



FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-210 ISSUE 9

CERTIFICATION TEST REPORT

FOR

Water Bottle Filler

MODEL NUMBER: LBWD00WHC & LBWD06WH

FCC ID: 2AC8R-NFC2  
IC: 12430A-NFC2

REPORT NUMBER: 12736784A

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*Prepared for*  
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USA

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## 1. ATTESTATION OF TEST RESULTS

COMPANY NAME: **Elkay MFG CO  
2222 Camden Ct  
Oak Brook, IL 60523-4674  
USA**

EUT DESCRIPTION: Water Bottle Filler

MODEL: **LBWD00WHC & LBWD06WH**

SERIAL NUMBER: non-serialized

DATE TESTED: 2019-03-12 to 2019-05-09

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Complies
ISED RSS-210 Issue 9, Annex B.6	Complies
ISED RSS-GEN Issue 5	Complies

UL LLC 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 LLC 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 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, or any agency of the U.S. Government.

Approved & Released For  
UL LLC By:



Jeff Moser  
Operations Leader  
UL LLC

Prepared By:



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UL LLC

## 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 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0.

## 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

#### Sample Calculations

Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)

Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)

Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

Frequency Error PPM = ((Freq@NOM-Freq<sub>MEAS</sub>)/13.56)\*1,000,000

@NOM=Frequency Measured and Nominal Temp and/or Voltage

MEAS=Frequency Measured at specific Temp and/or Voltage

### 4.3. MEASUREMENT UNCERTAINTY

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

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a wall mounted drinking water fountain incorporating 13.56MHz near field transmitter. The water fountain comes in two different configurations. 1 – the filter with the NFC radio is built into the fountain, and 2 – the filter with NFC radio is connected remotely. Both configurations were tested.

### 5.2. MAXIMUM ELECTRIC FIELD STRENGTH

The transmitter has a maximum peak radiated field strength as follows:

Frequency Range (MHz)	Configuration #	Peak Field Strength dBuV/m	Measurement Distance meters
13.56	1	15.82	30.00
13.56	2	45.60	30.00

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an loop antenna as part of the PCB.

### 5.4. SOFTWARE AND FIRMWARE

The device uses a chipset where there is no control over firmware or software related to the radio.

### 5.5. WORST-CASE CONFIGURATION AND MODE

Configuration 1 - The radio with antenna is mounted inside the fountain in specific orientation.  
Configuration 2 – The radio with antenna is mounted parallel to the filter in portrait orientation.  
\*for both configurations only single antenna orientation is possible. Testing with tag in place is considered worst case.

### 5.6. MODIFICATIONS

No modifications were made during testing.

### 5.7. MODEL DIFFERENCES

Model Tested	Representative Models	Model Difference Description
LBWD00WHC	LBWD00WHC	ezH2O Liv Aspen **White w/enclosed Filter [-NFC radio]
	LBWD00BKC	ezH2O Liv **Midnight w/enclosed Filter [-NFC radio]
LBWD06WH	LBWD06WH	ezH2O Liv **Aspen White w/non-enclosed Filter [-NFC radio]
	LBWD06B	ezH2O Liv **Midnight w/non-enclosed Filter [-NFC radio]
	*LBWD06WHK	Top level model that includes LBWD06WH and ERS11Y Chiller
	*LBWD06BKK	Top level model that includes LBWD06B and ERS11Y Chiller

\* Chiller is remotely installed and will not effect the radio.

\*\* The only difference between models is the color of the EUT.

## 5.8. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
none	-	-	-	-

### I/O CABLES

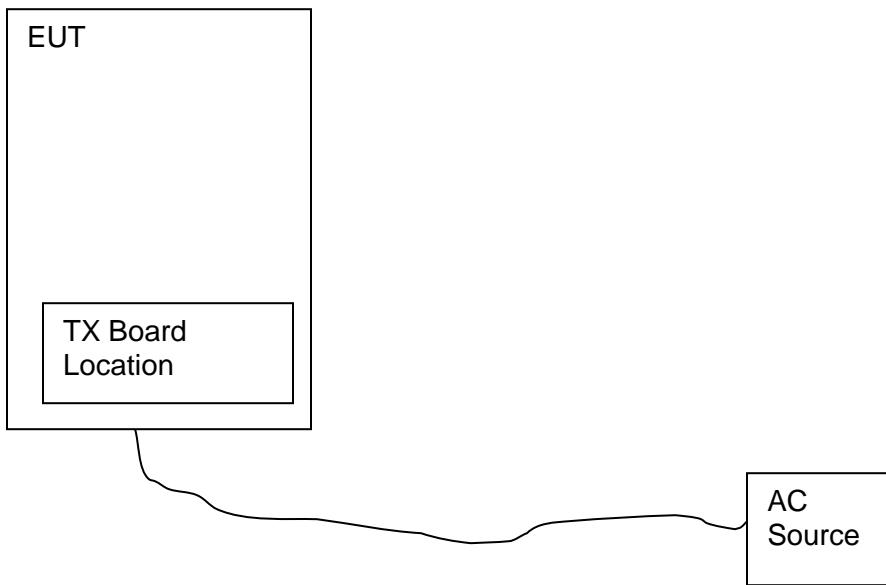
Only in Configuration 2

DC Power and Data cable connected between the main EUT controller and the TX board.

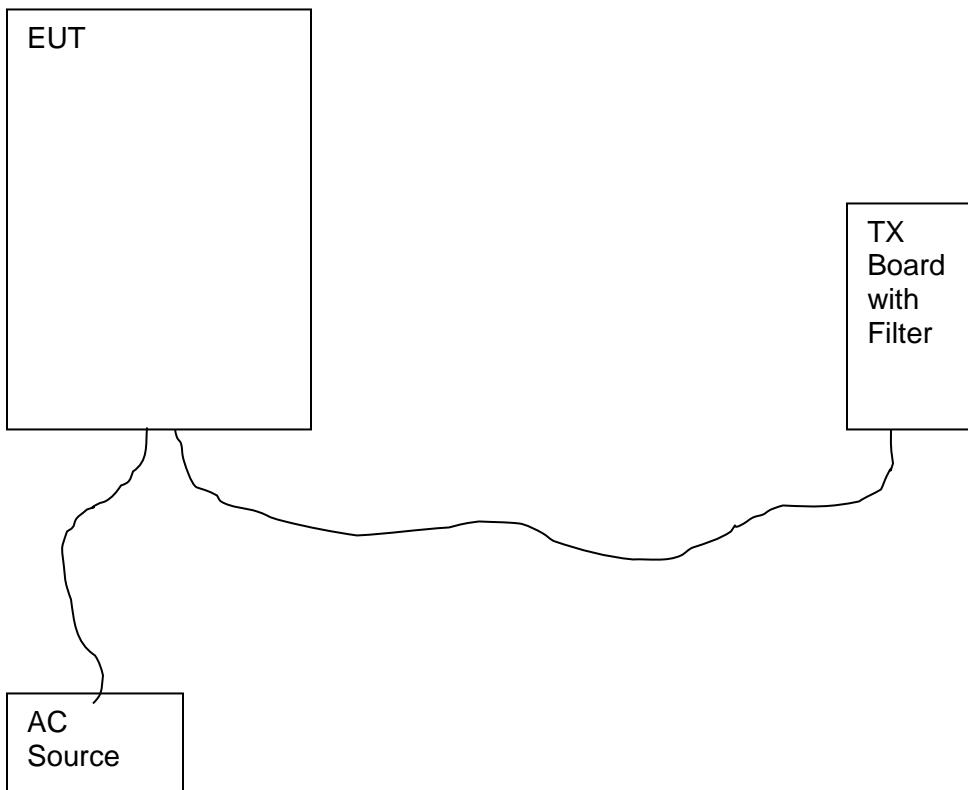
### TEST SETUP

The EUT was placed on 80cm table.

**CONFIGURATION 1 SETUP DIAGRAM**



**CONFIGURATION 2 SETUP DIAGRAM**



## 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	Asset Number	Cal Date	Cal Due
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Conducted Software	UL	UL EMC	Ver 9.5, May 17 2012		
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	2018-12-26	2019-12-31
Bicon Antenna	Chase	VBA6106A	EMC4078	2018-03-28	2019-03-31
Log-P Antenna	Chase	UPA6109	EMC4313	2018-04-09	2019-04-30
Loop Antenna	EMCO	6502/1	EMC4026	2019-01-07	2020-01-31
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	2018-12-26	2019-12-31
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
High-Pass Filter	Solar Electronics	2803-150	EMC4327	N/A	N/A
Attenuator	HP	8494B	2831A00838	N/A	N/A
LISN - L1	Solar Electronics	8602-50-TS-50-N	EMC4066	2018-12-19	2019-12-31
LISN - L2	Solar Electronics	8602-50-TS-50-N	EMC4064	2018-12-19	2019-12-31
Signal Analyzer	Agilent	N9030A PXA	EMC4360	2018-12-11	2019-12-31
Environmental Chamber	Espec	BTX-475	EMC4378	*2019-04-15	2020-04-30

\* The environmental chamber was calibrated after the testing took place. The environmental chamber was found in specification by the calibration provider at time of calibration. Testing results collected prior to calibration date are considered valid.

## 7. 20 dB AND 99% BW

### LIMITS

For reference only

### TEST PROCEDURE

ANSI C63.10

The transmitter output is connected to the spectrum analyzer.

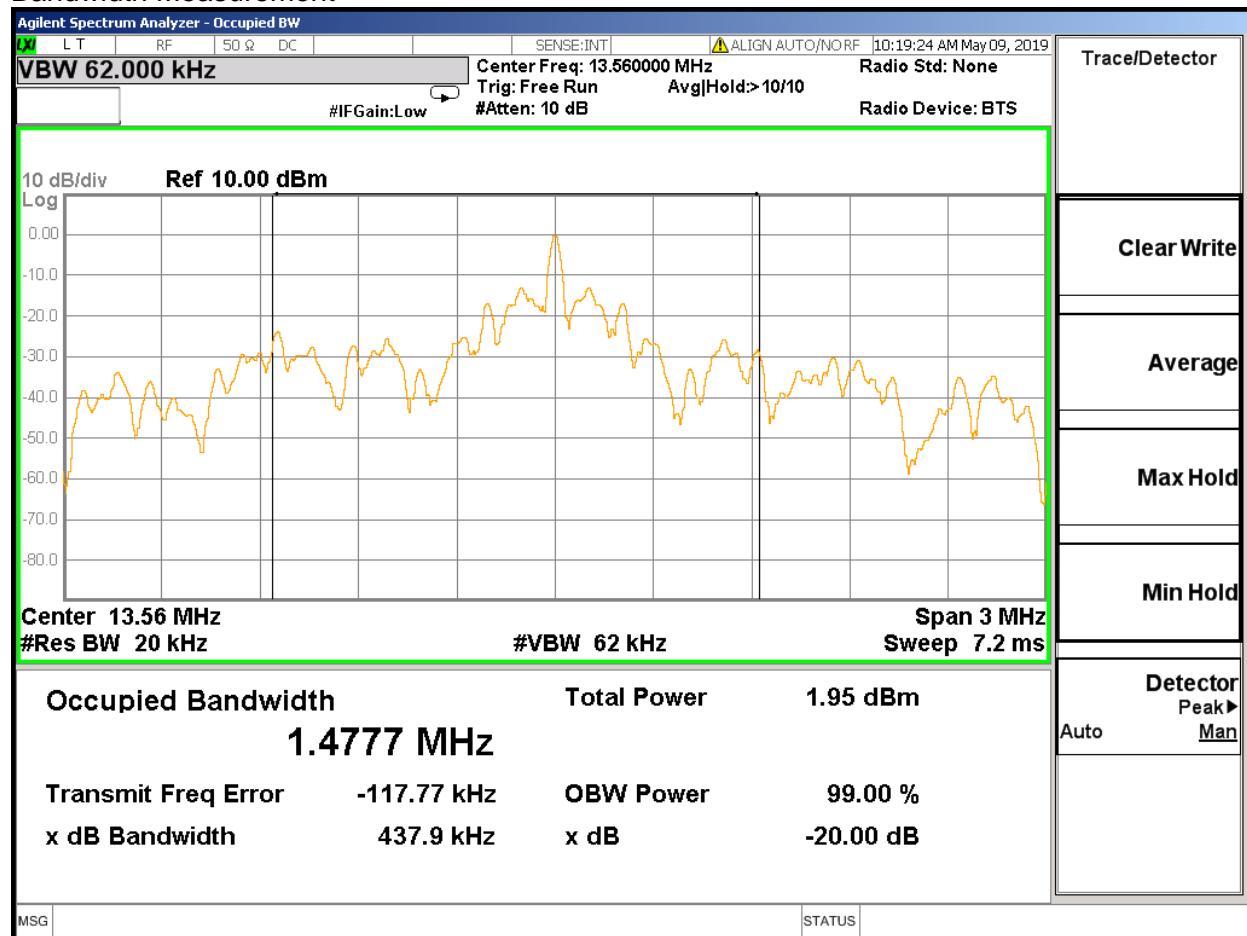
The RBW is set to 1% to 5% of the 99 % bandwidth. The VBW is set to >3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

### RESULTS

20dB Bandwidth

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
13.56	437.9	1477.7

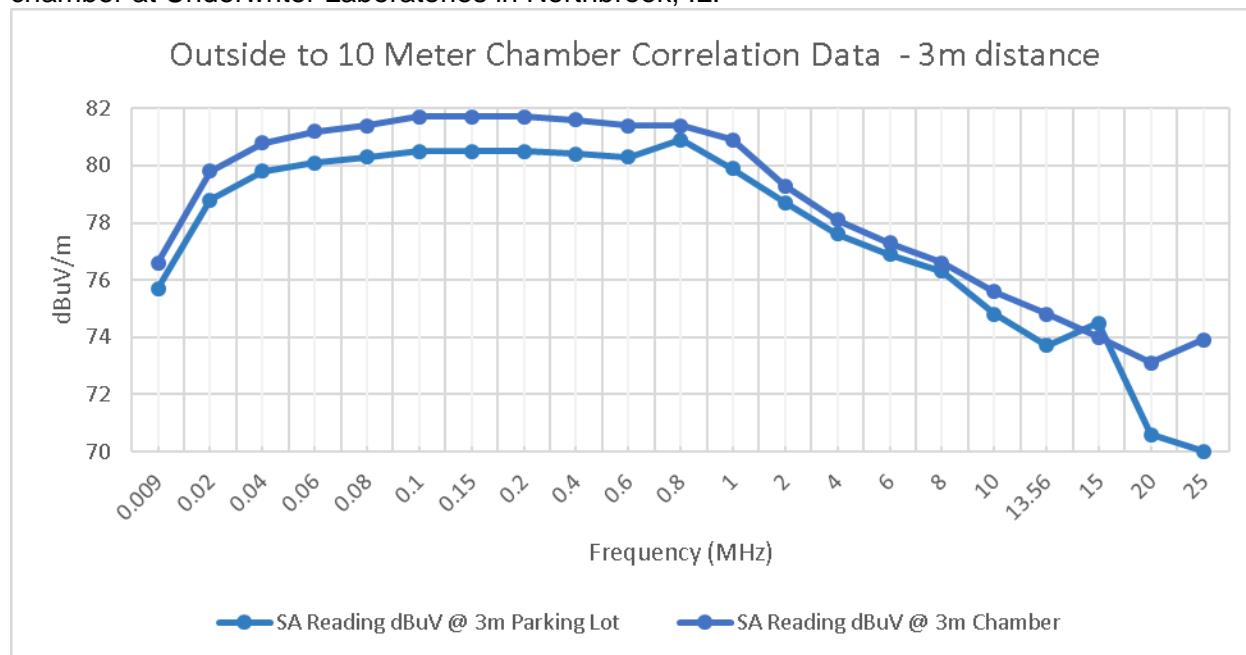
## Bandwidth Measurement



## 8. RADIATED EMISSION TEST RESULTS

### 8.1. Outdoor to 10m SAC Correlation Data

Correlation Data for measurements 9kHz-30MHz between Outside and 10m semi-anechoic chamber at Underwriter Laboratories in Northbrook, IL.



Correlation measurements were conducted using a signal source with an antenna outside in open area (parking lot). Immediately following the measurements the same setup was moved inside the 10 meter semi-anechoic chamber and the measurements were repeated. The above plot shows the difference in levels measured between outside and the 10 meter semi anechoic chamber.

## 8.2. LIMITS AND PROCEDURE

### LIMIT

§15.225  
IC RSS-210, Annex B.6 (Transmitter)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) 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.

(c) 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.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§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:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits ( $\mu$ V/m)	Measurement Distance (m)
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. §§ 15.231 and 15.241.

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

Formula for converting the field strength from uV/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (uV/m)

Masurements between 9kHz-30MHz were conducted at 3m measurement distance and 30MHz-1GHz at 10m distance. The emissions levels were extrapolated to the limit distance using the following factor:

9kHz - 490kHz:  $40 * \log(3/300)$   
490kHz – 30MHz:  $40 * \log(3/30)$   
30MHz-1GHz:  $20 * \log(10/3)$

In addition:

§15.225 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.225 (e) 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

### **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

The spectrum from 0.009 to 1000MHz is investigated with the transmitter set to transmit at 13.56 MHz.

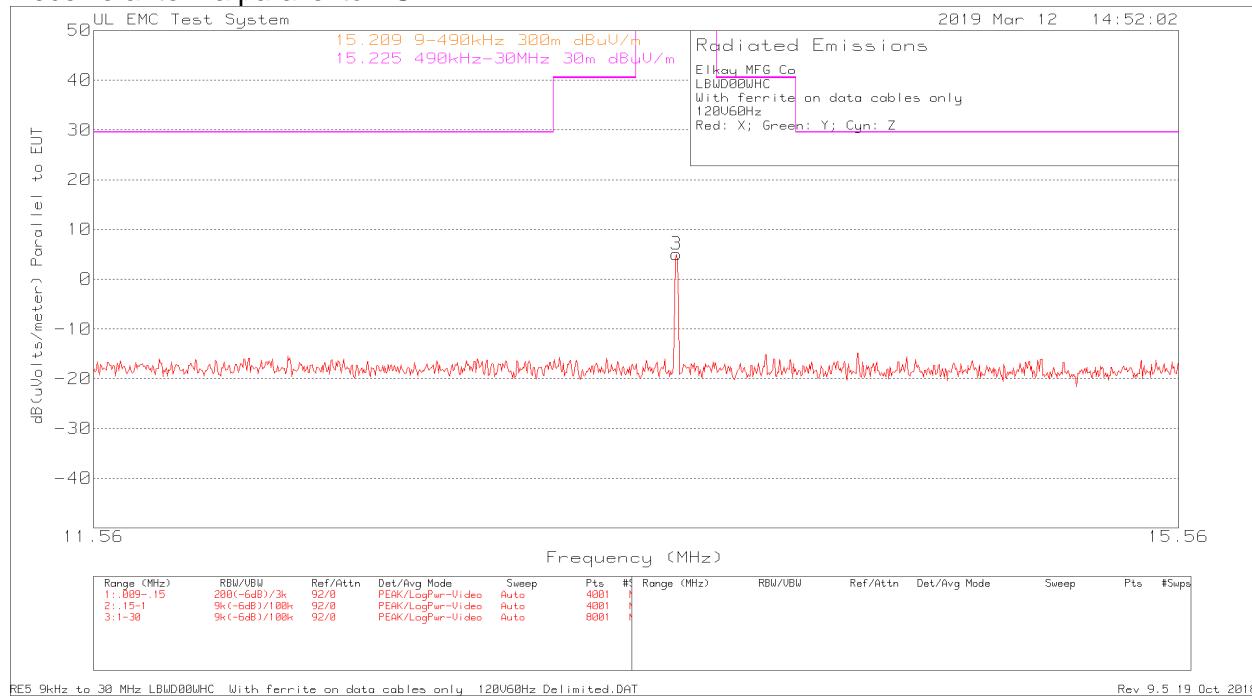
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission, above 30 MHz. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

### **RESULTS**

## 8.2.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) – Configuration 1

In band Data

Receive antenna parallel to EUT



Receive Antenna Perpendicular to EUT



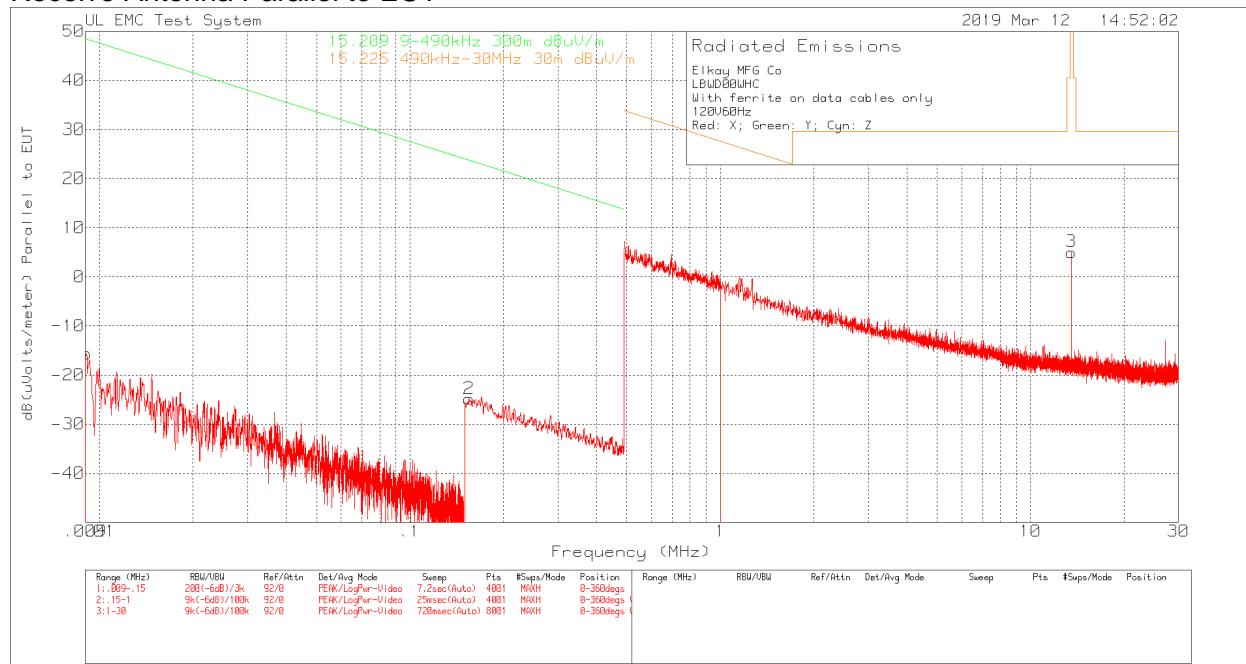
### Receive Antenna Parallel to Ground



Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor	3mPath Red Cable dB	Distance Factor	Level	15.209 9-490kHz	15.225 490kHz-30MHz	Margin (dB)	Azimuth [Degs]
RX Antenna Parallel to EUT											
3	13.56063	33.12	Pk	11.5	0.4	-40	5.02	-	-	84	-78.98 0-360
RX Antenna Perpendicular to EUT											
7	13.56063	43.92	Pk	11.5	0.4	-40	15.82	-	-	84	-68.18 0-360
RX Antennan Parallel to Ground											
11	13.56063	30.53	Pk	11.5	0.4	-40	2.43	-	-	84	-81.57 0-360
Pk - Peak detector											

## 9kHz-30MHz Data for Configuration 1

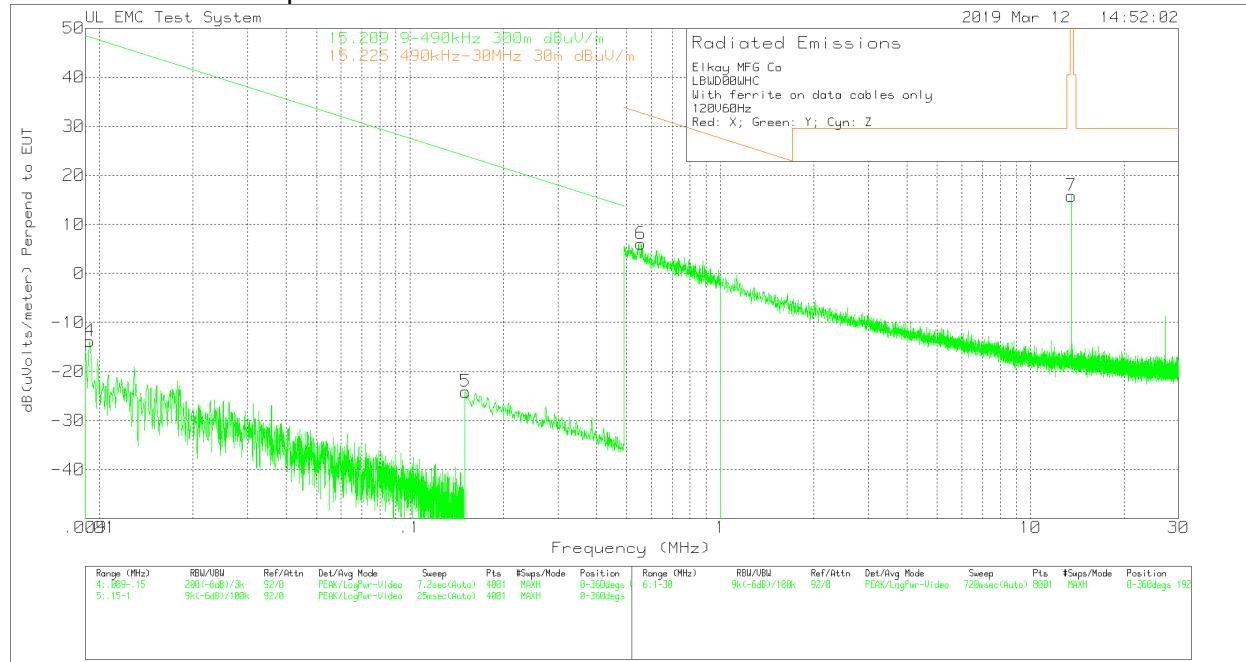
### Receive Antenna Parallel to EUT



RE 9kHz-30MHz 3m E-Field Loop 3 axis with CorrectDistances FCC 15.225 ESCI.TST

Rev 9.5 11 Jan 2019

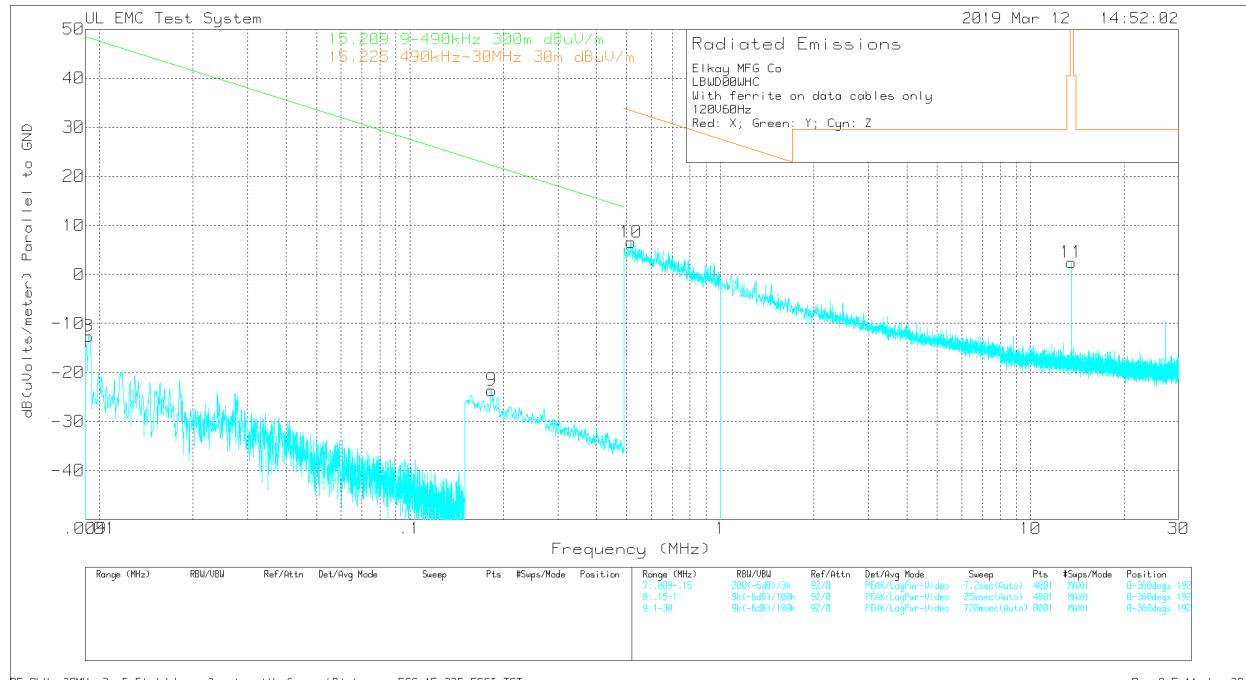
### Receive Antenna Perpendicular to EUT



RE 9kHz-30MHz 3m E-Field Loop 3 axis with CorrectDistances FCC 15.225 ESCI.TST

Rev 9.5 11 Jan 2019

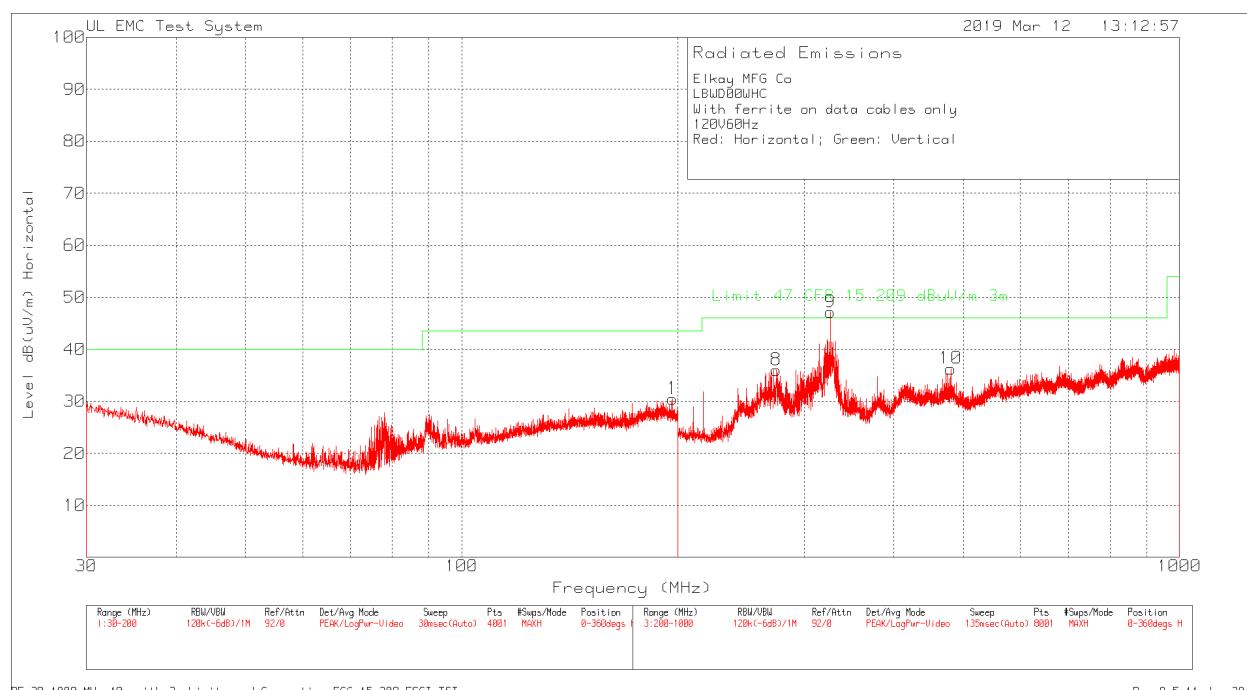
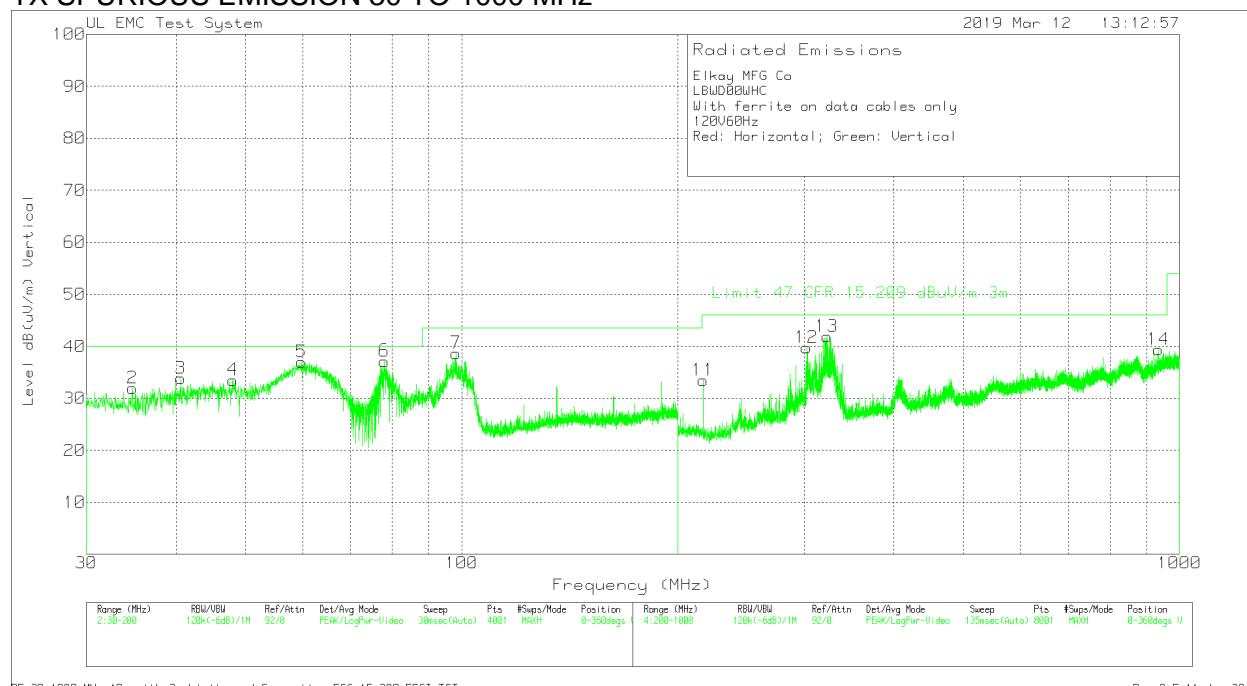
### Receive Antenna Parallel to Ground



Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Meter Detector	Antenna Factor	3mPath Red Cable dB	Distance Factor	Level dB	15.209 9-490kHz 300m dBuV/m	Margin (dB)	15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
<b>RX Antenna Parallel to EUT</b>												
1	0.00907	40.7	Pk	23.7	0	-80	-15.6	48.44	-64.04	-	-	0-360
2	0.15511	43.05	Pk	12.1	0	-80	-24.85	23.79	-48.64	-	-	0-360
3	13.56063	33.12	Pk	11.5	0.4	-40	5.02	-	-	84	-78.98	0-360
<b>RX Antenna Perpendicular to EUT</b>												
4	0.00928	42.55	Pk	23.7	0	-80	-13.75	48.24	-61.99	-	-	0-360
5	0.15085	43.78	Pk	12.1	0	-80	-24.12	24.03	-48.15	-	-	0-360
6	0.55619	33.96	Pk	12	0.1	-40	6.06	-	-	32.7	-26.64	0-360
7	13.56063	43.92	Pk	11.5	0.4	-40	15.82	-	-	84	-68.18	0-360
<b>RX Antennan Parallel to Ground</b>												
8	0.00923	43.66	Pk	23.7	0	-80	-12.64	48.29	-60.93	-	-	0-360
9	0.18302	44.29	Pk	12	0.1	-80	-23.61	22.35	-45.96	-	-	0-360
10	0.51551	34.45	Pk	12	0.1	-40	6.55	-	-	33.36	-26.81	0-360
11	13.56063	30.53	Pk	11.5	0.4	-40	2.43	-	-	84	-81.57	0-360
Pk - Peak detector												

### 8.2.1. SPURIOUS EMISSIONS (30MHz – 1GHz) – Configuration 1

#### TX SPURIOUS EMISSION 30 TO 1000 MHz

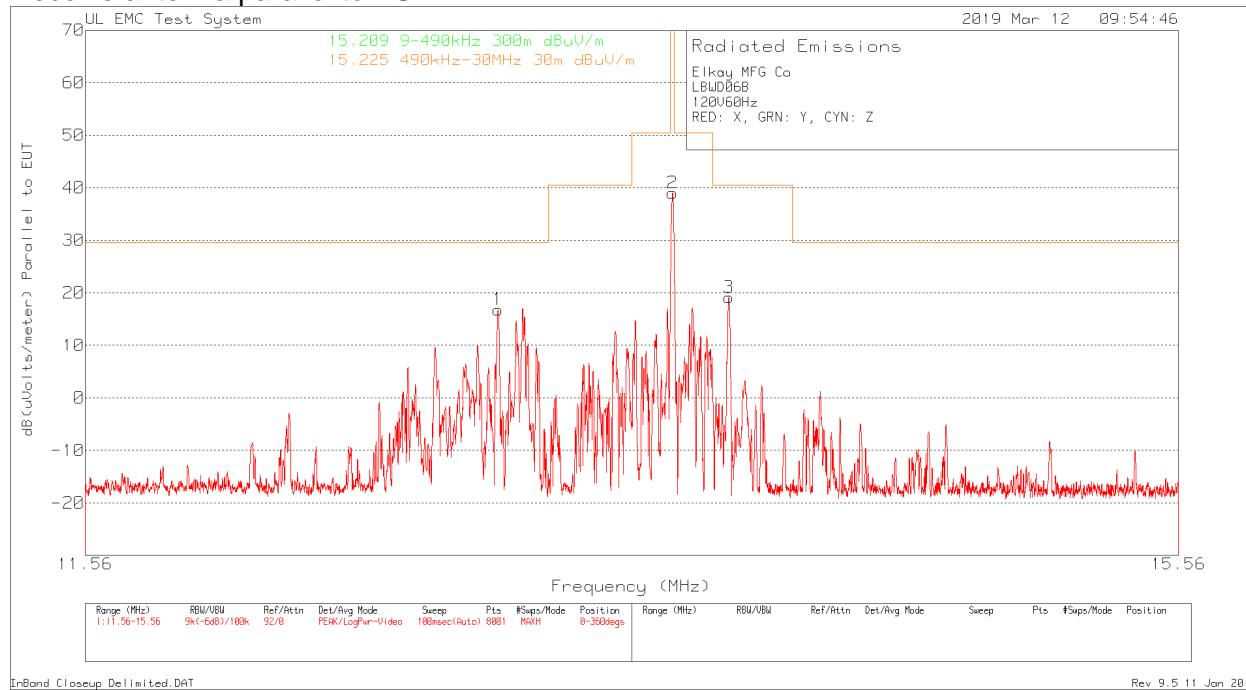


Elkay MFG Co												
LBWD00WHC												
With ferrite on data cables only												
120V60Hz												
Red: Horizontal; Green: Vertical												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR 15.209 dBuV/m 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	196.6425	32.6	Pk	16.2	-28.8	10.5	30.5	43.52	-13.02	0-360	248	H
2	34.76	35.19	Pk	16.3	-30	10.5	31.99	40	-8.01	0-360	101	V
3	40.5825	39.44	Pk	14	-30.1	10.5	33.84	40	-6.16	0-360	101	V
4	48.02	42.23	Pk	10.9	-30.1	10.5	33.53	40	-6.47	0-360	101	V
5	59.835	49.67	Pk	6.8	-30	10.5	36.97	40	-3.03	0-360	252	V
6	77.9825	49.96	Pk	6.7	-30	10.5	37.16	40	-2.84	0-360	252	V
7	98.1275	47.66	Pk	10.4	-29.9	10.5	38.66	43.52	-4.86	0-360	101	V
8	274.2	41.64	Pk	12.8	-28.9	10.5	36.04	46.02	-9.98	0-360	199	H
9	326.1	51.23	Pk	13.9	-28.5	10.5	47.13	46.02	1.11	0-360	199	H
10	480	36	Pk	17.5	-27.7	10.5	36.3	46.02	-9.72	0-360	99	H
11	216.9	41.2	Pk	11.1	-29.3	10.5	33.5	46.02	-12.52	0-360	99	V
12	302.3	44.74	Pk	13.2	-28.7	10.5	39.74	46.02	-6.28	0-360	99	V
13	322.6	46.07	Pk	13.9	-28.6	10.5	41.87	46.02	-4.15	0-360	399	V
14	934.8	32.68	Pk	23.5	-27.3	10.5	39.38	46.02	-6.64	0-360	399	V
Radiated Emission Data												
Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR 15.209 dBuV/m 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	
61.49625	41.24	Qp	6.7	-30	10.5	28.44	40	-11.56	326	233	V	
79.655	41.7	Qp	6.9	-30	10.5	29.1	40	-10.9	322	161	V	
96.91	43.08	Qp	10.2	-29.9	10.5	33.88	43.52	-9.64	0	106	V	
322.5	40.74	Qp	13.9	-28.6	10.5	36.54	46.02	-9.48	180	179	H	
325.915	41.97	Qp	13.9	-28.5	10.5	37.87	46.02	-8.15	221	145	H	
323.44563	41.7	Qp	13.9	-28.6	10.5	37.5	46.02	-8.52	283	349	V	
Pk - Peak detector												
Qp - Quasi-Peak detector												

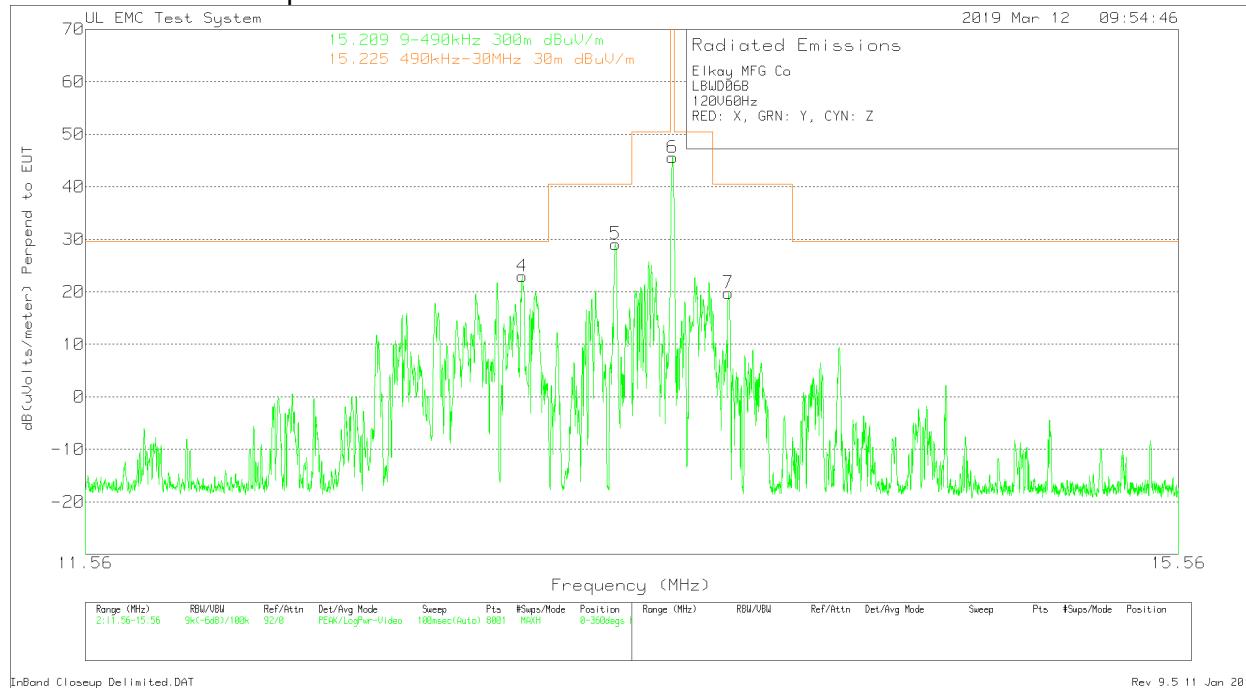
## 8.2.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) – Configuration 2

In band Data

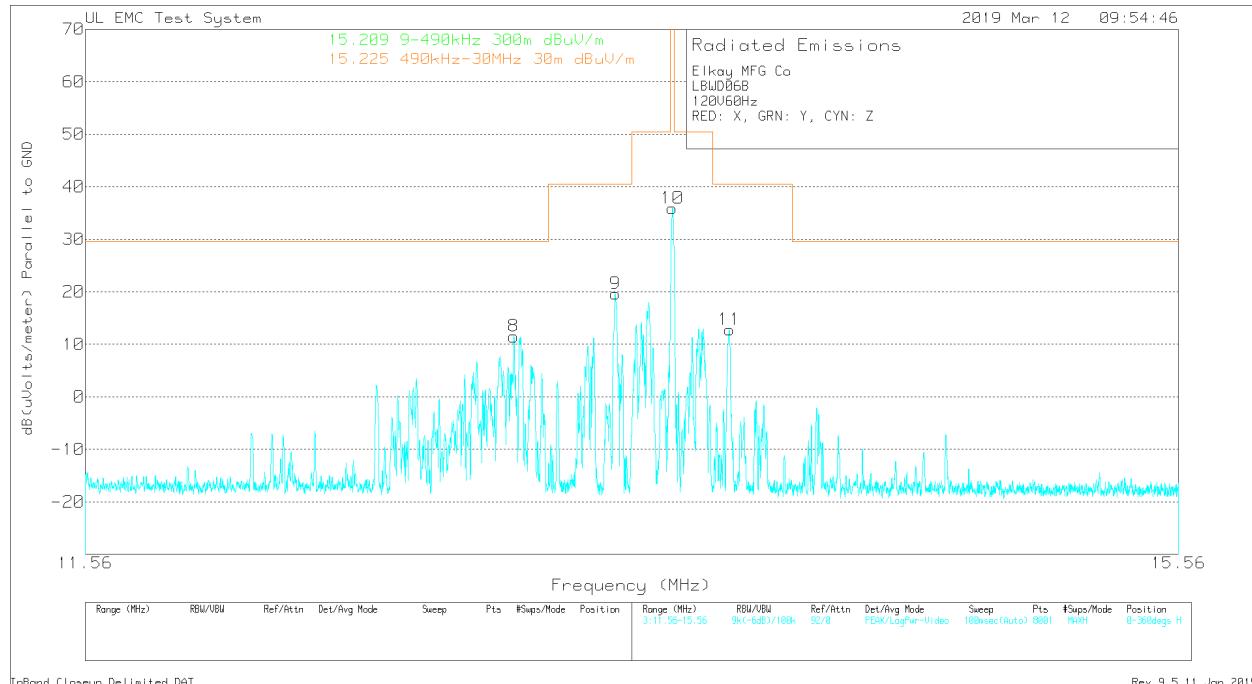
Receive antenna parallel to EUT



Receive Antenna Perpendicular to EUT

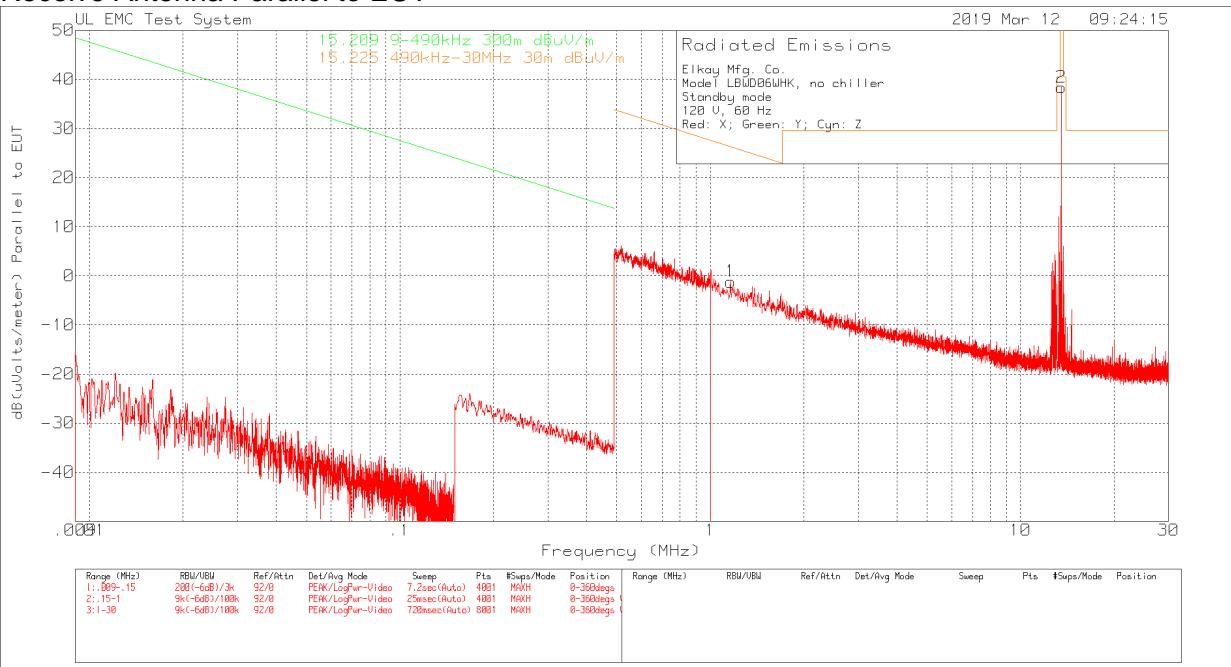


### Receive Antenna Parallel to Ground



Elkay MFG Co												
LBWD06B												
120V60Hz												
RED: X, GRN: Y, CYN: Z												
Trace Markers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	3mPath Red Cable dB	Distance Factor dB	Level dBuV/m	15.209 9-490kHz 300m dBuV/m	Margin (dB)	15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
RX Antenna Parallel to EUT												
1	12.932	44.8	Pk	11.6	0.4	-40	16.8	-	-	29.54	-12.74	0-360
2	13.5605	67.11	Pk	11.5	0.4	-40	39.01	-	-	84	-44.99	0-360
3	13.769	47.25	Pk	11.5	0.4	-40	19.15	-	-	40.51	-21.36	0-360
RX Antenna Perpendicular to EUT												
4	13.0175	50.99	Pk	11.6	0.4	-40	22.99	-	-	29.54	-6.55	0-360
5	13.351	57.11	Pk	11.6	0.4	-40	29.11	-	-	40.51	-11.4	0-360
6	13.5605	73.7	Pk	11.5	0.4	-40	45.6	-	-	84	-38.4	0-360
7	13.7675	47.88	Pk	11.5	0.4	-40	19.78	-	-	40.51	-20.73	0-360
RX Antennas Parallel to Ground												
8	12.9885	39.49	Pk	11.6	0.4	-40	11.49	-	-	29.54	-18.05	0-360
9	13.351	47.58	Pk	11.6	0.4	-40	19.58	-	-	40.51	-20.93	0-360
10	13.56025	64.02	Pk	11.5	0.4	-40	35.92	-	-	84	-48.08	0-360
11	13.7715	40.86	Pk	11.5	0.4	-40	12.76	-	-	40.51	-27.75	0-360
Pk - Peak detector												
Trace Markers												

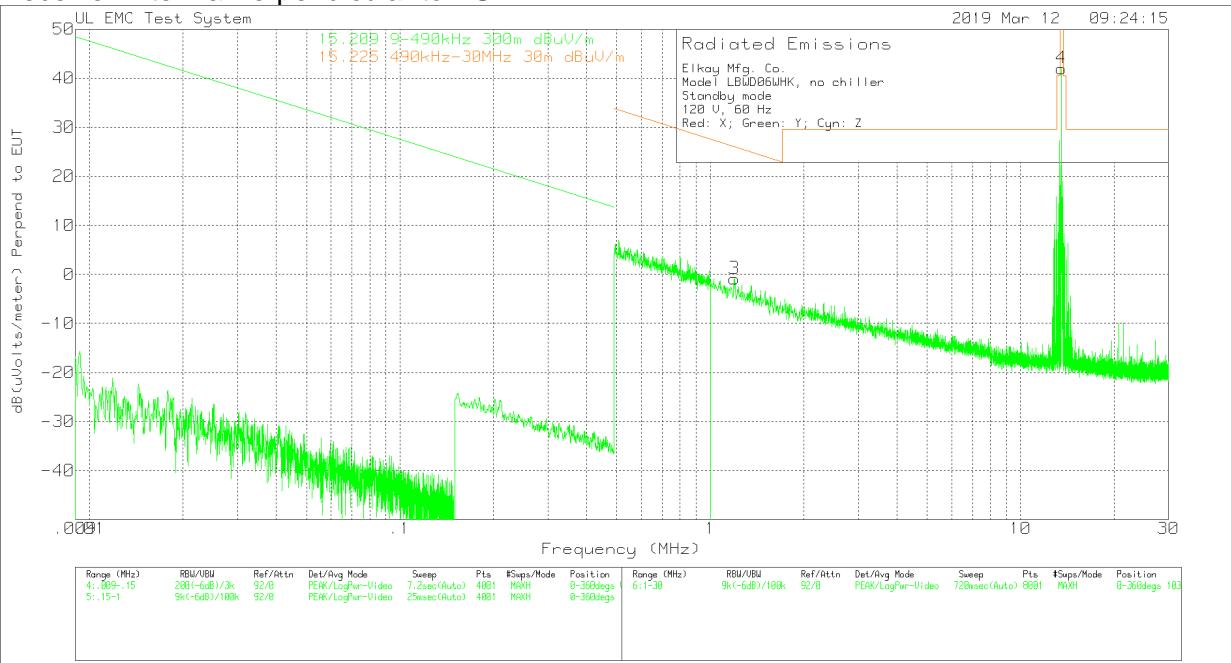
**9kHz-30MHz Data**  
**Receive Antenna Parallel to EUT**



RE 9kHz-30MHz 3m E-Field Loop 3 axis with CorrectDistances FCC 15.225 ESC1.TST

Rev. 9.5.11 Jan. 2019

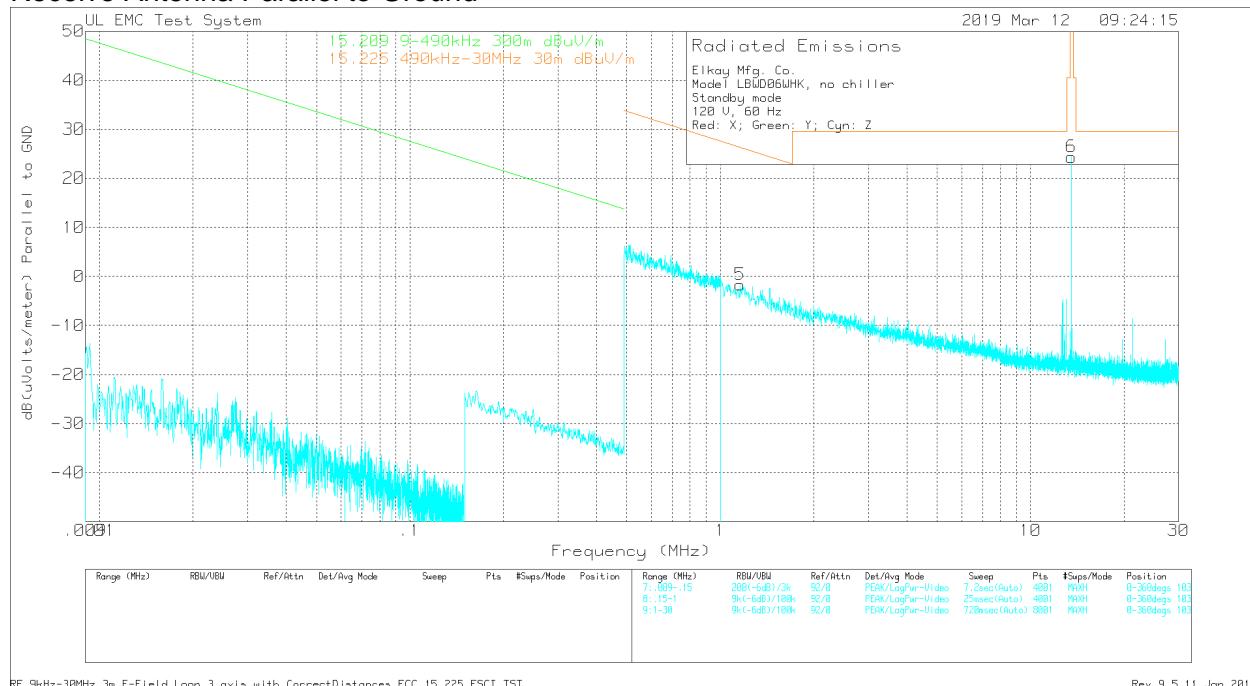
**Receive Antenna Perpendicular to EUT**



RE 9kHz-30MHz 3m E-Field Loop 3 axis with CorrectDistances FCC 15.225 ESC1.TST

Rev. 9.5.11 Jan. 2019

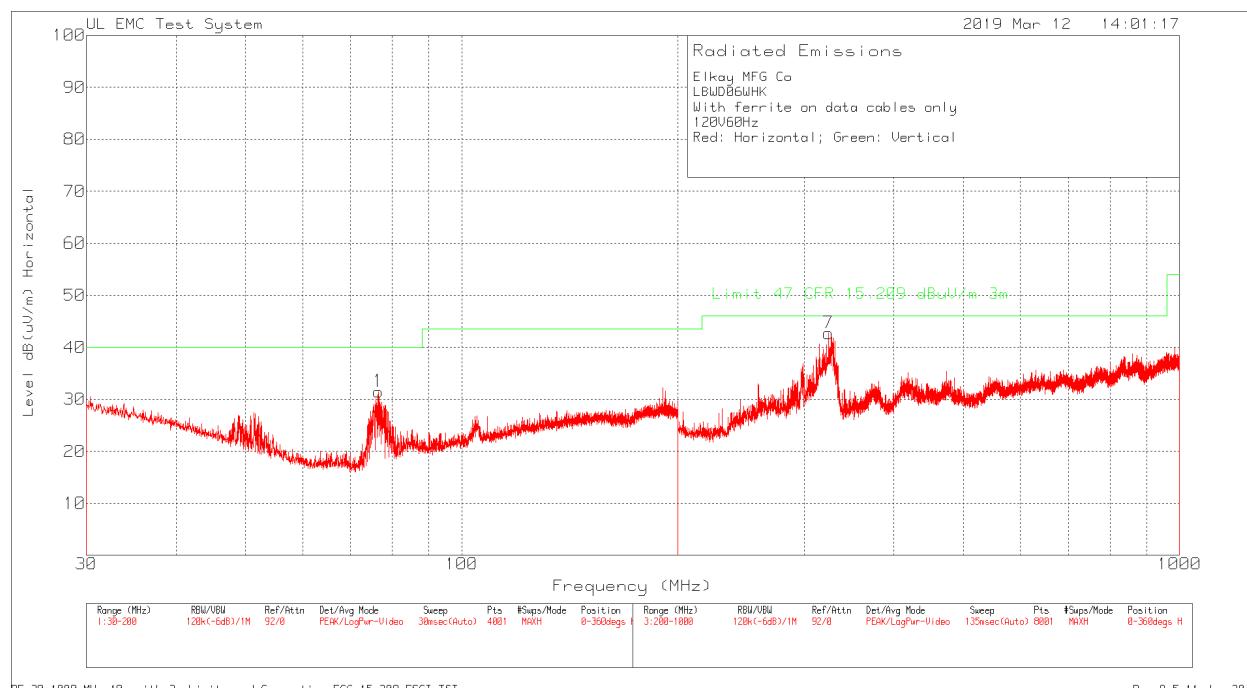
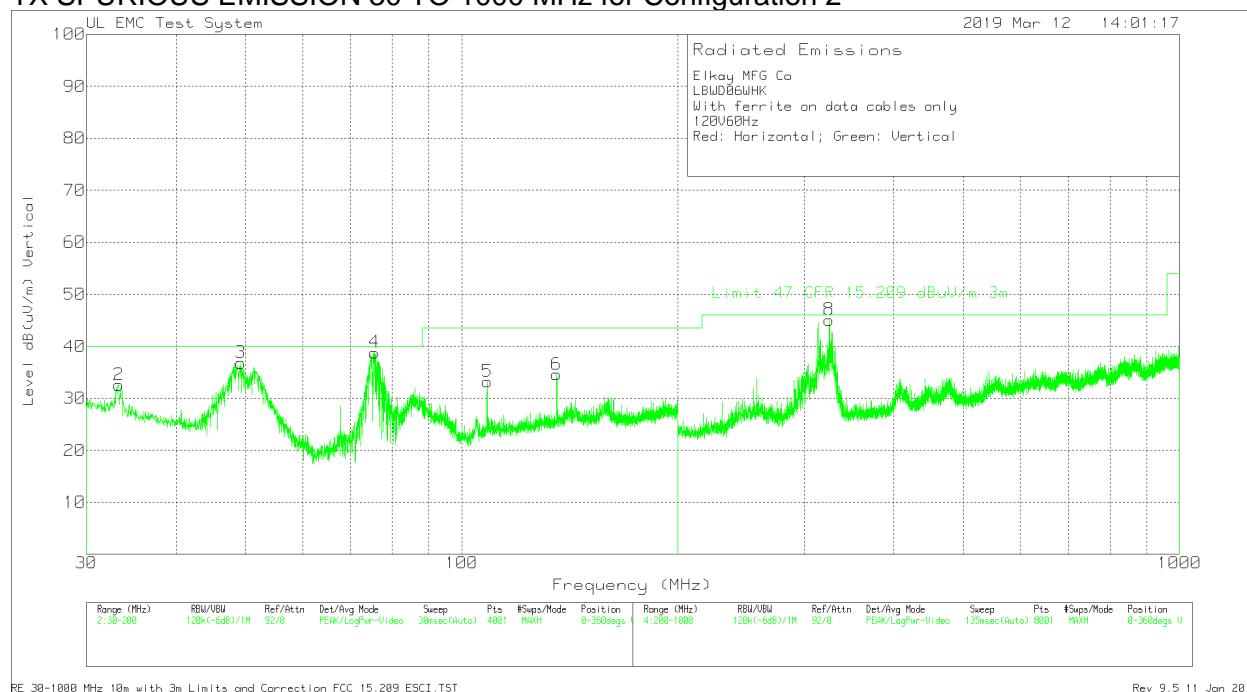
### Receive Antenna Parallel to Ground



Elkay Mfg. Co.												
Model LBWD06WHK, no chiller												
Standby mode												
120 V, 60 Hz												
Red: X; Green: Y; Cyn: Z												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	3mPath Red Cable dB	Distance Factor dB	Level	15.209 9-490kHz 300m dBuV/m	Margin (dB)	15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
RX Antenna Parallel to EUT												
1	1.16313	26.38	Pk	12.3	0.1	-40	-1.22	-	-	26.28	-27.5	0-360
2	13.56063	66.42	Pk	11.5	0.4	-40	38.32	-	-	84	-45.68	0-360
RX Antenna Perpendicular to EUT												
3	1.19575	26.74	Pk	12.3	0.1	-40	-0.86	-	-	26.04	-26.9	0-360
4	13.56063	70.13	Pk	11.5	0.4	-40	42.03	-	-	84	-41.97	0-360
RX Antennan Parallel to Ground												
5	1.1595	25.92	Pk	12.3	0.1	-40	-1.68	-	-	26.31	-27.99	0-360
6	13.56063	52.44	Pk	11.5	0.4	-40	24.34	-	-	84	-59.66	0-360
Pk - Peak detector												

### 8.2.3. SPURIOUS EMISSIONS (30MHz – 1GHz) – Configuration 2

#### TX SPURIOUS EMISSION 30 TO 1000 MHz for Configuration 2



Elkay MFG Co												
LBWD06WHK												
With ferrite on data cables only												
120V60Hz												
Red: Horizontal; Green: Vertical												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR 15.209 dBuV/m 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	76.5375	44.51	Pk	6.5	-30	10.5	31.51	40	-8.49	0-360	248	H
2	33.315	35.25	Pk	16.9	-30.1	10.5	32.55	40	-7.45	0-360	101	V
3	49.2525	46.01	Pk	10.4	-30.1	10.5	36.81	40	-3.19	0-360	101	V
4	75.645	51.91	Pk	6.4	-30	10.5	38.81	40	-1.19	0-360	398	V
5	108.4975	40.73	Pk	11.9	-29.9	10.5	33.23	43.52	-10.29	0-360	101	V
6	135.6125	39.38	Pk	14.4	-29.7	10.5	34.58	43.52	-8.94	0-360	101	V
7	324.3	46.92	Pk	13.9	-28.6	10.5	42.72	46.02	-3.3	0-360	99	H
8	325.1	49.19	Pk	13.9	-28.5	10.5	45.09	46.02	-0.93	0-360	99	V
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	Level dBuV/m	Limit 47 CFR 15.209 dBuV/m 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	48.7163	37.63	Qp	10.6	-30.1	10.5	28.63	40	-11.37	50	111	V
	74.8775	44.68	Qp	6.3	-30	10.5	31.48	40	-8.52	309	192	V
	326.21875	43.23	Qp	13.9	-28.5	10.5	39.13	46.02	-6.89	299	165	H
	324.09125	45.01	Qp	13.9	-28.6	10.5	40.81	46.02	-5.21	320	100	V
Pk - Peak detector												
Qp - Quasi-Peak detector												

## 9. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207  
IC RSS-GEN, Section 8.8

(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 $\mu$ 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. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Notes:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### TEST PROCEDURE

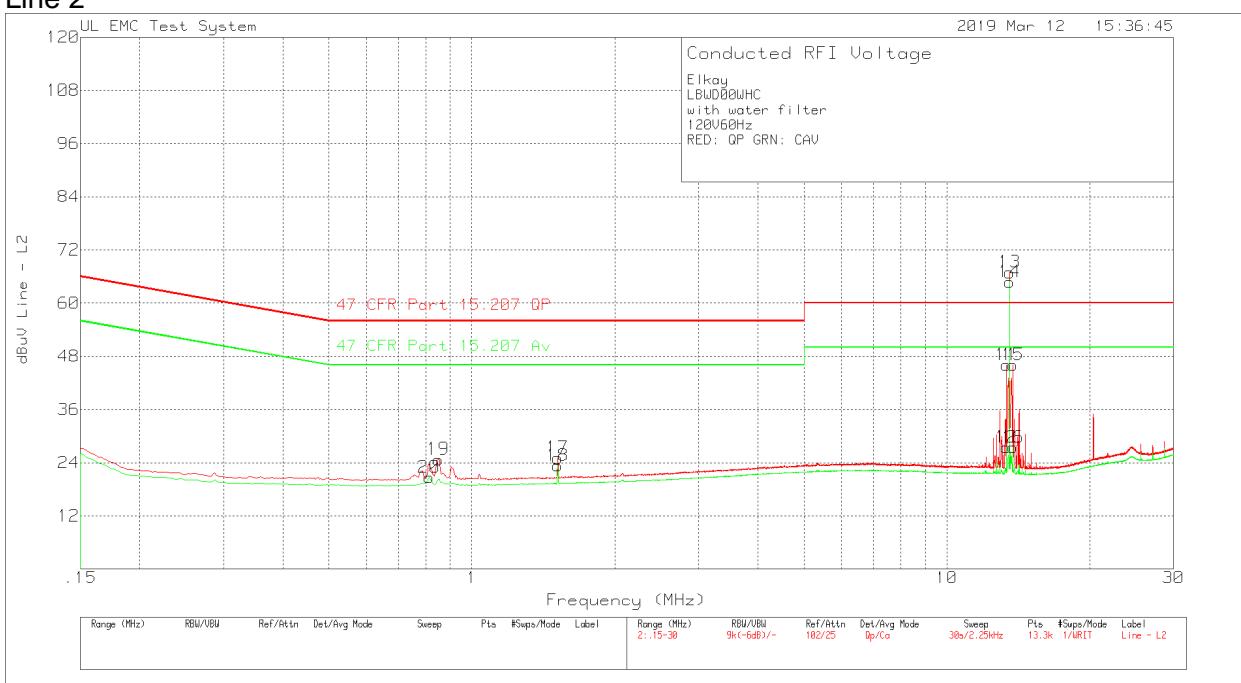
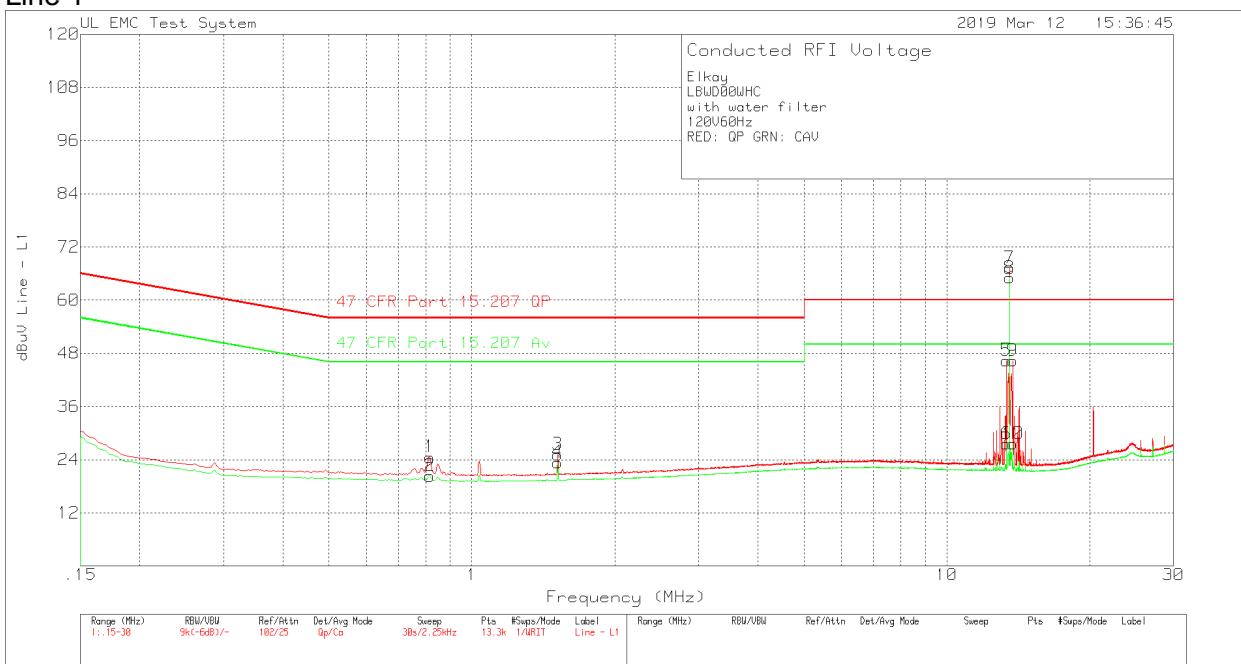
ANSI C63.10  
FCC KDB174176 DO1

### RESULTS

No non-compliance noted:

### AC Line Conducted Emissions with normal antenna - Configuration 1

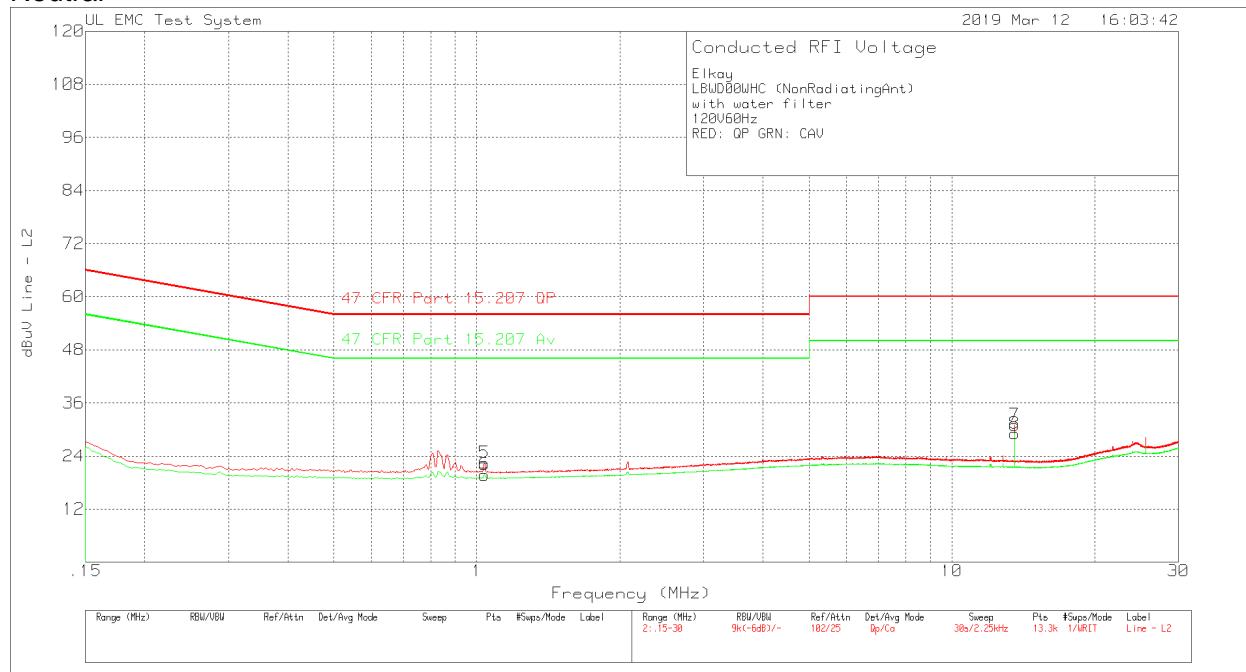
#### Line 1



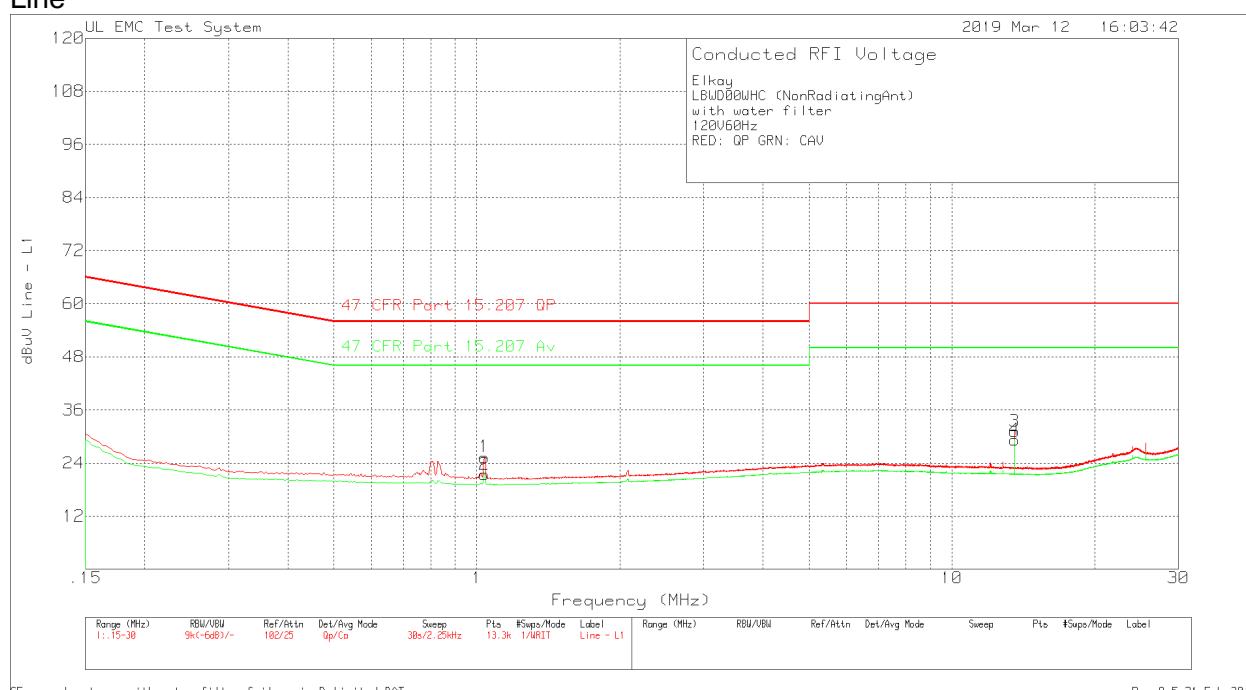
Trace MArkers											
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Doungle Factor dB	Corrected Reading dBuV	47 CFR Part 15.207 QP dBuV	Margin (dB)	47 CFR Part 15.207 Av dBuV	Margin (dB)
Line 1											
1	0.816	14.09	Qp	0	10.5	0	24.59	56	-31.41	-	-
2	0.816	9.82	Ca	0	10.5	0	20.32	-	-	46	-25.68
3	1.51575	14.67	Qp	0	10.5	0	25.17	56	-30.83	-	-
4	1.51575	12.9	Ca	0	10.5	0	23.4	-	-	46	-22.6
5	13.35075	34.88	Qp	0	11.1	0.4	46.38	60	-13.62	-	-
6	13.35075	16.13	Ca	0	11.1	0.4	27.63	-	-	50	-22.37
7	13.56	55.71	Qp	0	11.1	0.4	67.21	60	7.21	-	-
8	13.56	53.53	Ca	0	11.1	0.4	65.03	-	-	50	15.03
9	13.76925	34.81	Qp	0	11.1	0.4	46.31	60	-13.69	-	-
10	13.76925	16.08	Ca	0	11.1	0.4	27.58	-	-	50	-22.42
Line 2											
11	13.35075	34.57	Qp	0.1	11.1	0.3	46.07	60	-13.93	-	-
12	13.35075	15.93	Ca	0.1	11.1	0.3	27.43	-	-	50	-22.57
13	13.56	55.43	Qp	0.1	11.1	0.3	66.93	60	6.93	-	-
14	13.56	53.29	Ca	0.1	11.1	0.3	64.79	-	-	50	14.79
15	13.76925	34.58	Qp	0.1	11.1	0.3	46.08	60	-13.92	-	-
16	13.76925	15.96	Ca	0.1	11.1	0.3	27.46	-	-	50	-22.54
17	1.51575	14.54	Qp	0	10.5	0	25.04	56	-30.96	-	-
18	1.51575	12.8	Ca	0	10.5	0	23.3	-	-	46	-22.7
19	0.84975	14.22	Qp	0	10.5	0	24.72	56	-31.28	-	-
20	0.81375	10.18	Ca	0	10.5	0	20.68	-	-	46	-25.32
Qp - Quasi-Peak detector											
Ca - CISPR Average detection											

**AC Line Conducted Emissions with antenna terminated with equivalent non-radiating impedance  
- Configuration 1**

Neutral



Line



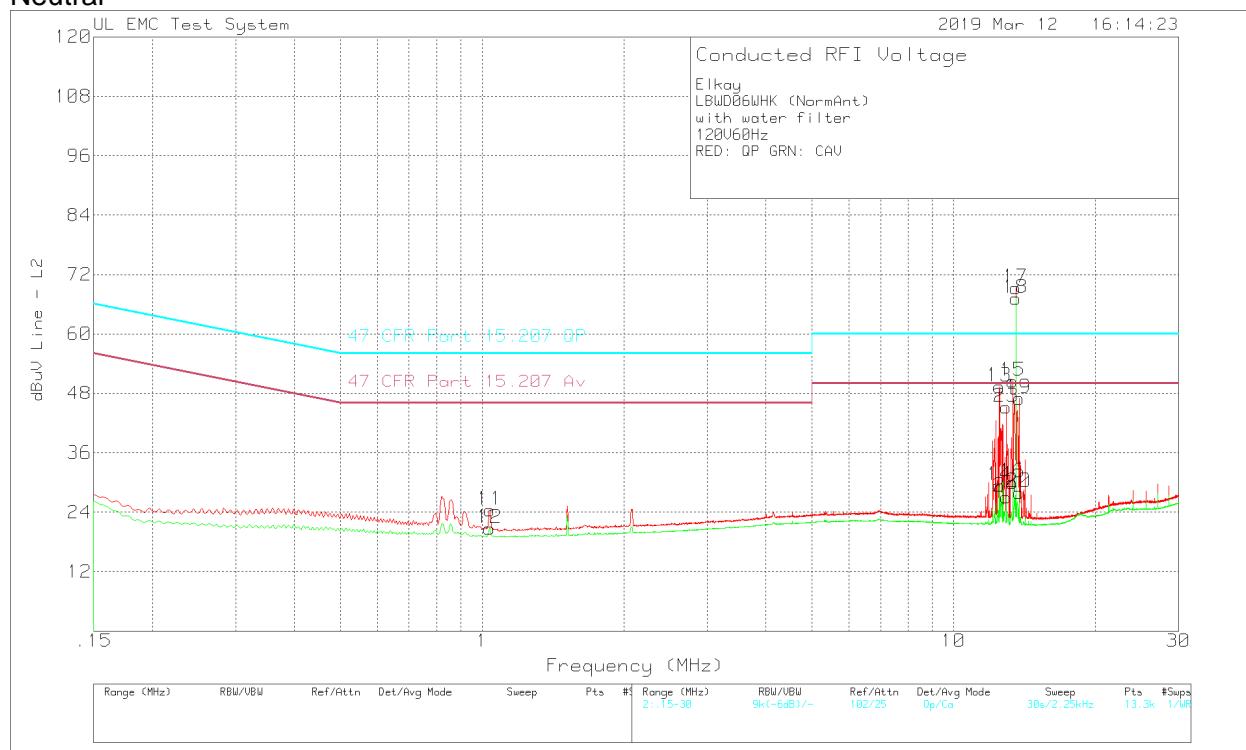
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Doungle Factor dB	Corrected Reading dBuV	47 CFR Part 15.207 QP dBuV	Margin (dB)	47 CFR Part 15.207 Av dBuV	Margin (dB)
Line 1											
1	1.03875	14.82	Qp	0	10.5	0	25.32	56	-30.68	-	-
2	1.0365	10.87	Ca	0	10.5	0	21.37	-	-	46	-24.63
3	13.56	19.63	Qp	0	11.1	0.4	31.13	60	-28.87	-	-
4	13.56	17.71	Ca	0	11.1	0.4	29.21	-	-	50	-20.79
Line 2											
5	1.03875	11.97	Qp	0	10.5	0	22.47	56	-33.53	-	-
6	1.0365	9.24	Ca	0	10.5	0	19.74	-	-	46	-26.26
7	13.56	19.53	Qp	0.1	11.1	0.3	31.03	60	-28.97	-	-
8	13.56	17.58	Ca	0.1	11.1	0.3	29.08	-	-	50	-20.92

Qp - Quasi-Peak detector

Ca - CISPR Average detection

### AC Line Conducted Emissions with normal antenna - Configuration 2

Neutral



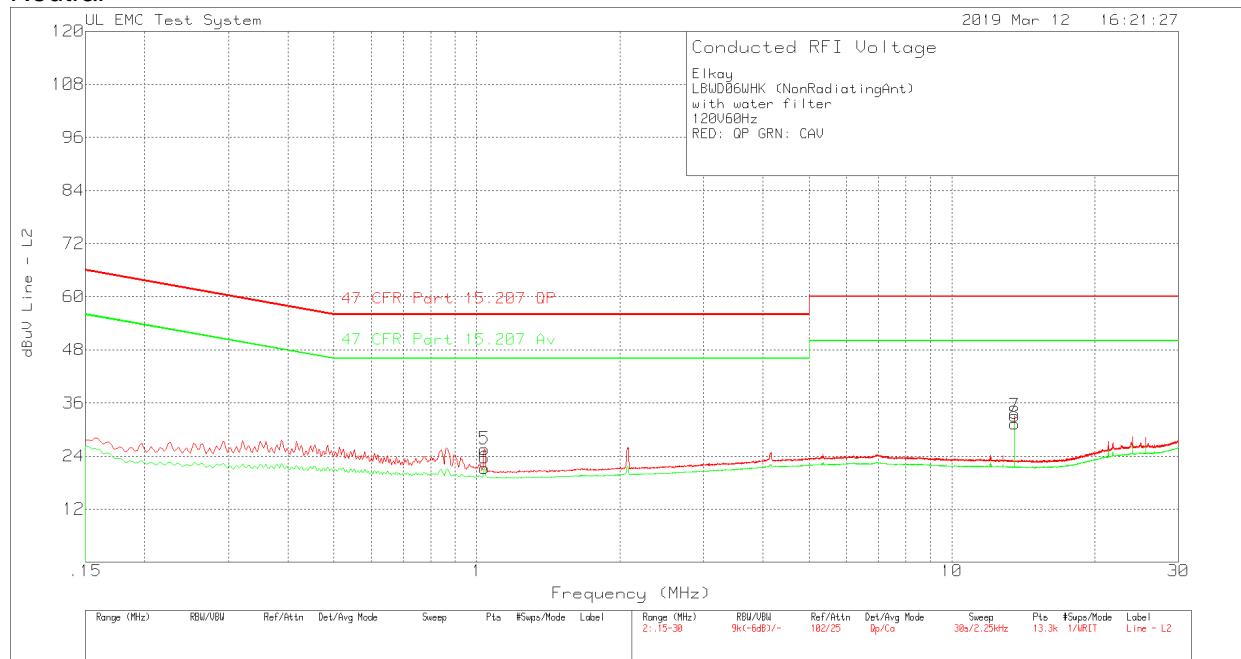
Line



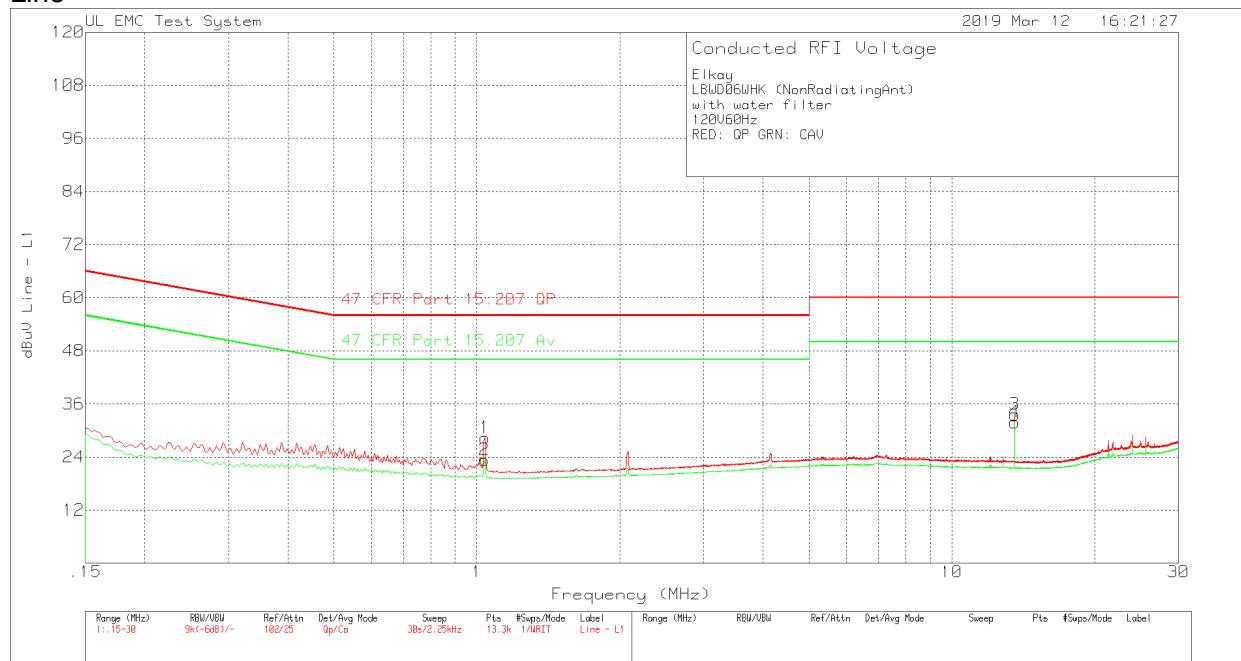
Elkay LBWD06WHK (NormAnt) with water filter 120V60Hz RED: QP GRN: CAV Trace MArkers											
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Doungle Factor dB	Corrected Reading dBuV	47 CFR Part 15.207 QP dBuV	Margin (dB)	47 CFR Part 15.207 Av dBuV	Margin (dB)
Line 1											
1	1.03875	16.37	Qp	0	10.5	0	26.87	56	-29.13	-	-
2	1.0365	11.92	Ca	0	10.5	0	22.42	-	-	46	-23.58
3	12.51375	39.53	Qp	0	11	0.3	50.83	60	-9.17	-	-
4	12.51375	18.87	Ca	0	11	0.3	30.17	-	-	50	-19.83
5	13.35075	41.36	Qp	0	11.1	0.4	52.86	60	-7.14	-	-
6	13.35075	19.99	Ca	0	11.1	0.4	31.49	-	-	50	-18.51
7	13.56	60.18	Qp	0	11.1	0.4	71.68	60	11.68	-	-
8	13.56	57.9	Ca	0	11.1	0.4	69.4	-	-	50	19.4
9	13.76925	37.89	Qp	0	11.1	0.4	49.39	60	-10.61	-	-
10	13.76925	17.78	Ca	0	11.1	0.4	29.28	-	-	50	-20.72
21	12.93225	36.22	Qp	0	11.1	0.3	47.62	60	-12.38	-	-
22	12.93225	16.83	Ca	0	11.1	0.3	28.23	-	-	50	-21.77
Line 2											
11	1.03875	13.9	Qp	0	10.5	0	24.4	56	-31.6	-	-
12	1.0365	10.22	Ca	0	10.5	0	20.72	-	-	46	-25.28
13	12.51375	37.95	Qp	0.1	11	0.3	49.35	60	-10.65	-	-
14	12.51375	17.97	Ca	0.1	11	0.3	29.37	-	-	50	-20.63
15	13.35075	38.93	Qp	0.1	11.1	0.3	50.43	60	-9.57	-	-
16	13.35075	18.49	Ca	0.1	11.1	0.3	29.99	-	-	50	-20.01
17	13.56	57.78	Qp	0.1	11.1	0.3	69.28	60	9.28	-	-
18	13.56	55.69	Ca	0.1	11.1	0.3	67.19	-	-	50	17.19
19	13.76925	35.47	Qp	0.1	11.1	0.3	46.97	60	-13.03	-	-
20	13.76925	16.51	Ca	0.1	11.1	0.3	28.01	-	-	50	-21.99
23	12.93225	33.73	Qp	0.1	11.1	0.3	45.23	60	-14.77	-	-
24	12.93225	15.59	Ca	0.1	11.1	0.3	27.09	-	-	50	-22.91
Qp - Quasi-Peak detector Ca - CISPR Average detection											

**AC Line Conducted Emissions with antenna terminated with equivalent non-radiating impedance  
- Configuration 2**

Neutral



Line



Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Doungle Factor dB	Corrected Reading dBuV	47 CFR Part 15.207 QP dBuV	Margin (dB)	47 CFR Part 15.207 Av dBuV	Margin (dB)
Line 1											
1	1.041	17.81	Qp	0	10.5	0	28.31	56	-27.69	-	-
2	1.03875	12.8	Ca	0	10.5	0	23.3	-	-	46	-22.7
3	13.56	22.1	Qp	0	11.1	0.4	33.6	60	-26.4	-	-
4	13.56	20.33	Ca	0	11.1	0.4	31.83	-	-	50	-18.17
Line 2											
5	1.0365	15.11	Qp	0	10.5	0	25.61	56	-30.39	-	-
6	1.03875	10.8	Ca	0	10.5	0	21.3	-	-	46	-24.7
7	13.56	21.63	Qp	0.1	11.1	0.3	33.13	60	-26.87	-	-
8	13.56	19.85	Ca	0.1	11.1	0.3	31.35	-	-	50	-18.65

Qp - Quasi-Peak detector

Ca - CISPR Average detection

## 10. FREQUENCY STABILITY

### LIMIT

§15.225 (e) 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

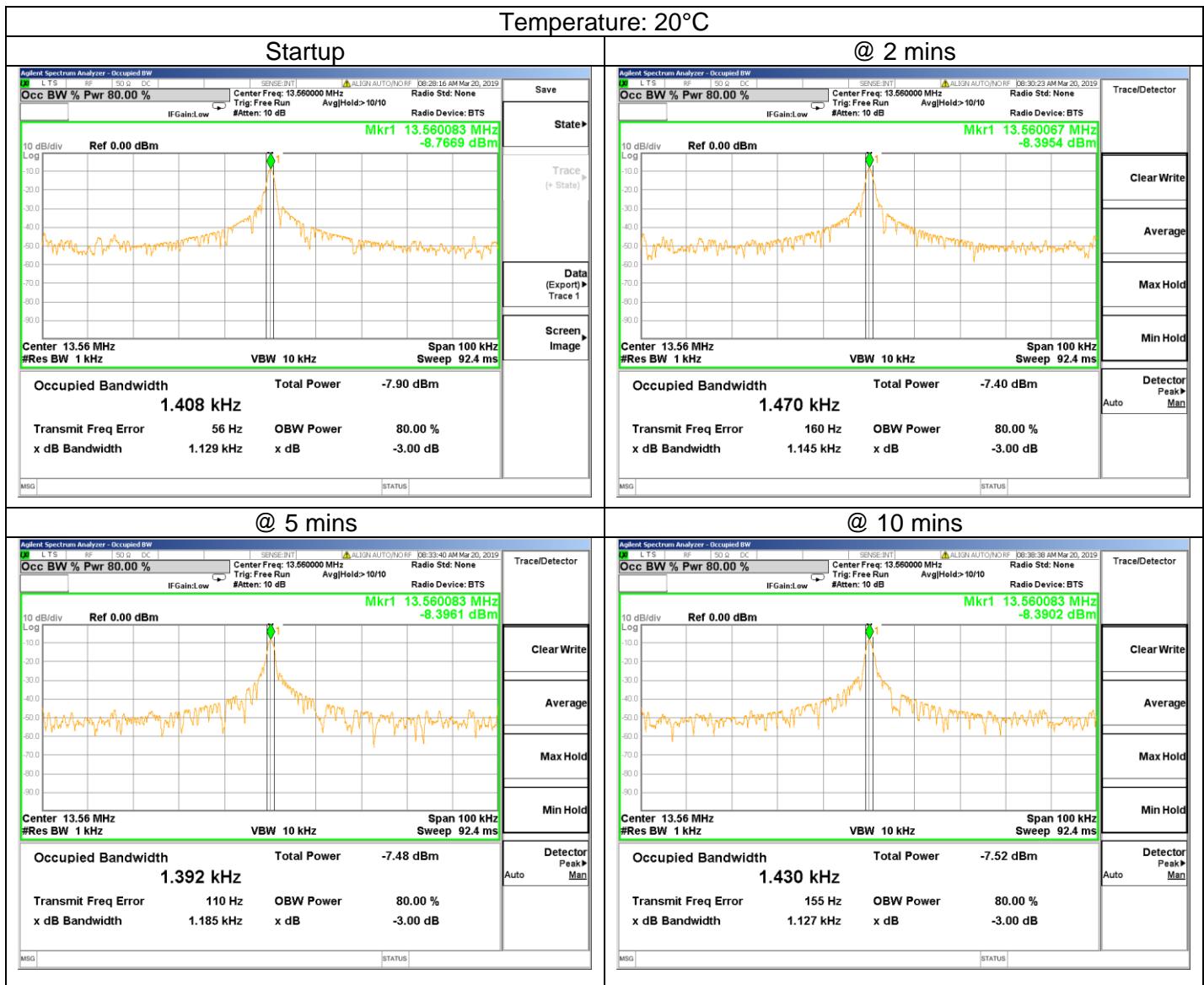
RSS-210 Annex B.6: Carrier frequency stability shall be maintained to  $\pm 0.01\%$  ( $\pm 100$  ppm).

### TEST PROCEDURE

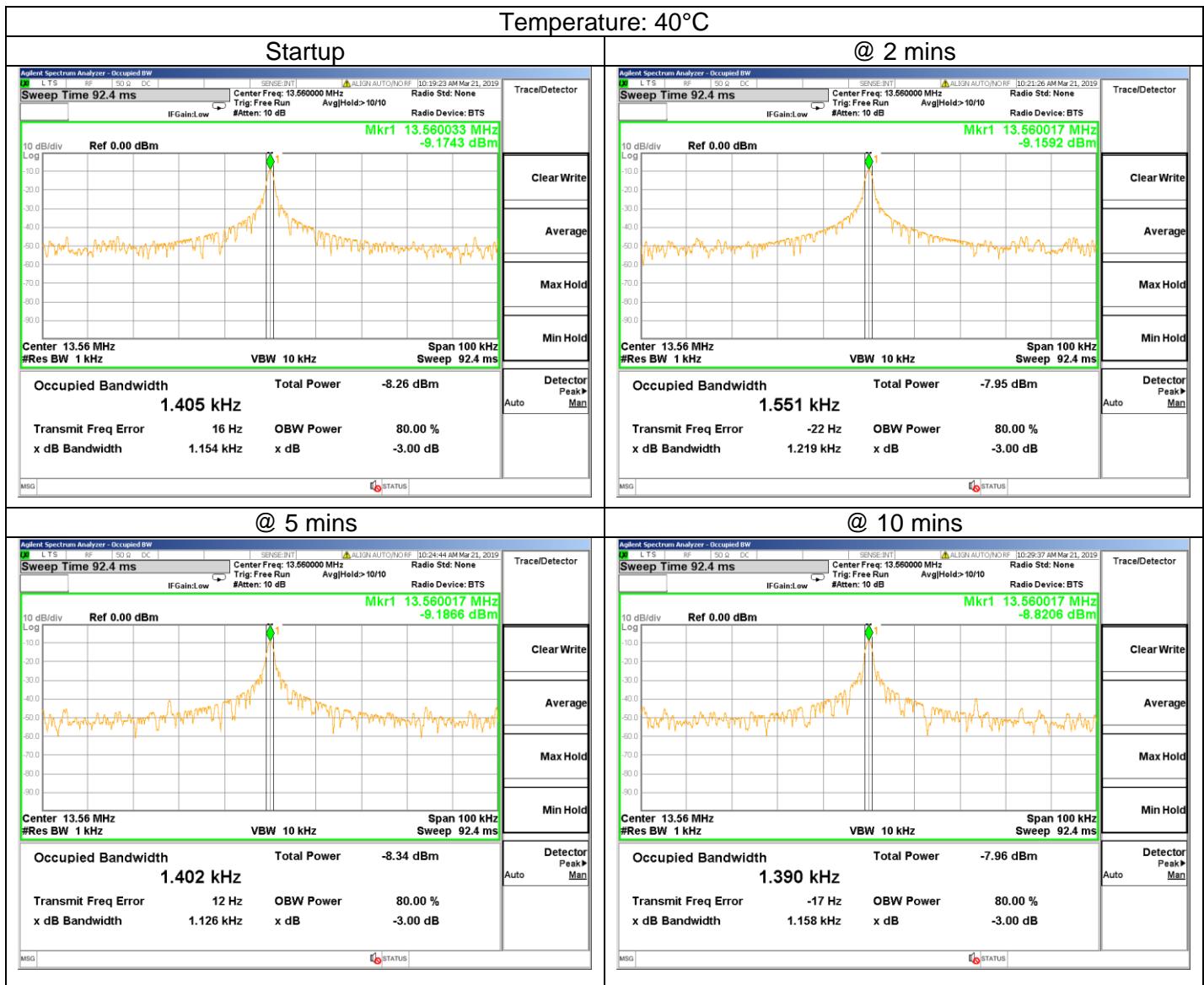
ANSI 63.10:2013 Clause 6.8.1 and 6.8.2

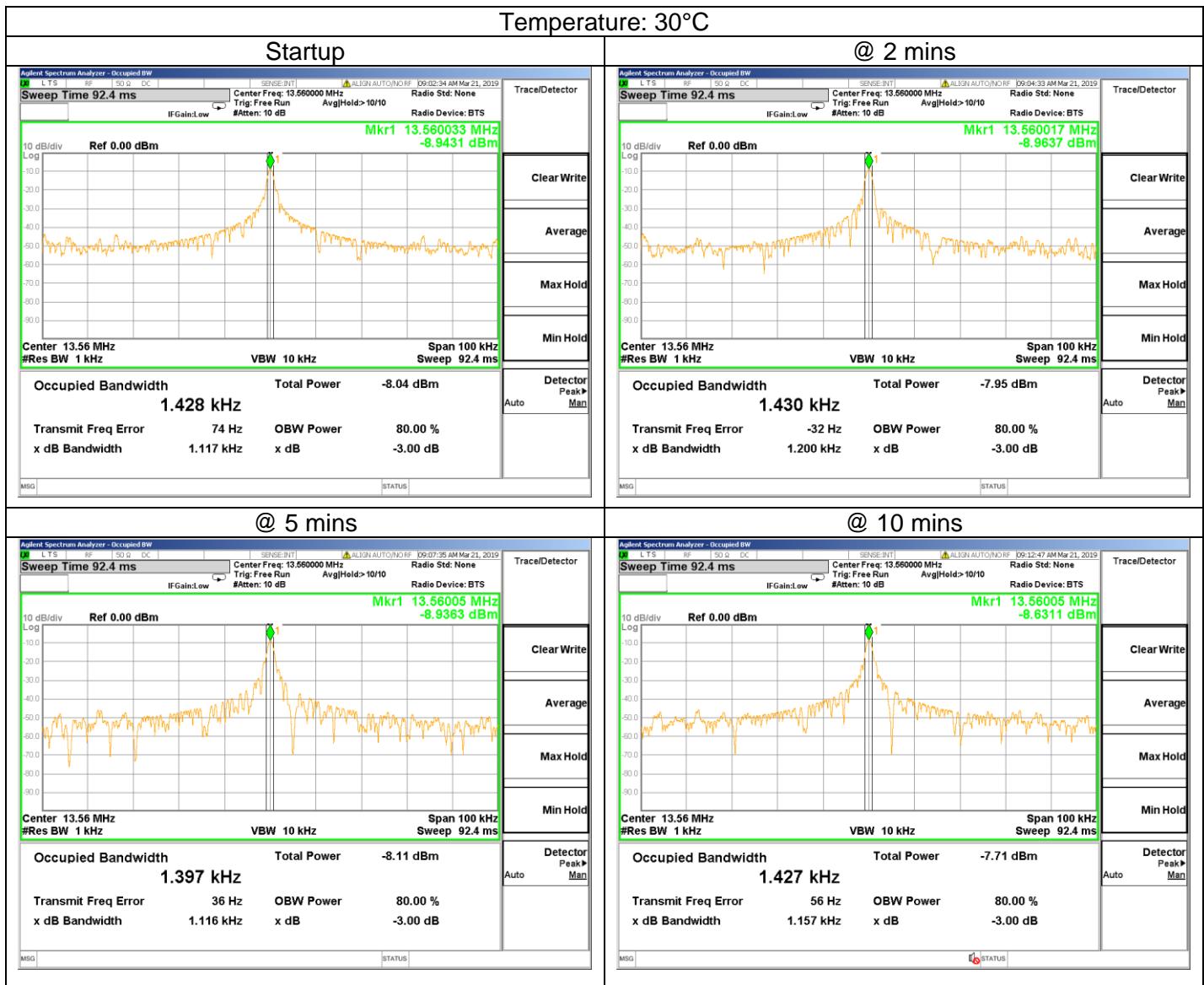
### RESULTS

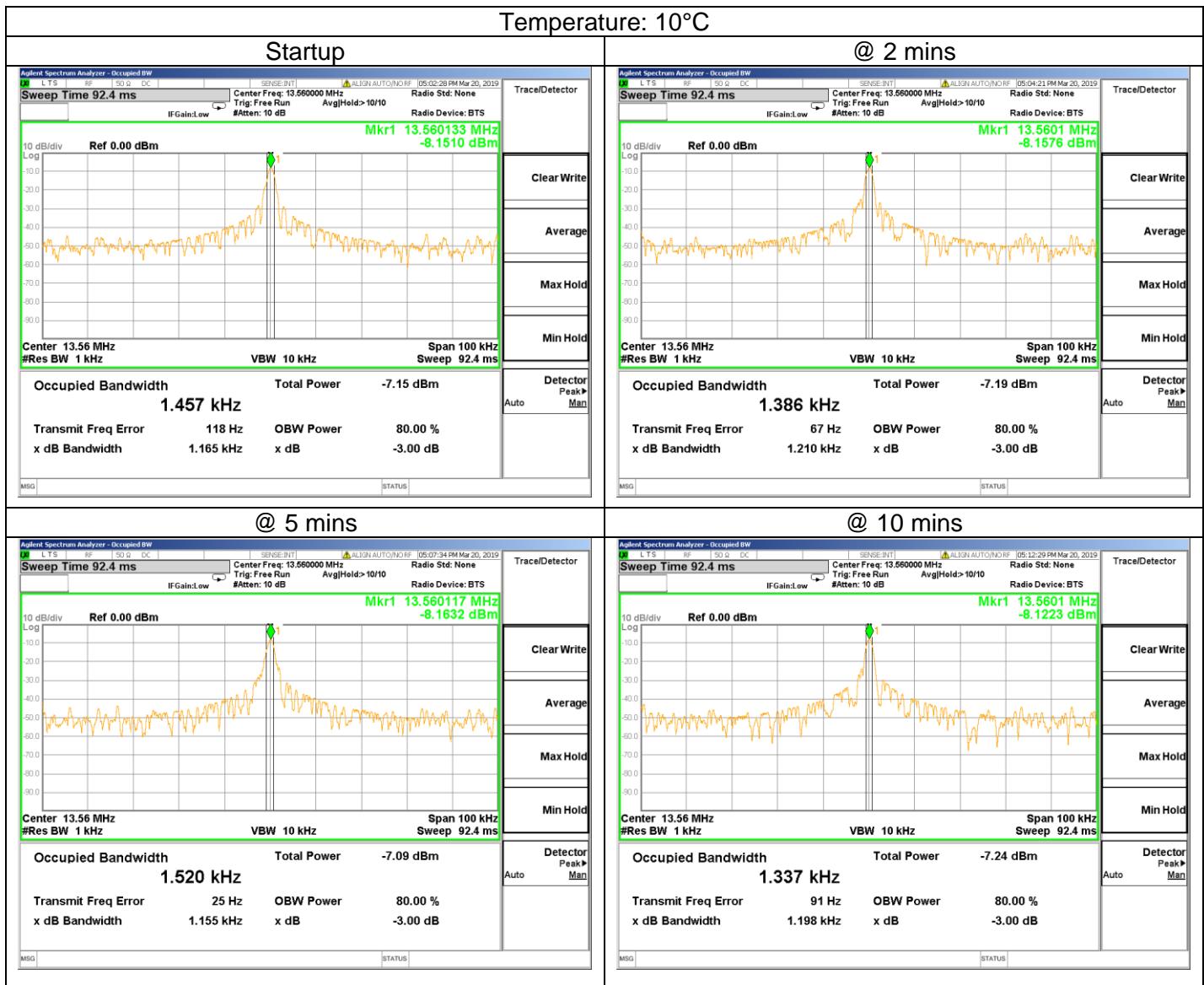
Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: $\pm 100$ ppm = 1.356 kHz										
Power Supply (Vdc)	Envir. Temp (°C)	Frequency Deviation Measured with Time Elapse								
		Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
120.0	50	13.5600710	-1.106	13.5599730	6.121	13.5600590	-0.221	13.5600650	-0.664	$\pm 100$
	40	13.5600160	2.950	13.5599780	5.752	13.5600120	3.245	13.5599830	5.383	$\pm 100$
	30	13.5600740	-1.327	13.5599680	6.490	13.5600360	1.475	13.5600560	0.000	$\pm 100$
	20	<b>13.5600560</b>	<b>0.000</b>	<b>13.5601600</b>	<b>-7.670</b>	<b>13.5601100</b>	<b>-3.982</b>	<b>13.5601550</b>	<b>-7.301</b>	<b><math>\pm 100</math></b>
	10	13.5601180	-4.572	13.5600670	-0.811	13.5600250	2.286	13.5600910	-2.581	$\pm 100$
	0	13.5601830	-9.366	13.5601910	-9.956	13.5600860	-2.212	13.5601680	-8.260	$\pm 100$
	-10	13.5601070	-3.761	13.5602010	-10.693	13.5602320	-12.979	13.5600400	1.180	$\pm 100$
	-20	13.5600340	1.622	13.5601240	-5.015	13.5601070	-3.761	13.5601410	-6.268	$\pm 100$
102.0	20	13.5601350	-5.826	13.5601650	-8.038	13.5601080	-3.835	13.5601190	-4.646	$\pm 100$
138.0	20	13.5601190	-4.646	13.5600220	2.507	13.5601080	-3.835	13.5600560	0.000	$\pm 100$





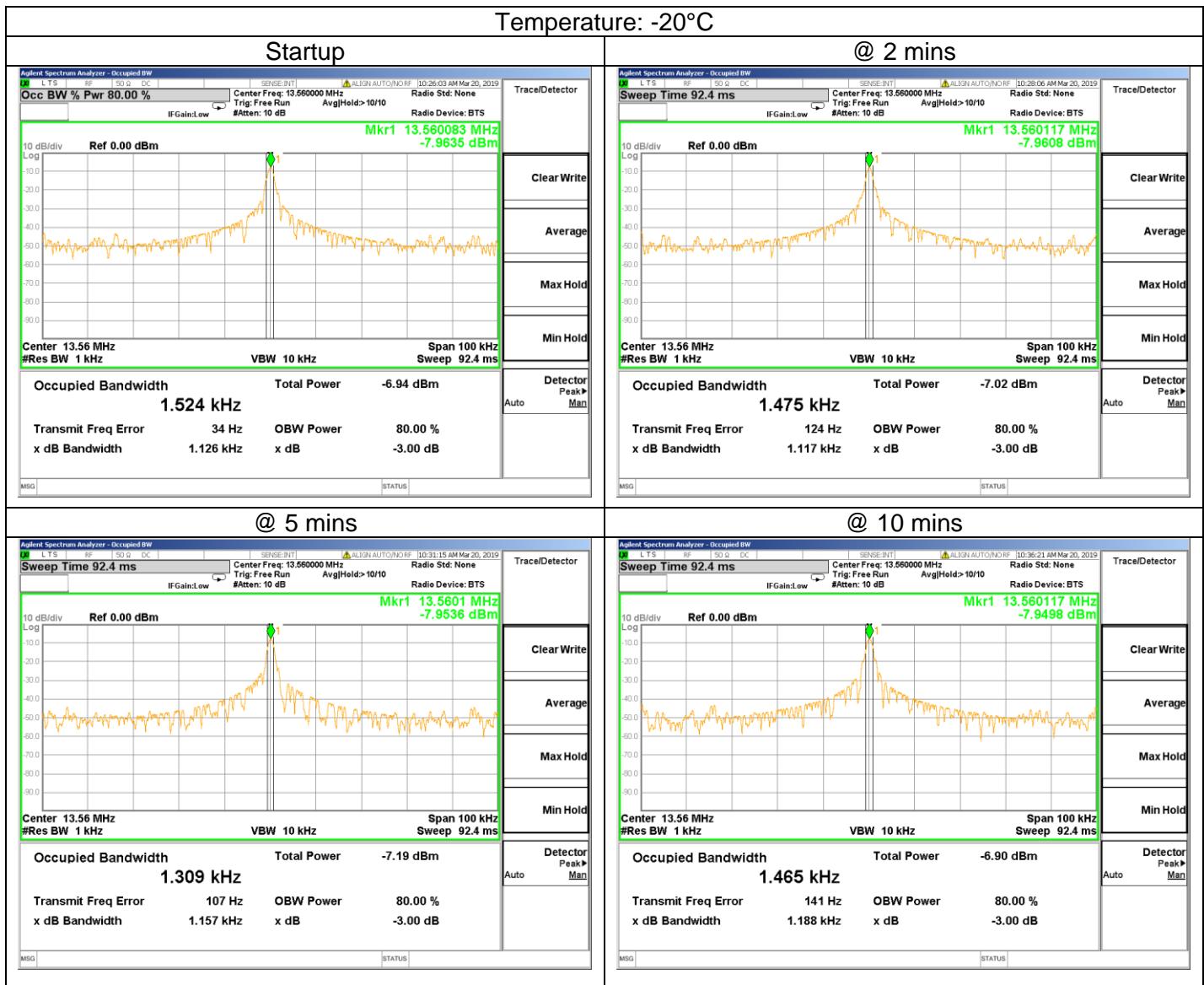










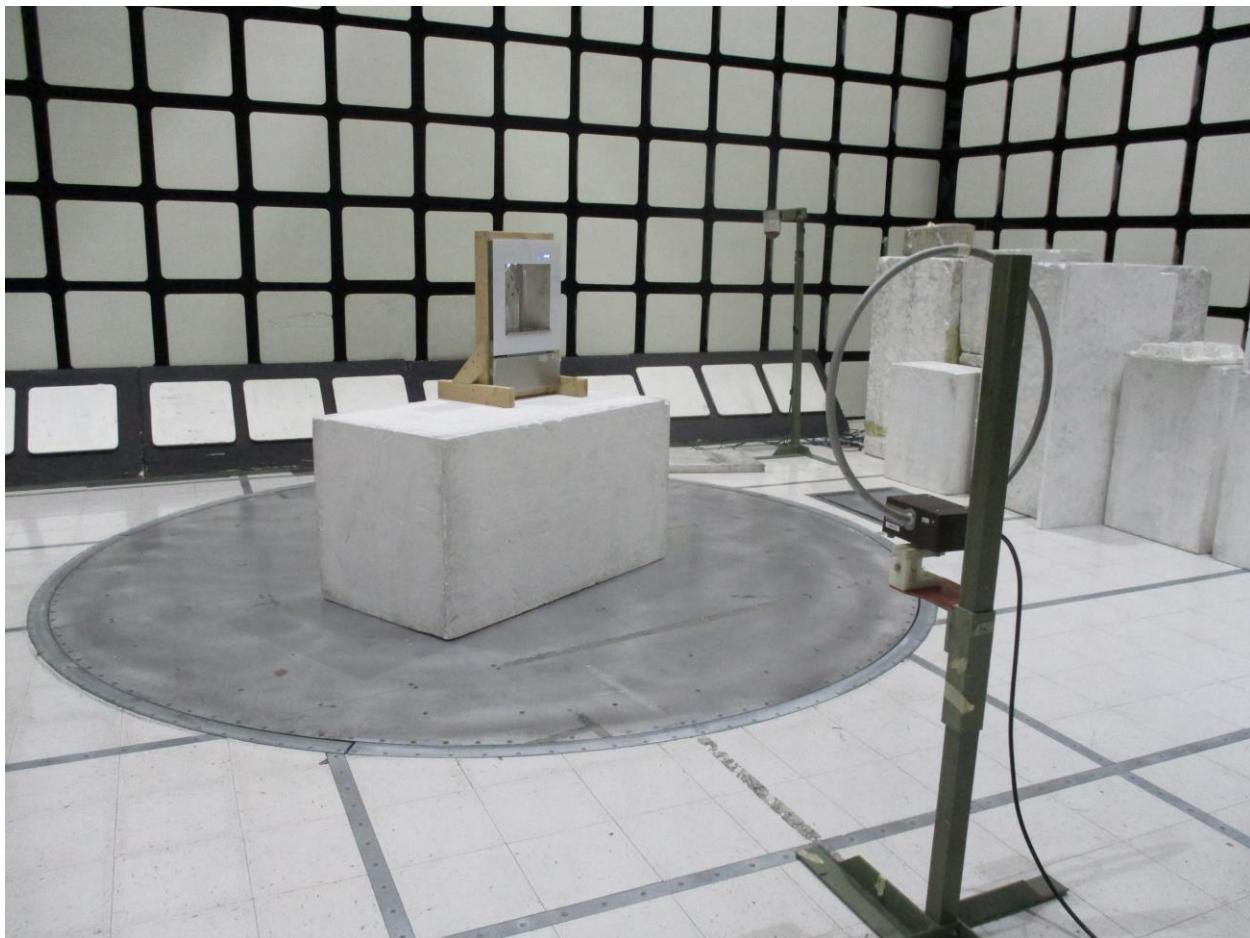




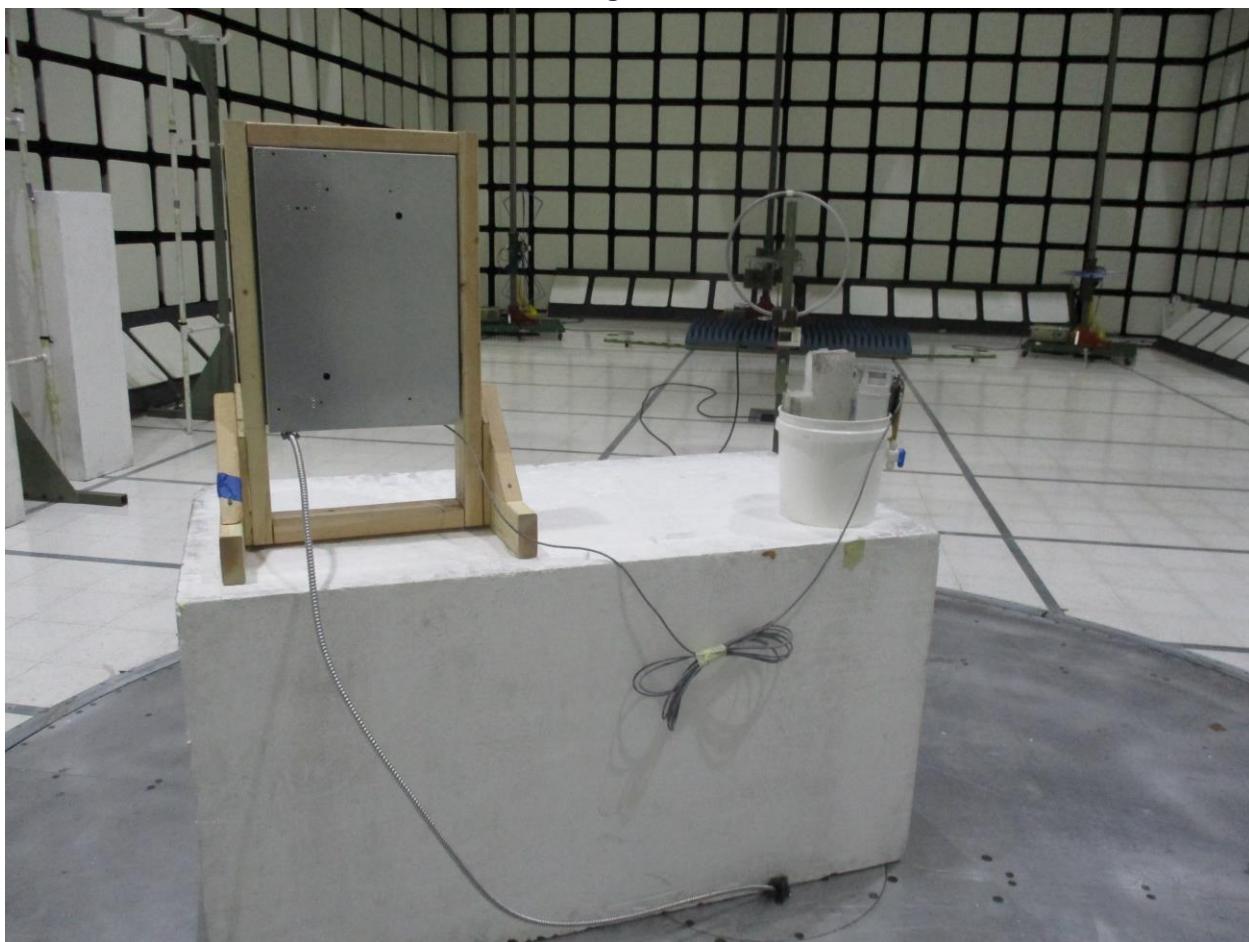


## 11. SETUP PHOTOS

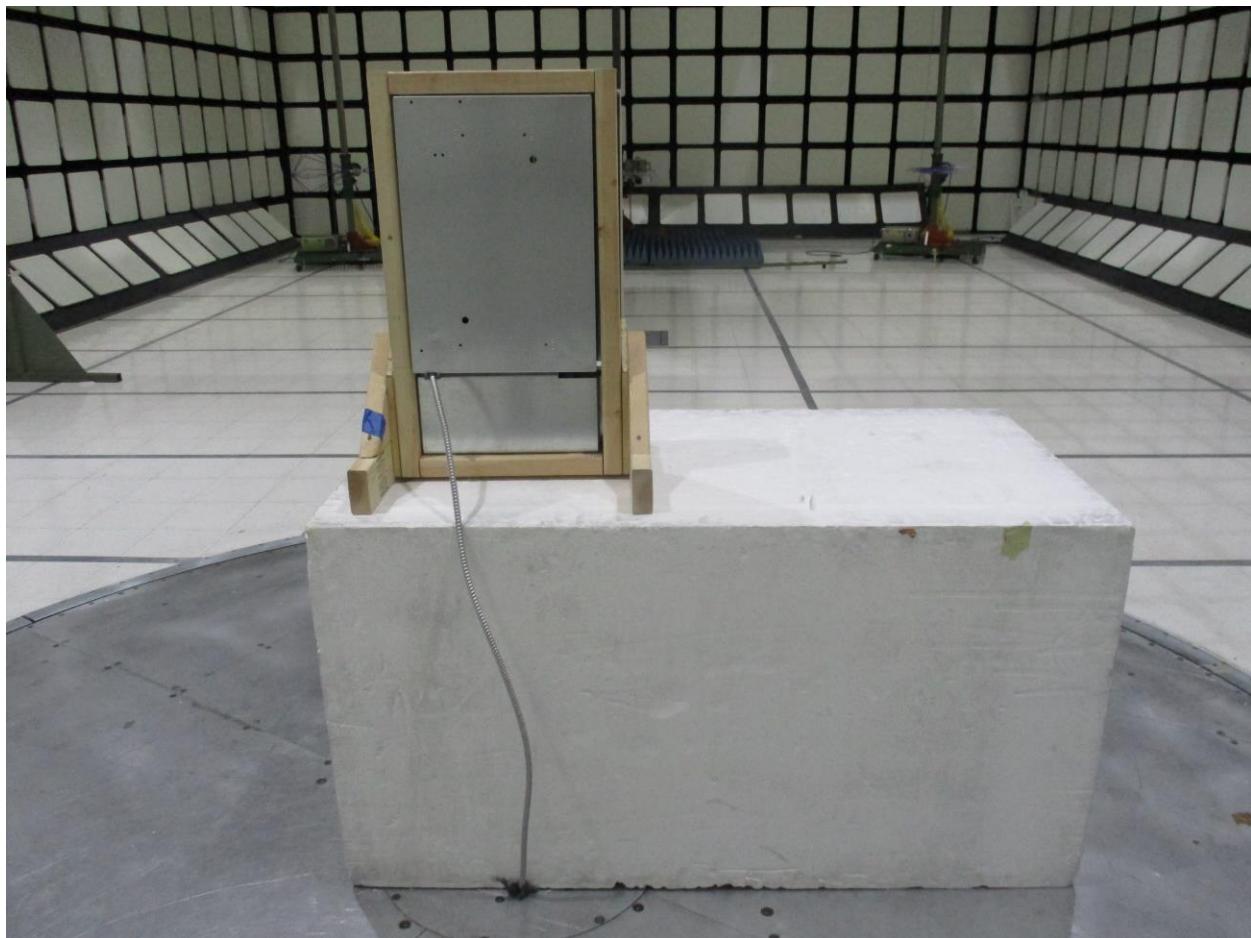
### RADIATED EMISSION BELOW 30 MHz for Configuration 1



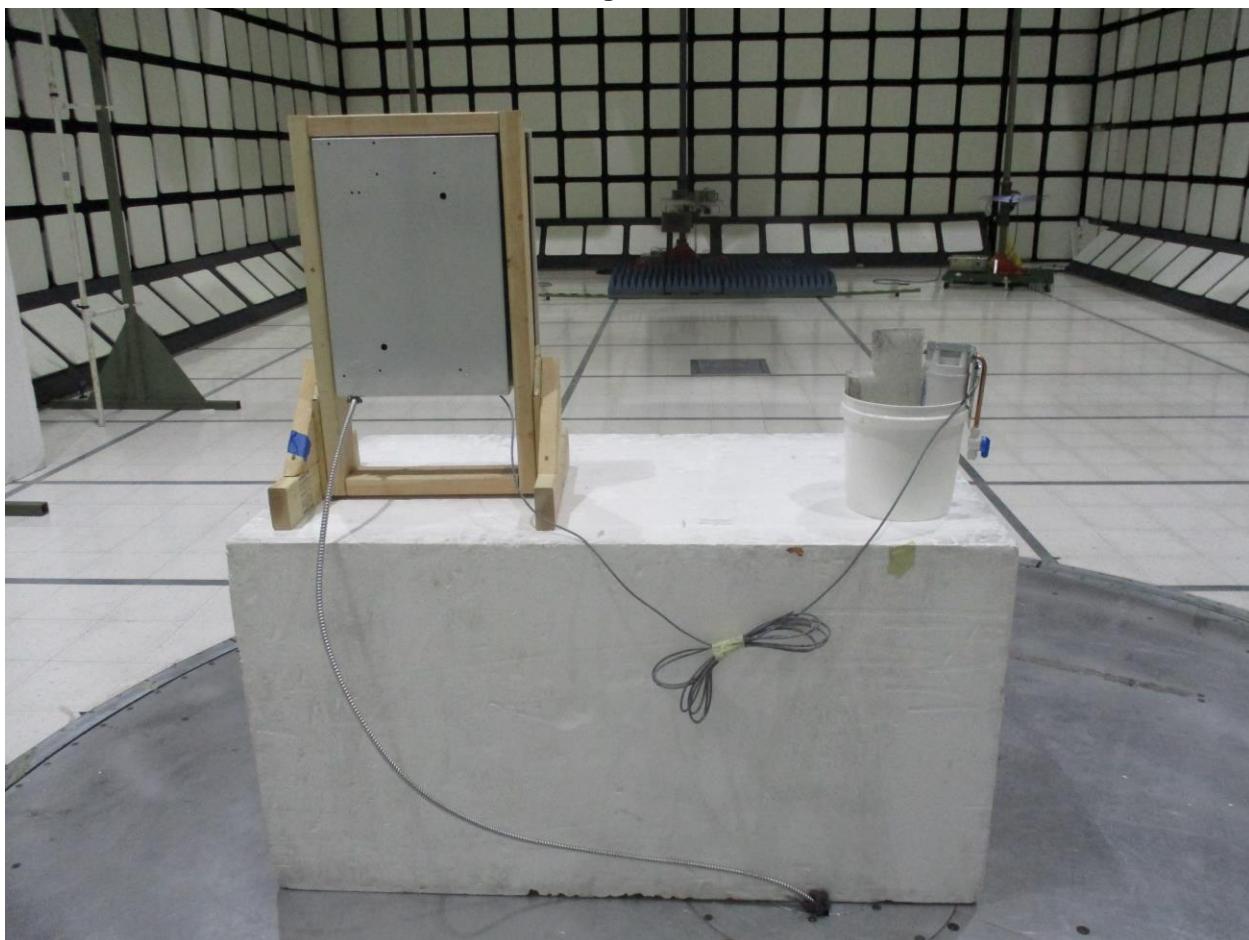
**RADIATED EMISSION BELOW 30 MHz for Configuration 2**



**RADIATED EMISSION ABOVE 30 MHz for Configuration 1**



**RADIATED EMISSION ABOVE 30 MHz for Configuration 2**



AC MAINS LINE CONDUCTED EMISSION Configuration 1



**AC MAINS LINE CONDUCTED EMISSION Configuration 2**



**FREQUENCY TOLERANCE OVER EXTREME CONDITIONS**



**END OF REPORT**