F2 Labs
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Middlefield, Ohio 44062
United States of America
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CERTIFICATION TEST REPORT

Manufacturer:	**Structured Mining Systems, Inc.** **d.b.a. Cervis Inc.** **170 Thorn Hill Road** **Warrendale, Pennsylvania 15086** **United States of America**
Applicant:	**Same As Above**
Product:	**SmaRT 900 MHz 9H Radio Module**
Model:	**SRF309**
FCC ID:	**LOBSRF309**
Testing Commenced:	**Feb. 20, 2014**
Testing Ended:	**June 11, 2014**
Summary of Test Results:	**Page 5**

Standards:

- **FCC Part 15 Subpart C, Section 15.247**
- **FCC Part 15, Subpart C, Section 15.207**
- **FCC Part 15, Subpart C, Section 15.209**

Evaluation Conducted by:

Joe Knepper, EMC Proj. Eng.

Michael Toth, Senior EMC Eng.

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Report Reviewed by:

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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 15.247 and in KDB558074. 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
F2LQ5978-01E	First Issue	June 13, 2014	W. Fuster

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
-6dB Occupied Bandwidth	CFR 47 Part 15.247(a)(2) / KDB558074	Complies
Conducted Output Power	CFR 47 Part 15.247(b)(3) / KDB558074	Complies
Conducted Spurious Emissions	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074	Complies
Radiated Spurious Emission with 1.49dBi Integral Antenna	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074	Complies
Radiated Spurious Emission with 9dBi Whip Antenna	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074	Complies
Peak Power Spectral Density	CFR 47 Part 15.247(e) / KDB558074	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies

Note: Product was operated using AAA batteries. There is an option for the Host product to be powered from other DC sources, so Voltage Variation testing in 15.31(3)(e) was performed using 12VDC as 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 was 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 924 MHz	Mid Channel 916 MHz	Low Channel 906 MHz
Conducted Output Power	6.339mW (8.02dBm)	6.561mW (8.17dBm)	7.261mW (8.61dBm)
Conducted Output Power Limit	1 Watt, (30dBm)	1 Watt, (30dBm)	1 Watt, (30dBm)
E.I.R.P. with 1.49dBi Integral Antenna	8.933mW (9.51dBm)	9.247mW (9.66dBm)	10.233mW (10.10dBm)
E.I.R.P. with 9dBi Whip Antenna	50.35mW (17.02dBm)	52.12mW (17.17dBm)	57.68mW (17.61dBm)
E.I.R.P. Limit	4 Watts, (36.02dBm)	4 Watts, (36.02dBm)	4 Watts, (36.02dBm)
Peak Power Spectral Density	-3.38 dBm	-3.19 dBm	-2.92 dBm
Peak Power Spectral Density Limit	8 dBm	8 dBm	8 dBm
-6dB Occupied bandwidth	.51282 MHz	.51603 MHz	.50641 MHz
-6dB Occupied Bandwidth Limit	≥ 500KHz	≥ 500KHz	≥ 500KHz

4 ENGINEERING STATEMENT

This report has been prepared on behalf of Cervis Inc. to provide documentation for the testing described herein. This equipment has been tested and found to comply with parts 15.247, 15.207 and 15.209 of the FCC Rules using ANSI C63.4 2009 and KDB558074 standards. 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: SmaRT 900 MHz 9H Radio Module
Model: SRF309
Serial No.: None
FCC ID: LOBSRF309

5.2 Trade Name:

Structured Mining Systems, Inc. d.b.a. Cervis Inc.

5.3 Power Supply:

Non-rechargeable AAA Batteries

5.4 Applicable Rules:

CFR 47, Part 15.247, subpart C
CFR 47, Part 15.207
CFR 47, Part 15.209

5.5 Equipment Category:

Radio Transmitter-DTS

5.6 Antenna:

1.49dBi gain Integral Antenna
9dBi gain Whip 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:

The EUT was configured to permit frequency changes from low-mid-upper transmission channel using digital modulation (required for digital transmission systems). For RF antenna conducted tests, the EUT was equipped with an SMA connector for connection to the measuring equipment. For radiated emissions tests, in a semi-anechoic chamber and on the OATS, the EUT was equipped with integral/internal chip antenna and an external Whip antenna. The highest emissions were recorded in the data tables.

6 LIST OF MEASUREMENT INSTRUMENTATION

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Temp/Hum. Recorder	CL137	Extech	RH520	CH16992	Apr. 17, 2014
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Oct. 31, 2014
Cable: 0.3m Low Loss	CL116	A.H. Systems, Inc.	SAC-26G-0.3	206	Aug. 1, 2014
Spectrum Analyzer	CL138	Agilent Technologies	E4407B	US41192779	Oct. 29, 2014
Shield Room	0175	Ray Proof	N/A	11645	Verified
OATS-3m	CL017	Compliance Labs	N/A	001	Dec. 12, 2014
Antenna 1-Chamber	0142	ETS/EMCO	3142B	9811-1330	Verified
Antenna 2-OATS	0105	Sunol Sciences	JB1	A101101	May 7, 2015
Pre-Amplifier	CL153	Agilent	83006A	MY39500900	Jan. 9, 2015
Active 18” Loop Antenna	CL082	A.H. Systems, Inc.	SAS-562B	241	Sept. 6, 2014
Antenna, Horn	CL098	Emco	3115	9809-5580	Dec. 3, 2015
Cable: 0.3m Low Loss	CL117	A.H. Systems, Inc.	SAC-26G-3	207	Jan. 16, 2015
Coaxial Cable	CL139	Thermax	M17/128-RG400	JB (Brown)	Feb. 6, 2015
Coaxial Cable	CL140	Thermax	M17/128-RG400	JC (Brown)	Feb. 6, 2015
Temp/Hum. Rec.	CL119	Extech	RH520	H005869	Jan. 8, 2015
Transient Limiter	CL102	Hewlett Packard	11947A	3107A03325	Feb. 11, 2015
LISN 2	0147	Solar	8028-50-TS-24-BNC	1128	Jan. 16, 2017
LISN 4	0146	Solar	8028-50-TS-24-BNC	1127	Jan. 16, 2017
Spectrum Analyzer	CL147	Agilent	E7402A	MY45101241	Oct. 24, 2014
Software:	Tile Version 1.0		Software Verified: Apr. 21, 2014		

7 FCC PART 15.247(a)(2) – OCCUPIED BANDWIDTH

7.1 Requirements:

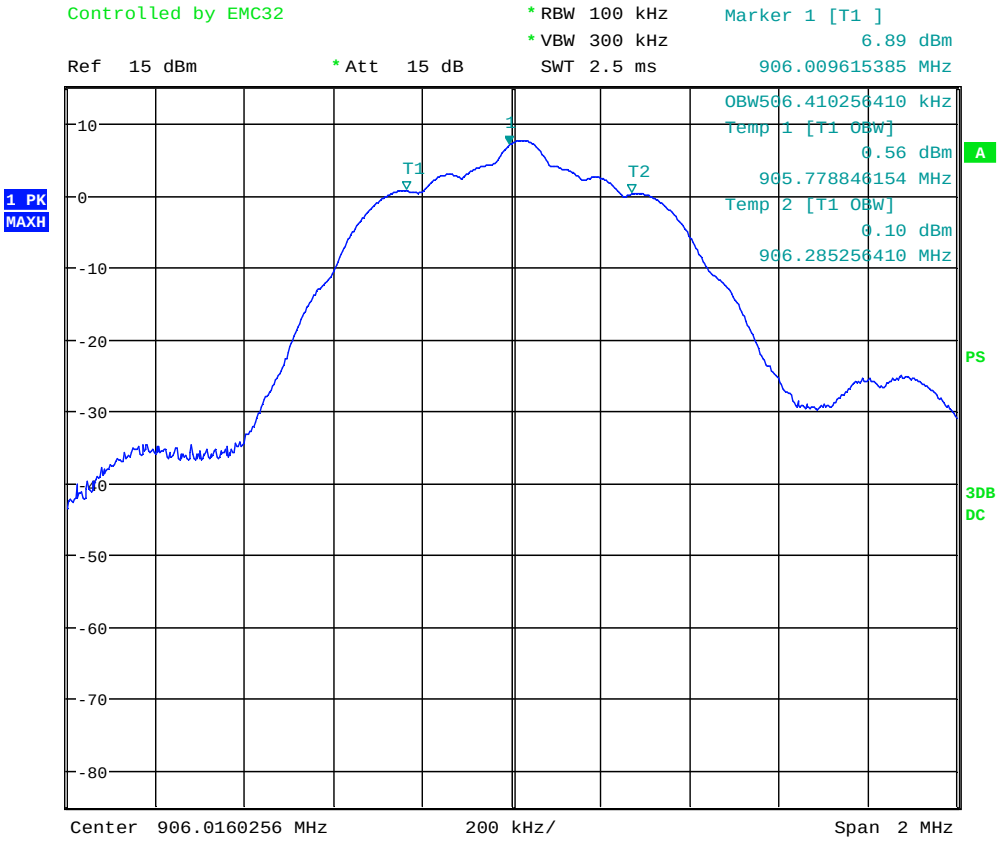
The 6dB bandwidth shall be greater than 500 kHz.

Bandwidth measurements were made at the low (906 MHz), mid (916 MHz) and upper (924 MHz) frequencies. The bandwidth was measured using the analyzer's marker function.

7.2 Occupied Bandwidth Test Data

Test Date:	Mar. 24, 2014	**Test Engineers:**	K. Littell
Standards:	CFR 47 Part 15.247(a)(2); KDB558074	**Air Temperature:**	20.6ºC
		Relative Humidity:	45%

Low Channel



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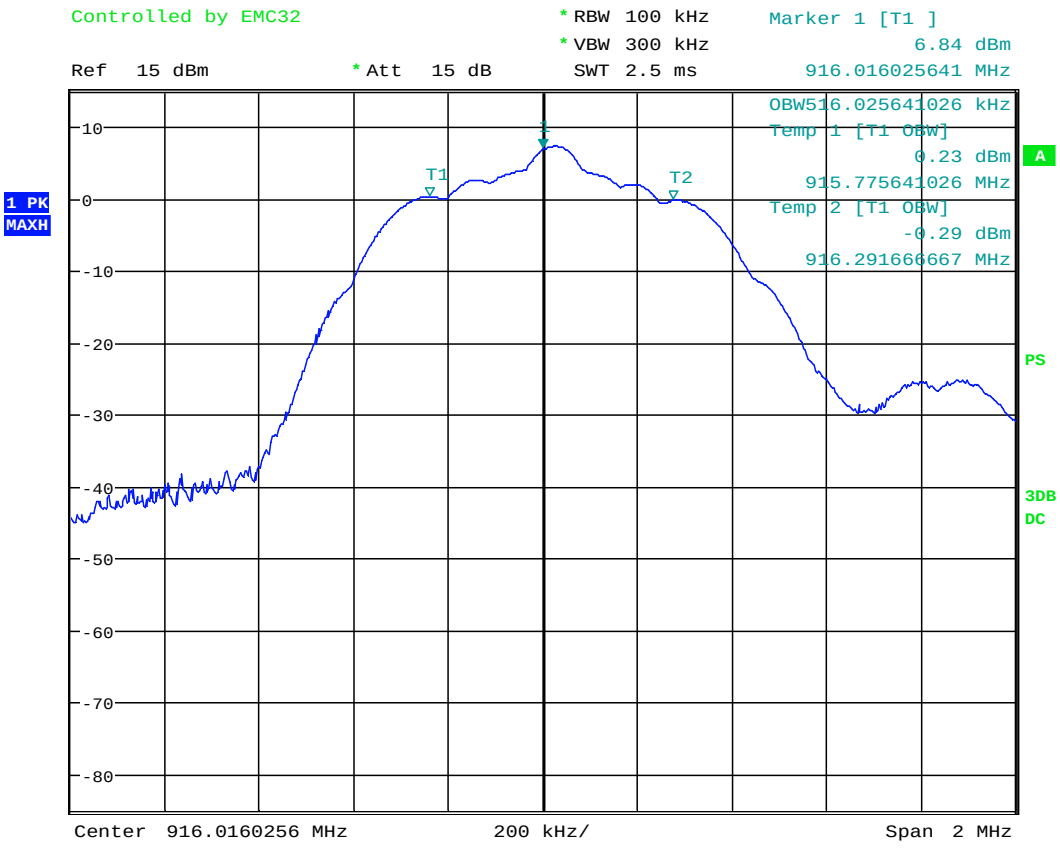
Mid Channel



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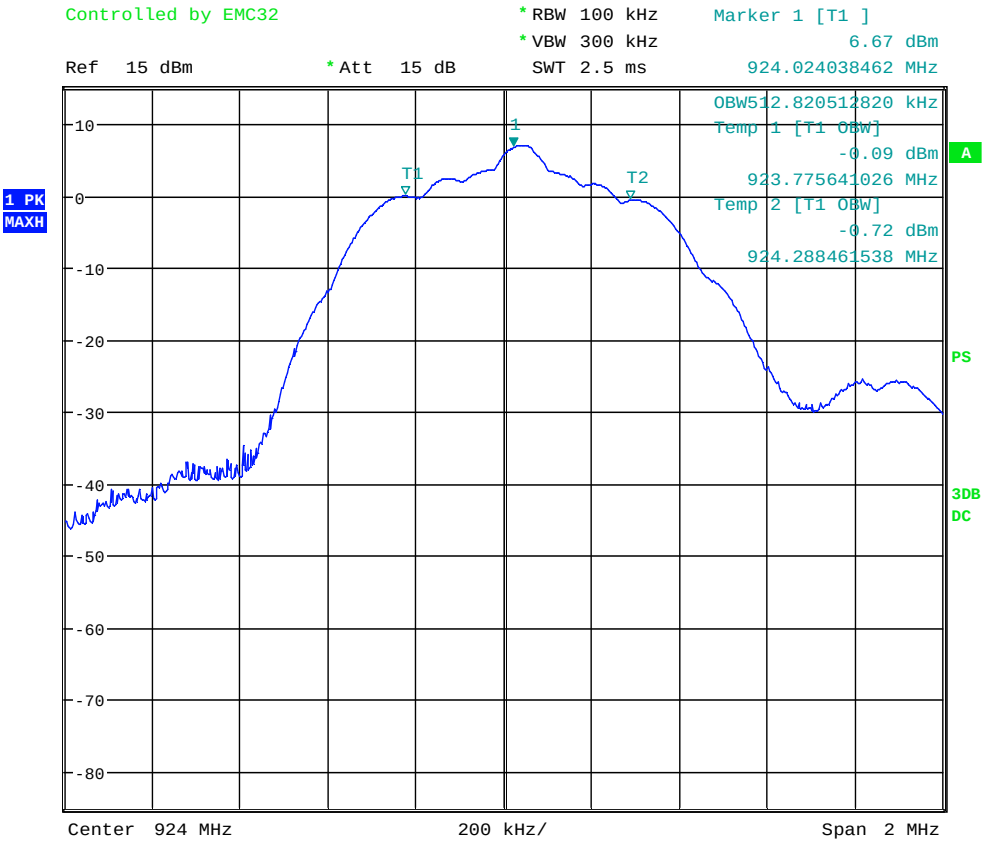
High Channel



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8 FCC PART 15.247(b)(3) – CONDUCTED OUTPUT POWER

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

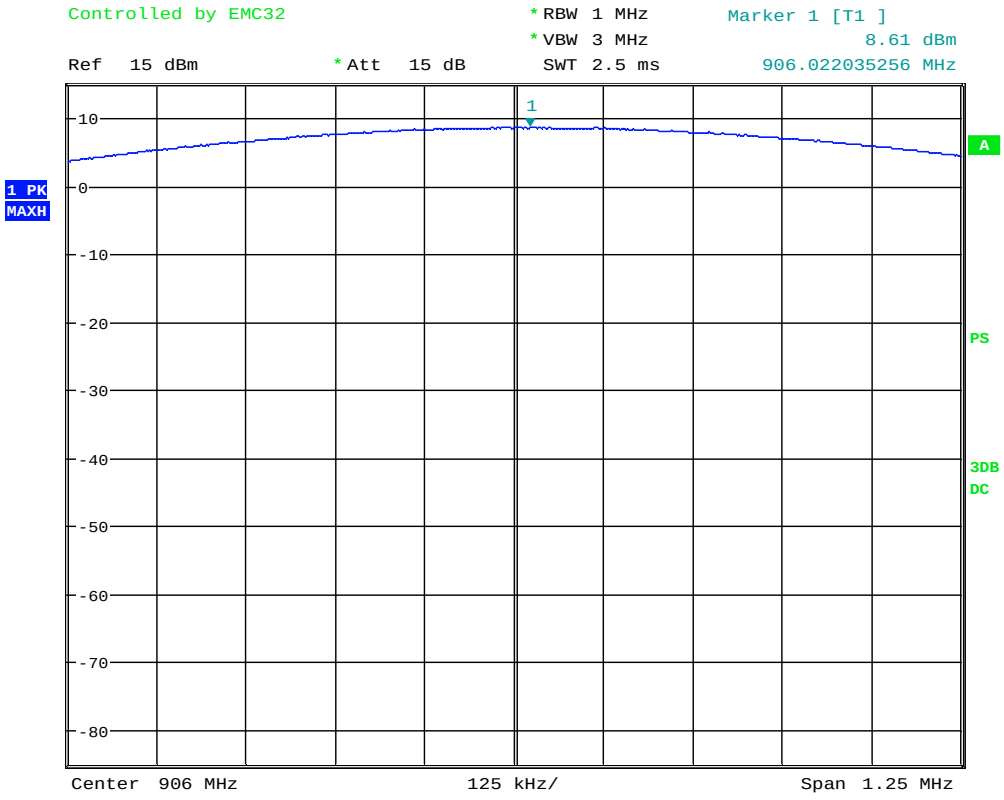
8.1 Requirements:

The peak power output shall be 1 watt (30 dBm) or less when using an antenna with a gain of less than 6dBi. For antennas having a gain of more than 6dBi, the limit is reduced by 1dB for every dB the antenna gain is over 6dBi.

8.2 Conducted Output Power Test Data

Test Date:	Mar. 24, 2014	**Test Engineers:**	J. Knepper; K. Littell
Standards:	CFR 47 Part 15.247(b)(3); KDB558074	**Air Temperature:**	21.1ºC
		Relative Humidity:	44%

Low Channel



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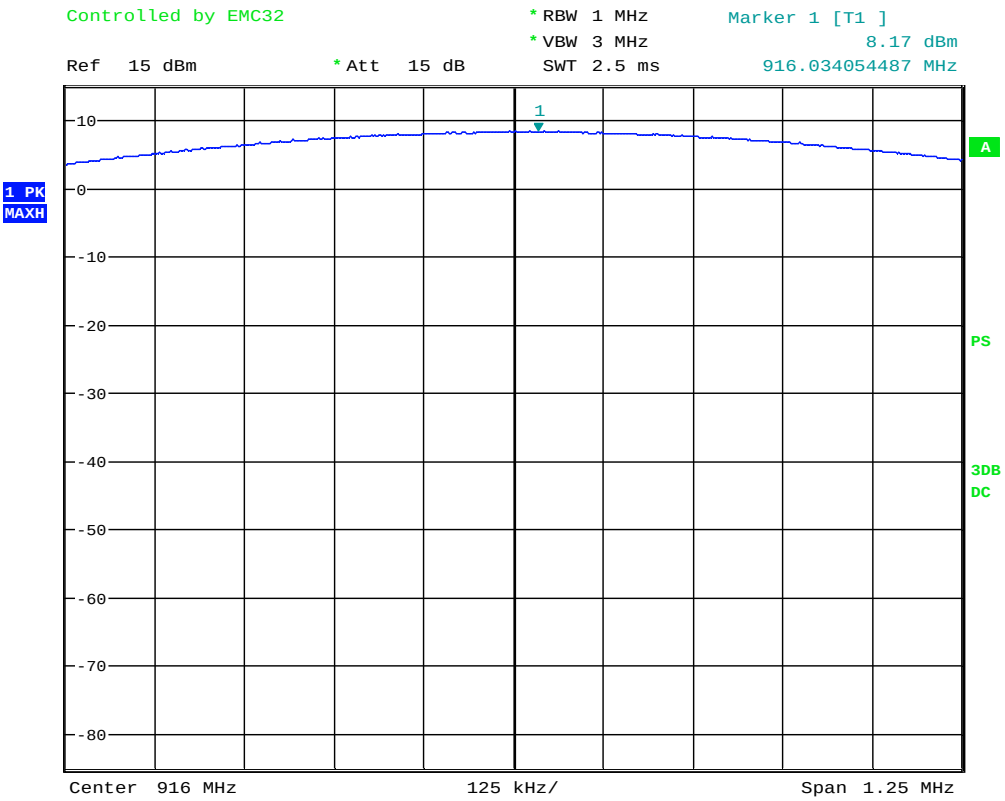
Mid Channel



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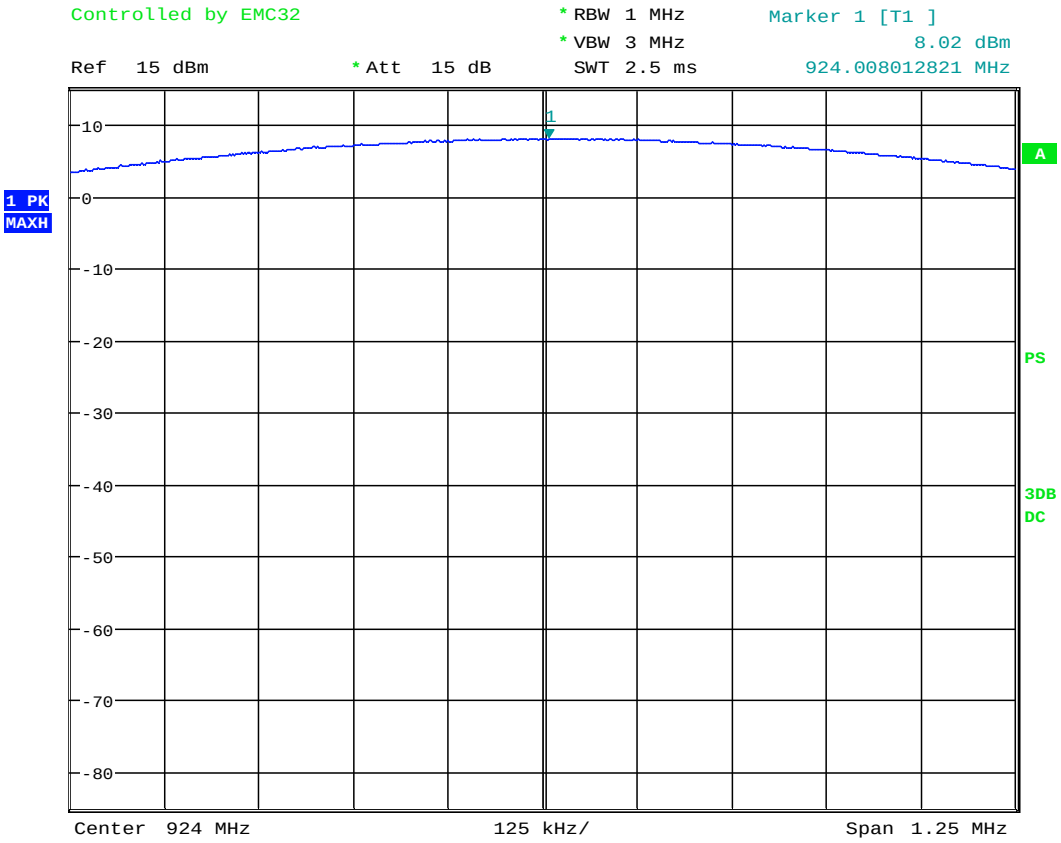
High Channel



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9 FCC Part 15.247(c) – CONDUCTED SPURIOUS EMISSIONS

The following tests were performed to demonstrate compliance.

RF Antenna Conducted Test
The EUT antenna port was fitted with an SMA connector and directly connected to the input of the spectrum analyzer.

9.1 Requirements:

All Spurious Emissions must be at least 20dB down from the highest emission level measured within the authorized band up through the tenth harmonic.

Spurious emissions measurements were made at the low, mid, and upper channels with the appropriate spectrum analyzer impulse bandwidth. Additionally, 20dB down points were measured for the low and high channels to verify band edge compliance.

9.2 Test Data – CONDUCTED SPURIOUS EMISSIONS

Test Date:	Feb. 27, 2014	**Test Engineers:**	J. Knepper; K. Littell
Standards:	CFR 47 Part 15.247(d) / Part 15.209; KDB558074	**Air Temperature:**	20.3ºC
		Relative Humidity:	47%

Low Channel: 9 kHz to 150 kHz

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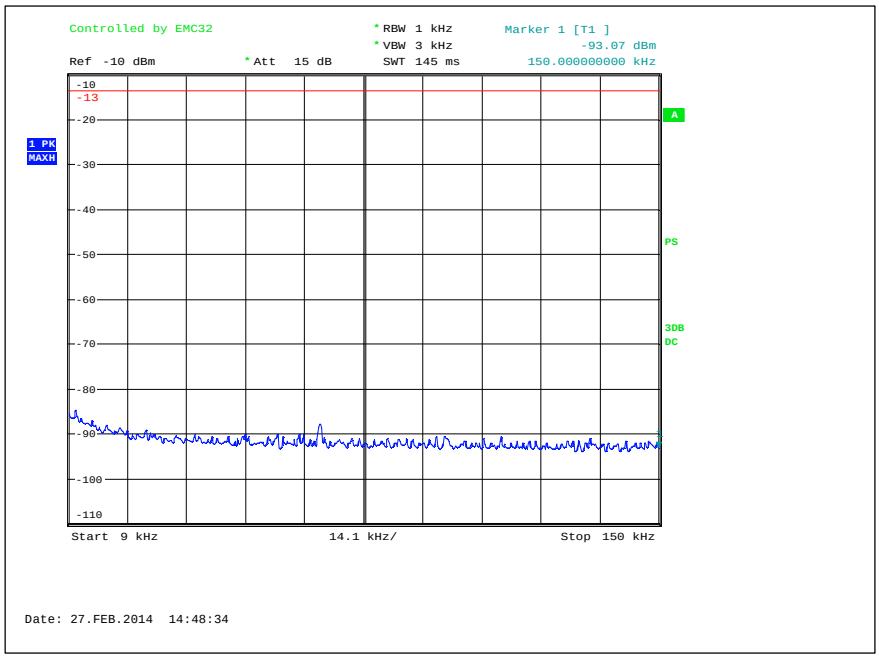
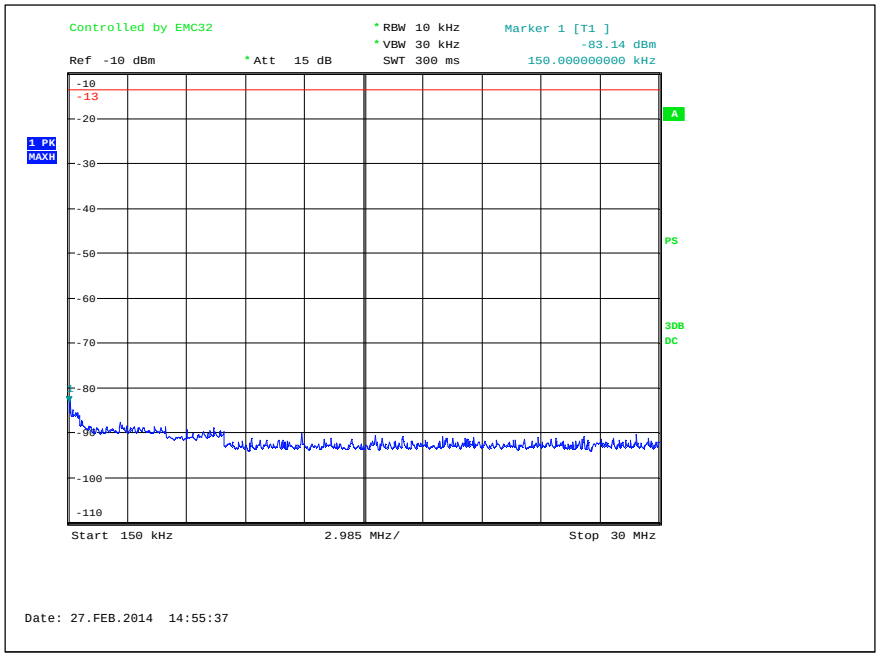


Low Channel: 150 kHz to 30 MHz

.



Low Channel: 30 MHz to 900 MHz

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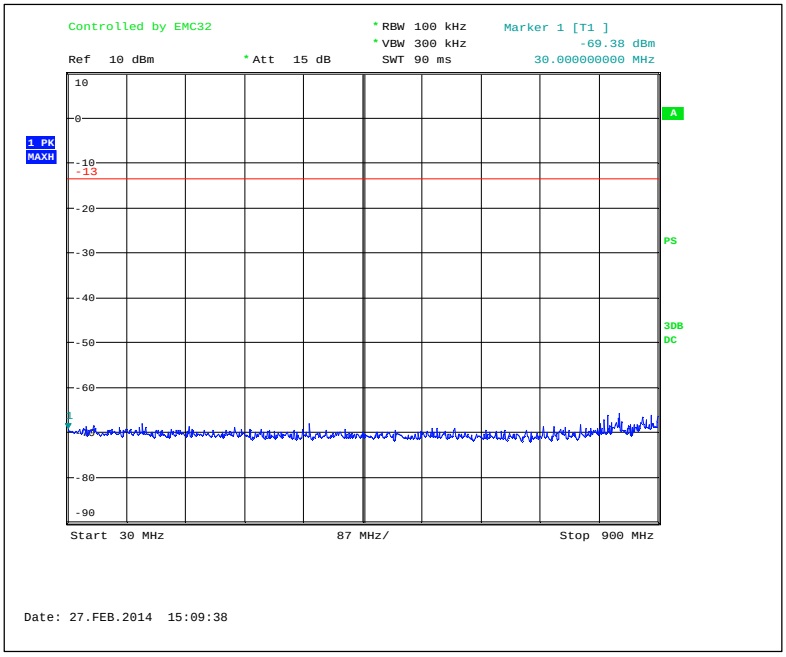

Low Channel: 900 MHz to 930 MHz

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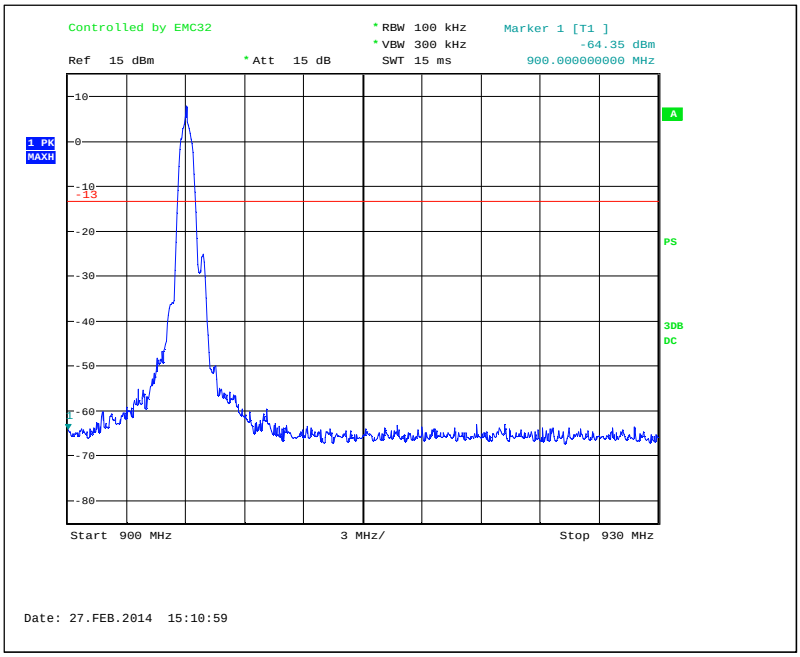
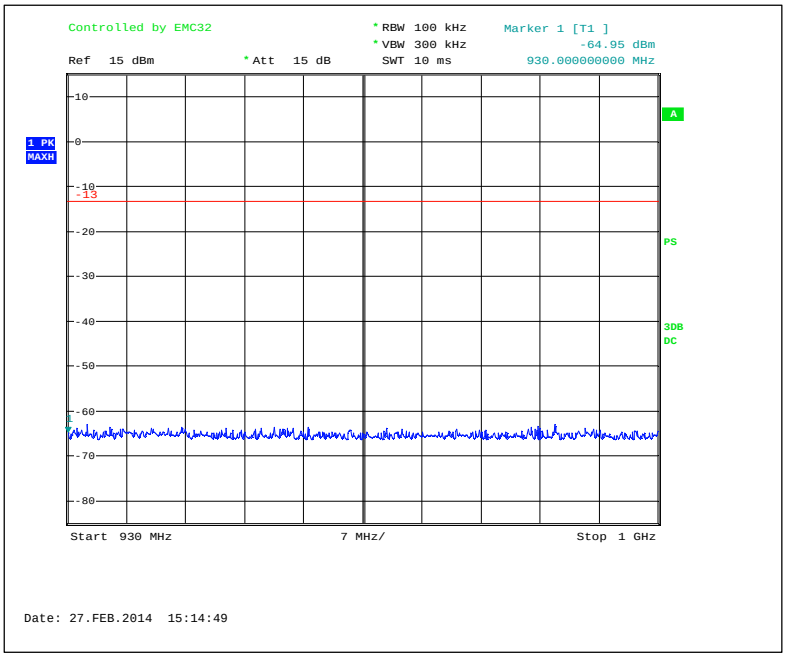
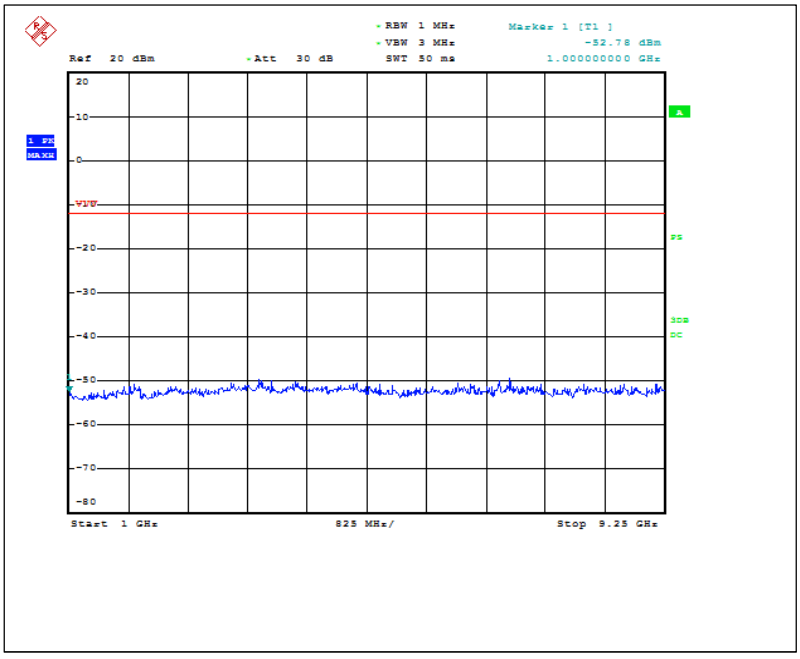


Low Channel: 930 MHz to 1 GHz

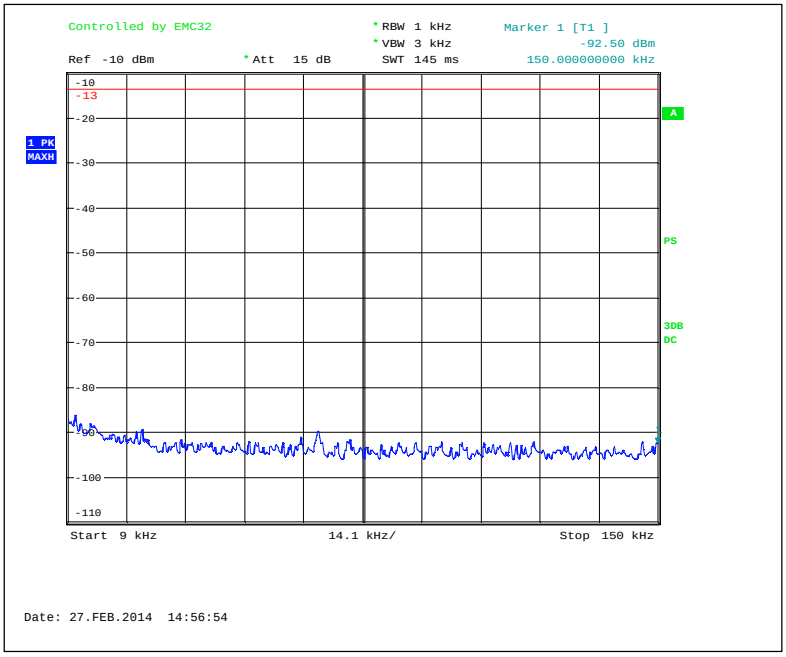


Low Channel: 1 GHz to 9.25 GHz



Mid Channel: 9 kHz to 150 kHz

.



Mid Channel: 150 kHz to 30 MHz

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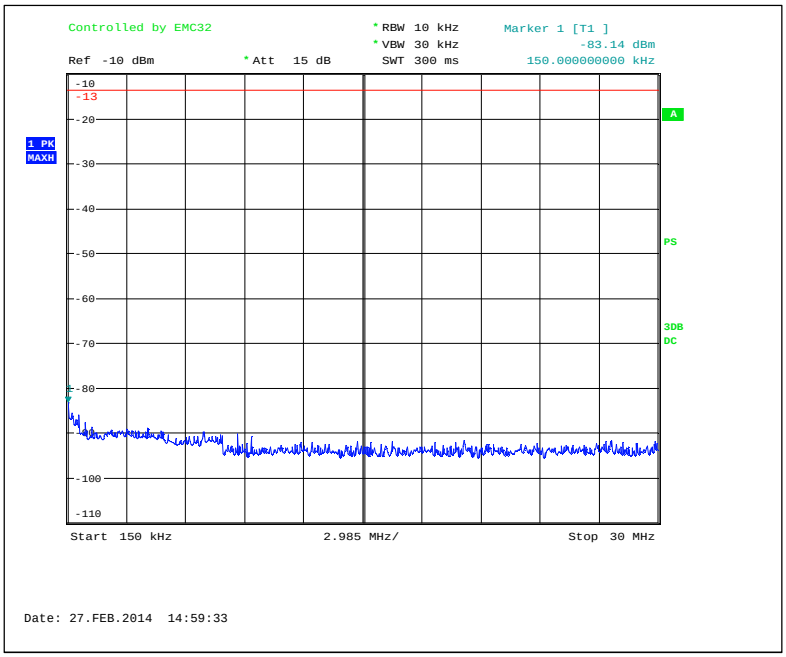
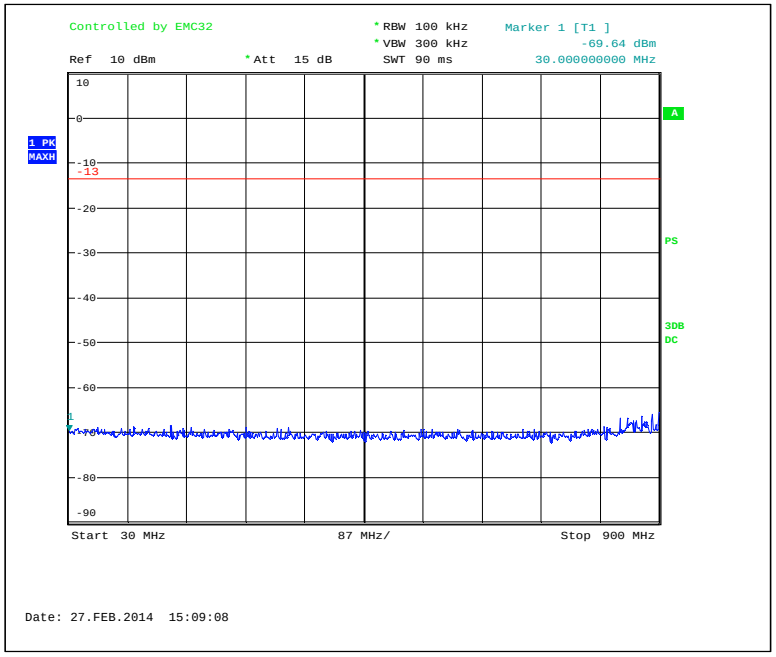


Mid Channel: 30 MHz to 900 MHz

.



Mid Channel: 900 MHz to 930 MHz

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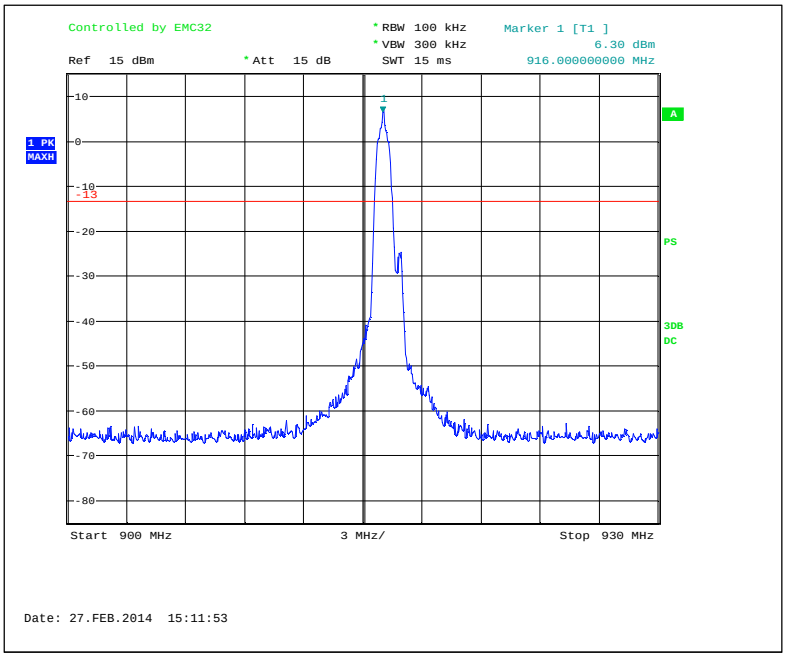

Mid Channel: 930 MHz to 1 GHz

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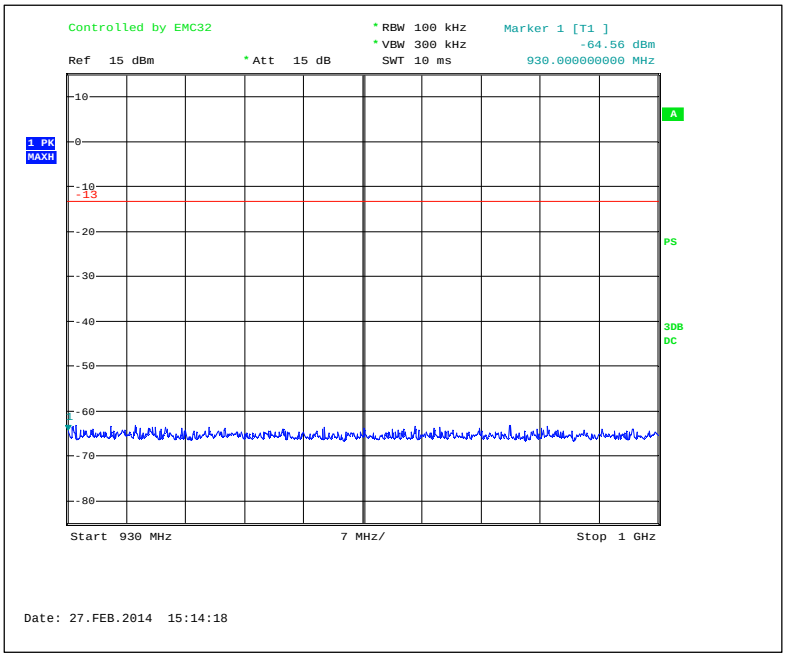

Mid Channel: 1 GHz to 9.25 GHz

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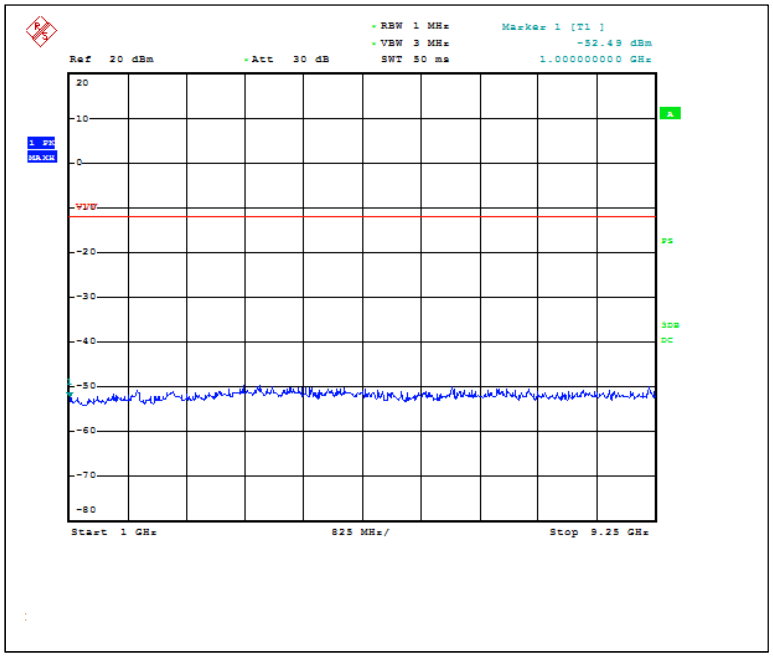

High Channel: 9 kHz to 150 kHz

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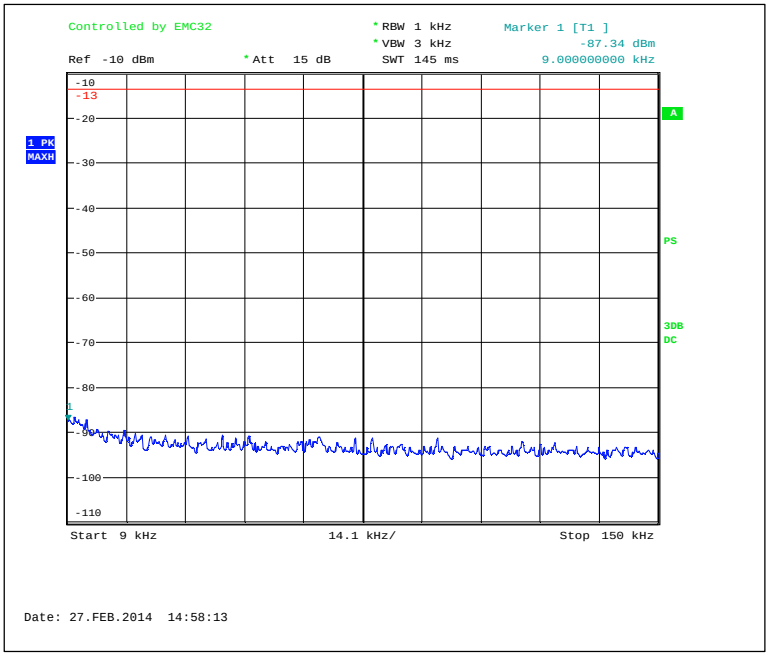

High Channel: 150 kHz to 30 MHz

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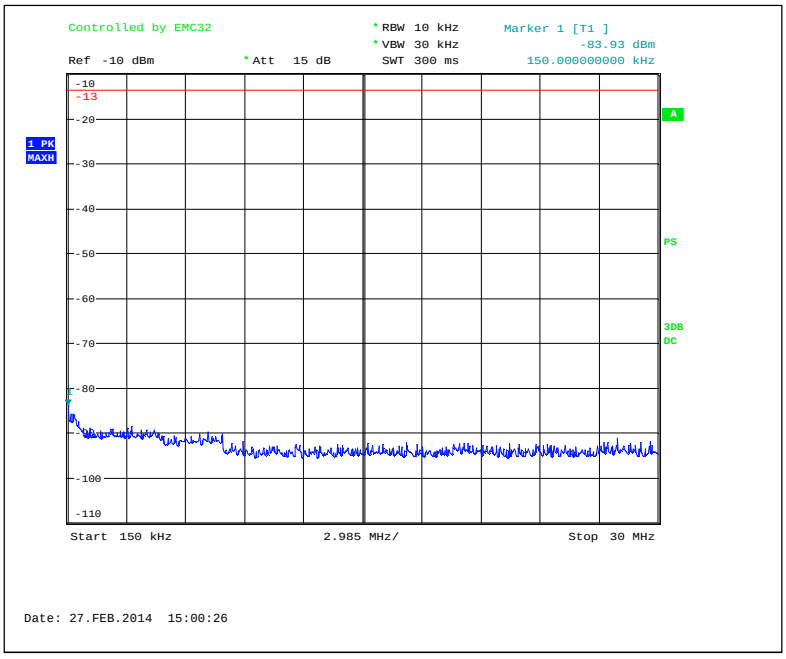

High Channel: 30 MHz to 900 MHz

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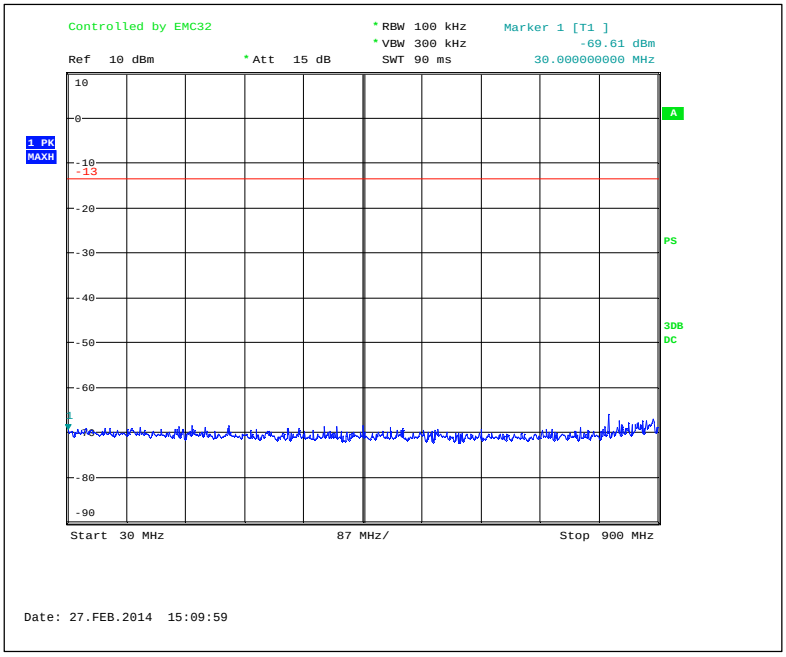
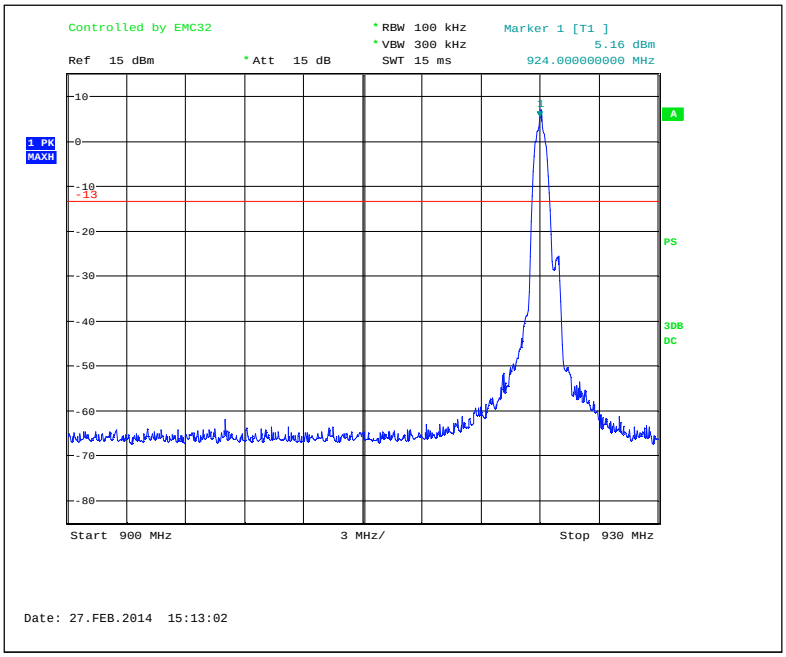


High Channel: 900 MHz to 930 MHz

.



High Channel: 930 GHz to 1 GHz

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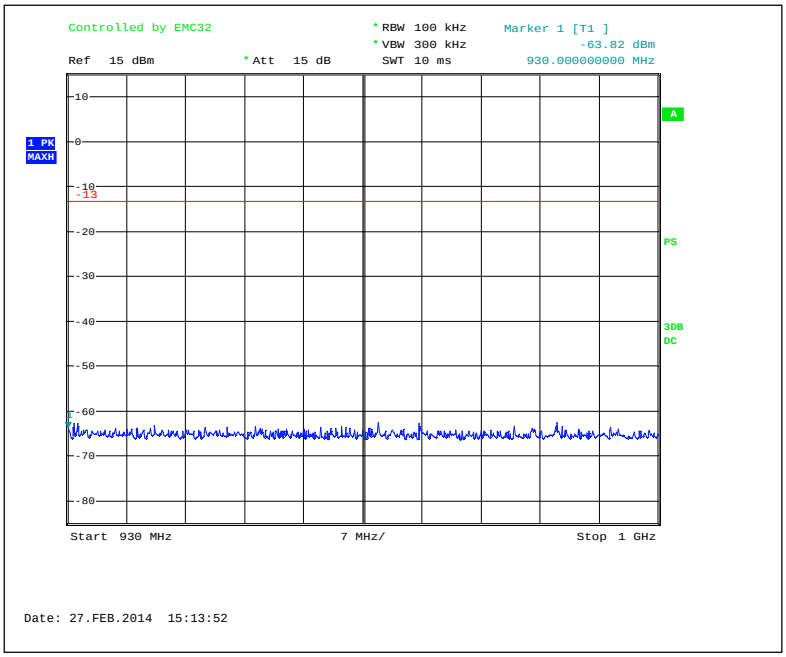

High Channel: 1 GHz to 9.25 GHz

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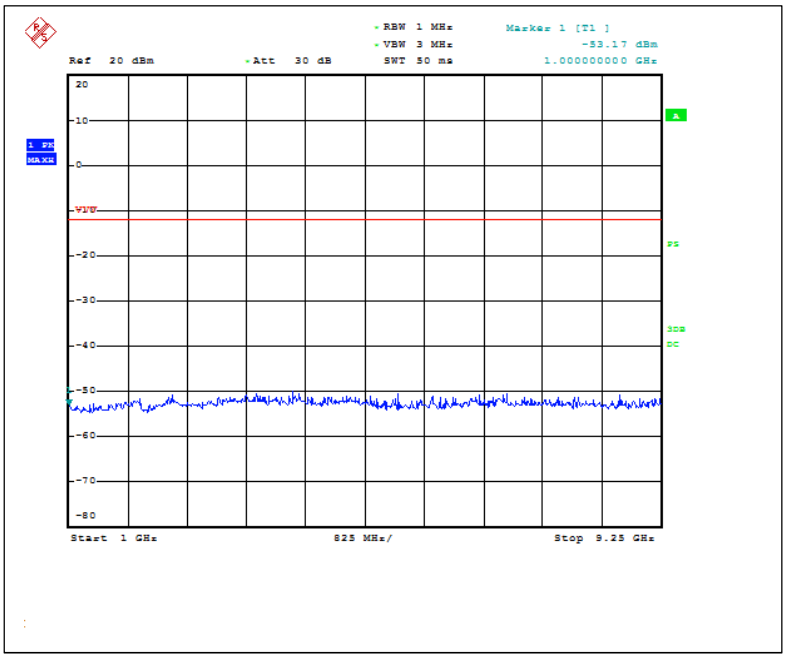


10 RADIATED SPURIOUS EMISSION

The EUT antenna port was fitted with its integral/internal chip and 9dBi whip antennae. Radiated emissions were measured on the Open Area Test Site (OATS). All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

10.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).

10.2 Radiated Spurious Emission Test Data

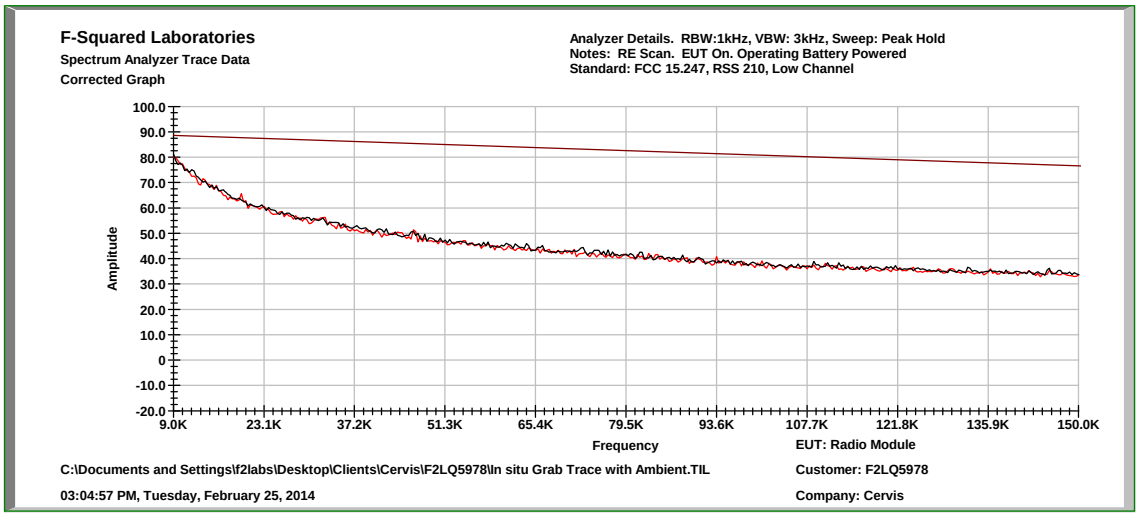
Test Dates:	Mar. 7, 2014	**Test Engineers:**	J. Knepper; K. Littell
Standards:	CFR 47 Part 15.247(d); Part 15.209 / KDB558074	**Air Temperature:**	19.2ºC
		Relative Humidity:	55%

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. Out of the three orthogonal positions, 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.

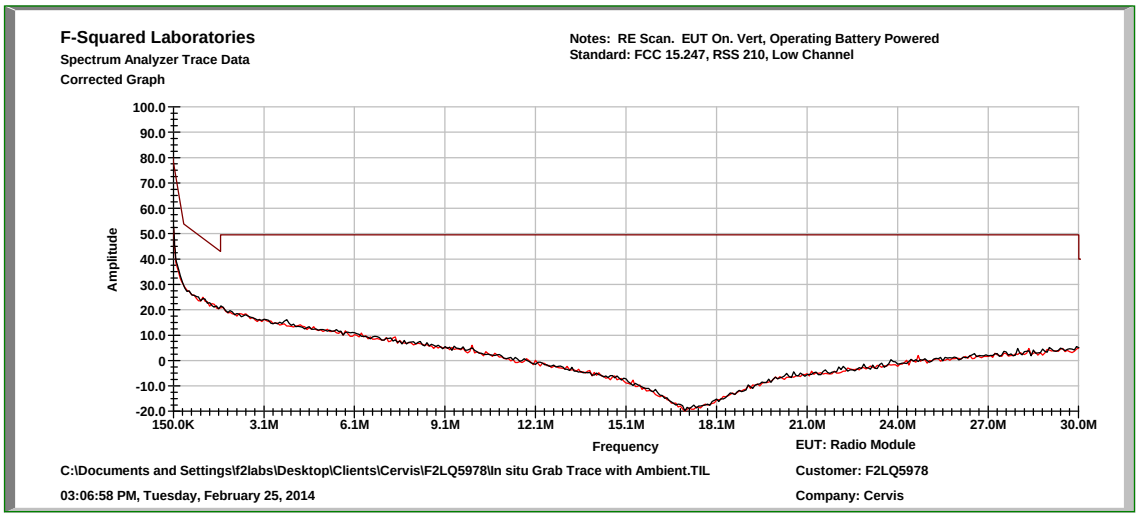
At least 6 of the highest frequencies were measured per ANSI 63.4 on the Open Area Test Site. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies 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.

The equipment was fully exercised with all cabling attached to the EUT and was positioned for maximum emissions. The EUT antenna was positioned flat against the plastic tabletop and it was verified, by placing a foam support between the table and the antenna, that the table had no effect on the emissions at these frequency ranges.

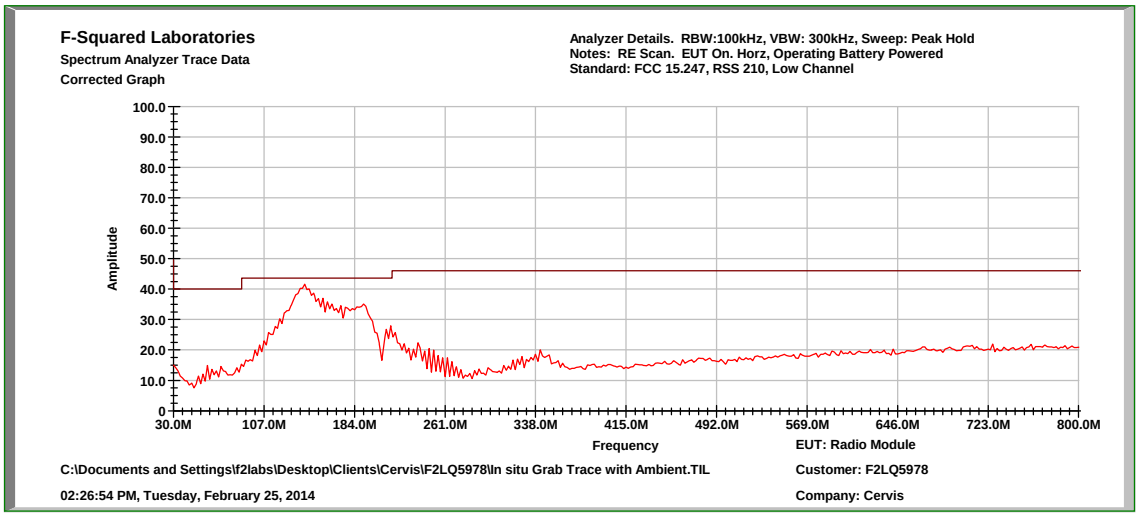
9dBi Whip Antenna, Low Channel, .009 MHz to 0.15 MHz



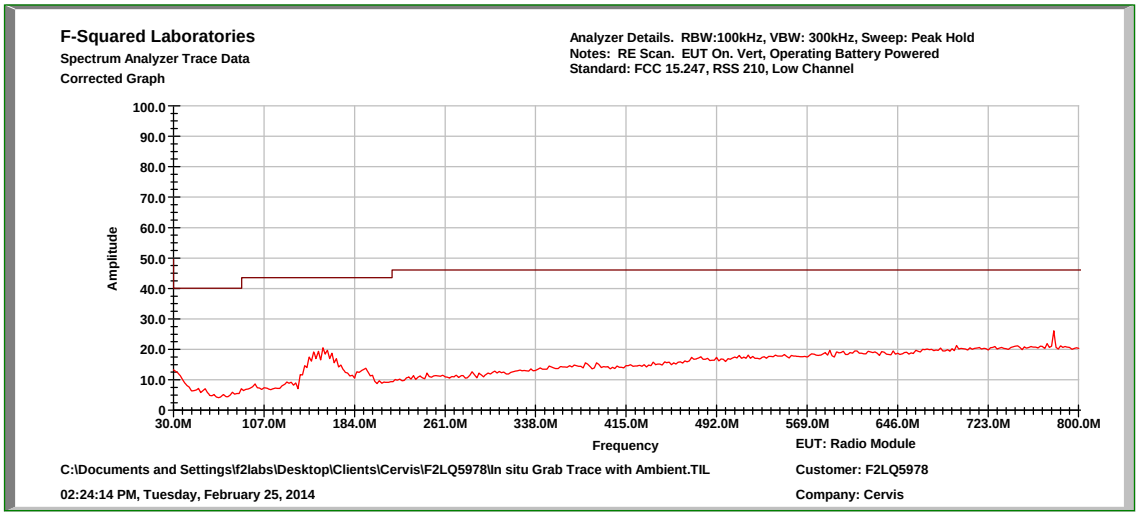
9dBi Whip Antenna, Low Channel, 0.15 MHz to 30 GHz, Vertical



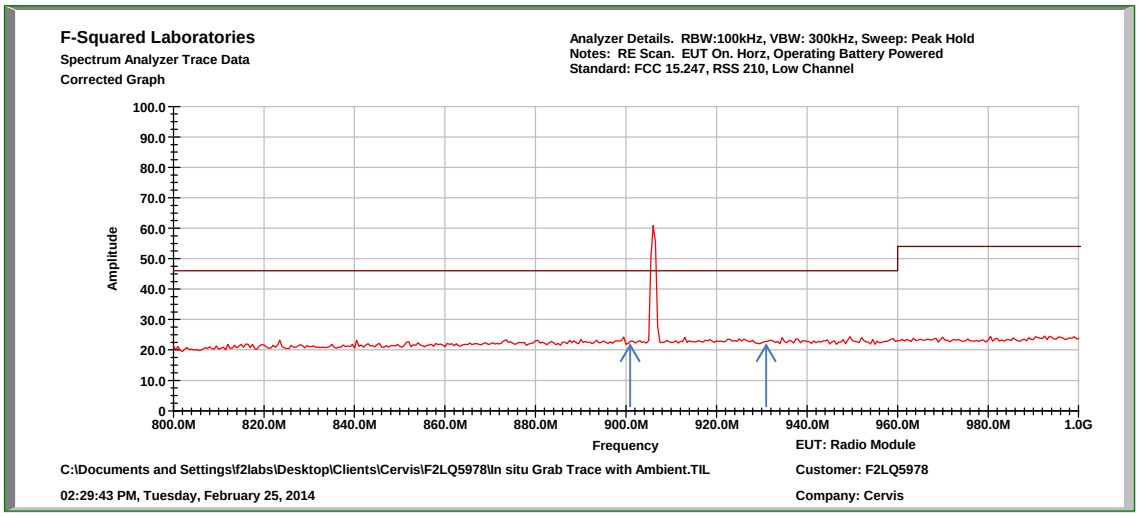
9dBi Whip Antenna, Low Channel, 30 MHz to 800 MHz, Horizontal



9dBi Whip Antenna, Low Channel, 30 MHz to 800 MHz, Vertical

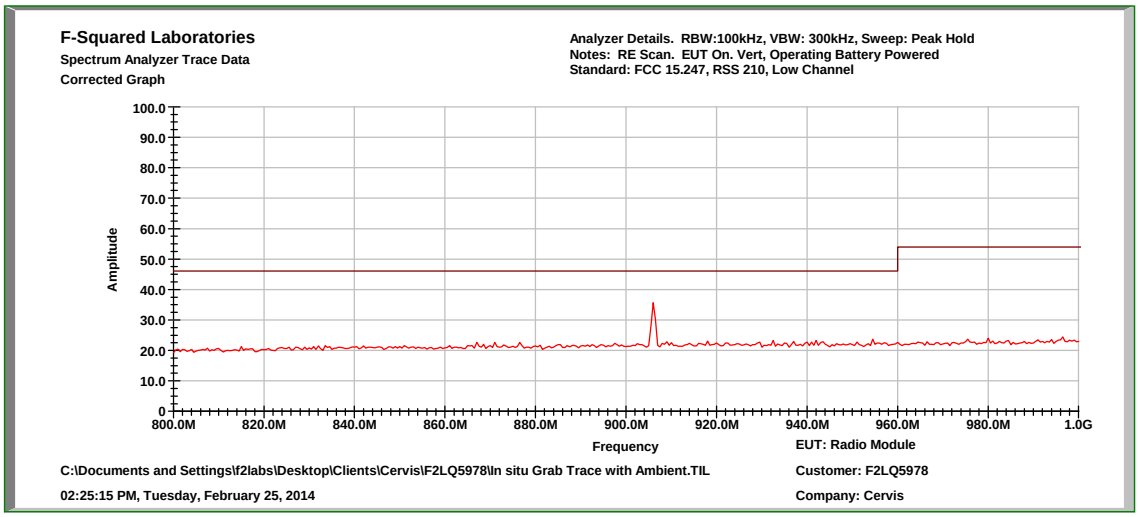


9dBi Whip Antenna, Low Channel, 800 MHz to 1 GHz, Horizontal

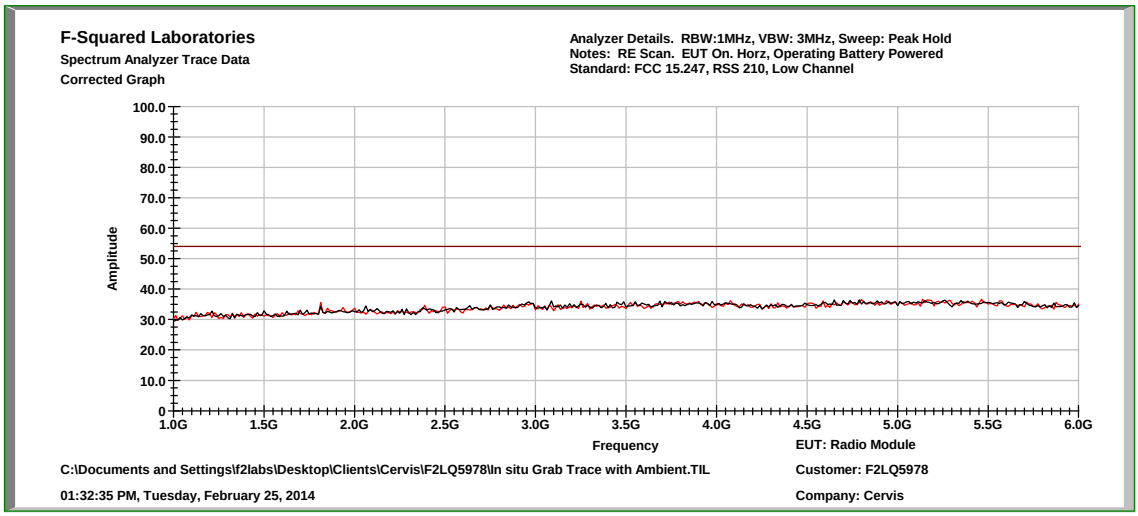


In the graph above, the blue arrows indicate the band edges and display that the band edges are more than 20dB below the limit line of 15.209.

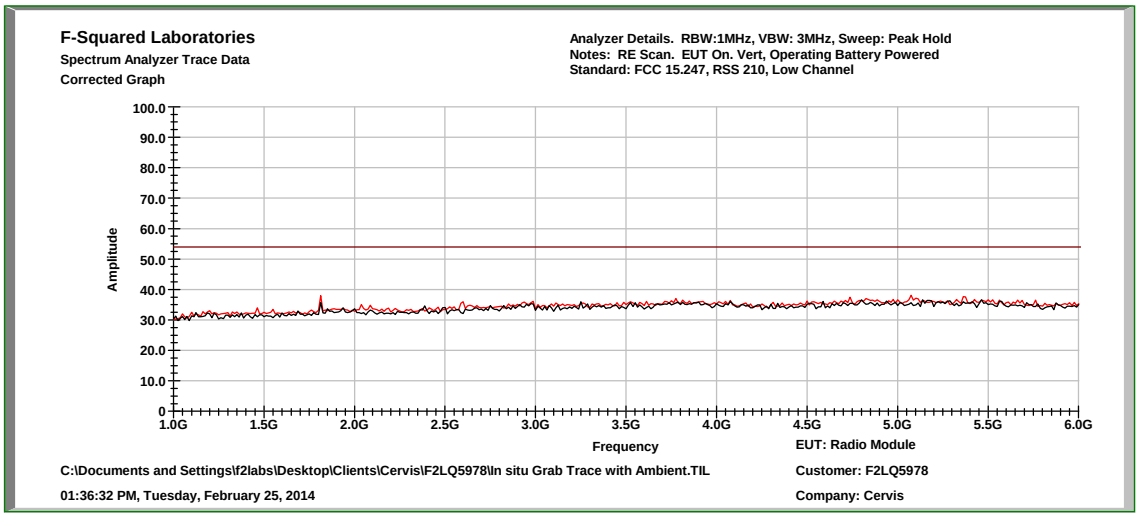
9dBi Whip Antenna, Low Channel, 800 MHz to 1 GHz, Vertical



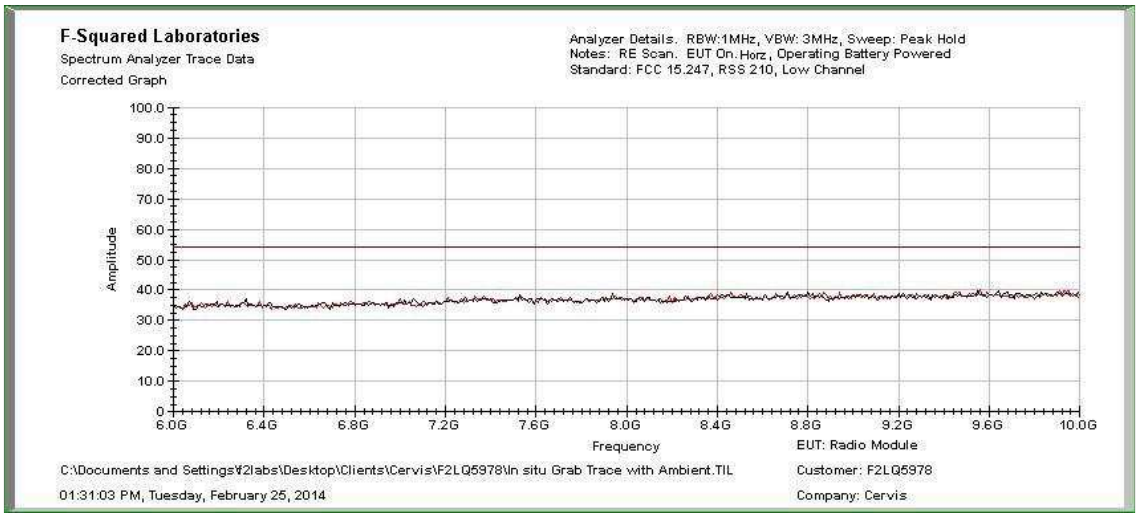
9dBi Whip Antenna, Low Channel, 1 GHz to 6 GHz, Horizontal



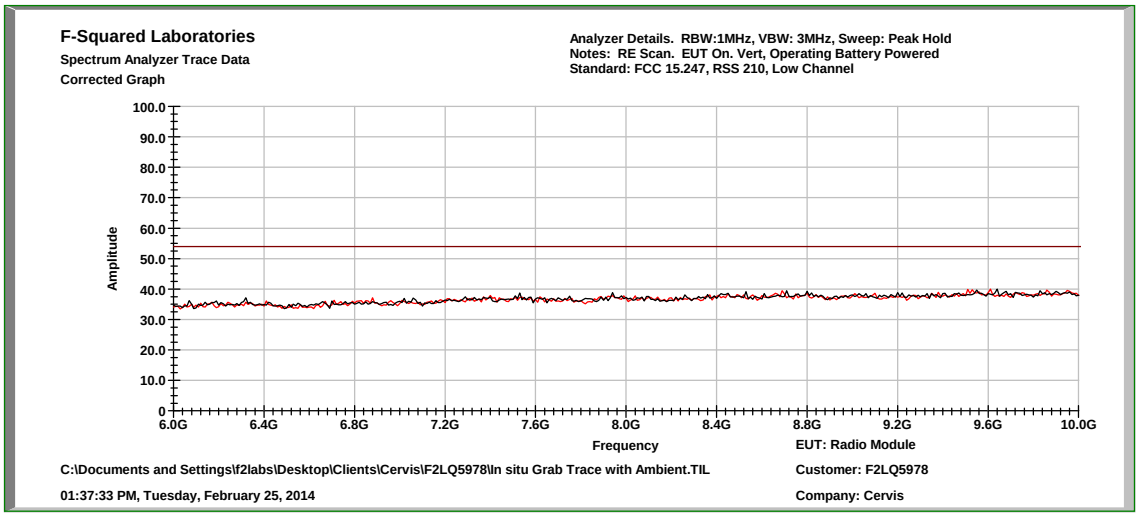
9dBi Whip Antenna, Low Channel, 1 GHz to 6 GHz, Vertical



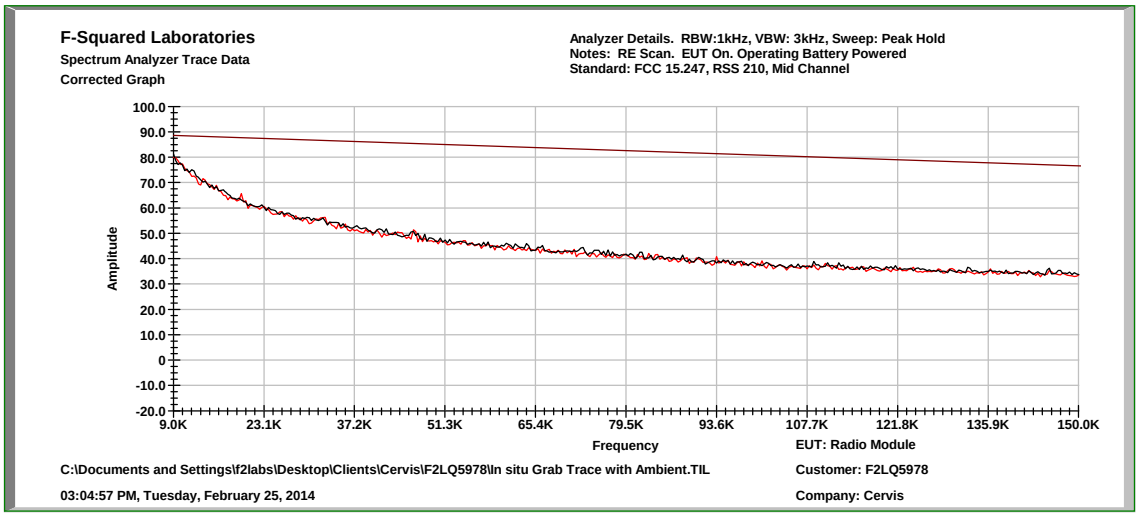
9dBi Whip Antenna, Low Channel, 6 GHz to 10 GHz, Horizontal



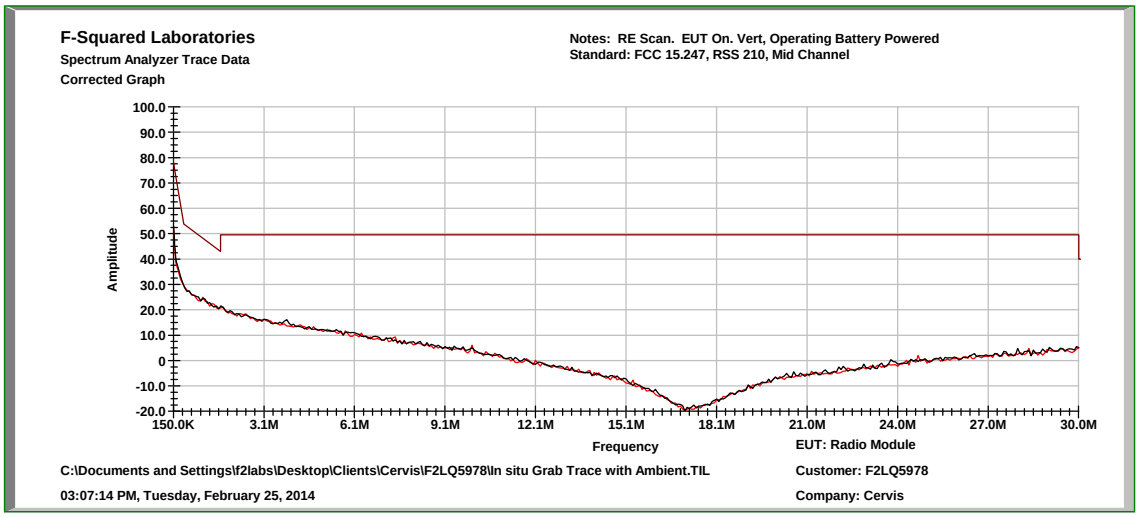
9dBi Whip Antenna, Low Channel, 6 GHz to 10 GHz, Vertical



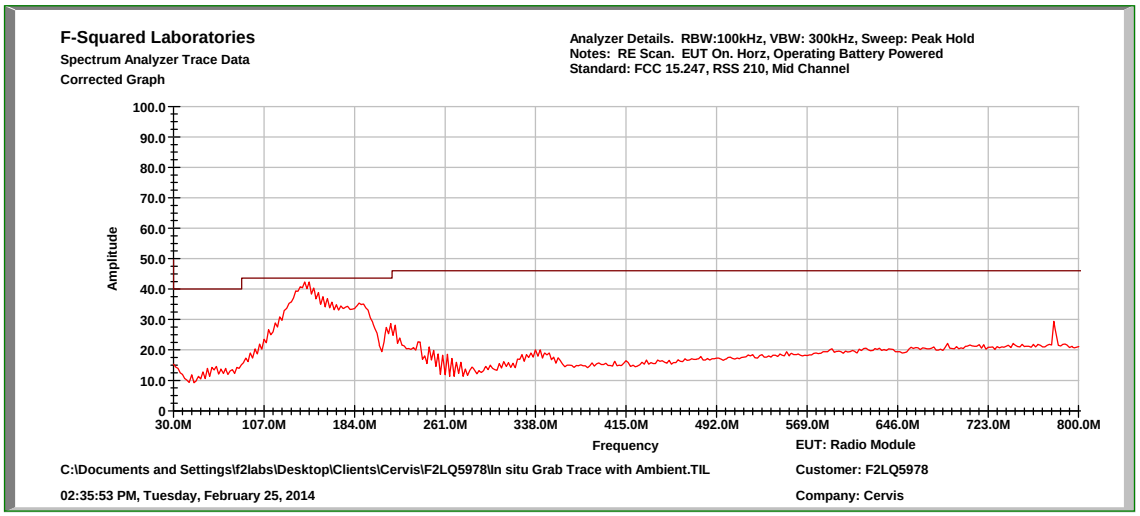
9dBi Whip Antenna, Mid Channel, .009 MHz to 0.15 MHz



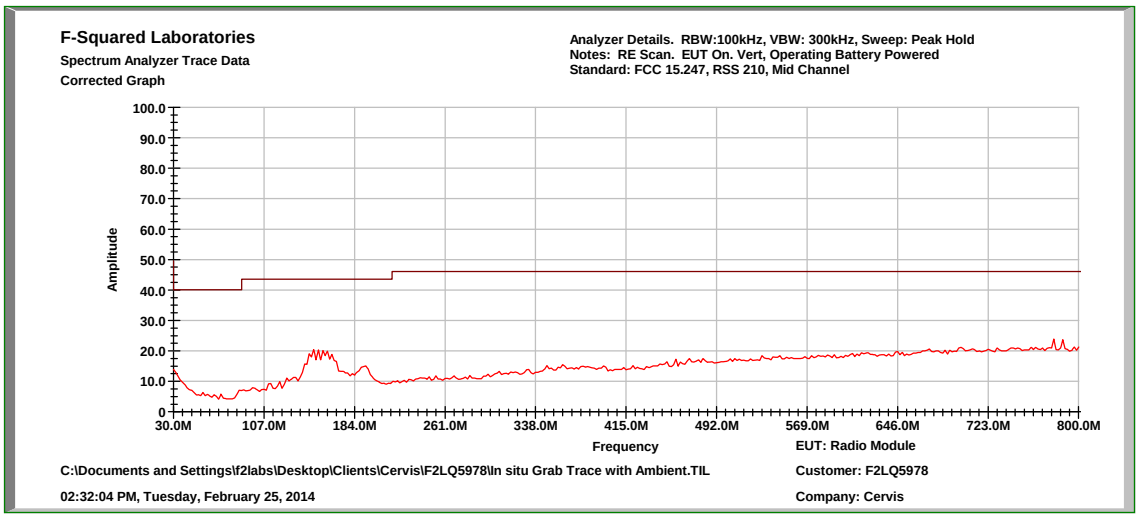
9dBi Whip Antenna, Mid Channel, 0.15 MHz to 30 MHz, Vertical



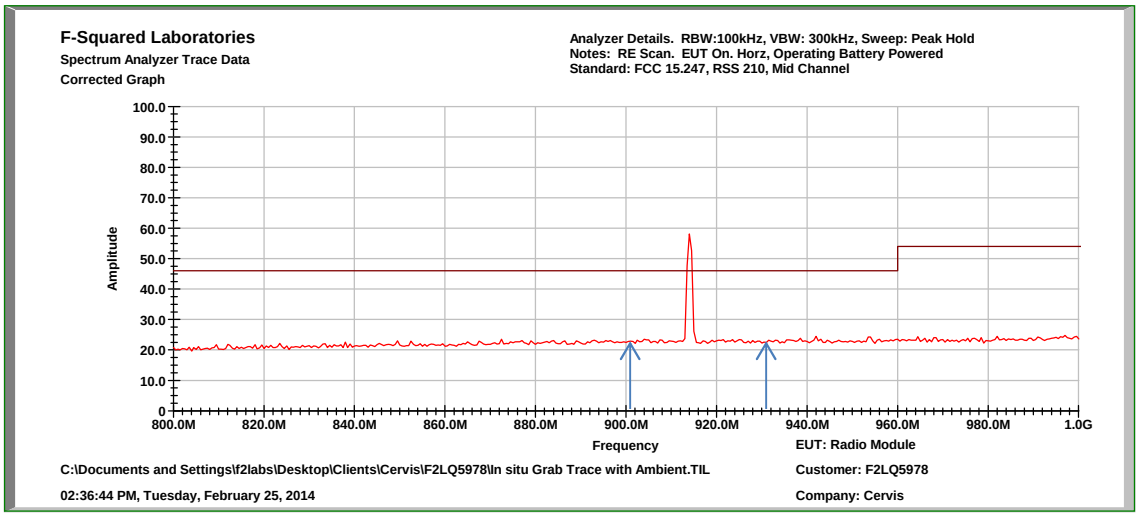
9dBi Whip Antenna, Mid Channel, 30 MHz to 800 MHz, Horizontal



9dBi Whip Antenna, Mid Channel, 30 MHz to 800 MHz, Vertical

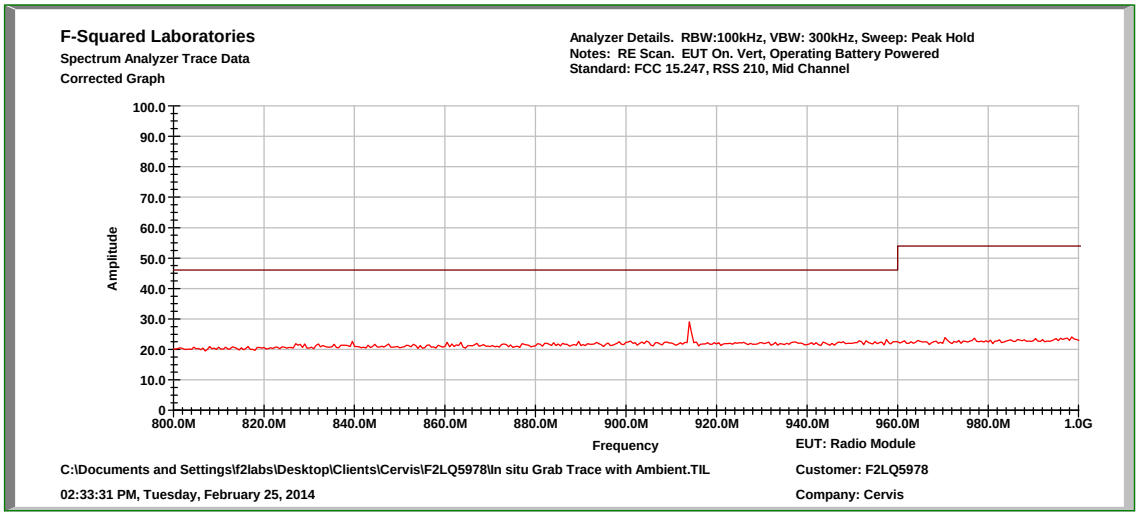


9dBi Whip Antenna, Mid Channel, 800 MHz to 1 GHz, Horizontal

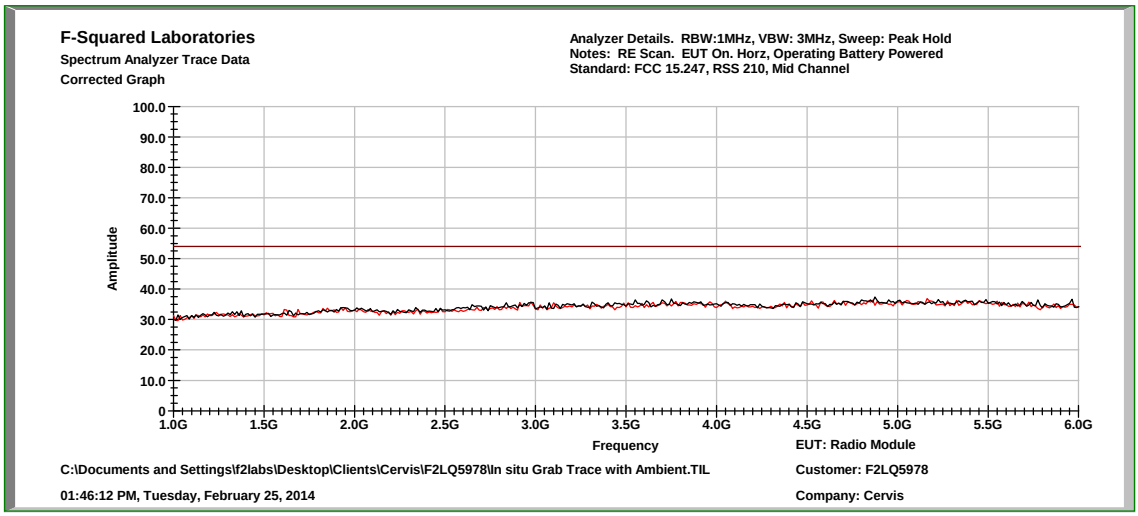


In the graph above, the blue arrows indicate the band edges and display that the band edges are more than 20dB below the limit line of 15.209.

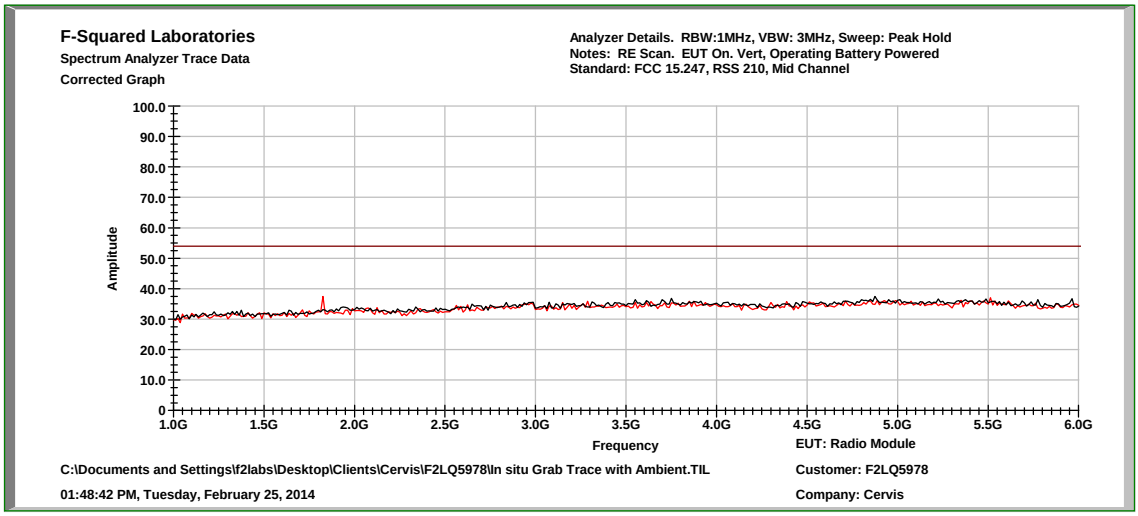
9dBi Whip Antenna, Mid Channel, 800 MHz to 1 GHz, Vertical



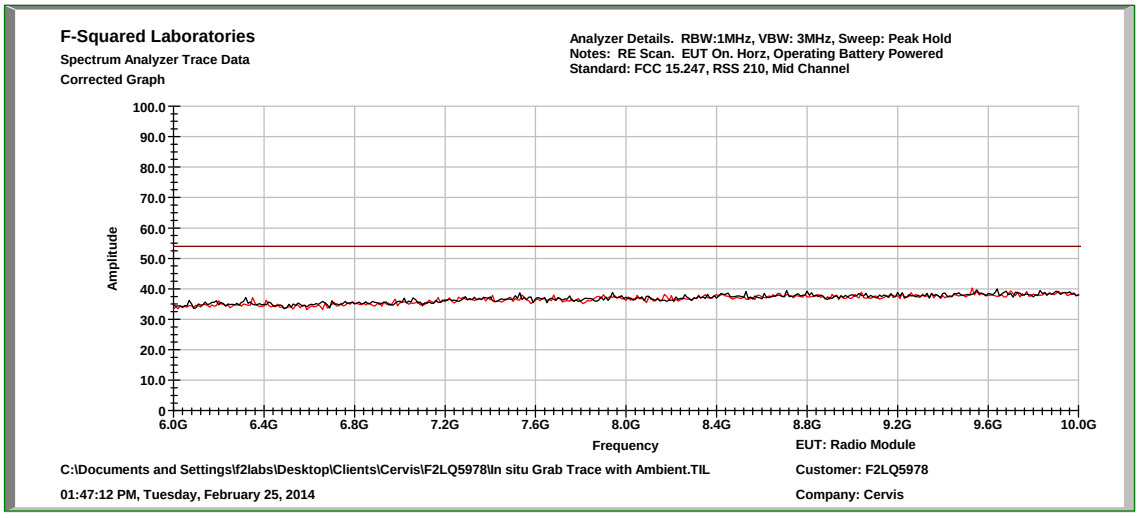
9dBi Whip Antenna, Mid Channel, 1 GHz to 6 GHz, Horizontal



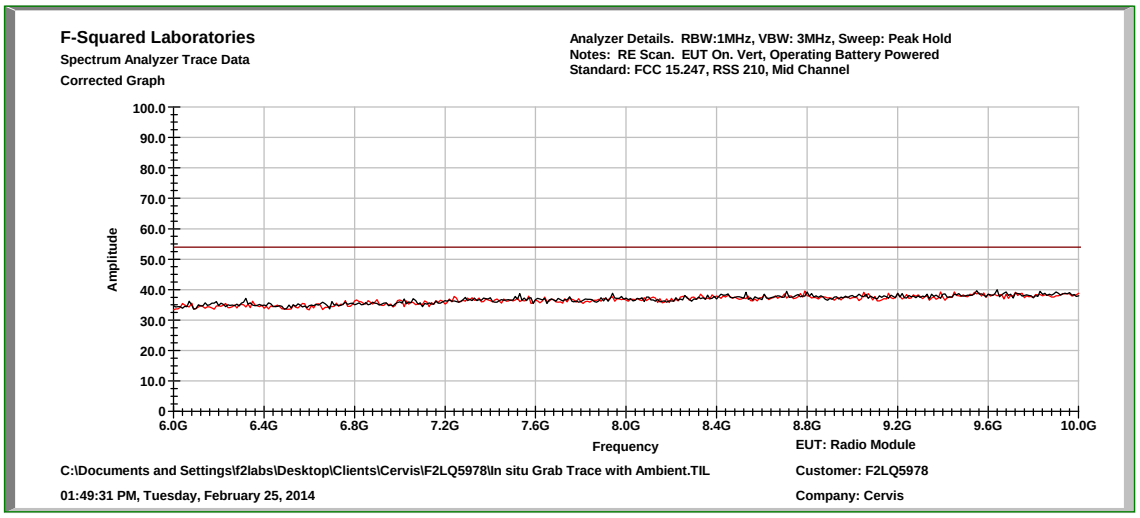
9dBi Whip Antenna, Mid Channel, 1 GHz to 6 GHz, Vertical



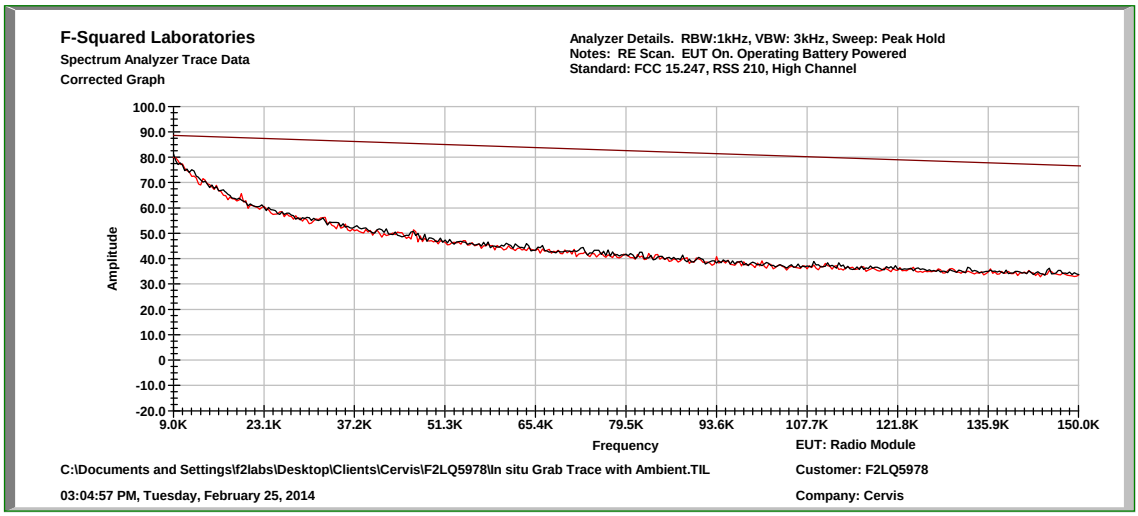
9dBi Whip Antenna, Mid Channel, 6 GHz to 10 GHz, Horizontal



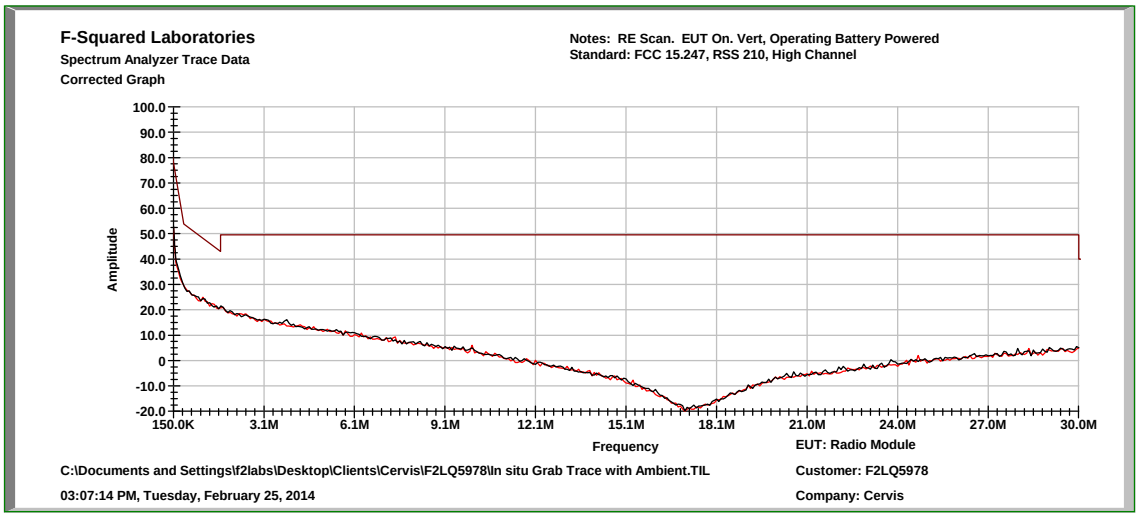
9dBi Whip Antenna, Mid Channel, 6 GHz to 10 GHz, Vertical



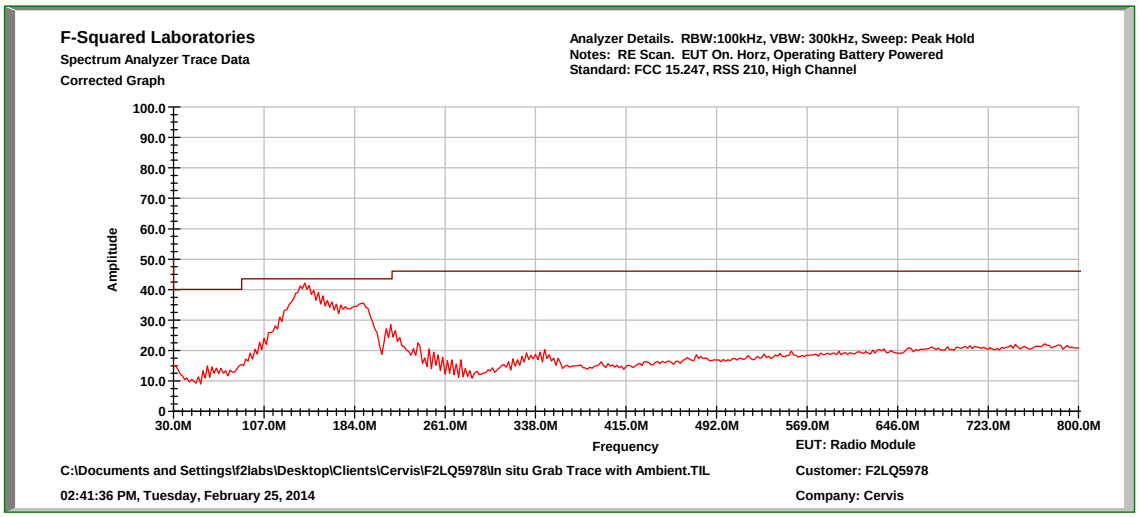
9dBi Whip Antenna, High Channel, .009 MHz to 0.15 MHz



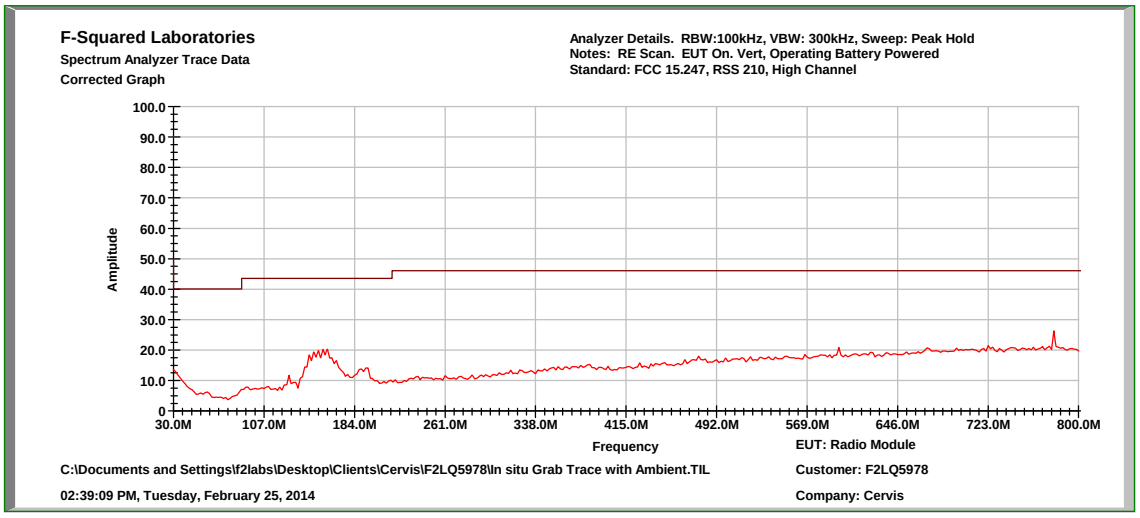
9dBi Whip Antenna, High Channel, 0.15 MHz to 30 MHz, Vertical



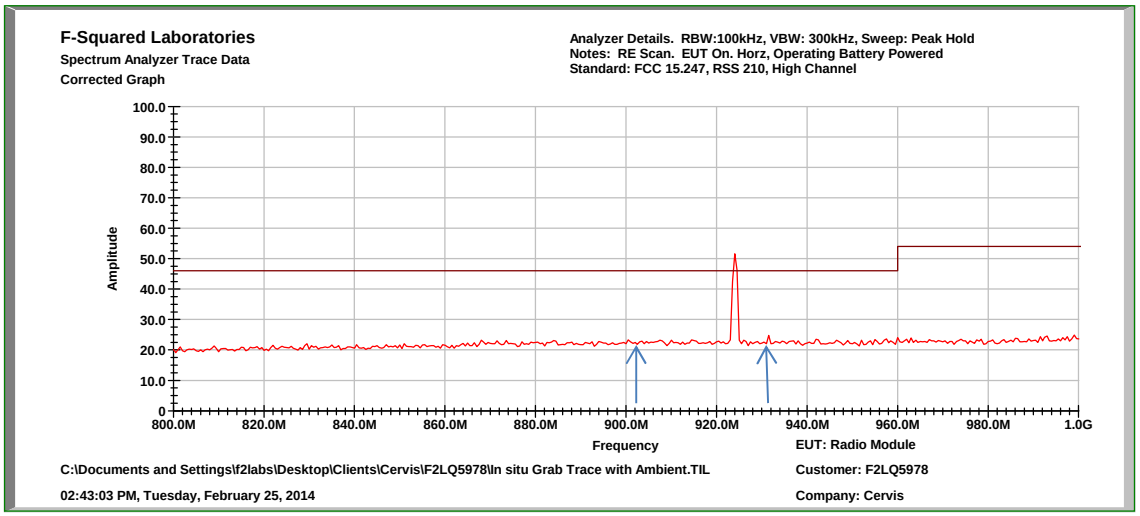
9dBi Whip Antenna, High Channel, 30 MHz to 800 MHz, Horizontal



9dBi Whip Antenna, High Channel, 30 MHz to 800 MHz, Vertical

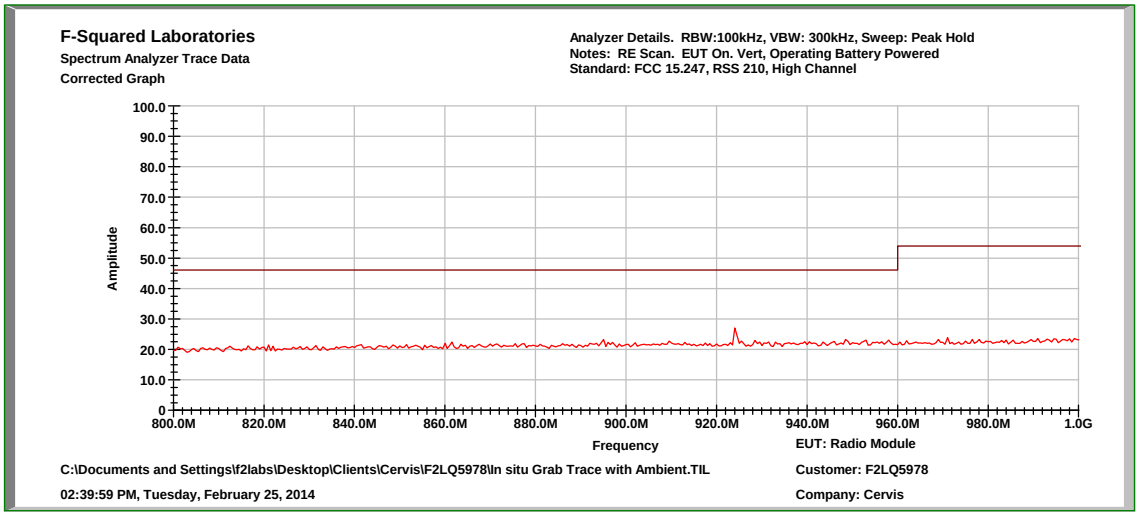


9dBi Whip Antenna, High Channel, 800 MHz to 1 GHz, Horizontal

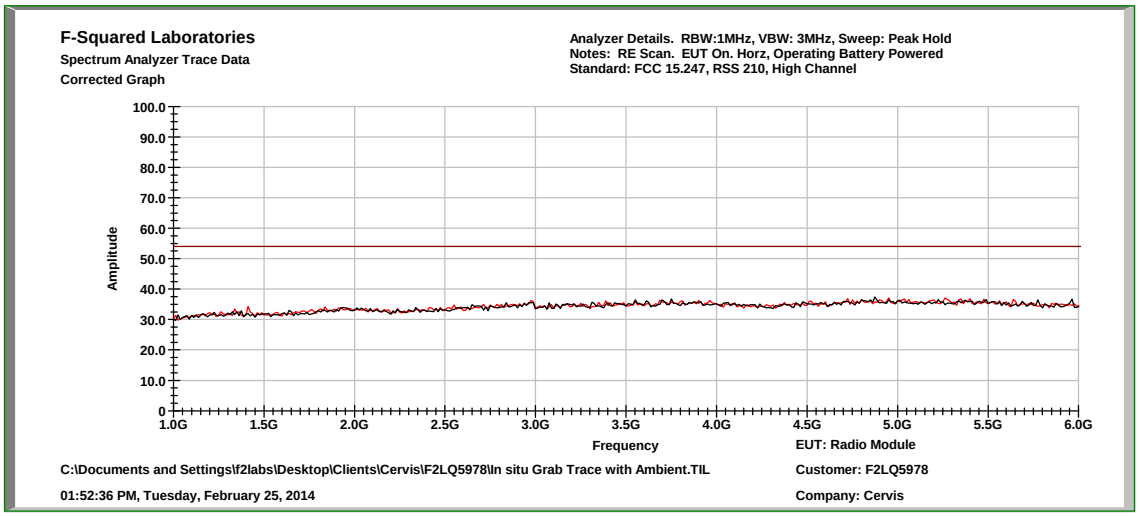


In the graph above, the blue arrows indicate the band edges and display that the band edges are more than 20dB below the limit line of 15.209.

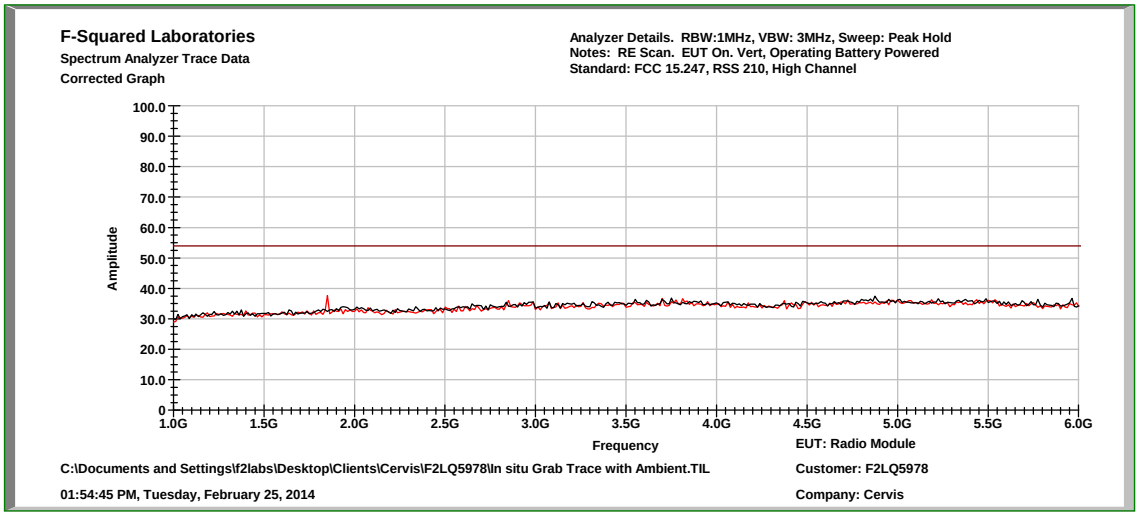
9dBi Whip Antenna, High Channel, 800 MHz to 1 GHz, Vertical



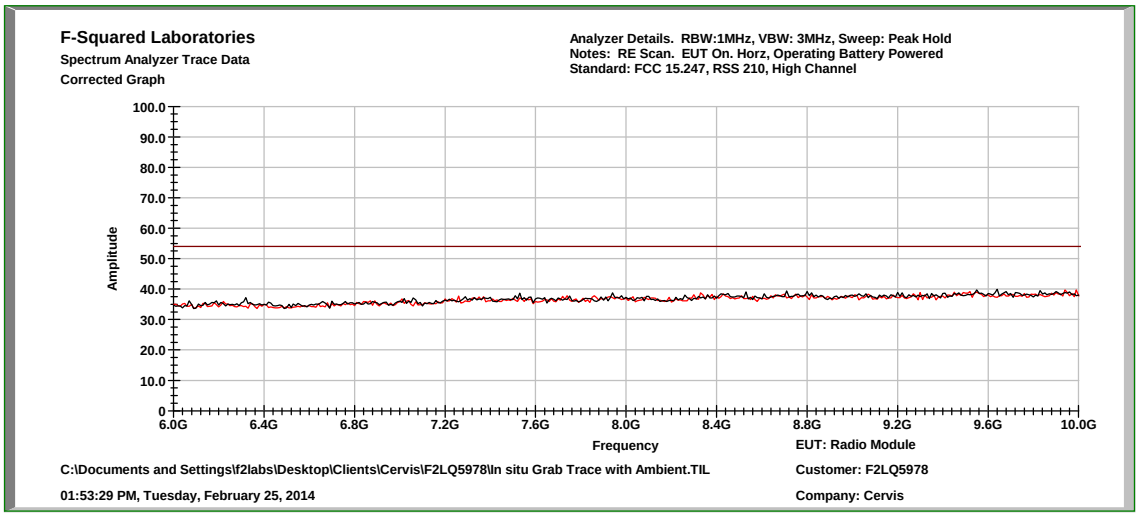
9dBi Whip Antenna, High Channel, 1 GHz to 6 GHz, Horizontal



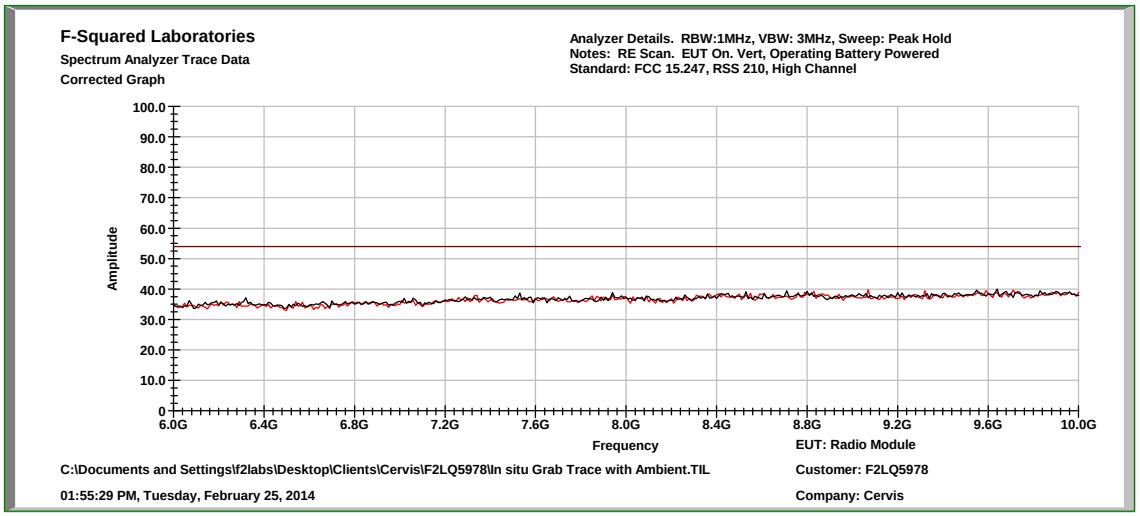
9dBi Whip Antenna, High Channel, 1 GHz to 6 GHz, Vertical



9dBi Whip Antenna, High Channel, 6 GHz to 10 GHz, Horizontal



9dBi Whip Antenna, High Channel, 6 GHz to 10 GHz, Vertical



9dBi Whip Antenna, Low Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit dBµV/m)	Bandwidth (kHz)	Polarity	Corr. (dB)
184.600000	32.5	43.5	120.000	H	12.8
185.240000	22.9	43.5	120.000	V	12.9
192.690000	33.2	43.5	120.000	H	13.8
196.980000	34.6	43.5	120.000	H	14.4
209.900000	27.3	43.5	120.000	V	12.1
614.000000	32.0	46.0	120.000	H	24.4
901.160000	39.3	46.0	120.000	V	30.6
902.600000	39.1	46.0	120.000	H	30.6
909.960000	37.6	46.0	120.000	H	30.8
914.180000	38.7	46.0	120.000	V	30.7
928.200000	40.9	46.0	120.000	V	31.1
928.250000	41.3	46.0	120.000	H	31.5
960.000000	40.8	46.0	120.000	H	32.3

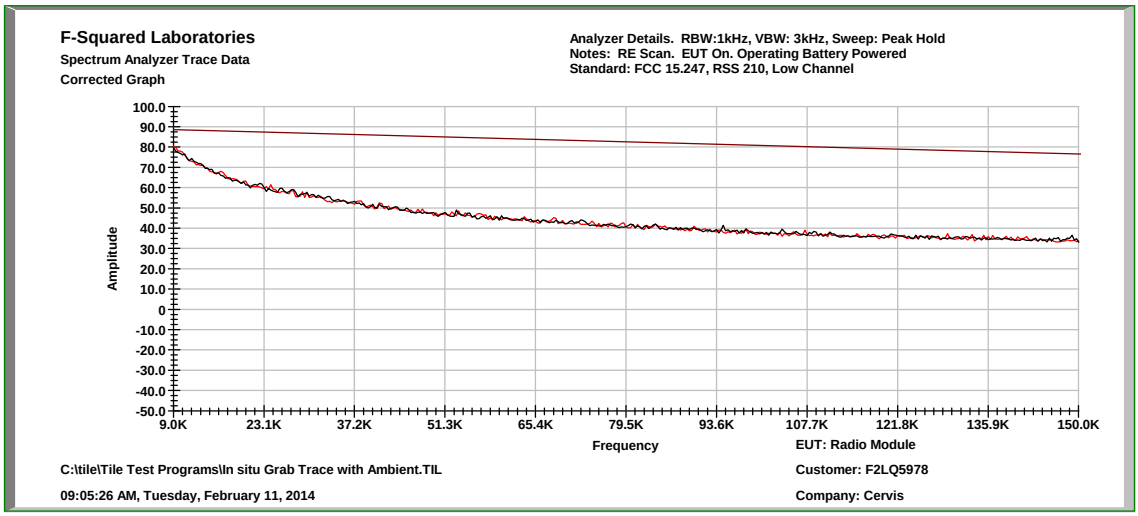
9dBi Whip Antenna, Mid Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit dBµV/m)	Bandwidth (kHz)	Polarity	Corr. (dB)
180.860000	31.8	43.5	120.000	H	12.8
184.390000	34.8	43.5	120.000	H	12.8
185.480000	24.7	43.5	120.000	V	13.0
193.170000	35.1	43.5	120.000	H	14.0
196.980000	35.6	43.5	120.000	H	14.4
198.860000	23.3	43.5	120.000	H	15.4
210.010000	27.2	43.5	120.000	V	12.0
614.000000	32.0	46.0	120.000	H	24.4
901.100000	40.4	46.0	120.000	H	31.0
901.740000	41.0	46.0	120.000	V	31.0
928.100000	41.2	46.0	120.000	H	31.5
928.520000	39.4	46.0	120.000	V	31.5
960.000000	40.8	46.0	120.000	H	32.3

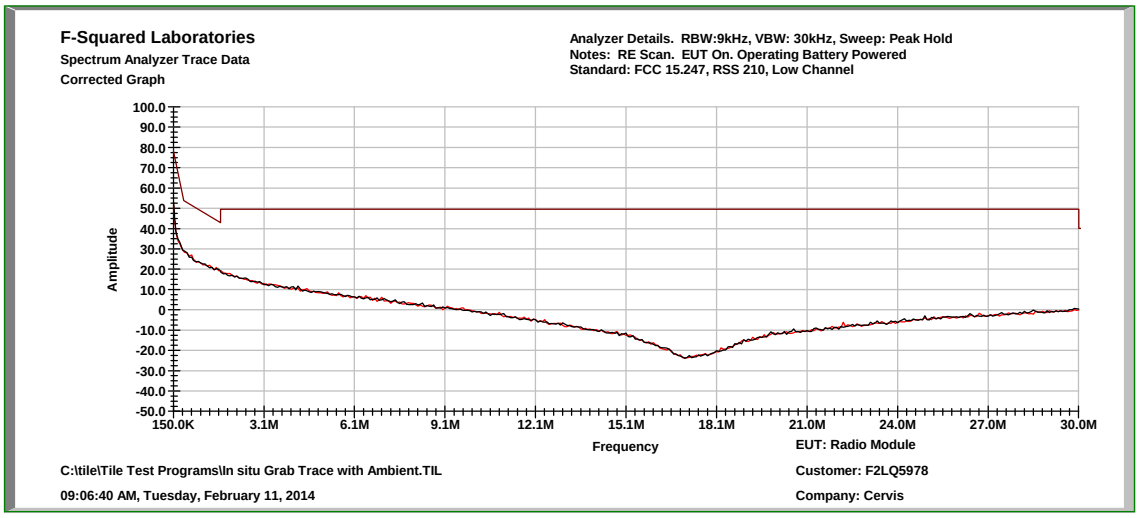
9dBi Whip Antenna, High Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit dBµV/m)	Bandwidth (kHz)	Polarity	Corr. (dB)
180.790000	30.7	43.5	120.000	H	12.8
184.360000	34.6	43.5	120.000	H	12.8
184.970000	22.6	43.5	120.000	V	12.8
192.760000	33.9	43.5	120.000	H	13.9
197.230000	36.7	43.5	120.000	H	14.5
210.020000	26.8	43.5	120.000	V	12.0
614.000000	32.0	46.0	120.000	H	24.4
901.070000	38.9	46.0	120.000	H	31.0
901.490000	39.7	46.0	120.000	V	31.0
928.100000	40.2	46.0	120.000	V	31.1
928.250000	39.9	46.0	120.000	H	31.5
960.000000	40.8	46.0	120.000	H	32.3

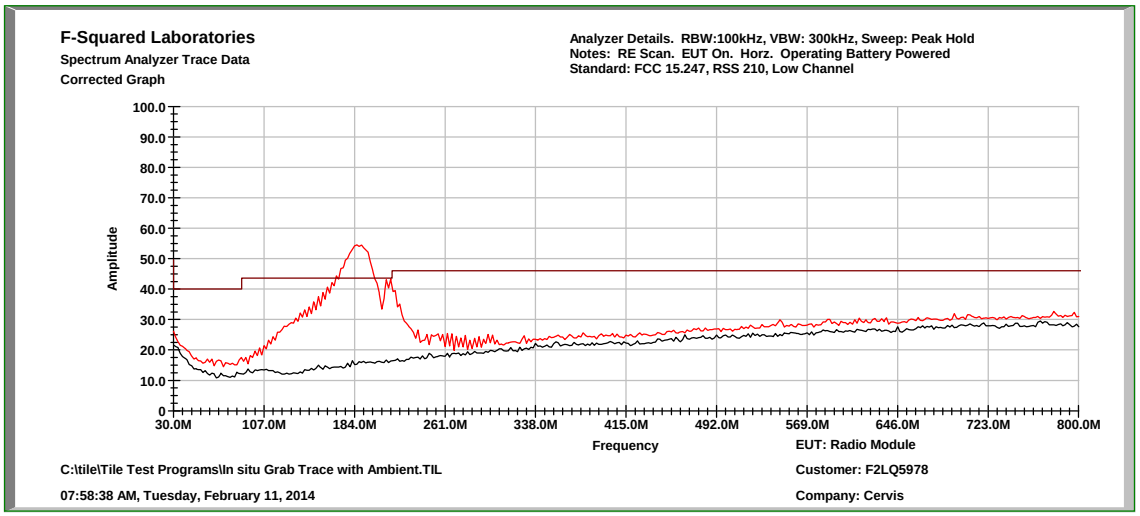
1.49dBi Integral Antenna, Low Channel, .009 MHz to 0.15 MHz



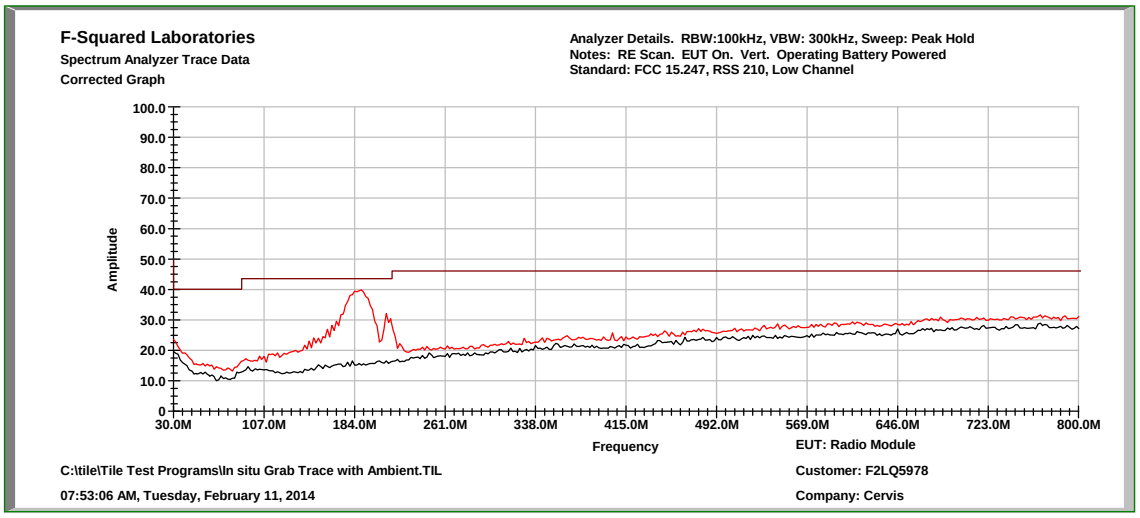
1.49dBi Integral Antenna, Low Channel, 0.15 MHz to 30 MHz



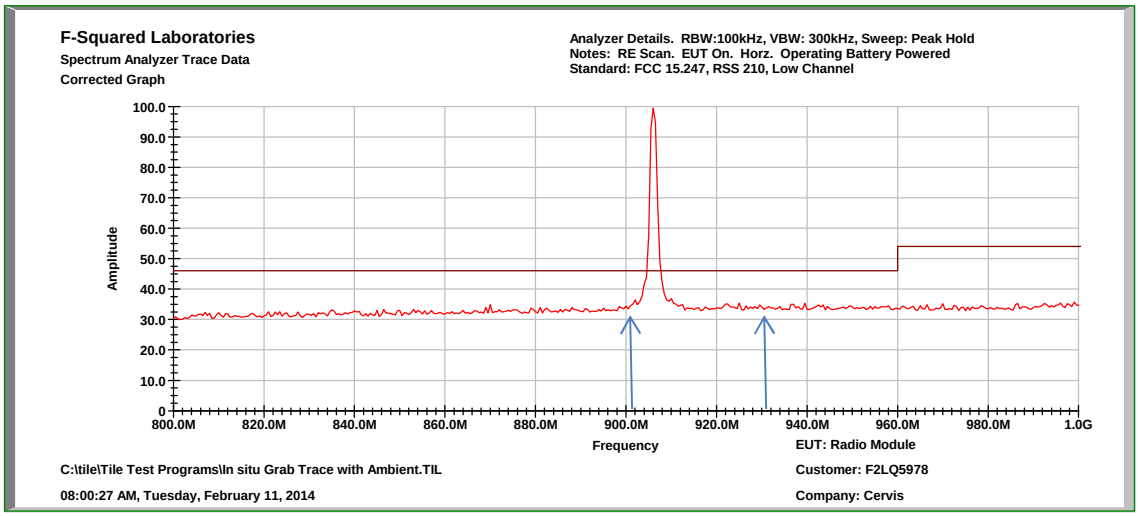
1.49dBi Integral Antenna, Low Channel, 30 MHz to 800 MHz, Horizontal



1.49dBi Integral Antenna, Low Channel, 30 MHz to 800 MHz, Vertical

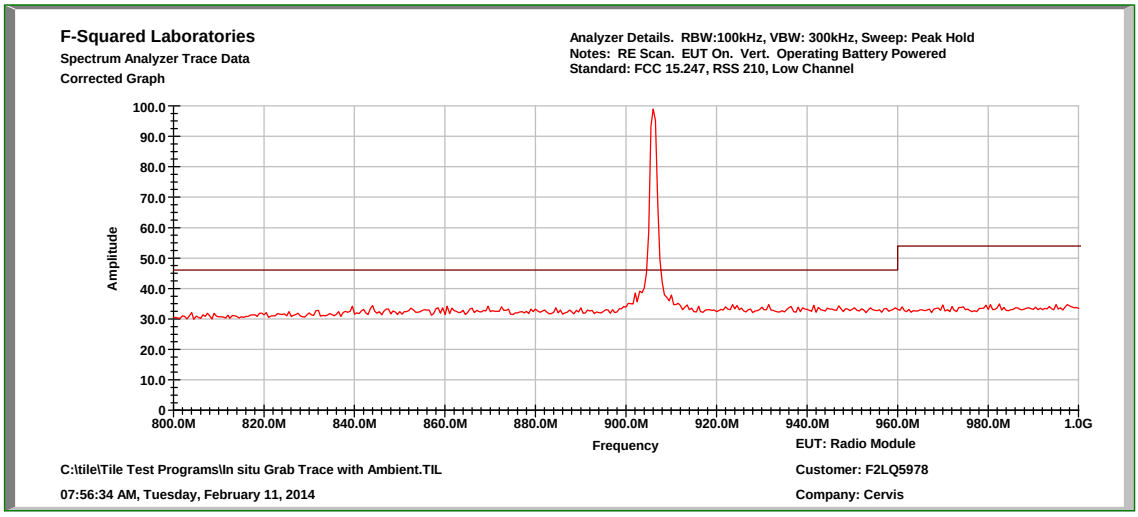


1.49dBi Integral Antenna, Low Channel, 800 MHz to 1 GHz, Horizontal

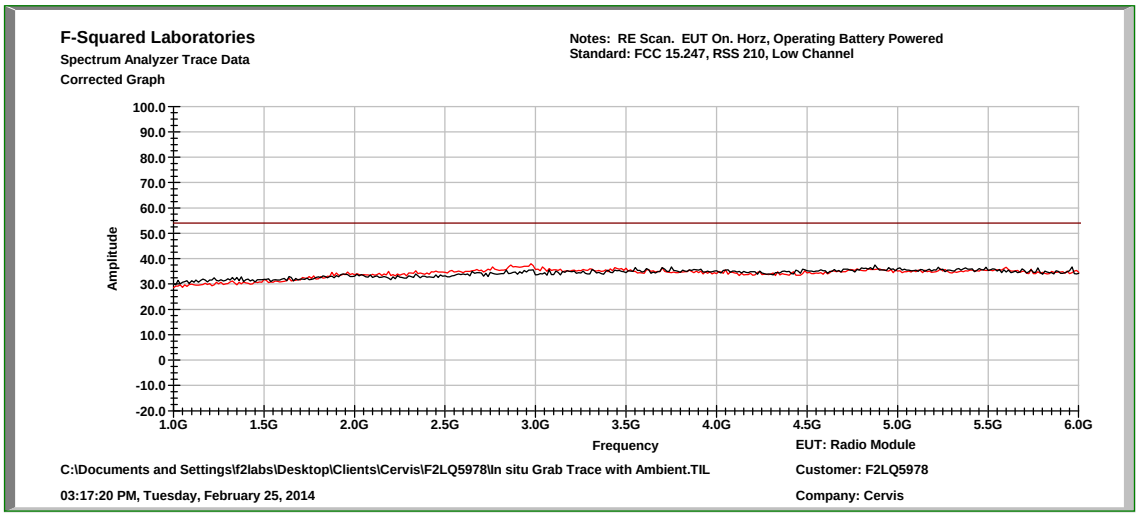


In the graph above, the blue arrows indicate the band edges and display that the band edges are more than 20dB below the limit line of 15.209.

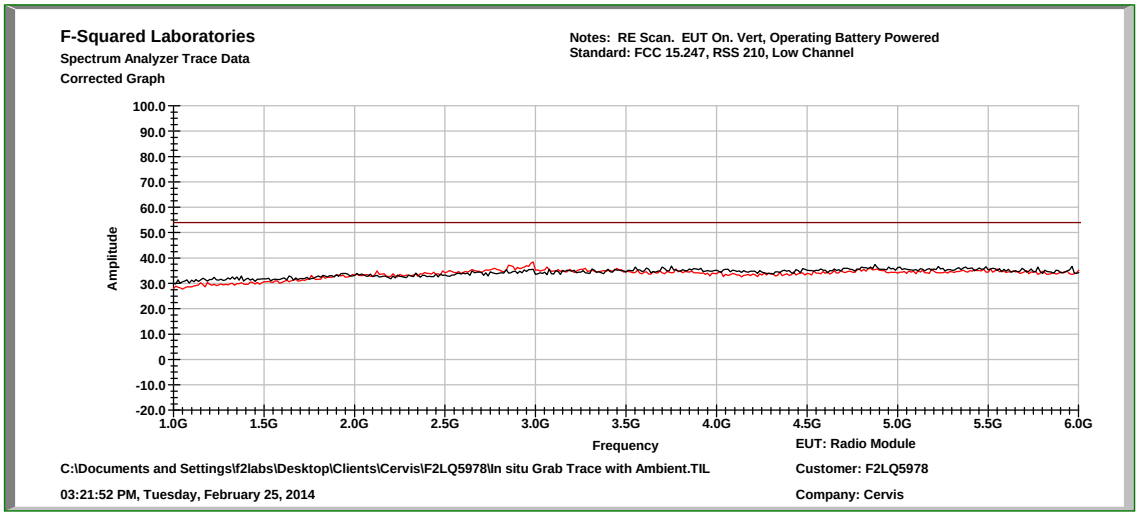
1.49dBi Integral Antenna, Low Channel, 800 MHz to 1 GHz, Vertical



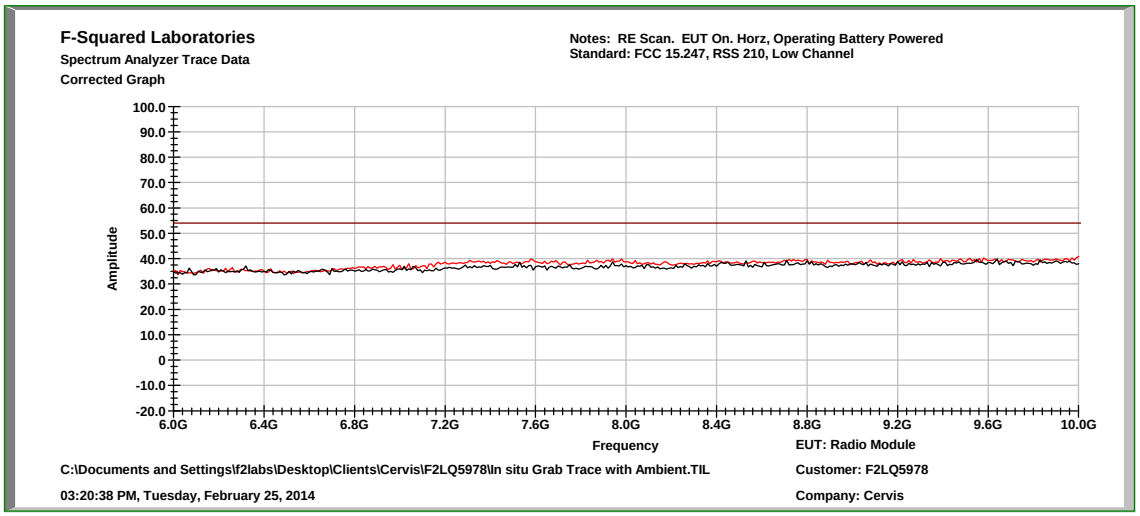
1.49dBi Integral Antenna, Low Channel, 1 GHz to 6 GHz Horizontal



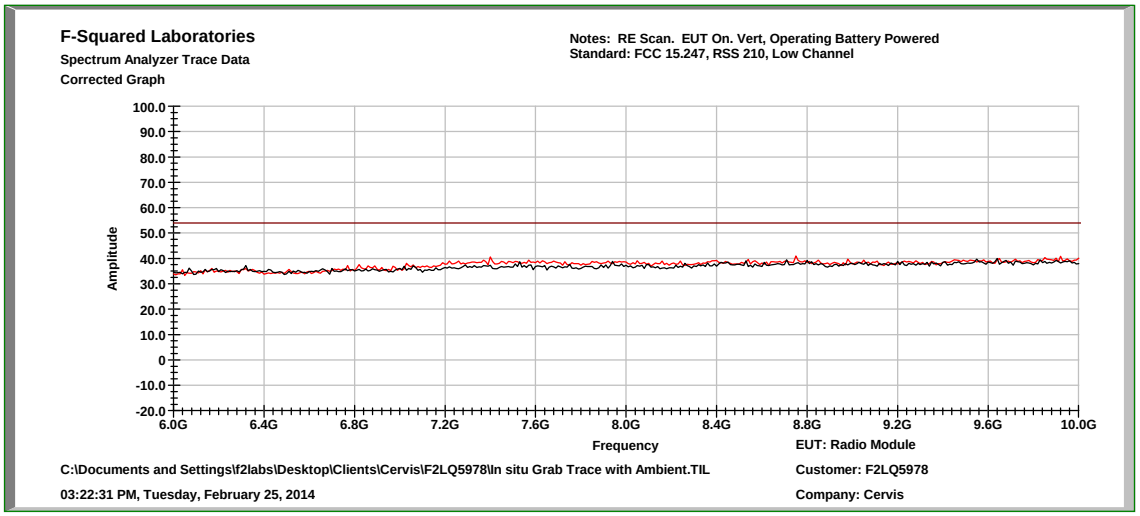
1.49dBi Integral Antenna, Low Channel, 1 GHz to 6 GHz, Vertical



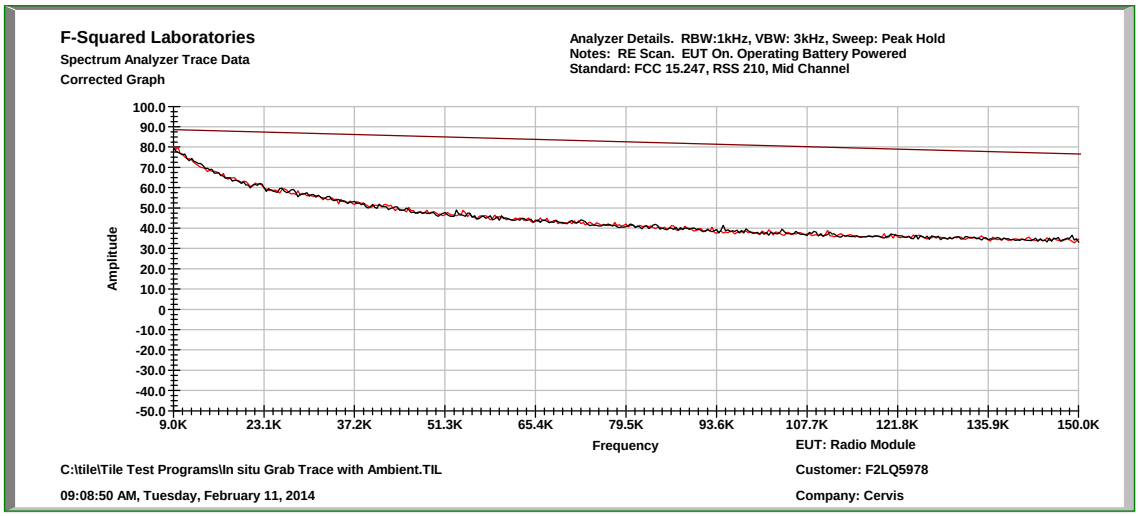
1.49dBi Integral Antenna, Low Channel, 6 GHz to 10 GHz, Horizontal



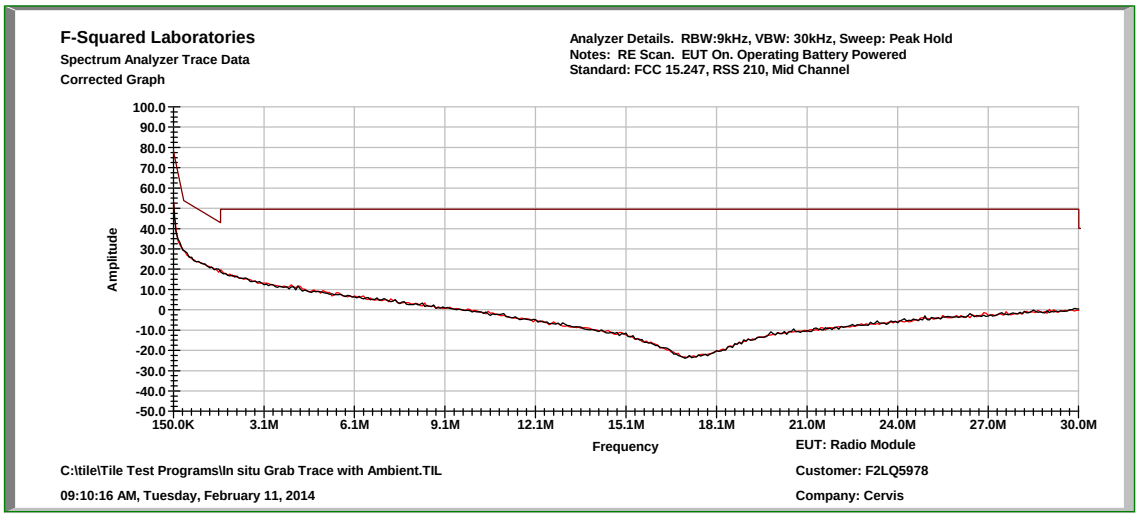
1.49dBi Integral Antenna, Low Channel, 6 GHz to 10 GHz, Vertical



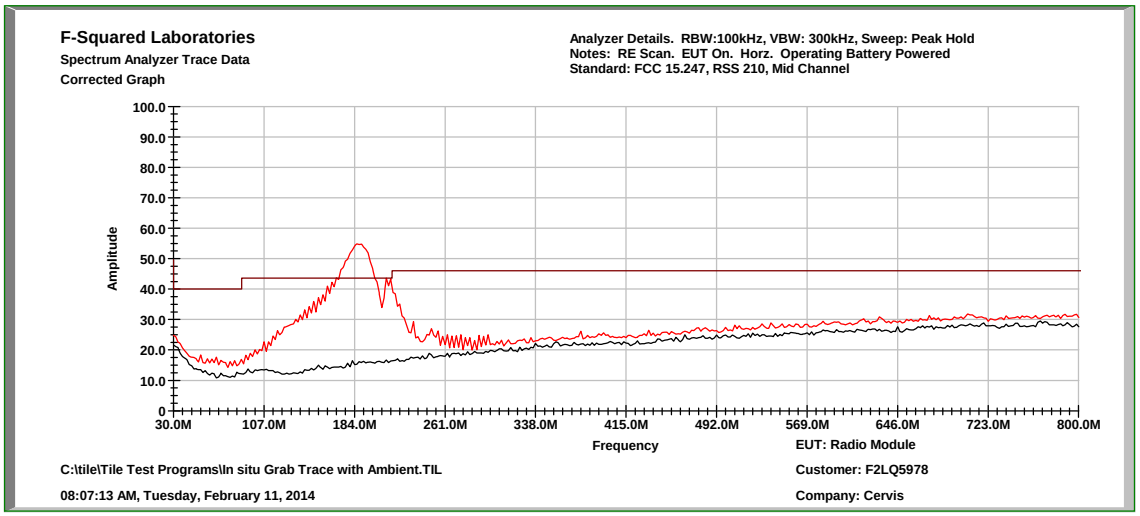
1.49dBi Integral Antenna, Mid Channel, .009 MHz to 0.15 MHz



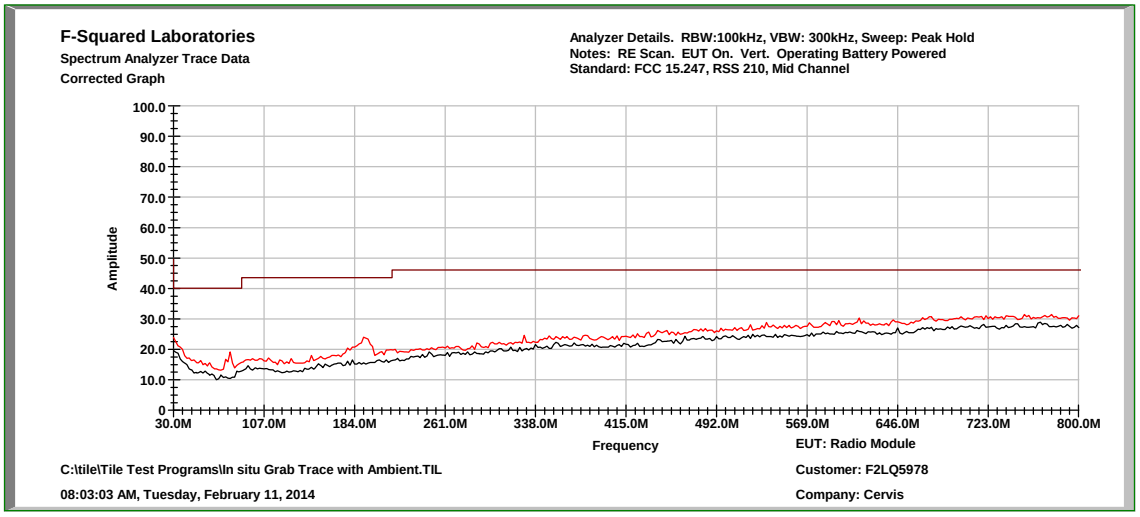
1.49dBi Integral Antenna, Mid Channel, 0.15 MHz to 30 MHz



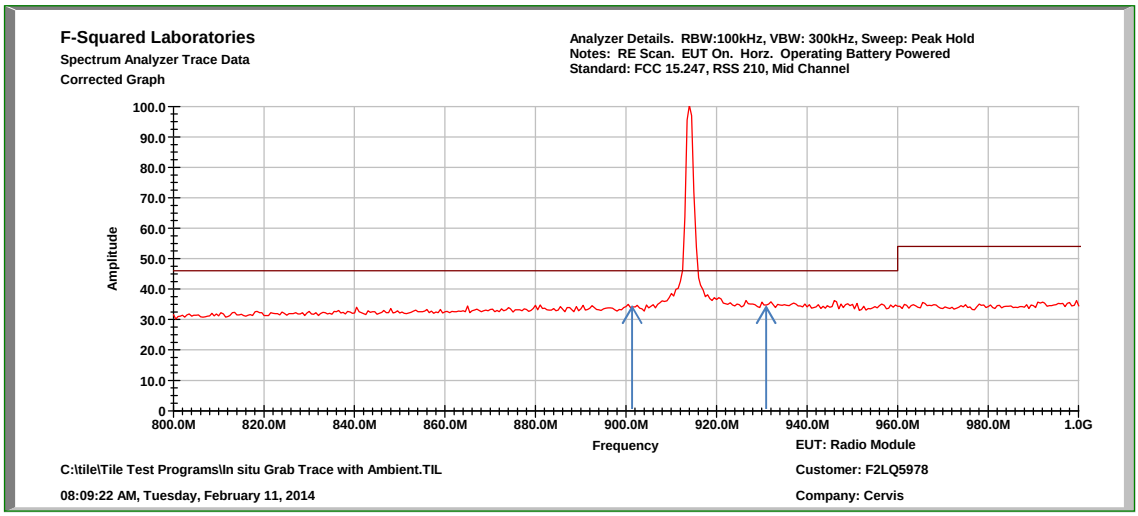
1.49dBi Integral Antenna, Mid Channel, 30 MHz to 800 MHz, Horizontal



1.49dBi Integral Antenna, Mid Channel, 30 MHz to 800 MHz, Vertical

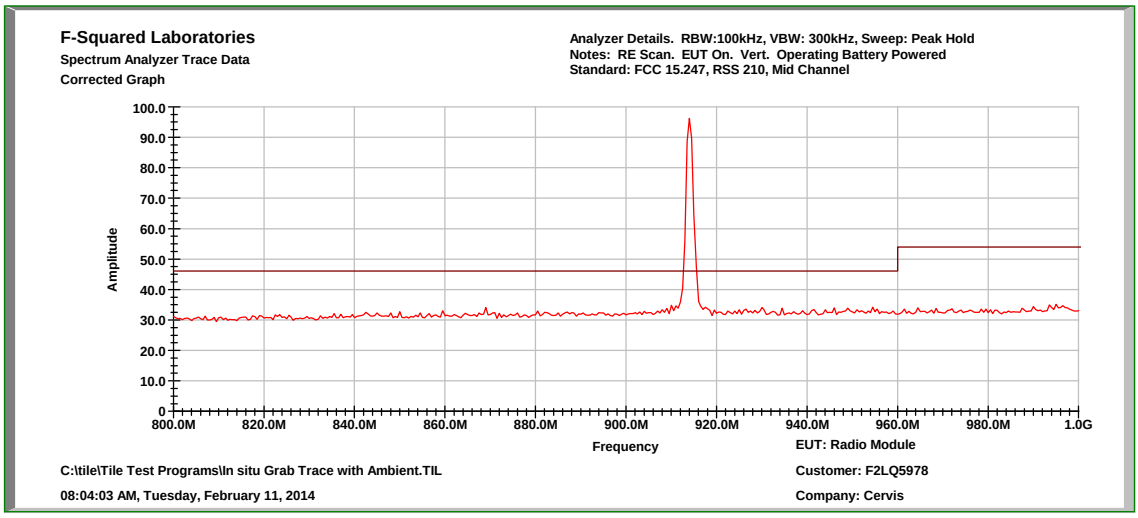


1.49dBi Integral Antenna, Mid Channel, 800 MHz to 1 GHz, Horizontal

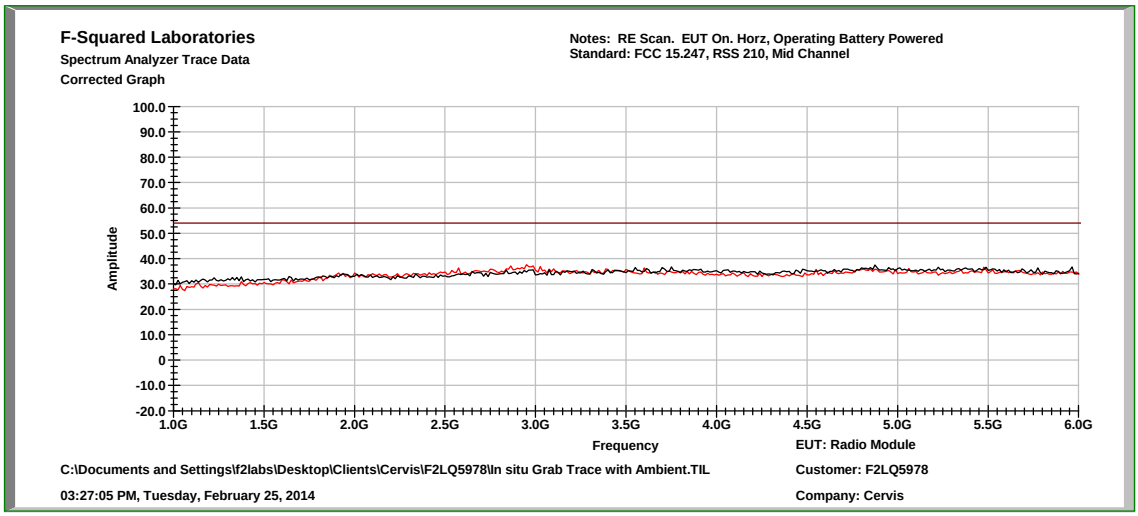


In the graph above, the blue arrows indicate the band edges and display that the band edges are more than 20dB below the limit line of 15.209.

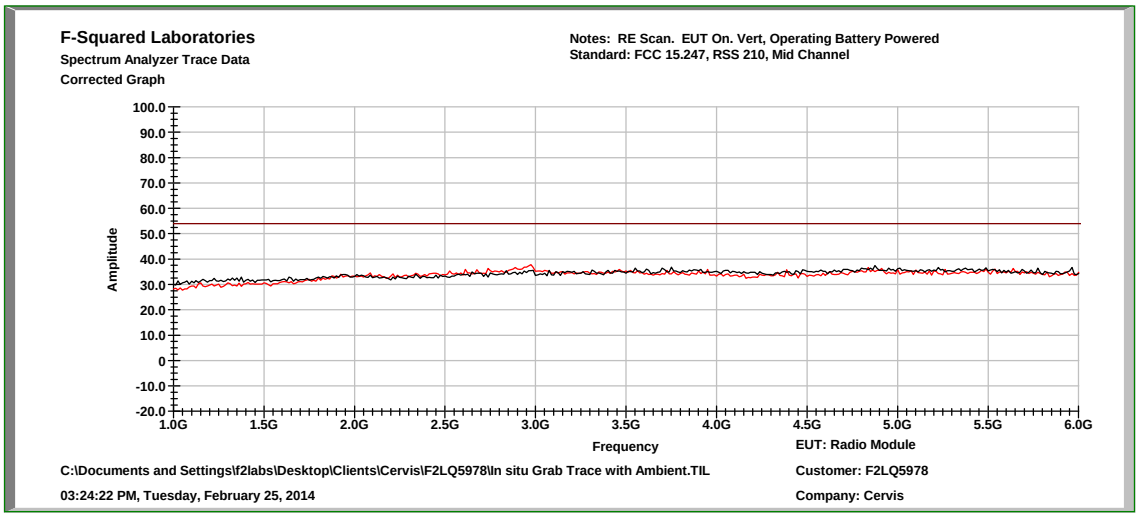
1.49dBi Integral Antenna, Mid Channel, 800 MHz to 1 GHz, Vertical



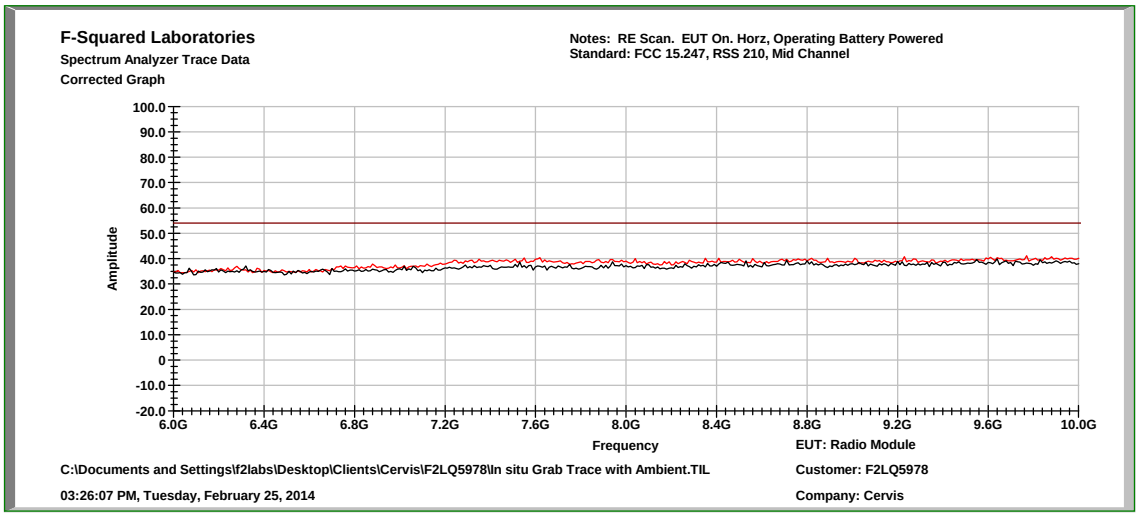
1.49dBi Integral Antenna, Mid Channel, 1 GHz to 6 GHz, Horizontal



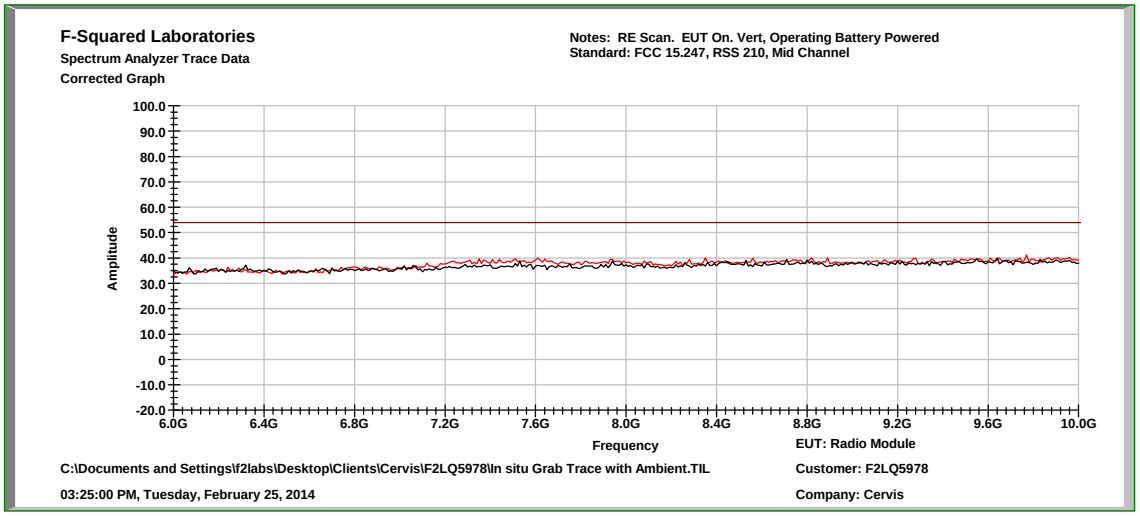
1.49dBi Integral Antenna, Mid Channel, 1 GHz to 6 GHz, Vertical



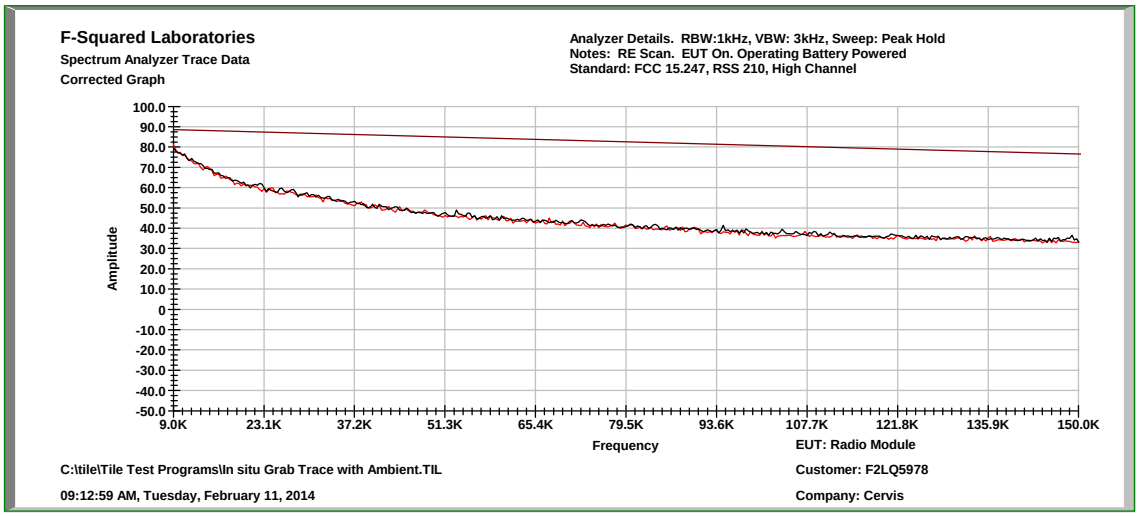
1.49dBi Integral Antenna, Mid Channel, 6 GHz to 10 GHz, Horizontal



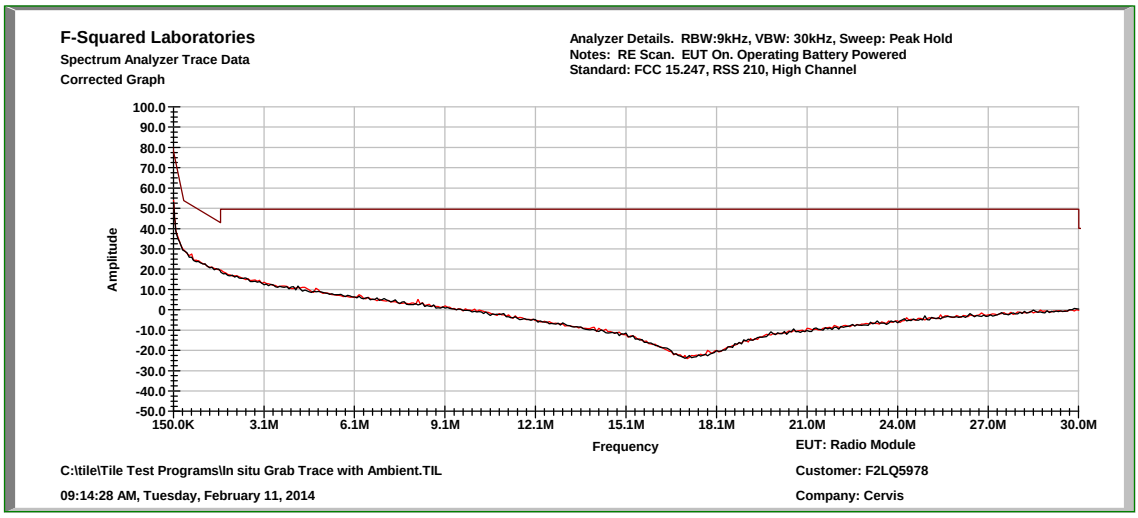
1.49dBi Integral Antenna, Mid Channel, 6 GHz to 10 GHz, Vertical



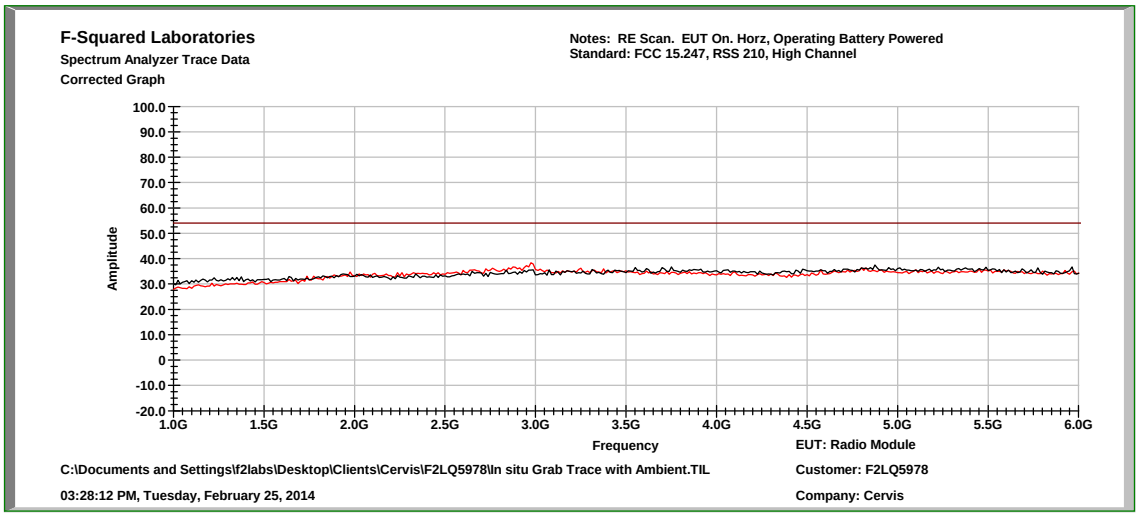
1.49dBi Integral Antenna, High Channel, .009 MHz to 0.15 MHz



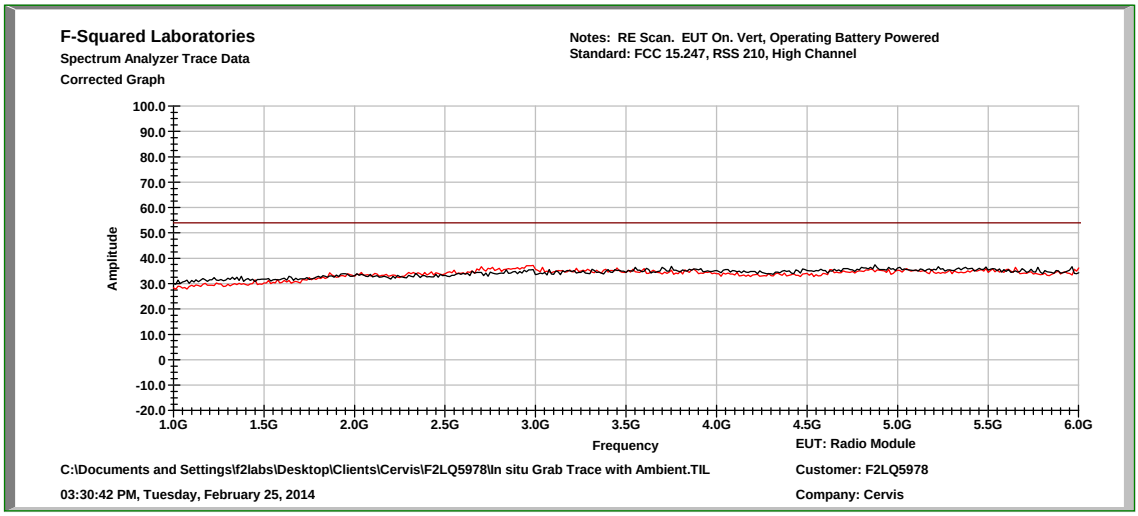
1.49dBi Integral Antenna, High Channel, 0.15 MHz to 30 MHz



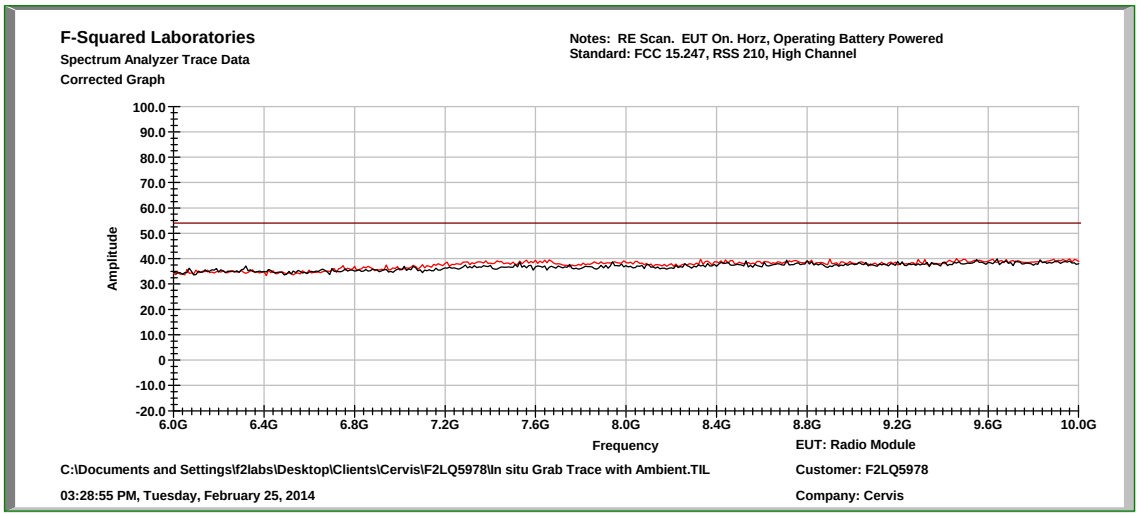
1.49dBi Integral Antenna, High Channel, 1 GHz to 6 GHz, Horizontal



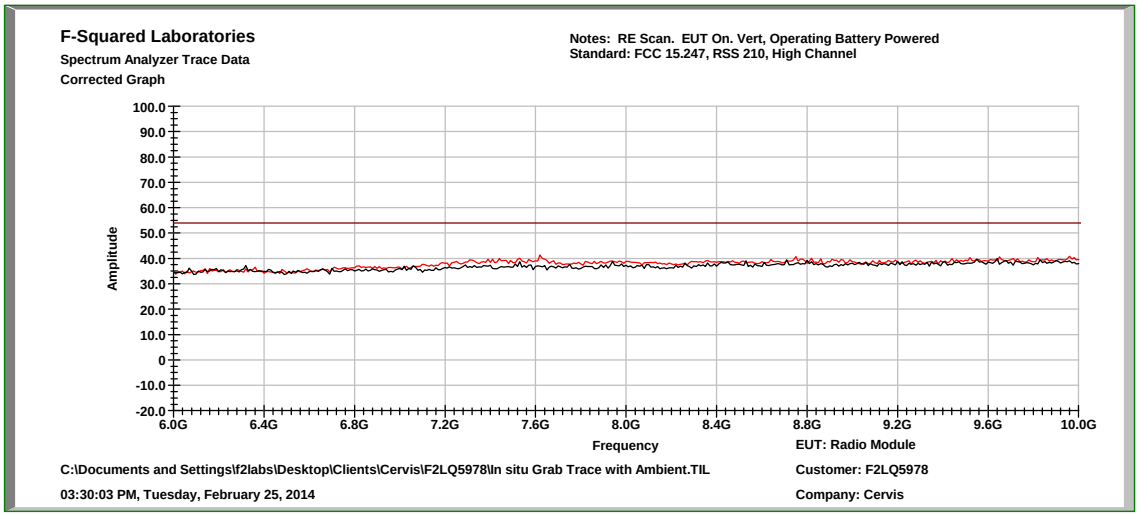
1.49dBi Integral Antenna, High Channel, 1 GHz to 6 GHz, Vertical



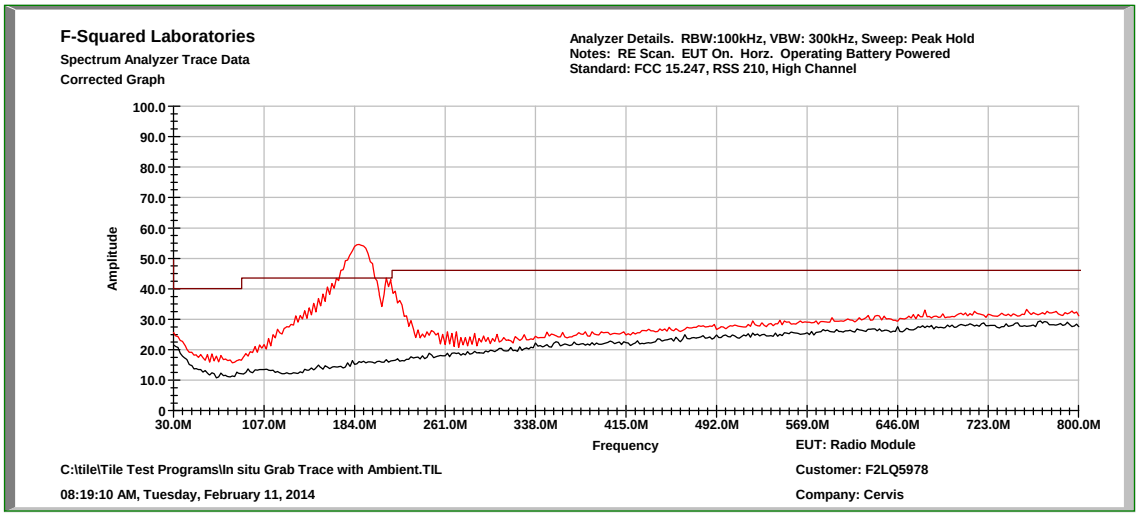
1.49dBi Integral Antenna, High Channel, 6 GHz to 10 MHz, Horizontal



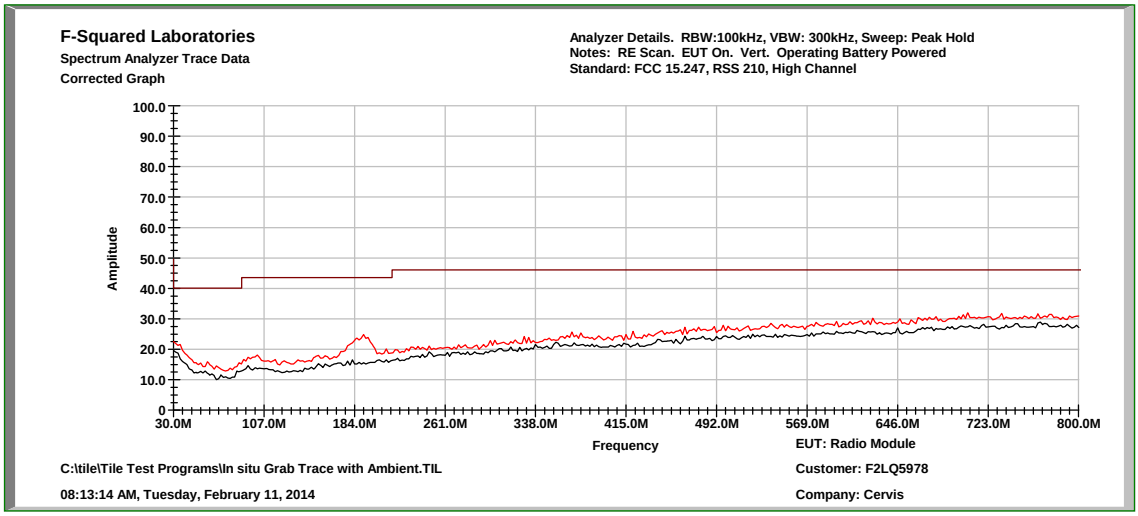
1.49dBi Integral Antenna, High Channel, 6 GHz to 10 GHz, Vertical



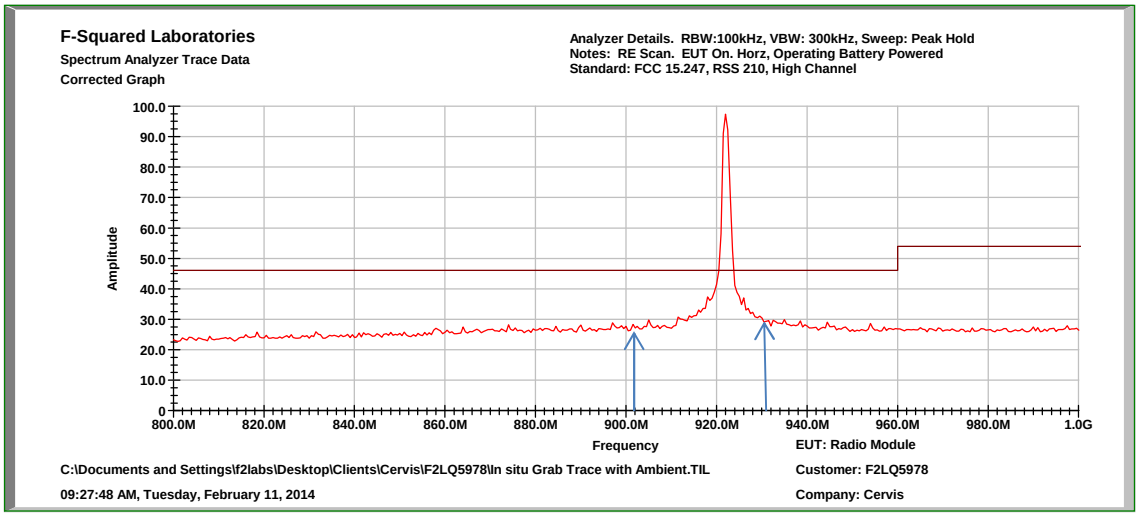
1.49dBi Integral Antenna, High Channel, 30 MHz to 800 MHz, Horizontal



1.49dBi Integral Antenna, High Channel, 30 MHz to 800 MHz, Vertical

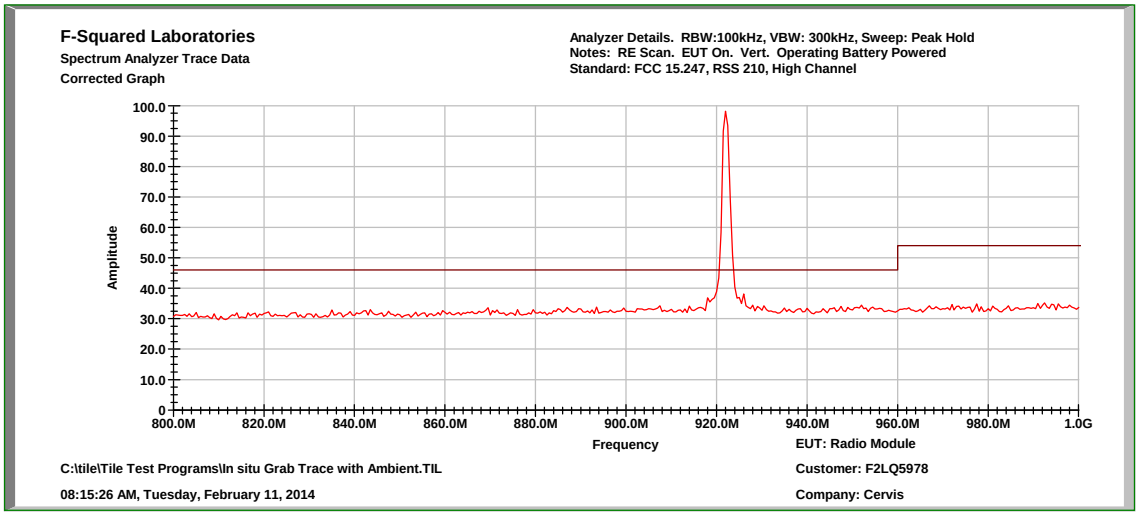


1.49dBi Integral Antenna, High Channel, 800 MHz to 1 GHz, Horizontal



In the graph above, the blue arrows indicate the band edges and display that the band edges are more than 20dB below the limit line of 15.209.

1.49dBi Integral Antenna, High Channel, 800 MHz to 1 GHz, Vertical



Measurements

1.49dBi Integral Antenna, Low Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit dBµV/m	Bandwidth (kHz)	Polarity	Corr. (dB)
172.390000	39.3	43.5	120.000	H	13.5
172.420000	38.4	43.5	120.000	H	13.5
174.390000	28.2	43.5	120.000	V	13.5
176.260000	39.9	43.5	120.000	H	13.2
178.220000	39.9	43.5	120.000	H	13.0
178.410000	31.3	43.5	120.000	V	13.2
180.280000	33.7	43.5	120.000	V	13.1
190.170000	37.2	43.5	120.000	H	12.9
209.460000	21.3	43.5	120.000	V	12.4
614.000000	32.0	46.0	120.000	H	24.4
901.160000	37.0	46.0	120.000	V	30.6
902.600000	38.8	46.0	120.000	H	30.6
909.960000	38.0	46.0	120.000	H	30.8
914.180000	39.3	46.0	120.000	V	30.7
915.410000	37.7	46.0	120.000	V	30.8
924.310000	36.3	46.0	120.000	H	30.9
960.000000	40.8	46.0	120.000	H	32.3

1.49dBi Integral Antenna, Mid Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit dBµV/m)	Bandwidth (kHz)	Polarity	Corr. (dB)
170.430000	33.3	43.5	120.000	H	13.4
172.340000	34.9	43.5	120.000	H	13.5
174.420000	37.1	43.5	120.000	H	13.2
176.480000	40.2	43.5	120.000	H	13.2
178.300000	40.8	43.5	120.000	H	13.0
184.310000	31.3	43.5	120.000	V	12.9
186.320000	28.9	43.5	120.000	V	13.1
188.230000	38.3	43.5	120.000	H	12.8
190.170000	34.8	43.5	120.000	H	12.9
210.050000	21.6	43.5	120.000	V	12.0
614.000000	32.0	46.0	120.000	H	24.4
901.100000	39.1	46.0	120.000	H	31.0
901.740000	39.2	46.0	120.000	V	31.0
902.150000	39.3	46.0	120.000	H	31.0
902.500000	39.2	46.0	120.000	V	31.0
927.470000	40.0	46.0	120.000	V	31.5
927.990000	40.0	46.0	120.000	H	31.5
928.100000	40.0	46.0	120.000	H	31.5
928.520000	39.9	46.0	120.000	V	31.5
960.000000	40.9	46.0	120.000	H	32.3

1.49dBi Integral Antenna, High Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit dBµV/m)	Bandwidth (kHz)	Polarity	Corr. (dB)
172.310000	34.1	43.5	120.000	H	13.5
174.350000	37.2	43.5	120.000	H	13.2
176.280000	34.2	43.5	120.000	V	13.4
176.450000	40.2	43.5	120.000	H	13.2
178.280000	36.0	43.5	120.000	V	13.2
180.280000	38.7	43.5	120.000	V	13.1
186.390000	38.9	43.5	120.000	H	12.9
188.210000	38.0	43.5	120.000	H	12.8
190.360000	37.0	43.5	120.000	H	13.0
210.020000	21.4	43.5	120.000	V	12.0
614.000000	32.1	46.0	120.000	H	24.4
901.370000	39.1	46.0	120.000	H	31.0
901.810000	39.1	46.0	120.000	V	31.0
904.840000	39.2	46.0	120.000	V	31.1
904.950000	39.3	46.0	120.000	H	31.1
927.500000	39.5	46.0	120.000	V	31.0
927.520000	40.0	46.0	120.000	H	31.5
928.100000	39.5	46.0	120.000	V	31.1
928.250000	39.9	46.0	120.000	H	31.5
960.000000	40.9	46.0	120.000	H	32.3

11 FCC PART 15.247 – PEAK POWER SPECTRAL DENSITY (PSD)

Peak power spectral density measurements were performed.

11.1 Requirements:

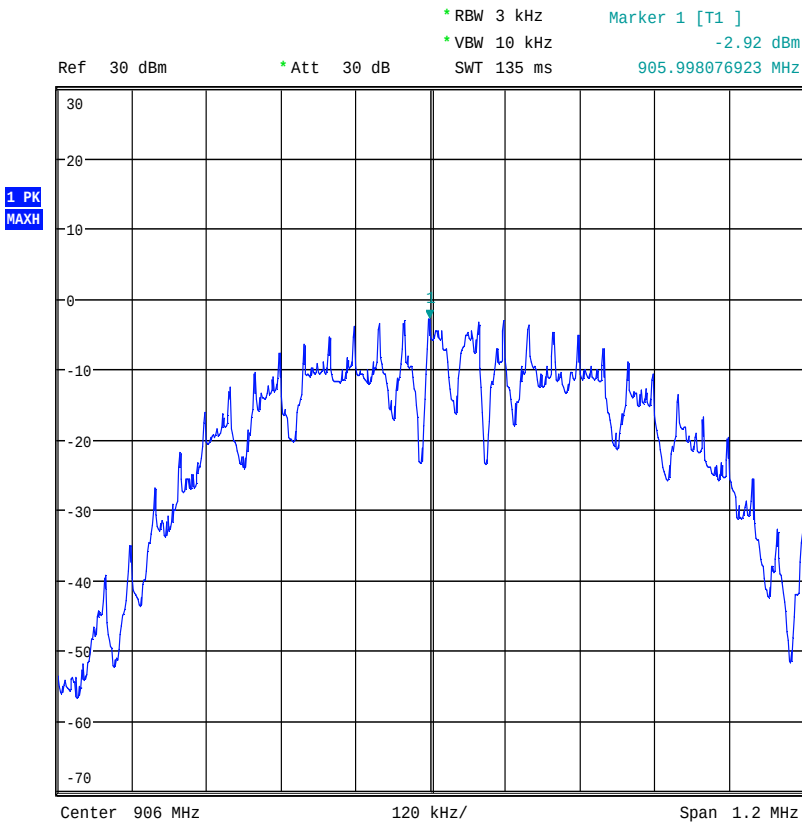
The peak power spectral density shall not exceed +8dBm in any 3 kHz band during any time interval of continuous transmission.

Power spectral density measurements were performed at a resolution bandwidth of 3 kHz (video bandwidth set at 10 KHz). The peak spectral densities were measured at the low, mid, and upper channels.

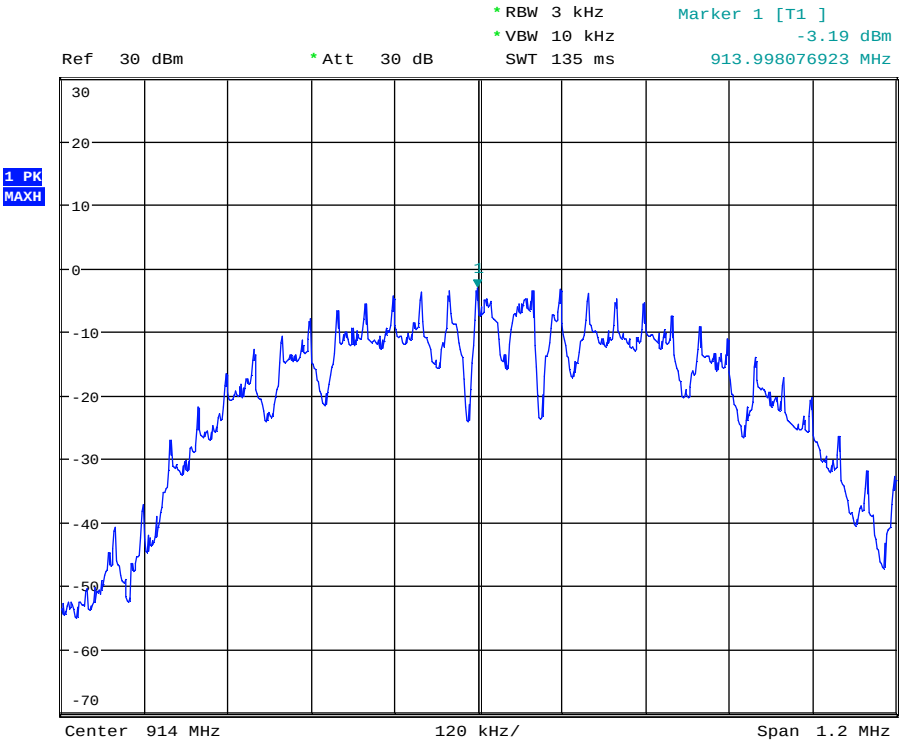
11.2 Peak Power Spectral Density Test Data

Test Date:	Feb. 26, 2014	Test Engineers:	J. Knepper; K. Littell
Standards:	CFR 47 Part 15.247; KDB558074	Air Temperature:	20.7ºC
		Relative Humidity:	45%

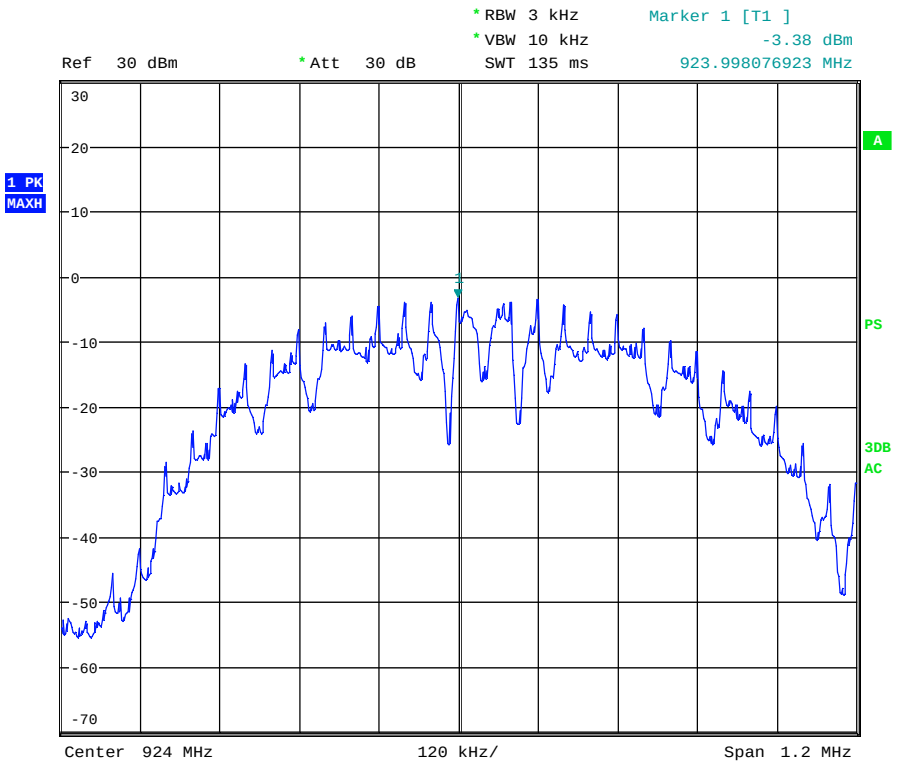
Low Channel



Mid Channel


*RBW 3 kHz
*VBW 10 kHz
Marker 1 [T1]
-3.19 dBm
Ref 30 dBm
*Att 30 dB
SWT 135 ms
913.998076923 MHz
1 PK
MAXH
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Center 914 MHz
120 kHz/
Span 1.2 MHz

High Channel



Date: 26.FEB.2014 09:05:55

12 CONDUCTED EMISSIONS

12.1 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.

12.2 Procedure

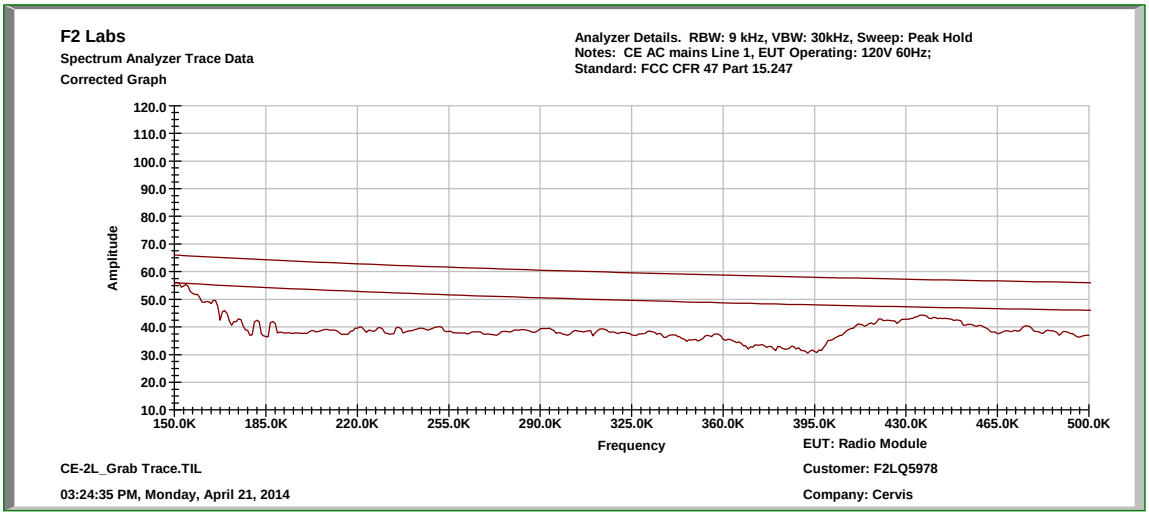
The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power 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

12.3 Conducted Emissions Test Data

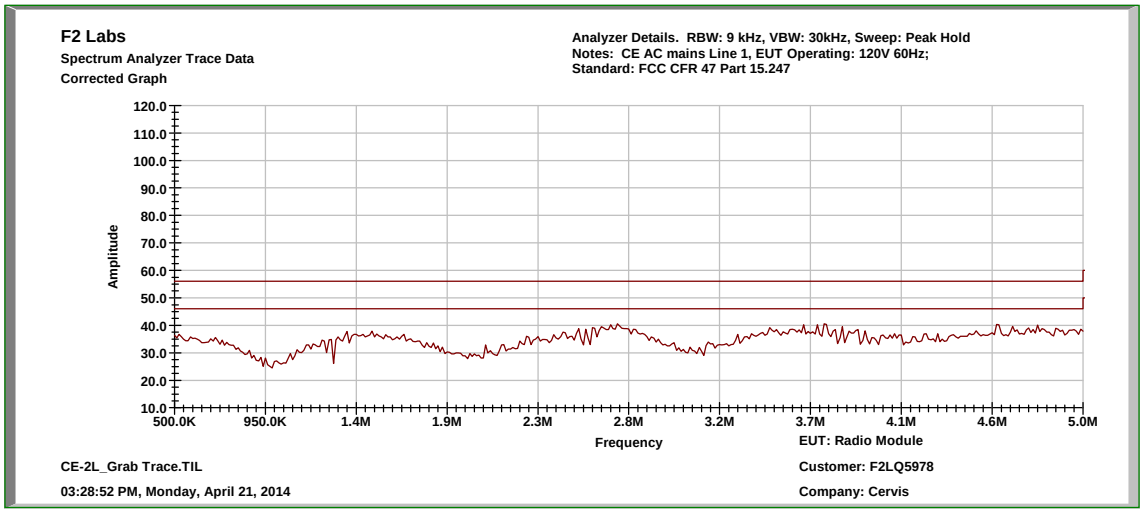
Test Date:	Apr. 21, 2014	**Test Engineer:**	J. Knepper
Rule:	15.207(a)	**Air Temperature:**	25.2º C
Test Results:	Pass	**Relative Humidity:**	44%

Note: The test data in this section represents the worst case results of all three channels

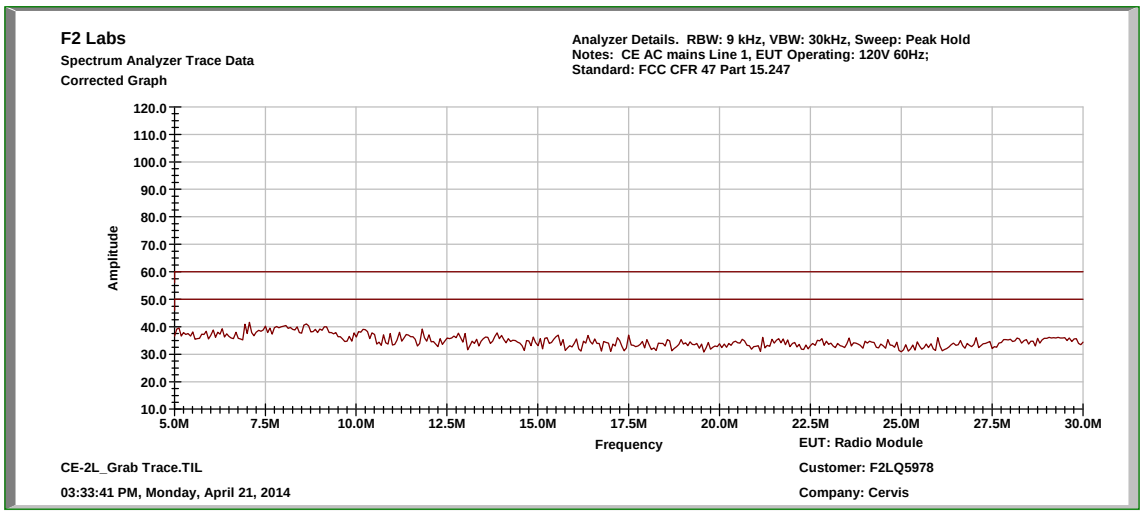
Conducted Test – Line 1: 0.15 MHz to 0.5 MHz



Conducted Test – Line 1: 0.5 MHz to 5.0 MHz

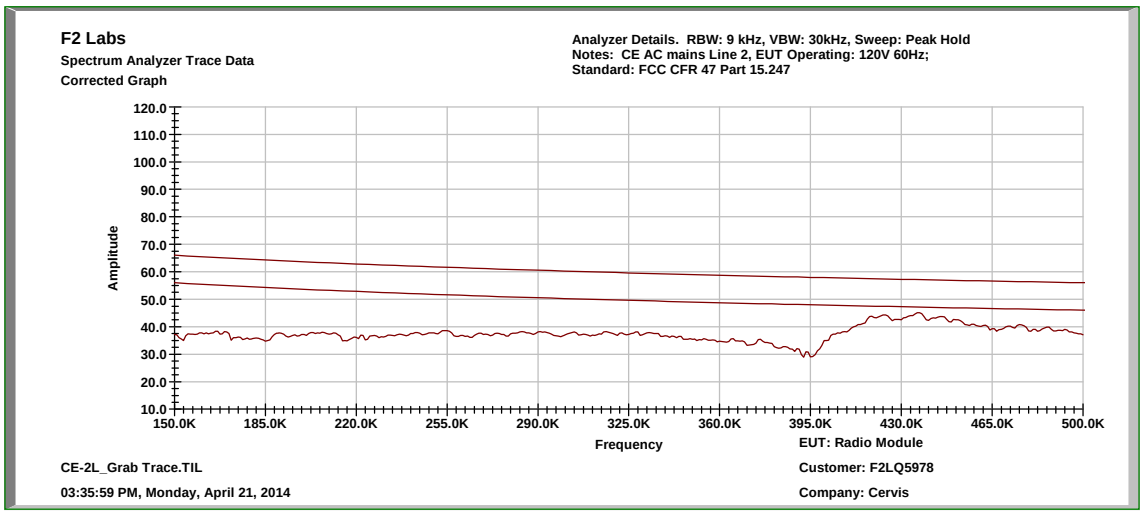


Conducted Test – Line 1: 5.0 MHz to 30.0 MHz

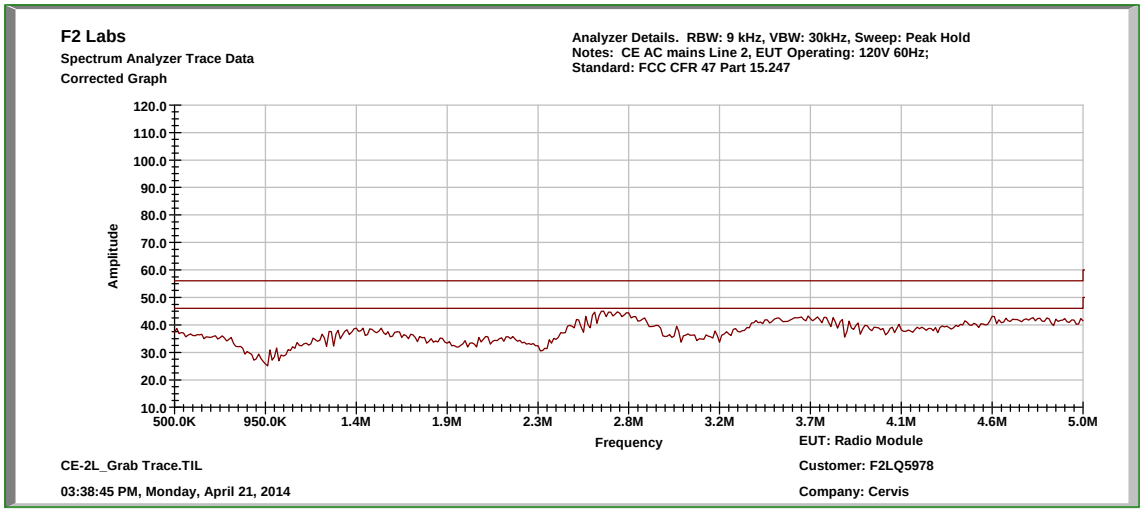


Top Discrete Measurements								
No.	**Conductor**	**Frequency (MHz)**	**Detector**	**Level (dBµV)**	**Adjustment (dB)**	**Results (dBµV)**	**Limit (dBµV)**	**Margin (dB)**
1	Line 1	0.155	Quasi-Peak	21.51	11.0	32.51	65.73	-33.2
			Average	9.25	11.0	20.25	55.73	-35.5
2	Line 1	0.165	Quasi-Peak	23.2	11.0	34.2	65.208	-31.0
			Average	11.62	11.0	22.62	55.208	-32.6
3	Line 1	0.419	Quasi-Peak	28.23	11.0	39.23	57.46	-18.2
			Average	21.44	11.0	32.44	47.46	-15.0
4	Line 1	0.450	Quasi-Peak	26.8	11.0	37.8	56.88	-19.1
			Average	20.92	11.0	31.92	46.88	-15.0
5	Line 1	3.56	Quasi-Peak	25.65	11.0	36.65	56	-19.4
			Average	16.22	11.0	27.22	46	-18.8
6	Line 1	7.125	Quasi-Peak	22.34	11.0	33.34	60	-26.7
			Average	16.11	11.0	27.11	50	-22.9

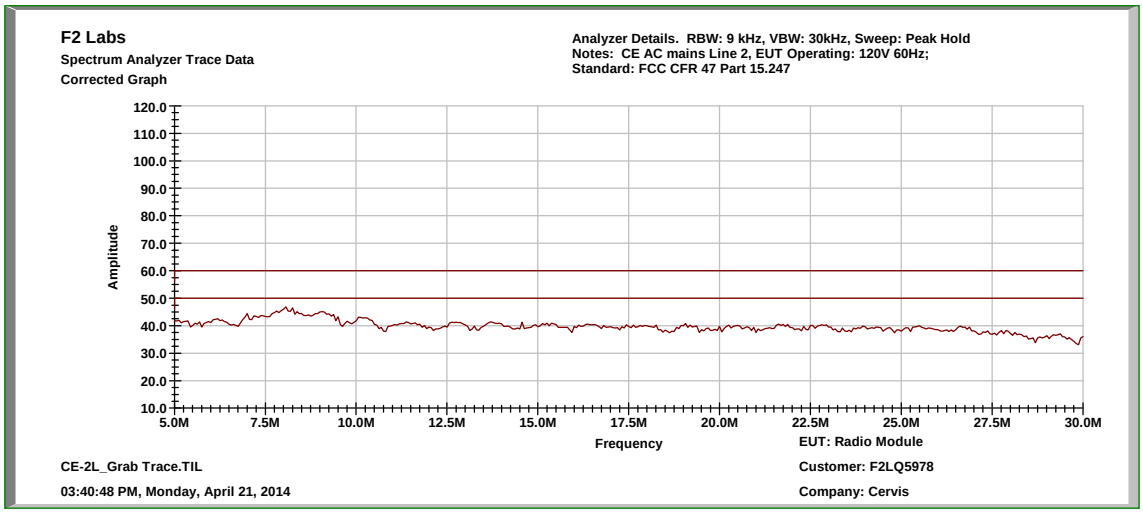
Conducted Test – Line 2: 0.15 MHz to 0.5 MHz



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	0.423	Quasi-Peak	28.72	11.0	39.72	57.39	-17.7
			Average	20.09	11.0	31.09	47.39	-16.3
2	Line 2	0.437	Quasi-Peak	29.62	11.0	40.62	57.12	-16.5
			Average	22.3	11.0	33.3	47.12	-13.8
3	Line 2	0.450	Quasi-Peak	30.33	11.0	41.33	56.88	-15.6
			Average	22.09	11.0	33.09	46.88	-13.8
4	Line 2	2.64	Quasi-Peak	33.0	11.0	44.0	56	-12.0
			Average	23.2	11.0	34.2	46	-11.8
5	Line 2	3.64	Quasi-Peak	29.42	11.0	40.42	56	-15.6
			Average	19.78	11.0	30.78	46	-15.2
6	Line 2	8.06	Quasi-Peak	30.05	11.0	41.05	60	-19.0
			Average	20.88	11.0	31.88	50	-18.1

13 PHOTOGRAPHS/EXHIBITS – PRODUCT PHOTOS, TEST SETUPS

Radiated Spurious Emission Pre-scan

Radiated Spurious Emission OATS

Conducted Output Power, Occupied Bandwidth, Conducted Spurious, Peak Power Spectral Density

Conducted Emissions