TEST REPORT

According to FCC, CFR 47 Part 15
And IC, RSS210

USN-3D

N°195109-CC-1-d

GYL technologies
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Summary

OTHER ASSOCIATED FILES:

195109-CC-1-b Exhibit 1 ID label FCC ID RPM-UN3D
195109-CC-1-a Exhibit 3 External Photographs FCC ID RPM-UN3D
195109-CC-1-a Exhibit 4 Bloc diagram FCC ID RPM-UN3D
195109-CC-1-a Exhibit 5 Schematics FCC ID RPM-UN3D
195109-CC-1-d Exhibit 7 Test set up photos FCC ID RPM-UN3D
195109-CC-1-b Exhibit 8 USN-3D_ShortNotice_v1r01a_D2 FCC ID RPM-UN3D
195109-CC-1-b Exhibit 8a USN-3D_DSHEET_v1r01d FCC ID RPM-UN3D
195109-CC-1-b Exhibit 8b USN-3D_DSHEET_FRANCAIS_v1r01d FCC ID RPM-UN3D
195109-CC-1-a Exhibit 8c T70x45x2_DSHEET_v1r01b FCC ID RPM-UN3D
195109-CC-1-b Exhibit 8d model difference letter FCC ID RPM-UN3D
195109-CC-1-a Exhibit 9 Internal Photographs FCC ID RPM-UN3D
195109-CC-1-a Exhibit 12 Operational description FCC ID RPM-UN3D
195109-CC-1-d Exhibit 13 cover letter FCC ID RPM-UN3D

1 Reference and record of revisions of the test report:

Test report number :	Revision :	Number of pages	Modification reasons :
195109-CC-1-a	a	18	Creation, September 12,2011
195109-CC-1-b	b	18	Modification of associated files
195109-CC-1-c	c	21	Addition of conducted emissions
195109-CC-1-d	d	22	Replacement of conducted emissions
Redactor : O.ROY			
Technical control: O. ROY 			**Quality Control: F. NOURRY** 

2 Interpretation and remarks:

2.1 RESULTS:

This equipment complies with the rules of the FCC part 15.225 and related sections.
This equipment complies with the rules of the IC RSS-210 A2.8 and related sections.

3 GENERAL INFORMATION:

3.1 APPLICANT:

SMARTWARE
11, avenue des Andes
ZA de Courtaboeuf
91940 LES ULIS
France

3.2 TEST DATE:

July 25 to 29, 2011, December 7, 2011

3.3 TEST SITE:

GYL Technologies
Parc d'activités de Lanserre
49610 Juigné sur Loire – France
FCC registration Number: 90469
IC registration IC 4452

4 INTRODUCTION:

The following test report for contact less smart card reader is written in accordance with Part 15 of the Federal Communications Commissions. The Equipment under Test (EUT) was a smartcard card reader. The test results reported in this document relate only to the item that was tested USN-3D.
All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions of 2009. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All conducted and radiated emissions measurements were performed manually at GYL TECHNOLOGIES. The radiated emissions measurements required by the rules were performed on the three to ten meters, open field, test site maintained by GYL Technologies Parc d'activités de Lanserre, 49610 Juigné sur Loire , France. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission.

5 MEASUREMENT EQUIPMENT LIST:

PART TYPE	MANUFACTURER	MODEL	GYL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
RECEIVERS					
Receiver	Rohde & Schwarz	ESI 7	M02020	June-11	June-12
Receiver	HP	HP8591EM	M96005	May-11	May-12
Spectrum analyzer	Rohde & Schwarz	FSEM 30	M02021	June-11	June-12
Satellite synchronized frequency standard	Acquisis	GPS8	M06013	without	without
Filter 150 kHz	SECRE	ETP232	M02061	Feb-11	Feb-12
ARTIFICIAL MAINS NETWORKS					
LISN (50µH / 5/50Ω)	Rohde & Schwarz	ESH3-Z5	M02027	Jun-11	Jun-12
ANTENNAS					
Bilog (30-2000MHz)	CHASE	CBL-6112	M02031	Aug.-10	Aug.-11
Bilog (30-2000MHz)	CHASE	CBL-6112	M02032	Aug.-10	Aug.-11
Active loop antenna	Rohde & Schwarz	HFH2-Z2	M01128	April-10	April-12
Horn antenna	EMCO	3115	M02045	March-11	March-12

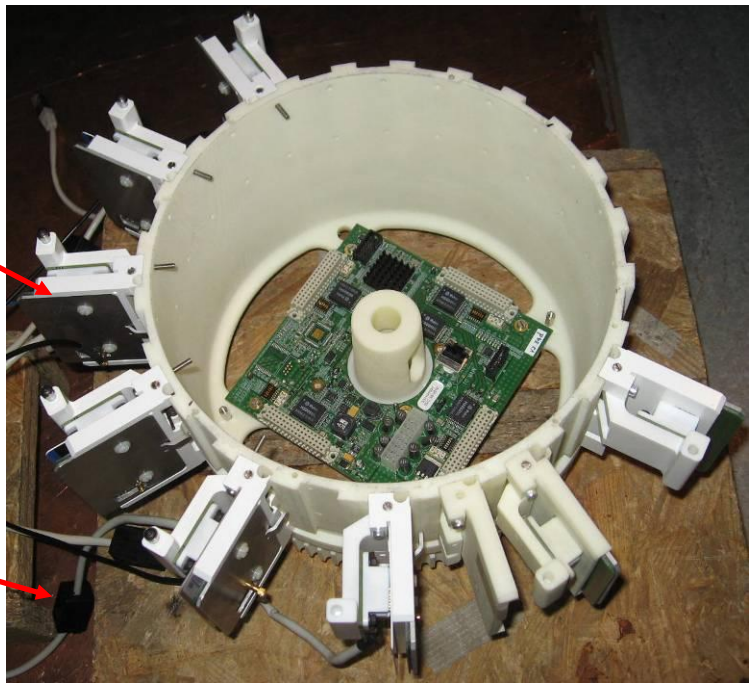
All equipments where within their calibration period when used

6 CONFIGURATION OF TESTED SYSTEM:

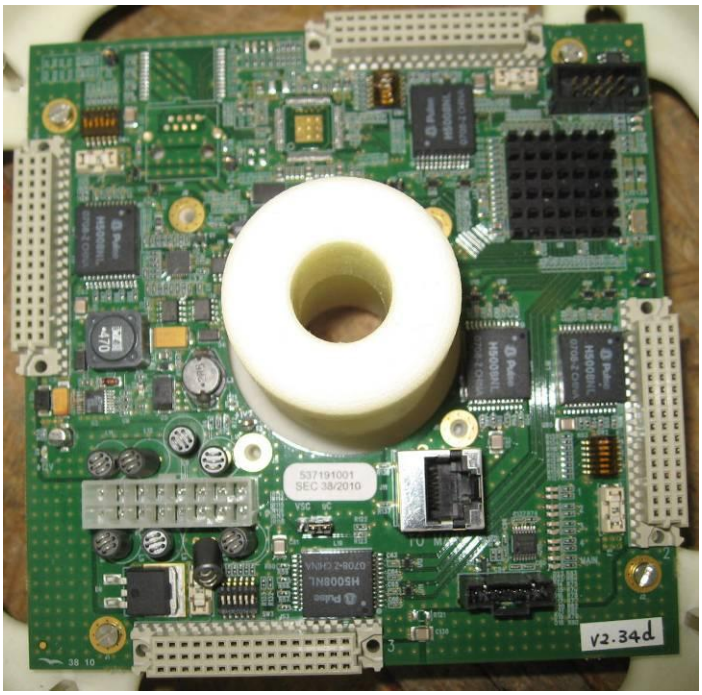
6.1 Auxiliary equipment:

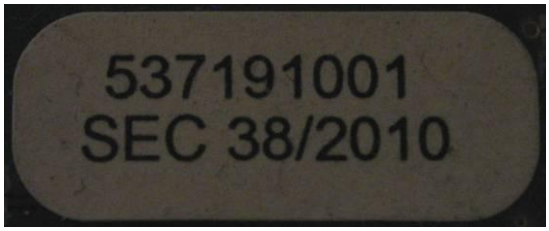
Aux1: Cards reader module

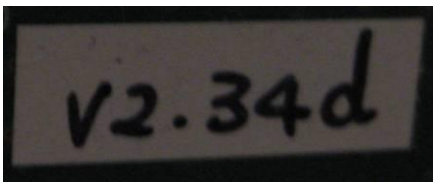
Antenna are described
In T70x45x2_DSHEET_v1r01b



Ferrite on 6 cables
RICHOH RKCF-06-A5

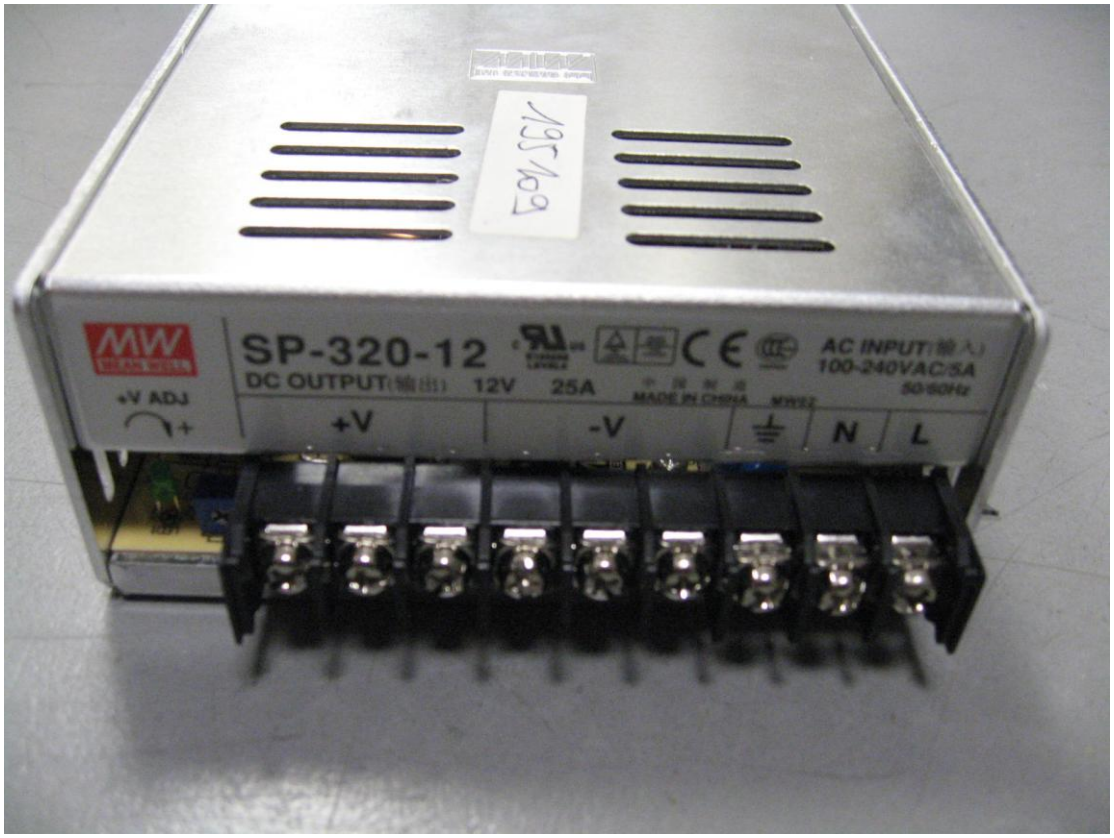






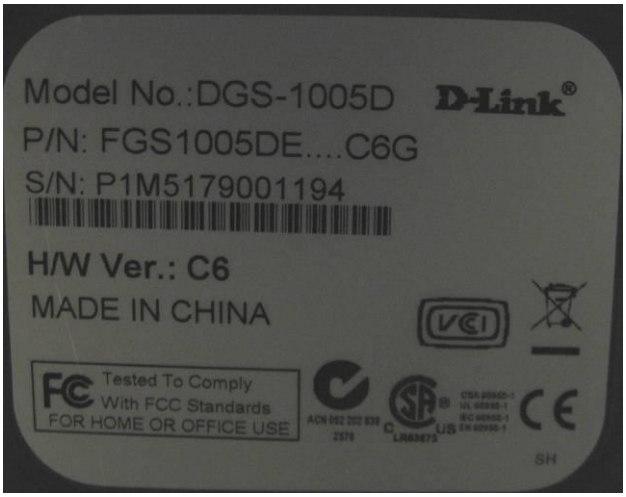
Aux2: power supply for radiated emissions

Aux2: power supply for conducted emissions



Aux3: Laptop DELL

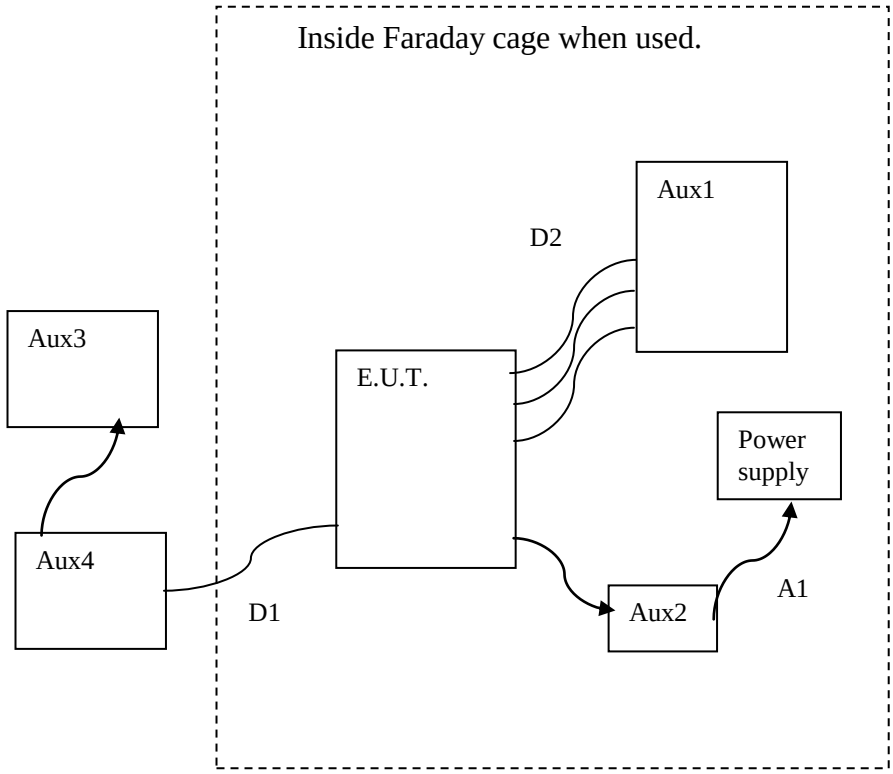
Aux4: Switch Hub



6.2 List of cables:

A1	Power cord of Aux2		
	Data I/O Name	Shielded Y/N	Max length (m)
D1	Ethernet GBit	Y	1
D2	antenna (x3)	Y	0,5

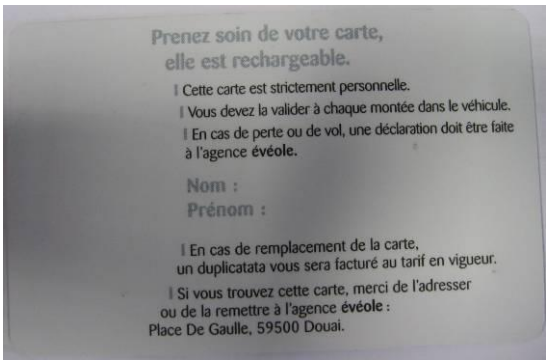
6.3 Synoptic of configuration:



E.U.T.: Equipment Under Test

7 EXERCISING TEST CONDITIONS:

Working mode for emission measurements:
The test is launched by the customer with type B modulation at 106 kbps in permanent communication.
During tests, the mode of operation was under customer's responsibility.
The EVEOLE cards are used for the measurements.



8 CONFORMANCE STATEMENT:

8.1 STANDARDS REFERENCED FOR THIS REPORT:

PART 2: 2004	Frequency allocations and Radio Treaty Matters General Rules and Regulations
PART 15: 2008	Radio frequency devices
ANSI C63.4-2009	Standard format measurements/technical report personal computer and peripherals
RSS-210 Issue 8, Dec 2010	Low-power License-exempt Radio communication Devices (All Frequency Bands): Category I Equipment
RSS-Gen Issue 3, Dec 2010	General Requirements and Information for the Certification of Radio communication Equipment

8.2 JUSTIFICATION:

As mentioned in paragraph 4 of this report, the equipment is a smartcard reader. It can be installed in light industry areas the following sub clause of the standard mentioned above are:

- Part 15.225 for Operation within the band 13.110 – 14.010 MHz.
- RSS-210 Issue 8 A2.6 for intentional radiator within the band13.110 – 14.010 MHz.
- Part 15.207 and 15.107 for conducted emission of aux power supply box

9 TEST ACCORDING TO CFR 47 Part 15 and RSS210

Tests performed by Olivier ROY at GYL Technologies laboratories.

9.1 POWER LINE CONDUCTED EMISSIONS MEASUREMENTS (15.207):

Tests performed by A. ABBASSI at GYL Technologies laboratories July 29, 2011.

The power line conducted emission measurements were performed in a semi anechoic chamber. The EUT was assembled on a non conductive 10 centimeters high wooden element. Power was fed to the EUT through a 50 ohm / 50 micro-Henry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Rohde and Schwartz 150 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 150 kHz. Conducted emission levels were measured on each current-carrying line with the receiver operating in the CISPR quasi-peak mode (or average mode if applicable)

9.2 RESULTS:

The conducted emissions initial measurement consists of a prescan (tester in analyser mode), in order to determine the maximum peak values.

- If the conducted emissions have limits showing a margin lower than 20dB, data collection measurement is performed on QP and average on the six (6) highest frequencies to determine the compliance of the EUT.
- If the conducted emissions have limits showing a margin greater than 20dB, data collection measurement is not performed and the curves are given as evidence of compliance.

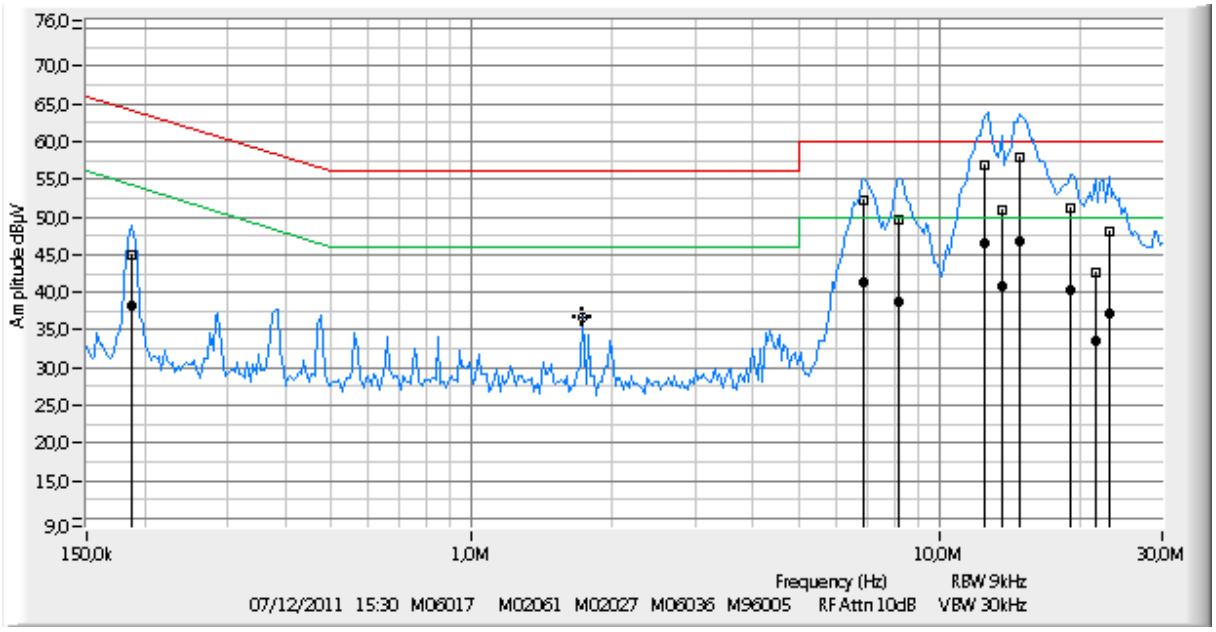
The following table lists worst-case conducted emission data. Specifically: emission frequency, measurement level (including cable loss and transducer factors) in quasi-peak and average mode and margin.

The conducted test was performed with the EUT exercise program loaded with 3 active emitters, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and LIVE SIDE, herein referred to as Neutral, and Live respectively.

9.2.1 Power supply

9.2.1.1 Neutral:

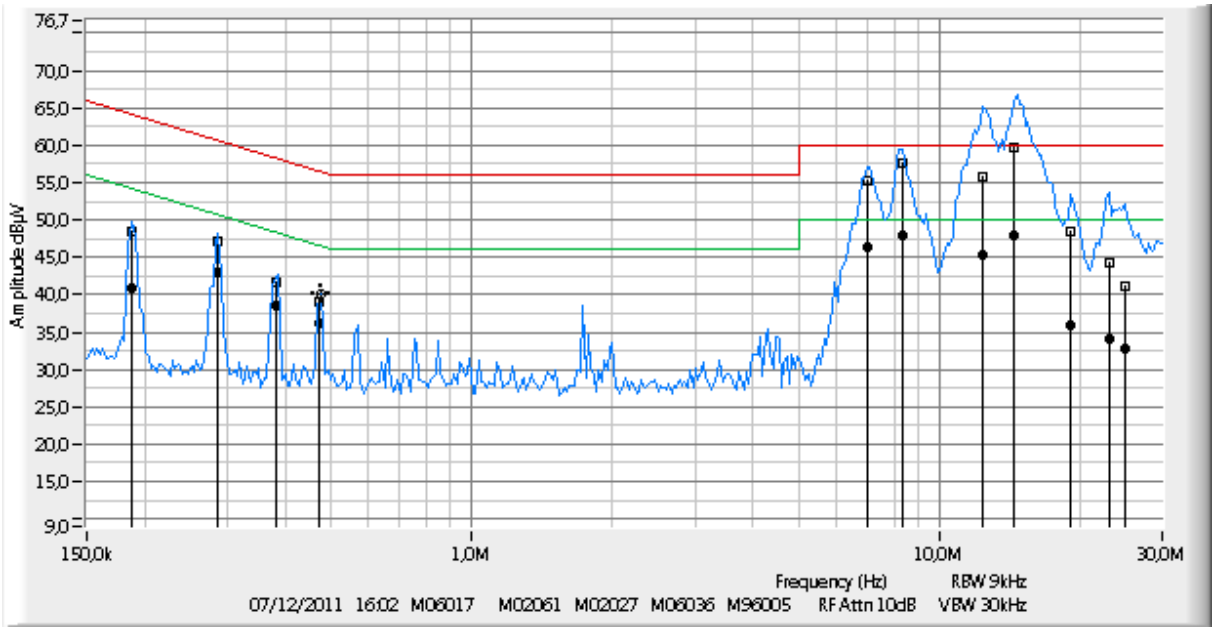
Legend: curve represents the peak values



Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0,188	44,99	64,12	19,13
6,921	52,08	60,00	7,92
8,218	49,70	60,00	10,30
12,543	56,77	60,00	3,23
13,578	50,89	60,00	9,11
14,893	57,79	60,00	2,21
19,144	51,23	60,00	8,77
21,561	42,67	60,00	17,33
23,033	48,13	60,00	11,87

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0,188	38,30	54,12	15,82
6,921	41,46	50,00	8,54
8,218	38,73	50,00	11,27
12,543	46,63	50,00	3,37
13,578	40,77	50,00	9,23
14,893	46,86	50,00	3,14
19,144	40,26	50,00	9,74
21,561	33,54	50,00	16,46
23,033	37,25	50,00	12,75

9.2.1.2 LIVE:



Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0,188	48,55	64,12	15,57
0,287	47,07	60,61	13,54
0,383	41,63	58,21	16,58
0,473	38,99	56,46	17,47
7,013	55,26	60,00	4,74
8,327	57,49	60,00	2,51
12,378	55,83	60,00	4,17
14,505	59,70	60,00	**0,30**
19,144	48,44	60,00	11,56
23,033	44,21	60,00	15,79
24,934	41,16	60,00	18,84

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0,188	40,81	54,12	13,31
0,287	42,92	50,61	7,69
0,383	38,49	48,21	9,72
0,473	36,29	46,46	10,17
7,013	46,29	50,00	3,71
8,327	47,86	50,00	2,14
12,378	45,29	50,00	4,71
14,505	47,93	50,00	2,07
19,144	35,83	50,00	14,17
23,033	34,09	50,00	15,91
24,934	32,68	50,00	17,32

9.3 INTERPRETATION AND REMARKS:

The equipment complies with the §15.207.

9.4 INTENTIONAL RADIATOR OPERATION FCC PART 15.225 and RSS 210 A2.6

9.4.1 Field strength for the emitter

According to the §15.31 f (2) the distance extrapolation factor (40dB/decade) is used.
Measurement performed in open area.

Measured with RBW = 500kHz (larger than 20dB BW) and VBW = 1MHz.

Frequency MHz	3m measurement dB(µV/m)	30 m (computed) dB(µV/m)	30 m limit dB(µV/m)	Margin dB
13.56	60.1	20.1	84.0	63.9

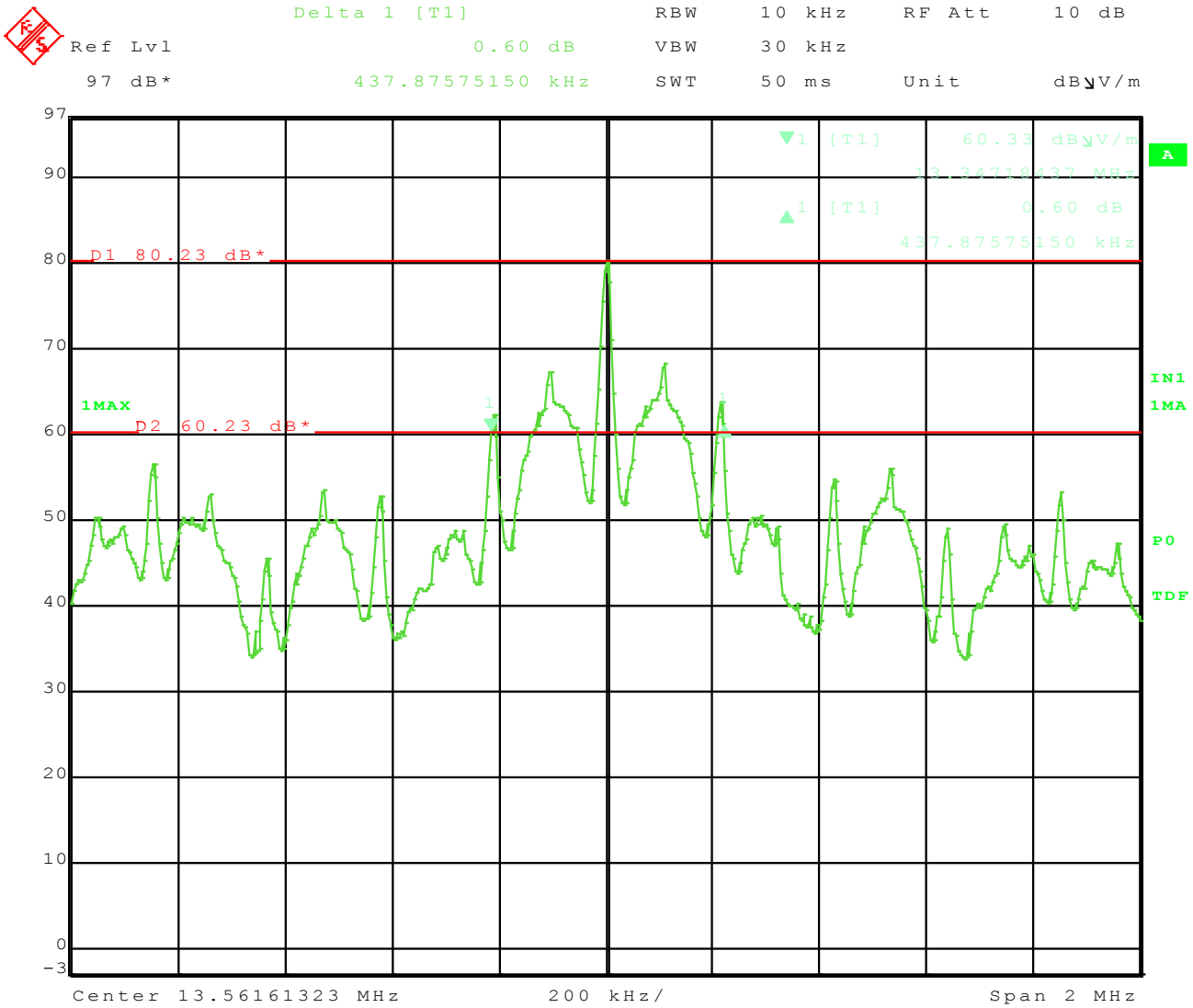
With G = 1 (worst case) that gives a radiated power of 0.31mW.

Computed from 3 m measurement with $P= (E.d)^2/30$.

Maximum increase of transmitters collocation is limited to 10log(N) where N is the number of transmitters. With 48 transmitters, that gives an increase of 33.6dB. It will always conform as the margin is greater than 63 dB.

9.4.2 20 dB BW

Largest 20 dB BW is 437 kHz.



9.4.3 Field strength around the emitter (15.225)

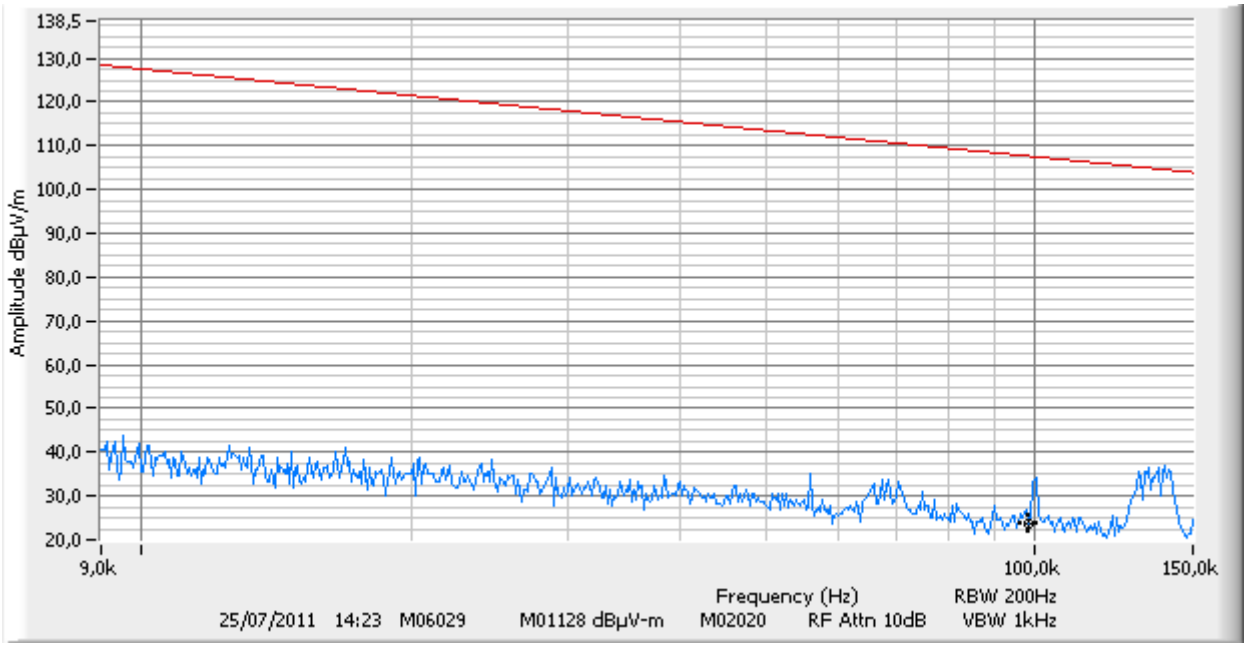
No emission needs to be maximized in open area test site excepted for the 13.56MHz voluntary emission, see next §.

9.5 SPURIOUS EMISSIONS (15.225 and 15.209)

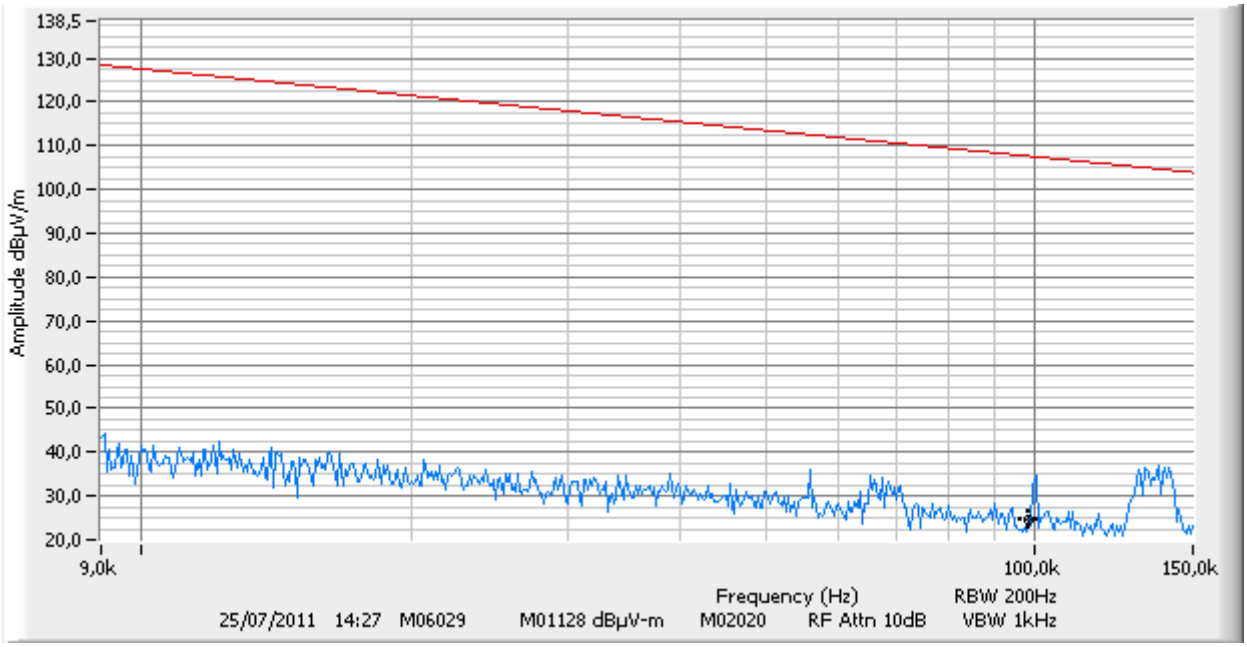
The maximization for the frequency from 9 kHz to 30 MHz has been done in shielded enclosure at 3 m. No emission needs to be maximized in open area test site excepted for the 13.56MHz voluntary emission and first harmonic.

9.5.1 Measurement from 9 kHz to 150 kHz.

Shielded enclosure worst case 3 m
With one transmitter active at P max

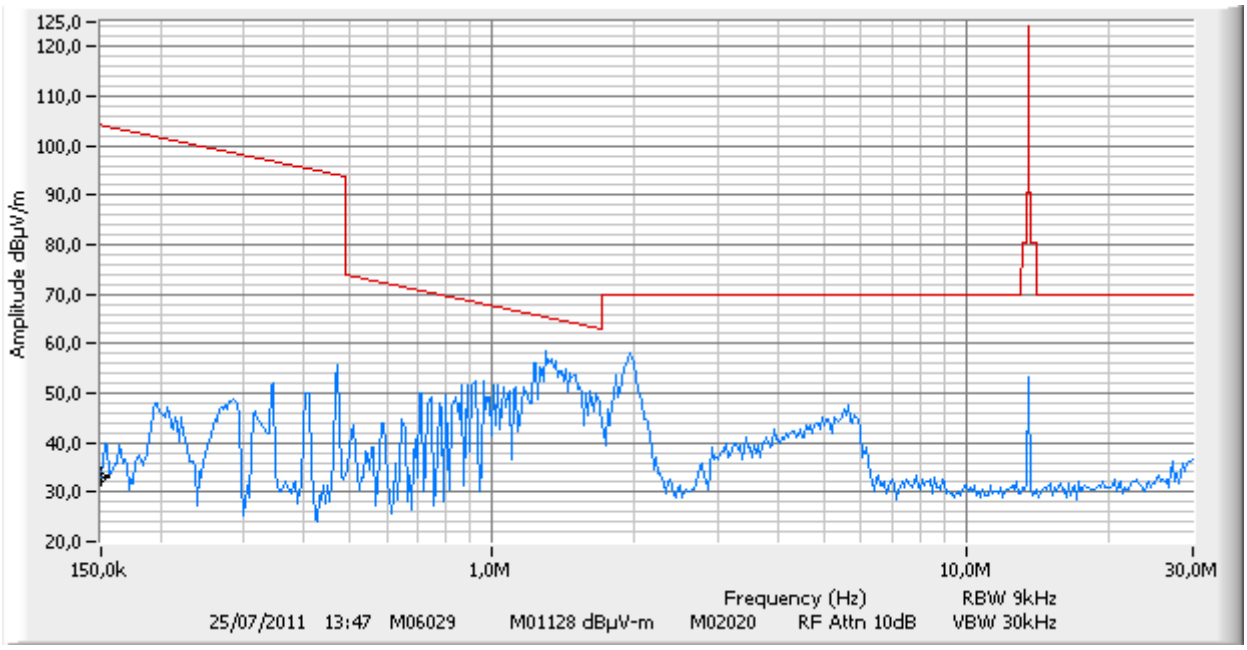


With 3 transmitters active at P max

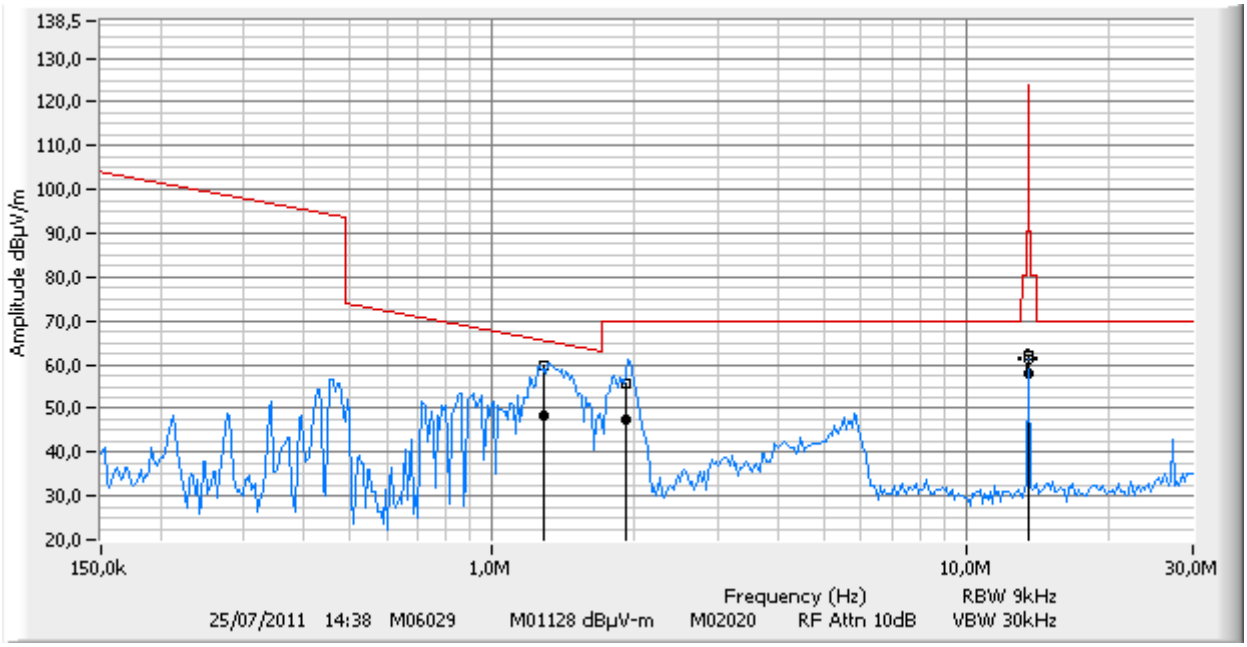


9.5.2 Measurement from 150 kHz to 30 MHz

shielded enclosure worst case 3 m
With one transmitter active at P max



With 3 transmitters active at P max



No emission possible to measure on open area test site due to ambient noise between 1 and 2 MHz

OATS measurement of 27.12 MHz emission at 3 m : 53.4 dBµV/m (16.6 dB margin) with 3 transmitters active.

Spurious emissions measurement results from 30MHz to 1GHz:

Before final measurements of radiated emissions were made on the open-field three/ten meter range; the EUT was pre-scanned in the semi anechoic at one meter distance. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a conductive turntable on isolated support, table, 0.8 meter above the ground plane. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 100 kHz for peak measurement and 120 kHz for quasi-peak, and the analyzer was operated in the CISPR quasi-peak detection mode when needed. No video filter less than 10 times the resolution bandwidth was used. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Summary of settings for measurements in restricted bands below 1GHz

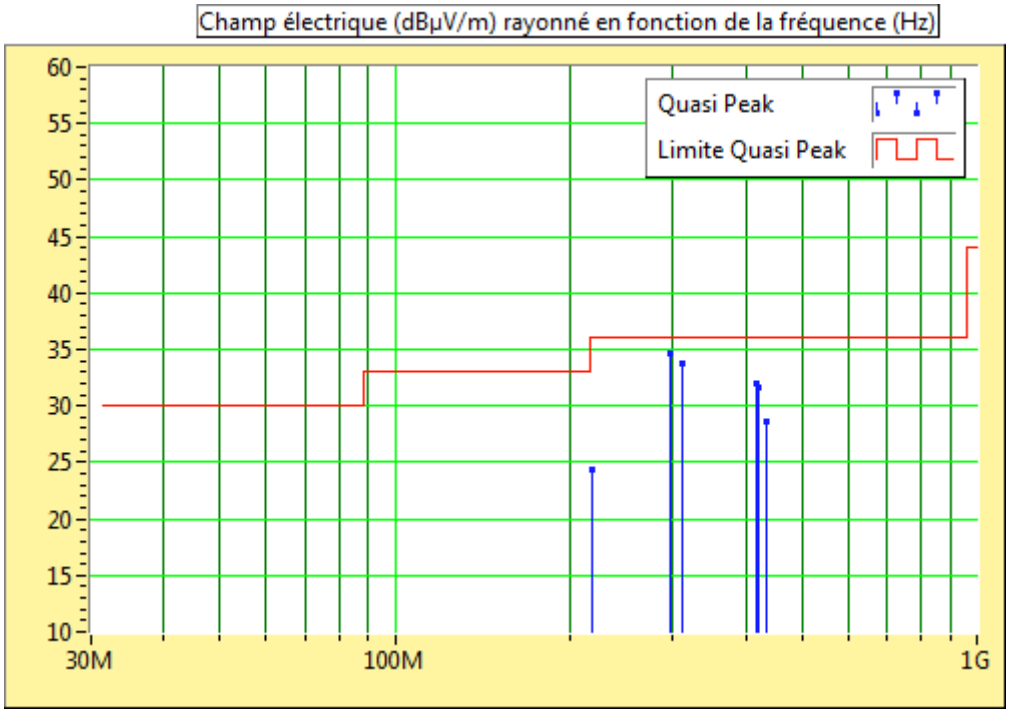
ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	40 kHz
Preamplifier	ON
Pre-selector	ON
Resolution, Band Width	120 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	1 s minimum

9.5.2.1 Spurious RESULTS:

The following data table lists the most significant emission frequencies, measured level, correction factor (includes cable and antenna corrections), corrected reading and the limit.

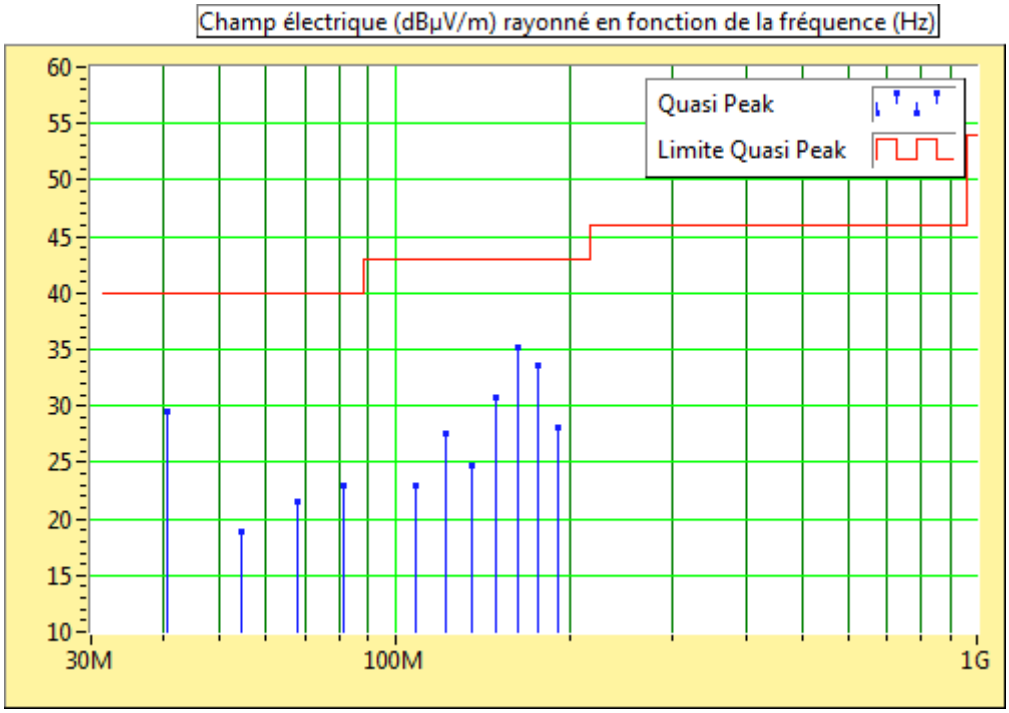
3 m open area test site final measurements results (other than harmonics)

Frequency in MHz	Peak Value in dBµV/m	Quasi-Peak Value in dBµV/m	Quasi-Peak Limit in dBµV/m	Margin in dB	Pol	Height in cm	Angles in °	Correction Factors in dB
218,333	19,2	24,3	36,0	11,7	V	101	154	13,6
297,049	17,2	34,6	36,0	1,4	V	106	6	16,4
311,367	31,8	33,7	36,0	2,3	V	144	15	16,8
418,750	28,0	31,9	36,0	4,1	V	105	155	19,3
420,026	33,7	31,6	36,0	4,4	V	100	236	20,6
433,077	27,9	28,7	36,0	7,3	V	103	211	19,7



3 m open area test site final measurements results (harmonics)

Frequency in MHz	Peak Value in dBµV/m	Quasi-Peak Value in dBµV/m	Quasi-Peak Limit in dBµV/m	Margin in dB	Pol	Height in cm	Angles in °	Correction Factors in dB
40,666	32,5	29,5	40,0	10,5	V	106	32	14,3
54,262	22,1	18,8	40,0	21,2	V	108	5	7,7
67,830	23,9	21,6	40,0	18,4	V	126	360	6,9
81,386	23,6	23,0	40,0	17,0	V	243	360	9,0
108,506	25,2	22,9	43,0	20,1	V	101	360	13,1
122,070	29,6	27,5	43,0	15,5	H	135	360	14,0
135,622	29,4	24,7	43,0	18,3	H	125	360	13,5
149,186	33,9	30,8	43,0	12,2	H	175	360	12,2
162,746	39,6	35,3	43,0	7,8	H	185	360	12,0
176,310	37,6	33,6	43,0	9,4	H	166	360	11,3
189,874	32,5	28,1	43,0	14,9	H	163	360	11,3



9.6 Exposition of public to radio frequency energy

This kind device is not subject to routine evaluation according to bulletin 65 and FCC part 2.1091 and 2.1093

9.7 Antenna requirements

Antenna is not replaceable by user as stated in user manual.

9.8 Measurement of frequency stability

The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Measurements were performed according to the operating temperature range given in the § 15.225

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency (13.561683 MHz)
The frequency limits are 13.5603268 MHz and 13.5630392 MHz.

Frequencies measurement (MHz)

Nominal voltage is 12V, thus 85% and 115% give respectively

Temperature	**20°C**		**-20°C**	**50°C**
Power Supply (V)	10,2	13,8	12	12
Measured frequency : 13.56 MHz	13.561683	13.561683	13.561703	13.561723

Neither voltage nor temperature variations affect the frequency stability that is better than ±100ppm (3 ppm)