FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 2

PERMISSIVE CHANGE
CERTIFICATION TEST REPORT

FOR

GDO with 900MHz FHSS Transceiver and 2.4GHz WiFi Module

MODEL NUMBER: 001D8852

FCC ID: HBW1D8169-1
IC: 2666A-1D8169

REPORT NUMBER: 11752108A

ISSUE DATE: June 5, 2017

Prepared for
The Chamberlain Group, Inc.
300 Windsor Dr.
Oak Brook, IL 60523
US

Prepared by
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333 Pfingsten Rd.
Northbrook, IL 60062
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NVLAP TESTING
NVLAB LAB CODE: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--		Initial Issue	

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: The Chamberlain Group, Inc.
300 Windsor Dr
Oak Brook, IL 60523, US

EUT DESCRIPTION: GDO with 900MHz FHSS Transceiver and 2.4GHz WiFi Module

MODEL: 001D8852

SERIAL NUMBER: non-serialized

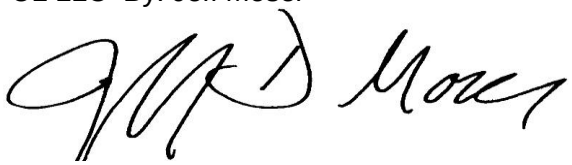
DATE TESTED: May 1, 2017 to May 12, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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



PROGRAM MANAGER
UL LLC

Tested By: Bart Mucha

STAFF ENGINEER
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, RSS-247 Issue 2.

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. The full scope of accreditation can be viewed at http://ts.nist.gov/

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)

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
Radiated Emissions	30-200MHz	Bicon 3m Horz	3.30dB
Radiated Emissions	30-130MHz	Bicon 3m Vert	4.84dB
Radiated Emissions	130-200MHz	Bicon 3m Vert	4.94dB
Radiated Emissions	200-1000MHz	LogP 3m Horz	3.46dB
Radiated Emissions	200-1000MHz	LogP 3m Vert	4.98dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94
Occupied Channel Bandwidth	30MHz-26GHz	Spectrum Analyzer	± 0.39 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an Garage Door Operator with FHSS transceiver operating between 902MHz – 928MHz. The GDO also contains a modular WiFi transceiver, FCC ID: COFWMNBM11 / IC: 10239A-WMNBM11.

The radio circuit and area around the radio circuit is identical to the originally certified device. The only change is where one side of the board got extended to allow for additional connectors for additional accessories.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
902.25	16.768	47.51
914.75	16.617	45.89
926.75	16.414	43.79

* highest power recorded for original EUT.

5.1. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an wire antenna, with a peak gain of -2 dBi determined by simulation.

5.2. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 127A0490, Rev C

5.3. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit on low, middle and high channels.

The EUT was oriented in a normal installation position (gear up)

Radiated emissions for EUT with antenna was performed and passed; therefore, antenna port spurious was not performed.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
EUT	Chamberlain Group IN	001D8169-1	non-serialized	HBW1D8169-1
Photo Eyes	Chamberlain Group IN	Generic	non-serialized	N/A
Wall Control	Chamberlain Group IN	Generic	non-serialized	N/A
Door Lock	Chamberlain Group IN	Generic	non-serialized	N/A

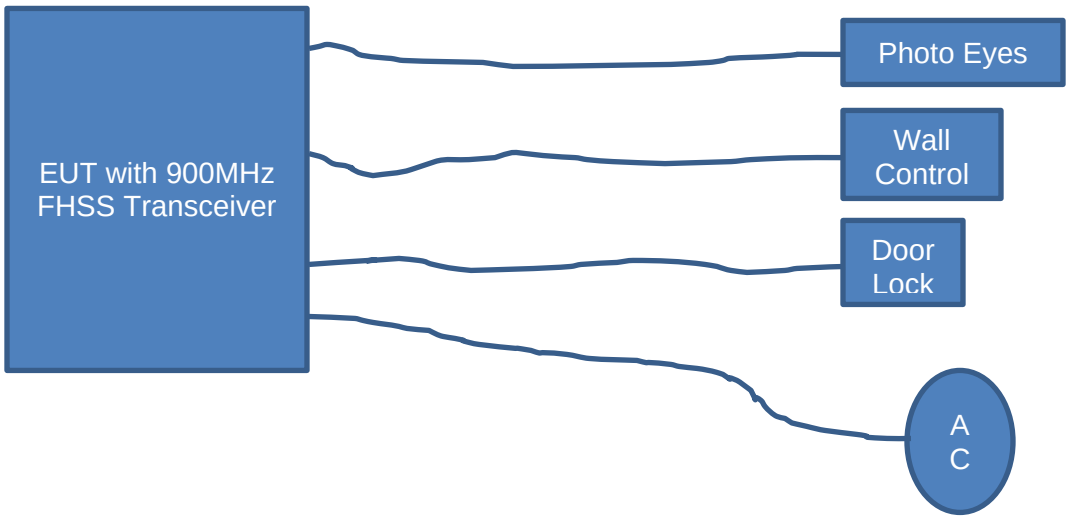
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	PHoto EYes	1	custom	solid wire	1m	none
2	Wall Control	1	custom	solid wire	1m	none
3	Door Lock	1	custom	solid wire	1m	none

TEST SETUP

The wireless device is part of the main board of the GDO.

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**	**Eqp. No.**	**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	12/2/2016	12/31//2017
Bicon Antenna	Chase	VBA6106A	EMC4078	2/15/2017	2/28/2018
Log-P Antenna	Chase	UPA6109	EMC4258	5/11/2016	5/31/2017
Loop Antenna	EMCO	6502/1	EMC4026	5/22/2016	5/31/2017
Antenna Array	UL	BOMS	EMC4276	11/15/2016	11/15/2017
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	12/24/2016	12/31/2017
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	12/30/2016	12/31/2017
Transient Limiter "Behind Attenuator"	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	8602-50-TS-50-N	EMC4066	12/30/2016	12/31/2017

7. MEASUREMENT METHODS

ANSI C63.10:2013 and specific references are listed under procedure for each test.

7.1. DUTY CYCLE

LIMITS

Measured for the purpose of:

a) if device cannot be set to 100% duty cycle when operating on individual channels (low, mid and high) measure the duty cycle and apply to the radiated spurious emissions measurements in restricted bands.

b) in hopping mode it is likely that the same channel will be only used for few mS out of 100mS. In that case per part 15.35 (c) measurement of the total on time of an individual channel over 100mS can be conducted and duty cycle factor determined. That duty cycle factor can be applied to peak level of the radiated emission to show average level.

PROCEDURE

ANSI C63.10, section 7.8.4

ON TIME AND DUTY CYCLE RESULTS

The duty cycle results are from the original test report, FCC ID: HBW1D8169-1 and the table is copied below.

Mode	Number of TX in 100mS	TX Duration in 100mS	Duty Cycle Correction (dB) $20\times\log(\frac{TX\,(ms)}{100ms})$
TX Short Packet	1	1.311	-37.65
TX Long Packet	1	3.05	-30.31
Per the operational descriptions there is a rare worst case possibility where transmission may take place when two short pulses and one long pulse is transmitted within 100mS window. This case is almost impossible to capture. If this case ever happens the duty cycle correction factor will decrease from -30.31dB to -24.93dB based on the measured individual pulse lengths. This is slightly less then what is reported by the manufacturer in the operational description. The manufacturer uses theoretical values for the Log Pulse TX duration where measured values are used in this test report. For Radiated Spurious Emissions the worst case is used.			

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-247 Clause 5.5

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

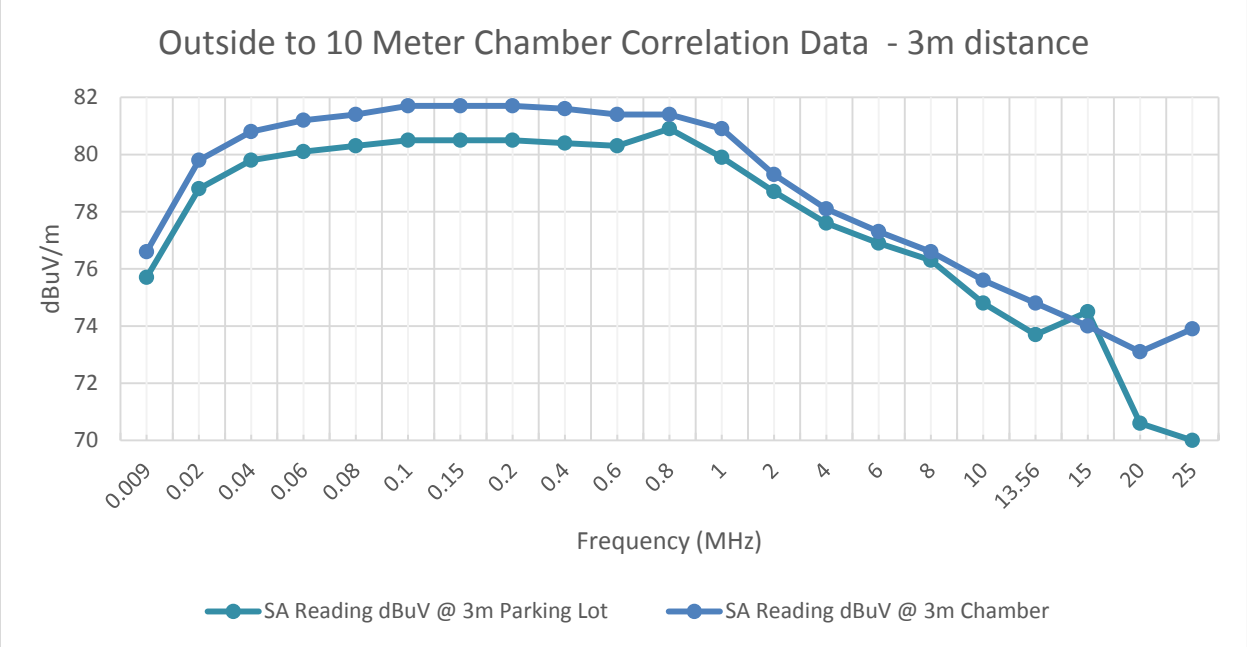
PROCEDURE

ANSI C63.10:2013, Section 11.12

8.2. RADIATED SPUROUS EMSSIONS

8.2.1. SPURIOUS EMISSIONS 9kHz-30MHz Open Field to 10 Meter Chamber Correlation Data

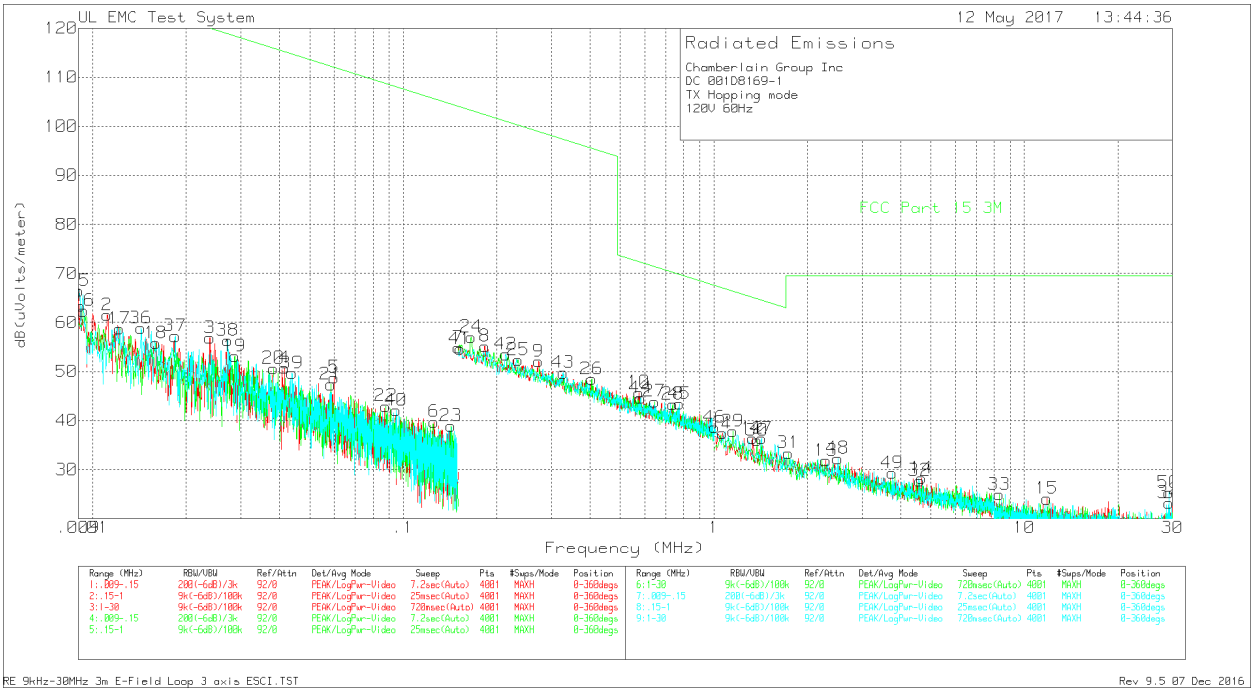
Correlation Data for measurements 9kHz-30MHz between Outside and 10m semi-anechoic chamber in at Underwriter Laboratories in Northbrook, IL.



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.

8.2.2. Spurious Emissions 9kHz – 30MHz

Plot

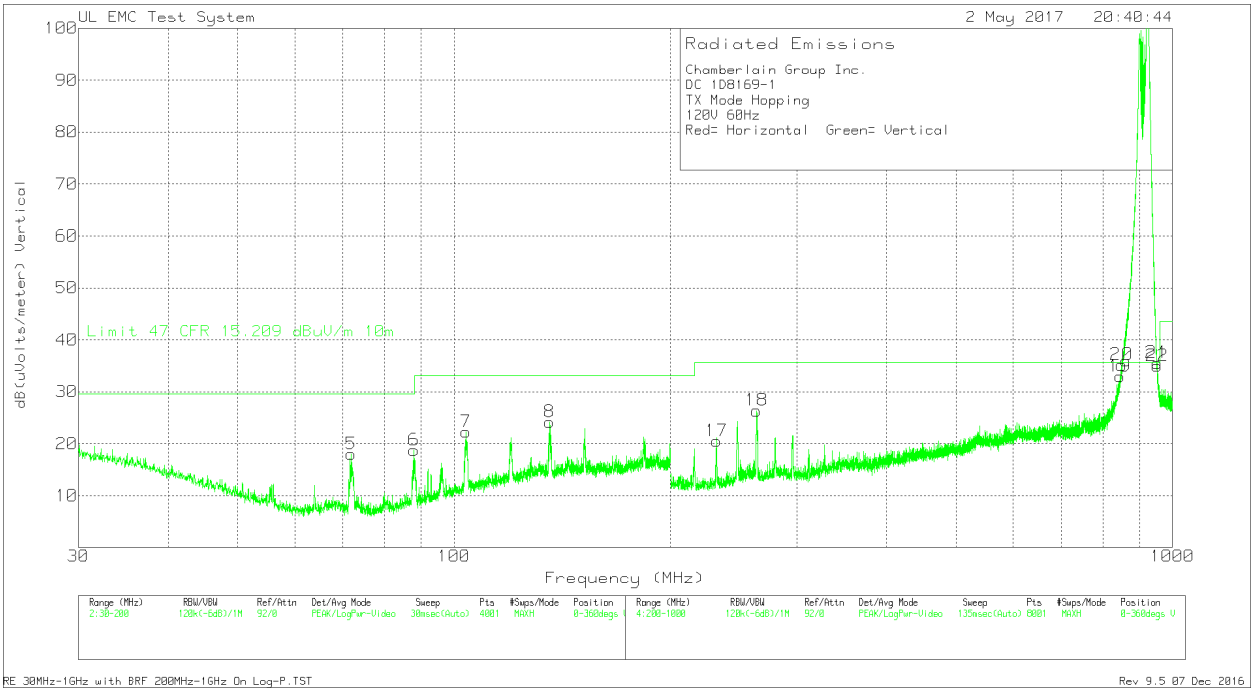


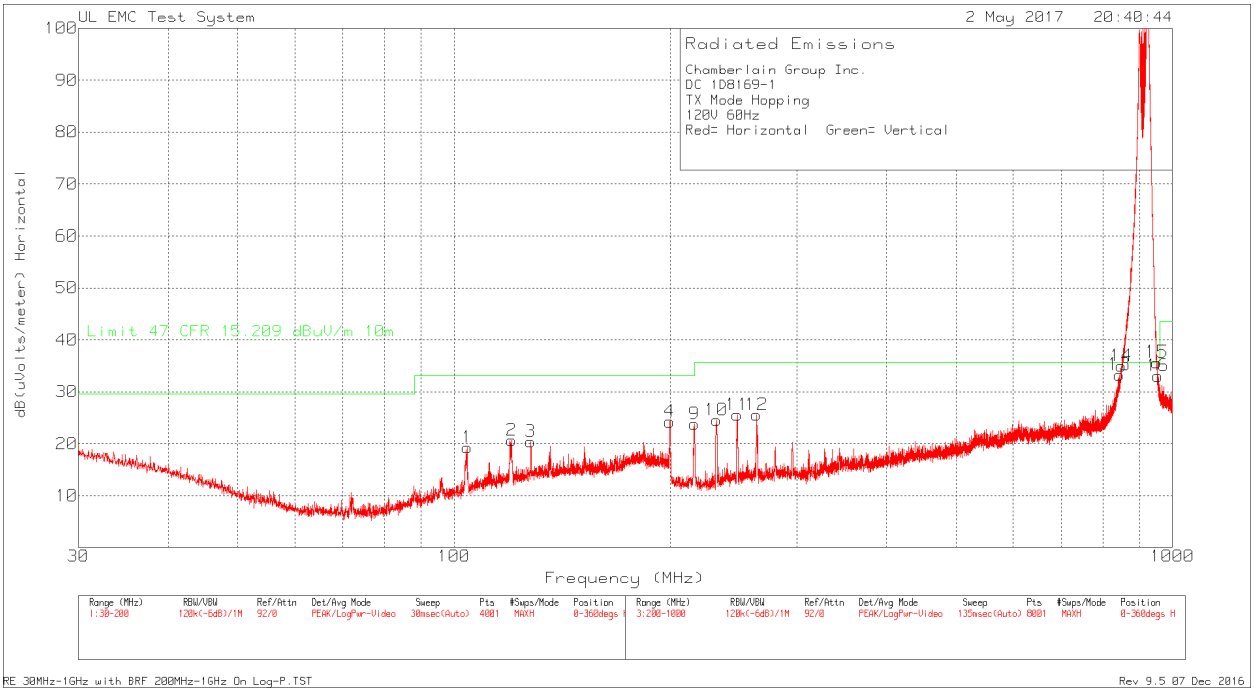
Data

Chamberlain Group Inc									
DC 001D8169-1									
TX Hopping mode									
120V 60Hz									
Trace MArkers									
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Limit 47 CFR Part 15.209 dBuV/m	Margin (dB)	Azimuth [Degs]
Parallel to EUT									
1	0.00914	41.09	Pk	22.3	0	63.39	128.37	-64.98	0-360
2	0.011135	40.6	Pk	20.9	0	61.5	126.65	-65.15	0-360
3	0.02384	40.94	Pk	15.9	0	56.84	120.04	-63.2	0-360
4	0.04148	37.1	Pk	13.6	0	50.7	115.24	-64.54	0-360
5	0.059925	36.58	Pk	12.2	0	48.78	112.04	-63.26	0-360
6	0.1259	28.35	Pk	11.4	0	39.75	105.6	-65.85	0-360
7	0.15043	43.58	Pk	11.3	0	54.88	104.05	-49.17	0-360
8	0.18302	43.86	Pk	11.3	0	55.16	102.35	-47.19	0-360
9	0.27311	40.79	Pk	11.3	0	52.09	98.87	-46.78	0-360
10	0.57408	34.43	Pk	11.3	0	45.73	72.42	-26.69	0-360
11	1.06525	25.88	Pk	11.4	0.1	37.38	67.06	-29.68	0-360
12	1.3335	24.87	Pk	11.4	0.1	36.37	65.1	-28.73	0-360
13	2.29775	20.21	Pk	11.5	0.1	31.81	69.54	-37.73	0-360
14	4.67575	16.76	Pk	11.4	0.1	28.26	69.54	-41.28	0-360
15	11.82063	13.46	Pk	10.4	0.2	24.06	69.54	-45.48	0-360
Perpendicular to EUT									
16	0.00935	40.29	Pk	22.1	0	62.39	128.17	-65.78	0-360
17	0.01222	38.33	Pk	20.4	0	58.73	125.84	-67.11	0-360
18	0.015965	37.26	Pk	18.5	0	55.76	123.52	-67.76	0-360
19	0.02867	37.85	Pk	15.3	0	53.15	118.44	-65.29	0-360
20	0.038225	36.64	Pk	14	0	50.64	115.94	-65.3	0-360
21	0.058455	35.05	Pk	12.3	0	47.35	112.26	-64.91	0-360
22	0.087995	31.35	Pk	11.6	0	42.95	108.71	-65.76	0-360
23	0.142455	27.62	Pk	11.3	0	38.92	104.52	-65.6	0-360
24	0.16555	45.74	Pk	11.3	0	57.04	103.22	-46.18	0-360
25	0.23435	41.07	Pk	11.3	0	52.37	100.2	-47.83	0-360
26	0.40454	37.13	Pk	11.3	0	48.43	95.46	-47.03	0-360
27	0.64416	32.48	Pk	11.4	0	43.88	71.42	-27.54	0-360
28	0.73937	31.94	Pk	11.4	0	43.34	70.23	-26.89	0-360
29	1.15225	26.28	Pk	11.4	0.1	37.78	66.37	-28.59	0-360
30	1.377	24.49	Pk	11.4	0.1	35.99	64.83	-28.84	0-360
31	1.7395	21.76	Pk	11.5	0.1	33.36	69.54	-36.18	0-360
32	4.596	16.25	Pk	11.4	0.1	27.75	69.54	-41.79	0-360
33	8.2935	13.83	Pk	10.9	0.2	24.93	69.54	-44.61	0-360
34	29.23875	14.83	Pk	8.1	0.3	23.23	69.54	-46.31	0-360
Parallel to Ground									
35	0.009035	44.05	Pk	22.4	0	66.45	128.47	-62.02	0-360
36	0.01432	39.51	Pk	19.3	0	58.81	124.47	-65.66	0-360
37	0.01845	40	Pk	17.2	0	57.2	122.27	-65.07	0-360
38	0.027235	40.81	Pk	15.5	0	56.31	118.89	-62.58	0-360
39	0.04386	36.35	Pk	13.3	0	49.65	114.75	-65.1	0-360
40	0.09496	30.47	Pk	11.6	0	42.07	108.05	-65.98	0-360
41	0.15277	43.32	Pk	11.3	0	54.62	103.92	-49.3	0-360
42	0.2139	42.18	Pk	11.3	0	53.48	101	-47.52	0-360
43	0.327	38.45	Pk	11.3	0	49.75	97.31	-47.56	0-360
44	0.58154	33.29	Pk	11.3	0	44.59	72.31	-27.72	0-360
45	0.77494	32.03	Pk	11.4	0	43.43	69.82	-26.39	0-360
46	1.00725	27.13	Pk	11.4	0.1	38.63	67.54	-28.91	0-360
47	1.42775	24.83	Pk	11.4	0.1	36.33	64.51	-28.18	0-360
48	2.508	20.68	Pk	11.5	0.1	32.28	69.54	-37.26	0-360
49	3.755	17.66	Pk	11.5	0.1	29.26	69.54	-40.28	0-360
50	29.23875	16.9	Pk	8.1	0.3	25.3	69.54	-44.24	0-360
Pk - Peak detector									

8.2.3. SPURIOUS EMISSIONS 30 TO 1000 MHz – Hopping Mode

Plots



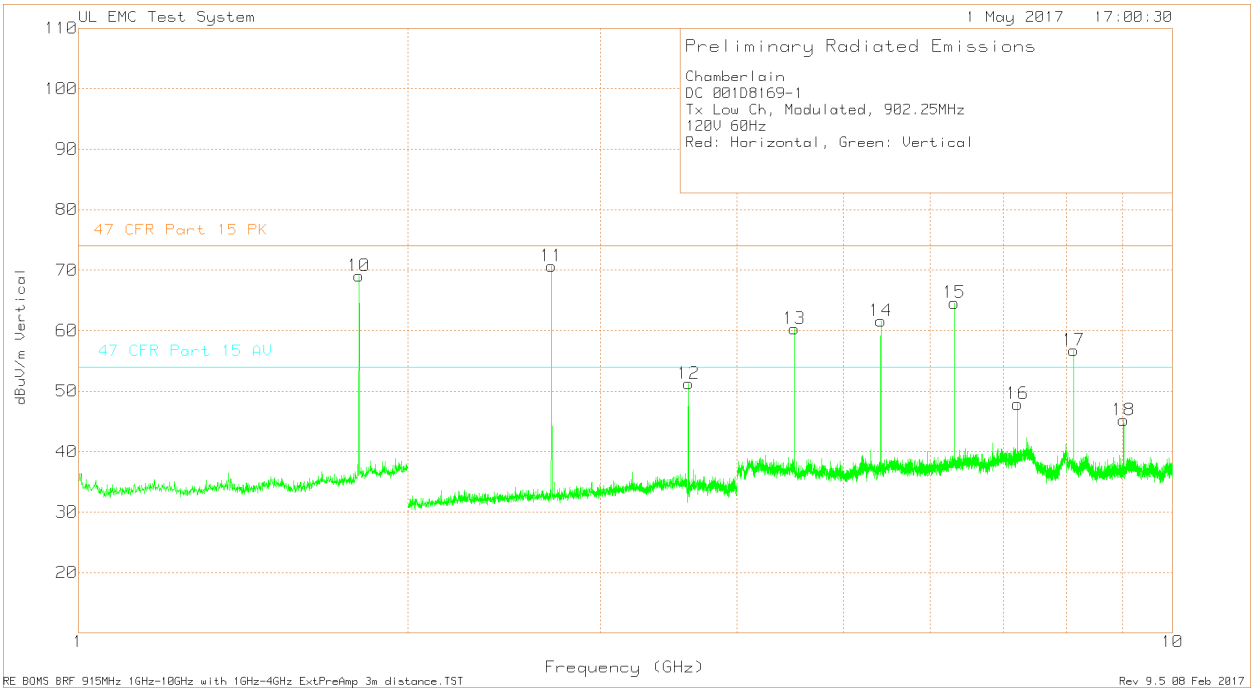


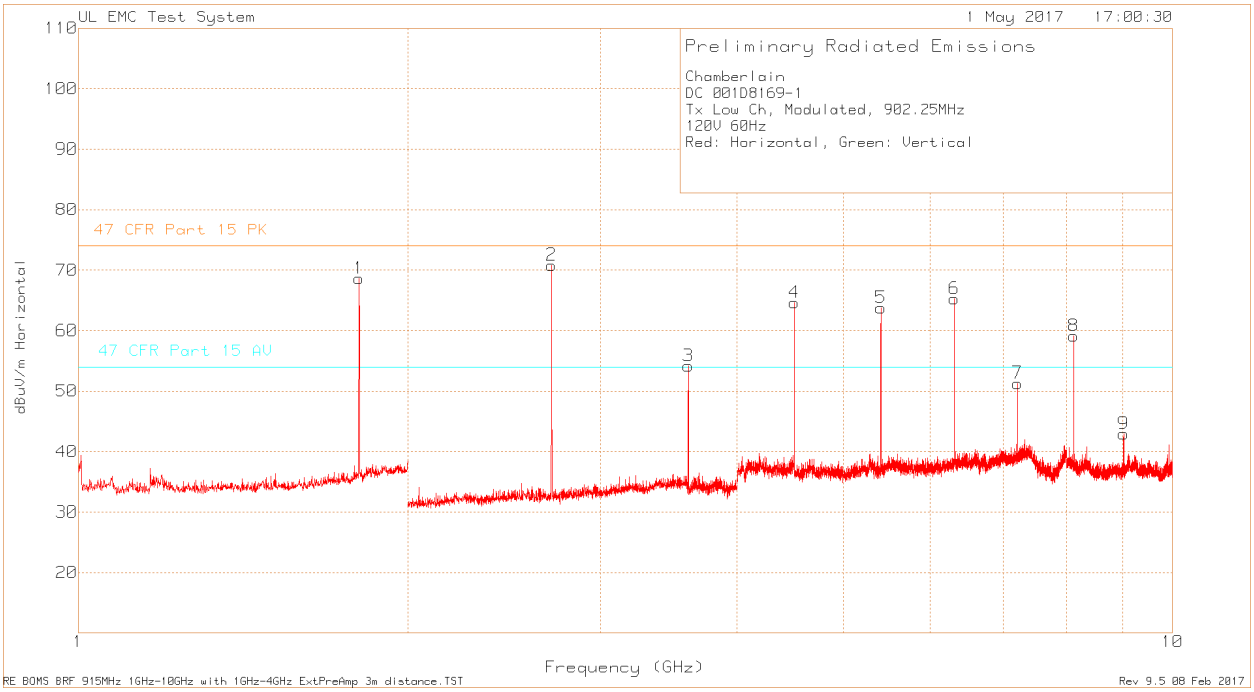
Data

Chamberlain Group Inc.												
DC 1D8169-1												
TX Mode Hopping												
120V 60Hz												
Red= Horizontal Green= Vertical												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Band Reject Filter dB	Level dBuV/m	CFR Part 15.209 dBuV/m 10m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	104.2475	37.75	Pk	11.3	-29.8	-	19.25	33.07	-13.82	0-360	398	H
2	120.185	37.16	Pk	13.2	-29.7	-	20.66	33.07	-12.41	0-360	398	H
3	127.92	36.21	Pk	13.9	-29.7	-	20.41	33.07	-12.66	0-360	398	H
4	199.6175	36.65	Pk	16.2	-28.6	-	24.25	33.07	-8.82	0-360	398	H
5	71.905	41.51	Pk	6.4	-29.9	-	18.01	29.55	-11.54	0-360	398	V
6	87.97	39.98	Pk	8.7	-29.9	-	18.78	29.55	-10.77	0-360	251	V
7	103.95	40.81	Pk	11.3	-29.8	-	22.31	33.07	-10.76	0-360	101	V
8	135.91	39.41	Pk	14.4	-29.6	-	24.21	33.07	-8.86	0-360	101	V
9	215.9	42.08	Pk	11	-29.4	0.1	23.78	33.07	-9.29	0-360	399	H
10	231.8	42.87	Pk	10.9	-29.3	0.1	24.57	35.57	-11	0-360	399	H
11	247.8	42.72	Pk	11.9	-29.3	0.2	25.52	35.57	-10.05	0-360	299	H
12	263.8	42.22	Pk	12.3	-29.1	0.1	25.52	35.57	-10.05	0-360	399	H
13	843.9	31.27	Pk	22.5	-28	7.5	33.27	-	-	0-360	399	H
14	848.5	30.5	Pk	22.5	-27.7	9.7	35	-	-	0-360	98	H
15	951.1	30.15	Pk	23.3	-27.3	9.5	35.65	-	-	0-360	199	H
16	954.4	30.75	Pk	23.4	-27.2	6.1	33.05	-	-	0-360	399	H
17	232.1	38.84	Pk	10.9	-29.3	0.1	20.54	35.57	-15.03	0-360	99	V
18	263.8	43.08	Pk	12.3	-29.1	0.1	26.38	35.57	-9.19	0-360	99	V
19	844.9	30.59	Pk	22.4	-27.9	7.9	32.99	-	-	0-360	299	V
20	849.7	29.98	Pk	22.6	-27.7	10.3	35.18	-	-	0-360	99	V
21	951.5	30.56	Pk	23.3	-27.3	9	35.56	-	-	0-360	99	V
22	952.7	31.28	Pk	23.4	-27.2	7.5	34.98	-	-	0-360	99	V
Pk - Peak detector												

8.2.1. SPURIOUS EMISSIONS 1GHz TO 10GHz

Low Channel Plots





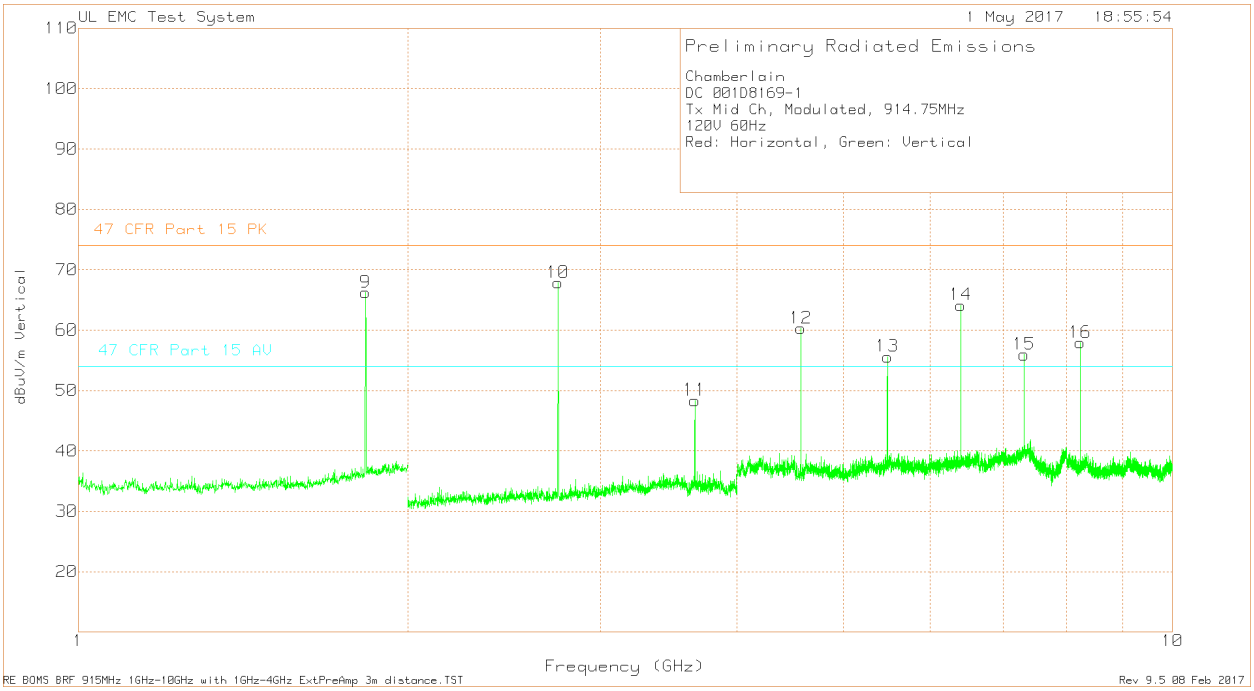
Low Channel Data

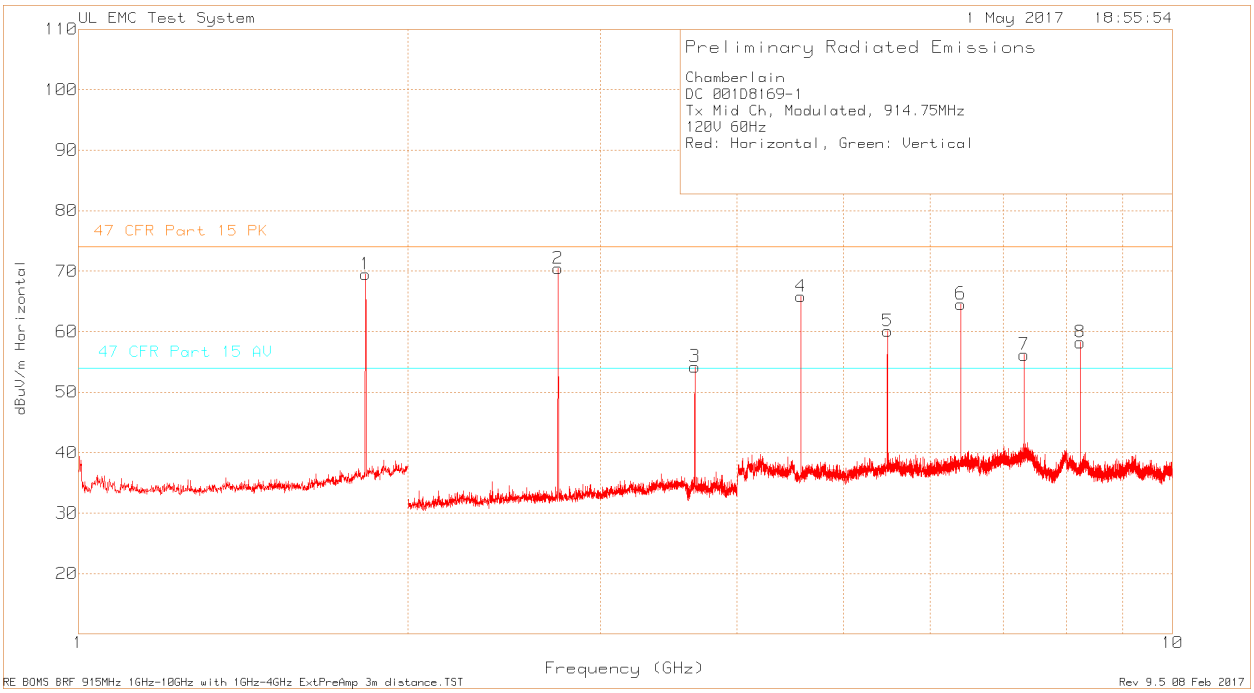
Chamberlain
DC 001D8169-1
Tx Low Ch, Modulated, 902.25MHz
120V 60Hz
Red: Horizontal, Green: Vertical
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Anteanna Factor dB/m	BRF Factor dB	Path Factor dB	Peak Level dBuV/m	Peak Limit 15.209 dBuV/m	Peak Margin (dB)	Hopping Duty Cycle Factor dB	Average Level with Duty Cycle Factor dBuV/m	Average Limit 15.209 dBuV/m	Average Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.805	96.28	Pk	26.8	0.4	-54.88	68.6	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	H
2	*2.706	99.66	Pk	22.1	N/A	-50.94	70.82	74	-3.18	-24.9	45.92	54	-8.08	0-360	150	H
3	*3.609	81.29	Pk	23.2	N/A	-50.34	54.15	74	-19.85	-24.9	29.25	54	-24.75	0-360	150	H
4	*4.511	88.67	Pk	27.8	N/A	-51.86	64.61	74	-9.39	-24.9	39.71	54	-14.29	0-360	149	H
5	*5.413	86.13	Pk	27.9	N/A	-50.26	63.77	74	-10.23	-24.9	38.87	54	-15.13	0-360	149	H
6	6.315	83.83	Pk	29.2	N/A	-47.74	65.29	N/A	N/A	N/A	N/A	N/A	N/A	0-360	149	H
7	7.218	67.83	Pk	29.8	N/A	-46.35	51.28	N/A	N/A	N/A	N/A	N/A	N/A	0-360	100	H
8	*8.119	70.68	Pk	36.2	N/A	-47.75	59.13	74	-14.87	-24.9	34.23	54	-19.77	0-360	150	H
9	*9.023	56.58	Pk	36.1	N/A	-49.77	42.91	74	-31.09	-24.9	18.01	54	-35.99	0-360	200	H
10	1.805	96.71	Pk	26.8	0.4	-54.88	69.03	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	V
11	*2.707	99.5	Pk	22.1	N/A	-50.95	70.65	74	-3.35	-24.9	45.75	54	-8.25	0-360	200	V
12	*3.61	78.35	Pk	23.2	N/A	-50.33	51.22	74	-22.78	-24.9	26.32	54	-27.68	0-360	150	V
13	*4.511	84.35	Pk	27.8	N/A	-51.86	60.29	74	-13.71	-24.9	35.39	54	-18.61	0-360	150	V
14	*5.413	83.94	Pk	27.9	N/A	-50.26	61.58	74	-12.42	-24.9	36.68	54	-17.32	0-360	150	V
15	6.316	83.12	Pk	29.2	N/A	-47.74	64.58	N/A	N/A	N/A	N/A	N/A	N/A	0-360	200	V
16	7.218	64.41	Pk	29.8	N/A	-46.35	47.86	N/A	N/A	N/A	N/A	N/A	N/A	0-360	200	V
17	*8.12	68.31	Pk	36.2	N/A	-47.78	56.73	74	-17.27	-24.9	31.83	54	-22.17	0-360	150	V
18	*9.022	58.85	Pk	36.1	N/A	-49.78	45.17	74	-28.83	-24.9	20.27	54	-33.73	0-360	200	V

* Indicates frequency in restricted band. No limit applies outside of the restricted band.
Pk - Peak detector

Middle Channel Plots





Middle Channel Data

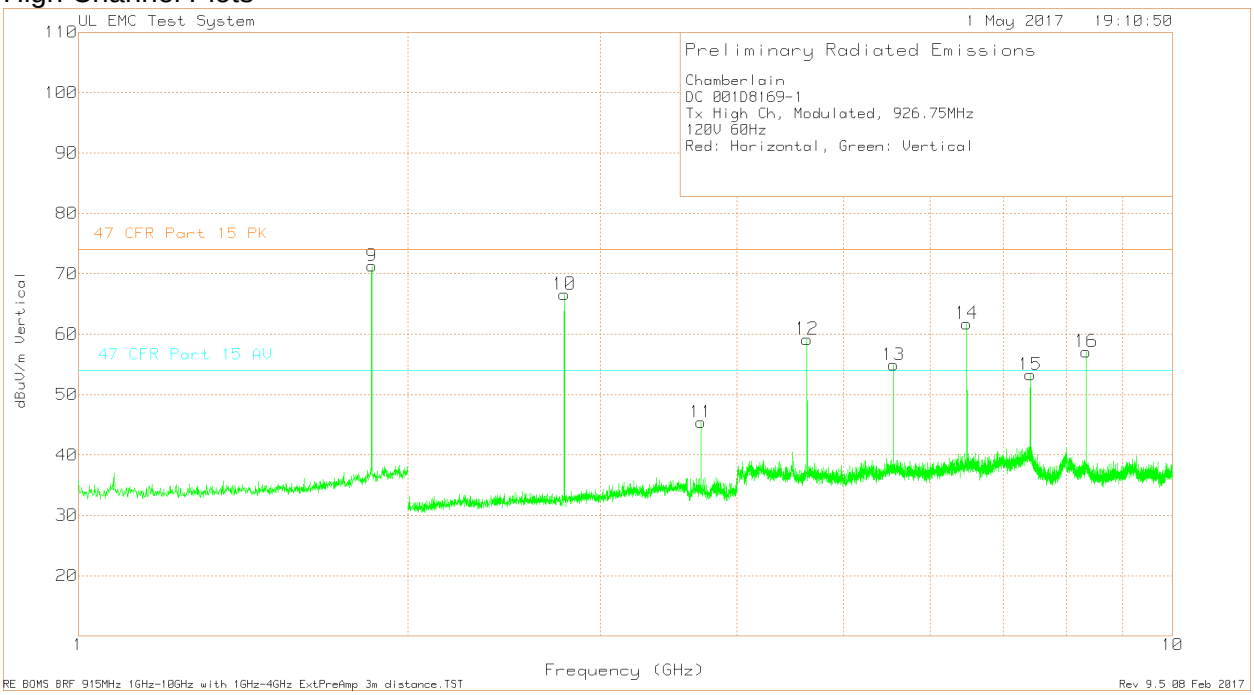
Chamberlain
DC 001D8169-1
Tx Mid Ch, Modulated, 914.75MHz
120V 60Hz
Red: Horizontal, Green: Vertical
Trace MArkers

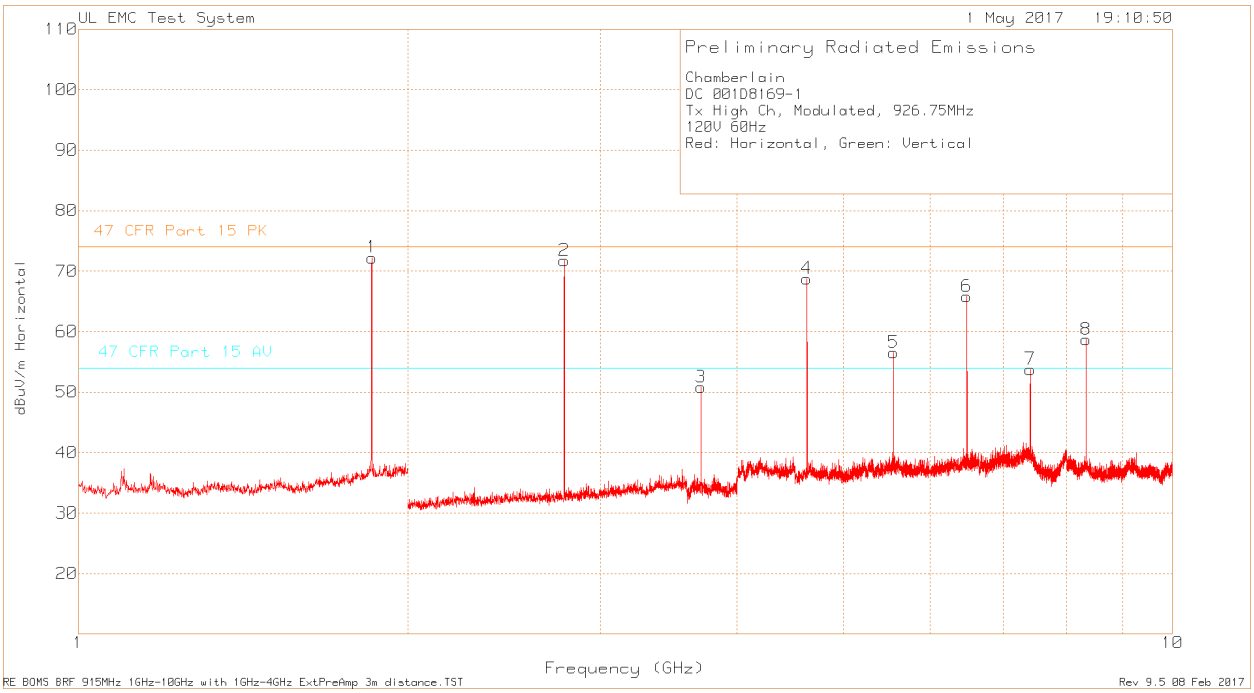
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Anteanna Factor dB/m	BRF Factor dB	Path Factor dB	Peak Level dBuV/m	Peak Limit 15.209 dBuV/m	Peak Margin (dB)	Hopping Duty Cycle Factor dB	Average Level with Duty Cycle Factor dBuV/m	Average Limit 15.209 dBuV/m	Average Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.83	96.77	Pk	27	0.4	-54.66	69.51	N/A	N/A	N/A	N/A	N/A	N/A	0-360	101	H
2	*2.744	99.25	Pk	22.1	N/A	-50.89	70.46	74	-3.54	-24.9	45.56	54	-8.44	0-360	150	H
3	*3.659	80.19	Pk	23.4	N/A	-49.39	54.2	74	-19.8	-24.9	29.3	54	-24.7	0-360	200	H
4	*4.574	89.94	Pk	27.7	N/A	-51.86	65.78	74	-8.22	-24.9	40.88	54	-13.12	0-360	150	H
5	5.488	82.08	Pk	28.1	N/A	-50.06	60.12	N/A	N/A	N/A	N/A	N/A	N/A	0-360	98	H
6	6.403	83.05	Pk	29.2	N/A	-47.68	64.57	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	H
7	*7.318	71.58	Pk	30.6	N/A	-46.01	56.17	74	-17.83	-24.9	31.27	54	-22.73	0-360	150	H
8	*8.232	70.52	Pk	36.4	N/A	-48.7	58.22	74	-15.78	-24.9	33.32	54	-20.68	0-360	200	H
9	1.83	93.47	Pk	27	0.4	-54.66	66.21	N/A	N/A	N/A	N/A	N/A	N/A	0-360	200	V
10	*2.744	96.63	Pk	22.1	N/A	-50.89	67.84	74	-6.16	-24.9	42.94	54	-11.06	0-360	150	V
11	*3.659	74.36	Pk	23.4	N/A	-49.39	48.37	74	-25.63	-24.9	23.47	54	-30.53	0-360	150	V
12	*4.574	84.46	Pk	27.7	N/A	-51.86	60.3	74	-13.7	-24.9	35.4	54	-18.6	0-360	150	V
13	5.488	77.58	Pk	28.1	N/A	-50.06	55.62	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	V
14	6.403	82.62	Pk	29.2	N/A	-47.68	64.14	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	V
15	*7.318	71.36	Pk	30.6	N/A	-46.01	55.95	74	-18.05	-24.9	31.05	54	-22.95	0-360	150	V
16	*8.232	70.23	Pk	36.4	N/A	-48.7	57.93	74	-16.07	-24.9	33.03	54	-20.97	0-360	200	V

* Indicates frequency in restricted band. No limit applies outside of the restricted band.

Pk - Peak detector

High Channel Plots





High Channel Data

Chamberlain
DC 001D8169-1
Tx High Ch, Modulated, 926.75MHz
120V 60Hz
Red: Horizontal, Green: Vertical
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Anteanna Factor dB/m	BRF Factor dB	Path Factor dB	Peak Level dBuV/m	Peak Limit 15.209 dBuV/m	Peak Margin (dB)	Hopping Duty Cycle Factor dB	Average Level with Duty Cycle Factor dBuV/m	Average Limit 15.209 dBuV/m	Average Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.854	99.19	Pk	27.3	0.4	-54.65	72.24	N/A	N/A	N/A	N/A	N/A	N/A	0-360	98	H
2	*2.78	100.29	Pk	22.2	N/A	-50.73	71.76	74	-2.24	-24.9	46.86	54	-7.14	0-360	200	H
3	*3.707	76.93	Pk	23.5	N/A	-49.6	50.83	74	-23.17	-24.9	25.93	54	-28.07	0-360	200	H
4	*4.633	92.8	Pk	27.7	N/A	-51.74	68.76	74	-5.24	-24.9	43.86	54	-10.14	0-360	150	H
5	5.56	77.68	Pk	28.3	N/A	-49.48	56.5	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	H
6	6.487	84.14	Pk	29.1	N/A	-47.42	65.82	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	H
7	*7.414	69.95	Pk	31	N/A	-47.18	53.77	74	-20.23	-24.9	28.87	54	-25.13	0-360	100	H
8	*8.34	69.44	Pk	36.5	N/A	-47.24	58.7	74	-15.3	-24.9	33.8	54	-20.2	0-360	200	H
9	1.854	98.26	Pk	27.3	0.4	-54.65	71.31	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	V
10	*2.78	95.13	Pk	22.2	N/A	-50.73	66.6	74	-7.4	-24.9	41.7	54	-12.3	0-360	150	V
11	*3.708	71.55	Pk	23.5	N/A	-49.62	45.43	74	-28.57	-24.9	20.53	54	-33.47	0-360	150	V
12	*4.634	83.2	Pk	27.7	N/A	-51.73	59.17	74	-14.83	-24.9	34.27	54	-19.73	0-360	200	V
13	5.561	76.07	Pk	28.3	N/A	-49.47	54.9	N/A	N/A	N/A	N/A	N/A	N/A	0-360	150	V
14	6.487	80.08	Pk	29.1	N/A	-47.42	61.76	N/A	N/A	N/A	N/A	N/A	N/A	0-360	200	V
15	*7.414	69.49	Pk	31	N/A	-47.18	53.31	74	-20.69	-24.9	28.41	54	-25.59	0-360	200	V
16	*8.341	67.87	Pk	36.5	N/A	-47.25	57.12	74	-16.88	-24.9	32.22	54	-21.78	0-360	150	V

* Indicates frequency in restricted band. No limit applies outside of the restricted band.
Pk - Peak detector

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.10:2013, Section 6.2

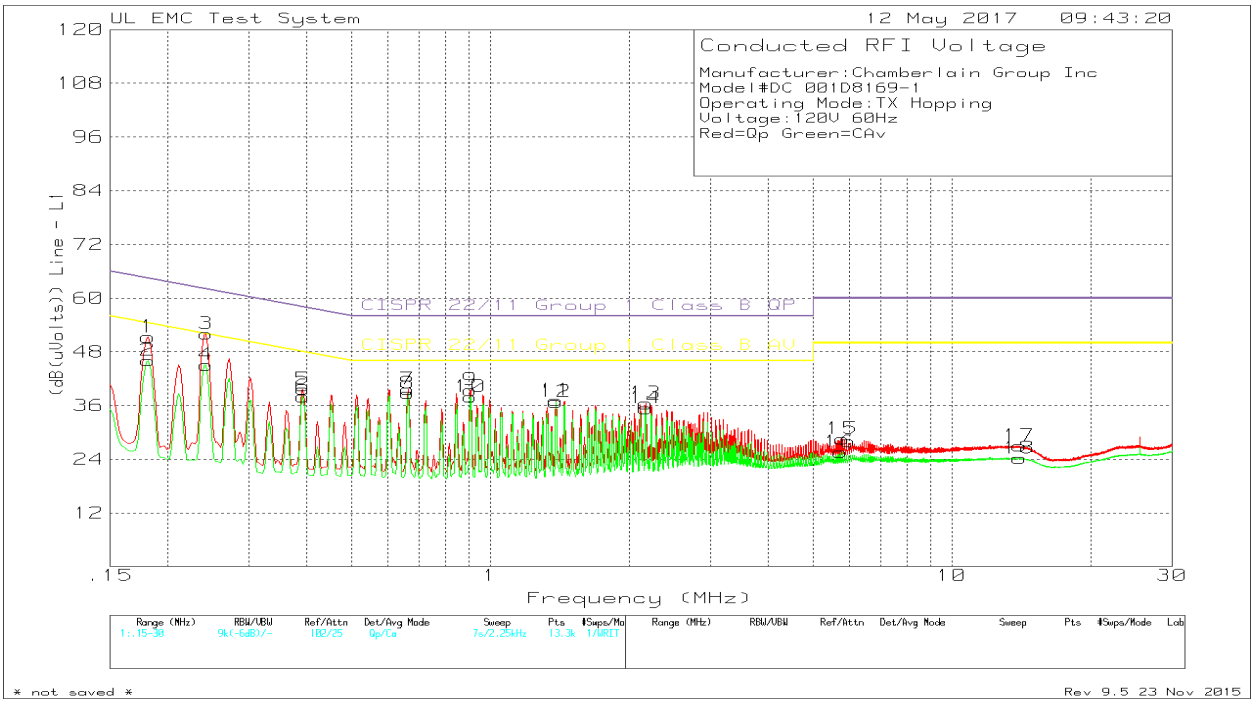
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

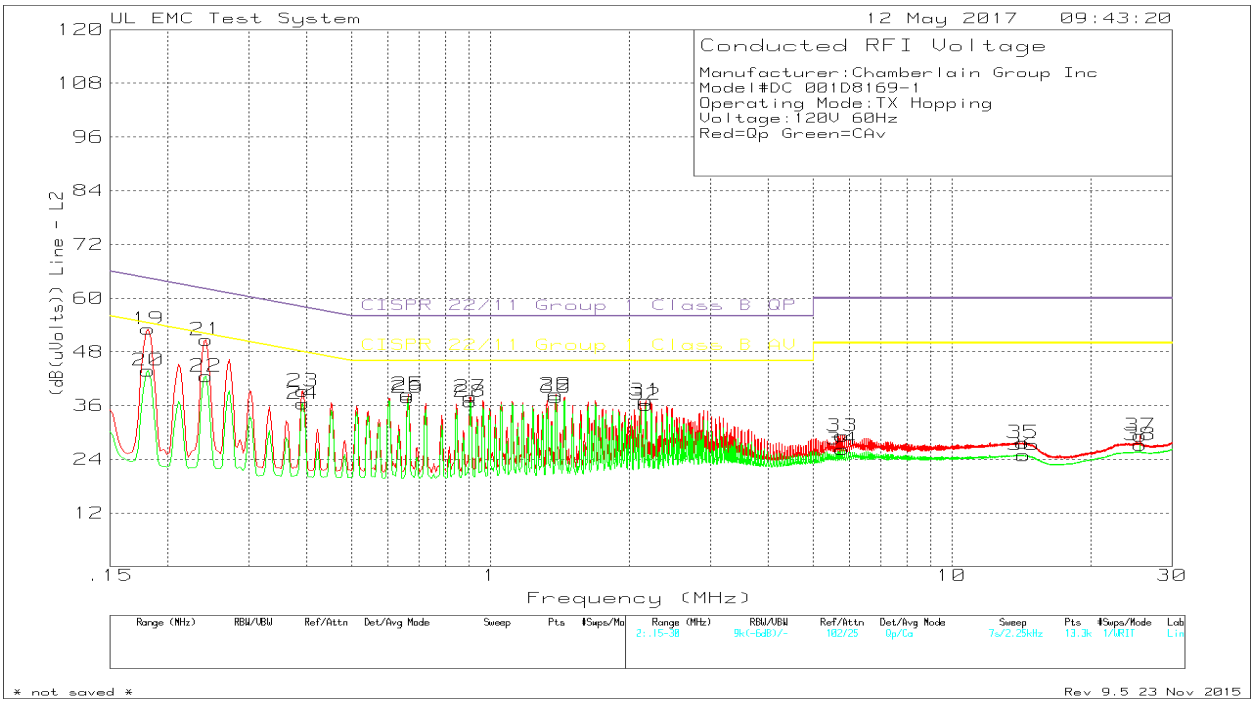
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

LINE 1 RESULTS - PLOT



LINE 2 RESULTS - PLOT



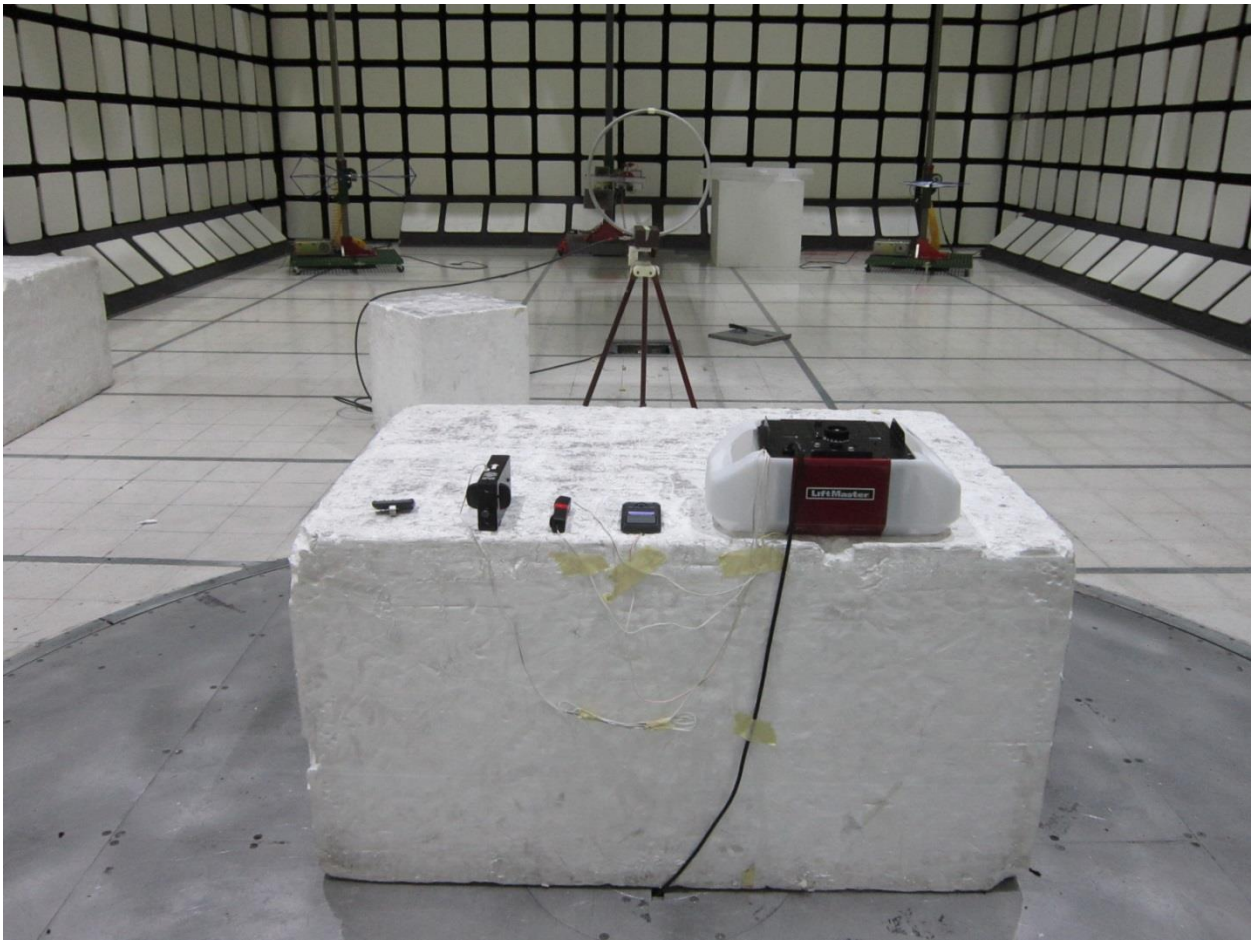
Line Conducted Emissions data

Manufacturer:Chamberlain Group Inc											
Model#DC 001D8169-1											
Operating Mode:TX Hopping											
Voltage:120V 60Hz											
Red=Qp Green=CAv											
Trace Markers											
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Doungle Factor dB	Level dBuV	QP Limit 47 CFR Part 15.207 dBuV	Margin (dB)	AV Limit 47 CFR Part 15.207 dBuV	Margin (dB)
Line											
1	0.1815	39.51	Qp	0.1	11.7	0	51.31	64.42	-13.11	-	-
2	0.1815	34.3	Ca	0.1	11.7	0	46.1	64.42	-18.32	54.42	-8.32
3	0.24225	40.72	Qp	0	11.3	0	52.02	62.02	-10	-	-
4	0.24225	33.8	Ca	0	11.3	0	45.1	62.02	-16.92	52.02	-6.92
5	0.393	28.86	Qp	0	10.8	0	39.66	58	-18.34	-	-
6	0.393	27.26	Ca	0	10.8	0	38.06	58	-19.94	48	-9.94
7	0.663	29.09	Qp	0	10.6	0	39.69	56	-16.31	-	-
8	0.663	28.13	Ca	0	10.6	0	38.73	56	-17.27	46	-7.27
9	0.906	28.88	Qp	0	10.6	0	39.48	56	-16.52	-	-
10	0.906	27.34	Ca	0	10.6	0	37.94	56	-18.06	46	-8.06
11	1.3875	26.58	Qp	0	10.6	0	37.18	56	-18.82	-	-
12	1.3875	26.18	Ca	0	10.6	0	36.78	56	-19.22	46	-9.22
13	2.17275	25.91	Qp	0	10.6	0	36.51	56	-19.49	-	-
14	2.17275	24.8	Ca	0	10.6	0	35.4	56	-20.6	46	-10.6
15	5.79188	17.66	Qp	0	10.8	0.1	28.56	60	-31.44	-	-
16	5.73225	14.7	Ca	0	10.8	0.1	25.6	60	-34.4	50	-24.4
17	13.99875	15.5	Qp	0	11.1	0.4	27	60	-33	-	-
18	14.0055	12.73	Ca	0	11.1	0.4	24.23	60	-35.77	50	-25.77
Neutral											
19	0.1815	40.81	Qp	0.1	12.2	0	53.11	64.42	-11.31	-	-
20	0.1815	31.53	Ca	0.1	12.2	0	43.83	64.42	-20.59	54.42	-10.59
21	0.24225	38.86	Qp	0	11.8	0	50.66	62.02	-11.36	-	-
22	0.24225	30.74	Ca	0	11.8	0	42.54	62.02	-19.48	52.02	-9.48
23	0.393	27.97	Qp	0	11.3	0	39.27	58	-18.73	-	-
24	0.393	25.12	Ca	0	11.3	0	36.42	58	-21.58	48	-11.58
25	0.663	27.39	Qp	0	11.1	0	38.49	56	-17.51	-	-
26	0.663	26.69	Ca	0	11.1	0	37.79	56	-18.21	46	-8.21
27	0.906	26.86	Qp	0	11.1	0	37.96	56	-18.04	-	-
28	0.906	25.77	Ca	0	11.1	0	36.87	56	-19.13	46	-9.13
29	1.3875	27.36	Qp	0	11.1	0	38.46	56	-17.54	-	-
30	1.3875	26.77	Ca	0	11.1	0	37.87	56	-18.13	46	-8.13
31	2.17275	26.08	Qp	0	11.1	0	37.18	56	-18.82	-	-
32	2.1705	25.09	Ca	0	11.1	0	36.19	56	-19.81	46	-9.81
33	5.793	17.83	Qp	0	11.3	0.1	29.23	60	-30.77	-	-
34	5.793	14.83	Ca	0	11.3	0.1	26.23	60	-33.77	50	-23.77
35	14.25525	15.59	Qp	0	11.7	0.4	27.69	60	-32.31	-	-
36	14.30925	12.81	Ca	0	11.7	0.4	24.91	60	-35.09	50	-25.09
37	25.59975	16.21	Qp	-0.1	12.2	1	29.31	60	-30.69	-	-
38	25.59975	14.13	Ca	-0.1	12.2	1	27.23	60	-32.77	50	-22.77
Qp - Quasi-Peak detector											
Ca - CISPR Average detection											

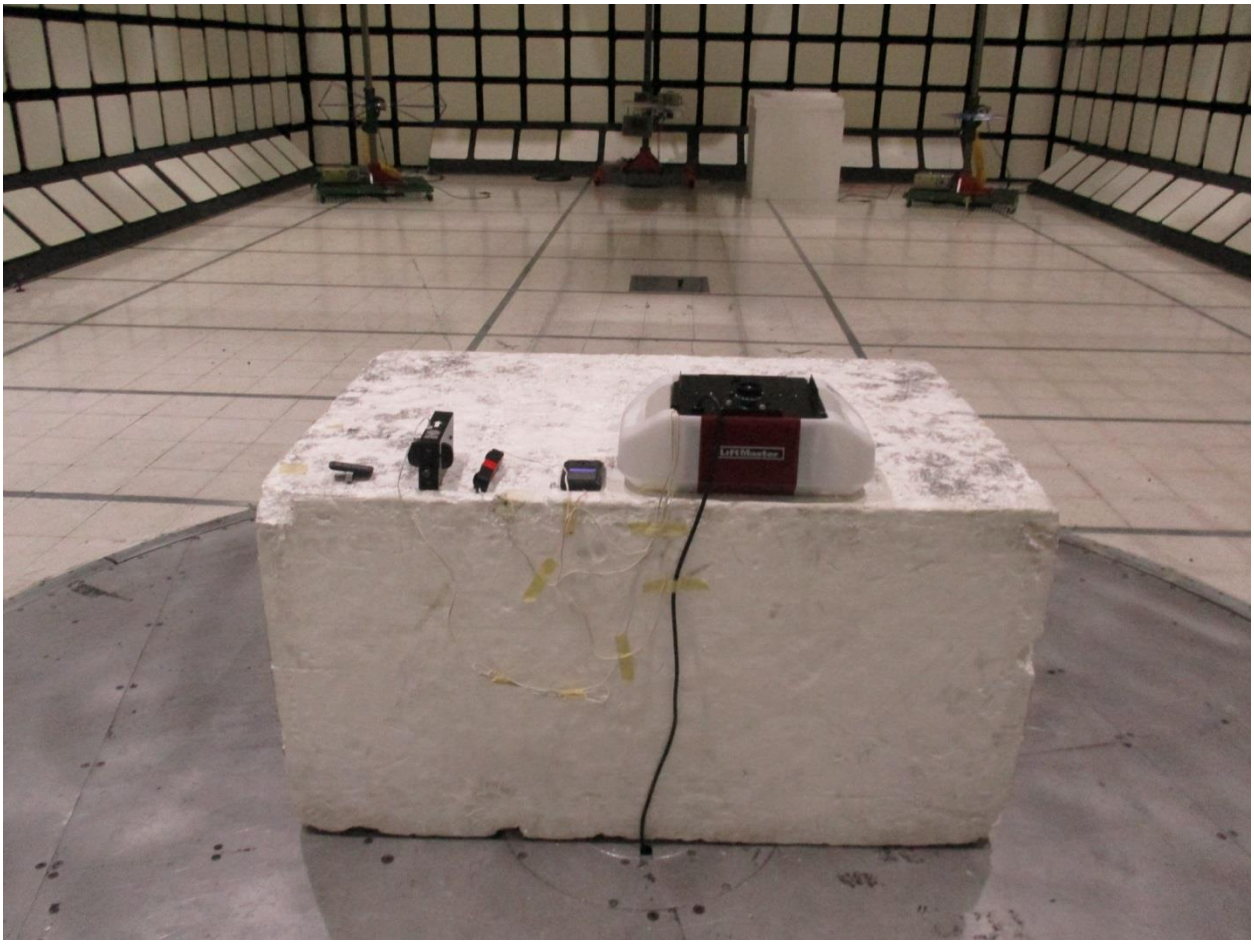
10. SETUP PHOTOS

Line Conducted Emissions

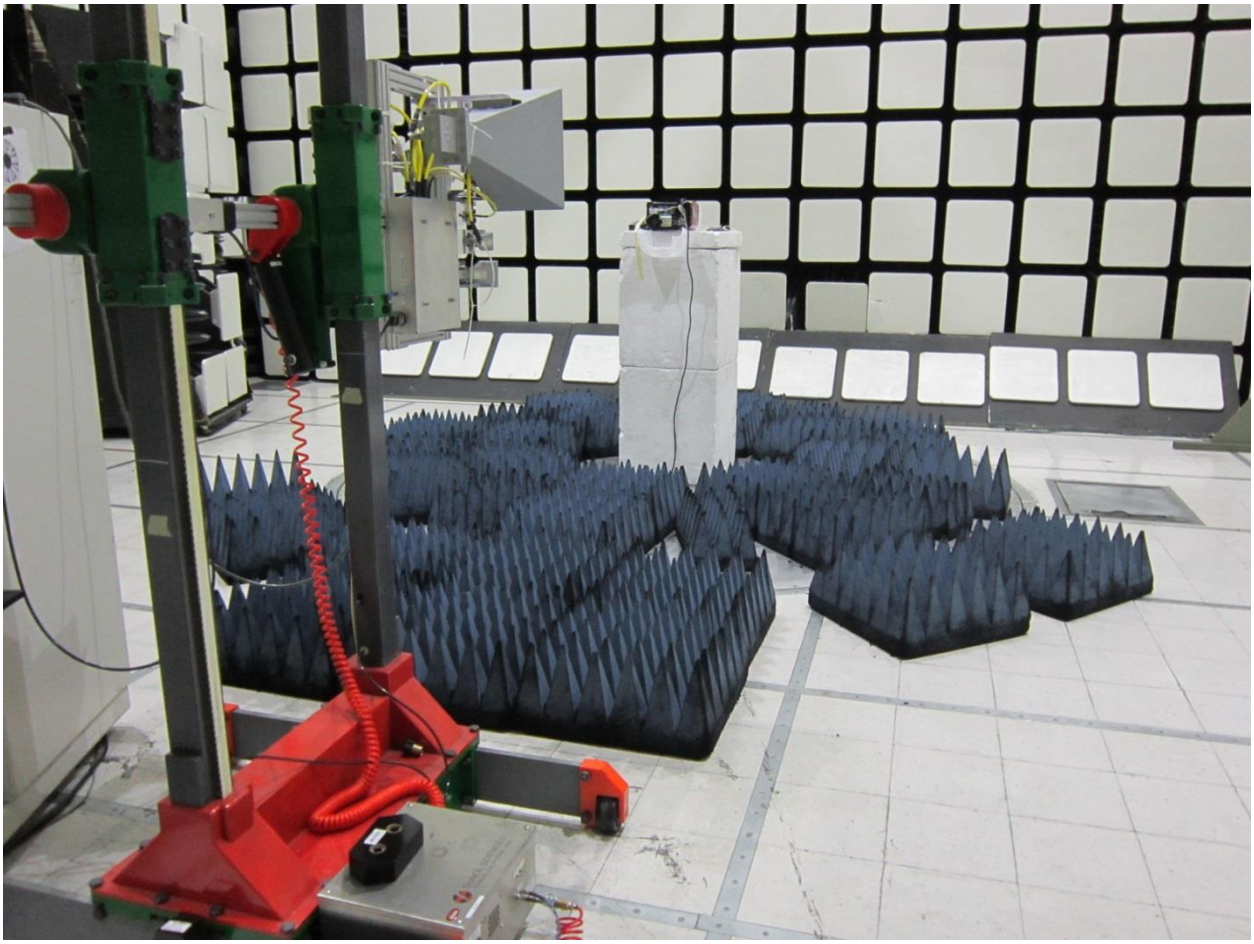
Radiated Emissions 9kHz-30MHz



Radiated Emissions 30MHz – 1GHz



Radiated Emissions 1GHz – 10GHz



END OF REPORT