



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

**CERTIFICATION TEST REPORT**

**FOR**

**Fibar Flood Sensor**

**MODEL NUMBER: FGFS-101**

**FCC ID: 2AA9MFGFS101Z5  
IC: 20430-FGFS101Z5**

**REPORT NUMBER: 11204799**

**ISSUE DATE: July 7, 2016**

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NVLAP Lab code: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	July 7 2016	Initial Issue	V Sabalvaro

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Fibar Group S.A.  
Ul. Lotnicza 1  
Poznań, Poland 60-421

**EUT DESCRIPTION:** Radio sensor probe

**MODEL:** FGFS-101

**SERIAL NUMBER:** non-serialized

**DATE TESTED:** May 4 – May 17, 2016

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

Approved & Released For  
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Tested By:



Bart Mucha  
Staff Engineer

UL LLC



Vincent Sabalvaro  
EMC WISE Engineer  
Consumer Technology  
UL LLC

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, 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/>

## 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
Conducted Emissions	150k-30MHz	LISN	3.65dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a 908.4MHz, 908.42MHz, and 916MHz transceiver. It is battery powered. The transmitter utilizes Z-wave technologies to communicate with other devices for home automation.

The device is manufactured by Fibar Group S.A.

### 5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

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

Frequency Range (MHz)	Mode	Output QP E-field Strength (dBuV/m)
908.4 - 916	TX	89.58*

\* Measurement taken with Peak detector

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio is equipped with a embedded, impedance matched quarter-wave antenna. Antenna was designed as a trace on PCB.

### 5.4. WORST-CASE CONFIGURATION AND MODE

The EUT was set in worst configuration and axis, as found in preliminary testing. While the EUT was wired and X-axis, sideways standing vertically, is the worst case configuration and axis.

For radiated emissions, the worst-case configuration is determined to be the mode and channel with the highest output power.

## 5.1. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Comments
Power Supply	-	MGT-12500-SPS	Generic, Not Supplied

### I/O CABLES

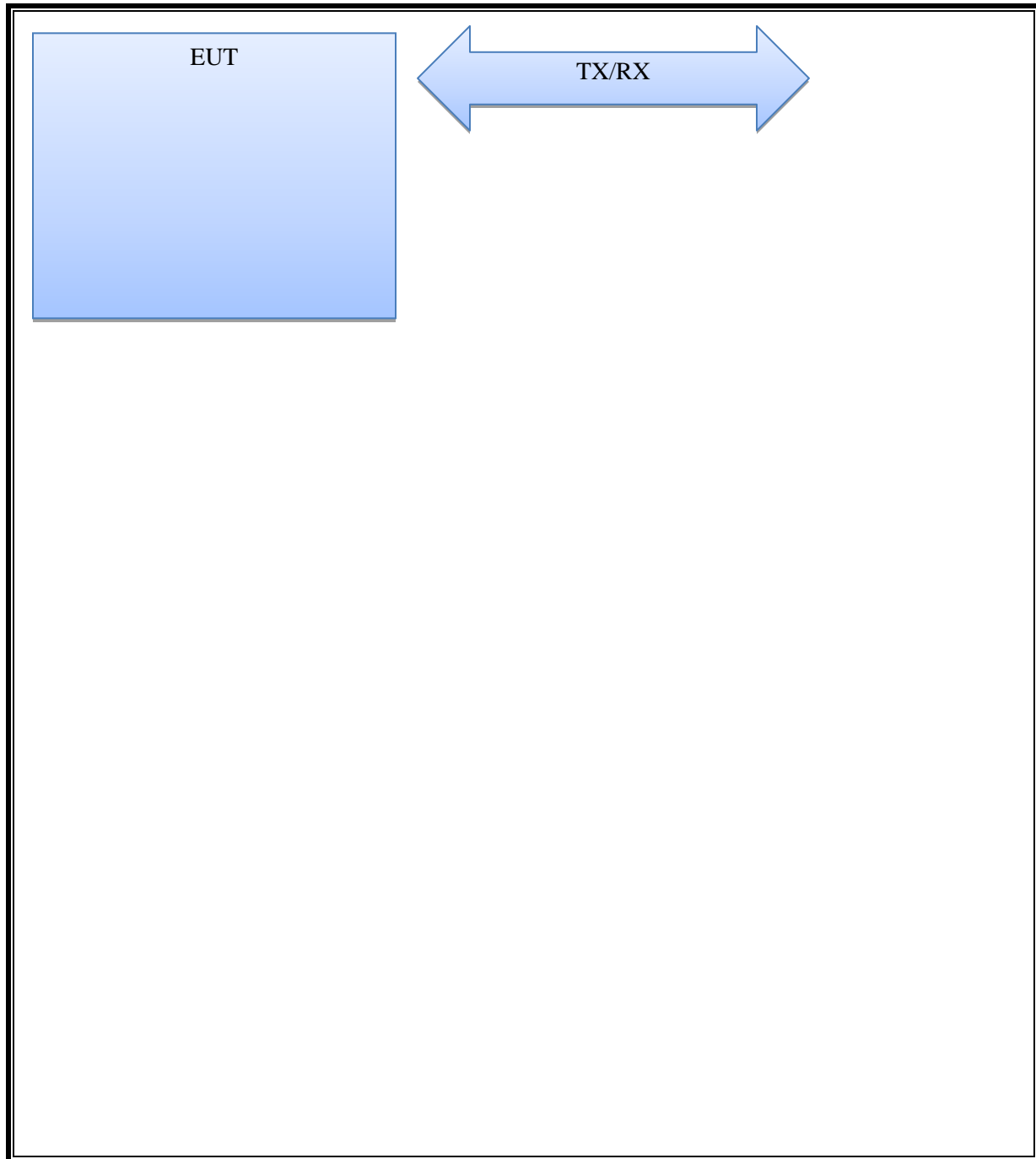
I/O Cable List					
Cable No	Port	Connector Type	Cable Type	Cable Length (m)	Remarks
0	Enclosure	N/E	-	-	None
1	DC Input	DC	Wire	-	Optional
2	IO Lines	I/O	Wire	-	Optional
Note:					
AC = AC Power Port      DC = DC Power Port      N/E = Non-Electrical					
I/O = Signal Input or Output Port (Not Involved in Process Control)					
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	T No.	Cal Date	Cal Due
Radiated Software	UL	UL EMC	Ver 9.5, Nov, 2015		
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	4/26/2016	4/30/2017
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
HighPass Filter	Solar Electronics	2803-150	EMC4327	N/A	N/A
Attenuator	HP	8494B	2831A0083	N/A	N/A
LISN - L1	Solar	8602-50-TS-50-N	EMC4052	2/16/2016	2/28/2017
LISN - L2	Solar	8602-50-TS-50-N	EMC4064	2/16/2016	2/28/2017
Signal Analyzer	Agilent	PXA	EMC4360	1/8/2016	0131/2017
Near Field Probe	EMCO	7405	1270	N/A	N/A
Test Receiver	Rhode & Schwarz	ESCI	EMC4328	11/18/2015	11/30/2016
Log-P Antenna	Chase	UPA6109	EMC4313	1/22/2016	1/31/2017
Bicon Antenna	Chase	UPA6106A	EMC4078	12/28/2015	12/31/2016
Antenna Array	UL	BOMS	EMC4276	12/1/2015	12/31/2016
Test Receiver	Rhode & Schwarz	ESU	EMC4323	1/2/2016	1/31/2017

## 7. TEST RESULTS

### 7.1. 20 dB AND 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

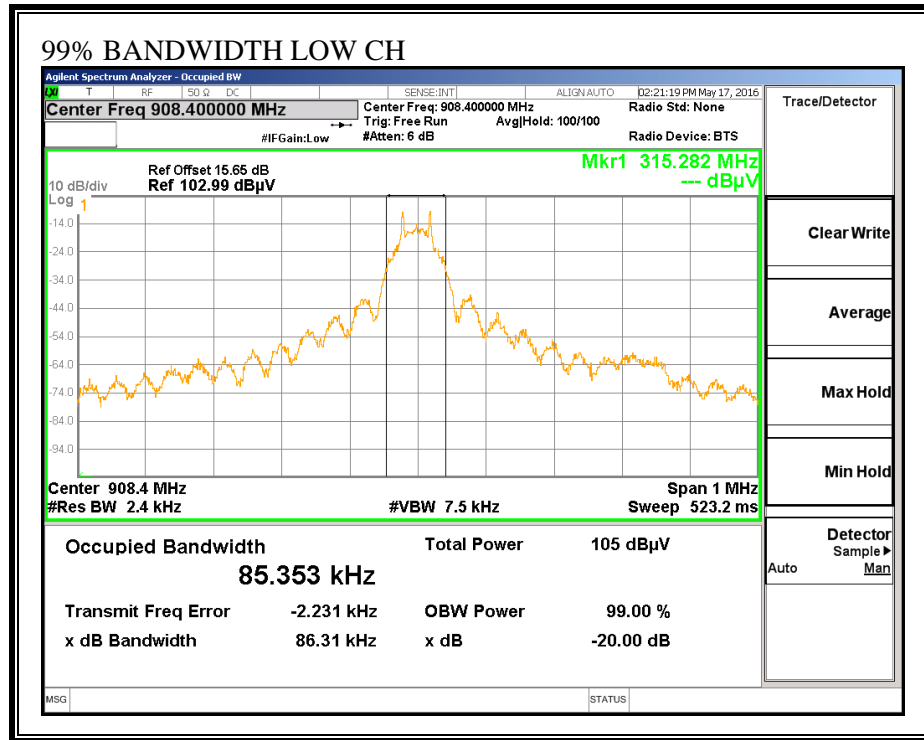
#### TEST PROCEDURE

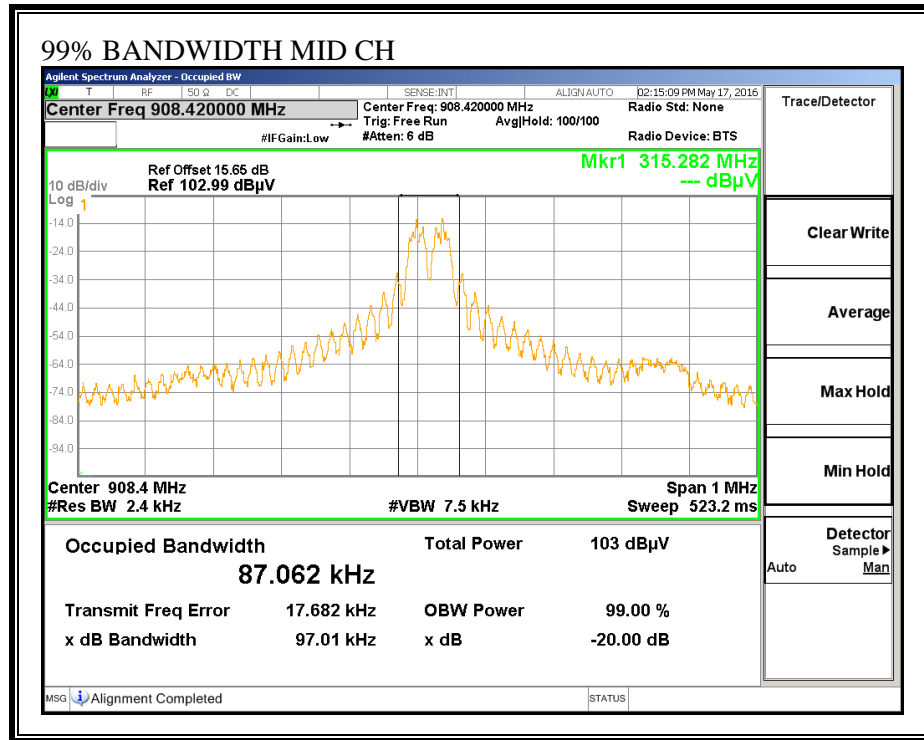
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 5% of the Occupied bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% and 20dB bandwidth function is utilized.

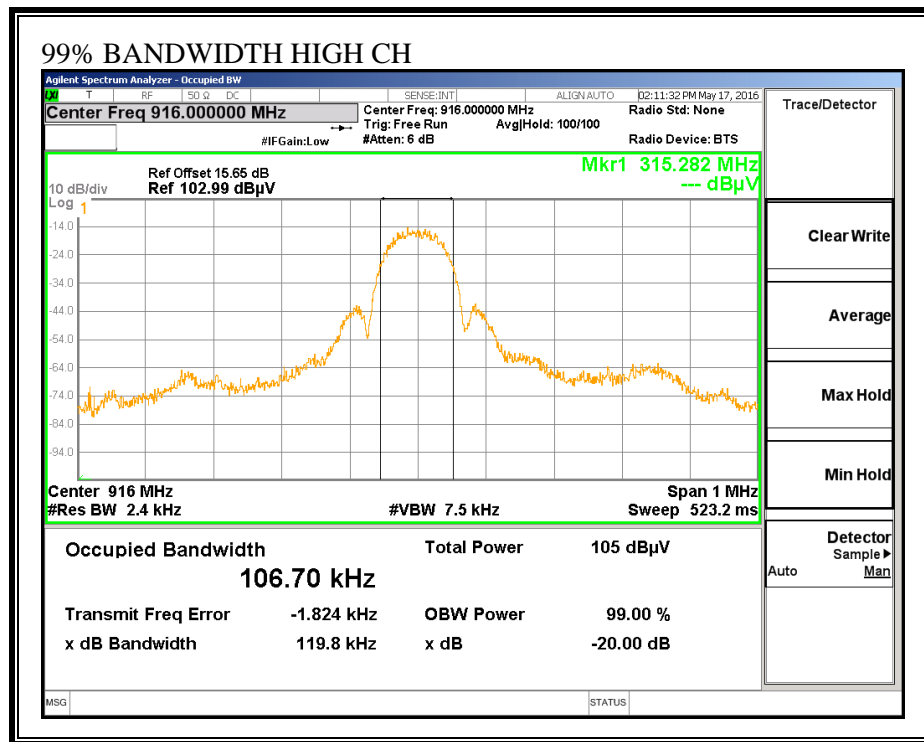
#### RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	908.4	86.16	85.353
Middle	908.42	97.39	87.062
High	916	122.5	106.7

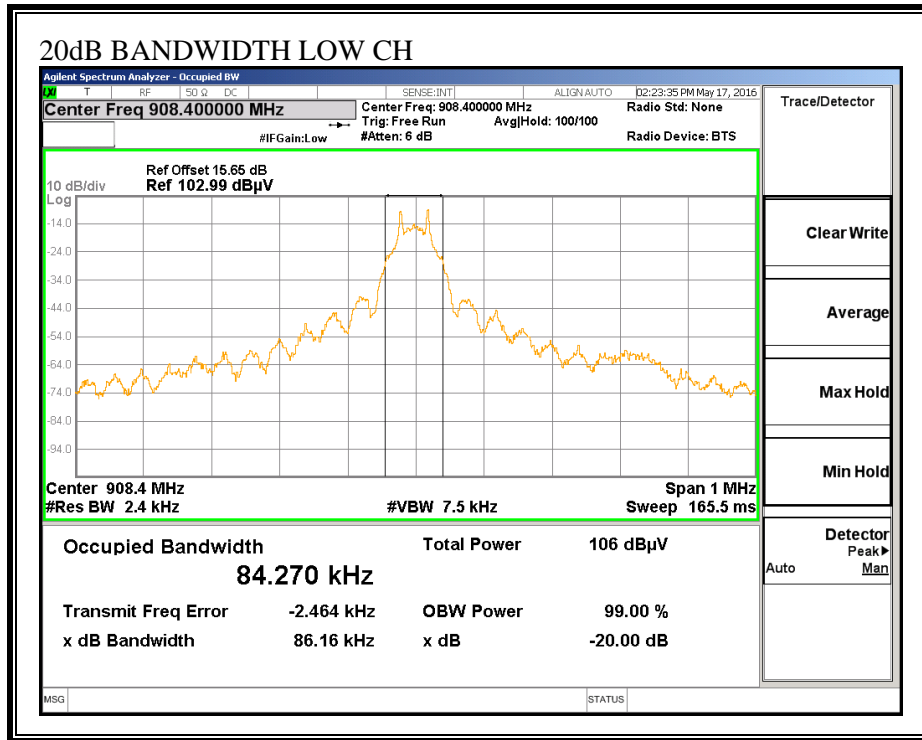
**99% BANDWIDTH**

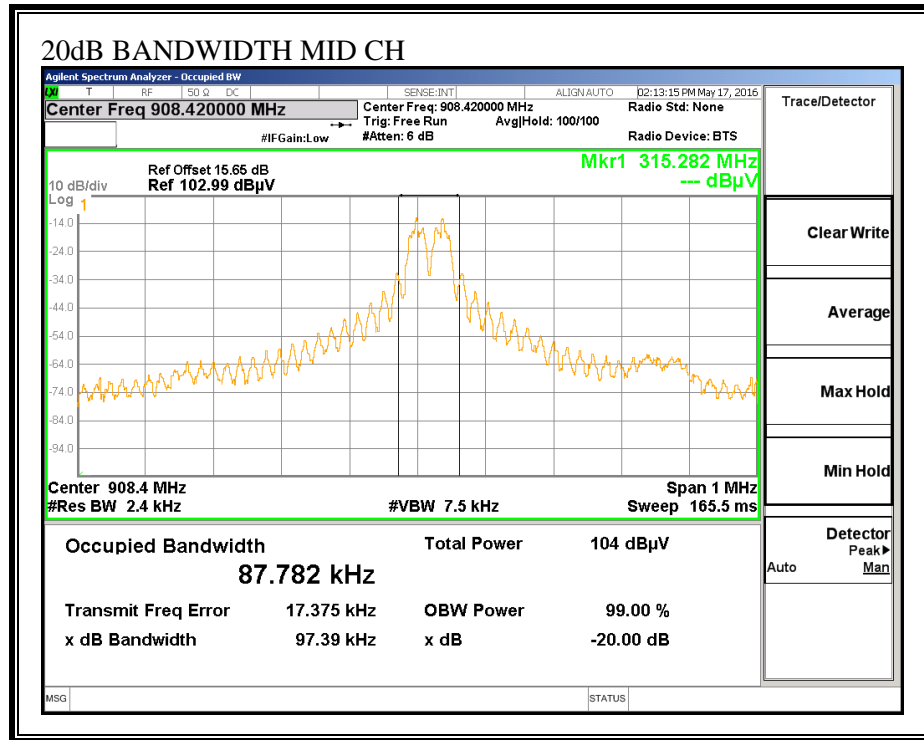




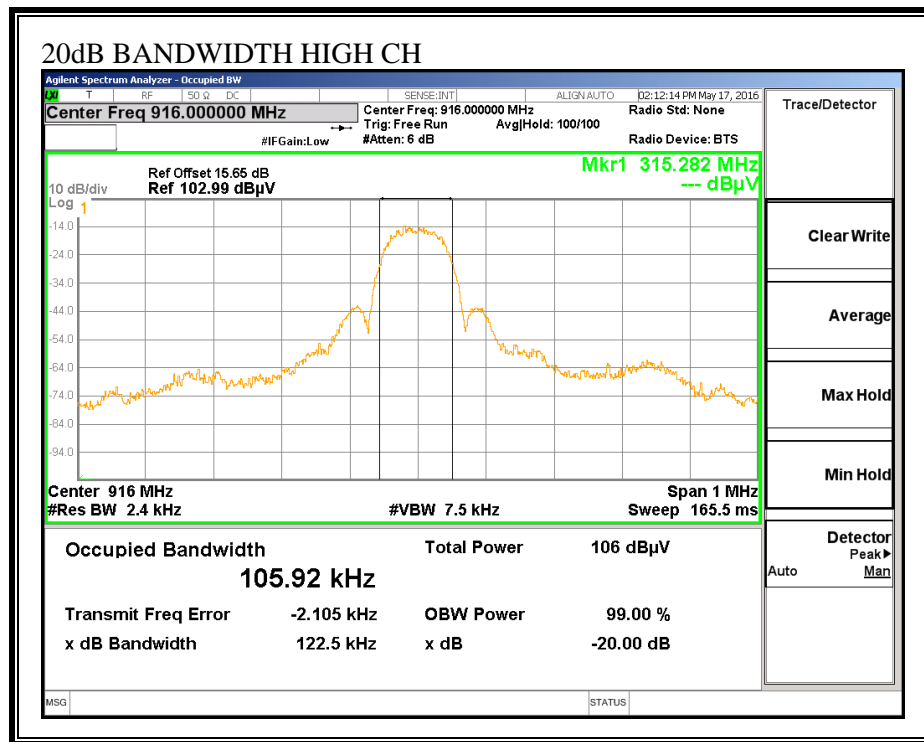


## 20dB BANDWIDTH









## 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.

## **Procedure**

Above 1GHz:

C63.10 sect. 4.1.4.2.3(e) Average voltage measurements using spectrum analyzer reduced video bandwidth:

PK: RBW 1MHz, VBW 1MHz

AV: RBW 1MHz, VBW 10Hz

Below 1Ghz:

See data as marked below

## RESULTS

### 7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

Fibar Group S.A.  
FGFS-101  
TX  
Battery

Test	Meter	Antenna	Corrected										
Frequency	Reading	Factor	Reading	PK	PK	QP	QP	Azimuth	Height				
(MHz)	(dBuV)	Detector	dB/m	Path dB	(uVolts/meter)	Limit 3m	Margin (dB)	Limit 3m	Margin (dB)	[Degs]	[cm]	Polarity	Notes
Wireless													
908.3803	46.63 Pk		23.1	9.5	79.23	114	-34.77	94	-14.77	271	178 V		1
908.3803	54.87 Pk		23.1	9.5	87.47	114	-26.53	94	-6.53	170	101 H		1
908.4188	54.81 Pk		23.1	9.5	87.41	114	-26.59	94	-6.59	114	101 H		2
908.4188	46.71 Pk		23.1	9.5	79.31	114	-34.69	94	-14.69	218	179 V		2
916.02835	44.89 Pk		23.3	9.6	77.79	114	-36.39	94	-16.21	193	176 V		3
916.02835	53.98 Pk		23.3	9.6	86.88	114	-27.42	94	-7.12	92	101 H		3
External Voltage I/O													
908.37575	56.98 Pk		23.1	9.5	89.58	114	-24.43	94	-4.42	117	101 H		4
908.37575	53.3 Pk		23.1	9.5	85.9	114	-28.2	94	-8.1	285	116 V		4
908.41663	53.19 Pk		23.1	9.5	85.79	114	-28.24	94	-8.21	282	116 V		5
908.41663	56.87 Pk		23.1	9.5	89.47	114	-24.6	94	-4.53	114	100 H		5
915.9699	55.22 Pk		23.3	9.6	88.12	114	-26.15	94	-5.88	164	101 H		6
915.9699	51.39 Pk		23.3	9.6	84.29	114	-29.94	94	-9.71	285	115 V		6

Notes:

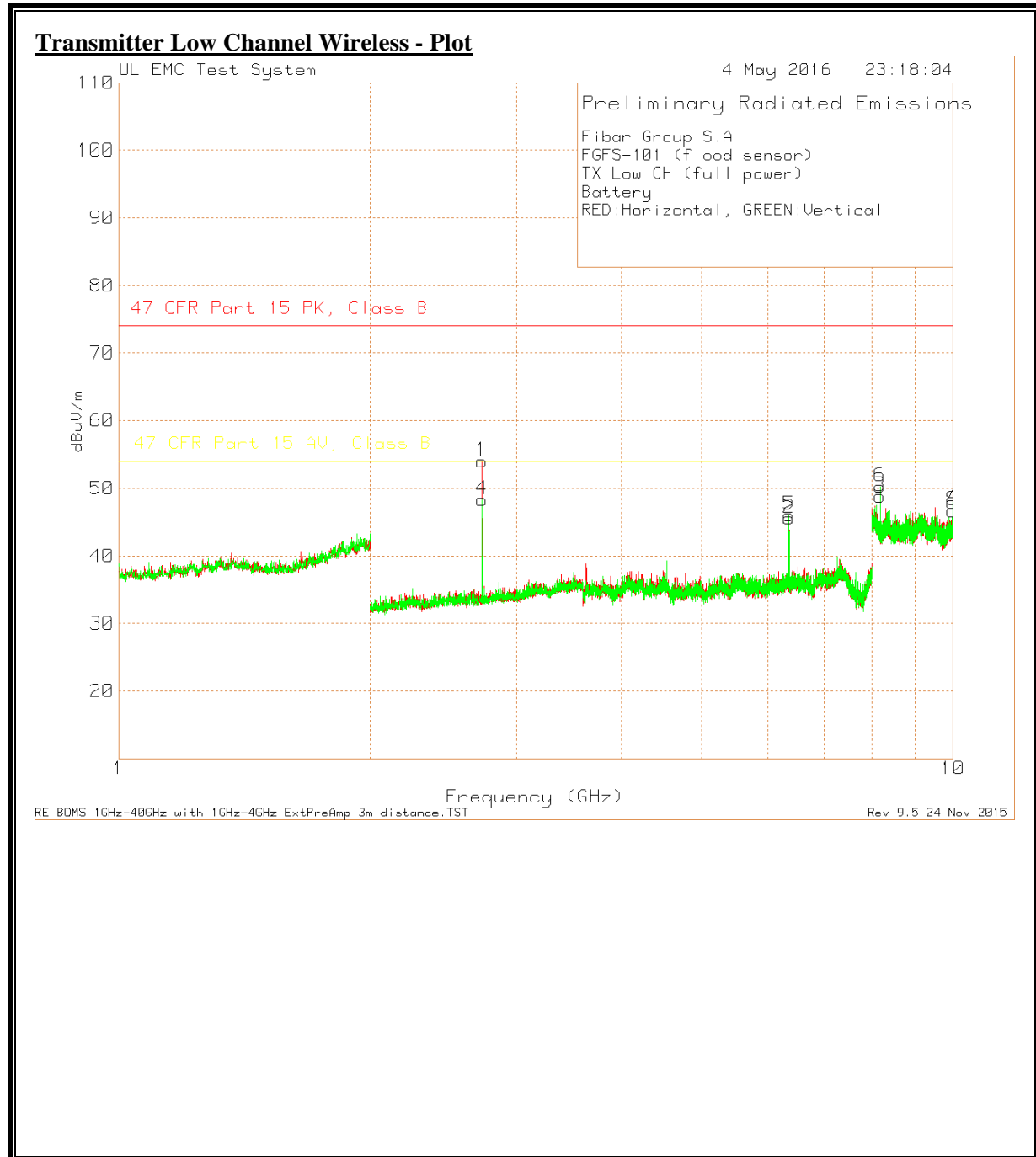
- 1 - Z-Axis Low CH
- 2 - Z-Axis Mid CH
- 3 - Z-Axis High CH
- 4- X Axis Low CH
- 3- X Axis Mid CH
- 6- X Axis High CH

Pk - Peak detector

Qp - Quasi-Peak detector

\*Measurements taken with Peak detector are under Quasi-Peak limit. Therefore, Quasi-Peak measurements are not necessary

## 7.2.2. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz



### Transmitter Low Channel Wireless - Data

Fibar Group S.A  
FGFS-101 (flood sensor)  
TX Low CH (full power)  
Battery  
RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.725	82.88 Pk	22.1	-50.96	54.02	74	-19.98	54	0.02	0-360	150	H
2	6.359	63.98 Pk	29.2	-47.61	45.57	74	-28.43	54	-8.43	0-360	150	H
3	8.1755	61.19 Pk	36.3	-48.68	48.81	74	-25.19	54	-5.19	0-360	100	H
8	9.9925	58.06 Pk	36.4	-47.79	46.67	74	-27.33	54	-7.33	0-360	100	H
4	2.725	77.16 Pk	22.1	-50.96	48.3	74	-25.7	54	-5.7	0-360	100	V
5	6.359	64.44 Pk	29.2	-47.61	46.03	74	-27.97	54	-7.97	0-360	100	V
6	8.1755	62.65 Pk	36.3	-48.68	50.27	74	-23.73	54	-3.73	0-360	100	V
7	9.993	59.35 Pk	36.4	-47.8	47.95	74	-26.05	54	-6.05	0-360	100	V

Pk - Peak detector

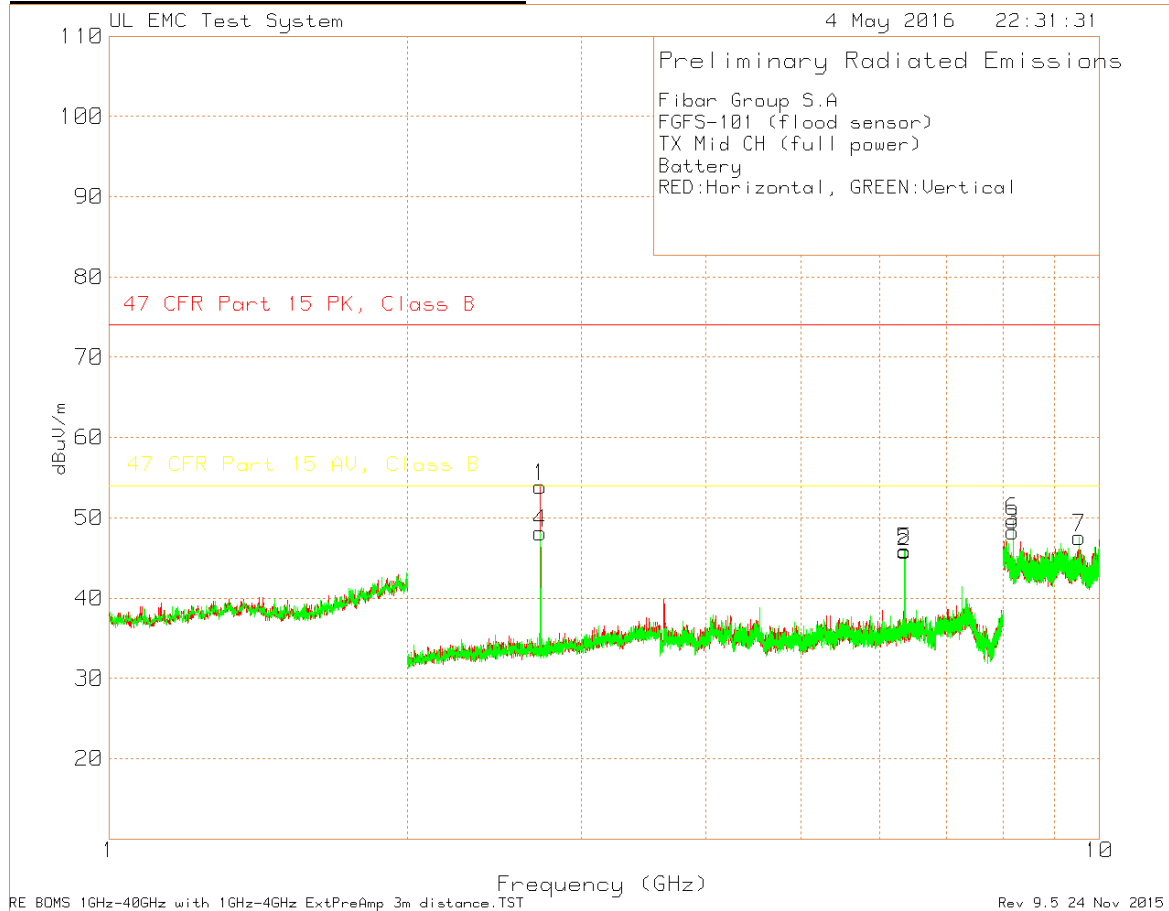
#### Radiated Emission Data

Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.7253	82.93 Pk	22.1	-50.96	54.07	74	-19.93	-	-	165	190	H
2.7252	82.17 Av	22.1	-50.96	53.31	-	-	54	-0.69	165	190	H
2.7252	77.02 Pk	22.1	-50.96	48.16	74	-25.84	-	-	223	100	V
2.7252	75.44 Av	22.1	-50.96	46.58	-	-	54	-7.42	223	100	V
8.1755	65.64 Pk	36.3	-48.68	53.26	74	-20.74	-	-	284	100	H
8.1755	58.53 Av	36.3	-48.68	46.15	-	-	54	-7.85	284	100	H
8.1757	65.99 Pk	36.3	-48.68	53.61	74	-20.39	-	-	53	100	V
8.1755	59.79 Av	36.3	-48.68	47.41	-	-	54	-6.59	53	100	V

Pk - Peak Detector

AV - Linear Average

# Transmitter Mid Channel Wireless - Plot



### Transmitter Mid Channel Wireless - Data

Fibar Group S.A  
FGFS-101 (flood sensor)  
TX Mid CH (full power)  
Battery  
RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.725	82.75 Pk	22.1	-50.96	53.89	74	-20.11	54	-0.11	0-360	150	H
2	6.359	64.2 Pk	29.2	-47.61	45.79	74	-28.21	54	-8.21	0-360	150	H
3	8.1755	60.65 Pk	36.3	-48.68	48.27	74	-25.73	54	-5.73	0-360	100	H
4	2.725	76.99 Pk	22.1	-50.96	48.13	74	-25.87	54	-5.87	0-360	100	V
5	6.359	64.32 Pk	29.2	-47.61	45.91	74	-28.09	54	-8.09	0-360	100	V
6	8.176	62 Pk	36.3	-48.69	49.61	74	-24.39	54	-4.39	0-360	100	V
7	9.543	59.62 Pk	36.4	-48.47	47.55	74	-26.45	54	-6.45	0-360	100	V

Pk - Peak detector

#### Radiated Emission Data

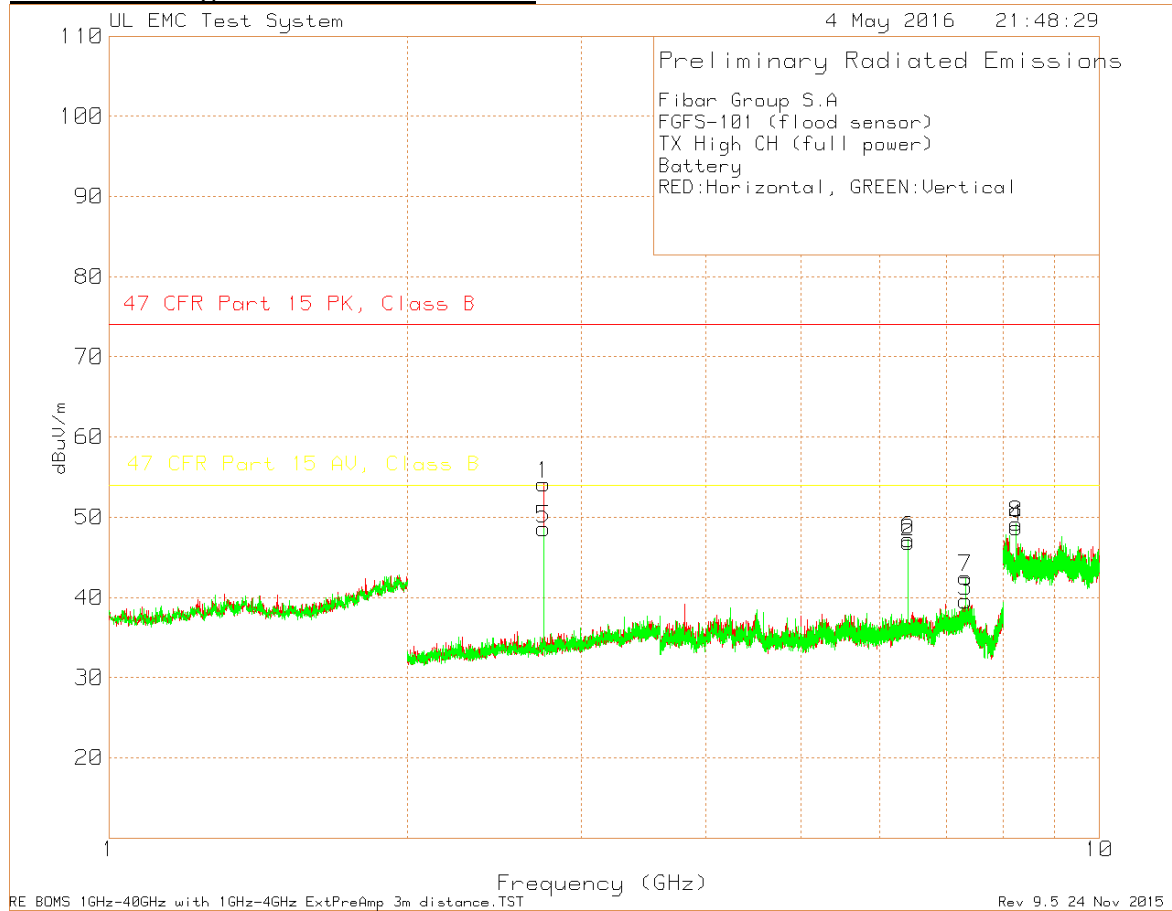
Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.7253	82.95 Pk	22.1	-50.96	54.09	74	-19.91	-	-	202	186	H
2.7253	82.15 Av	22.1	-50.96	53.29	-	-	54	-0.71	202	186	H
2.7251	73.37 Pk	22.1	-50.96	44.51	74	-29.49	-	-	307	122	V
2.7253	70.69 Av	22.1	-50.96	41.83	-	-	54	-12.17	307	122	V
8.1758	65.58 Pk	36.3	-48.69	53.19	74	-20.81	-	-	89	126	V
8.1759	59.73 Av	36.3	-48.69	47.34	-	-	54	-6.66	89	126	V
8.1761	64.89 Pk	36.3	-48.69	52.5	74	-21.5	-	-	225	130	H
8.1759	57.82 Av	36.3	-48.69	45.43	-	-	54	-8.57	225	130	H

Pk - Peak Detector

AV - Linear Average



### Transmitter High Channel Wireless - Plot



### Transmitter High Channel Wireless - Data

Fibar Group S.A  
FGFS-101 (flood sensor)  
TX High CH (full power)  
Battery  
RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.748	82.92 Pk	22.1	-50.86	54.16	74	-19.84	54	0.16	0-360	150	H
2	6.412	65.29 Pk	29.2	-47.58	46.91	74	-27.09	54	-7.09	0-360	100	H
3	7.328	54.93 Pk	30.7	-46.04	39.59	74	-34.41	54	-14.41	0-360	100	H
4	8.244	60.8 Pk	36.4	-48.48	48.72	74	-25.28	54	-5.28	0-360	100	H
5	2.748	77.35 Pk	22.1	-50.86	48.59	74	-25.41	54	-5.41	0-360	100	V
6	6.412	65.61 Pk	29.2	-47.58	47.23	74	-26.77	54	-6.77	0-360	100	V
7	7.328	57.85 Pk	30.7	-46.04	42.51	74	-31.49	54	-11.49	0-360	100	V
8	8.244	61.3 Pk	36.4	-48.48	49.22	74	-24.78	54	-4.78	0-360	100	V

Pk - Peak detector

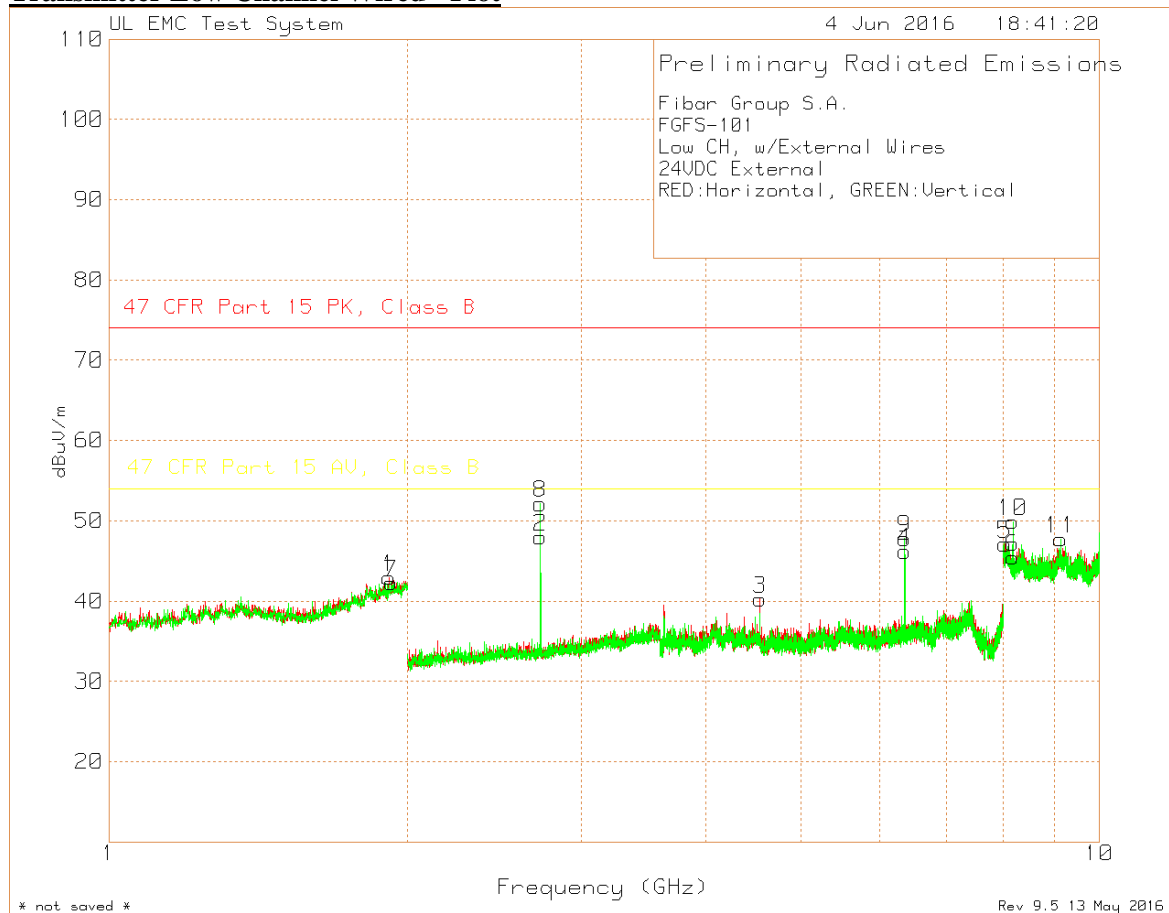
#### Radiated Emission Data

Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.7479	83.06 Pk	22.1	-50.86	54.3	74	-19.7	-	-	100	239	H
2.748	82.13 Av	22.1	-50.86	53.37	-	-	54	-0.63	100	239	H
2.748	77.45 Pk	22.1	-50.86	48.69	74	-25.31	-	-	165	100	V
2.748	75.93 Av	22.1	-50.86	47.17	-	-	54	-6.83	165	100	V
8.2436	65.13 Pk	36.4	-48.49	53.04	74	-20.96	-	-	124	111	H
8.244	57.83 Av	36.4	-48.48	45.75	-	-	54	-8.25	124	111	H
8.2438	65.62 Pk	36.4	-48.49	53.53	74	-20.47	-	-	344	100	V
8.2439	59.11 Av	36.4	-48.48	47.03	-	-	54	-6.97	344	100	V

Pk - Peak Detector

AV - Linear Average

### Transmitter Low Channel Wired - Plot



### Transmitter Low Channel Wired - Data

7	1.927	65.43 Pk	31.4	-54.53	42.3	74	-31.7	-	0-360	100 V
8	2.725	81.02 Pk	22.1	-50.96	52.16	-	-	54	-1.84 0-360	100 V
9	6.359	66.23 Pk	29.2	-47.61	47.82	74	-26.18	-	0-360	100 V
10	8.176	62.3 Pk	36.3	-48.69	49.91	-	-	54	-4.09 0-360	100 V
11	9.14	59.77 Pk	36.3	-48.34	47.73	74	-26.27	-	0-360	149 V

Pk - Peak detector

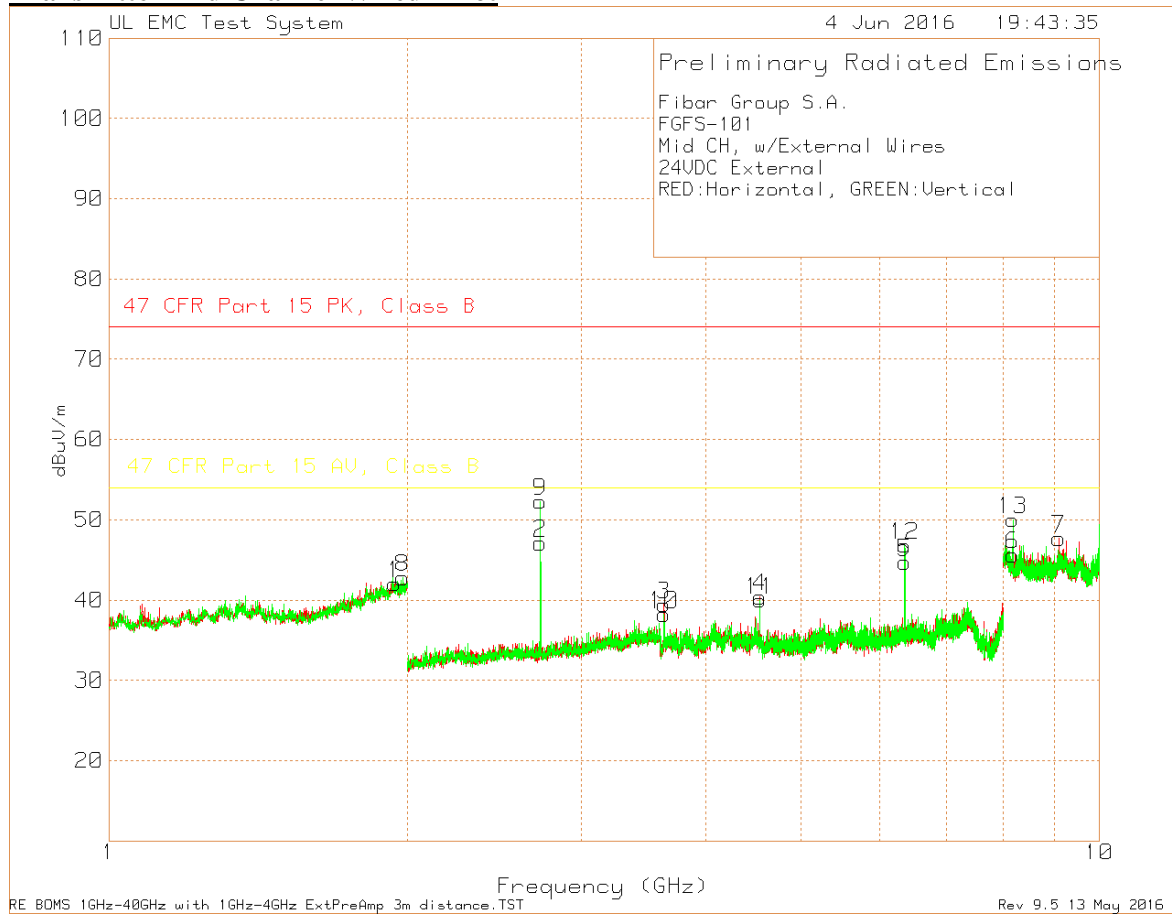
#### Radiated Emission Data

Test Frequency (MHz)	Meter		Antenna Factor dBm	Cable Gain/Loss dB	Corrected							
	Reading (dBuV)	Detector			Reading dB(uVolts/ meter)	Pk Limit 3m	Pk Margin (dB)	Av Limit 3m	Av Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.7251	77.25	Pk	22.1	-50.96	48.39	74	-25.61	-	-	311	115	H
2.7252	75.68	Av	22.1	-50.96	46.82	-	-	54	-7.18	311	115	H
2.7253	80.93	Pk	22.1	-50.96	52.07	74	-21.93	-	-	299	100	V
2.7252	79.98	Av	22.1	-50.96	51.12	-	-	54	-2.88	299	100	V
8.1758	65.9	Pk	36.3	-48.68	53.52	74	-20.48	-	-	226	100	V
8.1756	60.36	Av	36.3	-48.68	47.98	-	-	54	-6.02	226	100	V

Pk - Peak detector

Av - Average detection

### Transmitter Mid Channel Wired - Plot



### Transmitter Mid Channel Wired - Data

Fibar Group S.A.

FGFS-101

Mid CH, w/External Wires

24VDC External

RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Cable Gain/Loss dB	Corrected		Pk Limit 3m	Pk Margin (dB)	Av Limit 3m	Av Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
					Reading dB(uVolts/ meter)	Limit							
1	1.941	65.04 Pk	31.4	-54.39	42.05	74	-31.95	-	-	-	0-360	100 H	
2	2.725	75.96 Pk	22.1	-50.96	47.1	-	-	-	54	-6.9	0-360	100 H	
3	3.634	66.02 Pk	23.3	-49.87	39.45	74	-34.55	-	-	-	0-360	100 H	
4	4.542	64.41 Pk	27.8	-51.81	40.4	-	-	-	54	-13.6	0-360	102 H	
5	6.359	63.13 Pk	29.2	-47.61	44.72	74	-29.28	-	-	-	0-360	102 H	
6	8.176	58.03 Pk	36.3	-48.69	45.64	-	-	-	54	-8.36	0-360	150 H	
7	9.097	60.01 Pk	36.2	-48.53	47.68	74	-26.32	-	-	-	0-360	150 H	
8	1.979	65.22 Pk	31.7	-54.12	42.8	-	-	-	54	-11.2	0-360	100 V	
9	2.725	81.15 Pk	22.1	-50.96	52.29	74	-21.71	-	-	-	0-360	99 V	
10	3.634	64.79 Pk	23.3	-49.87	38.22	-	-	-	54	-15.78	0-360	150 V	
11	4.542	64.02 Pk	27.8	-51.81	40.01	74	-33.99	-	-	-	0-360	100 V	
12	6.359	65.23 Pk	29.2	-47.61	46.82	-	-	-	54	-7.18	0-360	100 V	
13	8.176	62.43 Pk	36.3	-48.69	50.04	74	-23.96	-	-	-	0-360	99 V	

Pk - Peak detector

#### Radiated Emission Data

Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Cable Gain/Loss dB	Corrected		Pk Limit 3m	Pk Margin (dB)	Av Limit 3m	Av Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
				Reading dB(uVolts/ meter)	Limit							
2.7253	81.28 Pk	22.1	-50.96	52.42	74	-21.58	-	-	-	285	100 V	
2.7253	80.42 Av	22.1	-50.96	51.56	-	-	-	54	-2.44	285	100 V	
8.176	65.84 Pk	36.3	-48.69	53.45	74	-20.55	-	-	-	177	100 V	
8.176	59.6 Av	36.3	-48.69	47.21	-	-	-	54	-6.79	177	100 V	

Pk - Peak detector

Av - Average detection

UL EMC Test System

4 Jun 2016 19:13:21

Preliminary Radiated Emissions

Fibar Group S.A.  
FGFS-101  
High CH, w/External Wires  
24VDC External  
RED:Horizontal, GREEN:Vertical

47 CFR Part 15 PK, Class B

47 CFR Part 15 AU, Class B

dBμV/m

Frequency (GHz)

RE BOMS 1GHz-40GHz with 1GHz-4GHz ExtPreAmp 3m distance.TST

Rev 9.5 13 May 2016

### Transmitter High Channel Wired - Data

Fibar Group S.A.  
FGFS-101  
High CH, w/External Wires  
24VDC External  
RED:Horizontal, GREEN:Vertical  
Trace Markers

Marker No.	Test Frequency (MHz)	Meter		Antenna Factor dBm	Cable Gain/Loss dB	Corrected Reading		Pk Limit 3m	Pk Margin (dB)	Av Limit 3m	Av Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
		Reading (dBuV)	Detector			dB(uVolts/ meter)	Pk							
1	1.832	66.49	Pk	30.5	-54.66	42.33	74	-31.67	-	-	-	0-360	150	H
2	2.748	77.77	Pk	22.1	-50.86	49.01	-	-	-	54	-4.99	0-360	100	H
3	6.412	63.43	Pk	29.2	-47.58	45.05	74	-28.95	-	-	-	0-360	102	H
4	8.244	57.71	Pk	36.4	-48.48	45.63	-	-	-	54	-8.37	0-360	100	H
5	9.544	59	Pk	36.4	-48.48	46.92	74	-27.08	-	-	-	0-360	100	H
6	1.982	65.51	Pk	31.7	-54.1	43.11	-	-	-	54	-10.89	0-360	100	V
7	2.748	80.91	Pk	22.1	-50.86	52.15	74	-21.85	-	-	-	0-360	100	V
8	6.412	67.13	Pk	29.2	-47.58	48.75	-	-	-	54	-5.25	0-360	100	V
9	8.244	60.75	Pk	36.4	-48.48	48.67	74	-25.33	-	-	-	0-360	100	V

Pk - Peak detector

#### Radiated Emission Data

Test Frequency (MHz)	Meter		Antenna Factor dBm	Cable Gain/Loss dB	Corrected Reading		Pk Limit 3m	Pk Margin (dB)	Av Limit 3m	Av Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	Reading (dBuV)	Detector			dB(uVolts/ meter)	Pk							
2.7479	78.19	Pk	22.1	-50.86	49.43	74	-24.57	-	-	-	309	114	H
2.748	76.96	Av	22.1	-50.86	48.2	-	-	-	54	-5.8	309	114	H
2.748	81.15	Pk	22.1	-50.86	52.39	74	-21.61	-	-	-	286	100	V
2.748	80.22	Av	22.1	-50.86	51.46	-	-	-	54	-2.54	286	100	V
6.4122	69.27	Pk	29.2	-47.58	50.89	74	-23.11	-	-	-	97	100	V
6.412	66.21	Av	29.2	-47.58	47.83	-	-	-	54	-6.17	97	100	V
8.2437	65.38	Pk	36.4	-48.49	53.29	74	-20.71	-	-	-	227	100	V
8.244	59.04	Av	36.4	-48.48	46.96	-	-	-	54	-7.04	227	100	V

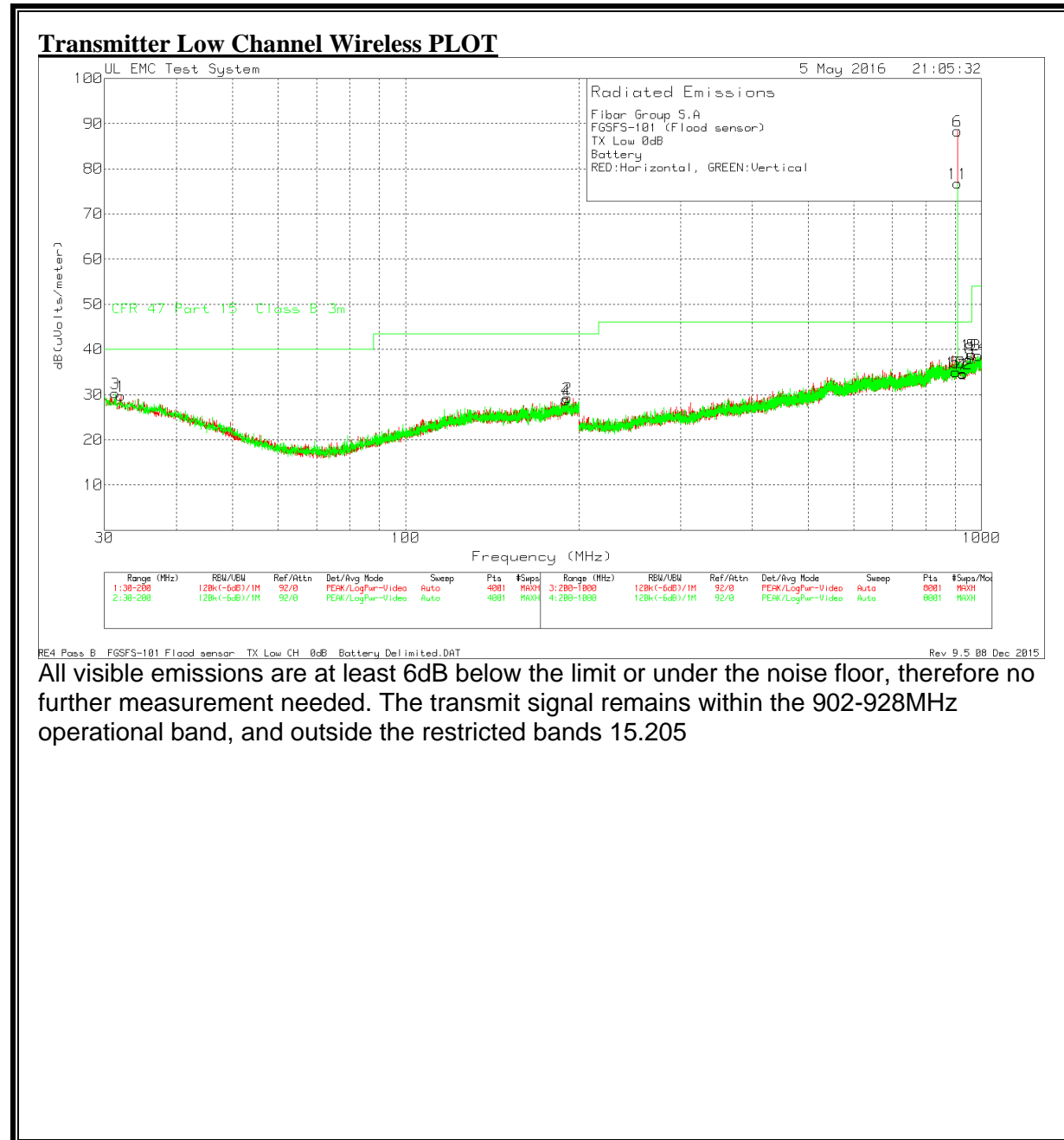
Pk - Peak detector

Av - Average detection



### 7.2.3. BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz - WIRELESS



### Transmitter Low Channel Wireless DATA

Fibar Group S.A  
FGSFS-101 (Flood sensor)  
TX Low 0dB  
Battery  
RED:Horizontal, GREEN:Vertical

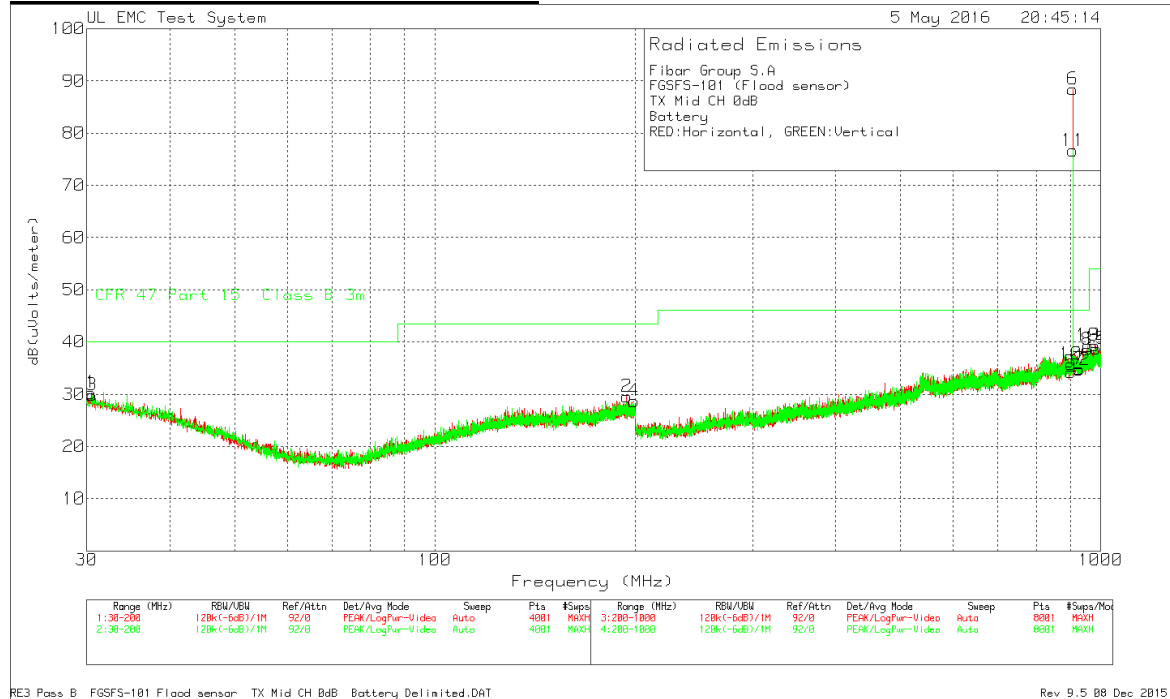
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Cable Gain/Loss dB	10M to 3M		Corrected Reading dB(uVolts/ meter)	QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
					Factor	dB						
1	32.04	31.93 Pk	17.3	-30	10.5		29.73	40	-10.27	0-360	398	H
2	191.16	31.68 Pk	16	-28.9	10.5		29.28	43.52	-14.24	0-360	241	H
3	31.3175	32.19 Pk	17.6	-30	10.5		30.29	40	-9.71	0-360	398	V
4	189.6725	31.36 Pk	16	-29	10.5		28.86	43.52	-14.66	0-360	101	V
5*	902	29.8 Pk	22.7	-28	10.5		35	46	-11	0-360	399	H
7*	928	28.91 Pk	22.7	-27.6	10.5		34.51	46.02	-11.51	0-360	103	H
8	954.9	31.22 Pk	23.5	-27.2	10.5		38.02	46.02	-8	0-360	103	H
9	963.1	32.29 Pk	23.5	-27.4	10.5		38.89	53.97	-15.08	0-360	199	H
10*	902	29.77 Pk	22.7	-28	10.5		34.97	46.02	-11.05	0-360	103	V
12*	928	29.02 Pk	22.7	-27.6	10.5		34.62	46.02	-11.4	0-360	103	V
13	958.8	32.04 Pk	23.6	-27.3	10.5		38.84	46.02	-7.18	0-360	399	V
14	986.2	30.44 Pk	24.3	-26.6	10.5		38.64	53.97	-15.33	0-360	199	V

Pk - Peak detector

\* - Transmit signal Bandedge markers

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter Mid Channel Wireless PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter Mid Channel Wireless DATA

Fibar Group S.A  
FGSFS-101 (Flood sensor)  
TX Mid CH 0dB  
Battery  
RED:Horizontal, GREEN:Vertical

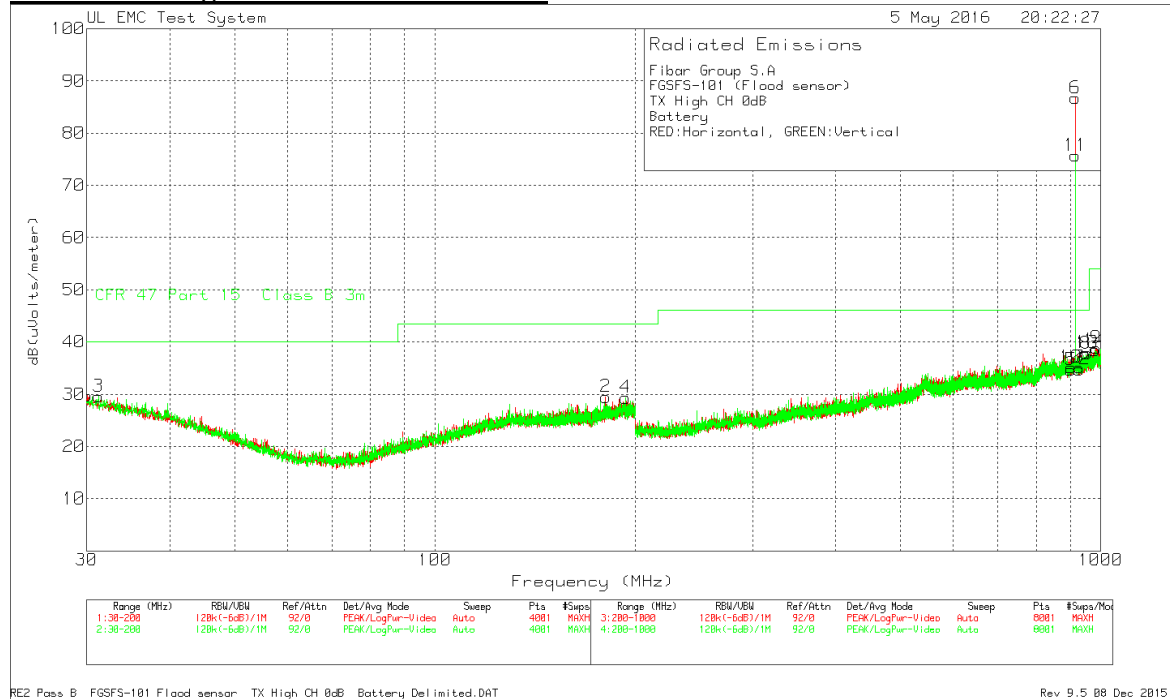
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV) Detector	Antenna Factor dBm	Cable Gain/Loss dB	10M to Corrected		QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
					3M Factor dB	Reading dB(uVolts/ meter)					
1	30.4675	31.75 Pk	18	-30	10.5	30.25	40	-9.75	0-360	101	H
2	194.0075	31.89 Pk	16	-28.8	10.5	29.59	43.52	-13.93	0-360	398	H
3	30.5525	31.34 Pk	18	-30	10.5	29.84	40	-10.16	0-360	398	V
4	198.98	30.88 Pk	16	-28.7	10.5	28.68	43.52	-14.84	0-360	251	V
5*	902	29.01 Pk	22.7	-28	10.5	34.21	46.02	-11.81	0-360	299	H
7*	928	29.24 Pk	22.7	-27.6	10.5	34.84	46.02	-11.18	0-360	103	H
8	953.5	31.71 Pk	23.5	-27.2	10.5	38.51	46.02	-7.51	0-360	399	H
9	979.1	31.86 Pk	24	-27	10.5	39.36	53.97	-14.61	0-360	299	H
10*	902	30.54 Pk	22.7	-28	10.5	35.74	46.02	-10.28	0-360	399	V
12*	928	29.11 Pk	22.7	-27.6	10.5	34.71	46.02	-11.31	0-360	299	V
13	956.1	32.45 Pk	23.5	-27.2	10.5	39.25	46.02	-6.77	0-360	199	V
14	984.1	30.63 Pk	24.3	-26.7	10.5	38.73	53.97	-15.24	0-360	299	V
15	984.1	30.63 Pk	24.3	-26.7	10.5	38.73	53.97	-15.24	0-360	299	V

Pk - Peak detector

\* - Transmit Signal Bandedge Markers

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter High Channel Wireless PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter High Channel Wireless DATA

Fibar Group S.A  
FGSFS-101 (Flood sensor)  
TX High CH OdB  
Battery  
RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV) Detector	Antenna Factor dBm	Cable Gain/Loss dB	10M to Corrected		QP Limit 3m	QP Margin (dB)	Azimuth [Deps]	Height [cm]	Polarity
					3M Factor dB	Reading dB(uVolts/ meter)					
1	30.0425	31.03 Pk	18.2	-30	10.5	29.73	40	-10.27	0-360	241	H
2	180.4925	32.76 Pk	15.4	-29.2	10.5	29.46	43.52	-14.06	0-360	102	H
3	31.2325	31.36 Pk	17.7	-30	10.5	29.56	40	-10.44	0-360	251	V
4	193.285	31.61 Pk	16	-28.8	10.5	29.31	43.52	-14.21	0-360	398	V
5*	902	29.45 Pk	22.7	-28	10.5	34.65	46.02	-11.37	0-360	299	H
7*	928	29.53 Pk	22.7	-27.6	10.5	35.13	46.02	-10.89	0-360	299	H
8	949.8	31.17 Pk	23.5	-27.4	10.5	37.77	46.02	-8.25	0-360	299	H
9	984.7	30.51 Pk	24.4	-26.6	10.5	38.81	53.97	-15.16	0-360	199	H
10*	902	29.94 Pk	22.7	-28	10.5	35.14	46.02	-10.88	0-360	199	V
12*	928	29.16 Pk	22.7	-27.6	10.5	34.76	46.02	-11.26	0-360	199	V
13	954.4	31.06 Pk	23.5	-27.2	10.5	37.86	46.02	-8.16	0-360	103	V
14	980.8	30.75 Pk	24.1	-26.9	10.5	38.45	53.97	-15.52	0-360	299	V

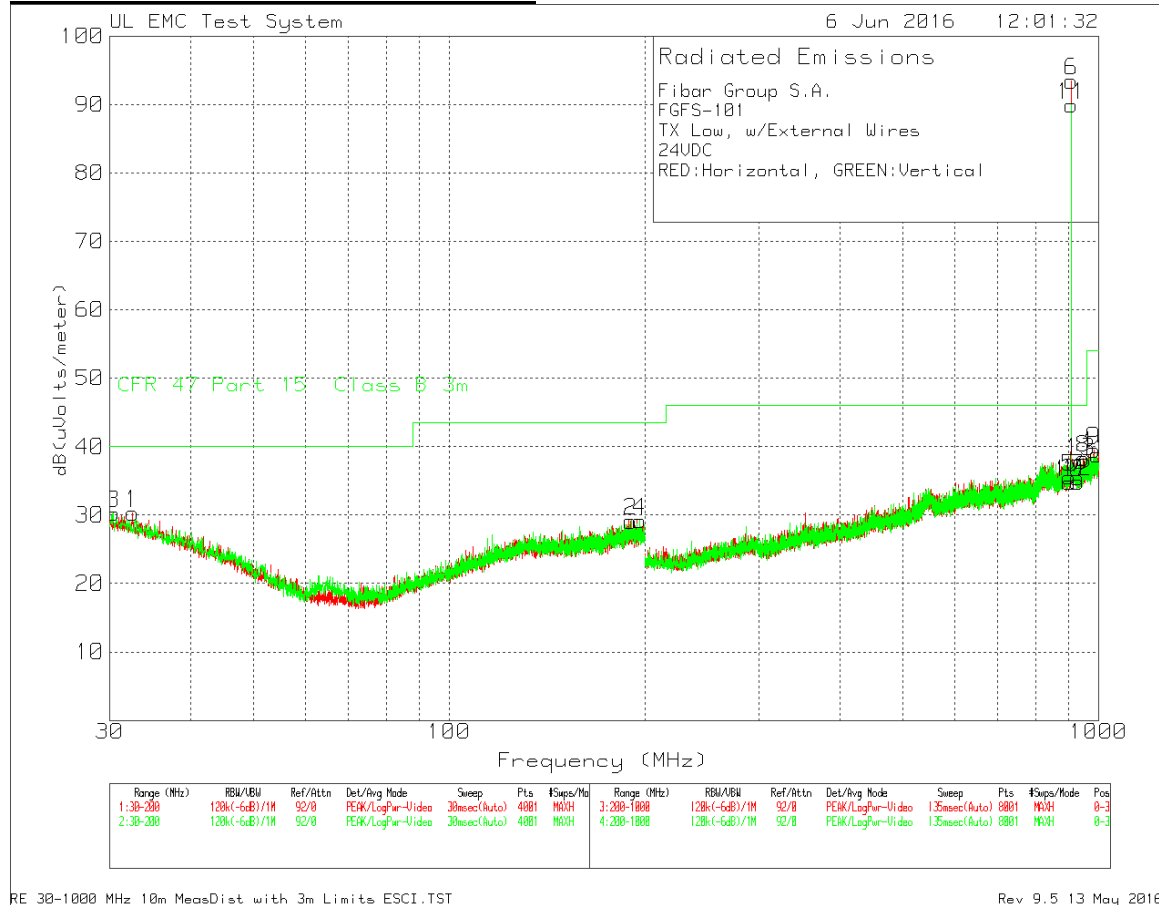
Pk - Peak detector

\* - Transmit signal Bandedge markers

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

## SPURIOUS EMISSIONS 30 TO 1000 MHz - WIRED

### Transmitter Low Channel Wired – PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter Low Channel Wired – DATA

Fibar Group S.A  
FGFS-101  
TX Low, w/External Wires  
24VDC  
RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (MHz)	Meter Reading (dBUV)	Detector	Antenna Factor dBm	Cable Gain/Loss dB	10M to 3M		Corrected Reading dB(uVolts/ meter)	QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
						Factor	Factor						
1	32.55	32.68 Pk		17.1	-30	10.5		30.28	40	-9.72	0-360	101	H
2	190.3525	31.63 Pk		16	-29	10.5		29.13	43.52	-14.39	0-360	399	H
3	30.425	31.75 Pk		18	-30	10.5		30.25	40	-9.75	0-360	399	V
4	196.6	31.49 Pk		16	-28.8	10.5		29.19	43.52	-14.33	0-360	252	V
5*	902	30.36 Pk		22.7	-28	10.5		35.56	46.02	-10.46	0-360	299	H
7*	928	29.88 Pk		22.7	-27.6	10.5		35.48	46.02	-10.54	0-360	99	H
8	947.8	31.89 Pk		23.5	-27.6	10.5		38.29	46.02	-7.73	0-360	199	H
9	983.9	31.37 Pk		24.3	-26.7	10.5		39.47	53.97	-14.5	0-360	199	H
10*	902	29.54 Pk		22.7	-28	10.5		34.74	46.02	-11.28	0-360	98	V
12*	928	29.26 Pk		22.7	-27.6	10.5		34.86	46.02	-11.16	0-360	399	V
13	939.1	31.75 Pk		23	-27.4	10.5		37.85	46.02	-8.17	0-360	199	V
14	994.5	31.15 Pk		23.8	-26.6	10.5		38.85	53.97	-15.12	0-360	199	V

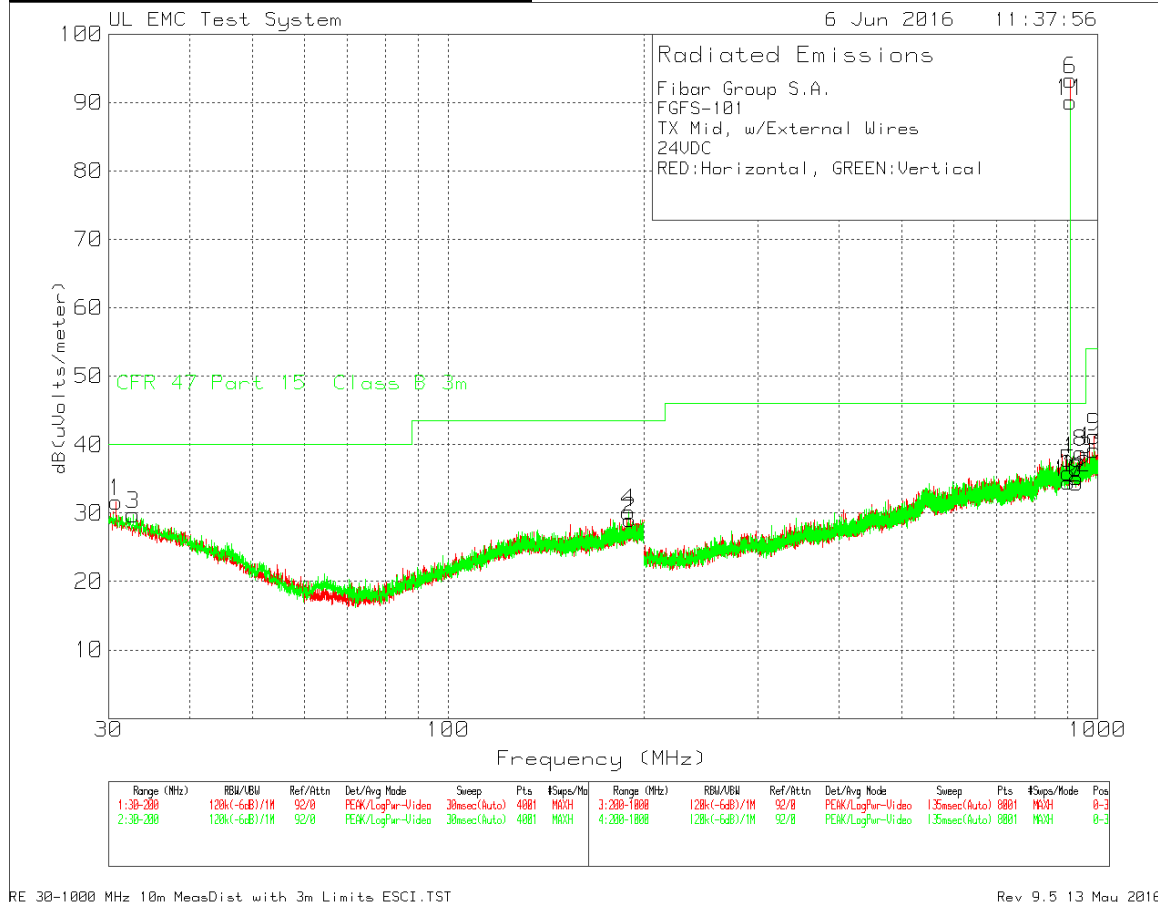
Pk - Peak detector

\* - Transmit signal Bandedge markers

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205



### Transmitter Mid Channel Wired – PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter Mid Channel Wired – DATA

Fibar Group S.A  
FGFS-101  
TX Mid, w/External Wires  
24VDC  
RED:Horizontal, GREEN:Vertical

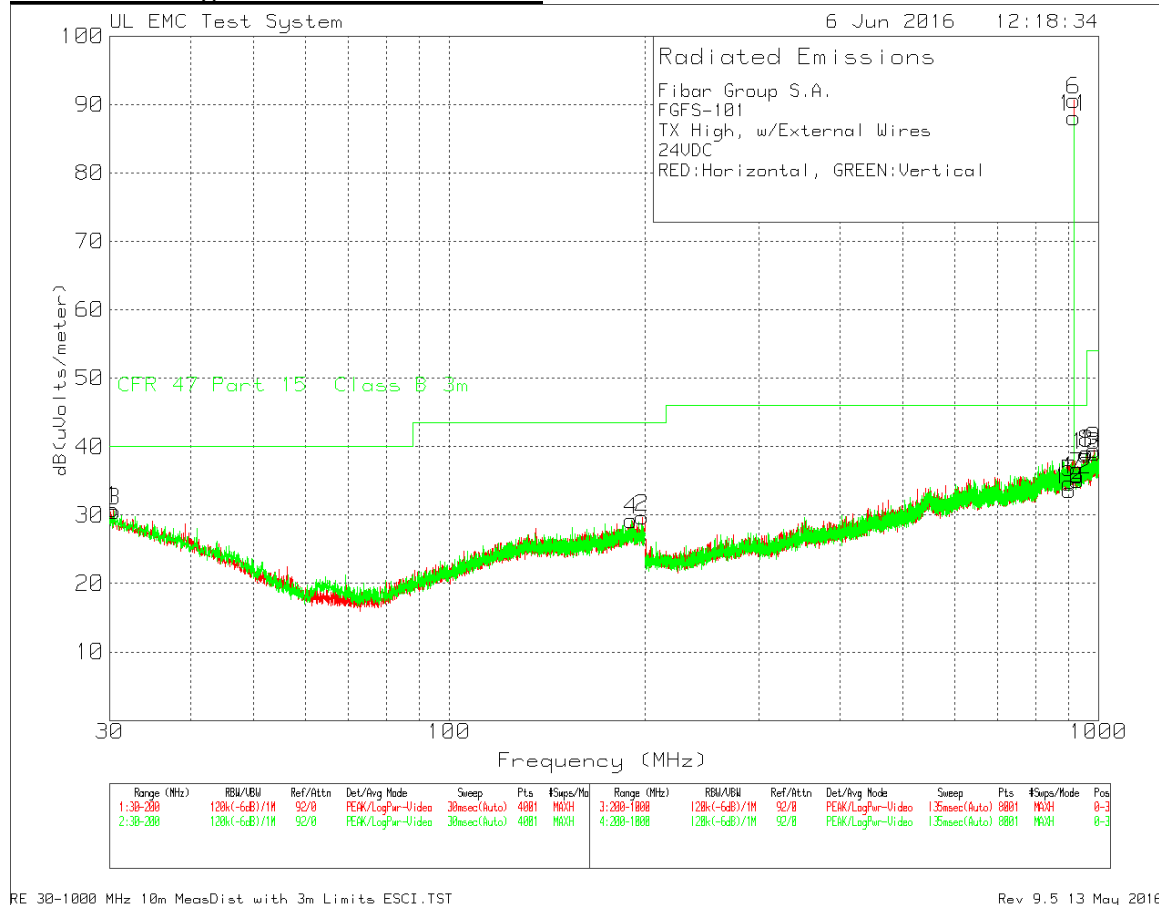
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dBm	Cable Gain/Loss dB	10M to Corrected		QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
						3M Factor dB	Reading dB(uVolts/ meter)					
1	30.8075	33.26 Pk		17.9	-30	10.5	31.66	40	-8.34	0-360	398 H	
2	190.5225	31.53 Pk		16	-29	10.5	29.03	43.52	-14.49	0-360	398 H	
3	32.72	32.19 Pk		17.1	-30	10.5	29.79	40	-10.21	0-360	101 V	
4	189.46	32.64 Pk		16	-29	10.5	30.14	43.52	-13.38	0-360	101 V	
5*	902	30.66 Pk		22.7	-28	10.5	35.86	46.02	-10.16	0-360	100 H	
7*	928	28.79 Pk		22.7	-27.6	10.5	34.39	46.02	-11.63	0-360	399 H	
8	941.8	32.73 Pk		23.1	-27.5	10.5	38.83	46.02	-7.19	0-360	100 H	
9	988.1	33.18 Pk		24.2	-26.7	10.5	41.18	53.97	-12.79	0-360	100 H	
10*	902	29.28 Pk		22.7	-28	10.5	34.48	46.02	-11.54	0-360	299 V	
12*	928	29.56 Pk		22.7	-27.6	10.5	35.16	46.02	-10.86	0-360	399 V	
13	934	32.2 Pk		22.8	-27.7	10.5	37.8	46.02	-8.22	0-360	99 V	
14	987.9	31.22 Pk		24.2	-26.7	10.5	39.22	53.97	-14.75	0-360	202 V	

Pk - Peak detector

\* - Transmit signal Bandedge markers

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter High Channel Wired – PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

### Transmitter High Channel Wired – DATA

Fibar Group S.A.

FGFS-101

TX High, w/External Wires

24VDC

RED:Horizontal, GREEN:Vertical

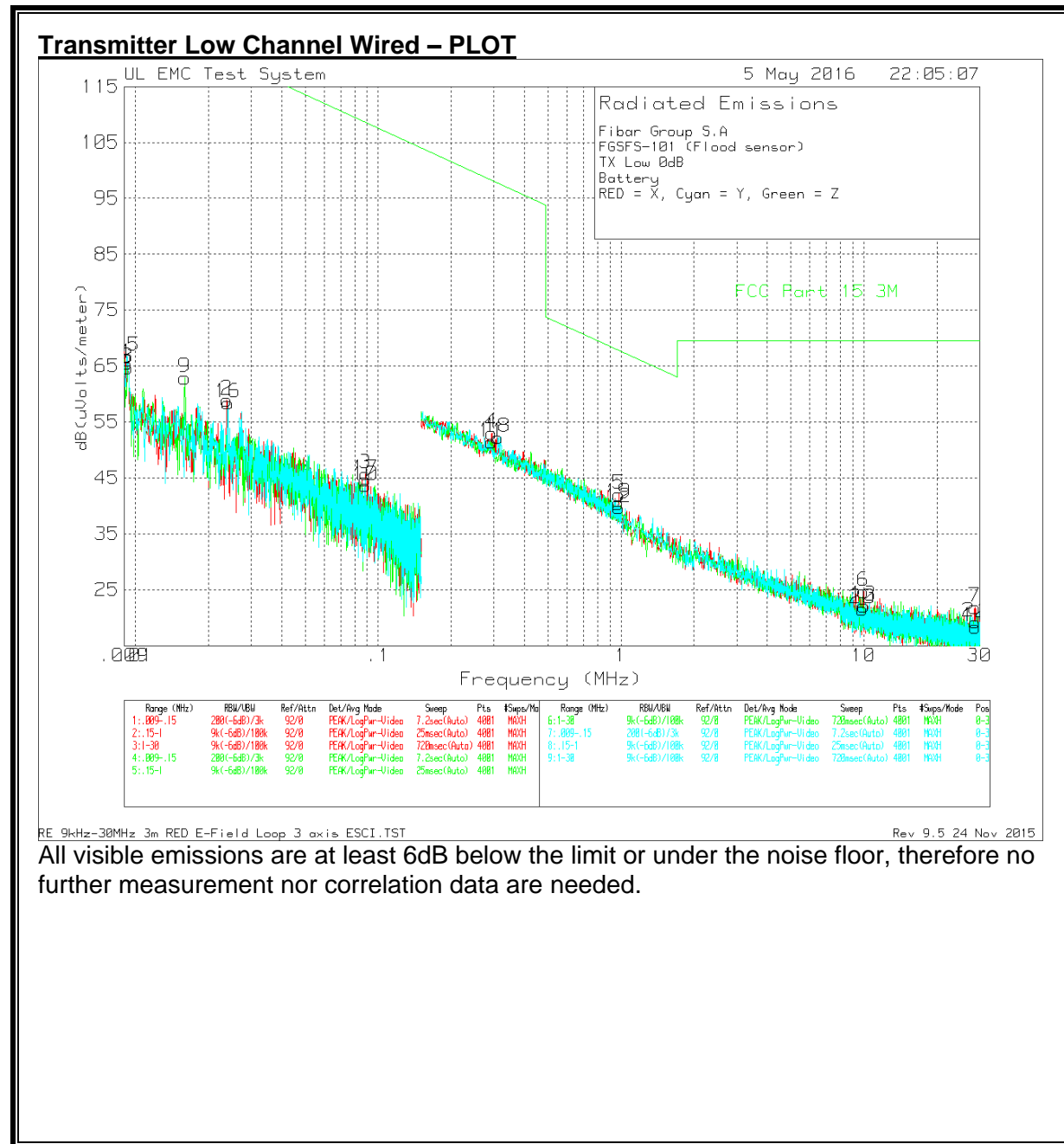
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dBm	Cable Gain/Loss dB	10M to 3M Factor dB	Corrected Reading dB(uVolts/meter)	QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	30.34	32.24 Pk		18.1	-30	10.5	30.84	40	-9.16	0-360	248 H	
2	198.385	32.01 Pk		16	-28.8	10.5	29.71	43.52	-13.81	0-360	398 H	
3	30.4675	32.07 Pk		18	-30	10.5	30.57	40	-9.43	0-360	101 V	
4	190.6075	31.77 Pk		16	-29	10.5	29.27	43.52	-14.25	0-360	101 V	
5*	902	29.52 Pk		22.7	-28	10.5	34.72	46.02	-11.3	0-360	98 H	
7*	928	30.23 Pk		22.7	-27.6	10.5	35.83	46.02	-10.19	0-360	98 H	
8	958.9	32.25 Pk		23.6	-27.3	10.5	39.05	46.02	-6.97	0-360	399 H	
9	983.7	31.35 Pk		24.3	-26.7	10.5	39.45	53.97	-14.52	0-360	199 H	
10*	902	28.43 Pk		22.7	-28	10.5	33.63	46.02	-12.39	0-360	198 V	
12*	928	29.52 Pk		22.7	-27.6	10.5	35.12	46.02	-10.9	0-360	299 V	
13	956.4	31.97 Pk		23.5	-27.2	10.5	38.77	46.02	-7.25	0-360	198 V	
14	986.3	30.88 Pk		24.3	-26.6	10.5	39.08	53.97	-14.89	0-360	399 V	

Pk - Peak detector

\* - Transmit signal Bandedge markers

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed. The transmit signal remains within the 902-928MHz operational band, and outside the restricted bands 15.205

# **SPURIOUS EMISSIONS 9 kHz TO 30 MHz – WIRED**



### Transmitter Low Channel Wireless – DATA

Fibar Group S.A

FGSFS-101 (Flood sensor)

TX Low OdB

Battery

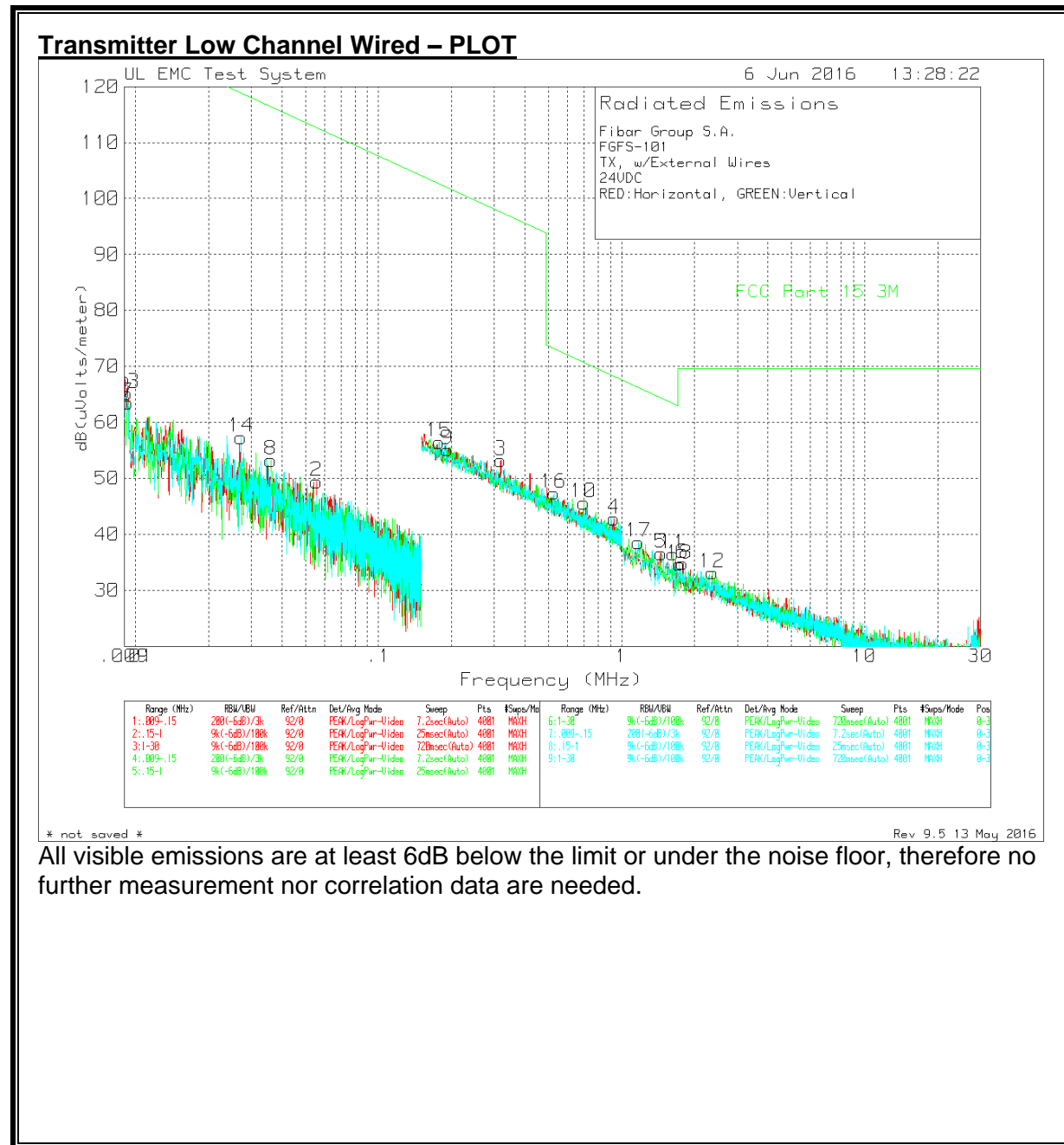
RED = X, Cyan = Y, Green = Z

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)		Antenna Factor dBm	Gain/Loss dB	Corrected Reading dB(uVolts/ meter)		Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
		Reading	Detector				Limit				
1	0.009245	46.08 Pk		19.4	0	65.48	128.27	-62.79	0-360	101	H
2	0.02384	44.7 Pk		14.2	0	58.9	120.04	-61.14	0-360	101	H
3	0.088765	34.12 Pk		11.6	0	45.72	108.63	-62.91	0-360	101	H
4	0.29356	41.43 Pk		11.6	0	53.03	98.25	-45.22	0-360	101	H
5	0.9807	30.32 Pk		11.6	0.1	42.02	67.77	-25.75	0-360	101	H
6	9.9755	13.66 Pk		10.8	0.2	24.66	69.54	-44.88	0-360	101	H
7	28.7095	13.55 Pk		8	0.3	21.85	69.54	-47.69	0-360	101	H
8	0.00928	45.28 Pk		19.4	0	64.68	128.23	-63.55	0-360	101	H
9	0.016	46.68 Pk		16.2	0	62.88	123.51	-60.63	0-360	101	H
10	0.088625	32.02 Pk		11.6	0	43.62	108.64	-65.02	0-360	101	H
11	0.29271	39.76 Pk		11.6	0	51.36	98.27	-46.91	0-360	101	H
12	0.97921	27.96 Pk		11.6	0.1	39.66	67.79	-28.13	0-360	101	H
13	10.0045	11.08 Pk		10.8	0.2	22.08	69.54	-47.46	0-360	101	H
14	28.7675	10.01 Pk		8	0.3	18.31	69.54	-51.23	0-360	101	H
15	0.009245	47.29 Pk		19.4	0	66.69	128.27	-61.58	0-360	101	H
16	0.024085	44.21 Pk		14.2	0	58.41	119.95	-61.54	0-360	101	H
17	0.088555	33.07 Pk		11.6	0	44.67	108.65	-63.98	0-360	101	H
18	0.31145	40.61 Pk		11.6	0	52.21	97.73	-45.52	0-360	101	H
19	0.97452	28.74 Pk		11.6	0.1	40.44	67.83	-27.39	0-360	101	H
20	9.87763	10.55 Pk		10.8	0.2	21.55	69.54	-47.99	0-360	101	H
21	28.76025	10.93 Pk		8	0.3	19.23	69.54	-50.31	0-360	101	H

Pk - Peak detector

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

**SPURIOUS EMISSIONS 9 kHz TO 30 MHz – WIRED**



### **Transmitter Low Channel Wired – DATA**

Fibar Group S.A.

FGFS-101

TX, w/External Wires

24VDC

RED:Horizontal, GREEN:Vertical

Trace Markers

Marker No.	Test Frequency (MHz)	Meter		Antenna Factor dBm	Path Gain/Loss dB	Corrected Reading	AV Limit	AV Margin	Azimuth [Degs]
		Reading (dBuV)	Detector			dB(uVolts/ meter)	3m	(dB)	
1	0.009035	48.1 Pk		19.6	0	67.7	128.47	-60.77	0-360
2	0.055585	37.43 Pk		12	0	49.43	112.69	-63.26	0-360
3	0.3187	41.58 Pk		11.6	0	53.18	97.53	-44.35	0-360
4	0.93192	31.04 Pk		11.6	0.1	42.74	68.22	-25.48	0-360
5	1.45675	24.89 Pk		11.6	0.1	36.59	64.34	-27.75	0-360
6	1.783	23.01 Pk		11.7	0.1	34.81	69.54	-34.73	0-360
7	0.009315	44.21 Pk		19.3	0	63.51	128.2	-64.69	0-360
8	0.036125	40.03 Pk		13.2	0	53.23	116.44	-63.21	0-360
9	0.19217	43.52 Pk		11.6	0	55.12	101.93	-46.81	0-360
10	0.69943	33.99 Pk		11.6	0	45.59	70.71	-25.12	0-360
11	1.63075	24.68 Pk		11.7	0.1	36.48	63.36	-26.88	0-360
12	2.363	21.33 Pk		11.7	0.1	33.13	69.54	-36.41	0-360
13	0.00921	45.78 Pk		19.4	0	65.18	128.3	-63.12	0-360
14	0.0272	43.44 Pk		13.9	0	57.34	118.9	-61.56	0-360
15	0.17769	44.89 Pk		11.6	0	56.49	102.61	-46.12	0-360
16	0.52722	35.74 Pk		11.6	0	47.34	73.16	-25.82	0-360
17	1.174	26.87 Pk		11.6	0.1	38.57	66.21	-27.64	0-360
18	1.73225	22.84 Pk		11.7	0.1	34.64	69.54	-34.9	0-360

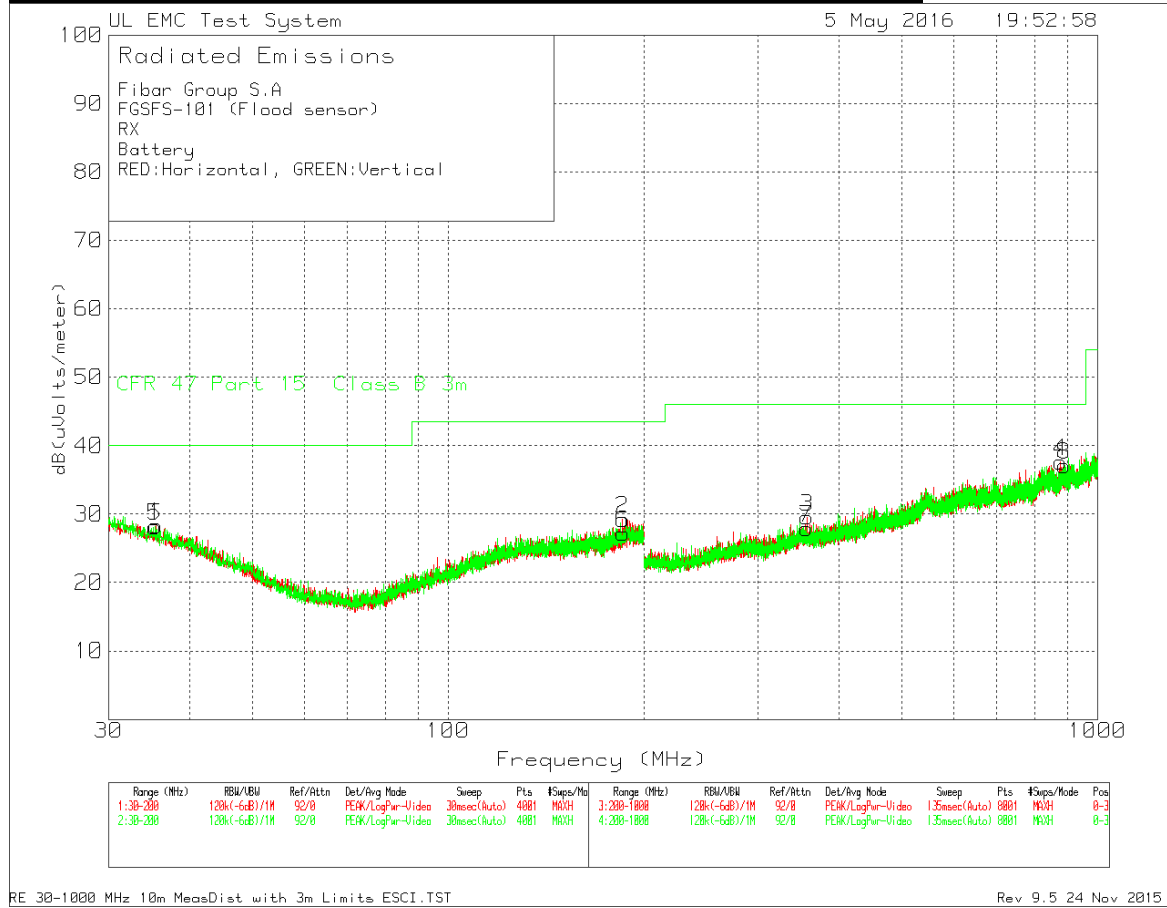
Pk - Peak detector

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.



## 7.2.1. TRANSMITTER RX/DIGITAL RADIATED EMISSIONS

### Transmitter RX/Digital Radiated Emissions 30 MHz – 1000MHz - PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

### Transmitter RX/Digital Radiated Emissions 30 MHz – 1000MHz - DATA

Fibar Group S.A

FGSFS-101 (Flood sensor)

RX

Battery

RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Cable Gain/Loss dB	10M to 3M Factor dB	Corrected		QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
						Reading	dB(uVolts/ meter)					
	1	35.4825	31.57 Pk	16.1	-29.9	10.5	28.27	40	-11.73	0-360	101	H
	2	185.635	32.07 Pk	15.8	-29.1	10.5	29.27	43.52	-14.25	0-360	398	H
	5	35.355	31.49 Pk	16.1	-29.9	10.5	28.19	40	-11.81	0-360	102	V
	6	185.805	29.99 Pk	15.8	-29.1	10.5	27.19	43.52	-16.33	0-360	244	V
	3	357	32.35 Pk	15.2	-28.5	10.5	29.55	46.02	-16.47	0-360	299	H
	4	877	32.42 Pk	22.5	-27.8	10.5	37.62	46.02	-8.4	0-360	299	H
	7	356.2	30.72 Pk	15.2	-28.5	10.5	27.92	46.02	-18.1	0-360	299	V
	8	889	31.72 Pk	22.8	-27.9	10.5	37.12	46.02	-8.9	0-360	399	V

Pk - Peak detector

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

UL EMC Test System 5 May 2016 00:01:08

Preliminary Radiated Emissions

Fibar Group S.A.  
FGFS-101 (flood sensor)  
RX  
Battery  
RED:Horizontal, GREEN:Vertical

47 CFR Part 15 PK, Class B

47 CFR Part 15 AU, Class B

dBμV/m

Frequency (GHz)

RE BOMS 1GHz-40GHz with 1GHz-4GHz ExtPreAmp 3m distance.TST

Rev 9.5 24 Nov 2015

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# Transmitter RX/Digital Radiated Emissions 1 GHz – 10GHz - DATA

Fibar Group S.A  
FGFS-101 (flood sensor)  
RX  
Battery  
RED:Horizontal, GREEN:Vertical

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK		AV		Azimuth [Degs]	Height [cm]	Polarity
		Detector				Limit	Margin (dB)	Limit	Margin (dB)			
1	1.91	65.76 Pk	31.3	-54.68	42.38	74	-31.62	54	-11.62	0-360	150	H
2	3.404	63.91 Pk	23.5	-50.31	37.1	74	-36.9	54	-16.9	0-360	150	H
3	5.813	58.57 Pk	28.7	-49.26	38.01	74	-35.99	54	-15.99	0-360	100	H
4	8.333	57.96 Pk	36.5	-47.3	47.16	74	-26.84	54	-6.84	0-360	150	H
5	1.903	65.53 Pk	31.2	-54.68	42.05	74	-31.95	54	-11.95	0-360	100	V
6	3.399	63.13 Pk	23.5	-50.26	36.37	74	-37.63	54	-17.63	0-360	100	V
7	5.588	59.86 Pk	28.4	-49.47	38.79	74	-35.21	54	-15.21	0-360	100	V
8	8.3225	57.38 Pk	36.5	-47.49	46.39	74	-27.61	54	-7.61	0-360	100	V

Pk - Peak detector

## 8. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 <sup>*</sup>	56 to 46 <sup>*</sup>
0.5-5	56	46
5-30	60	50

<sup>\*</sup> Decreases with the logarithm of the frequency.

### TEST PROCEDURE

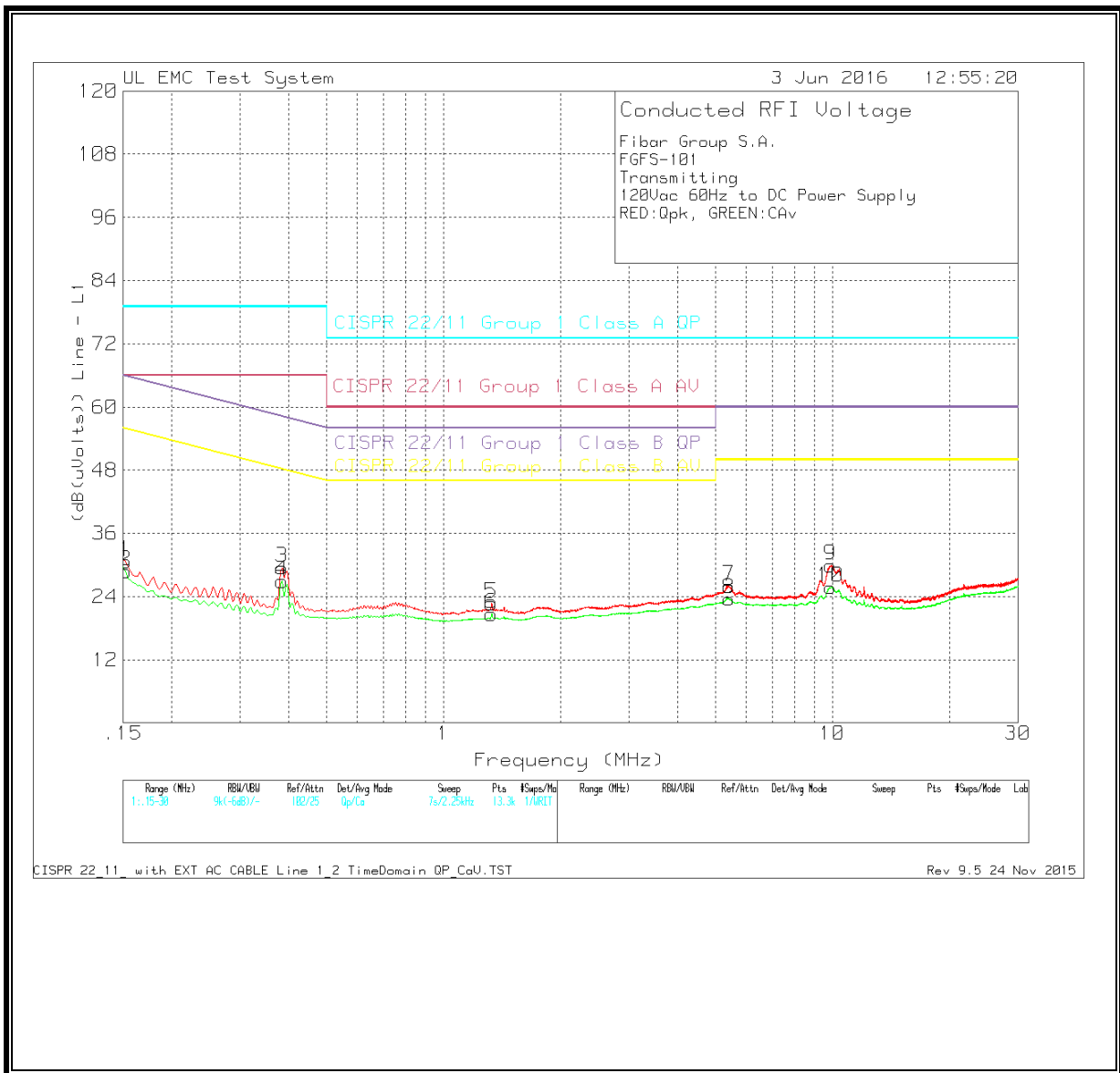
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

**LINE 1 PLOT – TX Mode – 120Vac 60Hz to DC Power Supply**



**LINE 1 DATA – TX Mode – 120Vac 60Hz to DC Power Supply**

Fibar Group S.A.

FGFS-101

Transmitting

120Vac 60Hz to DC Power Supply

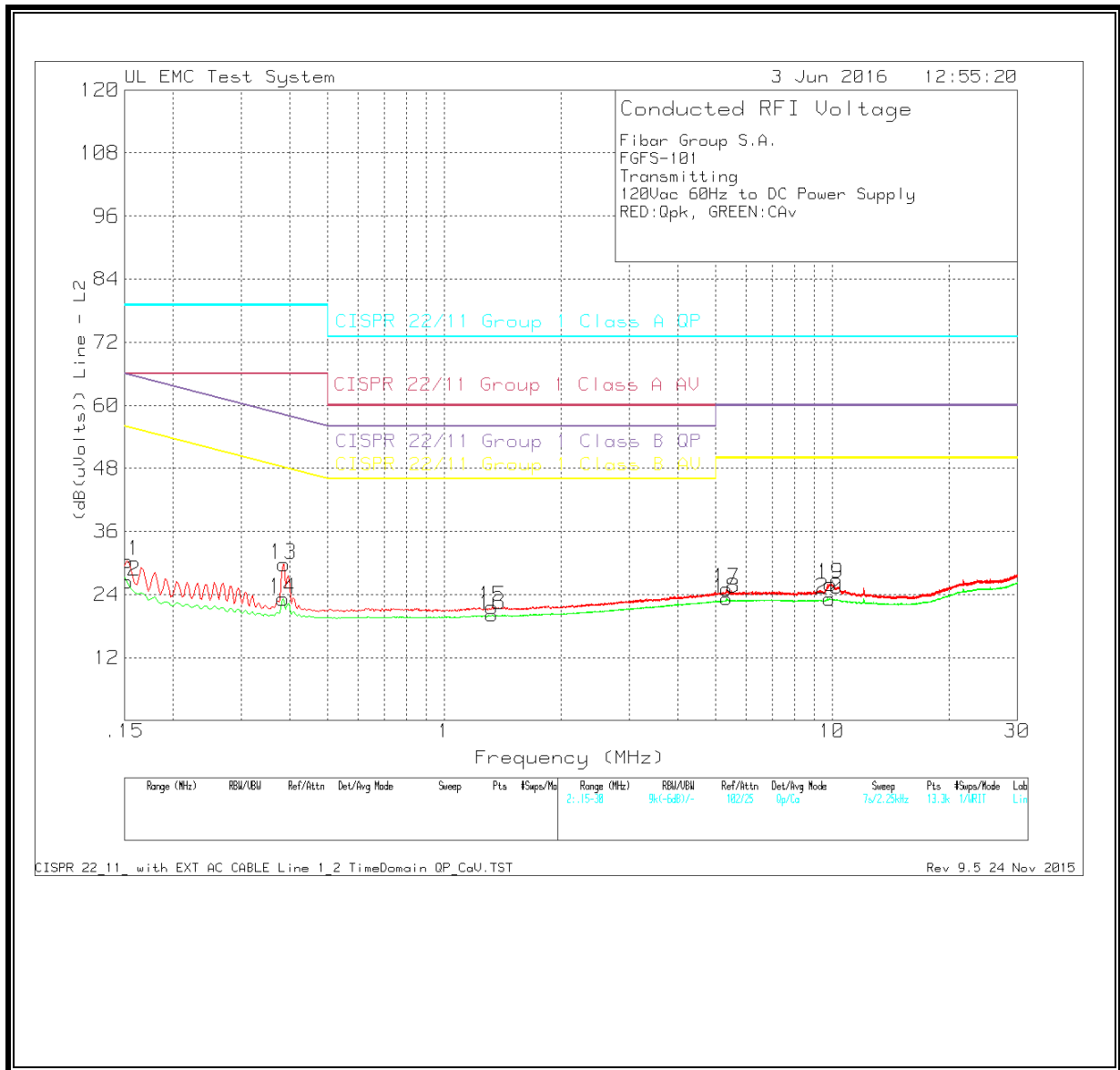
RED:Qpk, GREEN:CAv

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dBm	Path Gain/Loss dB	EXT Cable Gain/Loss dB	Dongle Gain/Loss dB	Corrected Reading dB(uVolts)	Class A		Class A		Class B		Class B	
									QP	Limit	AV	Margin (dB)	QP	Limit	AV	Margin (dB)
1	0.15225	16.97	Qp	0.1	13.6	0	0	30.67	79	-48.33	-	-	65.88	-35.21	-	-
2	0.15225	15.13	Ca	0.1	13.6	0	0	28.83	-	-	66	-37.17	-	-	55.88	-27.05
3	0.384	18.69	Qp	0	10.8	0	0	29.49	79	-49.51	-	-	58.19	-28.7	-	-
4	0.384	16.13	Ca	0	10.8	0	0	26.93	-	-	66	-39.07	-	-	48.19	-21.26
5	1.329	12.1	Qp	0	10.6	0	0	22.7	73	-50.3	-	-	56	-33.3	-	-
6	1.329	10.1	Ca	0	10.6	0	0	20.7	-	-	60	-39.3	-	-	46	-25.3
7	5.42625	15.09	Qp	0	10.8	0	0.1	25.99	73	-47.01	-	-	60	-34.01	-	-
8	5.42175	12.65	Ca	0	10.8	0	0.1	23.55	-	-	60	-36.45	-	-	50	-26.45
9	9.89025	18.52	Qp	0.1	11	0.1	0.2	29.92	73	-43.08	-	-	60	-30.08	-	-
10	9.8925	14.36	Ca	0.1	11	0.1	0.2	25.76	-	-	60	-34.24	-	-	50	-24.24

Qp - Quasi-Peak detector

Ca - CISPR Average detection

**LINE 2 PLOT – TX Mode – 120Vac 60Hz to DC Power Supply**





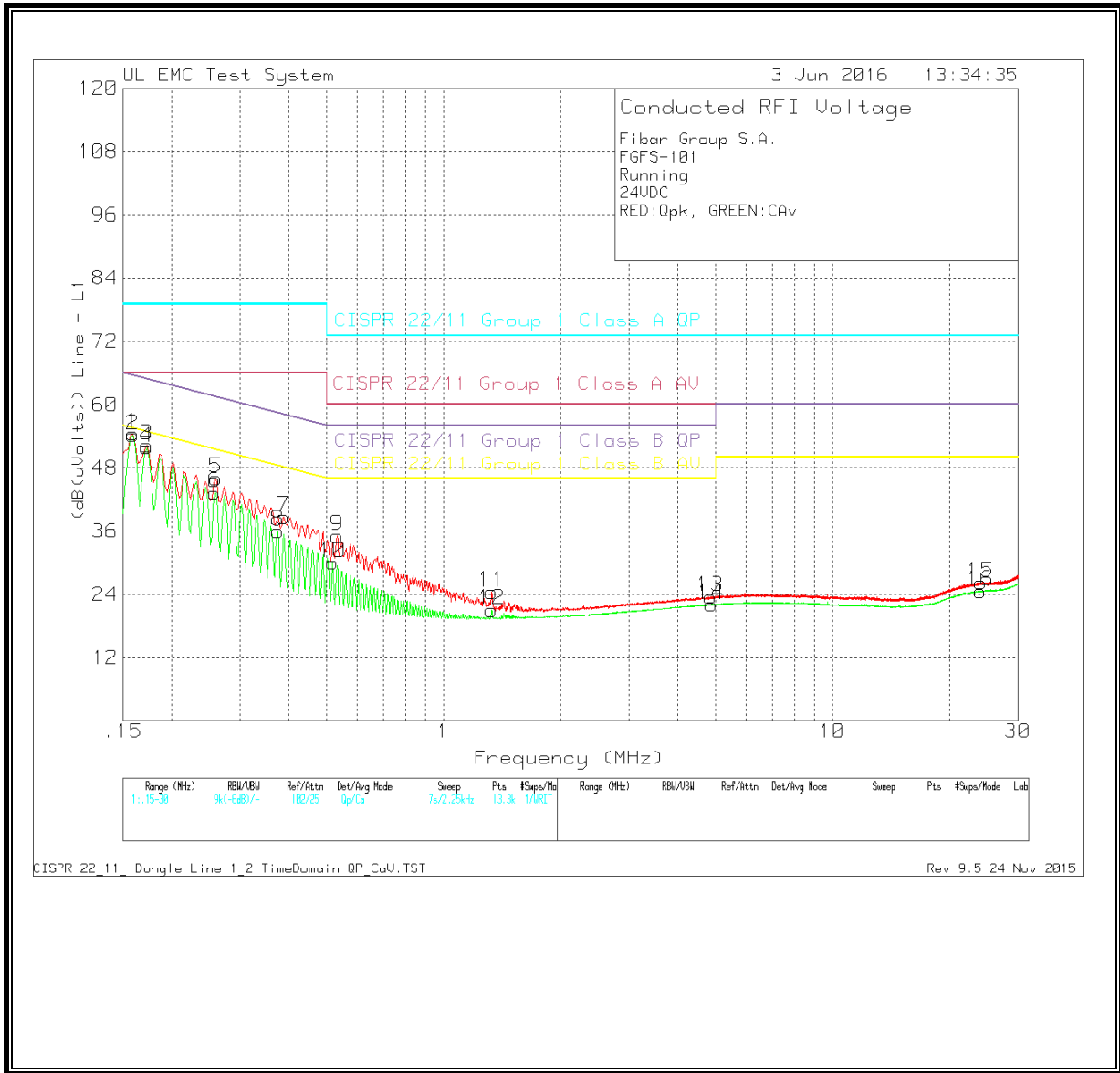
**LINE 2 DATA – TX Mode – 120Vac 60Hz to DC Power Supply**

Fibar Group S.A.  
FGFS-101  
Transmitting  
120Vac 60Hz to DC Power Supply  
RED:Qpk, GREEN:CAv

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dBm	Path Gain/Loss dB	EXT Cable Gain/Loss dB	Dongle Gain/Loss dB	Corrected Reading dB(uVolts)	Class A		Class A		Class B		Class B	
									QP	Limit	AV	Margin (dB)	Limit	QP	Margin (dB)	Limit
11	0.15225	16.08	Qp	0.1	14.2	0	0	30.38	79	-48.62	-	-	65.88	-35.5	-	-
12	0.15225	12.2	Ca	0.1	14.2	0	0	26.5	-	-	66	-39.5	-	-	55.88	-29.38
13	0.38625	18.42	Qp	0	11.3	0	0	29.72	79	-49.28	-	-	58.14	-28.42	-	-
14	0.384	11.88	Ca	0	11.3	0	0	23.18	-	-	66	-42.82	-	-	48.19	-25.01
15	1.329	10.57	Qp	0	11.1	0	0	21.67	73	-51.33	-	-	56	-34.33	-	-
16	1.329	9.04	Ca	0	11.1	0	0	20.14	-	-	60	-39.86	-	-	46	-25.86
17	5.34975	13.62	Qp	0	11.3	0	0.1	25.02	73	-47.98	-	-	60	-34.98	-	-
18	5.3475	11.86	Ca	0	11.3	0	0.1	23.26	-	-	60	-36.74	-	-	50	-26.74
19	9.91275	14.22	Qp	0	11.5	0.1	0.2	26.02	73	-46.98	-	-	60	-33.98	-	-
20	9.8475	11.35	Ca	0	11.5	0.1	0.2	23.15	-	-	60	-36.85	-	-	50	-26.85

Qp - Quasi-Peak detector  
Ca - CISPR Average detection

**LINE 1 PLOT – TX Mode – 24 VDC**



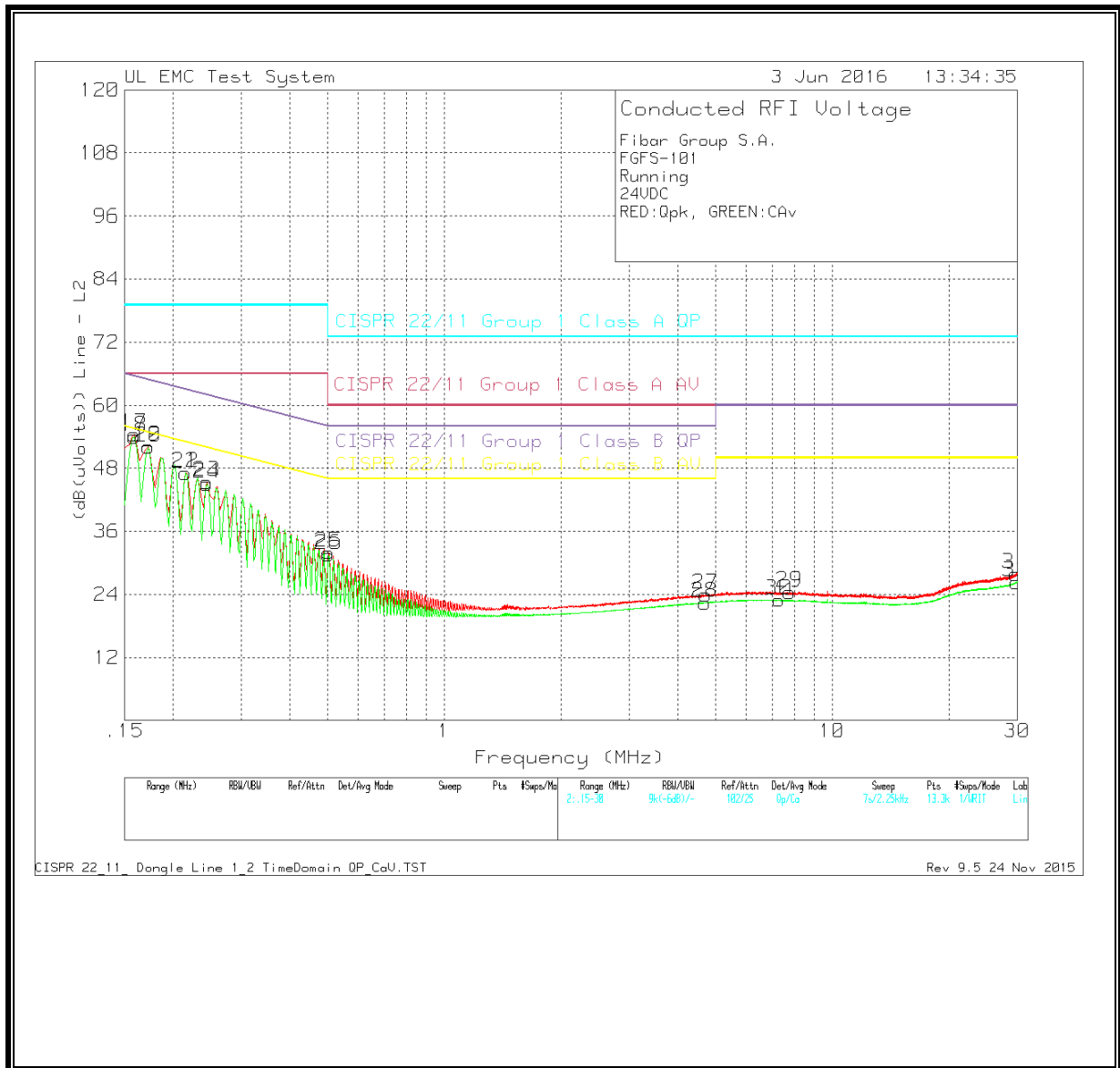
**LINE 1 DATA – TX Mode – 24 VDC**

Fibar Group S.A.  
FGFS-101  
Transmitting  
24VDC  
RED:Qpk, GREEN:CAV

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dBm	Path Gain/Loss dB	EXT Cable Gain/Loss dB	Dongle Gain/Loss dB	Corrected Reading dB(uVolts)	Class A		Class A		Class B		Class B	
									QP Limit	Margin (dB)	AV Limit	Margin (dB)	QP Limit	Margin (dB)	AV Limit	Margin (dB)
1	0.159	41.64	Qp	0.1	12.8	0	0	54.54	79	-24.46	-	-	65.52	-10.98	-	-
2	0.159	41.31	Ca	0.1	12.8	0	0	54.21	-	-	66	-11.79	-	-	55.52	-1.31
3	0.1725	40.19	Qp	0.1	12	0	0	52.29	79	-26.71	-	-	64.84	-12.55	-	-
4	0.1725	39.76	Ca	0.1	12	0	0	51.86	-	-	66	-14.14	-	-	54.84	-2.98
5	0.26025	34.91	Qp	0	11.1	0	0	46.01	79	-32.99	-	-	61.42	-15.41	-	-
6	0.258	32.09	Ca	0	11.2	0	0	43.29	-	-	66	-22.71	-	-	51.5	-8.21
7	0.3885	27.9	Qp	0	10.8	0	0	38.7	79	-40.3	-	-	58.1	-19.4	-	-
8	0.375	25.19	Ca	0	10.8	0	0	35.99	-	-	66	-30.01	-	-	48.39	-12.4
9	0.5325	24.48	Qp	0	10.6	0	0	35.08	73	-37.92	-	-	56	-20.92	-	-
10	0.519	19.41	Ca	0	10.6	0	0	30.01	-	-	60	-29.99	-	-	46	-15.99
11	1.329	13.8	Qp	0	10.6	0	0	24.4	73	-48.6	-	-	56	-31.6	-	-
12	1.329	10.41	Ca	0	10.6	0	0	21.01	-	-	60	-38.99	-	-	46	-24.99
13	4.857	12.71	Qp	0	10.7	0	0.1	23.51	73	-49.49	-	-	56	-32.49	-	-
14	4.884	11.26	Ca	0	10.7	0	0.1	22.06	-	-	60	-37.94	-	-	46	-23.94
15	24.0585	13.54	Qp	0	11.6	0.1	1	26.24	73	-46.76	-	-	60	-33.76	-	-
16	24.018	11.93	Ca	0	11.6	0.1	1	24.63	-	-	60	-35.37	-	-	50	-25.37

Qp - Quasi-Peak detector  
Ca - CISPR Average detection

**LINE 2 PLOT – TX Mode – 24 VDC**



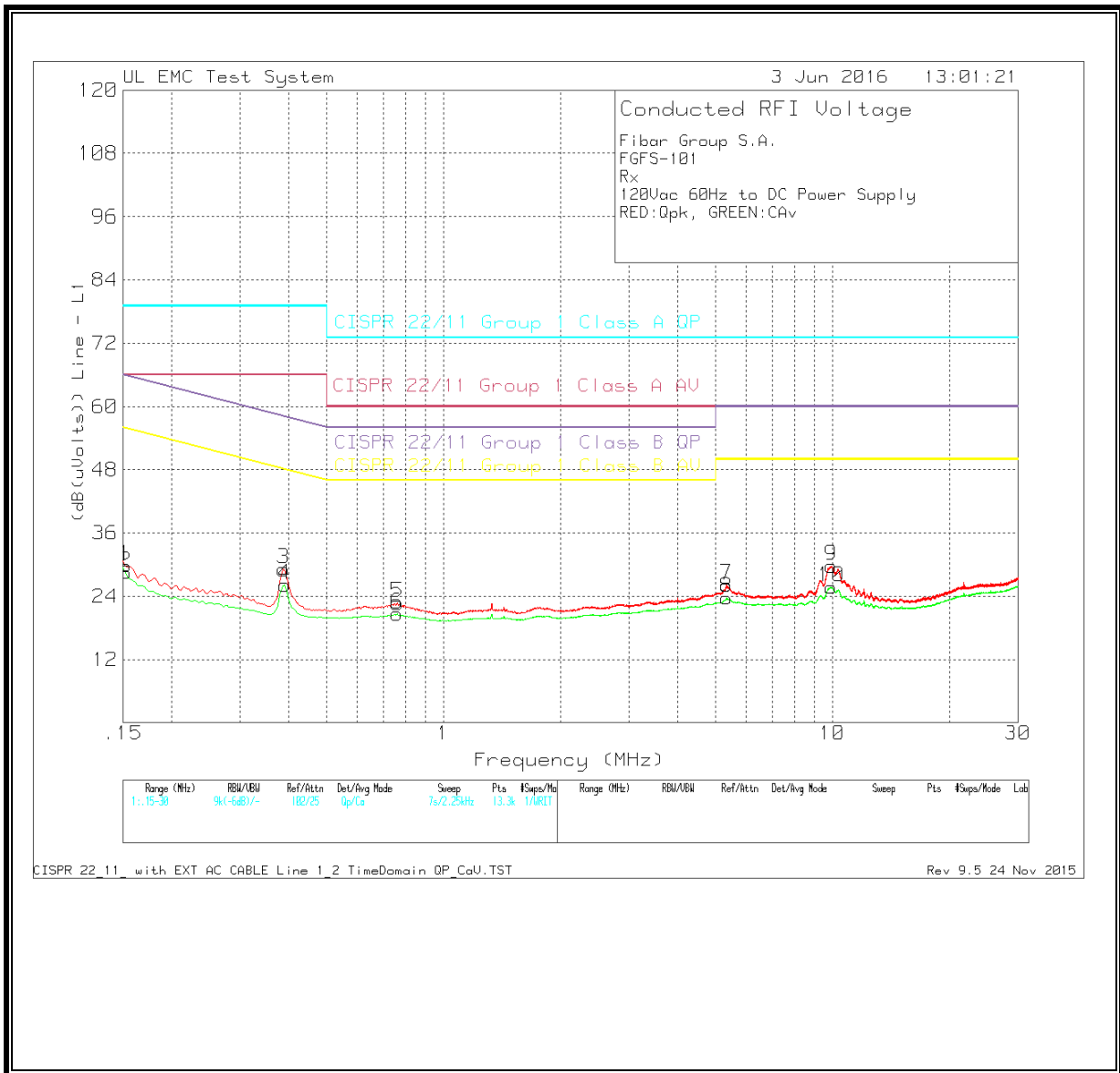
**LINE 2 DATA – TX Mode – 24 VDC**

Fibar Group S.A.  
FGFS-101  
Transmitting  
24VDC  
RED:Qpk, GREEN:CAV

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dBm	Path Gain/Loss dB	EXT Cable Gain/Loss dB	Dongle Gain/Loss dB	Corrected Reading dB(uVolts)	Class A		Class A		Class B		Class B	
									QP Limit	Margin (dB)	AV Limit	Margin (dB)	QP Limit	Margin (dB)	AV Limit	Margin (dB)
17	0.159	41.08	Qp	0.1	13.3	0	0	54.5	79	-24.52	-	-	65.52	-11.04	-	-
18	0.159	40.58	Ca	0.1	13.3	0	0	54.0	-	-	66	-12.02	-	-	55.52	-1.54
19	0.1725	39.54	Qp	0.1	12.5	0	0	52.1	79	-26.86	-	-	64.84	-12.7	-	-
20	0.1725	39.42	Ca	0.1	12.5	0	0	52.0	-	-	66	-13.98	-	-	54.84	-2.82
21	0.21525	35.08	Qp	0.1	11.9	0	0	47.1	79	-31.92	-	-	63	-15.92	-	-
22	0.21525	35.12	Ca	0.1	11.9	0	0	47.1	-	-	66	-18.88	-	-	53	-5.88
23	0.2445	33.48	Qp	0.1	11.8	0	0	45.4	79	-33.62	-	-	61.94	-16.56	-	-
24	0.2445	33.18	Ca	0.1	11.8	0	0	45.1	-	-	66	-20.92	-	-	51.94	-6.86
25	0.50325	20.79	Qp	0	11.2	0	0	32.0	73	-41.01	-	-	56	-24.01	-	-
26	0.50325	20.34	Ca	0	11.2	0	0	31.5	-	-	60	-28.46	-	-	46	-14.46
27	4.7175	12.57	Qp	0	11.3	0	0.1	24.0	73	-49.03	-	-	56	-32.03	-	-
28	4.6995	11.15	Ca	0	11.2	0	0.1	22.5	-	-	60	-37.55	-	-	46	-23.55
29	7.7685	12.92	Qp	0	11.4	0	0.1	24.4	73	-48.58	-	-	60	-35.58	-	-
30	7.296	11.47	Ca	0	11.4	0	0.1	23.0	-	-	60	-37.03	-	-	50	-27.03
31	29.69475	14.3	Qp	-0.1	12.4	0.1	1.2	27.9	73	-45.1	-	-	60	-32.1	-	-
32	29.79375	12.71	Ca	-0.1	12.4	0.1	1.2	26.3	-	-	60	-33.69	-	-	50	-23.69

Qp - Quasi-Peak detector  
Ca - CISPR Average detection

**LINE 1 RESULTS – RX Mode**



# **LINE 1 DATA – RX Mode**

Fibar Group S.A.  
FGFS-101

Rx

120Vac 60Hz to DC Power Supply

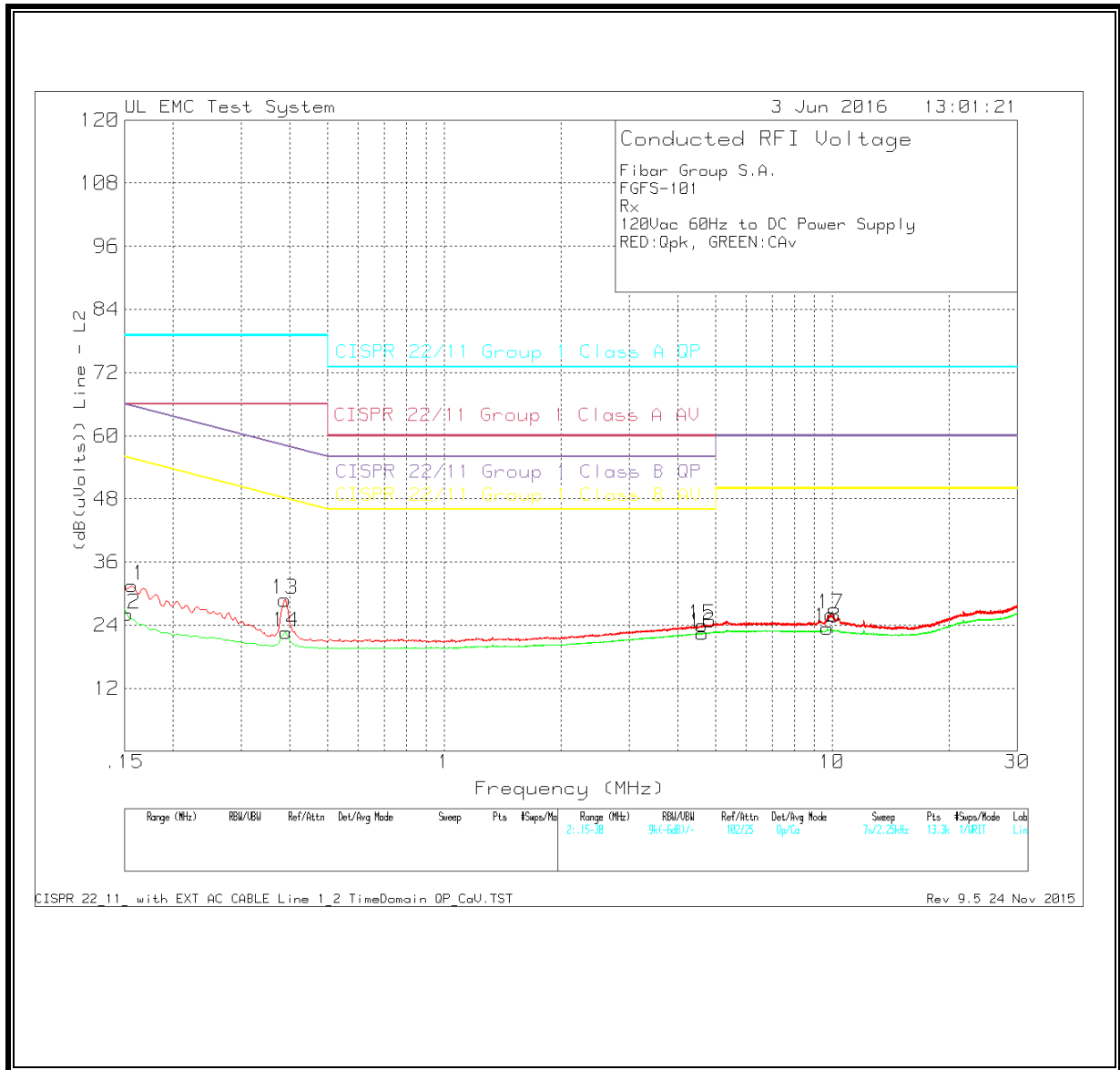
RED:Qpk, GREEN:CAv

Marker	Test No.	Frequency (MHz)	Meter Reading (dBuV)		LISN Factor dBm	Path Gain/Loss dB	EXT Cable Gain/Loss dB	Dongle Gain/Loss dB	Corrected Reading dB(uVolts)	Class A QP		Class A AV		Class B QP		Class B AV	
			Detector							Limit (dB)	Margin	Limit (dB)	Margin	Limit (dB)	Margin	Limit (dB)	Margin
	1	0.15225	16.14 Qp		0.1	13.6	0	0	29.84	79	-49.16	-	-	65.88	-36.04	-	-
	2	0.15225	14.86 Ca		0.1	13.6	0	0	28.56	-	-	66	-37.44	-	-	55.88	-27.32
	3	0.3885	18.35 Qp		0	10.8	0	0	29.15	79	-49.85	-	-	58.1	-28.95	-	-
	4	0.39075	15.36 Ca		0	10.8	0	0	26.16	-	-	66	-39.84	-	-	48.05	-21.89
	5	0.762	12.16 Qp		0	10.6	0	0	22.76	73	-50.24	-	-	56	-33.24	-	-
	6	0.75975	10.07 Ca		0	10.6	0	0	20.67	-	-	60	-39.33	-	-	46	-25.33
	7	5.3475	15.22 Qp		0	10.8	0	0.1	26.12	73	-46.88	-	-	60	-33.88	-	-
	8	5.34975	12.81 Ca		0	10.8	0	0.1	23.71	-	-	60	-36.29	-	-	50	-26.29
	9	9.942	18.37 Qp		0.1	11	0.1	0.2	29.77	73	-43.23	-	-	60	-30.23	-	-
	10	9.94425	14.34 Ca		0.1	11	0.1	0.2	25.74	-	-	60	-34.26	-	-	50	-24.26

Qp - Quasi-Peak detector

Ca - CISPR Average detection

**LINE 2 RESULTS – RX Mode**





## LINE 2 DATA – RX Mode

Fibar Group S.A.  
FGFS-101

Rx

120Vac 60Hz to DC Power Supply  
RED:Qpk, GREEN:CAv

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dBm	Path Gain/Loss dB	EXT Cable Gain/Loss dB	Dongle Gain/Loss dB	Corrected Reading dB(uVolts)	Class A		Class A		Class A		Class B		Class B	
									QP Limit	QP Margin (dB)	AV Limit	AV Margin (dB)	AV Limit	AV Margin (dB)	QP Limit	QP Margin (dB)	Class B AV Limit	Class B AV Margin (dB)
11	0.15675	17.94	Qp	0.1	13.5	0	0	31.54	79	-47.46	-	-	-	-	65.63	-34.09	-	-
12	0.15225	11.81	Ca	0.1	14.2	0	0	26.11	-	-	66	-39.89	-	-	-	-	55.88	-29.77
13	0.3885	17.53	Qp	0	11.3	0	0	28.83	79	-50.17	-	-	-	-	58.1	-29.27	-	-
14	0.39075	11.37	Ca	0	11.3	0	0	22.67	-	-	66	-43.33	-	-	-	-	48.05	-25.38
15	4.62188	12.72	Qp	0	11.2	0	0.1	24.02	73	-48.98	-	-	-	-	56	-31.98	-	-
16	4.63425	11.16	Ca	0	11.2	0	0.1	22.46	-	-	60	-37.54	-	-	-	-	46	-23.54
17	9.9285	14.24	Qp	0	11.5	0.1	0.2	26.04	73	-46.96	-	-	-	-	60	-33.96	-	-
18	9.72825	11.55	Ca	0.1	11.5	0.1	0.2	23.45	-	-	60	-36.55	-	-	-	-	50	-26.55

Qp - Quasi-Peak detector

Ca - CISPR Average detection