



**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-210 ISSUE 8**

**CERTIFICATION TEST REPORT**

**FOR**

**WIRELESS SECURITY DOOR/WINDOW CONTACT**

**MODEL NUMBER: WST-200**

**FCC ID: XQC-WST200  
IC: 9863B-WST200**

**REPORT NUMBER: 12U14732**

**ISSUE DATE: 2012-12-14**

*Prepared for*  
**ECOLINK INTELLIGENT TECHNOLOGY  
2055 CORTE DEL NOGAL  
CARLSBAD  
CA 92011, USA**

*Prepared by*  
**UL LLC  
1285 WALT WHITMAN RD.  
MELVILLE, NY 11747, U.S.A.  
TEL: (631) 271-6200  
FAX: (877) 854-3577**



**NVLAP LAB CODE 100255-0**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	2012-12-14	Initial Issue	

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** ECOLINK INTELLIGENT TECHNOLOGY  
2055 CORTE DEL NOGAL  
CARLSBAD CA 92011, USA

**EUT DESCRIPTION:** Wireless Security Door/Window Contact

**MODEL:** WST-200

**SERIAL NUMBER:** Non-serialized production unit

**DATE TESTED:** 2012-12-12 through 2012-12-13

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 8, Annex 1	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations of these calculations. The results show that the equipment is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation, as described by the referenced documents. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL By:

Tested By:



Joseph Danisi  
WiSE Project Lead  
UL LLC

Bob DeLisi  
WiSE Principal Engineer  
UL LLC

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1002550.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.3 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB

Uncertainty figures are valid to a confidence level of 95%.

## **5. EQUIPMENT UNDER TEST**

### **5.1. DESCRIPTION OF EUT**

The EUT is a Wireless Security Door/Window Contact. The EUT operates from a 3VDC, internal CR2032 battery.

### **5.2. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes a raised wire loop on PCB antenna, with an estimated gain of -15 dBi.

### **5.3. SOFTWARE AND FIRMWARE**

Not Applicable. The manufacturer configured a sample of the device to constantly transmit and a sample to operate as intended when normally operated.

### **5.4. WORST-CASE CONFIGURATION AND MODE**

The EUT has only one channel (433.92MHz) and after preliminary testing it was determined that the Z axis was the worst case configuration.

### **5.5. MODIFICATIONS**

No modifications were made during testing.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Not Applicable

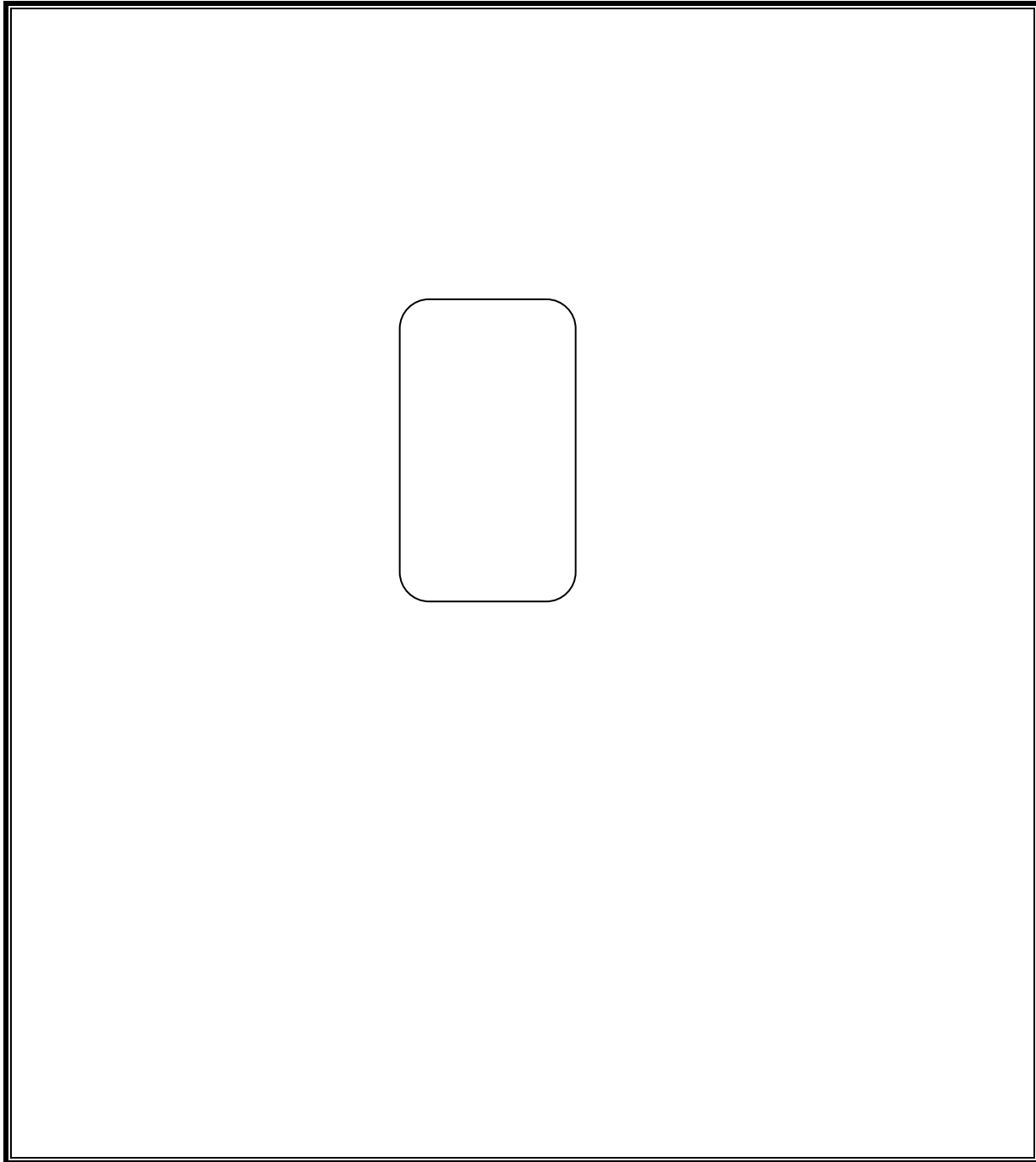
### I/O CABLES

Not Applicable

### TEST SETUP

The EUT was tested as a standalone device.

**SETUP DIAGRAM FOR TESTS**





## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used – Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2012-01-30	2013-01-30
Bicon Antenna	Schaffner	VBA6106A	43441	2012-11-12	2013-11-12
Log-P Antenna	Schaffner	UPA6109	44067	2012-05-16	2013-05-16
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-03-13	2014-03-13
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28
Above 1GHz (Band Optimized System)					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	012-03-01	2013-03-01
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03	48106	2007-09-27	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07	8933	2008-11-24	See * below
Horn Antenna (12-18 GHz)	ETS	3160-08	8932	2007-09-27	See * below
Horn Antenna (18-26.5 GHz)	ETS	3160-09	8947	2007-09-26	See * below
Horn Antenna (26.5-40 GHz)	ETS	3160-10	8947	2007-09-26	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-03-13	2014-03-13
Multimeter	Fluke	83III	ME5B-305	2012-03-13	2014-03-13
<p>* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration.</p> <p>* Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than <math>2D^2/\lambda</math>. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.</p>					

<b>Test Equipment Used – Occupied Bandwidth/Cease Operation/Duty Cycle</b>					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Spectrum Analyzer	Agilent	E4446A	72822	2012-01-31	2013-02-28
Dipole Antenna	EMCO	3121C	3359	2011-12-16	2012-12-16
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43733	2012-03-13	2014-03-13

## 7. ANTENNA PORT TEST RESULTS

### 7.1. 20 dB AND 99% BW

#### LIMITS

FCC §15.231 (c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

IC A1.1.3

For the purpose of Section A1.1, the 99% Bandwidth shall be no wider than 0.25% of the center frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

#### TEST PROCEDURE

ANSI C63.4

The transmitter output is connected to the spectrum analyzer.

20dB Bandwidth: The RBW is set to 10 KHz. The VBW is set to 100 KHz. The sweep time is coupled. Bandwidth is determined at the points 20 dB down from the modulated carrier.

99% Bandwidth: The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

**RESULTS**

No non-compliance noted:

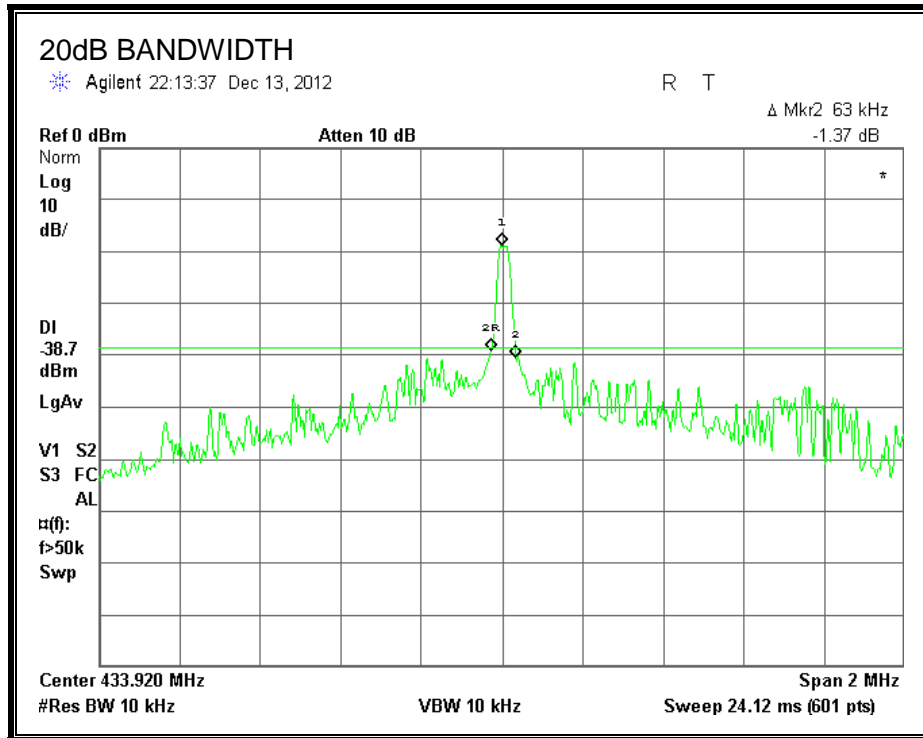
20dB Bandwidth

<b>Frequency (MHz)</b>	<b>20dB Bandwidth (kHz)</b>	<b>Limit (kHz)</b>	<b>Margin (kHz)</b>
433.92	63	1084.8	-1021.8

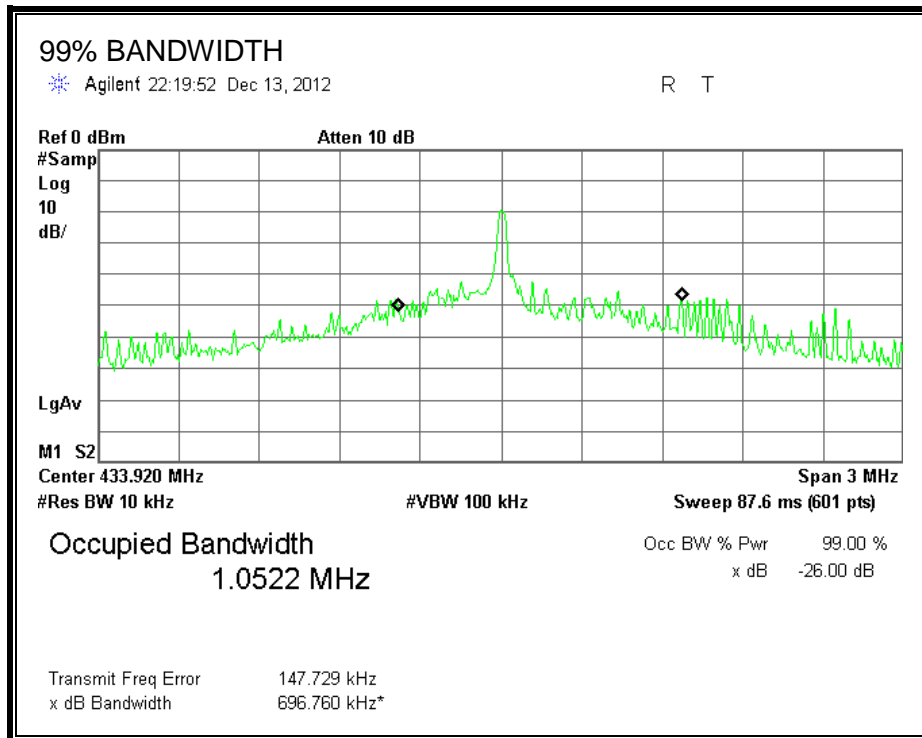
99% Bandwidth

<b>Frequency (MHz)</b>	<b>99% Bandwidth (kHz)</b>	<b>Limit (kHz)</b>	<b>Margin (kHz)</b>
433.92	1052.2	1084.8	-32.6

20dB BANDWIDTH



99% BANDWIDTH



## 7.2. DUTY CYCLE

### LIMITS

FCC §15.35 (c)

The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer or radiated field strength. The RBW is set to 1 MHz and the VBW is set to 1 MHz. The sweep time is coupled and the span is set to 0 Hz. The number of pulses is measured and calculated in a 100 ms scan.

### CALCULATION

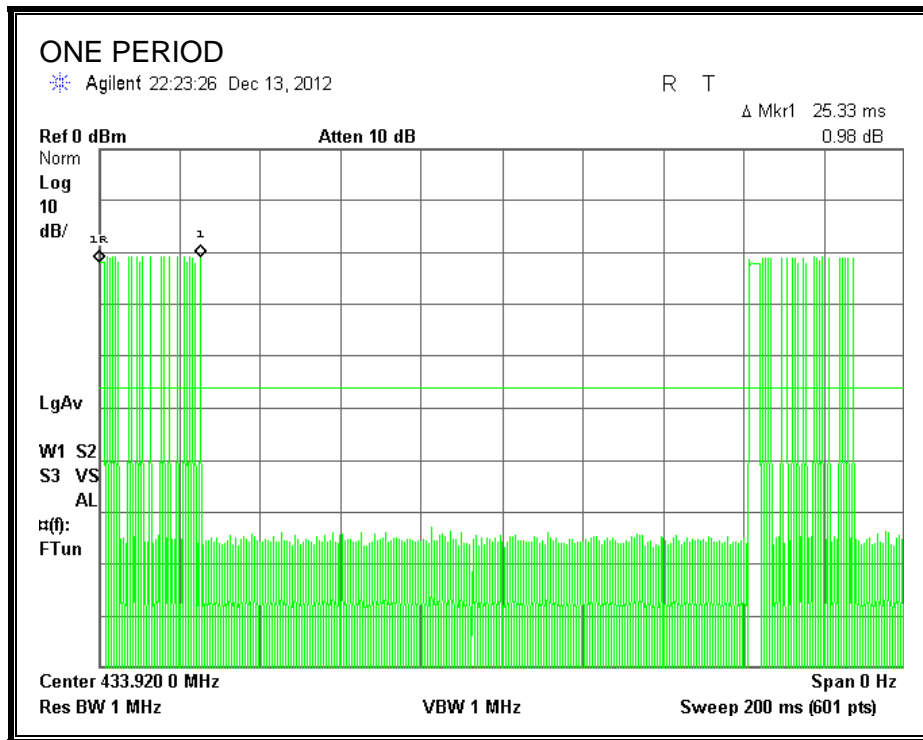
Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is (# of long pulses \* long pulse width) + (# of short pulses \* short pulse width) / 100 or T

### RESULTS

No non-compliance noted:

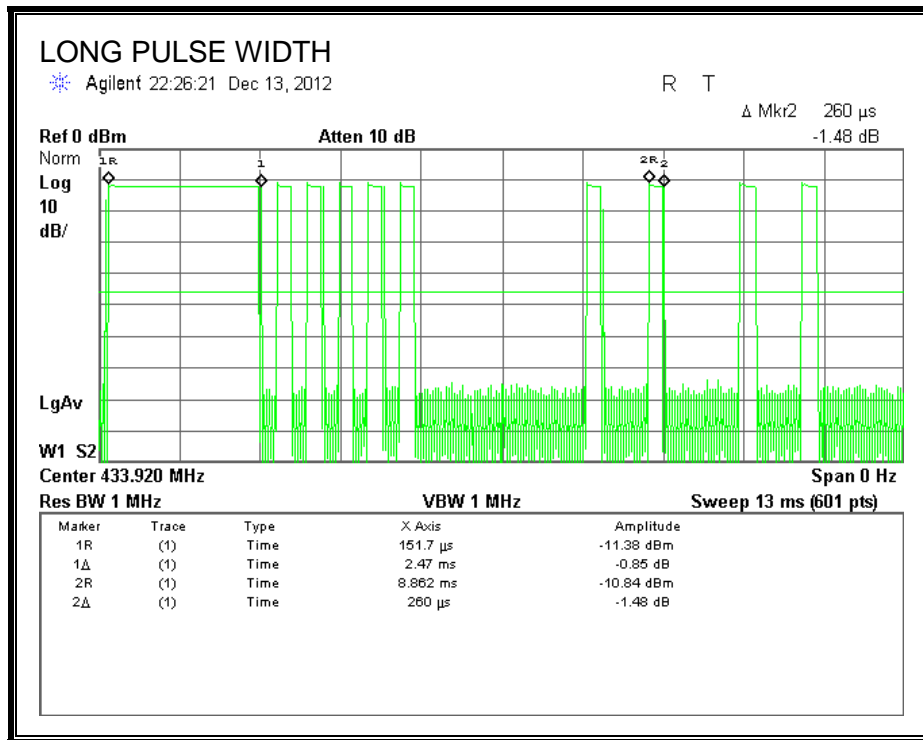
One Period (ms)	Long Pulse Width (ms)	# of Long Pulses	Short Width (ms)	# of Short Pulses	Duty Cycle	20*Log Duty Cycle (dB)
100	2.417	1	0.26	19	0.074	-22.67

**ONE PERIOD**

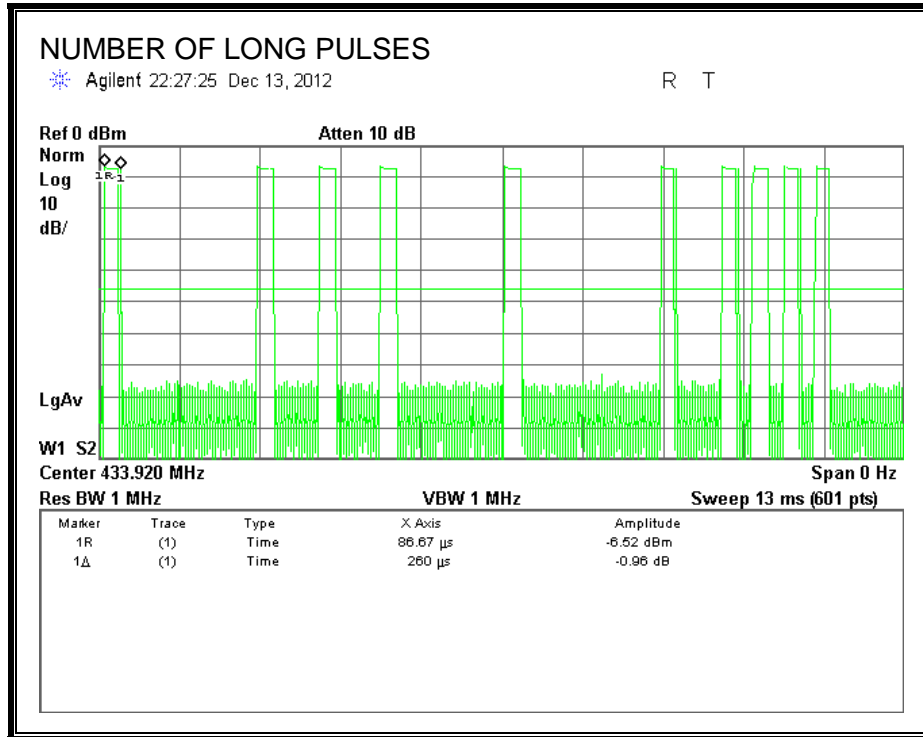




**LONG PULSE WIDTH**



**NUMBER OF LONG PULSES**



### 7.3. TRANSMISSION TIME

#### LIMITS

FCC §15.231 (a) (2)

IC A1.1.1 (b)

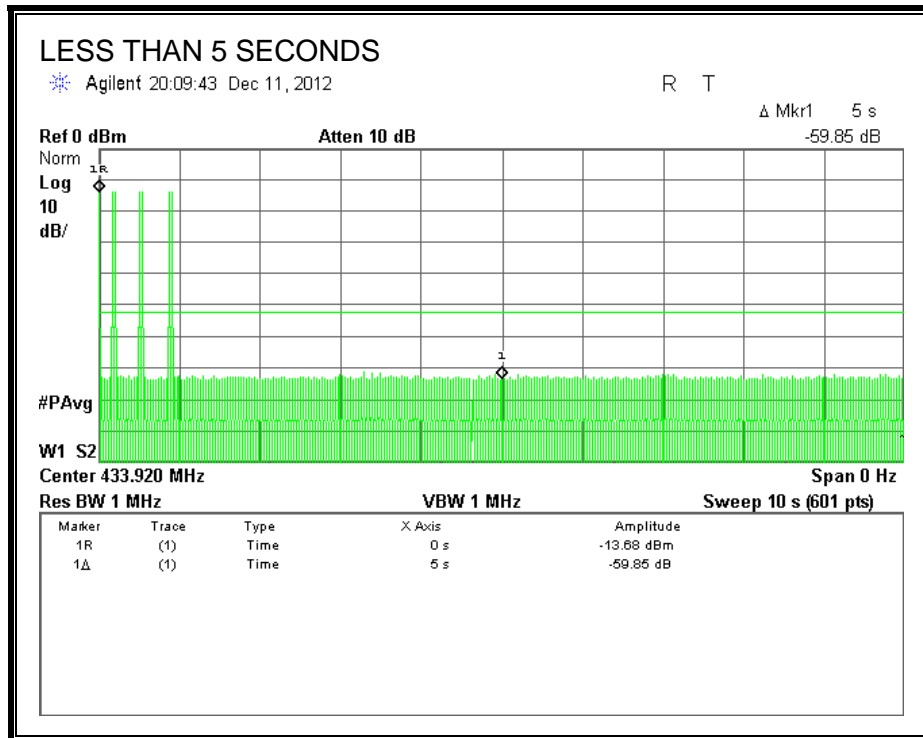
A transmitter activated automatically shall cease transmission within 5 seconds after activation.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer or radiated field strength. The RBW is set to 1 MHz and the VBW is set to 1 MHz. The sweep time is set to 10 seconds and the span is set to 0 Hz.

#### RESULTS

No non-compliance noted:



## 8. RADIATED EMISSION TEST RESULTS

### 8.1. TX RADIATED SPURIOUS EMISSION

#### LIMITS

FCC §15.231 (b)  
 IC A1.1.2

In addition to the provisions of § 15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental Frequency (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,7501	125 to 3751
174 - 260	3,750	375
260 - 470	3,750 to 12,5001	375 to 1,2501
Above 470	12,500	1,250

1 Linear interpolation

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.  
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 88	100 **	3
88 216	150 **	3
216 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

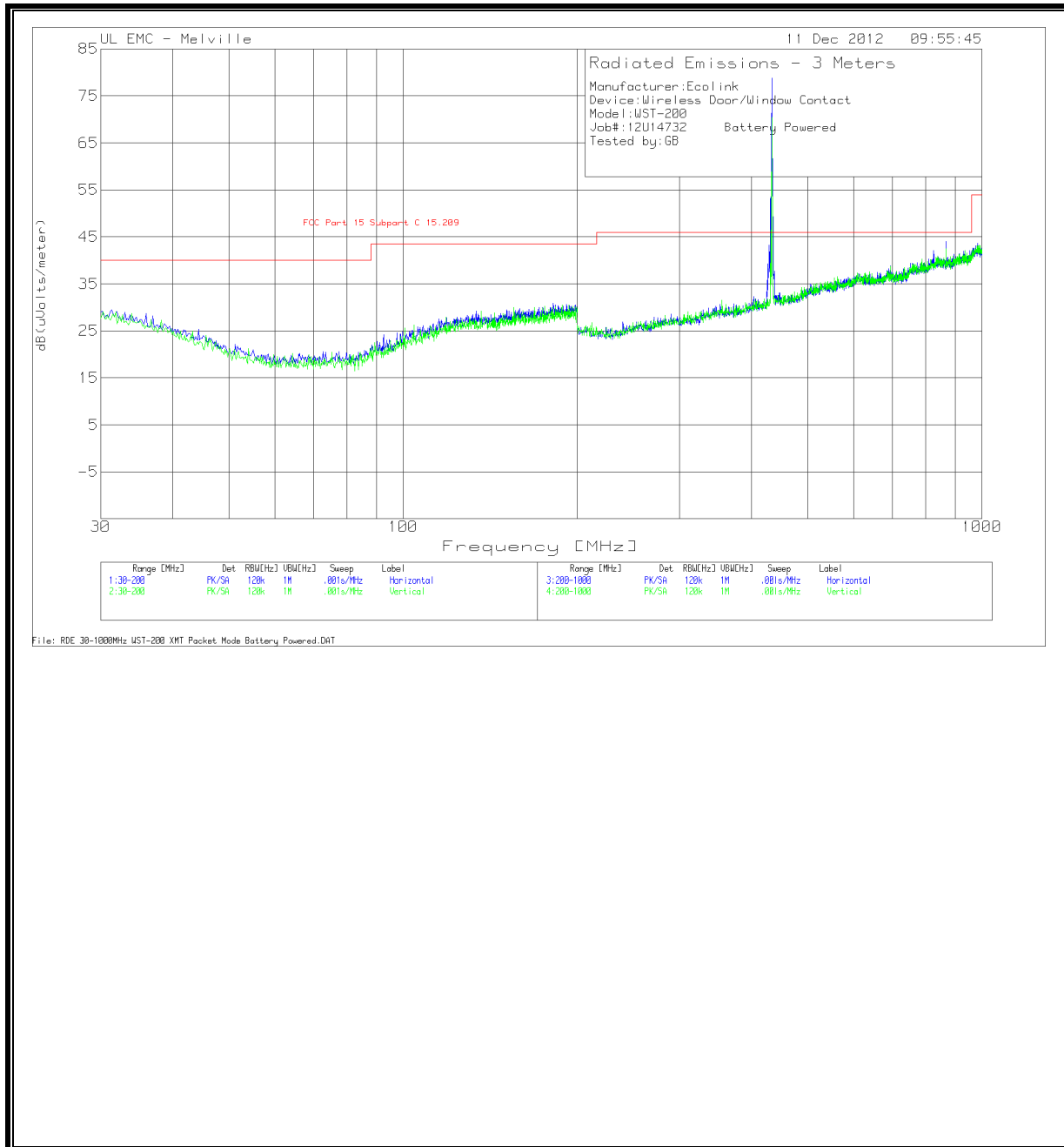
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

## **RESULTS**

No non-compliance noted:

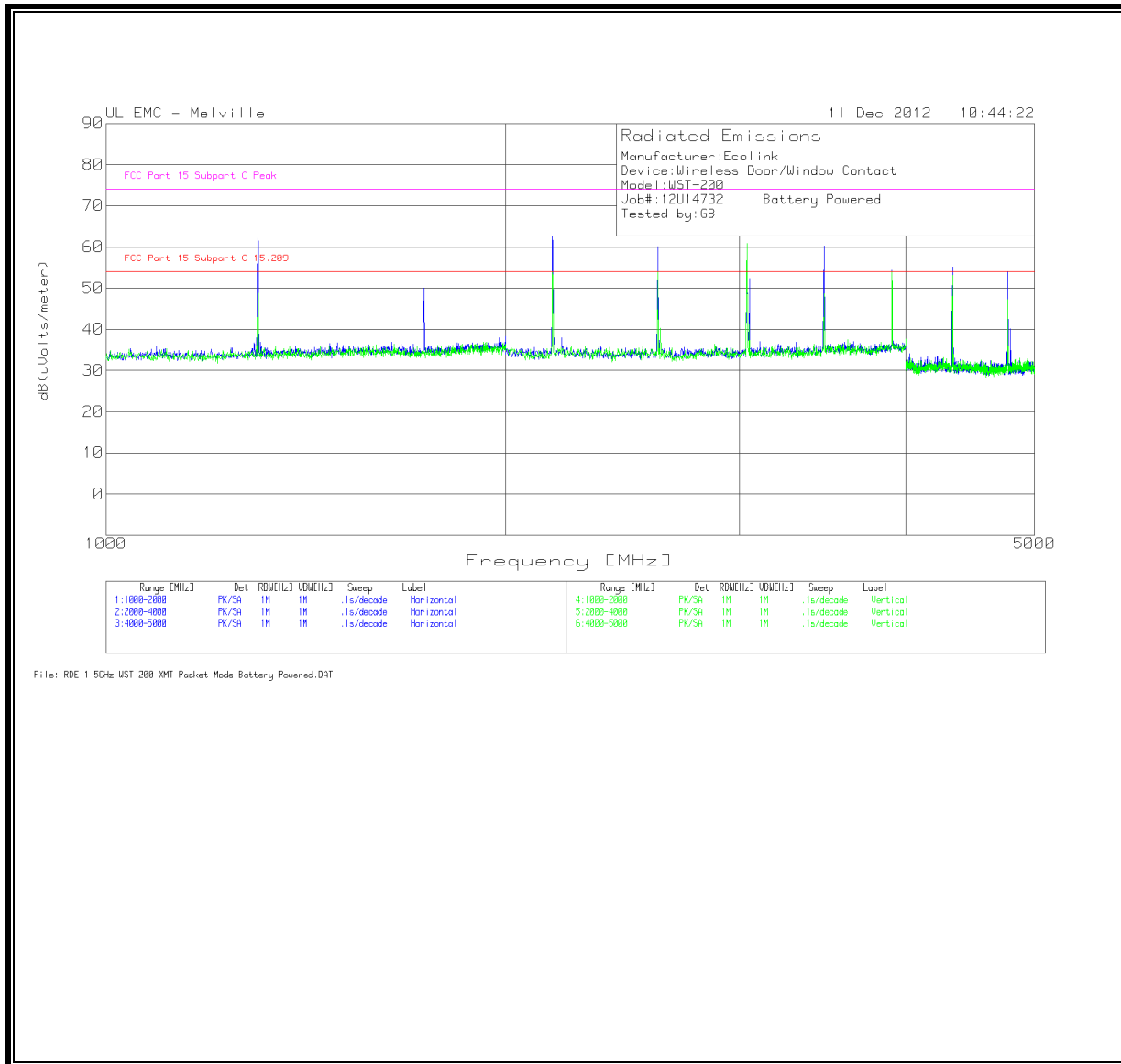
**FUNDAMENTAL, HARMONICS AND TX SPURIOUS EMISSION (30 – 1000 MHz)**



Manufacturer:Ecolink																
Device:Wireless Door/Window Contact																
Model:WST-200																
Job#:12U14732 Battery Powered																
Tested by:GB																
Test	Meter		AF-44067	GL-3M	dB(uVolts		Corrected	FCC Part 15		FCC Part 15		FCC Part 15		Azimuth	Height	
Frequency	Reading	Detector	[dB]	[dB]	/meter)	DCF (dB)	Value	Subpart C	Margin	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
433.9148	59.88	PK	16.5	2.3	78.68	-22.67	56.01	80.8	-24.79	100.8	-22.12	-	-	256	251	Horz
433.9148	52.12	PK	16.5	2.3	70.92	-22.67	48.25	80.8	-32.55	100.8	-29.88	-	-	13	231	Vert
867.9	19.31	PK	22.5	3.4	45.21	-22.67	22.54	60.8	-38.26	80.8	-35.59	-	-	143	202	Vert
867.9	21.34	PK	22.5	3.4	47.24	-22.67	24.57	60.8	-36.23	80.8	-33.56	-	-	59	183	Horz
933.7413	15.02	PK	23.1	3.5	41.62	-22.67	18.95	60.8	-41.85	80.8	-39.18	-	-	164	117	Vert
824.0621	14.45	PK	22.4	3.3	40.15	-	-	-	-	-	-	46	-5.85	91	154	Horz
PK - Peak detector (Maximized)																
QP - Quasi-Peak detector																
LnAv - Linear Average detector																
LgAv - Log Average detector																
Av - Average detector																
CAV - CISPR Average detector																
RMS - RMS detection																
CRMS - CISPR RMS detection																



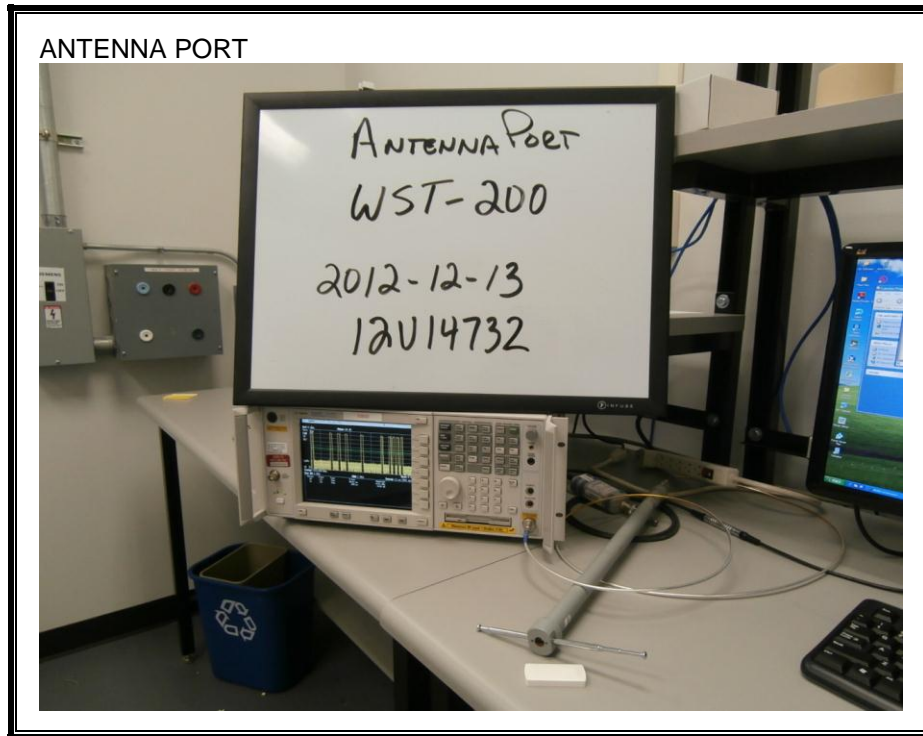
**HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHZ**



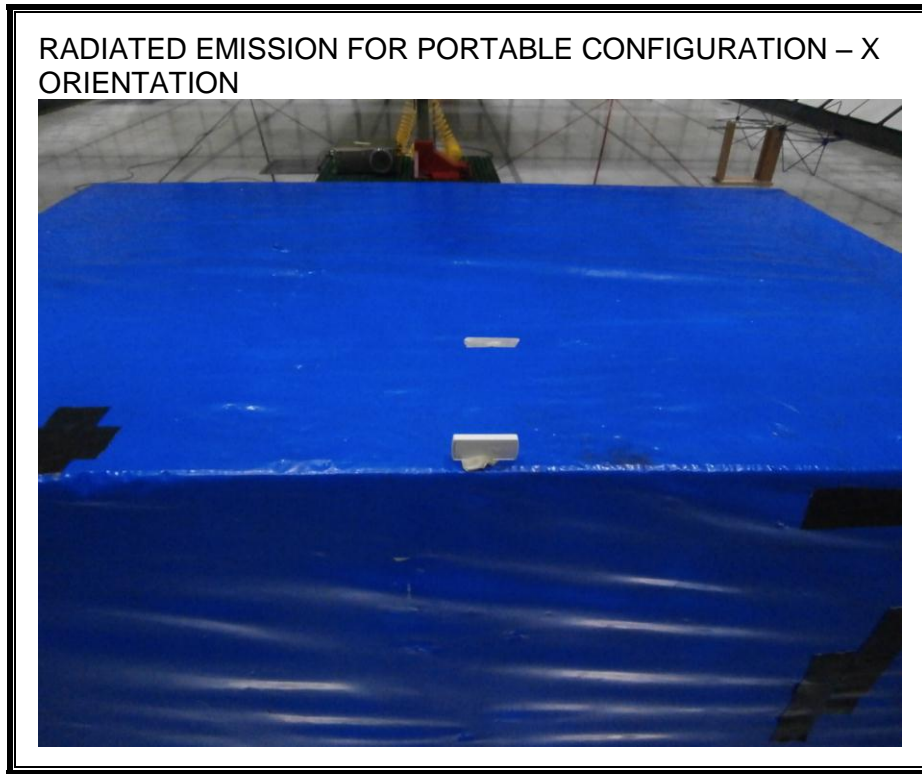
Manufacturer:Ecolink														
Device:Wireless Door/Window Contact														
Model:WST-200														
Job#:12U14732 Battery Powered														
Tested by:GB														
Test Frequency	Meter Reading	Detector	AF-51442 [dB]	BOMS Factor [dB]	dB(uVolts /meter)	DCF (dB)	Corrected Valude dB(uVolts /meter)	FCC Part 15 Subpart C 15.209	Margin	FCC Part 15 Subpart C Peak	Margin	Azimuth [Degs]	Height [cm]	Polarity
1000 - 2000MHz														
1301.7515	89.36	PK	20.5	-44.72	65.14	-22.67	42.47	54	-11.53	74	-8.86	271	281	Horz
1301.7515	82.53	PK	20.5	-44.72	58.31	-22.67	35.64	54	-18.36	74	-15.69	0	309	Vert
1735.6739	70.88	PK	20.8	-44.27	47.41	-22.67	24.74	54	-29.26	74	-26.59	327	389	Vert
1735.6	76.27	PK	20.8	-44.27	52.8	-22.67	30.13	54	-23.87	74	-21.2	276	378	Horz
Horizontal 2000 - 4000MHz														
2169.5531	88.11	PK	21.4	-43.87	65.64	-22.67	42.97	54	-11.03	74	-8.36	270	363	Horz
2169.5531	84.96	PK	21.4	-43.87	62.49	-22.67	39.82	54	-14.18	74	-11.51	176	368	Vert
2603.608	84.02	PK	21.3	-43.43	61.89	-22.67	39.22	54	-14.78	74	-12.11	224	351	Vert
2603.608	86.7	PK	21.3	-43.43	64.57	-22.67	41.9	54	-12.1	74	-9.43	132	337	Horz
3037.7735	91.02	PK	21.6	-42.83	69.79	-22.67	47.12	54	-6.88	74	-4.21	205	383	Horz
3037.7735	86.28	PK	21.6	-42.83	65.05	-22.67	42.38	54	-11.62	74	-8.95	115	378	Vert
3471.6503	81.13	PK	22.2	-42.64	60.69	-22.67	38.02	54	-15.98	74	-13.31	338	397	Vert
3471.6503	84.49	PK	22.2	-42.64	64.05	-22.67	41.38	54	-12.62	74	-9.95	39	383	Horz
3905.5894	78.41	PK	22.6	-42.83	58.18	-22.67	35.51	54	-18.49	74	-15.82	138	325	Horz
3905.5894	76.39	PK	22.6	-42.83	56.16	-22.67	33.49	54	-20.51	74	-17.84	97	382	Vert
Horizontal 4000 - 5000MHz														
4339.1908	83.04	PK	27.7	-51.8	58.94	-22.67	36.27	54	-17.73	74	-15.06	36	395	Vert
4339.1908	82.04	PK	27.7	-51.8	57.94	-22.67	35.27	54	-18.73	74	-16.06	145	274	Horz
4773.324	79.66	PK	27.1	-52.36	54.4	-22.67	31.73	54	-22.27	74	-19.6	22	328	Horz
4773.324	76.98	PK	27.1	-52.36	51.72	-22.67	29.05	54	-24.95	74	-22.28	333	321	Vert
PK - Peak detector (Maximized)														
QP - Quasi-Peak detector														
LnAv - Linear Average detector														
LgAv - Log Average detector														
Av - Average detector														
CAV - CISPR Average detector														
RMS - RMS detection														

## 9. SETUP PHOTOS

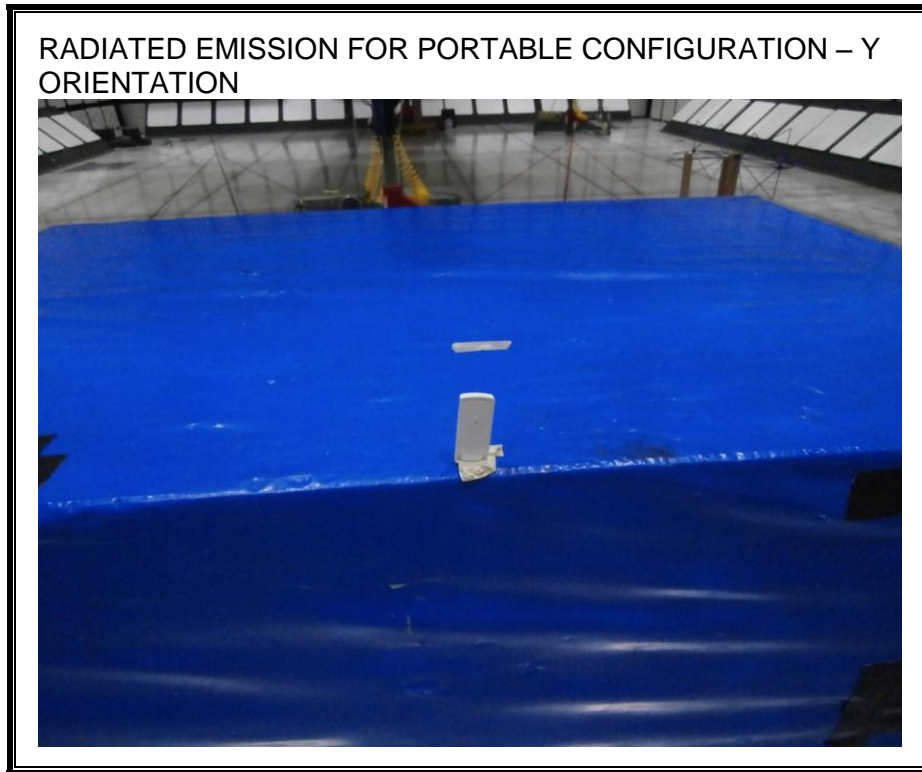
### ANTENNA PORT



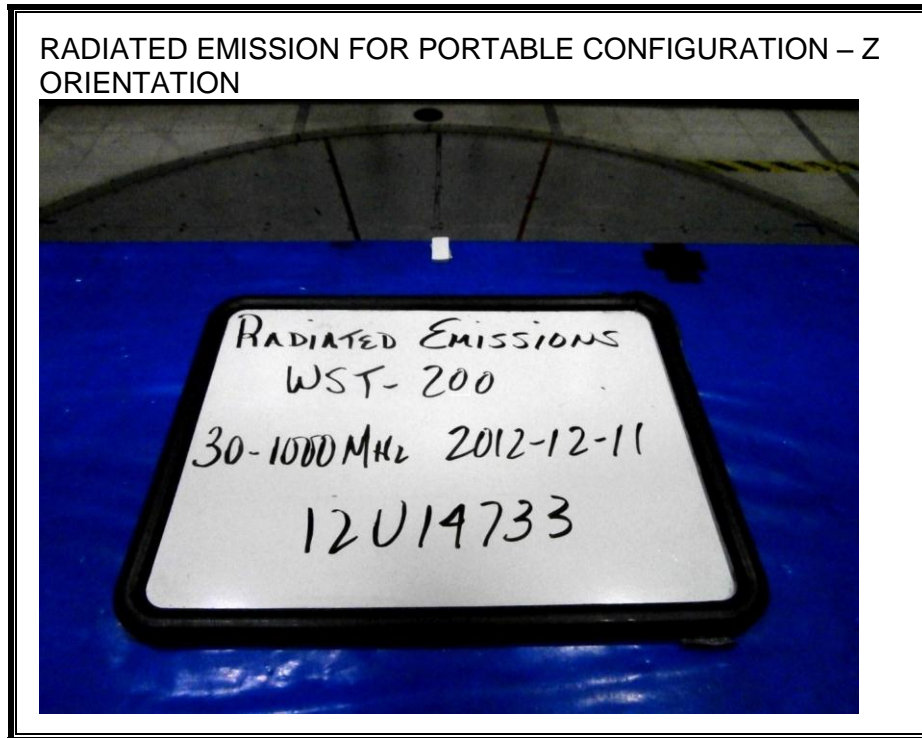
**RADIATED EMISSION FOR PORTABLE CONFIGURATION – X ORIENTATION**



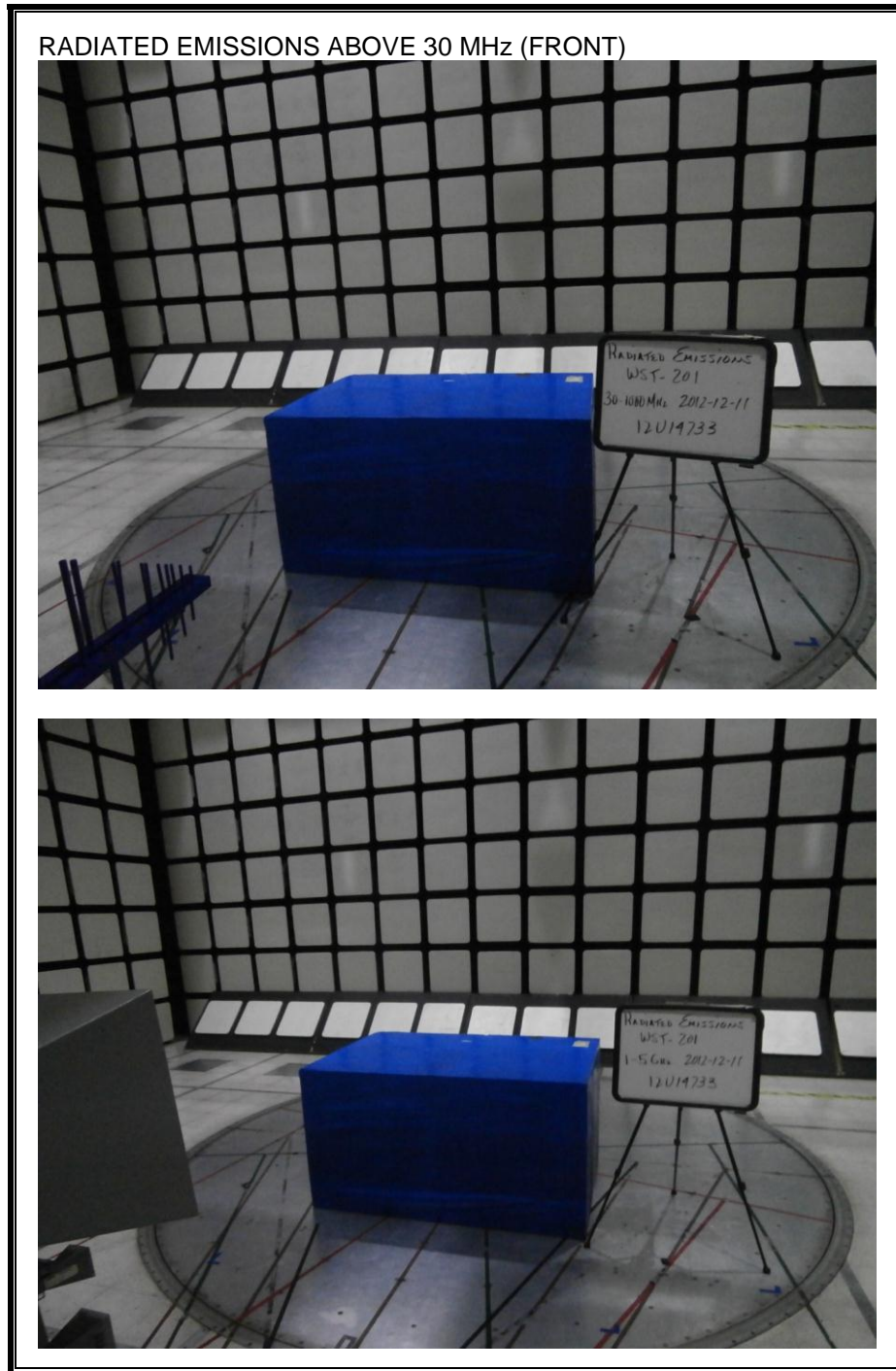
**RADIATED EMISSION FOR PORTABLE CONFIGURATION – Y ORIENTATION**



**RADIATED EMISSION FOR PORTABLE CONFIGURATION – Z ORIENTATION**

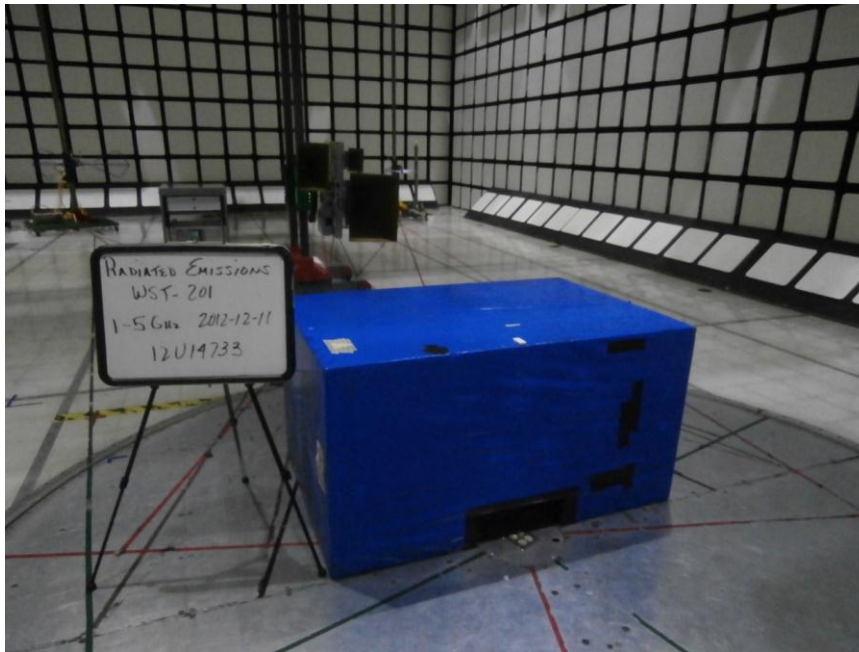
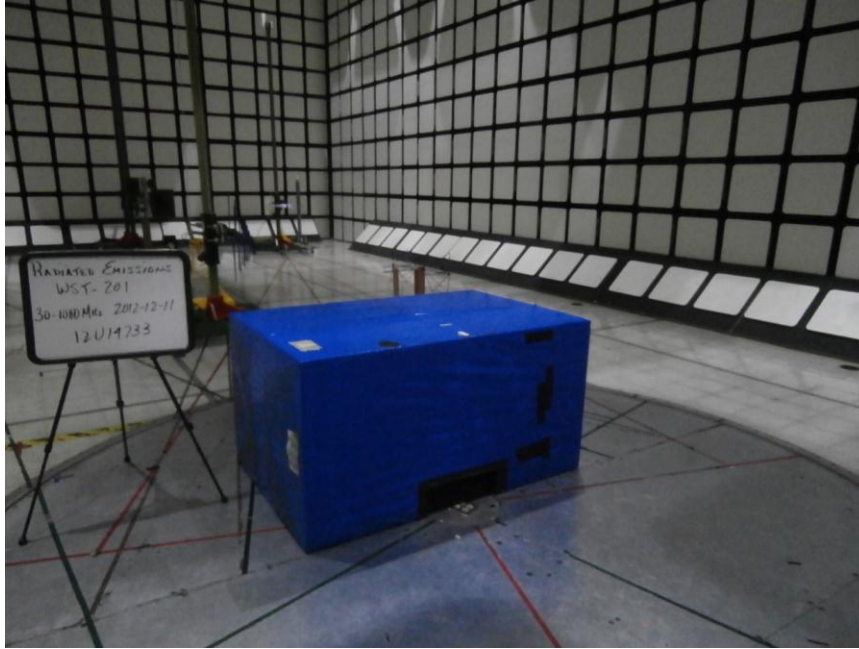


**RADIATED EMISSION ABOVE 30 MHz**





RADIATED EMISSIONS ABOVE 30 MHz (BACK)



**END OF REPORT**