



FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

Fibar Smoke Sensor

MODEL NUMBER: FGSD-002

FCC ID: 2AA9MFGSD002

REPORT NUMBER: 11237561

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Prepared for
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NVLAP Lab code: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	June 23, 2016	Initial Issue	V Sabalvaro
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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	5
4.1. MEASURING INSTRUMENT CALIBRATION	5
4.2. SAMPLE CALCULATION	5
4.3. MEASUREMENT UNCERTAINTY.....	6
5.5. DESCRIPTION OF TEST SETUP	8
6. TEST AND MEASUREMENT EQUIPMENT	10
7. TEST RESULTS	11
7.1. 20 dB AND 99% BANDWIDTH.....	11
7.2. RADIATED EMISSIONS.....	18
7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION	20
7.2.2. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz	21
7.2.3. WORST-CASE BELOW 1 GHz	27
7.2.4. Transmitter RX/Digital Radiated Emissions.....	35
8. SETUP PHOTOS	39

1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Radio Sensor

MODEL: FGSD-002

SERIAL NUMBER: 149857, 149814

DATE TESTED: May 4 – May 17, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	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
UL LLC By:

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.

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

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 DC 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 PK E-field Strength (dBuV/m)
908.4 - 916	TX	90.82*

* - Measurement take with Peak detector

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio is equipped with an 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 axis as found in preliminary testing. Y-axis is the worst axis, which is sideways as it would be installed vertically on a wall. The EUT was also set to the worst case power mode. The worst case acceptable power mode was determined to be setting -4dB.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
None	-	-	-	-

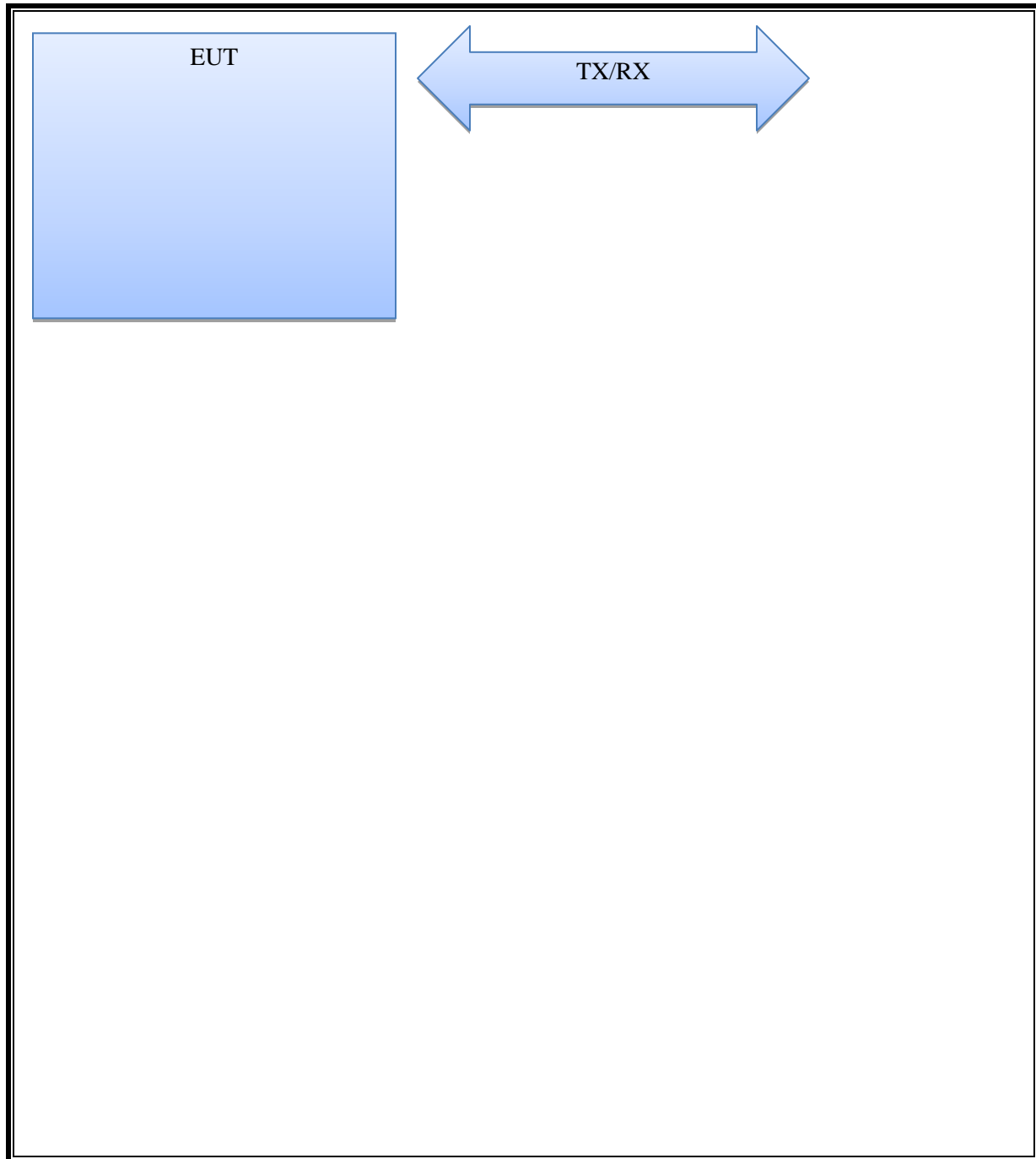
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
0	Enclosure	-	Non-Electrical	-	-	None

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		
Conducted 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
Loop Antenna	ETS-Lindgren	6502	201021	7/31/2016	7/31/2017

7. TEST RESULTS

7.1. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

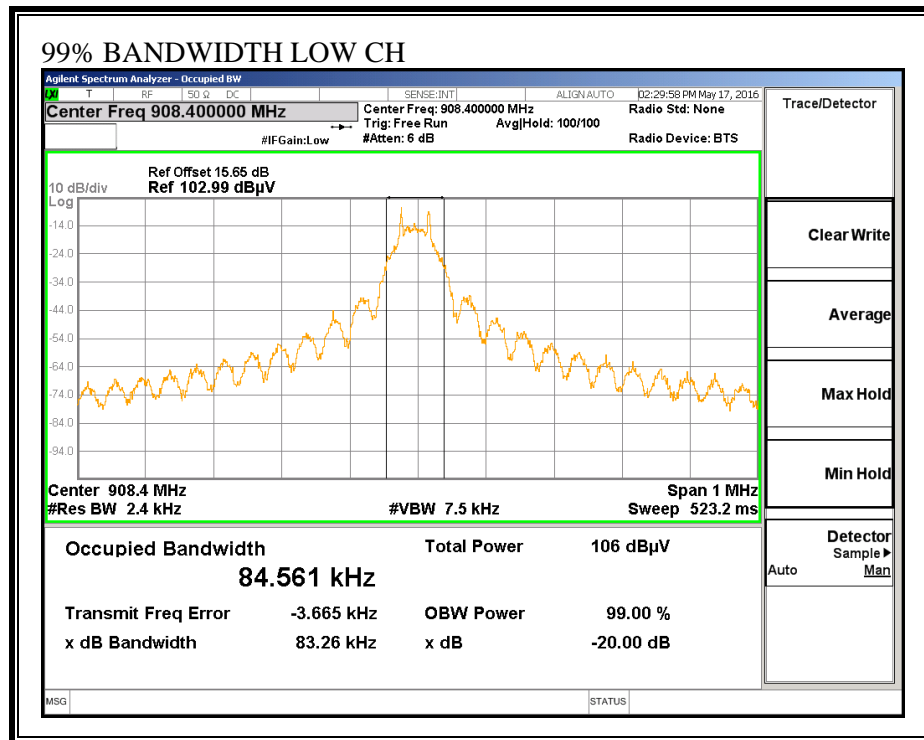
TEST PROCEDURE

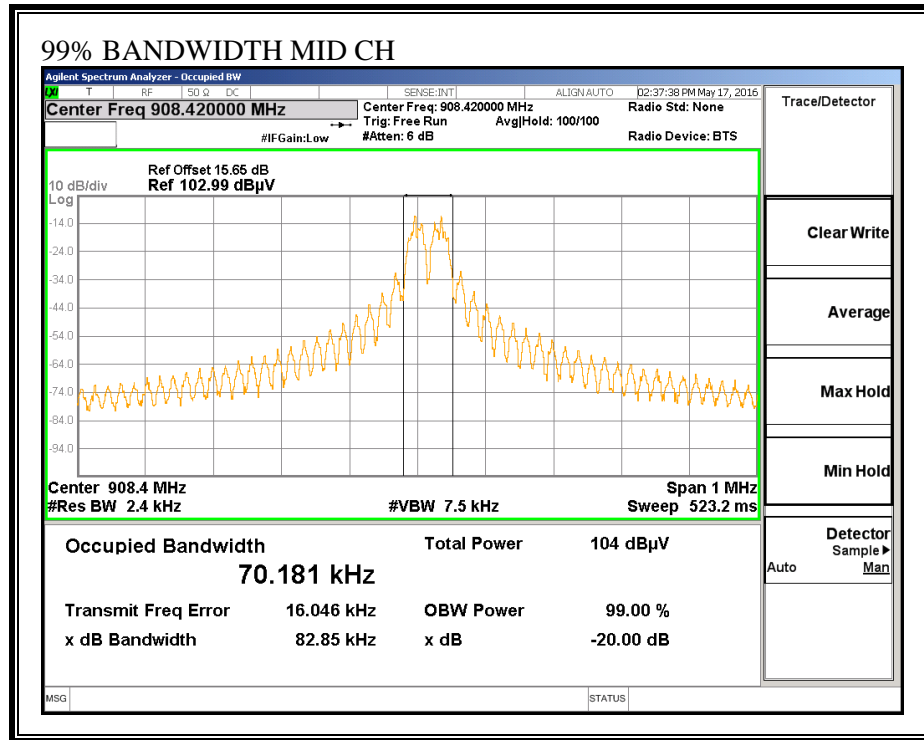
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 5% of the Occupied bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% and 20dB bandwidth function is utilized.

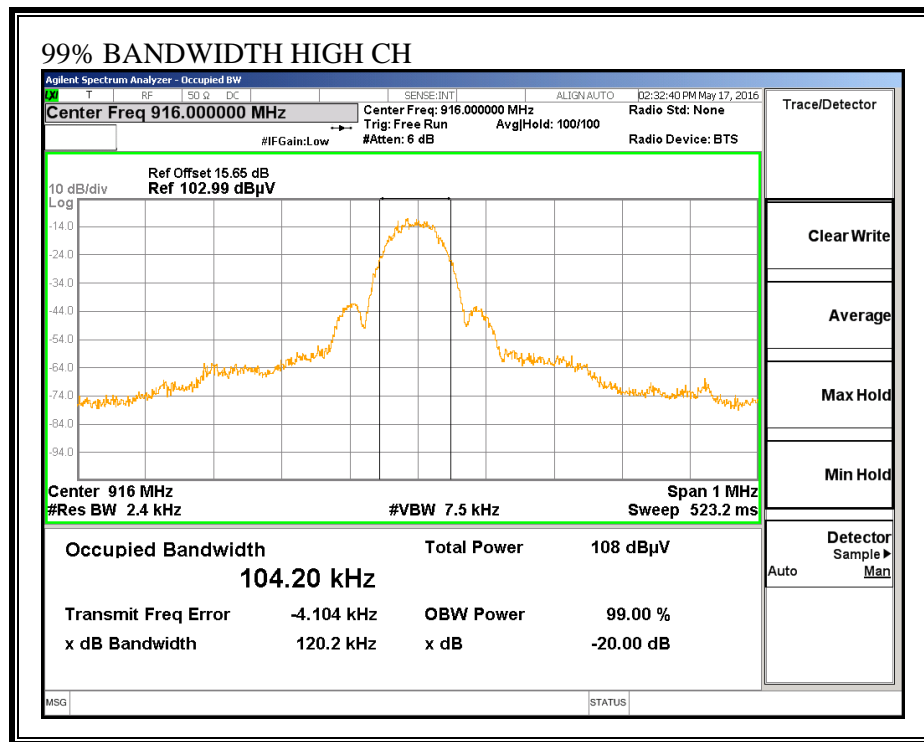
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	908.4	83.78	84.561
Middle	908.42	70.07	70.181
High	916	121.4	104.2

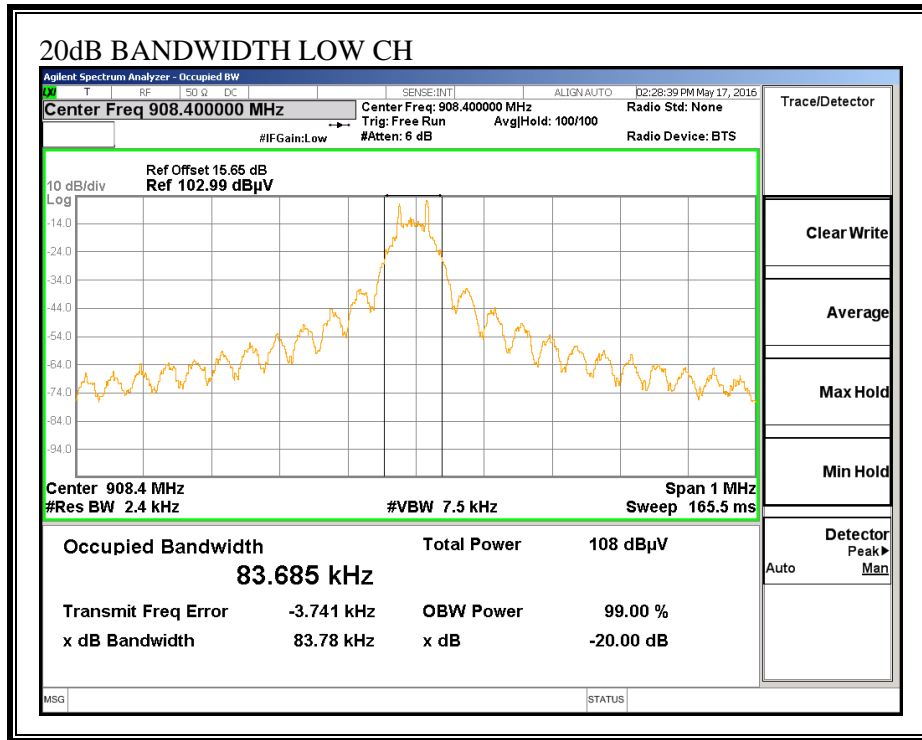
99% BANDWIDTH

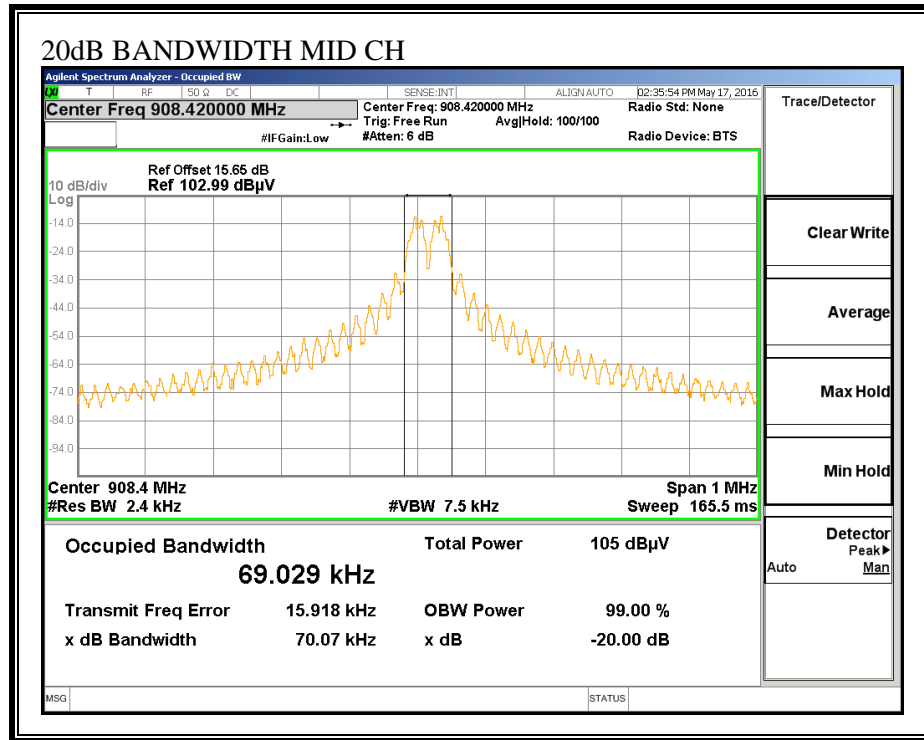


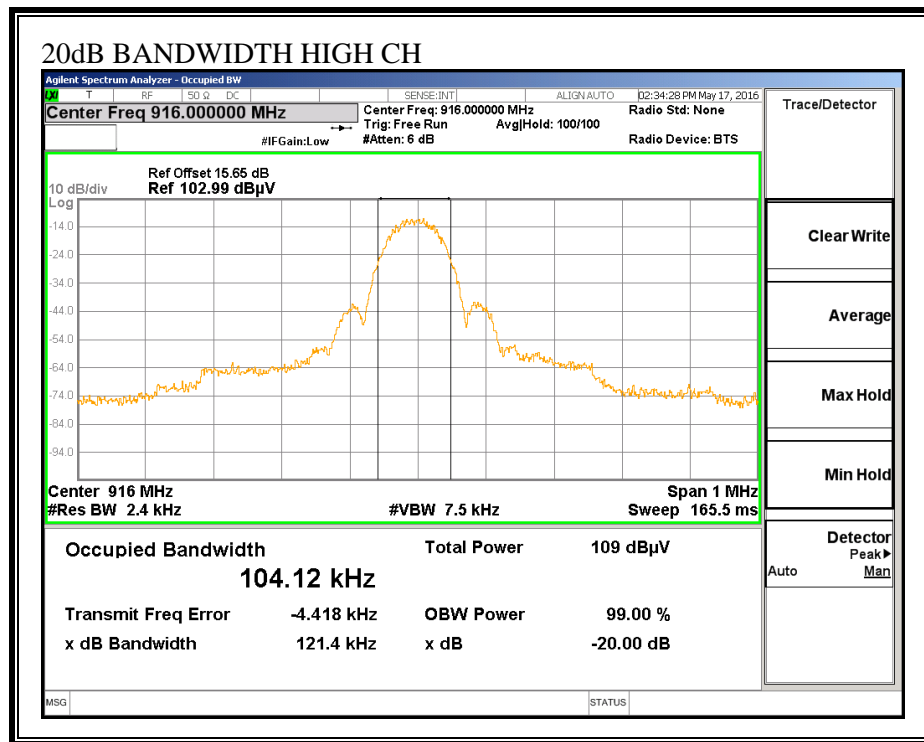




20dB BANDWIDTH







7.2. RADIATED EMISSIONS

LIMIT

FCC 15.249

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

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

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

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

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

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

RESULTS

Above 1 GHz:

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 below

7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

Fibar Group S.A.

FGSD-002

TX

Battery

Test Frequency (MHz)	Meter		Antenna		Corrected Reading		PK Limit 3m	PK Margin (dB)	QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	Notes
	Reading (dBuV)	Detector	Factor dBm	Gain/Loss dB	dB(uVolts/ meter)									
908.4134	57.47	Pk	23.1	9.5	90.07	114	-23.93	94	-3.93		286	164	H	7
908.4143	52.27	Pk	23.1	9.5	84.87	114	-29.13	94	-9.13		37	189	V	7
908.45485	45.28	Pk	23.1	9.5	77.88	114	-36.12	94	-16.12		82	159	V	7
908.45485	57.59	Pk	23.1	9.5	90.19	114	-23.81	94	-3.81		298	155	H	7
915.97285	57.92	Pk	23.3	9.6	90.82	114	-23.19	94	-3.18		297	153	H	7
915.97285	45.95	Pk	23.3	9.6	78.85	114	-35.18	94	-15.15		82	147	V	7

Notes:

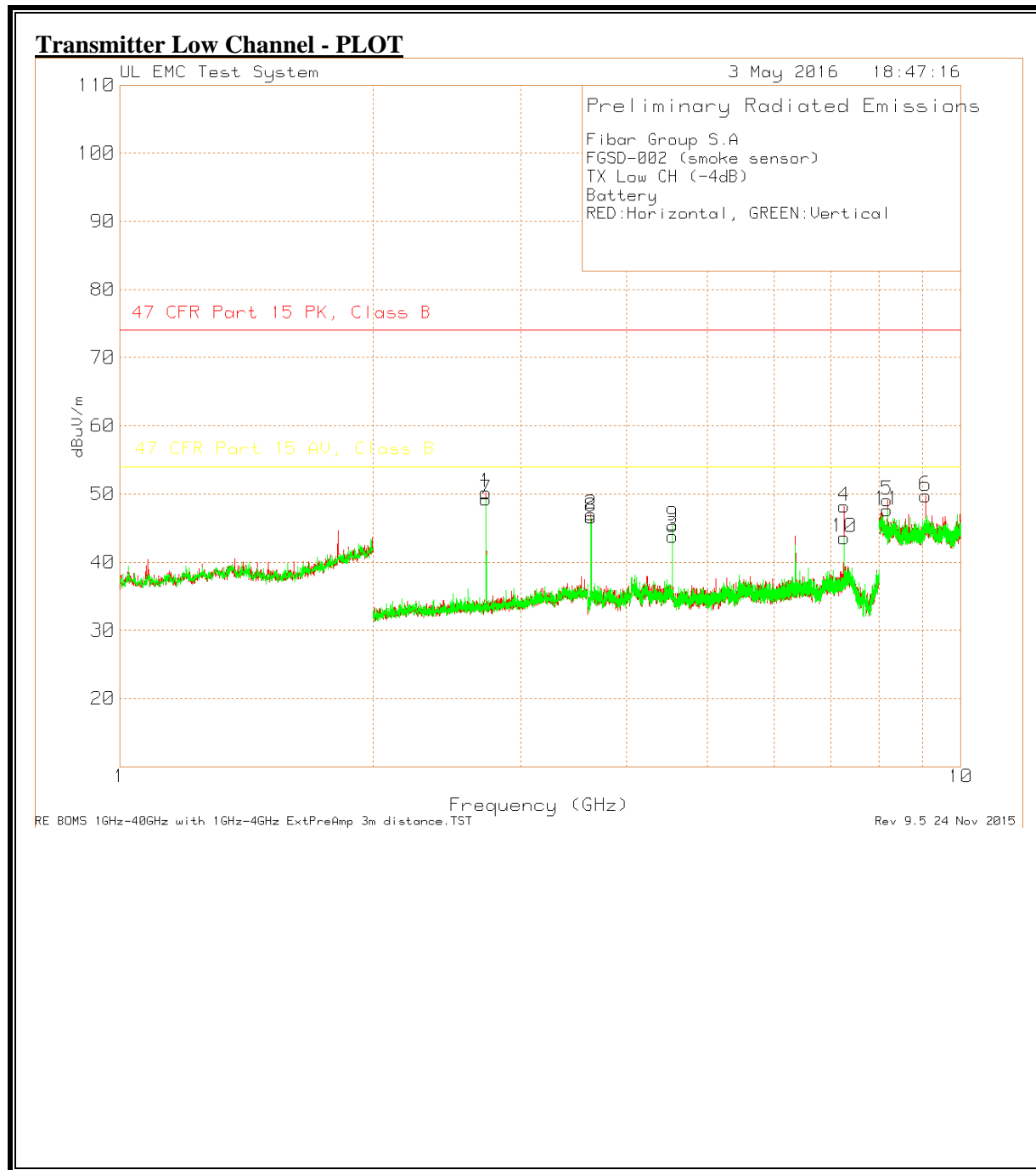
7 - Y-Axis -4dB

Pk - Peak detector

Qp - Quasi-Peak detector

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

7.2.2. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz



Transmitter Low Channel -DATA

Fibar Group S.A
FGSD-002
TX Low CH (-4dB)
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	79.07 Pk	22.1	-50.96	50.21	74	-23.79	54	-3.79	0-360	150	H
2	3.634	73.65 Pk	23.3	-49.87	47.08	74	-26.92	54	-6.92	0-360	150	H
3	4.542	67.85 Pk	27.8	-51.81	43.84	74	-30.16	54	-10.16	0-360	100	H
4	7.268	64.04 Pk	30.2	-46.02	48.22	74	-25.78	54	-5.78	0-360	100	H
5	8.175	61.5 Pk	36.3	-48.67	49.13	74	-24.87	54	-4.87	0-360	100	H
6	9.084	62.26 Pk	36.2	-48.72	49.74	74	-24.26	54	-4.26	0-360	100	H
7	2.725	78.08 Pk	22.1	-50.96	49.22	74	-24.78	54	-4.78	0-360	150	V
8	3.634	73.16 Pk	23.3	-49.87	46.59	74	-27.41	54	-7.41	0-360	150	V
9	4.542	69.37 Pk	27.8	-51.81	45.36	74	-28.64	54	-8.64	0-360	150	V
10	7.268	59.41 Pk	30.2	-46.02	43.59	74	-30.41	54	-10.41	0-360	100	V
11	8.175	60.03 Pk	36.3	-48.67	47.66	74	-26.34	54	-6.34	0-360	100	V

Pk - Peak detector

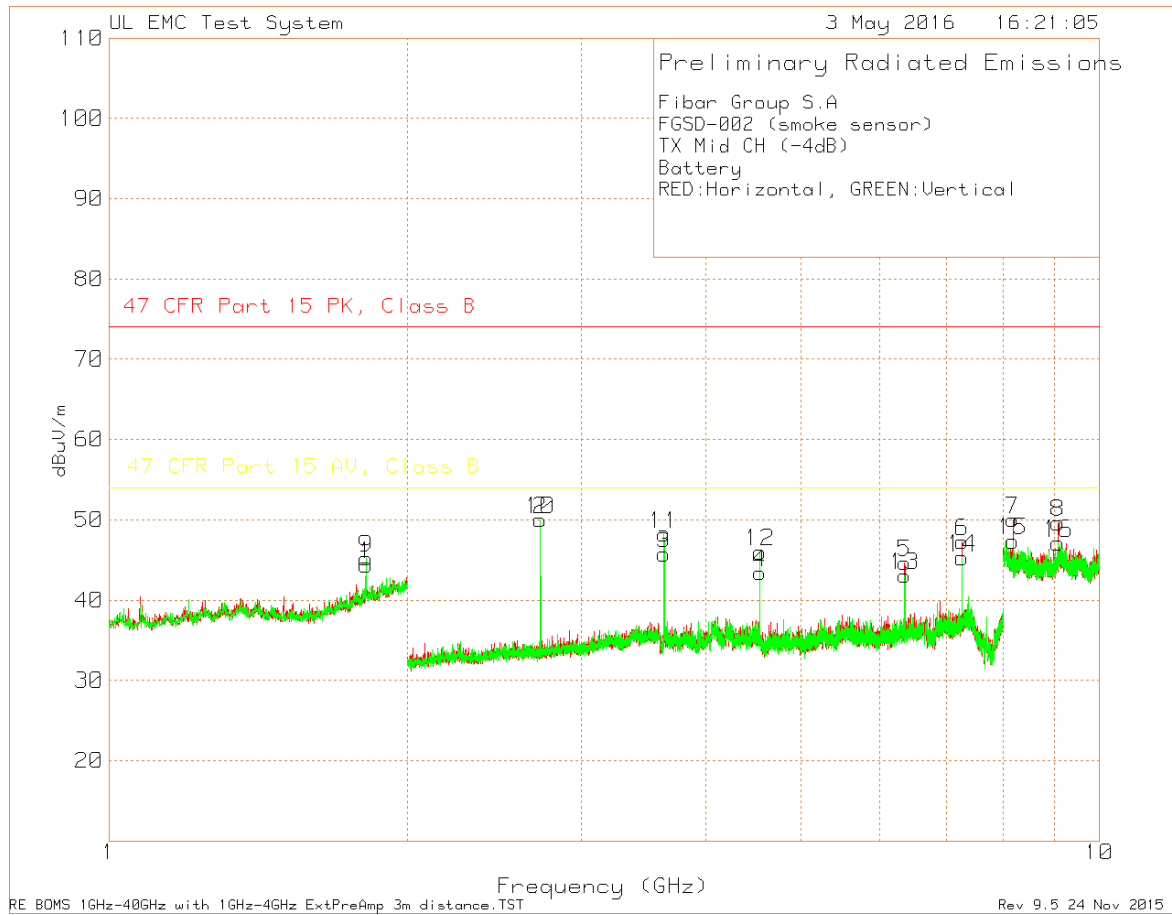
Radiated Emission Data

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
2.7252	78.66 Pk	22.1	-50.96	49.8	74	-24.2	-	-	173	130	H
2.7252	77.36 Av	22.1	-50.96	48.5	-	-	54	-5.5	173	130	H
2.7252	78.08 Pk	22.1	-50.96	49.22	74	-24.78	-	-	117	160	V
2.7252	76.74 Av	22.1	-50.96	47.88	-	-	54	-6.12	117	160	V
7.2672	65.68 Pk	30.2	-46.02	49.86	74	-24.14	-	-	106	100	H
7.2671	61.95 Av	30.2	-46.02	46.13	-	-	54	-7.87	106	100	H
8.1757	65.72 Pk	36.3	-48.68	53.34	74	-20.66	-	-	95	115	H
8.1755	59.04 Av	36.3	-48.68	46.66	-	-	54	-7.34	95	115	H
9.084	65.52 Pk	36.2	-48.72	53	74	-21	-	-	89	100	H
9.0839	57.39 Av	36.2	-48.72	44.87	-	-	54	-9.13	89	100	H

Pk - Peak detector

Av - Average detection

Transmitter Mid Channel – PLOT



Transmitter Mid Channel - DATA

Fibar Group S.A

FGSD-002

TX Mid CH (-4dB)

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	1.817	68.77 Pk	30.4	-54.78	44.39	74	-29.61	54	-9.61	0-360	150	H
2	2.725	78.87 Pk	22.1	-50.96	50.01	74	-23.99	54	-3.99	0-360	100	H
3	3.634	72.34 Pk	23.3	-49.87	45.77	74	-28.23	54	-8.23	0-360	150	H
4	4.542	67.43 Pk	27.8	-51.81	43.42	74	-30.58	54	-10.58	0-360	100	H
5	6.359	63.08 Pk	29.2	-47.61	44.67	74	-29.33	54	-9.33	0-360	100	H
6	7.268	63.12 Pk	30.2	-46.02	47.3	74	-26.7	54	-6.7	0-360	149	H
7	8.176	62.42 Pk	36.3	-48.69	50.03	74	-23.97	54	-3.97	0-360	150	H
8	9.085	62.14 Pk	36.2	-48.69	49.65	74	-24.35	54	-4.35	0-360	100	H
9	1.817	69.6 Pk	30.4	-54.78	45.22	74	-28.78	54	-8.78	0-360	150	V
10	7.268	59.41 Pk	30.2	-46.02	43.59	74	-30.41	54	-10.41	0-360	100	V
11	8.175	60.03 Pk	36.3	-48.67	47.66	74	-26.34	54	-6.34	0-360	100	V
12	4.542	69.99 Pk	27.8	-51.81	45.98	74	-28.02	54	-8.02	0-360	150	V
13	6.359	61.48 Pk	29.2	-47.61	43.07	74	-30.93	54	-10.93	0-360	100	V
14	7.268	61.09 Pk	30.2	-46.02	45.27	74	-28.73	54	-8.73	0-360	100	V
15	8.176	59.75 Pk	36.3	-48.69	47.36	74	-26.64	54	-6.64	0-360	150	V
16	9.084	59.63 Pk	36.2	-48.72	47.11	74	-26.89	54	-6.89	0-360	100	V

Pk - Peak detector

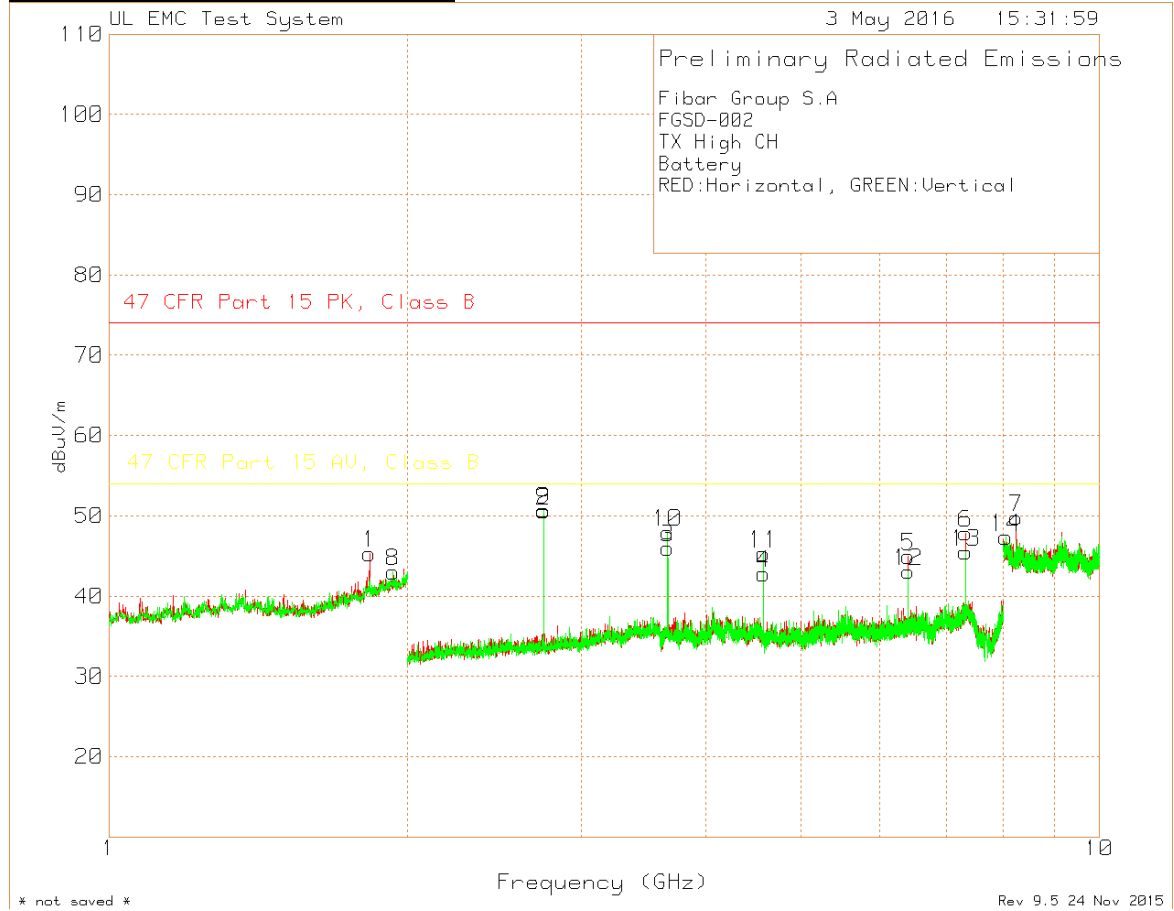
Radiated Emission Data

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
2.7252	78.4 Pk	22.1	-50.96	49.54	74	-24.46	-	-		176	131 H
2.7253	77.05 Av	22.1	-50.96	48.19	-	-	54	-5.81		176	131 H
2.7253	78.83 Pk	22.1	-50.96	49.97	74	-24.03	-	-		142	218 V
2.7253	77.49 Av	22.1	-50.96	48.63	-	-	54	-5.37		142	218 V
8.1758	65.54 Pk	36.3	-48.69	53.15	74	-20.85	-	-		96	240 H
8.1759	59.06 Av	36.3	-48.69	46.67	-	-	54	-7.33		96	240 H
9.0841	65.6 Pk	36.2	-48.71	53.09	74	-20.91	-	-		86	100 H
9.0843	57.1 Av	36.2	-48.71	44.59	-	-	54	-9.41		86	100 H
3.6338	75.27 Pk	23.3	-49.87	48.7	74	-25.3	-	-		115	146 V
3.6337	73.11 Av	23.3	-49.87	46.54	-	-	54	-7.46		115	146 V

Pk - Peak detector

Av - Average detection

Transmitter High Channel – PLOT



Transmitter High Channel – DATA

Fibar Group S.A
FGSD-002
TX High CH
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	1.832	69.47 Pk	30.5	-54.66	45.31	74	-28.69	54	-8.69	0-360	100	H
2	2.748	79.35 Pk	22.1	-50.86	50.59	74	-23.41	54	-3.41	0-360	100	H
3	3.664	71.89 Pk	23.4	-49.31	45.98	74	-28.02	54	-8.02	0-360	150	H
4	4.58	66.96 Pk	27.7	-51.85	42.81	74	-31.19	54	-11.19	0-360	101	H
5	6.412	63.31 Pk	29.2	-47.58	44.93	74	-29.07	54	-9.07	0-360	149	H
6	7.328	63.21 Pk	30.7	-46.04	47.87	74	-26.13	54	-6.13	0-360	101	H
7	8.244	61.86 Pk	36.4	-48.48	49.78	74	-24.22	54	-4.22	0-360	100	H
8	1.935	66.09 Pk	31.4	-54.47	43.02	74	-30.98	54	-10.98	0-360	150	V
9	2.748	79.48 Pk	22.1	-50.86	50.72	74	-23.28	54	-3.28	0-360	150	V
10	3.665	73.87 Pk	23.4	-49.29	47.98	74	-26.02	54	-6.02	0-360	100	V
11	4.58	69.44 Pk	27.7	-51.85	45.29	74	-28.71	54	-8.71	0-360	150	V
12	6.412	61.45 Pk	29.2	-47.58	43.07	74	-30.93	54	-10.93	0-360	100	V
13	7.328	60.83 Pk	30.7	-46.04	45.49	74	-28.51	54	-8.51	0-360	100	V
14	8.046	57.78 Pk	36.2	-46.65	47.33	74	-26.67	54	-6.67	0-360	100	V

Pk - Peak detector

Radiated Emission Data

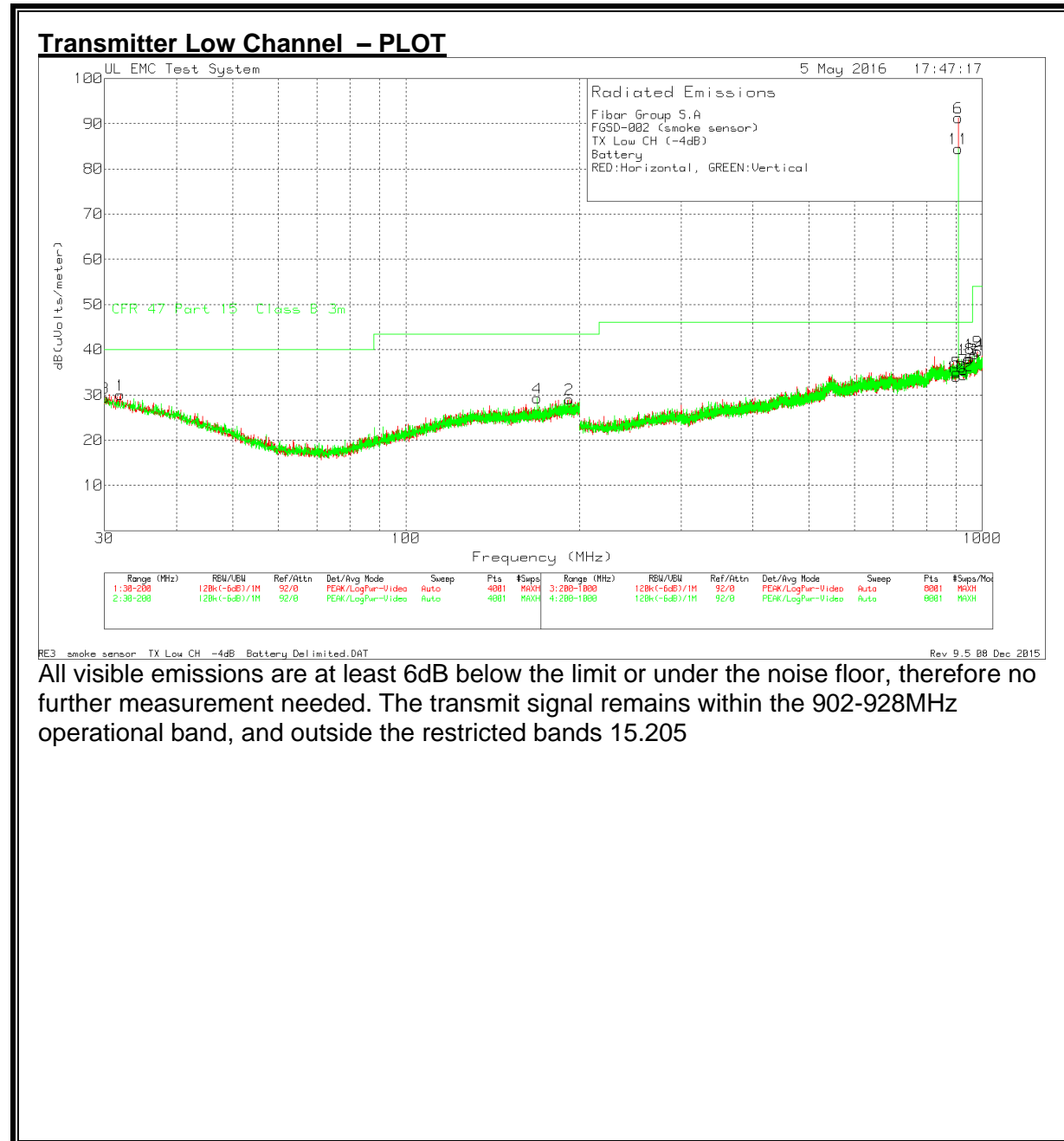
Test Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.7481	78.91 Pk	22.1	-50.86	50.15	74	-23.85	-	-	173	117	H
2.748	77.82 Av	22.1	-50.86	49.06	-	-	54	-4.94	173	117	H
8.2441	66.05 Pk	36.4	-48.48	53.97	74	-20.03	-	-	199	102	H
8.2439	58.69 Av	36.4	-48.48	46.61	-	-	54	-7.39	199	102	H
2.7479	79.55 Pk	22.1	-50.86	50.79	74	-23.21	-	-	123	136	V
2.748	78.48 Av	22.1	-50.86	49.72	-	-	54	-4.28	123	136	V

Pk - Peak detector

Av - Average detection

7.2.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz



Transmitter Low Channel - DATA

Fibar Group S.A

FGSD-002 (smoke sensor)

TX Low CH (-4dB)

Battery

RED:Horizontal, GREEN:Vertical

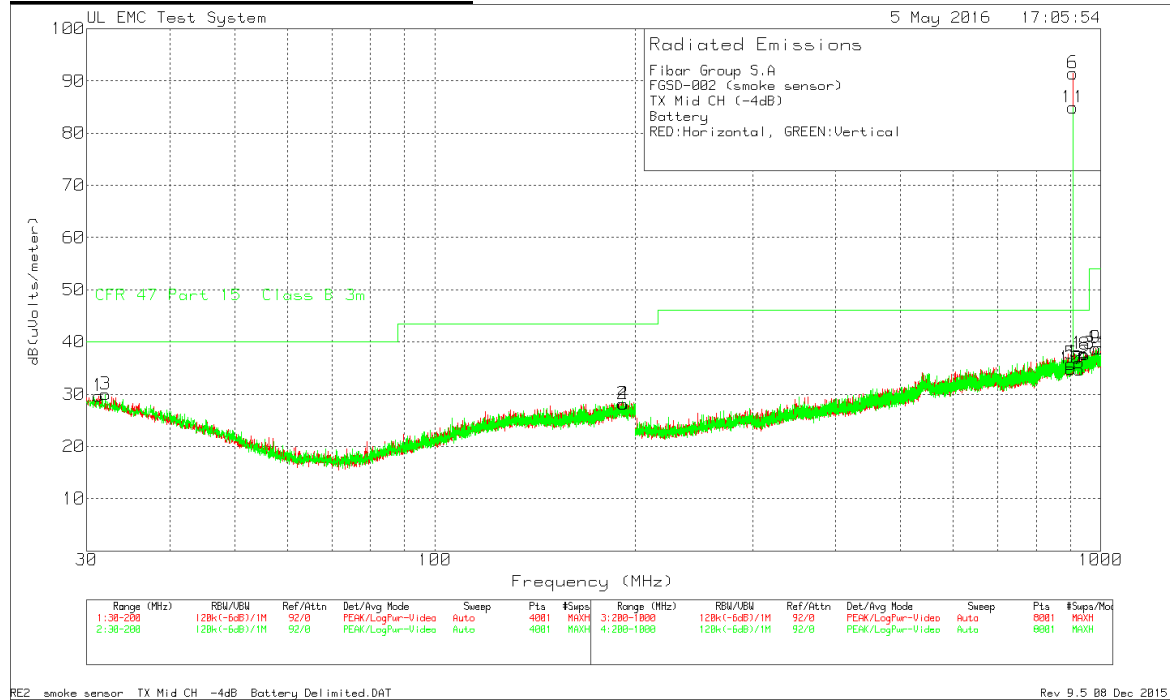
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Cable Gain/Loss dB	10M to Corrected		QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
					3M Factor dB	Reading dB(uVolts/meter)					
1	31.955	32.21 Pk	17.3	-30	10.5	30.01	40	-9.99	0-360	102	H
2	192.0525	31.43 Pk	16	-28.9	10.5	29.03	43.52	-14.49	0-360	249	H
3	30.0425	30.65 Pk	18.2	-30	10.5	29.35	40	-10.65	0-360	398	V
4	169.0175	33.29 Pk	14.9	-29.4	10.5	29.29	43.52	-14.23	0-360	101	V
5*	902	29.81 Pk	22.7	-28	10.5	35.01	46.02	-11.01	0-360	102	H
6	908.4	85.3 Pk	23.1	-27.6	10.5	91.3	46.02	45.28	0-360	102	H
7*	928	29.93 Pk	22.7	-27.6	10.5	35.53	46.02	-10.49	0-360	102	H
8	950.8	31.5 Pk	23.5	-27.4	10.5	38.1	46.02	-7.92	0-360	102	H
9	980.6	31.92 Pk	24.1	-26.9	10.5	39.62	53.97	-14.35	0-360	399	H
10*	902	28.87 Pk	22.7	-28	10.5	34.07	46.02	-11.95	0-360	299	V
11	908.4	78.48 Pk	23.1	-27.6	10.5	84.48	46.02	38.46	0-360	199	V
12*	928	28.78 Pk	22.7	-27.6	10.5	34.38	46.02	-11.64	0-360	299	V
13	943.6	31.61 Pk	23.3	-27.5	10.5	37.91	46.02	-8.11	0-360	299	V
14	968.7	32.11 Pk	23.4	-27	10.5	39.01	53.97	-14.96	0-360	199	V

Pk - Peak detector

* - Transmit signal Bandedge marker

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 – 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 - DATA

Fibar Group S.A
FGSD-002 (smoke sensor)
TX Mid CH (-4dB)
Battery
RED:Horizontal, GREEN:Vertical

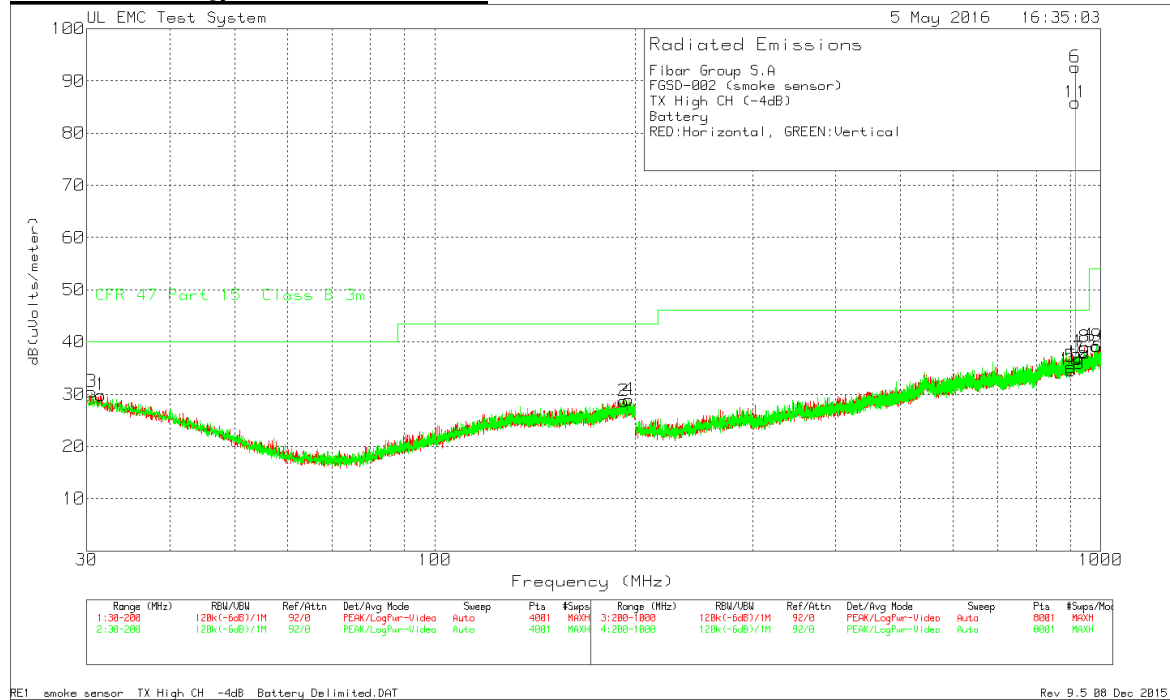
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Cable Gain/Loss dB	10M to 3M Factor dB	Corrected Reading dB(uVolts /meter)	QP Limit 3m	QP Margin (dB)	Azimuth [Degr]	Height [cm]	Polarity
		Detector									
1	31.2325	31.45 Pk	17.7	-30	10.5	29.65	40	-10.35	0-360	101	H
2	191.585	30.58 Pk	16	-28.9	10.5	28.18	43.52	-15.34	0-360	101	H
3	31.9975	32.2 Pk	17.3	-30	10.5	30	40	-10	0-360	398	V
4	192.0525	30.51 Pk	16	-28.9	10.5	28.11	43.52	-15.41	0-360	251	V
5*	902	30.65 Pk	22.7	-28	10.5	35.85	46.02	-10.17	0-360	399	H
7*	928	29.16 Pk	22.7	-27.6	10.5	34.76	46.02	-11.26	0-360	299	H
8	946.4	31.3 Pk	23.4	-27.6	10.5	37.6	46.02	-8.42	0-360	199	H
9	982.9	30.79 Pk	24.3	-26.8	10.5	38.79	53.97	-15.18	0-360	199	H
10*	902	29.7 Pk	22.7	-28	10.5	34.9	46.02	-11.12	0-360	399	V
12*	928	30.49 Pk	22.7	-27.6	10.5	36.09	46.02	-9.93	0-360	199	V
13	942.6	31.62 Pk	23.2	-27.5	10.5	37.82	46.02	-8.2	0-360	103	V
14	993.9	31.08 Pk	23.8	-26.6	10.5	38.78	53.97	-15.19	0-360	299	V

Pk - Peak detector

* - Transmit signal Bandedge marker

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 – 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 - DATA

Fibar Group S.A

FGSD-002 (smoke sensor)

TX High CH (-4dB)

Battery

RED:Horizontal, GREEN:Vertical

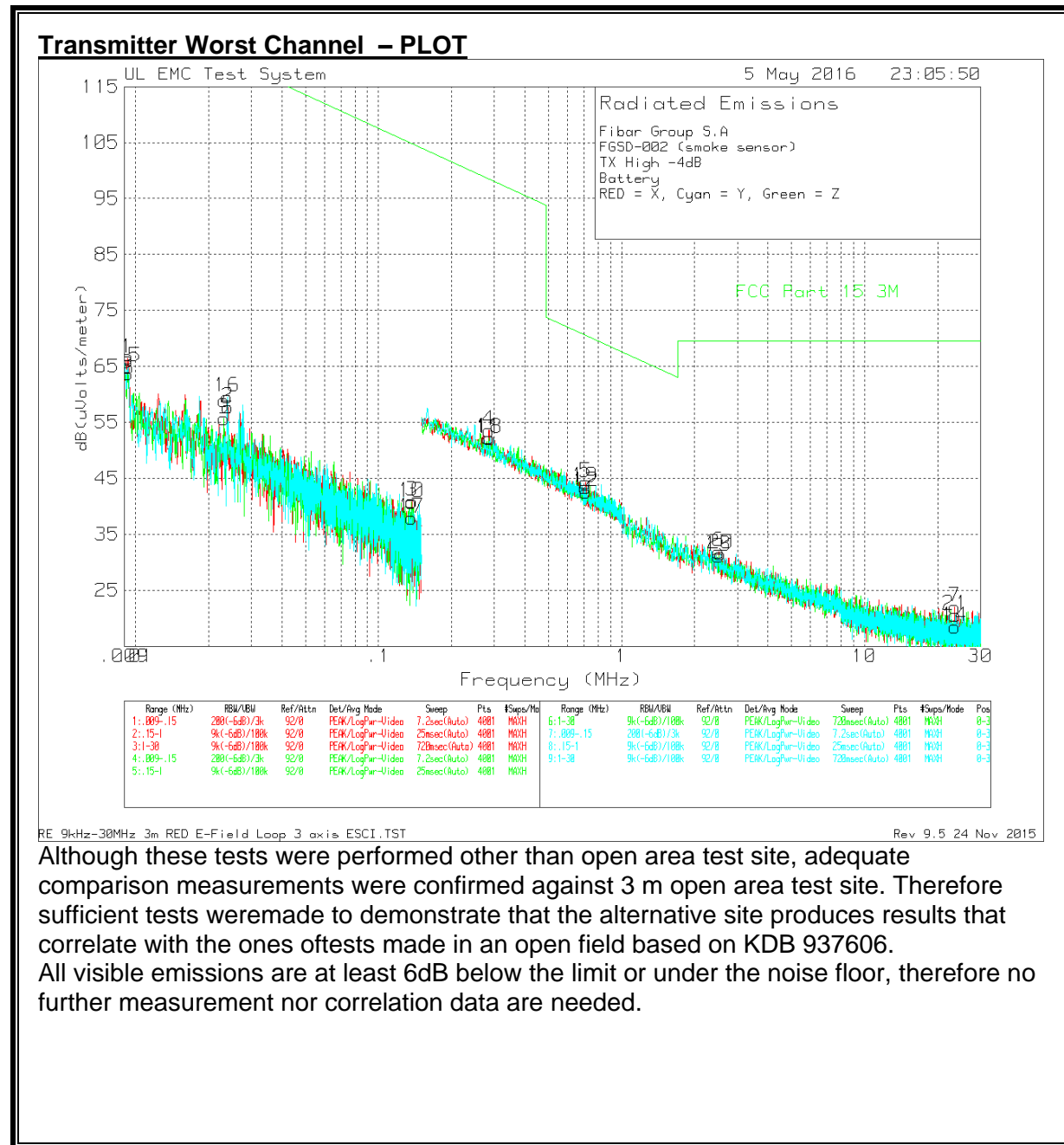
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Cable Gain/Loss dB	10M to 3M		Corrected Reading dB(uVolts/ meter)	QP Limit 3m	QP Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
					Factor	Gain/Loss						
1	31.53	31.82 Pk	17.5	-30	10.5		29.82	40	-10.18	0-360	100	H
2	192.095	31.07 Pk	16	-28.9	10.5		28.67	43.52	-14.85	0-360	249	H
3	30.51	31.95 Pk	18	-30	10.5		30.45	40	-9.55	0-360	398	V
4	195.495	31.27 Pk	16	-28.8	10.5		28.97	43.52	-14.55	0-360	101	V
5*	902	30.02 Pk	22.7	-28	10.5		35.22	46.02	-10.8	0-360	299	H
7*	928	31.19 Pk	22.7	-27.6	10.5		36.79	46.02	-9.23	0-360	299	H
8	945.4	32.71 Pk	23.4	-27.6	10.5		39.01	46.02	-7.01	0-360	299	H
9	986.8	30.94 Pk	24.3	-26.6	10.5		39.14	53.97	-14.83	0-360	299	H
10*	902	29.39 Pk	22.7	-28	10.5		34.59	46.02	-11.43	0-360	103	V
12*	928	30.26 Pk	22.7	-27.6	10.5		35.86	46.02	-10.16	0-360	199	V
13	944.4	31.77 Pk	23.4	-27.6	10.5		38.07	46.02	-7.95	0-360	399	V
14	984.6	30.97 Pk	24.4	-26.6	10.5		39.27	53.97	-14.7	0-360	199	V

Pk - Peak detector

* - Transmit signal Bandedge marker

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



Transmitter Worst Channel - DATA

Fibar Group S.A

FGSD-002 (smoke sensor)

TX High -4dB

Battery

RED = X, Cyan = Y, Green = Z

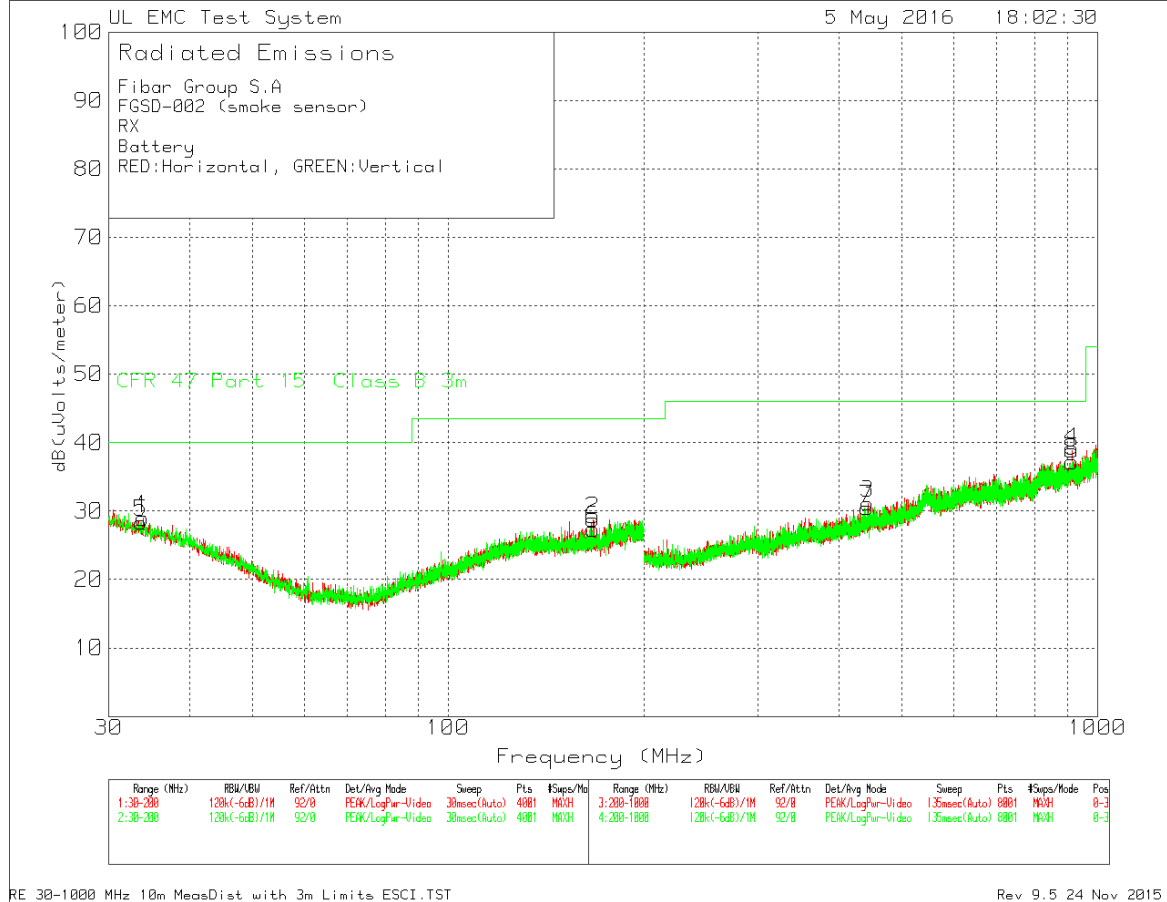
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dBm	Gain/Loss dB	Corrected Reading dB(uVolts/meter)	Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	0.00928	47.05 Pk	19.4	0	66.45	128.23	-61.78	0-360	101	H
2	0.02405	43.53 Pk	14.2	0	57.73	119.97	-62.24	0-360	101	H
3	0.13717	29.3 Pk	11.6	0	40.9	104.85	-63.95	0-360	101	H
4	0.28472	41.95 Pk	11.6	0	53.55	98.51	-44.96	0-360	101	H
5	0.71232	32.62 Pk	11.6	0	44.22	70.55	-26.33	0-360	101	H
6	2.51525	20.06 Pk	11.7	0.1	31.86	69.54	-37.68	0-360	101	H
7	23.52575	12.69 Pk	9	0.3	21.99	69.54	-47.55	0-360	101	H
8	0.00928	44.24 Pk	19.4	0	63.64	128.23	-64.59	0-360	101	H
9	0.023105	41.37 Pk	14.3	0	55.67	120.32	-64.65	0-360	101	H
10	0.136925	29.12 Pk	11.6	0	40.72	104.87	-64.15	0-360	101	H
11	0.28398	40.61 Pk	11.6	0	52.21	98.54	-46.33	0-360	101	H
12	0.71317	30.97 Pk	11.6	0	42.57	70.54	-27.97	0-360	101	H
13	2.508	19.31 Pk	11.7	0.1	31.11	69.54	-38.43	0-360	101	H
14	23.55475	9.16 Pk	9	0.3	18.46	69.54	-51.08	0-360	101	H
15	0.00935	45.56 Pk	19.3	0	64.86	128.17	-63.31	0-360	101	H
16	0.023875	45.34 Pk	14.2	0	59.54	120.03	-60.49	0-360	101	H
17	0.136785	26.3 Pk	11.6	0	37.9	104.88	-66.98	0-360	101	H
18	0.28781	40.54 Pk	11.6	0	52.14	98.42	-46.28	0-360	101	H
19	0.70998	31.78 Pk	11.6	0	43.38	70.58	-27.2	0-360	101	H
20	2.55875	19.68 Pk	11.7	0.1	31.48	69.54	-38.06	0-360	101	H
21	23.6345	11.35 Pk	8.9	0.3	20.55	69.54	-48.99	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.

7.2.4. 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

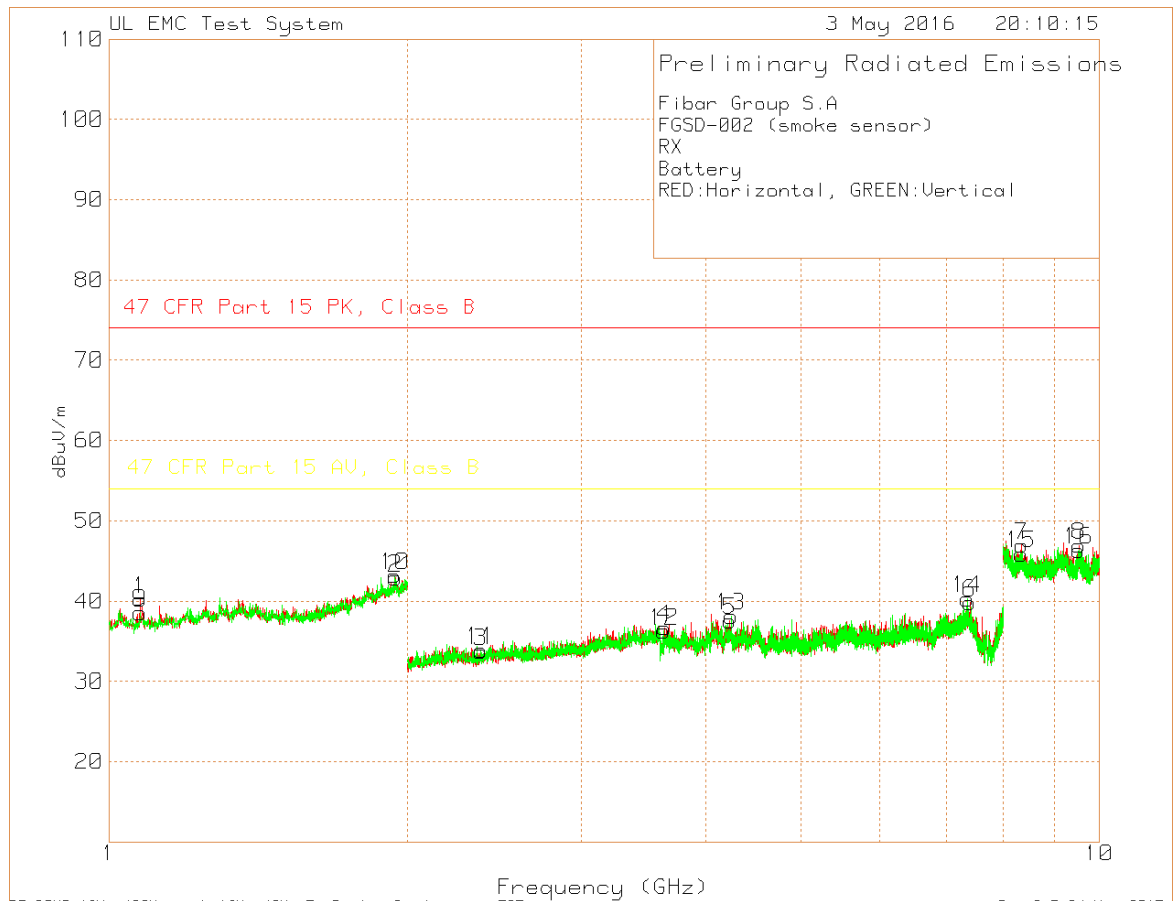
Fibar Group S.A
FGSD-002 (smoke sensor)
RX
Battery
RED:Horizontal, GREEN:Vertical

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	33.8675	31.74	Pk	16.7	-30	10.5		28.94	40	-11.06	0-360	101	H
2	167.2325	32.77	Pk	14.9	-29.4	10.5		28.77	43.52	-14.75	0-360	101	H
5	33.655	31.18	Pk	16.7	-30	10.5		28.38	40	-11.62	0-360	398	V
6	167.105	31.34	Pk	14.9	-29.4	10.5		27.34	43.52	-16.18	0-360	243	V
3	442.6	32.06	Pk	16.8	-28.2	10.5		31.16	46.02	-14.86	0-360	199	H
4	913.4	32.66	Pk	23.3	-27.6	10.5		38.86	46.02	-7.16	0-360	199	H
7	441.8	31.5	Pk	16.7	-28.2	10.5		30.5	46.02	-15.52	0-360	299	V
8	913.8	31.03	Pk	23.4	-27.7	10.5		37.23	46.02	-8.79	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.

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

Fibar Group S.A
FGSD-002
RX
Battery
RED:Horizontal, GREEN:Vertical

Marker No.	Test	Meter	Antenna		Corrected	PK		AV			Azimuth [Degs]	Height [cm]	Polarity
	Frequency (GHz)	Reading (dBUV)	Factor dBm	Gain/Loss (dB)	Reading dBUV/m	PK Limit	Margin (dB)	AV Limit	Margin (dB)				
1	1.075	70.28 Pk		27.6	-57.65	40.23	74	-33.77	54	-13.77	0-360	100	H
2	1.945	65.71 Pk		31.5	-54.32	42.89	74	-31.11	54	-11.11	0-360	100	H
3	2.373	63.25 Pk		21.8	-51.31	33.74	74	-40.26	54	-20.26	0-360	100	H
4	3.637	63.19 Pk		23.3	-49.82	36.67	74	-37.33	54	-17.33	0-360	100	H
5	4.235	61.15 Pk		28.2	-51.79	37.56	74	-36.44	54	-16.44	0-360	100	H
6	7.397	55.66 Pk		31.2	-47.05	39.81	74	-34.19	54	-14.19	0-360	100	H
7	8.346	57.83 Pk		36.5	-47.36	46.97	74	-27.03	54	-7.03	0-360	150	H
8	9.536	58.92 Pk		36.4	-48.38	46.94	74	-27.06	54	-7.06	0-360	100	H
9	1.075	68.62 Pk		27.6	-57.65	38.57	74	-35.43	54	-15.43	0-360	100	V
10	1.943	66.15 Pk		31.4	-54.35	43.2	74	-30.8	54	-10.8	0-360	150	V
11	2.374	63.38 Pk		21.8	-51.3	33.88	74	-40.12	54	-20.12	0-360	150	V
12	3.631	62.87 Pk		23.3	-49.91	36.26	74	-37.74	54	-17.74	0-360	150	V
13	4.249	61.83 Pk		28.2	-51.89	38.14	74	-35.86	54	-15.86	0-360	150	V
14	7.356	55.7 Pk		30.9	-46.3	40.3	74	-33.7	54	-13.7	0-360	100	V
15	8.34	56.62 Pk		36.5	-47.24	45.88	74	-28.12	54	-8.12	0-360	150	V
16	9.53	58.46 Pk		36.4	-48.52	46.34	74	-27.66	54	-7.66	0-360	100	V

Pk - Peak detector

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