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Rapport d'essai / *Test report*

N° 200703-3683CR-R1-E **JDE :** 60057682

DELIVRE A / *ISSUED TO* : **RADIOMETER ANALYTICAL**
72, rue d'Alsace
69200 VILLEURBANNE
FRANCE

Objet / *Subject* : Essais de compatibilité électromagnétique conformément aux normes FCC CFR 47 Part 15, Subpart C.
Electromagnetic compatibility tests according to the standards FCC CFR 47 Part 15, Subpart C.

Matériel testé / *Apparatus under test* :

- Produit / *Product* : Passeur d'échantillons / *Samples changer*
- Marque / *Trade mark* : Radiometer Analytical
- Constructeur / *Manufacturer* : Radiometer Analytical
- Type / *Model* : SAC 990
- N° de série / *serial number* * : Proto *
- FCC ID : UHC-TTL075

* : information donnée par le client / *information given by the customer*

Date des essais / *Test date* : 23 au 27 avril 2007 / *April from 23rd to 27th, 2007*

Lieu d'essai / *Test location* : **LCIE**
ZI des Blanchisseries
38500 VOIRON - France

Test réalisé par / Test *performed by* : Laurent CHAPUS

Ce document comporte /*Composition of document :* 21 pages.

VOIRON, LE 17 OCTOBRE 2007 / *OCTOBER 17TH, 2007*

Ecrit par / *Written by*
Laurent CHAPUS

Approuvé par / *Approved by,*
Yannick SAVOIE

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SUMMARY

1. TEST PROGRAM

Standard : FCC CFR 47, PART 15, Subpart C
ANSI C63-4 (2003).
Requirements for intentional radiator. Chapter 15.225 (Operation within the band 13.110-14.010MHz).

2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in a typical fashion (as a customer would normally use it).
The **SAC990** equipment is the most complete hardware configuration of the product range:

- **SAC990**
- **SAC950**
- **SAC850**

2.2. HARDWARE IDENTIFICATION

- **Equipment under test (EUT):**

SAC 990 — Serial number: Proto
FCC ID: **UHC-TTL075**

Internal frequencies list:
40MHz, 6.4MHz, 12MHz and 13.56MHz

- **Input/output:**

- 1x Power supply input (90-240V / 50-60Hz)
- 1x USB port
- 1x Serial RS232 port
- 1x TTL Input/Output (RJ11)
- 1x Electromagnet socket (to beaker cover module, RJ11)
- 1x Propeller stirrer socket (24Vdc, RJ11)
- 1x Ultrasonic sensor (to beaker detection module, Jack 3.5mm)
- 1x Temperature sensor (CINCH)

- **Auxiliaries used for testing:**

Trade Mark – Model Number (Serial number)	Description	Cable description
DELL INSPIRON 9100 M/N: PP09L Sn: (01) 07898349890344	Laptop Personal Computer	Power cable: unshielded USB cable: shielded Serial cable: shielded
Inside OUT Edge port/2 RS232 P/N: (1P) 50000785-01 B Sn: V32088968	RS232 to USB converter	Power cable unshielded USB cables: shielded

- **I/O cables used for testing:**

- 1x Power supply cable (2P+E), unshielded: 1.8m
- 1x Serial cable, shielded: 1.5m
- 1x USB cable, shielded: 5m (with one ferrite)

- 1x TTL I/O cable, unshielded: 1m

2.3. Equipment modifications

Added ferrite WURTH ELECTRONIK 742 701 1 (1 pass) on the RF module cable.

RF module reader

2.4. EUT Exercise software

The PC exercise software permits the following running modes:

- Normal analysis cycle (all functions are activated)
- Continuous RFID reading (RF ON)

2.5. Special accessories

USB cable with ferrite.

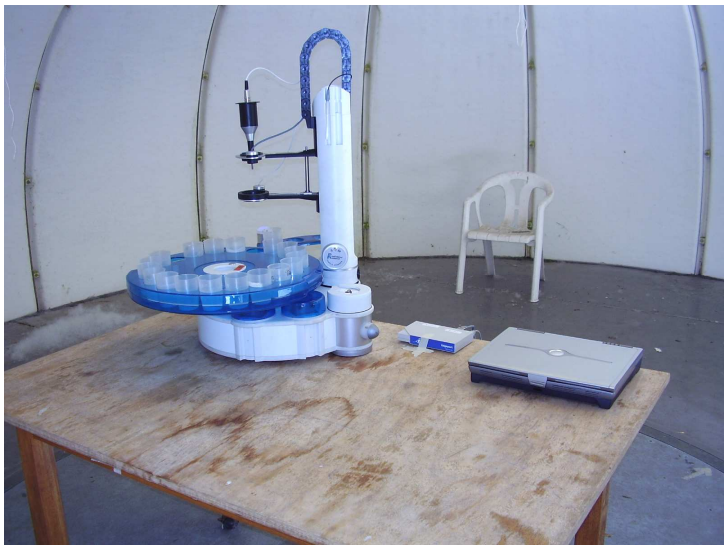
3. RADIATED EMISSION DATA

3.1. CLIMATIC CONDITIONS

Date of test : April 23rd, 2007
Test performed by : Laurent CHAPUS
Atmospheric pressure : 976mb
Relative humidity : 33%
Ambient temperature : 22°C

3.2. TEST SETUP

The installation of EUT is identical for pre-characterization measurement in a 3 meters full anechoic chamber and for measures on a 3 meters Open site.
Power supply: 230Vac/50Hz
The EUT is placed on a non-conducting table of 80cm height.



Radiated emission test setup

3.3. TEST SEQUENCE AND RESULTS

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

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber.
The distance between EUT and antenna is 3 meters. Pre-characterization is performed in vertical (V) polarization and the loop antenna position was rotated during the test for maximized the emission measurement.
Frequency band investigated is 9kHz to 30MHz.
The pre-characterization graphs are obtained in PEAK detection.

See graphs for 150kHz-30MHz band: **graph#1** (See annex 1)
(Note: no frequency observed in the band 9kHz to 150KHz)

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

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber.
The distance between EUT and antenna is 3 meters. Test is performed in horizontal (H) and vertical (V) polarization with a log-periodic antenna Chase CBL6111A. The EUT is being rotated on 360° during the measurement. T he pre-characterization graphs are obtained in PEAK detection.

See graphs for 30MHz-1GHz:

H polarization	**graph#2**	(See annex 1)
V polarization	**graph#3**	(See annex 1)

3.3.3. Characterization on 10 meters open site below 30 MHz

The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart C. 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 §15.225 limits in the frequency range 13.553MHz 13.567MHz. Measurement bandwidth was 9kHz.
Antenna height was 1m for both horizontal and vertical polarization.
Antenna was rotated around its vertical axis.
Continuous linear turntable azimuth search was performed with 360 degrees range.
A summary of the worst case emissions found in all test configurations and modes is shown on clauses 3.2.1.

Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	QPeak (dBµV/m)	QPeak-Lmt (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)
13.560046*[1]	84.0	19.3	-64.7	90°	V / 0°	37.9

*[1]: Fundamental – 15.225 limits. Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@30m = M@10m-19.1dB)

Limits Subclause §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

3.3.4. 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 C. 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 §15.209 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.
3 axis measurements were performed for both reader and antenna positions.
A summary of the worst case emissions found in all test configurations and modes is shown on clause 3.2.2.

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	48.002	40.0	37.6	**-2.4**	325	V	100	11.8	
2	54.237	40.0	35.0	**-5.0**	210	V	220	11.9	
3	160.021	43.5	35.9	**-7.6**	295	H	370	18.9	
4	176.298	43.5	40.8	**-2.7**	95	H	350	19.4	Peak meas.
5	200.012	43.5	36.7	**-6.8**	270	V	120	13.5	
6	257.678	46.0	39.9	**-6.1**	195	H	350	15.4	
7	271.218	46.0	40.5	**-5.5**	130	H	280	16.1	
8	684.857	46.0	41.2	**-4.8**	305	H	300	25.5	
9	698.434	46.0	41.6	**-4.4**	285	H	280	25.9	
10	725.543	46.0	40.4	**-5.6**	290	H	280	26.1	
11	800.123	46.0	42.9	**-3.1**	225	H	280	26.6	

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

RESULTS: PASS

3.4. 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 is 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.

4. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)

The frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating frequency when the temperature is varied from -20℃ to +50℃ at the no minal power voltage and the primary power voltage is varied from 85% to 115% of the rated supply voltage at 20℃.

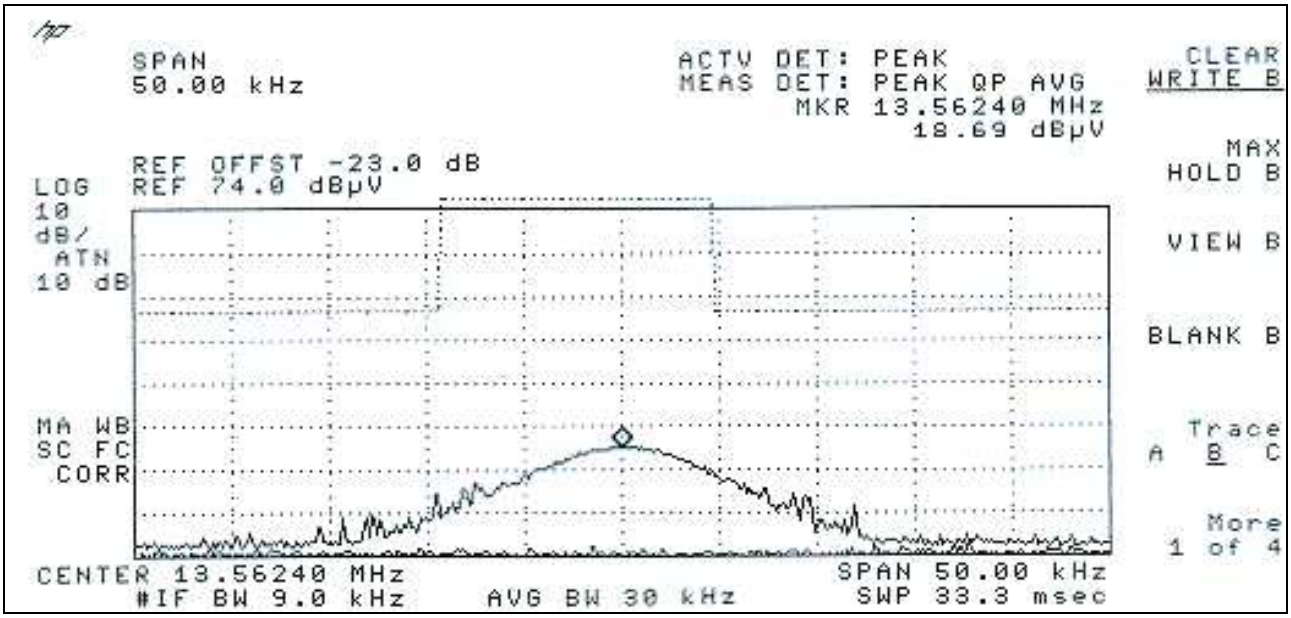
4.1. Temperature and voltage fluctuation

Temperature has been set at +20℃, –20℃ and +50℃.
Rated mains voltage is 90V/230V; 50/60Hz
Frequency of carrier: 13.56 MHz
Upper limit: 13.561356 MHz
Lower limit: 13.558644 MHz

Temperature	-20℃	20℃	+50℃
Power voltage: 110V			
Frequency (MHz)	13.561504 MHz	13.561308 MHz	13.561139 MHz
Carrier level	-0.1dBc	REF	-0.4dBc
Power voltage: 76.5V			
Frequency (MHz)	13.561504 MHz	13.561308 MHz	13.561139 MHz
Carrier level	-0.1dBc	0.0dBc	-0.4dBc
Power voltage: 264.5V			
Frequency (MHz)	13.561504 MHz	13.561308 MHz	13.561139 MHz
Carrier level	-0.1dBc	0.0dBc	-0.4dBc

Frequency drift measured is **365Hz** when the temperature is varied from -20℃ to +55℃ .

5. BAND-EDGE COMPLIANCE §15.209



RBW=9KHz / VBW=30KHz

6. MEASUREMENT OF CONDUCTED EMISSION (150KHZ-30MHZ)

6.1. CLIMATIC CONDITIONS

Date of test : April 24th, 2007
Test performed by : Laurent CHAPUS
Atmospheric pressure : 978mb
Relative humidity : 35%
Ambient temperature : 24°C

6.2. SETUP FOR CONDUCTED EMISSIONS MEASUREMENT

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

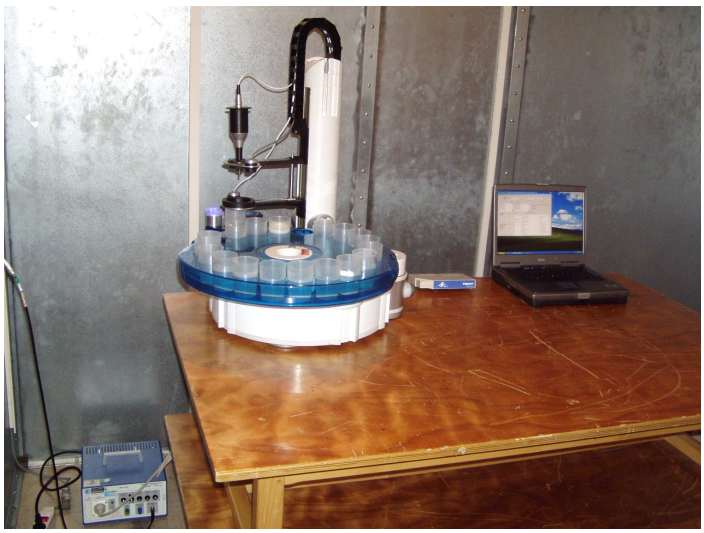
The product has been tested with 110V/60Hz power line voltage and compared to the FCC Part 15 subpart C §15.207 limits. Measurement bandwidth was 9kHz from 150 kHz to 30 MHz.

Measurement is made with a Rohde & Schwarz ESH3 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) 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.

The distance between the EUT and the LISN is 80cm. The EUT is 80cm away for the vertical ground plane.
The EUT is powered through a LISN (measure) with an AC cable shortened to 1m. Auxiliaries are powered by another LISN.
Mains: 110Vac/60Hz



6.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

6.4. MEASUREMENTS RESULTS

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

A measurement is also performed with a shielding foil placed on the transmitter antenna in order to demonstrate that some 13.56MHz may be cross-coupled to AC line connection.

Graphs are obtained in PEAK detection.
Measures are also performed in Quasi-Peak and Average for any strong signal.

Permanent RF emission:

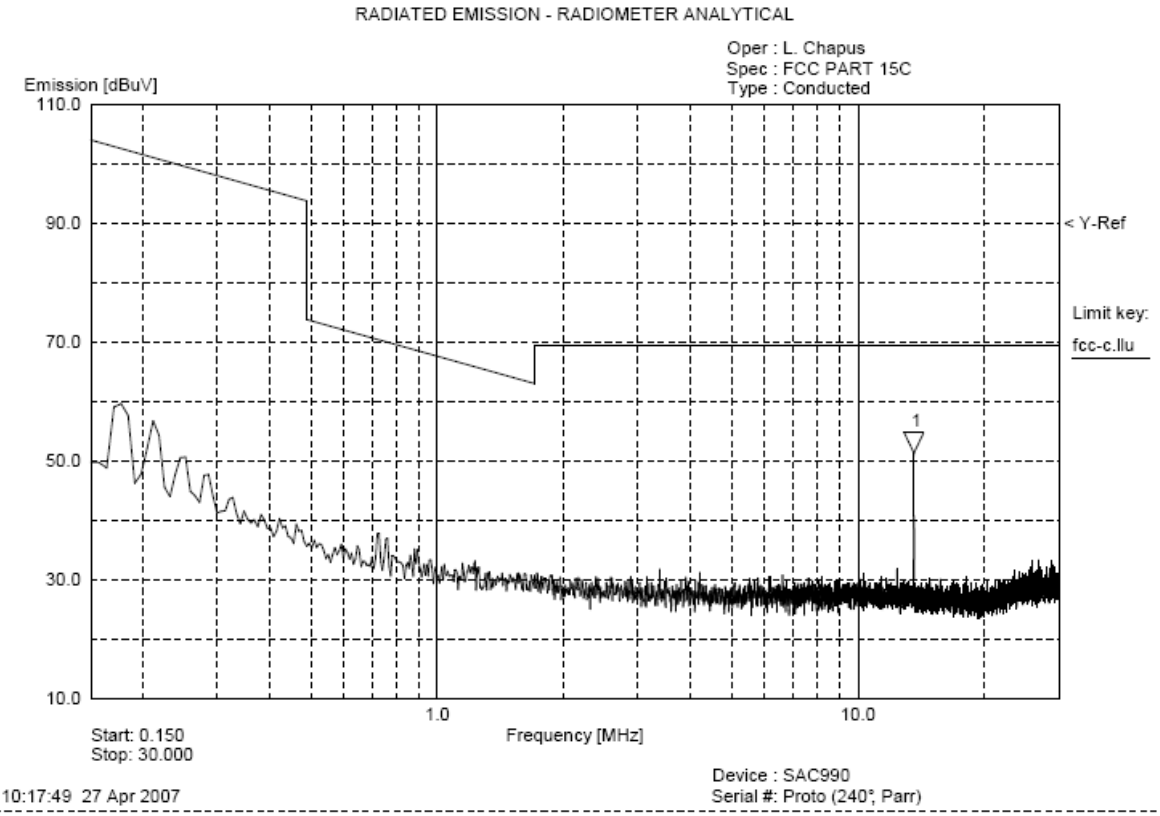
Measure on L1:	graph Emc#1	(see annex 1)
Measure on N:	graph Emc#2	(see annex 1)

Shielded foil on RF antenna:

Measure on L1:	graph Emc#3	(see annex 1)
Measure on N:	graph Emc#4	(see annex 1)

7. ANNEX 1 (GRAPHS)

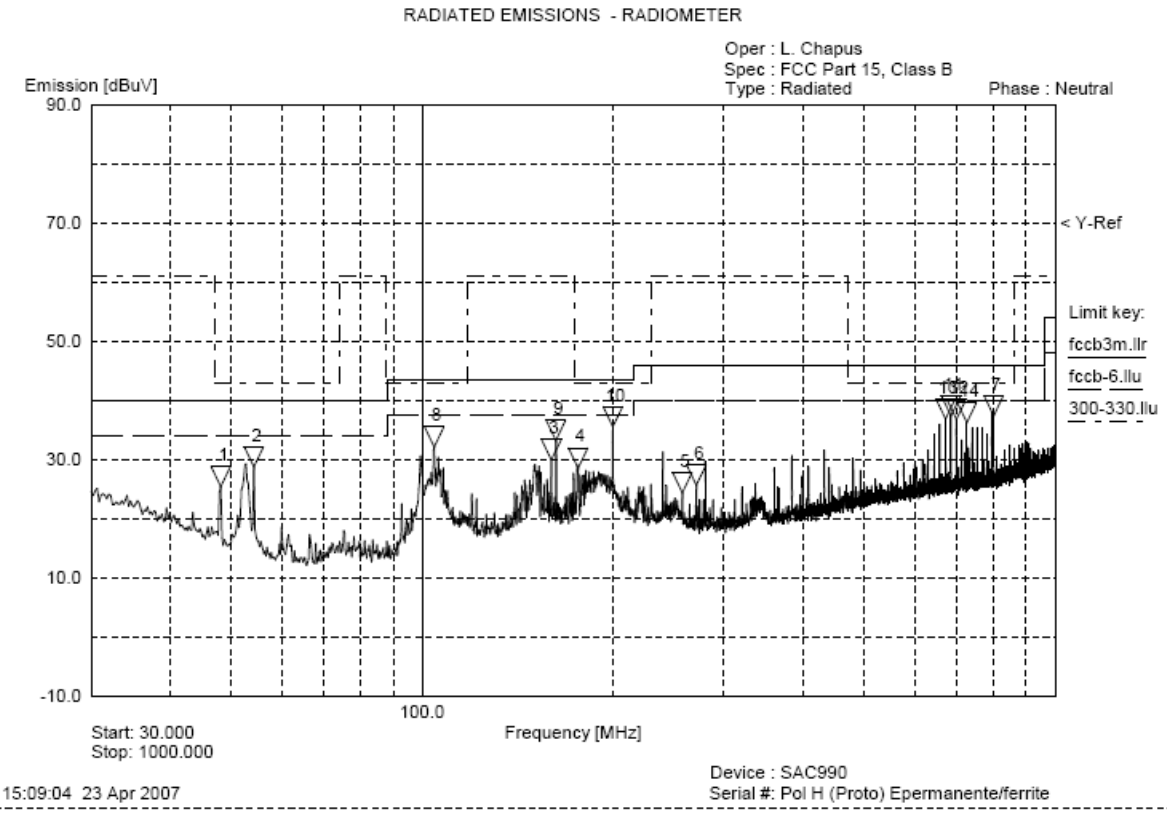
RADIATED EMISSIONS (Pre-characterization)		**Test configuration:**
Graph name:	**graph#1**	
Antenna polarization	**Perpendicular**	
Frequency band	**150kHz-30MHz**	
Azimuth:	**90°**	
RBW / VBW :	**9kHz / 30kHz**	



Marker ▽	Frequency [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	13.58	51.34	-	-	69.50

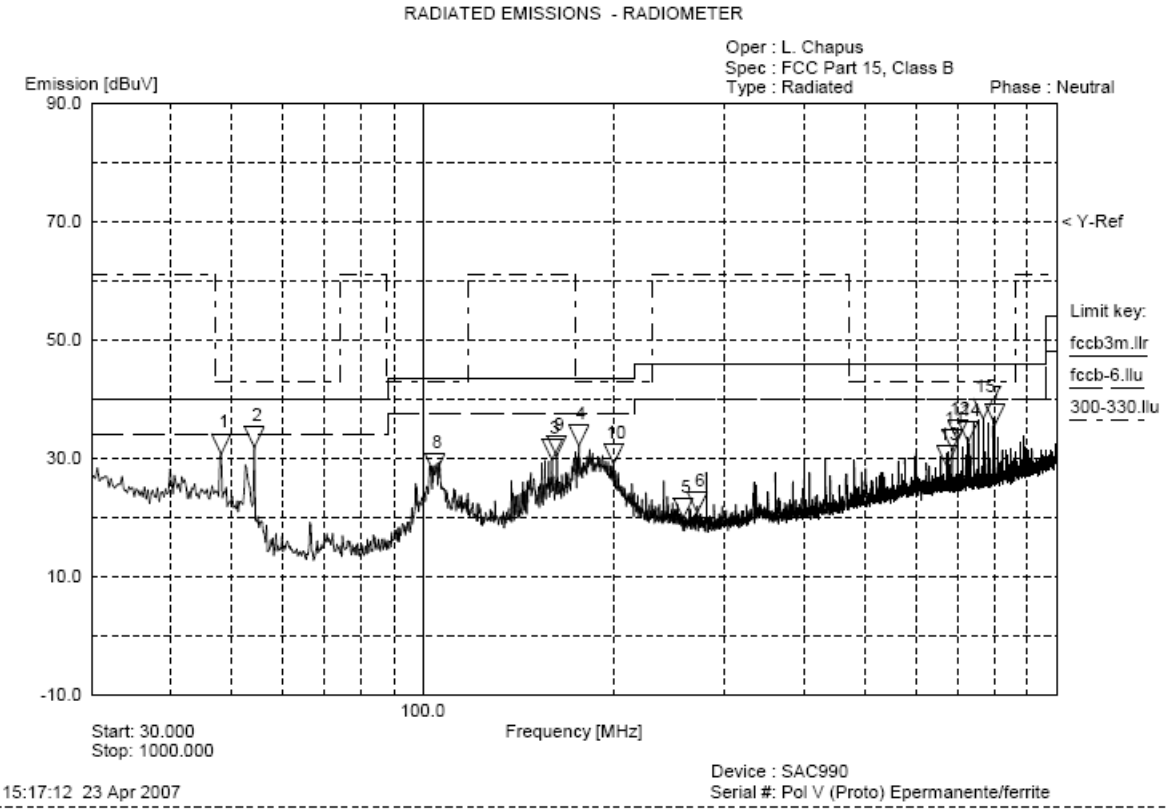
Marker 1 is carrier frequency

RADIATED EMISSIONS		**Test configuration:**
Graph name:	**graph#2**	
Antenna polarisation	**Horizontal**	
Frequency band	**30MHz – 1GHz**	
Azimuth:	**From 0°to 360°(Max-hold measurement)**	
RBW / VBW :	**120kHz / 300kHz**	



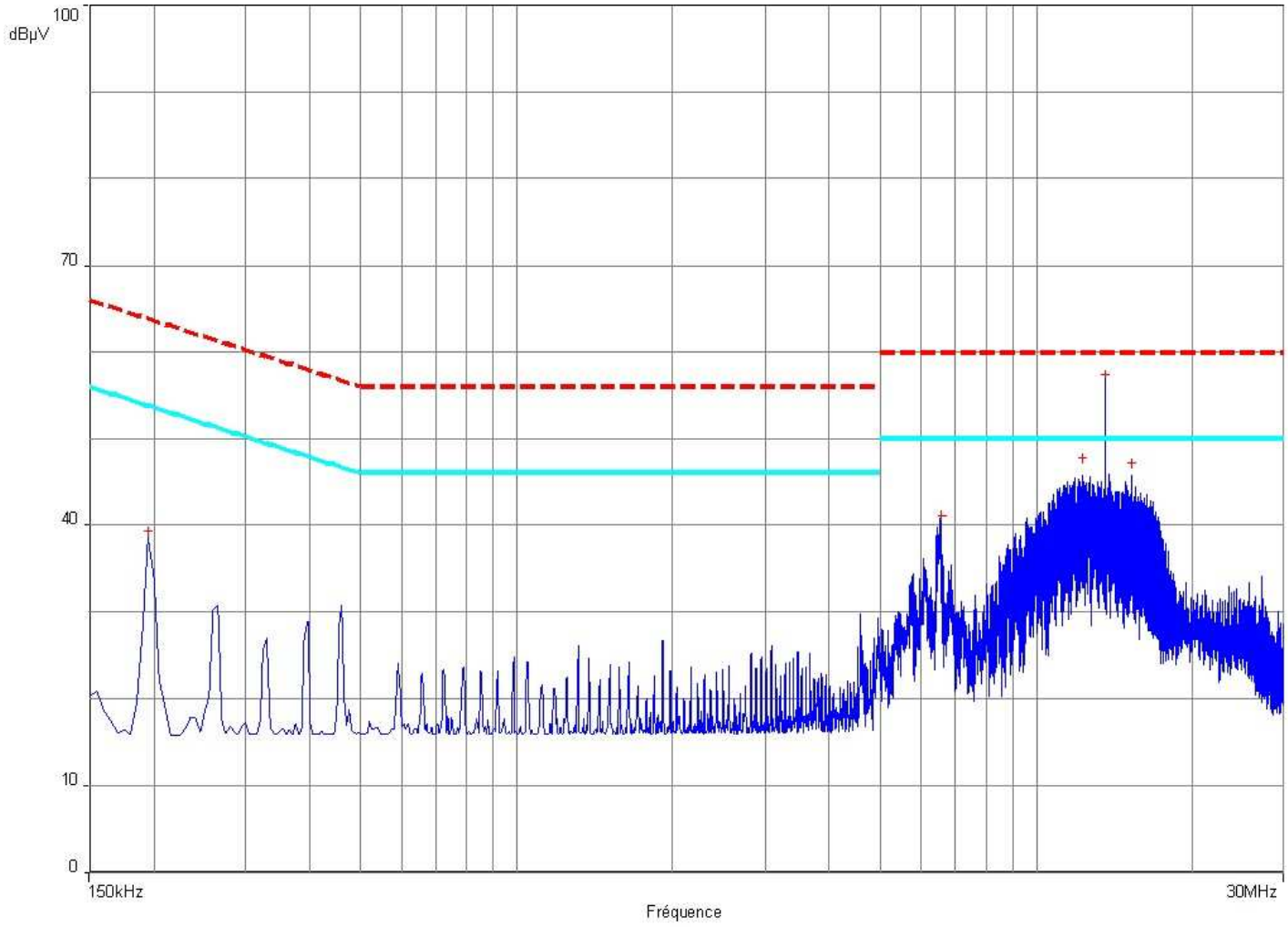
Marker ▽	Frequency [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	48.08	25.43	-	-	40.00
2	54.25	28.77	-	-	40.00
3	160.1	29.95	-	-	43.50
4	176.4	28.57	-	-	43.50
5	257.7	24.39	-	-	46.00
6	271.2	25.67	-	-	46.00
7	799.6	37.41	-	-	46.00
8	104.5	32.13	-	-	43.50
9	162.7	33.24	-	-	43.50
10	200.2	35.56	-	-	43.50
11	685.0	37.43	-	-	46.00
12	698.4	36.83	-	-	46.00
13	671.5	36.91	-	-	46.00
14	725.5	36.26	-	-	46.00

RADIATED EMISSIONS		**Test configuration:**
Graph name:	**graph#3**	
Antenna polarisation	**Vertical**	
Frequency band	**30MHz – 1GHz**	
Azimuth:	**From 0°to 360°(Max-hold measurement)**	
RBW / VBW :	**120kHz / 300kHz**	



Marker ▽	Frequency [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	48.08	30.74	-	-	40.00
2	54.25	31.89	-	-	40.00
3	160.1	29.70	-	-	43.50
4	176.4	32.12	-	-	43.50
5	257.7	19.86	-	-	46.00
6	271.2	20.80	-	-	46.00
7	799.6	35.72	-	-	46.00
8	104.5	27.28	-	-	43.50
9	162.7	30.41	-	-	43.50
10	200.2	29.08	-	-	43.50
11	685.0	31.45	-	-	46.00
12	698.4	32.93	-	-	46.00
13	671.5	28.67	-	-	46.00
14	725.5	32.77	-	-	46.00
15	766.3	36.68	-	-	46.00

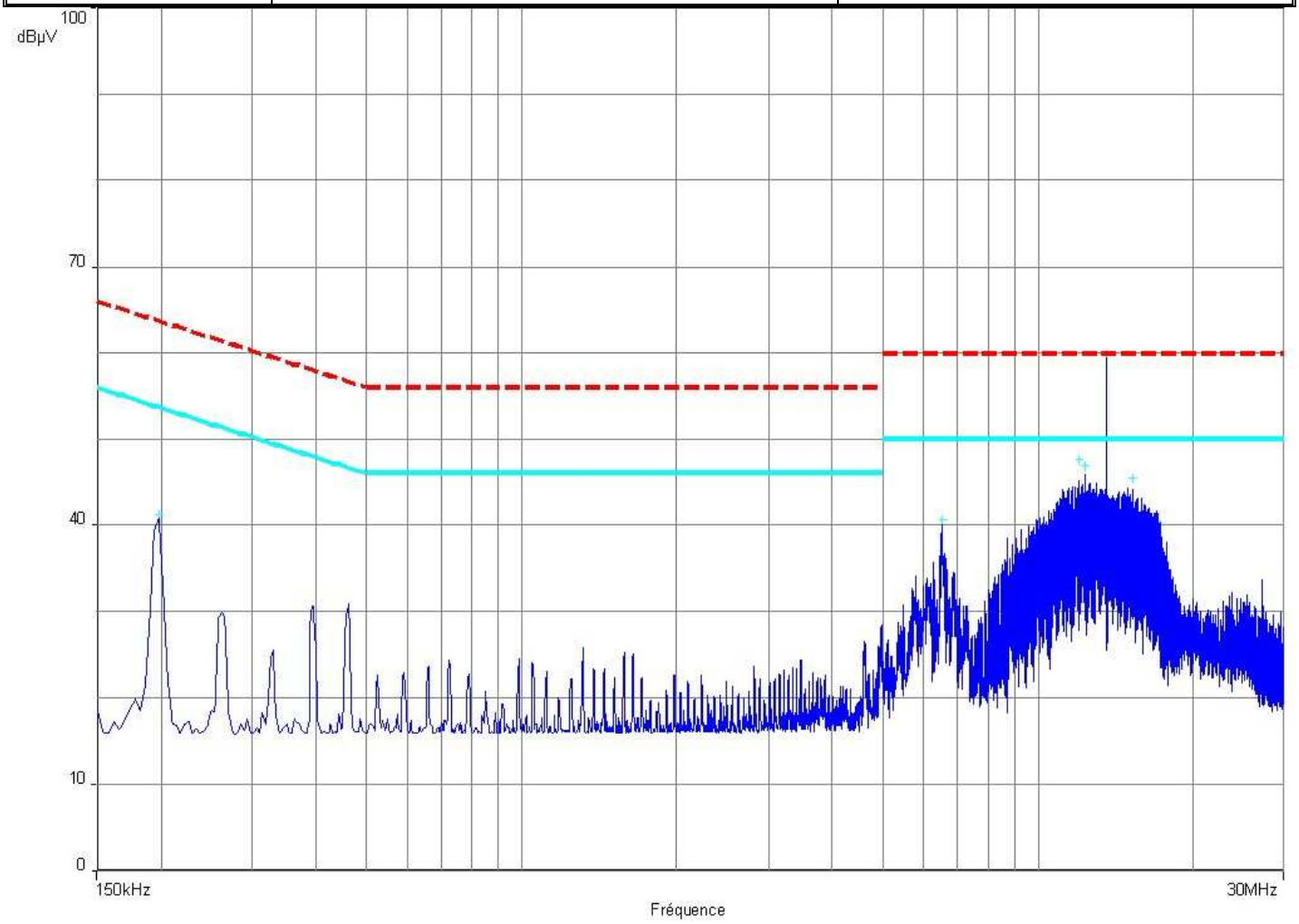
CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#1**	Permanent RF emission
Voltage / Frequency	**110/60Hz**	
Line/Port	**Line L1**	
RBW / VBW :	**9kHz / 30kHz**	



Frequency (MHz)	Measure Peak dBµV	Measure Average dBµV	Limit Average dBµV	Avg-Lim (Margin) dB	Measure Quasi-Peak dBµV	Limit QPeak dBµV	QPeak-Lim (Margin) dB
0.195	39.3	23.2	53.8	**-30.6**	37.6	63.8	**-26.2**
6.555	41.1	24.2	50.0	**-25.8**	32.2	60.0	**-27.8**
12.275	47.7	32.4	50.0	**-17.6**	43.7	60.0	**-16.3**
13.560 *	57.5	56.6	50.0	**6.6**	56.6	60.0	**-3.4**
15.230	47.3	31.2	50.0	**-18.8**	42.6	60.0	**-17.4**

*: carrier frequency

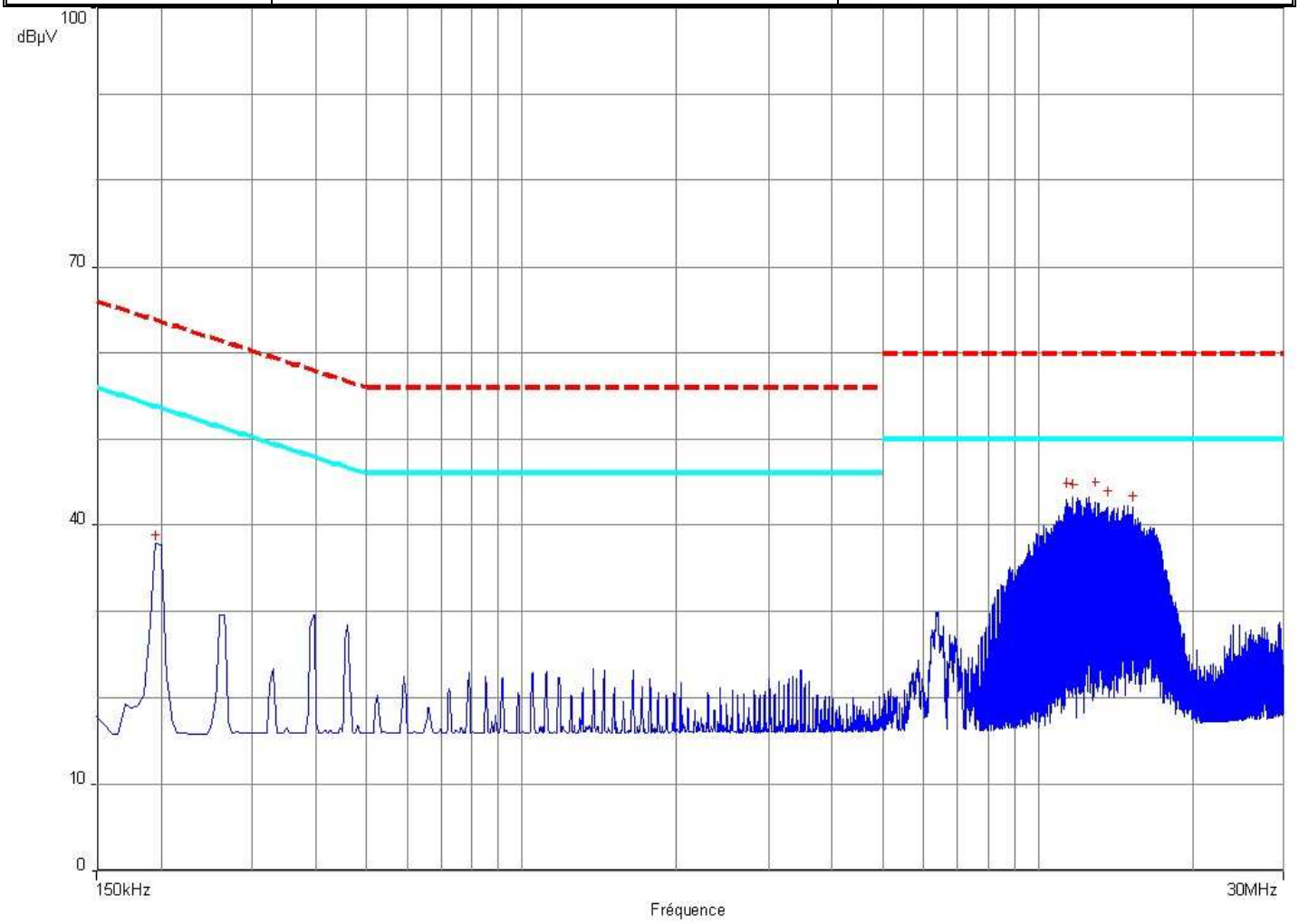
CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#2**	Permanent RF emission
Voltage / Frequency	**110/60Hz**	
Line/Port	**Neutral**	
RBW / VBW :	**9kHz / 30kHz**	



Frequency (MHz)	Measure Peak dBµV	Measure Average dBµV	Limit Average dBµV	Avg-Lim (Margin) dB	Measure Quasi-Peak dBµV	Limit QPeak dBµV	QPeak-Lim (Margin) dB
0.198	41.3	23.9	53.7	**-29.8**	40.2	63.7	**-23.5**
6.538	40.6	28.3	50.0	**-21.7**	34.4	60.0	**-25.6**
12.014	47.6	30.1	50.0	**-19.9**	42.2	60.0	**-17.8**
12.342	46.9	32.0	50.0	**-18.0**	43.5	60.0	**-16.5**
13.562 *	59.9	59.3	50.0	**+ 9.3**	59.3	60.0	**-0.7**
15.230	45.6	31.3	50.0	**-18.7**	42.0	60.0	**-18.0**

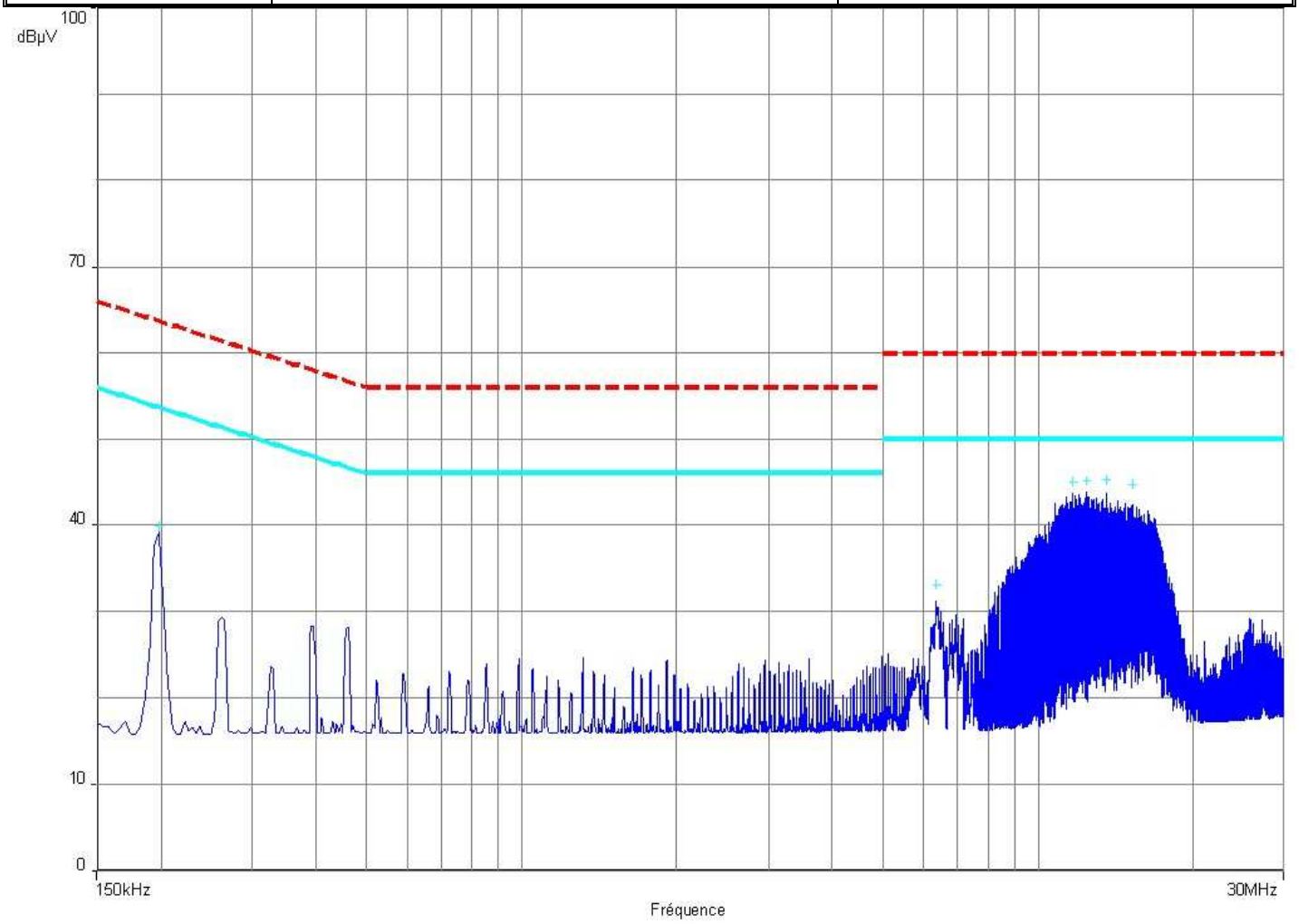
*: carrier frequency

CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#3**	Shielding foil on RF antenna
Voltage / Frequency	**110/60Hz**	
Line/Port	**Line L1**	
RBW / VBW :	**9kHz / 30kHz**	



Frequency (MHz)	Measure Peak dBµV	Measure Average dBµV	Limit Average dBµV	Avg-Lim (Margin) dB	Measure Quasi-Peak dBµV	Limit QPeak dBµV	QPeak-Lim (Margin) dB
0.195	38.9	22.9	53.8	**-30.9**	37.1	63.8	**-26.7**
11.355	44.9	26.7	50.0	**-23.3**	40.8	60.0	**-19.2**
11.680	44.8	26.4	50.0	**-23.6**	40.1	60.0	**-19.9**
12.930	45.0	27.1	50.0	**-22.9**	40.3	60.0	**-19.7**
13.650	44.0	27.7	50.0	**-22.3**	39.8	60.0	**-20.2**
15.290	43.5	27.3	50.0	**-22.7**	39.1	60.0	**-20.9**

CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#4**	Shielding foil on RF antenna
Voltage / Frequency	**110/60Hz**	
Line/Port	**Neutral**	
RBW / VBW :	**9kHz / 30kHz**	



Frequency (MHz)	Measure Peak dBµV	Measure Average dBµV	Limit Average dBµV	Avg-Lim (Margin) dB	Measure Quasi-Peak dBµV	Limit QPeak dBµV	QPeak-Lim (Margin) dB
0.198	39.9	23.5	53.7	**-30.2**	38.9	63.7	**-24.8**
6.366	33.1	20.0	50.0	**-30.0**	27.5	60.0	**-32.5**
11.682	45.1	26.6	50.0	**-23.4**	41.1	60.0	**-18.9**
12.406	45.2	26.7	50.0	**-23.3**	41.2	60.0	**-18.8**
13.562	45.4	43.8	50.0	**-6.2**	43.8	60.0	**-16.2**
15.290	44.8	28.0	50.0	**-22.0**	39.4	60.0	**-20.6**

8. TEST EQUIPMENT LIST

	N°LCIE	TYPE	COMPANY	REF	SN
RADIATED EMISSION MEASUREMENT					
	C2040057VO	Antenna monopole	AH SYSTEM	SAS-551	181
	A7102026VO	Amplifier 8-26GHz	ALDETEC	ALS01452	1
X	C4040009VO	Air Compressor	ATLAS COPCO	LX111	0615-038
X	A3169050VO	Radiated emission comb generator	BARDET		PR17B
X	C2040051VO	Antenna Bi-log	CHASE	CBL6111A	1628
	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
	C2042027VO	Antenna horn	EMCO	3115	6382
X	C2040050VO	Antenna biconic	EMCO	3104C	9401-4636
X	C2040056VO	Antenna log-periodic	EMCO	3146	2178
X	F2000286VO	Turntable controller	EMCO	1060-10	1217
X	F2000287VO	Antenna mast controller	EMCO	1050	8811-1295
X	F2000288VO	Antenna mast	EMCO	1050	
X	F2000289VO	Turntable	EMCO	1060	
X	F2000371VO	Turntable chamber	ETS Lingren	Model 2065	F2000371VO
X	F2000372VO	Turntable controller chamber	ETS Lingren	Model 2066	F2000372VO
X	D3044009VO	Anechoic chamber	EUROSHIELD	RDF-F-60-060	1213
	A7102024VO	Amplifier 8 GHz	HEROTEK	A1080304A	222033
X	A4060016VO	Spectrum analyzer 9kHz –1.8GHz	HEWLETT PACKARD	8591E	3536A00384
X	A7102019VO	Amplifier 9 KHz – 1300 MHz	HEWLETT PACKARD	8447F Opt 64	3113A06394
X	A4060018VO	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	3409u00537
X	A4049059VO	Adapter quasi-peak	HEWLETT PACKARD	HP85650A	2811A01134
X	A4060019VO	Spectrum analyzer display	HEWLETT PACKARD	HP85662A	2816A16603
X	A4060017VO	Spectrum analyzer	HEWLETT PACKARD	HP8568B	2732A04155
X	A4060027VO	Pre-selector RF	HEWLETT PACKARD	HP85685A	2837A00784
	A5329032VO	Absorption clamp	LUTHI	MDS21	2826
	A5329044VO	Absorption clamp	RHODE ET SCHWARZ	85024A	194.0100.50
	A2640011VO	Measurement receiver 9kHz–30MHz	ROHDE ET SCHWARZ	ESH3	972079/117
	C2042028VO	Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	BBHA9170232
X	A5329045VO	Cable IMR&EMR (Anechoic chamber)	SMEE	KX13	
X	A5329048VO	Cable EMR OATS	SUCOFLEX	106G	553
	A5329038VO	Cable coaxial 3.5 m (Blue)	SUHNER	SUCOFLEX 106	26732/6
X	A5329056VO	Cable Radiat EMI (Pre-amp/Analyzer)			
X	A5329057VO	Cable Radiat. EMI (Pre-amp/cage)			
X	A5329059VO	Cable OATS (Mast at 10m)			
	A5329058VO	Cable OATS (Mast at 3m)			
CONDUCTED MEASUREMENT EMISSION					
X	A3169049VO	Conducted emission comb generator	BARDET		CGPR12
	C2320059VO	LISN	EMCO	3810/2SH	9511/1182
X	C2320068VO	LISN 50Ω / 50µH (Auxiliaries)	EMCO	3825/2	9309/2122
X	A4049061VO	Transient limiter	HEWLETT PACKARD	11947A	3107A01596
X	A2120003VO	Programmable PSU, HAR/FLK	HEWLETT PACKARD	6842A	3531A00109
	A4060016VO	Spectrum analyzer 9kHz –1.8GHz	HEWLETT PACKARD	8591E	3536A00384
	A5329036VO	Direct Injection Module 100 Ohms	LCIE	MID01-100 ohms	
	A5329042VO	Ferrite Tube	LUTHI	FTC 101	4485
	A1092042VO	Ferrite Tube	LUTHI	FTC101	4763
X	D3044010VO	Faraday Cage	RAY PROOF		4854
	C2320062VO	LISN tri-phase ESH2-Z5	RHODE ET SCHWARZ	33852.19.53	841223/008
	C2320063VO	LISN tri-phase ESH2-Z5	RHODE ET SCHWARZ	33852.19.53	841223/007
	C2320066VO	RSI 4 wires	RHODE ET SCHWARZ	ENY41	838119/023
	C2320067VO	RSI 2 x 2 wires	RHODE ET SCHWARZ	ENY22	836727/015
X	A2640011VO	Measurement receiver 9kHz–30MHz	ROHDE ET SCHWARZ	ESH3	972079/117
	A1290017VO	Current probe	SCHAFFNER	CSP9160	1097
	A5329037VO	Current injection probe	SCHAFFNER	CIP8213	52
	A4089117VO	Voltage probe	SMEE		
X	C2320061VO	LISN (Measure) 50Ω / 50µH	TELEMETER ELECTRONIC	NNB-2/16Z	98010
X	A5329061VO	Cable Conduct. EMI (Analyzer/cage)			
X	A5329060VO	Cable Conduct. EMI (LISN/cage)			
MISCALLENOUS (CONTROL EQUIPMENT)					
	A6440068VO	Data Logger	AGILENT	34970A	US37043935
	A6440068VO	Data Logger Board	AGILENT	34901A	MY41037442

	N°LCIE	TYPE	COMPANY	REF	SN
X	D1022117VO	Climatic chamber	BIA CLIMATIC	CL 6-25	200 105 6
	A7043037VO	Power supply DC 30V 10A	ELC	AL924	95/00600
	A1240170VO	Multimeter	Fluke	87	75250745
X	A1240171VO	Multimeter	FLUKE	189	89770115
	A4024018VO	Oscilloscope 500 MHz	Hewlett Packard	54542C	US36040602
	A4024019VO	Oscilloscope	Hewlett Packard	54720A	7426600
X	A2120003VO	Programmable PSU, HAR/FLK	HEWLETT PACKARD	6842A	3531A00109
X	B4204052VO	Thermo-hygrometer	HUGER		
	A7043036VO	Power supply DC 300W / 150V-6A	SODILEC	7SDLIN/GB AUTO 300	493711
	A4083040VO	Oscilloscope 100 MHz 500Ms/s	Tektronix	TDS30-25	H712103

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*	3.57 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.*	3.28 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.47 dB	3.6 dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	2.90 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Voiron *Measurement of radiated electric field on the Voiron open area test site*	5.07 dB	5.2 dB