CERTIFICATION C2PC TEST REPORT

Report Number. : 12446338-E1V1

Applicant	:	ECOLINK INTELLIGENT TECHNOLOGY, INC. 2055 CORTE DEL NOGAL CARLSBAD, CA, 92011, U.S.A
FCC ID	:	XQC-WST212
ISED	:	9863B-WST212
Model Number	:	CS-202
EUT Description	:	Wireless Security Door/Window Sensor
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS 210

Date Of Issue:
August 16, 2018

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	8/16/18	Initial Issue	-

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ECOLINK INTELLIGENT TECHNOLOGY, INC.
2055 CORTE DEL NOGAL
CARLSBAD, CA, 92011, U.S.A

EUT DESCRIPTION: WIRELESS SENSOR

MODEL: CS-202

SERIAL NUMBER: 782136724608

DATE TESTED: AUGUST 07, 2018 TO AUGUST 10, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 9, Annex A	Pass
INDUSTRY CANADA RSS-GEN Issue 5	Pass

UL Verification Services Inc tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested 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 herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc 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 the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

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CONSUMER TECHNOLOGY DIVISION
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UL Verification Services Inc.

Reviewed By:

Kiya Kedida
CONSUMER TECHNOLOGY DIVISION
Project Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 5, and RSS-210 Issue 9.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A(ISED: 2324B-1)	☐ Chamber D(ISED: 22541-1)
☐ Chamber B(ISED: 2324B-2)	☐ Chamber E(ISED: 22541-2)
☐ Chamber C(ISED: 2324B-3)	☐ Chamber F(ISED: 22541-3)
	☐ Chamber G(ISED: 22541-4)
	☐ Chamber H(ISED: 22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

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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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

Parameter	Uncertainty
Worst Case Radiated Disturbance, 9kHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a battery powered wireless transmitter for home automation/security application.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is:

- New Model number (CS-202) and new Firmware which results in increased duty cycle.
- Modified Enclosure, removed rubber bottom.
- Removed switch, SW2, changed to no place.

5.3. MAXIMUM OUTPUT POWER

The transmitter has the maximum peak and average radiated field strengths as follows:

Frequency Range (MHz)	Mode	Field Strength Peak (dBuV/m)	Field Strength Average (dBuV/m)
345	Normal	83.91	64.31

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Loop antenna using copper wire, with a maximum peak gain of -15dBi.

5.5. SOFTWARE AND FIRMWARE

The typical factory firmware installed in the EUT during testing was ESW1034-05-006.

5.6. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in each of its three orthogonal axes. All radiated testing was performed in the worse-case axis, which was found to be the “X-axis”. See photos for details.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

NONE

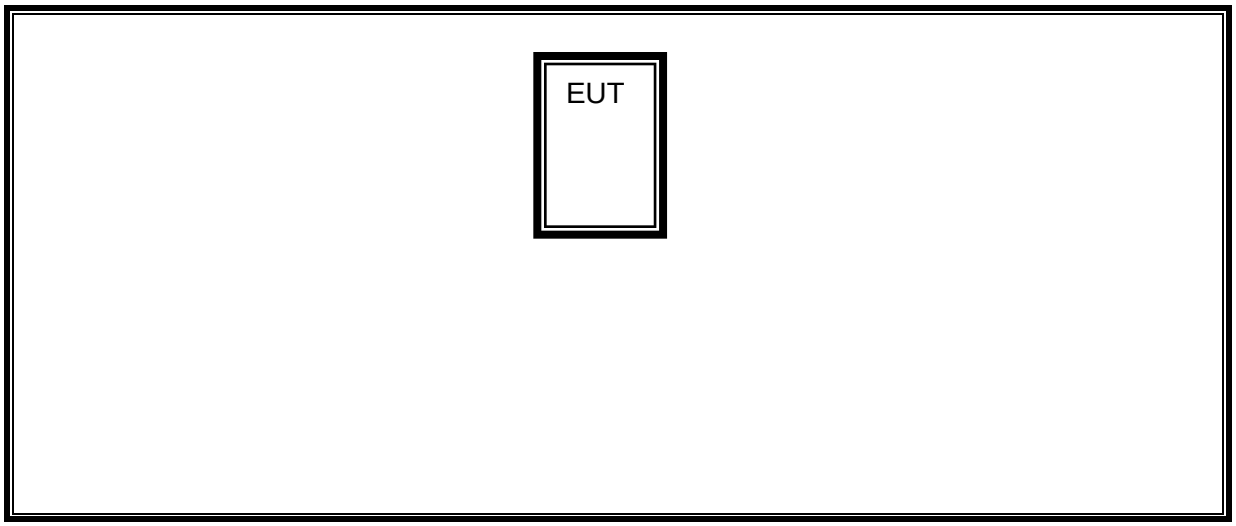
I/O CABLES

NONE

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 List					
Description	**Manufacturer**	**Model**	**T Number**	**Cal Date**	**Cal Due**
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	905	02/03/2018	02/03/2019
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	493	04/03/2018	04/03/2019
Amplifier, 100KHz to 1GHz, 32dB	Keysight	8447D	15	08/14/2017	08/14/2018
Antenna, Horn 1-18GHz	ETS Lindgren	3117	711	01/30/2018	01/30/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	899	7/24/2018	7/24/2019
Loop Antenna	COM-POWER CORPORATION	AL-130R	1866	12/31/2017	12/31/2018

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, Dec 01, 2016

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7. ANTENNA PORT TEST RESULTS

7.1. 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 1MHz and the VBW is set to 1MHz. 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	0.264	17	0.13	46	0.105	-19.60

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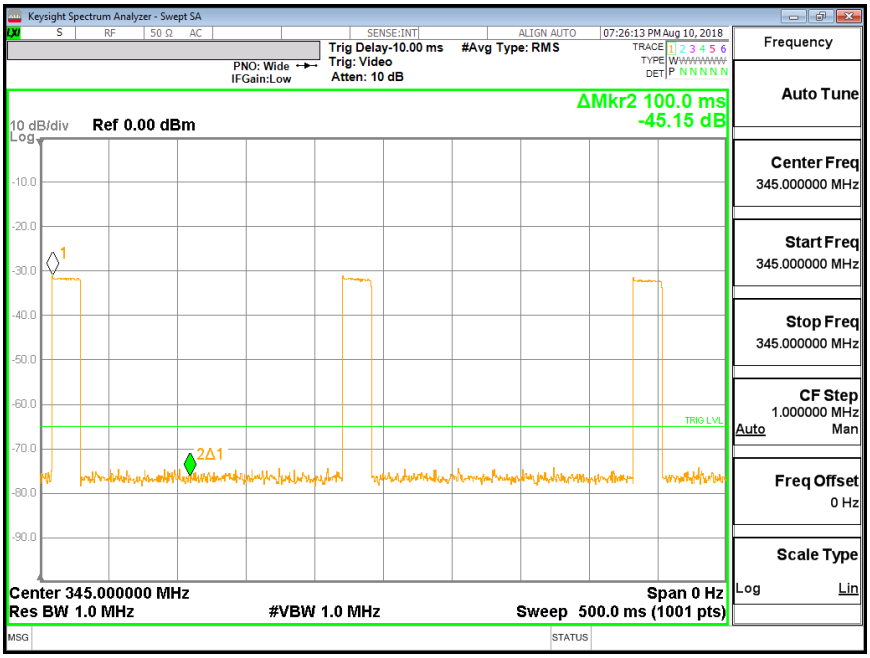
ONE PERIOD

ONE PERIOD



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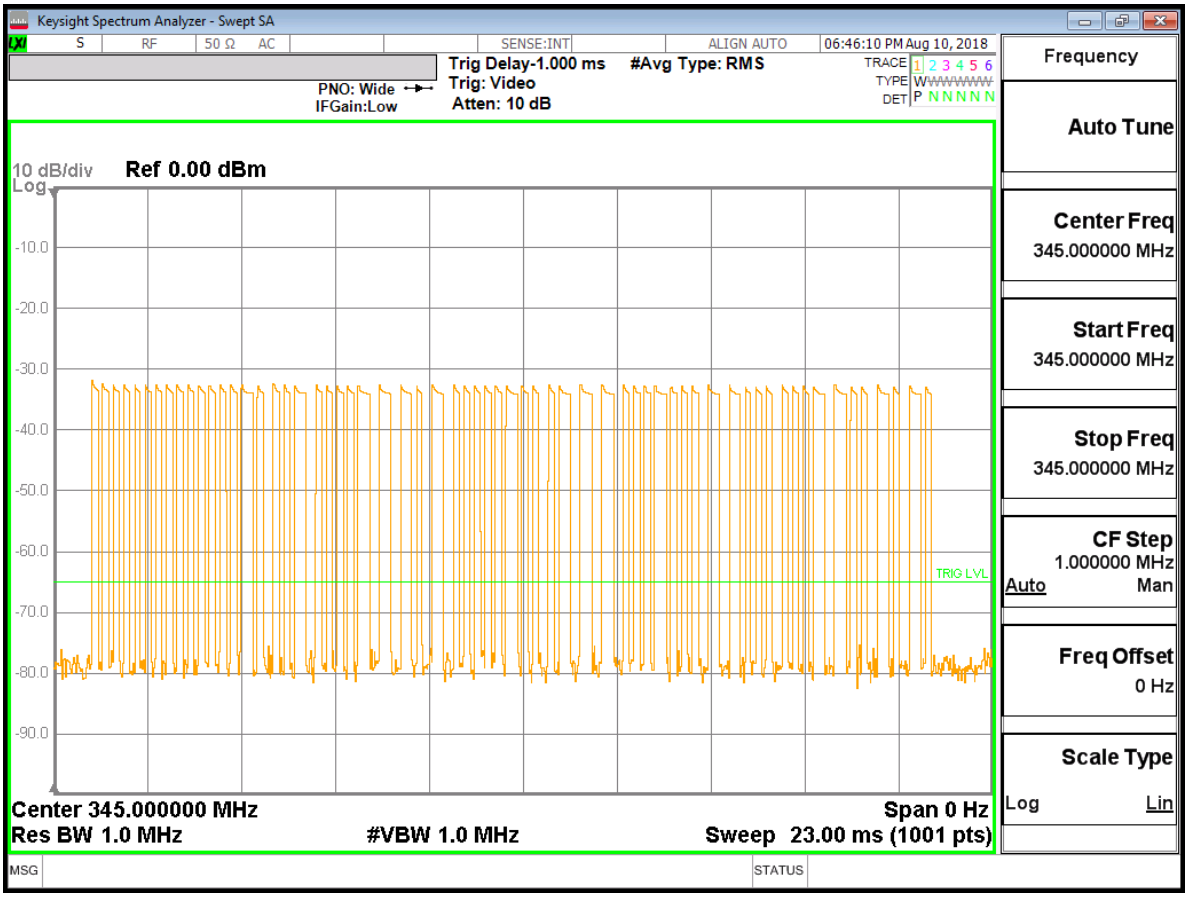
PULSE WIDTHS

LONG PULSE AND SHORT PULSE WIDTHS

NUMBER OF PULSES

NUMBER OF PULSES



7.2.

8. RADIATED EMISSION TEST RESULTS

LIMITS

FCC §15.231 (b)
RSS-210 A.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 (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
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
[1]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	([2])
13.36 – 13.41	322 - 335.4		

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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)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
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 for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. Please refer to test report section 7.2 for duty cycle factor information. Note: The pre-scan measurements above 1GHz the VBW is set to 30 kHz.

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:

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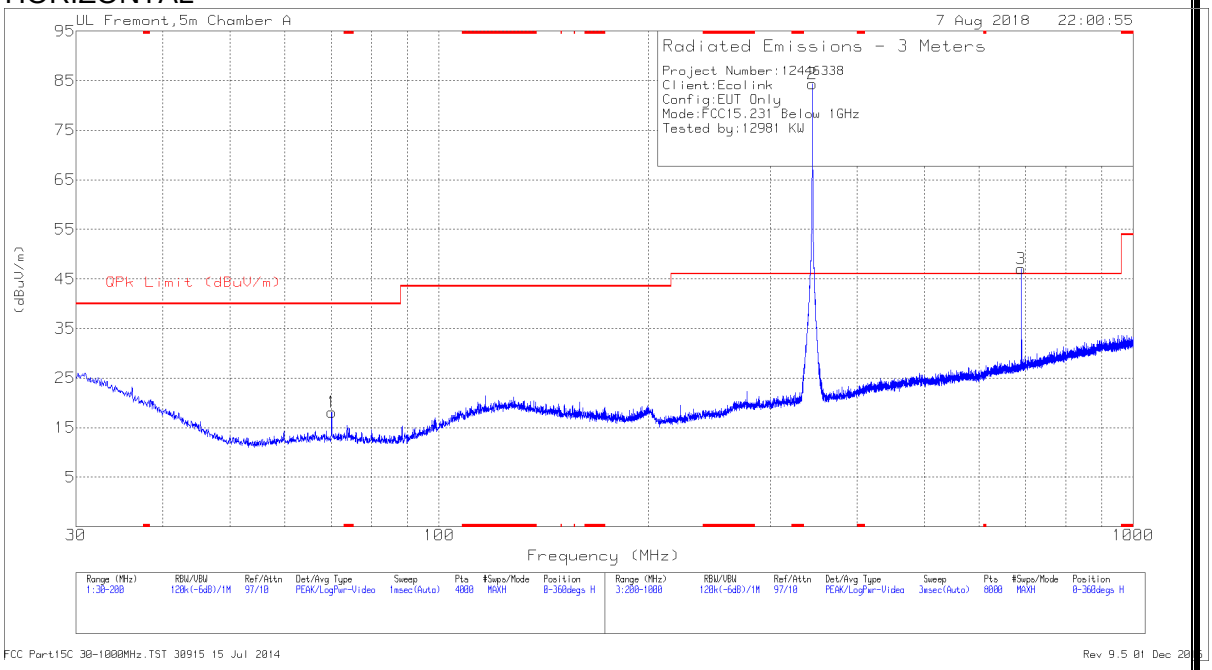
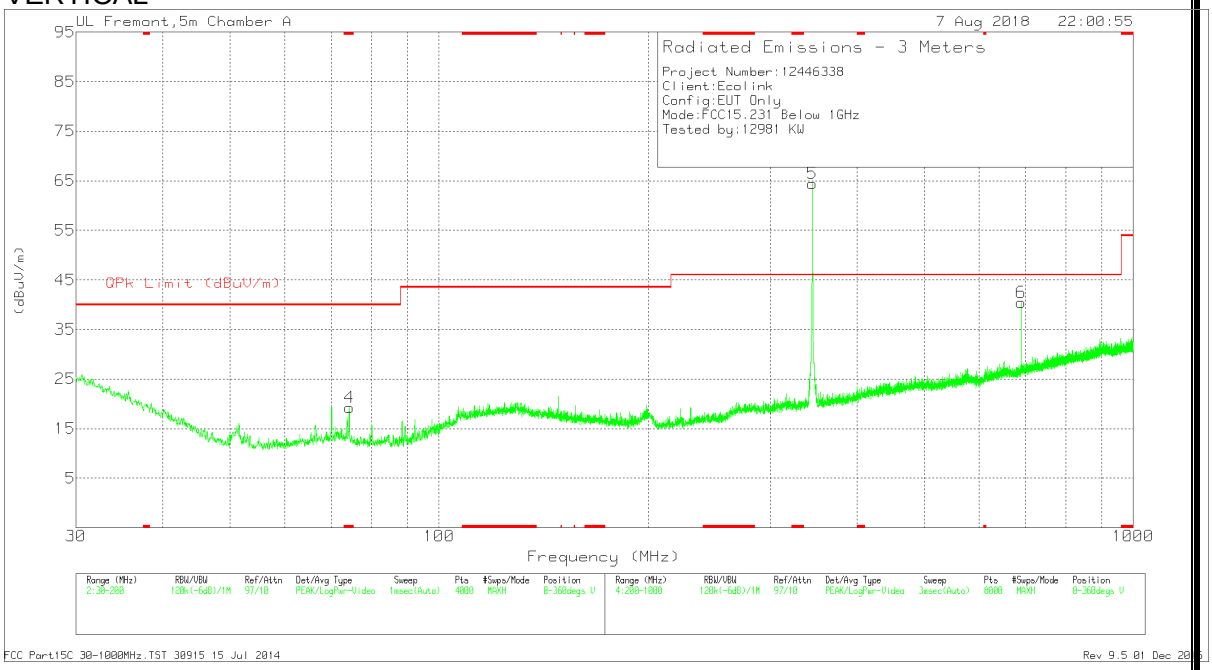
FUNDAMENTAL, HARMONICS AND TX SPURIOUS EMISSION (30 – 1000 MHz)

HORIZONTAL



VERTICAL



BELOW 1GHZ RADIATED EMISSIONS

FUNDAMENTAL FIELD STRENGTH AND HARMONICS SPURIOUS EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T899 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	74.2445	33.85	Pk	12	-26.7	19.15	40	-20.85	112	132	V
1	70.0534	33.65	Pk	12.1	-26.7	19.05	40	-20.95	198	146	H
2	345.0158	90.51	Pk	18.1	-24.7	83.91	97.26	-13.35	0	115	H
			Av			64.31	77.26	-12.95	0	115	H
5	345.0175	75.36	Pk	18.1	-24.7	68.76	97.26	-28.5	74	151	V
			Av			49.16	77.26	-29	74	151	V
3	**690.0131	51.03	Pk	24	-24.6	50.43	77.26	-26.83	280	124	H
			Av			30.83	57.26	-26.43	280	124	H
6	**690.0363	41.87	Pk	24	-24.6	41.27	77.26	-35.99	102	154	V
			Av			21.67	57.26	-35.59	102	154	V

Pk - Peak detector
Av – Average detector

* Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is -19.6dB
(# of long pulses * long pulse width) + (# of short pulses * short pulse width) / 100 or T
Refer to section 7.2 for duty cycle factor calculation (-19.6dB)
Note: Radiated peak result is based on 100% duty cycle sample; average reading = peak reading + DCCF
** Harmonics of fundamental 345MHz

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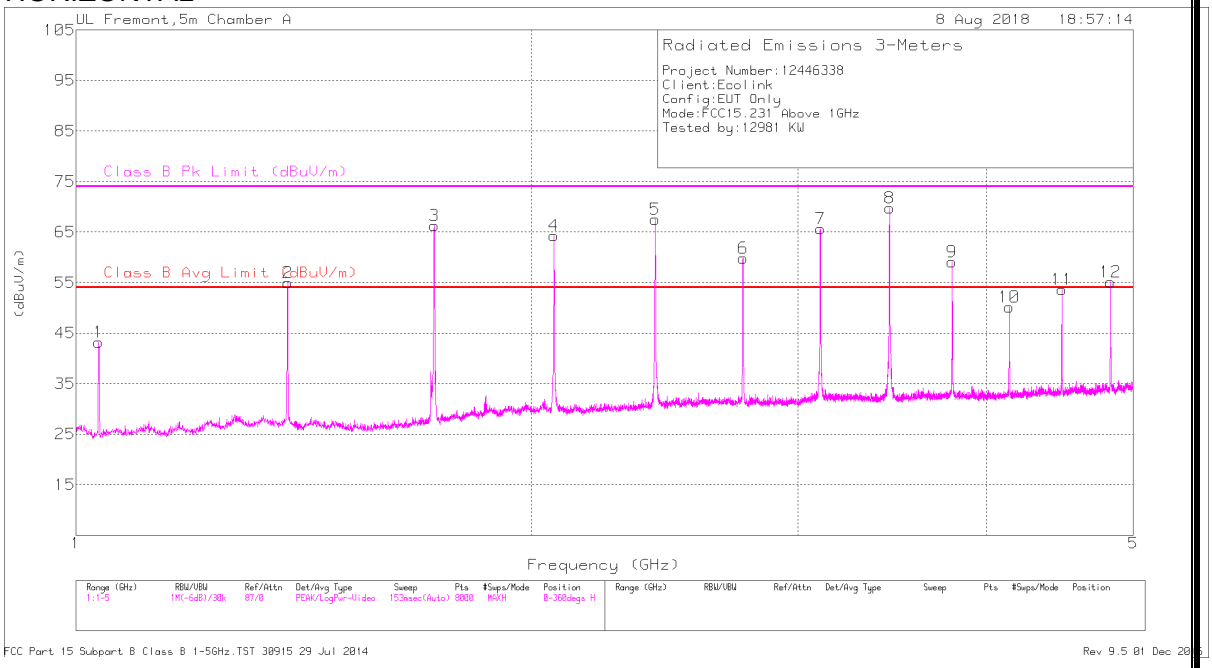
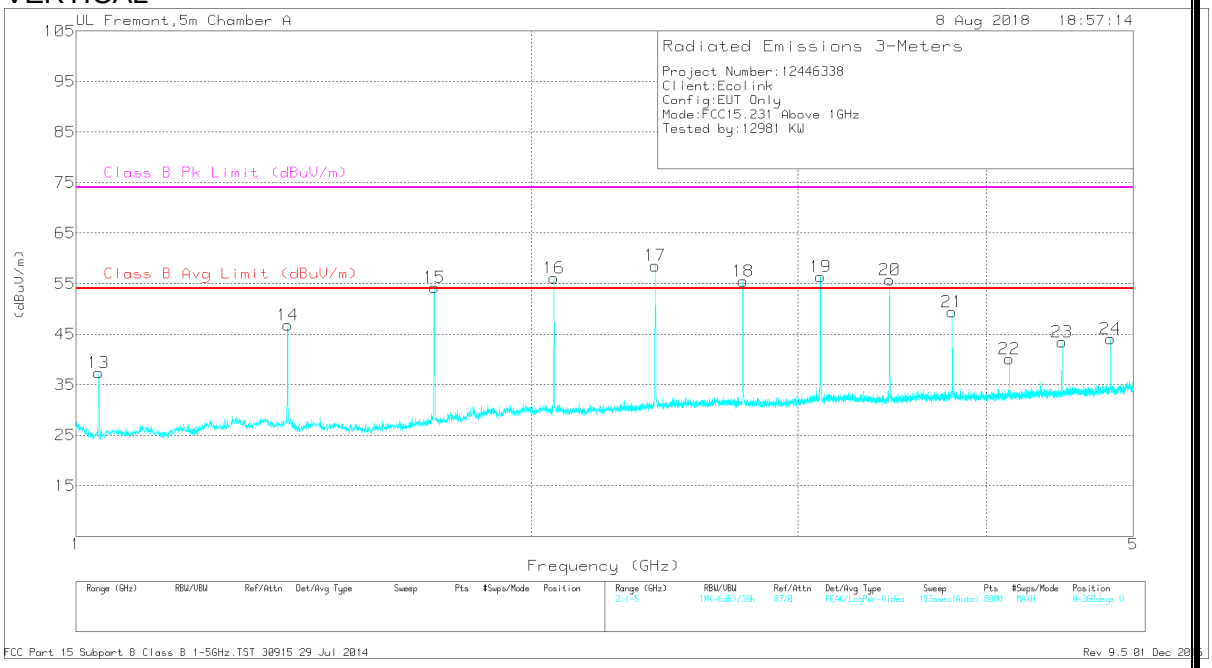
HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz

HORIZONTAL



VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Av Limit (dBuV/m)	Peak Margin (dB)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	**1.035	50.69	Pk	27.3	-32.4	45.59	74	-	-28.41	-	285	196	H
			Av			25.99	-	54	-	-28.01	285	196	H
13	**1.035	47.24	Pk	27.3	-32.4	42.14	74	-	-31.86	-	228	158	V
			Av			22.54	-	54	-	-31.46	228	158	V
2	**1.38	62.4	Pk	29	-31.8	59.6	74	-	-14.4	-	295	195	H
			Av			40	-	54	-	-14	295	195	H
14	**1.38	55.04	Pk	29	-31.8	52.24	74	-	-21.76	-	206	345	V
			Av			32.64	-	54	-	-21.36	206	345	V
3	**1.725	70.35	Pk	29.4	-31.4	68.35	74	-	-5.65	-	115	200	H
			Av			48.75	-	54	-	-5.25	115	200	H
15	**1.725	60.04	Pk	29.4	-31.4	58.04	74	-	-15.96	-	13	310	V
			Av			38.44	-	54	-	-15.56	13	310	V
4	**2.07	67.48	Pk	31.3	-30.9	67.88	74	-	-6.12	-	305	137	H
			Av			48.28	-	54	-	-5.72	305	137	H
16	**2.07	60.91	Pk	31.3	-30.9	61.31	74	-	-12.69	-	197	330	V
			Av			41.71	-	54	-	-12.29	197	330	V
5	**2.414	62.84	Pk	31.9	-30.4	64.34	74	-	-9.66	-	38	310	V
			Av			44.74	-	54	-	-9.26	38	310	V
17	**2.415	67.56	Pk	31.9	-30.4	69.06	74	-	-4.94	-	127	190	H
			Av			49.46	-	54	-	-4.54	127	190	H
6	**2.76	58.76	Pk	32.3	-30.1	60.96	74	-	-13.04	-	313	227	H
			Av			41.36	-	54	-	-12.64	313	227	H
18	**2.76	54.79	Pk	32.3	-30.1	56.99	74	-	-17.01	-	25	325	V
			Av			37.39	-	54	-	-16.61	25	325	V
7	**3.105	64.58	Pk	32.9	-29.3	68.18	74	-	-5.82	-	345	114	H
			Av			48.58	-	54	-	-5.42	345	114	H
19	**3.105	55.86	Pk	32.9	-29.3	59.46	74	-	-14.54	-	58	103	V
			Av			39.86	-	54	-	-14.14	58	103	V
8	**3.45	69.2	Pk	32.7	-28.9	73	74	-	-1	-	64	126	H
			Av			53.4	-	54	-	-0.6	64	126	H
20	**3.45	52.97	Pk	32.7	-28.9	56.77	74	-	-17.23	-	75	327	V
			Av			37.17	-	54	-	-16.83	75	327	V
9	**3.795	55.02	Pk	33.2	-28.5	59.72	74	-	-14.28	-	322	130	H
			Av			40.12	-	54	-	-13.88	322	130	H
21	**3.796	38.88	Pk	33.2	-28.5	43.58	74	-	-30.42	-	123	257	V
			Av			23.98	-	54	-	-30.02	123	257	V
10	**4.14	49.57	Pk	33.4	-28.1	54.87	74	-	-19.13	-	273	119	H
			Av			35.27	-	54	-	-18.73	273	119	H
22	**4.14	41.41	Pk	33.4	-28.1	46.71	74	-	-27.29	-	204	346	V
			Av			27.11	-	54	-	-26.89	204	346	V
11	**4.485	52.52	Pk	33.8	-28.1	58.22	74	-	-15.78	-	148	124	H
			Av			38.62	-	54	-	-15.38	148	124	H
23	**4.485	42.18	Pk	33.8	-28.1	47.88	74	-	-26.12	-	170	290	V
			Av			28.28	-	54	-	-25.72	170	290	V
12	**4.83	49.97	Pk	34.2	-27.2	56.97	74	-	-17.03	-	247	162	H
			Av			37.37	-	54	-	-16.63	247	162	H
24	**4.83	41.96	Pk	34.2	-27.2	48.96	74	-	-25.04	-	114	106	V
			Av			29.36	-	54	-	-24.64	114	106	V

Pk - Peak detector
Av – Average detector

* Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is -19.6dB
(# of long pulses * long pulse width) + (# of short pulses * short pulse width) / 100 or T
Refer to section 7.2 for duty cycle factor calculation (-19.6dB)
Note: Radiated peak result is based on 100% duty cycle sample; average reading = peak reading + DCCF
** Harmonics of fundamental 345MHz

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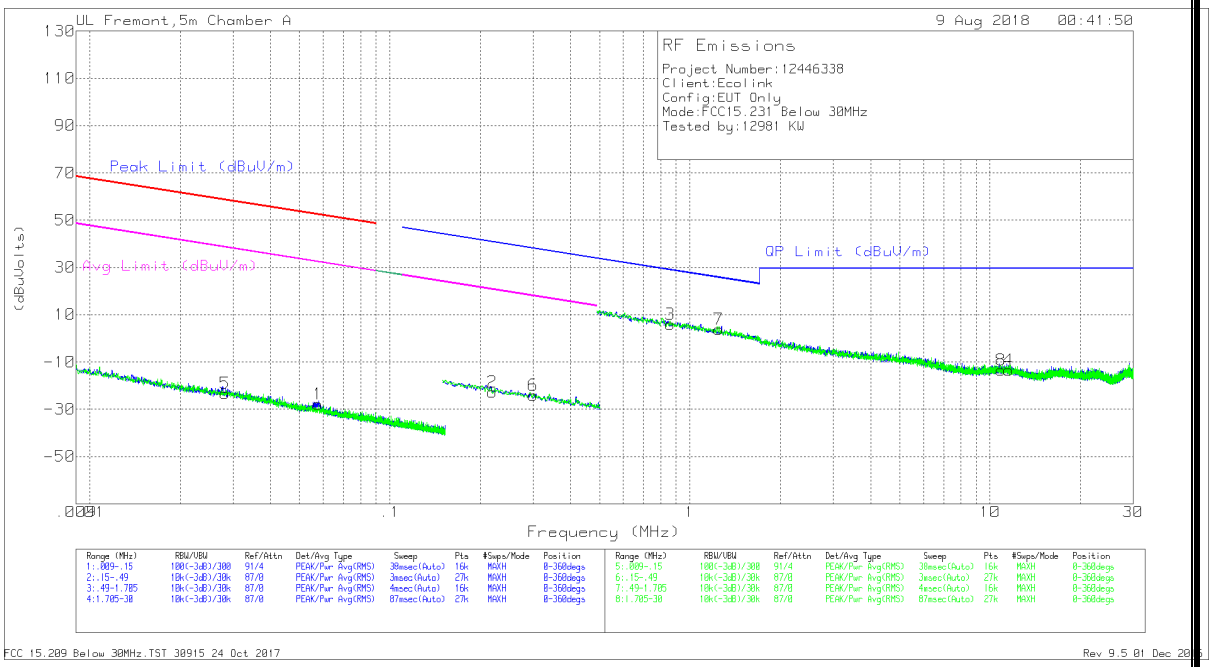
BELOW 30MHz



NOTE: KDB 414788 OATS and Chamber Correlation Justification

- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

BELOW 30MHz RADIATED EMISSIONS

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.02819	41.18	Pk	15.4	.1	-80	-23.32	58.58	-81.9	38.58	-61.9	0-360
1	.05762	37.51	Pk	14.5	.1	-80	-27.89	52.37	-80.26	32.37	-60.26	0-360
2	.21954	43.3	Pk	13.9	.1	-80	-22.7	40.79	-63.49	20.79	-43.49	0-360
6	.30038	42.1	Pk	13.8	.1	-80	-24	38.06	-62.06	18.06	-42.06	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.86016	31.76	Pk	14.1	.1	-40	5.96	28.93	-22.97	0-360
7	1.24711	29.38	Pk	14.3	.2	-40	3.88	25.71	-21.83	0-360
8	10.88443	11.24	Pk	14.7	.5	-40	-13.56	29.5	-43.06	0-360
4	11.53524	11.29	Pk	14.7	.5	-40	-13.51	29.5	-43.01	0-360

Pk - Peak detector