



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

**CERTIFICATION TEST REPORT**

**FOR**

**Universal Sensor**

**MODEL NUMBER: FGBS001**

**FCC ID: 2AA9MFGBS001**

**REPORT NUMBER: 10044158C**

**ISSUE DATE: February 11, 2014**

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Revision History

| Rev. | Issue<br>Date | Revisions     | Revised By |
|------|---------------|---------------|------------|
| --   | 2/11/14       | Initial Issue | M.Ferrer   |

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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:** Universal Sensor

**MODEL:** FGBS001

**SERIAL NUMBER:** Prototype

**DATE TESTED:** September 12, 2013 – February 4, 2013

| APPLICABLE STANDARDS                       |              |
|--------------------------------------------|--------------|
| STANDARD                                   | TEST RESULTS |
| CFR 47 Part 15 Subpart C Part 15.249       | Pass         |
| INDUSTRY CANADA RSS-210 Issue 8 Annex A2.9 | Pass         |
| INDUSTRY CANADA RSS-GEN Issue 3            | Pass         |

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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.

Approved & Released For UL CCS By:



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UL Verification Services Inc.

Tested By:



MICHAEL FERRER  
WiSE Project Lead  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 15, RSS-GEN Issue 3, 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.

## 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

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (MU shows 10m, but Emissions were extrapolated to 3m)

| 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 | 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            |
| RF Power           | dB          | Power Meter       | 0.45dB          |

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT contains a 908MHz transceiver. It is DC powered. The transmitter utilizes Z-wave technologies to communicate with other devices for home automation. EUT can be configured in 2 ways, alarm mode and temp mode.

The radio is manufactured by Fibar Group

### 5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

The transmitter has a maximum output quasi-peak E-field as follows:  
Data from section 7.2

| Frequency Range<br>(MHz) | Mode | Output E-field Strength<br>(dBuV/m) |
|--------------------------|------|-------------------------------------|
| 908                      | TX   | 91.69                               |

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an isolated copper wire type whip antenna

### 5.4. WORST-CASE CONFIGURATION AND MODE

The EUT was set in worst axis as found in preliminary testing. X-axis is worst axis. There are 2 modes Temp mode and Alarm mode as shown in block diagram. Only temp mode was tested for Conducted Emissions as either mode will not affect this test.

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Use                                                                                                               | Product Type | Manufacturer | Model        | Comments           |
|-------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|--------------------|
| EUT                                                                                                               | Sensor       | Fibar        | FGBS001      | None               |
| AE                                                                                                                | Power Supply | -            | MW41-1200500 | 12VDV 500mA output |
| AE                                                                                                                | Temp Sensor  | -            | -            | 3 wire connection  |
| Note: EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test) |              |              |              |                    |

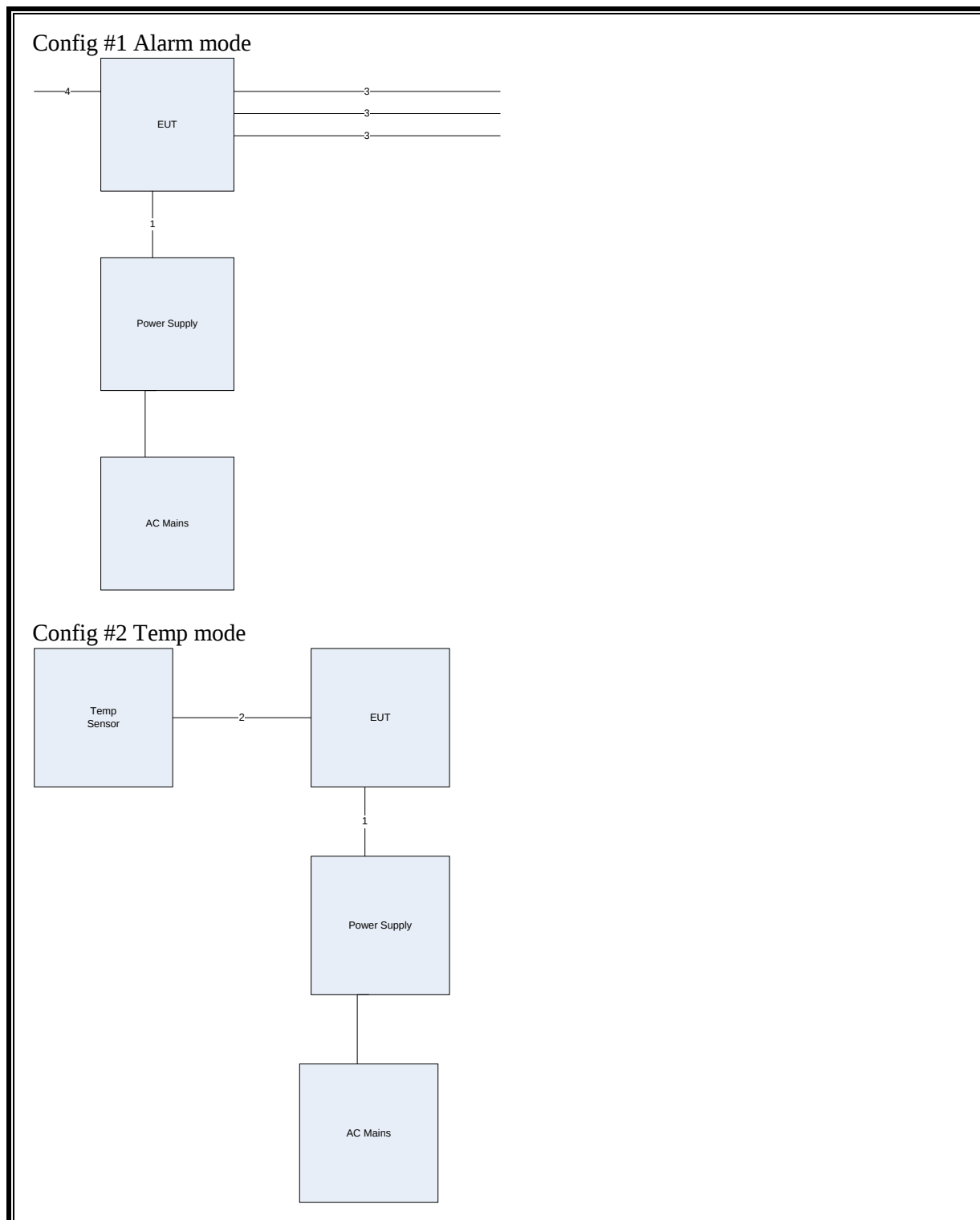
### I/O CABLES

| Port #                                                                                                                                                                               | Name      | Type* | Cable Max. >3m (Y/N) | Cable Shielded (Y/N) | Comments                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|----------------------|----------------------|-------------------------------------|
| 0                                                                                                                                                                                    | Enclosure | N/E   | —                    | —                    | None                                |
| 1                                                                                                                                                                                    | DC input  | DC    | N                    | N                    | AC adapter provided DC input        |
| 2                                                                                                                                                                                    | IO lines  | IO    | N                    | N                    | 1m wire to Temp Sensor              |
| 3                                                                                                                                                                                    | IO Lines  | IO    | N                    | N                    | 1m wires                            |
| 4                                                                                                                                                                                    | IO lines  | IO    | N                    | N                    | 6in wires connected to all IO ports |
| Note:<br>AC = AC Power Port      DC = DC Power Port      N/E = Non-Electrical<br>I/O = Signal Input or Output Port (Not Involved in Process Control)<br>TP = Telecommunication Ports |           |       |                      |                      |                                     |

### TEST SETUP

The EUT is programmed for continuous TX mode.

**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 | ESU             | EMC4323 | 20121227 | 20131231 |
| Bicon Antenna       | Chase           | VBA6106A        | EMC4078 | 20130213 | 20140228 |
| Log-P Antenna       | Chase           | UPA6109         | EMC4258 | 20121015 | 20131030 |
| Spectrum Analyzer   | Rhode & Schwarz | FSEK            | EMC4182 | 20121226 | 20131231 |
| Antenna Array       | UL              | BOMS            | EMC4276 | 20111227 | 20131231 |
| Spectrum Analyzer   | Agilent         | N9030A          | EMC4360 | 20121226 | 20131226 |
| Near Field Antenna  | EMCO            | -               | -       | -        | -        |
| EMI Test Receiver   | Rohde & Schwarz | ESCI            | EMC4328 | 20121230 | 20131230 |
| LISN                | Solar           | 8602-50-TS-50-N | EMC4052 | 20130115 | 20140116 |
| LISN                | Solar           | 8602-50-TS-50-N | EMC4064 | 20130115 | 20140116 |

Log-P Antenna was used during testing in September before cal due date.

## 7. TEST RESULTS

### 7.1.1. 99%, 20dB BANDWIDTH

#### LIMITS

None; for reporting purposes only.

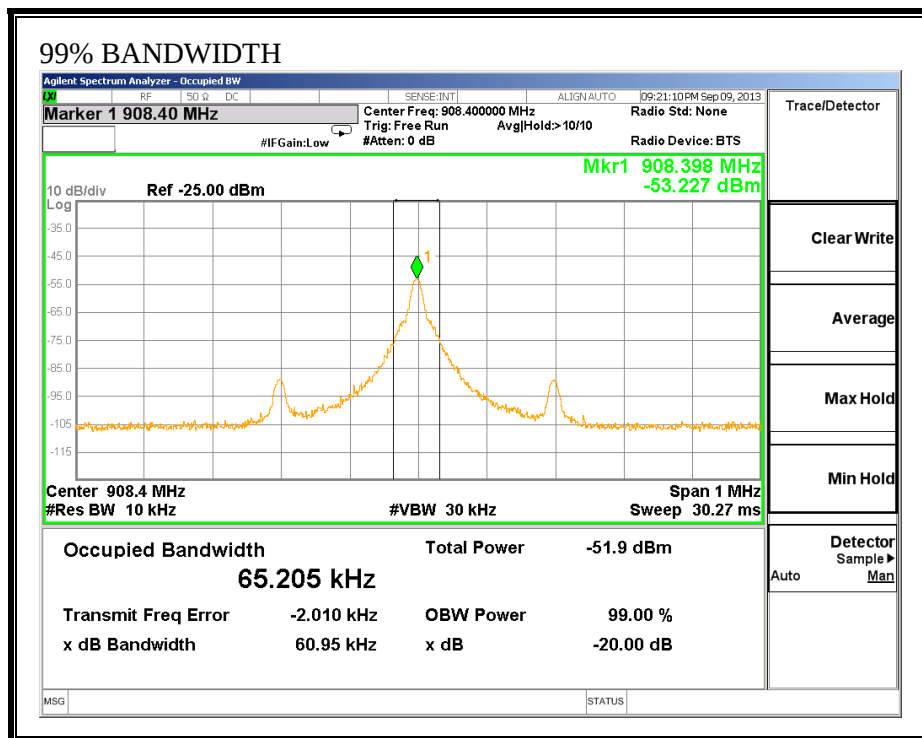
#### TEST PROCEDURE

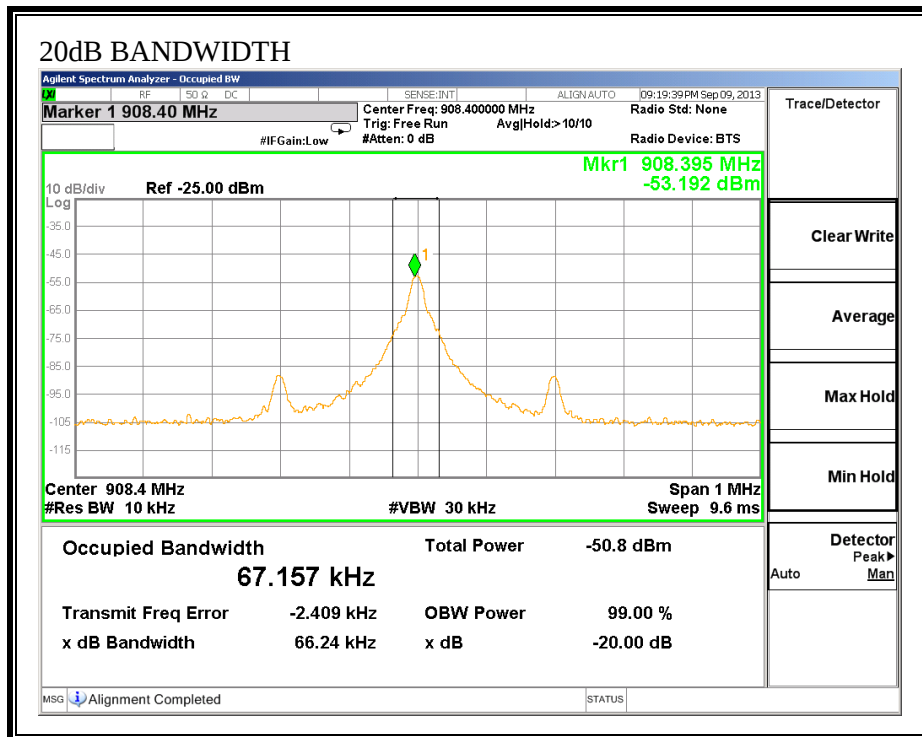
The transmitter output is connected to the spectrum analyzer. The RBW is set to 10kHz bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth and 20dB function is utilized.

#### RESULTS

| Channel | Frequency<br>(kHz) |
|---------|--------------------|
| 99%     | 65.205             |
| 20dB    | 66.24              |

## 99% BANDWIDTH





## 7.2. RADIATED EMISSIONS

### TEST PROCEDURE

ANSI C63.4

### 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:

Limit is 3m

| 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<br>(microvolts/meter) | Measure-<br>ment dis-<br>tance<br>(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

Manufacturer:Fibar  
Model#Universal Sensor  
Mode:Security contacts to GND, TX  
Voltage:120Vac 60Hz Yellow PS  
RED:Horizontal, GREEN:Vertical

| Radiated Emission Data |                 | Transducer<br>Frequency<br>(MHz) | Meter<br>Reading | Transducer<br>Factor<br>(dB) | Gain/Loss<br>Factor<br>(dB) | Corrected<br>Reading | Limit:1<br>dB (uVolts/meter) | 2 | 3 | 4 | 5 | 6 | Notes |
|------------------------|-----------------|----------------------------------|------------------|------------------------------|-----------------------------|----------------------|------------------------------|---|---|---|---|---|-------|
| Test                   |                 |                                  |                  |                              |                             |                      |                              |   |   |   |   |   |       |
| =====                  |                 |                                  |                  |                              |                             |                      |                              |   |   |   |   |   |       |
| LogP Horizontal        | 200 - 1000MHz   |                                  |                  |                              |                             |                      |                              |   |   |   |   |   |       |
| 908.3808               | 51.73dBuV QP    | 23                               | 10               | 84.73                        | -                           | 94                   | -                            | - | - | - | - | - | 1     |
| Azimuth: 228           | Height:100 Horz |                                  |                  | Margin (dB):                 | -                           | -9.27                | -                            | - | - | - | - | - |       |
| 908.3808               | 45.27dBuV QP    | 23                               | 10               | 78.27                        | -                           | 94                   | -                            | - | - | - | - | - | 1     |
| Azimuth: 272           | Height:108 Vert |                                  |                  | Margin (dB):                 | -                           | -15.73               | -                            | - | - | - | - | - |       |
| 908.3808               | 48.78dBuV QP    | 23                               | 10               | 81.78                        | -                           | 94                   | -                            | - | - | - | - | - | 2     |
| Azimuth: 14            | Height:116 Vert |                                  |                  | Margin (dB):                 | -                           | -12.22               | -                            | - | - | - | - | - |       |
| 908.3808               | 54.38dBuV QP    | 23                               | 10               | 87.38                        | -                           | 94                   | -                            | - | - | - | - | - | 2     |
| Azimuth: 229           | Height:102 Horz |                                  |                  | Margin (dB):                 | -                           | -6.62                | -                            | - | - | - | - | - |       |
| 908.3808               | 58.69dBuV QP    | 23                               | 10               | 91.69                        | -                           | 94                   | -                            | - | - | - | - | - | 3     |
| Azimuth: 308           | Height:103 Horz |                                  |                  | Margin (dB):                 | -                           | -2.31                | -                            | - | - | - | - | - |       |
| 908.3808               | 57.83dBuV QP    | 23                               | 10               | 90.83                        | -                           | 94                   | -                            | - | - | - | - | - | 3     |
| Azimuth: 203           | Height:128 Vert |                                  |                  | Margin (dB):                 | -                           | -3.17                | -                            | - | - | - | - | - |       |

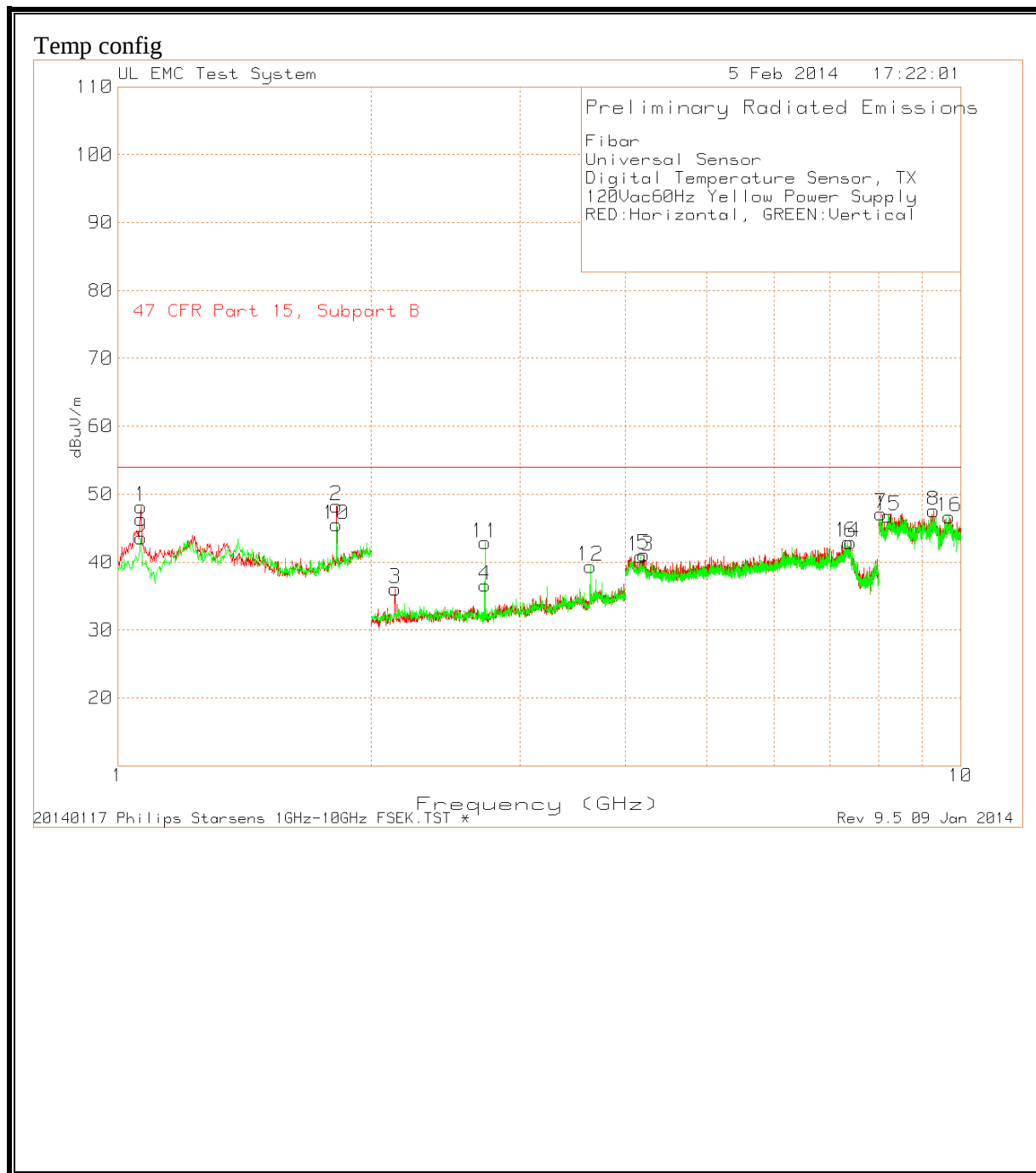
Notes:  
1 - Z-Axis (Laying Flat)  
2 - Y-Axis (On Side)  
3 - X-Axis (Standing Up)

LIMIT 1: NONE  
LIMIT 2: FCC 15.249 Limit  
LIMIT 3: NONE  
LIMIT 4: NONE  
LIMIT 5: NONE  
LIMIT 6: NONE

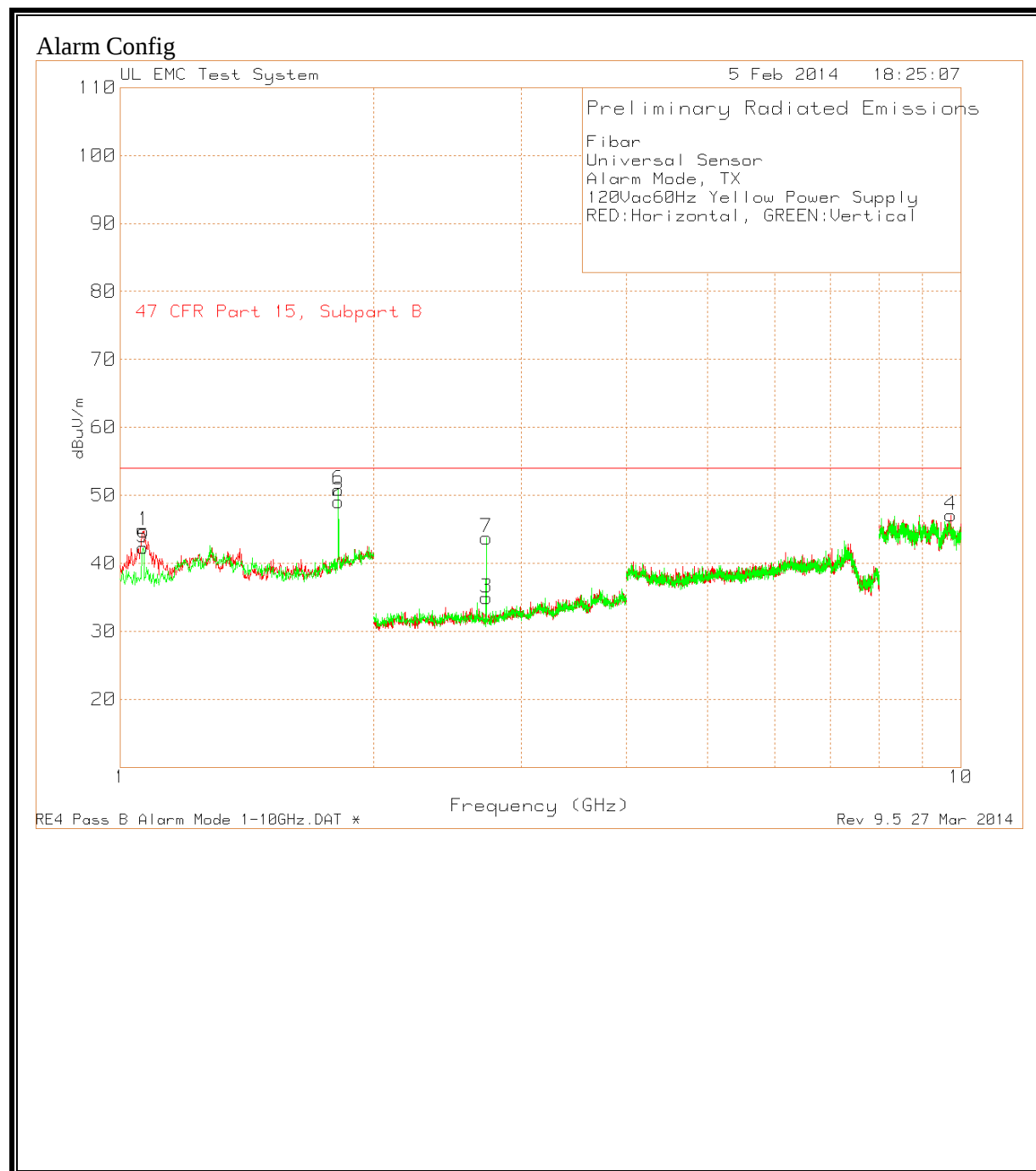
QP - Quasi-Peak detector

Measurements for above data were measured at 3m.

### 7.2.1. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz



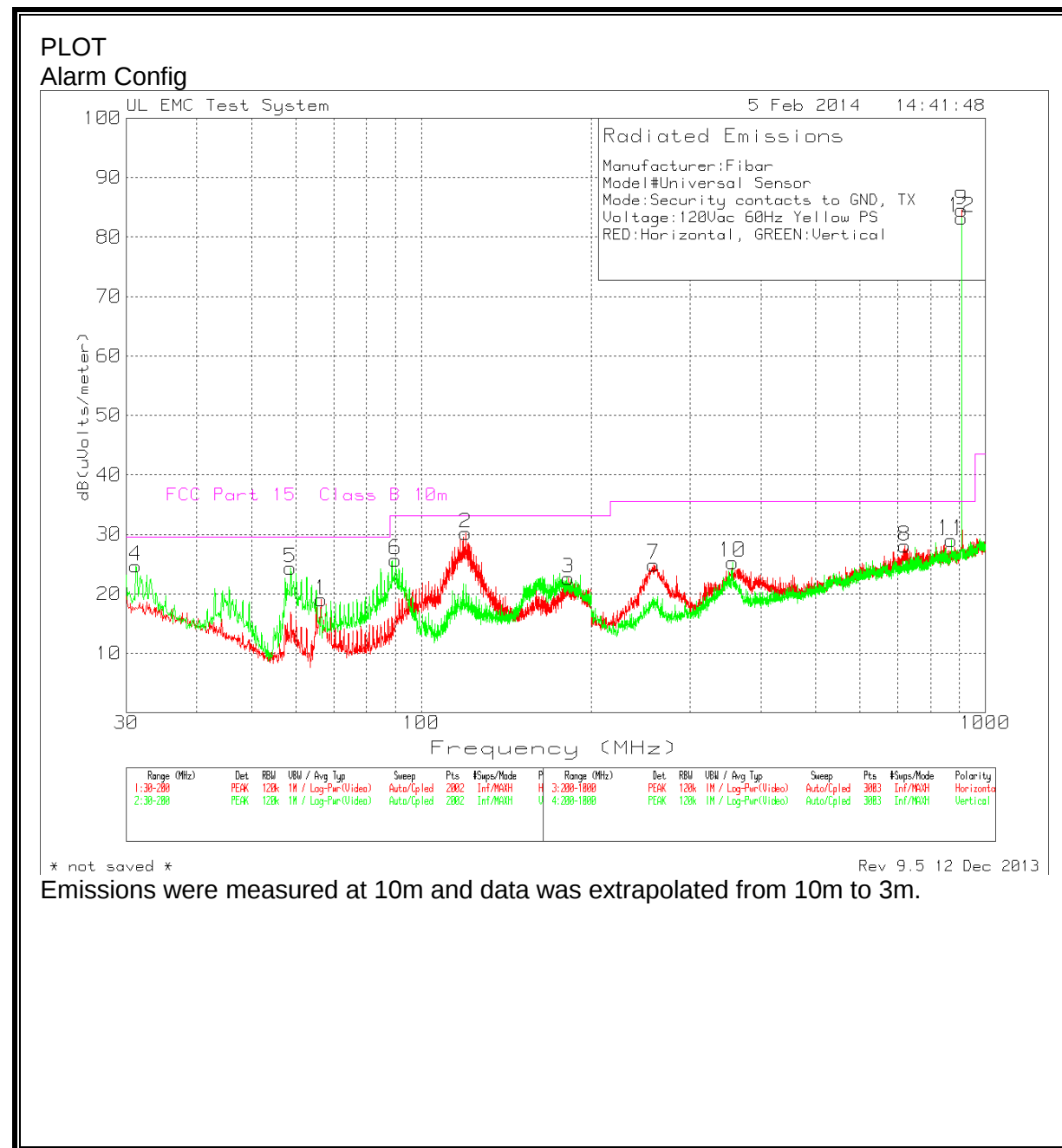
| Fibar                          |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
|--------------------------------|----------------------|----------------------|---------------------|---------------------|--------------------------|---------------------------|---------------------------|----------------|----------------|-------------|----------|
| Universal Sensor               |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
| Digital Temperature Sensor, TX |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
| 120Vac60Hz Yellow Power Supply |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
| RED:Horizontal, GREEN:Vertical |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
|                                |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
| Marker No.                     | Test Frequency (GHz) | Meter Reading (dBuV) | Detector            | Antenna Factor dB/m | BOMS Factor (dB)         | Corrected Reading dBuV/m  | 47 CFR Part 15, Subpart B | Margin (dB)    | Azimuth [Degs] | Height [cm] | Polarity |
| 1                              | 1.0661               | 76.94                | PK                  | 27.2                | -55.98                   | 48.16                     | 54                        | -5.84          | 0-360          | 100         | H        |
| 2                              | 1.8176               | 71.75                | PK                  | 30.1                | -53.55                   | 48.3                      | 54                        | -5.7           | 0-360          | 100         | H        |
| 3                              | 2.1321               | 66.71                | PK                  | 21.5                | -52.09                   | 36.12                     | 54                        | -17.88         | 0-360          | 100         | H        |
| 4                              | 2.7247               | 65.15                | PK                  | 22.1                | -50.66                   | 36.59                     | 54                        | -17.41         | 0-360          | 100         | H        |
| 5                              | 4.2121               | 64.05                | PK                  | 28.3                | -51.26                   | 41.09                     | 54                        | -12.91         | 0-360          | 150         | H        |
| 6                              | 7.4017               | 58.06                | PK                  | 31.2                | -46.35                   | 42.91                     | 54                        | -11.09         | 0-360          | 150         | H        |
| 7                              | 8.04                 | 57.96                | PK                  | 36.1                | -46.9                    | 47.16                     | 54                        | -6.84          | 0-360          | 150         | H        |
| 8                              | 9.2933               | 59.08                | PK                  | 36.4                | -47.92                   | 47.56                     | 54                        | -6.44          | 0-360          | 150         | H        |
| 9                              | 1.0661               | 72.4                 | PK                  | 27.2                | -55.98                   | 43.62                     | 54                        | -10.38         | 0-360          | 100         | V        |
| 10                             | 1.8176               | 68.95                | PK                  | 30.1                | -53.55                   | 45.5                      | 54                        | -8.5           | 0-360          | 100         | V        |
| 11                             | 2.7247               | 71.43                | PK                  | 22.1                | -50.66                   | 42.87                     | 54                        | -11.13         | 0-360          | 150         | V        |
| 12                             | 3.6356               | 65.75                | PK                  | 23.3                | -49.67                   | 39.38                     | 54                        | -14.62         | 0-360          | 150         | V        |
| 13                             | 4.1741               | 63.39                | PK                  | 28.3                | -50.82                   | 40.87                     | 54                        | -13.13         | 0-360          | 150         | V        |
| 14                             | 7.3517               | 57.96                | PK                  | 30.8                | -45.82                   | 42.94                     | 54                        | -11.06         | 0-360          | 150         | V        |
| 15                             | 8.2062               | 57.91                | PK                  | 36.3                | -47.4                    | 46.81                     | 54                        | -7.19          | 0-360          | 150         | V        |
| 16                             | 9.6997               | 57.94                | PK                  | 36.4                | -47.69                   | 46.65                     | 54                        | -7.35          | 0-360          | 150         | V        |
|                                |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
| Test Frequency (GHz)           | Meter Reading (dBuV) | Detector             | Antenna Factor dB/m | BOMS Factor (dB)    | Corrected Reading dBuV/m | 47 CFR Part 15, Subpart B | Margin (dB)               | Azimuth [Degs] | Height [cm]    | Polarity    |          |
| 1.0664                         | 77.75                | PK                   | 27.2                | -55.97              | 48.98                    | 54                        | -5.02                     | 120            | 100            | H           |          |
| 1.0658                         | 67.39                | LnAv                 | 27.2                | -55.98              | 38.61                    | 54                        | -15.39                    | 120            | 100            | H           |          |
| 1.8168                         | 74.96                | PK                   | 30.1                | -53.55              | 51.51                    | 54                        | -2.49                     | 122            | 104            | H           |          |
| 1.8168                         | 72.26                | LnAv                 | 30.1                | -53.55              | 48.81                    | 54                        | -5.19                     | 122            | 104            | H           |          |
|                                |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
| PK - Peak detector             |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |
| LnAv - Linear Average detector |                      |                      |                     |                     |                          |                           |                           |                |                |             |          |



| Fibar                                    |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
|------------------------------------------|----------------------|----------------------|------------------------|---------------------|--------------------------|---------------------------|---------------------------|----------------|----------------|-------------|----------|
| Universal Sensor                         |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| Alarm Mode, TX                           |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| 120Vac60Hz Yellow Power Supply           |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| RED:Horizontal, GREEN:Vertical           |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
|                                          |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| Marker No.                               | Test Frequency (GHz) | Meter Reading (dBuV) | Detector               | Antenna Factor dB/m | BOMS Factor (dB)         | Corrected Reading dBuV/m  | 47 CFR Part 15, Subpart B | Margin (dB)    | Azimuth [Degs] | Height [cm] | Polarity |
| 1                                        | 1.0661               | 73.53                | PK                     | 27.2                | -55.98                   | 44.75                     | 54                        | -9.25          | 0-360          | 95          | H        |
| 2                                        | 1.8176               | 72.56                | PK                     | 30.1                | -53.55                   | 49.11                     | 54                        | -4.89          | 0-360          | 95          | H        |
| 3                                        | 2.7247               | 63.49                | PK                     | 22.1                | -50.66                   | 34.93                     | 54                        | -19.07         | 0-360          | 150         | H        |
| 4                                        | 9.7277               | 58.59                | PK                     | 36.4                | -47.89                   | 47.1                      | 54                        | -6.9           | 0-360          | 150         | H        |
| 5                                        | 1.0641               | 71.1                 | PK                     | 27.2                | -56                      | 42.3                      | 54                        | -11.7          | 0-360          | 150         | V        |
| 6                                        | 1.8176               | 74.29                | PK                     | 30.1                | -53.55                   | 50.84                     | 54                        | -3.16          | 0-360          | 150         | V        |
| 7                                        | 2.7247               | 72.32                | PK                     | 22.1                | -50.66                   | 43.76                     | 54                        | -10.24         | 0-360          | 150         | V        |
|                                          |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| PK - Peak detector                       |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
|                                          |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| Test Frequency (GHz)                     | Meter Reading (dBuV) | Detector             | EMCO311 7 S/N 00060338 | BOMS Factor (dB)    | Corrected Reading dBuV/m | 47 CFR Part 15, Subpart B | Margin (dB)               | Azimuth [Degs] | Height [cm]    | Polarity    |          |
| 1.8167                                   | 75.7                 | PK                   |                        | 30.1                | -53.55                   | 52.25                     | 54                        | -1.75          | 118            | 102         | H        |
| 1.8168                                   | 73.29                | LnAv                 |                        | 30.1                | -53.55                   | 49.84                     | 54                        | -4.16          | 118            | 102         | H        |
| 1.8168                                   | 71.2                 | PK                   |                        | 30.1                | -53.55                   | 47.75                     | 54                        | -6.25          | 154            | 119         | V        |
| 1.8168                                   | 66.83                | LnAv                 |                        | 30.1                | -53.55                   | 43.38                     | 54                        | -10.62         | 154            | 119         | V        |
|                                          |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| PK - Peak detector                       |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |
| LnAv - Linear (voltage) average detector |                      |                      |                        |                     |                          |                           |                           |                |                |             |          |

## 7.2.2. WORST-CASE BELOW 1 GHz

### SPURIOUS EMISSIONS 30 TO 1000 MHz



Manufacturer:Fibar  
Model#Universal Sensor  
Mode:Security contacts to GND, TX  
Voltage:120Vac 60Hz Yellow PS  
RED:Horizontal, GREEN:Vertical

| Trace Markers                       |                            |                  |                              |                             |                      |         |   |   |        |   |   |
|-------------------------------------|----------------------------|------------------|------------------------------|-----------------------------|----------------------|---------|---|---|--------|---|---|
| No.                                 | Test<br>Frequency<br>(MHz) | Meter<br>Reading | Transducer<br>Factor<br>(dB) | Gain/Loss<br>Factor<br>(dB) | Corrected<br>Reading | Limit:1 | 2 | 3 | 4      | 5 | 6 |
| dB(uVolts/meter)                    |                            |                  |                              |                             |                      |         |   |   |        |   |   |
| =====                               |                            |                  |                              |                             |                      |         |   |   |        |   |   |
| Bicon Horizontal 30 - 200MHz -----  |                            |                  |                              |                             |                      |         |   |   |        |   |   |
| 1                                   | 66.4468                    | 42.78dBuV PK     | 6.2                          | -30                         | 18.98                | -       | - | - | 29.55  | - | - |
|                                     |                            | Azimuth:0-360    | Height:399                   | Horz                        | Margin (dB)          | -       | - | - | -10.57 | - | - |
| 2                                   | 119.8851                   | 46.75dBuV PK     | 13.2                         | -29.8                       | 30.15                | -       | - | - | 33.07  | - | - |
|                                     |                            | Azimuth:0-360    | Height:399                   | Horz                        | Margin (dB)          | -       | - | - | -2.92  | - | - |
| 3                                   | 182.5837                   | 35.98dBuV PK     | 15.8                         | -29.2                       | 22.58                | -       | - | - | 33.07  | - | - |
|                                     |                            | Azimuth:0-360    | Height:399                   | Horz                        | Margin (dB)          | -       | - | - | -10.49 | - | - |
| Bicon Vertical 30 - 200MHz -----    |                            |                  |                              |                             |                      |         |   |   |        |   |   |
| 4                                   | 31.1894                    | 37.39dBuV PK     | 17.4                         | -30.1                       | 24.69                | -       | - | - | 29.55  | - | - |
|                                     |                            | Azimuth:0-360    | Height:99                    | Vert                        | Margin (dB)          | -       | - | - | -4.86  | - | - |
| 5                                   | 58.6307                    | 47.3dBuV PK      | 7.1                          | -30.1                       | 24.3                 | -       | - | - | 29.55  | - | - |
|                                     |                            | Azimuth:0-360    | Height:250                   | Vert                        | Margin (dB)          | -       | - | - | -5.25  | - | - |
| 6                                   | 89.98                      | 46.62dBuV PK     | 9                            | -29.9                       | 25.72                | -       | - | - | 33.07  | - | - |
|                                     |                            | Azimuth:0-360    | Height:250                   | Vert                        | Margin (dB)          | -       | - | - | -7.35  | - | - |
| LogP Horizontal 200 - 1000MHz ----- |                            |                  |                              |                             |                      |         |   |   |        |   |   |
| 7                                   | 258.3611                   | 38.9dBuV PK      | 12.4                         | -26.4                       | 24.9                 | -       | - | - | 35.57  | - | - |
|                                     |                            | Azimuth:0-360    | Height:299                   | Horz                        | Margin (dB)          | -       | - | - | -10.67 | - | - |
| 8                                   | 720.986                    | 31.72dBuV PK     | 20.6                         | -24.3                       | 28.02                | -       | - | - | 35.57  | - | - |
|                                     |                            | Azimuth:0-360    | Height:99                    | Horz                        | Margin (dB)          | -       | - | - | -7.55  | - | - |
| 9                                   | 908.5943                   | 86.11dBuV PK     | 23.2                         | -24.8                       | 84.51                | -       | - | - | 35.57  | - | - |
|                                     |                            | Azimuth:0-360    | Height:99                    | Horz                        | Margin (dB)          | -       | - | - | 48.94  | - | - |
| LogP Vertical 200 - 1000MHz -----   |                            |                  |                              |                             |                      |         |   |   |        |   |   |
| 10                                  | 356.1626                   | 36.19dBuV PK     | 14.9                         | -25.8                       | 25.29                | -       | - | - | 35.57  | - | - |
|                                     |                            | Azimuth:0-360    | Height:99                    | Vert                        | Margin (dB)          | -       | - | - | -10.28 | - | - |
| 11                                  | 870.2199                   | 31.03dBuV PK     | 22.5                         | -24.5                       | 29.03                | -       | - | - | 35.57  | - | - |
|                                     |                            | Azimuth:0-360    | Height:399                   | Vert                        | Margin (dB)          | -       | - | - | -6.54  | - | - |
| 12                                  | 908.5943                   | 84.86dBuV PK     | 23.2                         | -24.8                       | 83.26                | -       | - | - | 35.57  | - | - |
|                                     |                            | Azimuth:0-360    | Height:199                   | Vert                        | Margin (dB)          | -       | - | - | 47.69  | - | - |

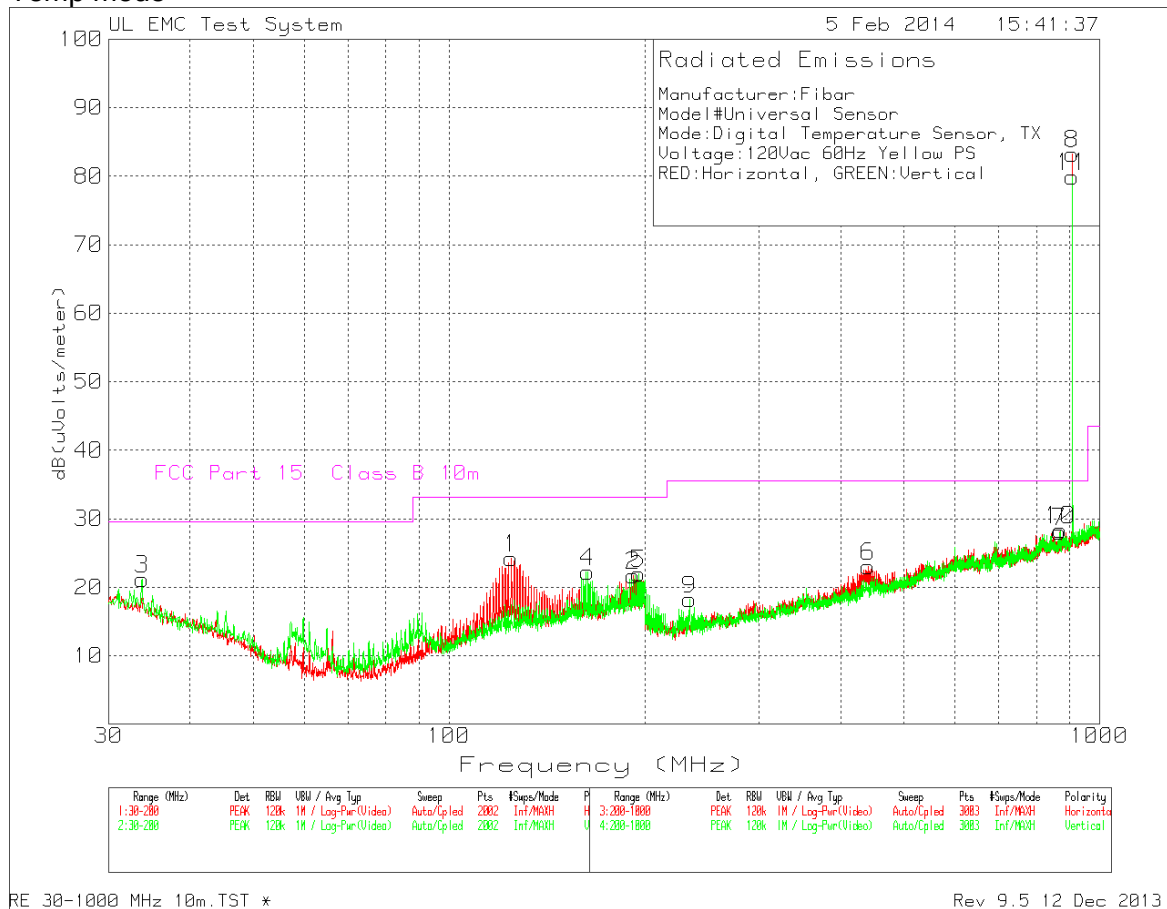
LIMIT 1: NONE  
LIMIT 2: NONE  
LIMIT 3: NONE  
LIMIT 4: FCC Part 15 Class B 10m  
LIMIT 5: NONE  
LIMIT 6: NONE

Manufacturer:Fibar  
Model#Universal Sensor  
Mode:Security contacts to GND, TX  
Voltage:120Vac 60Hz Yellow PS  
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      | dB (uVolts/meter) |   |   |       |   |   |  |
| (MHz)                            |              | (dB)       | (dB)      |              |                   |   |   |       |   |   |  |
| =====                            |              |            |           |              |                   |   |   |       |   |   |  |
| =                                |              |            |           |              |                   |   |   |       |   |   |  |
| Bicon Horizontal 30 - 200MHz     |              |            |           |              |                   |   |   |       |   |   |  |
| 119.86266                        | 44.06dBuV QP | 13.2       | -29.8     | 27.46        | -                 | - | - | 33.07 | - | - |  |
| Azimuth: 0                       | Height:382   | Horz       |           | Margin (dB): | -                 | - | - | -5.61 | - | - |  |
| Bicon Vertical 30 - 200MHz       |              |            |           |              |                   |   |   |       |   |   |  |
| 31.26793                         | 36.07dBuV QP | 17.3       | -30.1     | 23.27        | -                 | - | - | 29.55 | - | - |  |
| Azimuth: 0                       | Height:100   | Vert       |           | Margin (dB): | -                 | - | - | -6.28 | - | - |  |
| 58.62429                         | 45.49dBuV QP | 7.1        | -30.1     | 22.49        | -                 | - | - | 29.55 | - | - |  |
| Azimuth: 65                      | Height:234   | Vert       |           | Margin (dB): | -                 | - | - | -7.06 | - | - |  |
| LIMIT 4: FCC Part 15 Class B 10m |              |            |           |              |                   |   |   |       |   |   |  |

PK - Peak detector  
QP - Quasi-Peak detector

# PLOT Temp mode



All Peak Spurious Emissions at least 6dB under the limit.

Emissions were measured at 10m and data was extrapolated from 10m to 3m.

## 8. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207 (a)  
IC RSS-GEN, Section 7.2.2

| Frequency of emission<br>(MHz)                   | Conducted Limit (dBμV) |           |
|--------------------------------------------------|------------------------|-----------|
|                                                  | Quasi-peak             | Average   |
| 0.15 to 0.50                                     | 66 to 56*              | 56 to 46* |
| 0.50 to 5                                        | 56                     | 46        |
| 5 to 30                                          | 60                     | 50        |
| * Decreases with the logarithm of the frequency. |                        |           |

### TEST PROCEDURE

ANSI C63.4

### RESULTS

No non-compliance noted:

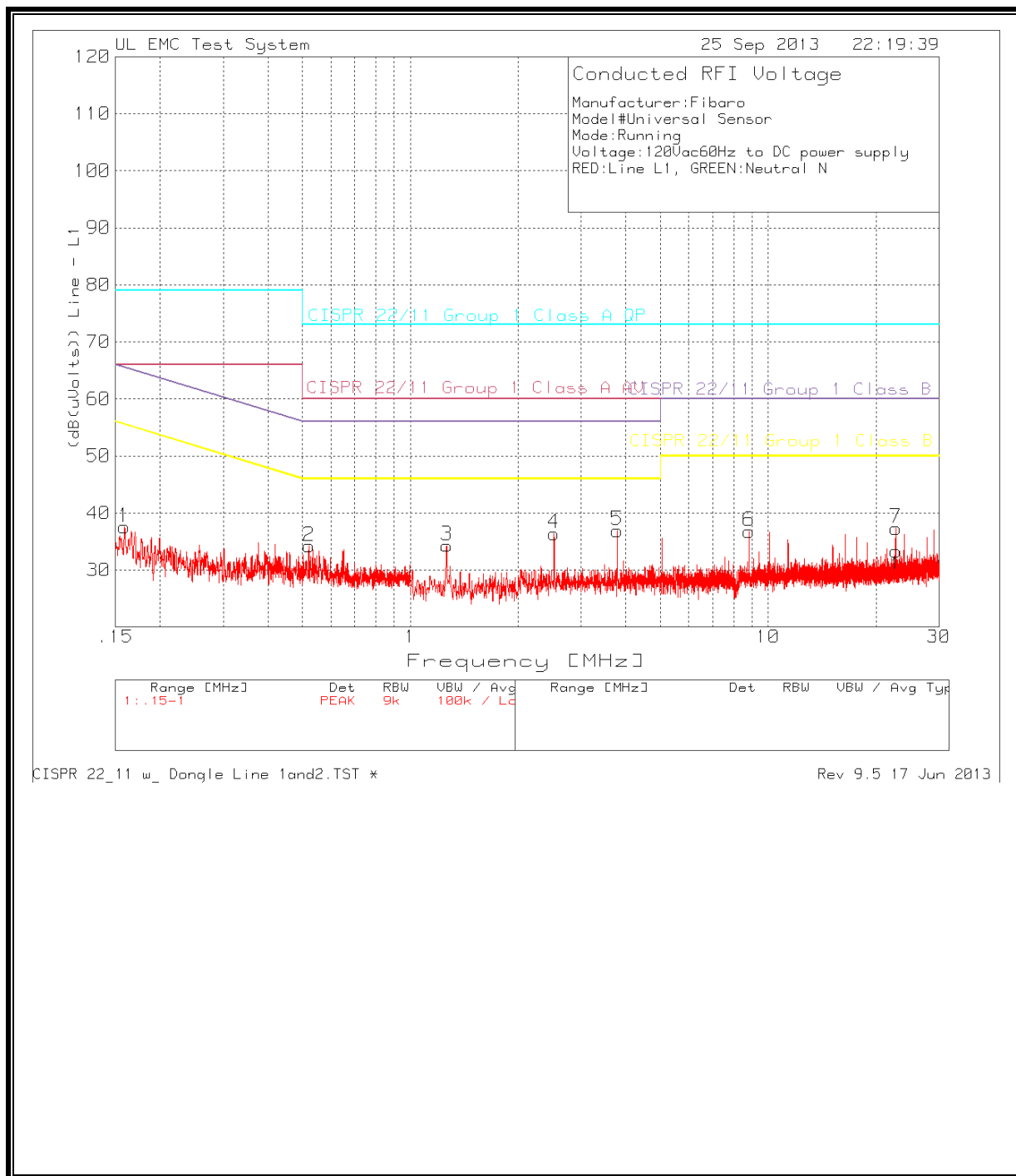
# **WORST EMISSIONS**

Manufacturer:Fibaro  
Model#Universal Sensor  
Mode:Running  
Voltage:120Vac60Hz to DC power supply  
RED:Line L1, GREEN:Neutral N

| Trace Markers                           |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
|-----------------------------------------|----------------------------|------------------|------------------------------|-----------------------------|-----------------------------------|---------|--------|--------|--------|---|---|
| No.                                     | Test<br>Frequency<br>[MHz] | Meter<br>Reading | Transducer<br>Factor<br>[dB] | Gain/Loss<br>Factor<br>[dB] | Corrected<br>Reading (dB(uVolts)) | Limit:1 | 2      | 3      | 4      | 5 | 6 |
| =====                                   |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| Line - L1 .15 - 1MHz -----              |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| 1                                       | .15913                     | 23.42dBuV PK     | .1                           | 14                          | 37.52                             | 79      | 66     | 65.51  | 55.51  | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -41.48  | -28.48 | -27.99 | -17.99 | - | - |
| 2                                       | .52064                     | 23.5dBuV PK      | .1                           | 10.6                        | 34.2                              | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -38.8   | -25.8  | -21.8  | -11.8  | - | - |
| Line - L1 1 - 30MHz -----               |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| 3                                       | 1.26439                    | 23.62dBuV PK     | .1                           | 10.6                        | 34.32                             | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -38.68  | -25.68 | -21.68 | -11.68 | - | - |
| 4                                       | 2.52117                    | 25.66dBuV PK     | .1                           | 10.6                        | 36.36                             | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -36.64  | -23.64 | -19.64 | -9.64  | - | - |
| 5                                       | 3.78519                    | 26.13dBuV PK     | .1                           | 10.7                        | 36.93                             | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -36.07  | -23.07 | -19.07 | -9.07  | - | - |
| 6                                       | 8.83402                    | 25.71dBuV PK     | .2                           | 10.9                        | 36.81                             | 73      | 60     | 60     | 50     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -36.19  | -23.19 | -23.19 | -13.19 | - | - |
| 7                                       | 22.69477                   | 25.49dBuV PK     | .2                           | 11.6                        | 37.29                             | 73      | 60     | 60     | 50     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -35.71  | -22.71 | -22.71 | -12.71 | - | - |
| Line - L2 .15 - 1MHz -----              |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| 8                                       | .16465                     | 23.2dBuV PK      | .1                           | 13.5                        | 36.8                              | 79      | 66     | 65.23  | 55.23  | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -42.2   | -29.2  | -28.43 | -18.43 | - | - |
| 9                                       | .57532                     | 22.96dBuV PK     | .1                           | 10.6                        | 33.66                             | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -39.34  | -26.34 | -22.34 | -12.34 | - | - |
| Line - L2 1 - 30MHz -----               |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| 10                                      | 1.25715                    | 24.8dBuV PK      | .1                           | 10.6                        | 35.5                              | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -37.5   | -24.5  | -20.5  | -10.5  | - | - |
| 11                                      | 2.51755                    | 25.15dBuV PK     | .1                           | 10.6                        | 35.85                             | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -37.15  | -24.15 | -20.15 | -10.15 | - | - |
| 12                                      | 3.77794                    | 25.84dBuV PK     | .1                           | 10.7                        | 36.64                             | 73      | 60     | 56     | 46     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -36.36  | -23.36 | -19.36 | -9.36  | - | - |
| 13                                      | 10.07631                   | 25.53dBuV PK     | .1                           | 11                          | 36.63                             | 73      | 60     | 60     | 50     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -36.37  | -23.37 | -23.37 | -13.37 | - | - |
| 14                                      | 23.93706                   | 24.29dBuV PK     | .5                           | 11.6                        | 36.39                             | 73      | 60     | 60     | 50     | - | - |
|                                         |                            |                  |                              | Margin [dB]                 |                                   | -36.61  | -23.61 | -23.61 | -13.61 | - | - |
| LIMIT 1: CISPR 22/11 Group 1 Class A QP |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| LIMIT 2: CISPR 22/11 Group 1 Class A AV |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| LIMIT 3: CISPR 22/11 Group 1 Class B QP |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| LIMIT 4: CISPR 22/11 Group 1 Class B AV |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| LIMIT 5: NONE                           |                            |                  |                              |                             |                                   |         |        |        |        |   |   |
| LIMIT 6: NONE                           |                            |                  |                              |                             |                                   |         |        |        |        |   |   |

PK - Peak detector

# **LINE 1 RESULTS**



## LINE 2 RESULTS

