F2 Labs
16740 Peters Road
Middlefield, Ohio 44062
United States of America
www.f2labs.com

CERTIFICATION TEST REPORT

Manufacturer:	**Sonic Notify Inc.** **251 Fifth Avenue, Floor 6** **New York, New York 10016** **United States of America**
Applicant:	**Same As Above**
Product:	**Wall Powered Beacon**
Model:	**4.70 AC Wall**
FCC ID:	**2ACB9470-AC**
Testing Commenced:	**May 5, 2014**
Testing Ended:	**June 11, 2014**
Summary of Test Results:	**Page 5**

Standards:

- **FCC Part 15 Subpart C, Section 15.249**
- **FCC Part 15 Subpart C, Section 15.215(c) – Additional provisions to the general radiated emission limitations**
- **FCC15.207 - Conducted Limits**
- **FCC Part 15 Subpart A, Section 15.31(e) – Measurement Standards**

Evaluation Conducted by:

Joe Knepper, EMC Proj. Eng.

Michael Toth, Senior EMC Eng.

Ken Littell, EMC Tech. Mgr.

Report Reviewed by:

Wendy Fuster, President

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1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD**.**

1.2 Measurement Procedure:

All measurements were performed according to the 2009 version of ANSI C63.4 and recommended FCC procedure of measurement of DTS operating under Section 15.249. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

Radiated Emission

- Combined Uncertainty (+ or -) 2.67 dB
- Expanded Uncertainty (+ or -) 5.35 dB

Conducted Emissions

- Combined Uncertainty (+ or -) 1.88 dB
- Expanded Uncertainty (+ or -) 3.75 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2LQ6064C-01E	First Issue	June 11, 2014	W. Fuster

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
-20dB Occupied Bandwidth	CFR 47 Part 15.215(c)	Complies
Field Strength of Emissions	CFR 47 Part 15.249(a)(d)	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies
Variation of the Input Power	CFR 47 Part 15.231(e)	Complies

Note: Product was operated using an AC to DC power supply, so Voltage Variation testing in 15.31(3)(e) was performed at the nominal voltage, and then the 85% and 115% of that voltage was tested also. The output power at the High, Mid, and Low channels was measured to verify how much the power and frequency were affected by the variation of the input power. No shift in frequency or power was measured at either of the varied voltages on any of the channels.

Modifications Made to the Equipment
None

3 TABLE OF MEASURED RESULTS

Test	High Channel 2.480GHz	Mid Channel 2.440GHz	Low Channel 2.404GHz
Average Field Strength of Fundamental	74.7 dBµV/m	77.5 dBµV/m	78.1 dBµV/m
Peak Field Strength of Fundamental	75.2 dBµV/m	77.8 dBµV/m	78.9 dBµV/m
Average Limit for Fundamental	50 millivolts/meter (93.98 dBµV/m)	50 millivolts/meter (93.98 dBµV/m)	50 millivolts/meter (93.98 dBµV/m)
Peak Limit for Fundamental	(113.98dBuV/m)	(113.98dBuV/m)	(113.98dBuV/m)
-20dB Occupied Bandwidth	134.635kHz	139.571kHz	144.943kHz

The 20 dB bandwidth of the emission shall be contained within the frequency band designated in the rule section under which the equipment is operated.

4 ENGINEERING STATEMENT

This report has been prepared on behalf of Sonic Notify Inc. to provide documentation for the testing described herein. This equipment has been tested and found to comply with part 15.249 of the FCC Rules using ANSI C63.4 2009 standard. The test results found in this test report relate only to the items tested.

5 EUT INFORMATION AND DATA

5.1 Equipment Under Test:

Product: Wall Powered Beacon
Model: 4.70 AC Wall
Serial No.: 850041
FCC ID: 2ACB9470-AC

5.2 Trade Name:

Sonic Notify Inc.

5.3 Power Supply:

WSU120-0700

5.4 Applicable Rules:

CFR 47, Part 15.249

5.5 Equipment Category:

Radio Transmitter-DTS

5.6 Antenna:

0dBi Gain Integral Antenna

5.7 Accessories:

N/A

5.8 Test Item Condition:

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT was set up in a normal operating mode, connected to a smart phone via Bluetooth, pinging to a smart phone. Device was transmitting in three different channels (low, mid and high).

6 LIST OF MEASUREMENT INSTRUMENTATION

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shield Room	0175	Ray Proof	N/A	11645	Aug. 7, 2014
Temp./Humidity Recorder	CL119	Extech	RH520	H005869	Jan. 8, 2015
OATS-3m	CL017	Compliance Labs	N/A	001	Dec. 13, 2014
OATS-10m	CL017	Compliance Labs	N/A	001	Dec. 13, 2014
Spectrum Analyzer	CL138	Agilent Technologies	E4407B	US41192779	Oct. 29, 2014
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Oct. 30, 2014
Antenna 1-Chamber	0142	ETS/EMCO	3142B	9811-1330	Verified
Antenna 2-OATS	0105	Sunol Sciences	JB1	A101101	May 7, 2015
Horn Antenna	CL098	Emco	3115	9809-5580	Dec. 3, 2015
Horn Antenna	CL114	A.H. Systems, Inc.	SAS-572	237	Sept. 16, 2014
Pre-Amplifier	CL045	Hewlett-Packard	8447D	2944A08445	Nov. 15, 2015
Pre-Amplifier	CL153	Agilent	83006-69007	MY39500900	Jan. 9, 2015
Amp. w/Monopole & 18” Loop	CL163	A.H. Systems, Inc.	EHA-52B	100	Apr. 24, 2015
Software:	Tile Version 1.0		Software Verified: May 5, 2014		
Software:	EMC 32, Version 5.20.2		Software Verified: May 5, 2014		

7 FCC PART 15.215(e) – OCCUPIED BANDWIDTH

7.1 Requirements:

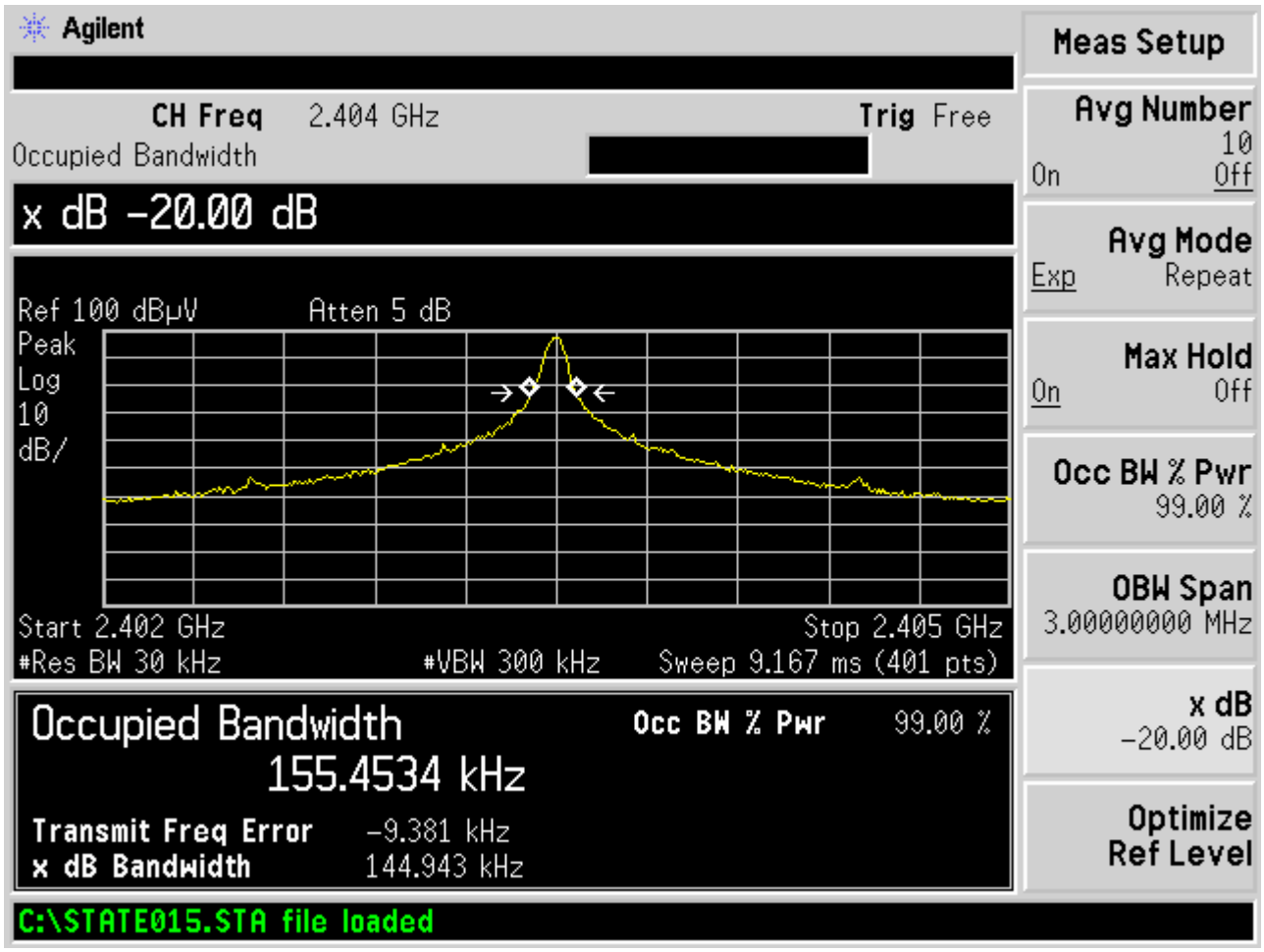
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

Bandwidth measurements were made at the low (2.404 GHz), mid (2.440 GHz) and upper (2.480 GHz) frequencies. The bandwidth was measured using the analyzer's marker function.

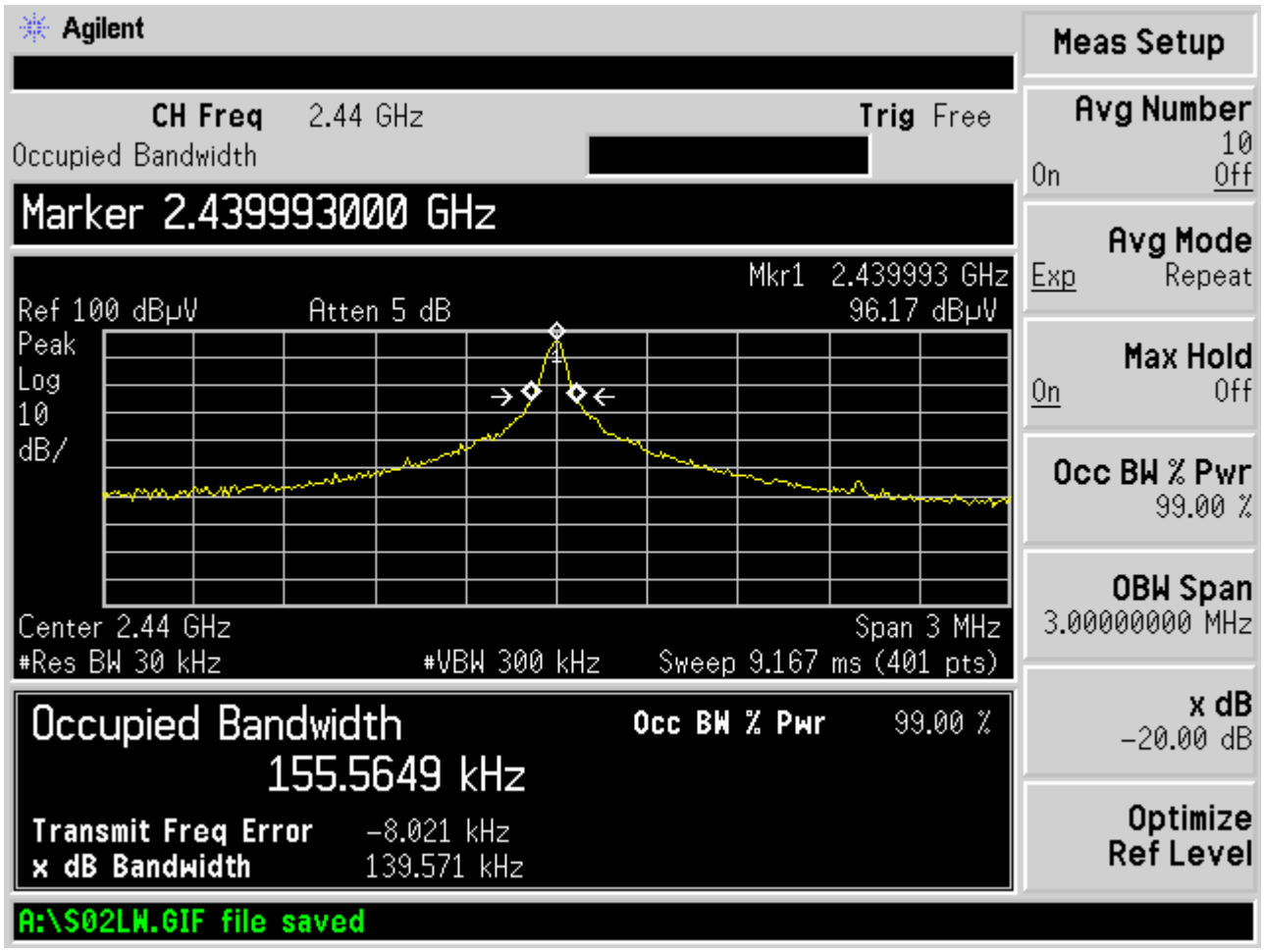
7.2 Occupied Bandwidth Test Data

Test Date:	May 16, 2014	**Test Engineers:**	J. Knepper, K. Littell
Standards:	CFR 47 Part 15.215(c)	**Air Temperature:**	20.7ºC
		Relative Humidity:	49%

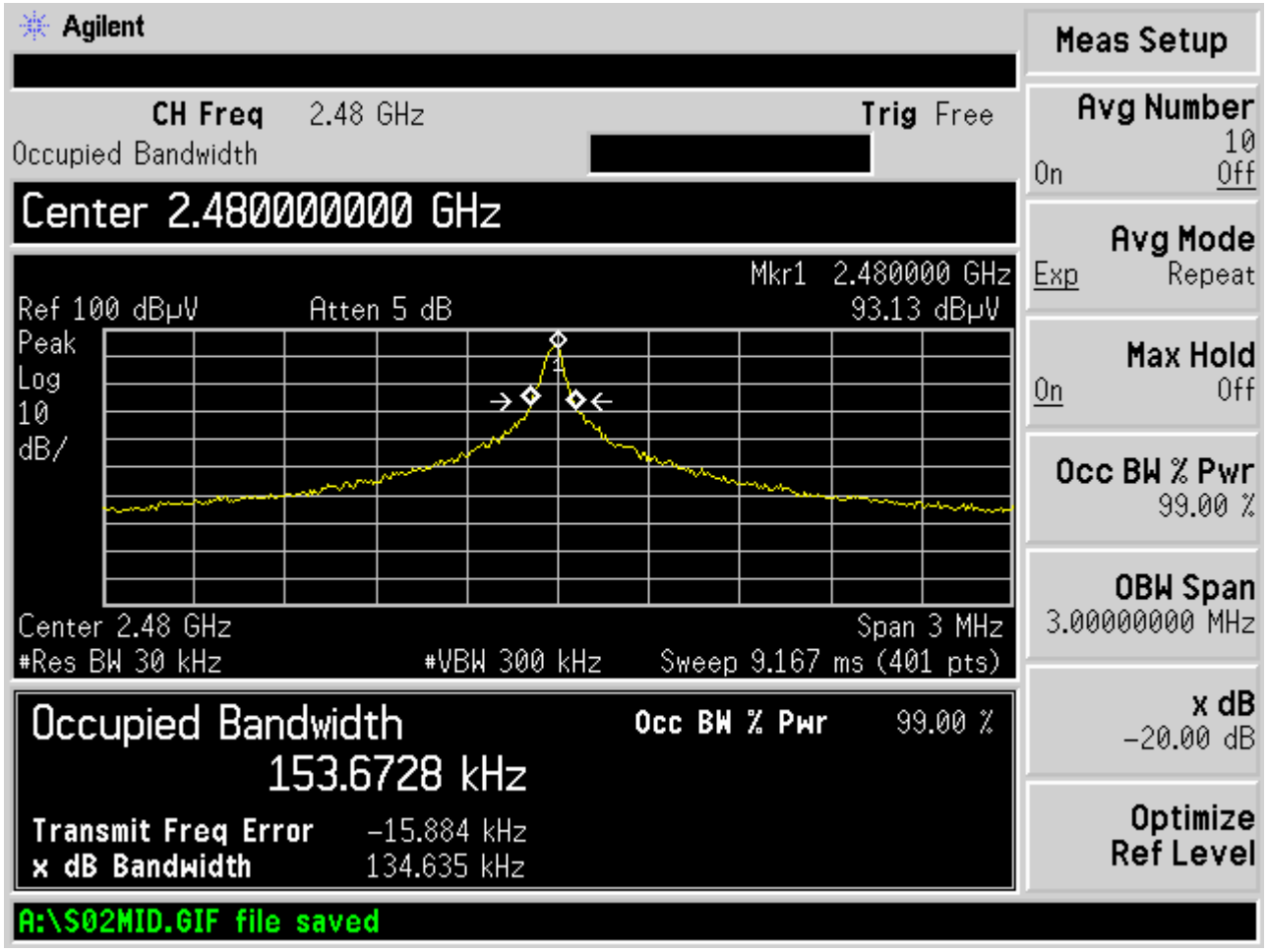
Low Channel



Mid Channel


Agilent
CH Freq 2.44 GHz
Trig Free
Occupied Bandwidth
Marker 2.439993000 GHz
Mkr1 2.439993 GHz
96.17 dBµV
Ref 100 dBµV
Atten 5 dB
Peak
Log
10
dB/
Center 2.44 GHz
Span 3 MHz
#Res BW 30 kHz
#VBW 300 kHz
Sweep 9.167 ms (401 pts)
Occupied Bandwidth
155.5649 kHz
Occ BW % Pwr 99.00 %
Transmit Freq Error -8.021 kHz
x dB Bandwidth 139.571 kHz
A:\S02LW.GIF file saved
Meas Setup
Avg Number
10
On Off
Avg Mode
Exp Repeat
Max Hold
On Off
Occ BW % Pwr
99.00 %
OBW Span
3.00000000 MHz
x dB
-20.00 dB
Optimize
Ref Level

High Channel



8 FCC PART 15.249(a)(d) – FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS

(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.

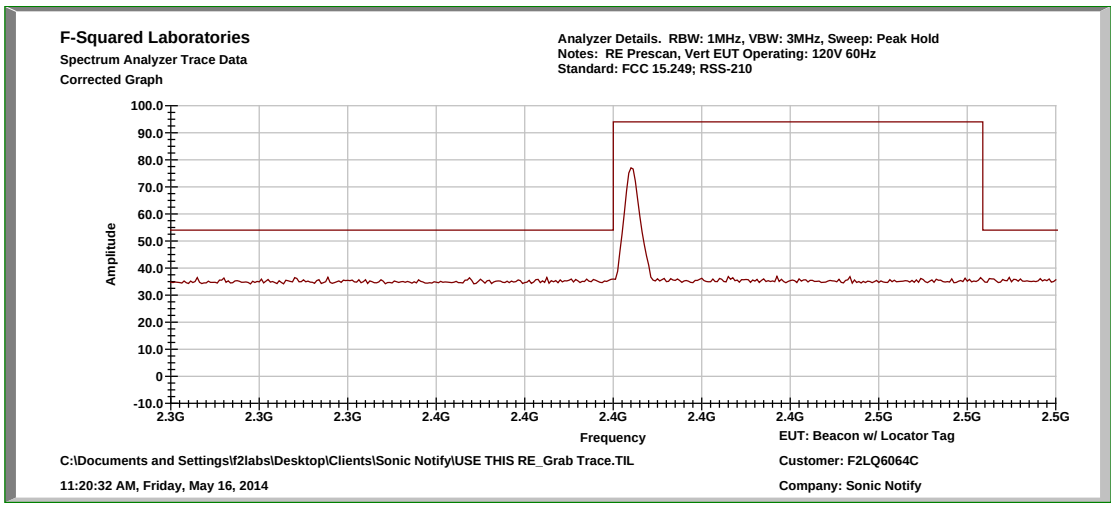
Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some frequencies, no emissions from the EUT were measurable over the ambient noise floor. The readings did not change with EUT on and EUT off.

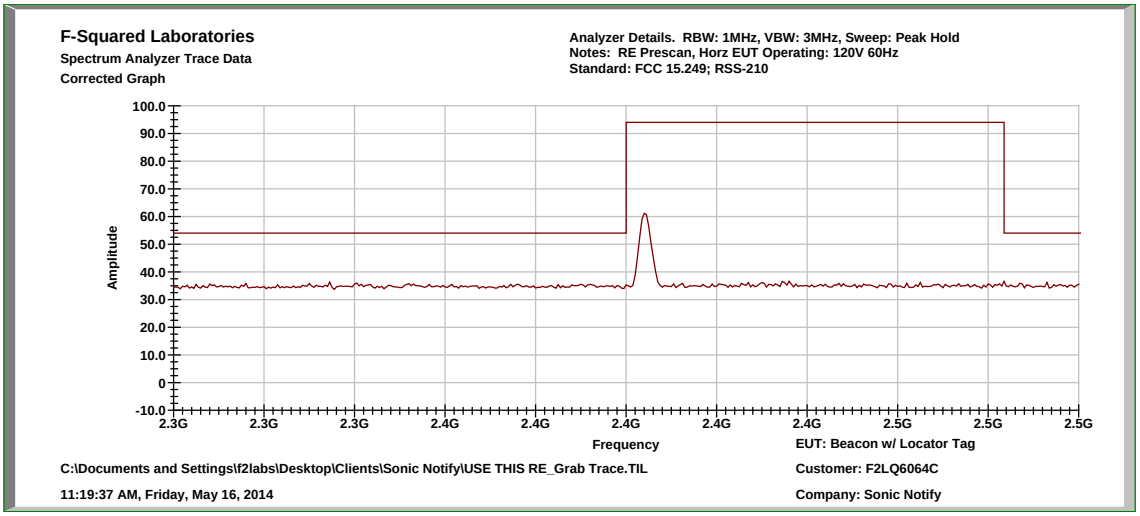
At least 6 of the highest frequencies were measured per ANSI 63.4 on the Open Area Test Site. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit.

8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date:	May 16, 2014	Test Engineers:	J. Knepper, K. Littell
Standards:	CFR 47 Part 15.249(a)	Air Temperature:	24.1ºC
		Relative Humidity:	59%

Low Channel

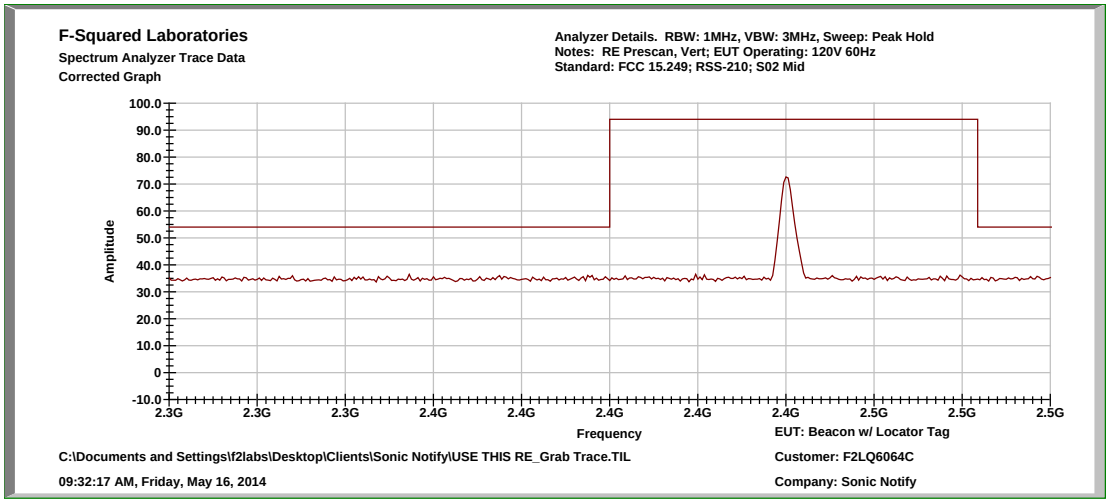


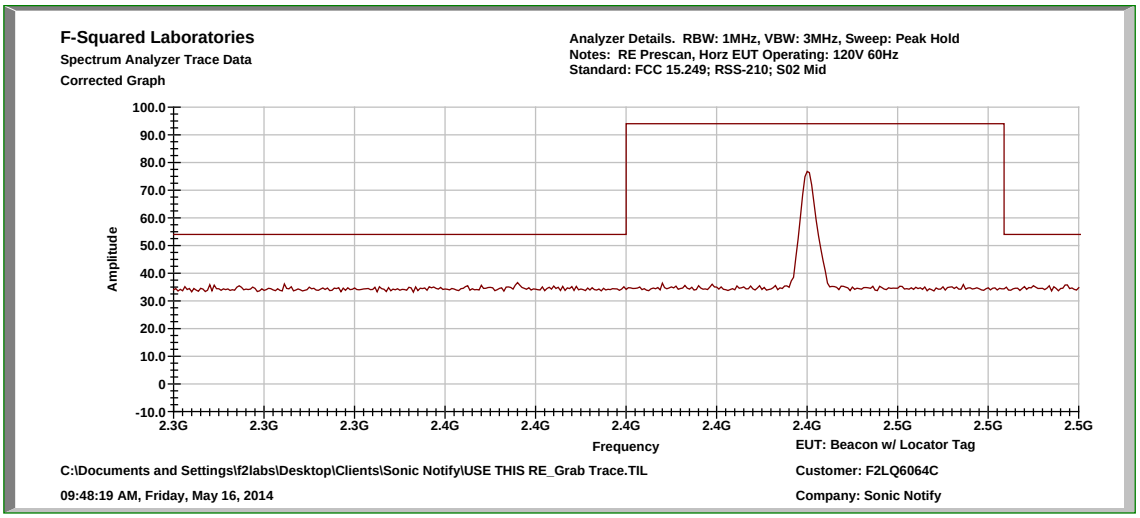


Low Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2399.000000	H	6.96	44.26	74	-29.7	31.06	54	-22.9	1000.000
2399.000000	V	6.96	44.16	74	-29.8	31.06	54	-22.9	100.000
2404.000000	V	6.96	83.56	113.97	-30.4	81.86	93.97	-12.1	1000.000
2404.000000	H	6.96	87.36	113.97	-26.6	86.56	93.97	-7.4	1000.000
2408.000000	V	6.96	60.66	74	-13.3	33.26	54	-20.7	1000.000
2409.000000	H	6.96	59.56	74	-14.4	35.36	54	-18.6	1000.000
2484.000000	V	7.05	44.95	74	-29.1	31.45	54	-22.6	1000.000
2484.000000	H	7.05	44.35	74	-29.7	31.45	54	-22.6	1000.000

Mid Channel


F-Squared Laboratories
Spectrum Analyzer Trace Data
Corrected Graph
Analyzer Details. RBW: 1MHz, VBW: 3MHz, Sweep: Peak Hold
Notes: RE Prescan, Vert; EUT Operating: 120V 60Hz
Standard: FCC 15.249; RSS-210; S02 Mid
Amplitude
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
2.3G 2.3G 2.3G 2.4G 2.4G 2.4G 2.4G 2.4G 2.5G 2.5G 2.5G
Frequency
EUT: Beacon w/ Locator Tag
C:\Documents and Settings\f2labs\Desktop\Clients\Sonic Notify\USE THIS RE_Grab Trace.TIL
Customer: F2LQ6064C
09:32:17 AM, Friday, May 16, 2014
Company: Sonic Notify


F-Squared Laboratories
Spectrum Analyzer Trace Data
Corrected Graph
Analyzer Details. RBW: 1MHz, VBW: 3MHz, Sweep: Peak Hold
Notes: RE Prescan, Horz EUT Operating: 120V 60Hz
Standard: FCC 15.249; RSS-210; S02 Mid
Amplitude
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
2.3G 2.3G 2.3G 2.4G 2.4G 2.4G 2.4G 2.4G 2.5G 2.5G 2.5G
Frequency
EUT: Beacon w/ Locator Tag
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Customer: F2LQ6064C
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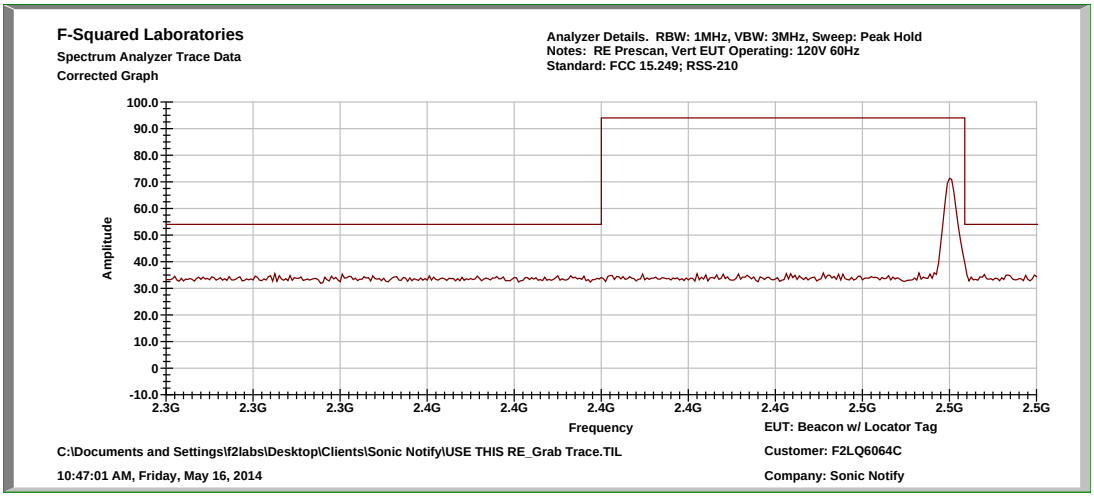
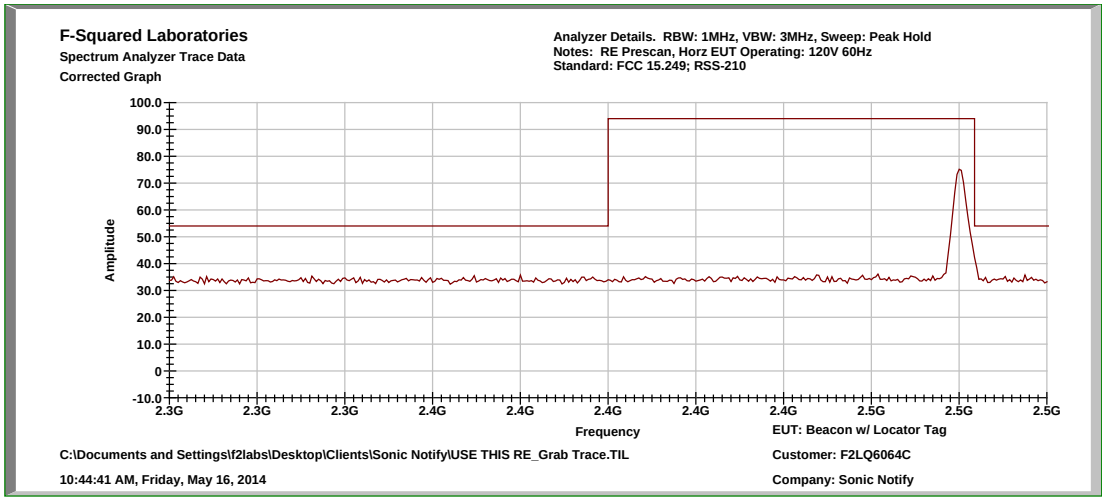
Company: Sonic Notify

Mid Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	V	6.96	43.96	74	-30.0	31.06	54	-22.9	1000.000
2390.000000	H	6.96	43.96	74	-30.0	31.06	54	-22.9	1000.000
2435.000000	H	6.96	59.46	74	-14.5	34.06	54	-19.9	1000.000
2435.000000	V	6.96	59.96	74	-14.0	34.26	54	-19.7	1000.000
2438.000000	H	6.96	66.46	74	-7.5	32.66	54	-21.3	1000.000
2438.000000	V	6.96	61.26	74	-12.7	35.26	54	-18.7	1000.000
2440.000000	V	6.96	83.25	113.97	-30.7	80.45	93.97	-13.5	1000.000
2440.000000	H	6.96	86.35	113.97	-27.6	86.05	93.97	-7.9	1000.000
2484.000000	V	7.05	38.5	74	-35.5	24.5	54	-29.5	1000.000
2484.000000	H	7.05	37.5	74	-36.5	24.4	54	-29.6	1000.000

High Channel





High Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	H	6.96	44.46	74	-29.5	31.06	54	-22.9	1000.000
2390.000000	V	6.96	43.86	74	-30.1	31.06	54	-22.9	1000.000
2478.000000	H	7.05	58.06	74	-15.9	31.96	54	-22.0	1000.000
2480.000000	H	7.05	83.66	113.97	-30.3	83.16	93.97	-10.8	1000.000
2480.000000	V	7.05	78.86	113.97	-35.1	77.56	93.97	-16.4	1000.000
2484.000000	H	7.05	50.16	74	-23.8	31.76	54	-22.2	1000.000
2484.000000	V	7.05	48.65	74	-25.4	31.55	54	-22.5	1000.000

8.2 Test Data – Spurious Emissions

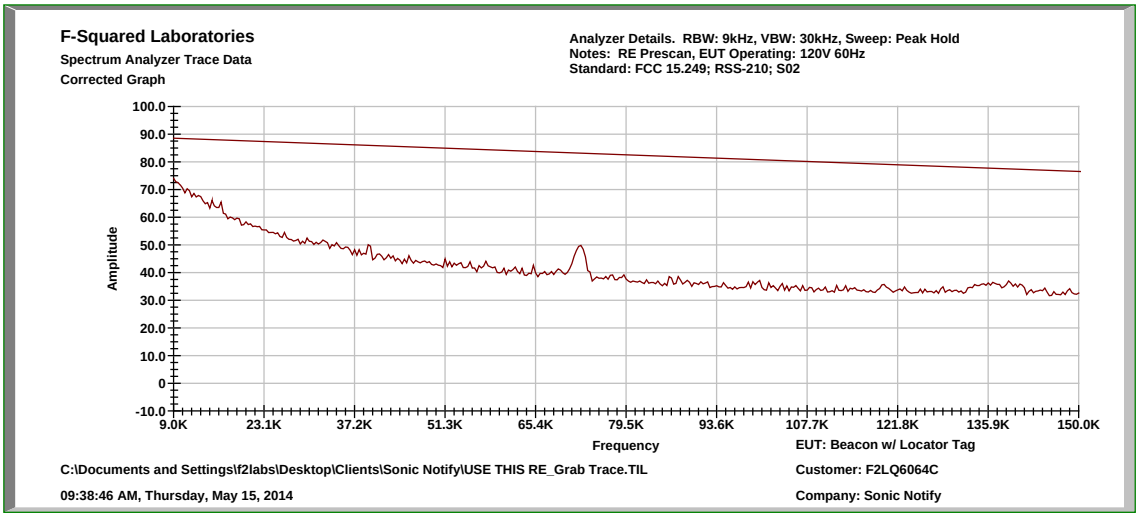
Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some frequencies, no emissions from the EUT were measurable over the ambient noise floor. The readings did not change with EUT on and EUT off.

At least 6 of the highest frequencies were measured per ANSI 63.4 on the Open Area Test Site. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit.

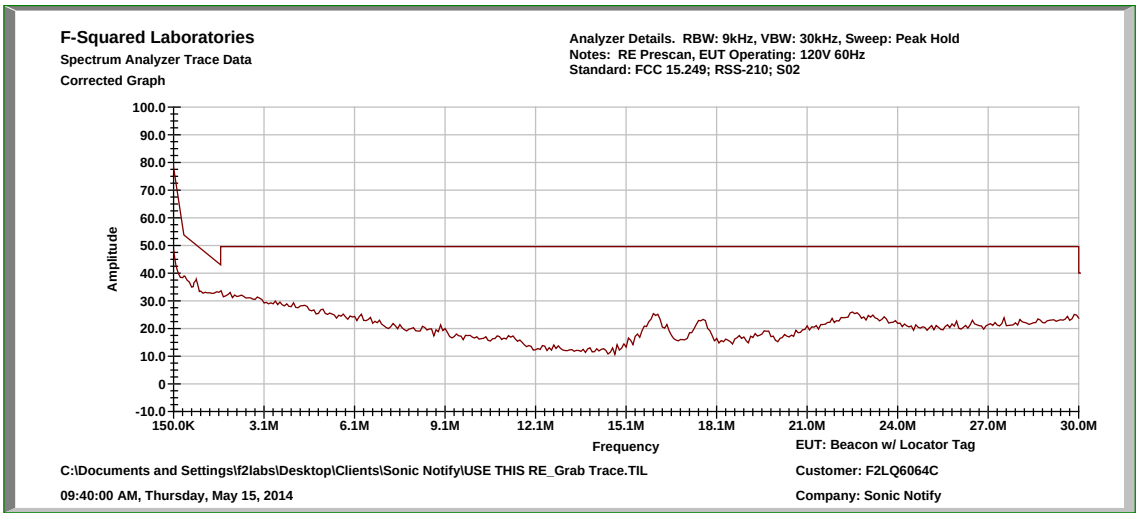
In the following plots, the black line indicates ambient noise and the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables below.

Test Date:	May 16, 2014	**Test Engineers:**	J. Knepper, K. Littell
Standards:	CFR 47 Part 15.249(d) / Part 15.209	**Air Temperature:**	24.8ºC
		Relative Humidity:	58%

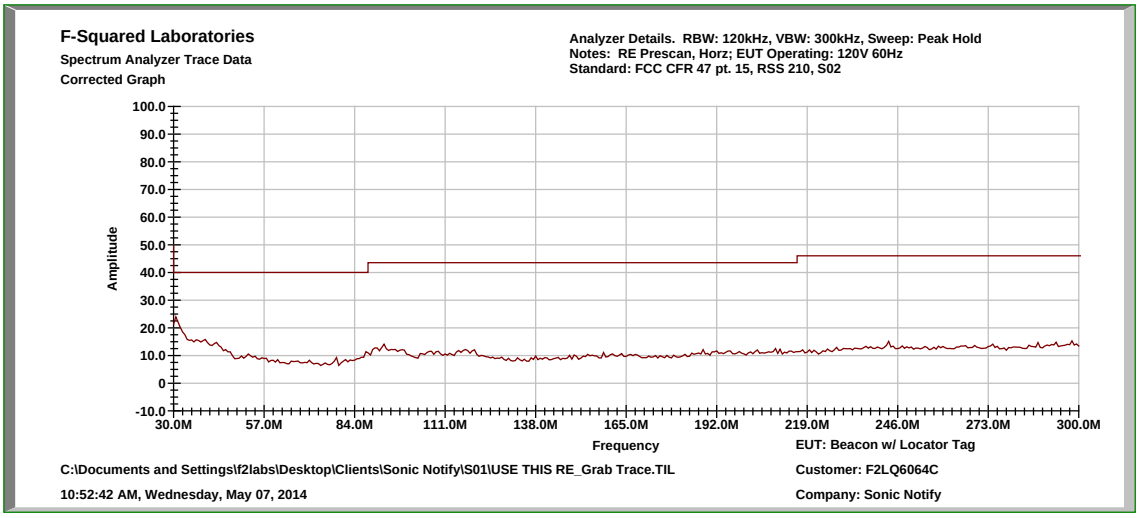
Low Channel, .009 to 0.15 MHz



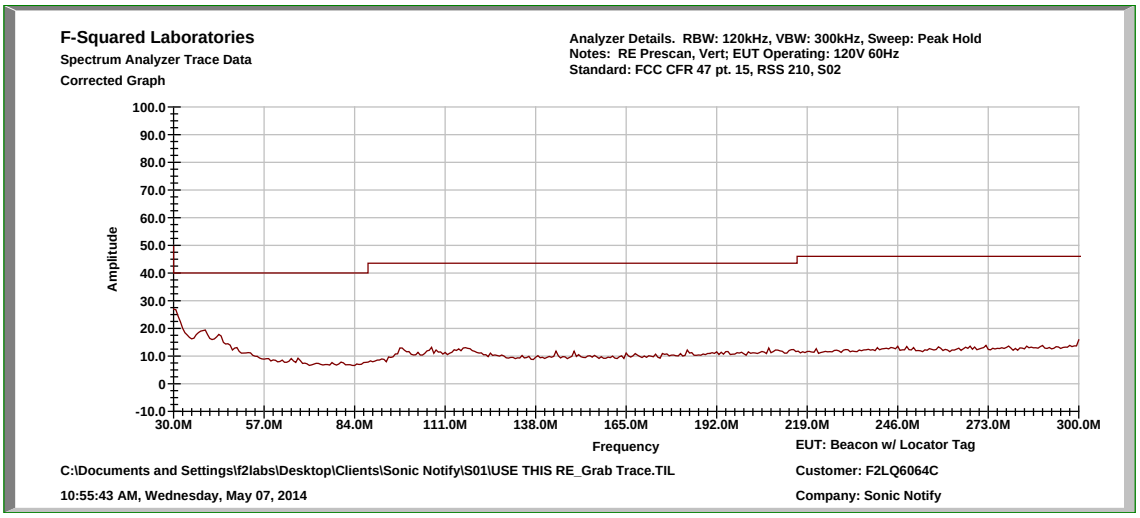
Low Channel, 0.15 MHz to 30 MHz



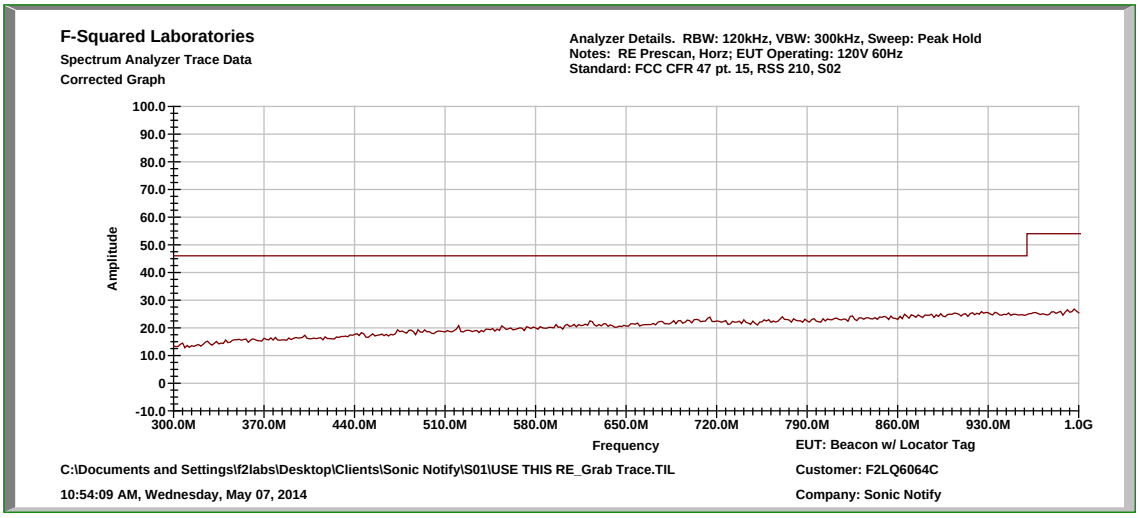
Low Channel, 30 MHz to 300 MHz, Horizontal



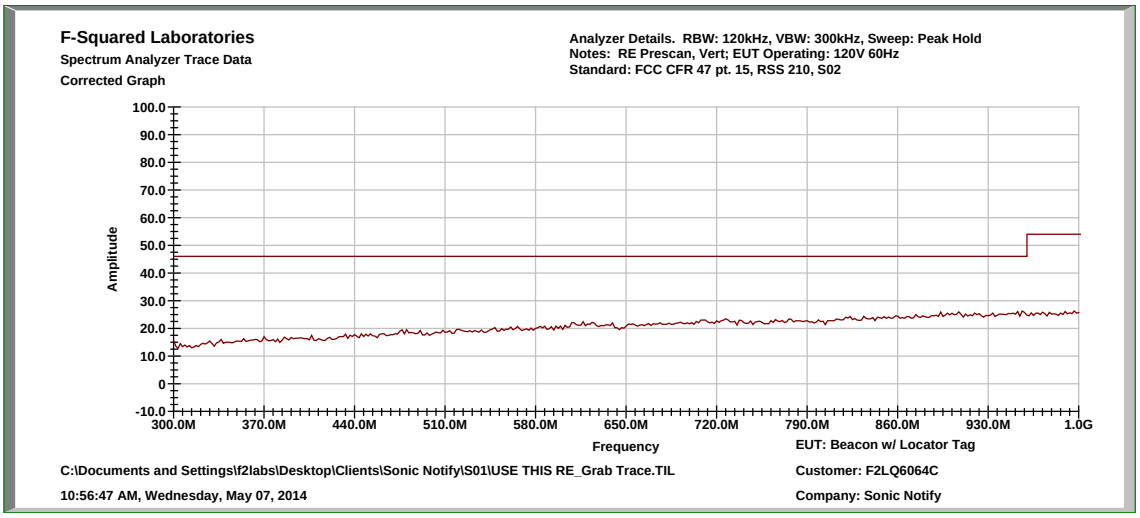
Low Channel, 30 MHz to 300 MHz, Vertical



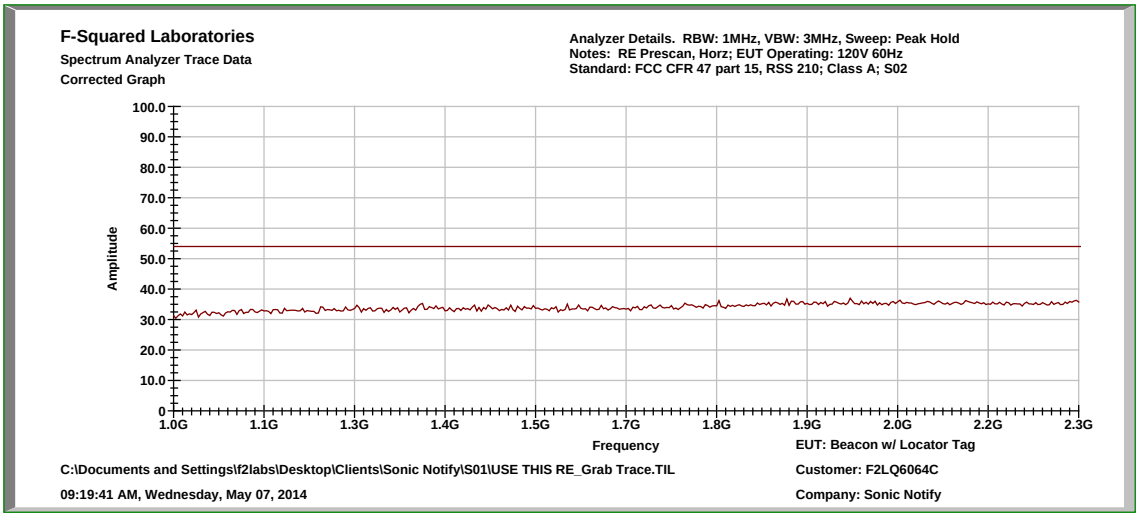
Low Channel, 300 MHz to 1 GHz, Horizontal



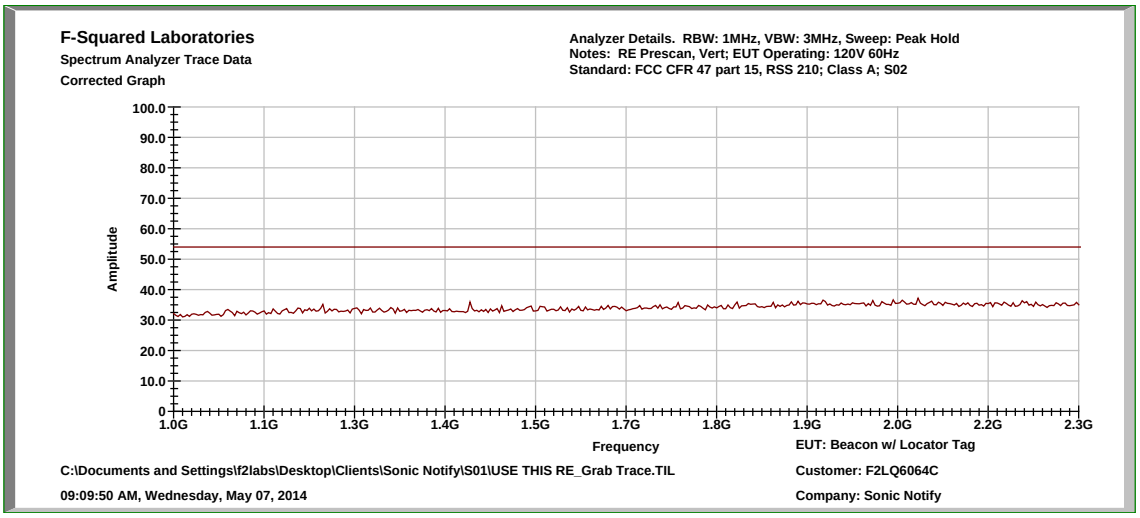
Low Channel, 30 MHz to 1 GHz, Vertical



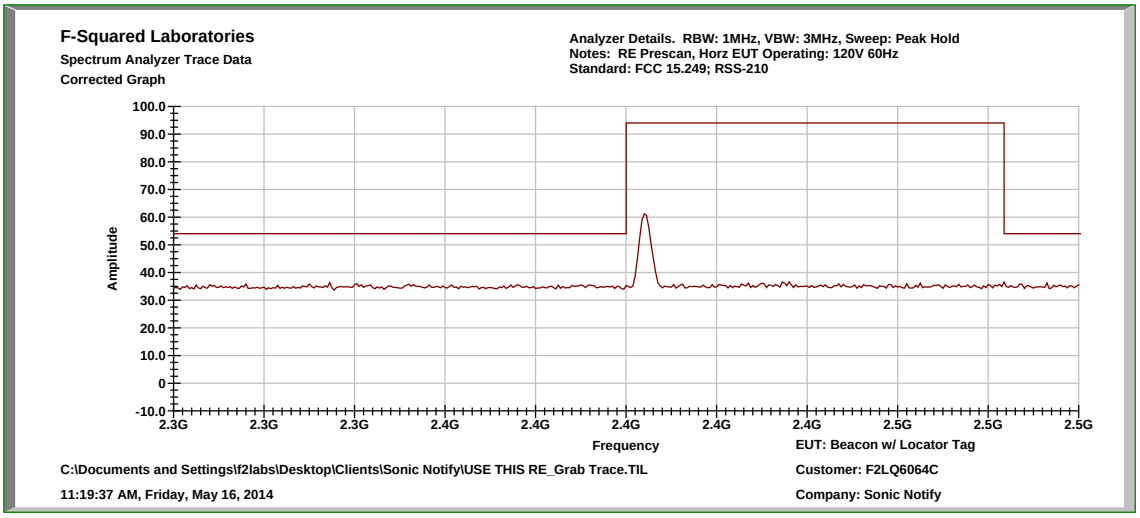
Low Channel, 1 GHz to 2.3 GHz, Horizontal



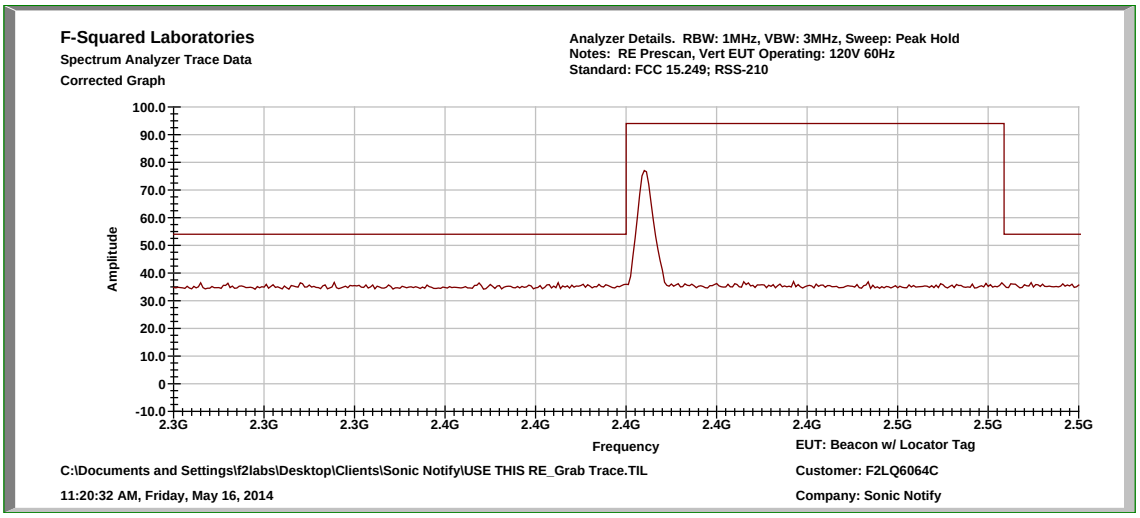
Low Channel, 1 GHz to 2.3 GHz, Vertical



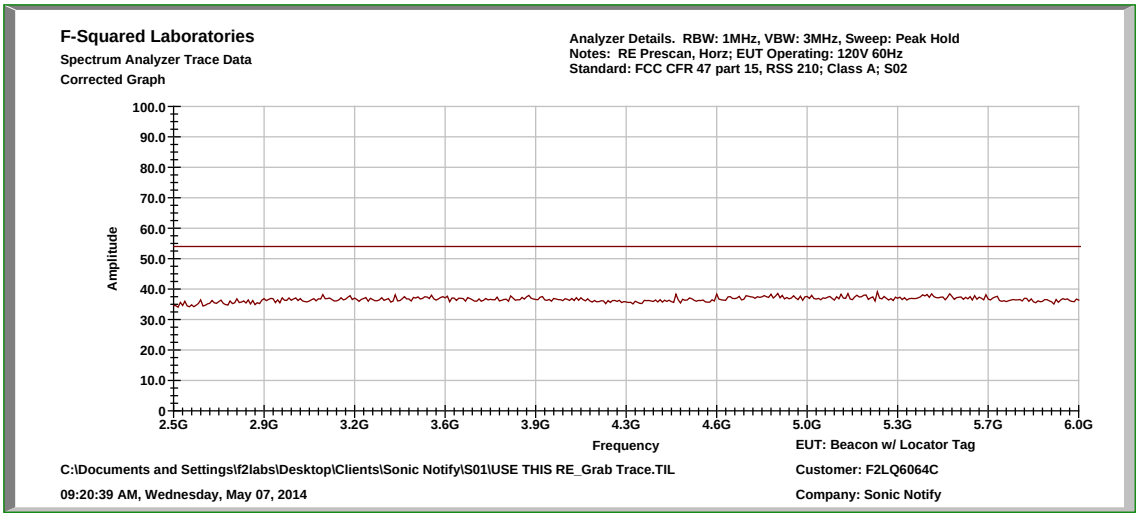
Low Channel, 2.3 GHz to 2.6 GHz, Horizontal



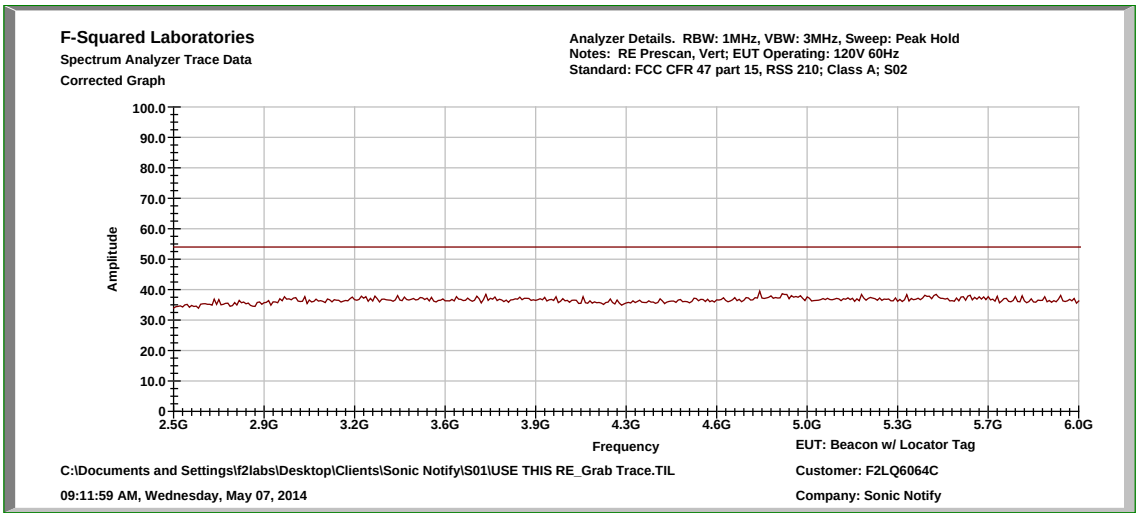
Low Channel, 2.3 GHz to 2.6 GHz, Vertical



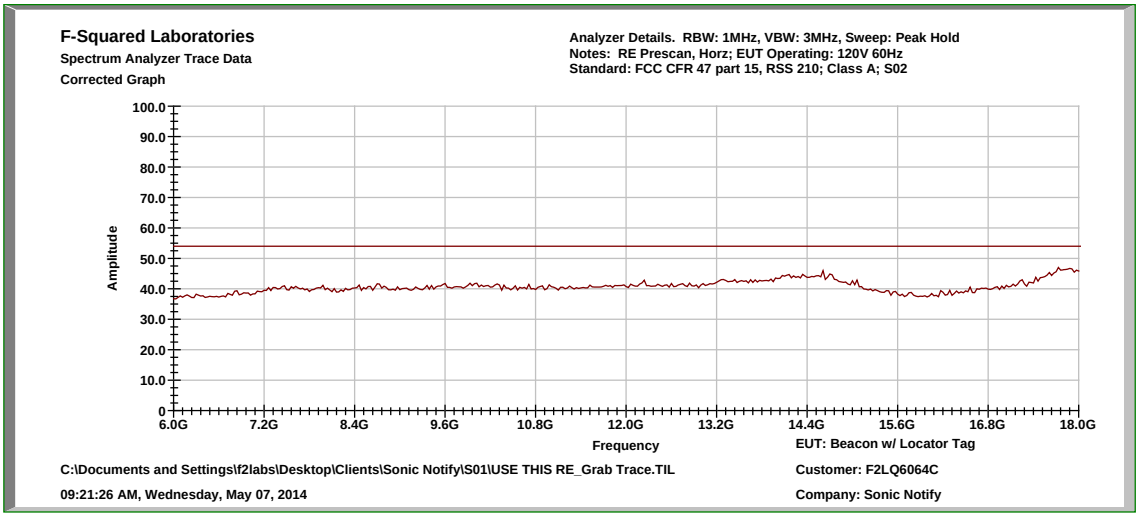
Low Channel, 2.6 GHz to 6 GHz, Horizontal



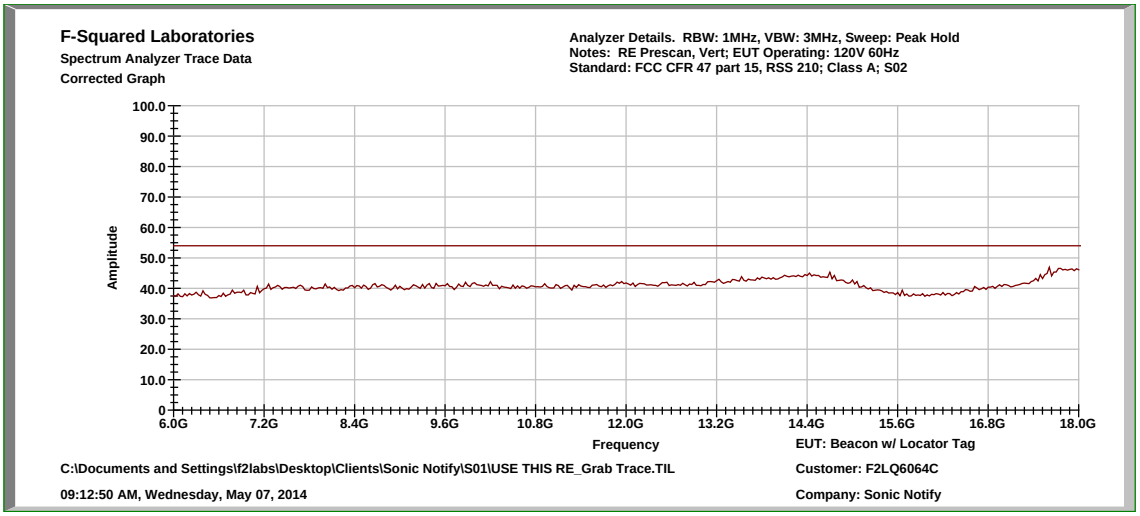
Low Channel, 2.6 GHz to 6 GHz, Vertical



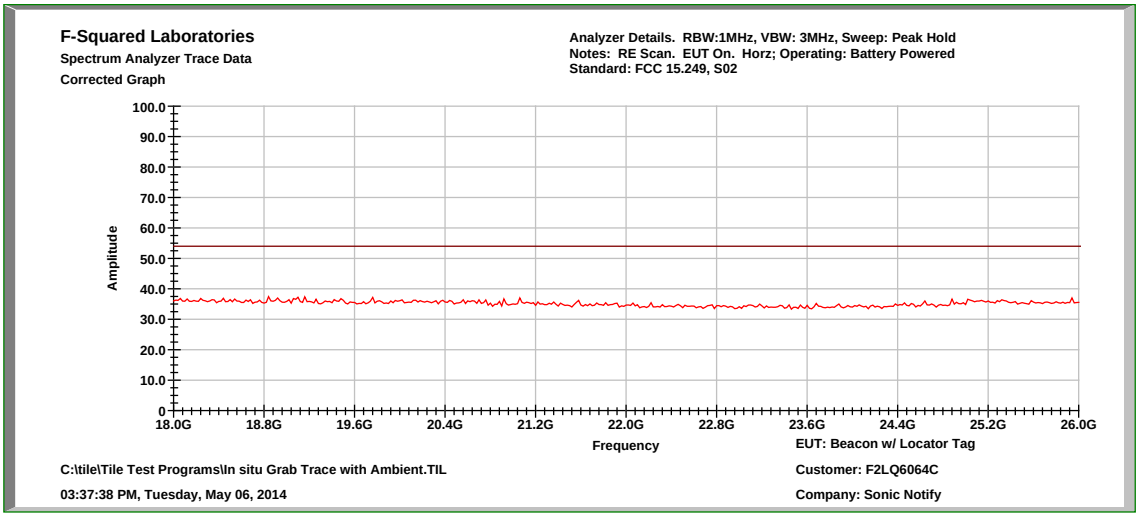
Low Channel, 6 GHz to 18 GHz, Horizontal



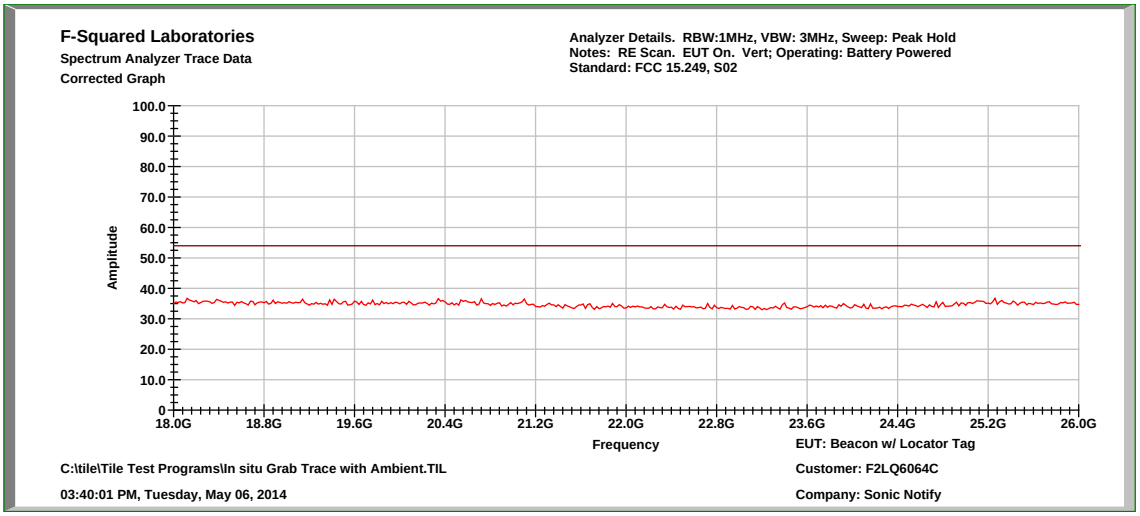
Low Channel, 6 GHz to 18 GHz, Vertical



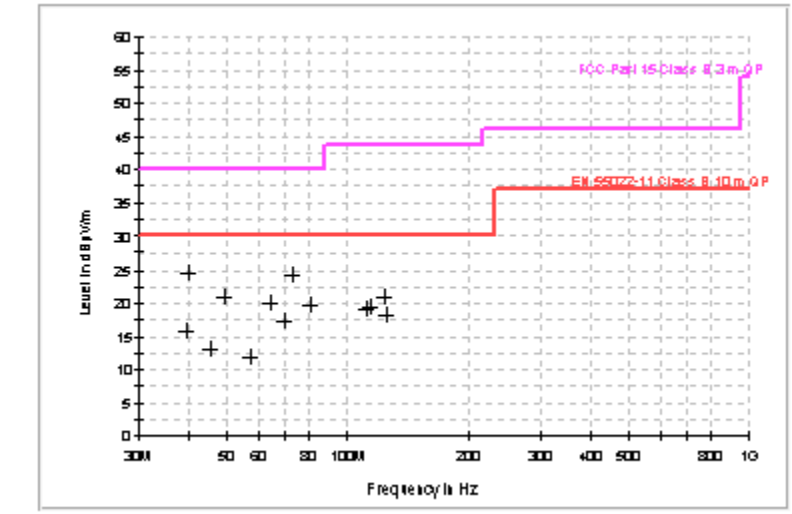
Low Channel, 18 GHz to 26 GHz, Horizontal



Low Channel, 18 GHz to 26 GHz, Vertical

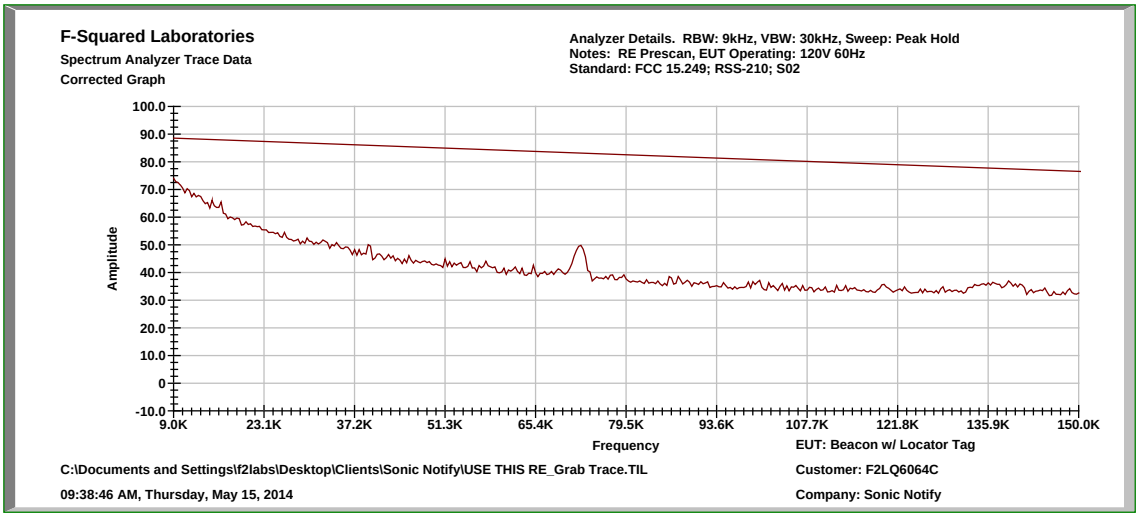


Low Channel

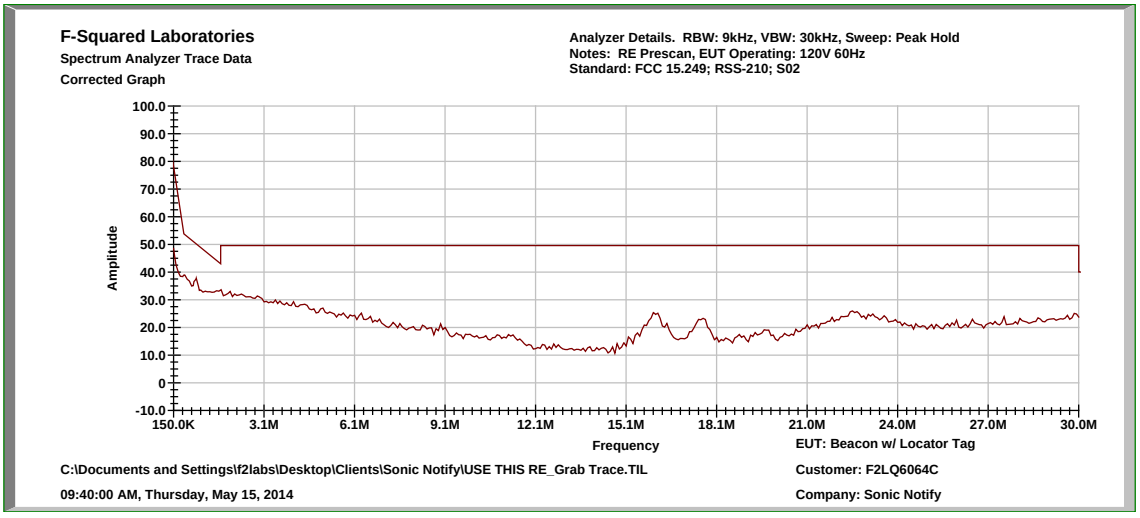


Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
39.740000	15.9	50.0	120.000	155.0	H	16.0	24.1	40.0
39.990000	24.6	50.0	120.000	155.0	V	15.8	15.4	40.0
45.390000	12.9	50.0	120.000	155.0	H	12.3	27.1	40.0
49.000000	20.9	50.0	120.000	155.0	V	10.6	19.1	40.0
57.360000	11.9	50.0	120.000	155.0	H	10.5	28.1	40.0
63.870000	20.0	50.0	120.000	155.0	V	11.0	20.0	40.0
69.360000	17.3	50.0	120.000	155.0	H	11.1	22.7	40.0
72.870000	24.3	50.0	120.000	155.0	V	11.2	15.7	40.0
81.270000	19.7	50.0	120.000	155.0	H	10.8	20.3	40.0
111.440000	19.1	50.0	120.000	155.0	V	17.0	24.4	43.5
114.060000	19.4	50.0	120.000	155.0	H	17.2	24.1	43.5
123.860000	20.8	50.0	120.000	155.0	V	17.9	22.7	43.5
125.860000	18.2	50.0	120.000	155.0	H	17.9	25.3	43.5

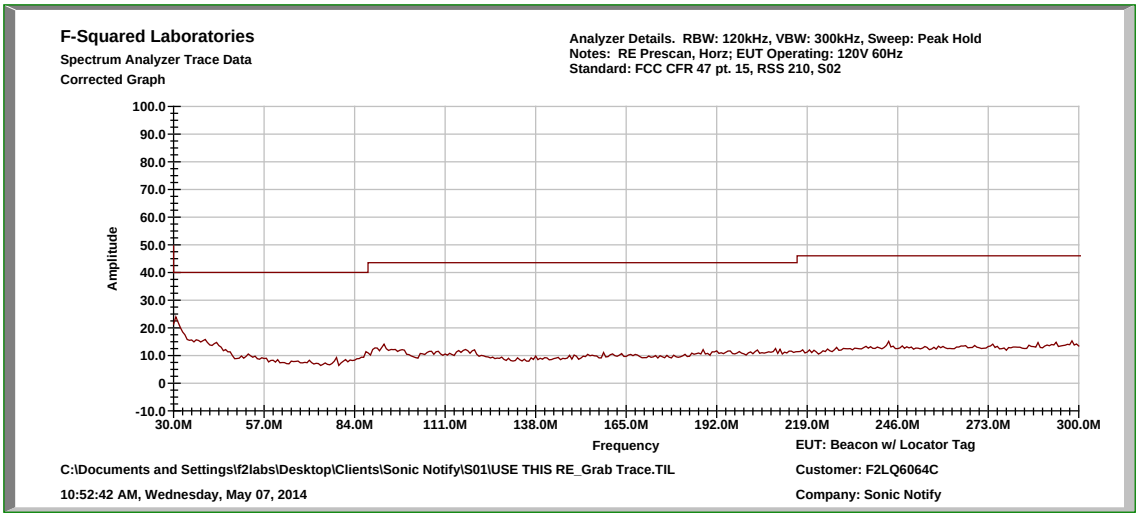
Mid Channel, .009 to 0.15 MHz



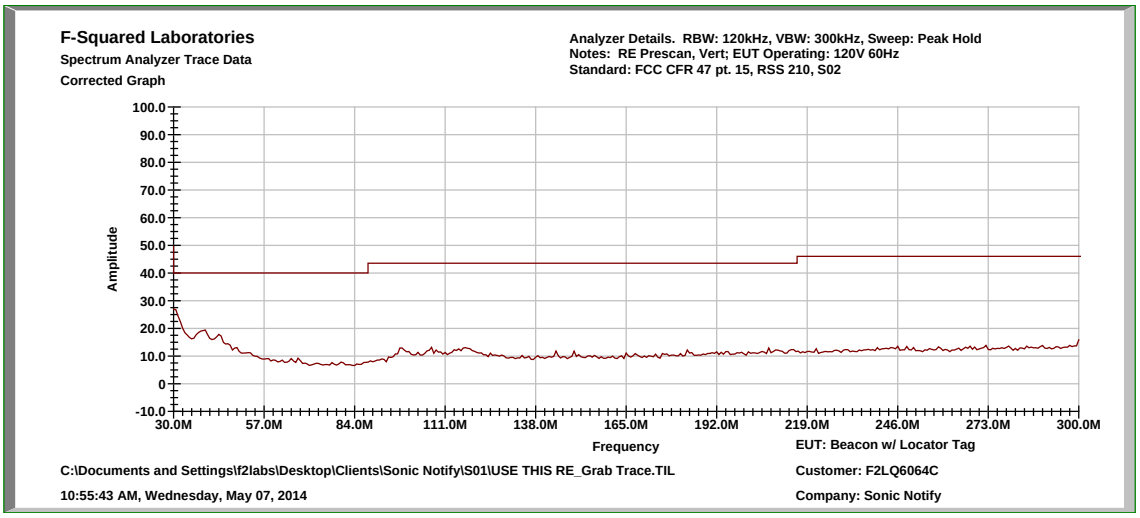
Mid Channel, 0.15 MHz to 30 MHz



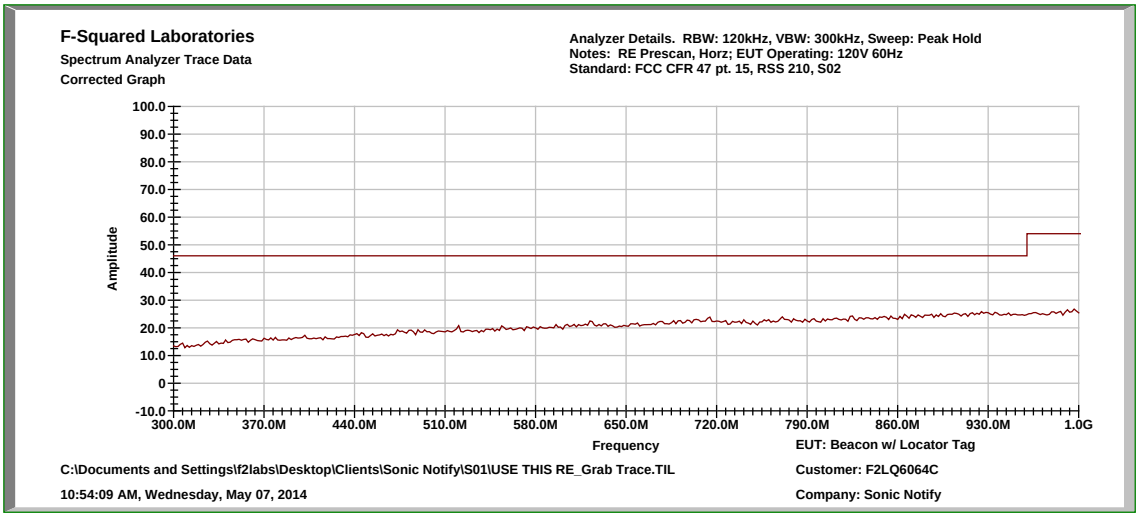
Mid Channel, 30 MHz to 300 MHz, Horizontal



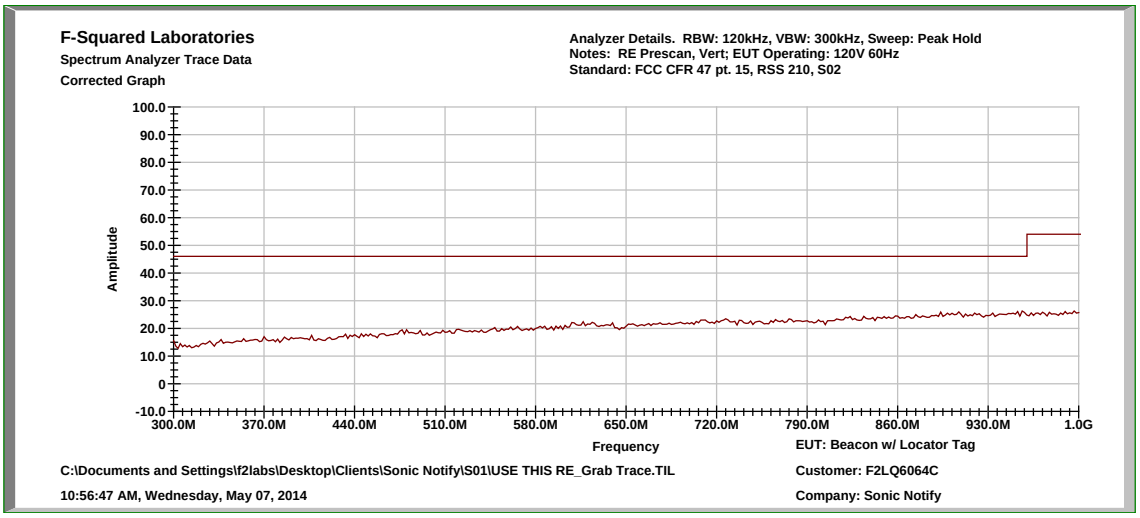
Mid Channel, 30 MHz to 300 MHz, Vertical



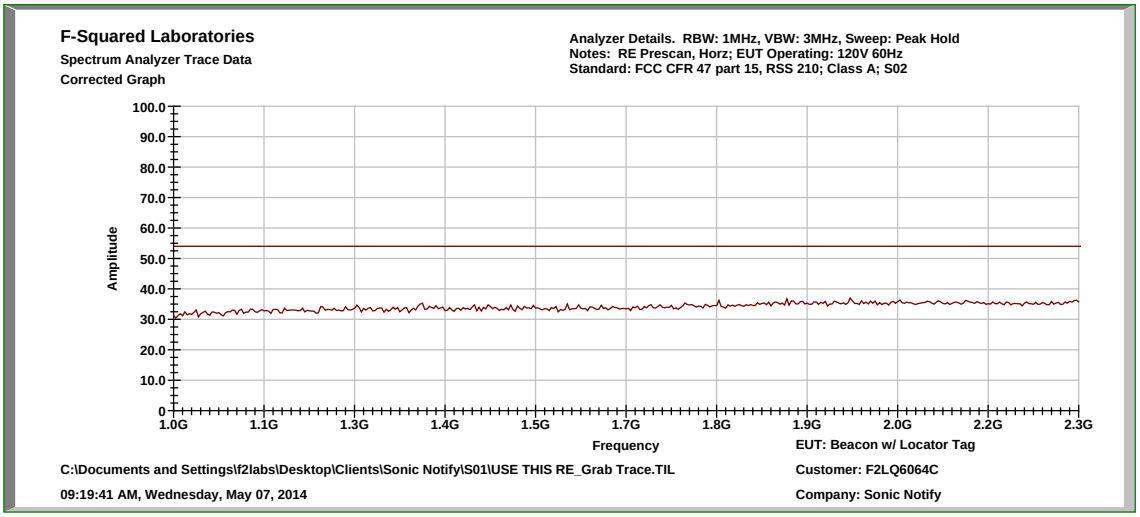
Mid Channel, 300 MHz to 1 GHz, Horizontal



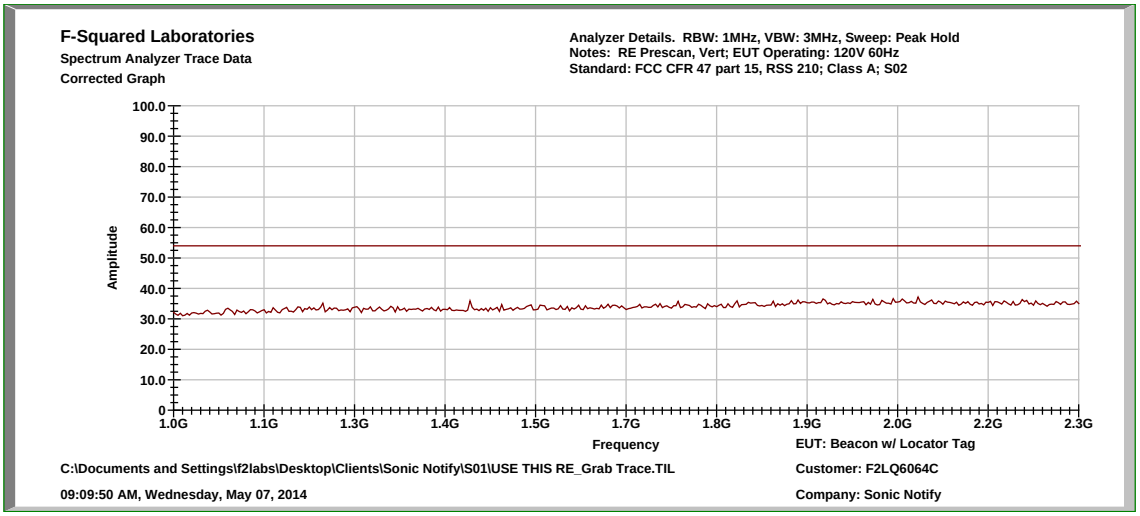
Mid Channel, 300 MHz to 1 GHz, Vertical



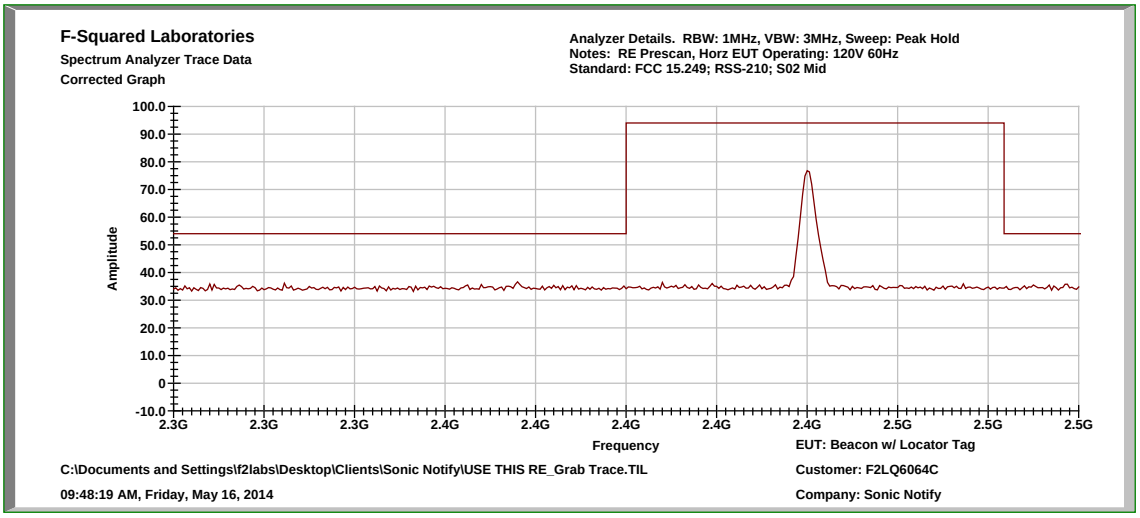
Mid Channel, 1 GHz to 2.3 GHz, Horizontal



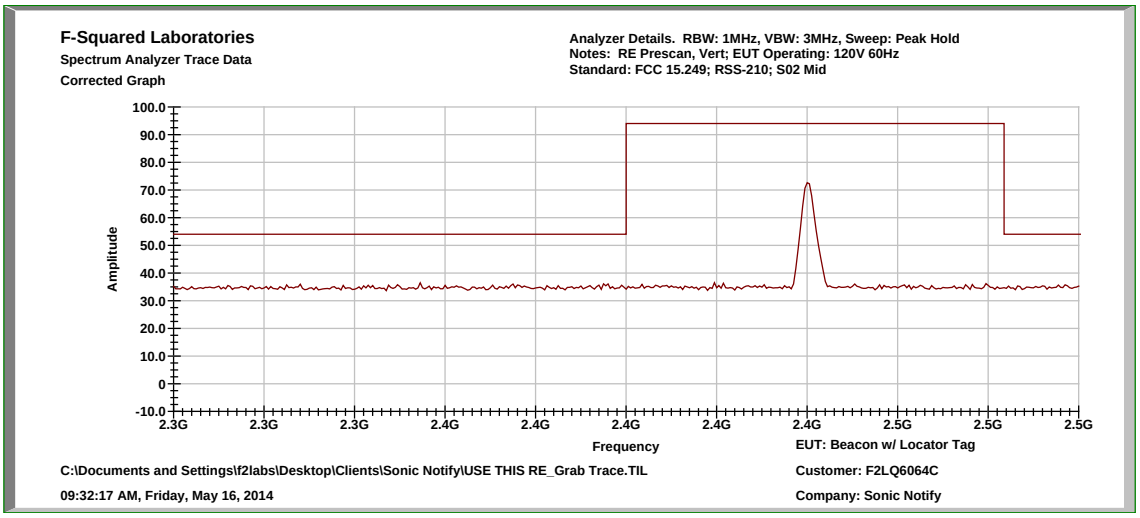
Mid Channel, 1 GHz to 2.3 GHz, Vertical



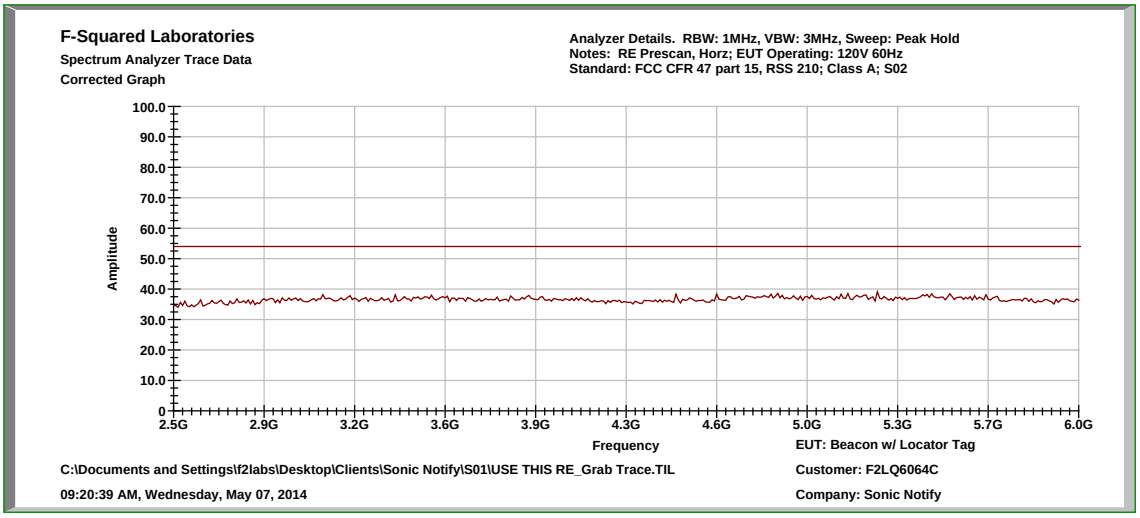
Mid Channel, 2.3 GHz to 2.6 GHz, Horizontal



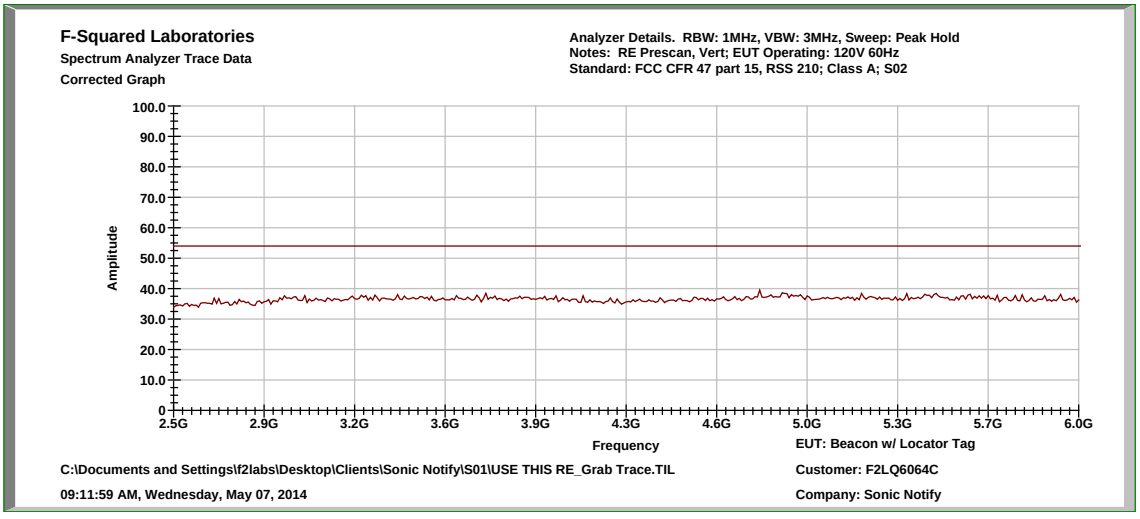
Mid Channel, 2.3 GHz to 2.6 GHz, Vertical



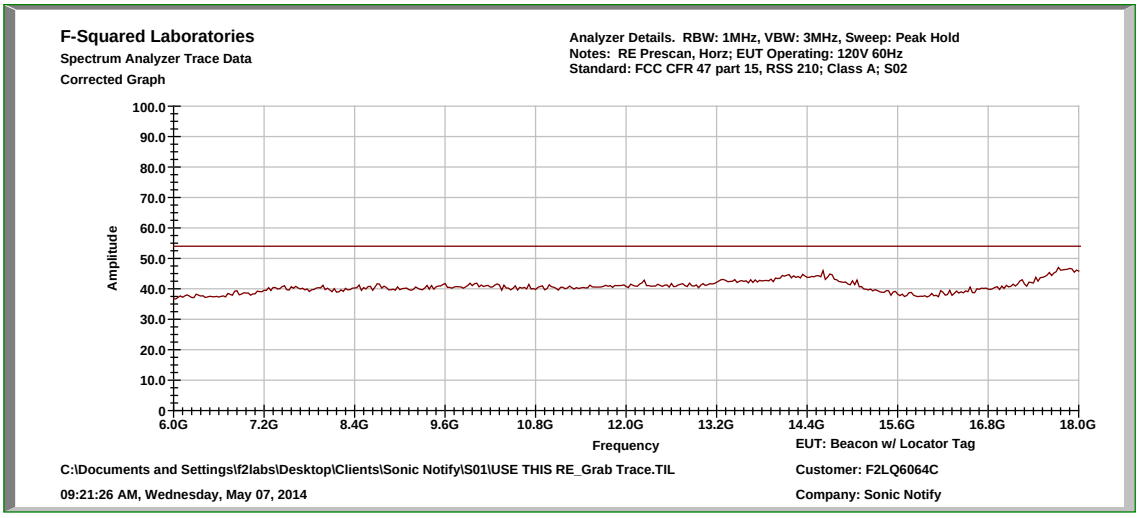
Mid Channel, 2.6 GHz to 6 GHz, Horizontal



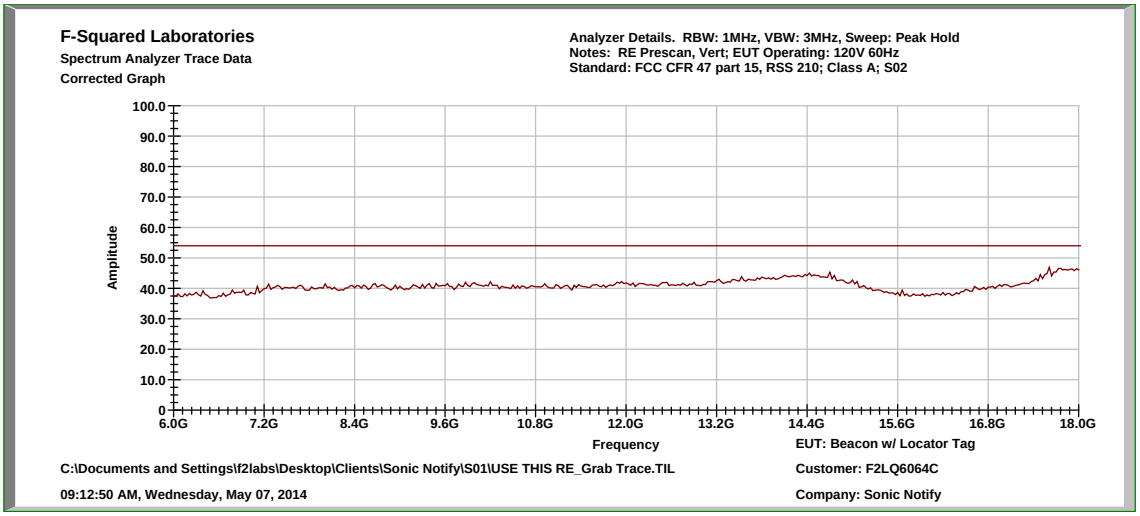
Mid Channel, 2.6 GHz to 6 GHz, Vertical



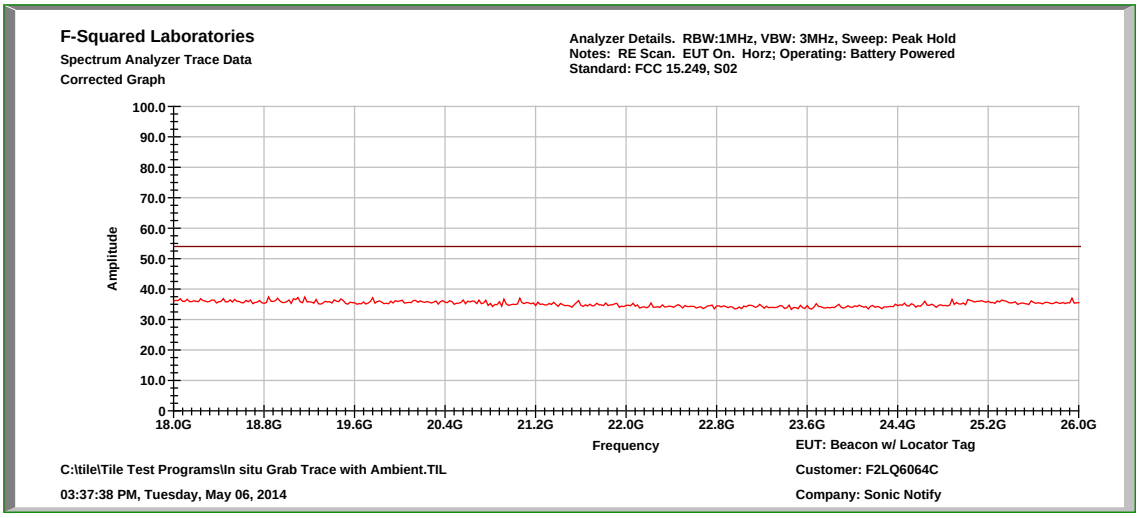
Mid Channel, 6 GHz to 18 GHz, Horizontal



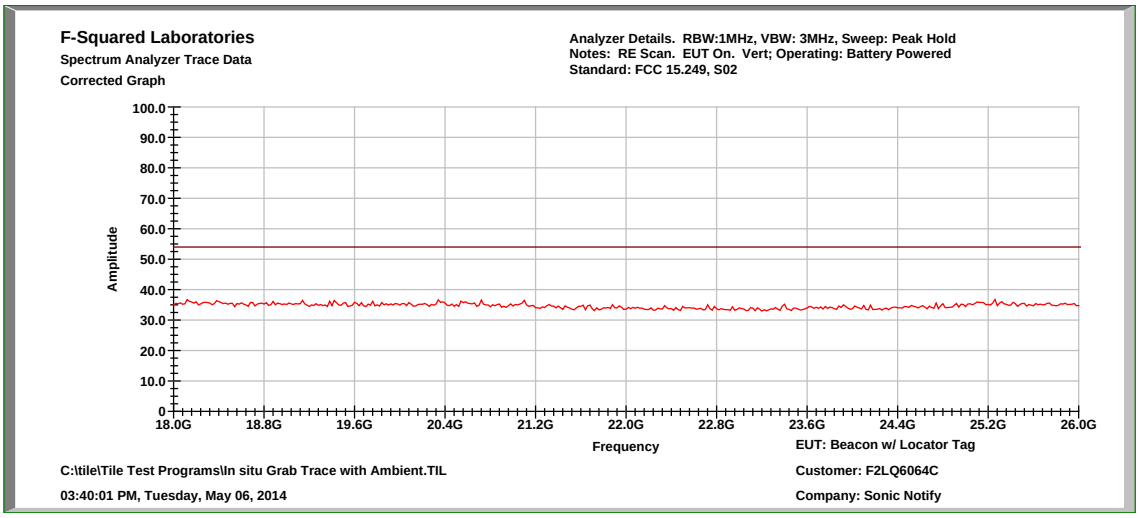
Mid Channel, 6 GHz to 18 GHz, Vertical



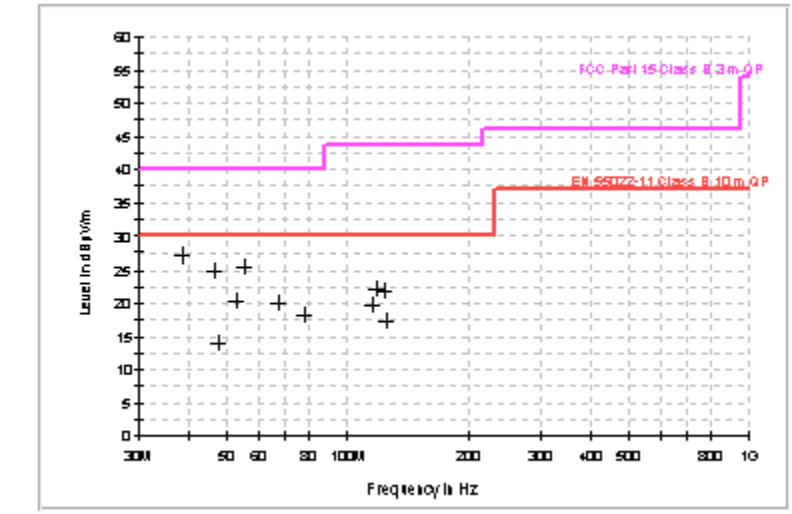
Mid Channel, 18 GHz to 26 GHz, Horizontal



Mid Channel, 18 GHz to 26 GHz, Vertical

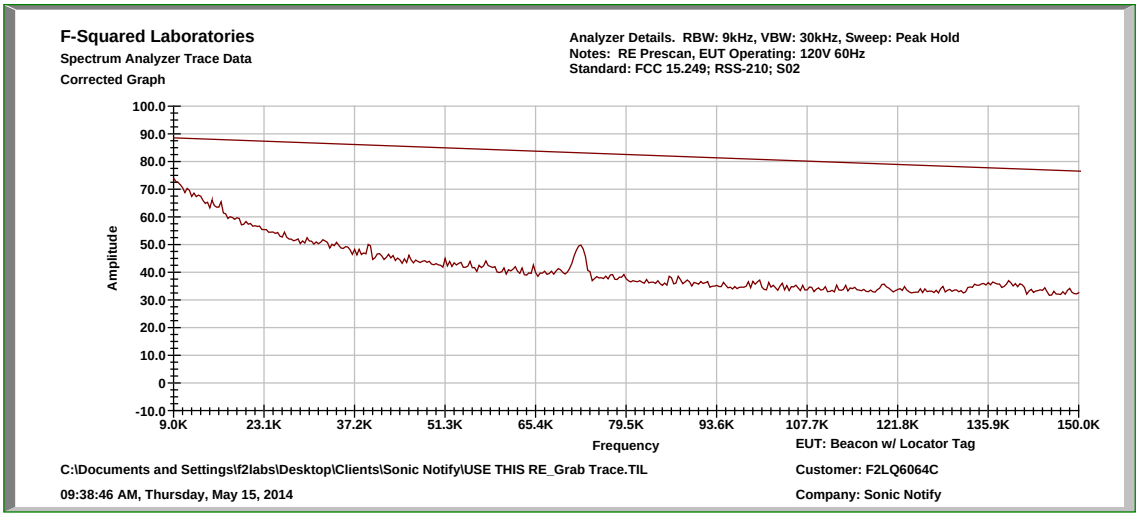


Mid Channel

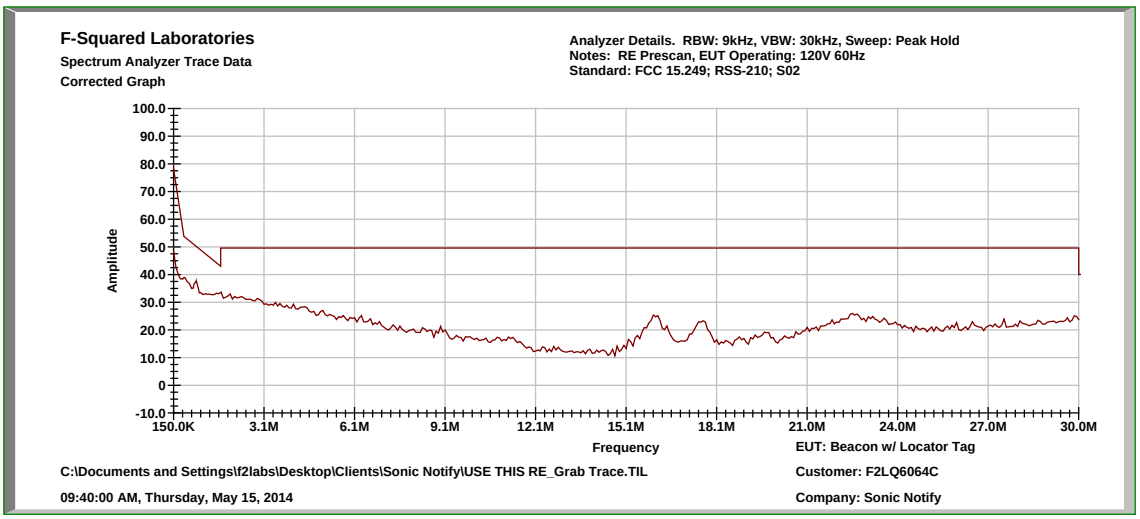


Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
38.720000	27.1	50.0	120.000	155.0	V	15.7	12.9	40.0
46.570000	24.8	50.0	120.000	155.0	V	11.5	15.2	40.0
47.570000	14.0	50.0	120.000	155.0	H	11.2	26.0	40.0
52.910000	20.2	50.0	120.000	155.0	V	10.0	19.8	40.0
55.590000	25.4	50.0	120.000	155.0	H	10.3	14.6	40.0
67.370000	19.9	50.0	120.000	155.0	V	10.6	20.1	40.0
78.210000	18.3	50.0	120.000	155.0	H	10.9	21.7	40.0
115.370000	19.7	50.0	120.000	155.0	H	17.4	23.8	43.5
117.930000	22.2	50.0	120.000	155.0	V	17.4	21.3	43.5
123.370000	21.9	50.0	120.000	155.0	V	18.0	21.6	43.5
124.750000	17.4	50.0	120.000	155.0	H	17.9	26.1	43.5

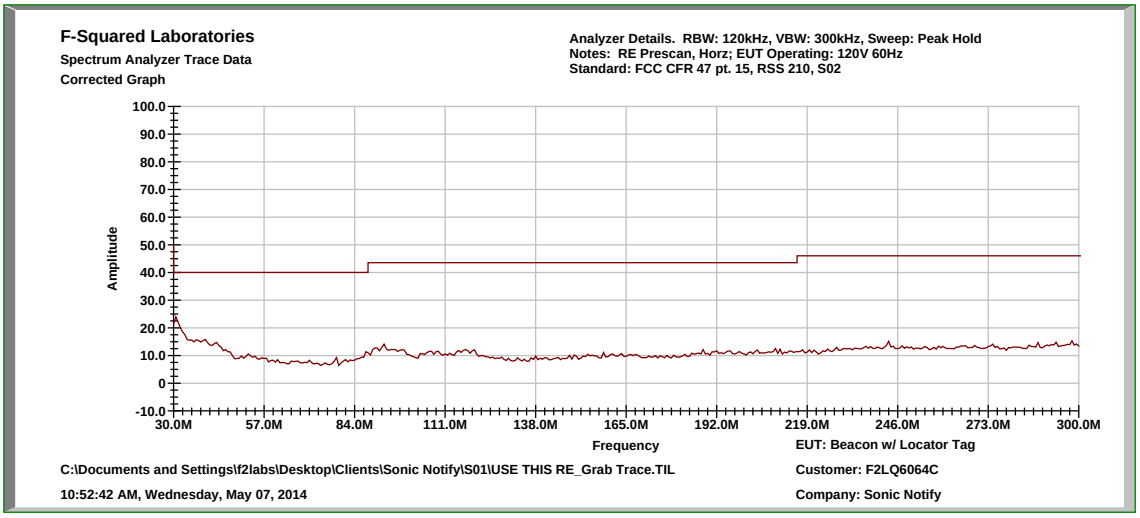
High Channel, .009 to 0.15 MHz



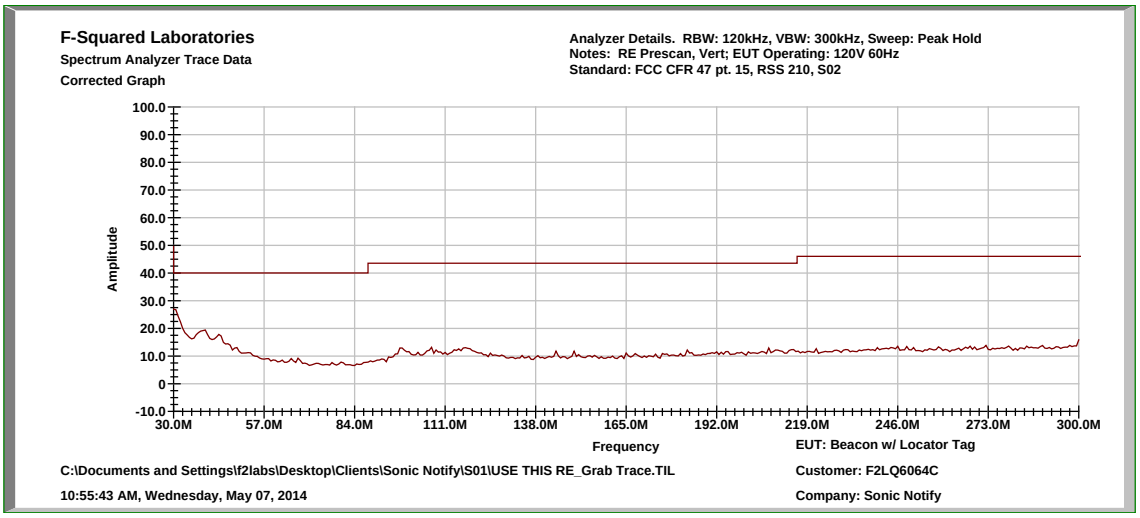
High Channel, 0.15 MHz to 30 MHz



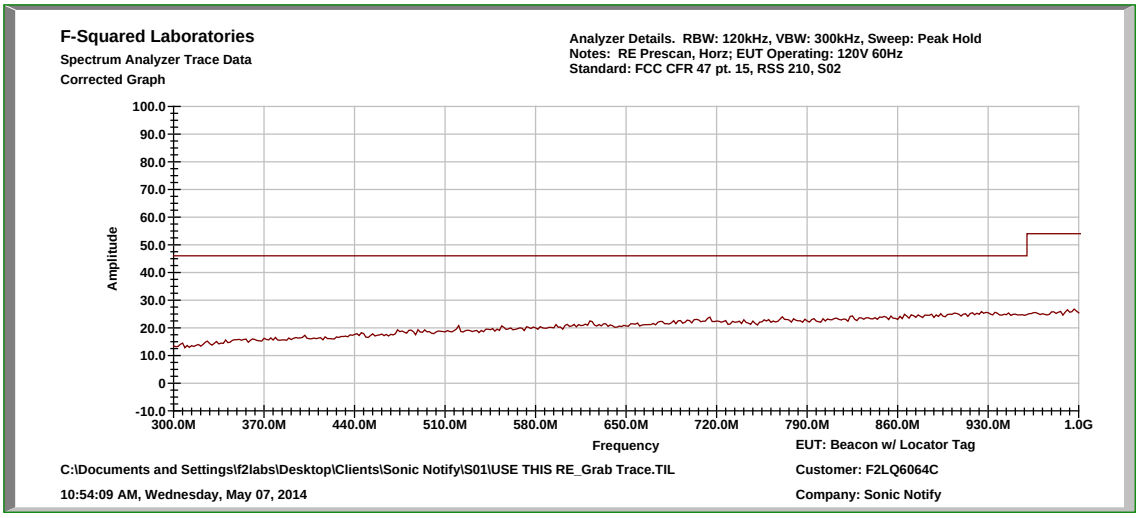
High Channel, 30 MHz to 300 MHz, Horizontal



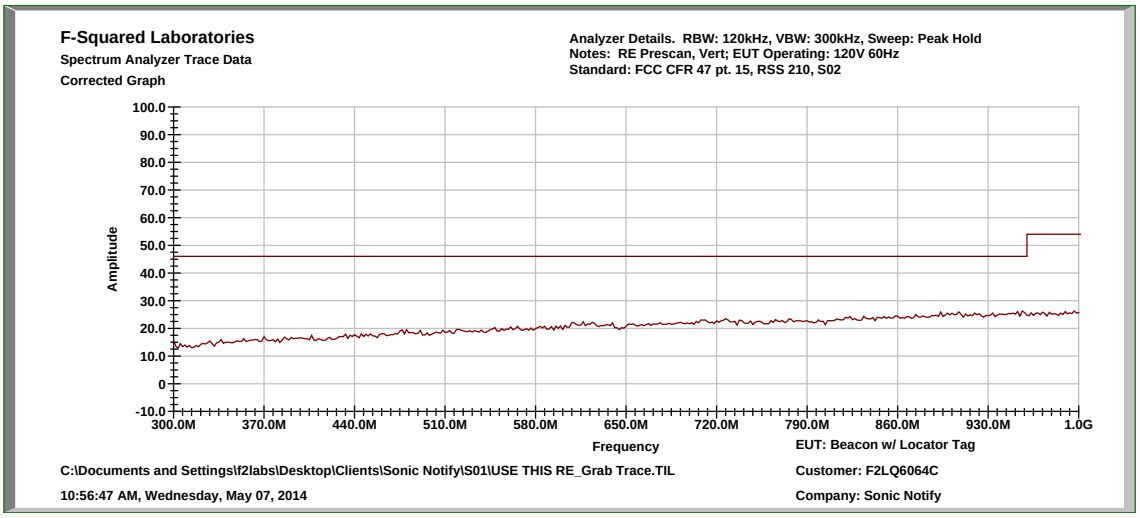
High Channel, 30 MHz to 300 MHz, Vertical



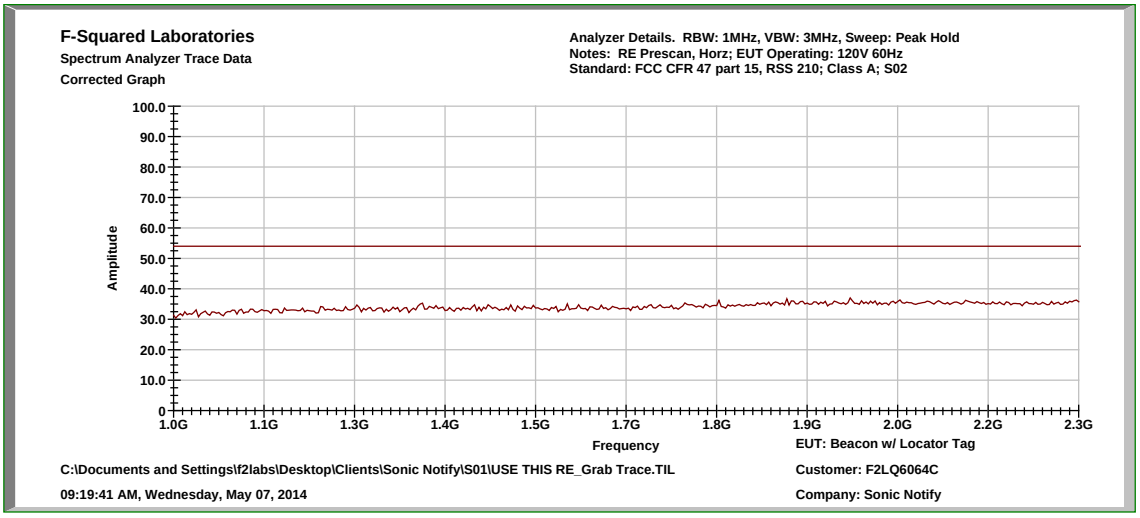
High Channel, 300 MHz to 1 GHz, Horizontal



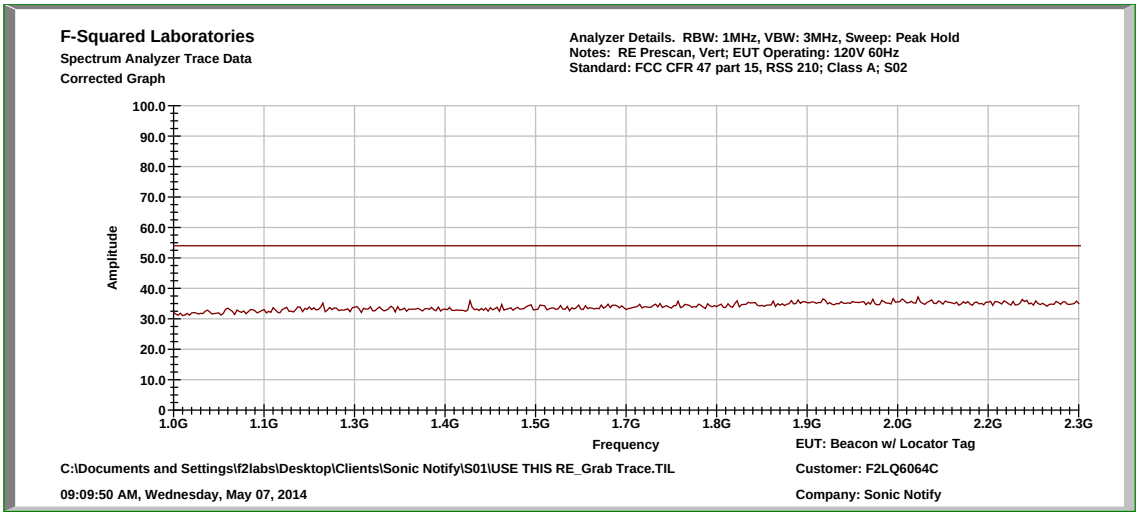
High Channel, 30 MHz to 1 GHz, Vertical



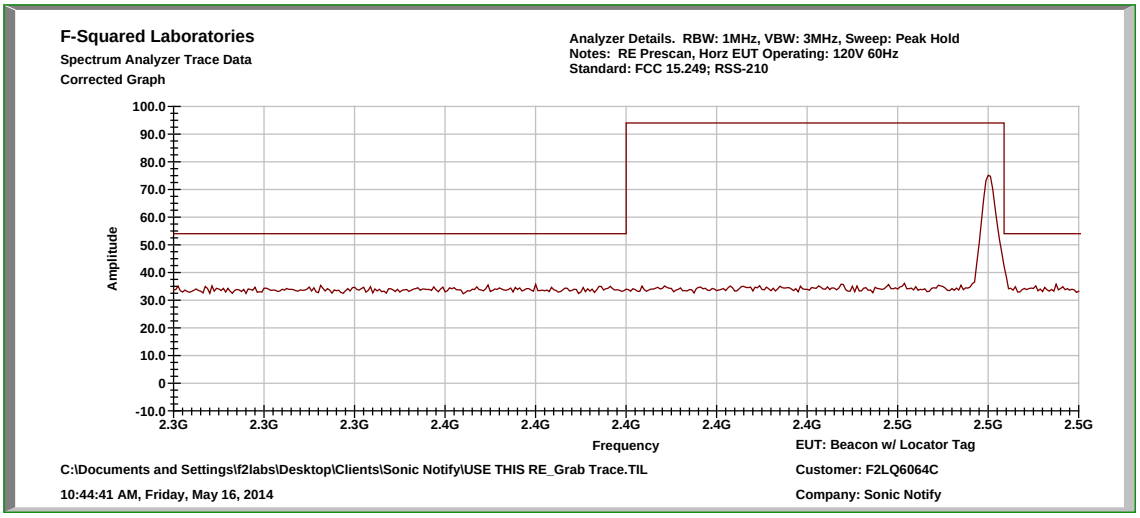
High Channel, 1 GHz to 2.3 GHz, Horizontal



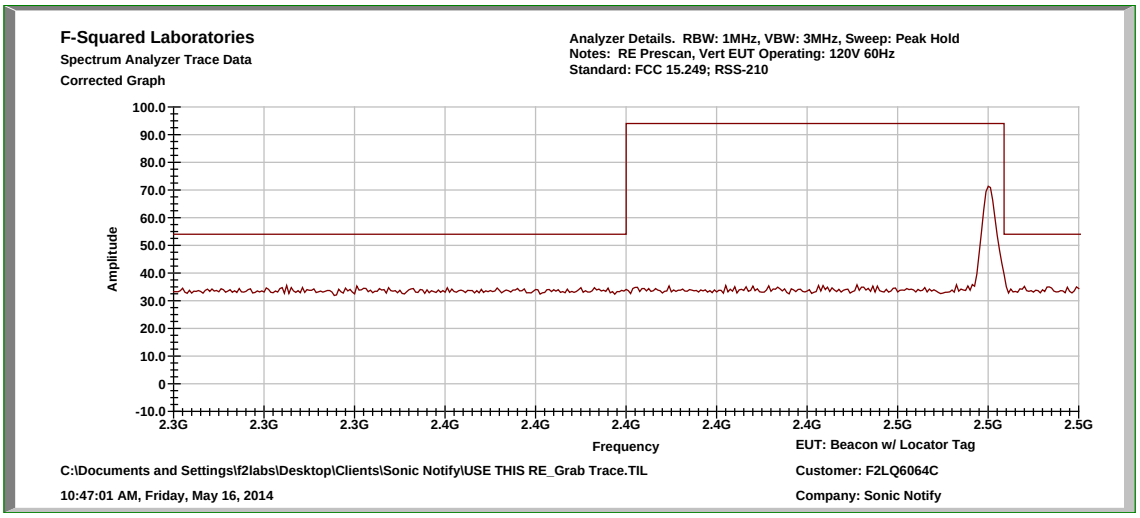
High Channel, 1 GHz to 2.3 GHz, Vertical



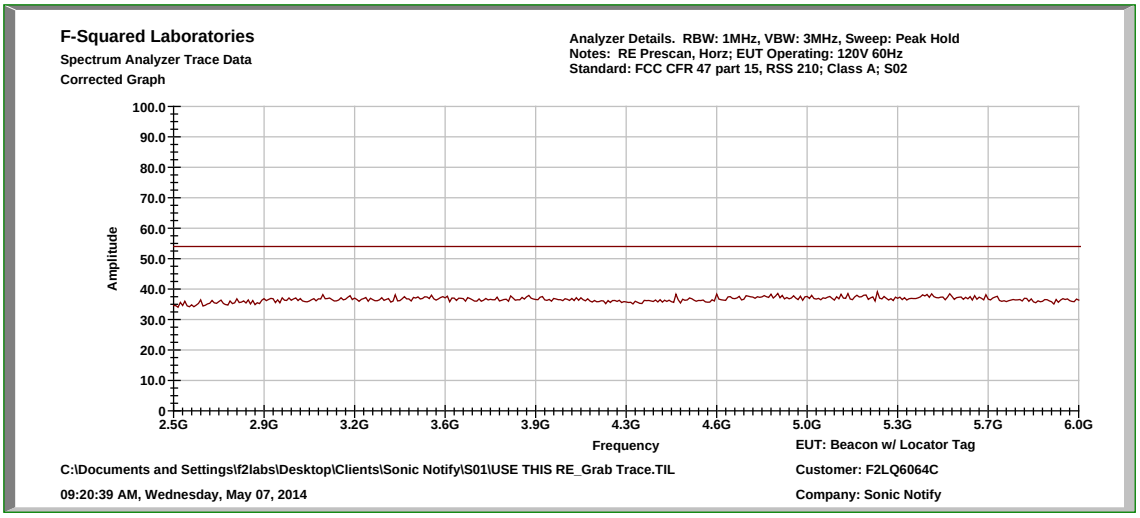
High Channel, 2.3 GHz to 2.6 GHz, Horizontal



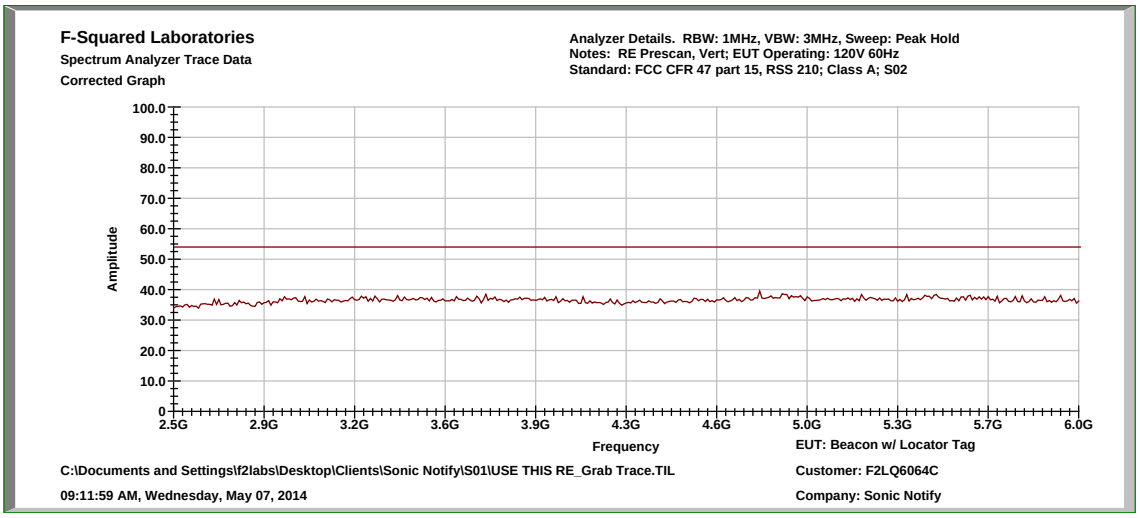
High Channel, 2.3 GHz to 2.6 GHz, Vertical



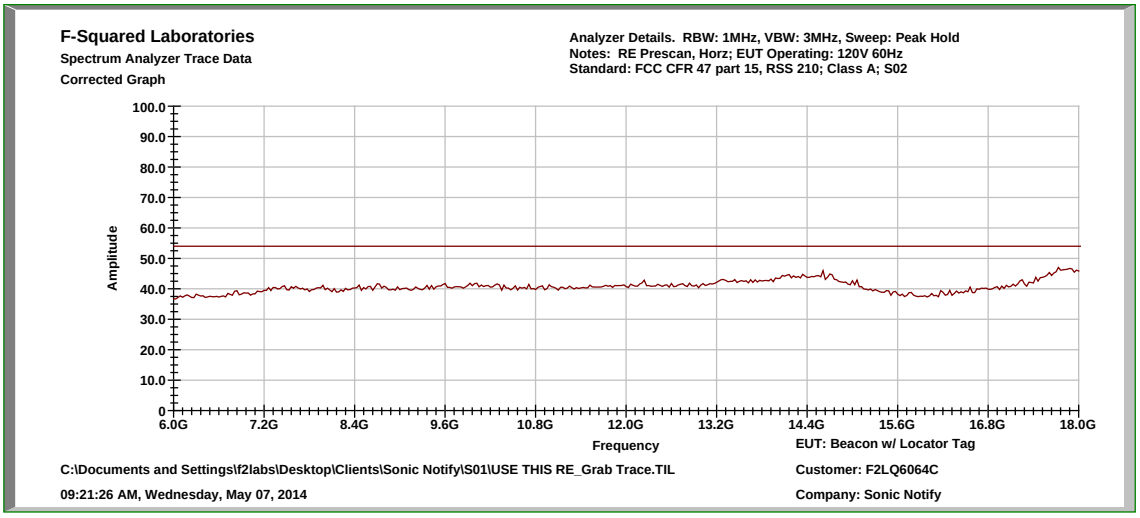
High Channel, 2.6 GHz to 6 GHz, Horizontal



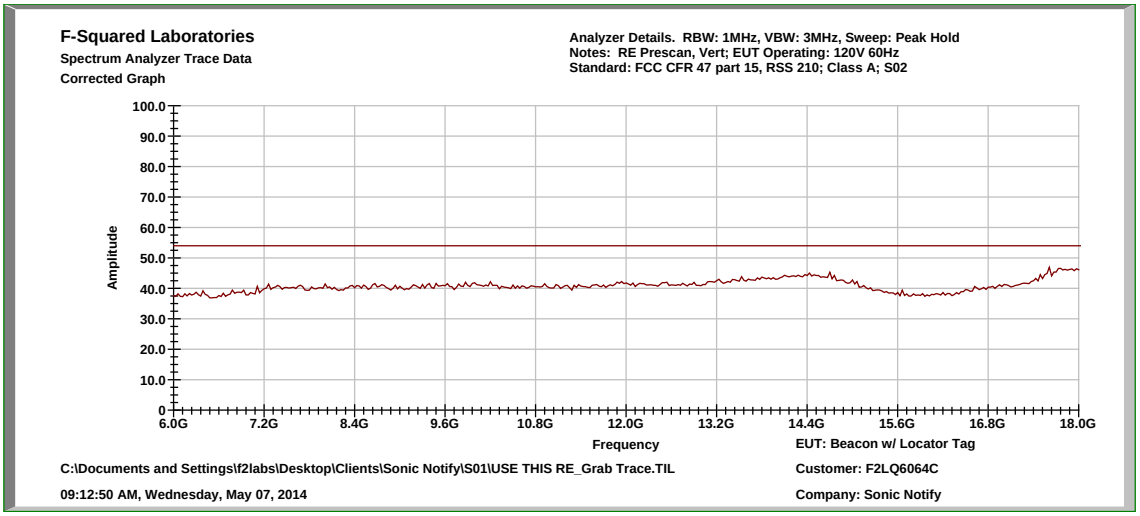
High Channel, 2.6 GHz to 6 GHz, Vertical



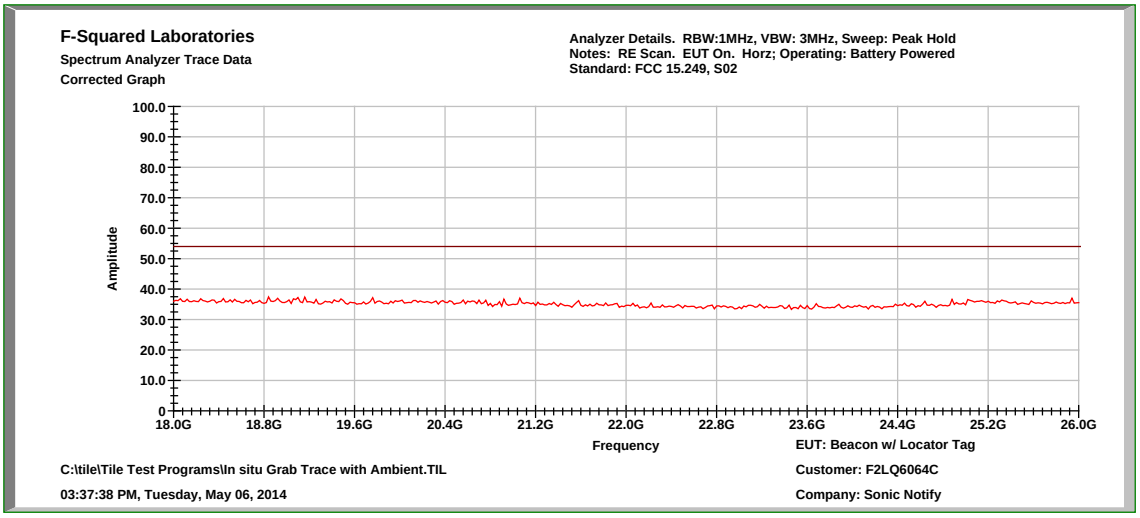
High Channel, 6 GHz to 18 GHz, Horizontal



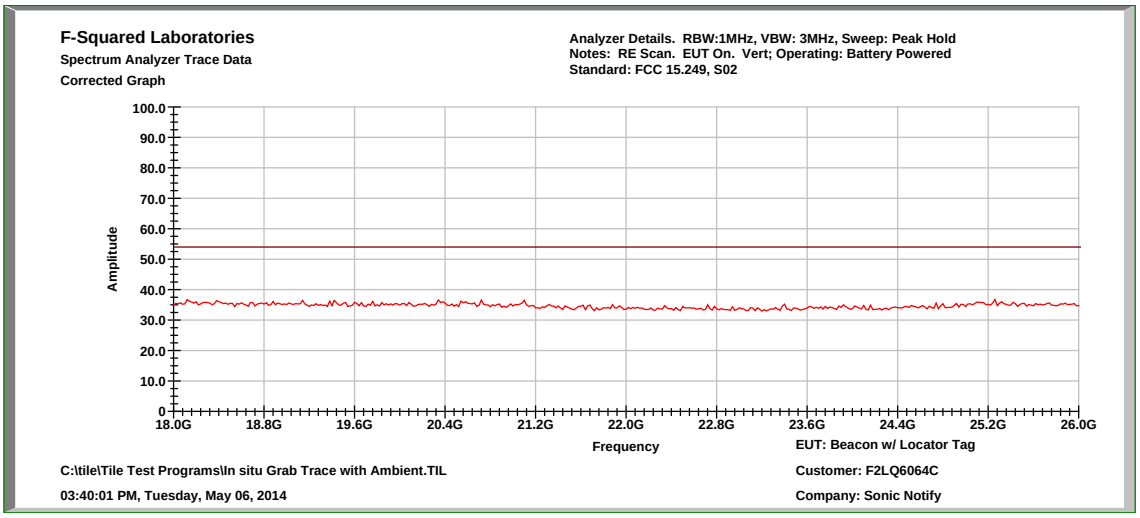
High Channel, 6 GHz to 18 GHz, Vertical



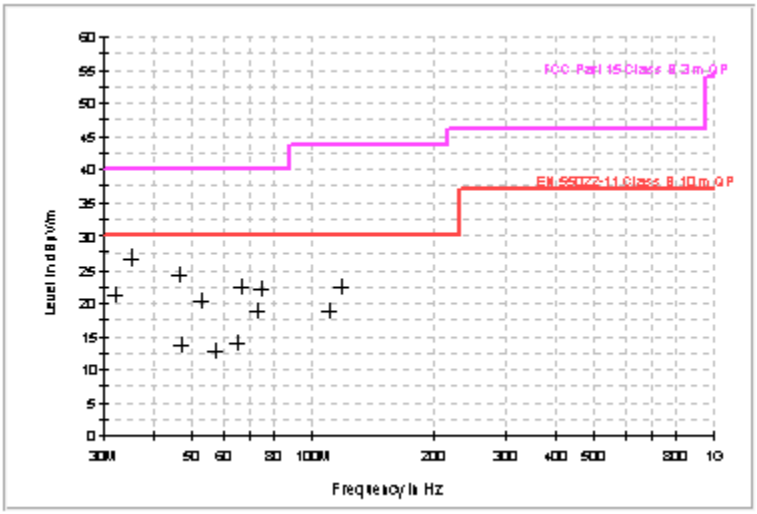
High Channel, 18 GHz to 26 GHz, Horizontal



High Channel, 18 GHz to 26 GHz, Vertical



High Channel



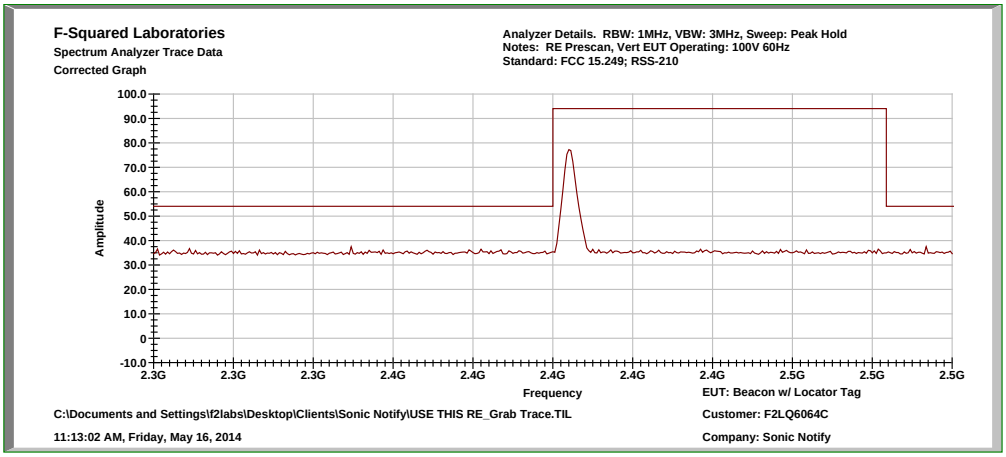
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.040000	21.2	50.0	120.000	155.0	H	21.4	18.8	40.0
35.070000	26.6	50.0	120.000	155.0	V	18.2	13.4	40.0
46.260000	24.3	50.0	120.000	155.0	V	11.6	15.7	40.0
47.210000	13.7	50.0	120.000	155.0	H	11.3	26.3	40.0
52.910000	20.3	50.0	120.000	155.0	V	10.0	19.7	40.0
57.000000	12.6	50.0	120.000	155.0	H	10.5	27.4	40.0
64.990000	14.0	50.0	120.000	155.0	H	10.9	26.0	40.0
66.660000	22.3	50.0	120.000	155.0	V	10.5	17.7	40.0
72.910000	18.7	50.0	120.000	155.0	H	11.2	21.3	40.0
75.000000	22.1	50.0	120.000	155.0	V	10.7	17.9	40.0
110.220000	18.8	50.0	120.000	155.0	H	16.9	24.7	43.5
117.830000	22.6	50.0	120.000	155.0	V	17.4	20.9	43.5

7 VOLTAGE VARIATIONS-15.31(E)

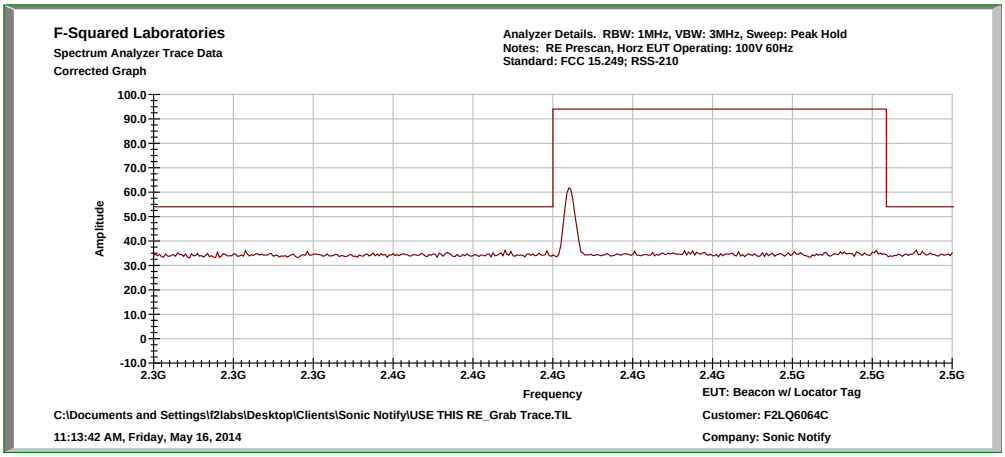
For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery. A nominal voltage of 120VAC was used and then 100VAC and 138VAC were used as the 85% and 115% variations.

RESULTS: The results showed that the fundamental frequency did not move outside the frequency band and the field strength did not increase above the limit during the variations.

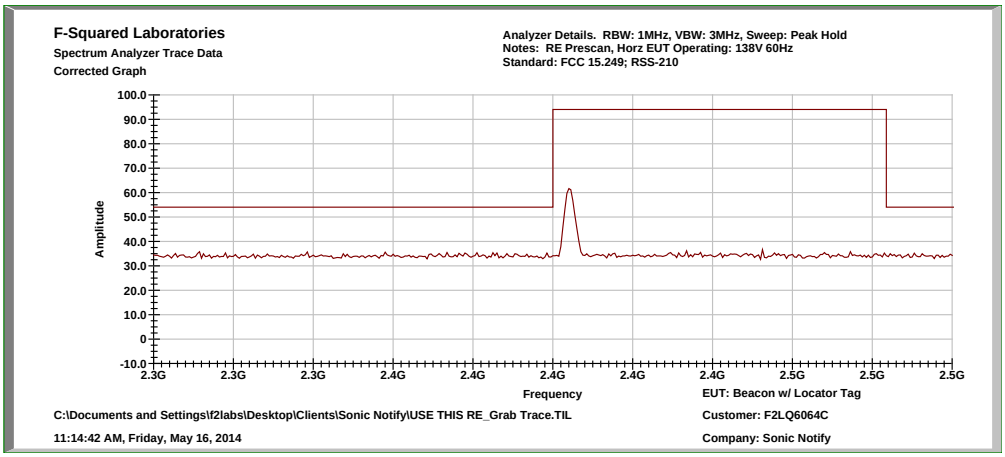
Low Channel Vertical-100VAC



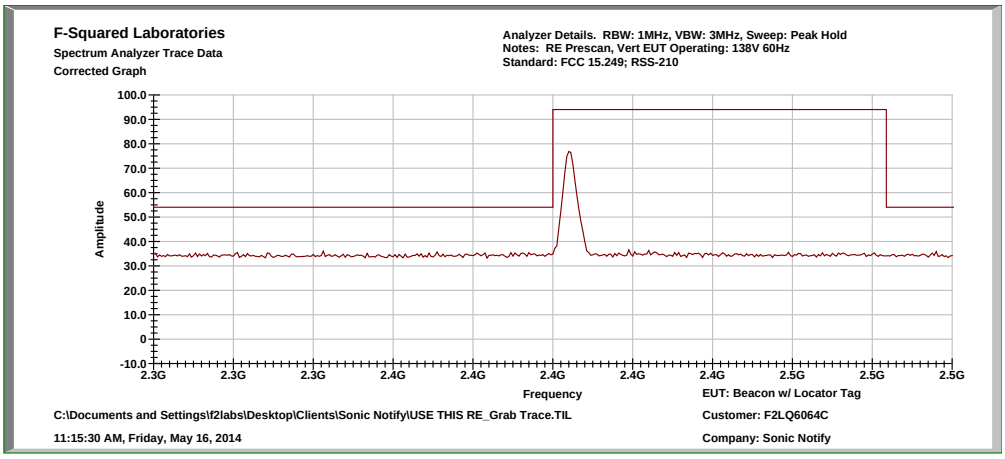
Low Channel Horizontal-100VAC



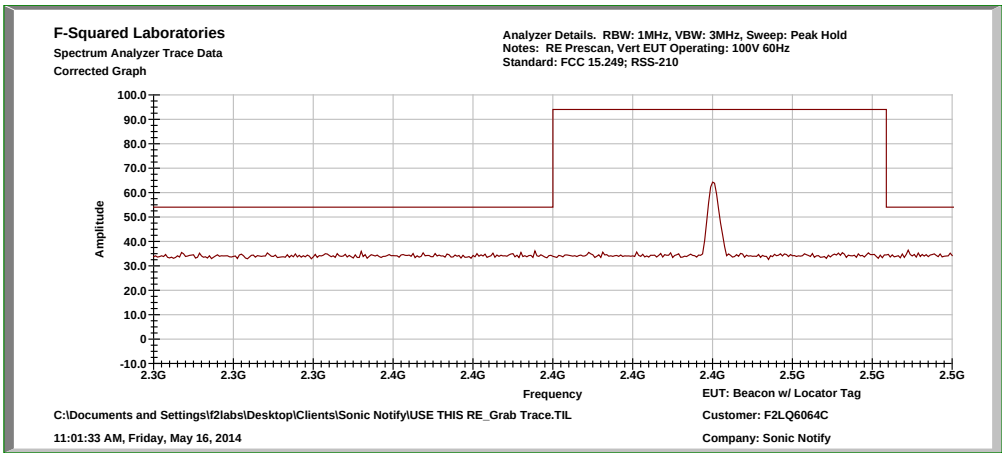
Low Channel Horizontal-138VAC



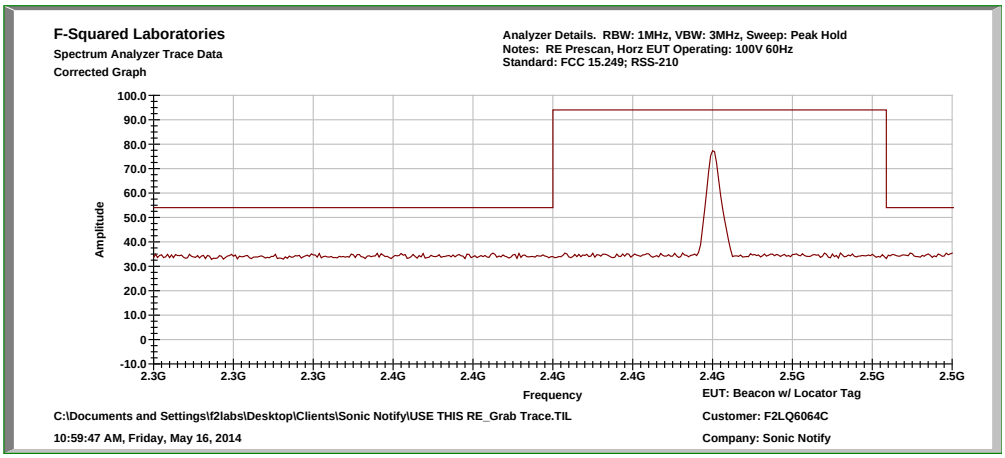
Low Channel Vertical-138VAC



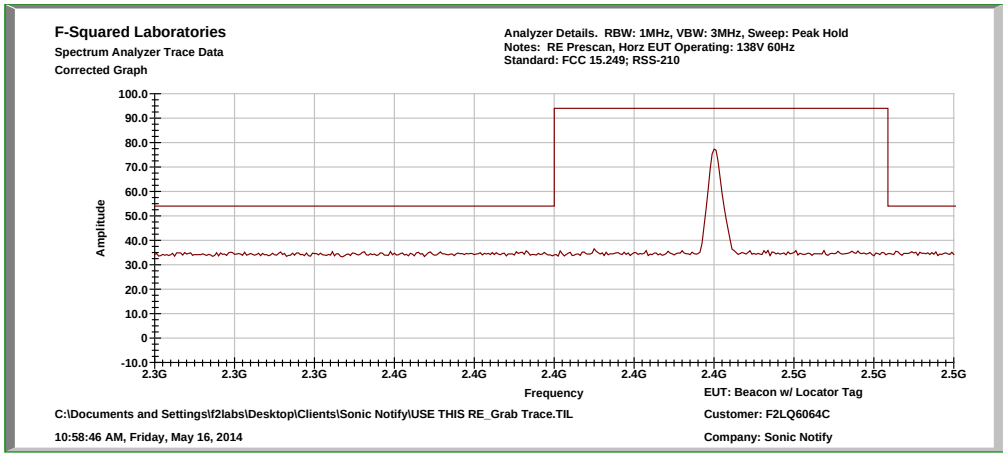
Mid Channel Vertical-100VAC



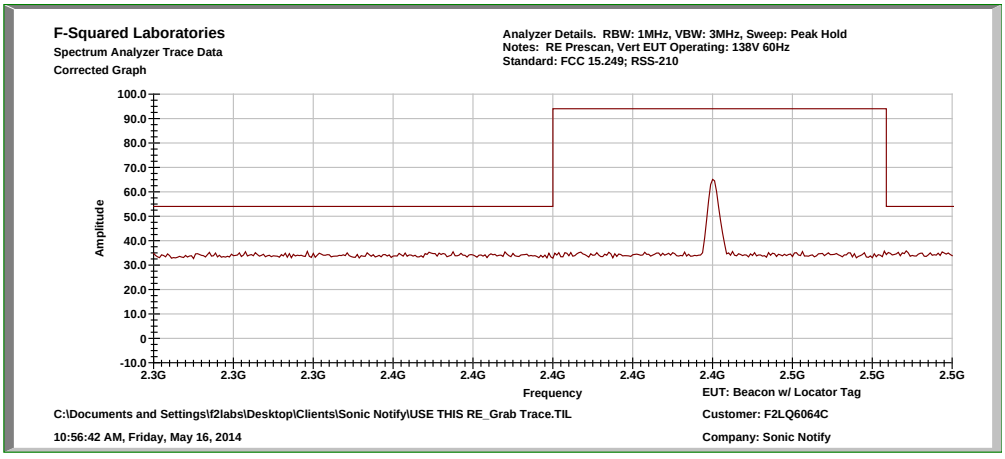
Mid Channel Horizontal-100VAC



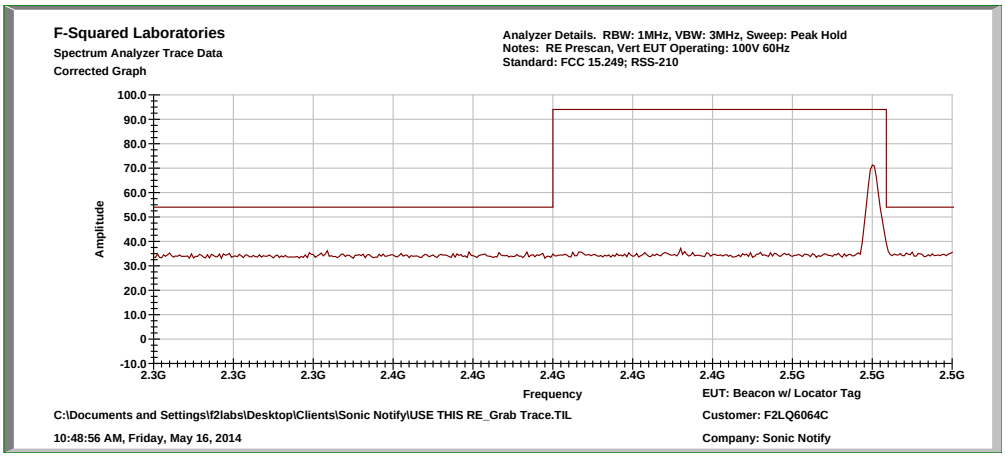
Mid Channel Horizontal-138VAC



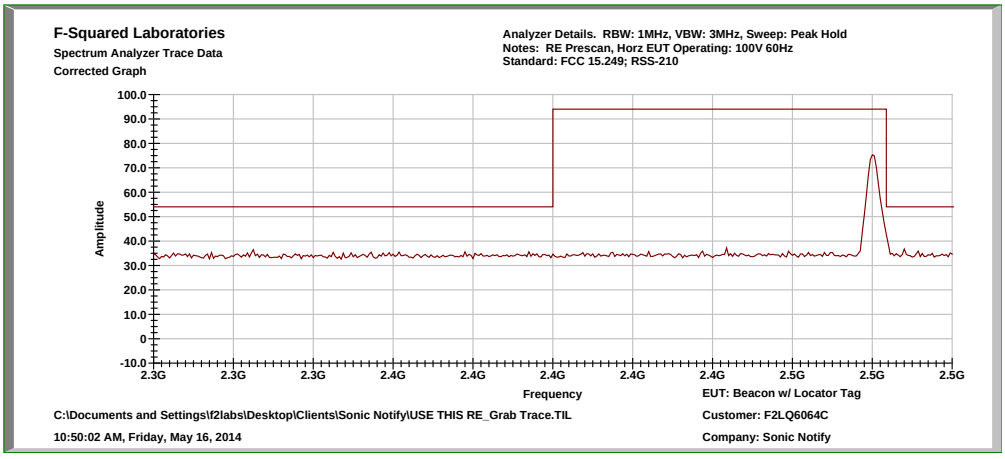
Mid Channel Vertical-138VAC



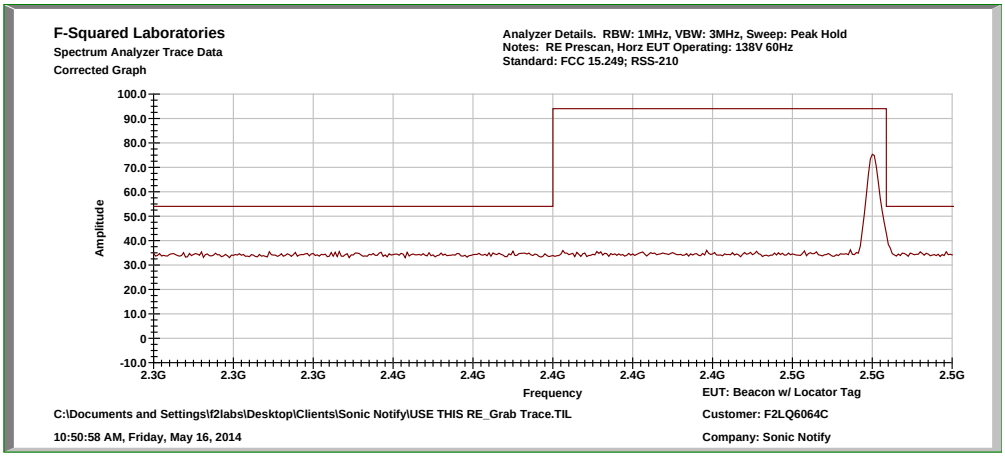
High Channel Vertical-100VAC



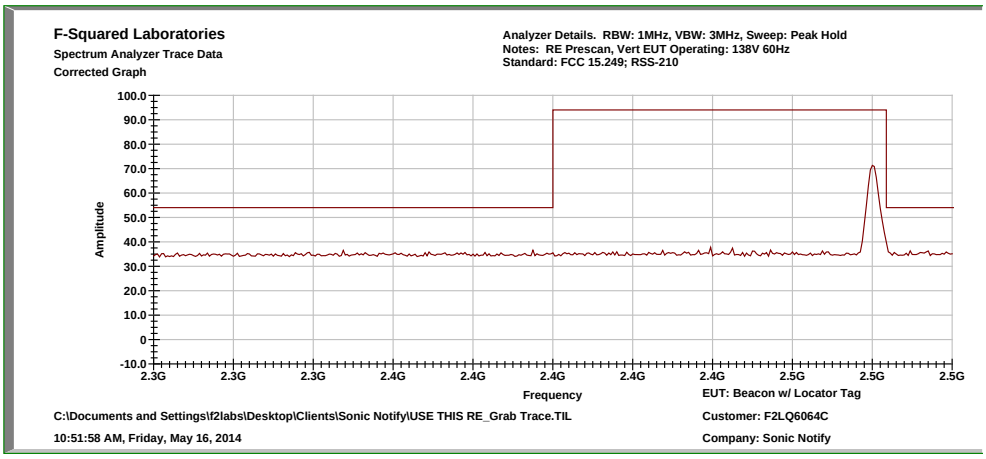
High Channel Horizontal-100VAC



High Channel Horizontal-138VAC



High Channel Vertical-138VAC



9 CONDUCTED EMISSIONS

9.1 Requirements

In accordance with FCC CFR 47 Part 15.207(a), “Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

9.2 Procedure

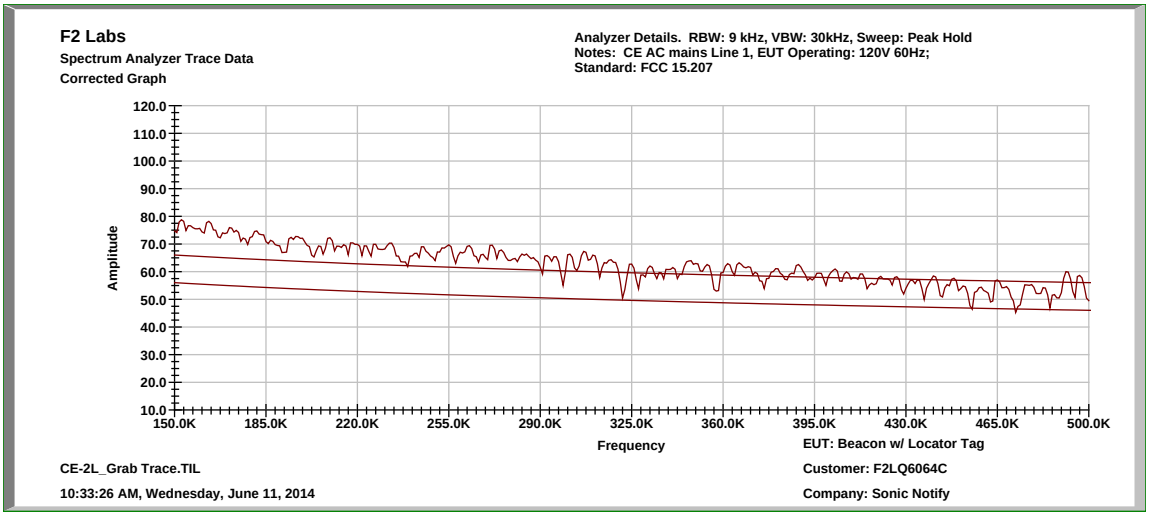
The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver via a transient limiter, and emissions in the range 150 kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak and average detectors as directed by the standard, and the resolution bandwidth during testing was 9 kHz. The raw measurements were corrected to allow for attenuation from the LISN, transient limiter and cables.

9.3 Conducted Emissions Test Data

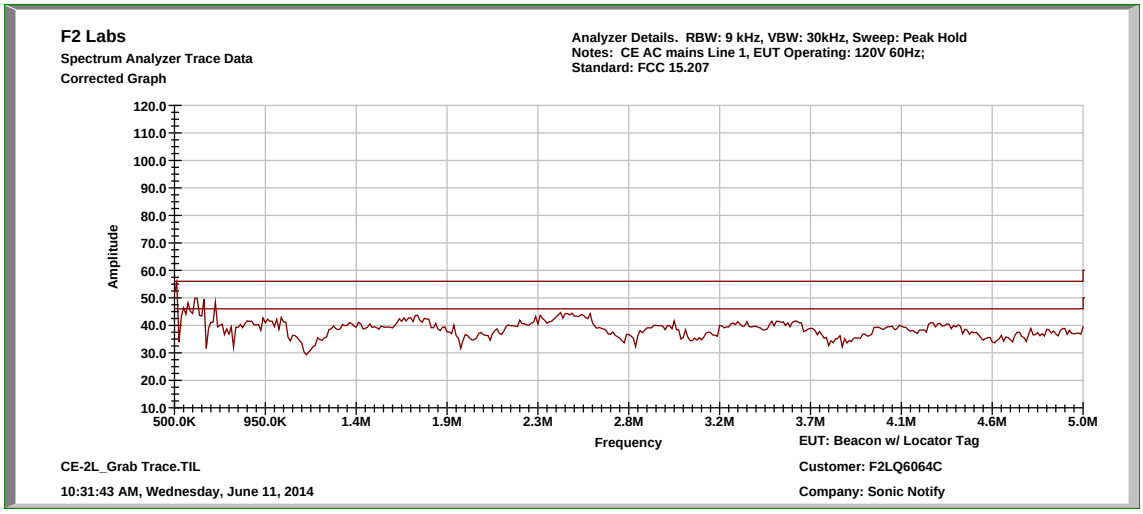
Test Date:	June 11, 2014	**Test Engineer:**	M. Toth
Rule:	15.207	**Air Temperature:**	21.9º C
Test Results:	Pass	**Relative Humidity:**	50%

Note: The data below represents worst case results of all three channels.

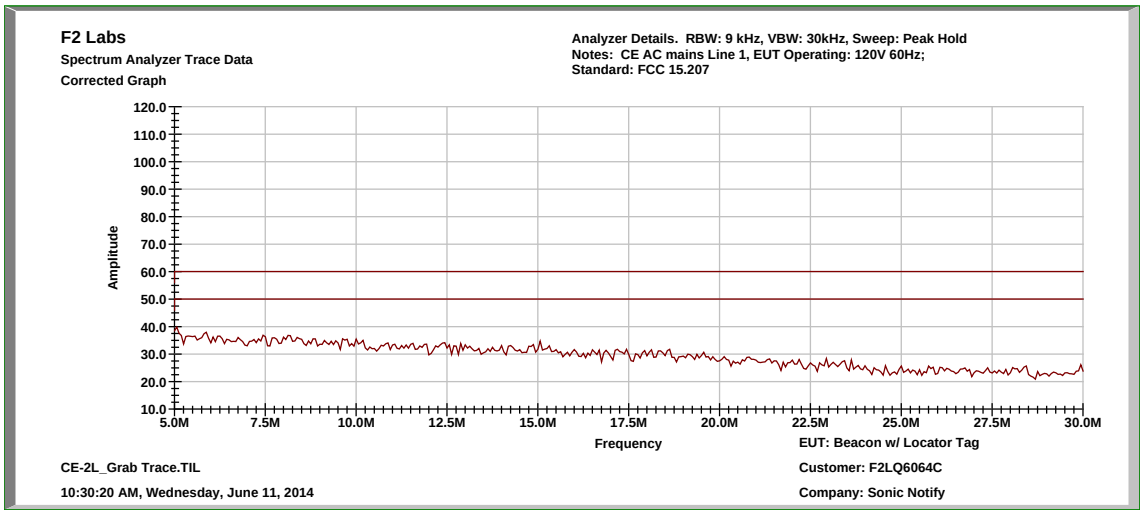
Conducted Test – Line 1: 0.15 MHz to 0.5 MHz



Conducted Test – Line 1: 0.5 MHz to 5.0 MHz

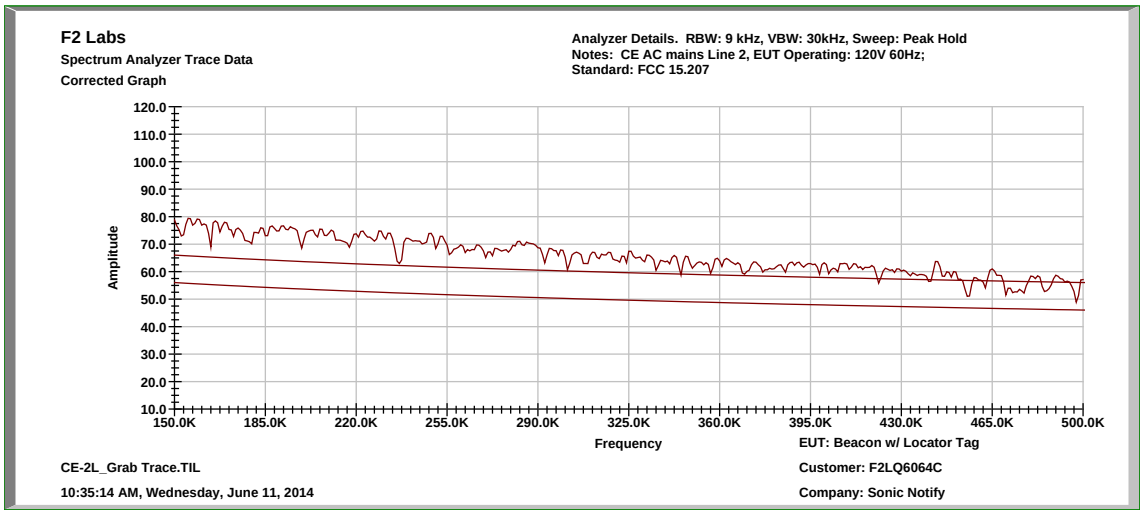


Conducted Test – Line 1: 5.0 MHz to 30.0 MHz

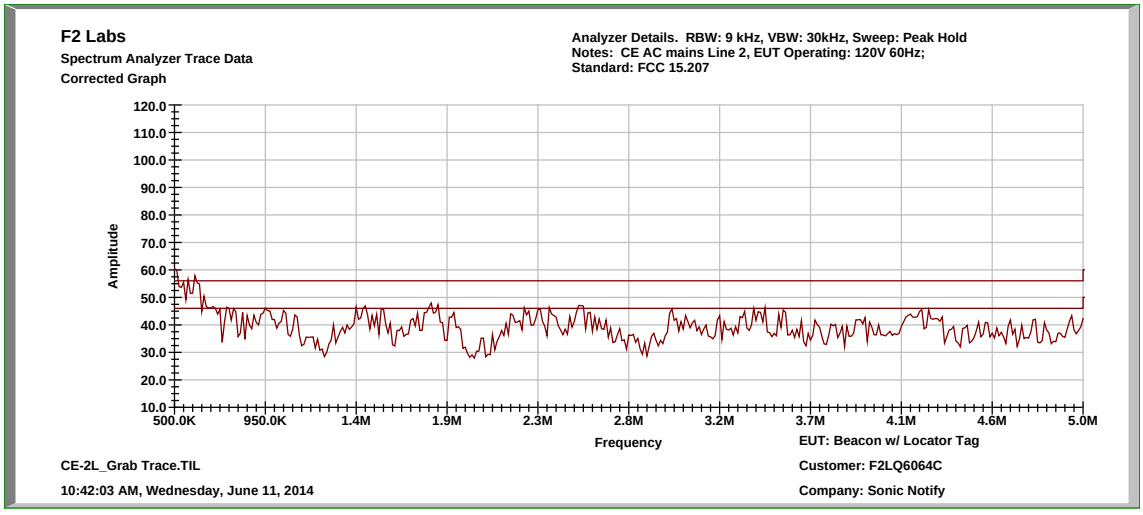


Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBµV)	Adjustment (dB)	Results (dBµV)	Limit (dBµV)	Margin (dB)
1	Line 1	0.154375	Quasi-Peak	48.37	11.0	59.37	65.76	-6.4
			Average	23.71	11.0	34.71	55.76	-21.1
2	Line 1	0.199875	Quasi-Peak	47.99	11.0	58.99	63.62	-4.6
			Average	22.20	11.0	33.20	53.62	-20.4
3	Line 1	0.227875	Quasi-Peak	41.24	11.0	52.24	62.53	-10.3
			Average	21.98	11.0	32.98	52.53	-19.6
4	Line 1	0.27075	Quasi-Peak	40.30	11.0	51.30	61.10	-9.8
			Average	19.81	11.0	30.81	51.10	-20.3
5	Line 1	0.32675	Quasi-Peak	42.79	11.0	53.79	59.53	-5.7
			Average	20.73	11.0	31.73	49.53	-17.8
6	Line 1	0.3915	Quasi-Peak	34.25	11.0	45.25	58.03	-12.8
			Average	20.29	11.0	31.29	48.03	-16.7

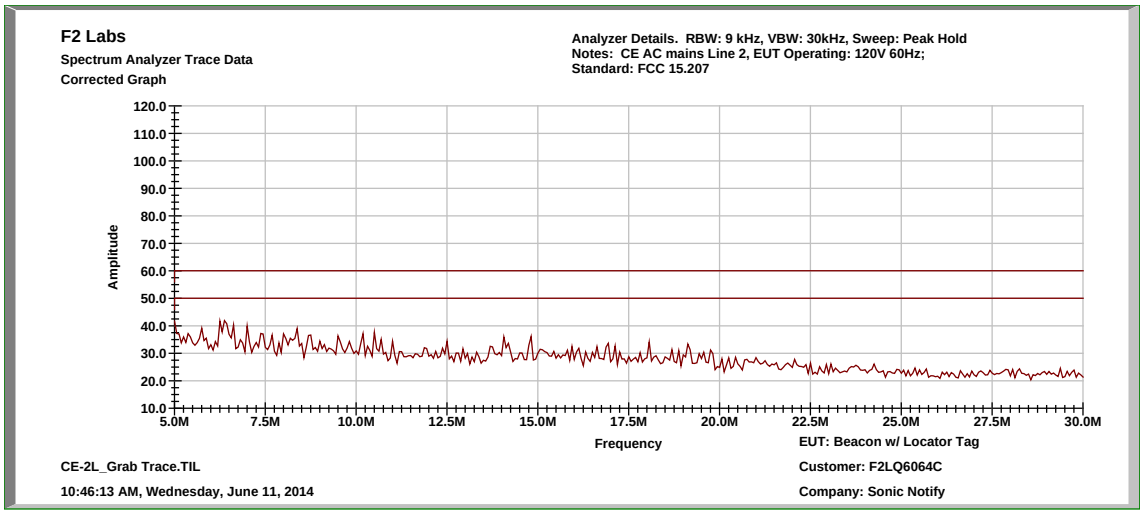
Conducted Test – Line 2: 0.15 MHz to 0.5 MHz



Conducted Test – Line 2: 0.5 MHz to 5.0 MHz



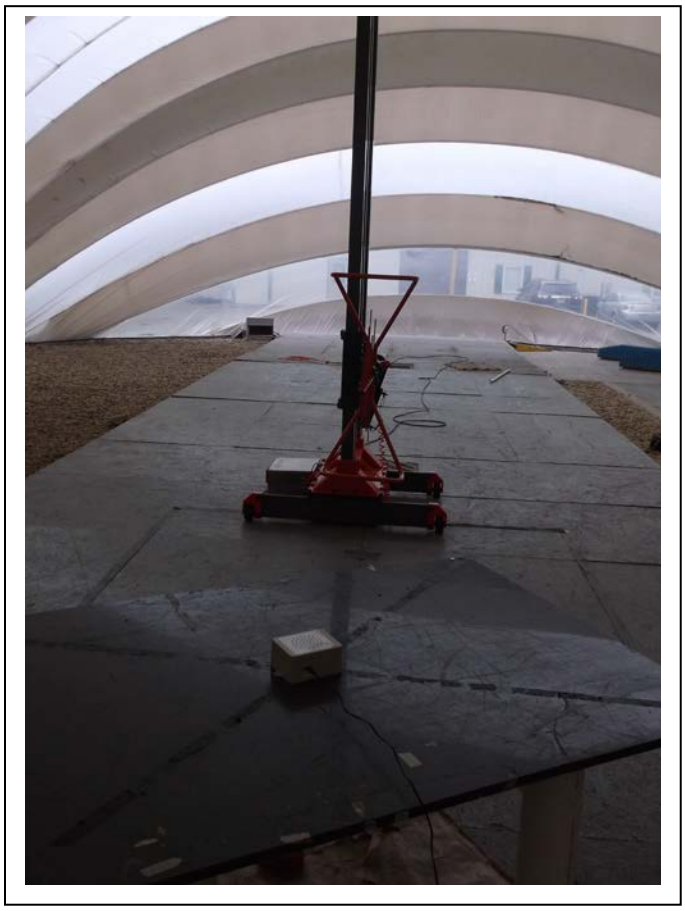
Conducted Test – Line 2: 5.0 MHz to 30.0 MHz



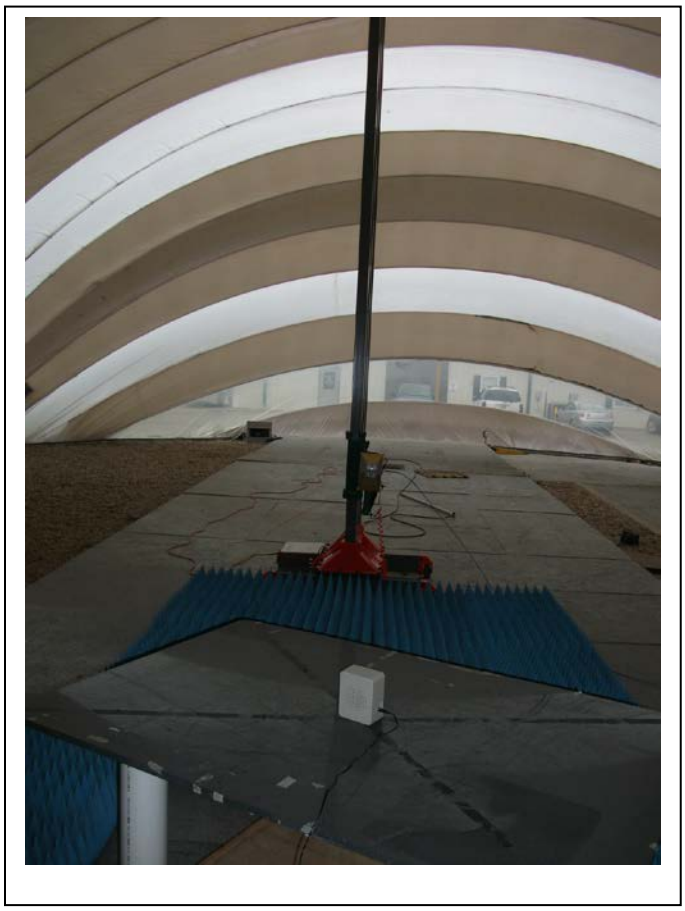
Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBµV)	Adjustment (dB)	Results (dBµV)	Limit (dBµV)	Margin (dB)
1	Line 2	0.156125	Quasi-Peak	52.59	11.0	63.59	65.67	-2.1
			Average	26.09	11.0	37.09	55.67	-18.6
2	Line 2	0.16575	Quasi-Peak	48.12	11.0	59.12	65.17	-6.1
			Average	27.06	11.0	38.06	55.17	-17.1
3	Line 2	0.192	Quasi-Peak	46.31	11.0	57.31	63.95	-6.6
			Average	27.16	11.0	38.16	53.95	-15.8
4	Line 2	0.22875	Quasi-Peak	49.82	11.0	60.82	62.50	-1.7
			Average	25.64	11.0	36.64	52.50	-15.9
5	Line 2	0.29525	Quasi-Peak	44.43	11.0	55.43	60.38	-5.0
			Average	23.28	11.0	34.28	50.38	-16.1
6	Line 2	0.35825	Quasi-Peak	42.35	11.0	53.35	58.77	-5.4
			Average	18.65	11.0	29.65	48.77	-19.1
7	Line 2	0.444	Quasi-Peak	37.63	11.0	48.63	56.99	-8.4
			Average	14.61	11.0	25.61	46.99	-21.4
8	Line 2	0.511	Quasi-Peak	35.60	11.0	46.60	56.0	-9.4
			Average	14.16	11.0	25.16	46.0	-20.8
9	Line 2	0.60125	Quasi-Peak	29.51	11.0	40.51	56.0	-15.5
			Average	12.49	11.0	23.49	46.0	-22.5
10	Line 2	1.4425	Quasi-Peak	25.82	11.0	36.82	56.0	-19.2
			Average	10.02	11.0	21.02	46.0	-25.0
11	Line 2	1.77125	Quasi-Peak	26.78	11.0	37.78	56.0	-18.2
			Average	10.17	11.0	21.17	46.0	-24.8

10 PHOTOGRAPHS/EXHIBITS – PRODUCT PHOTOS, TEST SETUPS

Spurious Emissions



Field Strength of Emissions, Occupied Bandwidth



Conducted Emissions