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Rapport d'essai / *Test report*

N° 200708-4002C-R2-E **JDE :** 74676

DELIVRE A / *ISSUED TO* : **TAGSYS S.A.**
180, Chemin de Saint Lambert
13821 LA PENNE SUR HUVEAUNE
FRANCE

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

Matériel testé / *Apparatus under test* :

- Produit / *Product* : Lecteur de tag RFID / *RFID tag reader*
- Marque / *Trade mark* : **TAGSYS**
- Constructeur / *Manufacturer* : **TAGSYS**
- Type / *Model* : **TR-L100**
- N°de série / *serial number* * : B0721125F0-R *
- FCC ID : QHKTRL100AEROLBLC

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

Date des essais / *Test date* : 29 et 30 août 2007 / August 29th and 30th, *2007*

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

Test réalisé par / Test p*erformed by* : Laurent CHAPUS

Ce document comporte /*Composition of document :* 22 pages.

Ecrit par / *Written by*
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SUMMARY

1. TEST PROGRAM

Standard: FCC CFR 47, PART 15, Subpart B
ANSI C63-4 (2003).

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 TR-L100 is tested with the 13.56MHz antennas AERO-LC and AERO-LB. The rated RF output power was 2W.
The TR-L100 reader is considered as a computer peripheral device as it is used in conjunction with a PC.

2.2. HARDWARE IDENTIFICATION

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

  TR-L100 Serial number: B0721125F0-R

- **Input/output on the MEDIO TR L100 :**
  * Serial RS232 connector (DB9)
  * Parallel connector
  * Ch1 BNC antenna connector
  * Ch2 BNC antenna connector
  * Sync IN/OUT BNC connector (not used for this application)
  * I/O ports (1,2,3,4, gnd, Vin, Vout, gnd)
  * Power supply 110V/240V – 50/60Hz

- **Auxiliaries used for testing:**

Trade Mark – Model Number (Serial number)	FCC ID	Description	Cable description
HEWLETT PACKARD –Vectra VL420.DT Sn: FR14122957	DOC	Laptop Personal Computer	Power cable: unshielded Serial/parallel cables: shielded
Hewlett Packard P/N: C4742-60101 Sn: C990897683	DOC	Keyboard	PS2 cable (1.2m)
Hewlett Packard P/N : C3751B Sn : LZA62831260	DZL211029	Mouse	PS2 cable (1.2m)
Hewlett Packard P/N : D2846 Sn : JP4001000	DOC	Video Monitor	Standard AC power cable SVGA cable, shielded
TAGSYS - RFID tag (C270)	-		
TAGSYS – RFID tag (ISO 15693)	-		

- **I/O cables used for testing:**
  - 1x Antenna RF cable, coaxial 50Ω: 3m (with six ferrites on reader's side)
  - 1x Serial cable, shielded: 1m
  - 1x Parallel cable, shielded: 1m
  - 1x I/O cable, 8 wires, shielded: 1.5m
  - 3x Mains power supply cables, unshielded: 1.8m (EUT, PC and monitor)

2.3. EQUIPMENT MODIFICATIONS

No equipment modification has been necessary during testing.

2.4. EUT EXERCISE SOFTWARE

The EUT exercise program used during radiated and conducted testing was exercised the TR-L100 reader in a manner similar to a typical use.
The test program permits the continuous reading of a RFID tag.
PC Software used: L200 Explorer. (V4.5.1)

2.5. EUT CONFIGURATION

Antenna AERO-LB or AERO-LC is connected on channel 1 of the reader.
The RF output power is set at 2W (Software controlled).
Tests are performed with RFID tags compatible to C220 and ISO 15693 standards.

2.6. SPECIAL ACCESSORIES

The RF antenna cable is coaxial 50Ω with six ferrites on the reader’s side.

3. RADIATED EMISSION DATA

3.1. CLIMATIC CONDITIONS

Date of test : August 29th, 2007
Test performed by : Laurent CHAPUS
Atmospheric pressure : 971mb
Relative humidity : 55%
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 10 meters Open site.
Power supply: 230V/50Hz
The EUT is placed on a non-conducting table of 80cm height.
Antennas are set in vertical and horizontal positions for worst case measurement (Standard position of antennas)


Radiated emission test setup
(AERO-LB and AERO-LC antennas, in vertical position)

Equipment configuration and running mode:
A RFID tag is placed in the vicinity of the antenna. The reader is communicating with the PC.

3.3. TEST SEQUENCE AND RESULTS

3.3.1. 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:
AERO-LB ANTENNA

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

AERO-LC ANTENNA

H polarization	**graph#3**	(See annex 1)
V polarization	**graph#4**	(See annex 1)

3.3.2. 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** from the antenna and 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.
3 axis measurements were performed for antennas positions (vertical and horizontal positions, with 360°rotation)
A summary of the worst case emissions found in all test configurations and modes is shown on clause 3.2.2.

AERO-LB ANTENNA:

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	40.679	40.0	37.4	-2.6	185	V	100	12.1	
2	67.806	40.0	27.3	-12.7	115	V	100	10.0	
3	148.164	43.5	30.9	-12.6	30	V	120	16.3	
4	216.966	46.0	40.6	-5.4	170	V	260	14.0	
5	244.085	46.0	35.3	-10.7	220	V	230	14.8	
6	732.239	46.0	44.3	-1.7	155	H	300	26.1	
7	786.449	46.0	40.4	-5.6	125	H	170	16.5	

AERO-LC ANTENNA:

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	40.685	40.0	36.2	-3.8	185	V	100	12.1	
2	67.810	40.0	35.1	-4.9	80	V	170	10.0	
3	216.980	46.0	39.6	-6.4	340	V	100	14.0	
4	244.102	46.0	34.0	-12.0	20	V	110	14.8	
5	271.219	46.0	39.6	-6.4	60	H	170	16.1	
6	732.259	46.0	42.0	-4.0	160	H	300	26.1	
7	786.492	46.0	41.0	-5.0	50	H	310	26.5	

*: 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. CONDUCTED EMISSION DATA

4.1. CLIMATIC CONDITIONS

Date of test : August 30th, 2007
Test performed by : Laurent CHAPUS
Atmospheric pressure : 975mb
Relative humidity : 52%
Ambient temperature : 22°C

4.2. 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 and compared to the FCC Part 15 subpart B §15.107 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.

4.3. TEST SETUP

The EUT is placed on a table at 0.8m height. The cable has been shorted to 1meter length. The EUT is powered trough the LISN (measure). The peripheral equipment (PC/monitor) is connected to a separate LISN.

4.4. TEST SEQUENCE AND RESULTS

Measurements are performed on the phase (L1) and neutral (N) of power lines of the reader.
A measurement is also performed with a 50Ω dummy load replacing 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.

Aero-LB antenna:

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

Aero-LC antenna:

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

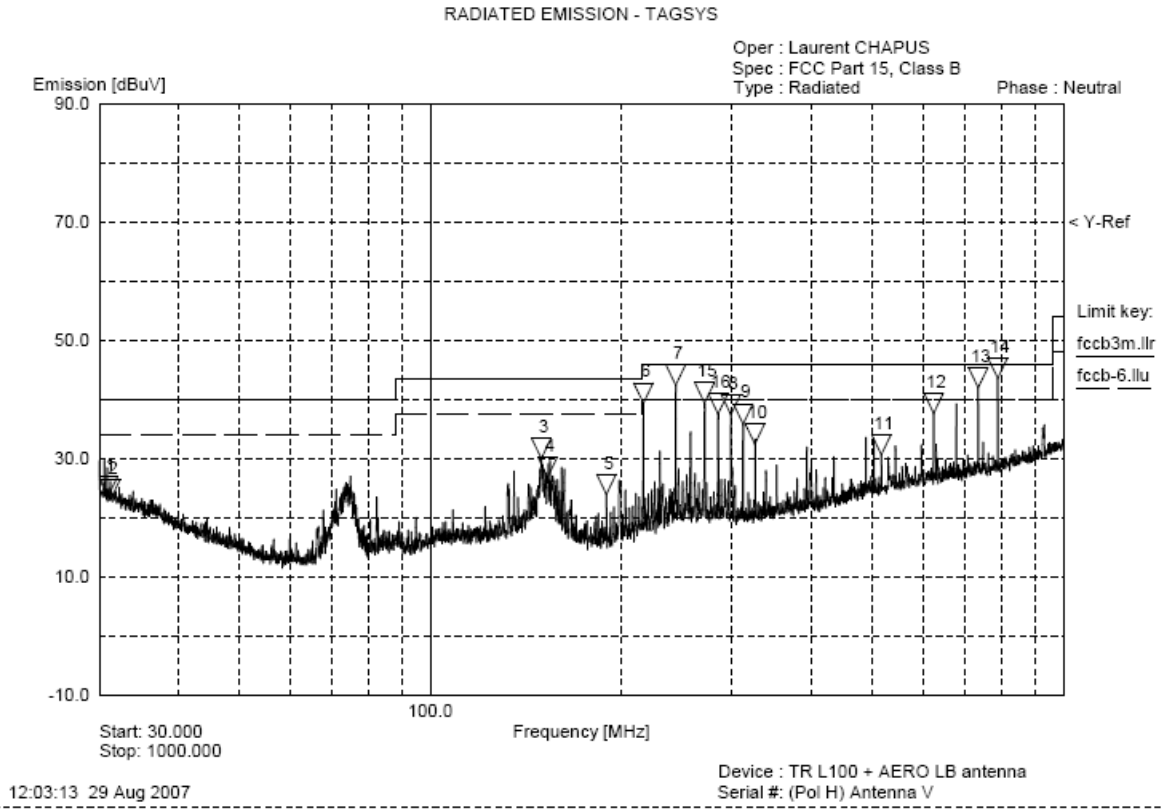
Dummy load (50Ω) replacing the antenna at the end of the cable:

Measure on L1:	graph Emc#5	(see annex 1)
Measure on N:	graph Emc#6	(see annex 1)

RESULT: PASS

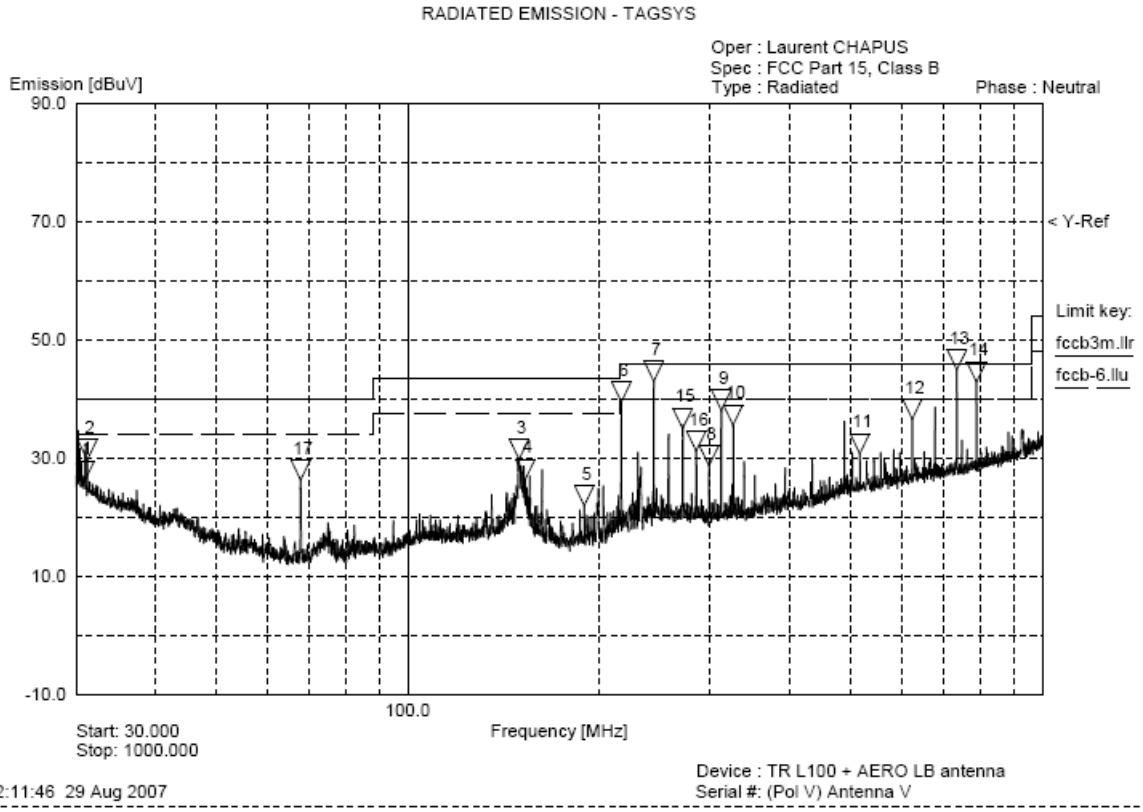
5. ANNEX 1 (GRAPHS)

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



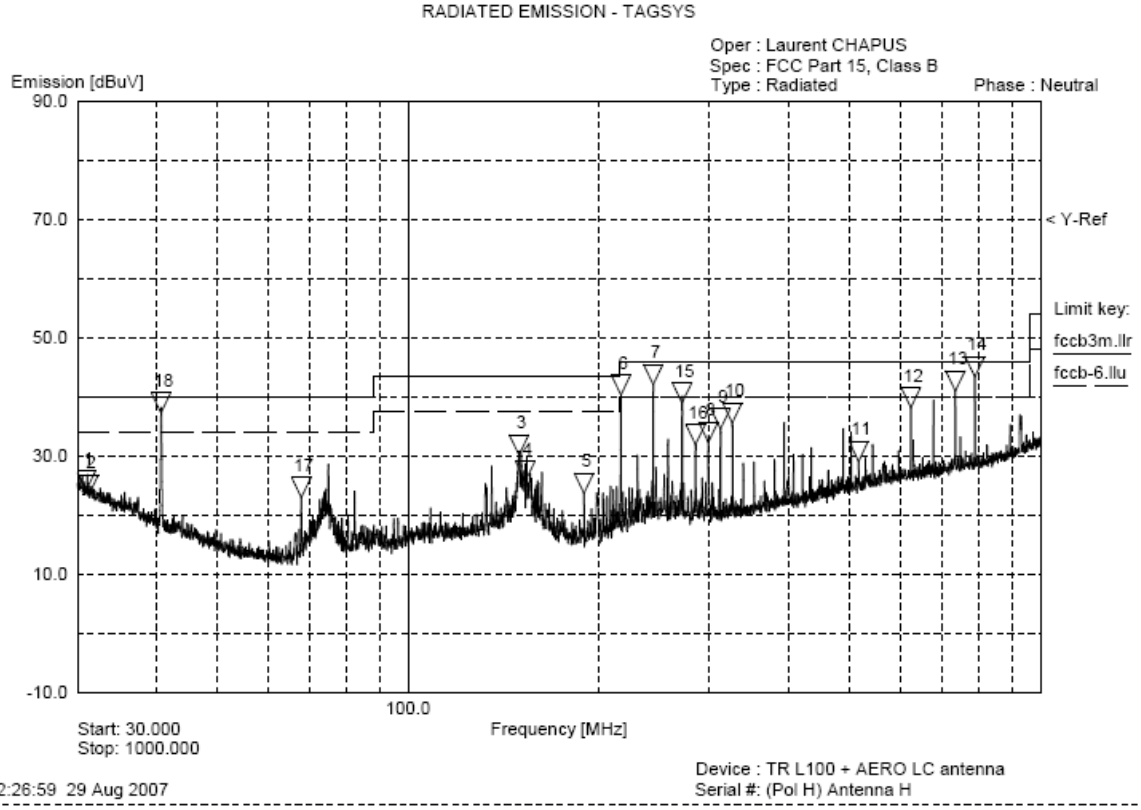
Marker ▽	Frequency [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	30.95	23.55	-	-	40.00
2	31.26	23.12	-	-	40.00
3	149.8	30.03	-	-	43.50
4	153.2	26.87	-	-	43.50
5	189.8	23.94	-	-	43.50
6	217.0	39.41	-	-	46.00
7	244.1	42.43	-	-	46.00
8	298.4	37.46	-	-	46.00
9	312.1	35.88	-	-	46.00
10	325.7	32.48	-	-	46.00
11	515.7	30.67	-	-	46.00
12	624.0	37.66	-	-	46.00
13	733.8	42.02	-	-	46.00
14	787.8	43.62	-	-	46.00
15	271.3	39.42	-	-	46.00
16	284.9	37.58	-	-	46.00

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



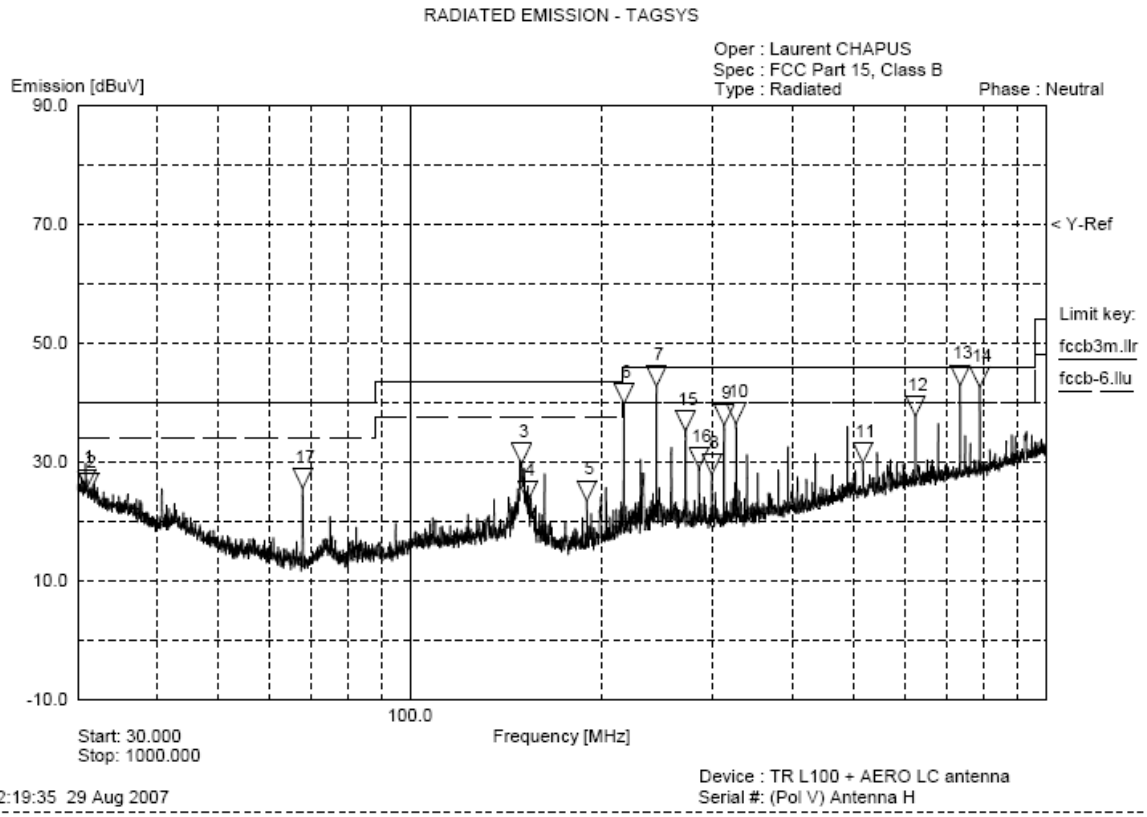
Marker ▽	Frequency [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	30.95	26.09	-	-	40.00
2	31.26	29.71	-	-	40.00
3	149.8	29.83	-	-	43.50
4	153.2	26.41	-	-	43.50
5	189.8	21.96	-	-	43.50
6	217.0	39.50	-	-	46.00
7	244.1	43.04	-	-	46.00
8	298.4	28.71	-	-	46.00
9	312.1	38.10	-	-	46.00
10	325.7	35.61	-	-	46.00
11	515.7	30.72	-	-	46.00
12	624.0	36.60	-	-	46.00
13	733.8	44.99	-	-	46.00
14	787.8	42.92	-	-	46.00
15	271.3	35.03	-	-	46.00
16	284.9	31.22	-	-	46.00
17	67.80	26.30	-	-	40.00

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



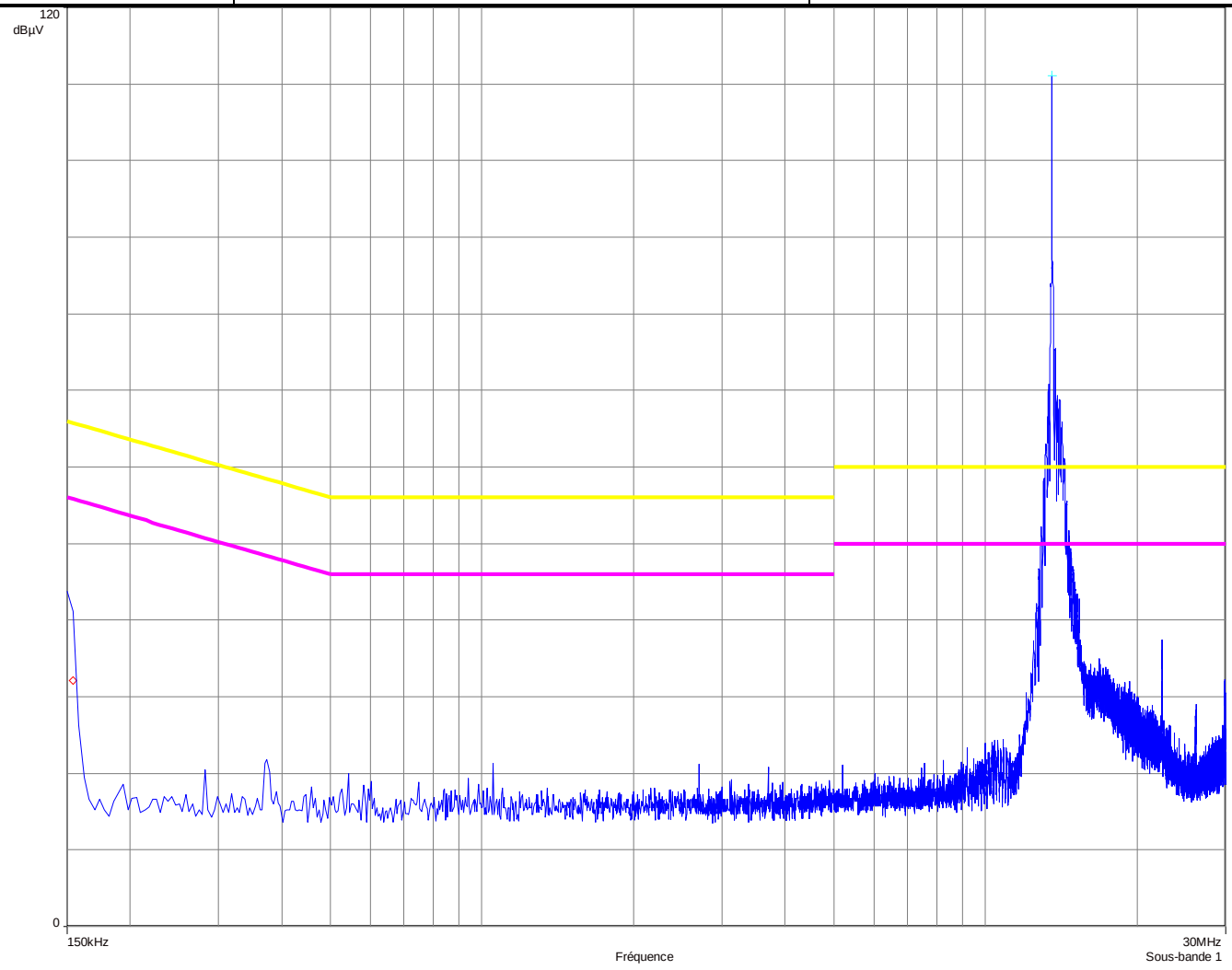
Marker ▽	Frequency [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	30.95	24.11	-	-	40.00
2	31.26	23.40	-	-	40.00
3	149.8	30.17	-	-	43.50
4	153.2	25.71	-	-	43.50
5	189.8	23.68	-	-	43.50
6	217.0	40.35	-	-	46.00
7	244.1	42.08	-	-	46.00
8	298.4	32.33	-	-	46.00
9	312.1	34.61	-	-	46.00
10	325.7	35.61	-	-	46.00
11	515.7	29.09	-	-	46.00
12	624.0	38.19	-	-	46.00
13	733.8	41.03	-	-	46.00
14	787.8	43.43	-	-	46.00
15	271.3	39.00	-	-	46.00
16	284.9	31.95	-	-	46.00
17	67.80	22.97	-	-	40.00
18	40.68	37.32	-	-	40.00

RADIATED EMISSIONS		**Test configuration:**
Graph name:	**graph#4**	**AERO-LC antenna**
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	30.95	25.36	-	-	40.00
2	31.26	24.67	-	-	40.00
3	149.8	29.69	-	-	43.50
4	153.2	23.37	-	-	43.50
5	189.8	23.44	-	-	43.50
6	217.0	39.81	-	-	46.00
7	244.1	42.71	-	-	46.00
8	298.4	27.90	-	-	46.00
9	312.1	36.21	-	-	46.00
10	325.7	36.47	-	-	46.00
11	515.7	29.85	-	-	46.00
12	624.0	37.73	-	-	46.00
13	733.8	42.92	-	-	46.00
14	787.8	42.62	-	-	46.00
15	271.3	35.22	-	-	46.00
16	284.9	28.98	-	-	46.00
17	67.80	25.56	-	-	40.00

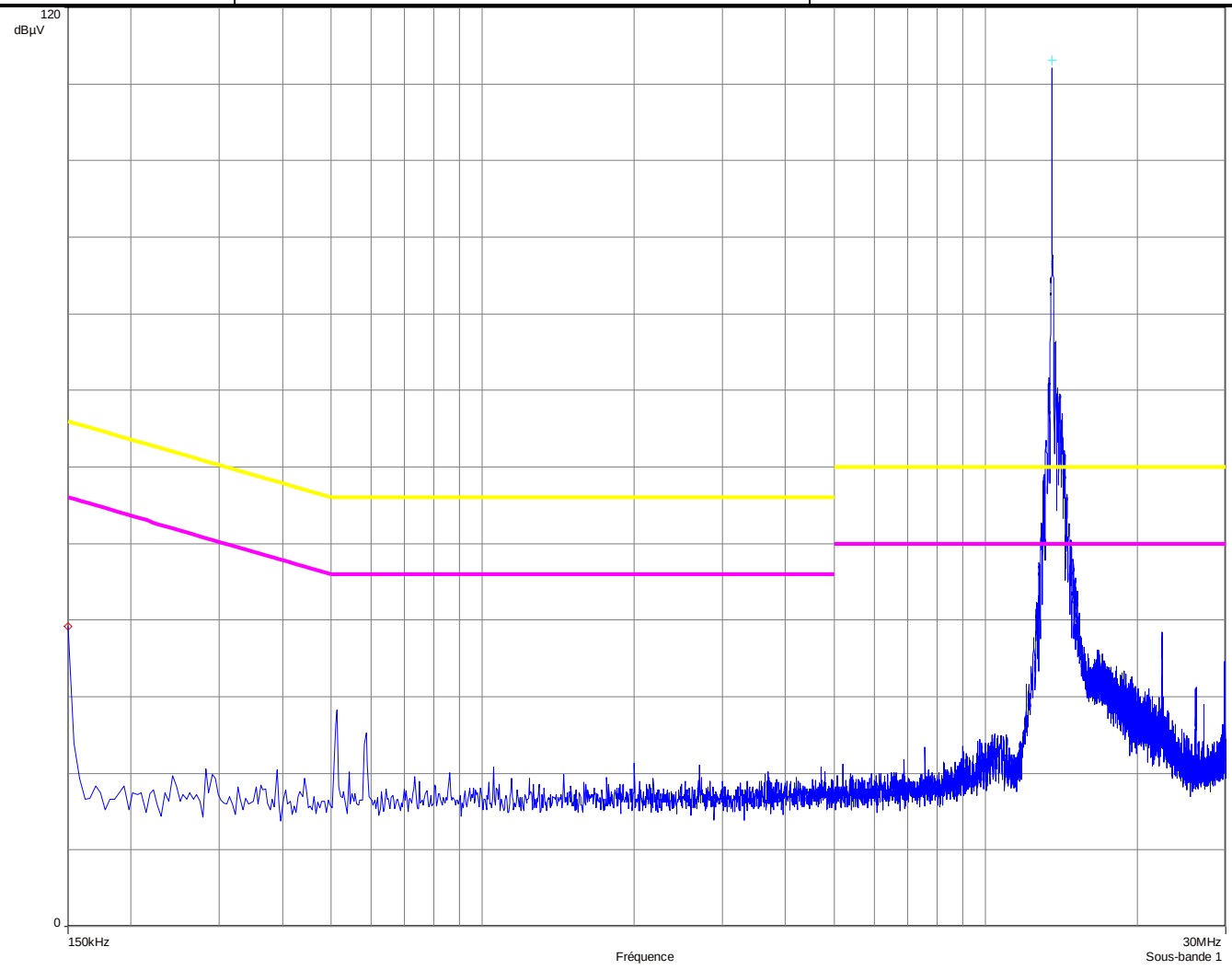
CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#1**	AERO-LB antenna
Voltage / Frequency	**110/60Hz**	
Line/Port	**Line L1**	
RBW / VBW :	**9kHz / 30kHz**	



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
0.154	32.1	17.5	56.0	**-38.5**	26.8	66.0	**-39.2**
13.562 *	111.0	111.0	50.0	**61.0**	111.0	60.0	**51.0**

*: Carrier frequency (see measurement with dummy load replacing the RF antenna)

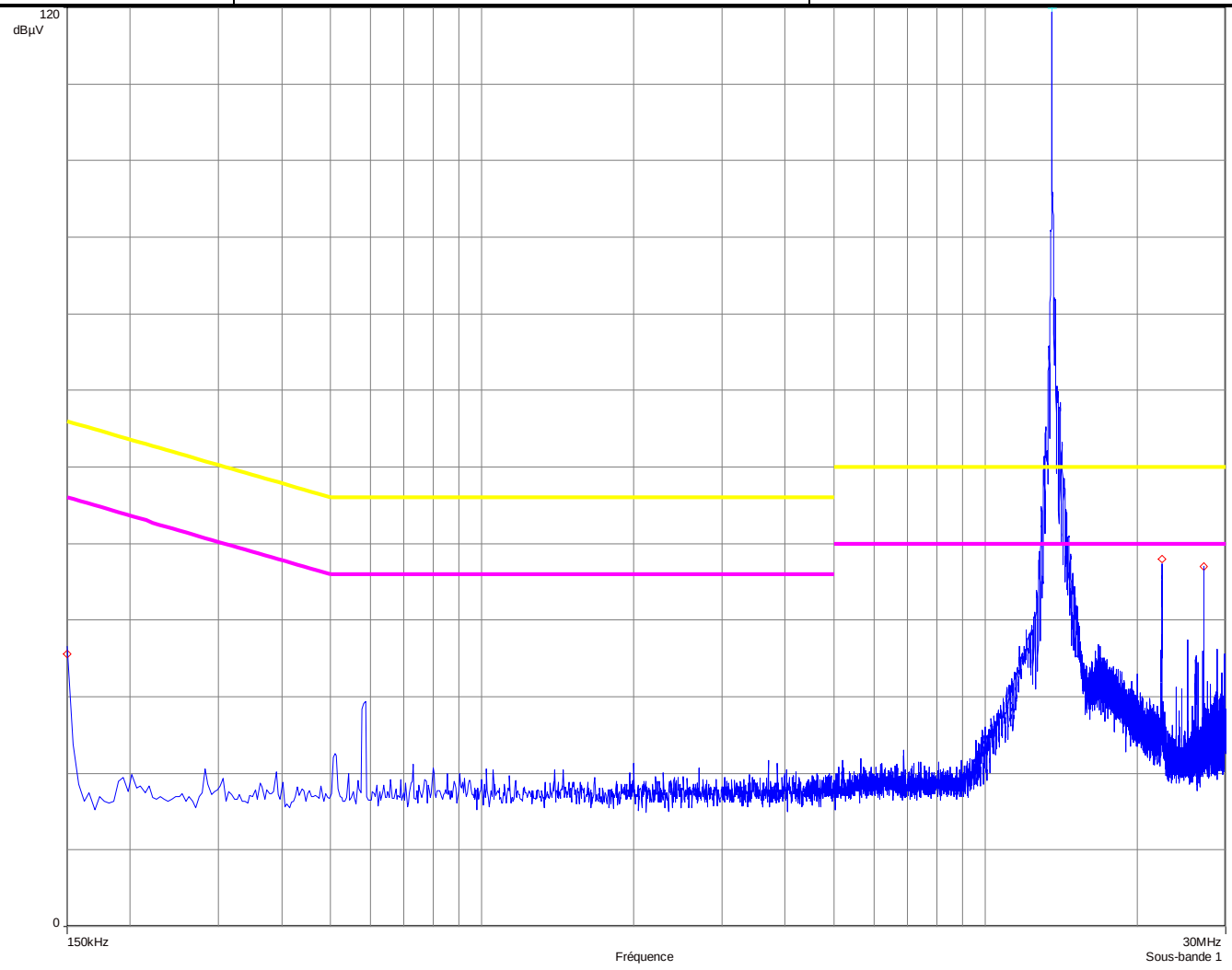
CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#2**	AERO-LB antenna
Voltage / Frequency	**110/60Hz**	
Line/Port	**Neutral (N)**	
RBW / VBW :	**9kHz / 30kHz**	



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
0.150	39.2	27.9	56.0	**-28.1**	35.3	66.0	**-30.7**
13.562 *	113.0	111.0	50.0	**61.0**	111.0	60.0	**51.0**

*: Carrier frequency (see measurement with dummy load replacing the RF antenna)

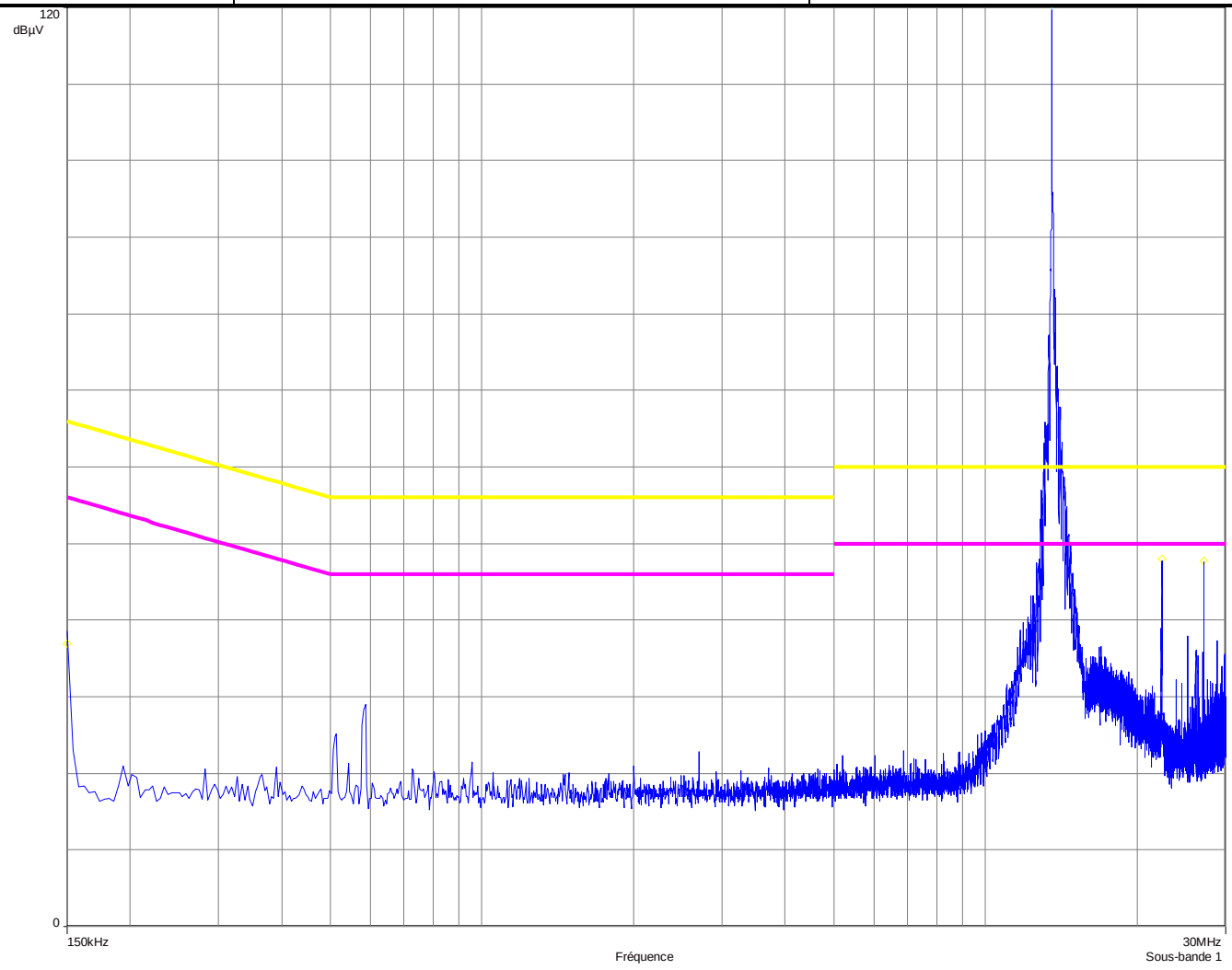
CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#3**	AERO-LC antenna
Voltage / Frequency	**110/60Hz**	
Line/Port	**Line L1**	
RBW / VBW :	**9kHz / 30kHz**	



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
0.150	35.6	25.5	56.0	**-30.5**	31.6	66.0	**-34.4**
13.562 *	120.0	119.0	50.0	**69.0**	119.0	60.0	**59.0**
22.434	48.0	36.3	50.0	**-13.7**	43.3	60.0	**-16.7**
27.122	47.0	45.8	50.0	**-4.2**	45.8	60.0	**-14.2**

*: Carrier frequency (see measurement with dummy load replacing the RF antenna)

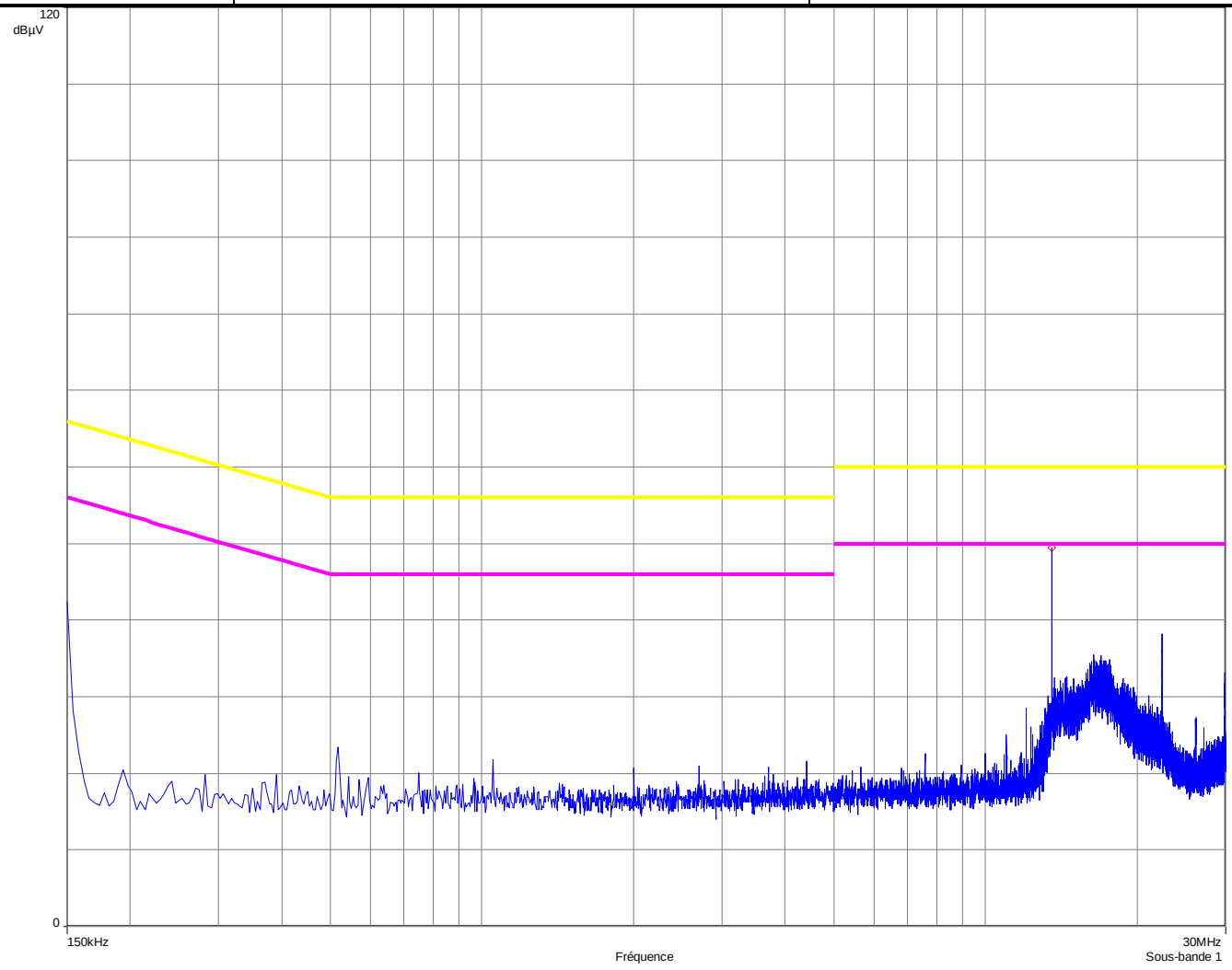
CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#4**	AERO-LC antenna
Voltage / Frequency	**110/60Hz**	
Line/Port	**Neutral (N)**	
RBW / VBW :	**9kHz / 30kHz**	



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
0.150	36.9	26.3	56.0	**-29.7**	33.5	66.0	**-32.5**
13.562 *	120.0	119.0	50.0	**69.0**	119.0	60.0	**59.0**
22.434	47.9	37.5	50.0	**-12.5**	43.8	60.0	**-16.2**
27.122	47.7	46.6	50.0	**-3.4**	46.6	60.0	**-13.4**

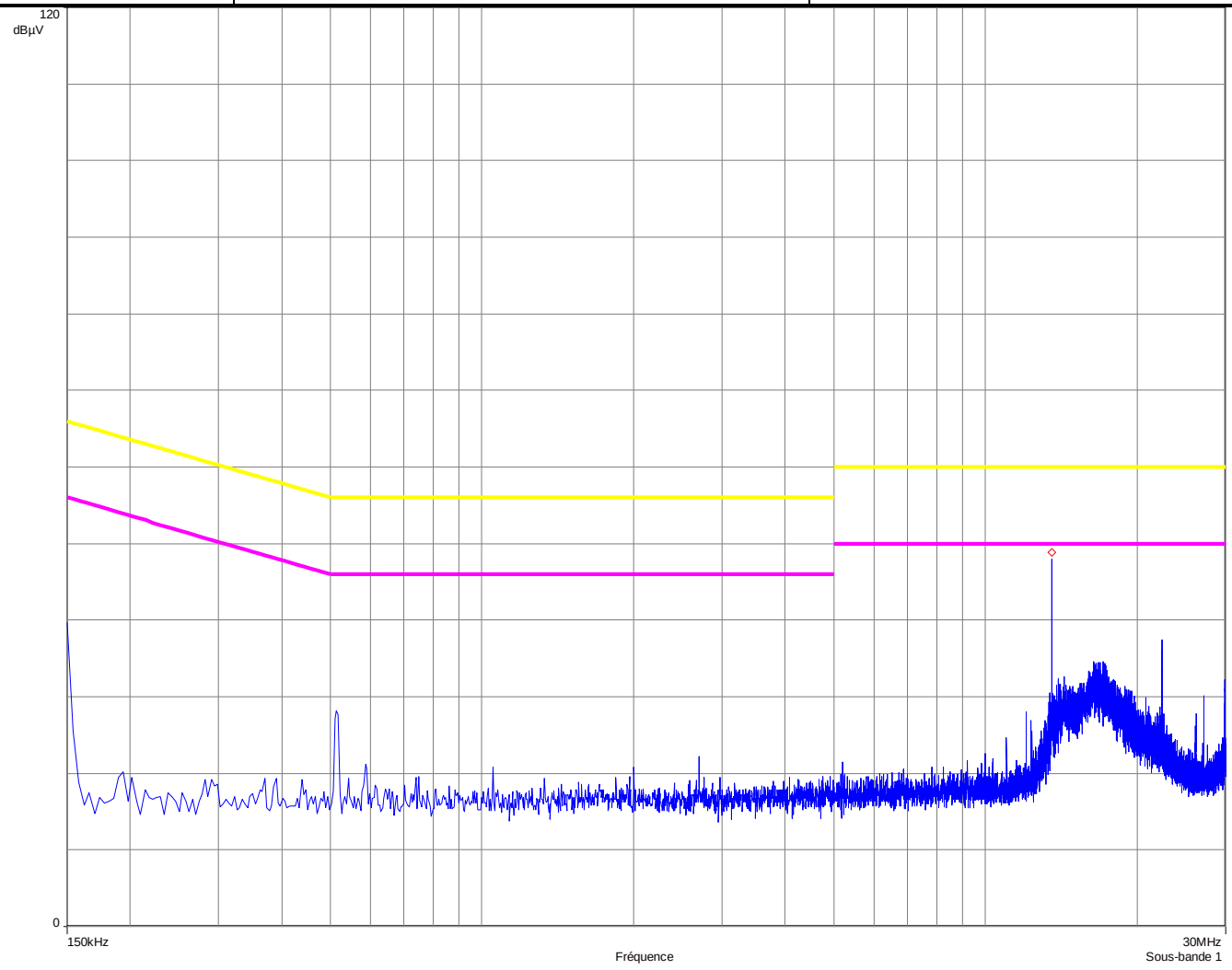
*: Carrier frequency (see measurement with dummy load replacing the RF antenna)

CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#5**	Dummy load 50Ω at the end of the RF cable replacing the 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**
13.562	49.5	48.4	50.0	**-1.6**	48.4	60.0	**-11.6**

CONDUCTED EMISSIONS		**Test configuration:**
Graph name:	**Emc#6**	Dummy load 50Ω at the end of the RF cable replacing the antenna
Voltage / Frequency	**110/60Hz**	
Line/Port	**Neutral (N)**	
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
13.562	48.8	47.4	50.0	**-2.6**	47.4	60.0	**-12.6**

6. 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
	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)			
X	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 (Auxiliaries) 50Ω / 50µH	EMCO	3825/2	9309/2122
X	A4049061VO	Transient limiter	HEWLETT PACKARD	11947A	3107A01596
X	A2120003VO	Programable 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
	A4040050VO	Click-meter (Discontinuous noise)	SCHAFFNER	DIA1512D	22338
	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)					

	N°LCIE	TYPE	COMPANY	REF	SN
	A6440068VO	Data Logger	AGILENT	34970A	US37043935
	A6440068VO	Data Logger Board	AGILENT	34901A	MY41037442
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	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
X	A2120003VO	Programable PSU, HAR/FLK	HEWLETT PACKARD	6842A	3531A00109

7. 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