TEST REPORT

According to FCC, CFR 47 Part 15

IER506

N°060130-CC-1-a

GYL technologies
Parc d'activités de Lanserre
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49610 JUIGNE SUR LOIRE
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Summary

1 Reference and record of revisions of the test report:

Test report number :	Revision :	Number of pages	Modification reasons :
060130-CC-1-a	a	33	Creation, July 4, 2008
060130-CC-1-b	b	32	Corrections as requested by TCB
Redactor : JL JAMET			**Date of writing** : 8 December 2008
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:

01 to 04 July, 09&17 September, 2008

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 printer with RF part is written in accordance with Part 15 of the Federal Communications Commissions. The Equipment under Test (EUT) was IER506.RFID. 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 2001. 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.

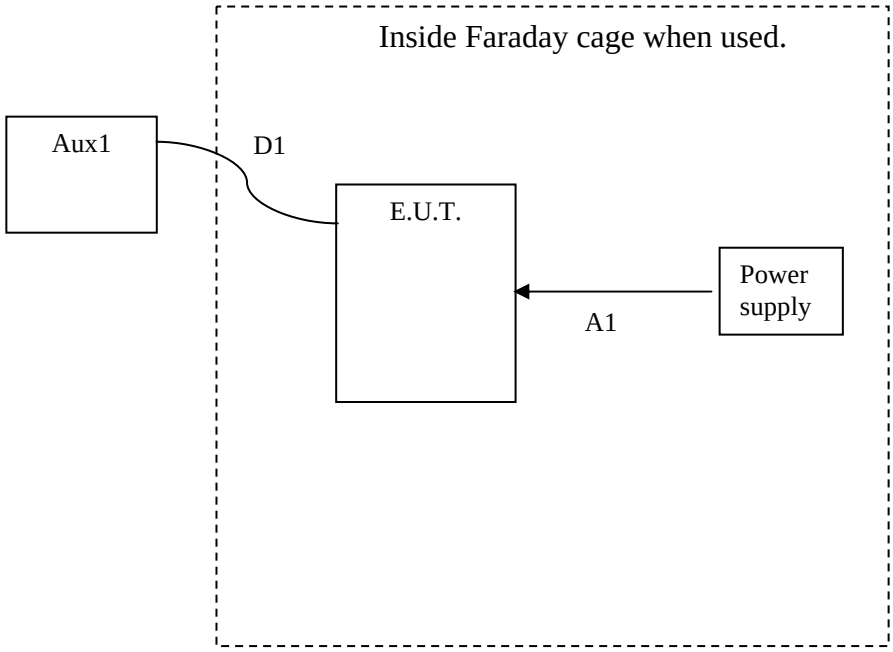
All radiated emissions measurements were performed manually at GYL TECHNOLOGIES. The radiated emissions measurements required by the rules were performed on the three to ten meters, open field, test site maintained by GYL Technologies Parc d'activités de Lanserre, 49610 Juigné sur Loire , France. Complete 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	Jan-0_	Jan-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

6 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
Aux1: NEC Laptop :

7 EXERCISING TEST CONDITIONS:

Measurements are done in hopping mode in all channels with modulation.
For measurements that need to be done with one channel, the channel used was activated with its modulation
The equipment uses a PRASK modulation for GEN2 and ASK modulation for Class0 on each channel.

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: 2007 & 2008	Radio frequency devices
ANSI C63.4-2003	Standard format measurements/technical report personal computer and peripherals

8.2 JUSTIFICATION:

As mentioned in paragraph 5 of this report, the equipment is a professional 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.

9 TEST ACCORDING TO CFR 47 Part 15

Tests performed by Jean-Luc JAMET at GYL Technologies laboratories from 1 to 4 July, 2008.

REFERENCE DOCUMENTATION:

FCC part 15 (Sub part B) 15.107, 15.109, 15.207, 15.209 and 15.247 of 2007 and 2008.

9.1 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

9.2 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 5dB, 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 5dB, 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

All readings are quasi-peak unless stated otherwise.

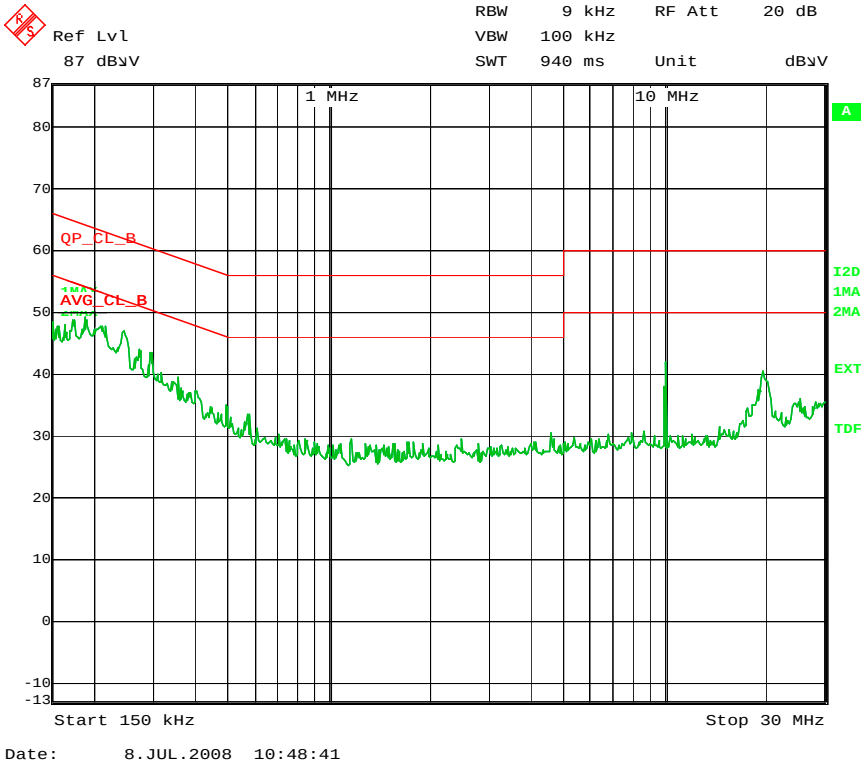
9.2.1 Power supply

9.2.1.1 Neutral:

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
10.049	19.9	60.0	40.1
19.828	28.6	60.0	31.4

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
10.049	15.3	50.0	34.7
19.828	26.6	50.0	23.4

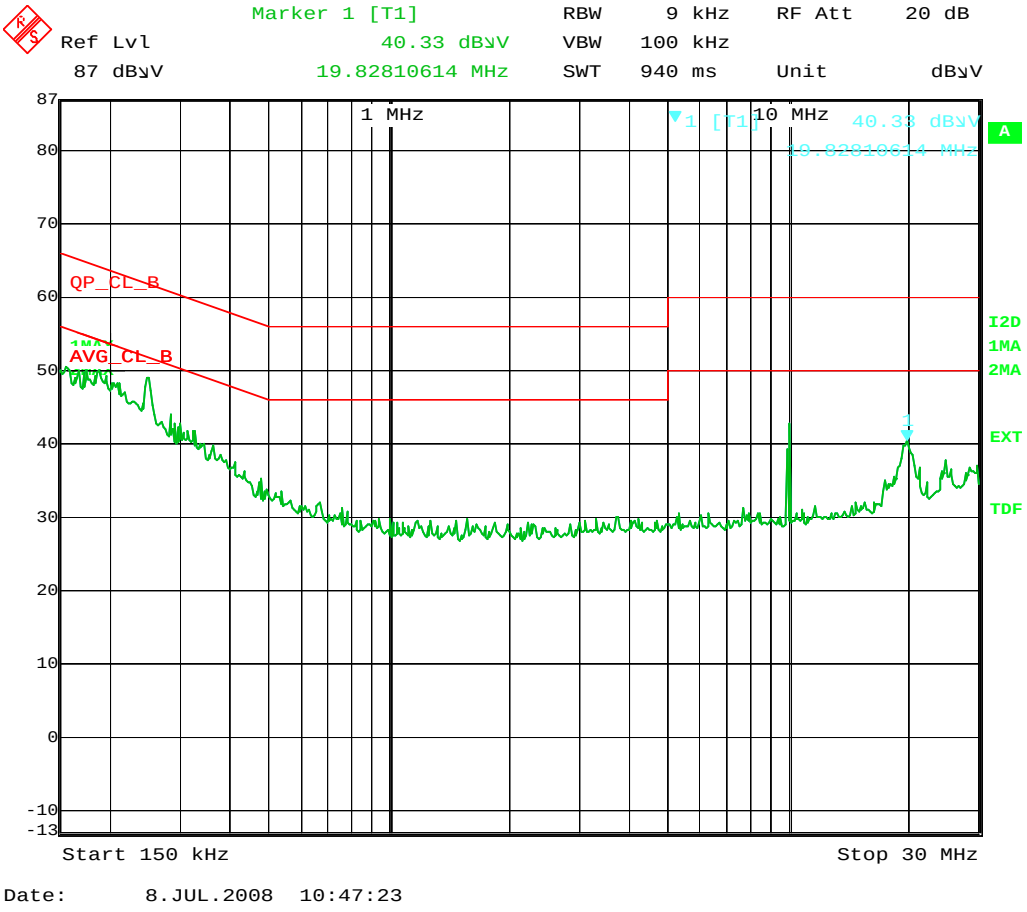
Legend: Green curve represents the peak values



9.2.1.2 LIVE:

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0.247	45.2	61.9	16.7
10.049	19.9	60.0	40.1
19.828	25.8	60.0	34.2

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0.247	38.6	51.9	13.3
10.049	15.3	50.0	34.7
19.828	20.6	50.0	29.4

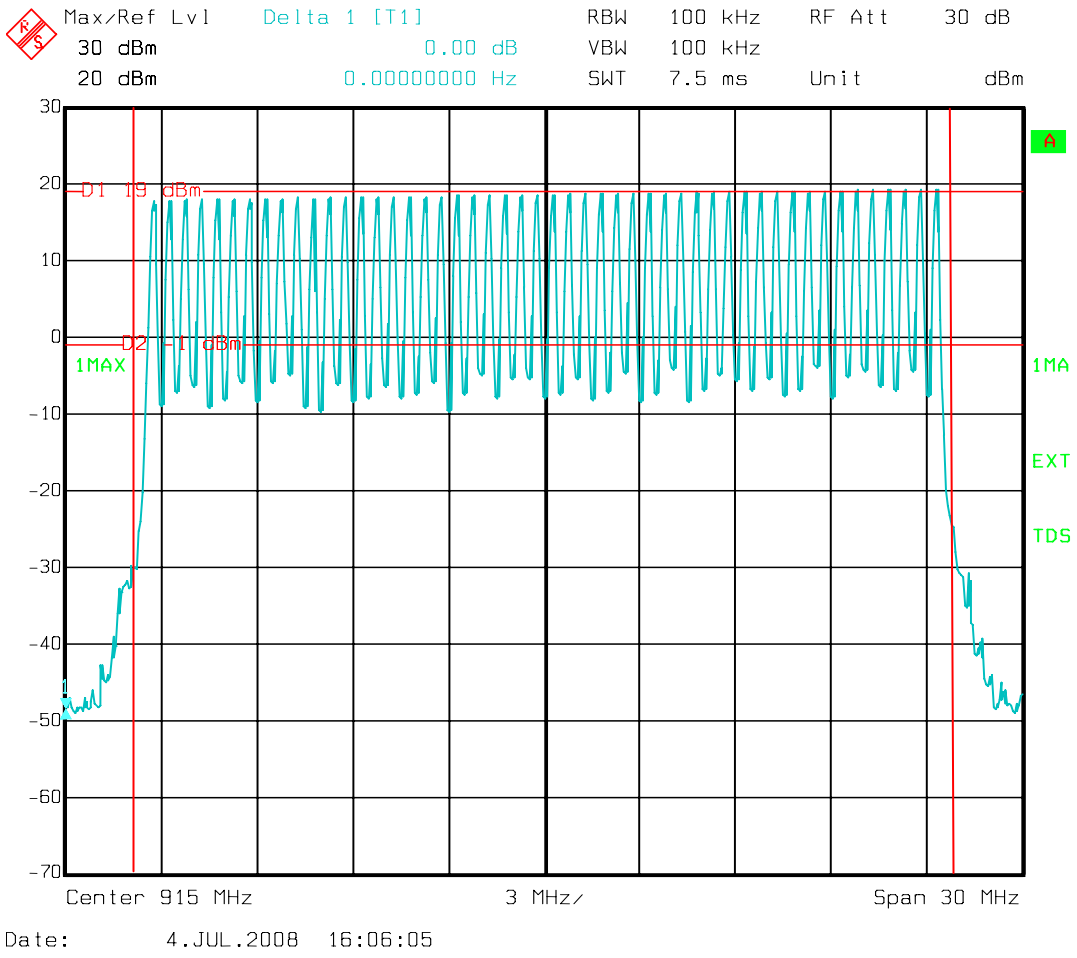


9.3 INTERPRETATION AND REMARKS:

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

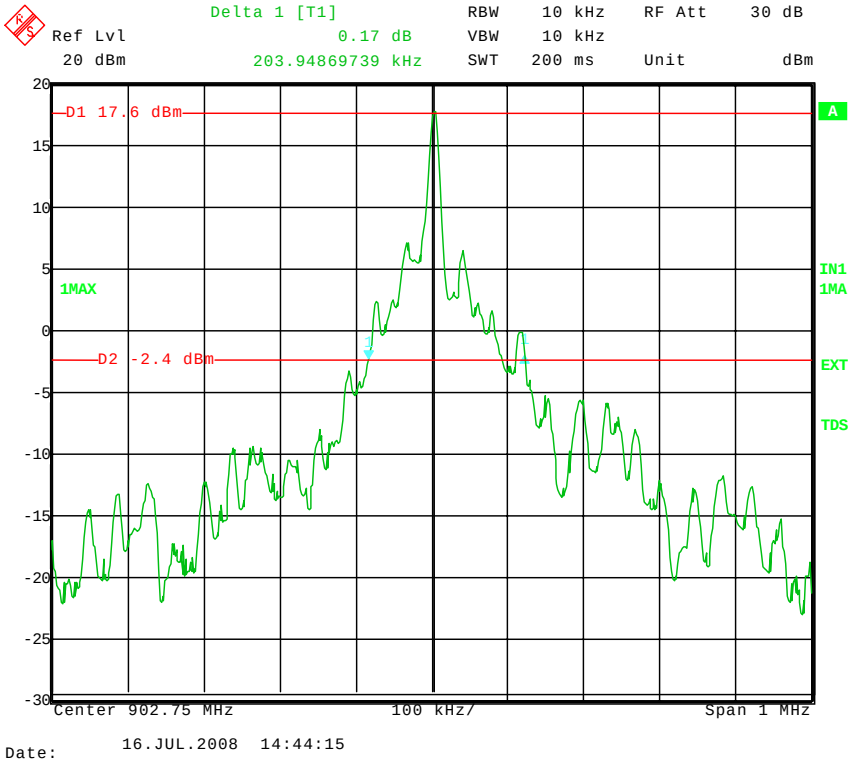
9.4 Intentional radiator operation within the band 902 – 928 MHz §15.247:

The system uses 50 channels numbered
At band edge F1(902 MHz), F2(928MHz), the level is far below this limit:
For details of frequency hopping technology used see Exhibit 12 operationnal description.

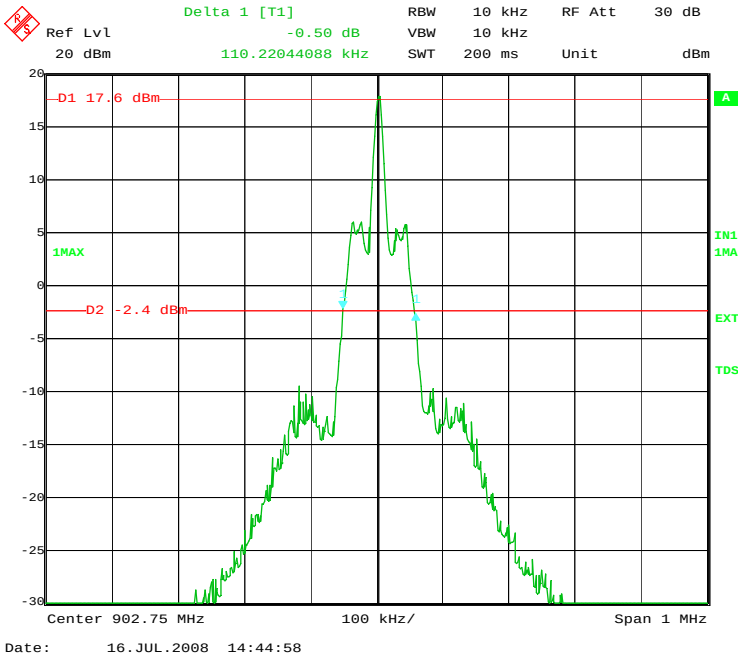


9.4.1 Frequency hopping channel separation and bandwidth (15.247 (a) (1))

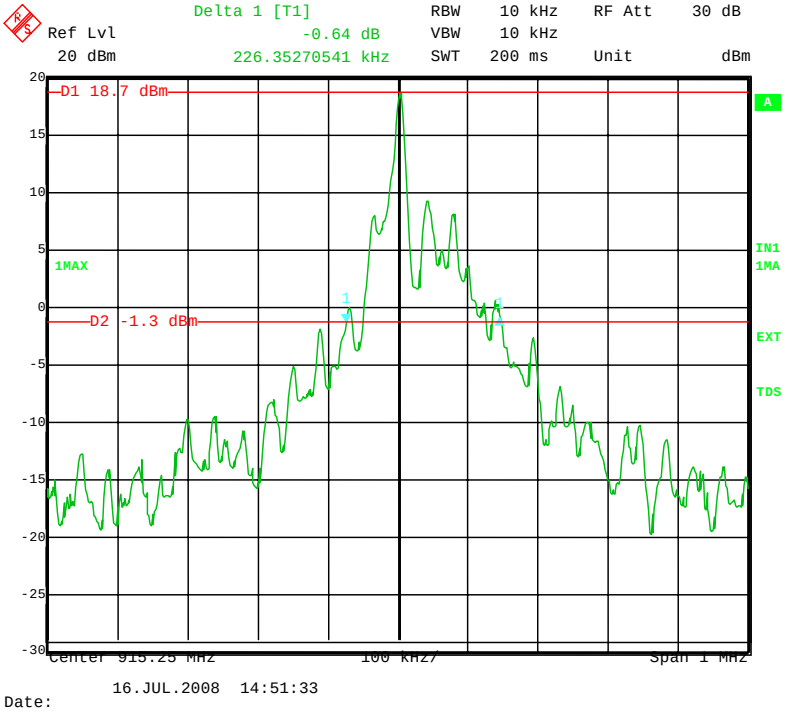
902.75MHz Class 0



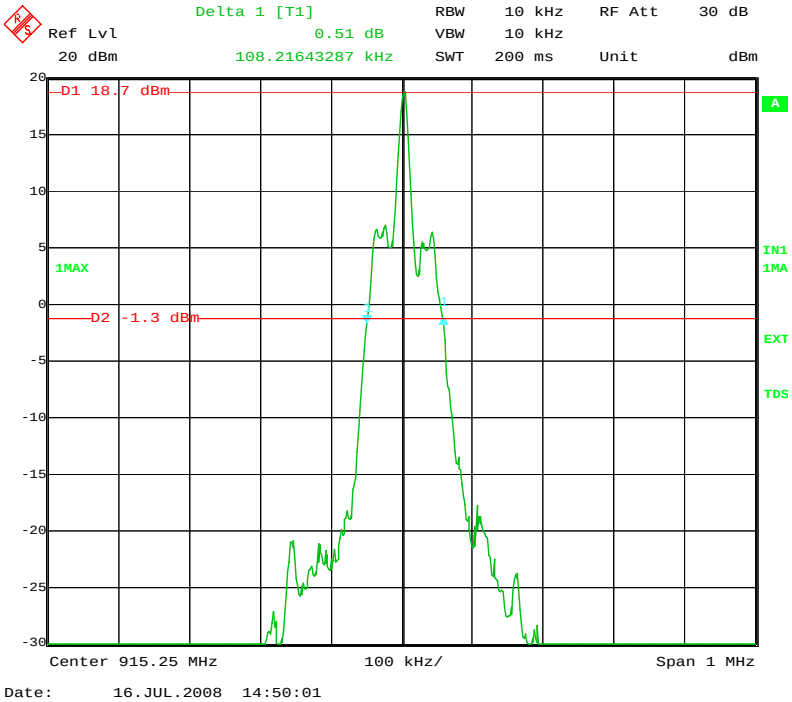
902.75MHz Gen2



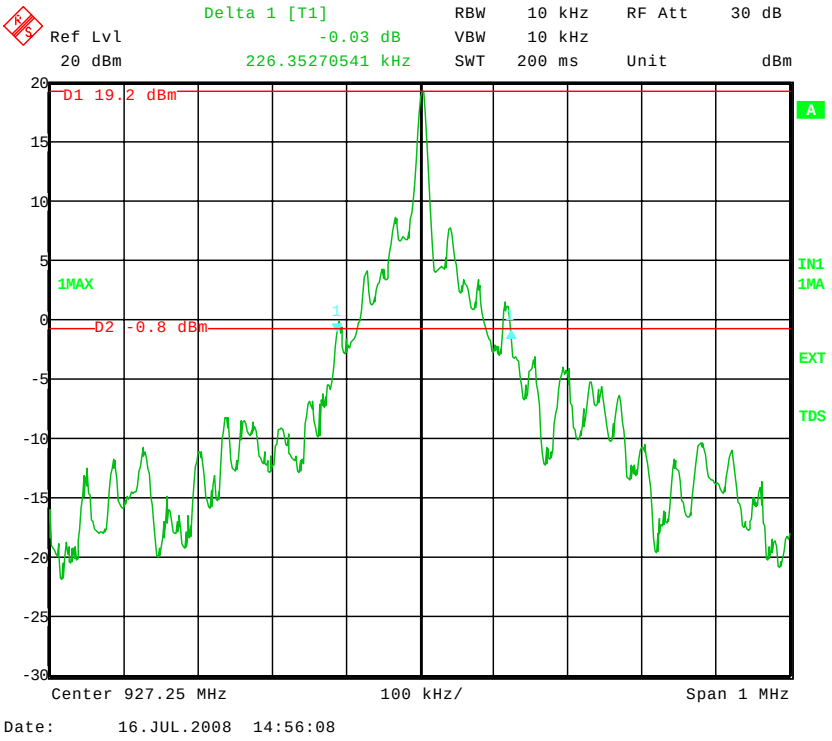
915.25MHz Class 0



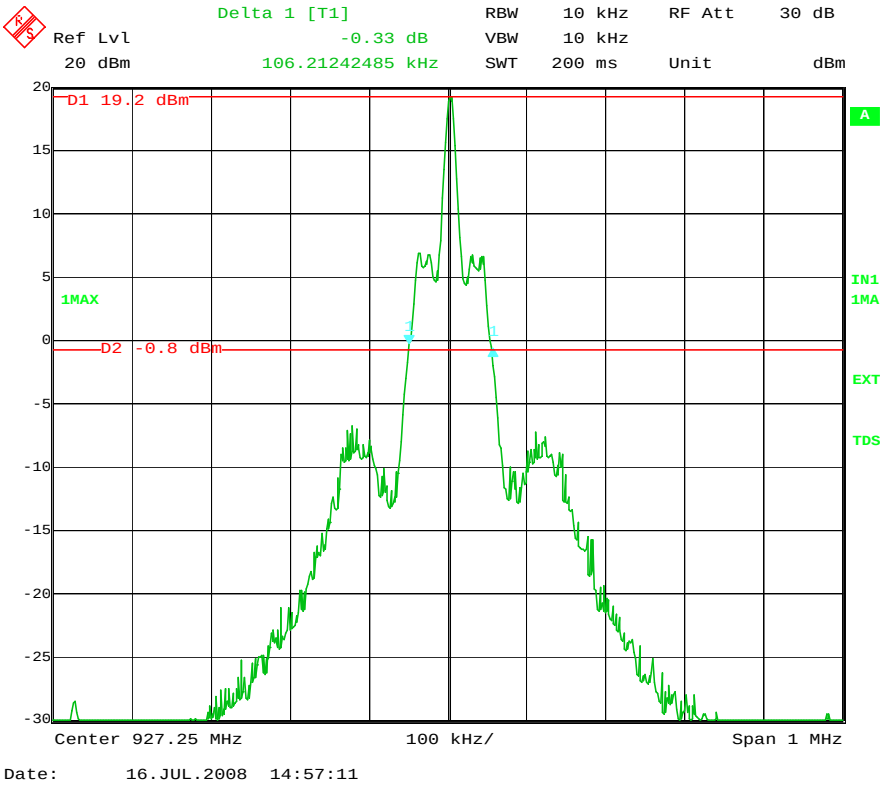
915.25MHz Gen2



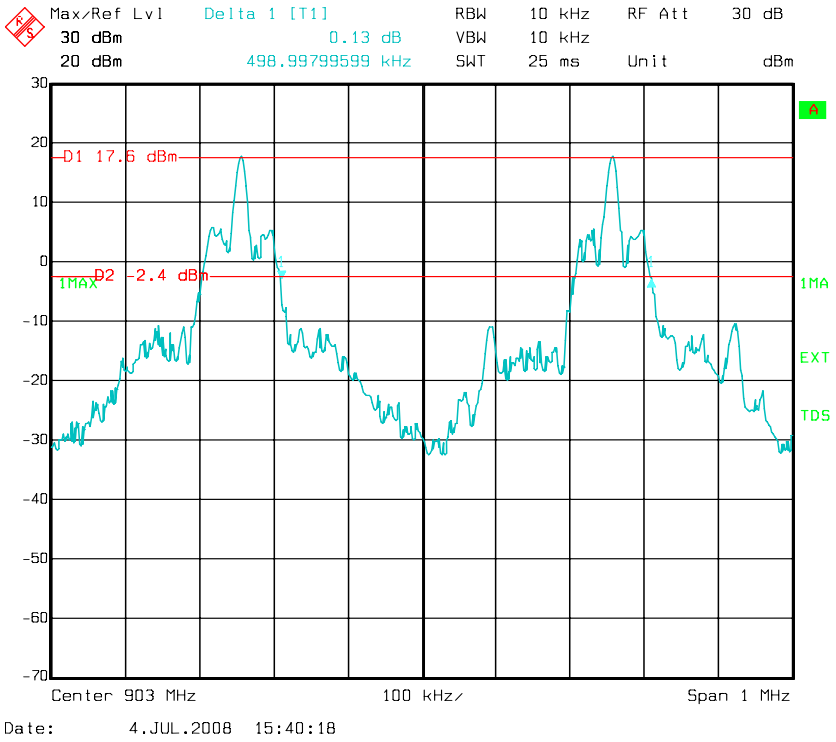
927.25MHz Class 0



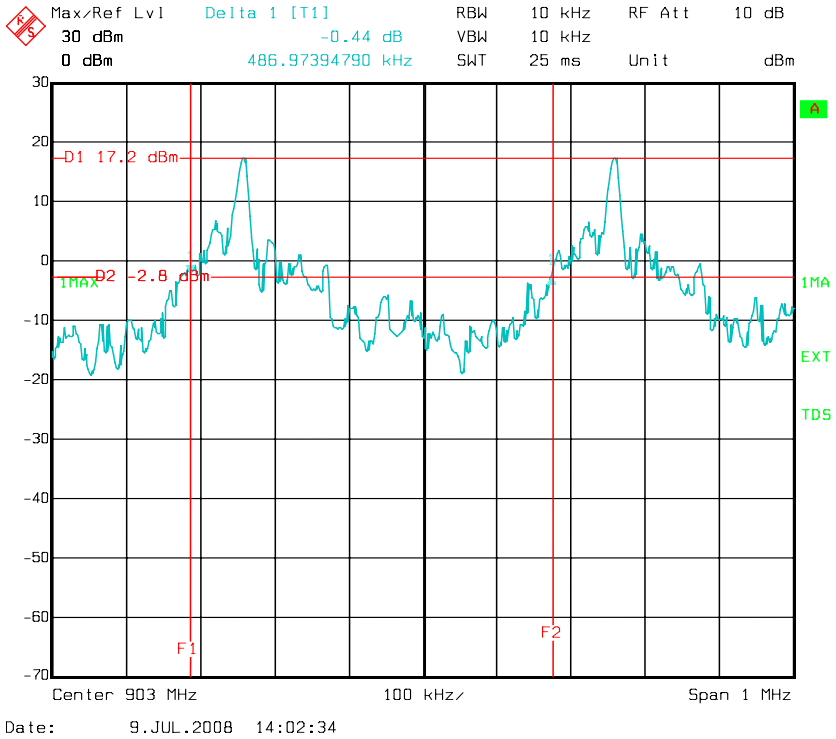
927.25MHz Gen2



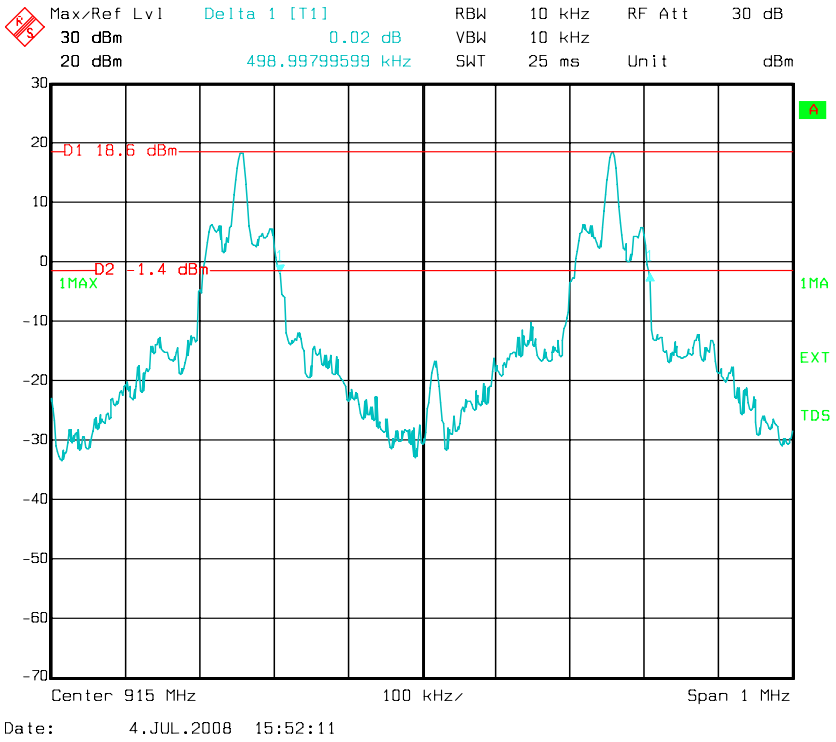
Frequencies: 902.5 MHz and 903.5 MHz in GEN2 mode



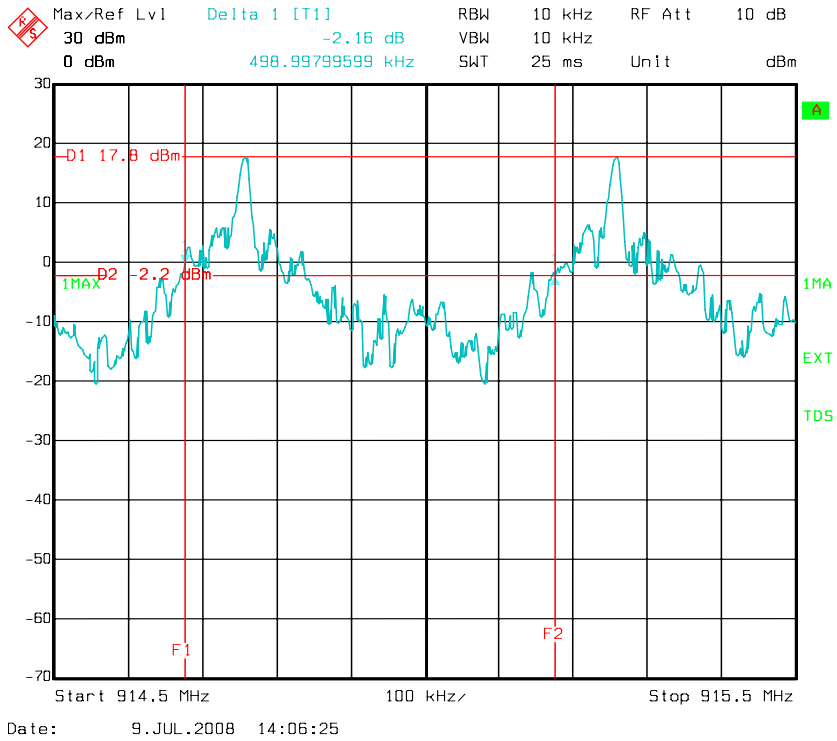
Frequencies: 902.5 MHz and 903.5 MHz in Class0 mode



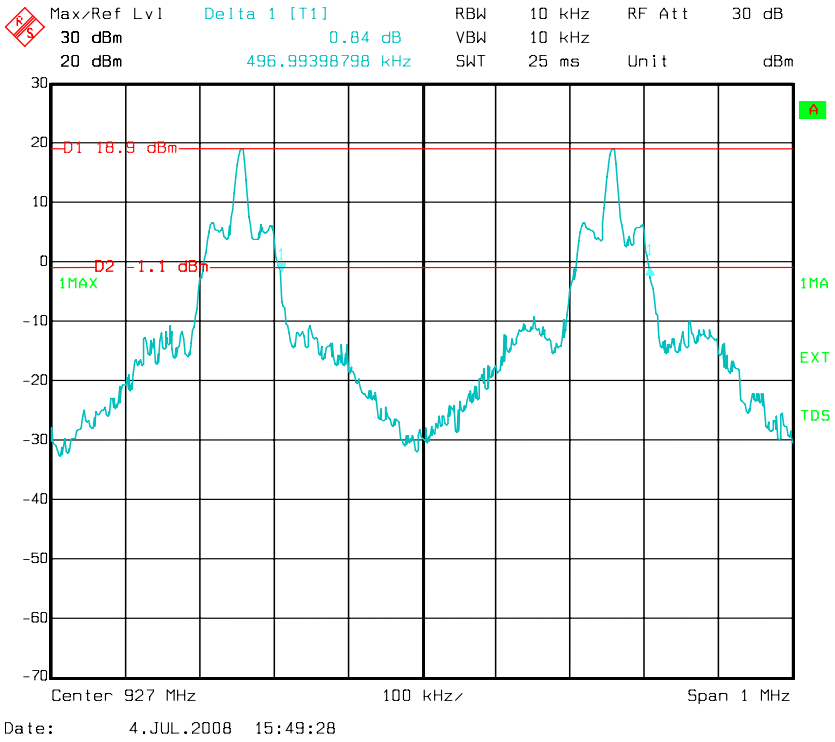
Frequencies: 914.5 MHz and 915.5 MHz in GEN2 mode



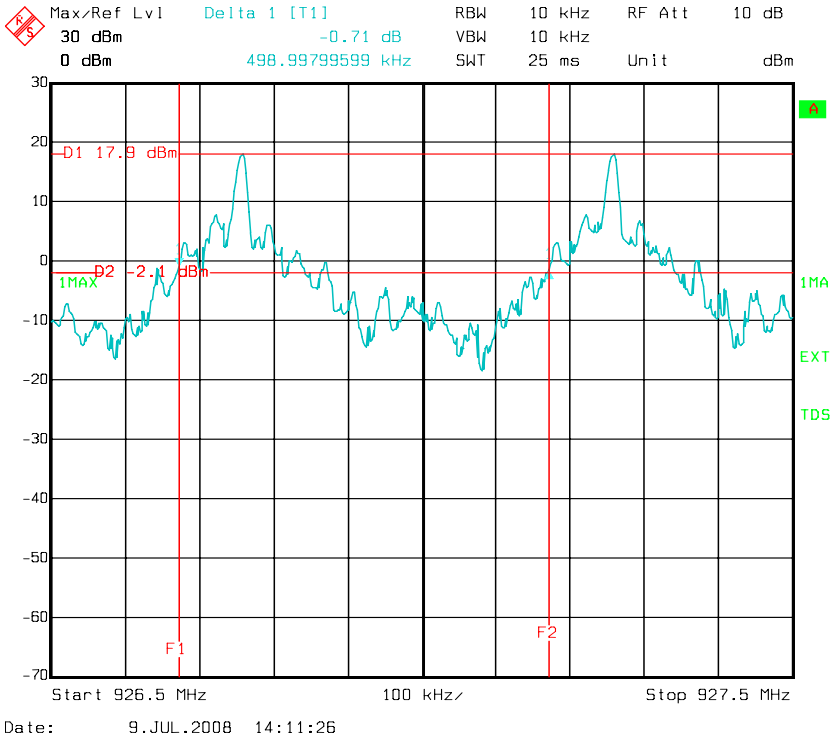
Frequencies: 914.75 MHz and 915.25 MHz in Class0 mode



Frequencies: 926.75 MHz and 927.25 MHz in GEN2 mode



Frequencies: 926.25 MHz and 926.75 MHz in class 0 mode



In Gen 2 mode

The 20dB bandwidth of each hopping channel is **110.22 kHz** (less than 500 kHz)
The channel separation is almost **500 kHz** which is greater than the 20dB bandwidth.

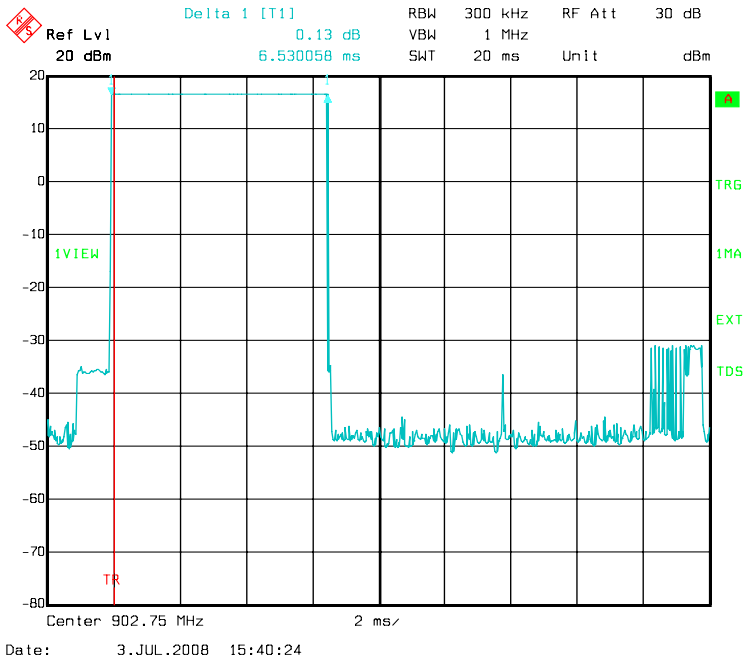
In class 0 mode

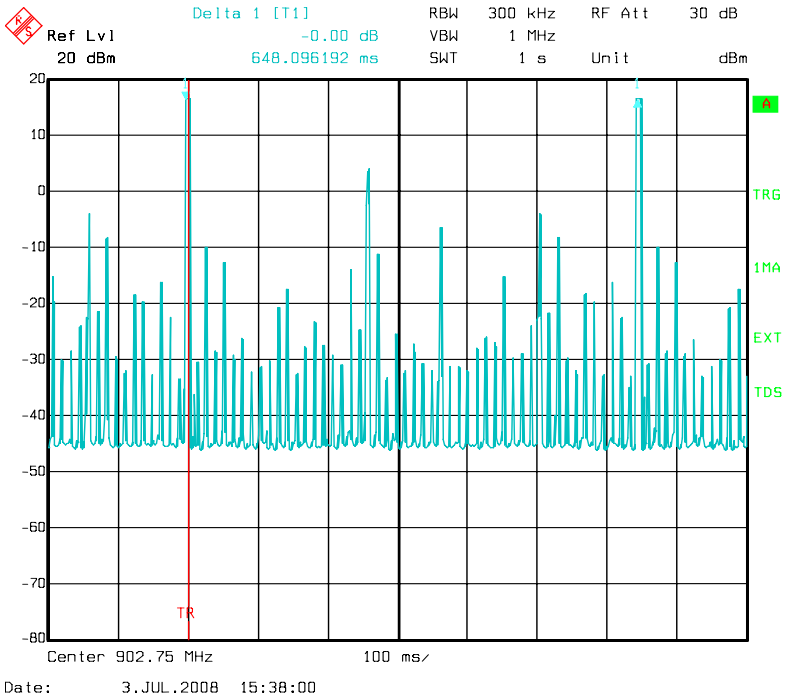
The 20dB bandwidth of each hopping channel is **176.35 kHz** (less than 500 kHz)
The channel separation is almost **500 kHz** which is greater than the 20dB bandwidth.

9.4.2 Duty cycle measurement

902.75 MHz Class 0 mode

The measurement during a continuous communication gives **6.53ms every 648ms** on each channel so the average time within a period of 20 seconds is **201.5 ms** which is less than the 400 ms limit.
The worst case of a real communication with the tag has been measured by the applicant (described in Exhibit 12 operational description) and is **66 ms**: less than the 400ms limit.

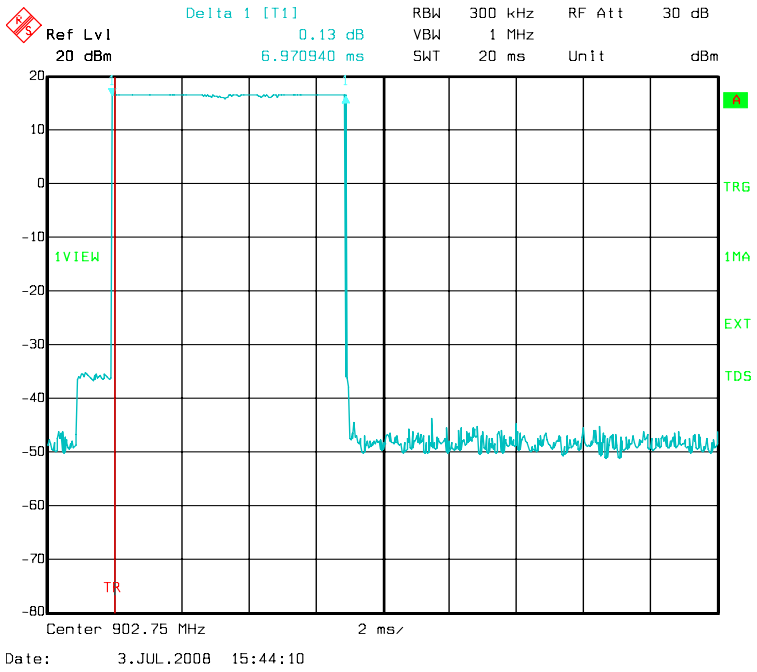


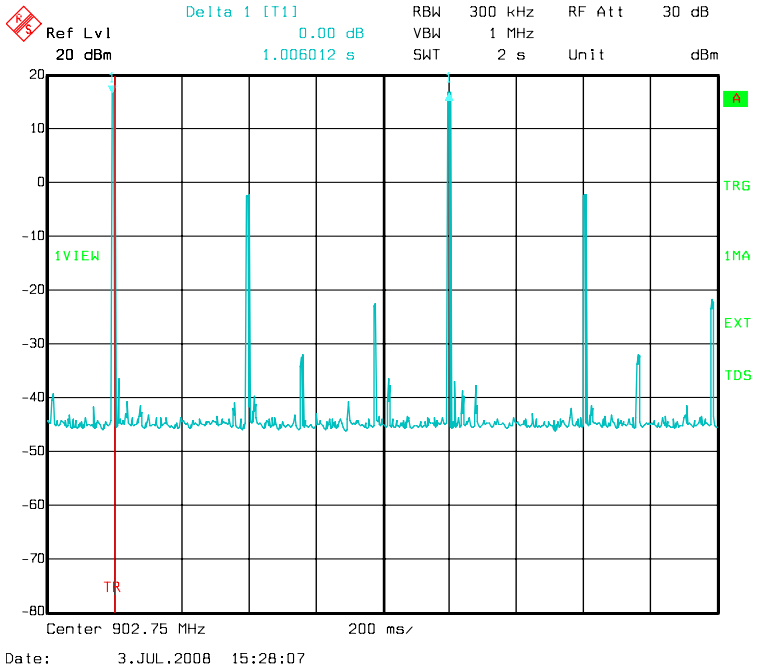


That gives a maximum of 1 transmissions in a period of 100 ms so the duel time correction factor for spurious measurement is 20Log(1x6.53/100) = **-23.70 dB**. But the worst case of a real communication has been measured by the manufacturer to be 18ms. That gives a correction factor of **-14.9 dB.**

902.75 MHz Gen2 mode

The measurement during a long transmission gives **6.97ms every 1s** on each channel so the average time within a period of 20 seconds is **140 ms** which is less than the 400 ms limit. The worst case of a real communication with the tag has been measured by the applicant (described in Exhibit 12 operational description) and is **208.5 ms**: less than the 400ms limit.

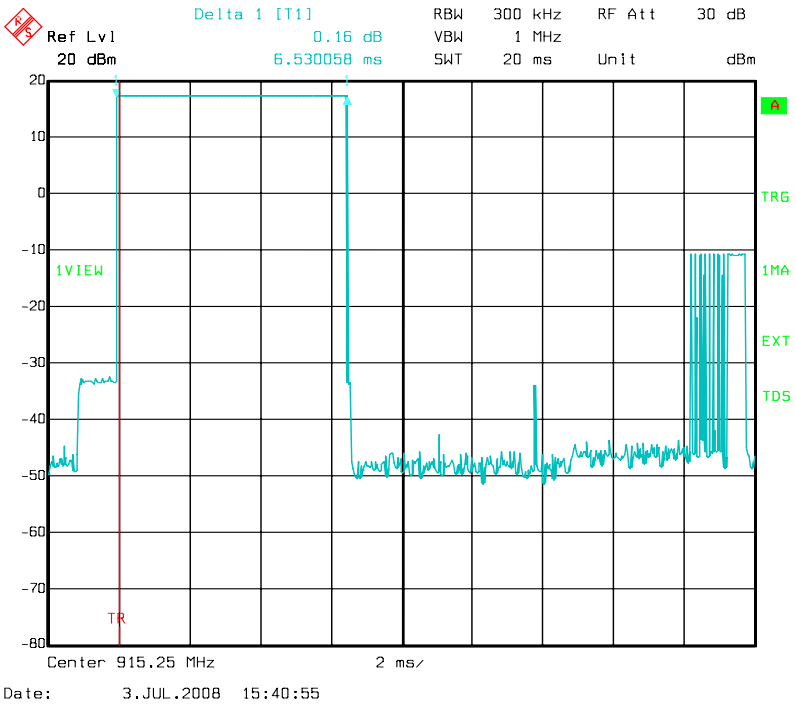


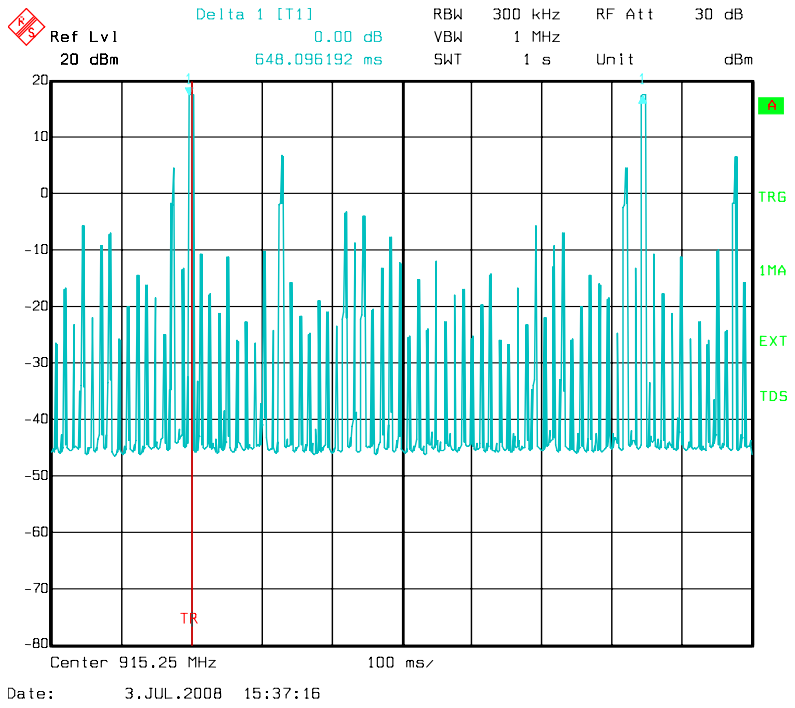


That gives a maximum of 1 transmissions in a period of 100 ms so the duel time correction factor for spurious measurement is 20Log(1x6.97/100) = **-23.14 dB**. But the worst case of a real communication has been measured by the manufacturer to be 200 ms. That gives a correction factor of **0 dB.**

915.25 MHz Class 0 mode

The measurement during a long transmission gives **6.53ms every 648ms** on each channel so the average time within a period of 20 seconds is **201.5 ms** which is less than the 400 ms limit.

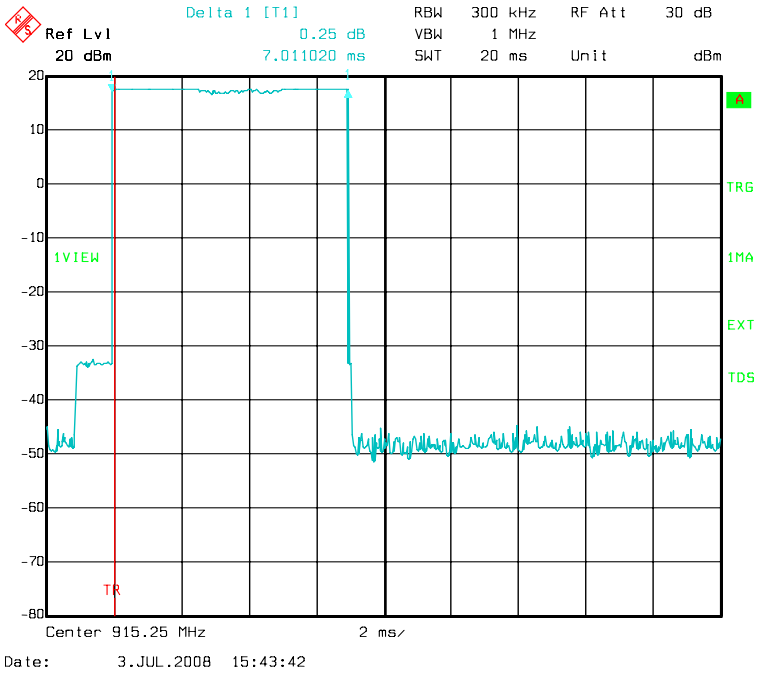


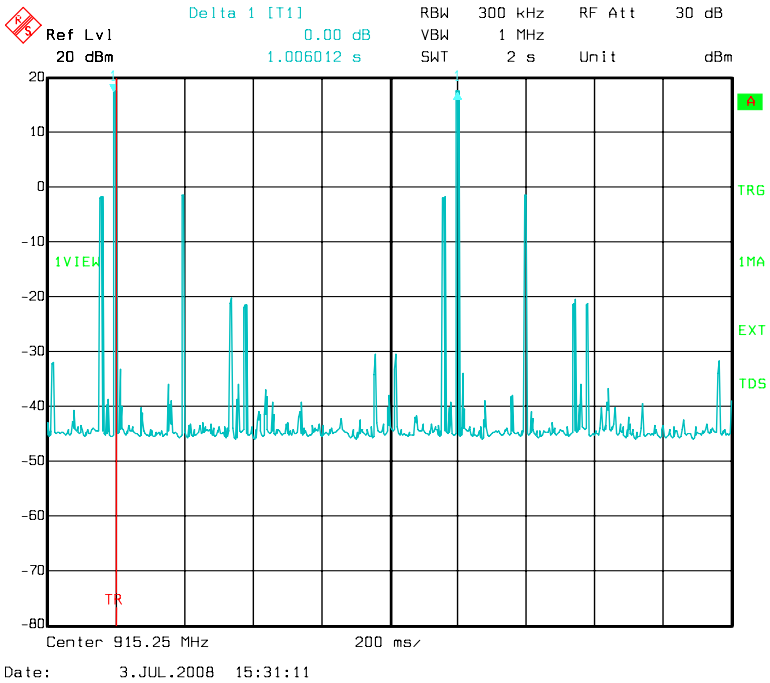


That gives a maximum of 1 transmissions in a period of 100 ms so the duel time correction factor for spurious measurement is 20Log(1x6.53/100) = **-23.70 dB**.

915.25 MHz Gen2 mode

The measurement during a long transmission gives **7.01ms every 1s** on each channel so the average time within a period of 20 seconds is **140.2 ms** which is less than the 400 ms limit.

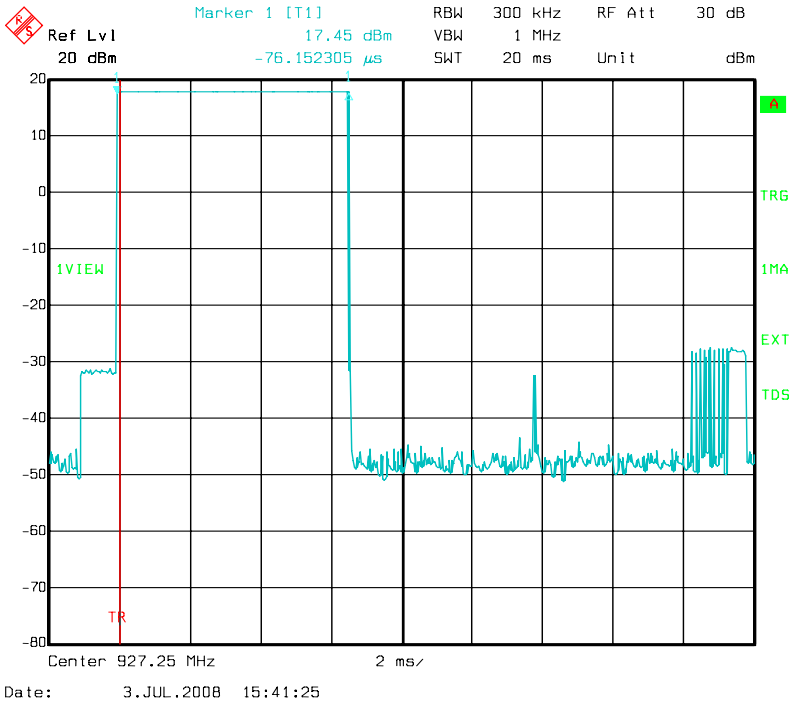


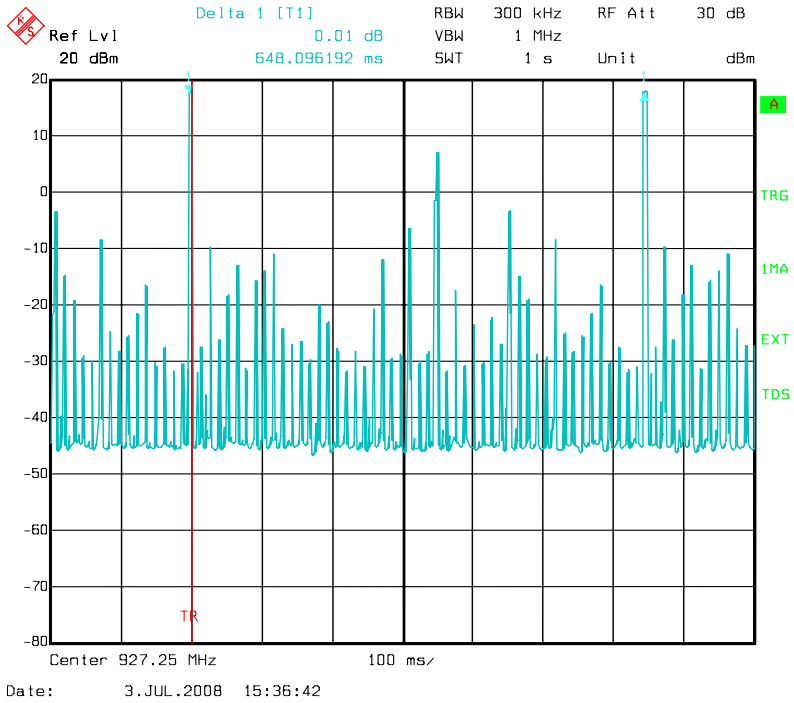


That gives a maximum of 1 transmissions in a period of 100 ms so the duel time correction factor for spurious measurement is 20Log(1x7.01/100) = **-23.09 dB**.

927.25 MHz Class 0 mode

The measurement during a long transmission gives **6.55ms every 1s** on each channel so the average time within a period of 20 seconds is **140.2 ms** which is less than the 400 ms limit.

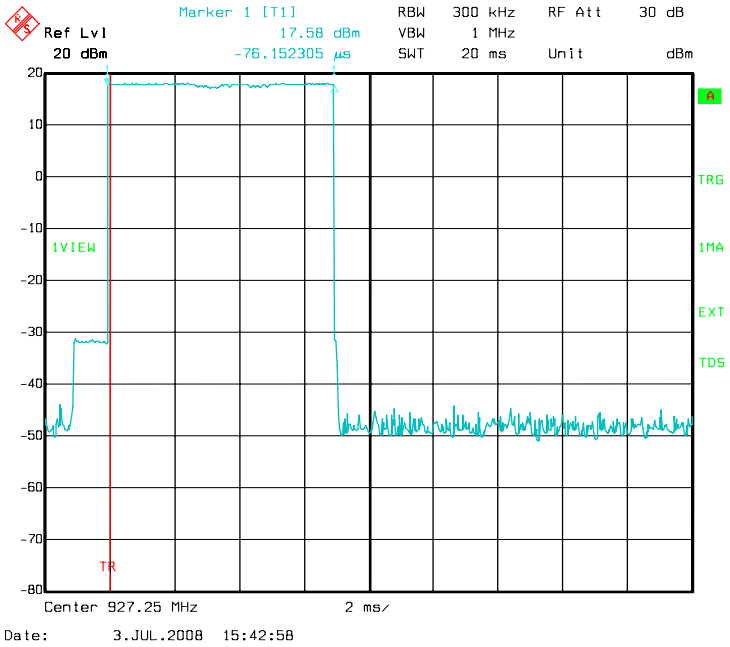


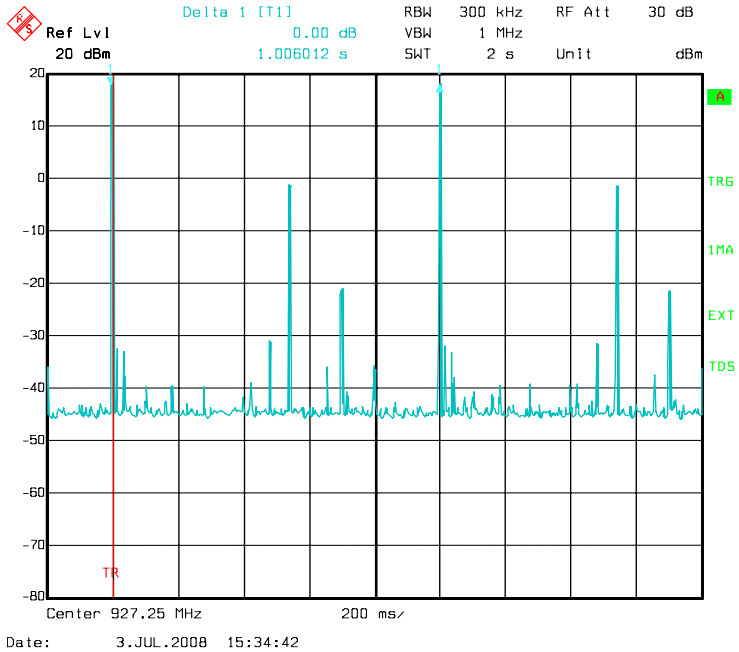


That gives a maximum of 1 transmissions in a period of 100 ms so the duel time correction factor for spurious measurement is 20Log(1x6.55/100) = **-23.74 dB**.

927.25 MHz GEN2 mode

The measurement during a long transmission gives **7.02ms every 1s** on each channel so the average time within a period of 20 seconds is **140.4 ms** which is less than the 400 ms limit.





That gives a maximum of 1 transmissions in a period of 100 ms so the duel time correction factor for spurious measurement is 20Log(1x7.02/100) = **-23.07 dB**.

9.4.3 Maximum peak output power

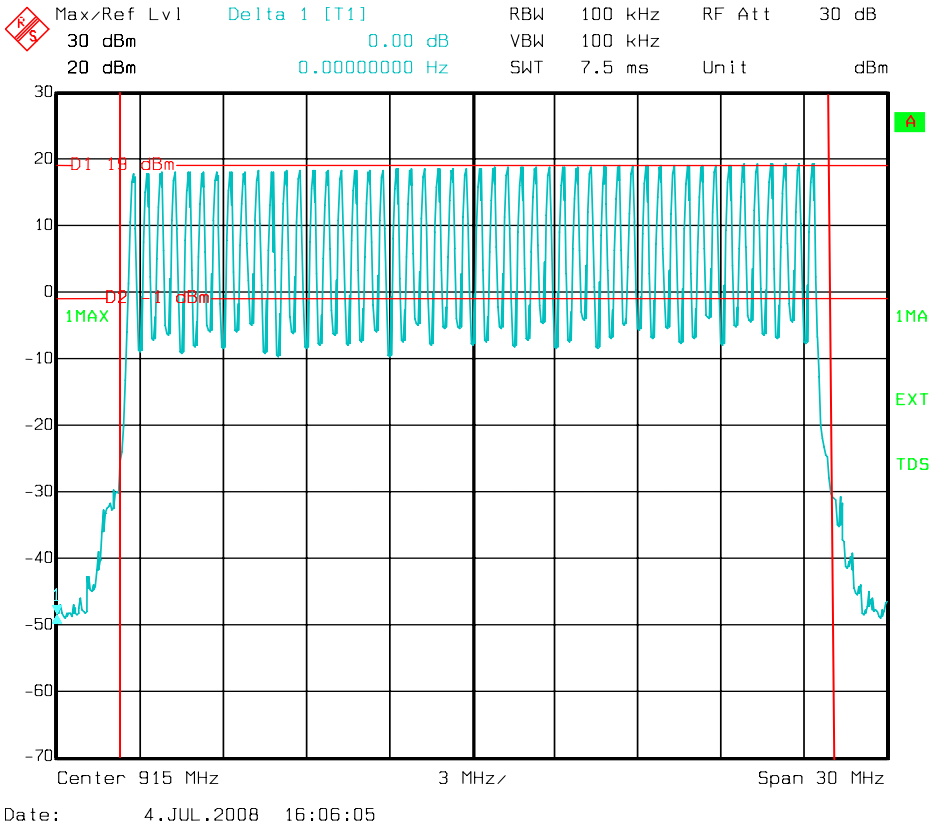
The maximum peak conducted power limit is 1W.
Measurement are done with RBW greater than the 20dB bandwidth.
A specific antenna connector is provided; measurement is done at antenna connector.
With additional Measurement at 3 m in OATS

Results	Frequency (MHz)	Power (mW)	Peak at 3m (dBµV/m)	Peak at 3m in 100kHz RBW
Lowest channel	902.75	58	94.0	93.1
Middle channel	915.25	70	99.1	99.1
Highest channel	927.25	**81**	**101.6**	**101.6**

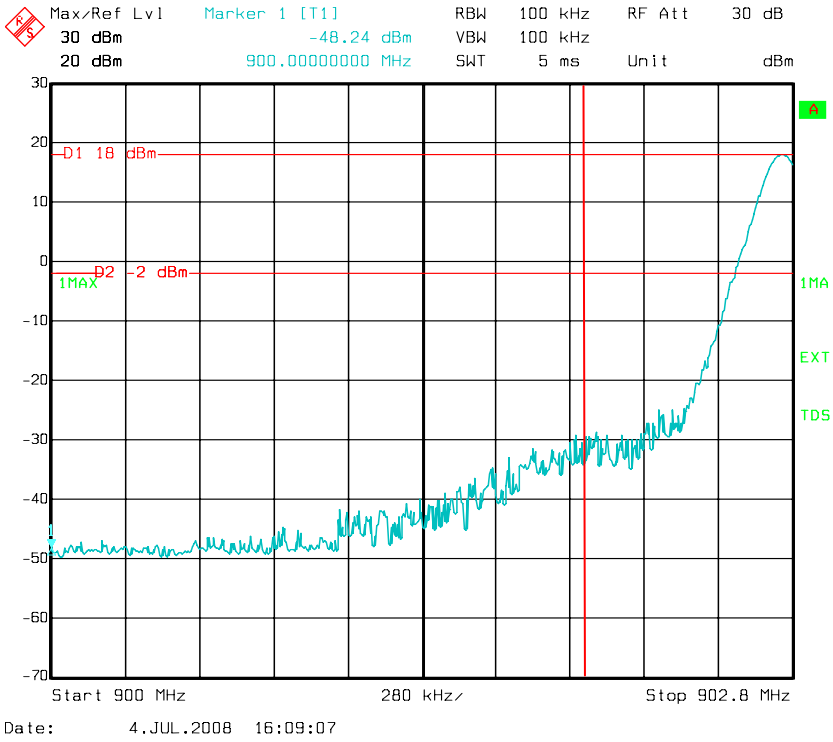
Power measurement done with input voltage at 90V, 120V and 264V without any change (delta lower than 0.1 dBm).

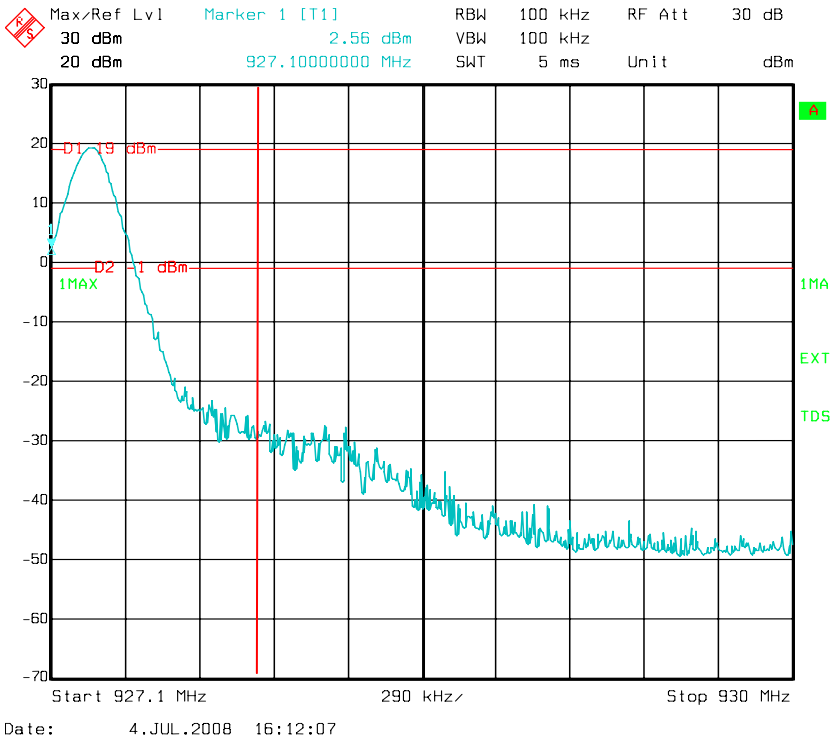
9.4.4 Spurious emissions (15.247 § (d))

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 this limit with or without hopping:
Wit hopping :



Without hopping





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

Spurious emissions measurement results from 1GHz to 10GHz:

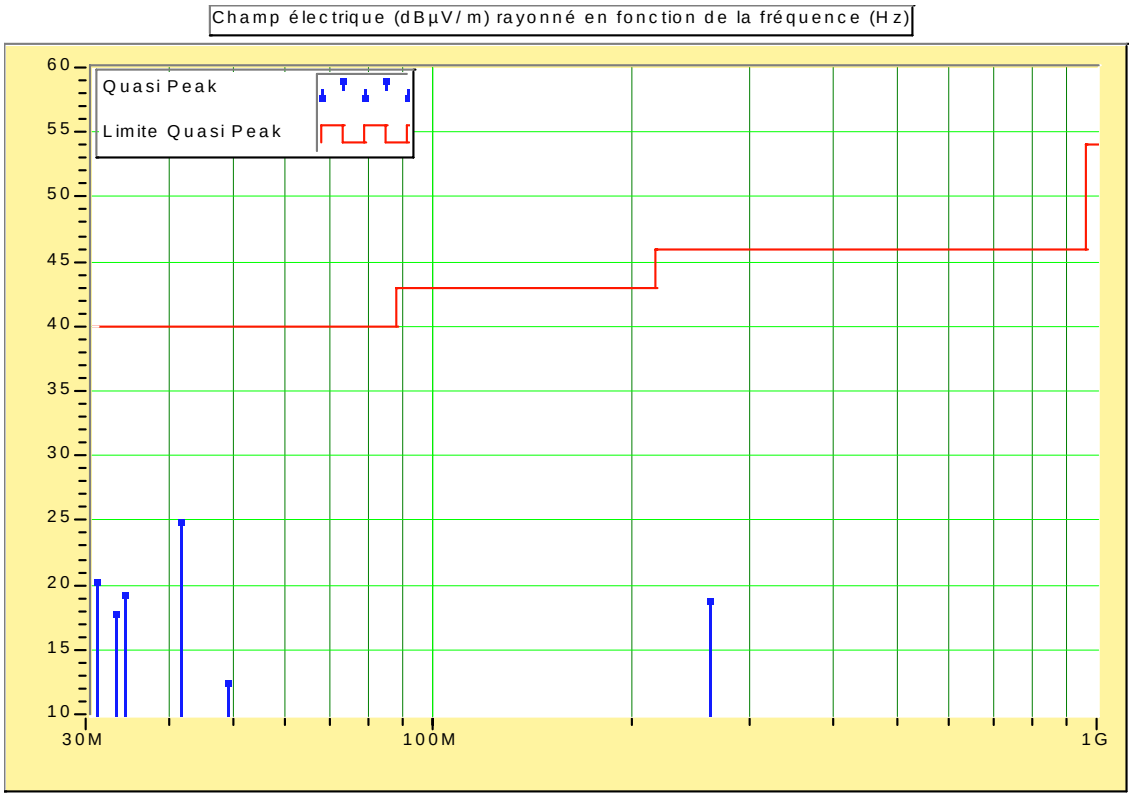
In restricted bands, a pre-scan measurement is done very close to the product (less than 10cm) with 100kHz RBW and a max peak detector. Then measurements are performed at 1 m with 1MHz RBW and a video averaging (10Hz) for spurious measurement with normal hopping emission and reception.
Harmonics are 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 (conducted measurement).
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.

9.4.4.1 Results below 1GHz:

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.
Peak measurements are made with 100kHz RBW and QP with 120kHz RBW.

For both mode Class 0 and Gen 2. intentional radiator and Class B non intentional radiator

Frequency (MHz)	Peak (dBµV/m)	Quasi peak (dBµV/m)	Limits Pk or QP	Margin (dB)	Polar.	Height (cm)	Angle (°)	Factor Corr. (dB)
31.085	25.3	20.3	40.0	19.7	V	101	3	18,2
33.379	23.9	17.8	40.0	22.2	V	102	358	16,9
34.334	21.6	19.2	40.0	20.8	V	119	7	16,6
41.741	35.4	24.8	40.0	15.2	V	104	4	13,6
49.135	22.6	12.5	40.0	37.5	V	225	361	11,3
259.672	18.3	18.8	46.0	27.2	H	140	299	17,1



9.4.4.2 Spurious RESULTS over 1GHz:

Conducted emissions or radiated emissions (in restricted bands) over 1GHz
No spurious founded outside harmonics.

Max spurious for 902.75MHz channel with GEN 2 mode

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m Or Conducted (dBm)	Peak Limit Conducted (dBm)	Peak limit At 3m (dBµV/m)	Avg Limit At 3m (dBµV/m)	Min. Margin (dB)
1 806	2	-43.6	-0.9			42.7
2 708	3	NF		74.0	54.0	20
3 611	4	NF		74.0	54.0	20
4 514	5	NF		74.0	54.0	20
5 417	6	NF		74.0	54.0	20
6 319	7	NF	-0.9			20
7 222	8	NF	-0.9			20
8 125	9	NF		74.0	54.0	20
9 028	10	NF		74.0	54.0	20

(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 902.75 with Class 0 mode

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m Or Conducted (dBm)	Peak Limit Conducted (dBm)	Peak limit At 3m (dBµV/m)	Avg Limit At 3m (dBµV/m)	Min. Margin (dB)
1 806	2	-42.9	-0.9			42
2 708	3	NF		74.0	54.0	20
3 611	4	NF		74.0	54.0	20
4 514	5	NF		74.0	54.0	20
5 417	6	NF		74.0	54.0	20
6 319	7	NF	-0.9			20
7 222	8	NF	-0.9			20
8 125	9	NF		74.0	54.0	20
9 028	10	NF		74.0	54.0	20

Max spurious for 915.25 with GEN 2 mode

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m Or Conducted (dBm)	Peak Limit Conducted (dBm)	Peak limit At 3m (dBµV/m)	Avg Limit At 3m (dBµV/m)	Min. Margin (dB)
1 830	2	-44.5	-0.9			43.6
2 744	3	NF		74.0	54.0	20
3 659	4	NF		74.0	54.0	20
4 574	5	NF		74.0	54.0	20
5 489	6	NF	-0.9			20
6 403	7	NF	-0.9			20
7 318	8	NF		74.0	54.0	20
8 233	9	NF		74.0	54.0	20
9 148	10	NF		74.0	54.0	20

Max spurious for 915.25 with Class 0 mode

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m Or Conducted (dBm)	Peak Limit Conducted (dBm)	Peak limit At 3m (dBµV/m)	Avg Limit At 3m (dBµV/m)	Min. Margin (dB)
1 830	2	-44.6	-0.9			43.7
2 744	3	NF		74.0	54.0	20
3 659	4	NF		74.0	54.0	20
4 574	5	NF		74.0	54.0	20
5 489	6	NF	-0.9			20
6 403	7	NF	-0.9			20
7 318	8	NF		74.0	54.0	20
8 233	9	NF		74.0	54.0	20
9 148	10	NF		74.0	54.0	20

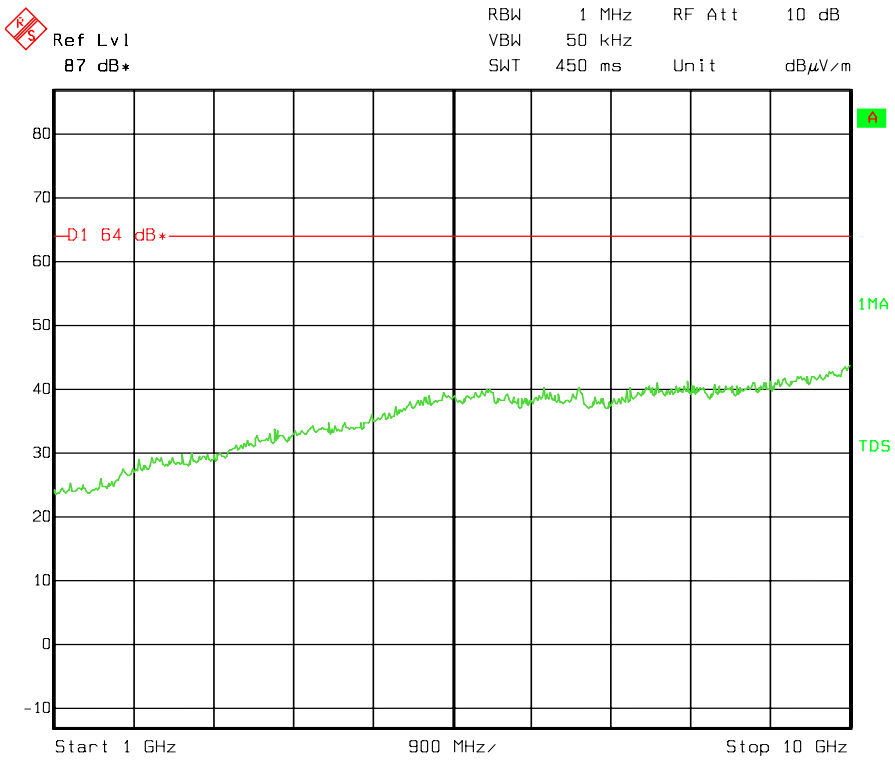
Max spurious for 927.25 with GEN 2 mode

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m Or Conducted (dBm)	Peak Limit Conducted (dBm)	Peak limit At 3m (dBµV/m)	Avg Limit At 3m (dBµV/m)	Min. Margin (dB)
1 855	2	-45.5	-0.9			44.6
2 782	3	NF		74.0	54.0	20
3 709	4	NF		74.0	54.0	20
4 636	5	NF		74.0	54.0	20
5 564	6	NF	-0.9			20
6 491	7	NF	-0.9			20
7 418	8	NF		74.0	54.0	20
8 345	9	NF		74.0	54.0	20
9 273	10	NF	-0.9			20

Max spurious for 927.25 with Class 0 mode

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m Or Conducted (dBm)	Peak Limit Conducted (dBm)	Peak limit At 3m (dBµV/m)	Avg Limit At 3m (dBµV/m)	Min. Margin (dB)
1 855	2	-46.1	-0.9			45.2
2 782	3	NF		74.0	54.0	20
3 709	4	NF		74.0	54.0	20
4 636	5	NF		74.0	54.0	20
5 564	6	NF	-0.9			20
6 491	7	NF	-0.9			20
7 418	8	NF		74.0	54.0	20
8 345	9	NF		74.0	54.0	20
9 273	10	NF	-0.9			20

Noise Floor



9.4.5 Receiver spurious radiation

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

9.4.6 Antenna gain (15.247 § (b)(4)

Measurement of radiated emission reported at previous § shows a maximum gain of -12dBi (0.053) for highest channel. The antenna is designed to communicate at few mm.

The antenna gain is less than 6dBi.

9.4.7 Antenna requirements

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