



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

Motion Sensor

MODEL NUMBER: FGMS-001

FCC ID: 2AA9MFGMS002

REPORT NUMBER: 10340736A

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Prepared for
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Revision History

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Fibar Group sp. z.o.o
Ul. Lotnicza 1
Poznan, Poland 60-453

EUT DESCRIPTION: Motion Sensor

MODEL: FGMS-001

SERIAL NUMBER: Prototype

DATE TESTED: November 25, 2014 – December 18, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/Standards/scopes/1004140.htm>

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Sample Calculations

Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Radiated Emissions	30-200MHz	Bicon 3m Horz	3.30dB
Radiated Emissions	30-130MHz	Bicon 3m Vert	4.84dB
Radiated Emissions	130-200MHz	Bicon 3m Vert	4.94dB
Radiated Emissions	200-1000MHz	LogP 3m Horz	3.46dB
Radiated Emissions	200-1000MHz	LogP 3m Vert	4.98dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Motion Detector that contains a 900MHz transceiver. EUT is battery powered.

The radio module is manufactured by Fibar Group.

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

The transmitter has a maximum output peak E-field as follows:

Frequency Range (MHz)	Mode	Output PK E-field Strength (dBuV/m)
908-916	TX	87.48

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an wire type 1/4L antenna.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT was set in worst axis as found in preliminary testing.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Motion Sensor	Fibar	FGMS-001	-	2AA9MFMS002

I/O CABLES

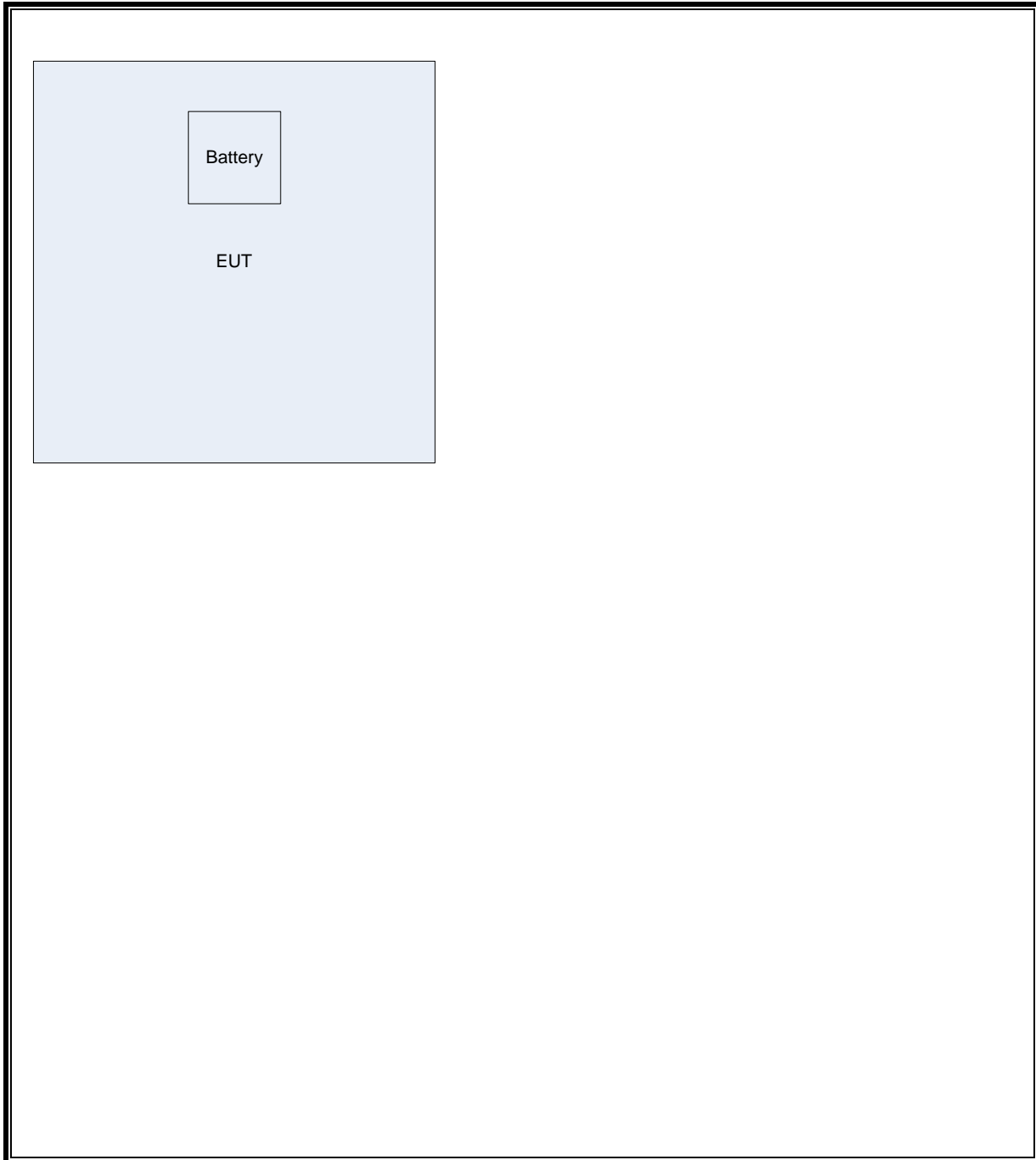
None

TEST SETUP

The EUT is a standalone product. 3 separate EUT samples were preprogrammed with 100% duty cycle for Lo, Mid, and Hi channels.

Duty Cycle was declared by the manufacturer as worst case of 5ms over 100ms, -26.02dB.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	20131215	20141230
Bicon Antenna	Chase	VBA6106A	EMC4078	20140401	20150401
Log-P Antenna	Schaffner	UPA6109	EMC4258	20131211	20141231
Spectrum Analyzer	Rhode & Schwarz	ESU	EMC4323	20131215	20141230
Antenna Array	UL	BOMS	EMC4276	20141014	20151030
EMI Test Receiver	Agilent	N9030A	EMC4360	20131221	20141221
Near Field Antenna	EMCO	-	-	-	-

7. TEST RESULTS

7.1.1. 99% BANDWIDTH and 20dB Bandwidth

LIMITS

None; for reporting purposes only.

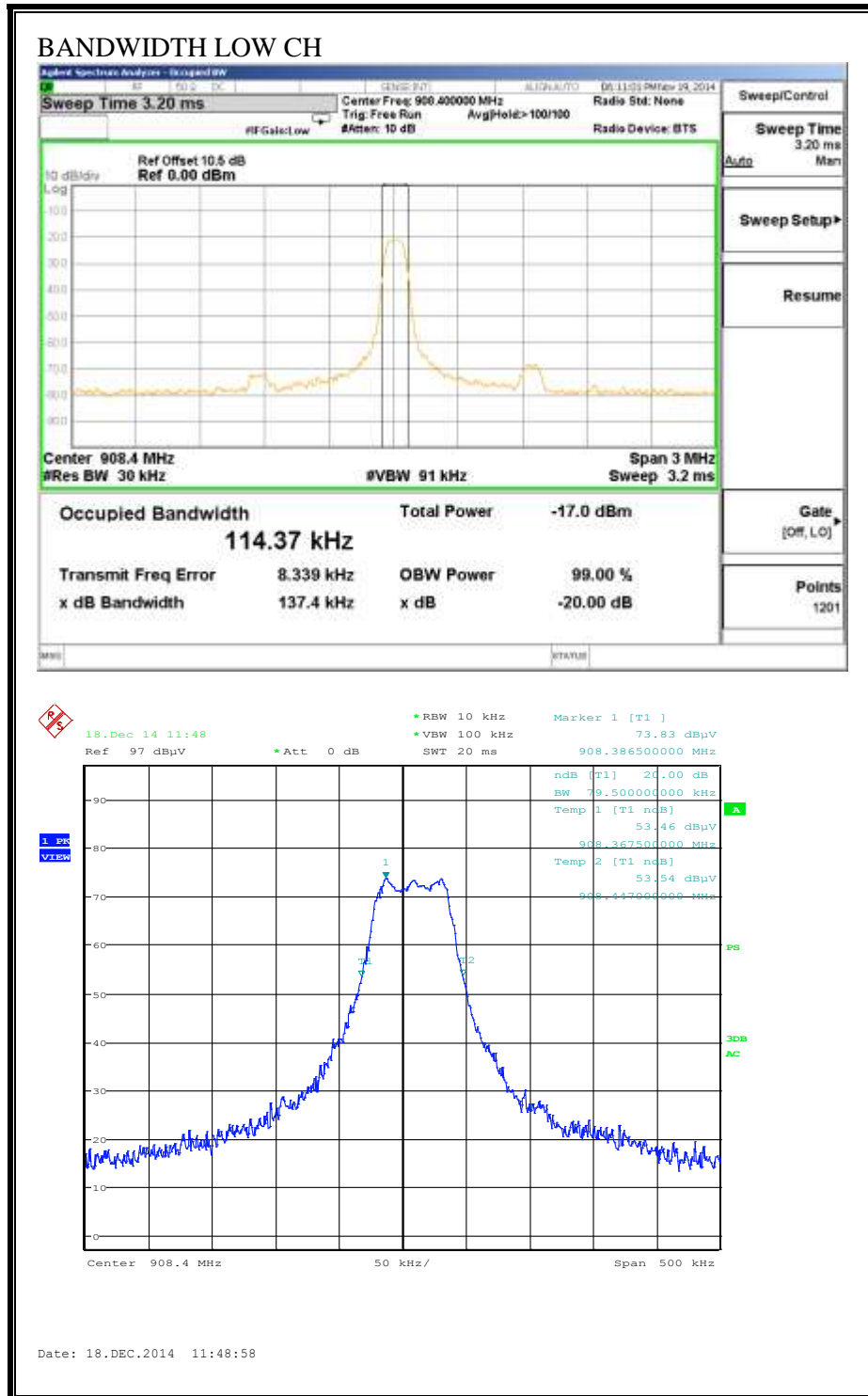
TEST PROCEDURE

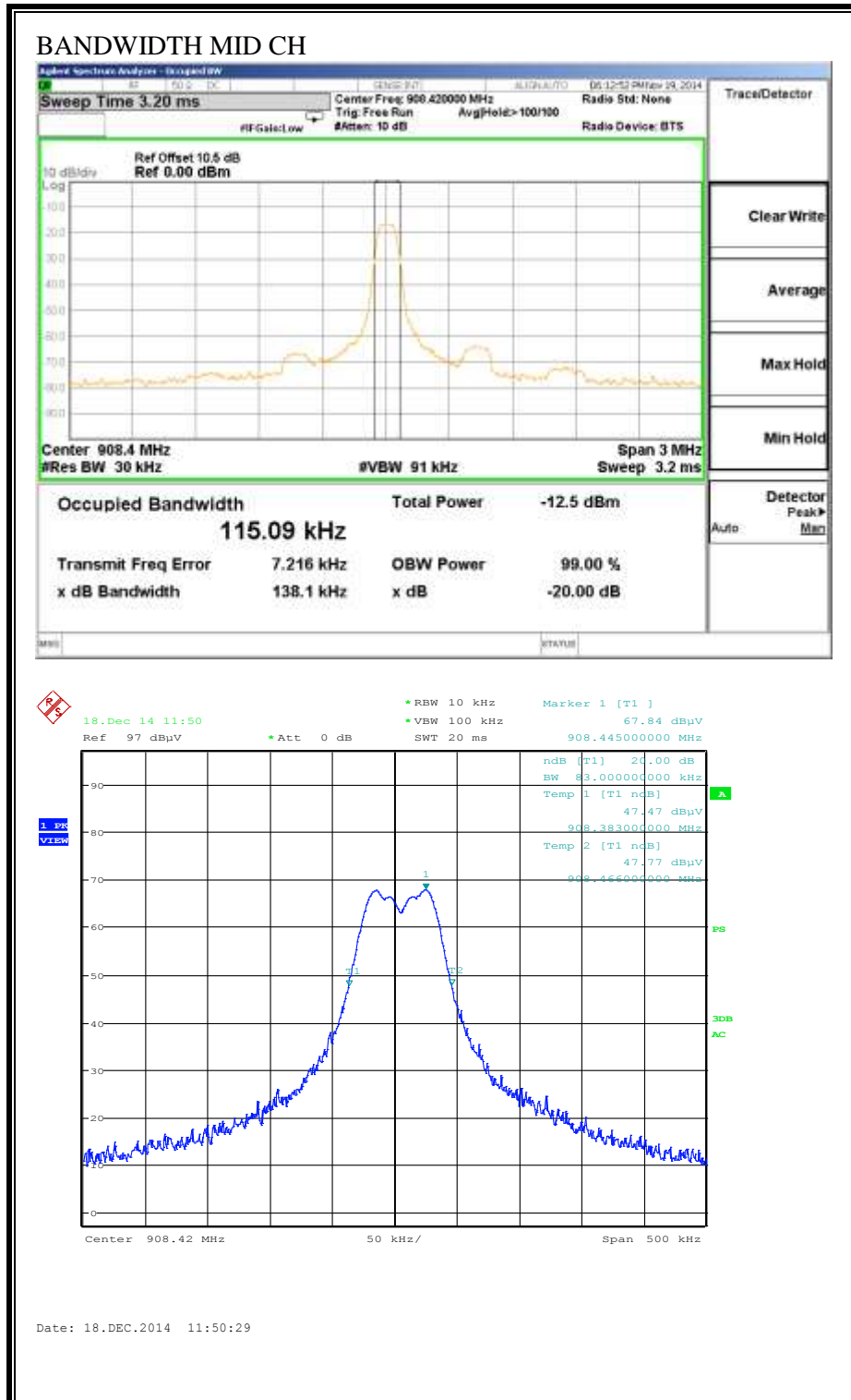
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% and 20dB bandwidth function is utilized.

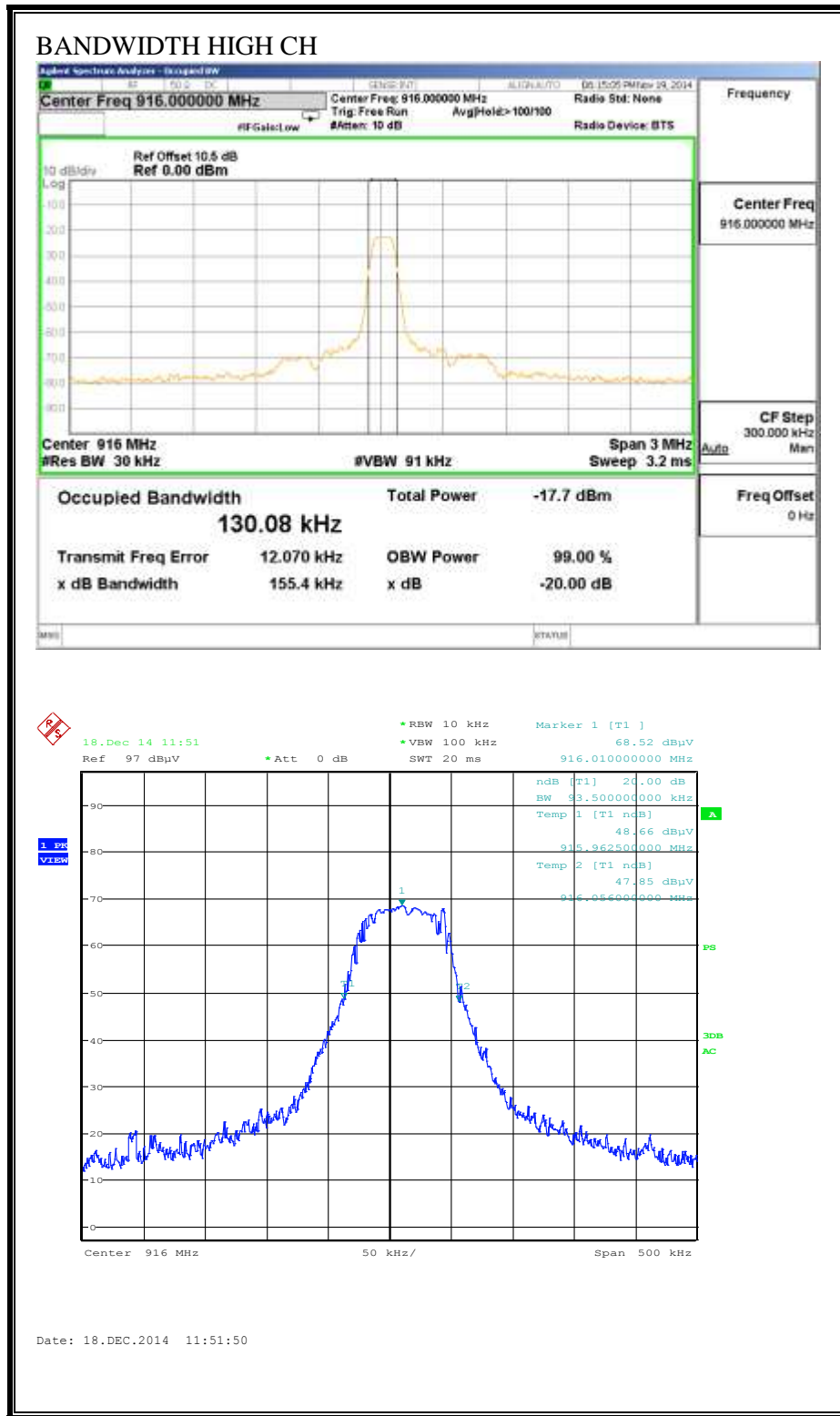
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (kHz)	20dB Bandwidth (kHz)
Low	908.40	114.37	79.5
Middle	908.42	115.09	83
High	916.00	130.08	93.5

99% and 20dB BANDWIDTH







7.2. RADIATED EMISSIONS

LIMIT

IC RSS-210, A2.9
 FCC 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz, and 24.0–24.25 GHz.

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

RESULTS

7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

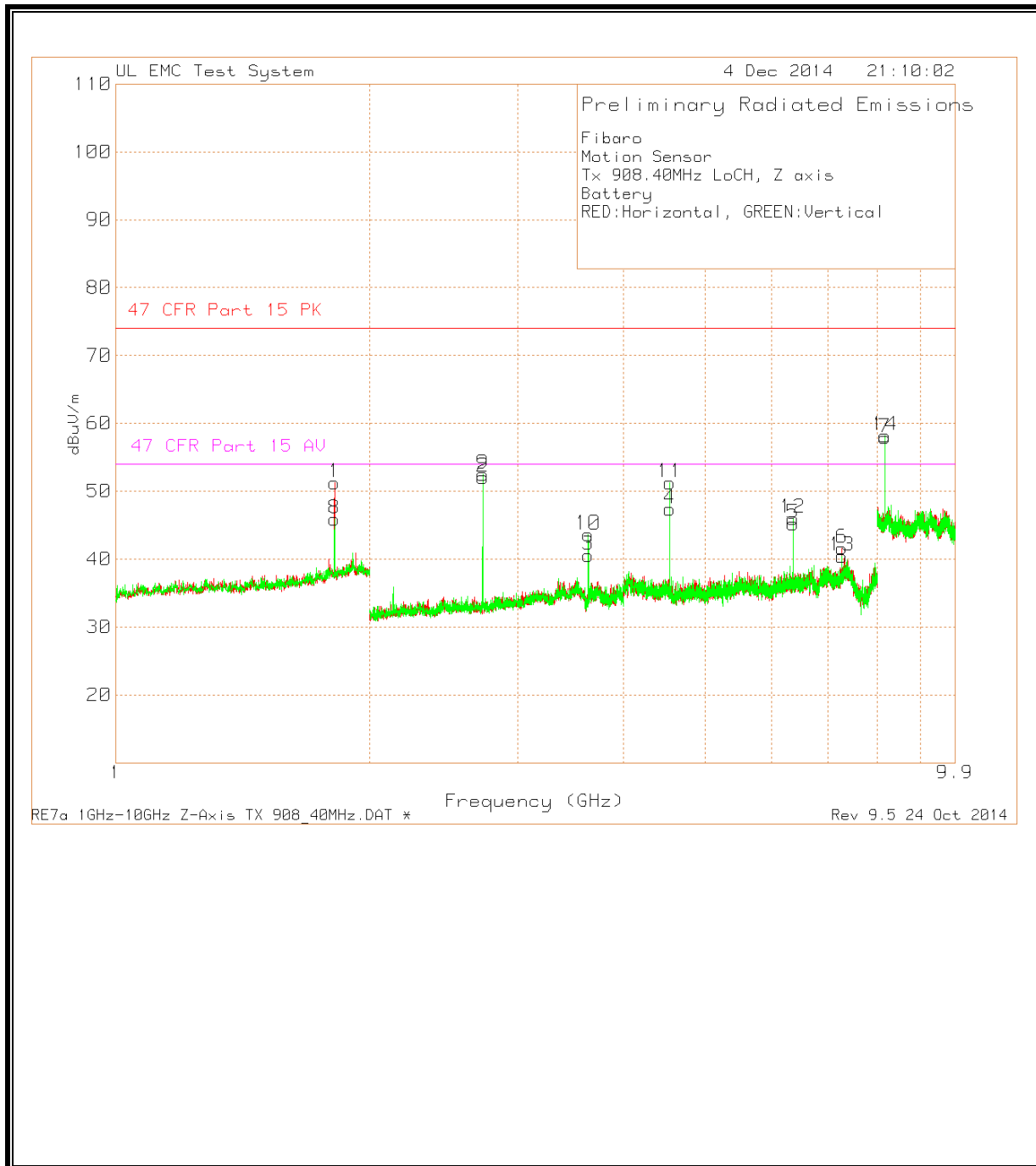
Fibaro
 Motion sensor
 Z Axis
 Battery

Radiated Emission Data											
Notes	Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4	5	6
Frequency (MHz)	Reading	Factor (dB)	Factor (dB)	Reading	dB(uVolts/meter)						
=====											
LogP Horizontal 200 - 1000MHz											
908.39813	49.65dBuV QP	22.9	10	82.55	-	94	-	-	-	-	-
Azimuth: 92	Height:125 Vert			Margin (dB):	-	-11.45	-	-	-	-	-
908.39813	52.84dBuV QP	22.9	10	85.74	-	94	-	-	-	-	-
Azimuth: 61	Height:153 Horz			Margin (dB):	-	-8.26	-	-	-	-	-
908.41375	54.58dBuV QP	22.9	10	87.48	-	94	-	-	-	-	-
Azimuth: 315	Height:165 Horz			Margin (dB):	-	-6.52	-	-	-	-	-
908.41375	50.28dBuV QP	22.9	10	83.18	-	94	-	-	-	-	-
Azimuth: 108	Height:133 Vert			Margin (dB):	-	-10.82	-	-	-	-	-
916.00638	53.26dBuV QP	23.3	10	86.56	-	94	-	-	-	-	-
Azimuth: 312	Height:163 Horz			Margin (dB):	-	-7.44	-	-	-	-	-
916.00638	50.23dBuV QP	23.3	10	83.53	-	94	-	-	-	-	-
Azimuth: 141	Height:137 Vert			Margin (dB):	-	-10.47	-	-	-	-	-

LIMIT 2: CFR 47 Part 15 Class B 3m

QP - Quasi-Peak detector

7.2.2. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz

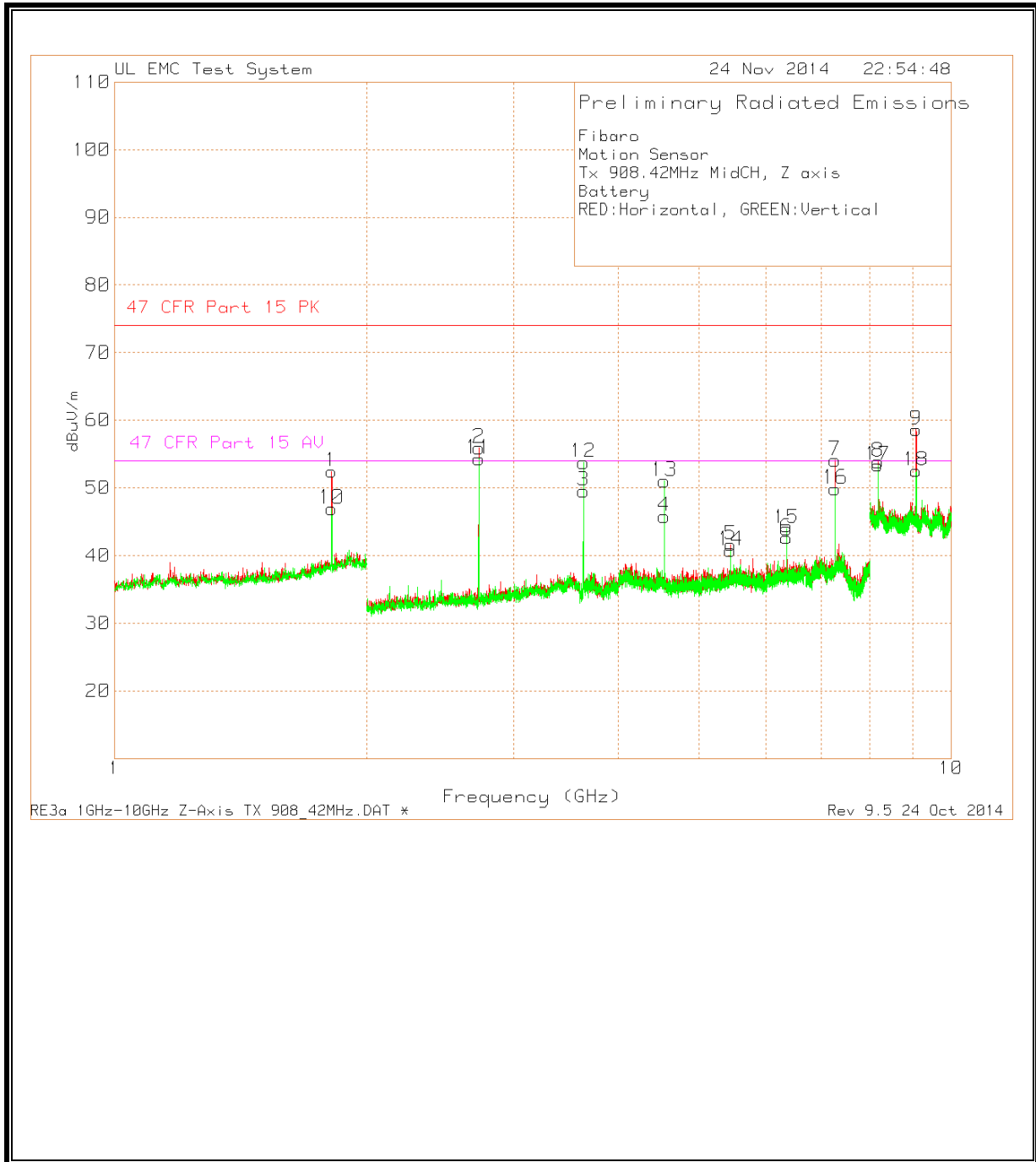


Fibaro
 Motion Sensor
 Tx 908.40MHz LoCH, Z axis
 Battery
 RED:Horizontal, GREEN:Vertical

Radiated Emission Data										
Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBuV/m	Limit:1	2	3	4	5	6
=====										
2 - 4GHz 2 - 4MHz										
2.7252	82.64dBuV Pk	22.1	-51.33	53.41	74	-	-	-	-	-
				Margin (dB):	-20.59	-	-	-	-	-
2.7252	81.85dBuV Av	22.1	-51.33	26.6*	-	54	-	-	-	-
				Margin (dB):	-	-26.6	-	-	-	-
2.7252	82.15dBuV Pk	22.1	-51.33	52.92	74	-	-	-	-	-
				Margin (dB):	-21.08	-	-	-	-	-
2.7252	81.36dBuV Av	22.1	-51.33	26.11*	-	54	-	-	-	-
				Margin (dB):	-	-27.89	-	-	-	-
8 - 12GHz 8 - 10MHz										
8.1758	71.4dBuV Pk	36.3	-48.24	59.46	74	-	-	-	-	-
				Margin (dB):	-14.54	-	-	-	-	-
8.1756	68.83dBuV Av	36.3	-48.25	30.86*	-	54	-	-	-	-
				Margin (dB):	-	-23.14	-	-	-	-
8.1758	71.19dBuV Pk	36.3	-48.24	59.25	74	-	-	-	-	-
				Margin (dB):	-14.75	-	-	-	-	-
8.1757	68.82dBuV Av	36.3	-48.25	30.85*	-	54	-	-	-	-
				Margin (dB):	-	-23.15	-	-	-	-

LIMIT 1: 47 CFR Part 15 PK
 LIMIT 2: 47 CFR Part 15 AV

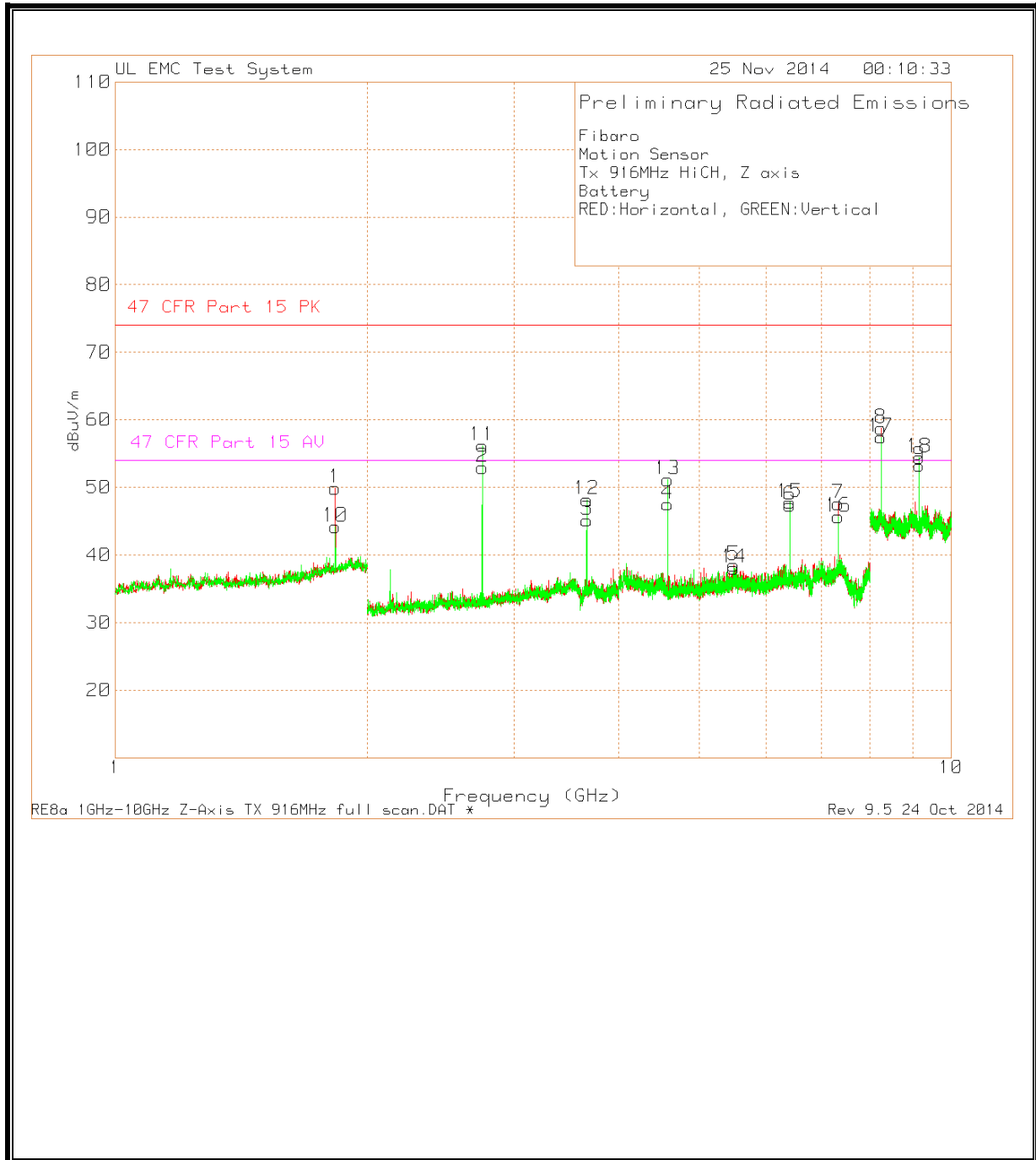
Pk - Peak detector
 Av - Average detection
 * Duty Cycle relaxation included



Fibaro
 Motion Sensor
 Tx 908.42MHz MidCH, Z axis
 Battery
 RED:Horizontal, GREEN:Vertical

Radiated Emission Data										
Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4	5	6
Frequency	Reading	Factor	Factor	Reading	dBuV/m					
(GHz)		(dB)	(dB)							
=====										
=										
2 - 4GHz 2 - 4MHz										
2.7252	85.1dBuV Pk	22.1	-51.33	55.87	74	-	-	-	-	-
				Margin (dB):	-18.13	-	-	-	-	-
Azimuth: 360 Height:108 Horz										
2.7253	84.91dBuV Av	22.1	-51.33	29.66*	-	54	-	-	-	-
				Margin (dB):	-	-24.34	-	-	-	-
Azimuth: 360 Height:108 Horz										
2.7252	84.12dBuV Pk	22.1	-51.33	54.89	74	-	-	-	-	-
				Margin (dB):	-19.11	-	-	-	-	-
Azimuth: 0 Height:113 Vert										
2.7253	83.97dBuV Av	22.1	-51.33	28.72*	-	54	-	-	-	-
				Margin (dB):	-	-25.28	-	-	-	-
Azimuth: 0 Height:113 Vert										
3.6337	77.01dBuV Pk	23.3	-50.39	49.92	74	-	-	-	-	-
				Margin (dB):	-24.08	-	-	-	-	-
Azimuth: 258 Height:101 Horz										
3.6337	75.34dBuV Av	23.3	-50.39	22.23*	-	54	-	-	-	-
				Margin (dB):	-	-31.77	-	-	-	-
Azimuth: 258 Height:101 Horz										
3.6338	82.55dBuV Pk	23.3	-50.38	55.47	74	-	-	-	-	-
				Margin (dB):	-18.53	-	-	-	-	-
Azimuth: 149 Height:109 Vert										
3.6337	81.6dBuV Av	23.3	-50.39	28.49*	-	54	-	-	-	-
				Margin (dB):	-	-25.51	-	-	-	-
Azimuth: 149 Height:109 Vert										
4 - 8GHz 4 - 8MHz										
7.2673	70.99dBuV Pk	30.2	-46.12	55.07	74	-	-	-	-	-
				Margin (dB):	-18.93	-	-	-	-	-
Azimuth: 322 Height:101 Horz										
7.2674	68.62dBuV Av	30.2	-46.12	26.68*	-	54	-	-	-	-
				Margin (dB):	-	-27.32	-	-	-	-
Azimuth: 322 Height:101 Horz										
7.2671	68.88dBuV Pk	30.2	-46.13	52.95	74	-	-	-	-	-
				Margin (dB):	-21.05	-	-	-	-	-
Azimuth: 21 Height:104 Vert										
7.2674	66.27dBuV Av	30.2	-46.12	24.33*	-	54	-	-	-	-
				Margin (dB):	-	-29.67	-	-	-	-
Azimuth: 21 Height:104 Vert										
8 - 12GHz 8 - 10MHz										
9.0842	71.79dBuV Pk	36.2	-49.36	58.63	74	-	-	-	-	-
				Margin (dB):	-15.37	-	-	-	-	-
Azimuth: 314 Height:111 Horz										
9.0842	70.6dBuV Av	36.2	-49.36	31.42*	-	54	-	-	-	-
				Margin (dB):	-	-22.58	-	-	-	-
Azimuth: 314 Height:111 Horz										
9.0843	67dBuV Pk	36.2	-49.36	53.84	74	-	-	-	-	-
				Margin (dB):	-20.16	-	-	-	-	-
Azimuth: 31 Height:104 Vert										
9.0842	65.48dBuV Av	36.2	-49.36	26.3*	-	54	-	-	-	-
				Margin (dB):	-	-27.7	-	-	-	-
Azimuth: 31 Height:104 Vert										
8.1759	68.45dBuV Pk	36.3	-48.23	56.52	74	-	-	-	-	-
				Margin (dB):	-17.48	-	-	-	-	-
Azimuth: 318 Height:101 Horz										
8.1758	63.62dBuV Av	36.3	-48.24	25.66*	-	54	-	-	-	-
				Margin (dB):	-	-28.34	-	-	-	-
Azimuth: 318 Height:101 Horz										
8.1755	68.16dBuV Pk	36.3	-48.25	56.21	74	-	-	-	-	-
				Margin (dB):	-17.79	-	-	-	-	-
Azimuth: 68 Height:105 Vert										
8.1757	63.3dBuV Av	36.3	-48.24	25.34*	-	54	-	-	-	-
				Margin (dB):	-	-28.66	-	-	-	-
Azimuth: 68 Height:105 Vert										

LIMIT 1: 47 CFR Part 15 PK
 LIMIT 2: 47 CFR Part 15 AV
 Pk - Peak detector
 Av - Average detection
 * Duty Cycle relaxation included



Fibaro
 Motion Sensor
 Tx 916MHz HiCH, Z axis
 Battery
 RED:Horizontal, GREEN:Vertical

Radiated Emission Data											
Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4	5	6	
Frequency	Reading	Factor	Factor	Reading	dBuV/m						
(GHz)		(dB)	(dB)								
=====											
=											
2 - 4GHz 2 - 4MHz											
2.7479	83.47dBuV Pk	22.1	-51.24	54.33	74	-	-	-	-	-	-
Azimuth: 360		Height:108 Horz		Margin (dB): -19.67		-	-	-	-	-	-
2.748	82.8dBuV Av	22.1	-51.24	27.64*	-	54	-	-	-	-	-
Azimuth: 360		Height:108 Horz		Margin (dB): -		-26.36	-	-	-	-	-
2.748	86.69dBuV Pk	22.1	-51.24	57.55	74	-	-	-	-	-	-
Azimuth: 0		Height:113 Vert		Margin (dB): -16.45		-	-	-	-	-	-
2.748	86.34dBuV Av	22.1	-51.24	31.18*	-	54	-	-	-	-	-
Azimuth: 0		Height:113 Vert		Margin (dB): -		-22.82	-	-	-	-	-
8 - 12GHz 8 - 10MHz											
8.2438	71.25dBuV Pk	36.4	-47.02	60.63	74	-	-	-	-	-	-
Azimuth: 315		Height:121 Horz		Margin (dB): -13.37		-	-	-	-	-	-
8.2441	68.71dBuV Av	36.4	-47.03	32.06*	-	54	-	-	-	-	-
Azimuth: 315		Height:121 Horz		Margin (dB): -		-21.94	-	-	-	-	-
8.2441	70.89dBuV Pk	36.4	-47.03	60.26	74	-	-	-	-	-	-
Azimuth: 57		Height:113 Vert		Margin (dB): -13.74		-	-	-	-	-	-
8.2441	68.28dBuV Av	36.4	-47.03	31.63*	-	54	-	-	-	-	-
Azimuth: 57		Height:113 Vert		Margin (dB): -		-22.37	-	-	-	-	-
9.1601	71.21dBuV Pk	36.3	-49.71	57.8	74	-	-	-	-	-	-
Azimuth: 302		Height:131 Horz		Margin (dB): -16.2		-	-	-	-	-	-
9.1601	68.09dBuV Av	36.3	-49.71	28.66*	-	54	-	-	-	-	-
Azimuth: 302		Height:131 Horz		Margin (dB): -		-25.34	-	-	-	-	-
9.1599	69.41dBuV Pk	36.3	-49.71	56	74	-	-	-	-	-	-
Azimuth: 39		Height:110 Vert		Margin (dB): -18		-	-	-	-	-	-
9.1601	65.11dBuV Av	36.3	-49.71	25.68*	-	54	-	-	-	-	-
Azimuth: 39		Height:110 Vert		Margin (dB): -		-28.32	-	-	-	-	-

LIMIT 1: 47 CFR Part 15 PK
 LIMIT 2: 47 CFR Part 15 AV

Pk - Peak detector
 Av - Average detection
 * Duty Cycle relaxation included

7.2.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz

