TEST REPORT

According to FCC, CFR 47 Part 15

GPS COM 915MHz

N°027115-CC-1-c

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

This report concerns :	**Original grant** ☐ **Class II change** ☑
Equipment tested :	**GPS COM 915MHz**
Equipment FCC ID :	**VPMGPSC915**
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 :

027115 Exhibit 1 ID label VPMGPSC915
027115 Exhibit 2 External Photographs VPMGPSC915
027115 Exhibit 2b Internal Photographs VPMGPSC915
027115 Exhibit 4 user notice 86378_A VPMGPSC915
027115 Exhibit 5 Test set up photos VPMGPSC915
027115 Exhibit 6a Synoptic VPMGPSC915
027115 Exhibit 6b BOM motherboard VPMGPSC915
027115 Exhibit 6c SCM motherboard VPMGPSC915
027115 Exhibit 6d RF Synoptic&desciption VPMGPSC915
027115 Exhibit 6e RF BOM VPMGPSC915
027115 Exhibit 6f RF user guide VPMGPSC915
027115 Exhibit 6g RF schematic VPMGPSC915
027115 Exhibit 7b CAN01_08301_A (System description) VPMGPSC915
027115 Exhibit 8 Cover Letter VPMGPSC915

1 Reference and record of revisions of the test report:

Test report number :	Revision :	Number of pages	Modification reasons :
027115-CC-1-a	a	18	Creation, April 02, 2008
027115-CC-1-b	b	20	Addition of measurements required by the TCB June 12, 2008
027115-CC-1-c	c	20	Permissive change for duty cycle change
Redactor : JL JAMET & O.ROY			**Date of writing** : September 10, 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.

The permissive change concerns only the length of the data stream. It has an effect on the calculation of averaging due to duty cycle correction factor (page 15) and spurious computation page 18 and 19 (bold data).

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 03, 2007 - October 25, 2007
Additional test June 9, 2008
New duty cycle July 22, 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 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 GPS COM 915MHz. The test results reported in this document relate only to the item that was tested on

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.

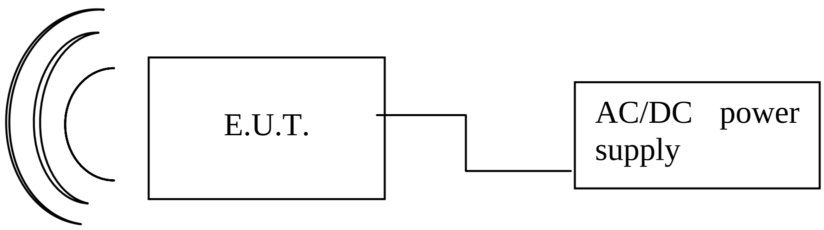
All conducted and radiated emissions measurements were performed manually at GYL TECHNOLOGIES. The radiated emissions measurements required by the rules were performed on the three to ten meters, open field, test site maintained by GYL Technologies Parc d'activités de Lanserre, 49610 Juigné sur Loire , 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 TECHNOLOGIES NUMBER	CALIBRATION DATE
RECEIVERS				
Receiver	Rohde & Schwarz	ESI 7	M02020	May-07
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.



Note: the AC/DC power supply is needed only to recharge the EUT battery. The radio function can't work when the power supply is connected.

7 EXERCISING TEST CONDITIONS:

On the GPS com 915 MHz, we press on/off key, when the blue LED blinks the product is ready.
Measurements are done in hopping mode in all channels with modulation
For measurements that need to be done in one channel, the channel used was activated with a normal modulation transmission.

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 clause 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 band 902-928 MHz.

9 TEST ACCORDING TO CFR 47 Part 15

Tests performed by Olivier Maret, Olivier ROY & Jean-Luc JAMET at GYL Technologies laboratories from Sept to October25, 2007.

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 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.

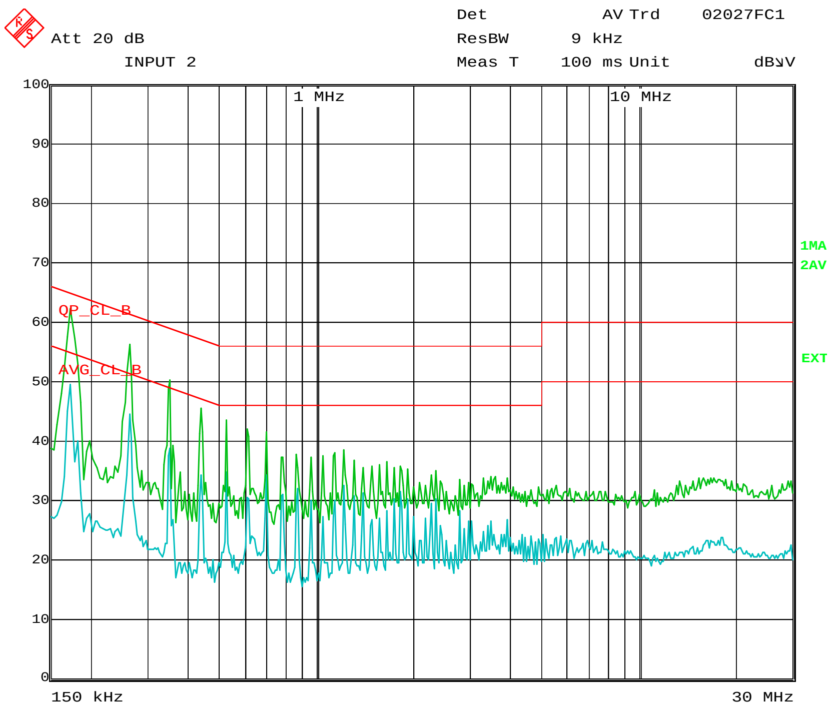
ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	4KHz
Preamplifier	OFF
Preselector	ON
Resolution, Band With	9 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	1 sec minimum

All readings are quasi-peak unless stated otherwise.

9.3.1 Power supply

9.3.1.1 Neutral:

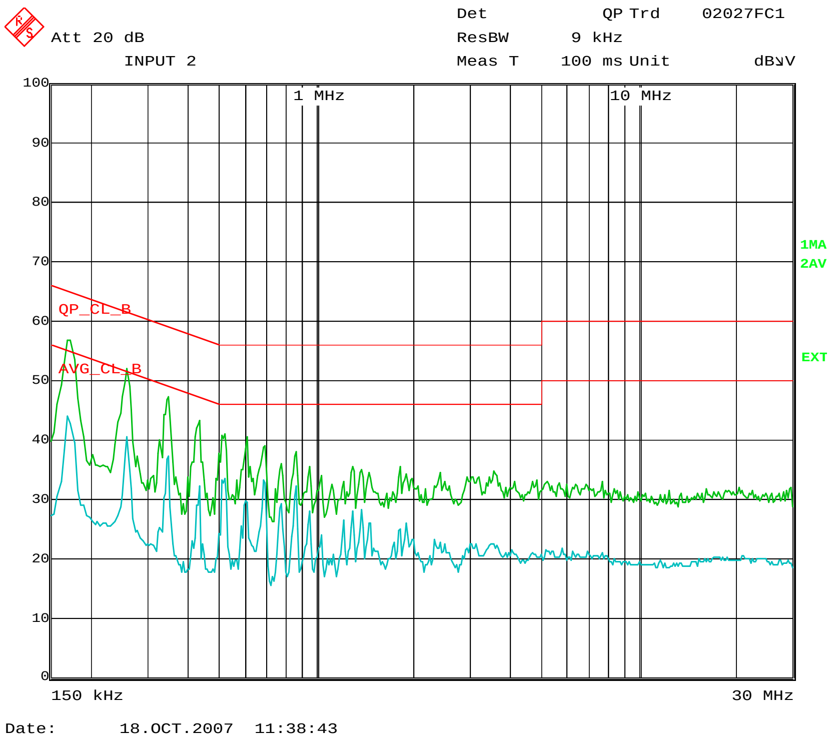
Legend: Blue curve represents average values
Green curve represents the peak values



Frequency (MHz)	Quasi-peak (dBµV)	QP margin (dB)
0,174	58,0	6,8
0,262	51,6	9,7
0,350	44,9	14,1
0,358	31,0	27,8
0,438	38,8	18,3
0,526	34,1	21,9
0,610	36,8	19,2

Frequency (MHz)	Average (dBµV)	Average margin (dB)
0,174	44,3	10,4
0,262	38,4	13,0
0,350	33,2	15,7
0,438	25,5	21,6
0,526	25,9	20,1
0,610	27,3	18,7
0,698	29,8	16,2

9.3.1.2 LIVE:



Frequency (MHz)	Quasi-peak (dBµV)	QP margin (dB)
0,170	53,5	11,5
0,258	44,9	16,6
0,346	36,7	22,4
0,430	34,1	23,1
0,518	31,3	24,7
0,606	28,8	27,2
0,690	30,8	25,2

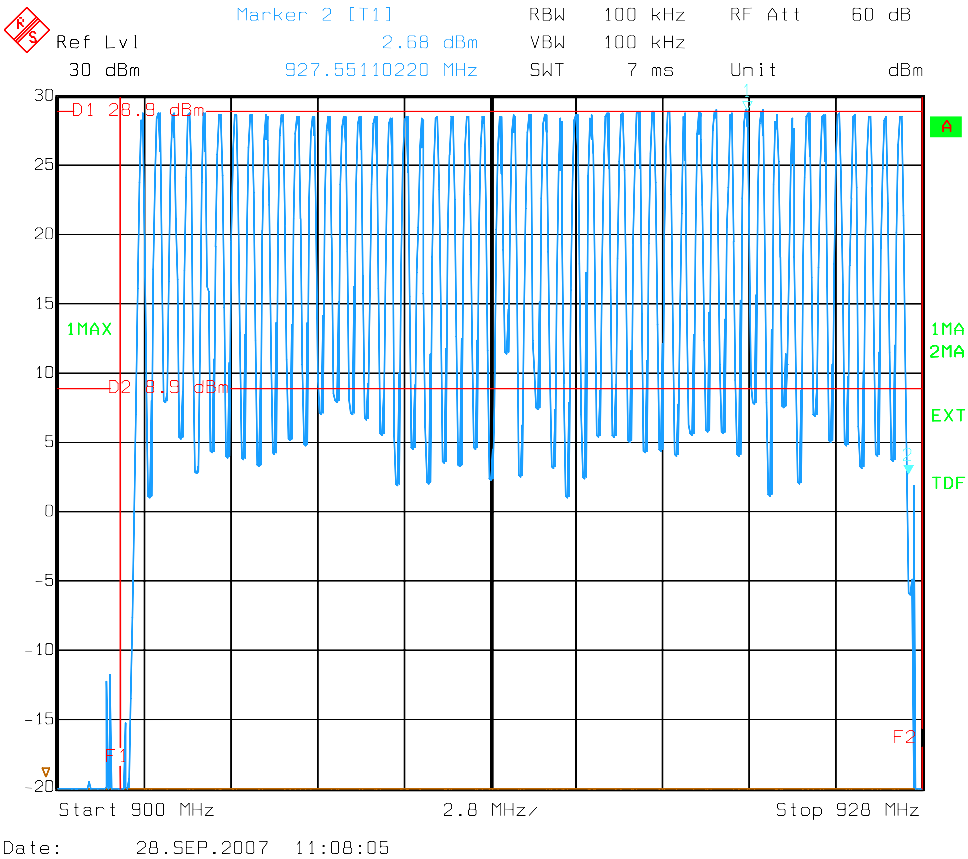
Frequency (MHz)	Average (dBµV)	Average margin (dB)
0,170	38,6	16,4
0,258	30,7	20,8
0,346	25,5	23,5
0,430	21,2	26,0
0,518	24,2	21,8
0,602	22,7	23,3
0,686	26,3	19,7

9.4 INTERPRETATION AND REMARKS:

The equipment complies with the §15.207 requirements, Class B

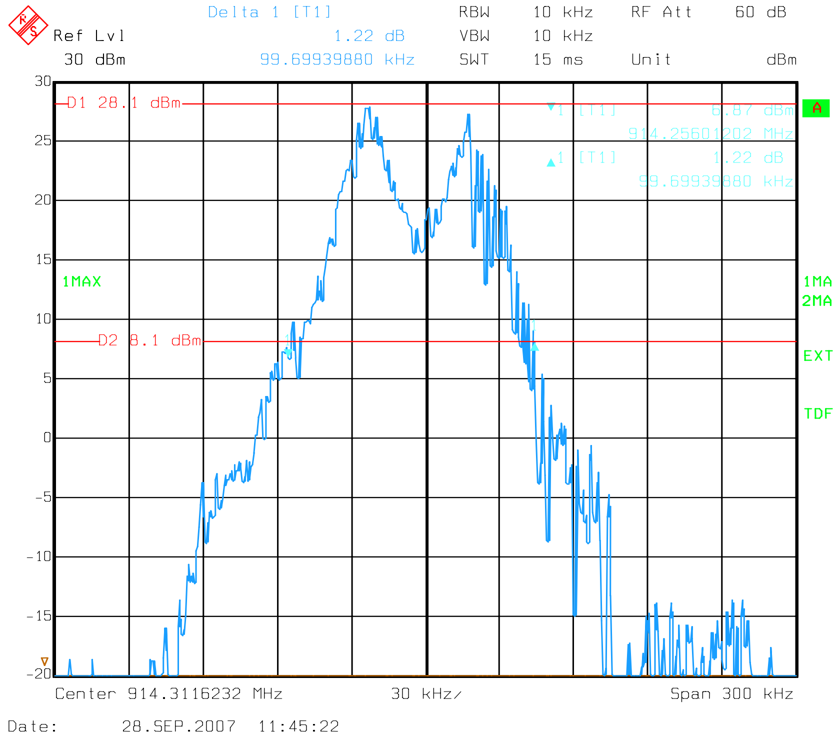
9.5 Intentional radiator operation within the band 902 – 928 MHz §15.247.

The system uses **50 channels** numbered from 1 to 50
At band edge F1 (902 MHz), F2 (928MHz), the level is far below this limit:
For details of frequency hopping technology used see Exhibit 7 frequency hopping description.
Measurements done directly on the RF module with a coaxial adapter soldered on the PCB

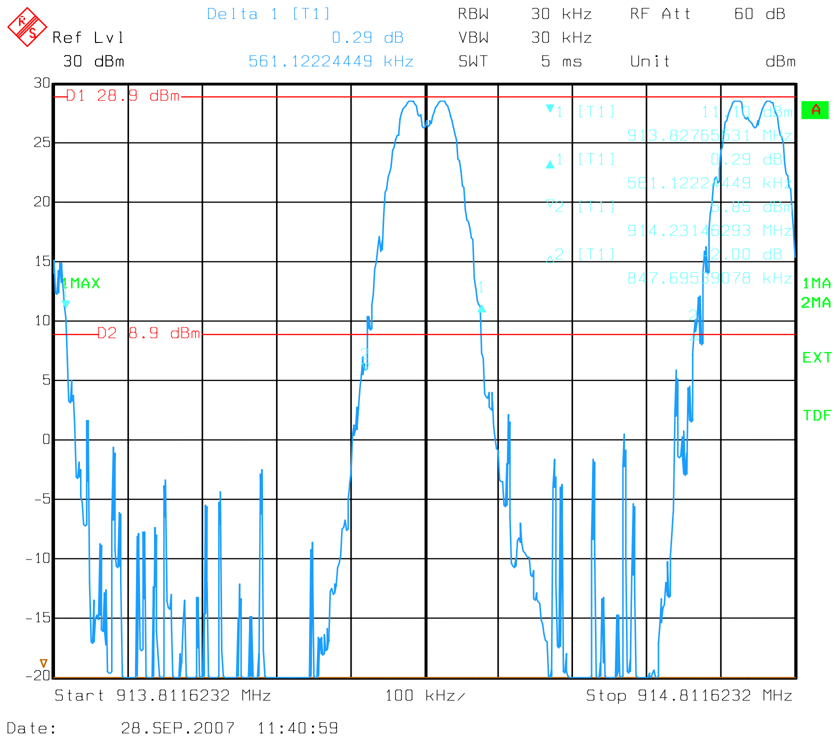


9.5.1 Frequency hopping channel separation (15.247 (a) (1))

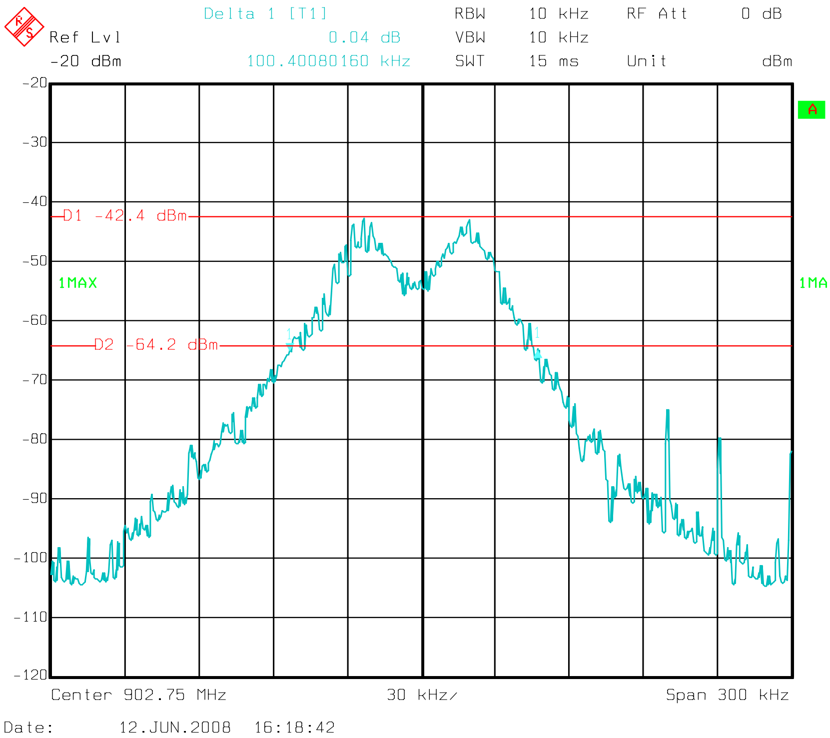
For a central channel

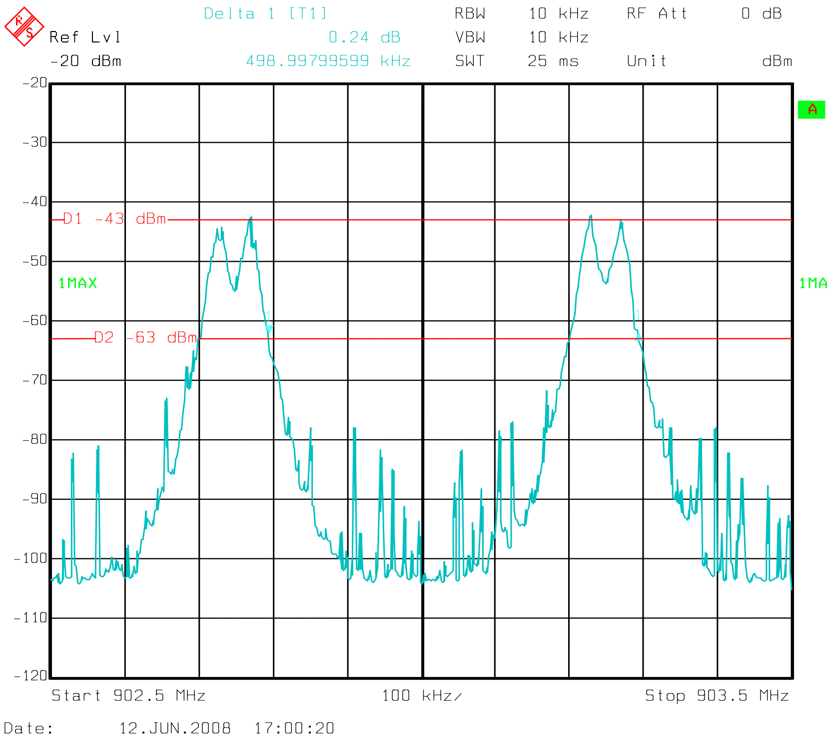


The 20dB bandwidth of each hopping channel is 100 kHz (less than 250 kHz)

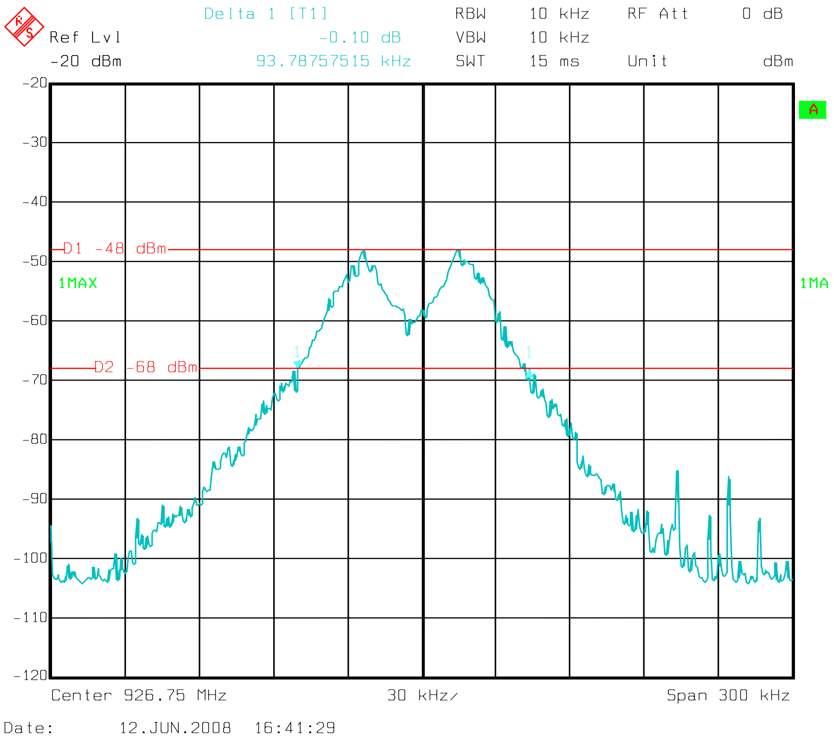


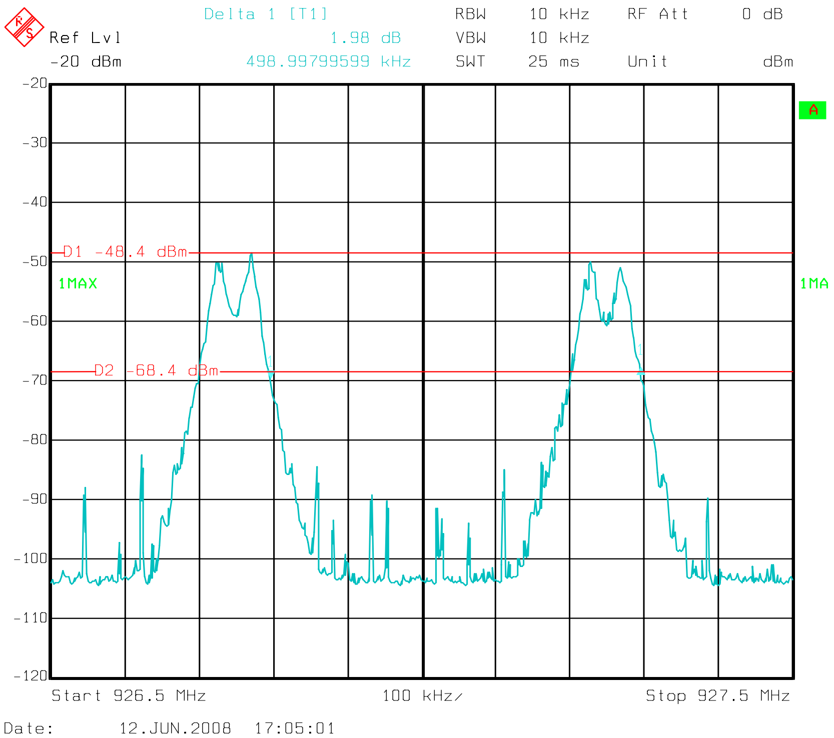
For a channel near bottom frequency





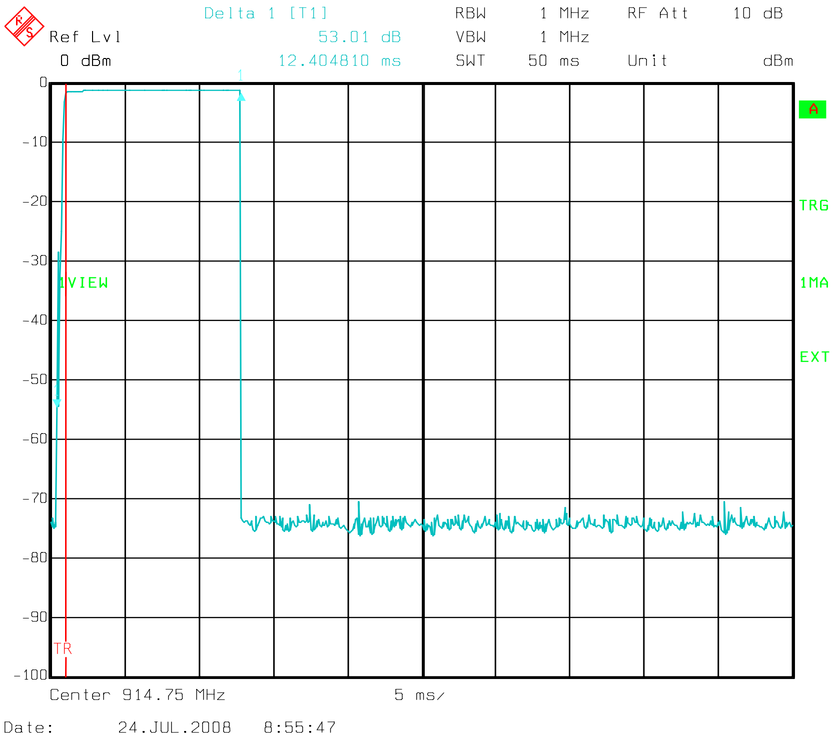
For a channel near top frequency

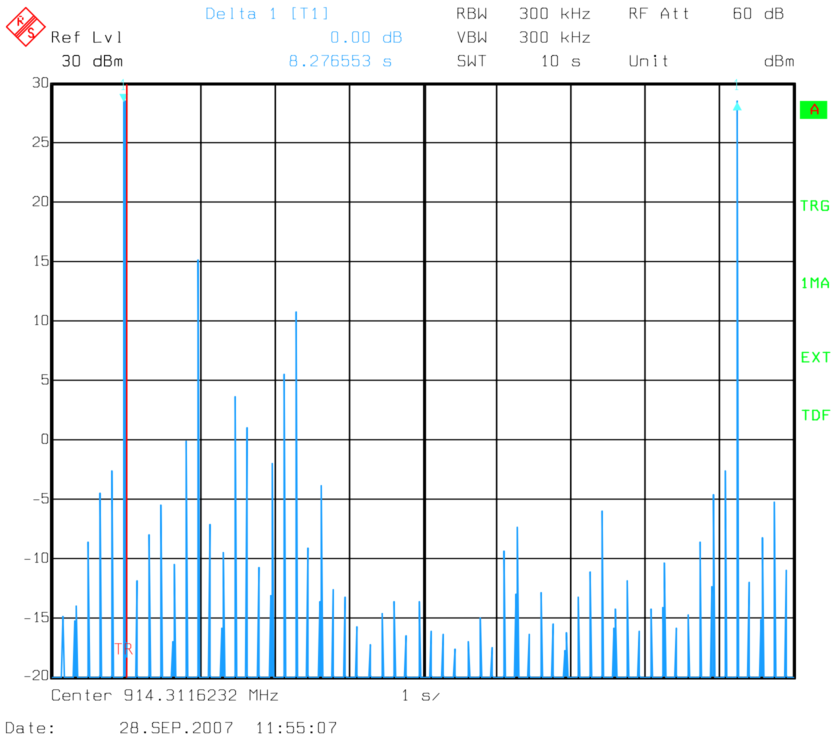




The channel separation is between 440kHz and 560 kHz (with an average at 500kHz) which is greater than the 20dB bandwidth.

The measurement during a long transmission gives 12.4 ms every 8.276 s on each channel so the average time within a period of 20 seconds is 30 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 should be 20Log(12.4/100) = -18.1 dB.
The manufacturer's data provided in the Operational description (Exhibit 7b) gives a maximum transmission time of 12.5 ms so the duel time correction factor for spurious measurement is 20Log(12.5/100) = **-18.1 dB.**

9.5.2 Maximum peak output power

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

Peak power is computed with

$$P(W) = (E(V/m) \times D\ (m))^2 / (30 \times G) \text{ with } G = 1 \text{ (isotropic antenna)}$$

Results	Peak* dBµV/m At 3m	Peak Power (mW)
Channel 1 902.75MHz	105.49	**10.6**
Channel 25 914.75MHz	106.19	**12.5**
Channel 50 927.25MHz	107.88	**18.4**

*Peak measurements are done with a RBW of 200kHz greater than the 20dB BW (100kHz) on Open Area Test Site.

9.5.3 Antenna gain (15.247 § (b)(4)

The antenna is a rod antenna of 75 mm soldered on the PCB. 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.

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 and associated cabling 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 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode for measurements in restricted bands. 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

ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	40 kHz
Preamplifier	ON
Preselector	ON
Resolution, Band With	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 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.
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 (87.88 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)
405.509	43.64	42.11	46.0	3.9	V	137	296	21.53
405.511	33.93	30.18	46.0	15.8	V	184	286	21.53
412.896	27.68	23.52	87.9	60.2	H	108	34	21.8
536.618	36.71	31.33	87.9	51.2	V	239	361	22.33
791.258	48.6	43.83	87.9	39.3	H	190	361	25.99
872.901	47.99	43.04	87.9	39.9	V	267	30	26.58
902.000*	26.88		87.9	61.0	V	108	357	26.71
928.000*	39.77		87.9	48.1	V	108	361	26.67

* band edge

Results over 1 GHz

No spurious founded outside harmonics.

Max spurious for channels 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 -18.1) (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
1 806	2	70.3	60.3	87.9					27.6
2 708	3	65.4	55.4	74.0			**37.3**	54.0	**16.7**
3 611	4	58.9	48.9	74.0			**30.8**	54.0	**23.2**
4 514	5	72.0	62.0	74.0			**43.9**	54.0	**10.1**
5 417	6	64.0	54.0	74.0			**35.9**	54.0	**18.1**
6 319	7	59.9	49.9	87.9					38.0
7 222	8	61.0	51.0	87.9					36.9
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.
(2) Peak measurement with 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 -18.1) (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
1 830	2	68.2	58.2	87.9					29.7
2 744	3	67.0	57.0	74.0			**38.9**	54.0	**15.1**
3 659	4	60.0	50.0	74.0			**31.9**	54.0	**22.1**
4 574	5	72.0	62.0	74.0			**43.9**	54.0	**10.1**
5 489	6	67.0	57.0	87.9					30.9
6 403	7	63.0	53.0	87.9					34.9
7 318	8	59.0	49.0	74.0			**30.9**	54.0	**23.1**
8 233	9	61.0	51.0	74.0			**32.9**	54.0	**21.1**
9 148	10	60.0	50.0	74.0			**31.9**	54.0	**22.1**

Max spurious for channels 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 -18.1) (dBµV/m)	Avg Limit (dBµV/m)	Min. Margin (dB)
1 855	2	76.0	66.0	87.9					21.9
2 782	3	74.0	64.0	74.0			**45.9**	54.0	**8.1**
3 709	4	58.0	48.0	74.0			**29.9**	54.0	**24.1**
4 636	5	71.0	61.0	74.0			**42.9**	54.0	**11.1**
5 564	6	69.0	59.0	87.9					28.9
6 491	7	67.0	57.0	87.9					30.9
7 418	8	60.0	50.0	74.0			**31.9**	54.0	**22.1**
8 345	9	64.0	54.0	74.0			**35.9**	54.0	**18.1**
9 273	10	63.0	53.0	87.9					34.9

9.6 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 done for the power and antenna gain, we can compute that the minimum distance between a body and the antenna is:

R = square root (EIRP/(4*Pi*S))
R = square root (0.0184/ (4*Pi*0.61))
R =4,9 cm

The normal use of this product is with the antenna at a distance greater than 20cm.
In accordance with bulletin OET 65 C, there is no need to make SAR evaluation for such device.

9.7 Antenna requirements

Not applicable because the antenna is not replaceable without modifying the product.

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 conducted according to the operating temperature range given in the installation guide.
These measurements have been done on the repeater/supervisor GPScom 915 which contains the same RF module with the same battery voltage operation.

Frequencies (MHz)

Resultats						
Temperature	-20°C		+20°C		+60°C	
Power Supply	3.3	4.2	3.3	4.2	3.3	4.2
Channel 1	902,732364	902,732465	902,729158	902,728657	902,727655	902,727655
Channel 25	914,731463	914,731964	914,728256	914,729158	914,727154	914,726954
Channel 50	927,231964	927,232364	927,228056	927,228857	927,227154	927,227254

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