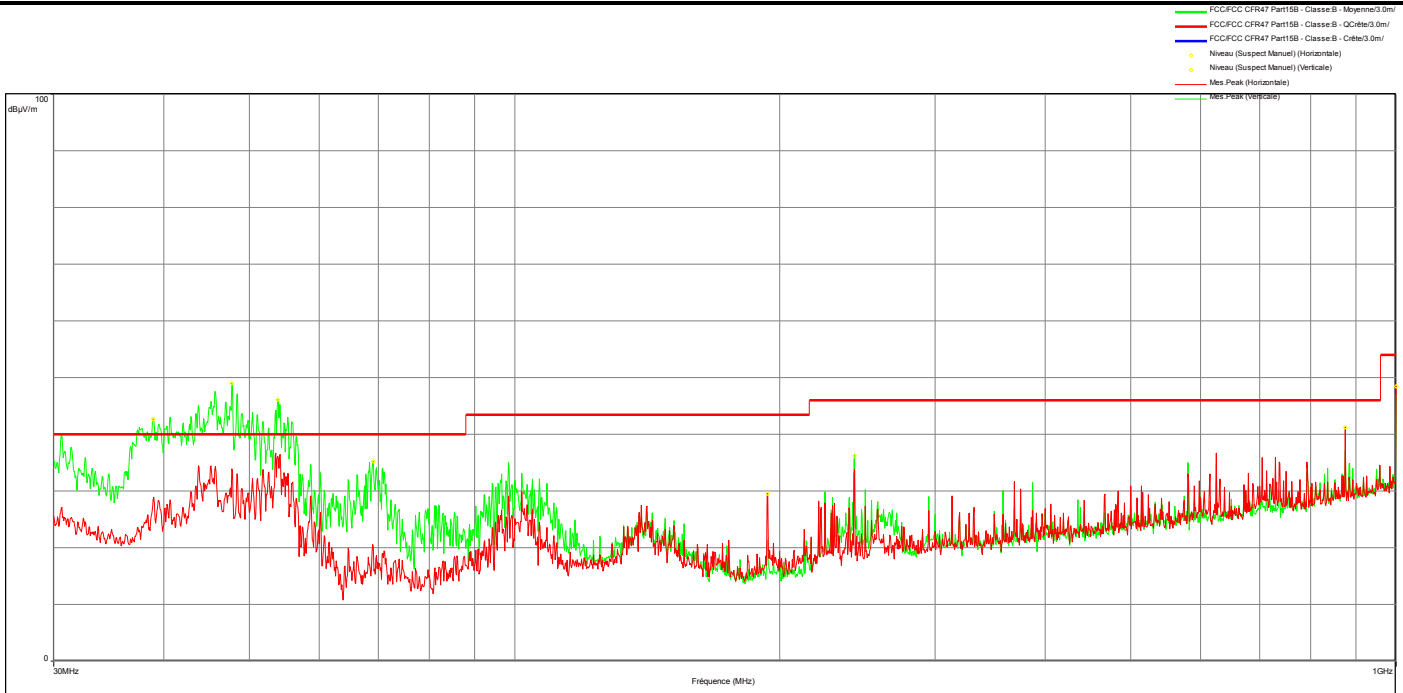
Frequency (MHz)	Peak (dBμV/m)	Polarization
13.55862	61.99	0°
27.119475	61.94	0°
13.55862	58.33	90°



L C I E

RADIATED EMISSIONS

Graph name:	Emr#3	Test configuration:
Limit:	FCC CFR47 Part15B	(H+V) - Configuration 1 <1GHz
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz



Spurious emissions

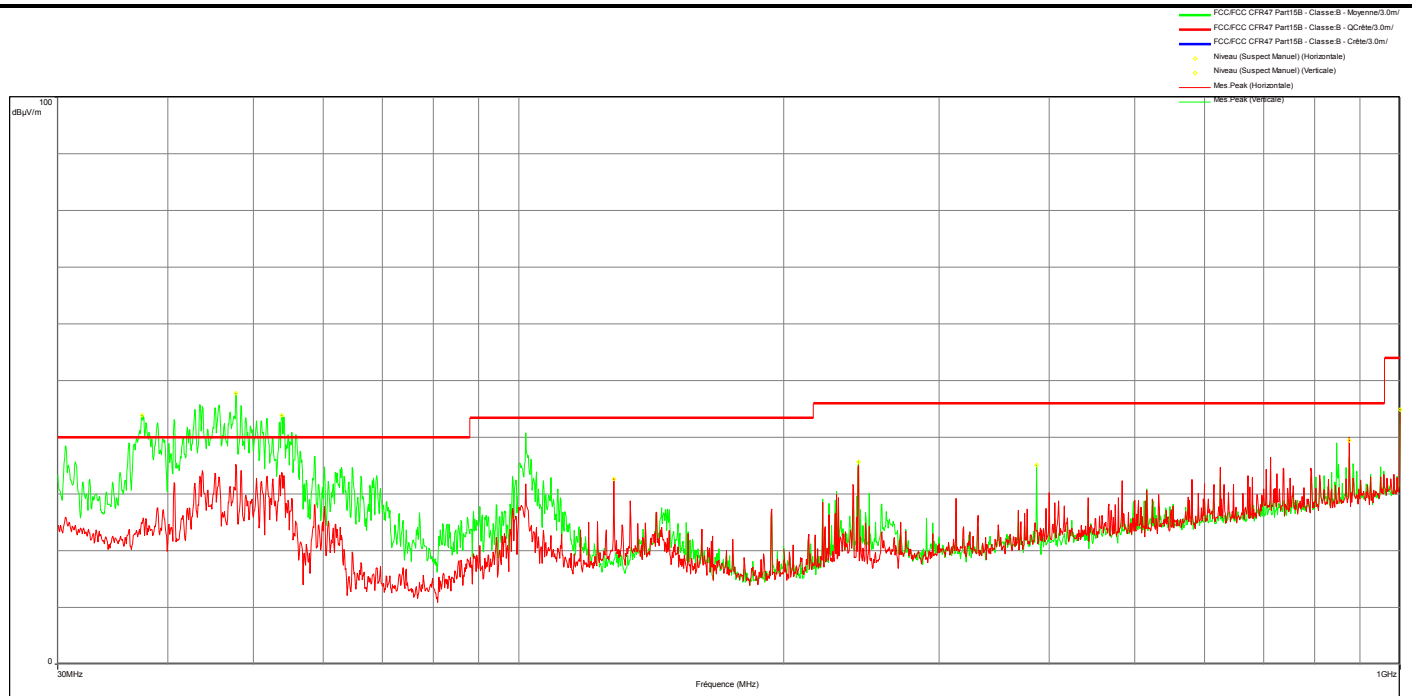
Frequency (MHz)	Niveau (dBµV/m)	Polarization
193.54	29.61	Horizontal
875	41.22	Horizontal
1000	48.46	Horizontal
38.891	42.72	Vertical
47.782	49.03	Vertical
53.885	46.14	Vertical
69.117	35.18	Vertical
242.8	36.25	Vertical



L C I E

RADIATED EMISSIONS

Graph name:	Emr#4	Test configuration:
Limit:	FCC CFR47 Part15B	(H+V) - Configuration 2 <1GHz
Class:	B	
Frequency range: [30MHz - 1GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 100kHz
Azimuth:	0° - 360°	VBW : 300kHz



Spurious emissions

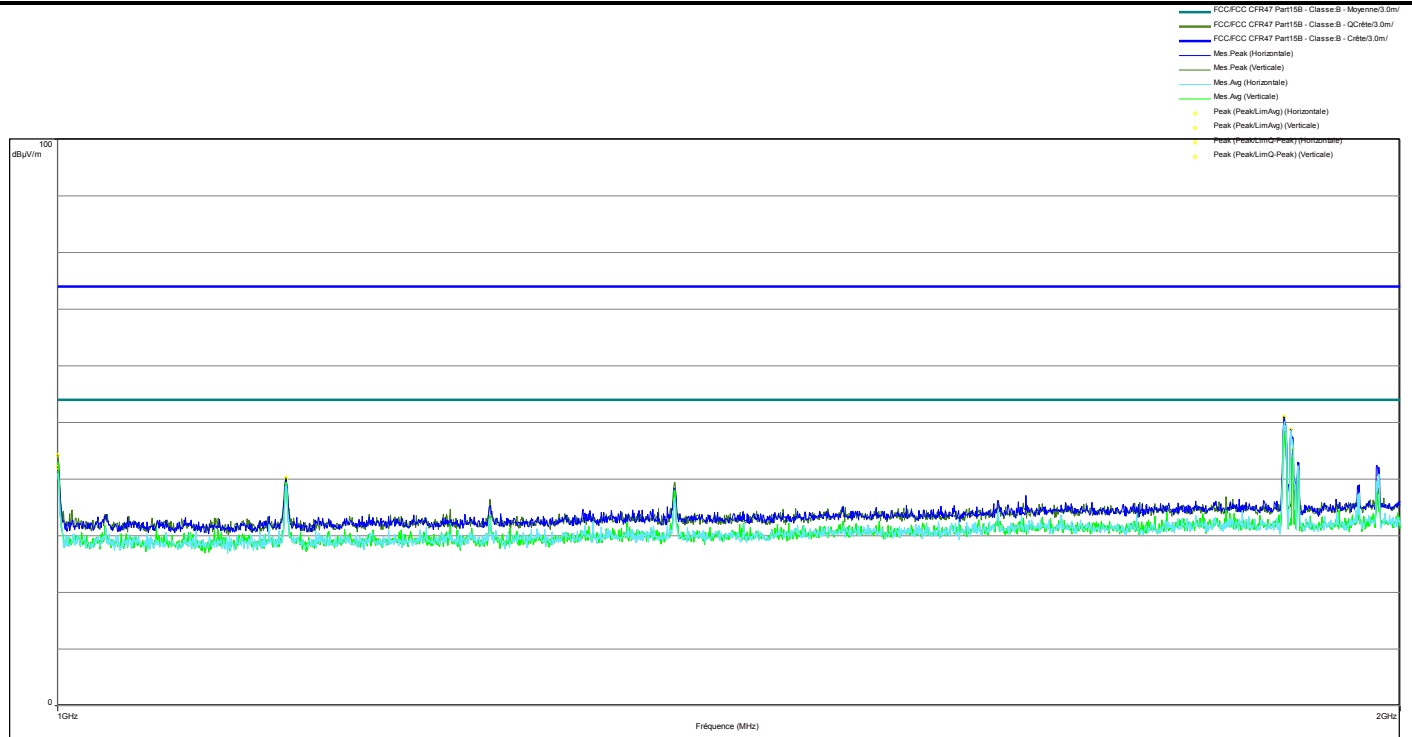
Frequency (MHz)	Niveau (dBµV/m)	Polarization
128.243	32.65	Horizontal
875.04	39.48	Horizontal
37.361	43.85	Vertical
47.782	47.8	Vertical
53.868	43.92	Vertical
242.8	35.72	Vertical
387.08	35.16	Vertical
1000	44.86	Vertical



L C I E

RADIATED EMISSIONS

Graph name:	Emr#5	Test configuration:
Limit:	FCC CFR47 Part15B	(H+V) - Configuration 1 >1GHz
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz



Spurious emissions

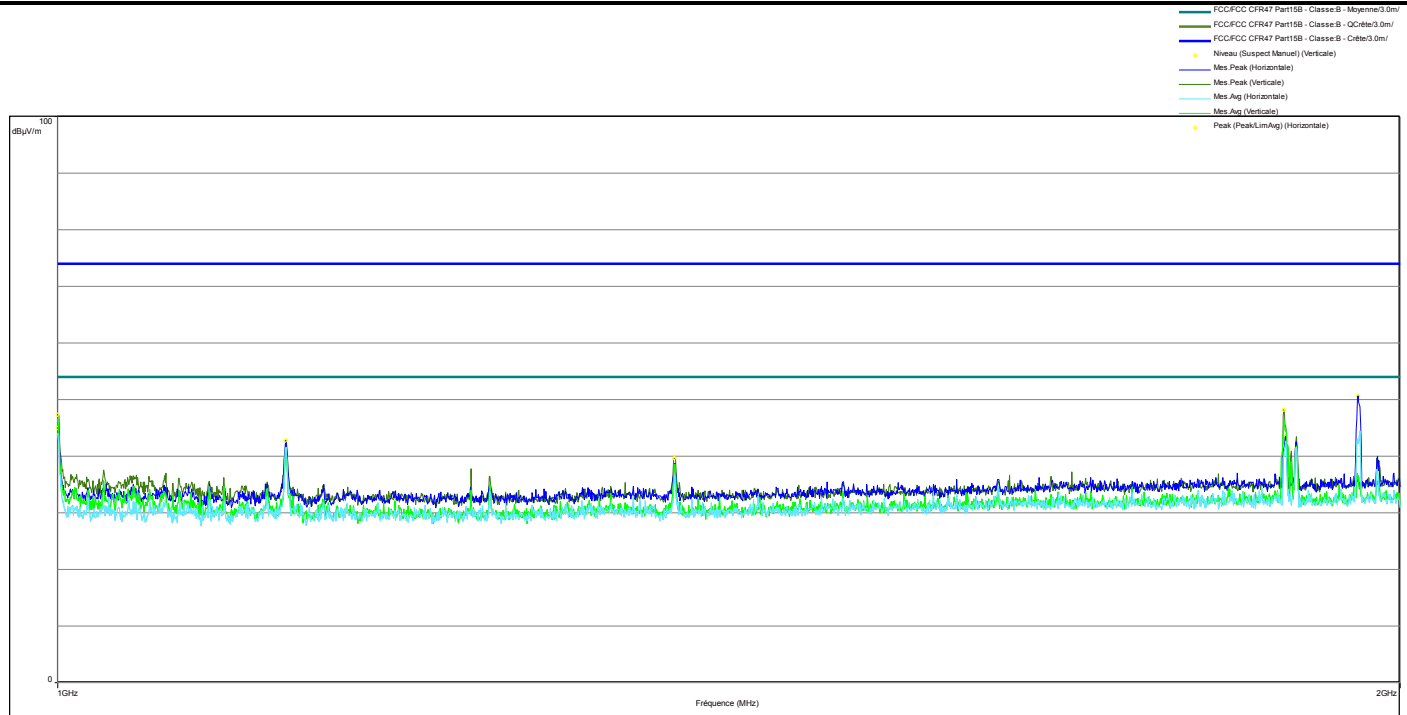
Frequency (MHz)	Peak (dBµV/m)	Polarization
1000	42.12	Horizontal
1125	40.04	Horizontal
1883.4	50.98	Horizontal
1890.2	48.76	Horizontal
1000	44.28	Vertical
1125.2	40.27	Vertical
1884	50.92	Vertical
1892.2	45.37	Vertical



L C I E

RADIATED EMISSIONS

Graph name:	Emr#6	Test configuration:
Limit:	FCC CFR47 Part15B	(H+V) - Configuration 2 >1GHz
Class:	B	
Frequency range: [1GHz - 2GHz]		
Antenna polarization:	Horizontal & Vertical	RBW : 1MHz
Azimuth:	0° - 360°	VBW : 3MHz



Spurious emissions

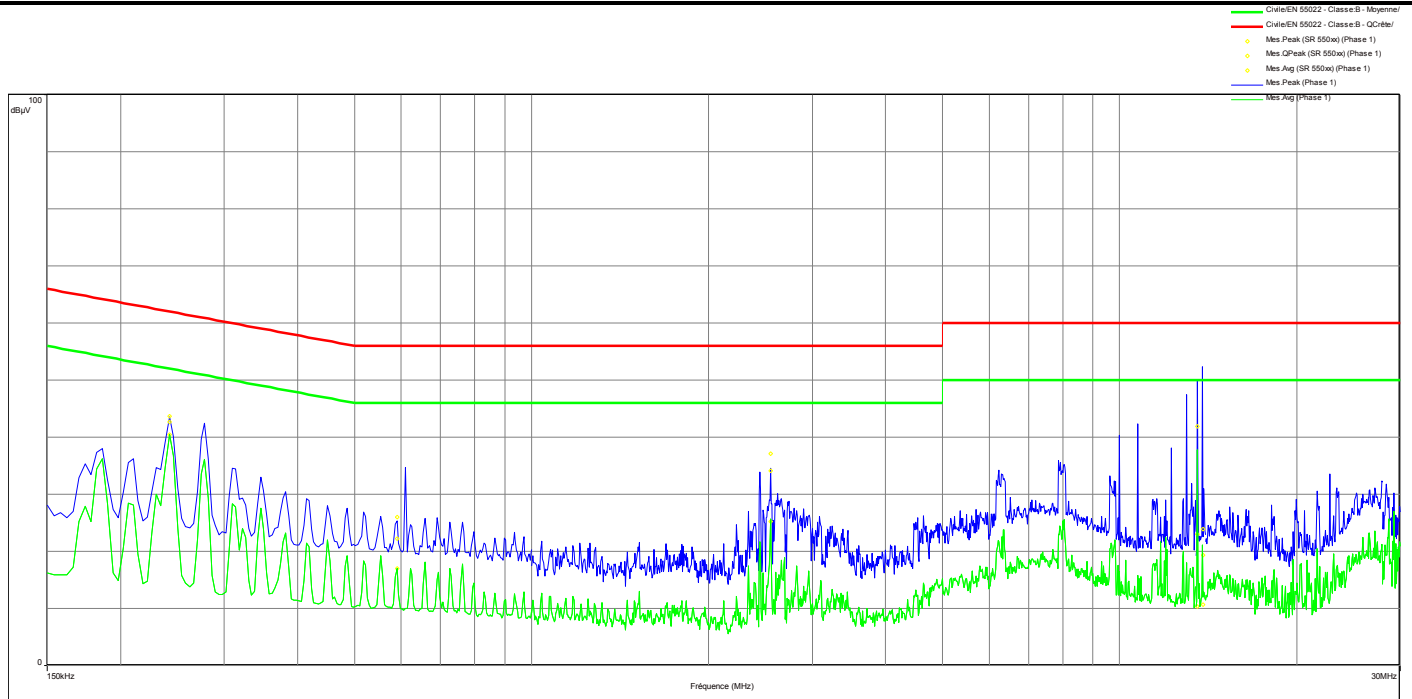
Frequency (MHz)	Peak (dBµV/m)	Polarization
1000.1	44.99	Horizontal
1125	42.73	Horizontal
1885.3	43.53	Horizontal
1956.9	50.72	Horizontal
1000.1	47.33	Vertical
1124.9	42.77	Vertical
1374.6	39.72	Vertical
1883.5	48.23	Vertical



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#1	Test configuration:	
Limit:	EN 55022	Phase ICT 250 V2 Configuration 1	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	RBW :	10kHz
Line:	Phase	VBW :	30kHz



Spurious emissions

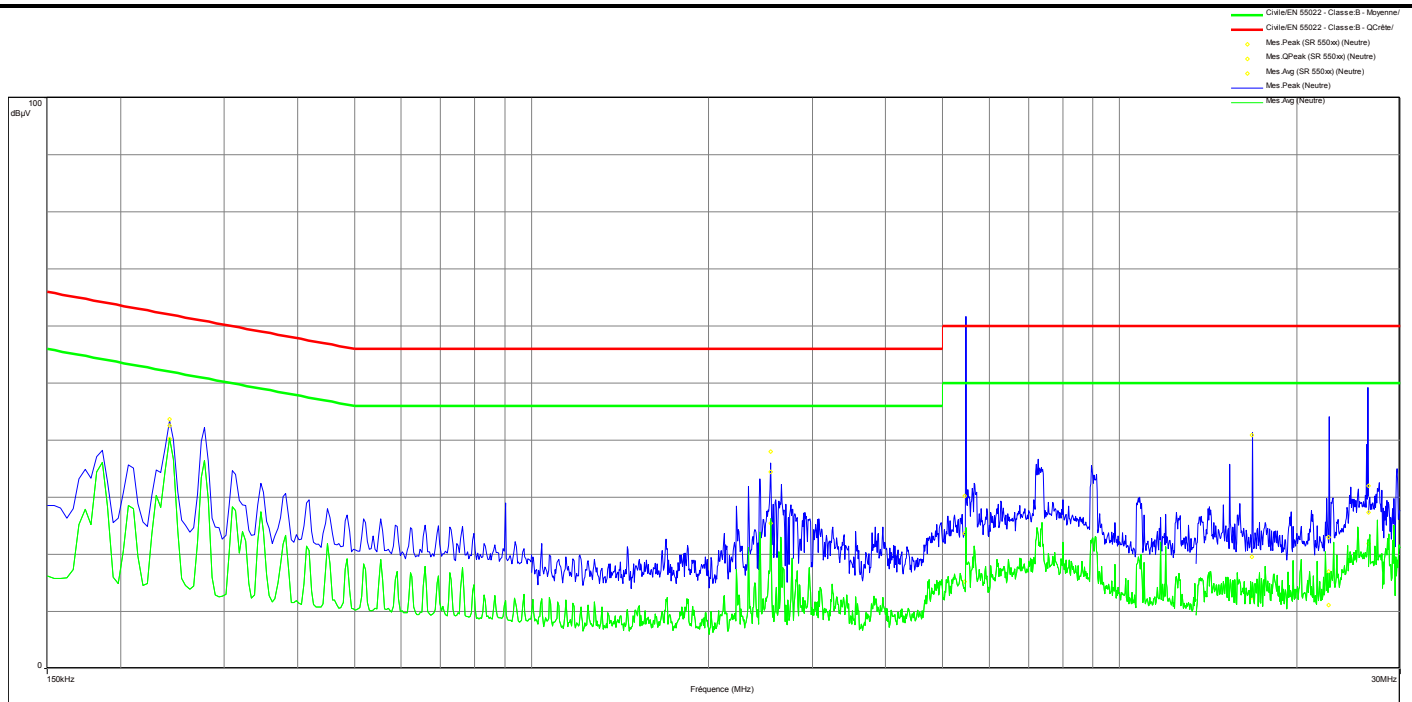
Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
0.242	43.7	42.69	62.03	-19.34	40.41	52.03	-11.62
0.59	26.04	22.2	56	-33.8	16.95	46	-29.05
2.552	37.16	34.07	56	-21.93	25.19	46	-20.81
13.559	23.03	41.89	60	-18.11	10.3	50	-39.7
13.843	23.91	19.34	60	-40.66	10.67	50	-39.33



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#2	Test configuration:	
Limit:	EN 55022	Neutral ICT 250 V2 Configuration 1	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	RBW :	10kHz
Line:	Neutral	VBW :	30kHz



Spurious emissions

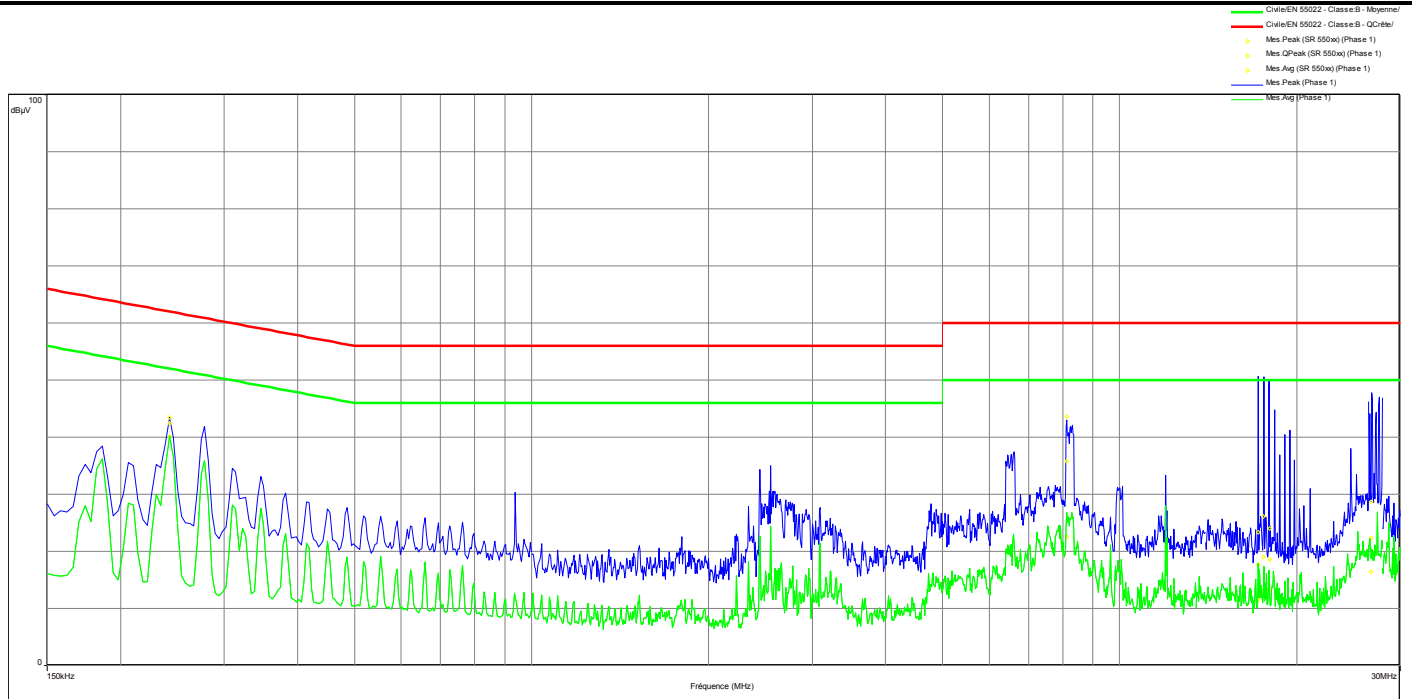
Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
0.242	43.62	42.54	62.03	-19.49	40.27	52.03	-11.76
2.552	38.05	34.47	56	-21.53	25.49	46	-20.51
5.45	30.24	23.68	60	-36.32	15.23	50	-34.77
16.777	40.85	19.5	60	-40.5	12.4	50	-37.6
22.68	23.05	17.02	60	-42.98	11.15	50	-38.85
26.485	31.95	27.37	60	-32.63	21.91	50	-28.09



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#3	Test configuration:	
Limit:	EN 55022	Phase ICT 250 V2 Configuration 2	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	RBW :	10kHz
Line:	Phase	VBW :	30kHz



Spurious emissions

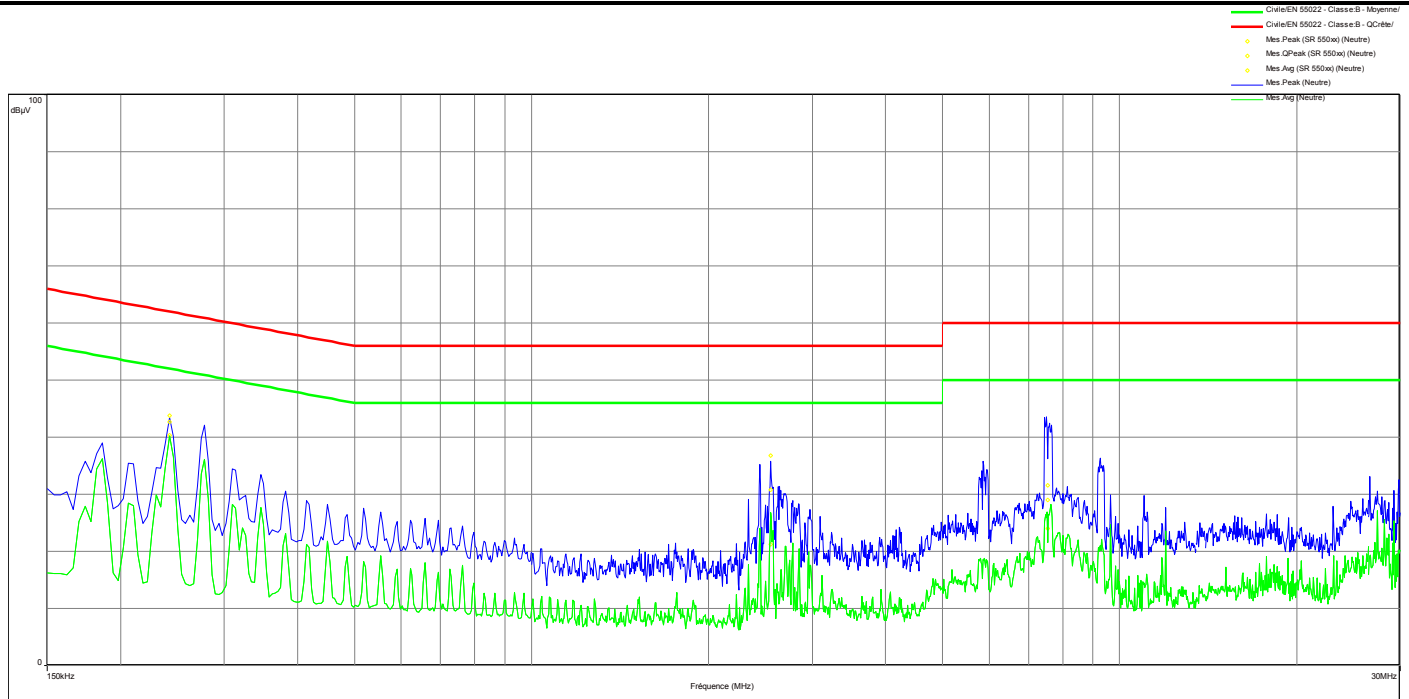
Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
0.242	43.47	42.41	62.03	-19.62	40.14	52.03	-11.89
8.119	43.57	35.75	60	-24.25	22.51	50	-27.49
17.193	23.39	17.64	60	-42.36	11.55	50	-38.45
17.565	26.16	18.95	60	-41.05	13.14	50	-36.86
18.001	23.98	18.59	60	-41.41	13.32	50	-36.68
26.787	28.7	22.33	60	-37.67	16.48	50	-33.52



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#4	Test configuration:	
Limit:	EN 55022	Neutral ICT 250 V2 Configuration 2	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	RBW :	10kHz
Line:	Neutral	VBW :	30kHz



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)
0.242	43.73	42.64	62.03	-19.39	40.37	52.03	-11.66
2.547	36.73	30.75	56	-25.25	21.19	46	-24.81
7.553	31.51	29.05	60	-30.95	24.03	50	-25.97



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.