COMPLIANCE WORLDWIDE INC.
TEST REPORT 461-09R1

In Accordance with the Requirements of

Federal Communications Commission CFR Title 47 Part 15.249, Subpart C
Industry Canada RSS 210, Issue 7

Low Power License-Exempt Radio Communication Devices
Intentional Radiators

Issued to

DEKA Research Inc.
340 Commercial Street
Manchester, NH 03101

for the

Freestyle Dispensing Machine

FCC ID: XQ4-GFS-SHEAR
IC: 8593A-GFSSHEAR

Report Issued on March 10, 2010
Original Report Issued on February 12, 2010

Tested by

Brian F. Breault

Reviewed by

Larry K. Stillings

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Compliance Worldwide, Inc. - 357 Main Street - Sandown, NH 03873
(603) 887 3903 Fax 887 6445
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1. Scope

This test report certifies that the Freestyle Dispensing Machine, as tested, meets the FCC Part 15, Subpart C and Industry Canada RSS 210, Issue 7 requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required. R1 incorporates additional detail to facilitate FCC/IC certification.

2. Product Details

2.1. Manufacturer: DEKA Research Inc.

2.2. Model Number: Freestyle Dispensing Machine

2.3. Serial Number: ZPL0001136
Item Code: 45907

2.4. Description: The Freestyle dispenser is a free-standing ice-beverage combo fountain machine with a single nozzle that is capable of dispensing a substantially wider variety of beverages than is possible with any current dispenser. The machine contains closed-loop controls for dispensing macro fluids (water, soda and HFCS), 36 micro ingredient pumps (for brands and flavors), NNS pumps, cold-carbonation, ice handling (for ice dispensing and chilling the macro fluids) and a 15" touch screen LCD for Consumer interaction. All of the microingredients (including NNS) are stored within the machine and are automatically identified using a set of EPC Gen 2 RFID tag readers. There are 4 main RFID readers in the system; one in the door of the unit referred to as the Easy Access Reader, and one on each of the 3 micro ingredient shelves referred to as the Shelf Reader.

2.5. Power Source: 120 Volts, 60 Hz

2.6. Hardware Revs.:

UIM ESN	3-02	QPM - Top Left	3-01
SOM	3-03	QPM - Top Middle	3-01
CCB	3-02	QPM - Top Right	3-01
IO Board	3-04	QPM - Mid Left	3-01
Easy Access Reader	1-04	QPM - Mid Middle	3-01
EAR Antenna Board	1-01	QPM - Mid Right	3-01
ADA Keypad		QPM - Bottom Left	3-01
PSM	3-00	QPM - Bottom Middle	3-01
Main	3-00	QPM - Bottom Right	3-01
Backplane	1-03	QPM - NNS	3-01
HFCS FCM	3-01	Shelf - Top	1-08
Carb FCM	3-00	Shelf - Middle	1-08
Water FCM	3-01	Shelf - Bottom	1-08

2.7. Software Rev.: 6.0.15

2.8. EMC Modifications: The power line filter was changed from Corcom model 15EEJ1 to Corcom model 15EJT1. The cable from the processor board to the front panel display was changed from and unshielded to shielded version and its shield was bonded to the chassis ground.

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3. Product Configuration

3.1. Support Equipment

Device	Manufacturer	Model	Serial No.	Comment
No Support Equipment				

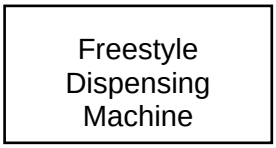
3.2. Cables

Cable Type	Length	Shield	From	To
No external cables other than the AC line cord	2M	No	EUT	120 VAC

3.3. Operational Characteristics & Software

1. Open the top door and toggle the green on/off stitch to the on position. The unit will begin a POST/Boot process similar to that of a PC.
2. Once the POST is complete, the touch screen will prompt: “Touch Screen.” Touching the screen places the Freestyle Dispensing Machine into its normal operating state.
3. The bottom door of the machine was opened to activate each of the tray readers in continous transmit mode.

3.4. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
Spectrum Analyzer	Agilent	E4407B	MY4510449	7/09/2010
EMI Receiver	Hewlett Packard	8546A	MY4510449	10/28/2010
LISN	EMCO	3825/2	9109-1860	7/7/2010
Microwave Preamp	Hewlett Packard	8449B	3008A01323	9/22/2010
Bilog Antenna	Com-Power	AC-220	25509	8/6/2010
Horn Antenna	Electro-Metrics	EM-6961	6337	7/22/2010

4.2. Measurement & Equipment Setup

Test Dates:	10/12/2009 - 2/4/2010
Test Engineers:	Larry Stillings Brian Breault
Normal Site Temperature (15 - 35°C):	21.6
Relative Humidity (20 -75%RH):	35
Frequency Range:	30 MHz to 9.6 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	100 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, Quasi-Peak & Average

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4. Measurements Parameters (continued)

4.3. Measurement Procedure

Test measurements were made in accordance FCC Part 15.249, IC RSS-210 Annex II: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

The test methods used to generate the data in this test report is in accordance with ANSI C63.4: 2003, 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

4.4. Choice of Operating Frequencies

The Freestyle Dispensing Machine cartridges employ 24 channels in the 903 MHz to 928 MHz frequency range. In accordance with ANSI C63.4, Section 13.1.1, three channels are detailed in this test report:

- Low Channel – 903 MHz
- Middle Channel – 909 MHz
- High Channel – 927 MHz

The Freestyle Dispensing Machine was tested with the lower front door opened to a position 90º from the front of the unit. This exposed the cartridges that contain the transmitters under test and was determined to produce the worst case emissions.

5. Measurement Summary

Test Requirement	FCC Requirement	Test Section	Result	Comment
Antenna Requirement	15.203	6.1	Compliant	Unit has an internal PCB antenna.
Radiated Field Strength of Fundamental	15.249 (a),(c)	6.2	Compliant	
Radiated Field Strength of Harmonics	15.249 (a),(c)	6.3	Compliant	
Fixed, Point-to-Point Operation	15.249 (b)	---	Not Required	
Band Edge Measurements	15.249 (d) 15.209	6.4	Compliant	
Spurious Radiated Emissions	15.249 (d), 15.209	6.5	Compliant	
Occupied Bandwidth	ANSI C63.4 § 13.1.7	6.6	Compliant	
99% Bandwidth	IC RSS-GEN	6.7	Compliant	
Conducted Emissions	15.207	6.8	Compliant	
Public Exposure to Radio Frequency Energy Levels	1.1307 (b) (1)	N/A	Not Req'd	

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6. Measurement Data

6.1. Antenna Requirement (Section 15.203)

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 permanent, non-user accessible antennas.

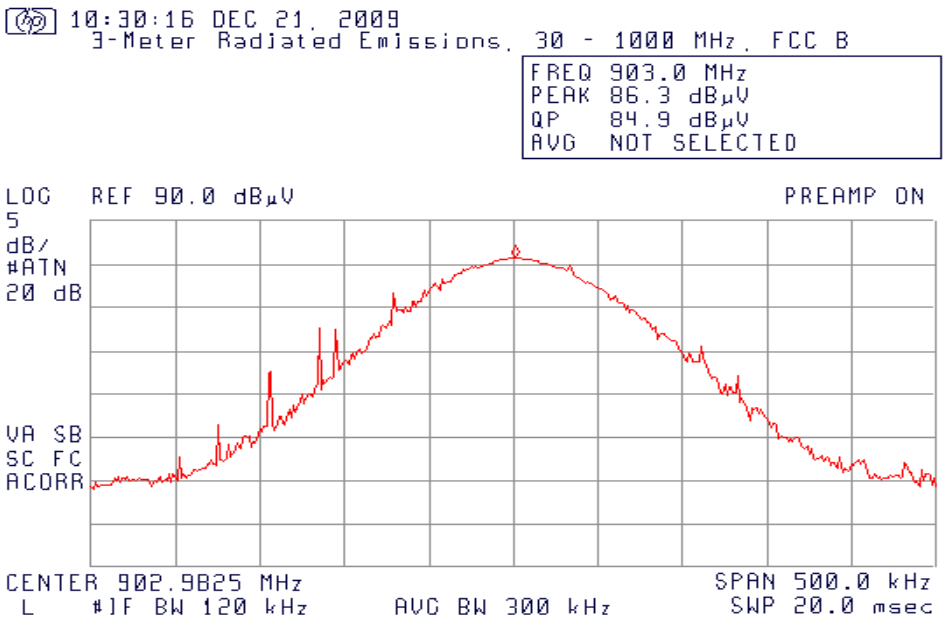
6.2. Radiated Field Strength of Fundamental (15.249, Section (a), (c)), IC RSS-210 A2.9

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operated within the 902-928 MHz frequency bands shall comply with the following requirement: 50 millivolts/meter (94 dBµV/m), quasi-peak mode measurement.

Site Temperature: 22.4ºC Site Humidity: 31% RH

Chan.	Freq. MHz	Amplitude[1] (dBµV/m) at 3Meters		Quasi-Peak Limit at 3 Meters	Margin	Ant Polarity	Ant Height	Turntable Azimuth	Result
		Peak	Quasi-Peak			H/V	cm	Deg	
Low	903.0	86.30	84.9	94	-9.1	H	103	324	Compliant
Middle	909.0	87.40	85.3	94	-8.7	V	100	354	Compliant
High	927.0	90.00	87.3	94	-6.7	H	101	290	Compliant

6.2.1. Radiated Field Strength of Fundamental – Low Channel



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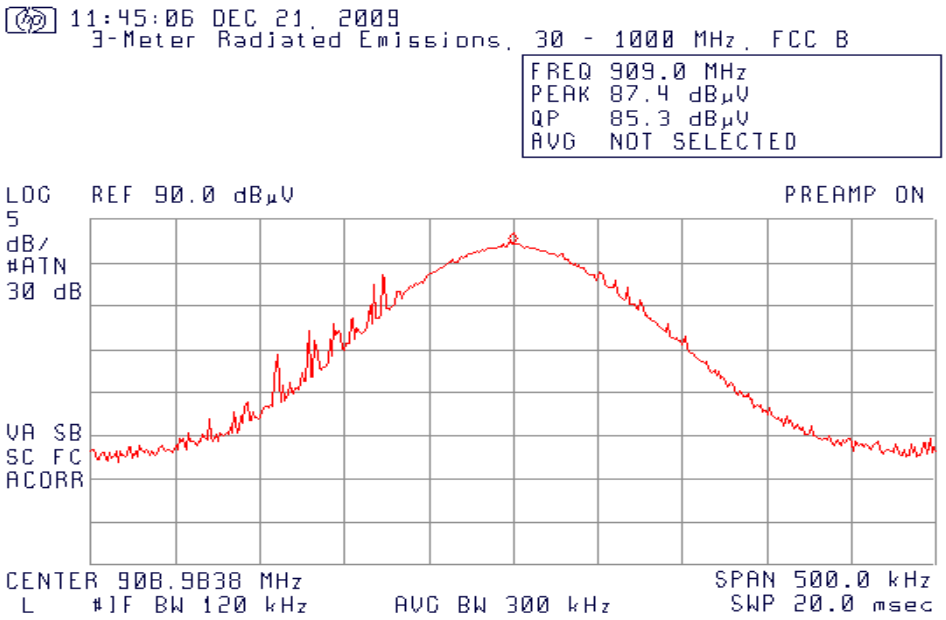
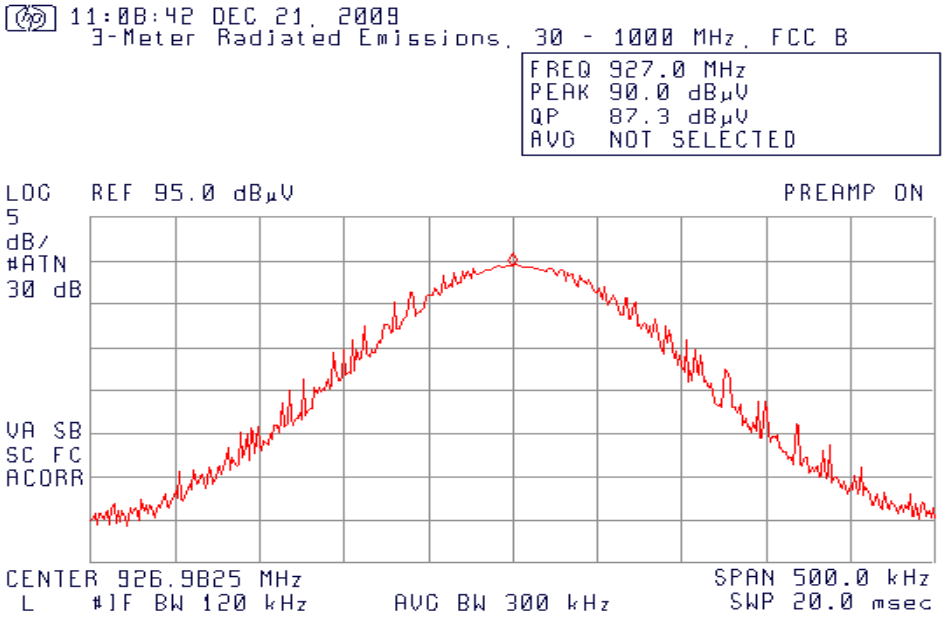
6. Measurement Data (continued)

6.2. Radiated Field Strength of Fundamental (15.249, Section (a)), IC RSS-210 A2.9

6.2.2. Radiated Field Strength of Fundamental – Middle Channel



6.2.3. Radiated Field Strength of Fundamental – Middle Channel



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6. Measurement Data (continued)

6.3. Radiated Field Strength of Harmonics (15.249, Section (a)), IC RSS-210 A2.9

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operated within the 902-928 MHz frequency bands shall comply with the following: 500 microvolts/meter (54 dBµV/m), average mode measurement. Peak field strength may not be greater than 20 dB above the average limit (74 dBµV/m).

Note: The harmonic emissions detailed in this section represent the combined worst case emissions of the low, middle and high operating frequencies.

Frequency (MHz)	Amplitude[1] (dBµV/m) (Peak)	Peak Limit	Amplitude[1] (dBµV/m) (Avg)	Average Limit	Margin (dB)	Ant Pol (H/V)	Ant Ht (cm)	TT Pos (Deg)	Result
1806.00	54.3	74	48.1	54	-5.90	V	189	310	Compliant
2709.00[2]	51.3	74	39.7	54	-14.30	H	104	324	Compliant
3612.00[2]	58.4	74	45.1	54	-8.90	V	102	328	Compliant
4515.00[2]	47.7	74	39.5	54	-14.54	V	108	355	Compliant
5418.00[2]	52.0	74	41.4	54	-12.56	V	100	350	Compliant
8127.00[2]	52.9	74	40.5	54	-13.48	Noise Floor			Compliant
9030.00[2]	51.9	74	40.8	54	-13.18	Noise Floor			Compliant
1818.00	54.3	74	47.0	54	-7.00	V	130	14	Compliant
2727.00[2]	57.9	74	46.2	54	-7.80	V	117	304	Compliant
3636.00[2]	56.4	74	42.9	54	-11.10	V	112	10	Compliant
4545.00[2]	49.4	74	35.9	54	-18.07	V	100	0	Compliant
7272.00[2]	54.4	74	45.1	54	-8.93	V	148	0	Compliant
8181.00[2]	51.9	74	39.5	54	-14.52	Noise Floor			Passed
9090.00[2]	51.2	74	40.6	54	-13.39	Noise Floor			Passed
1854.00	47.9	74	37.8	54	-16.20	V	109	358	Compliant
2781.00[2]	51.3	74	41.8	54	-12.20	V	114	244	Compliant
3708.00[2]	51.5	74	40.1	54	-13.90	V	114	334	Compliant
4635.00[2]	45.9	74	34.0	54	-20.00	V	106	0	Compliant
7416.00[2]	51.1	74	40.5	54	-13.55	V	133	15	Compliant
8343.00[2]	49.6	74	38.7	54	-15.26	Noise Floor			Passed
9270.00	51.7	74	40.4	54	-13.64	Noise Floor			Passed

[1] Value includes all correction factors.
[2] Frequency falls within the restricted bands of operation. See FCC Part 15, Section 15.205 for additional information.

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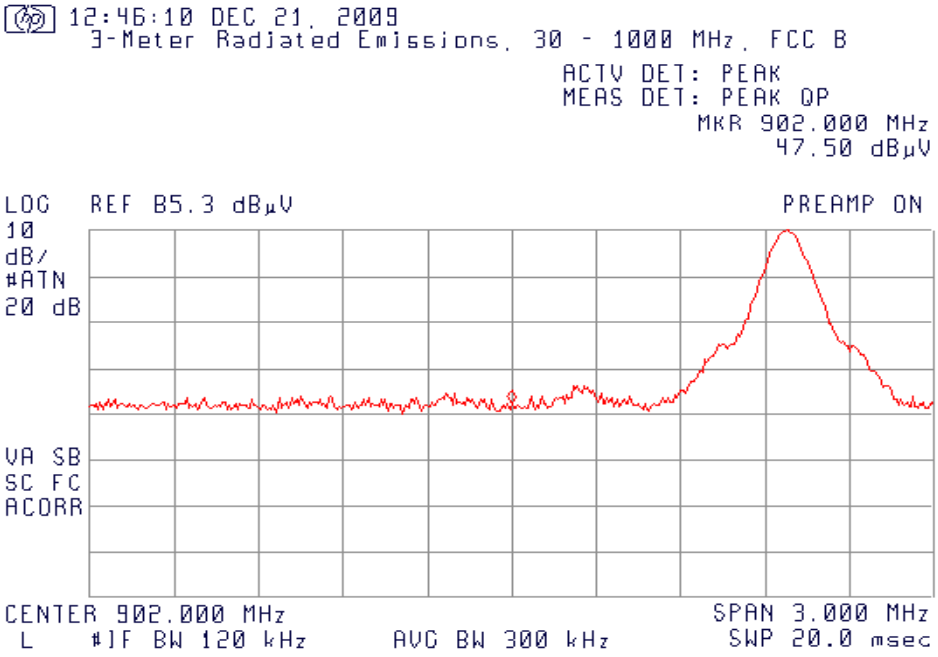
6. Measurement Data (continued)

6.4. Band Edge Measurements

Requirement: Emissions radiated outside of the specified frequency band of 902 MHz to 928 MHz, 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 Section 15.209, whichever is the lesser attenuation.

Frequency	Band Edge (dBµV/m)			Limit (dBµV/m)	Margin (dB)	Result
	Freq MHz	Peak	Q-Peak	Q-Peak		
903.0	902	47.50	33.8	46.0	-12.2	Compliant
927.0	928	49.16	34.8	46.0	-11.2	Compliant

6.4.1. Band Edge Measurements - Lower Band Edge



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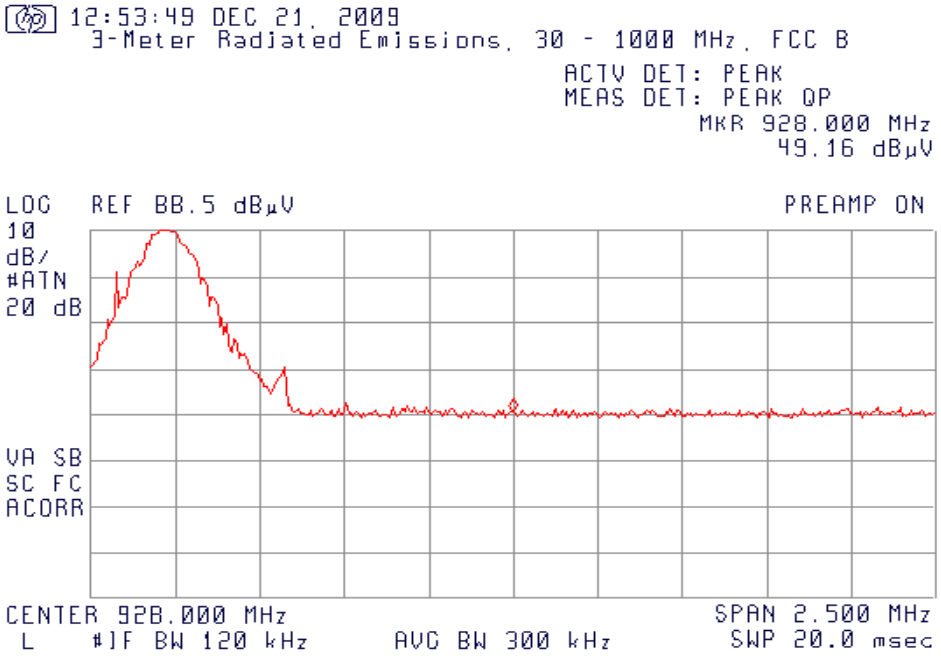
6. Measurement Data (continued)

6.4. Band Edge Measurements (continued)

6.4.2. Band Edge Measurements - Upper Band Edge



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6. Measurement Data (continued)

6.5. Spurious Radiated Emissions, 30 MHz to EUT 10th Harmonic (15.249, Section (d)), IC RSS-GEN

Requirement: 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 Section 15.209, whichever is the lesser attenuation.

Note: The spurious emissions detailed in this section represent the combined worst case emissions of the low, middle and high operating frequencies.

6.5.1. Regulatory Limit: FCC Part 209, Quasi-Peak & Average

Frequency Range (MHz)	Distance (Meters)	Limit (dBµV/m)
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
Above 960	3	54.0

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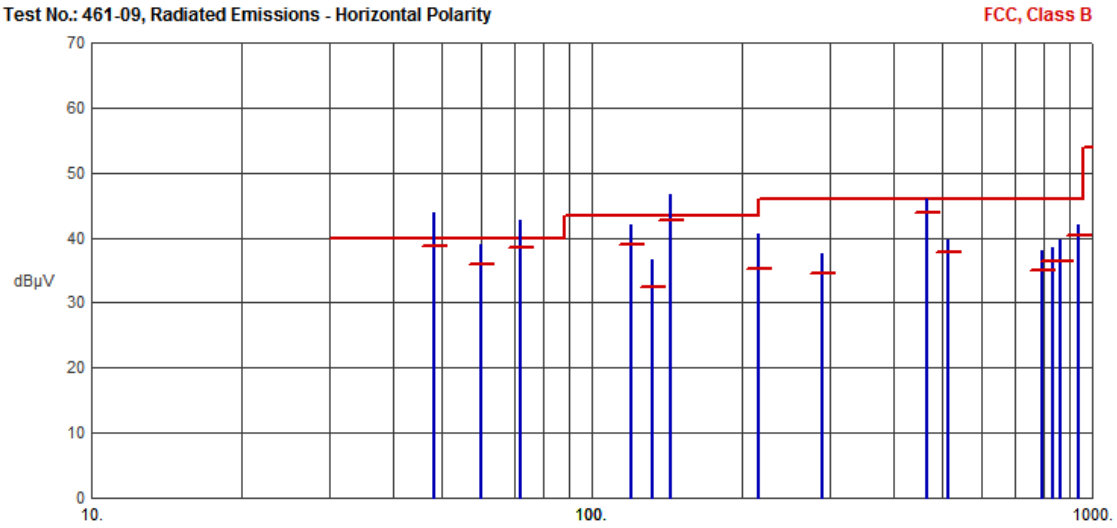
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions, 30 MHz to EUT 10th Harmonic (15.249, Section (d)), IC RSS-GEN

6.5.2. Test Results, 30 MHz to 1 GHz, Horizontal Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
48.4442	43.92	38.79	40.00	-1.21	N/A	N/A	
60.0358	39.04	35.99	40.00	-4.01	N/A	N/A	
72.0280	42.75	38.52	40.00	-1.48	N/A	N/A	
120.0915	41.96	39.07	43.50	-4.43	N/A	N/A	
132.1162	36.74	32.36	43.50	-11.14	N/A	N/A	
143.9796	46.78	42.73	43.50	-.77	N/A	N/A	
215.9704	40.62	35.29	43.50	-8.21	N/A	N/A	
287.9847	37.62	34.63	46.00	-11.37	N/A	N/A	
468.4193	46.02	43.93	46.00	-2.07	N/A	N/A	
516.4831	39.66	37.69	46.00	-8.31	N/A	N/A	
792.0067	38.14	35.09	46.00	-10.91	N/A	N/A	
832.0020	38.39	36.42	46.00	-9.58	N/A	N/A	
863.9930	39.56	36.36	46.00	-9.64	N/A	N/A	
935.9902	42.11	40.43	46.00	-5.57	N/A	N/A	

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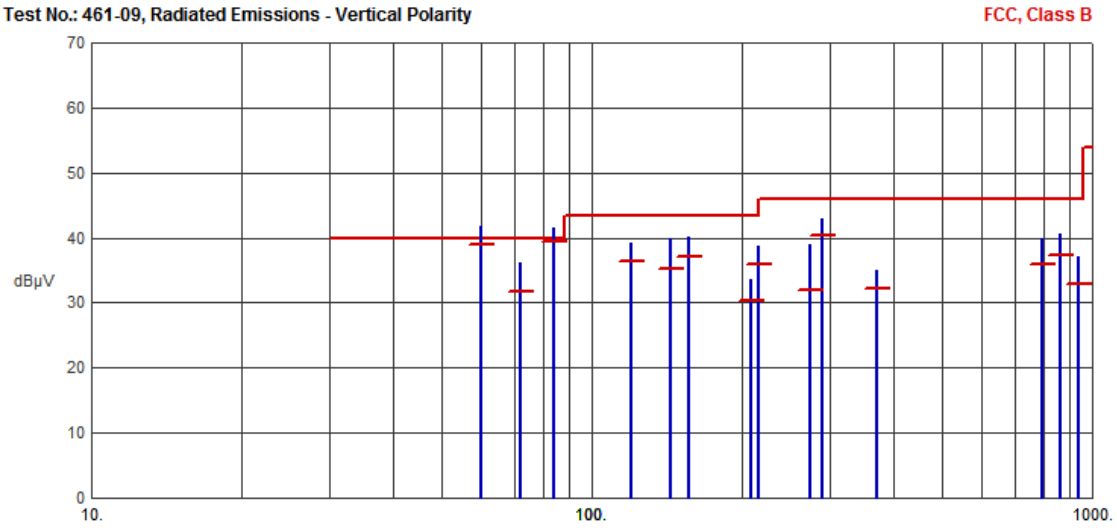
6. Measurement Data (continued)

6.5. Spurious Radiated Emissions, 30 MHz to EUT 10th Harmonic (15.249, Section (d)), IC RSS-GEN

6.5.3. Test Results, 30 MHz to 1 GHz, Vertical Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
60.0411	41.70	38.92	40.00	-1.08	N/A	N/A	
72.0444	36.14	31.75	40.00	-8.25	N/A	N/A	
84.0668	41.58	39.54	40.00	-.46	N/A	N/A	
120.0947	39.29	36.31	43.50	-7.19	N/A	N/A	
143.9948	39.99	35.33	43.50	-8.17	N/A	N/A	
155.9883	40.09	37.07	43.50	-6.43	N/A	N/A	
207.9878	33.61	30.31	43.50	-13.19	N/A	N/A	
216.0012	38.81	36.02	46.00	-9.98	N/A	N/A	
273.2097	38.94	31.89	46.00	-14.11	N/A	N/A	
288.0072	42.82	40.33	46.00	-5.67	N/A	N/A	
372.3342	34.91	32.28	46.00	-13.72	N/A	N/A	
792.0028	39.80	36.05	46.00	-9.95	N/A	N/A	
863.9807	40.52	37.36	46.00	-8.64	N/A	N/A	
935.9672	37.02	32.85	46.00	-13.15	N/A	N/A	

6.5.4. Test Results, Above 1 GHz

There were no measurable emissions above 1 GHz other than the emissions tabled in Section 6.3.

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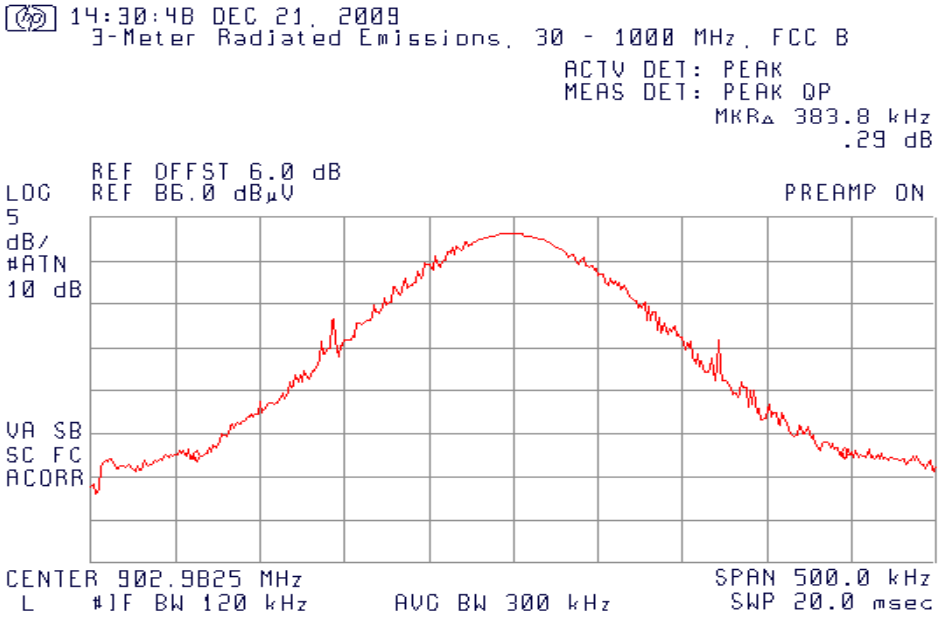
6. Measurement Data (continued)

6.6 Occupied Bandwidth (ANSI C63.4, Section 13.1.7)

Requirement: The occupied bandwidth measurements on an intentional radiator shall be made in accordance with the requirements outlined in ANSI C63.4-2003, Section 13.1.7. If no bandwidth requirement is specified by the procuring or regulatory agency, measure the bandwidth at –26 dB with respect to the reference level.

Channel	Frequency (MHz)	-26 dB Bandwidth (MHz)	Result
Low	903.0	0.3838	Compliant
Middle	909.0	0.3725	Compliant
High	927.0	0.3813	Compliant

6.6.1. Occupied Bandwidth – Low Frequency



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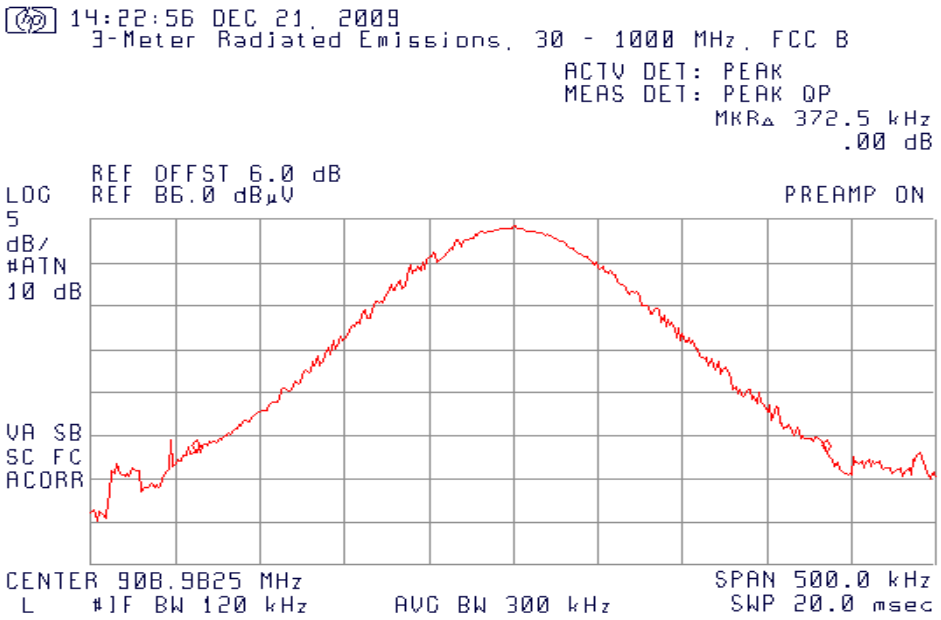
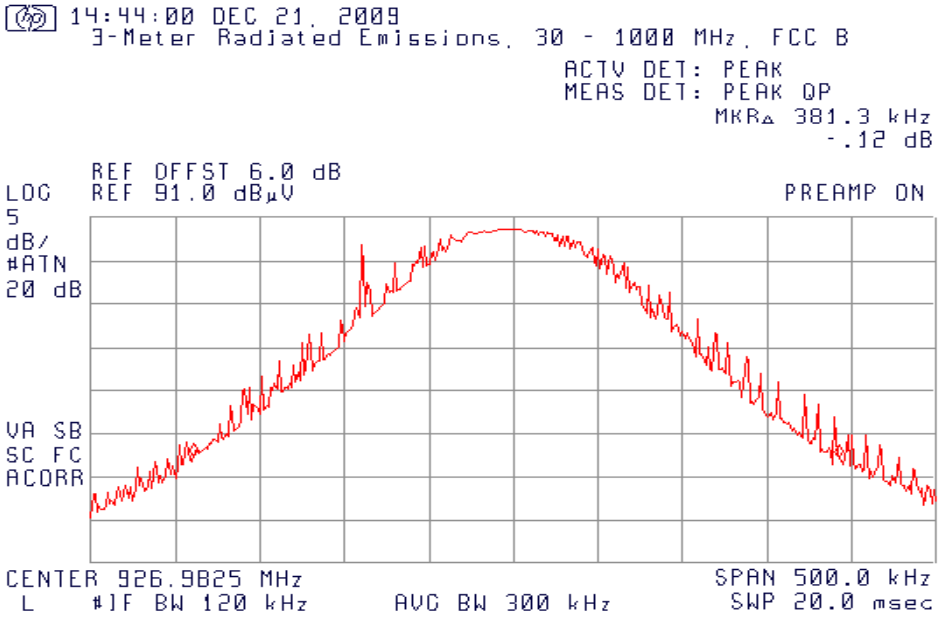
6. Measurement Data (continued)

6.6 Occupied Bandwidth (ANSI C63.4, Section 13.1.7) (continued)

6.6.2. Occupied Bandwidth – Middle Frequency



6.6.3. Occupied Bandwidth – High Frequency



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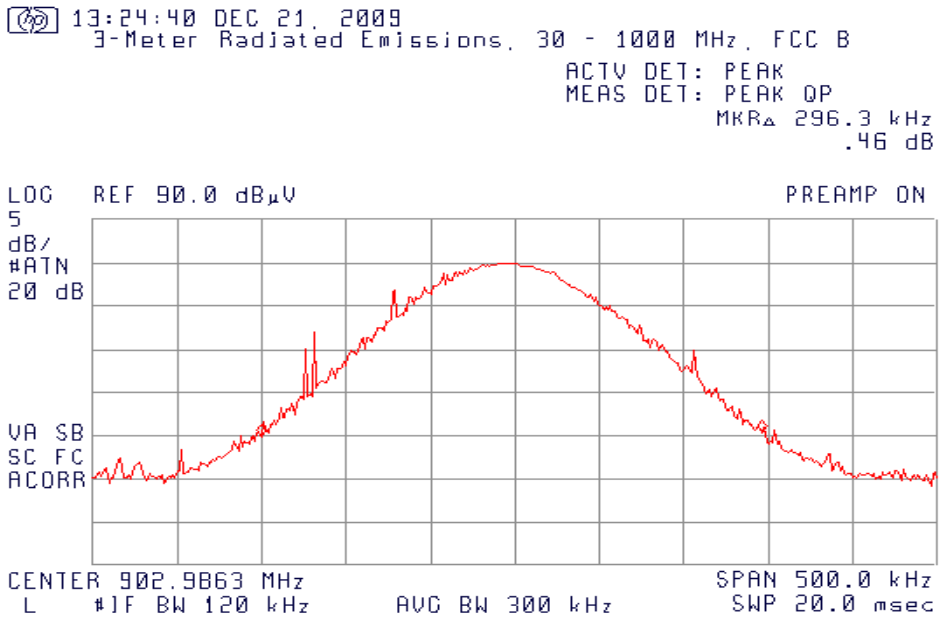
6. Measurement Data (continued)

6.7. 99% Bandwidth (RSS 210)

Channel	Channel Frequency	99% Power Bandwidth	Allowable Power Bandwidth	Result
	MHz	MHz	MHz	
Low	903.0	0.2963	4.515	Compliant
Middle	909.0	0.2750	4.545	Compliant
High	927.0	0.2663	4.635	Compliant

6.7.1. 99% Bandwidth – Low Frequency



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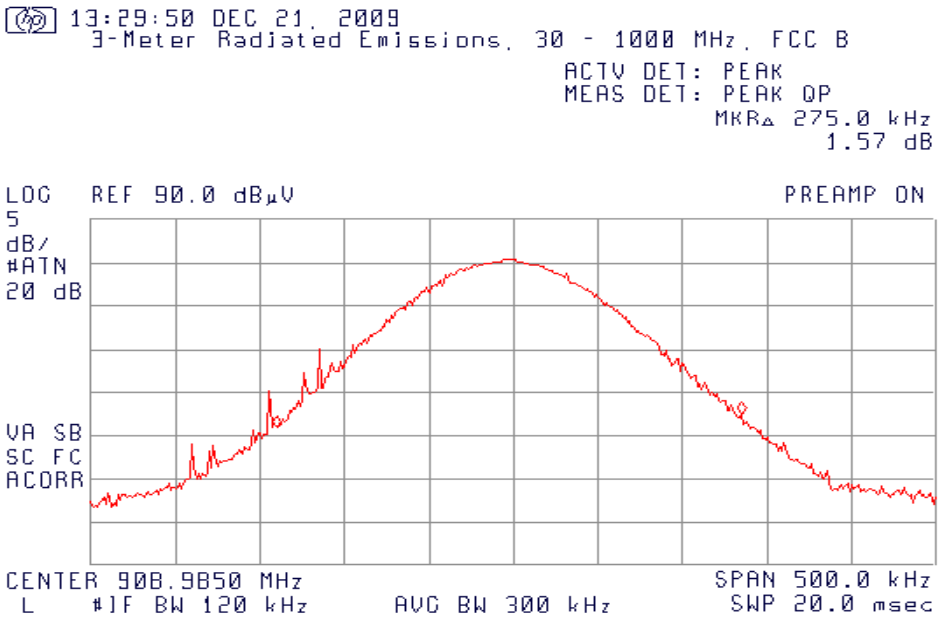
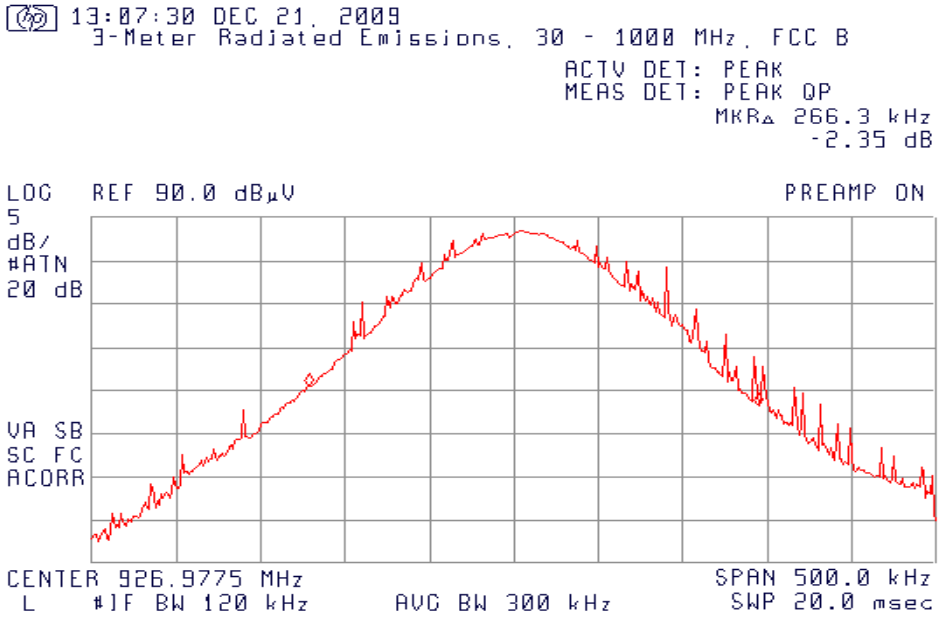
6. Measurement Data (continued)

6.7. 99% Bandwidth (RSS 210) (continued)

6.7.2. 99% Bandwidth – Middle Frequency



6.7.3. 99% Bandwidth – High Frequency



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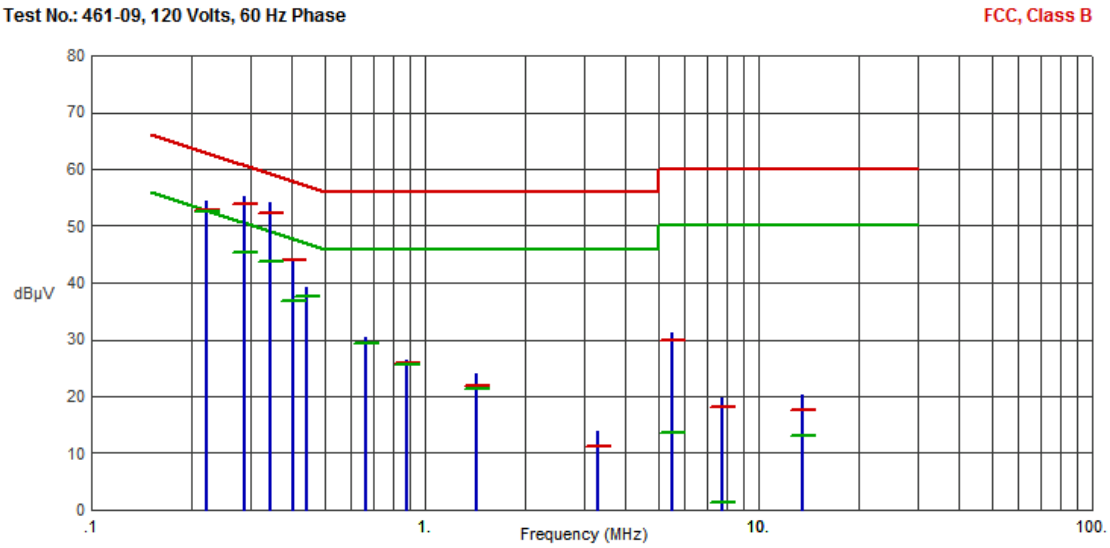
6. Measurement Data (continued)

6.8. Conducted Emissions (15.207)

6.8.1. 120 Volts, 60 Hz Phase



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.2205	54.30	52.83	62.80	-9.97	52.65	52.80	-.15	
.2876	55.24	53.97	60.59	-6.62	45.39	50.59	-5.20	
.3442	54.19	52.16	59.10	-6.94	43.63	49.10	-5.47	
.4019	44.29	43.97	57.81	-13.84	36.86	47.81	-10.95	
.4409	39.27	37.61	57.04	-19.43	37.47	47.04	-9.57	
.6620	30.28	29.46	56.00	-26.54	29.35	46.00	-16.65	
.8820	26.37	25.81	56.00	-30.19	25.71	46.00	-20.29	
1.4329	24.01	21.94	56.00	-34.06	21.22	46.00	-24.78	
3.3066	13.98	11.32	56.00	-44.68	-4.24	46.00	-50.24	
5.4951	31.30	29.90	60.00	-30.10	13.60	50.00	-36.40	
7.7477	19.85	18.05	60.00	-41.95	1.40	50.00	-48.60	
13.5641	20.36	17.70	60.00	-42.30	12.94	50.00	-37.06	

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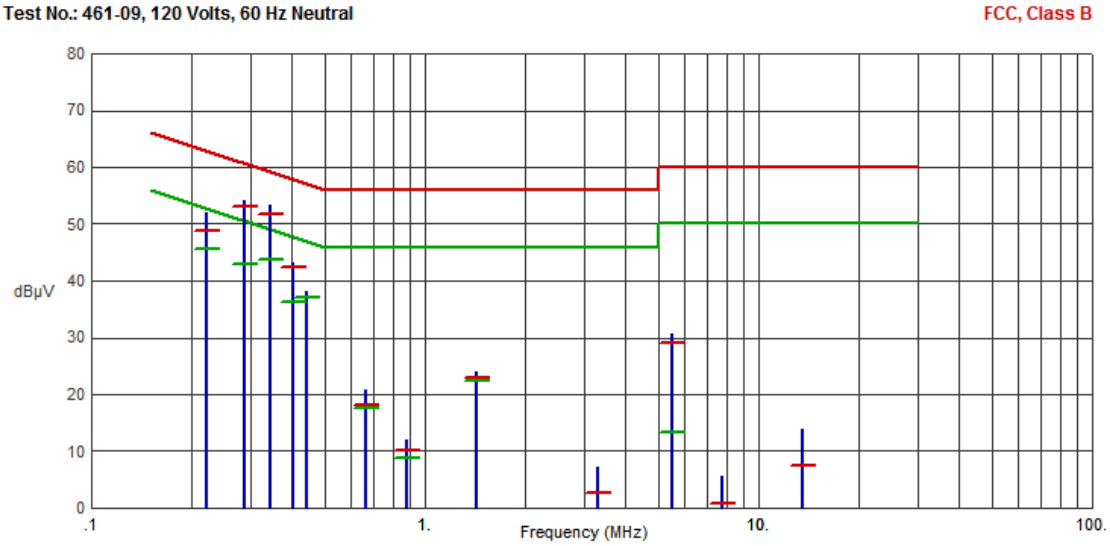
6. Measurement Data (continued)

6.8. Conducted Emissions (15.207)

6.8.2. 120 Volts, 60 Hz Neutral



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.2205	52.08	48.76	62.80	-14.04	45.57	52.80	-7.23	
.2876	54.26	53.01	60.59	-7.58	42.86	50.59	-7.73	
.3442	53.45	51.65	59.10	-7.45	43.86	49.10	-5.24	
.4019	43.29	42.30	57.81	-15.51	36.17	47.81	-11.64	
.4409	38.11	37.00	57.04	-20.04	36.94	47.04	-10.10	
.6620	20.74	18.21	56.00	-37.79	17.64	46.00	-28.36	
.8820	12.04	10.01	56.00	-45.99	8.68	46.00	-37.32	
1.4329	24.03	23.05	56.00	-32.95	22.40	46.00	-23.60	
3.3066	7.28	2.58	56.00	-53.42	-7.08	46.00	-53.08	
5.4951	30.75	29.18	60.00	-30.82	13.20	50.00	-36.80	
7.7477	5.64	.93	60.00	-59.07	-5.46	50.00	-55.46	
13.5641	13.87	7.45	60.00	-52.55	-0.06	50.00	-50.06	

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7. 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) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and 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 meter W x 1.5 meter L x 2.0 meter H, floor standing or table top.

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