TEST REPORT

According to FCC, CFR 47 Part 15

IER 400 UHF

N°060135-CC-1-a

GYL technologies
Parc d'activités de Lanserre
21 rue de la Fuye
49610 JUIGNE SUR LOIRE
FRANCE
Tel. : +33 (0) 2.41.57.57.40
Fax : +33 (0) 2.41.45.25.77

Summary

1 Reference and record of revisions of the test report:

Test report number :	**Revision :**	**Number of pages**	**Modification reasons :**
060135-CC-1-a	a	26	Creation
Redactor : JL JAMET			**Date of writing** : March 25, 2009
Technical control: O. ROY 			**Quality Control: F. NOURRY** 

2 Interpretation and remarks:

2.1 RESULTS:

This equipment complies with the rules of the FCC section 15.247 and related sections concerning its radio functions.

This equipment complies with the rules of the FCC section 15.207, 15.209 and related sections concerning its intentional radiator functions.

This equipment complies with the rules of the FCC section 15.107, 15.109 class B and related sections concerning its non intentional radiator functions (printer).

3 GENERAL INFORMATION:

3.1 APPLICANT:

IER
3 Rue Salomon de Rothschild
BP 320
92156 SURESNES Cédex

3.2 MANUFACTURER:

IER
3 Rue Salomon de Rothschild
BP 320
92156 SURESNES Cédex

3.3 TEST DATE:

December 17 and 18, 2008 and January 15, 2009

3.4 TEST SITE:

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

4 INTRODUCTION:

The following test report for bag tag reader/printer is written in accordance with Part 15 of the Federal Communications Commissions. The Equipment under Test (EUT) was IER400. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions of 2003. 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.

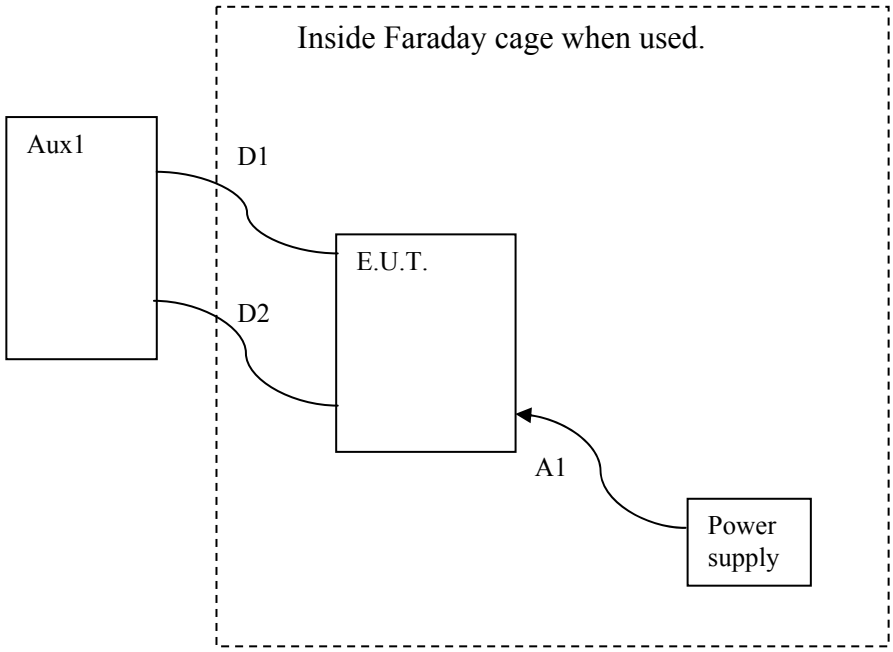
All radiated emissions measurements were performed manually at GYL TECHNOLOGIES. The radiated emissions measurements required by the rules were performed on the three to ten meters, open field, test site maintained by GYL Technologies Parc d'activités de Lanserre, 49610 Juigné sur Loire , France. Complete 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	May 08	May 09
Spectrum analyzer	Rohde & Schwarz	FSEM 30	M02021	May 08	May 09
Filter 150 kHz	Rohde & Schwarz	EZ25	M02040	May 08	May 09
ARTIFICIAL MAINS NETWORKS					
LISN (50µH / 5/50Ω)	Rohde & Schwarz	ESH3-Z5	M02027	June-08	June-09
ANTENNAS					
Bilog (30-2000MHz)	CHASE	CBL-6112	M02031	June-08	June-09
Bilog (30-2000MHz)	CHASE	CBL-6112	M02032	June-08	June-09
Horn antenna	EMCO	3115	M02045	March 08	March-09
Amplifier 0.5-18GHz	LUCIX Corporation	S005180L 3201	M08007	March 08	March-09

CONFIGURATION OF TESTED SYSTEM:

For all tests, the device under test was tested with its ancillary equipment.



E.U.T.: Equipment under Test
A1: AC power cable
D1: Ethernet cable D2: RS 232 cable
Aux1: NEC Laptop: Model: PC NEC Ref: Versa P440 Serial number: 4971487016

6 EXERCISING TEST CONDITIONS:

Measurements are done in hopping mode in all channels with modulation, and printing tickets.
For measurements that need to be done in one channel, the channel used was activated with its modulation.
The equipment uses a PRASK modulation for GEN2 mode.

7 CONFORMANCE STATEMENT:

7.1 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 C63.4-2003	Standard format measurements/technical report personal computer and peripherals

7.2 JUSTIFICATION:

As mentioned in paragraph 5 of this report, the equipment is a part of bag tag reader/printer, information technology equipment with radio part. It can be installed in residential commercial or light industry areas the following sub clause of the standard mentioned above are:

- Part 15.247 for intentional radiator in band 902-928 MHz.
- Part 15.207 and 15.209 (subpart C) for respectively conducted and radiated emission for intentional radiator.
- Part 15.107 and 15.109 (subpart B) for respectively conducted and radiated emission for unintentional radiator (printer) Class B.

8 TEST ACCORDING TO CFR 47 Part 15

Tests performed by JL JAMET and O MARET at GYL Technologies laboratories November 5, 2008 and January 15, 2009.

8.1 REFERENCE DOCUMENTATION:

FCC part 15 (Sub part B) 15.107, 15.109, 15.207, 15.209 and 15.247 of 2008.

8.2 POWER LINE CONDUCTED EMISSIONS MEASUREMENTS (15.207):

The power line conducted emission measurements were performed in a semi anechoic chamber. The EUT was assembled on a non conductive 80 centimeters high wooden table. 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)

8.3 RESULTS:

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

- If the conducted emissions have limits showing a margin lower than 20dB, data collection measurement is performed 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.

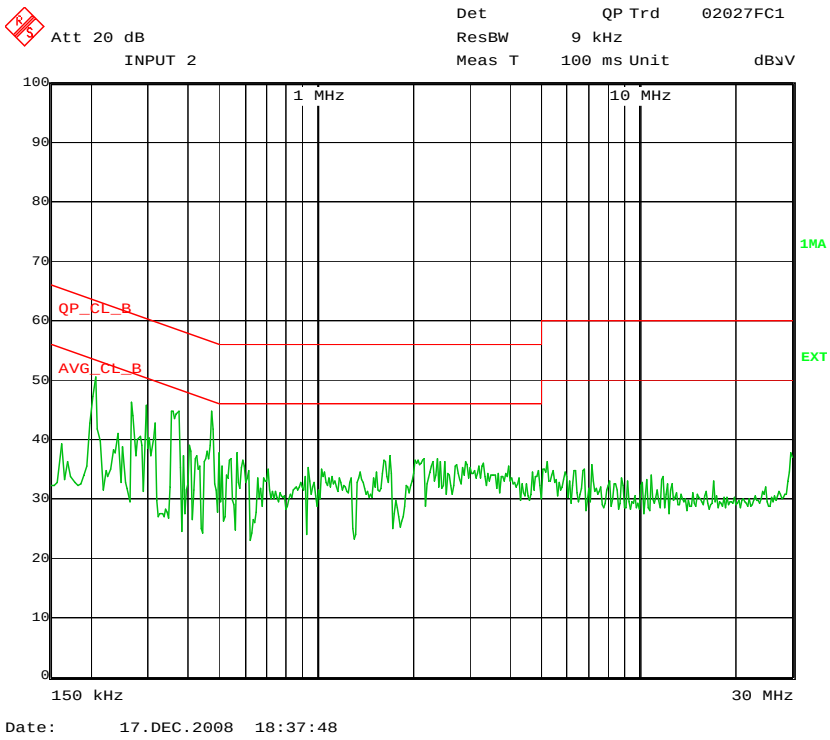
The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and LIVE SIDE, herein referred to as Neutral, and Live respectively.

ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	4kHz
Preamplifier	OFF
Preselector	ON
Resolution, Band With	9 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	1 sec minimum

8.3.1 Power supply

8.3.1.1 Neutral:

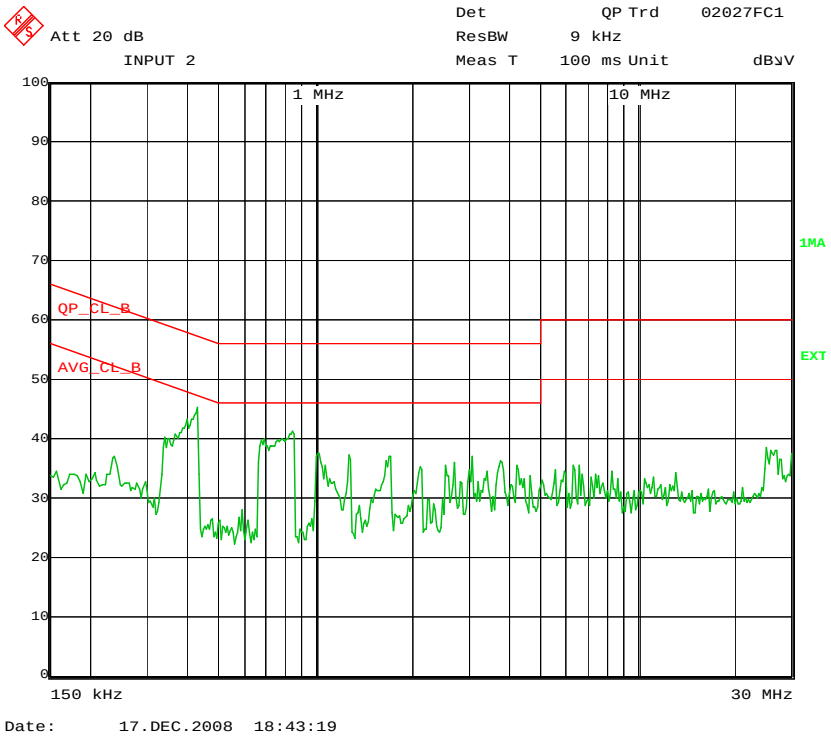
Legend: Green curve represents the peak values



Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0,206	30,0	63,4	33,3
0,266	27,5	61,2	33,7
0,294	26,3	60,4	34,1
0,370	36,6	58,5	21,9
0,470	41,3	56,5	15,2
0,562	18,0	56,0	38,0

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0,342	25,6	49,2	23,6
0,362	20,9	48,7	27,8
0,426	21,3	47,3	26,0
0,470	18,0	46,5	28,5
1,702	20,6	46,0	25,4
2,126	22,6	46,0	23,4

8.3.1.2 LIVE:



Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0,426	38,6	57,3	18,7
0,674	37,5	56,0	18,5
0,682	37,4	56,0	18,6
0,846	34,6	56,0	21,4
1,014	34,5	56,0	21,5
1,026	34,4	56,0	21,6

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0,418	30,4	47,5	17,0
0,426	22,1	47,3	25,3
0,846	27,8	46,0	18,2
1,266	21,0	46,0	25,0
1,690	21,4	46,0	24,6
27,066	25,3	50,0	24,7

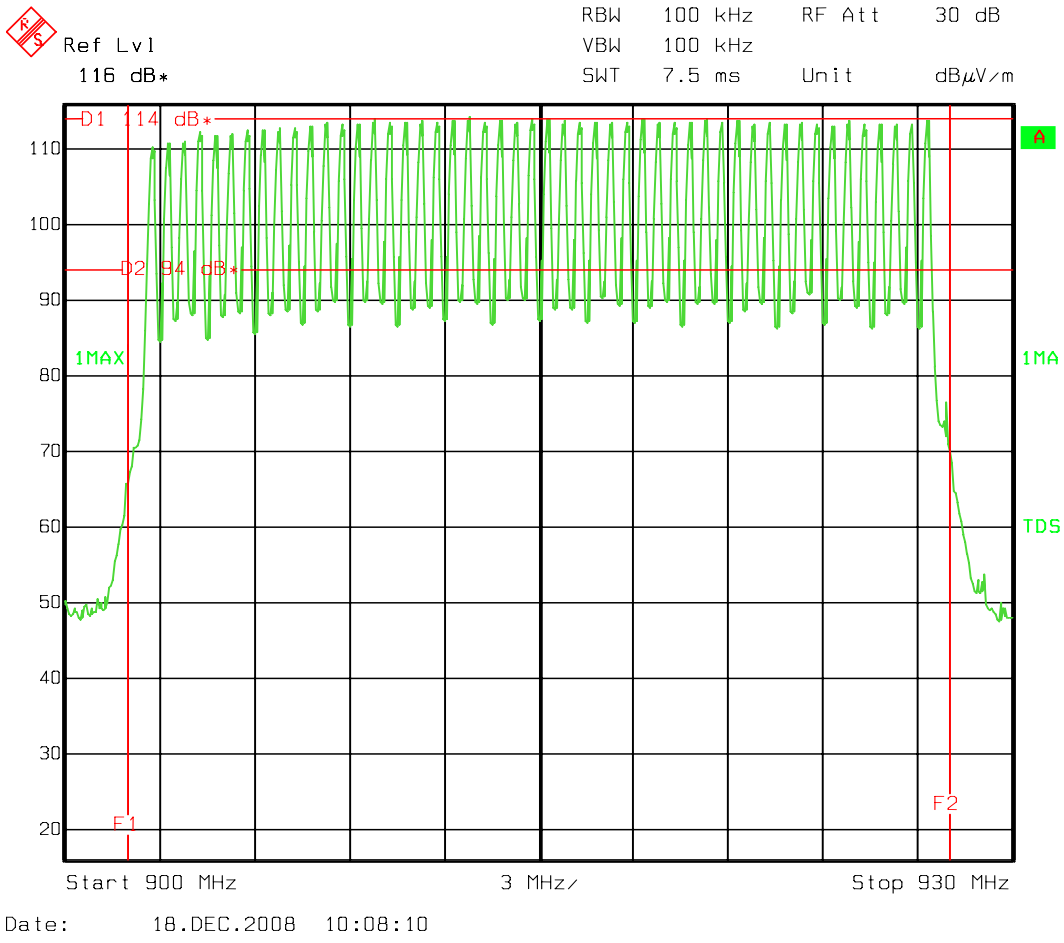
8.4 INTERPRETATION AND REMARKS:

The equipment complies with the §15.107 Class B and §15.207 requirements.

8.5 Intentional radiator operation within the band 902 – 928 MHz §15.247:

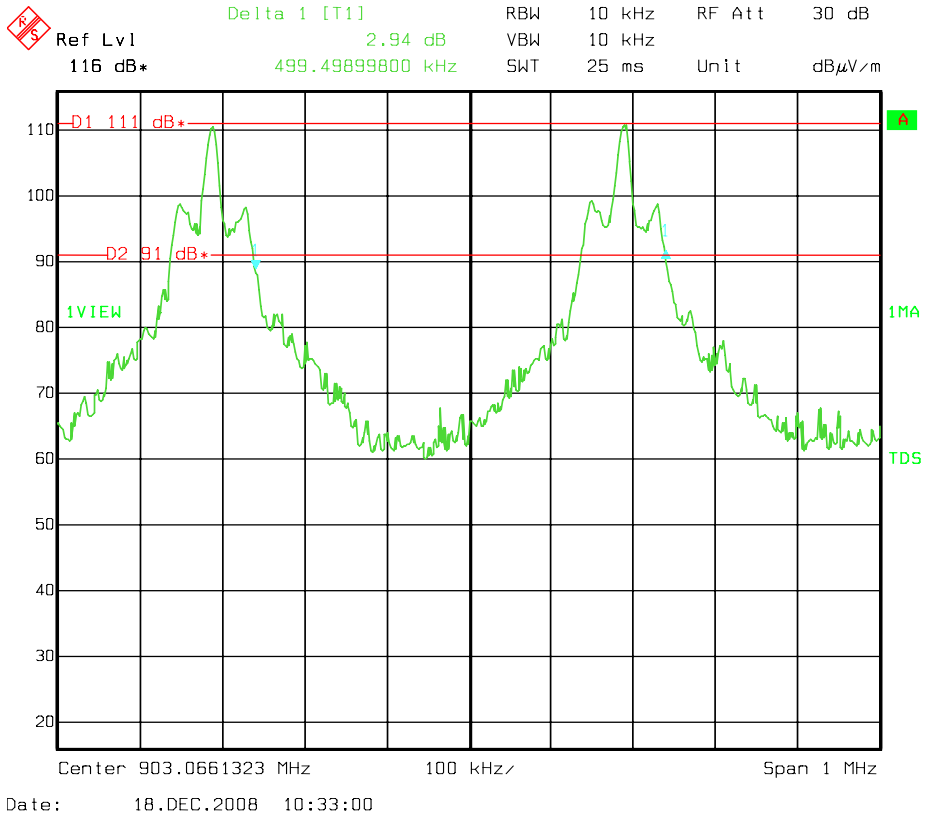
The system uses 50 channels numbered from 1 to 50.

For details of frequency hopping technology used see Exhibit 12 operational description.

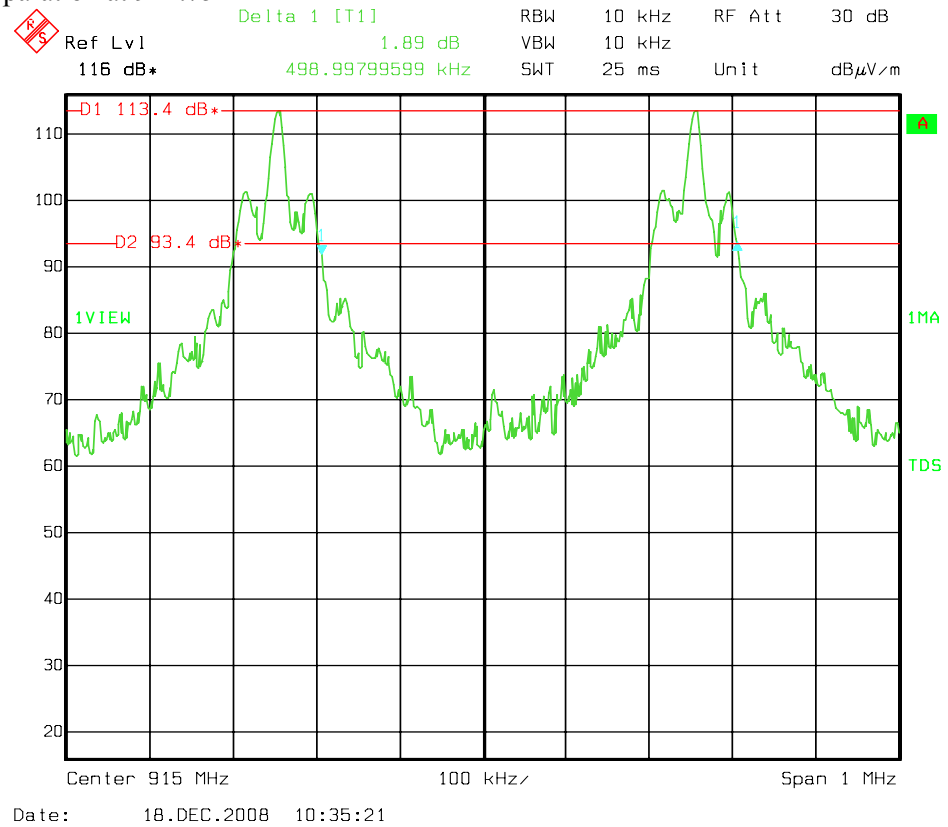


8.5.1 Frequency hopping channel separation and bandwidth (15.247 (a) (1))

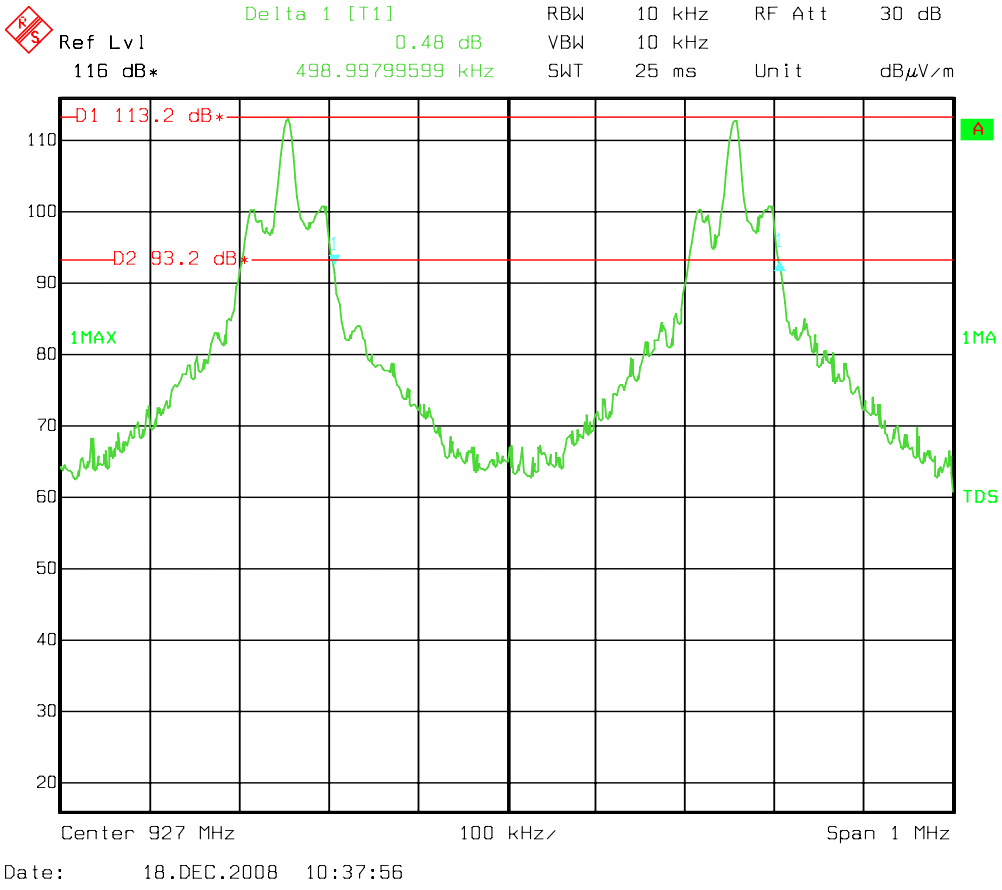
Channel separation at 902.75 MHz



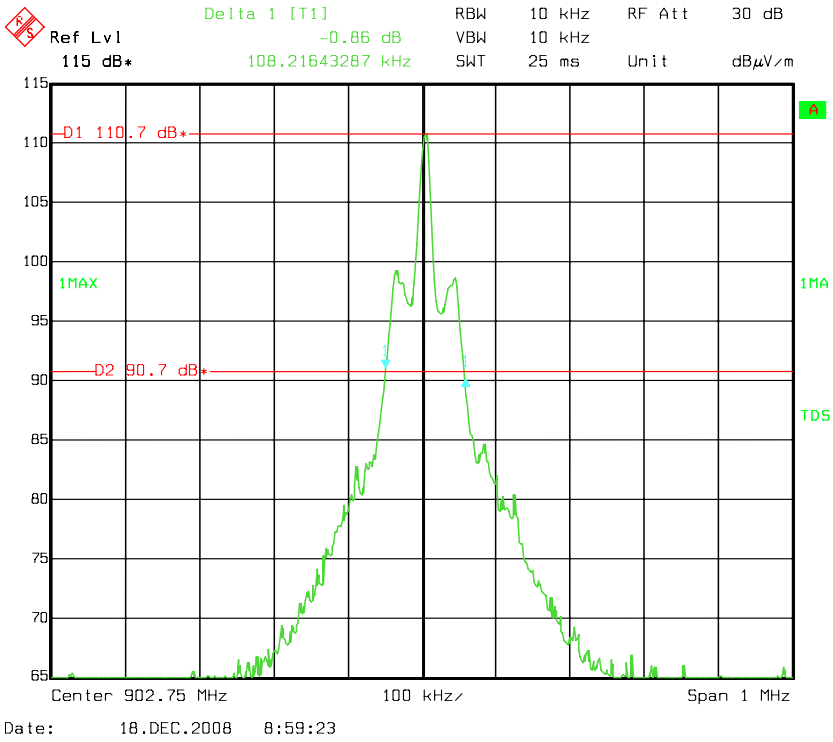
Channel separation at 914.75 MHz



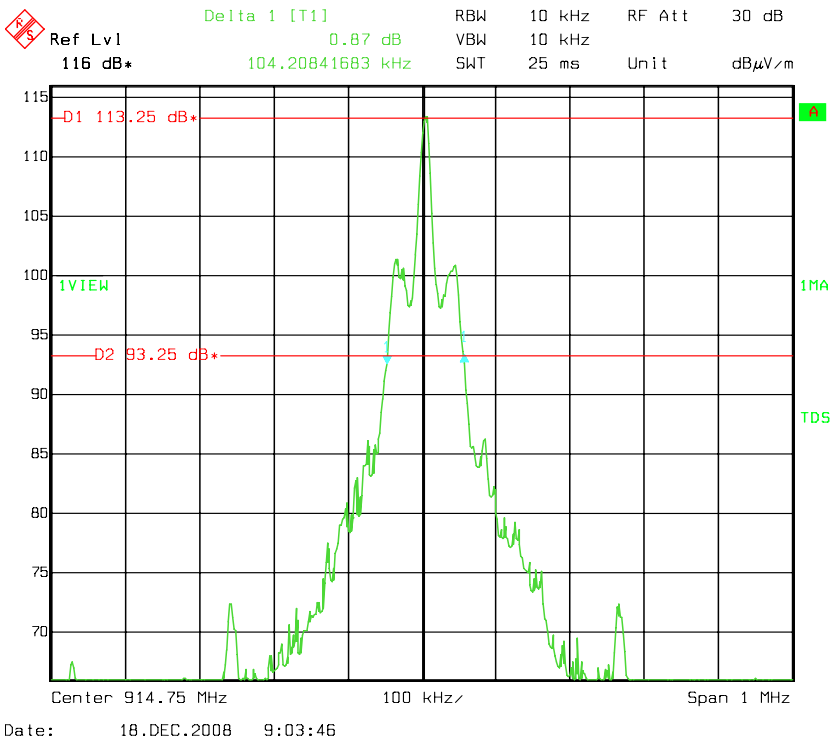
Channel separation at 927.25 MHz



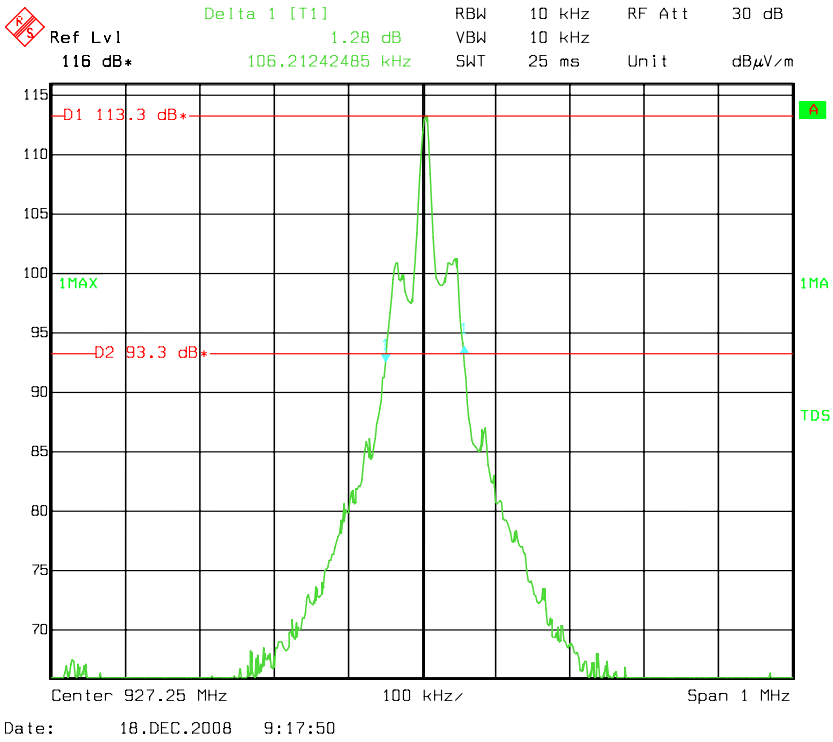
Channel bandwidth at 902.75 MHz



Channel bandwidth at 914.75 MHz



Channel bandwidth at 927.25 MHz

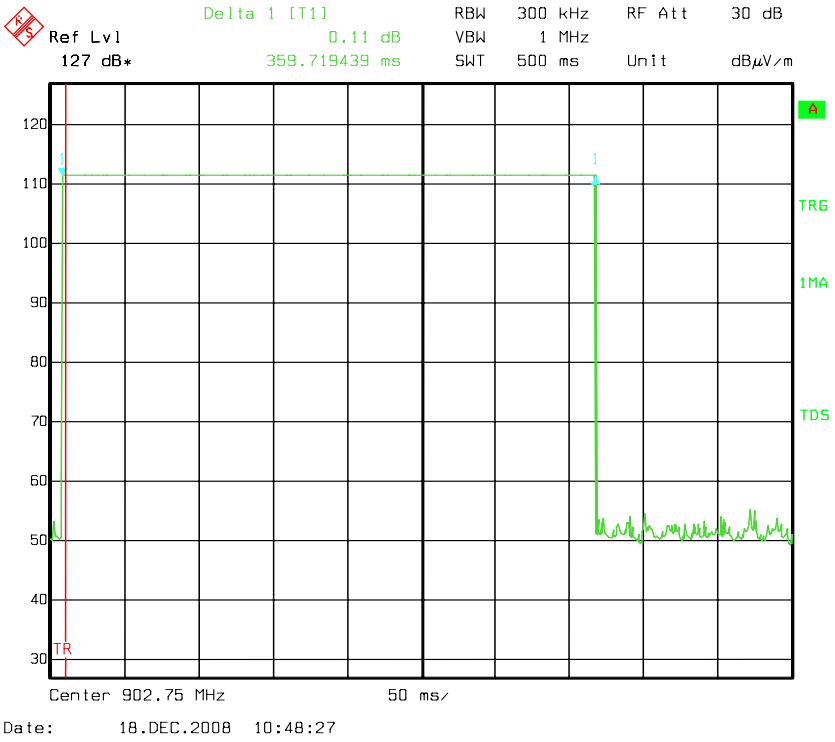


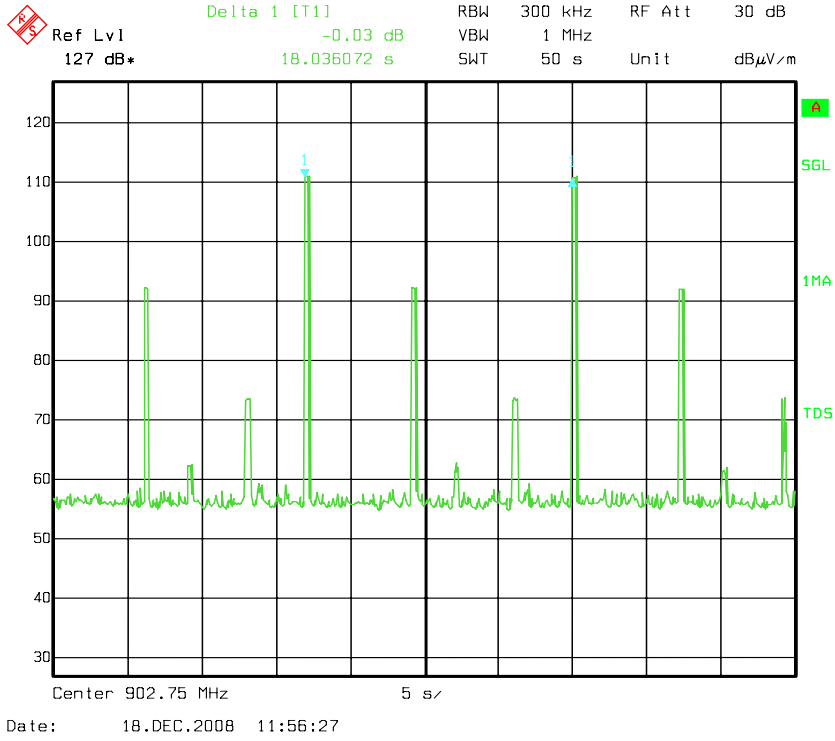
The 20dB bandwidth of each hopping channel is around 108 kHz (less than 500 kHz)

The channel separation is almost 500 kHz which is greater than the 20dB bandwidth.

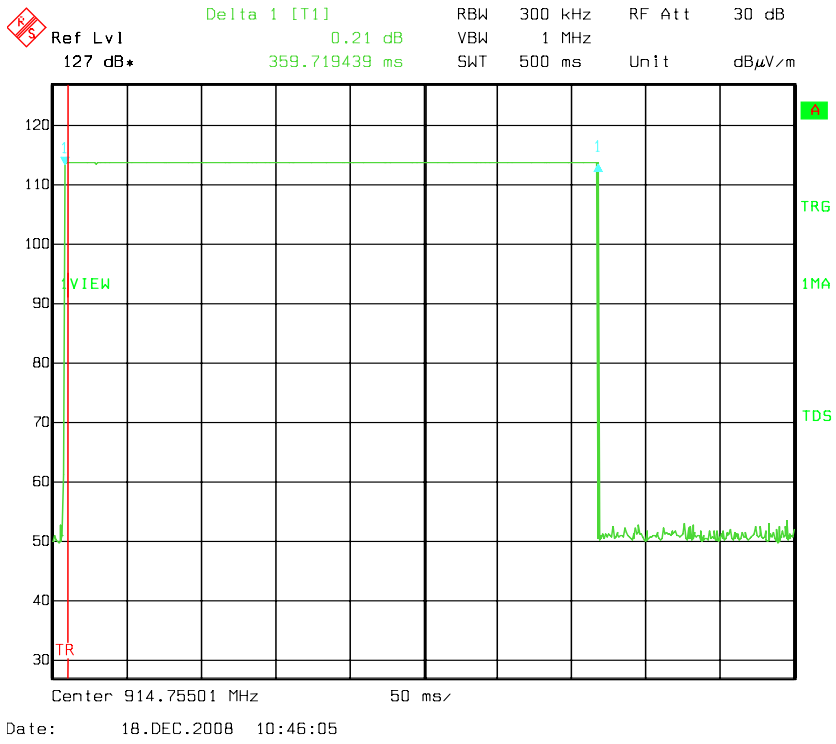
The worst case of a real communication with the tag has been measured by the applicant (described in Exhibit 12 operational description) and is 222.4 ms: less than the 400ms limit.

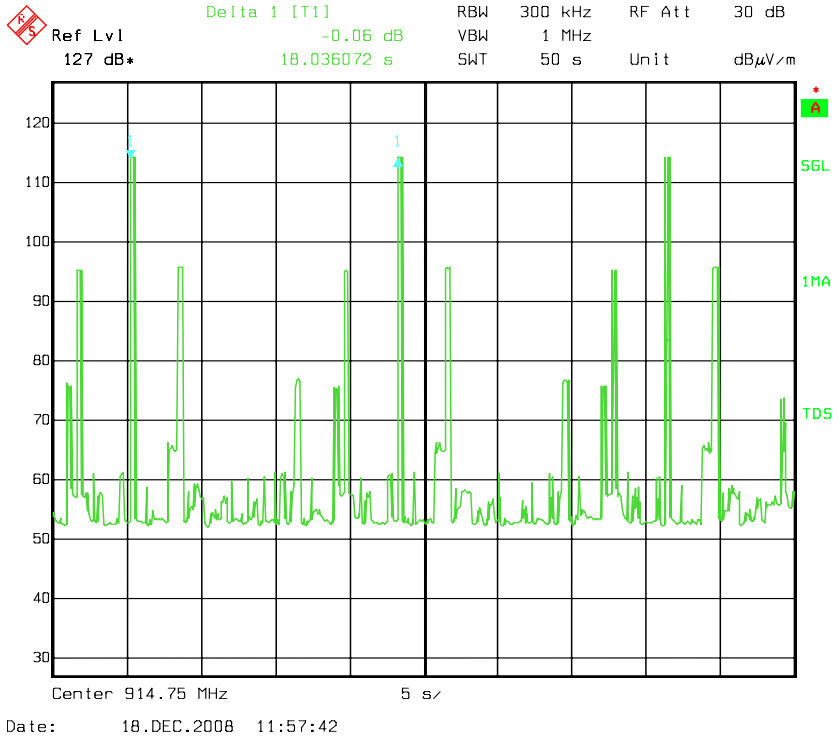
Measurement in a special mode used for quasi continuous emission gives
At the 902.75 frequency



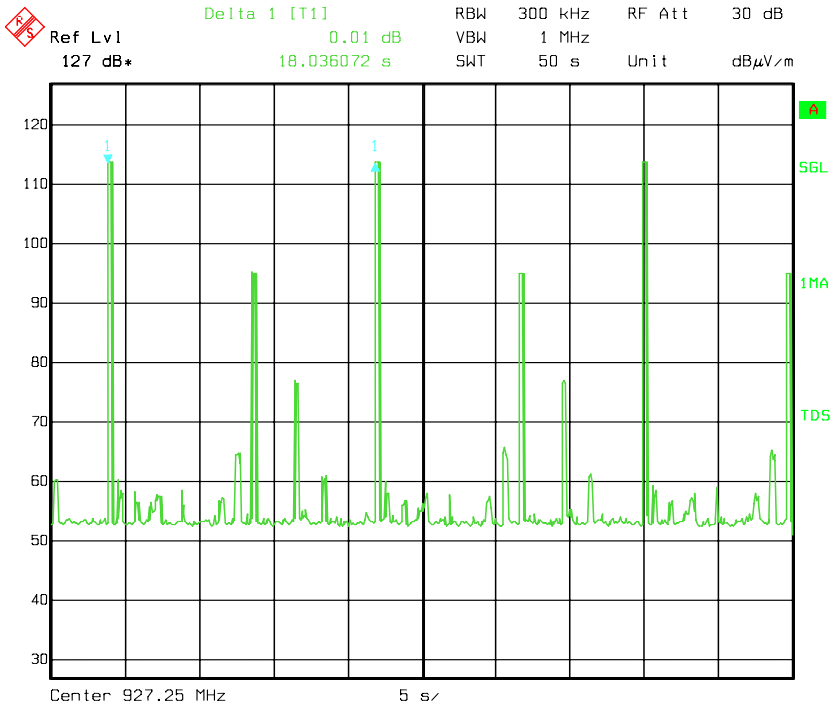


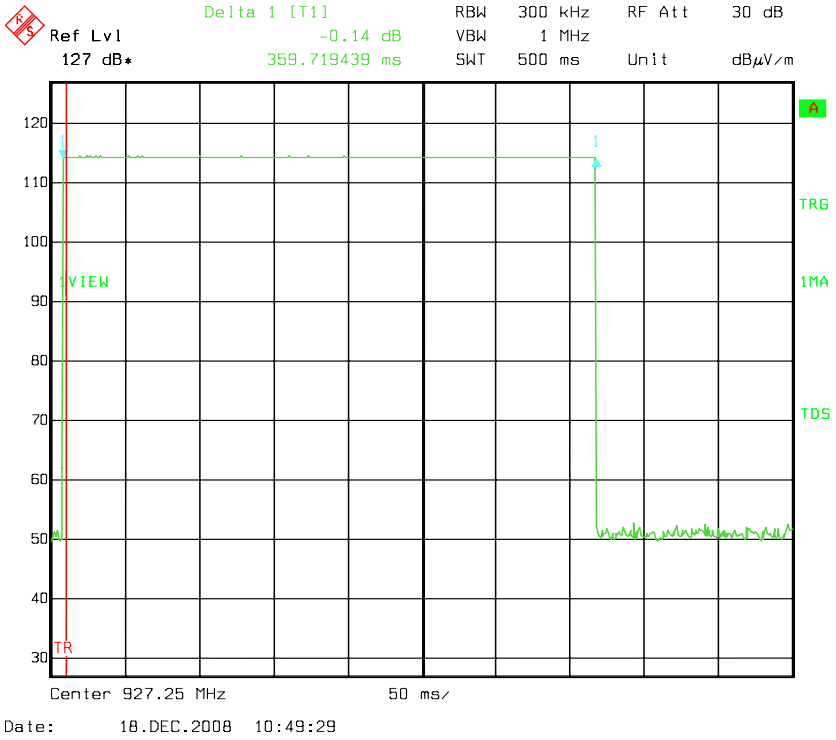
At the 914.75 frequency





At the 927.25 frequency





The worst case of a real communication has been measured by the manufacturer to be 222.4 ms. That gives a correction factor of **0 dB.**

8.5.2 Maximum peak output power

The maximum peak conducted power can't be measured in this product (internal antenna without connector).

According to DA 00-705, the alternative test procedure is used to calculate the conducted peak power.

$$P = \frac{(E*d)^2}{30G}$$

For calculation, G is taken to be 1 (isotropic antenna, worst case).
The conducted limit is 1W.
Measurements are done on OATS at 3 m distance.

Results	Frequency (MHz)	3 m dBµV/m	Power (mW)	Peak at 3m in 100kHz RBW
Lowest channel	902.75	96.09	1.23	96.1
Middle channel	914.75	100.17	3.2	100.2
Highest channel	927.25	101.53	**4.4**	**101.6**

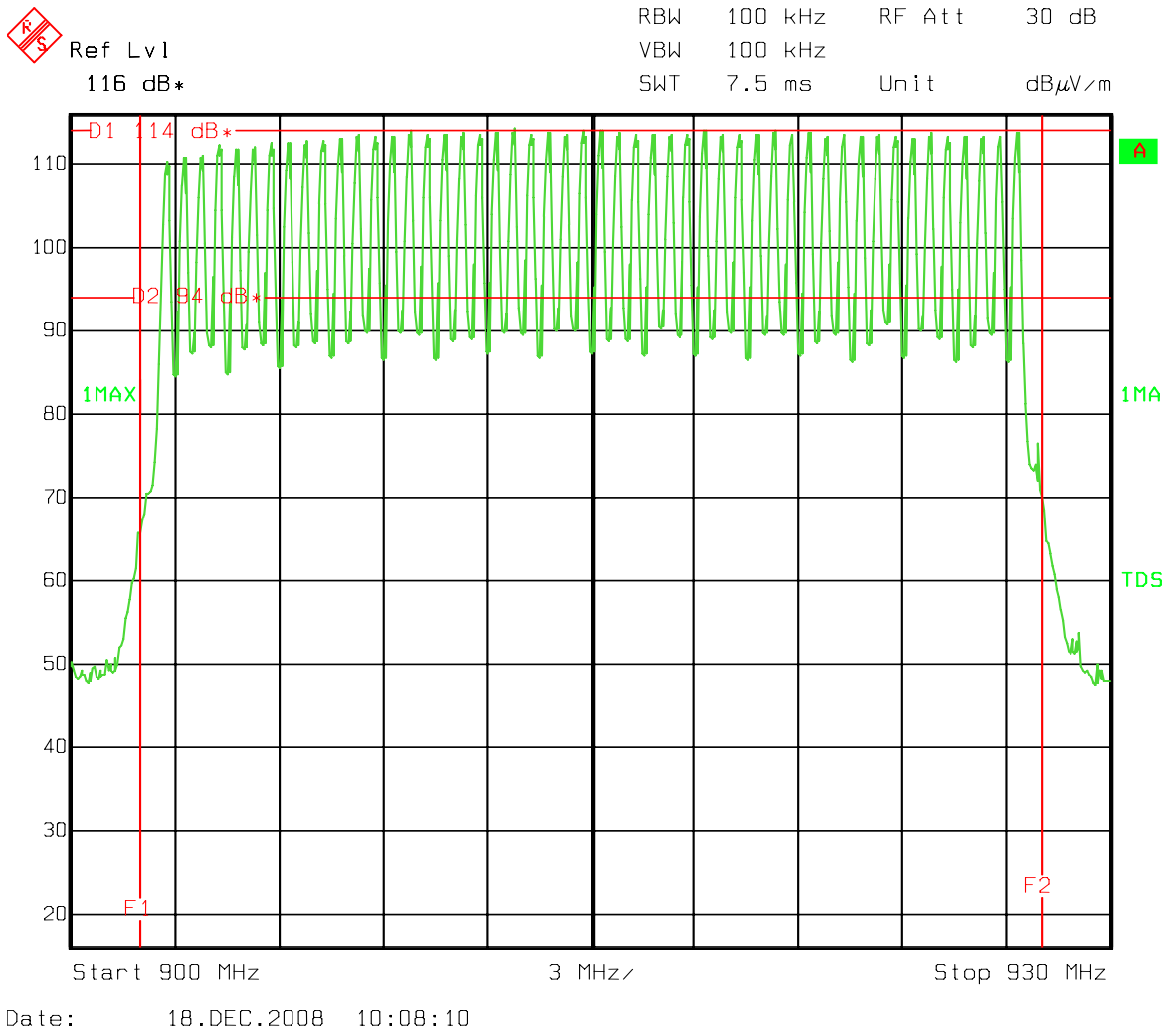
Power measurement done with input voltage at 102V, 120V and 138V without any change (delta lower than 0.2 dBm)

8.5.3 Spurious emissions (15.247 § (d))

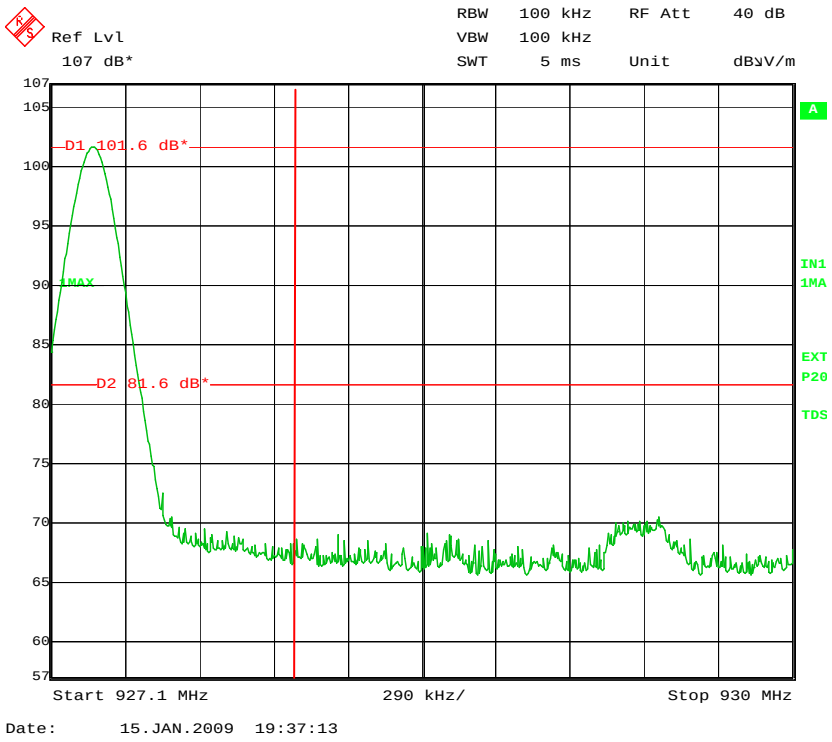
In any 100 kHz bandwidth outside the frequency band, the level is at least 20 dB below that in the 100 kHz bandwidth within the band contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

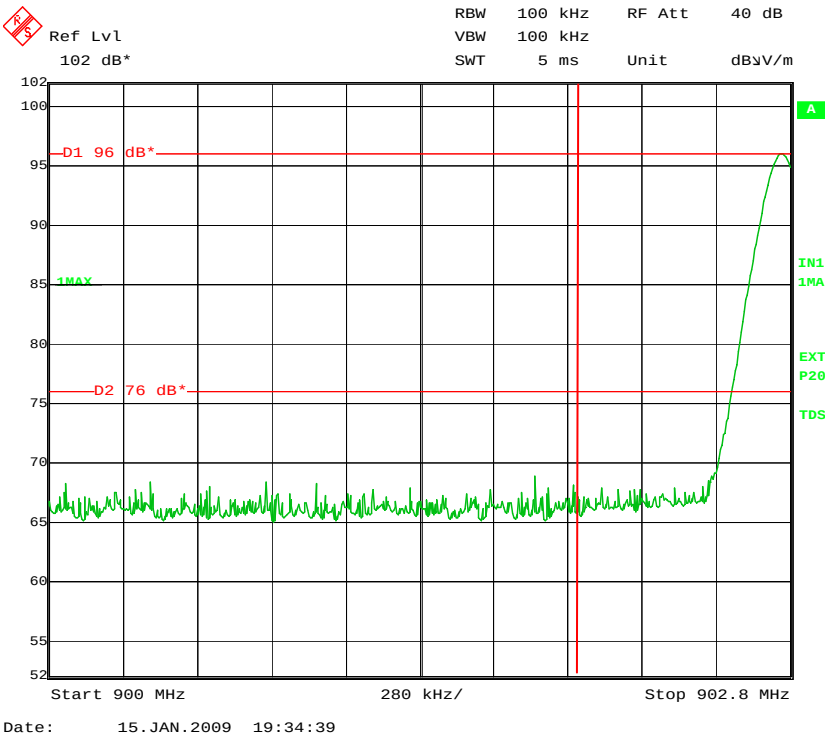
At band edge F1 (902 MHz), F2 (928MHz), the level is far below the limit with or without hopping:

With hopping:



Without hopping





SPURIOUS EMISSIONS MEASUREMENTS:

8.5.4 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 100kHz 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.

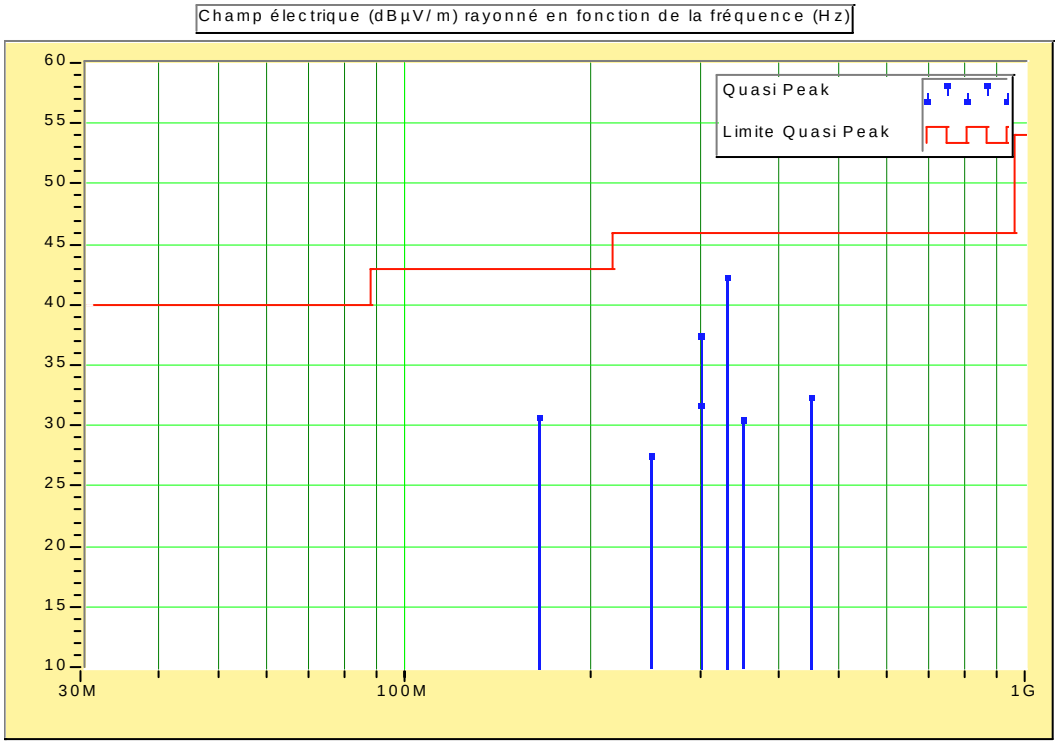
Summary of settings for measurements in restricted bands below 1GHz

ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Preamplifier	ON
Preselector	ON
Resolution, Band Width	120 kHz
Final Quasi Peak measurement time	1 s minimum

8.5.4.1 RESULTS (Class B):

The following data table lists the most significant emission frequencies, measured level, correction factor (includes cable and antenna corrections), corrected reading and the limit. The highest peaks are measured in quasi-peak detection mode at 3 meters distance.
Intentional radiator and Class B non intentional radiator

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
165.026	34.1	30.7	43.0	12.3	H	179	40	12.8
249.989	29.5	27.5	46.0	18.5	H	165	319	16.8
299.501	33.9	31.7	46.0	14.3	H	169	331	18.2
300.002	39.6	37.5	46.0	8.6	H	103	28	18.2
329.457	46.7	42.3	46.0	3.7	H	101	258	18.7
350.011	30.7	30.6	46.0	15.4	H	105	357	19.1
450.026	33.9	32.3	46.0	13.7	V	127	357	21.0



8.5.5 Spurious emissions measurement results from 1GHz to 10GHz:

In restricted bands, a pre-scan measurement is done very close to the product (less than 10cm) with 100 kHz RBW and a max peak detector. Then measurements are performed at 1 m with 1MHz RBW and a video averaging (10Hz) for spurious measurement with normal hopping emission and reception.
Harmonics are peak measured with 1MHz RBW and an averaging due to the duty cycle correction factor if needed.
Spurious emissions are also made with a permanent emission on lowest, middle and highest channel.
Average limit in restricted bands §15.205 at 3 m is 54 dBµV/m (with a peak limit at 74 dBµV/m). Otherwise, the limit is only 20 dB under the emission level without averaging with duty cycle factor (91.6 dBµV/m).
The averaging correction factor is used only when necessary (margin lower than 10dB) and when the spurious radiation is pulsed in the same manner as the normal emission.

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.

No spurious founded outside harmonics.
Final measurements results at 3 m

Max spurious for channel 902.75

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m	Peak (1) (dBµV/m) corrected for 3 m distance	Peak Limit (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
902,75	1					
1 806	2	62,8	52,8	91,6		38,8
2 708	3	58,3	48,3	74,0	54,0	25,7
3 611	4	NF		74,0	54,0	
4 514	5	NF		74,0	54,0	
5 417	6	NF		74,0	54,0	
6 319	7	NF		91,6		
7 222	8	NF		91,6		
8 125	9	NF		74,0	54,0	
9 028	10	NF		74,0	54,0	

(1) Peak measurement with 100 kHz RBW and VBW when frequency outside restricted bands.
Peak measurement with 1MHz RBW and VBW when frequency in restricted bands.
* NF means Noise Floor

Max spurious for channel 914.75

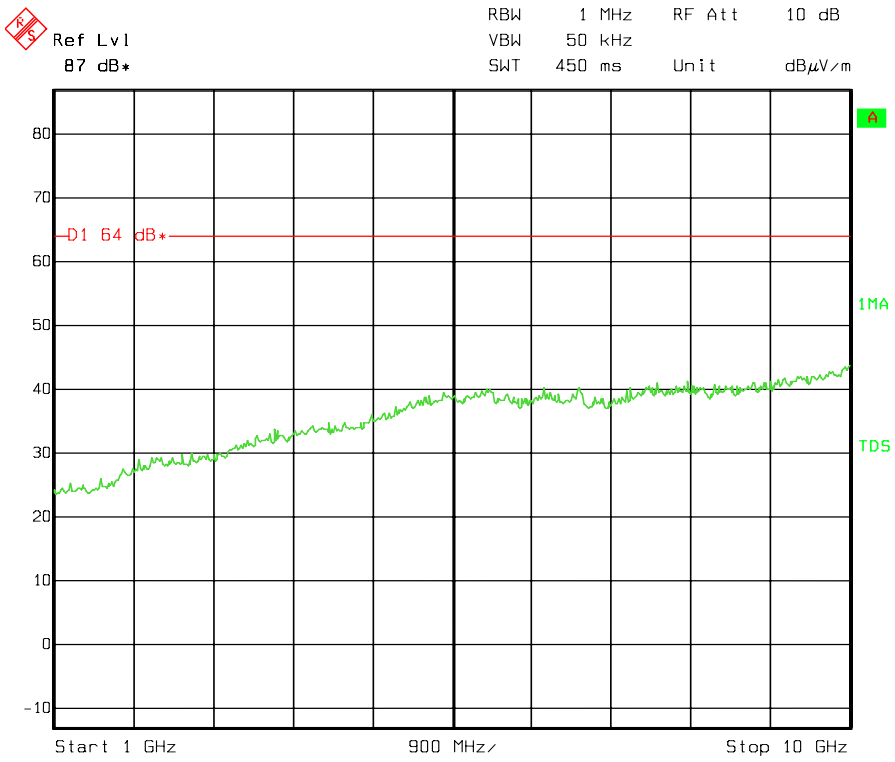
Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m	Peak (1) (dBµV/m) corrected for 3 m distance	Peak Limit (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
914,75	1					
1 830	2	68,1	58,1	91,6		33,5
2 744	3	65.1	55.1	74,0	54,0	18.9
3 659	4	57.7	47.7	74,0	54,0	26.3
4 574	5	NF		74,0	54,0	
5 489	6	NF		91,6		
6 403	7	NF		91,6		
7 318	8	NF		74,0	54,0	
8 233	9	NF		74,0	54,0	
9 148	10	NF		74,0	54,0	

Max spurious for channel 927.25

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m	Peak (1) (dBµV/m) corrected for 3 m distance	Peak Limit (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
927,25	1					
1 855	2	67,6	57,6	91,6		33,8
2 782	3	64,2	54,2	74,0	54,0	19,8
3 709	4	55,0	45,0	74,0	54,0	29,0
4 636	5	NF		74,0	54,0	
5 564	6	NF		91,6		
6 491	7	NF		91,6		
7 418	8	NF		74,0	54,0	
8 345	9	NF		74,0	54,0	
9 273	10	NF		91,6		

* NF means Noise Floor

Noise Floor



8.6 Receiver spurious radiation

No spurious emission has been found in receiver mode over the noise floor.

8.7 Antenna gain 15.247 § (b)(4)

Not applicable because the antenna is located inside the equipment and power computation have been done with a worst case of 0dBi gain.

8.8 Antenna requirements

Not applicable because the antenna is located inside the equipment and is not replaceable without modifying the product.