



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

**CERTIFICATION TEST REPORT**

**FOR**

**Fibaro Single Switch 2**

**MODEL NUMBER: FGS-213**

**FCC ID: 2AA9MFGS213**

**IC: 20430-FGS213**

**REPORT NUMBER: 11291477A**

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NVLAP Lab code: 100414-0

Revision History

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--	July 12, 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:** Fibaro Single Switch 2

**MODEL:** FGS-213

**SERIAL NUMBER:** Non-serialized

**DATE TESTED:** June 27 – July 7, 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:



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UL LLC



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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 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
Conducted Emissions	150k-30MHz	LISN	3.65dB
Radiated Emissions	9k-30MHz	H-Field Loop	3.15dB
Radiated Emissions	30-200MHz	Bicon 3m Horz	3.64dB
Radiated Emissions	30-200MHz	Bicon 3m Vert	5.10dB
Radiated Emissions	200-1000MHz	LogP 3m Horz	4.00dB
Radiated Emissions	200-1000MHz	LogP 3m Vert	5.36dB
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.48dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.49dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.79dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.84dB
Radiated Emissions	1-18GHz	Horn	4.32dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94dB

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 AC 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 QK E-field Strength (dBuV/m)
908.4 - 916	TX	92.05

### 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. The Z-axis was determined to be the worst axis.

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

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

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

### I/O CABLES

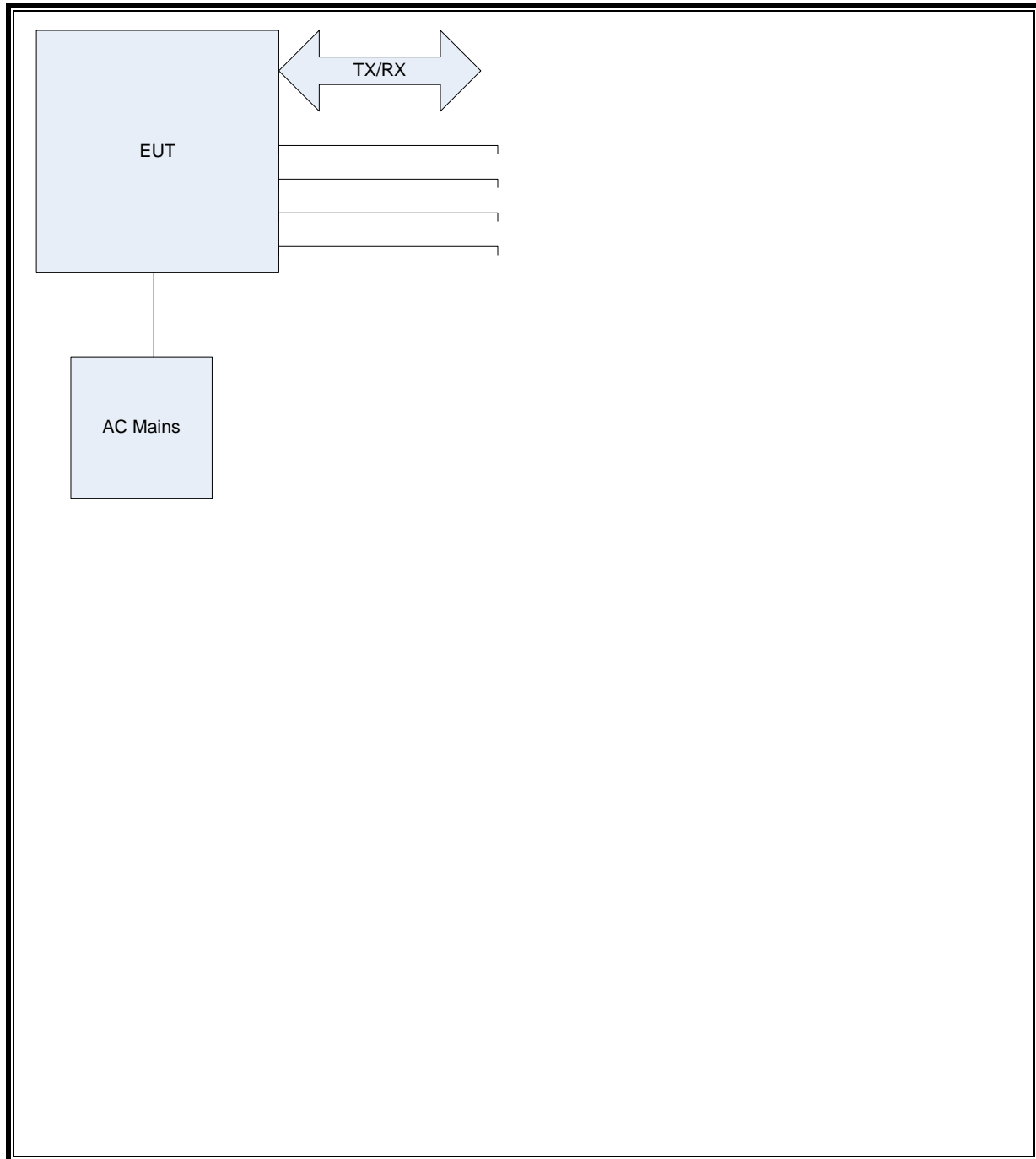
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
0	Enclosure	-	Non-Electrical	-	-	None
1	AC	2	Wire	AC	>3m	None
2	IO Lines	4	Wire	AC	>3m	Wires connected to all IO ports

### 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		
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	1/31/2017
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.

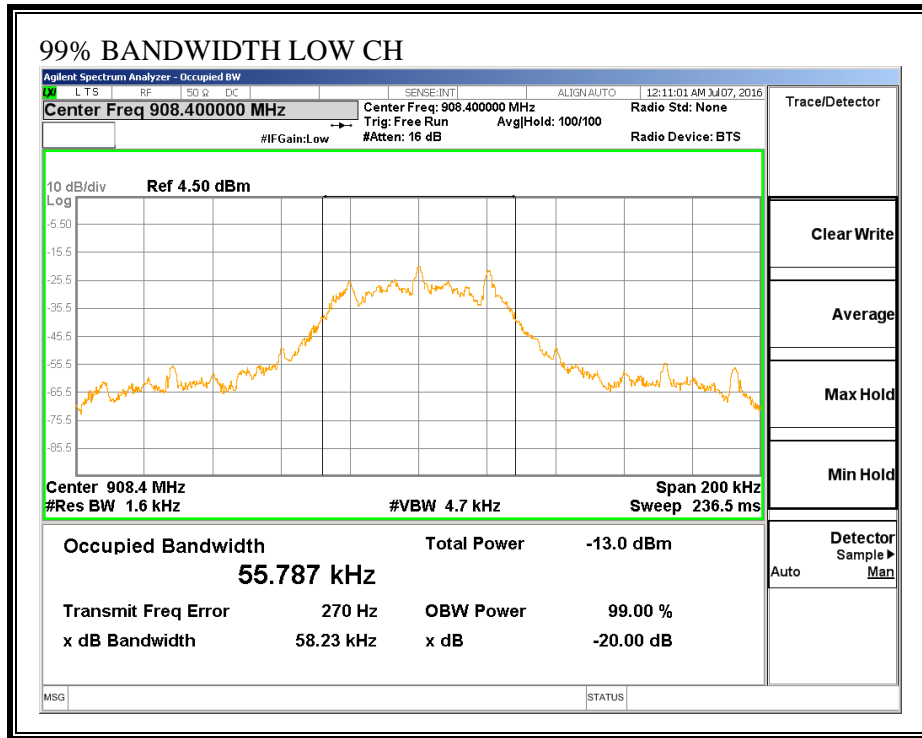
#### TEST PROCEDURE

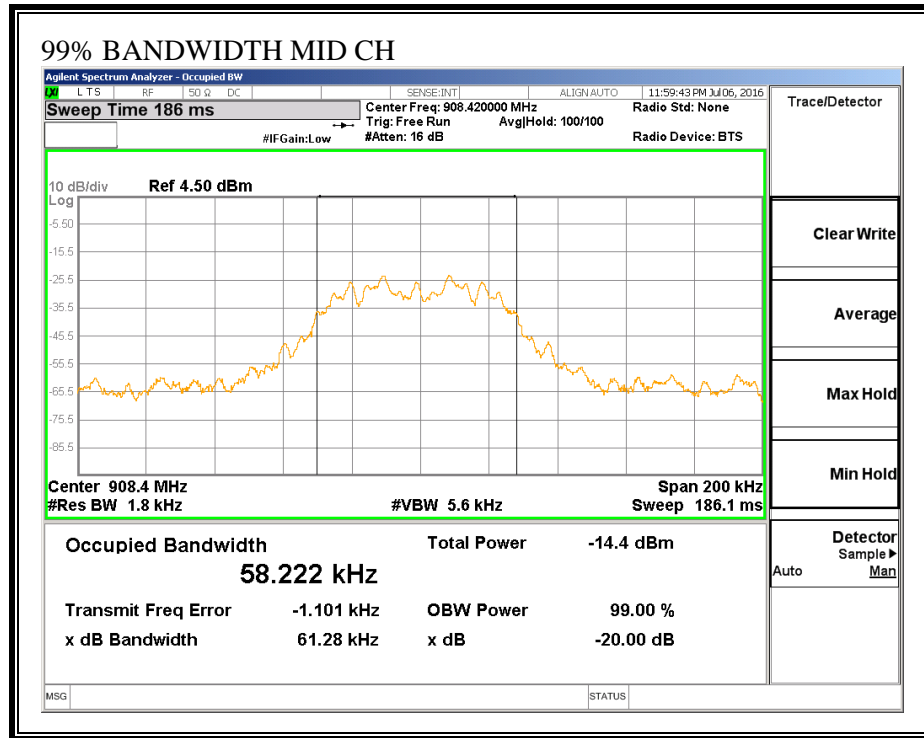
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to % of the Occupied bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

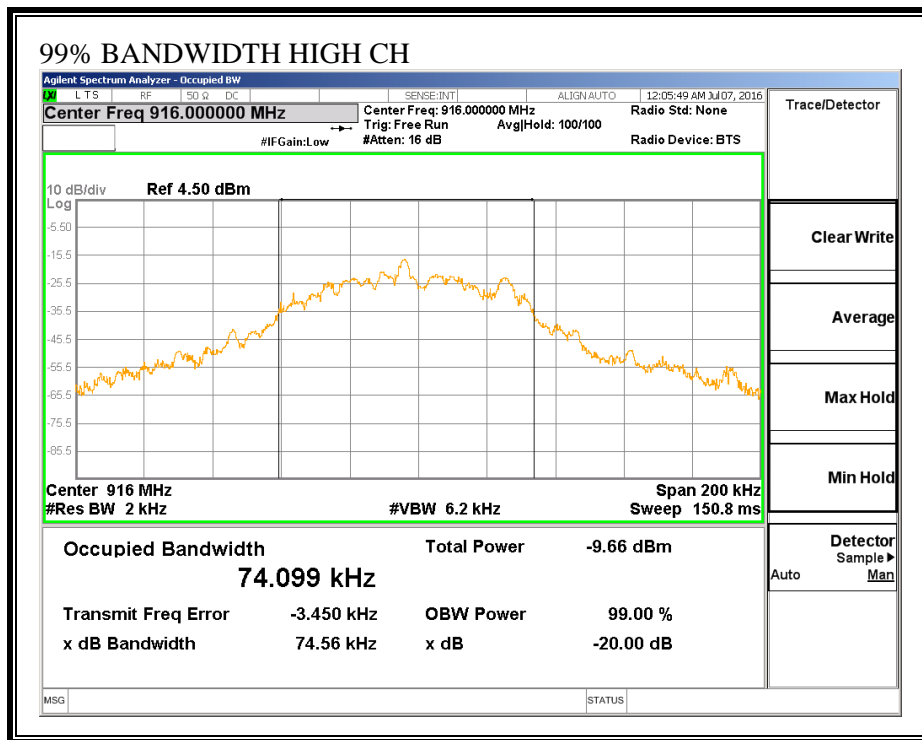
#### RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	908.4	58.52	55.787
Middle	908.42	62.14	58.222
High	916	75.23	74.099

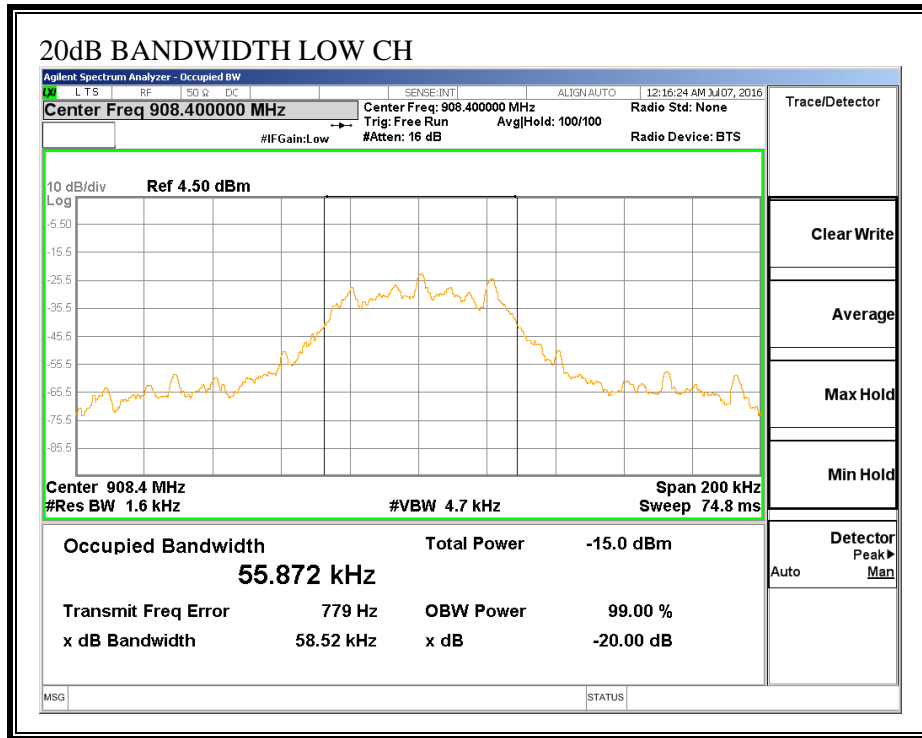
**99% BANDWIDTH**

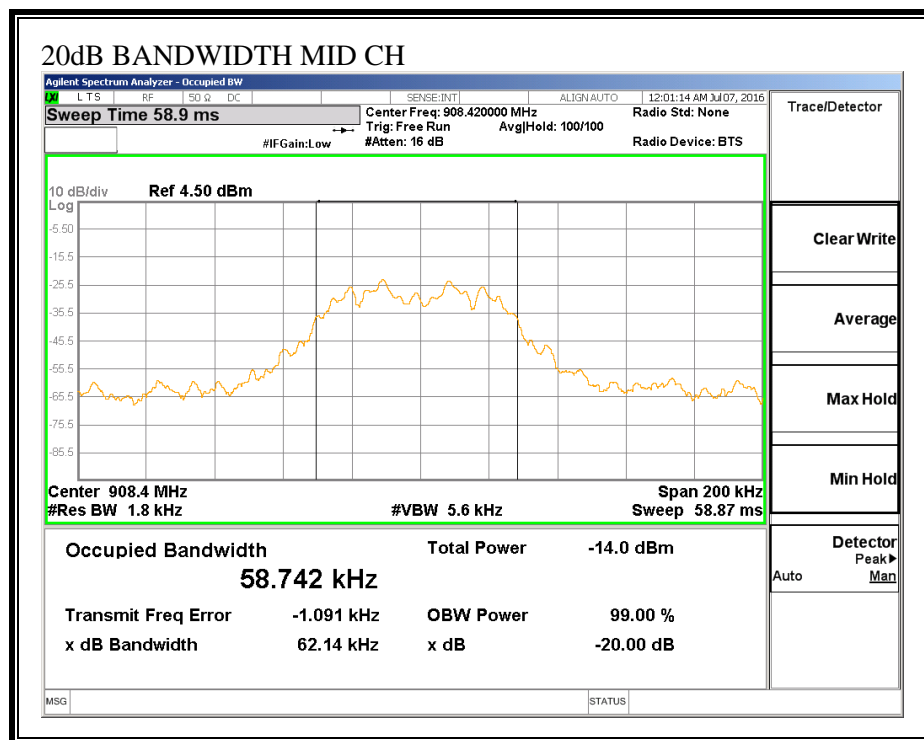




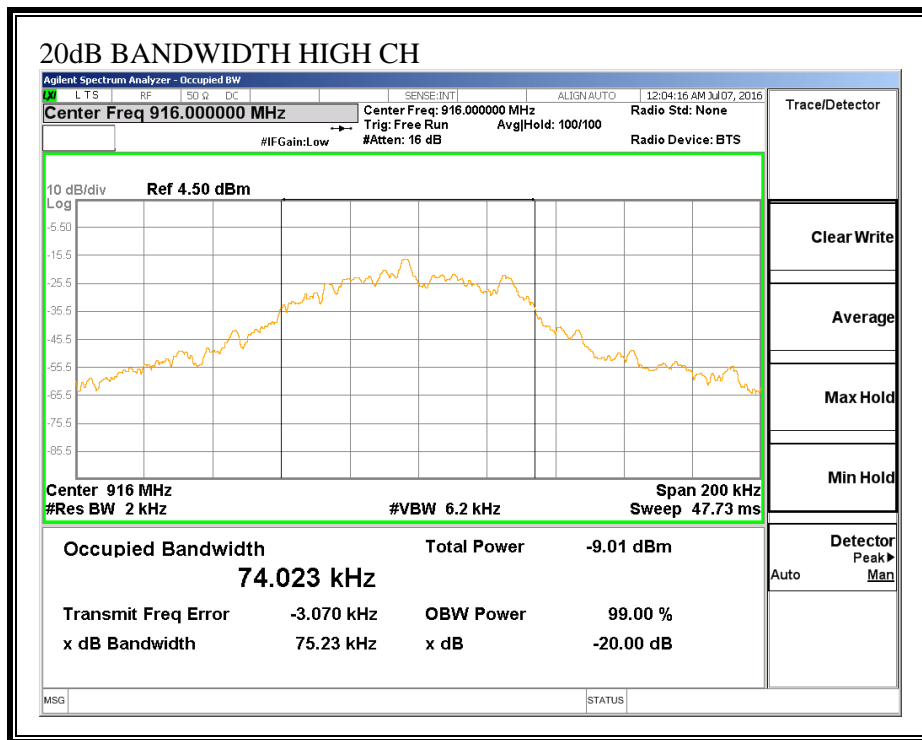


## 20dB BANDWIDTH









## 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.

## RESULTS

### 7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

Fibar

Single Switch 2, FGS-213

Worst Axis Fundamental Measurement

120V 60Hz

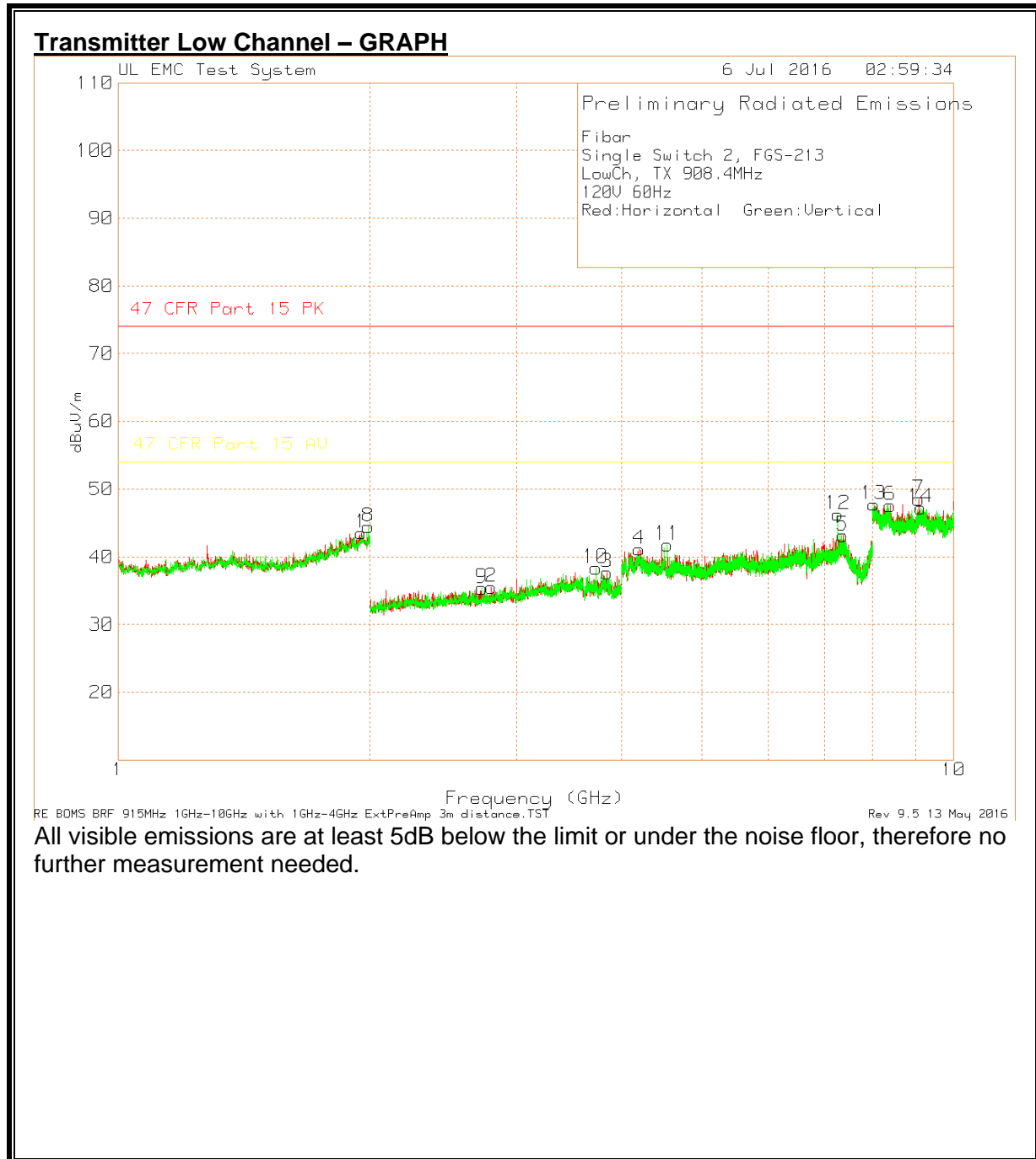
Radiated Emission Data

Test Frequency (MHz)	Meter		Antenna Factor dB/m	Corrected								Azimuth [Degs]	Height [cm]	Polarity
	Reading (dBuV)	Detector		Path dB	Reading dB(uVolts/ meter)	Peak Limit 3m	Margin (dB)	QP Limit 3m	Margin (dB)					
908.4051	54.62	Pk	23.1	9.5	87.22	114	-26.78	-	-	69	296	H		
908.4	54.5	Qp	23.1	9.5	87.1	-	-	94	-6.9	69	296	H		
908.4161	52.19	Pk	23.1	9.5	84.79	114	-29.21	-	-	345	119	V		
908.4051	52.07	Qp	23.1	9.5	84.67	-	-	94	-9.33	345	119	V		
908.3983	55.93	Pk	23.1	9.5	88.53	114	-25.47	-	-	307	102	H		
908.42	55.74	Qp	23.1	9.5	88.34	-	-	94	-5.66	307	102	H		
908.4381	54.17	Pk	23.1	9.5	86.77	114	-27.23	-	-	323	121	V		
908.42	53.94	Qp	23.1	9.5	86.54	-	-	94	-7.46	323	121	V		
915.978	58.75	Pk	23.3	9.6	91.65	114	-22.35	-	-	282	102	H		
916	58.54	Qp	23.3	9.6	91.44	-	-	94	-2.56	282	102	H		
915.976	59.37	Pk	23.3	9.6	92.27	114	-21.73	-	-	201	138	V		
916	59.15	Qp	23.3	9.6	92.05	-	-	94	-1.95	201	138	V		

Pk - Peak detector

Qp - Quasi-Peak detector

## 7.2.2. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz



# Transmitter Low Channel – DATA

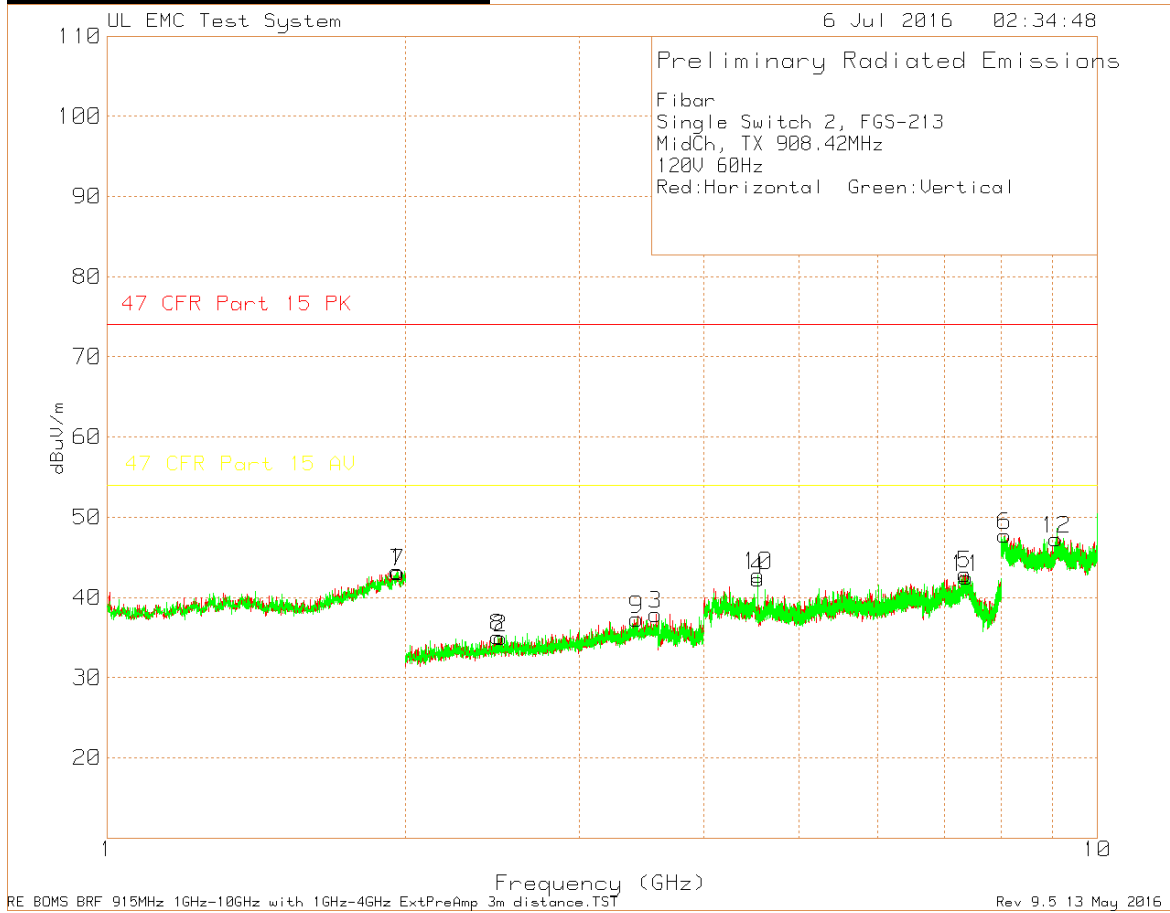
Fibar  
Single Switch 2, FGS-213  
LowCh, TX 908.4MHz  
120V 60Hz  
Radiated Emission Data

Marker No.	Test Frequency (MHz)	Meter		Antenna Factor dB/m	Path dB	Corrected		AV				Azimuth [Degs]	Height [cm]	Polarity
		Reading (dBuV)	Detector			Reading dB(uVolts/ meter)	Peak Limit 3m	Margin (dB)	Limit 3m	Margin (dB)				
1	1.953	65.77	Pk	32	-54	43.51	74	-30.49	54	-10.49	0-360	98	H	
2	2.797	63.94	Pk	22.2	-51	35.52	74	-38.48	54	-18.48	0-360	100	H	
3	3.847	63.46	Pk	24	-50	37.66	74	-36.34	54	-16.34	0-360	100	H	
4	4.205	64.3	Pk	28.3	-51	41.12	74	-32.88	54	-12.88	0-360	100	H	
5	7.367	58.48	Pk	31	-46	43.11	74	-30.89	54	-10.89	0-360	150	H	
6	8.391	59.15	Pk	36.6	-48	47.59	74	-26.41	54	-6.41	0-360	100	H	
7	9.084	61	Pk	36.2	-49	48.48	74	-25.52	54	-5.52	0-360	100	H	
8	1.992	66.19	Pk	32.3	-54	44.46	74	-29.54	54	-9.54	0-360	100	V	
9	2.725	64.21	Pk	22.1	-51	35.35	74	-38.65	54	-18.65	0-360	100	V	
10	3.731	64.97	Pk	23.7	-50	38.34	74	-35.66	54	-15.66	0-360	100	V	
11	4.542	65.77	Pk	27.8	-52	41.76	74	-32.24	54	-12.24	0-360	100	V	
12	7.268	62.1	Pk	30.2	-46	46.28	74	-27.72	54	-7.72	0-360	100	V	
13	8.026	58.68	Pk	36.1	-47	47.73	74	-26.27	54	-6.27	0-360	150	V	
14	9.13	59.19	Pk	36.3	-48	47.24	74	-26.76	54	-6.76	0-360	150	V	

Pk - Peak detector

All visible emissions are at least 5dB below the limit or under the noise floor, therefore no further measurement needed.

### Transmitter Mid Channel – GRAPH



All visible emissions are at least 5dB below the limit or under the noise floor, therefore no further measurement needed.

## Transmitter Mid Channel – DATA

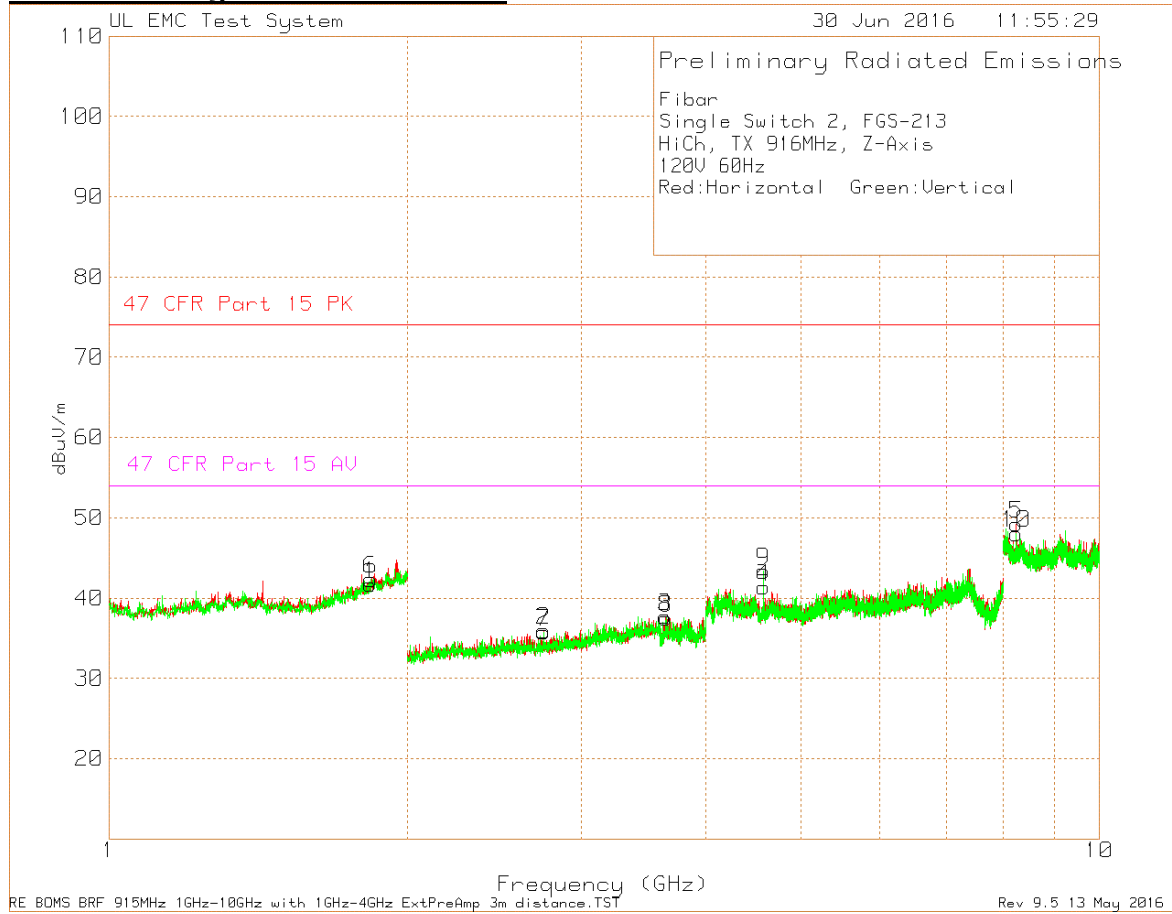
Fibar  
Single Switch 2, FGS-213  
MidCh, TX 908.42MHz  
120V 60Hz  
Radiated Emission Data

Marker No.	Test Frequency (MHz)	Meter		Antenna Factor dB/m	Corrected		Peak Limit 3m	AV		Azimuth [Degs]	Height [cm]	Polarity	
		Reading (dBuV)	Detector		Path dB	Reading dB(μVolts/ meter)		Margin (dB)	Limit 3m				Margin (dB)
1	1.962	65.37	Pk	32.1	-54	43.27	74	-30.73	54	-10.73	0-360	98	H
2	2.498	64.05	Pk	22.1	-51	34.97	74	-39.03	54	-19.03	0-360	150	H
3	3.581	65.11	Pk	23.3	-51	37.89	74	-36.11	54	-16.11	0-360	100	H
4	4.542	66.27	Pk	27.8	-52	42.26	74	-31.74	54	-11.74	0-360	100	H
5	7.352	58.41	Pk	30.8	-46	42.93	74	-31.07	54	-11.07	0-360	100	H
6	8.062	58.1	Pk	36.2	-47	47.74	74	-26.26	54	-6.26	0-360	100	H
7	1.966	65.21	Pk	32.1	-54	43.16	74	-30.84	54	-10.84	0-360	150	V
8	2.48	64.47	Pk	22	-51	35.1	74	-38.9	54	-18.9	0-360	150	V
9	3.428	64.33	Pk	23.5	-51	37.29	74	-36.71	54	-16.71	0-360	100	V
10	4.542	66.79	Pk	27.8	-52	42.78	74	-31.22	54	-11.22	0-360	100	V
11	7.371	57.95	Pk	31	-46	42.49	74	-31.51	54	-11.51	0-360	150	V
12	9.084	59.82	Pk	36.2	-49	47.3	74	-26.7	54	-6.7	0-360	150	V

Pk - Peak detector

All visible emissions are at least 5dB below the limit or under the noise floor, therefore no further measurement needed.

### Transmitter High Channel – GRAPH



All visible emissions are at least 5dB below the limit or under the noise floor, therefore no further measurement needed.



## Transmitter High Channel – DATA

Fibar  
Single Switch 2, FGS-213  
HiCh, TX 916MHz, Z-Axis  
120V 60Hz  
Radiated Emission Data

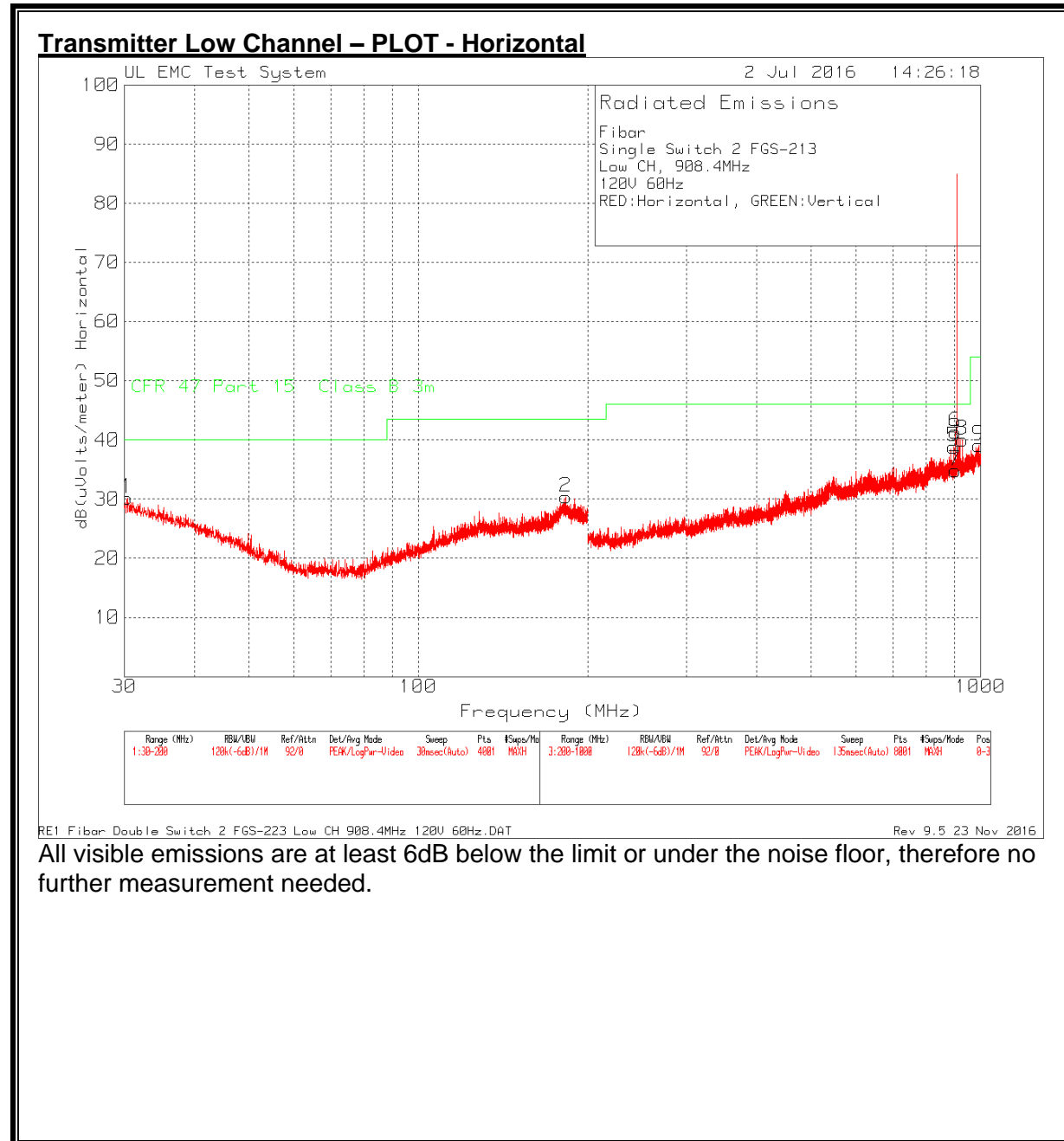
Marker No.	Test Frequency (MHz)	Meter		Antenna Factor dB/m	Path dB	Corrected	Peak Limit 3m	Margin (dB)	AV		Azimuth [Degr]	Height [cm]	Polarity
		Reading (dBuV)	Detector			Reading dB(uVolts/ meter)			Limit 3m	Margin (dB)			
1	1.836	65.24	Pk	31.1	-55	41.7	74	-32.3	54	-12.3	0-360	100	H
2	2.748	64.72	Pk	22.1	-51	35.96	74	-38.04	54	-18.04	0-360	150	H
3	3.643	64.07	Pk	23.3	-50	37.71	74	-36.29	54	-16.29	0-360	100	H
4	4.58	65.54	Pk	27.7	-52	41.39	74	-32.61	54	-12.61	0-360	100	H
5	8.244	61.01	Pk	36.4	-48	48.93	74	-25.07	54	-5.07	0-360	100	H
6	1.837	65.87	Pk	31.1	-55	42.34	74	-31.66	54	-11.66	0-360	100	V
7	2.748	64.55	Pk	22.1	-51	35.79	74	-38.21	54	-18.21	0-360	100	V
8	3.65	63.6	Pk	23.4	-49	37.51	74	-36.49	54	-16.49	0-360	100	V
9	4.58	67.49	Pk	27.7	-52	43.34	74	-30.66	54	-10.66	0-360	100	V
10	8.244	60.13	Pk	36.4	-48	48.05	74	-25.95	54	-5.95	0-360	100	V

Pk - Peak detector

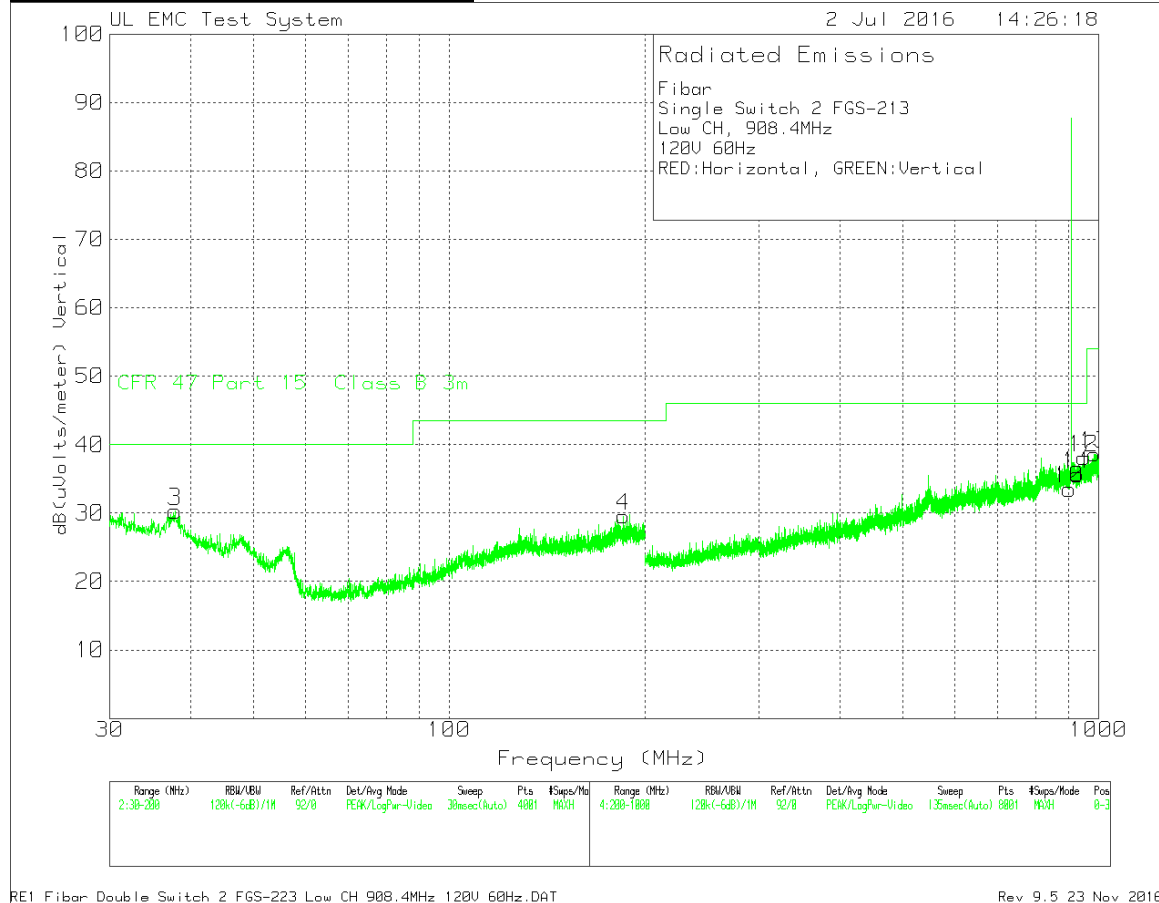
All visible emissions are at least 5dB below the limit or under the noise floor, therefore no further measurement needed.

### 7.2.3. WORST-CASE BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz



### Transmitter Low Channel – PLOT



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

### Transmitter Low Channel – DATA

Fibar

Single Switch 2, FGS-213

Low CH, 908.4MHz

120V 60Hz

Radiated Emission Data

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)		Antenna Factor dB/m		10M to 3M Factor dB		Corrected Reading dB(uVolts/m eter)	QP Limit 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
		Reading	Detector	Factor	Path dB	3M Factor							
1	30.34	31.54	Pk	18.1	-30	10.5		30.14	40	-9.86	0-360	398	H
2	183.0425	33.48	Pk	15.6	-29	10.5		30.38	43.52	-13.14	0-360	248	H
3	37.82	34.58	Pk	15.2	-30	10.5		30.28	40	-9.72	0-360	101	V
4	185.5075	32.38	Pk	15.8	-29	10.5		29.58	43.52	-13.94	0-360	252	V
5	896	33.45	Pk	22.5	-28	10.5		38.85	46.02	-7.17	0-360	299	H
6	901.2	36.15	Pk	22.6	-28	10.5		41.35	46.02	-4.67	0-360	299	H
7*	902	29.59	Pk	22.7	-28	10.5		34.79	46.02	-11.23	0-360	299	H
8*	928	34.39	Pk	22.7	-28	10.5		39.99	46.02	-6.03	0-360	299	H
9	992.8	31.36	Pk	23.9	-27	10.5		39.06	53.97	-14.91	0-360	199	H
10*	902	28.32	Pk	22.7	-28	10.5		33.52	46.02	-12.5	0-360	299	V
11*	928	30.09	Pk	22.7	-28	10.5		35.69	46.02	-10.33	0-360	399	V
12	949	31.61	Pk	23.5	-28	10.5		38.11	46.02	-7.91	0-360	399	V
13	985.5	30.31	Pk	24.4	-27	10.5		38.61	53.97	-15.36	0-360	399	V

Pk - Peak detector

\* - Bandedge markers

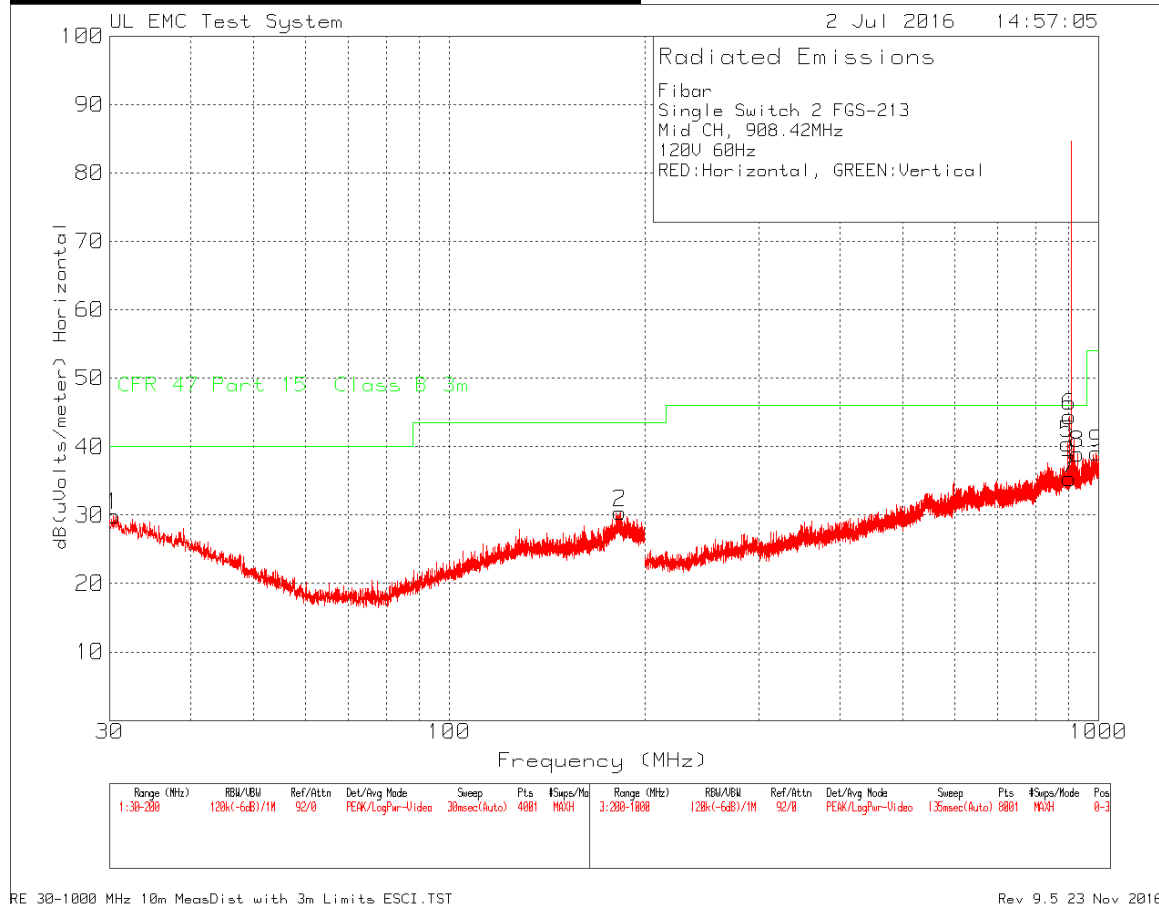
Radiated Emission Data

Test Frequency (MHz)	Meter Reading (dBuV)		Antenna Factor dB/m		10M to 3M Factor dB		Corrected Reading dB(uVolts/m eter)	QP Limit 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	Reading	Detector	Factor	Path dB	3M Factor							
901.2	28.05	Qp	22.6	-28	10.5		33.25	46.02	-12.77	159	107	H

Qp - Quasi-Peak detector

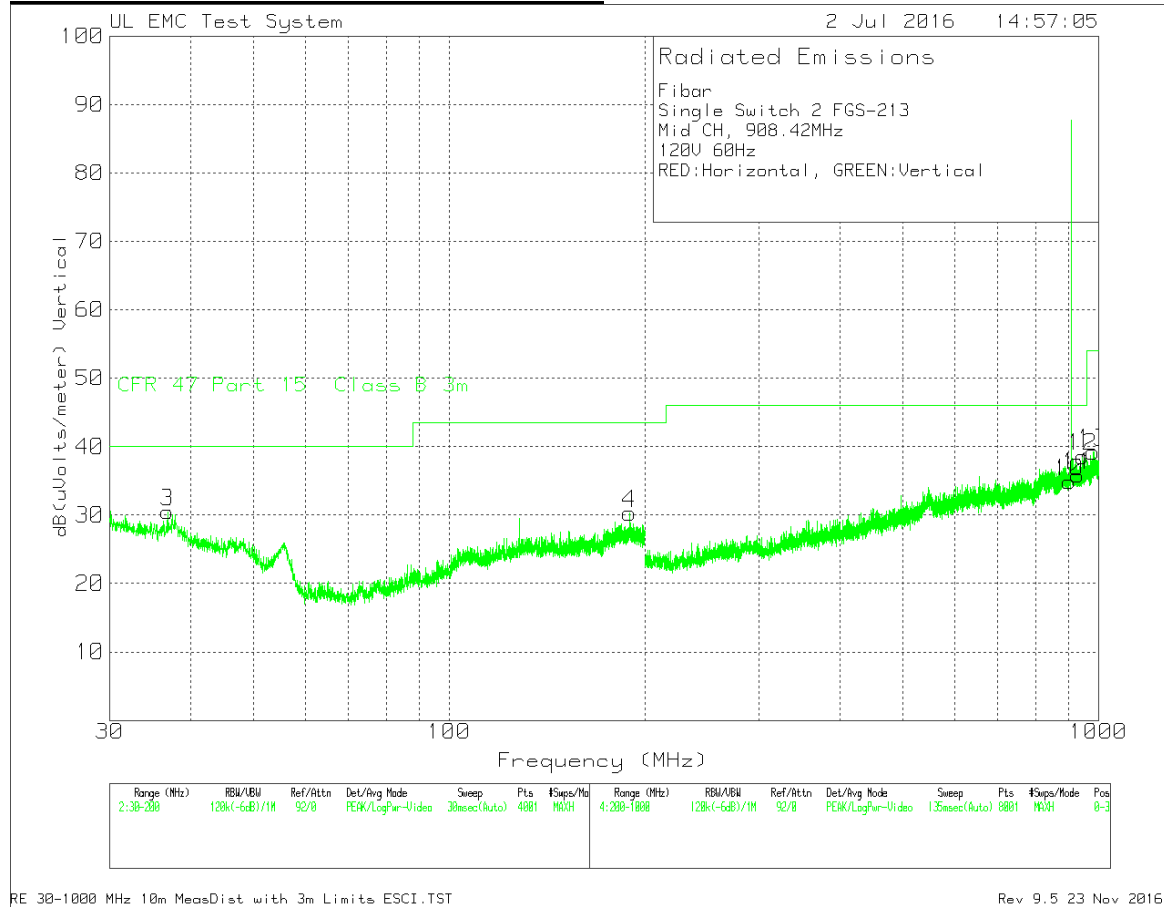
All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

### Transmitter Mid Channel – PLOT – Horizontal



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

### Transmitter Mid Channel – PLOT – Vertical



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

### Transmitter Mid Channel – DATA

Fibar

Single Switch 2, FGS-213

Mid CH, 908.42MHz

120V 60Hz

Radiated Emission Data

Marker No.	Test Frequency (MHz)	Meter		Antenna		10M to 3M Factor	Corrected Reading		QP Limit 3m	Margin (dB)	Azimuth [Degs]	Height	
		Reading (dBuV)	Detector	Factor dB/m	Path dB		dB(uVolts/m eter)	dB				Polarity	
1	30.3825	31.42	Pk	18	-30	10.5	29.92	40	-10.08	0-360	398	H	
2	183.34	33.39	Pk	15.6	-29	10.5	30.39	43.52	-13.13	0-360	248	H	
3	36.8425	34.28	Pk	15.6	-30	10.5	30.48	40	-9.52	0-360	101	V	
4	189.63	32.77	Pk	16	-29	10.5	30.27	43.52	-13.25	0-360	398	V	
5	896.1	35.05	Pk	22.5	-28	10.5	40.45	46.02	-5.57	0-360	99	H	
6	901.4	39.25	Pk	22.6	-28	10.5	44.45	46.02	-1.57	0-360	99	H	
7*	902	30.15	Pk	22.7	-28	10.5	35.35	46.02	-10.67	0-360	399	H	
8*	928	33.35	Pk	22.7	-28	10.5	38.95	46.02	-7.07	0-360	99	H	
9	992.1	31.4	Pk	23.9	-27	10.5	39.1	53.97	-14.87	0-360	299	H	
10*	902	29.69	Pk	22.7	-28	10.5	34.89	46.02	-11.13	0-360	98	V	
11*	928	30.22	Pk	22.7	-28	10.5	35.82	46.02	-10.2	0-360	199	V	
12	944.7	32.25	Pk	23.4	-28	10.5	38.55	46.02	-7.47	0-360	302	V	
13	980	31.51	Pk	24.1	-27	10.5	39.21	53.97	-14.76	0-360	199	V	

Pk - Peak detector

\* - Bandedge Markers

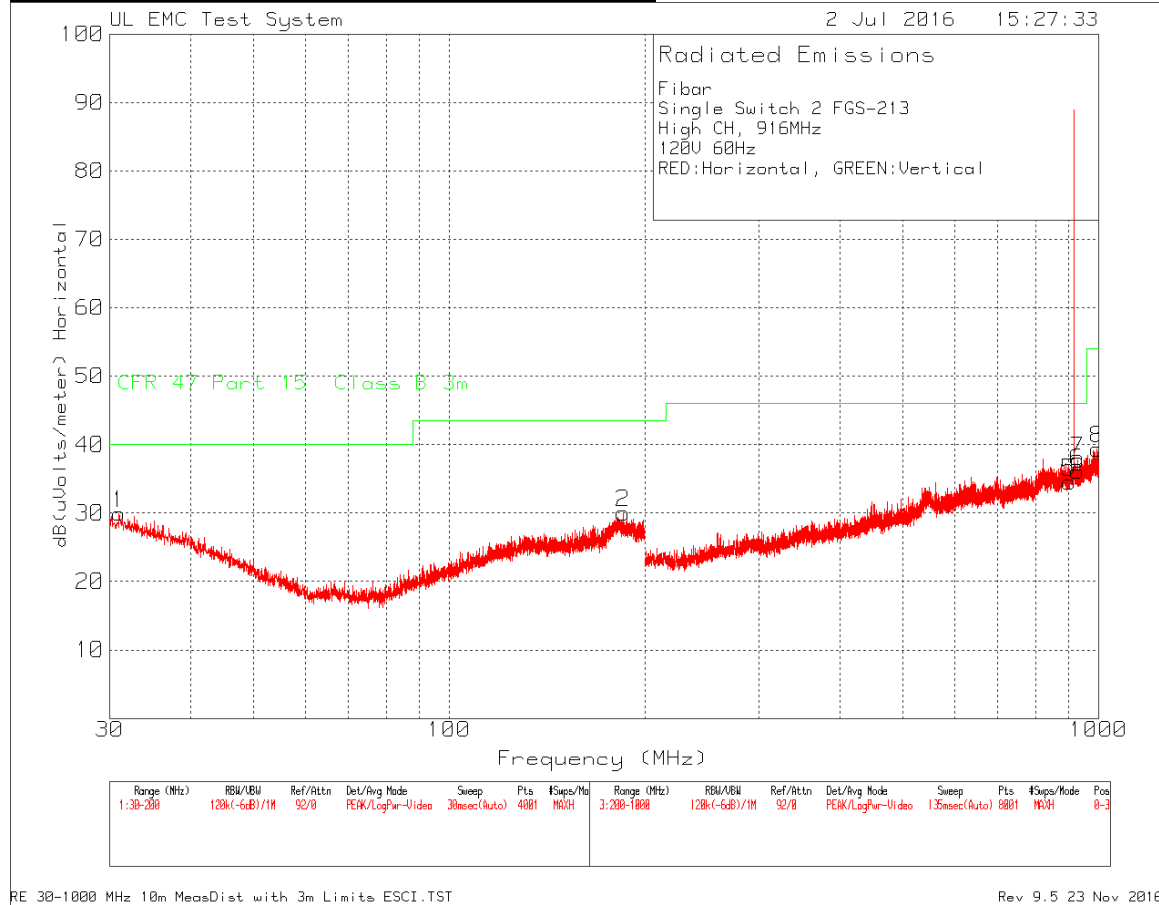
Radiated Emission Data

Test Frequency (MHz)	Meter		Antenna		10M to 3M Factor	Corrected Reading		QP Limit 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	Reading (dBuV)	Detector	Factor dB/m	Path dB		dB(uVolts/m eter)	QP					
901.2943	27.85	Qp	22.6	-28	10.5	33.05	46.02	-12.97	293	102	H	
896.0045	27.13	Qp	22.5	-28	10.5	32.53	46.02	-13.49	147	113	H	

Qp - Quasi-Peak detector

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

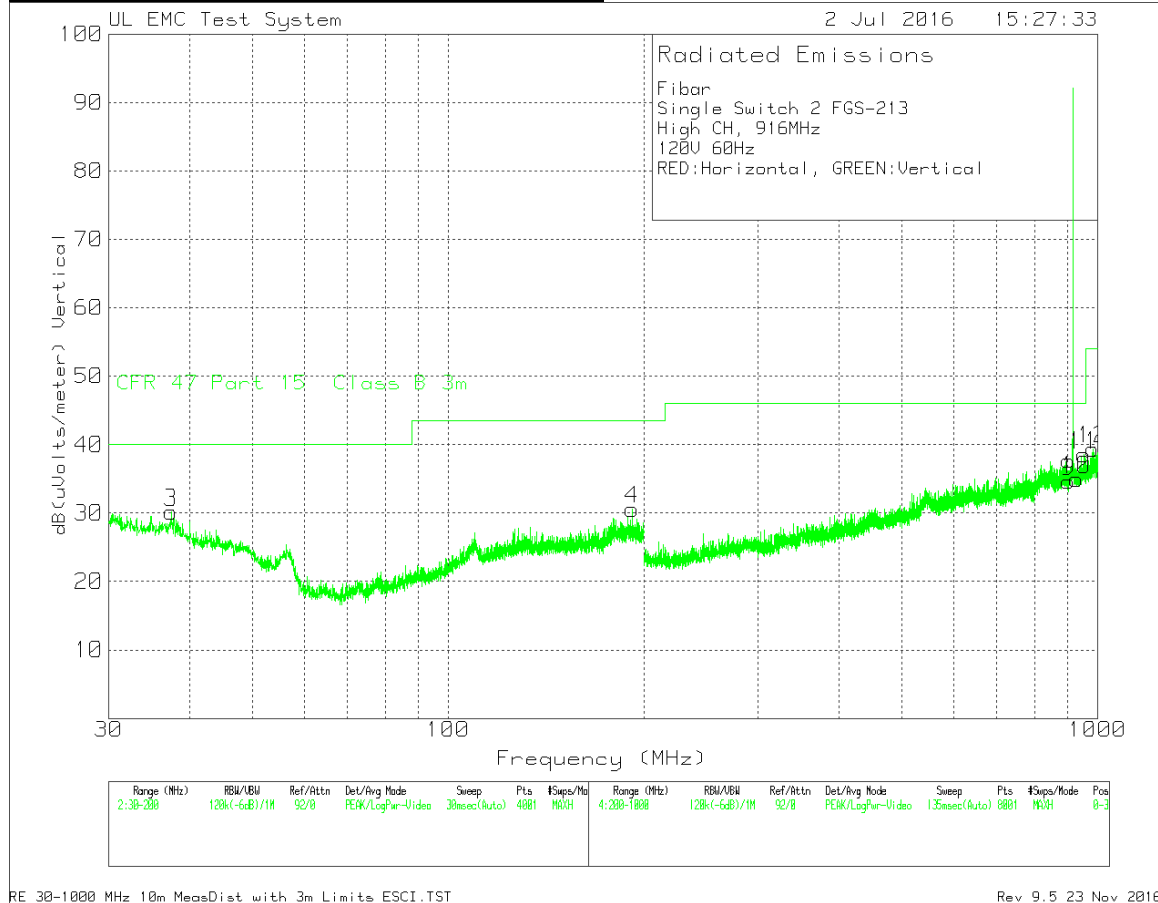
### Transmitter High Channel – PLOT – Horizontal



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



### Transmitter Low Channel – PLOT - Vertical



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

### Transmitter High Channel – DATA

Fibar

Single Switch 2, FGS-213

High CH, 916MHz

120V 60Hz

Radiated Emission Data

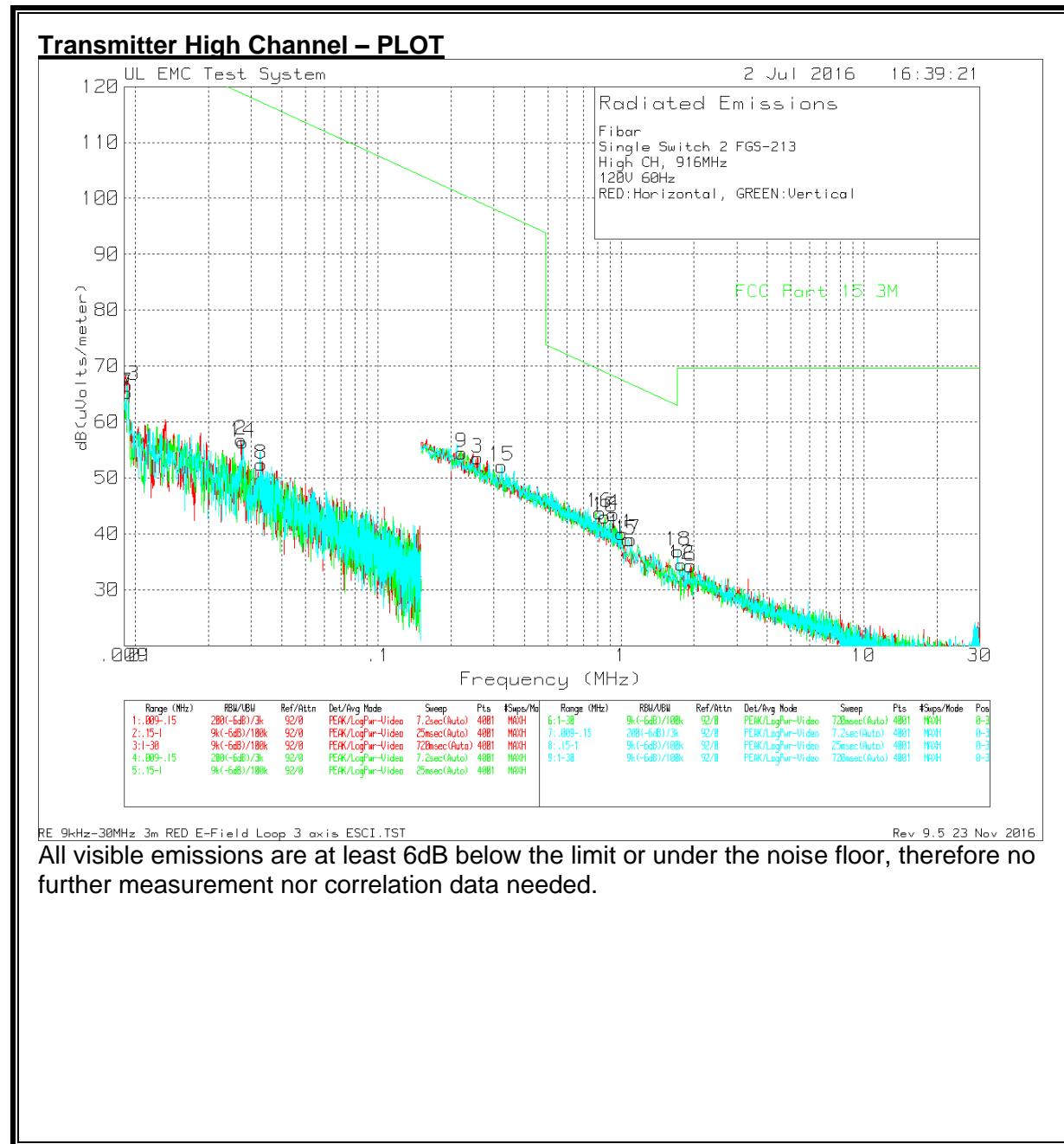
Marker No.	Test Frequency (MHz)	Meter		Antenna		10M to 3M Factor	Corrected Reading		QP Limit 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
		Reading (dBuV)	Detector	Factor dB/m	Path dB		dB(uVolts/m eter)						
1	31.02	31.67	Pk	17.8	-30	10.5	29.97		40	-10.03	0-360	398	H
2	185.4225	32.86	Pk	15.8	-29	10.5	30.06	43.52	-13.46	0-360		248	H
3	37.4375	34.23	Pk	15.3	-30	10.5	30.13	40	-9.87	0-360		102	V
4	192.1375	33	Pk	16	-29	10.5	30.6	43.52	-12.92	0-360		102	V
5*	902	29.35	Pk	22.7	-28	10.5	34.55	46.02	-11.47	0-360		100	H
6*	928	30.51	Pk	22.7	-28	10.5	36.11	46.02	-9.91	0-360		299	H
7	929.3	32.26	Pk	22.7	-28	10.5	37.76	46.02	-8.26	0-360		100	H
8	994.7	31.69	Pk	23.8	-27	10.5	39.39	53.97	-14.58	0-360		100	H
9*	902	29.44	Pk	22.7	-28	10.5	34.64	46.02	-11.38	0-360		399	V
10*	928	29.33	Pk	22.7	-28	10.5	34.93	46.02	-11.09	0-360		399	V
11	952.8	31.73	Pk	23.5	-27	10.5	38.53	46.02	-7.49	0-360		99	V
12	983	31.39	Pk	24.3	-27	10.5	39.39	53.97	-14.58	0-360		202	V

Pk - Peak detector

\* - Bandedge Markers

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



### **Transmitter High Channel – DATA**

Fibar

Single Switch 2, FGS-213

RX

120V 60Hz

Radiated Emission Data

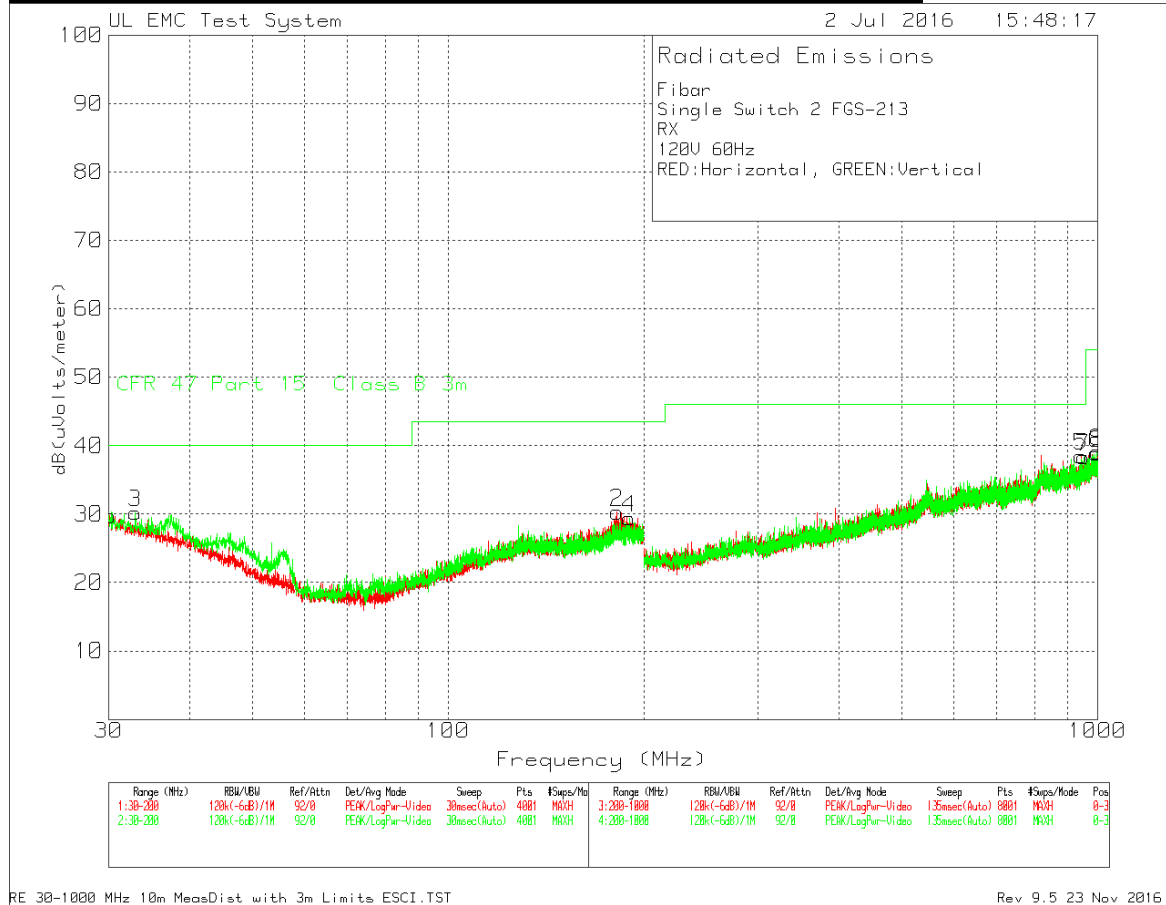
Marker No.	Test Frequency (MHz)	Meter		Antenna		Corrected Reading		Margin (dB)	Azimuth [Degs]
		Reading( dBuV)	Detector	Factor dB/m	Path dB	dB(uVolts/ meter)	Avg Limit		
1	0.009105	48.76	Pk	19.5	0	68.26	128.4	-60.14	0-360
2	0.02727	42.89	Pk	13.9	0	56.79	118.88	-62.09	0-360
3	0.25629	41.98	Pk	11.6	0	53.58	99.43	-45.85	0-360
4	0.93086	31.76	Pk	11.6	0.1	43.46	68.23	-24.77	0-360
5	1.1015	27.22	Pk	11.6	0.1	38.92	66.76	-27.84	0-360
6	1.93525	22.48	Pk	11.7	0.1	34.28	69.54	-35.26	0-360
7	0.009245	45.88	Pk	19.4	0	65.28	128.27	-62.99	0-360
8	0.03294	38.94	Pk	13.5	0	52.44	117.24	-64.8	0-360
9	0.22072	42.88	Pk	11.6	0	54.48	100.72	-46.24	0-360
10	0.85972	31.32	Pk	11.6	0.1	43.02	68.92	-25.9	0-360
11	1.00725	28.31	Pk	11.6	0.1	40.01	67.54	-27.53	0-360
12	1.77575	22.69	Pk	11.7	0.1	34.49	69.54	-35.05	0-360
13	0.009245	47.17	Pk	19.4	0	66.57	128.27	-61.7	0-360
14	0.02769	42.48	Pk	13.9	0	56.38	118.74	-62.36	0-360
15	0.32274	40.52	Pk	11.6	0	52.12	97.42	-45.3	0-360
16	0.81903	32.06	Pk	11.6	0.1	43.76	69.34	-25.58	0-360
17	1.0725	27.25	Pk	11.6	0.1	38.95	67	-28.05	0-360
18	1.71775	25.13	Pk	11.7	0.1	36.93	69.54	-32.61	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.

## 7.2.4. 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

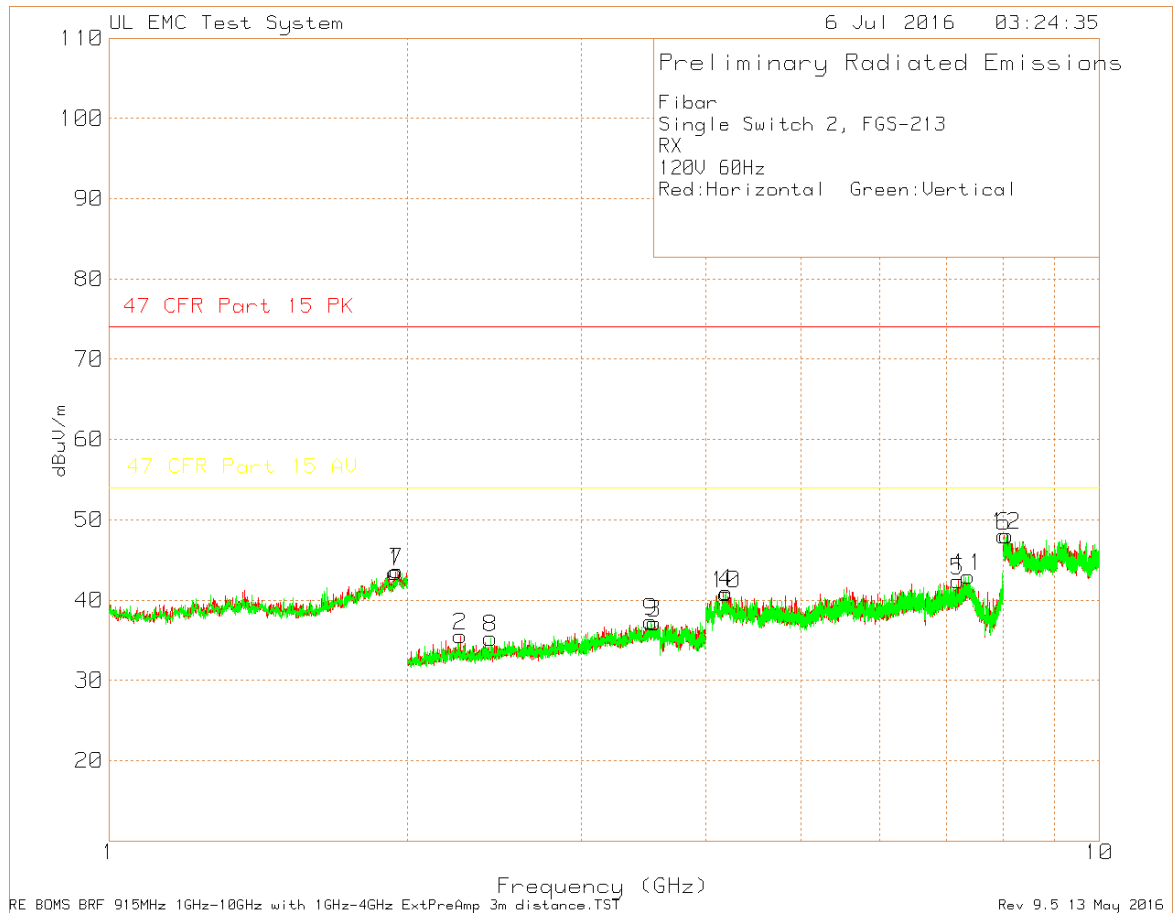
Fibar  
Single Switch 2, FGS-213  
RX  
120V 60Hz  
Radiated Emission Data

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Loss dB	10M to 3M Factor dB	Corrected Reading dB(uVolts/m eter)	QP Limit 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	30.085	31.06	Pk	18.2	-30	10.5	29.76	40	-10.24	0-360	398	H
2	182.065	33.47	Pk	15.5	-29	10.5	30.27	43.52	-13.25	0-360	398	H
3	32.975	32.71	Pk	17	-30	10.5	30.21	40	-9.79	0-360	102	V
4	189.97	31.91	Pk	16	-29	10.5	29.41	43.52	-14.11	0-360	398	V
5	942.9	32.3	Pk	23.2	-28	10.5	38.5	46.02	-7.52	0-360	199	H
6	995.6	31.11	Pk	23.8	-27	10.5	38.91	53.97	-15.06	0-360	199	H
7	951.6	31.66	Pk	23.5	-27	10.5	38.36	46.02	-7.66	0-360	199	V
8	997.9	31.22	Pk	23.8	-26	10.5	39.12	53.97	-14.85	0-360	199	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 – 10GHz - 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 – 10GHz - DATA

Fibar  
Single Switch 2, FGS-213  
RX  
120V 60Hz  
Radiated Emission Data

Marker No.	Test	Meter	Antenna		Corrected		QP				Azimuth [Degs]	Height [cm]	Polarity
	Frequency	Reading	Factor	Path	Reading	Peak	Limit	Margin	Limit	Margin			
	(MHz)	(dBuV) Detector	dB/m	dB	dB(uVolts/ meter)	3m	(dB)	3m	(dB)				
1	1.946	65.79 Pk	32	-54	43.48	74	-30.52	54	-10.52	0-360	98	H	
2	2.264	65.07 Pk	21.7	-51	35.55	74	-38.45	54	-18.45	0-360	150	H	
3	3.554	64.3 Pk	23.3	-50	37.17	74	-36.83	54	-16.83	0-360	100	H	
4	4.2	64.13 Pk	28.3	-51	40.96	74	-33.04	54	-13.04	0-360	150	H	
5	7.196	59.06 Pk	29.7	-46	42.41	74	-31.59	54	-11.59	0-360	100	H	
6	8.01	58.93 Pk	36.1	-47	48.03	74	-25.97	54	-5.97	0-360	150	H	
7	1.953	65.89 Pk	32	-54	43.63	74	-30.37	54	-10.37	0-360	100	V	
8	2.429	64.69 Pk	21.9	-51	35.28	74	-38.72	54	-18.72	0-360	100	V	
9	3.524	63.84 Pk	23.4	-50	37.34	74	-36.66	54	-16.66	0-360	150	V	
10	4.196	63.96 Pk	28.3	-51	40.79	74	-33.21	54	-13.21	0-360	150	V	
11	7.372	58.44 Pk	31	-46	42.96	74	-31.04	54	-11.04	0-360	150	V	
12	8.06	58.34 Pk	36.2	-47	48.04	74	-25.96	54	-5.96	0-360	150	V	

Pk - Peak detector

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



## 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.

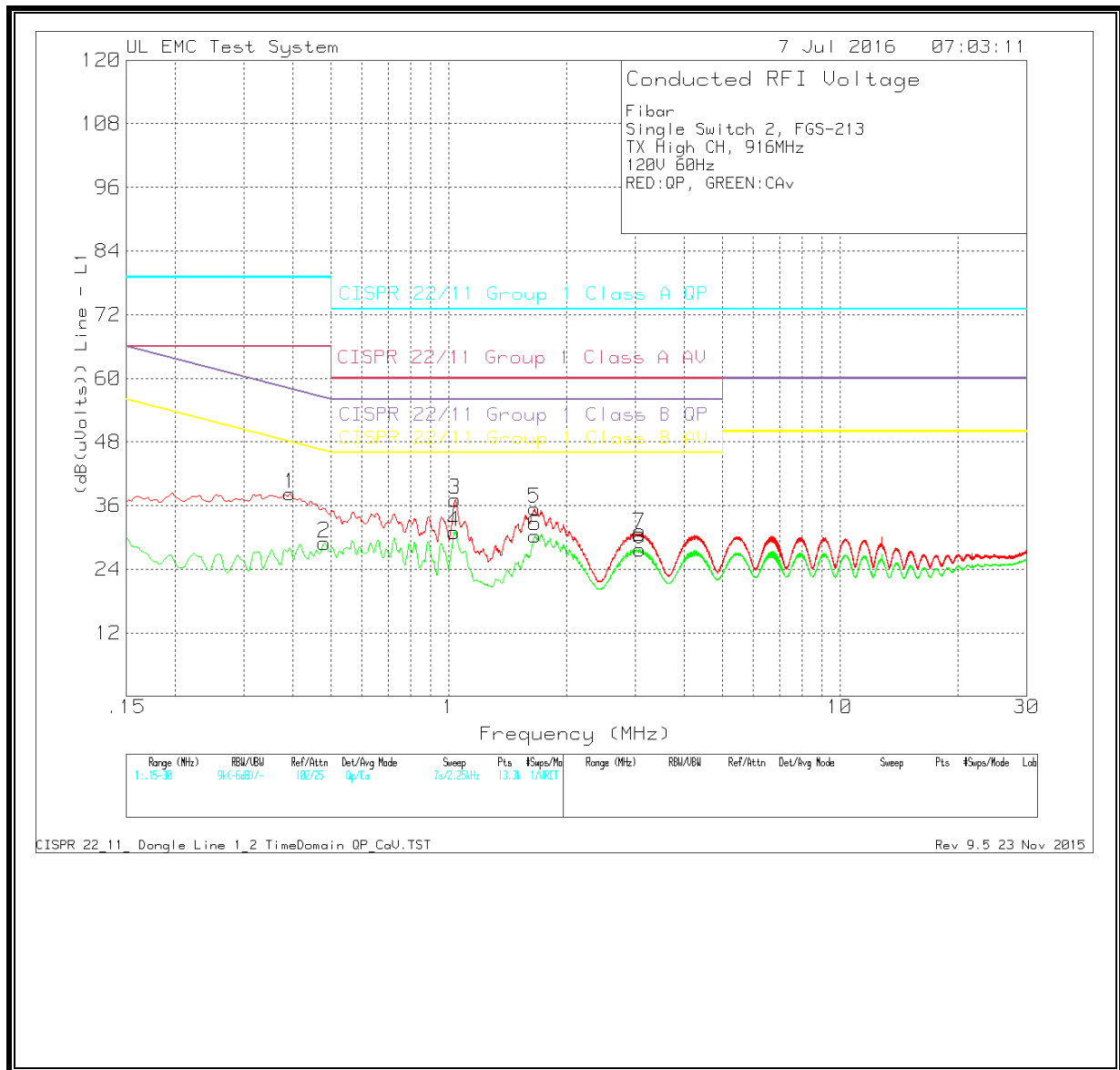
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

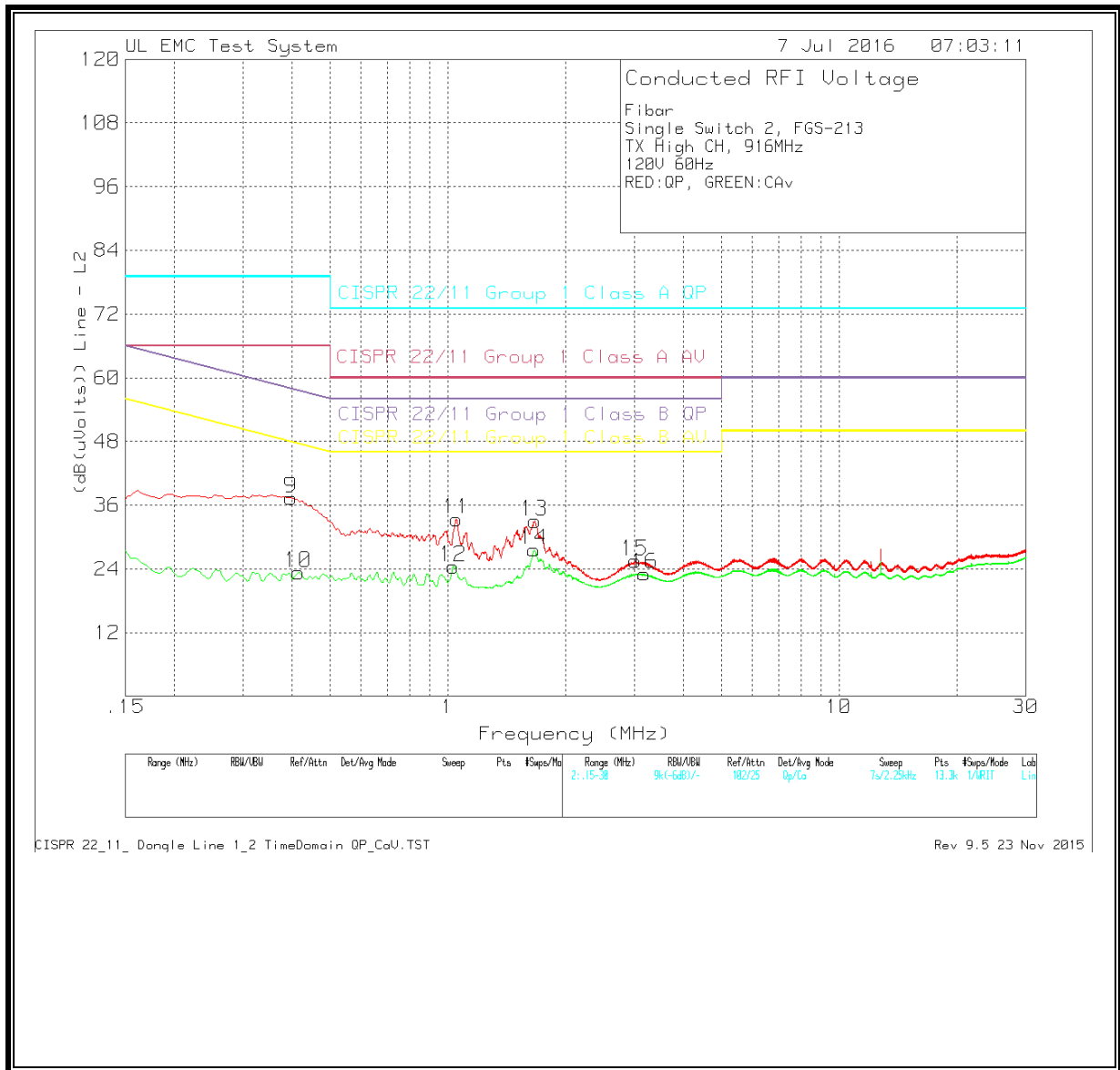
### RESULTS

## 8.1. TRANSMITTER – CONDUCTED EMISSIONS

### LINE 1 PLOT – TX Mode



**LINE 2 PLOT – TX Mode**



**LINE 1 & 2 DATA – TX Mode**

Fibar

Single Switch 2, FGS-213

TX High CH, 916MHz

120V 60Hz

Trace Markers

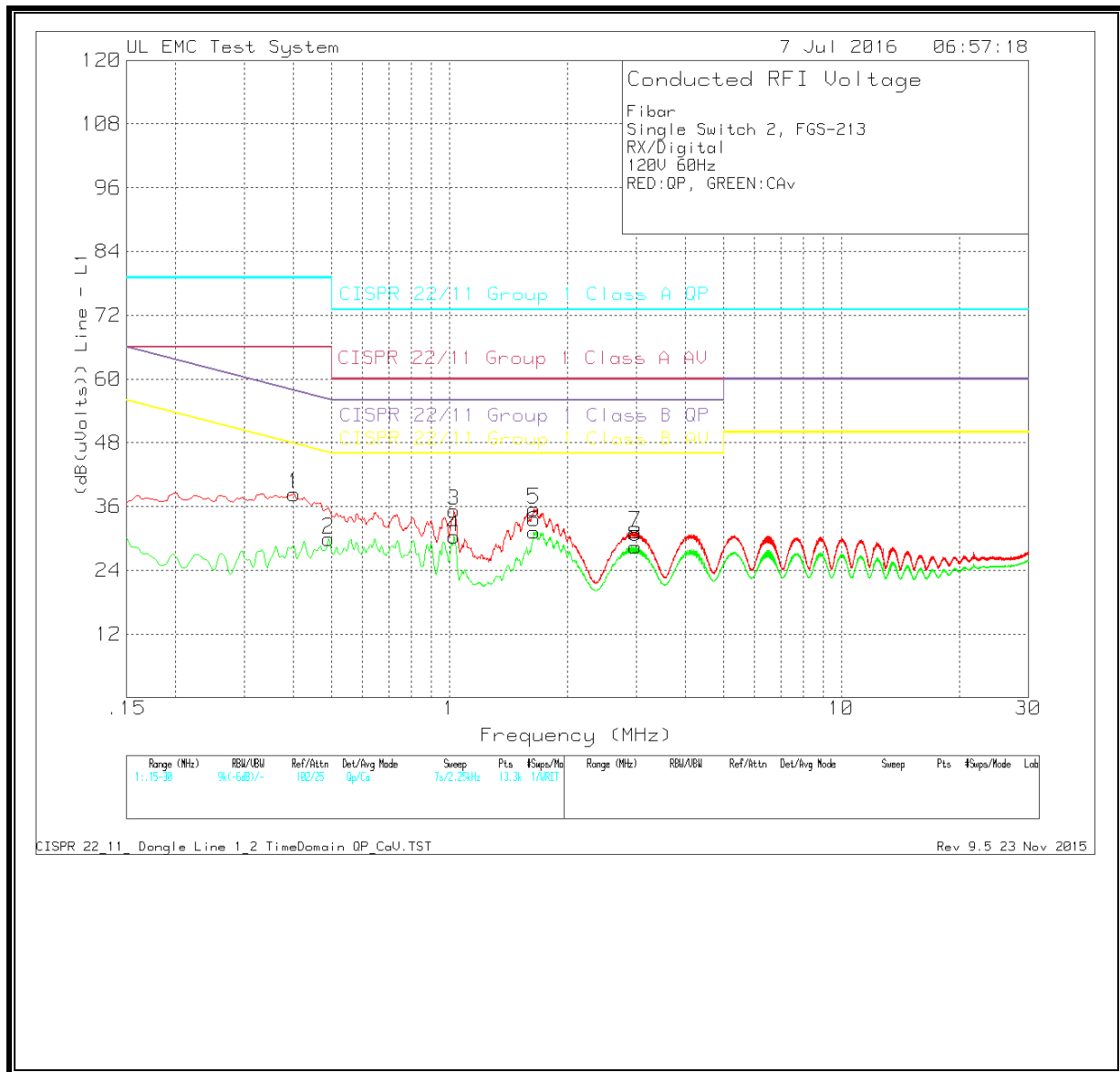
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Transducer Factor dB	Path dB	Corrected Reading (dB(uVolts))	QP Limit	QP Margin (dB)	AV Limit	AV Margin (dB)
Line - L1										
1	0.393	27.45	Qp		0	10.8	38.25	58 -19.75	-	-
2	0.48075	18.24	Ca		0	10.7	28.94	-	46.33	-17.39
3	1.03875	26.54	Qp		0	10.6	37.14	56 -18.86	-	-
4	1.032	20.41	Ca		0	10.6	31.01	-	46	-14.99
5	1.6575	24.87	Qp		0	10.6	35.47	56 -20.53	-	-
6	1.662	19.71	Ca		0	10.6	30.31	-	46	-15.69
7	3.075	20.08	Qp		0	10.6	30.68	56 -25.32	-	-
8	3.0795	17.13	Ca		0	10.6	27.73	-	46	-18.27
Line - N										
9	0.3975	26.06	Qp		0	11.3	37.36	57.91 -20.55	-	-
10	0.4155	12.02	Ca		0	11.3	23.32	-	47.54	-24.22
11	1.05225	22.26	Qp		0	11.1	33.36	56 -22.64	-	-
12	1.032	13.33	Ca		0	11.1	24.43	-	46	-21.57
13	1.66875	21.91	Qp		0	11.1	33.01	56 -22.99	-	-
14	1.662	16.52	Ca		0	11.1	27.62	-	46	-18.38
15	3.012	14.39	Qp		0	11.1	25.49	56 -30.51	-	-
16	3.183	11.89	Ca		0	11.2	23.09	-	46	-22.91

Qp - Quasi-Peak detector

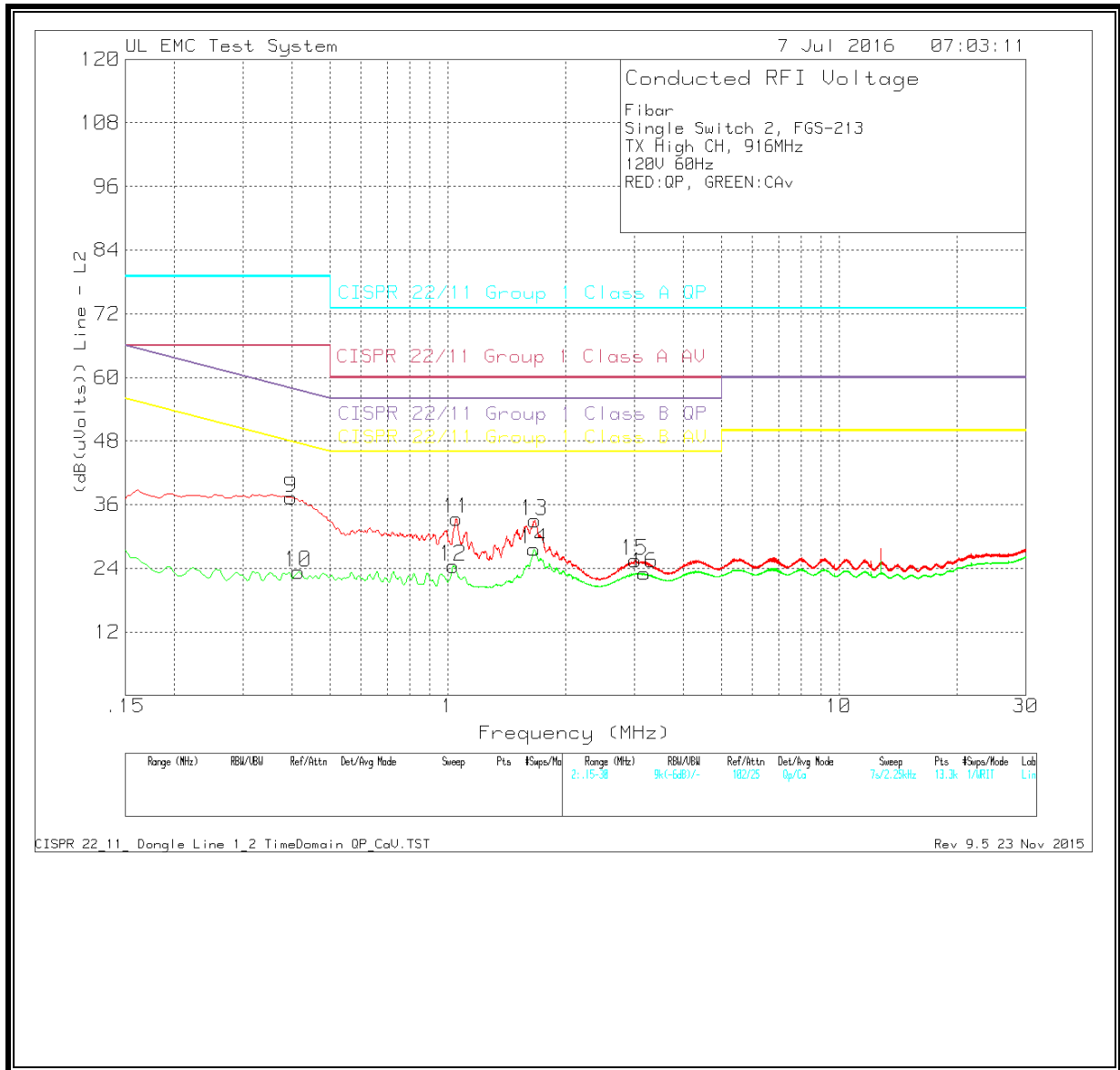
Ca - CISPR Average detection

## 8.2. RECEIVER / DIGITAL – CONDUCTED EMISSIONS

### LINE 1 RESULTS – RX Mode



**LINE 2 RESULTS – RX Mode**



**LINE 2 DATA – RX Mode**

Fibar  
Single Switch 2, FGS-213  
TX High CH, 916MHz  
120V 60Hz  
Trace Markers

Marker No.	Test Frequency (MHz)	Meter Reading (dBUV)	Detector	Transducer Factor dB	Path dB	Corrected Reading (dB(uVolts))	QP Limit	QP Margin (dB)	AV Limit	AV Margin (dB)
Line - L1										
1	0.393	27.45	Qp		0	10.8	38.25	58	-19.75	-
2	0.48075	18.24	Ca		0	10.7	28.94	-	46.33	-17.39
3	1.03875	26.54	Qp		0	10.6	37.14	56	-18.86	-
4	1.032	20.41	Ca		0	10.6	31.01	-	46	-14.99
5	1.6575	24.87	Qp		0	10.6	35.47	56	-20.53	-
6	1.662	19.71	Ca		0	10.6	30.31	-	46	-15.69
7	3.075	20.08	Qp		0	10.6	30.68	56	-25.32	-
8	3.0795	17.13	Ca		0	10.6	27.73	-	46	-18.27
Line - N										
9	0.3975	26.06	Qp		0	11.3	37.36	57.91	-20.55	-
10	0.4155	12.02	Ca		0	11.3	23.32	-	47.54	-24.22
11	1.05225	22.26	Qp		0	11.1	33.36	56	-22.64	-
12	1.032	13.33	Ca		0	11.1	24.43	-	46	-21.57
13	1.66875	21.91	Qp		0	11.1	33.01	56	-22.99	-
14	1.662	16.52	Ca		0	11.1	27.62	-	46	-18.38
15	3.012	14.39	Qp		0	11.1	25.49	56	-30.51	-
16	3.183	11.89	Ca		0	11.2	23.09	-	46	-22.91

Qp - Quasi-Peak detector  
Ca - CISPR Average detection