



Rapport d'essai / Test report

N° 200803-4393CR-A1-R1-E JDE : 83620

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 C.
*Electromagnetic compatibility tests according to the standards FCC CFR
47 Part 15, Subpart C.*

Matériel testé / Apparatus under test :

- Produit / Product : Appareil de lecture/écriture de Tag RFID / RFID tag Read/Write device
- Marque / Trade mark : TAGSYS
- Constructeur / Manufacturer : TAGSYS
- Type / Model : FAST TAGGING STATION
- N° de série / serial number * : T0824001B0-R
- FCC ID : QHKFOLIODISPENSER

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

Date des essais / Test date

: Le 3 et 4 Juillet 2008 / From July 3rd and 4th, 2008

Lieu d'essai / Test location

: LCIE
170 rue de Chatagnon
Z.I Centr'alp
38430 MOIRANS - France

Test réalisé par / Test performed by : Laurent CHAPUS / Anthony MERLIN

Ce document comporte / Composition of document : 20 pages.

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MOIRANS, 23 JUILLET 2008 / July 23th, 2008

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**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 Fast Tagging Station is able to dispense and program tags automatically. It is connected to a desktop personal computer during testing with the serial cable.

2.2. HARDWARE IDENTIFICATION**• Equipment under test (EUT):****FAST TAGGING STATION**

Serial number: T0824001B0-R

FCC ID: QHKFOLIODISPENSER

• Input/output:

* Serial RS232 connector (DB9)

* Power supply 230V – 50/60Hz

• Auxiliaries used for testing:

Trade Mark – Model Number (Serial number)	FCC ID	Description	Cable description
HP - D2846 (S/n: 3143078)	DOC	Monitor	/
DELL - Dimension 3100 (S/n: GOZVC2J)	DOC	Personal computer	/
IBM - M02U0L (S/n: 010000)	DOC	Mouse	USB length: 2m
DELL - SK-8115 (S/n: E145614)	DOC	Keyboard	USB length: 2m
UC232-A (S/n: E286C0)	DOC	USB – Serial Adaptator	USB length: 40cm

• I/O cables used for testing:

- 1x Serial cable, shielded: 1.5m
- 3x Mains power supply cable, unshielded: 1.8m (EUT, PC and VGA monitor)
- 1x VGA cable, shielded: 1.5m
- 1x LAN cable, shielded: 2m



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 FAST TAGGING STATION in a manner similar to a typical use.

The test program permits the continuous reading/writing of a RFID tag.

PC Software used: LoopC320Write.exe

2.5. Special accessories

None

3. MEASUREMENT OF RADIATED EMISSION (30MHz-1GHz)

3.1. CLIMATIC CONDITIONS

Date of test : July 4th, 2008
Test performed by : Laurent CHAPUS / Anthony MERLIN
Atmospheric pressure : 993 mb
Relative humidity : 43 %
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

Equipment configuration and running mode:

The reader/writer 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 the TESEQ CBL 6144 antenna. The EUT is being rotated on 360° during the measurement. The pre-characterization graphs are obtained in PEAK detection.

See graphs for 30MHz-1GHz:

Fast Tagging Station

H polarization
V polarization

graph#1
graph#2

(See annex 1)
(See annex 1)

Fast Tagging Station (Motor Stopped)

H polarization
V polarization

graph#3
graph#4

(See annex 1)
(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 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.

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

No	Frequency (MHz)	QPeak Limit (dBμV/m)	Qpeak * (dBμV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	32.272	40	31.6	-8.4	360	V	180	13.7	
2	37.258	40	27	-13.0	245	V	150	12.3	
3	53.402	40	33.1	-6.9	0	V	110	12.2	
4	76.706	40	26.1	-13.9	285	V	140	8.9	
5	112.543	43.5	28.1	-15.4	360	V	210	15.6	
6	157.404	43.5	26.9	-16.6	180	H	150	18.5	
7	200.030	43.5	22.8	-20.7	60	V	170	13.7	
8	294.111	46	32.1	-13.9	250	V	130	17.5	
9	466.426	46	36	-10.0	320	V	130	21.1	
10	812.333	46	40.6	-5.4	130	V	100	27.2	

*: 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.

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

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

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

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

4.1. CLIMATIC CONDITIONS

Date of test : July 3rd, 2008
Test performed by : Laurent CHAPUS / Anthony MERLIN
Atmospheric pressure : 971mb
Relative humidity : 50%
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 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 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) 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.

Power supply: 110Vac/60Hz



**4.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION**

None

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 antenna in order to demonstrate that some 13.56MHz radiation may be cross-coupled to the AC line connection.

Graphs are obtained in PEAK detection.

Measures are also performed in Quasi-Peak and Average for any strong signal.

Normal RF on for writing/reading operation:

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

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

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

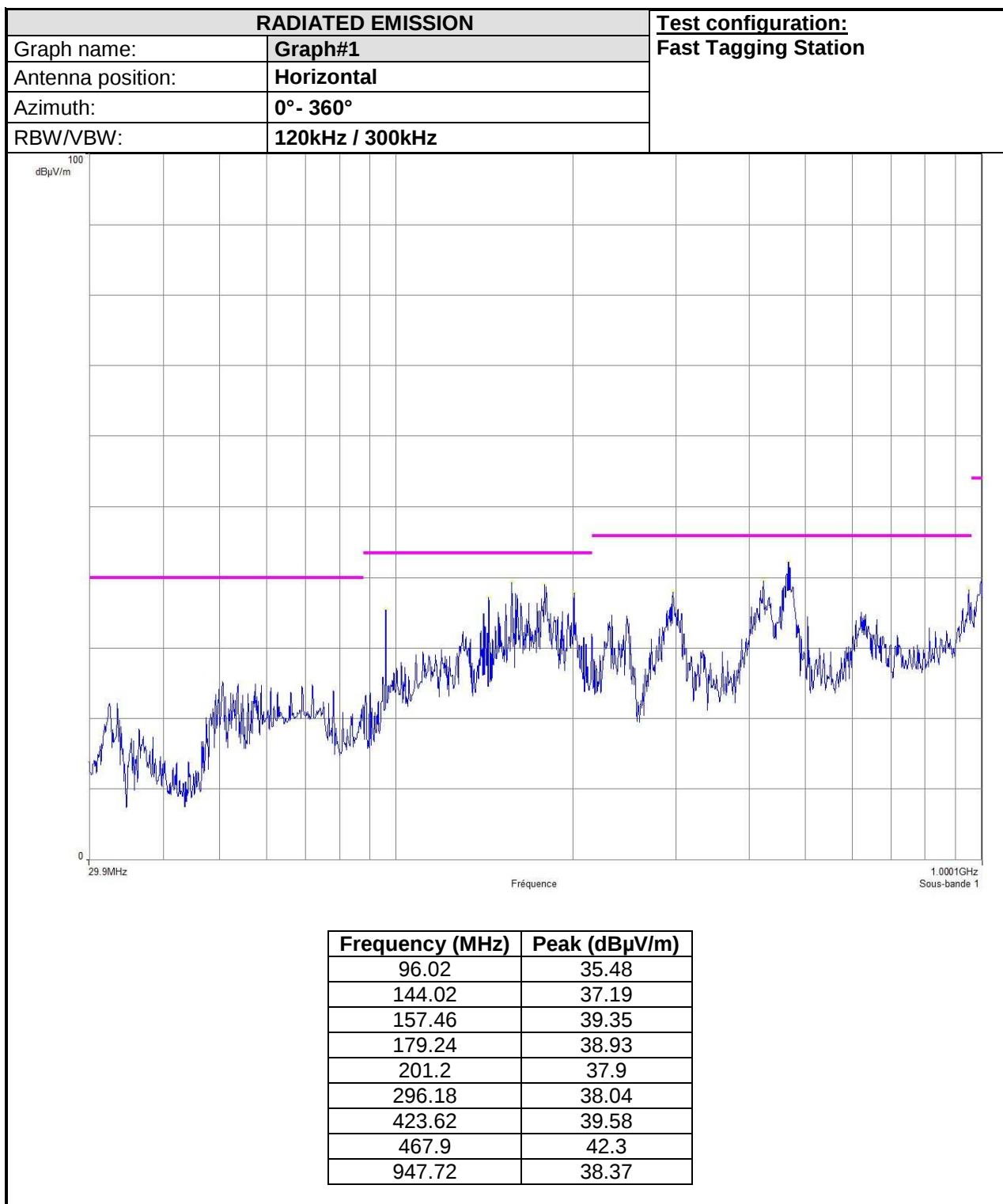
Measure on L1: graph Emc#3 (see annex 1)

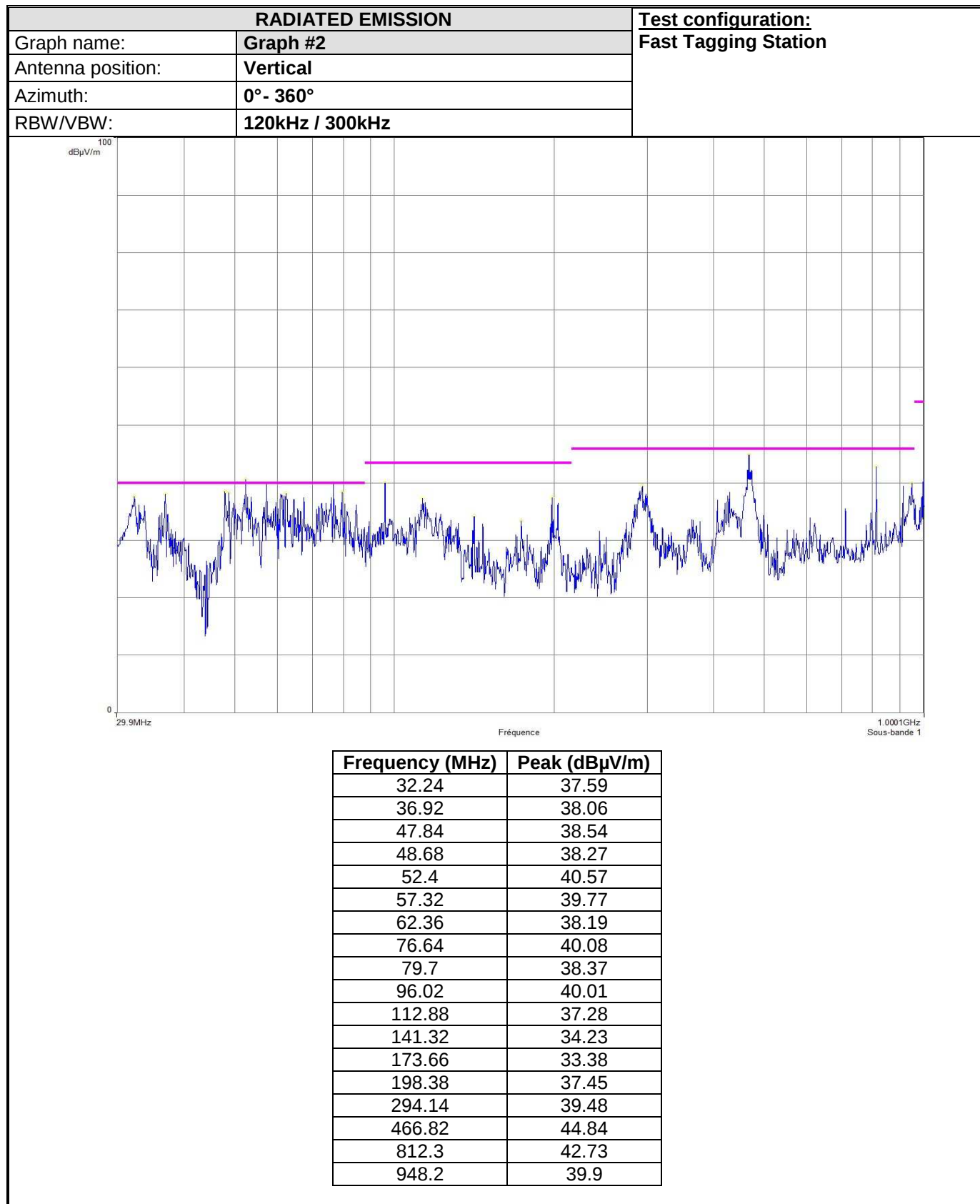
Measure on N: graph Emc#4 (see annex 1)

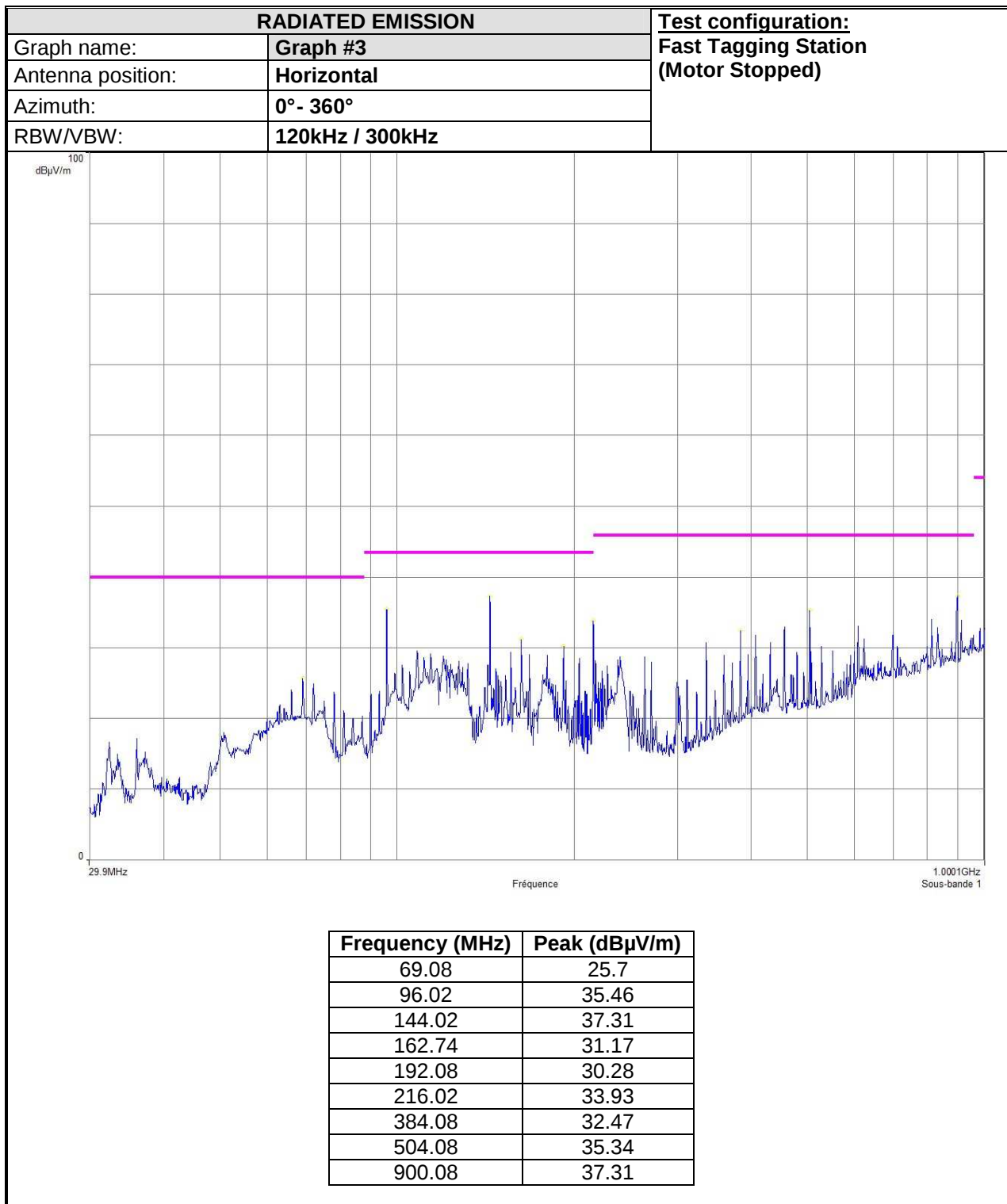
RESULT: PASS

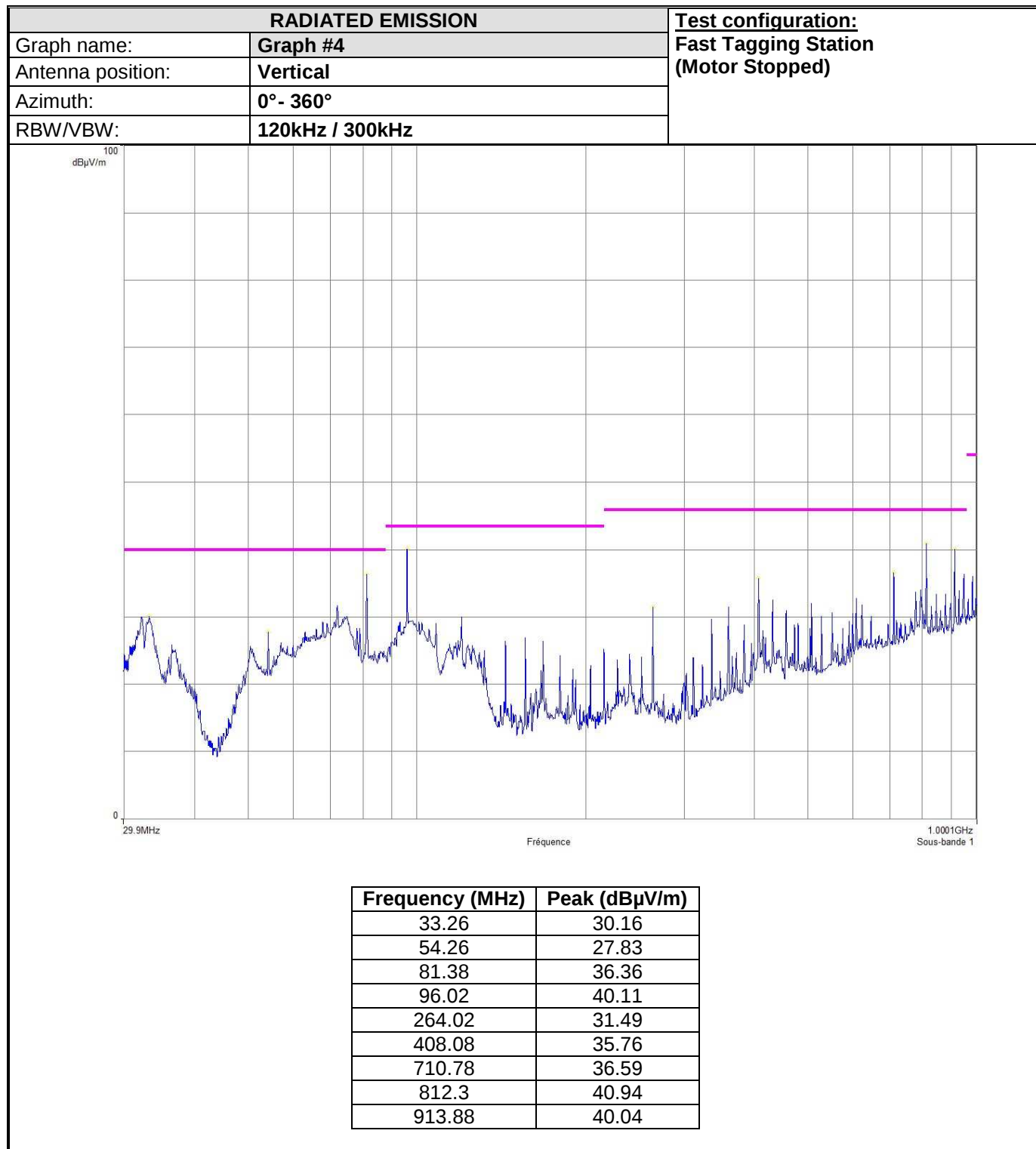


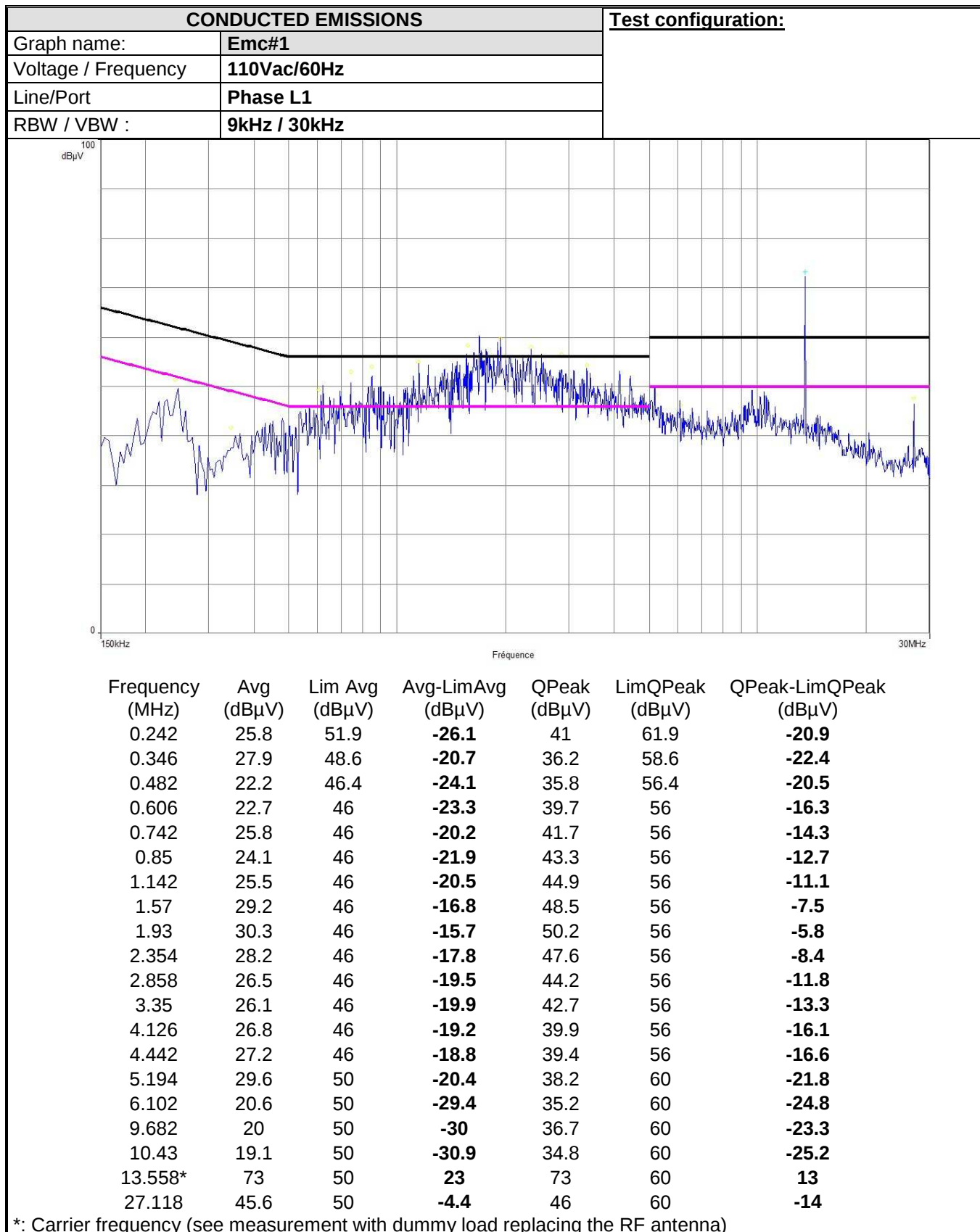
5. ANNEX 1 (GRAPHS)

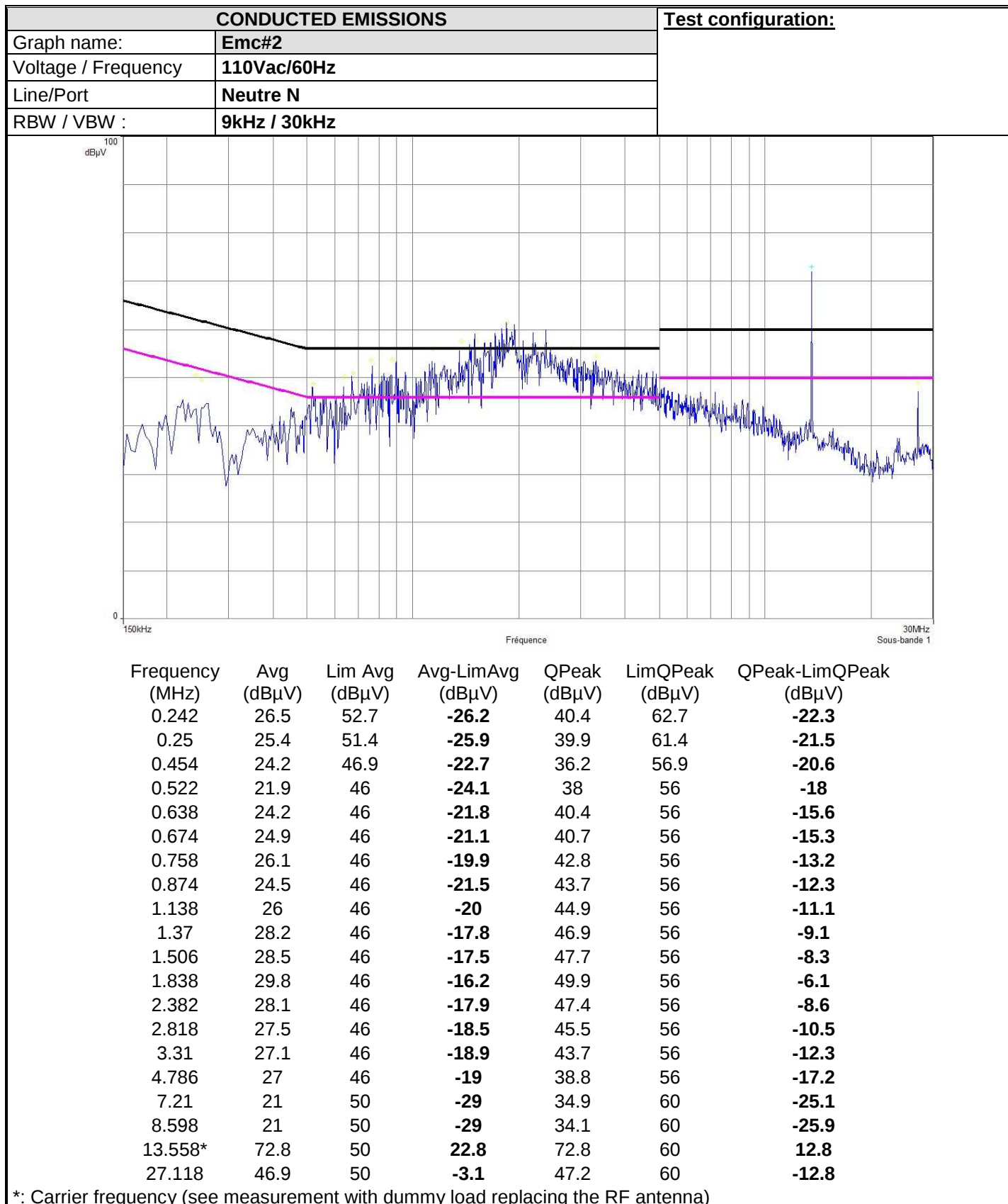


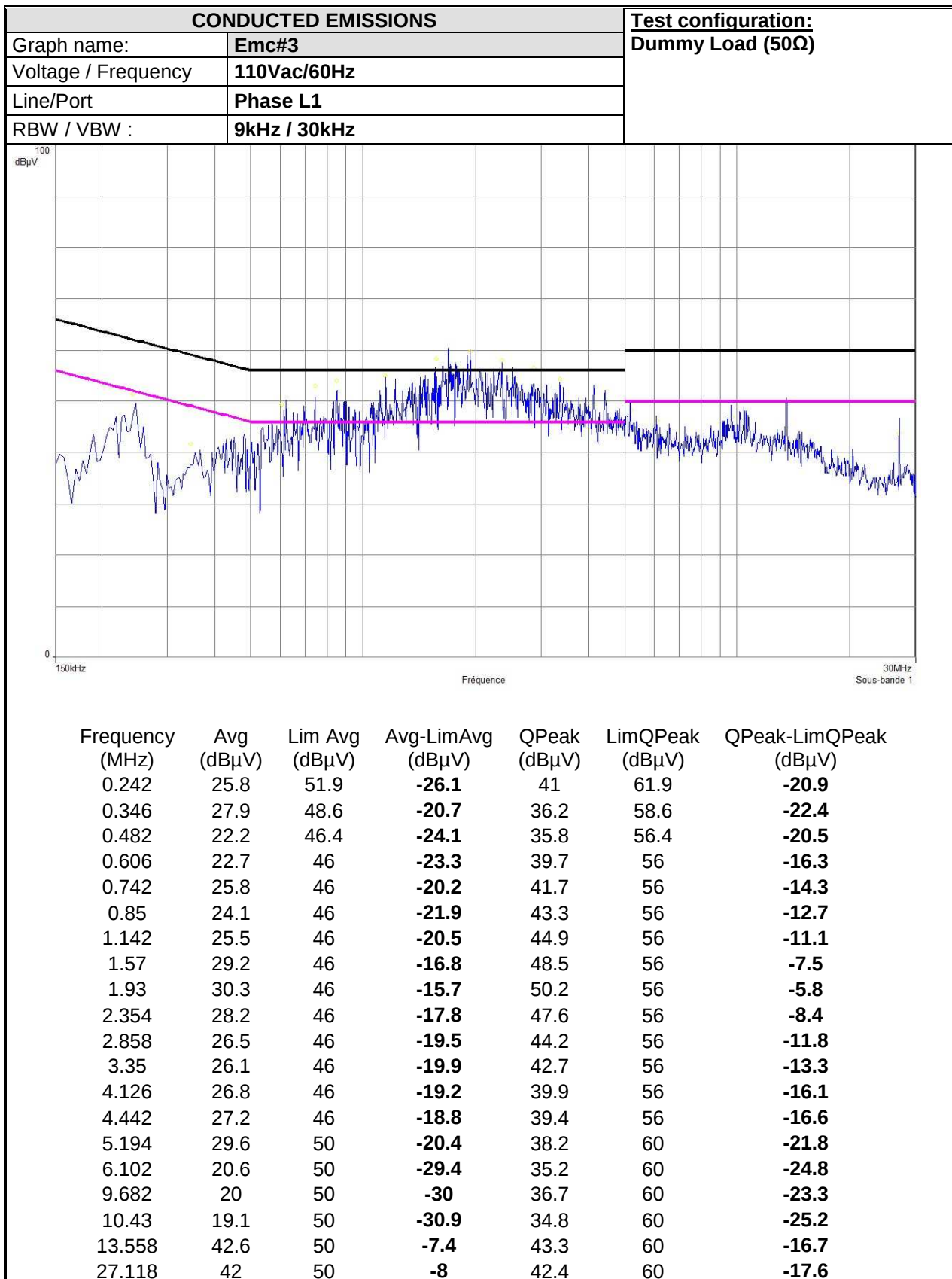


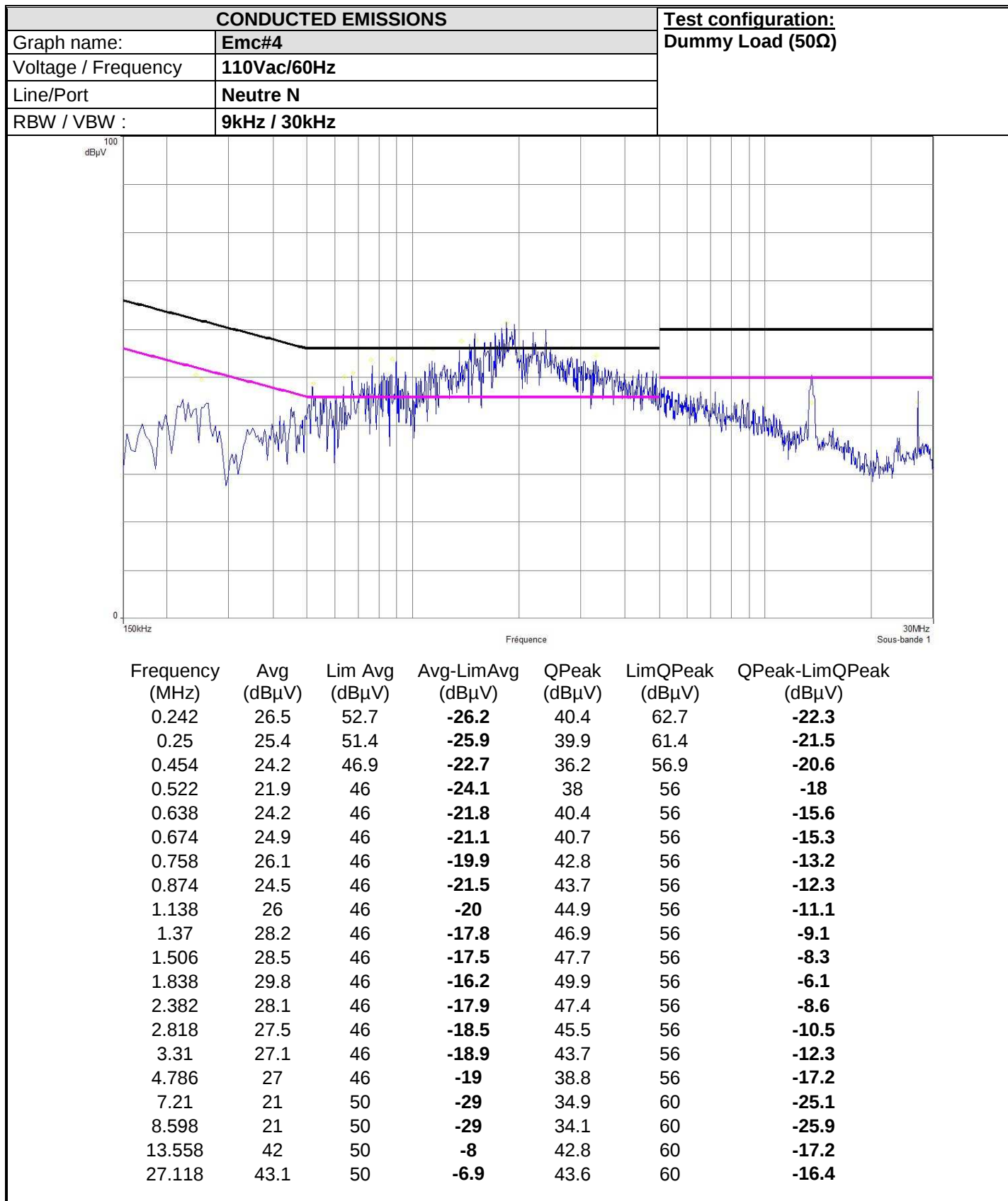














6. TEST EQUIPMENT LIST

	N° LCIE	TYPE	COMPANY	REF	SN
RADIATED EMISSION MEASUREMENT (SEMI-ANECHOIC CHAMBER #1)					
	A5329032VO	Absorption clamp	LUTHI	MDS21	2826
	A5329044VO	Absorption clamp	RHODE ET SCHWARZ	85024A	194.0100.50
	A7102024VO	Amplifier 8 GHz	HEROTEK	A1080304A	222033
	A7102019VO	Amplifier 9 KHz – 1300 MHz	HEWLETT PACKARD	8447F Opt 64	3113A06394
	A7105006VO	Amplifier 9 KHz – 1300 MHz	HEWLETT PACKARD	8447D Opt 64	
X	C2040145VO	Antenna Bi-Log XWing	TESEQ	CBL6144	25903
	C2042027VO	Antenna horn	EMCO	3115	6382
	C2042028VO	Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	BBHA9170232
	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
	F2000407	Antenna mast	MATURO Gmbh	AM 4.0	/037/1270308
X	A5329189VO	Cable EMI (s-Anechoic chamber)			
X	A539198VO	Cable Radiat EMI			
X	A2642019VO	Measurement Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	100131
X	D3044016VO	Semi-Anechoic chamber #1	SIEPEL		
	A4060033VO	Spectrum Analyzer 9KHz – 12.8GHz	HEWLETT PACKARD	8596E	3409u00537
	A4060018VO	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	3409u00537
	A4060016VO	Spectrum analyzer 9kHz –1.8GHz	HEWLETT PACKARD	8591E	3536A00384
X	F2000406	Turntable chamber	MATURO Gmbh	TT 2.0 SI	/053/1270308
X	F2000408	Turntable controller chamber	MATURO Gmbh	Multiple Control Unit	MCU/060/1270308
X	A3169050VO	Radiated emission comb generator	BARDET		PR17B
RADIATED EMISSION MEASUREMENT (OPEN AREA TEST SITE)					
	A5329032VO	Absorption clamp	LUTHI	MDS21	2826
	A5329044VO	Absorption clamp	RHODE ET SCHWARZ	85024A	194.0100.50
	A4049059VO	Adapter quasi-peak	HEWLETT PACKARD	HP85650A	2811A01134
X	A7102024VO	Amplifier 8 GHz	HEROTEK	A1080304A	222033
	A7102026VO	Amplifier 8-26GHz	ALDETEC	ALS01452	1
	A7102019VO	Amplifier 9 KHz – 1300 MHz	HEWLETT PACKARD	8447F Opt 64	3113A06394
	C2040050VO	Antenna biconic	EMCO	3104C	9401-4636
X	C2040051VO	Antenna Bi-log	CHASE	CBL6111A	1628
	C2042027VO	Antenna horn	EMCO	3115	6382
	C2042028VO	Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	BBHA9170232
	C2040056VO	Antenna log-periodic	EMCO	3146	2178
X	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
	F2000288VO	Antenna mast	EMCO	1050	
	C2040057VO	Antenna monopole	AH SYSTEM	SAS-551	181
	A5329048VO	Cable EMR OATS	SUCOFLEX	106G	553
X	A5329075VO	Cable OATS	UTIFLEX		
X	A5329188VO	Cable OATS (Mast at 10m)	UTIFLEX		
X	A5329076VO	Cable OATS (Mast at 3m)	UTIFLEX		
	A5329196VO	Cable OATS (Turntable)	UTIFLEX		
	A2640011VO	Measurement receiver 9kHz–30MHz	ROHDE ET SCHWARZ	ESH3	972079/117
X	A2642019	Measurement Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	100131
X	A4060027VO	Pre-selector RF	HEWLETT PACKARD	HP85685A	2837A00784
X	A3169050VO	Radiated emission comb generator	BARDET		PR17B
X	A4060017VO	Spectrum analyzer	HEWLETT PACKARD	HP8568B	2732A04155
X	A4060018VO	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	3409u00537
	A4060016VO	Spectrum analyzer 9kHz –1.8GHz	HEWLETT PACKARD	8591E	3536A00384
X	A4060019VO	Spectrum analyzer display	HEWLETT PACKARD	HP85662A	2816A16603
X	F2000403VO	Turntable	ETS LINDGREN	Model 2187	
X	F2000286VO	Turntable / Antenna mast controller	ETS LINDGREN	Model 2066	
CONDUCTED MEASUREMENT EMISSION					
X	A5329061VO	Cable Conduct. EMI			
X	A5329060VO	Cable Conduct. EMI			
X	A3169049VO	Conducted emission comb generator	BARDET		CGPR12
	A4040050VO	Clickmeter	SCHAFFNER	DIA1512D	22338
	A5329037VO	Current injection probe	SCHAFFNER	CIP8213	52
	A1290017VO	Current probe	SCHAFFNER	CSP9160	1097



	N°LCIE	TYPE	COMPANY	REF	SN
	A5329036VO	Direct Injection Module 100 Ohms	LCIE	MID01-100 ohms	
	A5329042VO	Ferrite Tube	LUTHI	FTC 101	4485
	A1092042VO	Ferrite Tube	LUTHI	FTC101	4763
X	C2320059VO	LISN	EMCO	3810/2SH	9511/1182
	C2320068VO	LISN	EMCO	3825/2	9309/2122
	C2320061VO	LISN	TELEMETER ELECTRONIC	NNB-2/16Z	98010
	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
X	C2320123VO	LISN	RHODE ET SCHWARZ	ENV216	100037
	A2640011VO	Measurement receiver 9kHz–30MHz	ROHDE ET SCHWARZ	ESH3	972079/117
X	A2642019VO	Measurement Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	100131
	C2320067VO	ISN 2 x 2 wires	RHODE ET SCHWARZ	ENY22	836727/015
	C2320066VO	ISN 4 wires	RHODE ET SCHWARZ	ENY41	838119/023
	C2320124VO	ISN 4 wires	TESEQ	T400A	24873
	D3044016VO	Semi-Anechoic chamber #1	SIEPEL		
	D3044017VO	Semi-Anechoic chamber #2	SIEPEL		
	D3044015VO	Semi-Anechoic chamber #3	SIEPEL		
X	D3044010VO	Faraday Cage	RAY PROOF		4854
X	A4049061VO	Transient limiter	HEWLETT PACKARD	11947A	3107A01596
	A4089117VO	Voltage probe	LCIE		
MISCALLENOUS (CONTROL EQUIPMENT)					
	A6440068VO	Data Logger	AGILENT	34970A	US37043935
	A2120003VO	Programable PSU, HAR/FLK	HEWLETT PACKARD	6842A	3531A00109
	A6440068VO	Data Logger Board	AGILENT	34901A	MY41037442
	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
	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



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 <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 Voiron <i>Measurement of radiated electric field on the Voiron open area test site</i>	5.07 dB	5.2 dB