TEST REPORT

According to FCC, CFR 47 Part 15

CSP COM 915MHz

N°027131-CC-1-a

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This report concerns :	**Original grant** ✓ **Class II change**
Equipment tested :	**CSP COM 915MHz**
Equipment FCC ID :	**VPM-CSP915**
Designed by :	**CANBERRA** **ZI de Vauzelle** **37600 LOCHES**
Manufactured by :	**CANBERRA** **ZI de Vauzelle** **37600 LOCHES**

Deferred grant requested per 47 CFR 0.457 (d)(1)(ii) **YES** ☐ **NO** ✓

if yes, defer until :

Company Named agrees to notify the Commission by :

of the intended date of announcement of the product so that the grant can be issued on the date

Transition rules requested per 15.37? **YES** ☐ **NO** ✓

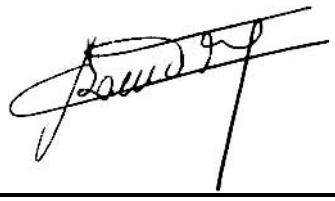
If no, assumed Part 15, Subpart B for intentional or unintentional radiator

The new 47 CFR [10-1-96 edition] provision

Summary

Other associated files :
027131 Exhibit 1 ID label VPM-CSP915
027131 Exhibit 2 External Photographs VPM-CSP915
027131 Exhibit 2b Internal Photographs VPM-CSP915
027131 Exhibit 4 user notice 86338_A VPM-CSP915
027131 Exhibit 5 Test set up photos VPM-CSP915
027131 Exhibit 6a block diagram VPM-CSP915
027131 Exhibit 6b SCM Motherboard VPM-CSP915
027131 Exhibit 6c SCM Daugtherboard VPM-CSP915
027131 Exhibit 6d RF Synoptic&desciption VPM-CSP915
027131 Exhibit 6e RF BOM VPM-CSP915
027131 Exhibit 6f RF data sheet VPM-CSP915
027131 Exhibit 6g RF schematic VPM-CSP915
027131 Exhibit 6h BOM Motherboard VPM-CSP915
027131 Exhibit 6i BOM Daugtherboard VPM-CSP915
027131 Exhibit 7 CAN02_08301_A System description VPM-CSP915

1 Reference and record of revisions of the test report:

Test report number :	**Revision :**	**Number of pages**	**Modification reasons :**
027131-CC-1-a	a	22	Creation
Redactor :JL JAMET & O.ROY			**Date of writing** : July 30, 2008
Technical control: O. ROY 			**Quality Control: P. BOURVON** 

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.

3 GENERAL INFORMATION:

3.1 APPLICANT:

CANBERRA
ZI de Vauzelle
37600 LOCHES

3.2 MANUFACTURER:

CANBERRA
ZI de Vauzelle
37600 LOCHES

3.3 TEST DATE:

October 22-25, 2007, July 2 2008

3.4 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 a data transmitter system with a radio part is written in accordance with Part 15 of the Federal Communications Commissions. The Equipment under Test (EUT) was a CSP COM 915MHz used with sensor SG-2R. 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.

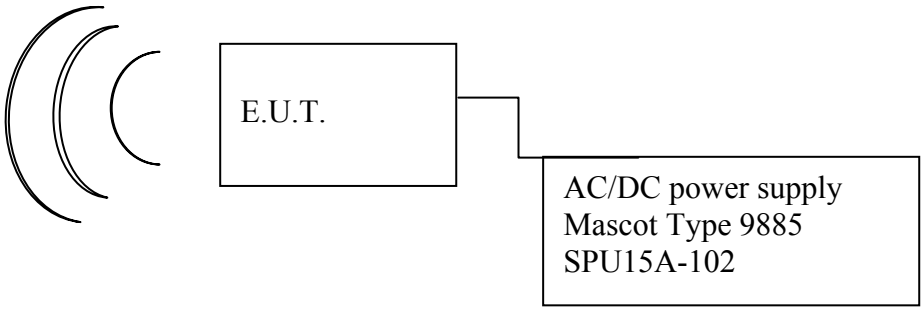
All radiated emissions measurements were performed manually at GYL TECHNOLOGIES. The radiated emissions measurements required by the rules were performed on the three to ten meters, open field, test site maintained by GYL Technologies Parc d'activités de Lanserre, 49610 Juigné sur Loire , France. Complete 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 TECHNOLOGIES NUMBER	CALIBRATION DATE
RECEIVERS				
Receiver	Rohde & Schwarz	ESI 7	M02020	May-07, May 08
Spectrum analyzer	Rohde & Schwarz	FSEM 30	M02021	May-07, May 08
Filter 150 kHz	Rohde & Schwarz	EZ25	M02040	July-07
ARTIFICIAL MAINS NETWORKS				
LISN (50µH / 5/50Ω)	Rohde & Schwarz	ESH3-Z5	M02027	Jan-07
ANTENNAS				
Bilog (30-2000MHz)	CHASE	CBL-6112	M02031	June-07
Bilog (30-2000MHz)	CHASE	CBL-6112	M02032	June-07
Horn antenna	EMCO	3115	M02045	Jan-07, Jan-08

6 CONFIGURATION OF TESTED SYSTEM:

For all tests, the device under test was tested alone. It doesn't need any other equipment.



7 EXERCISING TEST CONDITIONS:

On the CSP com 915 MHz, we press the on/off key, when the blue LED blinks the product is ready. Power supply box is powered with 120V 60Hz.

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: 2006	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 part of an alarm system. It can be installed in residential commercial or light industry areas. The following sub clauses of the standard mentioned above are:

- Part 15.207 and 15.209 (subpart C) for respectively conducted and radiated emission for intentional radiator.
- Part 15.247 for intentional radiator in 902-928 MHz band.

9 TEST ACCORDING TO CFR 47 Part 15

Tests performed by Olivier ROY and Jean-Luc JAMET at GYL Technologies laboratories from October 22 to October 25, 2007. Complementary tests of channel separation done on June 2008.

9.1 REFERENCE DOCUMENTATION:

FCC part 15 (Sub part B) §15.207, §15.209 and §15.247 of 2005

9.2 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

9.3 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 15dB, 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 15dB, 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.

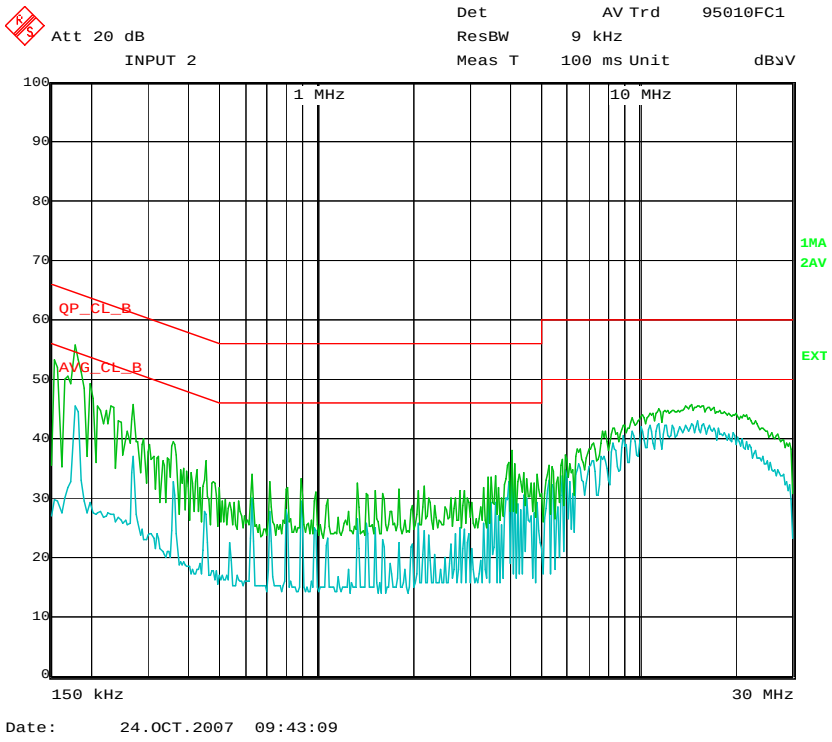
The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and LIVE SIDE, herein referred to as Neutral, and Live respectively.

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

9.3.1 Power supply

9.3.1.1 Neutral:

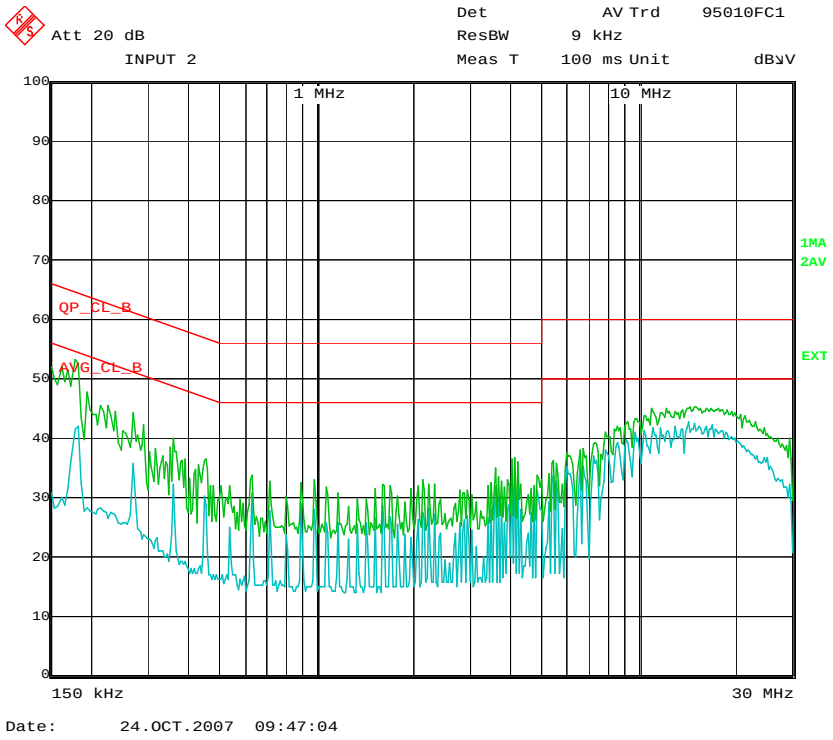
Legend: Blue curve represents average values
Green curve represents the peak values



Frequency	Quasi-Peak Measure	Quasi-Peak Limit	Margin
MHz	dBµV	dBµV	dB
0,178	53,4	64,6	11,2
14,900	45,0	60,0	15
15,450	45,6	60,0	14,4
16,000	45,8	60,0	14,2
16,250	45,5	60,0	14,5
16,890	45,2	60,0	14,8

Frequency	Average Measure	Average Limit	Margin
MHz	dBµV	dBµV	dB
0,178	35,6	50,0	14,4
14,900	39,1	50,0	10,9
15,450	39,5	50,0	10,5
16,000	39,4	50,0	10,6
16,250	40,5	50,0	9,5
16,890	40,3	50,0	9,7

9.3.1.2 LIVE:



Frequency	Quasi-Peak Measure	Quasi-Peak Limit	Margin
MHz	dBµV	dBµV	dB
14,702	44,9	60,0	15,1
14,970	45,2	60,0	14,8
15,330	45,8	60,0	14,2
15,598	45,8	60,0	14,2
16,226	45,6	60,0	14,4
16,942	45,0	60,0	15,0

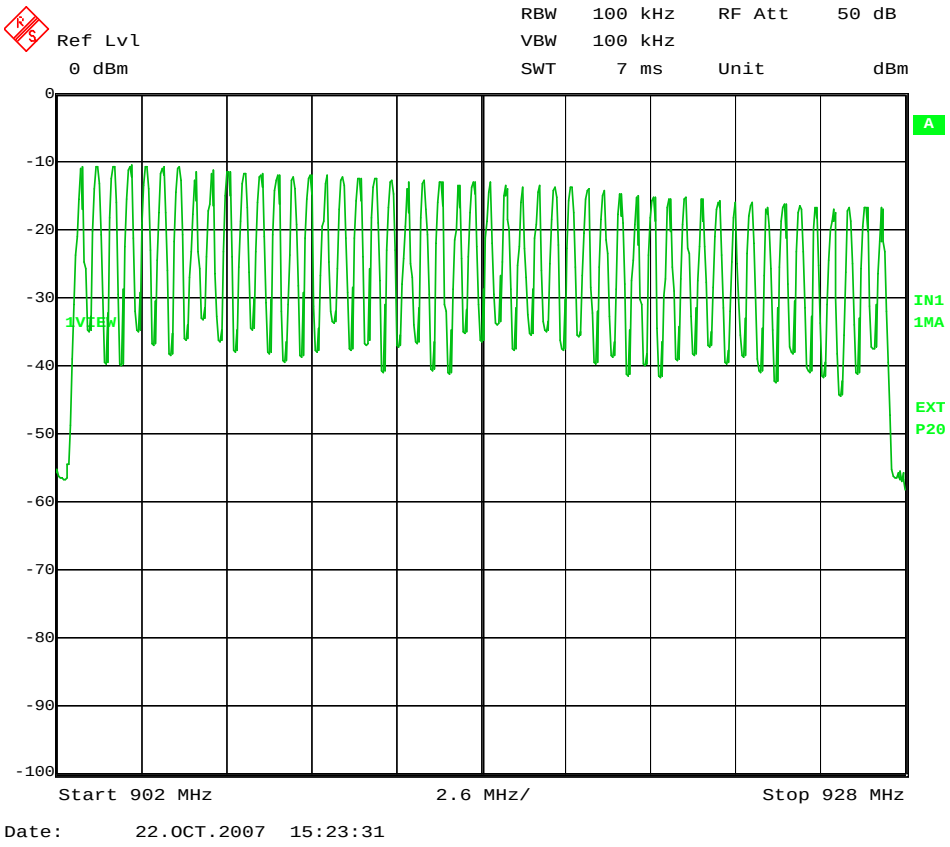
Frequency	Average Measure	Average Limit	Margin
MHz	dBµV	dBµV	dB
14,702	40,2	50,0	9,8
14,970	40,0	50,0	10,0
15,330	40,4	50,0	9,6
15,598	40,0	50,0	10,0
16,226	40,0	50,0	10,0
16,942	39,6	50,0	10,4

9.4 INTERPRETATION AND REMARKS:

The equipment complies with the §15.207 requirements.

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

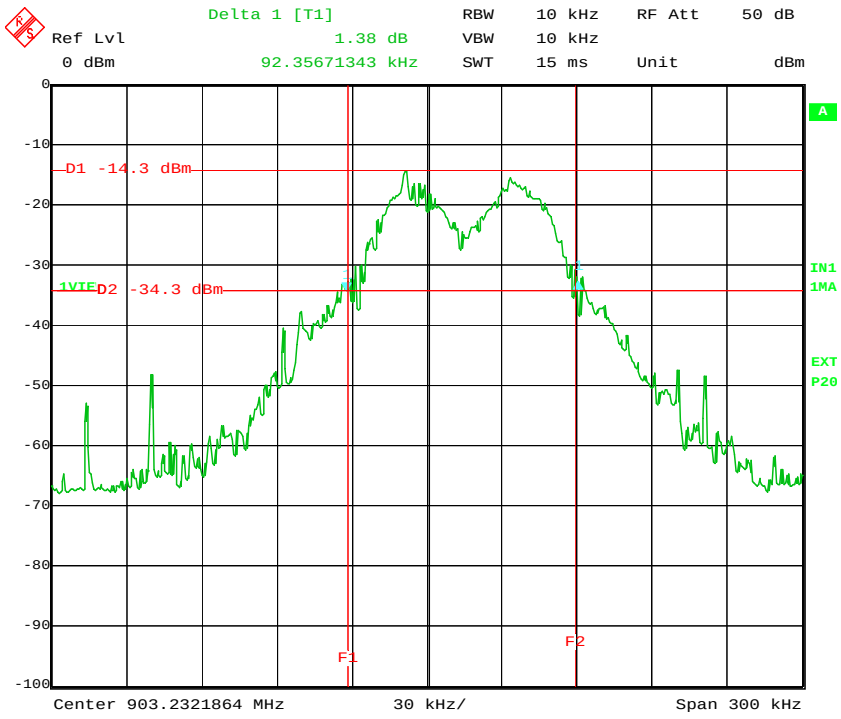
The system uses 50 channels numbered from 1 to 50
For details of frequency hopping technology used see Exhibit 7 description.

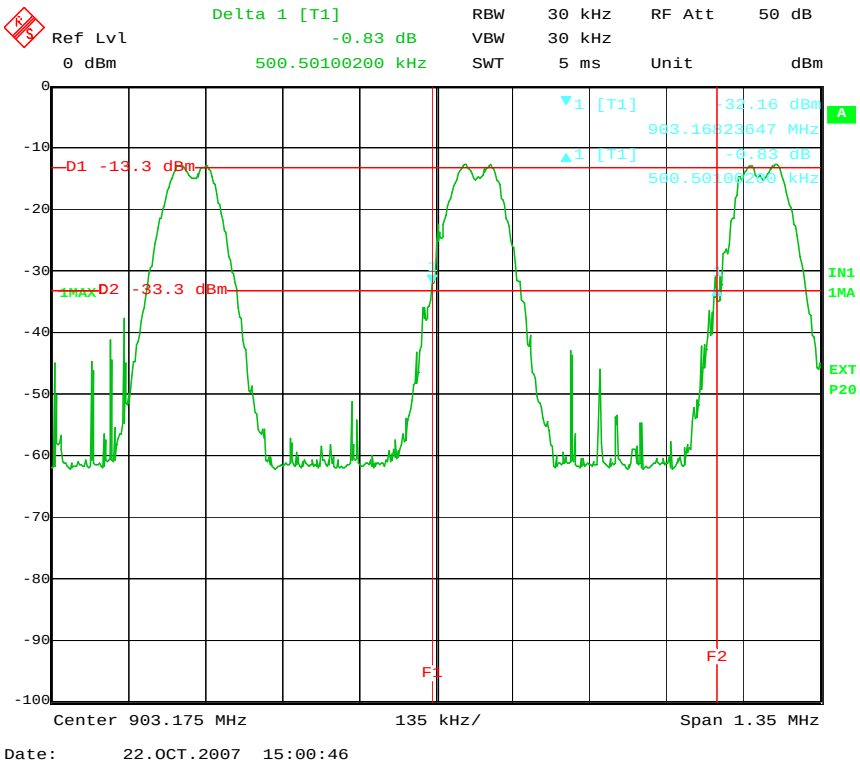


9.5.1 Frequency hopping channel separation (15.247 (a) (1))

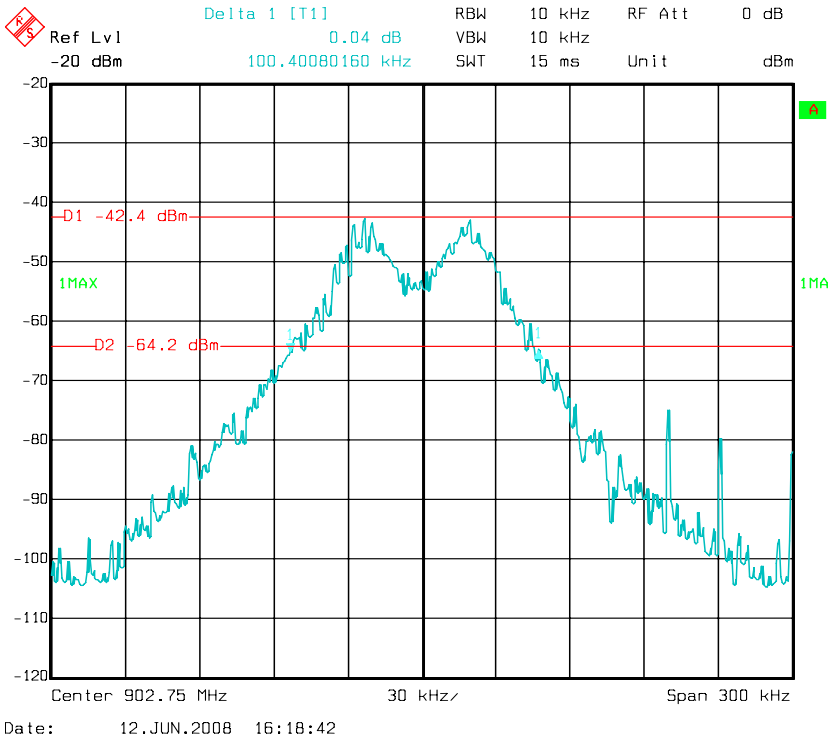
The 20dB bandwidth of each hopping channel is around 100 kHz (less than 250 kHz)
The channel separation is between 440kHz and 560 kHz (with an average at 500kHz) which is greater than the 20dB bandwidth.

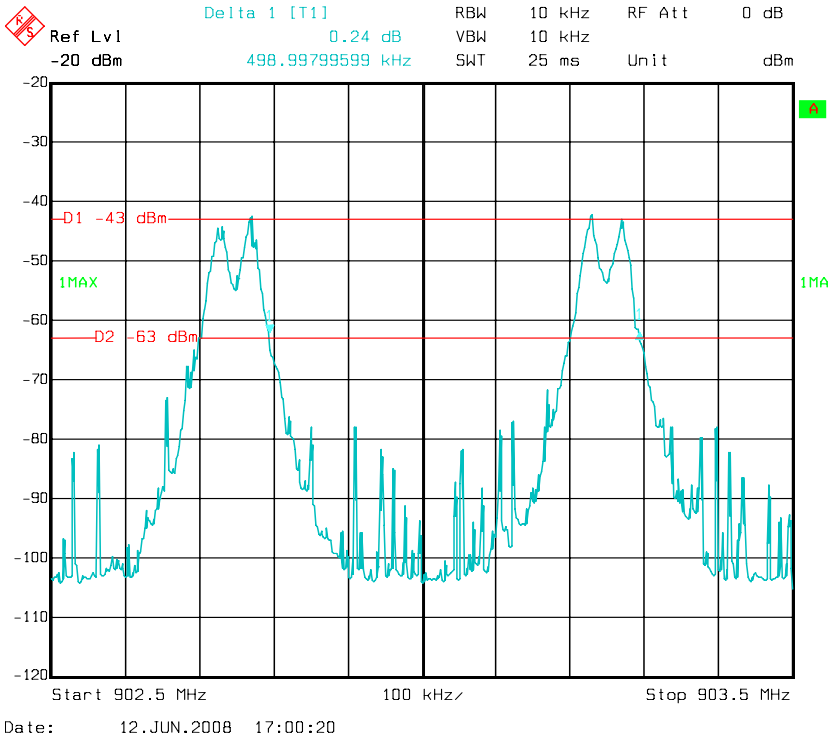
For a central channel



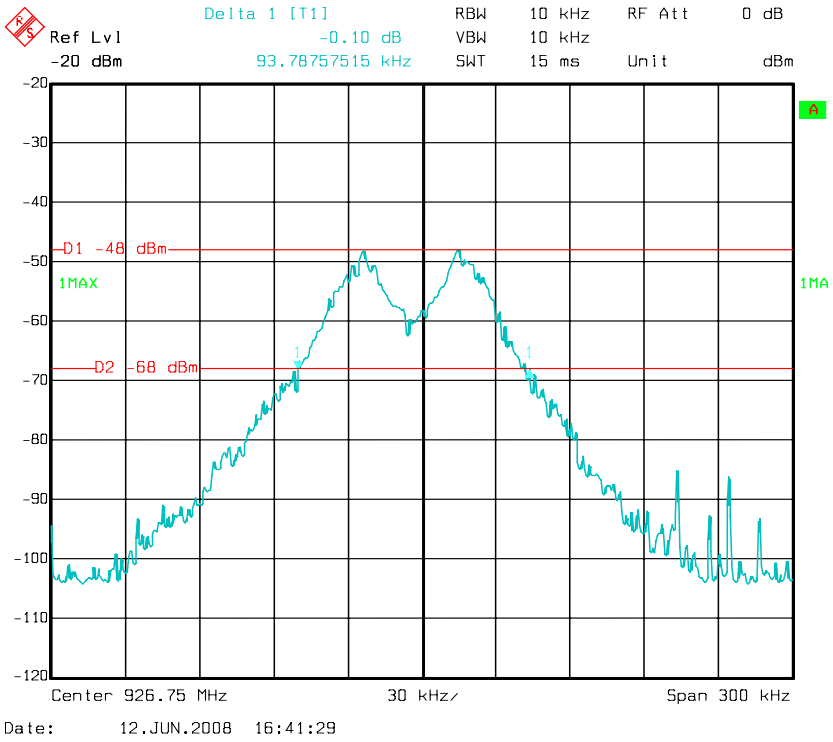


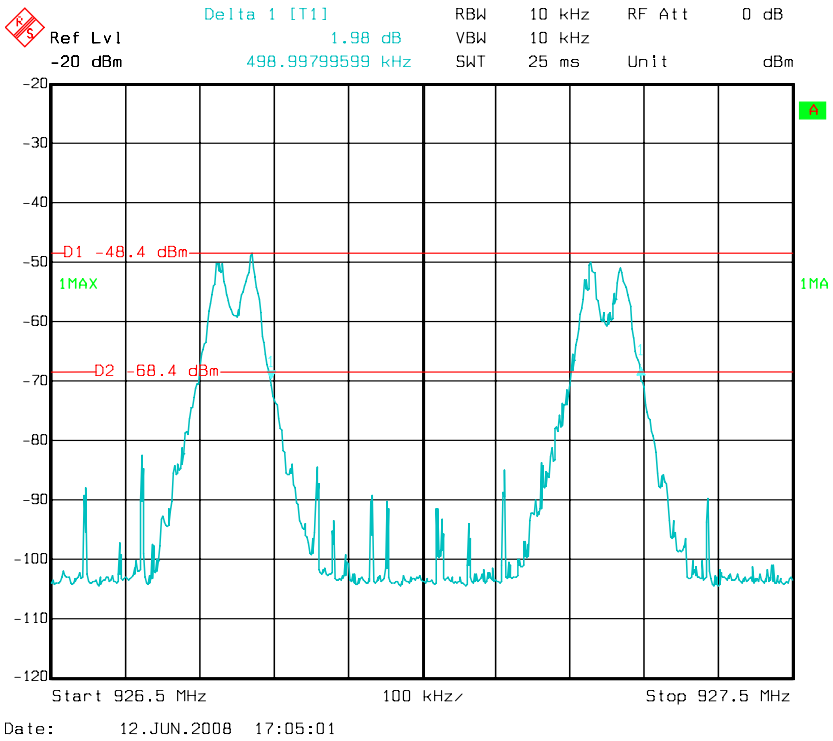
For a channel near bottom frequency



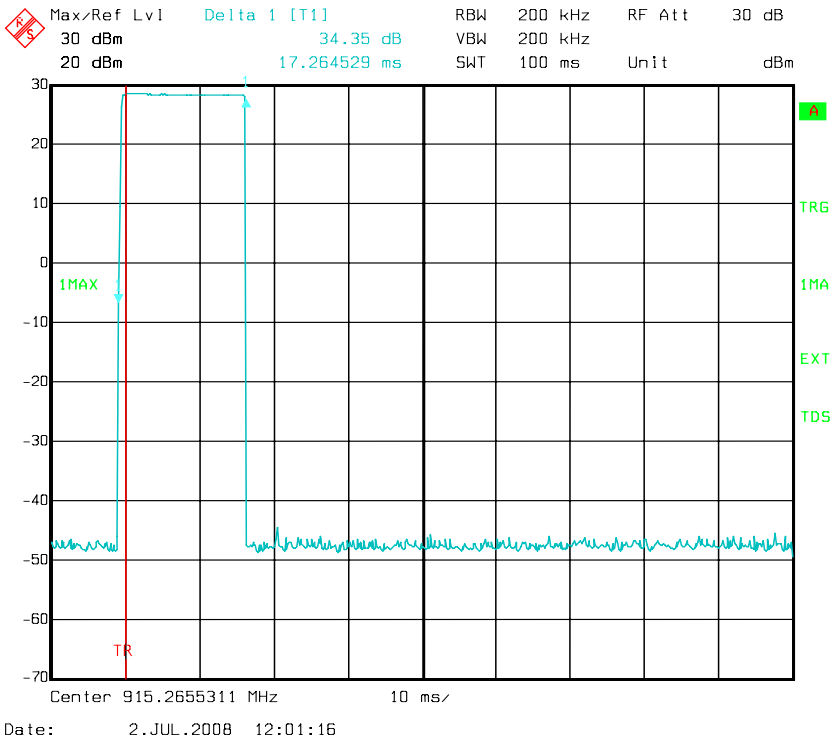


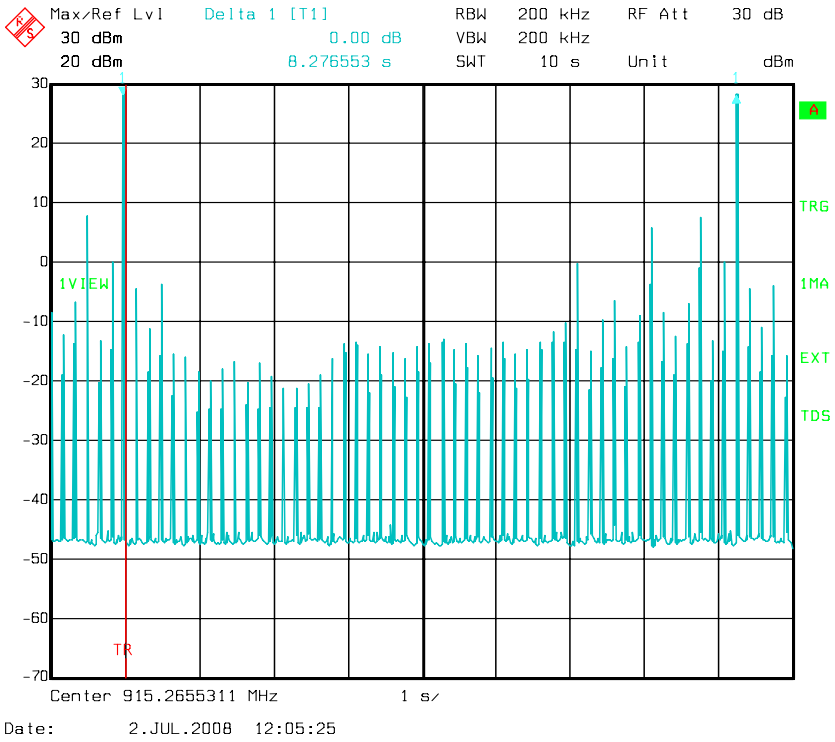
For a channel near top frequency





The measurement during a long transmission gives 17.3 ms every 8.27 s on each channel so the average time within a period of 20 seconds is 41.7 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(1x 17.3/100) = -15.24 dB.

9.5.2 Maximum peak output power

The maximum peak conducted power limit is 1W.
No antenna connector is provided; measurement is done at 3 m on an open area test site.
Peak power is computed with

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

For calculation, G is taken to be 1 (isotropic antenna, worst case).

RBW = VBW = 100 kHz greater than the 20dB BW

Results	Frequency (MHz)	3 m dBµV/m	Power (mW)
Channel 1	902.73	105.48	**10.6**
Channel 25	914.73	103.89	7.35
Channel 50	927.28	104.32	8.12

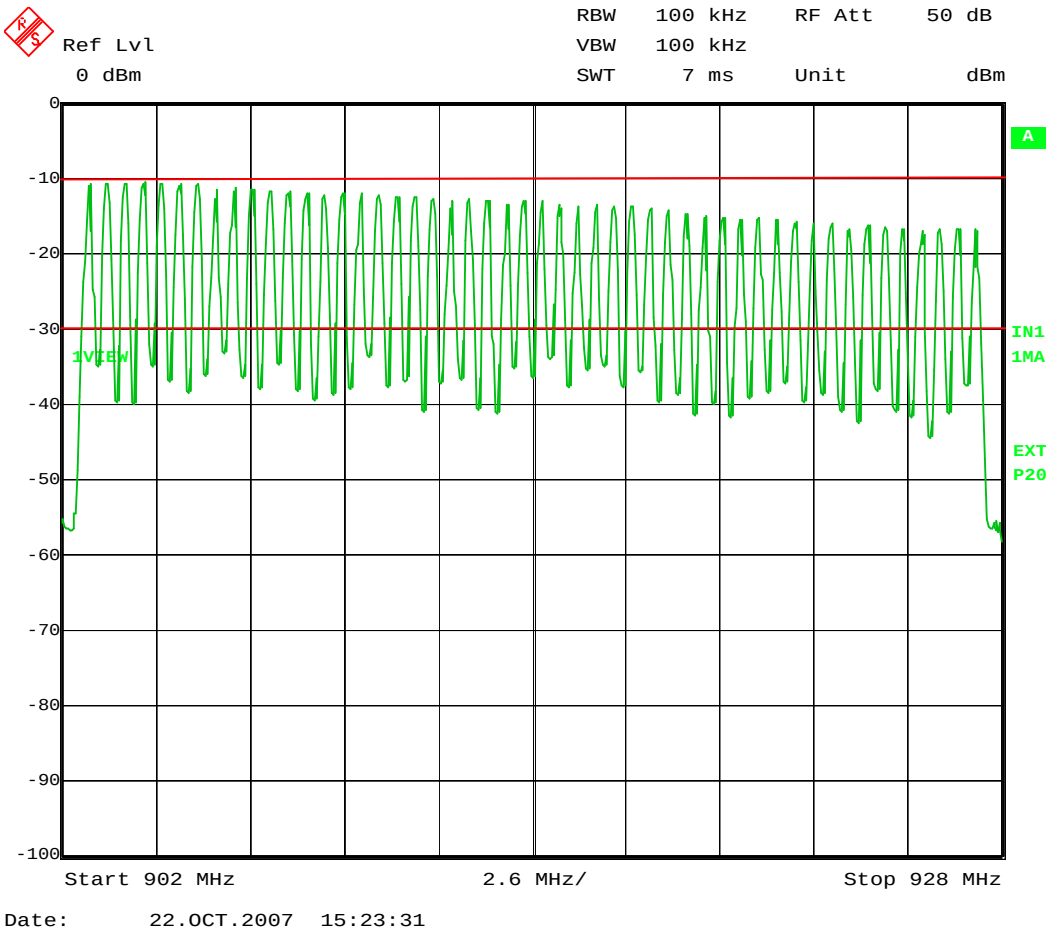
9.5.3 Antenna gain (15.247 § (b)(4)

The antenna is a twisted rod antenna. Thus the antenna gain is less than 6dBi.

9.5.4 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 902 MHz - 928MHz, the level is far below this limit:



9.5.4.1 RADIATED EMISSIONS MEASUREMENTS (15.209 in restricted bands):

Measurements below 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	
Peak measurement time	5 ms
step size	40 kHz
Preamplifier	ON
Preselector	ON
Resolution, Band Width	120 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	1 s minimum

All readings are quasi-peak unless stated otherwise.

Spurious emissions measurement from 1GHz to 10GHz:

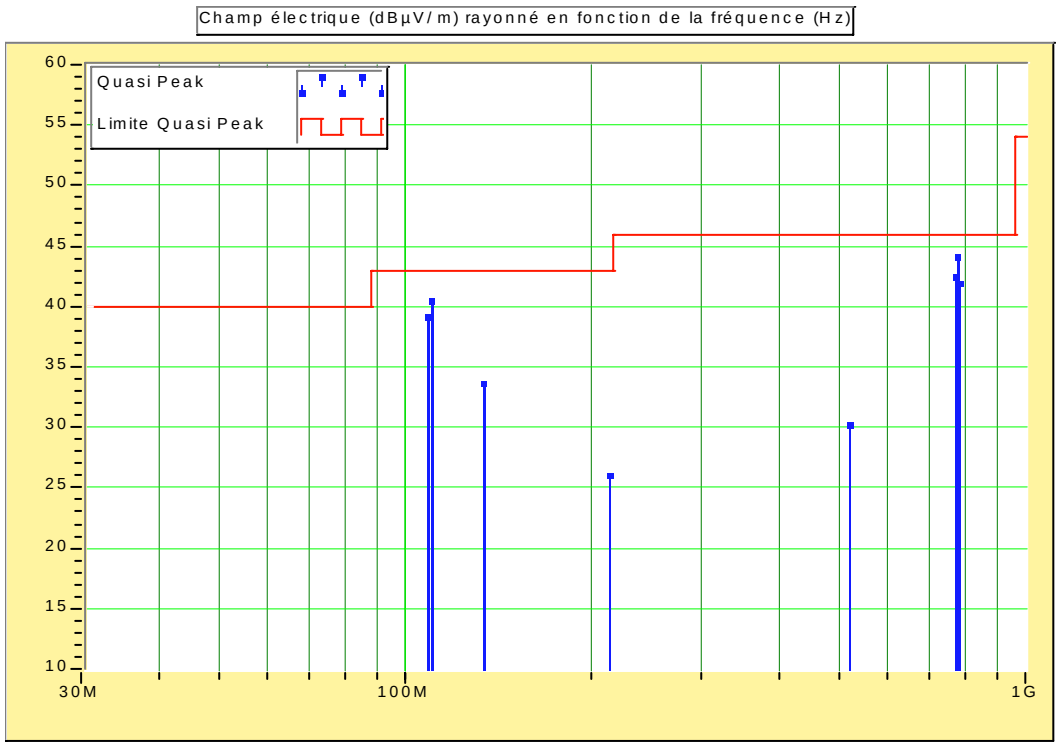
A pre-scan measurement is done very close to the product (less than 10cm) with 100kHz RBW and a max peak detector. Then measurements are performed at 1 m with 100kHz RBW and a max peak detector outside restricted bands or with 1MHz RBW in restricted bands and a video averaging (10Hz) for spurious measurement with normal hopping emission and reception.
Harmonics are peak measured with 1MHz RBW and an averaging due to the duty cycle correction factor.
Spurious emissions are also made with a permanent emission on channel 1, channel 25 and channel 50.
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 (85,5 dBµV/m at 3m) without averaging with duty cycle factor.
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.

9.5.4.2 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. The highest peaks are measured in quasi-peak detection mode at 3 meters distance.

3 m open area test site final measurements results

Frequency (MHz)	Peak (dBµV/m)	Quasi peak (dBµV/m)	Limits Pk or QP	Margin (dB)	Polar.	Height (cm)	Angle (°)	Factor Corr. (dB)
108,753	41,67	39,09	43,5	4,4	V	107	0	13,32
110,049	44,06	40,51	43,5	3,0	V	115	10	13,15
133,824	36,73	33,62	43,5	9,9	V	116	10	14,38
212,724	30,19	26,01	85,5	55,3	V	106	10	14,05
518,815	36,89	30,21	85,5	48,6	H	137	10	22,68
771,047	50,71	42,52	85,5	34,8	V	279	45	26,01
776,486	53,78	44,04	85,5	31,7	V	102	45	26,13
781,963	53,5	42,03	85,5	32,0	V	281	20	26,26



Spurious emissions measurement results from 1GHz to 10GHz:

No spurious founded outside harmonics.

Max spurious for Channel 01.

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m	Peak (1) corrected for 3 m distance (dBµV/m)	Peak Limit (dBµV/m)	Avg (2) (dBµV/m) At 1 m	Avg (2) corrected for 3 m distance (dBµV/m)	Averaging (duty cycle correction factor of -15.2) (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
1 805	2	62,9	52,9	85,5					32,6
2 708	3	75,5	65,5	74,0			50.3	54,0	3.7
3 610	4	NF		74,0				54,0	
4 513	5	64,9	54,9	74,0			39.7	54,0	14,3
5 415	6	73,7	63,7	85,5					21,8
6 318	7	NF		85,5					
7 220	8	NF		74,0				54,0	
8 122	9	NF		74,0				54,0	
9 025	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.
(2) Average measurement with peak detector, 1MHz RBW and 10HzVBW when frequency in restricted bands.
* NF means Noise Floor

Max spurious for Channel 25.

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m	Peak (1) corrected for 3 m distance (dBµV/m)	Peak Limit (dBµV/m)	Avg (2) (dBµV/m) At 1 m	Avg (2) corrected for 3 m distance (dBµV/m)	Averaging (duty cycle correction factor of -15.2) (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
1 816	2	NF			NF				
2 744	3	76.31	66.31	74	75.95		51.1	54	2.9
3 360	4	NF			NF				
4 573	5	67.88	57.88	74	67.19		42.7	54	11.3
5 491	6	NF			NF				
6 404	7	75.65	65.65	85.48	74.87		50.5	54	3.5
7 322	8	NF			NF				
8 237	9	NF			NF				
9 152	10	NF			NF				

Max spurious for Channel 50.

Freq. (MHz)	H.	Peak(1) (dBµV/m) At 1m	Peak (1) corrected for 3 m distance (dBµV/m)	Peak Limit (dBµV/m)	Avg (2) (dBµV/m) At 1 m	Avg (2) corrected for 3 m distance (dBµV/m)	Averaging (duty cycle correction factor of -15.2) (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
1 854	2	NF		85,5					
2 781	3	76,3	66,3	74,0			51.1	54,0	2.9
3 708	4	NF		74,0				54,0	
4 636	5	67,9	57,9	74,0			42.7	54,0	11.3
5 563	6	NF		85,5					
6 491	7	75,7	65,7	85,5					19,8
7 418	8	NF		74,0				54,0	
8 345	9	NF		74,0				54,0	
9 273	10	NF		85,5					

9.5.5 Exposition of public to radio frequency energy.

In the frequency range of this product, the limit of S is 0.61mW/cm^2.

With the formula given in OET 65 and the measurement of EIRP, we can compute that the minimum distance between a body and the antenna is:

For
R = square root (EIRP/ (4*Pi*S))
R = square root (0.0106/ (4*Pi*0.61))
R = 4 cm

If we consider the averaging possibility, the safe distance if far lower.

The normal use of this product is with the antenna at a distance greater than 20 cm from a body.

In accordance with bulletin OET 65 C, there is no need to make SAR evaluation for such device.

9.6 Antenna requirements

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

9.7 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 conducted according to the operating temperature range given in the installation guide.
Frequencies (MHz)

Resultats						
Temperature	**20°C**		**-10°C**		**+50°C**	
Power Supply DC	**4.5**	**5.5**	**4.5**	**5.5**	**4.5**	**5.5**
Channel 01	902,727056	902,728437	902,726553	902,725875	902,731242	902,731238
Channel 25	914,728356	914,728557	914,724695	914,724696	914,724709	914,724689
Channel 50	927,228421	927,228420	927,232809	927,232822	927,223888	927,223886

Neither voltage nor temperature variations affect the frequency stability that is better than ±10 ppm