

COMPLIANCE WORLDWIDE INC. TEST REPORT 361-13R1

In Accordance with the Requirements of
Federal Communications Commission CFR Title 47 Part 15.225, Subpart C
Industry Canada RSS 210, Issue 8, Annex 2

Low Power License-Exempt Radio Communication Devices
Intentional Radiators

Issued to
Nova Biomedical
200 prospect Street
Waltham, MA 02454

for the
Stat Profile Prime Blood Analyzer
with 13.56 MHz RFID

FCC ID: QYY-51360
IC: 4562A-51360

Report Issued on August 16, 2013

Tested by



Brian F. Breault

Reviewed by



Larry K. Stillings

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1. Scope

This test report certifies that Nova Biomedical Stat Profile Prime Blood Analyzer, as tested, meet the FCC Part 15.209, and Industry Canada RSS 210 requirements.

The scope of this test report is limited to the test samples provided by the client, only in as much as those samples represent other production units. If any significant changes are made to the units, the changes shall be evaluated and a retest may be required.

Revision R1: Page 7 test note added and table modified on to explain the low field strength.

2. Product Details

- 2.1. Manufacturer:** Nova Biomedical Corporation
- 2.2. Model Number:** Stat Profile Prime
- 2.3. Serial Number:** P0721302P
- 2.4. Description of EUT:** Blood Analyzer, RFID Tag Transmitter HID
- 2.5. Power Sources:** 120 Volts/60 Hz
- 2.6. Hardware Revision:** N/A
- 2.7. Software Revision:** N/A
- 2.8. EMC Modifications:** None

3. Product Configuration

3.1. Operational Characteristics & Software

The Nova Biomedical Corporation Stat Profile Prime Blood Analyzer was configured to transmit continuously to the RFID tags once power is applied to the unit.

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
Nova Biomedical	Stat Profile Prime	41308P	120	60	Stat Blood Analyzer

3.3. EUT Connected Hardware

Manufacturer	Model	Serial Number	Description
Sandisk	Cruser Micro	N/A	USB Thumb Drive

3.4. EUT Cables/Transducers

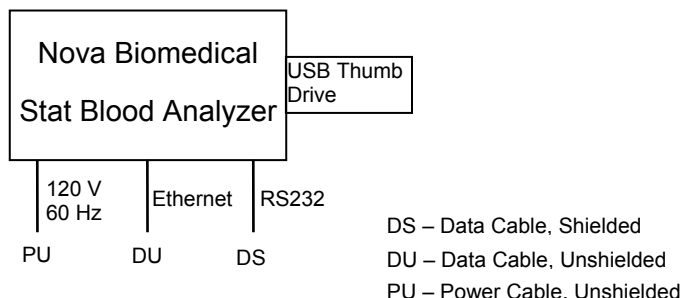
Cable Type	Length	Shield	From	To
RS232	2 M	Yes	EUT	Unterminated
Ethernet	2 M	No	EUT	Unterminated

3.5. Support Equipment

Manufacturer	Model	Serial Number	Input Voltage	Frq (Hz)	Description/Function
N/A					

3. Product Configuration (continued)

3.6. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Tests

Device	Manufacturer	Model No.	Serial No.	Cal Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	100899	6/6/2015
Spectrum Analyzer	Rohde & Schwarz	FSV40	100899	6/6/2015
EMI Receiver	Hewlett Packard	8546A	3650A00360	6/13/2014
Loop Antenna	EMCO	6512	9309-1139	8/28/2014
Bilog Antenna	Com-Power	AC-220	25509	8/20/2013
Horn Antenna	ETS-Lindgren	3117	00143292	1/14/2015
RF Signal Generator	Rohde & Schwarz	SMB 100A	175352	5/14/2014
LISN 50 Ω 50 μ H, 9 kHz to 30 MHz	EMCO	3825/2	9109-1860	6/5/2014
RF Power Meter	Boonton	4220A	323203AC	6/13/2014
Power Sensor	Boonton	51081	29412	6/13/2014
Compact Digital Barometer	Control Company	4195	ID236	2/25/2015

4.2. Measurement & Equipment Setup

Test Dates: August 1 - 16, 2011
 Test Engineer: Cody Merry
 Normal Site Temperature (15 - 35°C): 22.0
 Relative Humidity (20 -75%RH): 33%
 Frequency Range: .009 MHz to 1 GHz
 Measurement Distance: 3 Meters
 EMI Receiver IF Bandwidth: 200 Hz – 9 kHz to 150 kHz
 9 kHz – 150 kHz to 30 MHz
 120 kHz - 30 MHz to 1 GHz
 1 MHz - Above 1 GHz
 EMI Receiver Avg Bandwidth: 300 Hz – 9 kHz to 150 kHz
 30 kHz – 150 kHz to 30 MHz
 300 kHz - 30 MHz to 1 GHz
 3 MHz - Above 1 GHz
 Detector Function: Peak, QP, Avg – 150 kHz to 30 MHz
 Peak, QP - 30 MHz to 1 GHz
 Peak, Avg - Above 1 GHz
 Unless otherwise specified.

4. Measurements Parameters (continued)

4.3. Measurement Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 15, Subpart C - Intentional Radiators, notably Section 15.225, Operation within the band 13.110 – 14.010 MHz.

The test methods used to generate the data in this test report are in accordance with ANSI C63.4: 8 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

5. Choice of Equipment for Test Suits

5.1. Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2. Presentation

The test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for the product equipment configuration.

5.3. Choice of Operating Frequencies

The transmitters in the unit under test utilizes a single operating frequency at approximately 13.56 MHz

The other, non-transmitter oscillator frequencies also used in this device are as follows:

25 MHz	Main Board Ethernet Port
12 MHz	UI Board Processor
12 MHz	Main Board Processor
32.768 kHz	Real Time Clock

6. Measurement Summary

Test Requirement	FCC Part 15 Reference	RSS Reference	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN Section 7.1.2	7.1	Compliant	
Operation within the Band 13.110 MHz – 14.010 MHz (Field Strength)	15.225 (a), (b), (c)	RSS-210 Section A2.6	7.2	Compliant	
Operation within the Band 13.110 MHz – 14.010 MHz (Frequency Tolerance)	15.225 (e)	RSS-210 Section A2.6	7.3	Compliant	
Spurious Radiated Emissions	15.209		7.4	Compliant	
Power Line Conducted Emissions	15.207	RSS-GEN Section 7.2.4	7.5	Compliant	Reference ANSI C63.4 Annex H, Paragraph H1(b)
Occupied Bandwidth/ Lower and Upper Band Edges	15.215(c) C63.10	N/A	7.6	Compliant	
99% Power Bandwidth	N/A	RSS-GEN Section 4.6.1	6.7	Compliant	

7. Measurement Data

7.1. Antenna Requirement (Section 15.203, RSS-GEN 7.1.2)

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

Status: The unit under test employs a permanent, internally mounted antenna that is etched into the PC board.

7. Measurement Data (continued)

7.2. Operation within the Band 13.110 MHz – 14.010 MHz (15.225 (a), (b) and (c))

Requirement: The field strength of any emissions within the band 13.553 - 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Result: The unit under test complies with the requirements detailed in FCC Part 15.225 (a), (b) and (c).

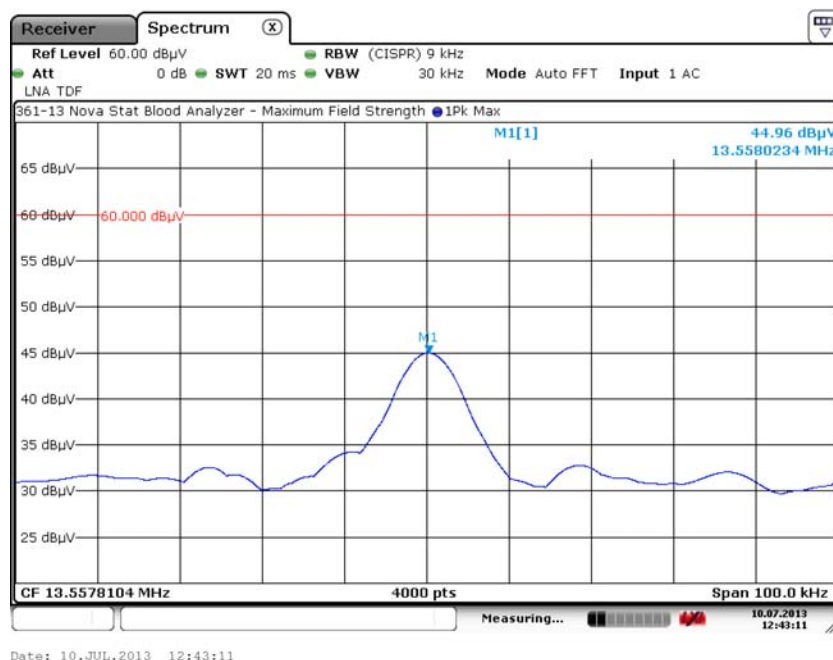
Test Note: The extremely low field strength was a consideration of the manufacturer to ensure that the three units inside the DUT did not create a crosstalk condition. Since each receiver is located millimeters from its corresponding transmitter, the DUT operates as it was designed to.

Freq. (MHz)	Meas. Dist. (Meters)	Measured ² dBμV/m	Limit ¹ dBμV/m	Margin (dB)
13.56	3	44.96	124	-79.04

¹ Limit has been extrapolated to 3 meters.

² The test measurement includes all correction factors.

7.2.1. Measurement Plot





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7. Measurement Data (continued)

7.3. Operation within the Band 13.110 MHz – 14.010 MHz (§ 15.225 (e))

Requirement: The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

Result: The unit under test complies with the requirements detailed in FCC Part 15.225 (e).

7.3.1. Temperature Variation

Mkr	Temp °C	Meas Freq.	Limit			Offset	Result
		(MHz)	F _{MIN} (MHz)	F _{MAX} (MHz)	%	(%)	
-	Ambient	13.5581351 ¹	N/A			N/A	
1	-20	13.5580914	13.556779	13.559491	± 0.01	-0.00032232	Compliant
2	-10	13.5581314	13.556779	13.559491	± 0.01	-0.00002729	Compliant
3	0	13.5581689	13.556779	13.559491	± 0.01	0.00024930	Compliant
4	+10	13.5581614	13.556779	13.559491	± 0.01	0.00019398	Compliant
5	+20	13.5581489	13.556779	13.559491	± 0.01	0.00010178	Compliant
6	+30	13.5581239	13.556779	13.559491	± 0.01	-0.00008261	Compliant
7	+40	13.5581139	13.556779	13.559491	± 0.01	-0.00015636	Compliant
8	+50	13.5580939	13.556779	13.559491	± 0.01	-0.00030388	Compliant

¹ Nominal frequency at ambient (~20°C)

7.3.2. Voltage Variation (Temperature - 20°C)

Mkr	VAC	Meas Freq.	Limit			Offset	Result
		(MHz)	F _{MIN} (MHz)	F _{MAX} (MHz)	%	(%)	
-	120 ¹	13.5583551 ²	N/A			N/A	
1	102	13.5583651	13.556999	13.559711	± 0.01	0.00007376	Compliant
2	108	13.5583501	13.556999	13.559711	± 0.01	-0.00003688	Compliant
3	114	13.5583576	13.556999	13.559711	± 0.01	0.00001844	Compliant
4	126	13.5583551	13.556999	13.559711	± 0.01	0.00000000	Compliant
5	132	13.5583576	13.556999	13.559711	± 0.01	0.00001844	Compliant
6	138	13.5583576	13.556999	13.559711	± 0.01	0.00001844	Compliant

¹ Nominal voltage

² Nominal frequency at ambient (~20°C)

7. Measurement Data (continued)**7.4. Transmitter Spurious Radiated Emissions (15.225 (d), 15.209)**

Requirement: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table (Reference FCC 15.209):

Frequency Range (MHz)	Distance (Meters)	Limit (dB μ V/m) ¹
0.009 to 0.490	3	128.5 to 93.8
0.490 to 1.705	3	73.8 to 63.0
1.705 to 30	3	69.5
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
>960	3	54.0

¹ Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

² Extrapolation below 30 MHz is calculated at 40 dB/decade.

Procedure: Test measurements were made in accordance with ANSI C63.4-2008, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

Test Notes: First, the intentional radiators were disabled and a scan of the unit under test was performed. The intentional radiators were then enabled and a second scan was performed. The two scans were compared to determine the contribution of the intentional radiators to the overall emissions profile.

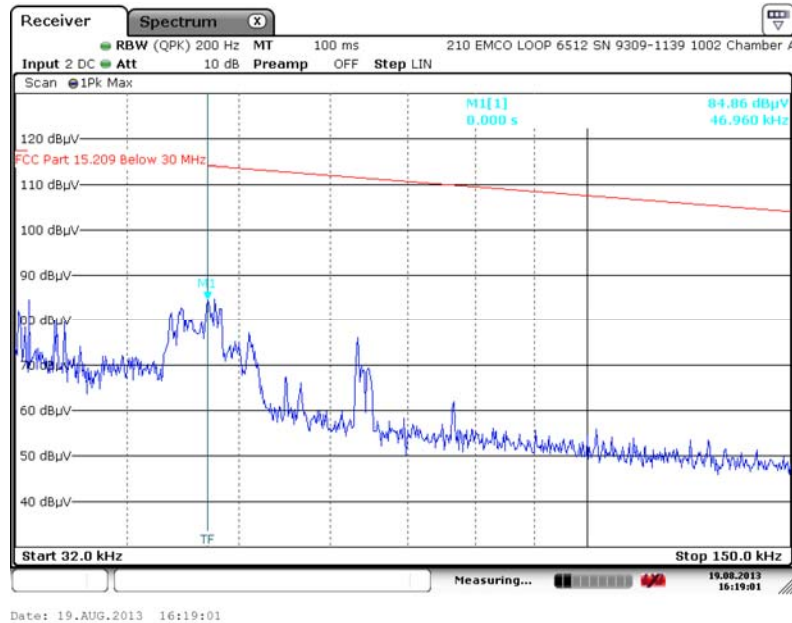
Results: The transmitters installed unit under test meet the FCC Part 15.209 emissions requirements.

7. Measurement Data (continued)

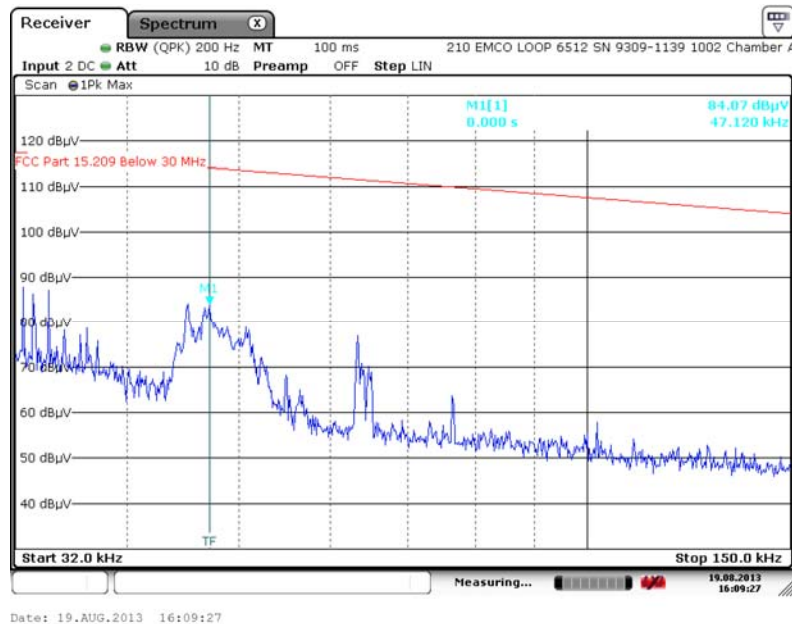
7.4. Transmitter Spurious Radiated Emissions (15.209) (continued)

7.4.1. Transmitter Spurious Radiated Emissions – 32 kHz to 150 kHz

7.4.1.1. Antenna is Parallel to the UUT



7.4.1.2. Antenna is Perpendicular to the UUT

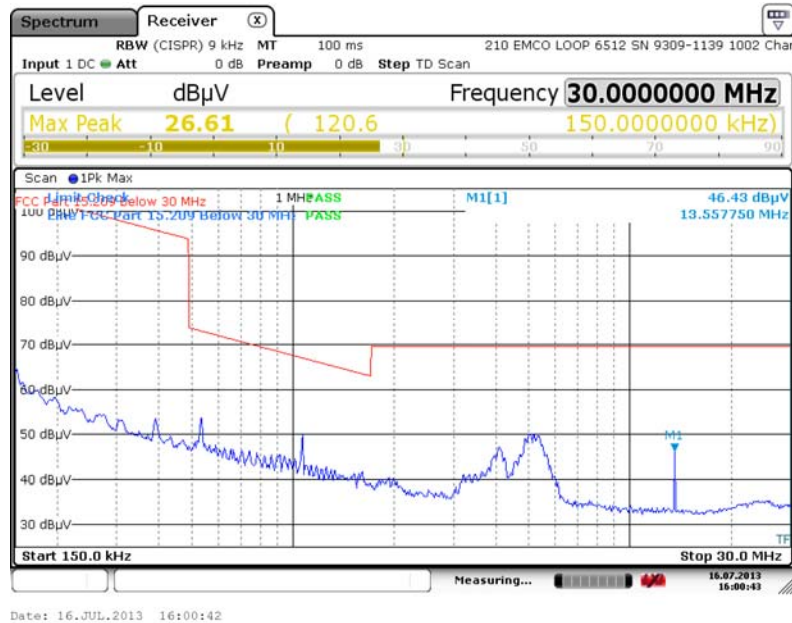


7. Measurement Data (continued)

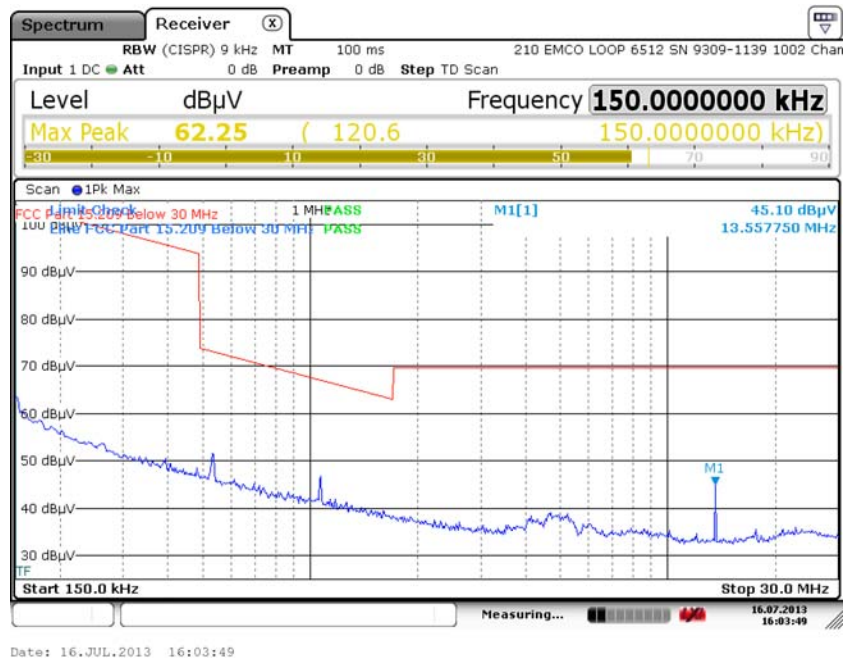
7.4. Transmitter Spurious Radiated Emissions (15.209) (continued)

7.4.2. Transmitter Spurious Radiated Emissions – 150 kHz to 30 MHz (continued)

7.4.2.1. Antenna is Parallel to the UUT



7.4.2.2. Antenna is Perpendicular to the UUT



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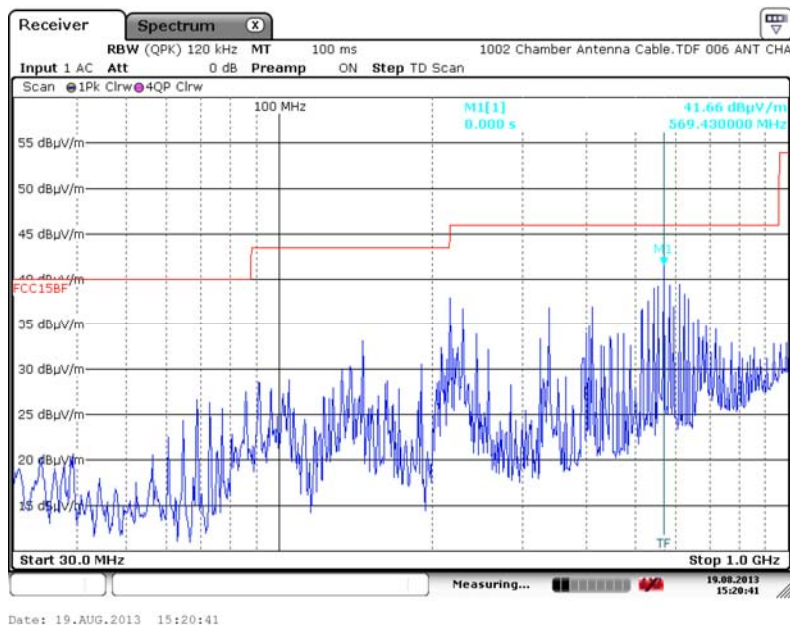
Issue Date: 8/16/2013

7. Measurement Data (continued)

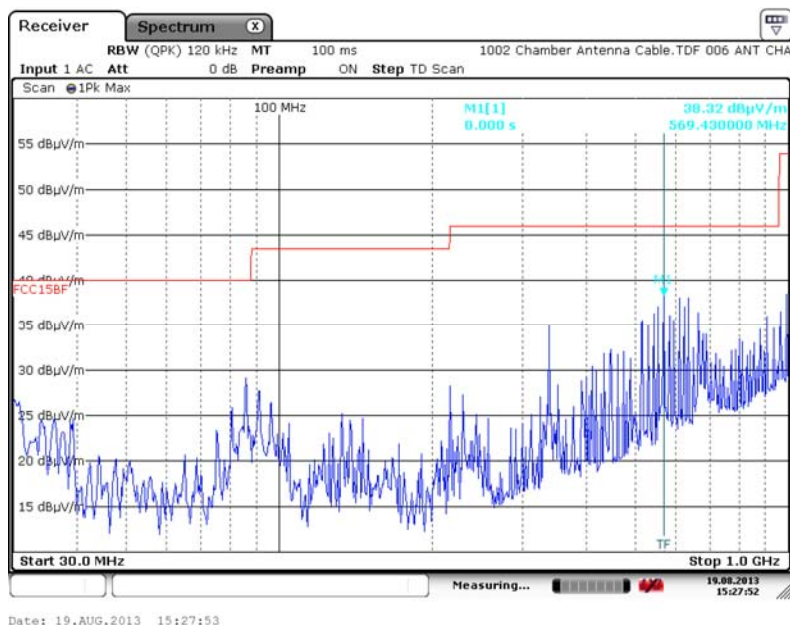
7.4. Spurious Radiated Emissions (15.209) (continued)

7.4.3. Spurious Radiated Emissions – 30 MHz to 1 GHz

7.4.3.1. Antenna is Horizontal



7.4.3.2. Antenna is Vertical



7. Measurement Data (continued)
7.4. Spurious Radiated Emissions (15.209) (continued)
7.4.4. Harmonic Emissions

Test Note: The emissions in the table below represent the worst case polarity, elevation and azimuth.

Frequency (MHz)	Pk Amp (dBμV/m)	QP Amp (dBμV/m)	QP Limit (dBμV/m)	Margin (dB)	Ant Pol (H/V)	Ant Ht (cm)	Table (Deg)	Result
27.12	33.49	21.29	69.5	-48.21	Parallel	100	254	Compliant
40.68	29.91	24.13	40.0	-15.87	H	100	348	Compliant
54.24	29.85	24.20	40.0	-15.80	H	101	354	Compliant
67.80	28.92	23.62	40.0	-16.38	H	100	274	Compliant
81.36	25.49	21.11	40.0	-18.89	H	191	220	Compliant
94.92	29.86	26.31	43.5	-17.19	H	120	224	Compliant
108.48	30.69	25.81	43.5	-17.69	H	154	250	Compliant
122.04	36.11	30.15	43.5	-13.35	H	225	284	Compliant
135.60	38.55	32.21	43.5	-11.29	H	176	254	Compliant

7. Measurement Data (continued)

7.5. Power Line Conducted Emissions (15.207)

Requirement: 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 μ H/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.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

Procedure: Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz. Specifically, Annex H, paragraph H1(b) regarding the use of a dummy load for a Part 15 transmitter.

Results: The unit under test meets the FCC Part 15.207 conducted emissions requirements.

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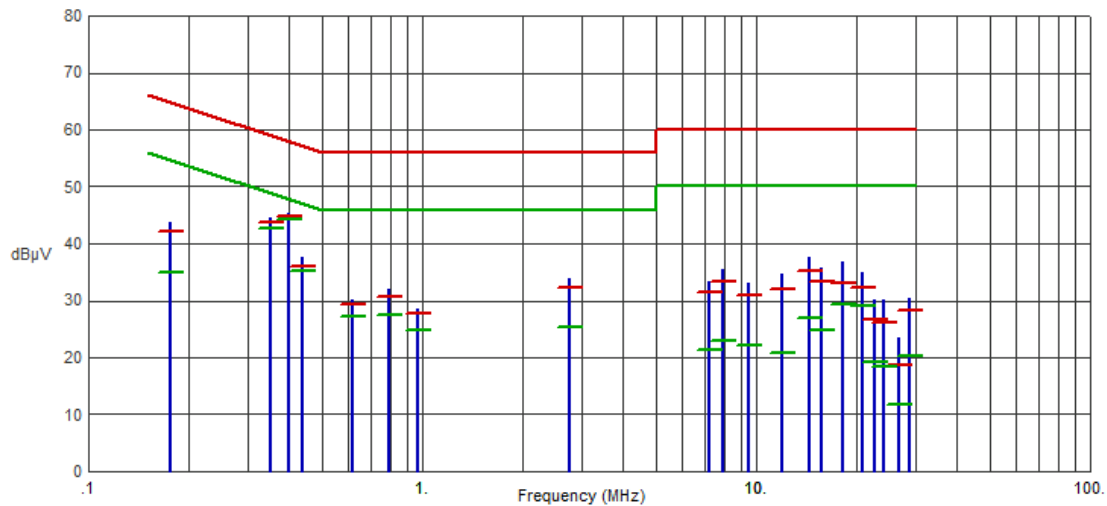
8. Conducted Emissions Test Results

7.5. Power Line Conducted Emissions (15.207)

7.5.1. 120 Volts, 60 Hz Phase

Test No.: 361-13, 120 Volts, 60 Hz Phase

FCC, Class B



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1754	43.67	42.03	64.70	-22.67	34.81	54.70	-19.89	
.3513	44.45	43.83	58.93	-15.10	42.76	48.93	-6.17	
.3962	45.43	44.79	57.93	-13.14	44.40	47.93	-3.53	
.4367	37.68	35.98	57.12	-21.14	35.17	47.12	-11.95	
.6161	30.11	29.23	56.00	-26.77	27.19	46.00	-18.81	
.7935	31.92	30.64	56.00	-25.36	27.34	46.00	-18.66	
.9650	28.66	27.82	56.00	-28.18	24.90	46.00	-21.10	
2.7728	33.87	32.31	56.00	-23.69	25.21	46.00	-20.79	
7.2595	33.45	31.53	60.00	-28.47	21.38	50.00	-28.62	
7.9769	35.41	33.27	60.00	-26.73	22.93	50.00	-27.07	
9.5134	33.04	30.98	60.00	-29.02	22.19	50.00	-27.81	
11.9878	34.77	32.11	60.00	-27.89	20.69	50.00	-29.31	
14.4270	37.66	35.17	60.00	-24.83	26.85	50.00	-23.15	
15.6241	35.80	33.36	60.00	-26.64	24.92	50.00	-25.08	
18.1229	36.88	33.07	60.00	-26.93	29.37	50.00	-20.63	
20.8537	35.01	32.20	60.00	-27.80	28.97	50.00	-21.03	
22.6370	30.13	26.64	60.00	-33.36	19.18	50.00	-30.82	
24.1673	30.22	26.21	60.00	-33.79	18.37	50.00	-31.63	
26.7153	23.43	18.74	60.00	-41.26	11.63	50.00	-38.37	
28.7899	30.27	28.25	60.00	-31.75	20.25	50.00	-29.75	

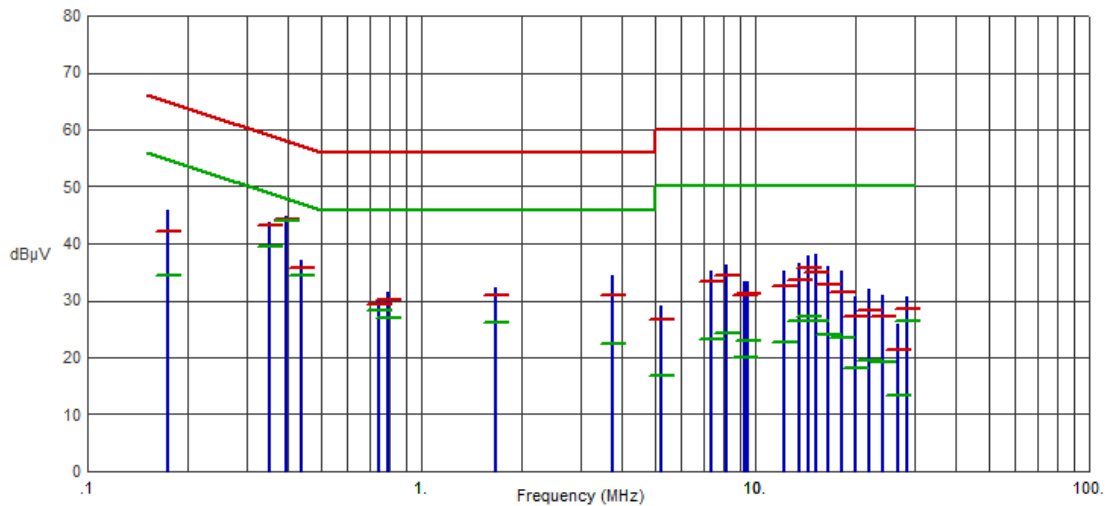
8. Conducted Emissions Test Results

7.5. Power Line Conducted Emissions (15.207)

7.5.2. 120 Volts, 60 Hz Neutral

Test No.: 361-13, 120 Volts, 60 Hz Neutral

FCC, Class B



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1744	45.87	42.06	64.75	-22.69	34.46	54.75	-20.29	
.3507	43.75	43.28	58.95	-15.67	39.56	48.95	-9.39	
.3939	44.87	44.40	57.98	-13.58	43.92	47.98	-4.06	
.4361	37.13	35.74	57.14	-21.40	34.41	47.14	-12.73	
.7479	30.15	29.26	56.00	-26.74	28.37	46.00	-17.63	
.7931	31.50	30.23	56.00	-25.77	27.05	46.00	-18.95	
1.6757	32.19	30.95	56.00	-25.05	26.12	46.00	-19.88	
3.7491	34.45	31.02	56.00	-24.98	22.35	46.00	-23.65	
5.2352	28.97	26.63	60.00	-33.37	16.67	50.00	-33.33	
7.3657	35.32	33.28	60.00	-26.72	23.09	50.00	-26.91	
8.1941	36.36	34.34	60.00	-25.66	24.36	50.00	-25.64	
9.3188	33.32	30.99	60.00	-29.01	19.87	50.00	-30.13	
9.5211	33.41	31.17	60.00	-28.83	22.98	50.00	-27.02	
12.2064	35.28	32.47	60.00	-27.53	22.62	50.00	-27.38	
13.5497	36.64	33.63	60.00	-26.37	26.49	50.00	-23.51	
14.4842	38.00	35.61	60.00	-24.39	27.15	50.00	-22.85	
15.2024	38.17	35.03	60.00	-24.97	26.48	50.00	-23.52	
16.5369	35.97	32.76	60.00	-27.24	24.09	50.00	-25.91	
18.1608	35.16	31.42	60.00	-28.58	23.35	50.00	-26.65	
19.9171	30.77	27.30	60.00	-32.70	18.21	50.00	-31.79	
22.0303	32.00	28.38	60.00	-31.62	19.50	50.00	-30.50	
24.1654	30.88	27.23	60.00	-32.77	19.27	50.00	-30.73	
26.8545	25.93	21.37	60.00	-38.63	13.21	50.00	-36.79	
28.5487	30.79	28.48	60.00	-31.52	26.39	50.00	-23.61	

7. Measurement Data (continued)

7.6. Occupied Bandwidth (Section 15.215 (c) and ANSI C63.10, Section 6.9)

Requirement: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Sections 15.217 through 15.255 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule.

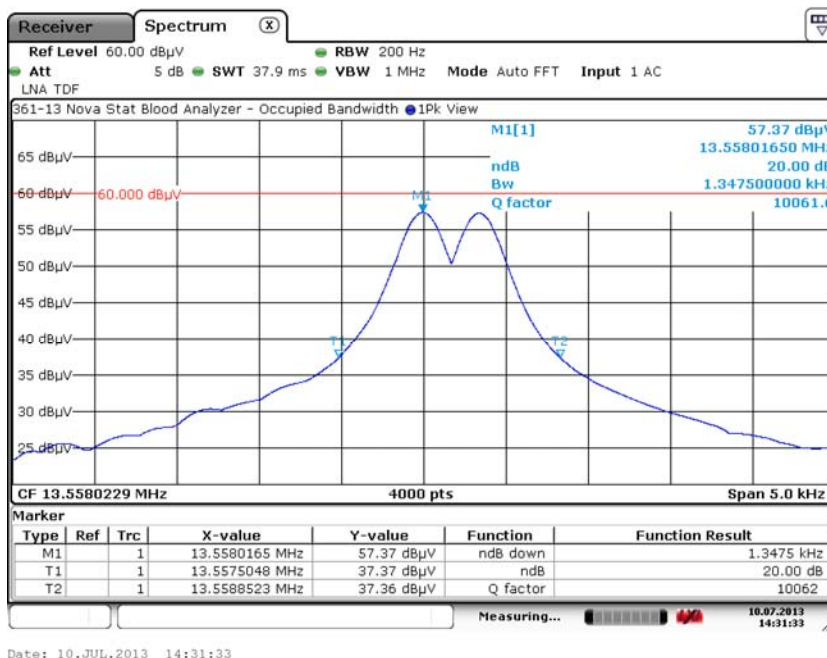
Frequency Band: $F_{MIN} = 13.110 \text{ MHz}$

$F_{MAX} = 14.010 \text{ MHz}$

Test Note: The reported bandwidth represents the worst case measured bandwidth of the combined three transmitters.

	-20 dB Frequency Measured	Lower & Upper Band Edge	Result
	MHz	MHz	
F_{LO}	13.5575048	13.11	Compliant ($F_{LO} > F_{MIN}$)
F_{HI}	13.5588523	14.01	Compliant ($F_{HI} < F_{MAX}$)

7.6.1. Plot of 20 dB Bandwidth vs. Frequency Band



7. Measurement Data (continued)

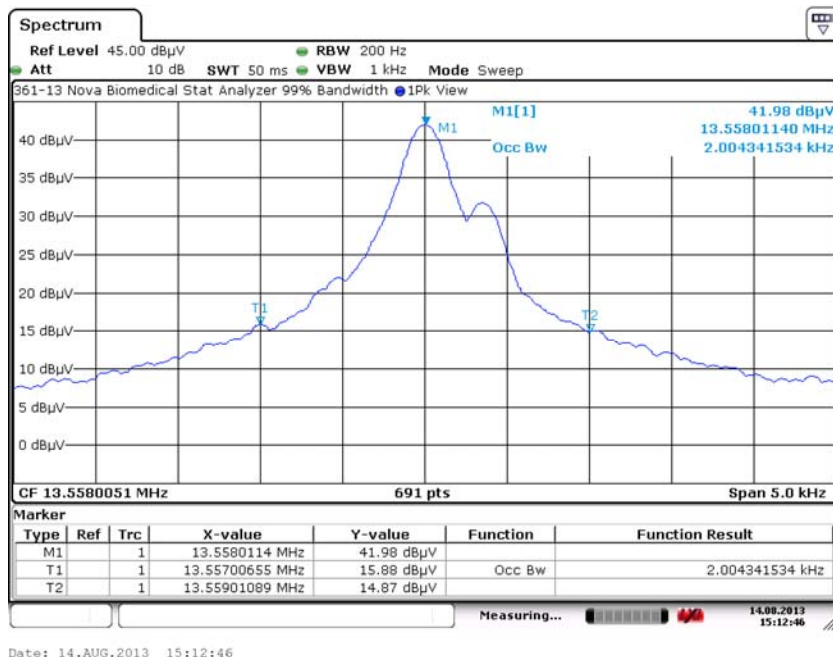
7.7. 99% Power Bandwidth (RSS-GEN Section 4.6.1)

Requirement: When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

Procedure: This test was performed utilizing the automated 99% bandwidth function of the spectrum analyzer.

Frequency	99% Power Bandwidth
(MHz)	(kHz)
13.56	2.0043



8. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC), Industry Canada, and Voluntary Control Council Interference (VCCI) standards. A description of the test sites is on file with the FCC (registration number 96392), Industry Canada (file number IC 3023A-1).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.