



Rapport d'essai / Test report

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: **GEMALTO**
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13705 LA CIOTAT Cedex - France

Objet / Subject

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

Matériel testé / Apparatus under test

- Produit / Product : Lecteur USB de carte contact & sans contact
Dual Interface Contact & Contactless USB Smart Card Reader
- Marque / Trade mark : **GEMALTO**
- Constructeur / Manufacturer : GEMALTO
- Type / Model : **PROX-DU**
- N° de série / serial number : 09A00150

Date des essais / Test date

: 19 et 20 Janvier 2010 / January 19th and 20th, 2010

Lieu d'essai / Test location

: **BUREAU VERITAS LCIE SUD-EST**
ZI Centr'Alp – 170 rue de Chatagnon
38430 MOIRANS - France

Test réalisé par / Test performed by : Laurent CHAPUS

Ce document comporte / Composition of document : 25 pages.

MOIRANS, LE 11 FEVRIER 2010 / FEBRUARY 11TH, 2010

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1. TEST PROGRAM

Standard : FCC CFR 47, PART 15, Subpart C

ANSI C63-4 (2009).

Requirements for intentional radiator. Chapter 15.225 (Operation within the band 13.110-14.010MHz)

- Radiated emissions from 9kHz to 1GHz
- Conducted emissions from 150kHz to 30MHz

Standard : FCC CFR 47, PART 15, Subpart B

ANSI C63-4 (2009).

Requirements for unintentional radiator. Class B computer peripheral.

- Radiated emissions from 30MHz to 1GHz
- Conducted emissions from 150kHz to 30MHz

General conclusion:

Measures performed on the sample of the product Prox-DU, SN: 09A00150, in configuration and description presented in this test report, show compliance levels with FCC CFR 47, Part 15 B and Part 15 C.



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 Prox-DU equipment has TAG reader functionality (reading data from tag). Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

The Prox-DU 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):**

Prox-DU

Serial number: 09A00150

- **Input/output:**

- 1 x USB port

- **Auxiliaries used for testing:**

- 1 x Laptop DELL n°51495 Model: PP11L
- 1 x Power supply unit for laptop DELL PA-12 Model: AA22850-L
- 1 x Contactless card GEMPLUS (00501001)
- 1x Contact card GEMPLUS (GemSAFE Logon)

Sn: 423- 546-849-19

Sn: CN-OU7088-16293-548-02BW

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

- 1 x USB cable of EUT, shielded, length: 1.8m (attached on equipment)

2.3. EQUIPMENT MODIFICATIONS

None

2.4. EUT EXERCISE / SOFTWARE

The EUT exercise program used during radiated and conducted testing was exercised the reader in a manner similar to a typical use.

The test program permits the continuous reading of a RFID card and a contact card.

PC Software used: CE&FCC EMC Tester for Prox-DU V1.0.0

Running mode:

- Contactless card: RF field is ON / Contactless card is place above the reader in the landing zone
- Contact card: RF field is OFF / Smartcard is inserted in the reader's slot



2.5. SPECIAL ACCESSORIES

None

3. RADIATED EMISSION DATA

3.1. CLIMATIC CONDITIONS

Date of test : January 19th, 2010
Test performed by : Laurent CHAPUS
Atmospheric pressure : 990mb
Relative humidity : 40%
Ambient temperature : 20°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: USB port



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 semi anechoic chamber.

The distance between EUT and antenna is 3 meters. For Pre-characterization, the loop antenna 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 graph for 9kHz-30MHz band: Emr#1 (RFID function is ON)

(See annex 1)

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

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 with a log-periodic 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 for contactless card:

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

See graphs for 30MHz-1GHz for contact card:

H polarization **Emr#4** (See annex 1)
V polarization **Emr#5** (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

Equipment was moved (vertical and horizontal) to position that maximized emission.

Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	Qpeak (dBµV/m)	Qpeak-Limit (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)
13.56 * ¹	84.0	39.4	-44.6	90	V / 0°	35.3

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



Limits Sub clause §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

See chapter 5 of this test report for band edge measurements.

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.

Equipment was moved (vertical and horizontal) to position that maximized emission.

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

Worst case final data result:

Contactless card:

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	39.4	-0.6	95	V	100	12.0	None
2	325.423	46.0	39.1	-6.9	60	H	240	17.8	None
3	352.558	46.0	45.6	-0.4	15	H	240	18.1	None
4	499.613	46.0	37.6	-8.4	250	V	100	21.9	None

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

RESULTS: PASS

Contact card:

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	43.996	40.0	35.8	-4.2	200	V	100	12.3	None
2	51.984	40.0	38.2	-1.8	275	V	280	12.5	None
3	60.000	40.0	33.0	-7.0	80	V	100	11.7	None
4	121.780	43.5	39.4	-4.1	185	V	100	16.2	None
5	149.870	43.5	36.2	-7.3	205	V	220	14.6	None
6	352.532	46.0	43.7	-2.3	15	H	250	18.1	None

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

**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 are 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. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)****4.1. TEST CONDITIONS**

Date of test : January 20th, 2010
Test performed by : Laurent CHAPUS
Atmospheric pressure : 980mb
Relative humidity : 40%
Ambient temperature : 20°C

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency when the temperature is varied from -20°C to +50°C at the nominal power voltage and the primary power voltage is varied from 85% to 115% of the rated supply voltage at 20°C.

4.2. Temperature and voltage fluctuation

Temperature has been set at +20°C, -20°C and +50°C.
Voltage is varied from 93.5V/60Hz to 126.5V/60Hz (power supply of PC)
Frequency of carrier: 13.56 MHz
Upper limit: 13.561356 MHz
Lower limit: 13.558644 MHz
The equipment is set in a climatic chamber. RF is ON.

Temperature	-20°C	20°C	+50°C
Voltage			
Mains voltage: 110V/60Hz			
Frequency (MHz)	13.559540	13.559543	13.559488
Carrier level	-1.5 dBc	REF	-0.5 dBc
Mains voltage: 93.5V/60Hz			
Frequency (MHz)	13.559540	13.559543	13.559488
Carrier level	-1.5 dBc	0.0	-0.5 dBc
Mains voltage: 126.5V/60Hz			
Frequency (MHz)	13.559540	13.559543	13.559488
Carrier level	-1.5 dBc	0.0	-0.5 dBc

Frequency drift measured is **55 Hz** when the temperature is varied from -20°C to +50°C and voltage is varied from 110V/60Hz $\pm 15\%$.

**5. BAND-EDGE COMPLIANCE §15.209****5.1. CLIMATIC CONDITIONS**

Date of test : January 20th, 2010
Test performed by : Laurent CHAPUS
Atmospheric pressure : 980mb
Relative humidity : 40%
Ambient temperature : 20°C

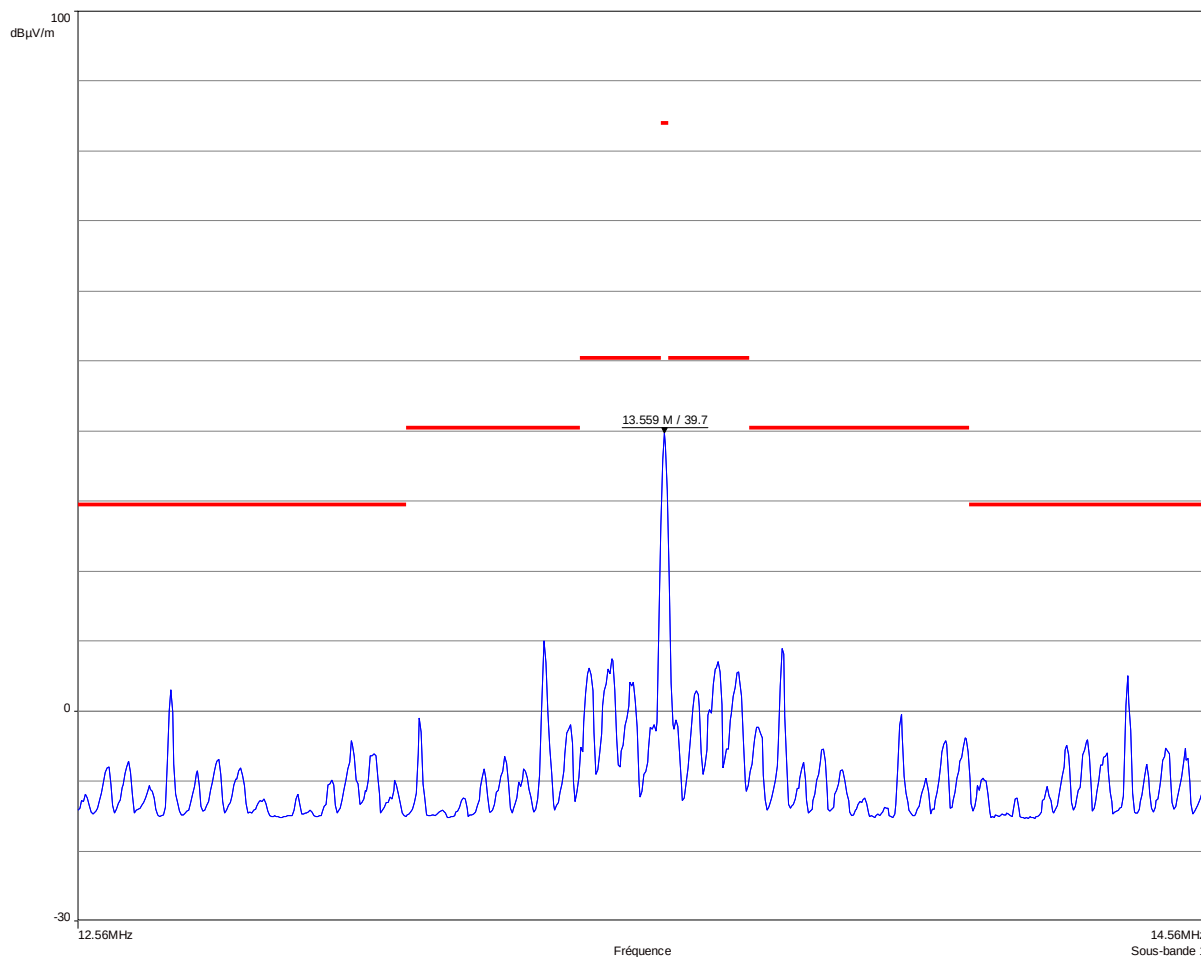
5.2. EQUIPMENT CONFIGURATION

The EUT was emitting with normal modulation. (Continuous reading, RF field ON).

5.3. Frequency band 13.110-14.010MHz

Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector.

The graphs are obtained with a measuring receiver ESU8.



6. CONDUCTED EMISSION DATA

6.1. CLIMATIC CONDITIONS

Date of test : January 20th, 2010
Test performed by : Laurent CHAPUS
Atmospheric pressure : 980mb
Relative humidity : 40%
Ambient temperature : 20°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 on laptop 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.

6.3. TEST SETUP

The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm.

The cable has been shorted to 1meter length. The laptop is powered trough the LISN (measure).



**6.4. TEST SEQUENCE AND RESULTS**

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

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.

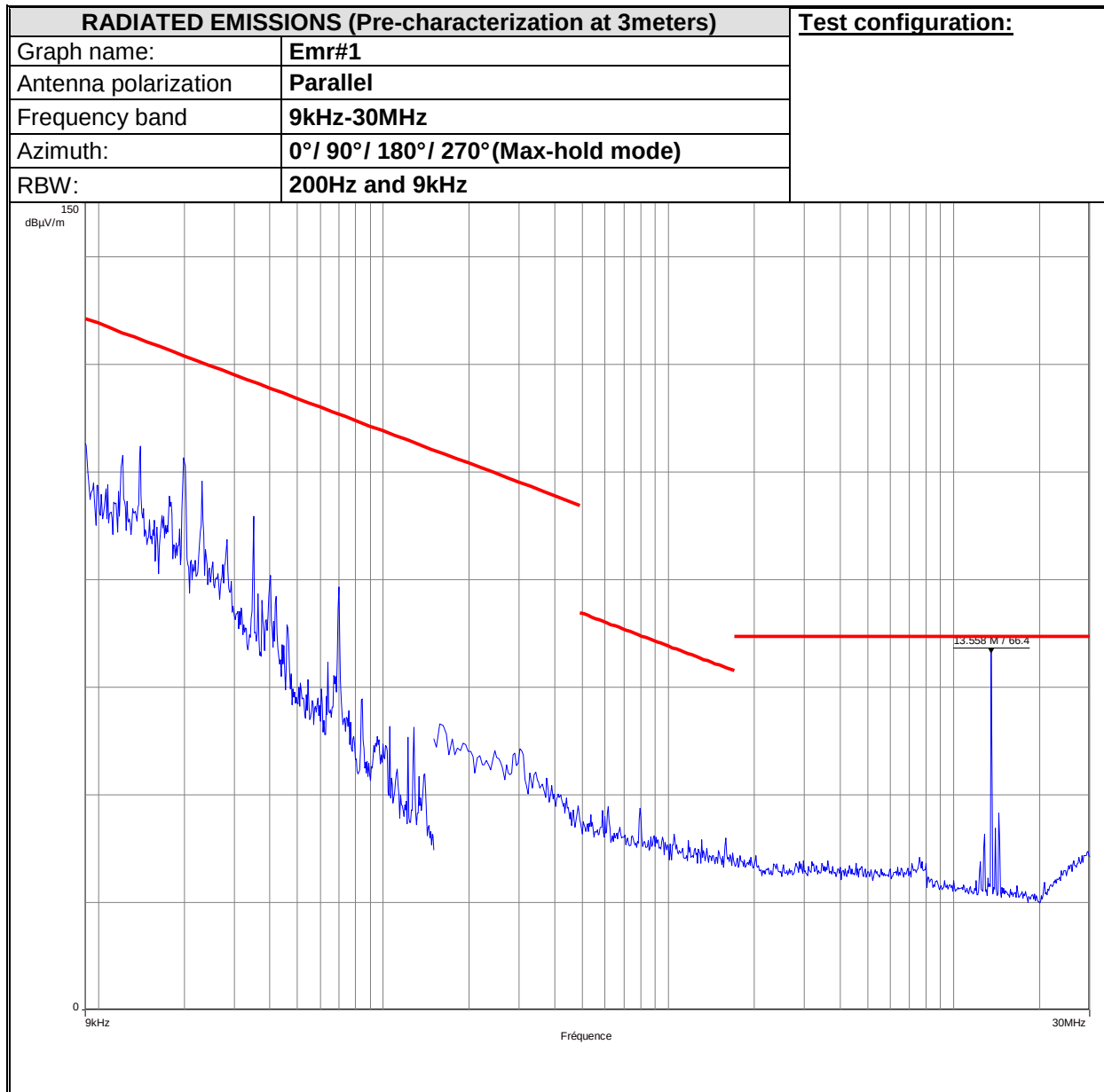
Graphs are obtained in PEAK detection.

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

Measure on L1:	graph Emc#1	Contactless card	(see annex 1)
Measure on N:	graph Emc#2	Contactless card	(see annex 1)
Measure on L1:	graph Emc#5	Contact card	(see annex 1)
Measure on N:	graph Emc#6	Contact card	(see annex 1)

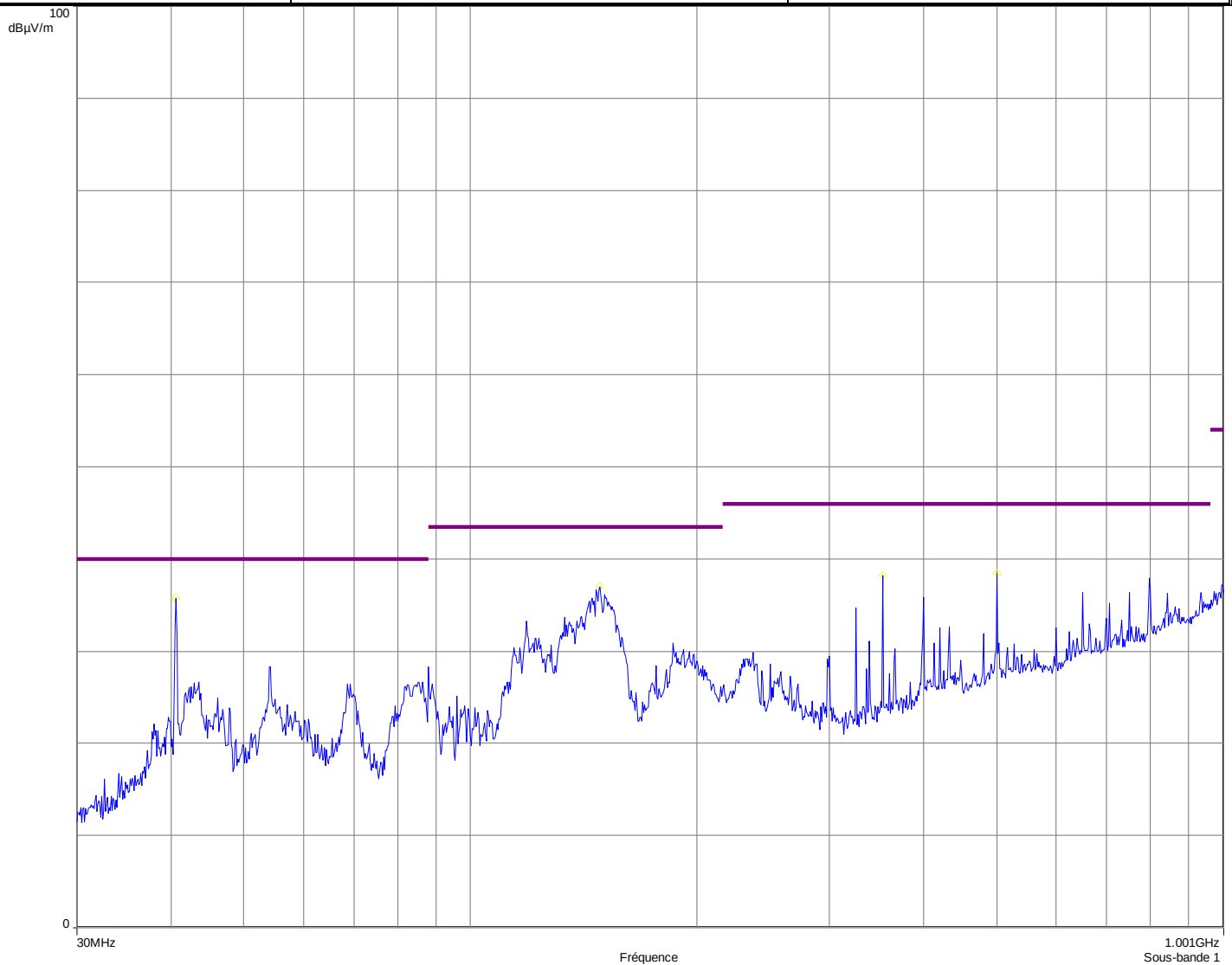
RESULT: PASS

7. ANNEX 1 (GRAPHS)





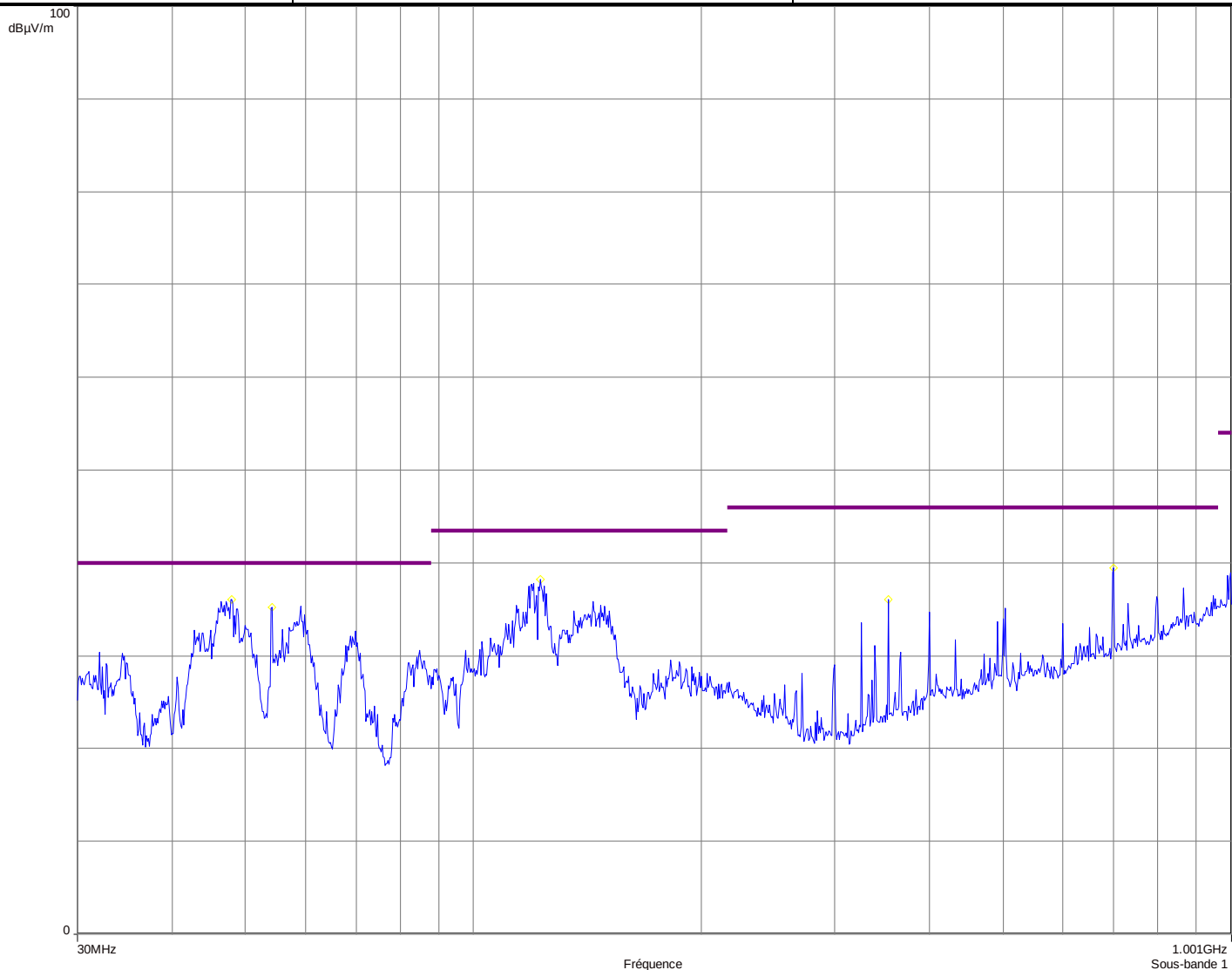
RADIATED EMISSIONS (Pre-Scan at 3m)		Test configuration: Mode Contactless
Graph name:	Emr#2	
Antenna polarisation	Horizontal	
Azimuth:	0° / 90° / 180° / 270° (Max-hold mode)	
RBW / VBW :	120kHz / 300kHz	



Frequency (MHz)	Level (dBμV/m)
40.600	35.7
148.720	37.0
352.640	38.2
499.920	38.4



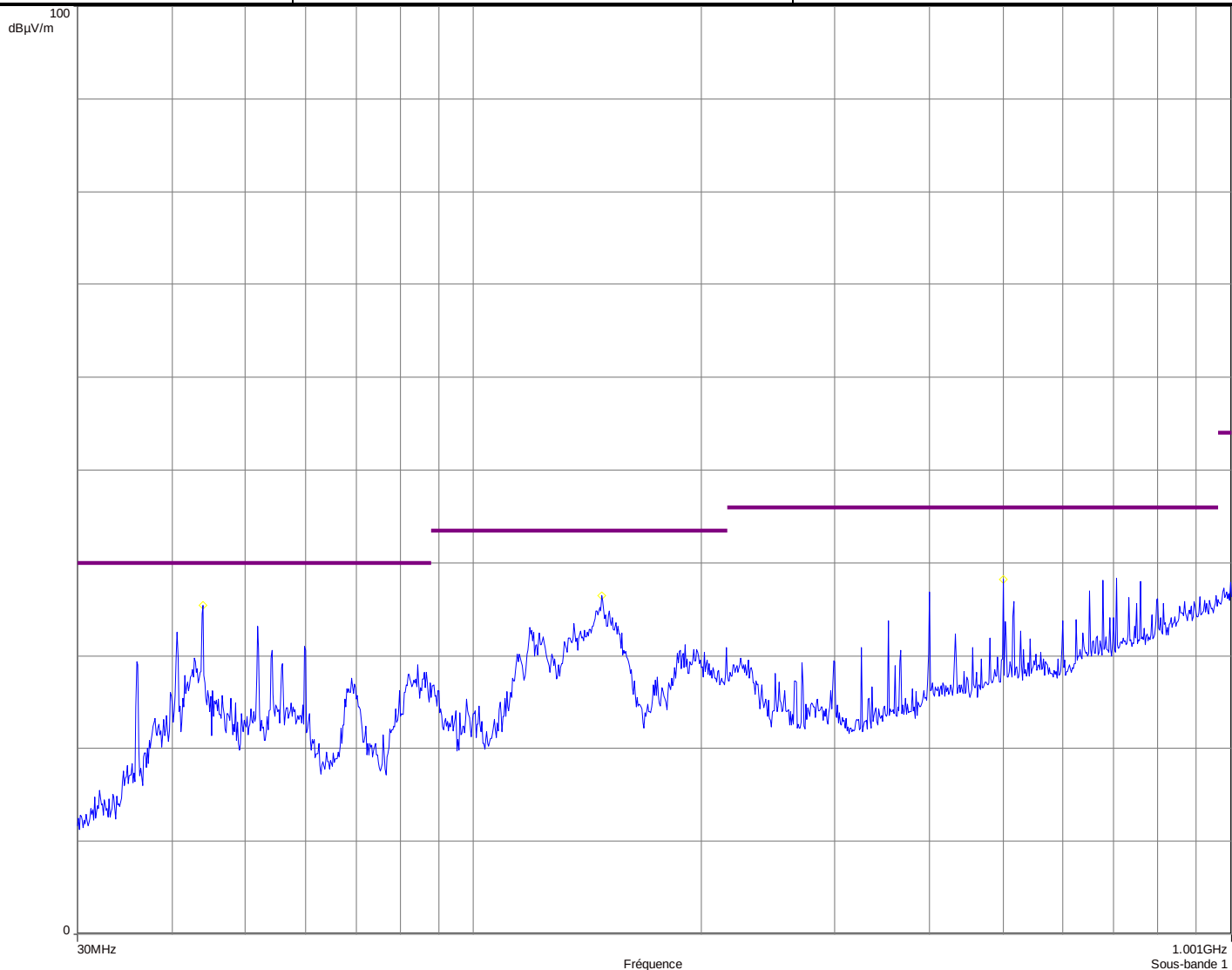
RADIATED EMISSIONS (Pre-Scan at 3m)		Test configuration: Mode Contactless
Graph name:	Emr#3	
Antenna polarisation	Vertical	
Azimuth:	0° / 90° / 180° / 270° (Max-hold mode)	
RBW / VBW :	120kHz / 300kHz	



Frequency (MHz)	Level (dBμV/m)
47.9	36.1
54.2	35.2
122.4	38.2
352.6	36.0
699.3	39.5



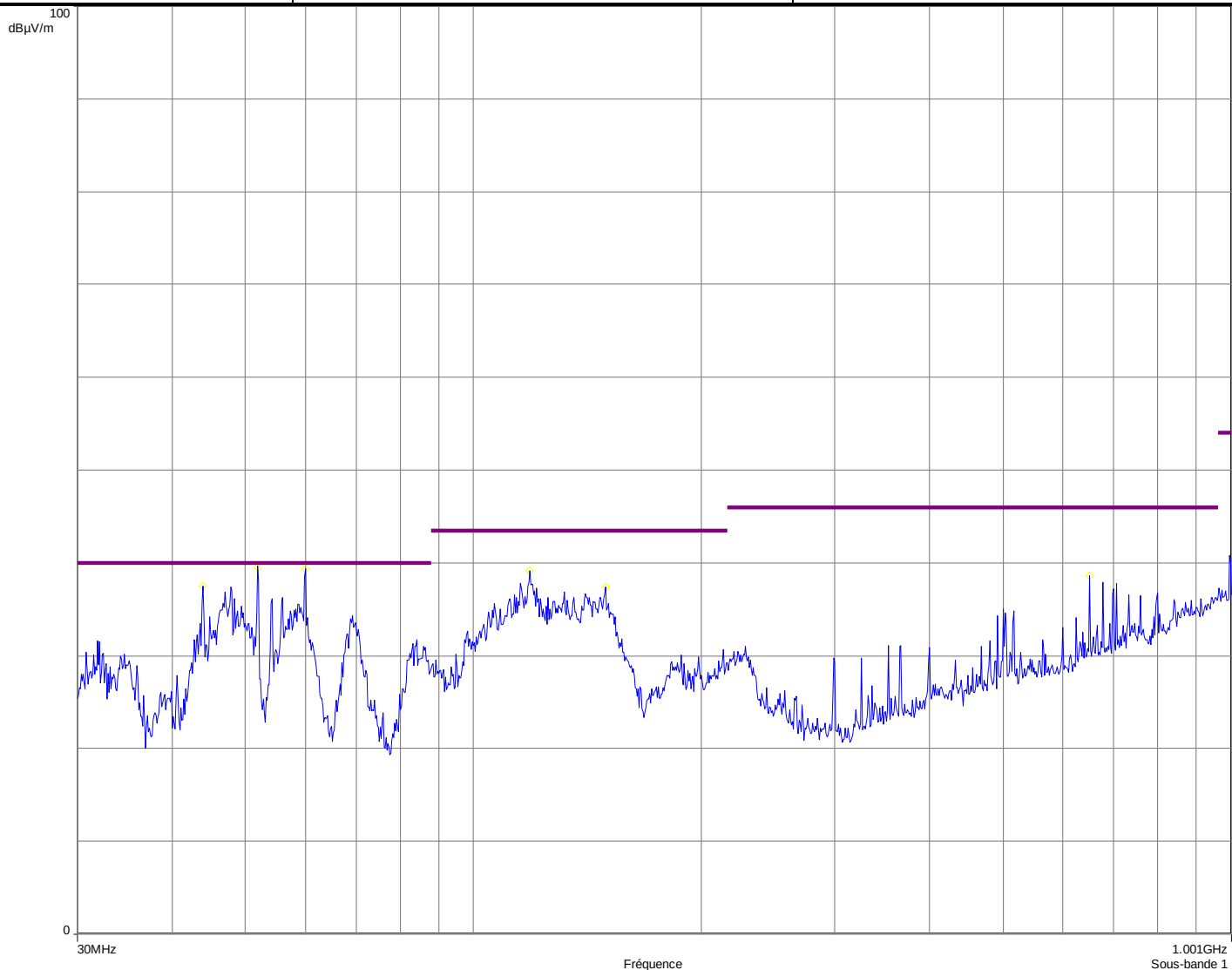
RADIATED EMISSIONS (Pre-Scan at 3m)		Test configuration: Mode Contact
Graph name:	Emr#4	
Antenna polarisation	Horizontal	
Azimuth:	0° / 90° / 180° / 270° (Max-hold mode)	
RBW / VBW :	120kHz / 300kHz	



Frequency (MHz)	Level (dBμV/m)
43.880	35.5
147.600	36.4
499.920	38.2



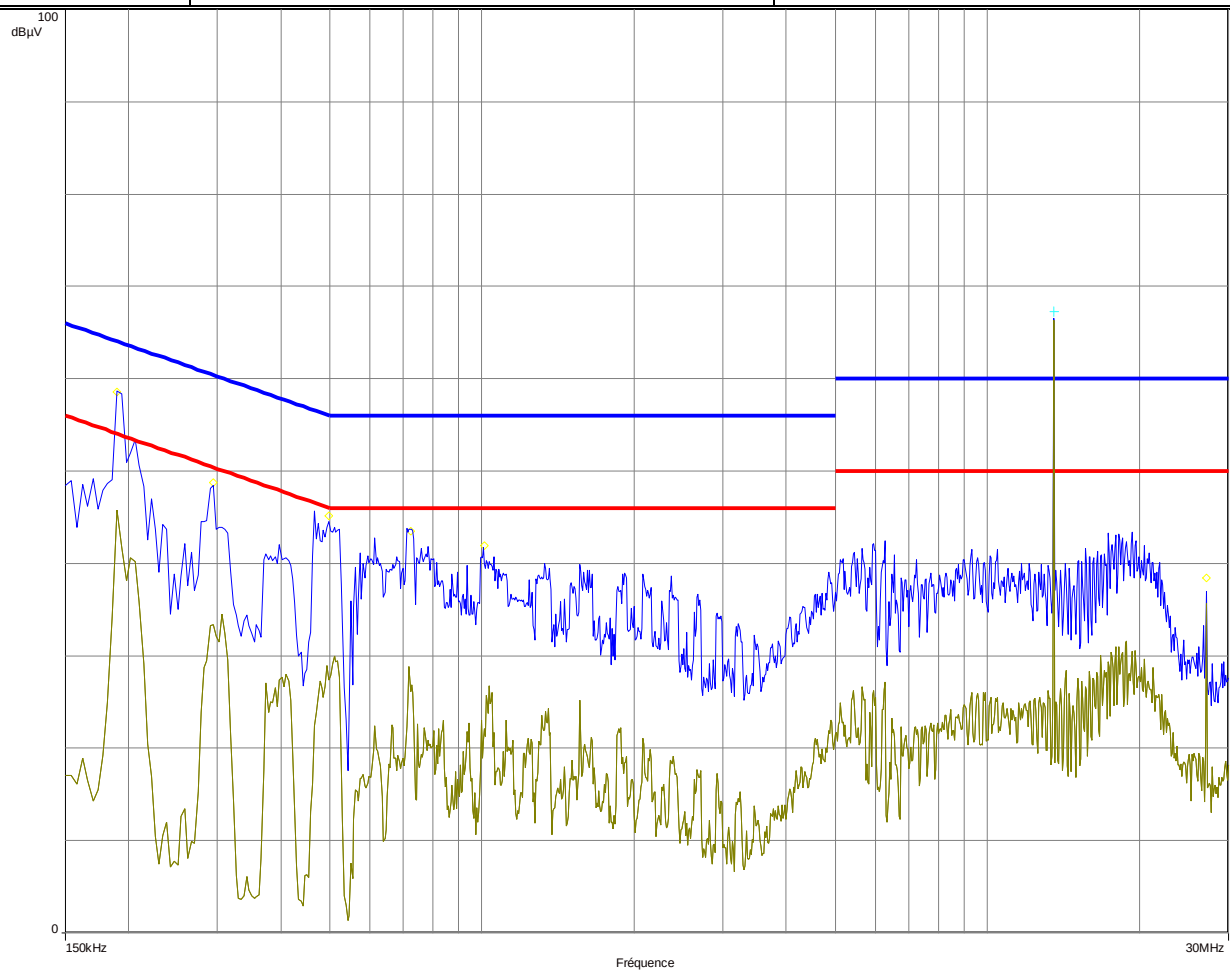
RADIATED EMISSIONS (Pre-Scan at 3m)		Test configuration: Mode Contact
Graph name:	Emr#5	
Antenna polarisation	Vertical	
Azimuth:	0° / 90° / 180° / 270° (Max-hold mode)	
RBW / VBW :	120kHz / 300kHz	



Frequency (MHz)	Level (dBμV/m)
43.880	37.5
51.880	39.5
59.960	39.3
118.840	39.2
149.200	37.4
650.760	38.7



CONDUCTED EMISSIONS		Test configuration:
Graph name:	Emc#1	Contactless card
Voltage / Frequency	110V / 60Hz	
Line/Port	Line 1 (L1)	
RBW / VBW :	9kHz	
Graph detector:	PEAK & AVERAGE	

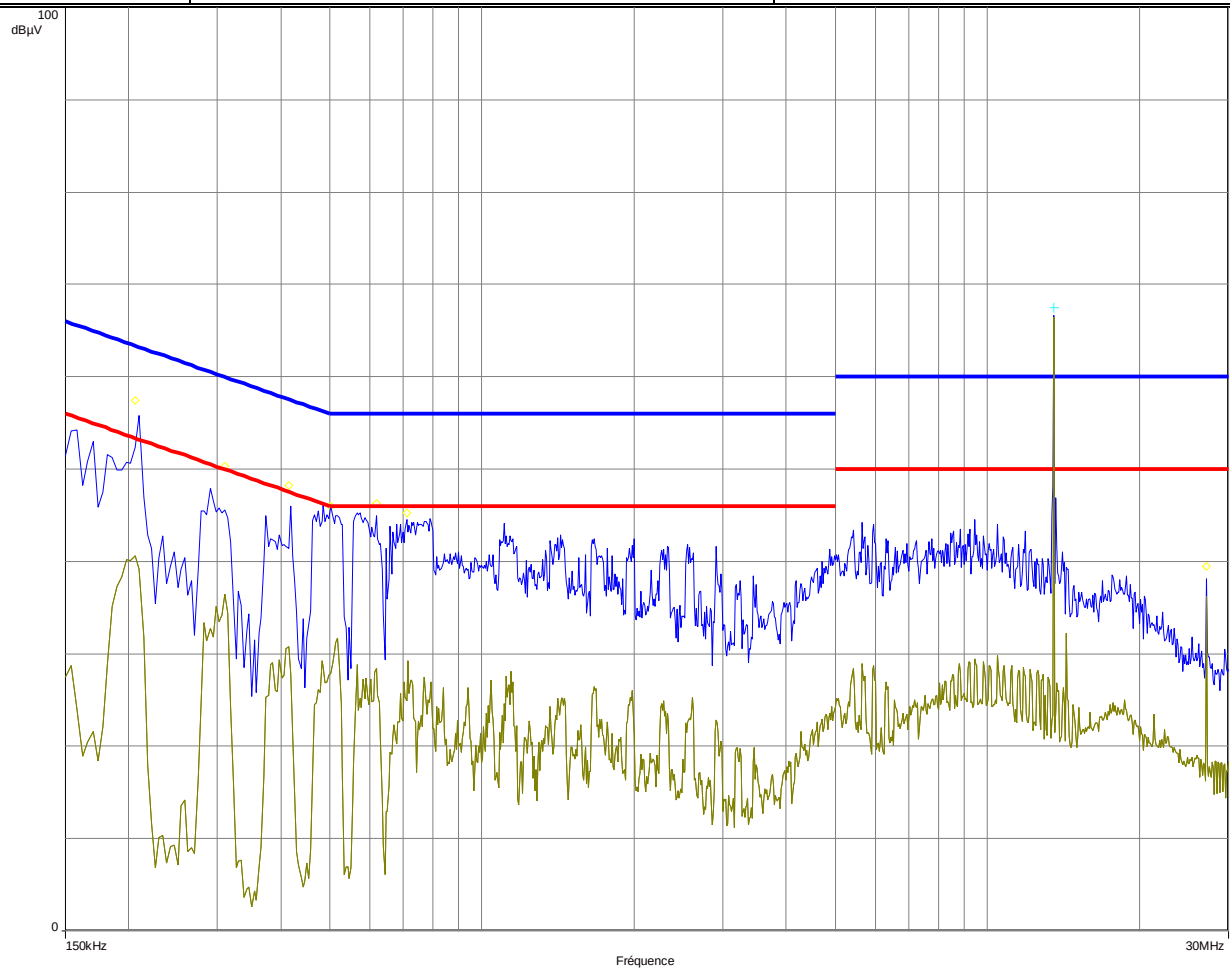


Frequency (MHz)	Measure Peak dBµV	Measure Average dBµV	Limit Average dBµV	Avg-Lim (Margin) dB	Measure Quasi-Peak dBµV	Limit QPeak dBµV	QPeak-Lim (Margin) dB
0.190	58.6	35.6	54.0	-18.5	53.2	64.0	-10.8
0.294	48.8	30.6	50.4	-19.8	44.1	60.4	-16.3
0.498	45.1	25.8	46.0	-20.3	40.9	56.0	-15.2
0.722	43.5	24.8	46.0	-21.2	39.3	56.0	-16.7
1.010	42.0	18.4	46.0	-27.6	35.6	56.0	-20.4
13.558 (1)	67.3	67.0	50.0	17.0	67.0	60.0	7.0
13.558 (2)	50.3	46.9	50.0	-3.1	47.6	60.0	-12.4
27.118	38.5	36.1	50.0	-13.9	36.6	60.0	-23.4

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

(2): Measurement with dummy load replacing the antenna.

CONDUCTED EMISSIONS		Test configuration:
Graph name:	Emc#2	Contactless card
Voltage / Frequency	110V / 60Hz	
Line/Port	Neutral (N)	
RBW / VBW :	9kHz / 30kHz	
Graph detector:	PEAK & AVERAGE	

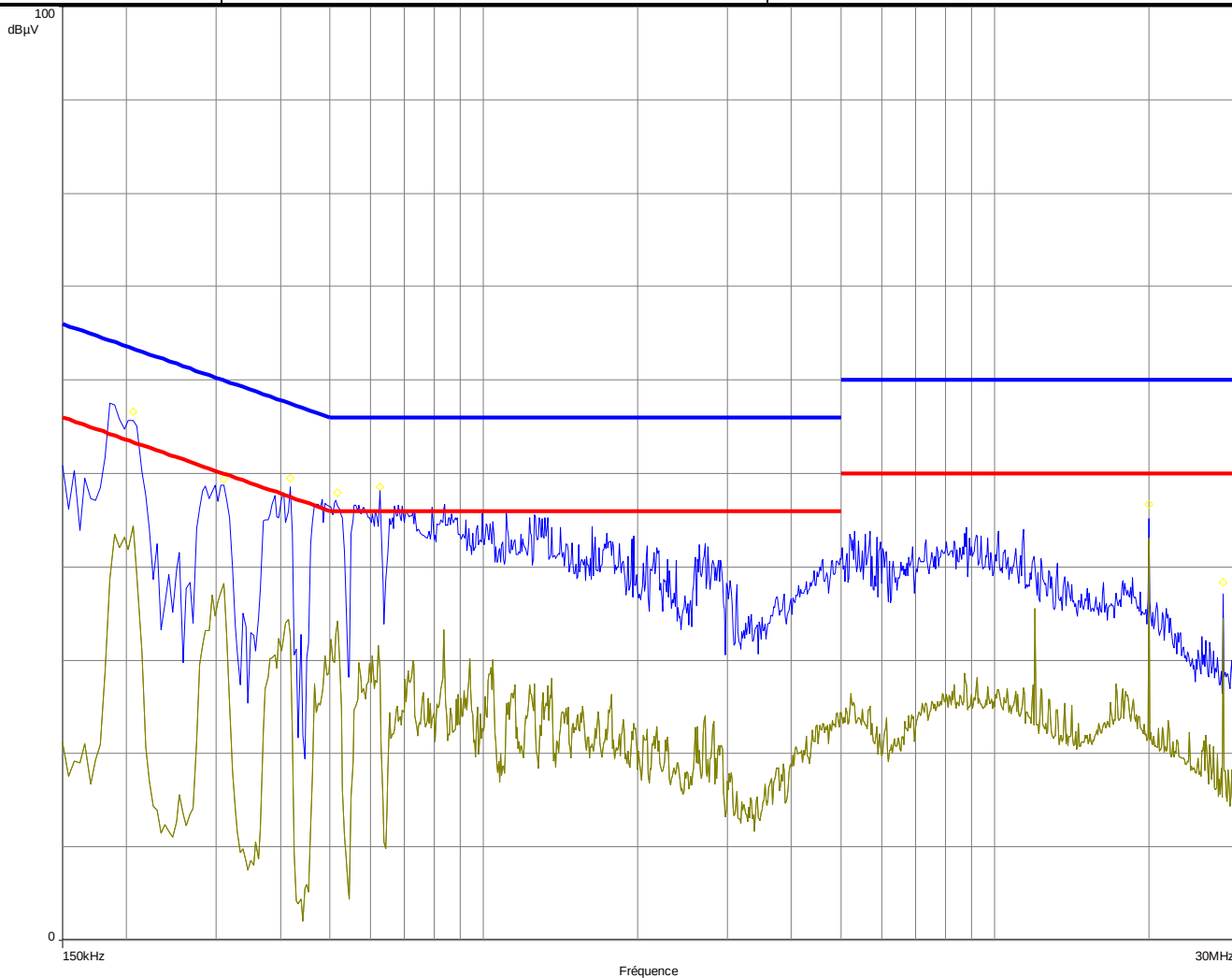


Frequency (MHz)	Measure Peak dBμV	Measure Average dBμV	Limit Average dBμV	Avg-Lim (Margin) dB	Measure Quasi-Peak dBμV	Limit QPeak dBμV	QPeak-Lim (Margin) dB
0.206	57.5	41.7	53.2	-11.5	52.9	63.2	-10.3
0.31	50.3	35.7	50.0	-14.3	45.4	60.0	-14.6
0.414	48.2	31.5	47.5	-16.0	44.6	57.5	-12.9
0.502	45.9	28.2	46.0	-17.8	42.4	56.0	-13.6
0.618	46.3	28.8	46.0	-17.2	43.1	56.0	-12.9
0.71	45.2	25.7	46.0	-20.3	41.3	56.0	-14.7
13.558 (1)	67.5	67.1	50.0	17.1	67.1	60.0	7.1
13.558 (2)	52.0	46.8	50.0	-3.2	48.0	60.0	-12.0
27.118	39.5	36.6	50.0	-13.4	37.3	60.0	-22.7

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

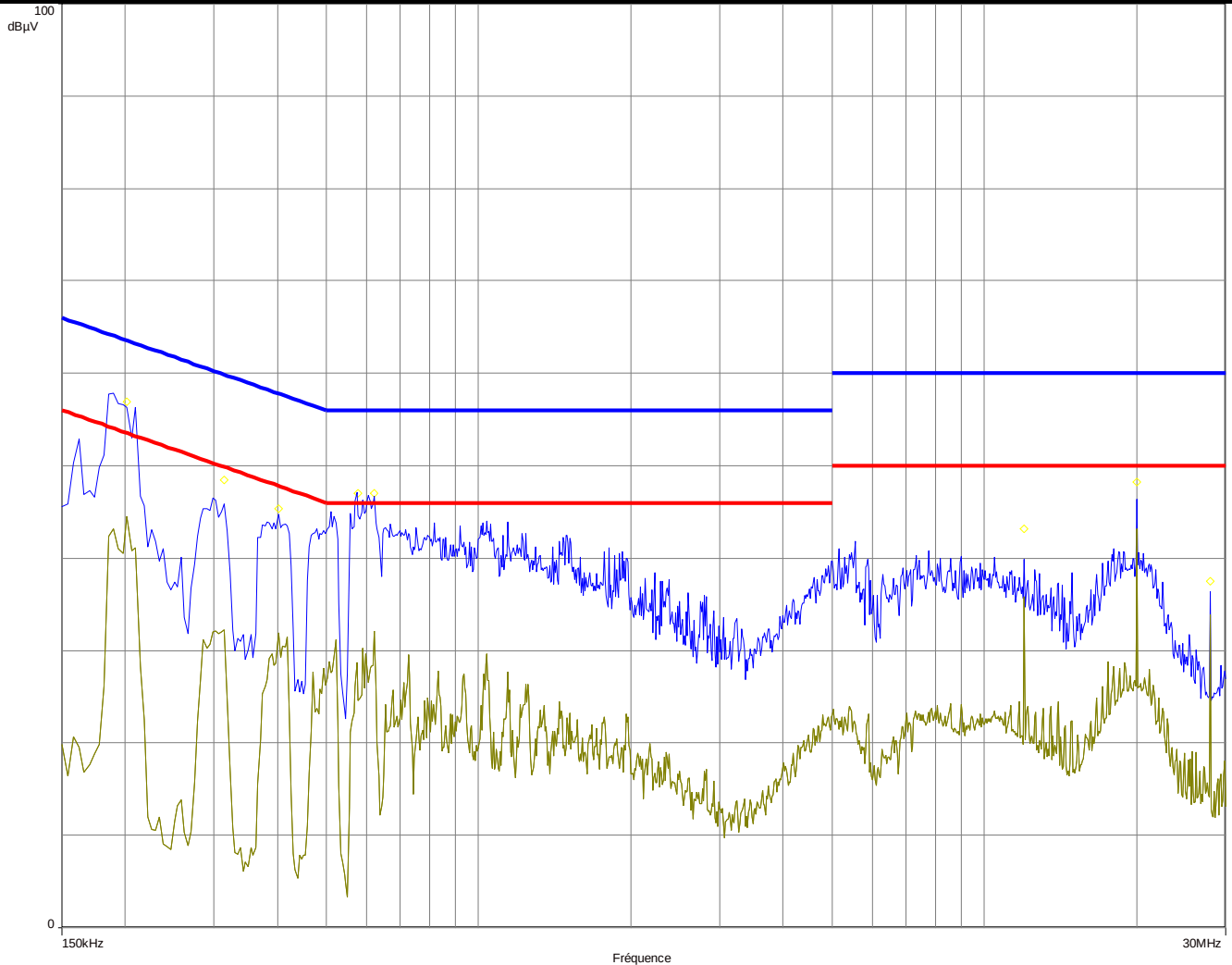
(2): Measurement with dummy load replacing the antenna.

CONDUCTED EMISSIONS		Test configuration: Contact card
Graph name:	Emc#5	
Voltage / Frequency	110V / 60Hz	
Line/Port	Line 1 (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
0.206	56.6	41.0	53.4	-12.3	52.4	63.4	-11.0
0.31	49.4	36.8	50.0	-13.2	46.5	60.0	-13.5
0.418	49.5	32.0	47.5	-15.5	45.0	57.5	-12.5
0.518	47.9	33.0	46.0	-13.0	45.6	56.0	-10.4
0.626	48.5	28.6	46.0	-17.4	44.3	56.0	-11.7
19.998	46.7	44.3	50.0	-5.7	44.7	60.0	-15.3
27.998	38.4	35.4	50.0	-14.6	36.2	60.0	-23.9

CONDUCTED EMISSIONS		Test configuration:
Graph name:	Emc#6	Contact card
Voltage / Frequency	110V / 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
0.202	56.9	37.1	53.5	-16.4	52.5	63.5	-11.1
0.314	48.5	32.7	49.9	-17.2	44.9	59.9	-15.0
0.402	45.3	30.3	47.8	-17.6	42.8	57.8	-15.0
0.578	47.0	23.4	46.0	-22.6	42.1	56.0	-13.9
0.622	47.0	27.8	46.0	-18.2	43.5	56.0	-12.5
11.998	43.2	36.6	50.0	-13.4	38.5	60.0	-21.5
19.998	48.2	44.2	50.0	-5.8	45.2	60.0	-14.8
27.998	37.5	35.0	50.0	-15.0	35.5	60.0	-24.5



8. TEST EQUIPMENT LIST (MOIRANS SITE)

	N°LCIE	TYPE	COMPANY	REF	SN
RADIATED EMISSION MEASUREMENT (PRE-SCAN SEMI-ANECHOIC CHAMBER #2)					
	A5329032VO	Absorption clamp	LUTHI	MDS21	2826
	A5329044VO	Absorption clamp	RHODE ET SCHWARZ	85024A	194.0100.50
X	A4049060VO	Adapter quasi-peak	HEWLETT PACKARD	HP85650A	
	A7102024VO	Amplifier 8 GHz	HEROTEK	A1080304A	222033
	A7486006VO	Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447F	3113A07116
	A7085008VO	Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D	2944A06838
	A7085009VO	Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D	2944A08871
X	A7085010VO	Amplifier 10MHz – 1300 MHz	A-INFO INC	JXWBLA-T	
X	C2040146VO	Antenna Bi-Log XWing	TESEQ	CBL6144	25904
	C2042027VO	Antenna horn	EMCO	3115	6382
	C2042028VO	Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	BBHA9170232
X	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
X	A5329045VO	Cable EMR (s-Anechoic chamber)			
X	A5329056VO	Cable Radiat EMI (Pre-amp/Analyzer)			
X	A5329057VO	Cable Radiat. EMI (Pre-amp/cage)			
	A2642019	Measurement Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	100131
	A4060030VO	Pre-selector RF	HEWLETT PACKARD	HP85685A	
X	A3169050VO	Radiated emission comb generator	BARDET		PR17B
X	D3044015VO	Semi-Anechoic chamber #2	SIEPEL		
X	A4060029VO	Spectrum analyzer	HEWLETT PACKARD	HP8568B	
X	A4060028VO	Spectrum analyzer display	HEWLETT PACKARD	HP85662A	
X	F2000404VO	Turntable chamber (Cage#2)	ETS Lingren	Model 2165	00085780
X	F2000393VO	Turntable controller (Cage#2)	ETS Lingren	Model 2066	
RADIATED EMISSION MEASUREMENT (OPEN AREA TEST SITE)					
	A5329032VO	Absorption clamp	LUTHI	MDS21	2826
	A5329044VO	Absorption clamp	RHODE ET SCHWARZ	85024A	194.0100.50
X	A4049059VO	Adapter quasi-peak	HEWLETT PACKARD	HP85650A	2811A01134
	A7102024VO	Amplifier 8 GHz	HEROTEK	A1080304A	222033
	A7102026VO	Amplifier 8-26GHz	ALDETEC	ALS01452	1
	A7085008VO	Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D	2944A06838
	A7085009VO	Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D	2944A08871
	A7085010VO	Amplifier 10MHz – 1300 MHz	A-INFO INC	JXWBLA-T	
X	C2040050VO	Antenna biconic	EMCO	3104C	9401-4636
	C2040051VO	Antenna Bi-log	CHASE	CBL6111A	1628
	C2042027VO	Antenna horn	EMCO	3115	6382
	C2042028VO	Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	BBHA9170232
X	C2040056VO	Antenna log-periodic	EMCO	3146	2178
X	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
X	F2000288VO	Antenna mast	EMCO	1050	
X	A5329048VO	Cable EMR OATS	SUCOFLEX	106G	553
X	A5329199VO	Cable OATS (Mast at 10m)	UTIFLEX		
X	A5329188VO	Cable OATS (Mast at 10m)	UTIFLEX		
	A5329076VO	Cable OATS (Mast at 3m)	UTIFLEX		
	A5329196VO	Cable OATS (Turntable)	UTIFLEX		
	A5329187VO	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
	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			
	A5329060VO	Cable Conduct. EMI			
	A5329189VO	Shielded cable	UTIFLEX		
	A5329076VO	Shielded cable	UTIFLEX		



	N°LCIE	TYPE	COMPANY	REF	SN
	A5329206VO	Shielded cable	UTIFLEX		
	A5329207VO	Shielded cable	UTIFLEX		
	A5329071VO	Shielded cable	UTIFLEX		
X	A3169049VO	Conducted emission comb generator	BARDET		CGPR12
	A4040015	Clickmeter	SCHAFFNER	DIA1512D	22338
	A5329037VO	Current injection probe	SCHAFFNER	CIP8213	52
	A1290017VO	Current probe	SCHAFFNER	CSP9160	1097
	A5329036VO	Direct Injection Module 100+50 Ohms	LCIE	MID01-100 ohms	
	A7156004VO	Direct Injection Module 100+50 Ohms	LUTHI	CR100A	221
	A5329042VO	Ferrite Tube	LUTHI	FTC 101	4485
	A1092042VO	Ferrite Tube	LUTHI	FTC101	4763
	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 (Measure 50Ω+50μH)	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 #3	SIEPEL		
	D3044015VO	Semi-Anechoic chamber #2	SIEPEL		
X	D3044010VO	Faraday Cage	RAY PROOF		4854
X	A4049061VO	Transient limiter	HEWLETT PACKARD	11947A	3107A01596
	A4089117VO	Voltage probe	LCIE		
FUNDAMENTAL FREQUENCY TOLERANCE					
X	D1022117VO	Climatic chamber	BIA CLIMATIC	CL 6-25	200 105 6
	B2082009VO	Frequency Counter	Hewlett Packard	HP 5350B	
X	A2240015VO	Passive loop antenna	EMCO	7405-901	/
X		BNC cable 50Ω			
	A5329206VO	Shielded cable	UTIFLEX		
	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
X	A4060018VO	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	3409u00537
BAND-EDGE COMPLIANCE					
	A2240015VO	Passive loop antenna	EMCO	7405-901	/
		BNC cable 50Ω			
X	A5329198VO	Shielded cable	UTIFLEX		
X	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
	A4060018VO	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	3409u00537
X	A2642019	Measurement Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	100131
MISCELLANEOUS (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

**9. UNCERTAINTIES CHART**

Type de mesure / Kind of measurement	Incertitude élargie laboratoire / Wide uncertainty laboratory (k=2) $\pm x$	Incertitude limite du CISPR / CISPR uncertainty limit $\pm y$
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 Moirans <i>Measurement of radiated electric field on the Moirans open area test site</i>	5.07 dB	5.2 dB