



CE-Mesures

Rapport d'essais / Test Report

N° : 20324-FCC-1

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SMEE

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FCC Registration Number: 0020356952 (FRN)

Industry Canada Test Firm Number: 9545A-1

Test Firm Registration Number: 171131

Matériel testé : **PCX-LW (IP Audio LiveWire Multichannel Sound Card)**
Equipment under test: **(PCX-IP LW881, VX-IP LW881, PCX-IP LW1221, VX-IP LW1221)**

Constructeur: **DIGIGRAM**
Manufacturer: 82/84 allée Galilée
38330 MONTBONNOT SAINT MARTIN – FRANCE

Rapport délivré à : **DIGIGRAM**
Issued to: 82/84 allée Galilée
38330 MONTBONNOT SAINT MARTIN – FRANCE

Référence de la proposition : 072012-20324
Proposal number:

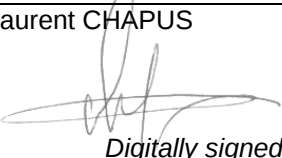
Date de l'essai : November 5th and 6th, 2012
Date of test:

Objectif des essais : EMC qualification accordingly to standard CFR 47, FCC Part 15, Subpart B
Test purpose: (Class B Personal Computer Peripheral)
FCC ID: IGTPCXIP

Lieu du test: SMEE CE-Mesures
Test location: 38 VOIRON - France

Test réalisé par : Laurent CHAPUS
Test realized by:

Conclusion : L'équipement satisfait aux prescriptions des normes citées en référence.
Conclusion: The appliance complies with requirements of above mentioned standards.

Ed.	Date	Modifications / Pages	Written: Visa	Approved: Visa
1	February 18 th , 2013	Initial Edition	Laurent CHAPUS  Digitally signed	Régis ANCEL  Digitally signed

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1. Normative references

Standard: FCC CFR 47, PART 15, Subpart B

ANSI C63-4 (2009).

Requirements for unintentional radiators, class B Personal Computer Peripheral.

2. Test synthesis

ESSAI D'EMISSION / EMISSION TEST	LIMITES / LIMITS			RESULTATS / RESULTS
Emissions conduites sur les bornes d'alimentation AC / <i>Conducted emissions at AC power supply ports</i> 150kHz-30MHz	Freq	Quasi-Peak (dBμV)	Average (dBμV)	PASS
	150-500kHz	66 to 56	56 to 46	
	0.5-5MHz	56	46	
	5-30MHz	60	50	
Emissions rayonnées / <i>Radiated emissions</i> 30MHz-12.5GHz FCC Part 15B	Measure at 3m 30MHz-88MHz : 40 dB μ V/m 88MHz-216MHz : 43.5 dB μ V/m 216MHz-960MHz : 46 dB μ V/m Above 960MHz : 54 dB μ V/m			PASS



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3. Equipment Under Test (EUT)

Nom /
Identification

PCX-LW881 (1)
LiveWire (IP Audio Multichannel Sound Card)
FCC ID: IGTPCXIP

Tested sample:
N°: 12009 25240

Alimentation /
Power supply

From PCI Express bus

Auxiliaires /
Auxiliaries

- PC DELL VOSTRO 220 (Model: DCSCMF)
- Gigabit Switch D-Link DGS-1016D
- Axia LiveWire 8x8 AES/EBU Audio node (TELOS Systems)
- Keyboard DELL (Model: SK-8115)
- Mouse DELL (Model: ODJ301)
- Video Monitor PHILIPS (Model: 190S6FS/00)
- GPIO cable SDB15P159S-060 Rev B + DB15 load

Sn: 6L2374J
Sn: DRBO464001812
Sn: 0135T1353

Sn: BZ000551116501

Entrées-Sorties /
Input / Output

	Câbles pour essai / Cables for test	Blindé / Shielded	Prévu pour >3m / Intended for >3m
Ethernet	Cat 5e FTP(10m)	Yes	Yes
GPIO	1.2m	Yes	Yes
AC mains (Aux.)	2P+PE (x4, 1.5m)	No	-
Ethernet (Aux.)	Cat 5e FTP(x5, 1m)	Yes	-

Version programme /
Firmware version

N.C

Dimensions (cm)

PCI Express board

Mode de fonctionnement /
Running mode

Outputs of the PCX881-LW are loop back on inputs with the Ethernet switch and the Axia LiveWire audio node.
A sinus 1kHz is generated on outputs and is analysed on inputs with the test program HAnalyser.

Fréquence max interne EST /
Max internal EUT frequency

PCI Express data rate: 2.5 GHz

(1) The PCX-LW 881 board is representative of the product range PCX-IP LiveWire family :
PCX-IP LW881, VX-IP LW881, PCX-IP LW1221, VX-IP LW1221 products.
The PCX-IP features the DSP version for audio compressed files, with 8 inputs and 8 outputs.
The VX-IP is only suitable for linear audio files (without DSP).



Tested equipment

HAnalyser
Offline Options Configuration ?

Analyses (Voies In)

Démarrer Arrêter

Nom voie	Analyse	Clock	Options	Rd	Duree	Vu	Fifo	Sync	Rem
PCX881-LW In 1 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L
PCX881-LW In 2 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L
PCX881-LW In 3 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L
PCX881-LW In 4 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L
PCX881-LW In 5 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L
PCX881-LW In 6 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L
PCX881-LW In 7 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L
PCX881-LW In 8 - Line	Sinus	Automatique		0,0	0:07:03	-0,0	0	B	L

Générations (Voies Out)

Démarrer Arrêter

Nom voie	Génération	Clock	Rd	Duree	Vu	Sync	Rem	Commentaire
PCX881-LW Out 1 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	
PCX881-LW Out 2 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	
PCX881-LW Out 3 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	
PCX881-LW Out 4 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	
PCX881-LW Out 5 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	
PCX881-LW Out 6 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	
PCX881-LW Out 7 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	
PCX881-LW Out 8 - Analogique	Sinus	Automatique	0,0	0:07:06	-0,0	A	L	

Démarrer sélection Arrêter sélection Erreurs 0 Voir Compte-rendu

Serveur 127 . 0 . 0 . 1

Audio analyser test program



4. Test conditions

Humidité relative / *Relative Humidity* : 50%
Température / *Temperature* : 20°C

Tension d'alimentation / *Power supply voltage*:

Equipment sous test / *Equipment under test* : From PCI Express port
Auxiliaires / *Auxiliaries* : 230V/50Hz (±2%) for radiated emission and 110V/60Hz (±2%) for conducted emission

5. Modifications of the equipment under test

None

6. Special accessories

Shielded Ethernet and GPIO cables.

7. Conducted Emission Measurement (150kHz-30MHz)

ANSI C63.4	TEST: Limits for conducted disturbance 150kHz – 30MHz			Verdict
<u>Method:</u> The LISN (Line Impedance Stabilization Network) is placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on lines were made at the output of the LISN. The EUT is 80cm above the ground reference plane and 40cm from the vertical ground plane. The AC power cable is 1m length.				Pass
Laboratory Parameters:		Required prior to the test	During the test	
Ambient Temperature		10 to 40 °C	20°C	
Relative Humidity		10 to 90 %	50%	
Fully configured sample scanned over the following frequency range		Frequency range on each side of line	Measurement Point	
		150kHz to 30MHz	AC input port (110V)	
Limits for AC power port (Class B)				
Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Result	Average	Result
0.15 – 0.50	66 \ 56	Pass	56 \ 46	Pass
0.50 – 5	56	Pass	46	Pass
5 – 30	60	Pass	50	Pass
Supplementary information: Test location: SMEE – CE Mesures Test date: November 5 th , 2012 by L.Chapus Power supply voltage: 110V for AC mains (PC)				

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Attenuator / limiter	SMEE	ATT#1	ATT-101-004	2012/3	2013/3
Cable RF	Div	2m	CAB-101-005	2012/3	2013/3
LISN (50Ω / 50μH)	AFJ	LS16C	RSI-101-001	2012/2	2013/2
LISN (50Ω / 50μH)	AFJ	LS16C	RSI-101-002	2012/2	2013/2
Measuring receiver	Rohde & Schwarz	ESL3	REC-101-001	2012/6	2014/6
Ref. Comb generator	SMEE	EMC-250K	REF-111-001	-	-

Photo of test setup for Conducted Emission measurement

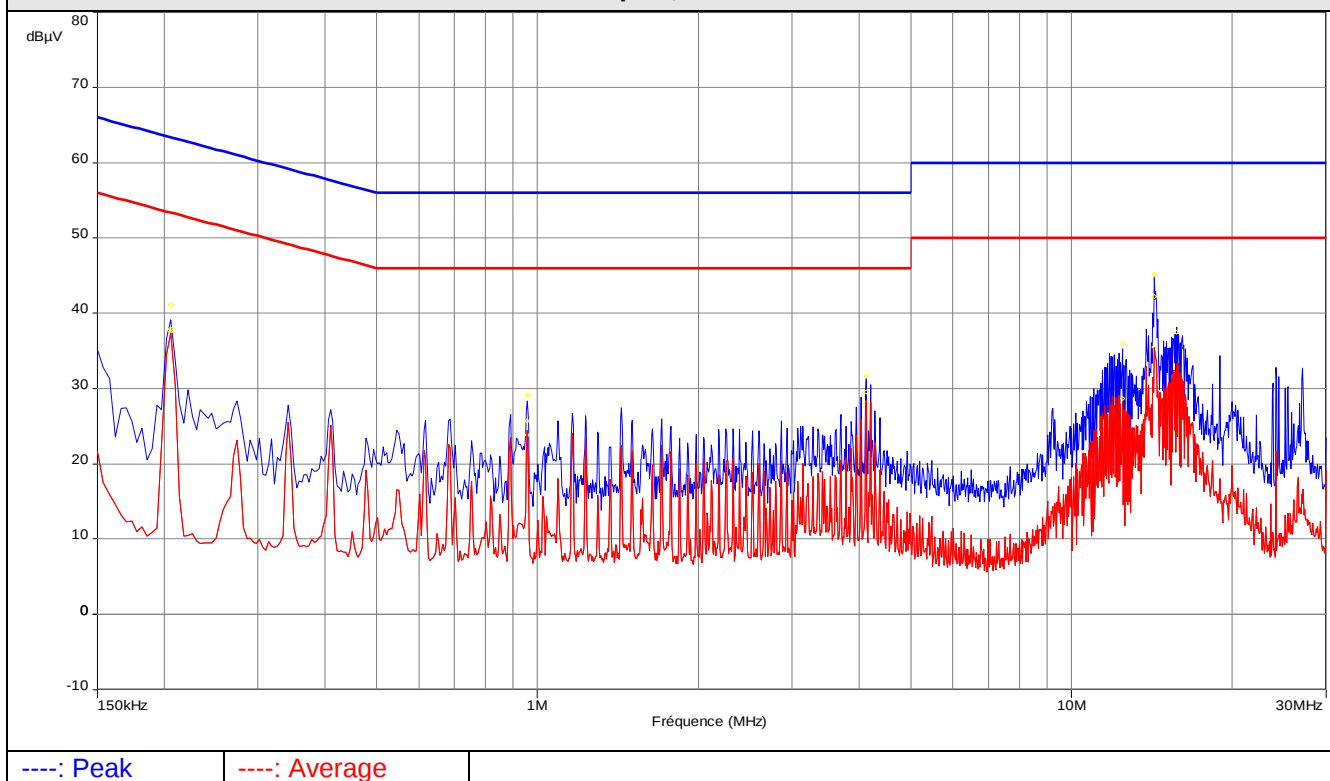


Measurement on AC mains

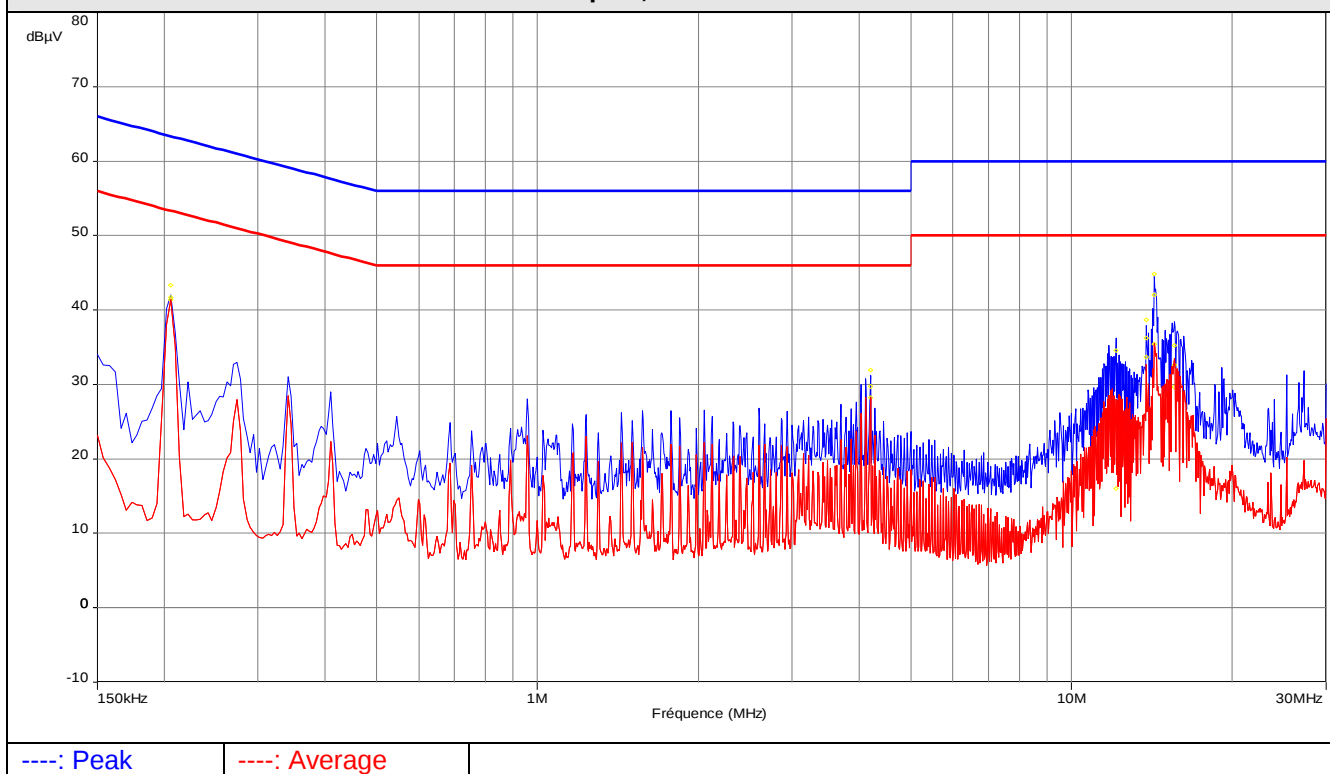
Tabulated Results for Mains Terminal Disturbance Voltage on AC port

FREQ (MHz)	Meas. PK (dBμV)	Mes. QP (dBμV)	LIMIT QP (dBμV)	Margin QP (dB)	Mes. AV (dBμV)	LIMIT AV (dBμV)	Margin AV (dB)	Line
0.20575	41.0	37.9	63.4	-25.5	37.6	53.4	-15.8	L1
0.95750	29.1	25.7	56.0	-30.3	23.8	46.0	-22.2	L1
4.12075	31.7	29.5	56.0	-26.5	28.1	46.0	-17.9	L1
12.44750	36.0	28.7	60.0	-31.3	21.6	50.0	-28.5	L1
14.30180	45.1	42.2	60.0	-17.8	35.5	50.0	-14.5	L1
15.72750	37.5	31.2	60.0	-28.8	24.0	50.0	-26.0	L1
0.20525	43.3	41.7	63.4	-21.7	41.5	53.4	-11.9	Neutral
4.20150	31.9	29.7	56.0	-26.3	28.2	46.0	-17.8	Neutral
12.10770	34.5	26.9	60.0	-33.1	16.0	50.0	-34.0	Neutral
13.82420	38.7	36.2	60.0	-23.8	33.7	50.0	-16.3	Neutral
14.30200	44.9	42.0	60.0	-18.0	35.5	50.0	-14.6	Neutral
15.58400	35.3	32.7	60.0	-27.3	29.7	50.0	-20.3	Neutral
Frequency band investigated:		150kHz-30MHz						
RBW:		9kHz						
Voltage:		110V / 50Hz						
Limit:		FCC Part 15, Clause 15.107 (Class B)						
Final measurement detector:		Quasi-Peak and Average						
Wide Measurement Uncertainty:		± 3.0 dB (k=2)						

Graphical representation of Conducted Disturbance Measurement (Peak detection) AC port, Line L1



Graphical representation of Conducted Disturbance Measurement (Peak detection) AC port, Line Neutral





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8. Radiated Emission Measurement (30MHz-12.5GHz)

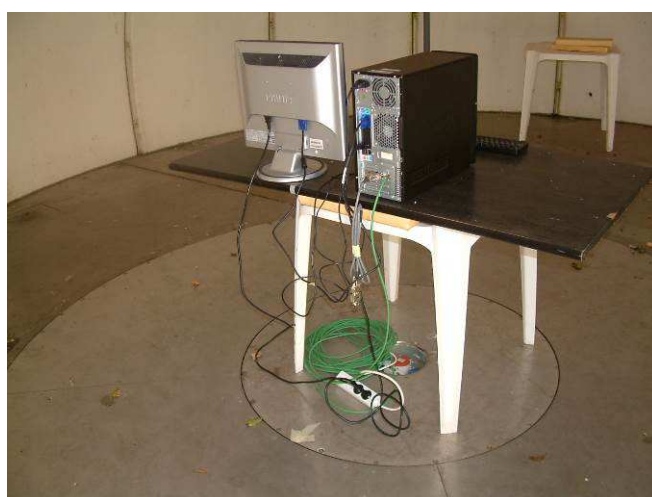
ANSI C63.4	TEST: Limits for radiated disturbance 30 MHz –12.5 GHz	Verdict
Method: Measurements were made in a 10 & 3-meter Open Area Test Site (OATS) that complies to CISPR 16 and ANSI C63.4 Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 & 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (quasi-peak, peak and average) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. A pre-scan frequency identification of the EUT has been performed in a GTEM cell. The measured radiated field of the EUT is correlated to a measurement distance of 3m. (3-axis algorithm) The pre-characterization graphs are obtained in PEAK detection.		Pass
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	20°C
Relative Humidity	10 to 90 %	50%
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point
	30MHz – 12.5GHz	3m measurement distance
Limits		
Frequency (MHz)	Limit (dBμV/m)	
	Level / Detector / Distance	Results
30-88 MHz	40.0 / QP / 3m	Pass
88-216 MHz	43.5 / QP / 3m	Pass
216-960 MHz	46.0 / QP / 3m	Pass
960-1000 MHz	54.0 / QP / 3m	Pass
Above 1GHz	54.0 / AV / 3m 74.0 / PK / 3m	Pass
Supplementary information: Test location: SMEE – CE Mesures Test date: November 5th, 2012 by L.Chapus Power supply voltage: 230V for AC mains		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2012/10	2013/10
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2012/10	2013/10
Horn Antenna	COM-POWER	AH-118	ANT-101-004	2010/3	2014/3
RF cable	Div	2m	CAB-101-011	2012/3	2013/3
RF cable	Div	OATS/25m	CAB-101-019	2012/3	2013/3
RF cable	Div	OATS/10m	CAB-101-020	2012/3	2013/3
GTEM cell	TESEQ	750	GTE-101-001	2012/3	2013/3
OATS	Div	10m	SIT-101-001	2012/10	2013/10
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-

Test Equipment Used

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Measuring Rec	Rohde&Schwarz	ESL3	REC-101-001	2012/6	2014/6
Spectrum Analyzer	AGILENT	HP 8563E	ASP-111-003	2012/9	2014/9
Pre-amplifier	PE	PE1524	PRE-101-002	2012/3	2013/3
Ref. Comb generator	SMEE	EMC-250K	REF-111-001	-	-

Photo of test setup for Radiated Disturbance (OATS)



Tabulated Results for Radiated Disturbance (3m measurement on Open Area Test Site, 30MHz-1GHz)

FREQ	Meter reading	Meter reading	CF total	Field level	Field level	Pol	Antenna height	Table angle	Limit	Margin
MHz	(QP) dBμV	(Pk) dBμV	dB	(QP) dBμV/m	(Pk) dBμV/m		cm	Degré	(QP) dBμV/m	dB
400.000	20.2	23.3	19.3	39.5	42.6	V	100	10	46.0	-6.5
450.000	15.3	19.5	20	35.3	39.5	V	140	70	46.0	-10.7
600.000	18.0	21.5	23.9	41.9	45.4	H	115	80	46.0	-4.1
640.000	14.7	20.5	24.8	39.5	45.3	H	380	210	46.0	-6.5
750.000	16.2	20.5	26.6	42.8	47.1	H	250	45	46.0	-3.2
975.000	17.0	20.5	21.1	38.1	41.6	H	230	55	54.0	-15.9

Supplementary information:

Frequency list measured on the Open Area Test Site has been created with pre-scan results.

Measure have been done at 10m distance and corrected according to requirements of 15.209.e)

(M@3m = M@10m+10.5dB)

Frequency band investigated: 30MHz-1GHz

RBW: 120kHz

Measurement distance: 3m

Limit: 15.109 (Class B)

Final measurement detector: Quasi-Peak

Wide Measurement Uncertainty: ± 5.2dB (k=2)



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Tabulated Results for Radiated Disturbance (3m measurement on Open Area Test Site, 1GHz-12.5GHz)

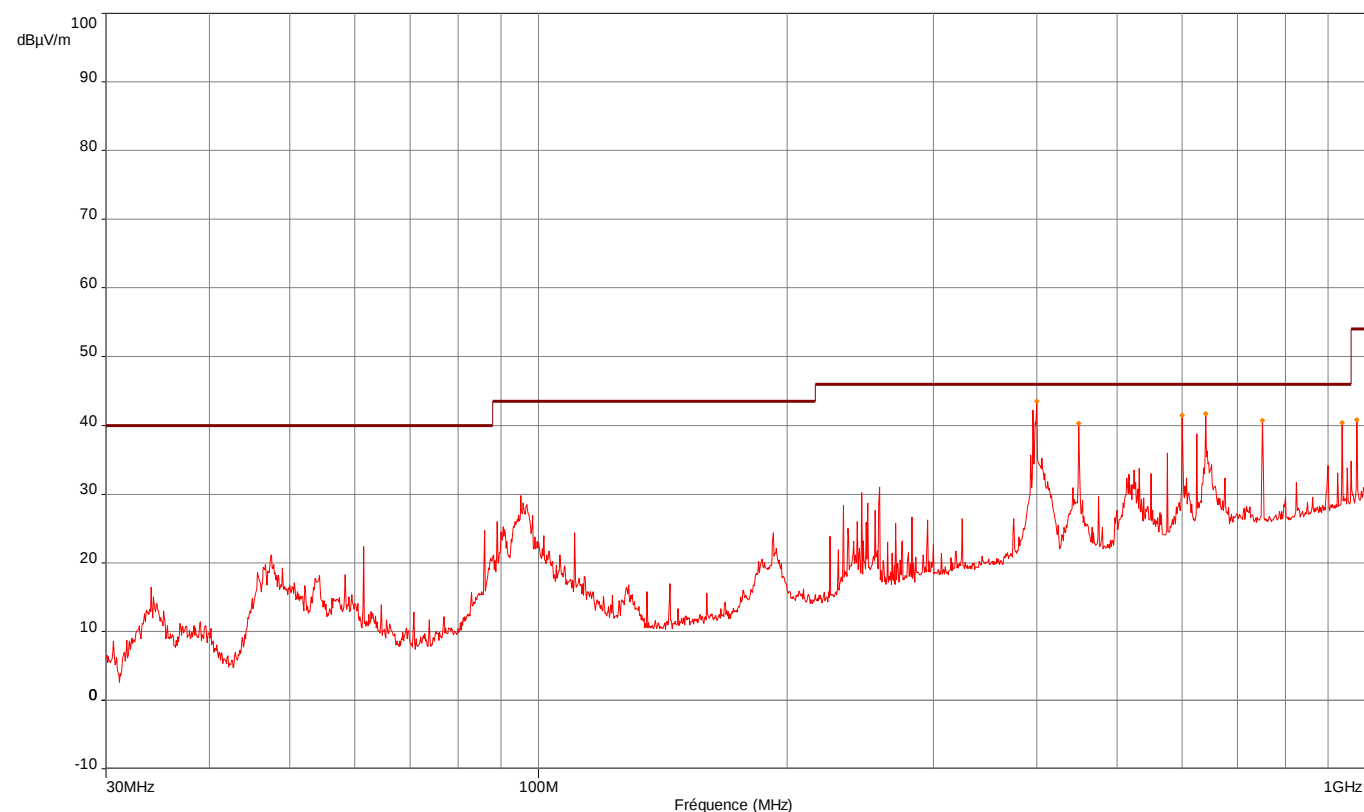
FREQ	Meter reading	Meter reading	CF total	Field level	Field level	Pol	Antenna height	Table angle	Limit	Limit	Margin	Margin
MHz	(PK) dBμV	(AV) dBμV	dB	(Pk) dBμV/m	(AV) dBμV/m		cm	Degré	(Pk) dBμV/m	(AV) dBμV/m	(Pk) dB	(AV) dB
1050.00	23.8	13.4	29.3	53.1	42.7	H	110	85	74	54	-20.9	-11.3
1500.00	22.8	9.5	35.5	58.3	45.0	V	125	170	74	54	-15.7	-9.0
2999.900	7.1	-2.3	45.0	52.1	42.7	H	140	185	74	54	-21.9	-11.3
5999.90	35.2	23.2	18.9	54.1	42.1	V	125	55	74	54	-19.9	-11.9

Informations supplémentaires :

La liste des fréquences mesurées sur le site en champ libre est établie à partir des résultats obtenus lors du pré-scan.

Frequency band investigated:	1GHz-12.5GHz
RBW:	1MHz
Measurement distance:	3m
Limit:	15.109 (Class B)
Final measurement detector:	Peak and Average
Wide Measurement Uncertainty:	± 5.2dB (k=2)
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

Graphical representation of Radiated Disturbance Measurement (Peak detection, GTEM pre-scan, 30MHz-1GHz / 3m)

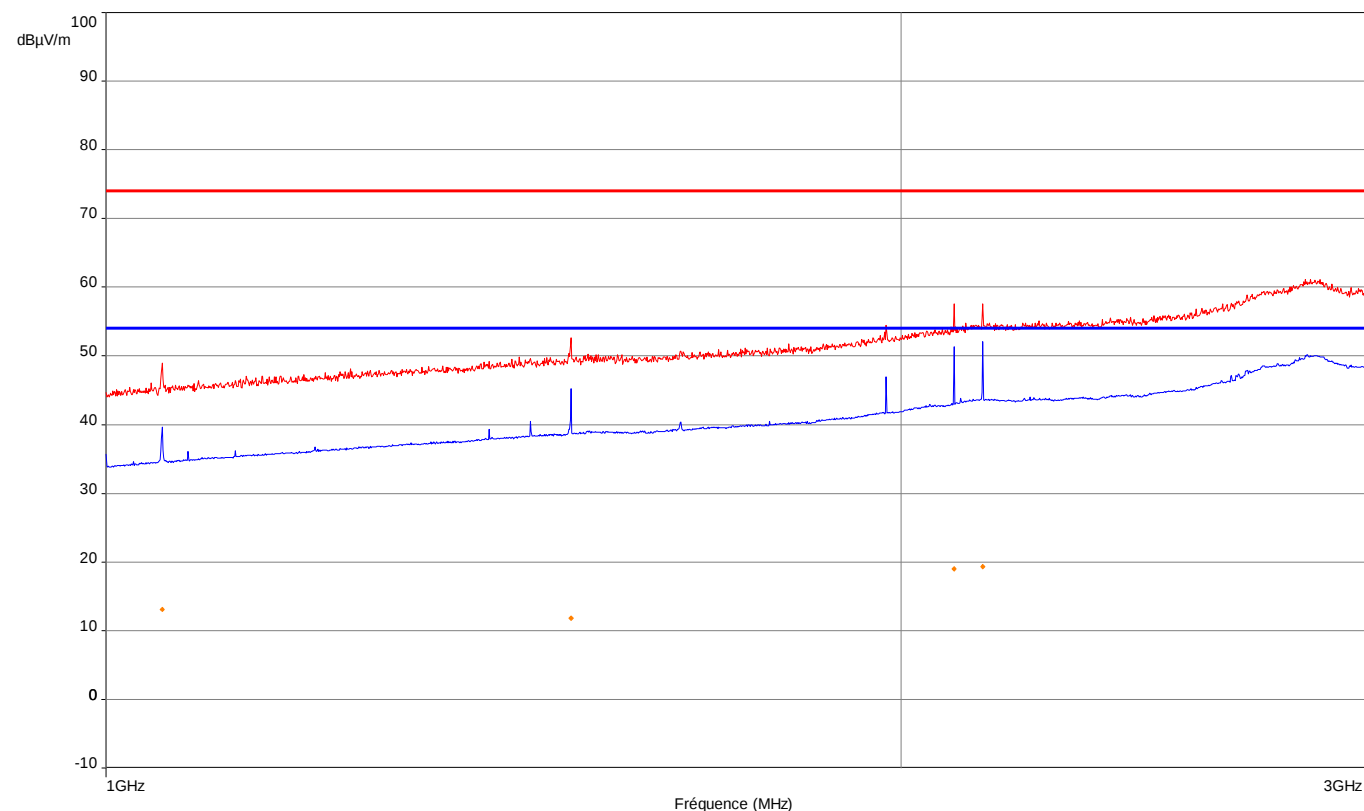


Frequency (MHz)	Peak level (dBμV/m)	Limit (dBμV/m)
400.00	43.0	46.0
450.00	39.8	46.0
600.00	41.0	46.0
640.00	41.2	46.0
750.00	40.2	46.0
936.60	39.9	46.0
975.00	40.3	46.0

Note: Pre-scan graph only for identification purpose.

----- : Peak measure

Graphical representation of Radiated Disturbance Measurement (Peak detection, GTEM pre-scan, 1GHz-3GHz / 3m)



Frequency (MHz)	Peak level (dBμV/m)	Peak limit (dBμV/m)	Comments
1050.00	49.0	74.0	
1500.00	52.6	74.0	
1988.17	54.5	74.0	Ext. ambient noise
2095.10	57.5	74.0	Ext. ambient noise
2147.50	57.5	74.0	Ext. ambient noise

Note: Pre-scan graph only for identification purpose.

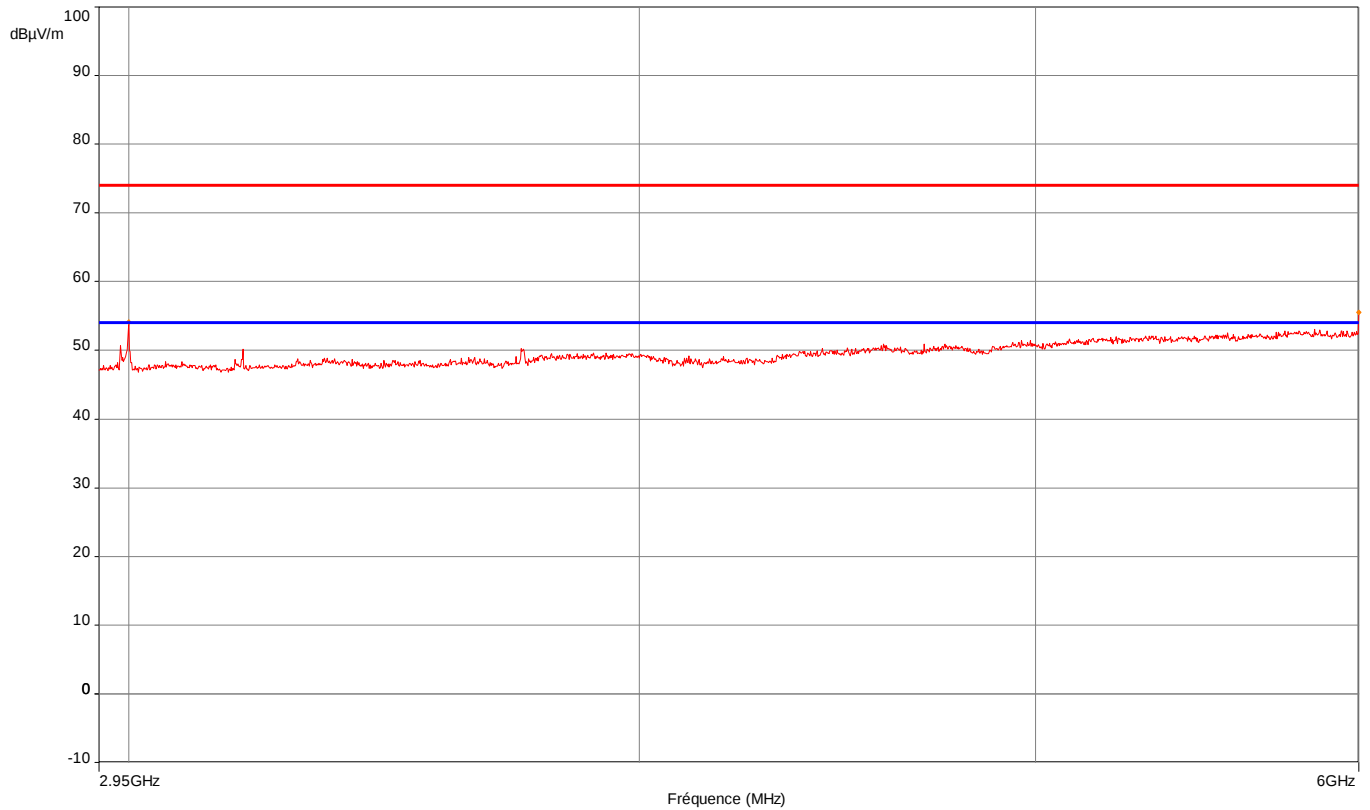
----- : Peak measure / limit ----- : Average measure / limit



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Graphical representation of Radiated Disturbance Measurement (Peak detection, GTEM pre-scan)



Frequency (MHz)	Peak level (dBμV/m)	Limit (dBμV/m)
2999.80	54.2	74.0
5999.90	55.5	74.0

Note: Pre-scan graph only for identification purpose.

Note: No frequency observed above 6GHz

----- : Peak measure / Limit - - - - - : Average limit