



Rapport d'essai / Test report

JDE : 112079 N° 359259-R2-E

DELIVRE A / ISSUED TO : DIGIGRAM (Mr Thierry HAUSER)
Parc du Pré-MILLET
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Objet / Subject : Essais de compatibilité électromagnétique conformément aux normes :
Electromagnetic compatibility tests according to the standards:
FCC CFR 47 Part 15, Subpart B.
ANSI C63.4 (2003)

Matériel testé / Apparatus under test :

- Produit / Product : **Tablette Audio/ Audio PAD**
- Marque / Trade mark : **DIGIGRAM**
- Constructeur / Manufacturer : **DIGIGRAM**
- Type / Model : **CANCUN222-MIC OEM / CANCUN222-MIC END USER**
CANCUN442-MIC OEM / CANCUN442-MIC END USER
- Type sous test / Model under test : **CANCUN442-MIC END USER**
- N° de série / serial number : **00020006**
- FCC ID : **IGTCANCUN**

Date des essais / Test date : **Le 03 et 13 Février 2012**
February 03rd and 13th, 2012

Lieu d'essai / Test location : **LCIE SUD-EST**
ZI Centr'Alp – 170 rue de Chatagnon
38430 MOIRANS - FRANCE

Test réalisé par / Test performed by : Majid MOURZAGH

document comporte / Composition of document: 18 pages

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MOIRANS, LE 18 JUIN 2012 / JUNE 18TH, 2012

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SUMMARY

1. TEST PROGRAM	3
2. APPARATUS UNDER TEST: CONFIGURATION	4
3. MEASUREMENT OF CONDUCTED EMISSION (150KHZ-30MHZ)	6
4. MEASUREMENT OF RADIATED EMISSION (30MHZ-5GHZ).....	8
5. UNCERTAINTIES CHART	14
6. ANNEX 1 (GRAPHS)	15



1. TEST PROGRAM

Standard:

- FCC Part 15, Subpart B (Digital Devices)
- ANSI C63.4 (2003)

EMISSION TEST	LIMITS			RESULTS (Comments)
Limits for conducted disturbance at mains ports 150kHz-30MHz	Frequency	Quasi-peak value (dBμV)	Average value (dBμV)	COMPLY
	150-500kHz	66 to 56	56 to 46	
	0.5-5MHz	56	46	
	5-30MHz	60	50	
Radiated emissions 30MHz-5GHz*	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			COMPLY FREQ MAX 500MHz

***§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.

2. APPARATUS UNDER TEST: CONFIGURATION

2.1. JUSTIFICATION:

CANCUN222-MIC OEM / CANCUN222-MIC END USER / CANCUN442-MIC OEM / CANCUN442-MIC END USER are same electronic, but CANCUN442-MIC END USER use more cables and more input and output. Then during test we have used only CANCUN442-MIC END USER, worst case.

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

• Equipment under test (EUT):

CANCUN442-MIC END USER

Serial Number: 00020006

• Power supply:

USB: 5Vdc

• Inputs/outputs:

CANCUN442

1 x audio output
1x USB MiniB type

Subd44 :

- 4 x analog output
- 4 x analog input
- 2 x digital output
- 2 x digital input

Optical:

- 1 x output
- 1 x Input

CANCUN222

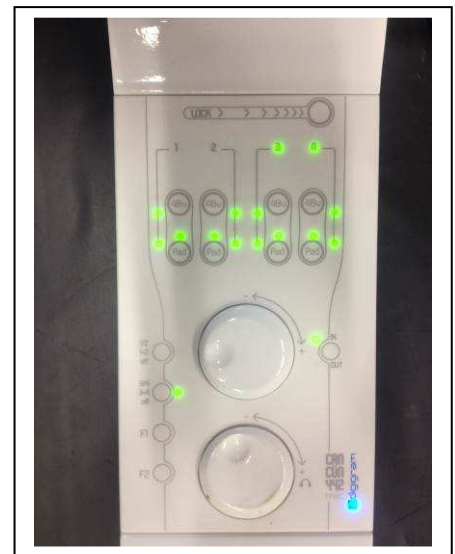
1 x audio output
1 x USB MiniB type

Subd44 :

- 2 x analog output
- 2 x analog input
- 1 x digital output
- 1 x digital input

Optical:

- 1 x output
- 1 x Input



• Cables:

CANCUN 442 with cable SC210400201-01

- 1 x Adaptor SubD44 to 12 x AUDIO XLR shielded length:0,25 m (specified by customer <3m)
- 12 x Audio XLR extension cords, shielded, length: 1 m (specified by customer <3m)
- 1 x XLR extension cords, shielded, length: 1 m (specified by customer <3m)
- 1 x USB cable: 1 m (specified by customer <3m)
- 1 x Audio cable shielded length:3m

CANCUN 222 with cable SC210400101-01

- 1 x Adaptor SubD44 to 6 x AUDIO XLR shielded length:0,25 m (specified by customer <3m)
- 6 x Audio XLR extension cords, shielded, length: 1 m (specified by customer <3m)
- 1 x XLR extension cords, shielded, length: 1 m (specified by customer <3m)
- 1 x USB cable: 1 m (specified by customer <3m)
- 1 x Audio cable shielded length:3m

• Auxiliaries equipment used during test:

- | | | |
|----------------------------------|-------------------------------|--------------------|
| - Laptop Toshiba satellite Pro | Model number: PSA65E-01L00XFR | Sn: X4085777Q |
| - AC/DC power supply: LITEON | Model number: PA-1121-04 | Sn: F4IB0436133291 |
| - Audio Load Box (DIGIGRAM Tool) | | Sn: None |
| - Headphone SENNHEISER HD 433 | | Sn: None |



2.3. *RUNNING MODE*

The system was configured for testing in a typical fashion (as a customer would normally use it).
We use software "REAPER", sound are play in loop on all output

2.4. *EQUIPMENT MODIFICATIONS*

None

2.5. *SPECIAL ACCESSORIES*

None

3. MEASUREMENT OF CONDUCTED EMISSION (150kHz-30MHz)

3.1. TEST CONDITIONS

Date of test : February 03 and 13, 2012
Test performed by : Majid MOURZAGH
Atmospheric pressure : 999 hPa & 1001 hPa
Relative humidity : 21% & 28%
Ambient temperature : 21°C & 20°C

3.2. SETUP FOR CONDUCTED EMISSIONS MEASUREMENT

The product has been tested according to ANSI C63.4-(2003) and FCC Part 15 subpart B.

The product has been tested with 110V/60Hz power line voltage on laptop and compared to the FCC Part 15 subpart B §15.107 limits. Measurement bandwidth was 9kHz from 150 kHz to 30 MHz.

The EUT with its auxiliaries are set on a non-conducting table 80cm above the ground reference plane.
The distance between the EUT and the LISN is 80cm. The EUT is 40cm away for the vertical ground plane.
The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.

Measurement is made with a Rohde & Schwarz ESU8 receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure and auxiliaries) 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.



**3.3. TEST EQUIPMENT LIST**

DESCRIPTION	MANUFACTURER	MODEL	N°LCIE
Cable	-	-	A5329197
Conducted emission comb generator	BARDET	-	A3169049
LISN	RHODE & SCHWARZ	ENV216	C2320123
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Attenuator 10dB	RHODE & SCHWARZ	ESH3-Z2	A7122204

3.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

3.5. MEASUREMENTS RESULTS**Mains terminals 110Vac/60Hz:**

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

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

RESULT: PASS

4. MEASUREMENT OF RADIATED EMISSION (30MHz-5GHz)

4.1. TEST CONDITIONS

Date of test : February 03rd and 13th, 2012
Test performed by : Majid MOURZAGH
Atmospheric pressure : 999 hPa & 1001 hPa
Relative humidity : 21% & 28%
Ambient temperature : 21°C & 2°C

4.2. SETUP FOR RADIATED EMISSIONS MEASUREMENT

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 on the non-conducting table of 80 cm height.

The EUT is powered by UBB laptop 230Vac/50Hz (PC and auxiliaries)

Pre-characterisation measurement:

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber. The distance between EUT and antenna is 3 meters. Test is performed in horizontal (H) and vertical (V) polarization. During the measurement, the EUT is rotated on a 360° range.

The pre-characterization graphs are obtained in PEAK detection.

For frequency band 1GHz to 5GHz, a search is performed in the semi-anechoic chamber in order to determine frequencies radiated by the EUT (Measuring distance reduced to 1m).

Characterization on 10 meters open site from 30MHz to 1GHz:

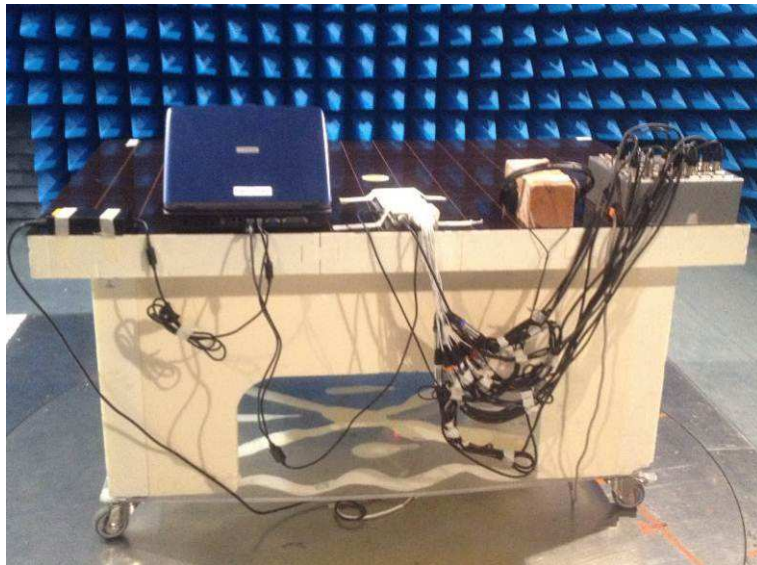
The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart B. Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC.

The product has been tested at a distance of **10 meters** (30MHz to 1GHz) from the antenna and corrected according to requirements of 15.109.e). Results are compared to the FCC part 15 subpart B §15.109 limits. Measurement bandwidth was 120kHz from 30 MHz to 1GHz. Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range.



Characterization on 3 meters full anechoic chamber from 1GHz to 5GHz:

The product has been tested at a distance of **3 meters** (1GHz to 5GHz) from the antenna and corrected according to requirements of 15.109.e). Results are compared to the FCC part 15 subpart B §15.109 limits. Measurement bandwidth was 1MHz from 1GHz to 5GHz. Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range.





4.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N°LCIE
Adapter quasi-peak	HEWLETT PACKARD	HP85650A	A4049059
Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D	A7085008
Amplifier 8 GHz	HEROTEK	A1080304A	A7102024
Antenna Bi-log	CHASE	CBL6111A	C2040051
Antenna Bi-Log XWing	TESEQ	CBL6144	C2040145
Antenna horn	EMCO	3115	C2042029
Cable	SUCOFLEX	106G	A5329061
Cable	-	-	A5329183
Cable OATS (Mast at 10m)	UTIFLEX	-	A5329188
Cable	UTIFLEX	-	A5329189
Cable	-	-	A5329191
Cable OATS (Mast at 10m)	UTIFLEX	-	A5329199
Semi-Anechoic chamber #1	SIEPEL	-	D3044016
Radiated emission comb generator	BARDET	-	A3169050
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Spectrum analyzer	HEWLETT PACKARD	HP8568B	A4060017
Spectrum analyzer display	HEWLETT PACKARD	HP85662A	A4060019
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392
Turntable chamber (Cage#1)	MATURO Gmbh	TT 2.0 SI	F2000406
Antenna mast (Cage#1)	MATURO Gmbh	AM 4.0	F2000407
Turntable controller (Cage#1)	MATURO Gmbh	Control Unit	F2000408
Table	LCIE	-	F2000438

4.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None



4.5. MEASUREMENTS RESULTS

Pre-characterisation measurement: pre-scan measurement at 3m (PEAK detection, graph examples)

Polarisation H: graph **Emr#1** (see annex 1)
Polarisation V: graph **Emr#2** (see annex 1)

QUALIFICATION: 10 / 3 meters measurement on the Open Area Test Site. Frequency list has been created with semi-anechoic chamber pre-scan results. Measurements are performed using a QUASI-PEAK detection.

Frequency range 30MHz to 1GHz:

Measurements are performed using a QUASI-PEAK detection (RBW=120kHz)

No	Frequency (MHz)	Limit Quasi-Peak (dBμV/m)	Measure Quasi-Peak (dBμV/m)	Margin (Meas-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. factor (dB)	Comments
1	157.8	43.5	35.89	-7.61	0	V	100	12.79	M@10m
2	166.6	43.5	36.20	-7.30	230	V	150	12.21	M@10m
3	221.121	46	32.85	-13.15	270	H	350	13.45	M@10m
4	299.999	46	38.22	-7.78	300	H	150	16.22	M@3m
5	479.993	46	36.02	-9.98	180	V	150	21.12	M@10m
6	601.067	46	38.38	-7.62	90	H	250	23.48	M@10m
7	631.81	46	38.74	-7.26	180	H	200	23.84	M@10m
8	720.106	46	39.80	-6.20	0	H	100	24.30	M@10m
9	712.702	46	41.50	-4.50	0	V	150	25.00	M@10m
10	712.702	46	38.00	-8.00	160	H	100	25.00	M@3m

Note: Measures have been done at 10m distance and corrected according to requirements of 15.109.e)
(M@3m = M@10m+10.5dB)



4.5.1. Characterization in full anechoic chamber at 3m from 1GHz to 5GHz

The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC part 15 subpart B §15.109 limits. Measurement bandwidth was and 1MHz from 1GHz to 5GHz.

Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT.

A summary of the worst case emissions found in all test configurations and modes is shown on clause 3.2

Frequency band 1GHz to 5GHz

Measurements are performed using a PEAK and Average detection. (RBW = 1MHz)

No	Frequency (GHz)	Limit Peak (dBμV/m)	Limit Peak (dBμV/m)	Measure Peak (dBμV/m)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
1	1.204	74	53.98	-20.02	180	H	100	-5.52	
2	1.067	74	45.56	-28.44	270	H	100	-6.01	
3	1.467	74	48.19	-25.81	0	H	120	-4.67	
4	1.336	74	49.52	-24.48	45	H	130	-5.05	
5	2.039	74	41.26	-32.74	270	H	100	-0.87	
6	2.459	74	42.31	-31.69	0	H	120	-0.48	
7	1.204	74	56.29	-17.71	0	V	110	-5.52	
8	1.467	74	51.13	-22.87	270	V	110	-4.67	
9	1.333	74	53.01	-20.99	180	V	120	-5.05	
10	1.602	74	55.57	-18.43	0	V	110	-3.73	

No	Frequency (MHz)	Limit Average (dBμV/m)	Measure Average (dBμV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
1	1.204	54	40.48	-13.52	180	H	100	-5.52	
2	1.067	54	28.58	-25.42	270	H	100	-6.01	
3	1.467	54	27.59	-26.41	0	H	120	-4.67	
7	1.204	54	42.28	-11.72	0	V	110	-5.52	
8	1.467	54	36.61	-17.39	270	V	110	-4.67	
9	1.333	54	31.95	-22.05	180	V	120	-5.05	
10	1.602	54	29.97	-24.03	0	V	110	-3.73	

Note: Measures have been done at 3m distance.

RESULT: PASS



4.6. 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 is added. The amplifier gain of 29dB is subtracted, giving field strength of 32 dBμV/m.

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

The 32 dBμV/m value can be mathematically converted to its corresponding level in μV/m.

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

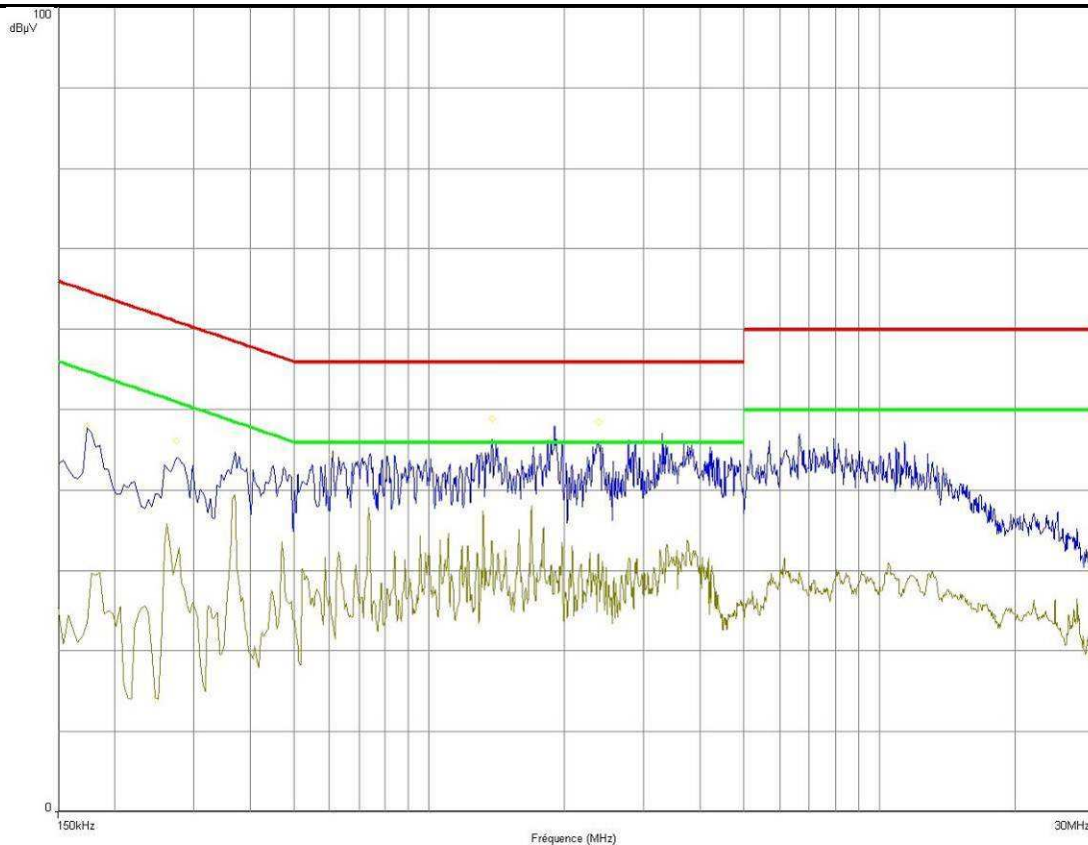
**5. UNCERTAINTIES CHART**

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 (monophasé) <i>Measurement of conducted disturbances in voltage on the power port (single line)</i>	3.57 dB	3.6 dB
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
Mesure du champ électrique rayonné IN SITU de 30 à 1000 MHz <i>IN SITU measurement of radiated electric field from 30 to 1000MHz</i>	A l'étude / Under consideration	5.2 dB

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par le CISPR, la conformité de l'échantillon est établie directement par les niveaux limites applicables. Ce tableau regroupe l'ensemble des incertitudes maximales pour les essais réalisables dans le laboratoire, qu'ils aient été ou non réalisés dans le cadre du présent rapport / The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report

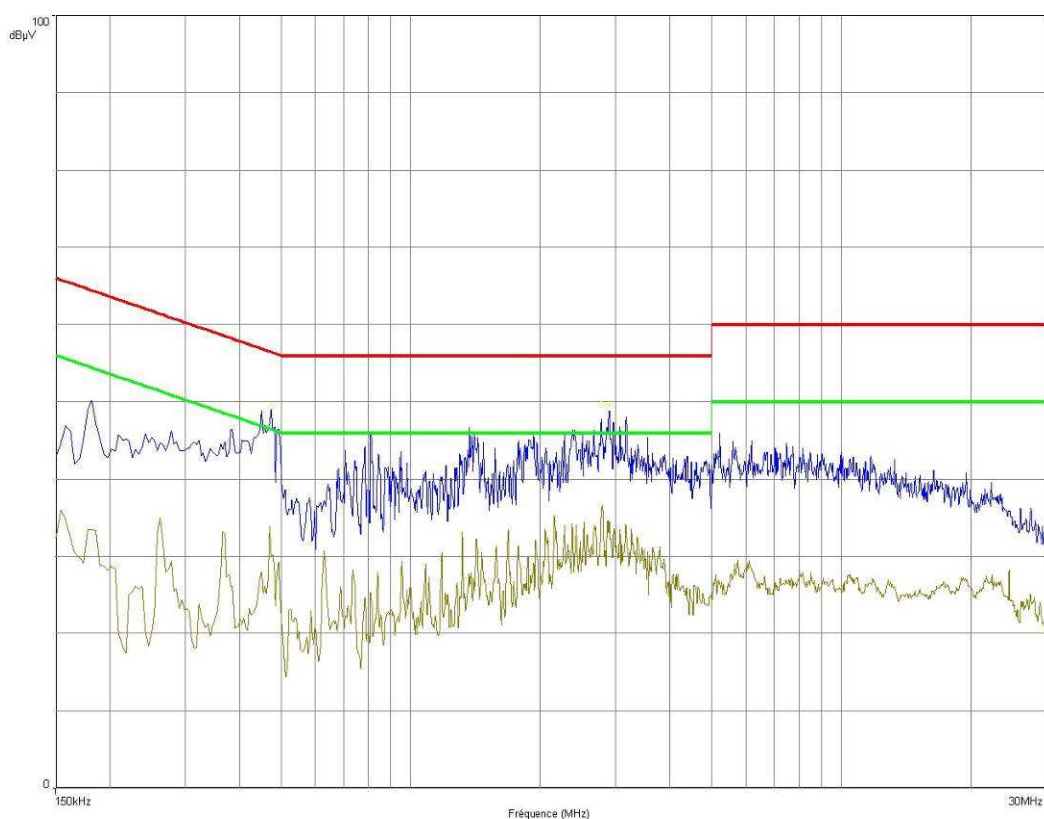
6. ANNEX 1 (GRAPHS)

CONDUCTED EMISSIONS				
Graph name :	Emc#1	Test configuration: Power Supply computer: Line		
Limit :	EN 55022			
Class :	B			
PARAMETERS				
Voltage / Frequency :	110VAC / 60Hz	Legend:		
Line :	Phase1	Peak Measure		Average Measure
RBW :	9kHz			
VBW :	30kHz	QPeak Limit		Average Limit
Frequency :	150kHz- 30MHz			



Frequency (MHz)	Avg (dBμV)	Lim Avg (dBμV)	Avg-LimAvg (dBμV)	QPeak (dBμV)	LimQPeak (dBμV)	QPeak-LimQPeak (dBμV)
0.174	24.46	54.77	-30.31	38.91	64.77	-25.86
0.274	29.8	51	-21.19	40.97	61	-20.02
0.61	26.04	46	-19.96	38.52	56	-17.48
1.382	31.78	46	-14.22	42.25	56	-13.75
1.902	28.82	46	-17.18	40.03	56	-15.97
2.378	28.73	46	-17.27	40.64	56	-15.36
3.294	28.97	46	-17.03	37.9	56	-18.1
6.63	26.67	50	-23.33	36.25	60	-23.75
11.39	26.25	50	-23.75	32.99	60	-27.01

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



Frequency (MHz)	Avg (dBμV)	Lim Avg (dBμV)	Avg-LimAvg (dBμV)	QPeak (dBμV)	LimQPeak (dBμV)	QPeak-LimQPeak (dBμV)
0.182	32.41	54.39	-21.98	43.89	64.39	-20.51
0.45	26.85	46.88	-20.02	43.06	56.88	-13.81
0.474	35.79	46.44	-10.65	45.94	56.44	-10.5
0.806	22.06	46	-23.94	35.23	56	-20.77
1.37	26.28	46	-19.72	37.1	56	-18.9
1.93	27.87	46	-18.13	38.19	56	-17.81
2.766	33	46	-13	41.72	56	-14.28
2.894	33.54	46	-12.46	41.91	56	-14.09
3.166	31.3	46	-14.7	39.54	56	-16.46
5.23	25.31	50	-24.69	34.42	60	-25.58
7.482	24.3	50	-25.7	33.4	60	-26.6

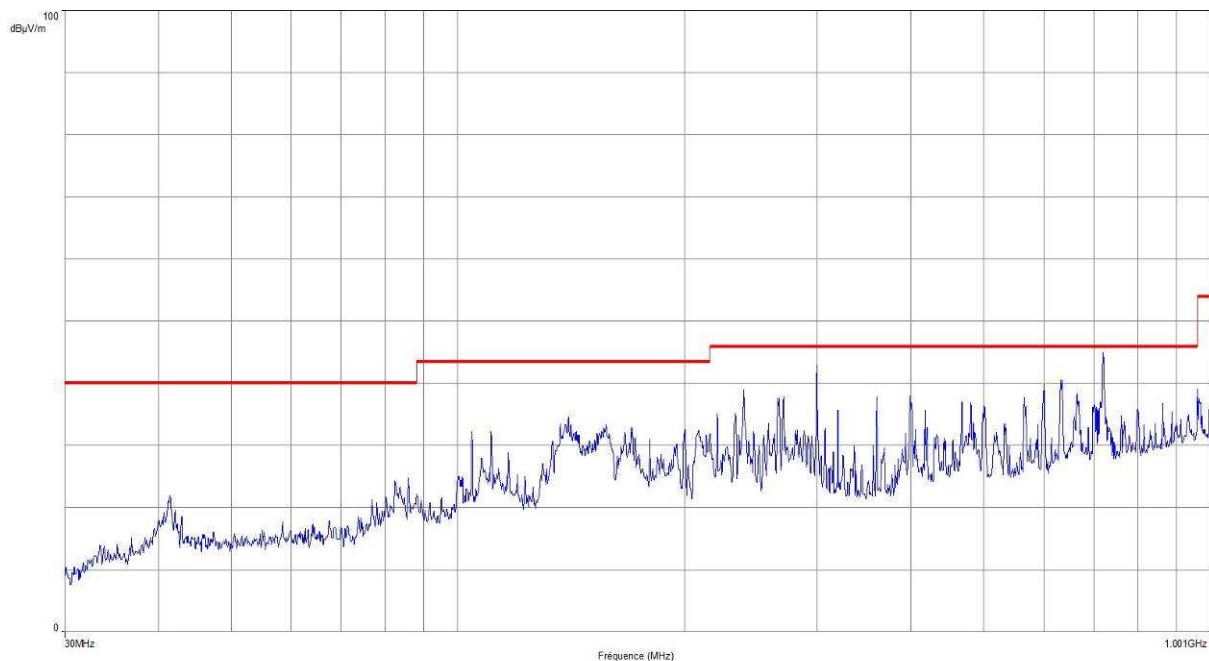


RADIATED EMISSIONS

Graph name :	Emr#1	Test configuration:
Limit :	Part15B	Pol H - Cancun 442
Class :	B	

PARAMETERS

Antenna polarization:	Horizontale	Legend:
Azimuth :	0° - 360°	Peak Measure
RBW :	100kHz	QPeak Limit@3m
VBW :	300kHz	
Frequency :	30MHz- 1.001GHz	



Frequency (MHz)	Peak (dBµV/m)
110.76	32.17
140.28	34.65
221.12	35.03
299.84	41.45
601.28	39.91
631.84	40.52
719.84	44.93

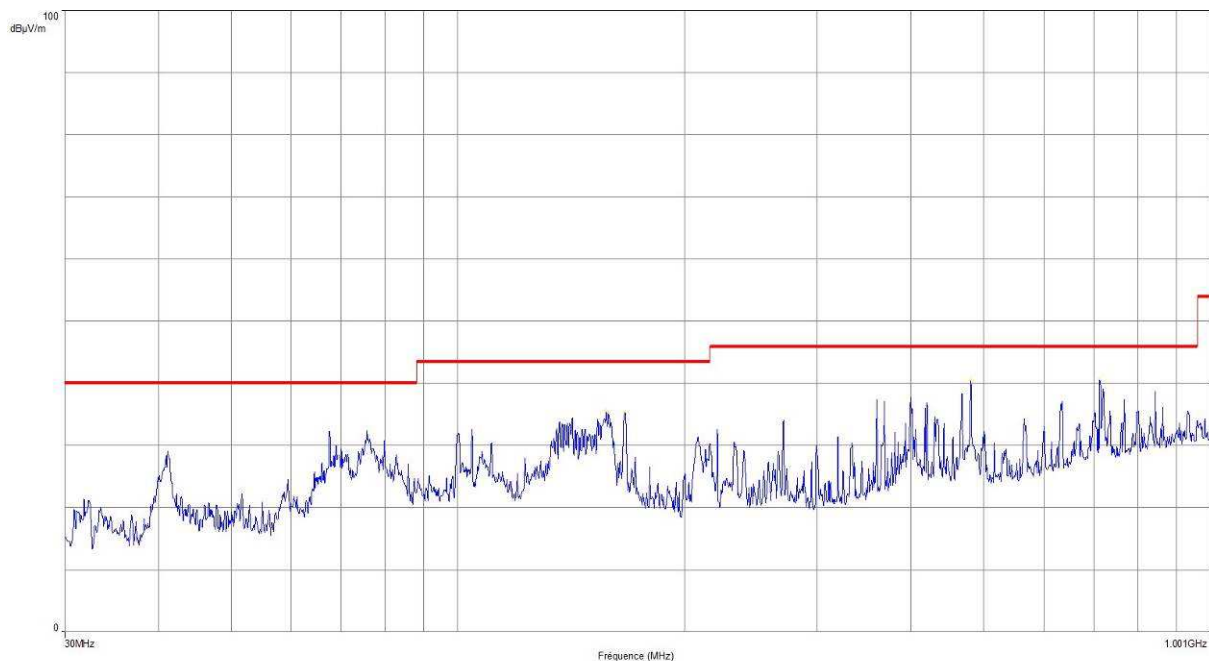


RADIATED EMISSIONS

Graph name :	Emr#2	Test configuration:
Limit :	Part15B	Pol V - Cancun 442
Class :	B	

PARAMETERS

Antenna polarization:	Verticale	Legend:
Azimuth :	0° - 360°	Peak Measure
RBW :	100kHz	
VBW :	300kHz	QPeak Limit@3m
Frequency :	30MHz- 1.001GHz	



Frequency (MHz)	Peak (dBµV/m)
157.48	35.37
166.6	35.24
479.92	40.35
712.84	40.54