



FCC 47 CFR PART 15 SUBPART C

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

Bluetooth Wireless Edge

MODEL NUMBER: 75-38076

FCC ID: HBW1D7437

REPORT NUMBER: 10958309A

ISSUE DATE: October 12, 2015

Prepared for
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	2015-10-12	Initial Issue	BM

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Chamberlain Group Inc.
845 N. Larch Ave
Elmhurst, IL 60126

EUT DESCRIPTION: LMWEKITU Monitored Wireless Edge Transmitter Model 75-38076 using assembly 1D7437

MODEL: **75-38076**

SERIAL NUMBER: non – serialized

DATE TESTED: 2015-OCT-10 to 2015-OCT-21

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	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, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL LLC By:



Michael Ferrer
EMC Engineer
UL LLC

Tested By:



Bart Mucha
EMC Engineer
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 15, ANSI C63.4-2009

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://www.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	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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

LMWEKITU Monitored Wireless Edge Transmitter Model 75-38076 using Assembly 1D7437

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	4.69	2.94

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes integral trace antenna.

5.4. SOFTWARE AND FIRMWARE

The test application FW was based off Rev. 1.4

The Bluetooth Radio Stack from TI was 2.1

5.5. WORST-CASE CONFIGURATION AND MODE

EUT was tested when oriented in three planes, X, Y and Z.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Sensors (x2)	Chamberlain	-	-	-

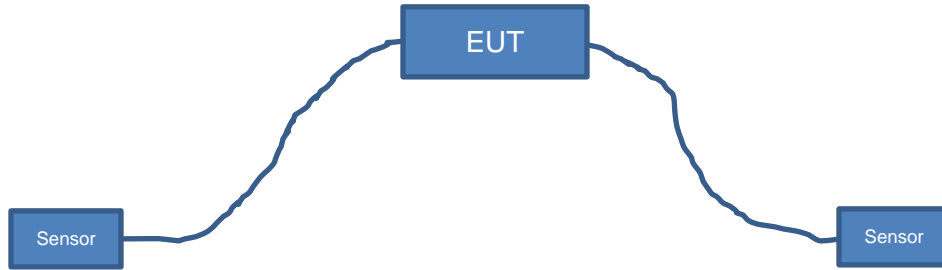
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Wired In	2	none	twisted	1.5m	sensors

TEST SETUP

The EUT is a safety entrapment device connected to two sensors. The device is battery operated.

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	Identifier	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	ESU	EMC4323	20141216	20151231
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	20141830	20151231
Bicon Antenna	Electro-Metrics	EM6912A	EMC4070	20141014	20151031
Log-P Antenna	Chase	UPA6109	EMC4313	20141119	20151130
Loop Antenna	EMCO	6502/1	EMC4026	20150420	20160430
Antenna Array	UL	BOMS	EMC4276	20141201	20151231
Spectrum Analyzer	Agilent	N9030A (PXA)	EMC4360	20141219	20151219

7. ANTENNA PORT TEST RESULTS

8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

8.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE	0.420	20.000	0.021	2.10%	33.56	2.381

Device is a BT LE transmitter only. By its design and its intended mode of operation it only operates in advertisement mode on three channels. The inherent duty cycle is defined by mode of operation where the intended packet length is 420uS per channel and each channel will be used 5 times in 100mS period. The resulting Duty cycle correction factor is -33.55dB

8.2. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r03, Section 8.2.

Output Power: KDB 558074 D01 v03r03, Section 9.1.1.

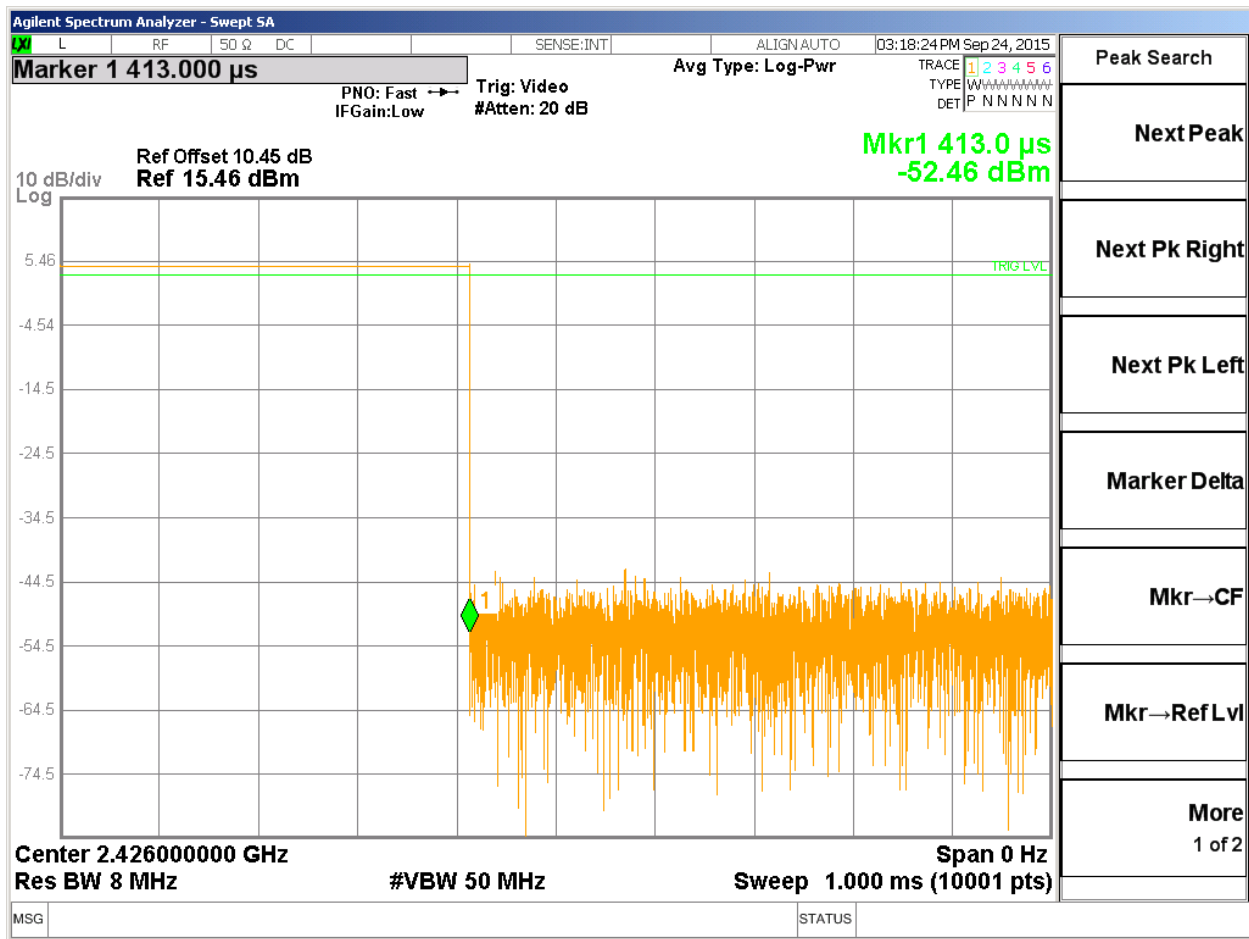
Power Spectral Density: KDB 558074 D01 v03r03, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r03, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r03, Section 12.1.

Band-edge: KDB 558074 D01 v03r03, Section 13.3.3.

8.3. DUTY CYCLE PLOTS



*representative plot of single channel TX time.

8.4. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

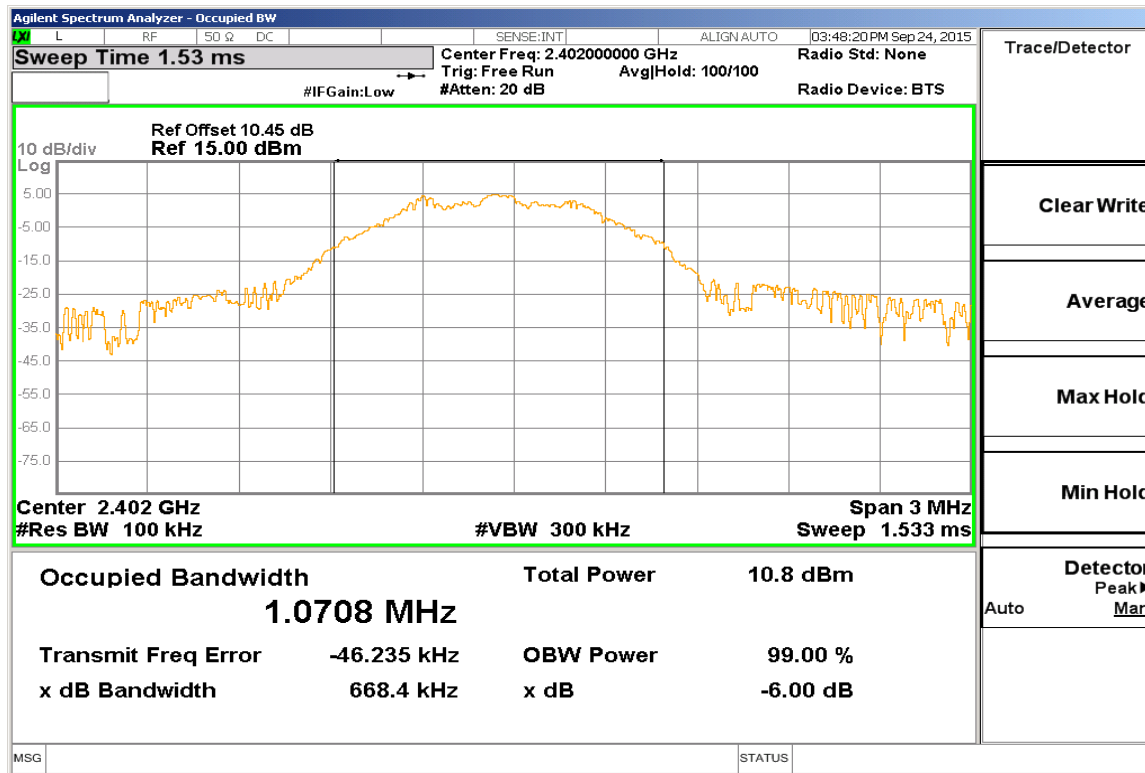
IC RSS-247 Clause 5.2 (1)

The minimum 6 dB bandwidth shall be at least 500 kHz.

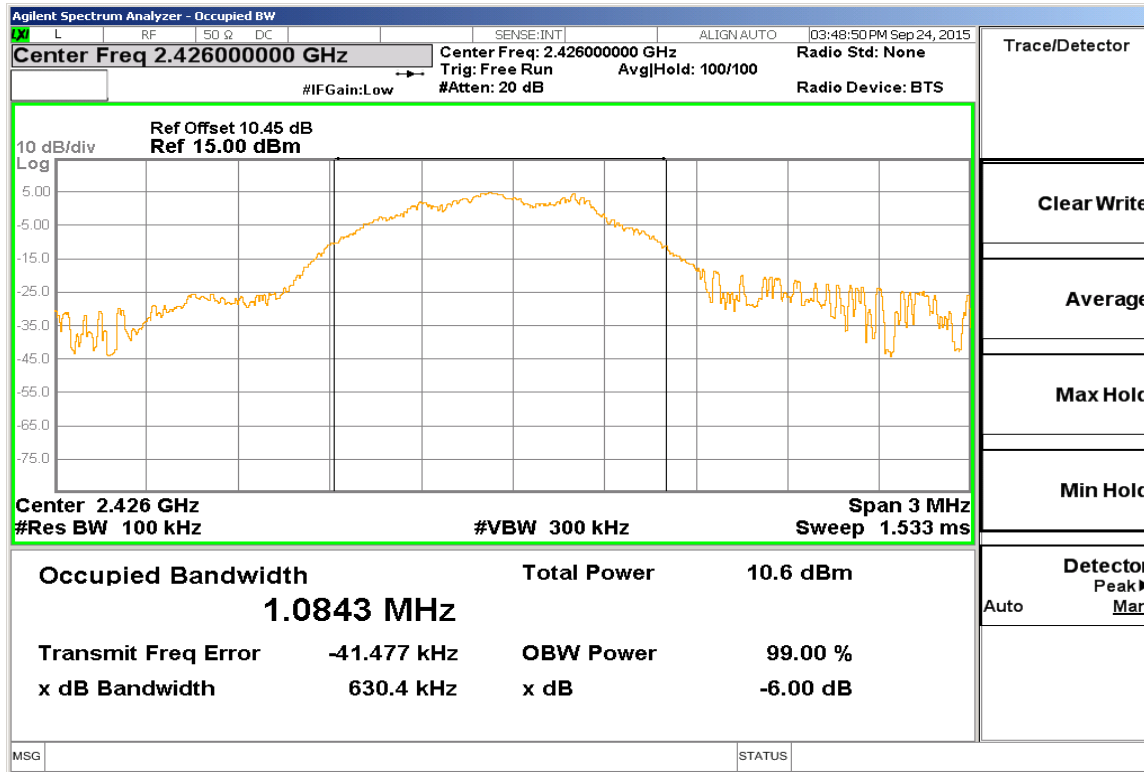
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6684	0.5
Middle	2440	0.6304	0.5
High	2480	0.6804	0.5

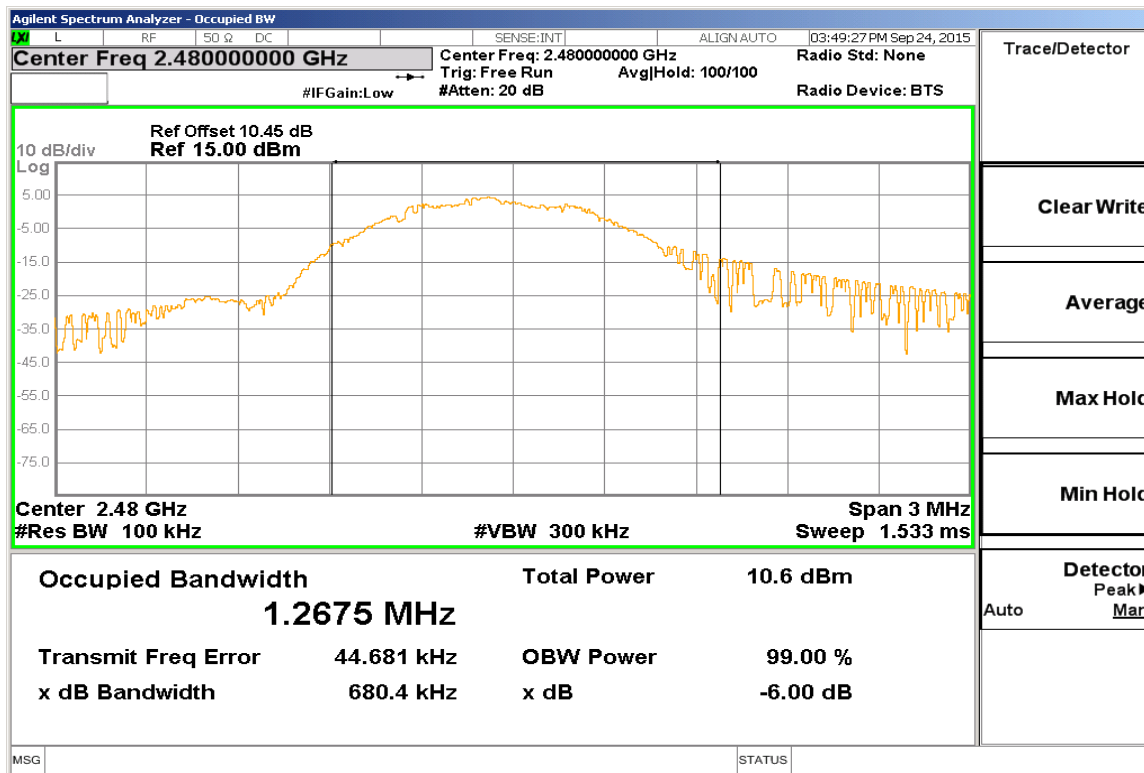
6 dB BANDWIDTH Low Channel



6 dB BANDWIDTH Middle Channel



6 dB BANDWIDTH High Channel



8.5. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

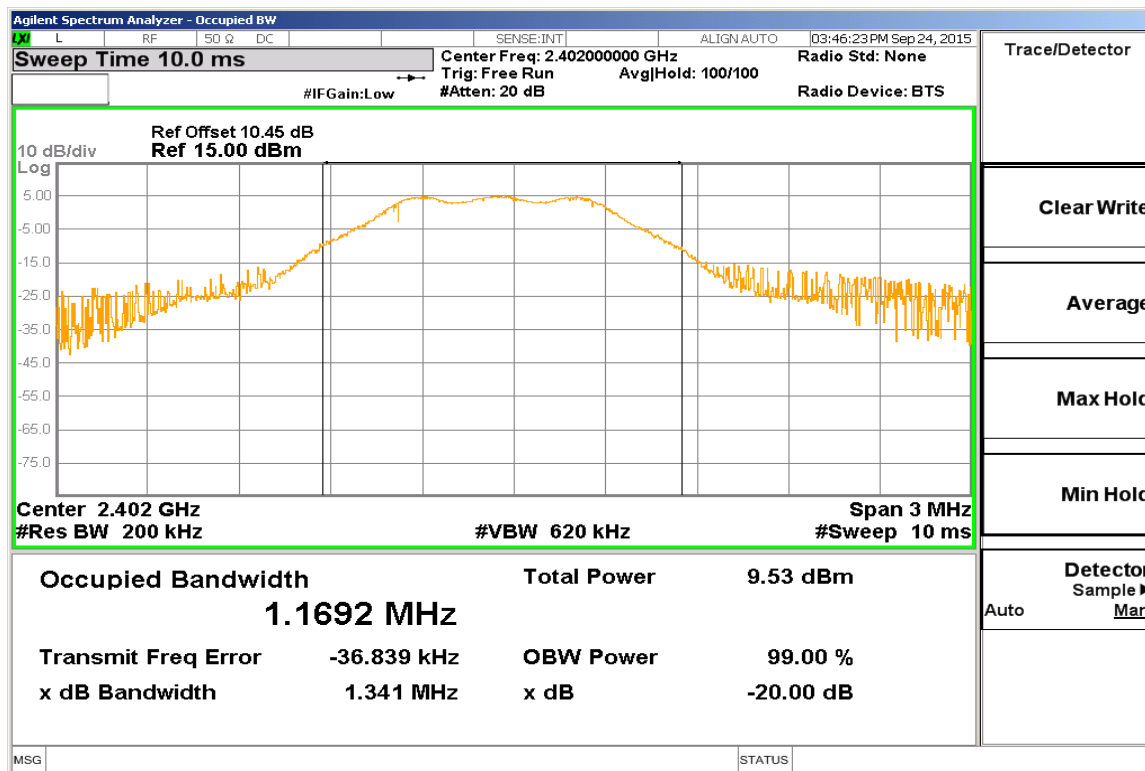
TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

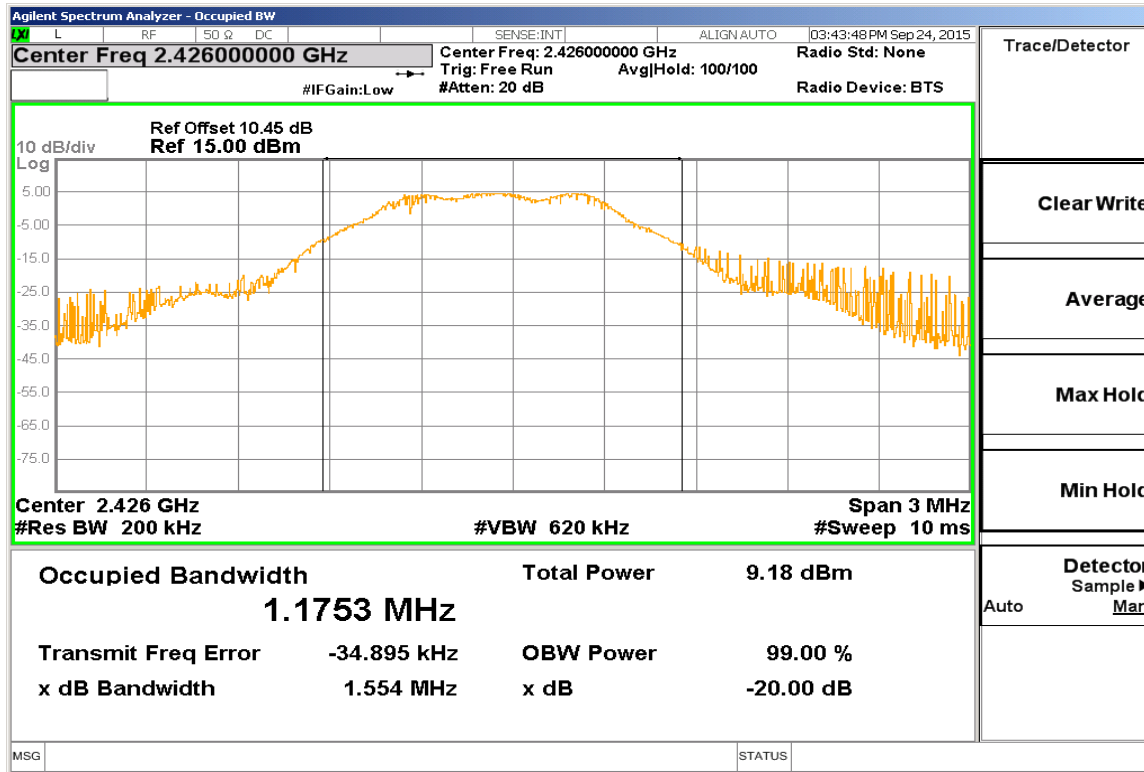
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.1692
Middle	2440	1.1753
High	2480	1.2956

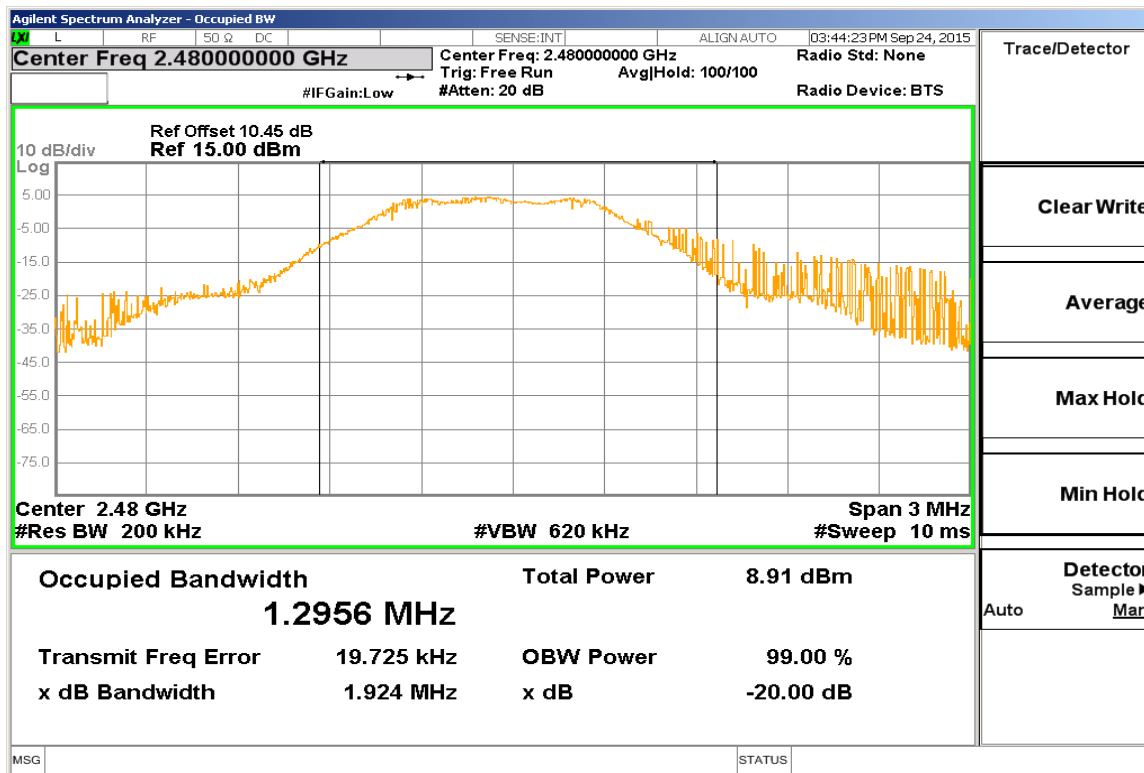
99% BANDWIDTH Low Channel



99% BANDWIDTH Middle Channel



99% BANDWIDTH High Channel



8.6. OUTPUT POWER

LIMITS

FCC §15.247 (b)

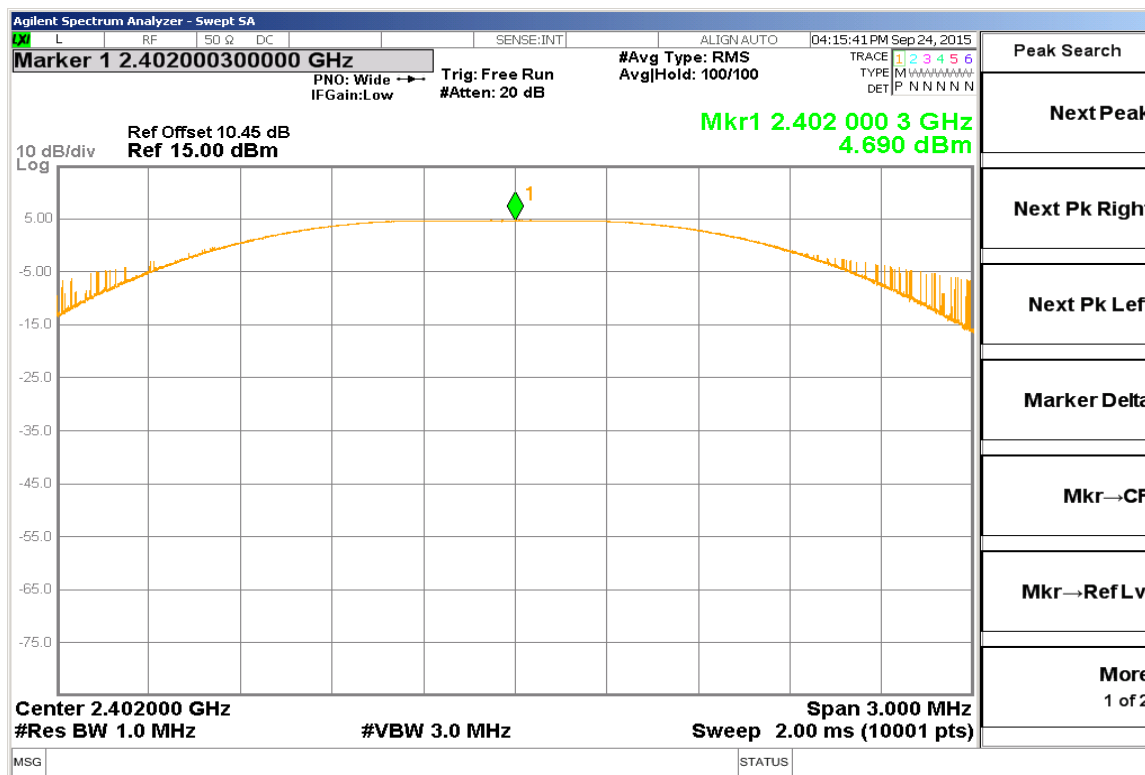
IC RSS-247 Clause 5.4 (4)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

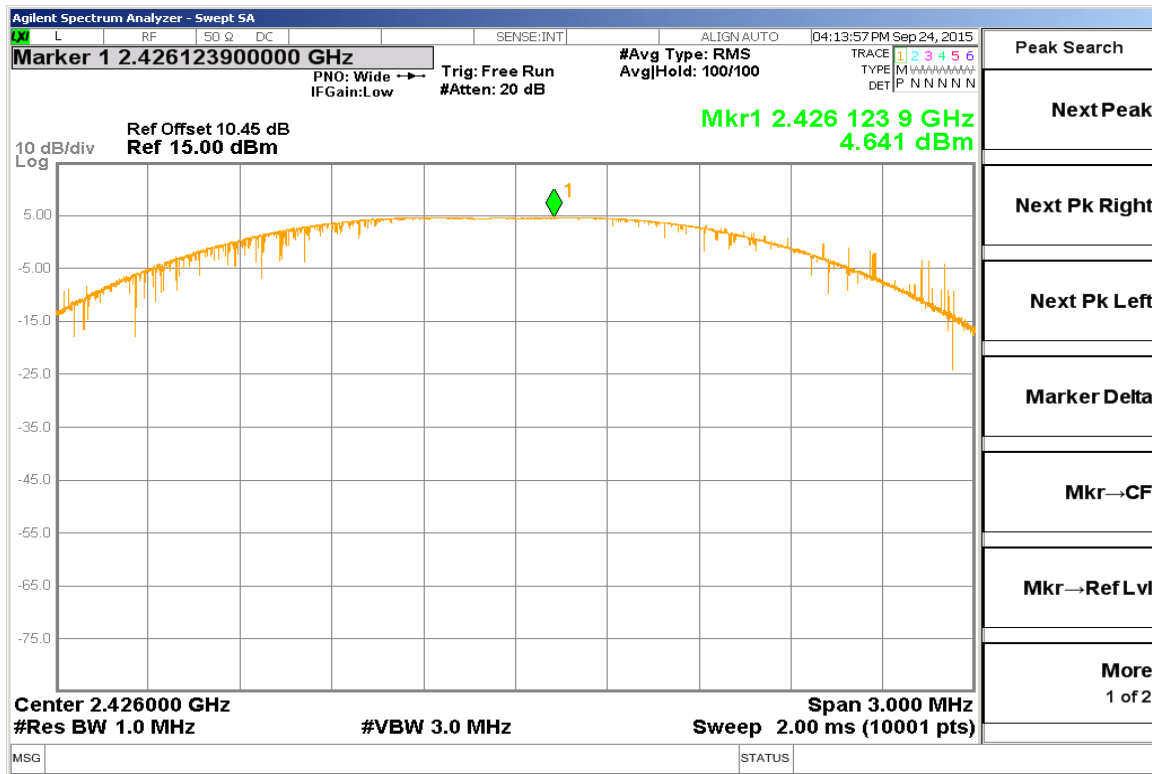
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.690	30	-25.310
Middle	2426	4.641	30	-25.359
High	2480	4.297	30	-25.703

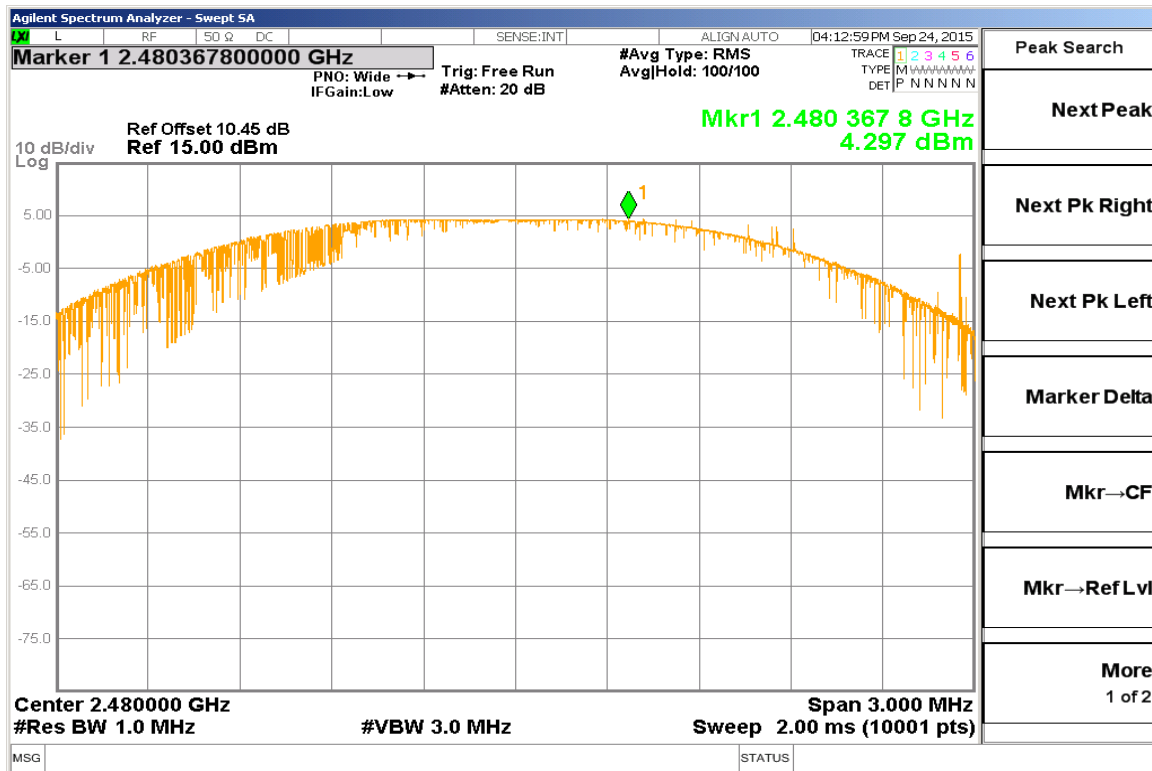
OUTPUT POWER Low Channel



OUTPUT POWER Middle Channel



OUTPUT POWER High Channel



8.7. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

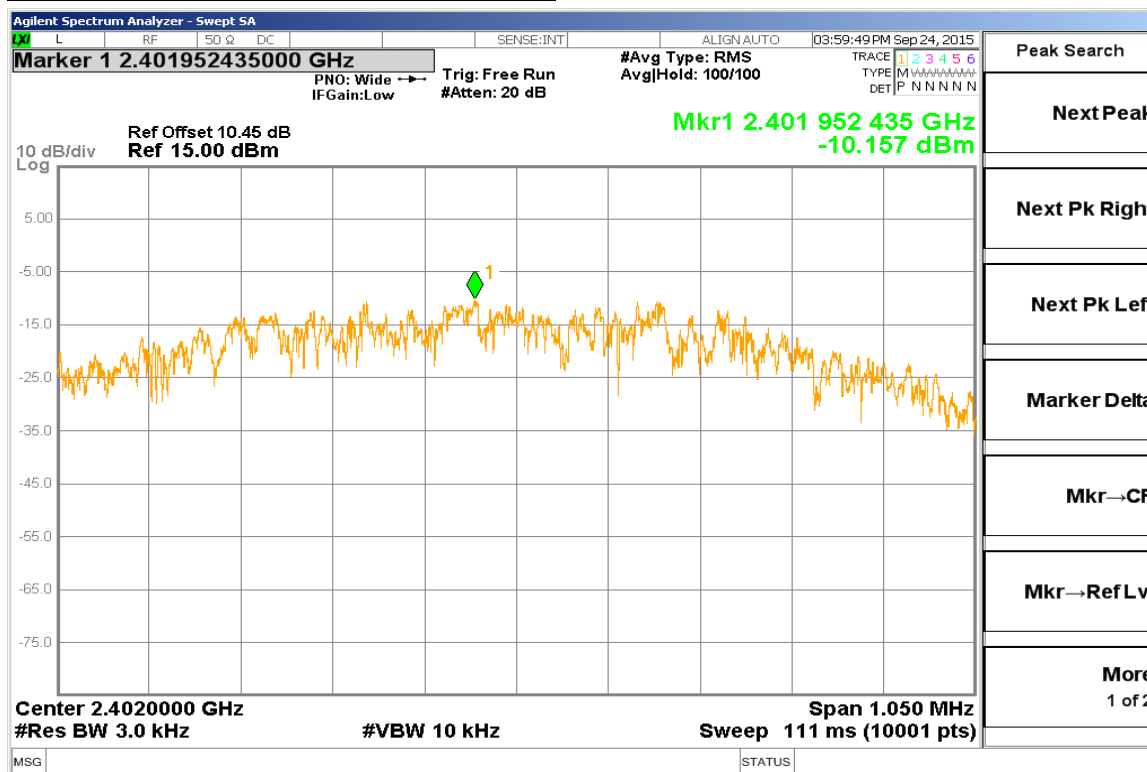
IC RSS-247 Clause 5.2 (2)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

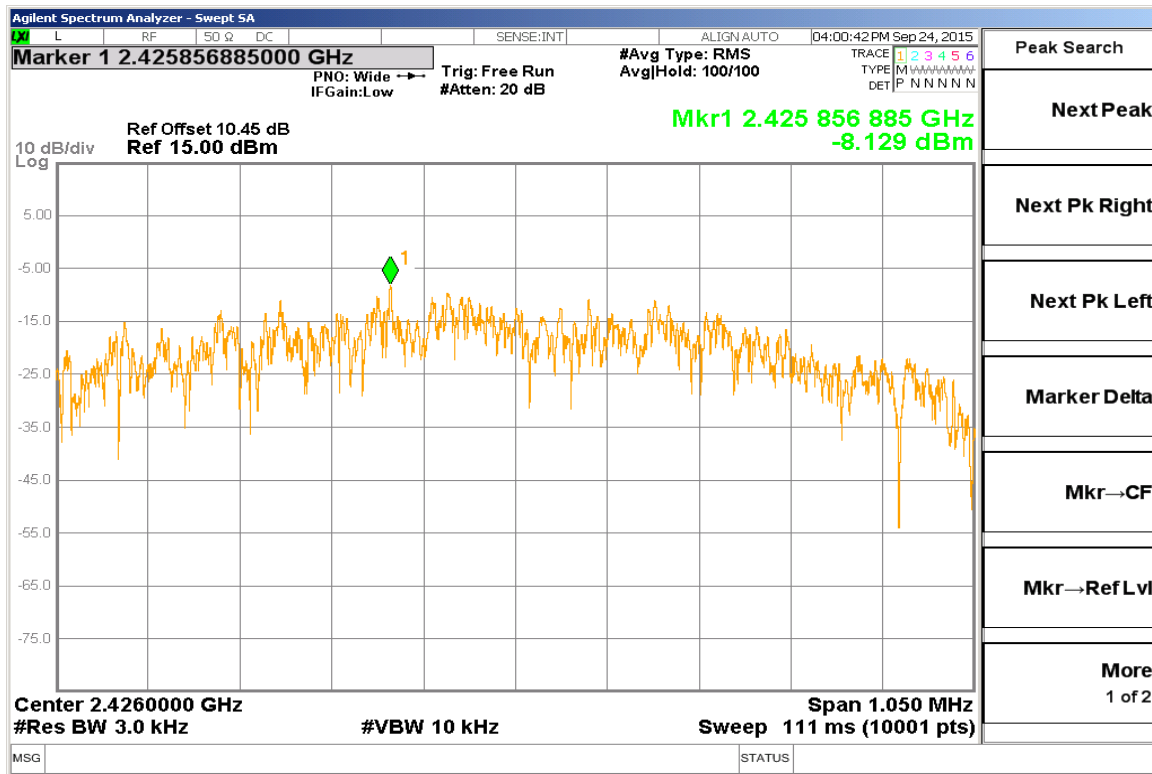
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-10.16	8	-18.16
Middle	2440	-8.13	8	-16.13
High	2480	-9.73	8	-17.73

POWER SPECTRAL DENSITY Low Channel

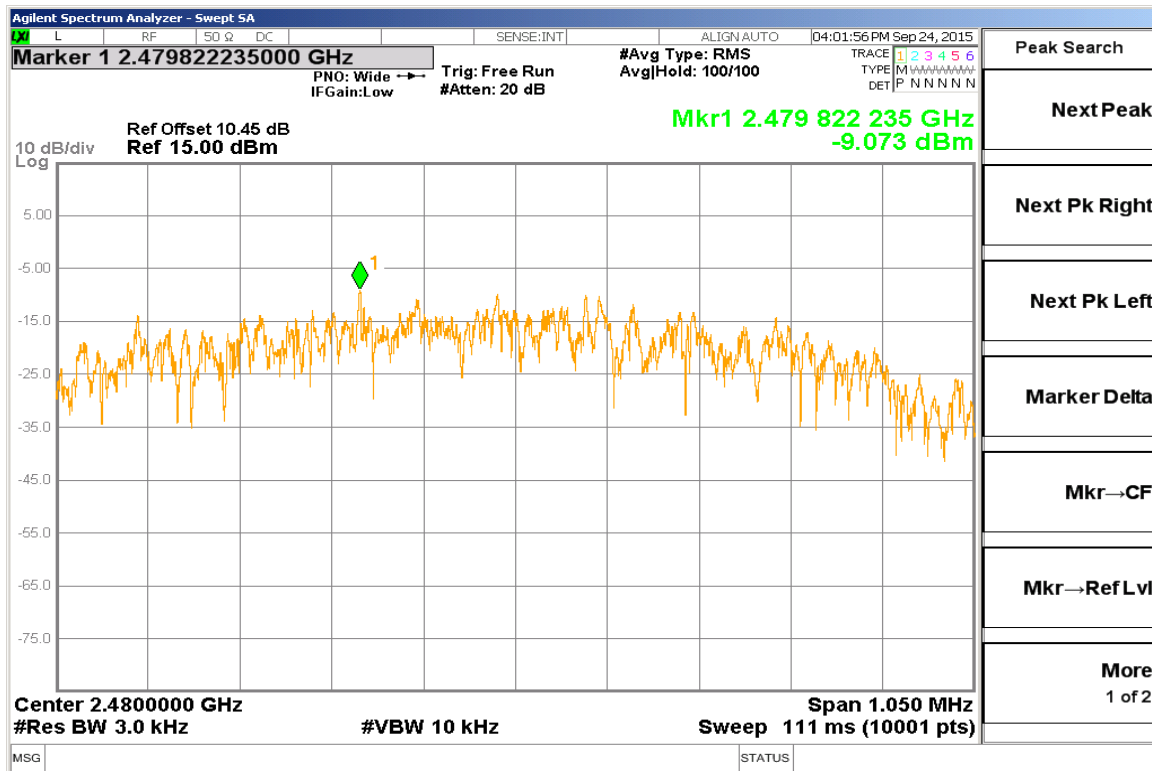


POWER SPECTRAL DENSITY Middle Channel



- Peak Search
- Next Peak
- Next Pk Right
- Next Pk Left
- Marker Delta
- Mkr→CF
- Mkr→Ref Lvl
- More 1 of 2

POWER SPECTRAL DENSITY High Channel



- Peak Search
- Next Peak
- Next Pk Right
- Next Pk Left
- Marker Delta
- Mkr→CF
- Mkr→Ref Lvl
- More 1 of 2

8.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

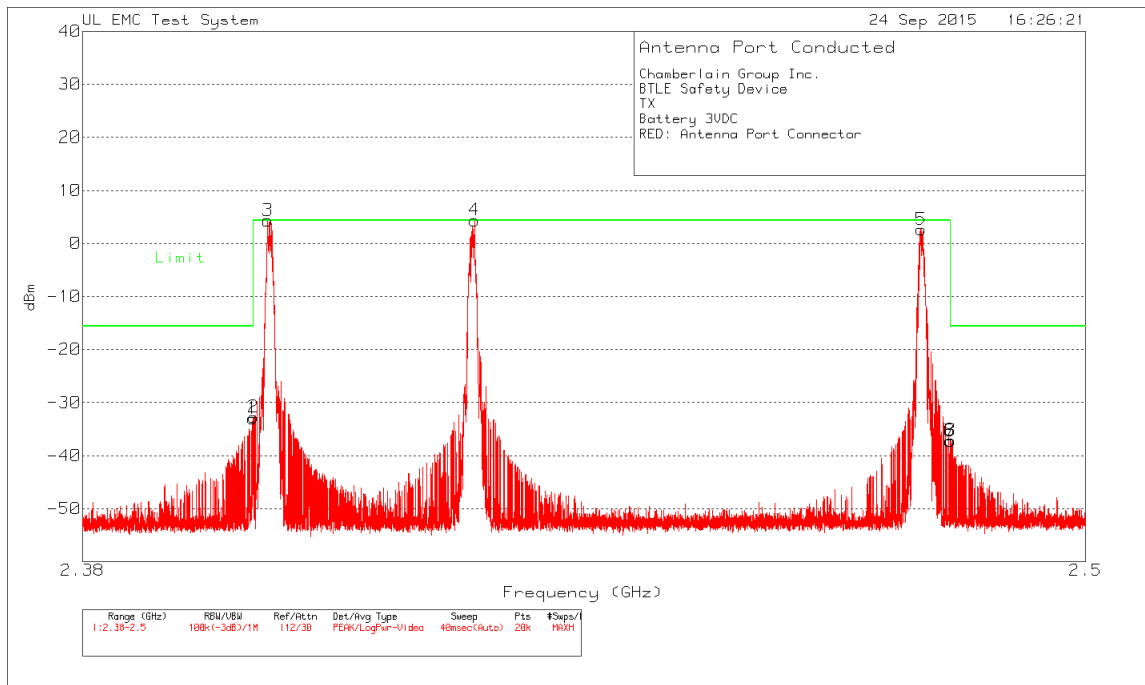
FCC §15.247 (d)

IC RSS-247 Clause 5.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

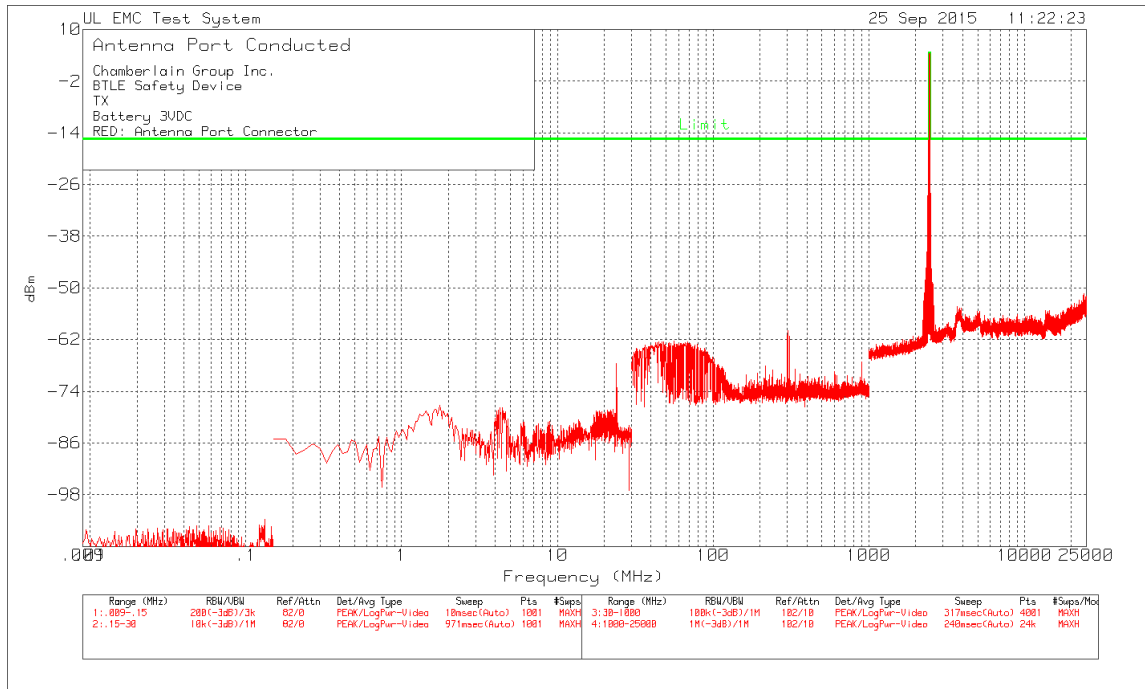
SPURIOUS EMISSIONS, LOW CHANNEL and HIGH CHANNEL, Band edge scan



SPURIOUS EMISSIONS, LOW CHANNEL and HIGH CHANNEL, Band edge data

Chamberlain Group Inc.								
BTLE Safety Device								
TX								
Battery 3VDC								
RED: Antenna Port Connector								
Trace Markers								
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	dBuV to dBm	Path Factor dB	Level dBm	Limit dBm	Margin (dB)
1	2.4	63.51	Pk	-107	10.5	-32.99	-15.7	-17.34
2	2.4001	63.76	Pk	-107	10.5	-32.74	4.35	-37.09
3	2.4017	100.82	Pk	-107	10.5	4.32	4.35	-0.03
4	2.4262	100.85	Pk	-107	10.5	4.35	4.35	0.00
5	2.4799	99.12	Pk	-107	10.5	2.62	4.35	-1.73
6	2.4834	59.24	Pk	-107	10.5	-37.26	4.35	-41.61
7	2.4835	59.26	Pk	-107	10.5	-37.24	-15.7	-21.59
8	2.4835	59.32	Pk	-107	10.5	-37.18	-15.7	-21.53
Pk - Peak detector								

SPURIOUS EMISSIONS, LOW, MIDDLE, HIGH CHANNEL 9kHz – 25GHz



* There are no emissions recorded. All emissions are well under the limit.

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

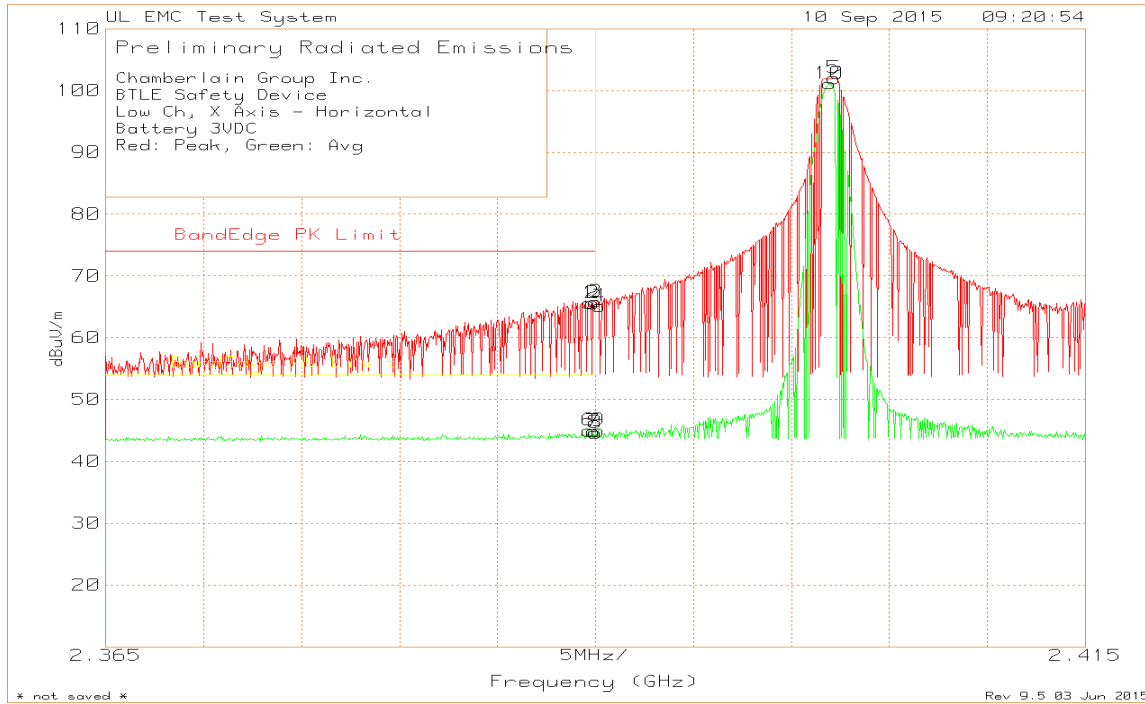
IC RSS-GEN Clause 7.1.2 (Receiver)

IC RSS-247 Clause 5.5

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

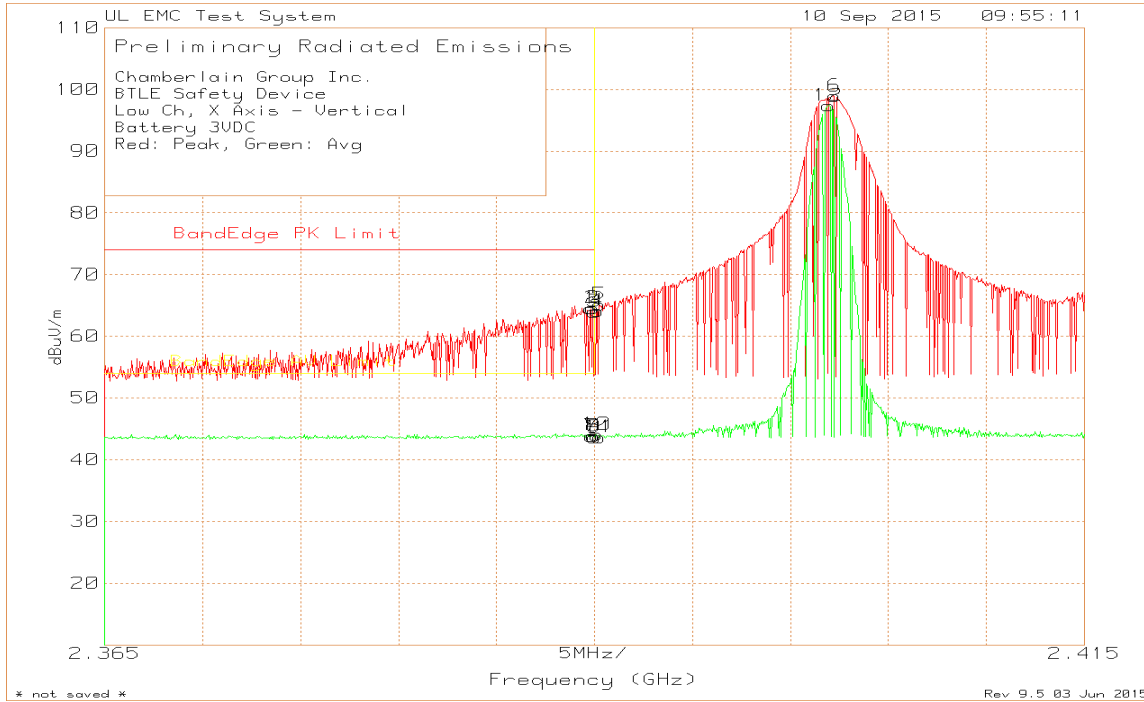
9.2. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (X-AXIS, LOW CHANNEL, HORIZONTAL)



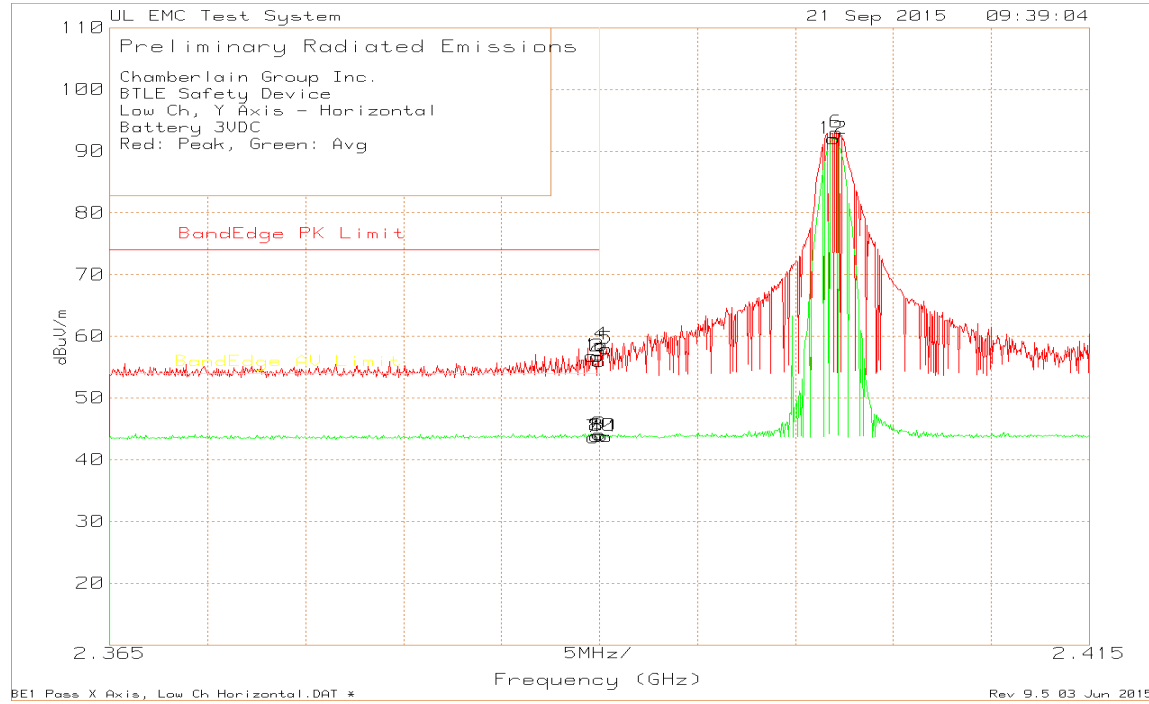
Chamberlain Group Inc. BTLE Safety Device Low Ch, X Axis - Horizontal Battery 3VDC Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.3897	39.1	Pk	21.8	4.72	65.62	74	-8.38	311	140	H
2	2.3899	39.07	Pk	21.8	4.72	65.59	74	-8.41	311	140	H
3	2.39	39.34	Pk	21.8	4.72	65.86	74	-8.14	311	140	H
4	2.3902	38.59	Pk	21.8	4.72	65.11	-	-	311	140	H
5	2.4022	75.64	Pk	21.8	4.58	102.02	-	-	311	140	H
Average											
6	2.3897	18.47	Av	21.8	4.72	44.99	54	-9.01	311	140	H
7	2.3899	18.33	Av	21.8	4.72	44.85	54	-9.15	311	140	H
8	2.39	18.09	Av	21.8	4.72	44.61	54	-9.39	311	140	H
9	2.3902	18.44	Av	21.8	4.72	44.96	-	-	311	140	H
10	2.402	74.75	Av	21.8	4.58	101.13	-	-	311	140	H
Pk - Peak detector AV - Average Detector											

RESTRICTED BANDEDGE (X-AXIS, LOW CHANNEL, VERTICAL)



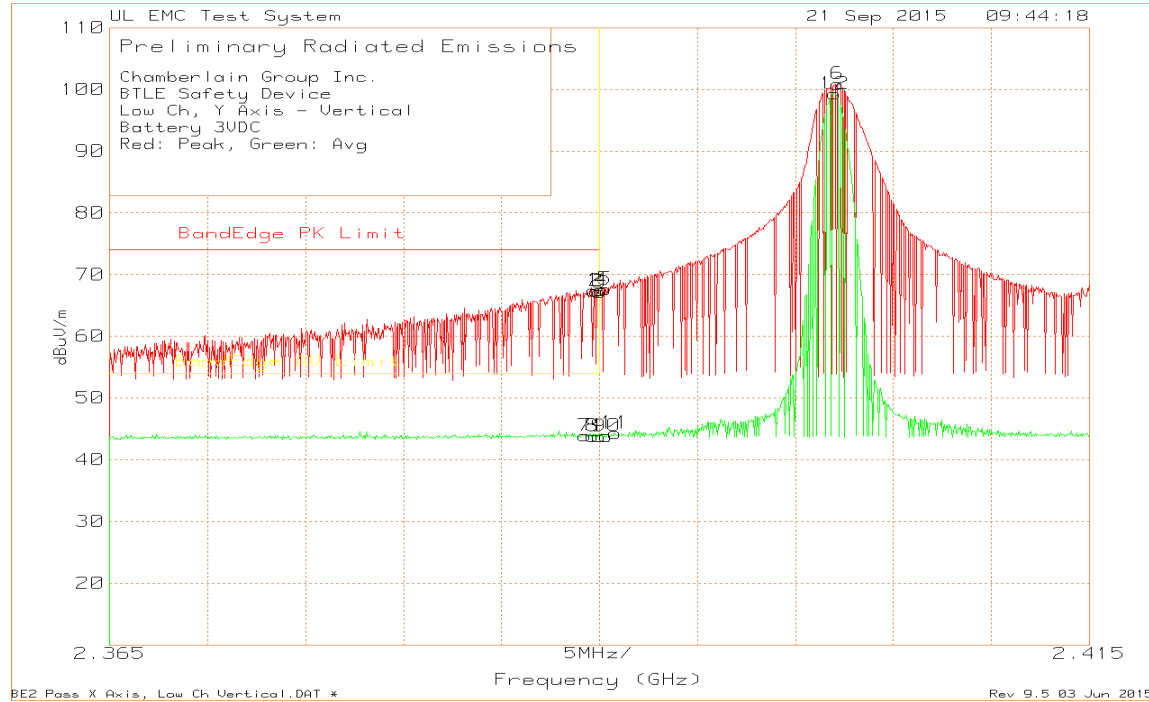
Chamberlain Group Inc.											
BTLE Safety Device											
Low Ch, X Axis - Vertical											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.3898	37.99	Pk	21.8	4.72	64.51	74	-9.49	57	110	V
2	2.3899	38.06	Pk	21.8	4.72	64.58	74	-9.42	57	110	V
3	2.39	37.5	Pk	21.8	4.72	64.02	74	-9.98	57	110	V
4	2.3902	37.59	Pk	21.8	4.72	64.11	-	-	57	110	V
5	2.3903	38.63	Pk	21.8	4.72	65.15	-	-	57	110	V
6	2.4023	72.53	Pk	21.8	4.58	98.91	-	-	57	110	V
Average											
7	2.3899	17.29	Av	21.8	4.72	43.81	54	-10.19	57	110	V
8	2.39	17.31	Av	21.8	4.72	43.83	54	-10.17	57	110	V
9	2.39	17.09	Av	21.8	4.72	43.61	54	-10.39	57	110	V
10	2.3901	17.54	Av	21.8	4.72	44.06	-	-	57	110	V
11	2.3903	17.11	Av	21.8	4.72	43.63	-	-	57	110	V
12	2.402	71	Av	21.8	4.58	97.38	-	-	57	110	V
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEGE (Y-AXIS, LOW CHANNEL, HORIZONTAL)



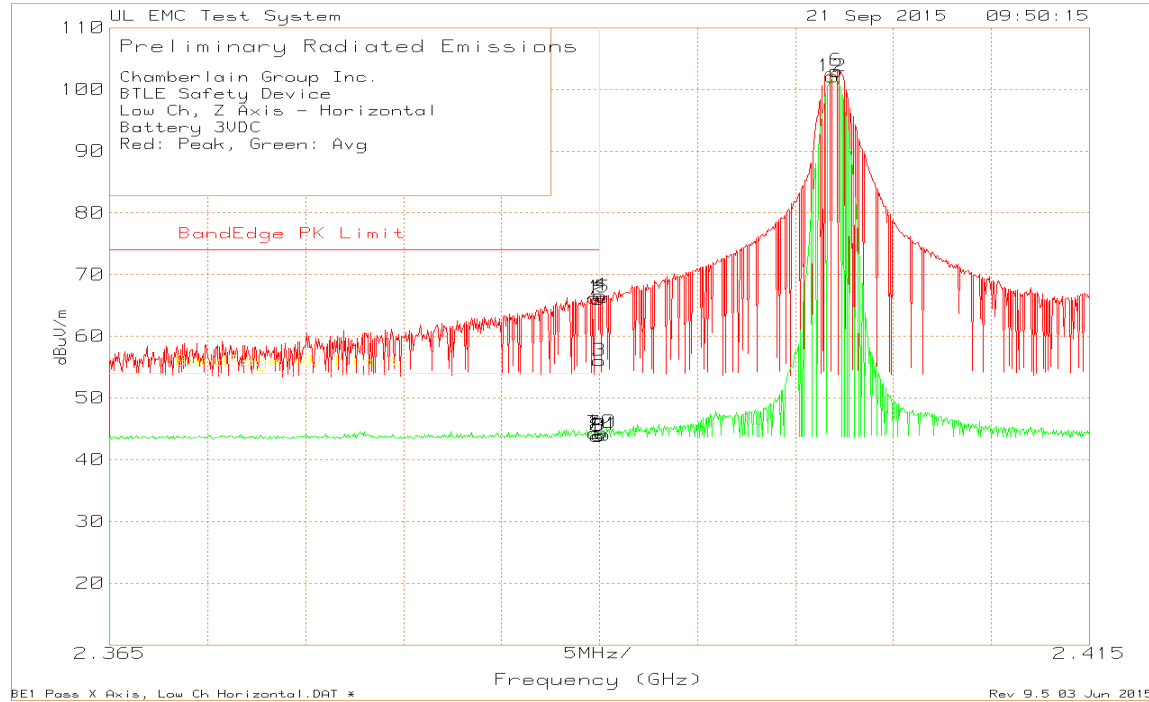
Chamberlain Group Inc.											
BTLE Safety Device											
Low Ch, Y Axis - Horizontal											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.3896	30.32	Pk	21.8	4.72	56.84	74	-17.16	212	99	H
2	2.3899	30.24	Pk	21.8	4.72	56.76	74	-17.24	212	99	H
3	2.39	29.43	Pk	21.8	4.72	55.95	74	-18.05	212	99	H
4	2.3901	32.15	Pk	21.8	4.72	58.67	-	-	212	99	H
5	2.3904	31.5	Pk	21.8	4.72	58.02	-	-	212	99	H
6	2.4021	66.63	Pk	21.8	4.58	93.01	-	-	212	99	H
Average											
7	2.3897	17.13	Av	21.8	4.72	43.65	54	-10.35	212	99	H
8	2.3899	17.32	Av	21.8	4.72	43.84	54	-10.16	212	99	H
9	2.39	17.6	Av	21.8	4.72	44.12	54	-9.88	212	99	H
10	2.3901	17.38	Av	21.8	4.72	43.9	-	-	212	99	H
11	2.3904	17.25	Av	21.8	4.72	43.77	-	-	212	99	H
12	2.402	65.66	Av	21.8	4.58	92.04	-	-	212	99	H
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEGE (Y-AXIS, LOW CHANNEL, VERTICAL)



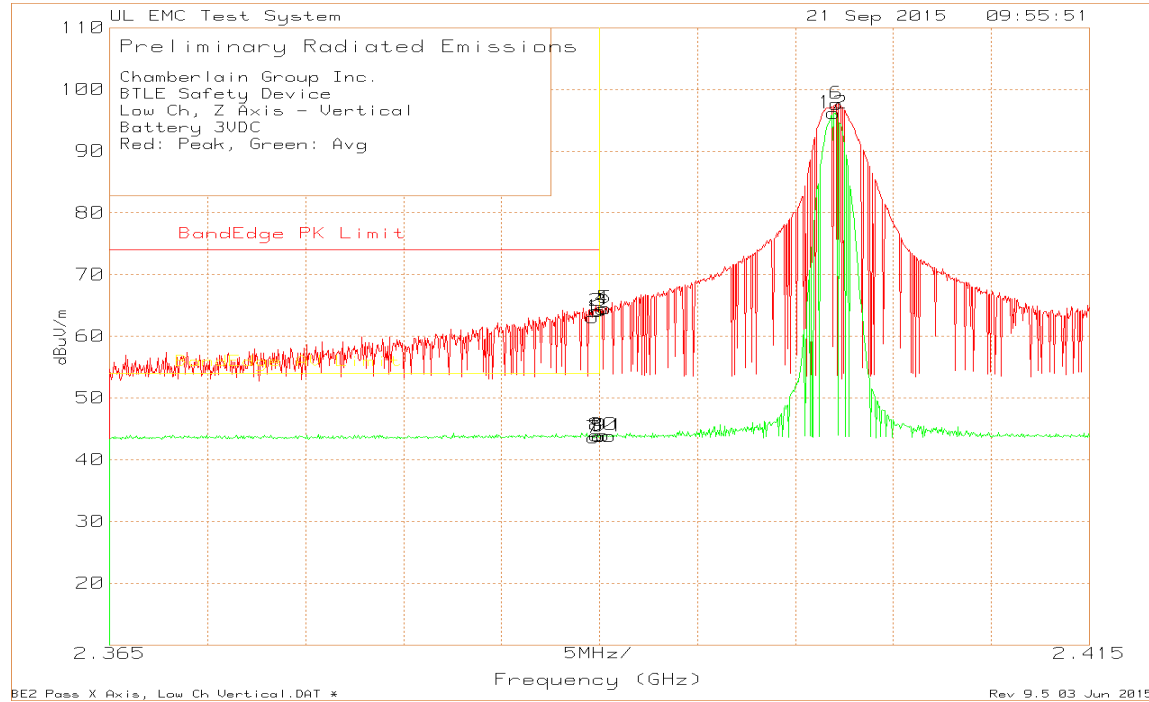
Chamberlain Group Inc.											
BTLE Safety Device											
Low Ch, Y Axis - Vertical											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.3897	40.86	Pk	21.8	4.72	67.38	74	-6.62	11	100	V
2	2.3899	40.82	Pk	21.8	4.72	67.34	74	-6.66	11	100	V
3	2.39	40.63	Pk	21.8	4.72	67.15	74	-6.85	11	100	V
4	2.3901	40.99	Pk	21.8	4.72	67.51	-	-	11	100	V
5	2.3903	41.1	Pk	21.8	4.72	67.62	-	-	11	100	V
6	2.4022	74.48	Pk	21.8	4.58	100.86	-	-	11	100	V
Average											
7	2.3893	17.38	Av	21.8	4.71	43.89	54	-10.11	11	100	V
8	2.3897	17.29	Av	21.8	4.72	43.81	54	-10.19	11	100	V
9	2.39	17.25	Av	21.8	4.72	43.77	54	-10.23	11	100	V
10	2.3904	17.36	Av	21.8	4.72	43.88	-	-	11	100	V
11	2.3908	17.76	Av	21.8	4.73	44.29	-	-	11	100	V
12	2.402	72.93	Av	21.8	4.58	99.31	-	-	11	100	V
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEGE (Z-AXIS, LOW CHANNEL, HORIZONTAL)



Chamberlain Group Inc.											
BTLE Safety Device											
Low Ch, Z Axis - Horizontal											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.3898	39.72	Pk	21.8	4.72	66.24	74	-7.76	292	132	H
2	2.39	39.47	Pk	21.8	4.72	65.99	74	-8.01	292	132	H
3	2.39	29.54	Pk	21.8	4.72	56.06	74	-17.94	292	132	H
4	2.3901	40.11	Pk	21.8	4.72	66.63	-	-	292	132	H
5	2.3902	39.81	Pk	21.8	4.72	66.33	-	-	292	132	H
6	2.4021	76.66	Pk	21.8	4.58	103.04	-	-	292	132	H
Average											
7	2.3898	17.76	Av	21.8	4.72	44.28	54	-9.72	292	132	H
8	2.3899	17.27	Av	21.8	4.72	43.79	54	-10.21	292	132	H
9	2.39	17.4	Av	21.8	4.72	43.92	54	-10.08	292	132	H
10	2.3901	17.87	Av	21.8	4.72	44.39	-	-	292	132	H
11	2.3903	17.53	Av	21.8	4.72	44.05	-	-	292	132	H
12	2.4019	75.73	Av	21.8	4.58	102.11	-	-	292	132	H
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEDGE (Z-AXIS, LOW CHANNEL, VERTICAL)



Chamberlain Group Inc.											
BTLE Safety Device											
Low Ch, Z Axis - Vertical											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.3897	36.52	Pk	21.8	4.72	63.04	74	-10.96	150	115	V
2	2.3899	37.6	Pk	21.8	4.72	64.12	74	-9.88	150	115	V
3	2.39	37.62	Pk	21.8	4.72	64.14	74	-9.86	150	115	V
4	2.3902	37.89	Pk	21.8	4.72	64.41	-	-	150	115	V
5	2.3903	38.04	Pk	21.8	4.72	64.56	-	-	150	115	V
6	2.4021	71.3	Pk	21.8	4.58	97.68	-	-	150	115	V
Average											
7	2.3897	17.04	Av	21.8	4.72	43.56	54	-10.44	150	115	V
8	2.3899	17.41	Av	21.8	4.72	43.93	54	-10.07	150	115	V
9	2.39	17.29	Av	21.8	4.72	43.81	54	-10.19	150	115	V
10	2.3902	17.45	Av	21.8	4.72	43.97	-	-	150	115	V
11	2.3905	17.31	Av	21.8	4.72	43.83	-	-	150	115	V
12	2.402	69.78	Av	21.8	4.58	96.16	-	-	150	115	V
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEDGE (X-AXIS, HIGH CHANNEL, HORIZONTAL)



Chamberlain Group Inc.											
BTLE Safety Device											
High Ch, X Axis - Horizontal											
Battery 3VDC											
Red: Peak, Green: Avg											
Trace Markers											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.4838	46.82	Pk	22.1	4.37	73.29	74	-0.71	146	133	H
2	2.4837	46.69	Pk	22.1	4.37	73.16	74	-0.84	146	133	H
3	2.4835	28.34	Pk	22.1	4.37	54.81	74	-19.19	146	133	H
4	2.4835	47.19	Pk	22.1	4.37	73.66	-	-	146	133	H
5	2.4833	48.02	Pk	22	4.37	74.39	-	-	146	133	H
6	2.4802	74.09	Pk	22	4.36	100.45	-	-	146	133	H
Average											
7	2.4838	19.97	AV	22.1	4.37	46.44	54	-7.56	146	133	H
8	2.4836	20.49	AV	22.1	4.37	46.96	54	-7.04	146	133	H
9	2.4835	19.51	AV	22.1	4.37	45.98	54	-8.02	146	133	H
10	2.4834	20.62	AV	22.1	4.37	47.09	-	-	146	133	H
11	2.4832	21.7	AV	22	4.37	48.07	-	-	146	133	H
12	2.48	73.17	AV	22	4.36	99.53	-	-	146	133	H
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEDGE (X-AXIS, HIGH CHANNEL, VERTICAL)



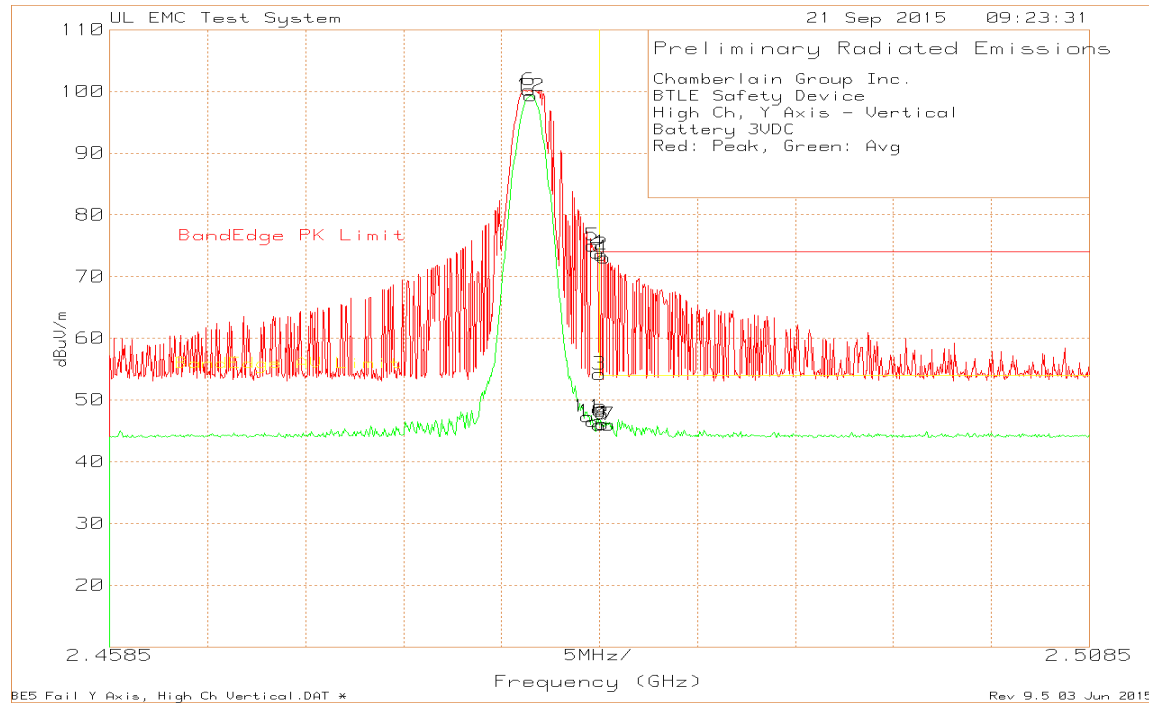
Chamberlain Group Inc.											
BTLE Safety Device											
High Ch, X Axis - Vertical											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.4838	41.3	Pk	22.1	4.37	67.77	74	-6.23	255	100	V
2	2.4836	41.72	Pk	22.1	4.37	68.19	74	-5.81	255	100	V
3	2.4835	41.52	Pk	22.1	4.37	67.99	74	-6.01	255	100	V
4	2.4832	42.71	Pk	22	4.37	69.08	-	-	255	100	V
5	2.4831	43.96	Pk	22	4.37	70.33	-	-	255	100	V
6	2.4797	68.96	Pk	22	4.36	95.32	-	-	255	100	V
Average											
7	2.4838	18.54	AV	22.1	4.37	45.01	54	-8.99	255	100	V
8	2.4837	18.32	AV	22.1	4.37	44.79	54	-9.21	255	100	V
9	2.4835	19.36	AV	22.1	4.37	45.83	54	-8.17	255	100	V
10	2.4833	19.58	AV	22	4.37	45.95	-	-	255	100	V
11	2.4831	19.61	AV	22	4.37	45.98	-	-	255	100	V
12	2.48	68.05	AV	22	4.36	94.41	-	-	255	100	V
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEDGE (Y-AXIS, HIGH CHANNEL, HORIZONTAL)



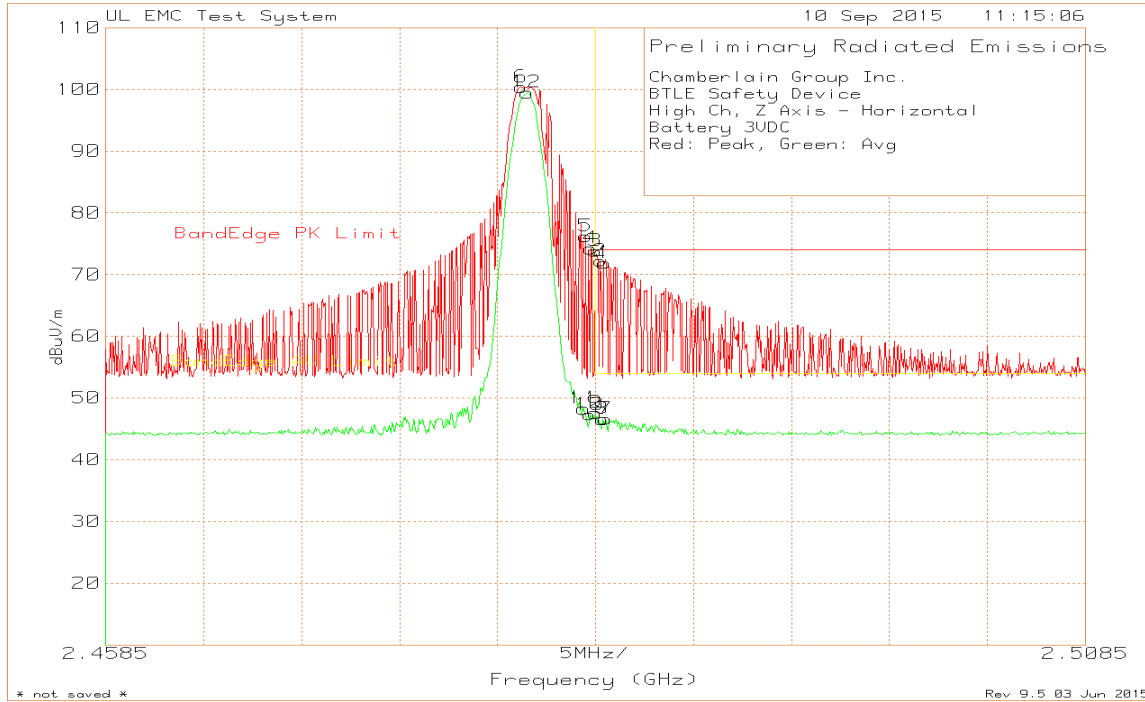
Chamberlain Group Inc.											
BTLE Safety Device											
High Ch, Y Axis - Horizontal											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.4838	39.27	Pk	22.1	4.37	65.74	74	-8.26	204	100	H
2	2.4836	40.42	Pk	22.1	4.37	66.89	74	-7.11	204	100	H
3	2.4835	40.12	Pk	22.1	4.37	66.59	74	-7.41	204	100	H
4	2.4834	41.66	Pk	22.1	4.37	68.13	-	-	204	100	H
5	2.4833	41.88	Pk	22	4.37	68.25	-	-	204	100	H
6	2.4798	67.13	Pk	22	4.36	93.49	-	-	204	100	H
Average											
7	2.4838	18.29	Av	22.1	4.37	44.76	54	-9.24	204	100	H
8	2.4836	17.84	Av	22.1	4.37	44.31	54	-9.69	204	100	H
9	2.4835	18.5	Av	22.1	4.37	44.97	54	-9.03	204	100	H
10	2.4834	18.56	Av	22.1	4.37	45.03	-	-	204	100	H
11	2.4833	18.37	Av	22	4.37	44.74	-	-	204	100	H
12	2.48	66.21	Av	22	4.36	92.57	-	-	204	100	H
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEDGE (Y-AXIS, HIGH CHANNEL, VERTICAL)



Chamberlain Group Inc.											
BTLE Safety Device											
High Ch, Y Axis - Vertical											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.4838	46.59	Pk	22.1	4.37	73.06	74	-0.94	340	145	V
2	2.4836	47.1	Pk	22.1	4.37	73.57	74	-0.43	340	145	V
3	2.4835	27.7	Pk	22.1	4.37	54.17	74	-19.83	340	145	V
4	2.4834	47.45	Pk	22.1	4.37	73.92	-	-	340	145	V
5	2.4832	48.68	Pk	22	4.37	75.05	-	-	340	145	V
6	2.4799	73.85	Pk	22	4.36	100.21	-	-	340	145	V
Average											
7	2.484	19.53	Av	22.1	4.37	46	54	-8	340	145	V
8	2.4837	19.63	Av	22.1	4.37	46.1	54	-7.9	340	145	V
9	2.4835	19.49	Av	22.1	4.37	45.96	54	-8.04	340	145	V
10	2.4832	20.14	Av	22	4.37	46.51	-	-	340	145	V
11	2.4829	20.96	Av	22	4.37	47.33	-	-	340	145	V
12	2.48	72.95	Av	22	4.36	99.31	-	-	340	145	V
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEDGE (Z-AXIS, HIGH CHANNEL, HORIZONTAL)



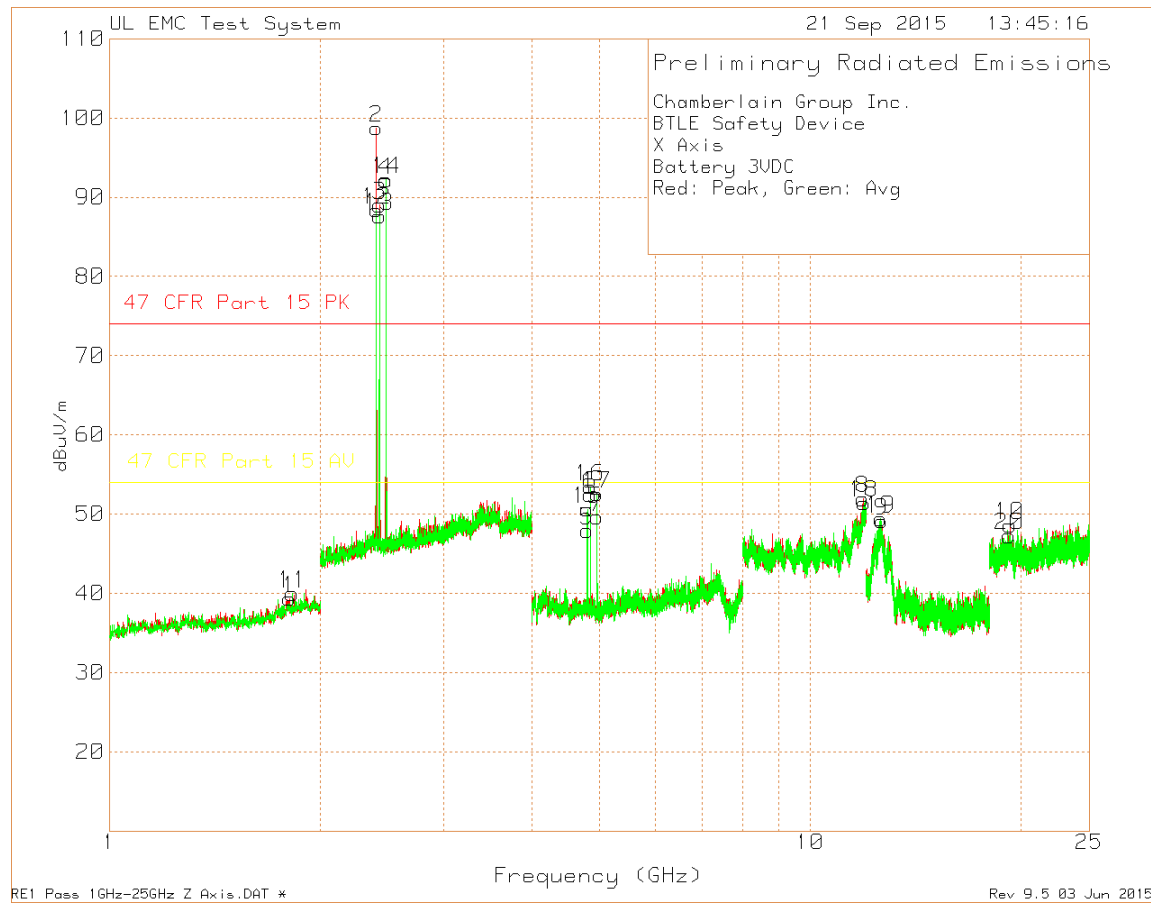
BTLE Safety Device											
High Ch, Z Axis - Horizontal											
Battery 3VDC											
Red: Peak, Green: Avg											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.484	45.41	Pk	22.1	4.37	71.88	74	-2.12	148	143	H
2	2.4838	45.77	Pk	22.1	4.37	72.24	74	-1.76	148	143	H
3	2.4835	47.36	Pk	22.1	4.37	73.83	74	-0.17	148	143	H
4	2.4833	47.89	Pk	22	4.37	74.26	-	-	148	143	H
5	2.483	49.85	Pk	22	4.37	76.22	-	-	148	143	H
6	2.4797	74.01	Pk	22	4.36	100.37	-	-	148	143	H
Average											
7	2.484	20.15	Av	22.1	4.37	46.62	54	-7.38	148	143	H
8	2.4839	20.14	Av	22.1	4.37	46.61	54	-7.39	148	143	H
9	2.4835	21.15	Av	22.1	4.37	47.62	54	-6.38	148	143	H
10	2.4832	20.95	Av	22	4.37	47.32	-	-	148	143	H
11	2.4829	21.94	Av	22	4.37	48.31	-	-	148	143	H
12	2.48	73.13	Av	22	4.36	99.49	-	-	148	143	H
Pk - Peak detector											
AV - Average Detector											

RESTRICTED BANDEGE (Z-AXIS, HIGH CHANNEL, VERTICAL)



Chamberlain Group Inc.											
BTLE Safety Device											
High Ch, Z Axis - Vertical											
Battery 3VDC											
Red: Peak, Green: Avg											
Trace Markers											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Bandedge Limit dBuV/m @ 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
Peak											
1	2.484	45.72	Pk	22.1	4.37	72.19	74	-1.81	193	225	V
2	2.4837	46.67	Pk	22.1	4.37	73.14	74	-0.86	193	225	V
3	2.4835	47.52	Pk	22.1	4.37	73.99	74	-0.01	193	225	V
4	2.4833	47.92	Pk	22	4.37	74.29	-	-	193	225	V
5	2.4831	49.68	Pk	22	4.37	76.05	-	-	193	225	V
6	2.4799	74.12	Pk	22	4.36	100.48	-	-	193	225	V
Average											
7	2.4839	20.51	Av	22.1	4.37	46.98	54	-7.02	193	225	V
8	2.4837	20.72	Av	22.1	4.37	47.19	54	-6.81	193	225	V
9	2.4835	20.55	Av	22.1	4.37	47.02	54	-6.98	193	225	V
10	2.4833	20.92	Av	22	4.37	47.29	-	-	193	225	V
11	2.483	21.61	Av	22	4.37	47.98	-	-	193	225	V
12	2.48	73.22	Av	22	4.36	99.58	-	-	193	225	V
Pk - Peak detector											
AV - Average Detector											

RADIATED SPURIOUS EMISSIONS, X-AXIS, 1GHz-25GHz



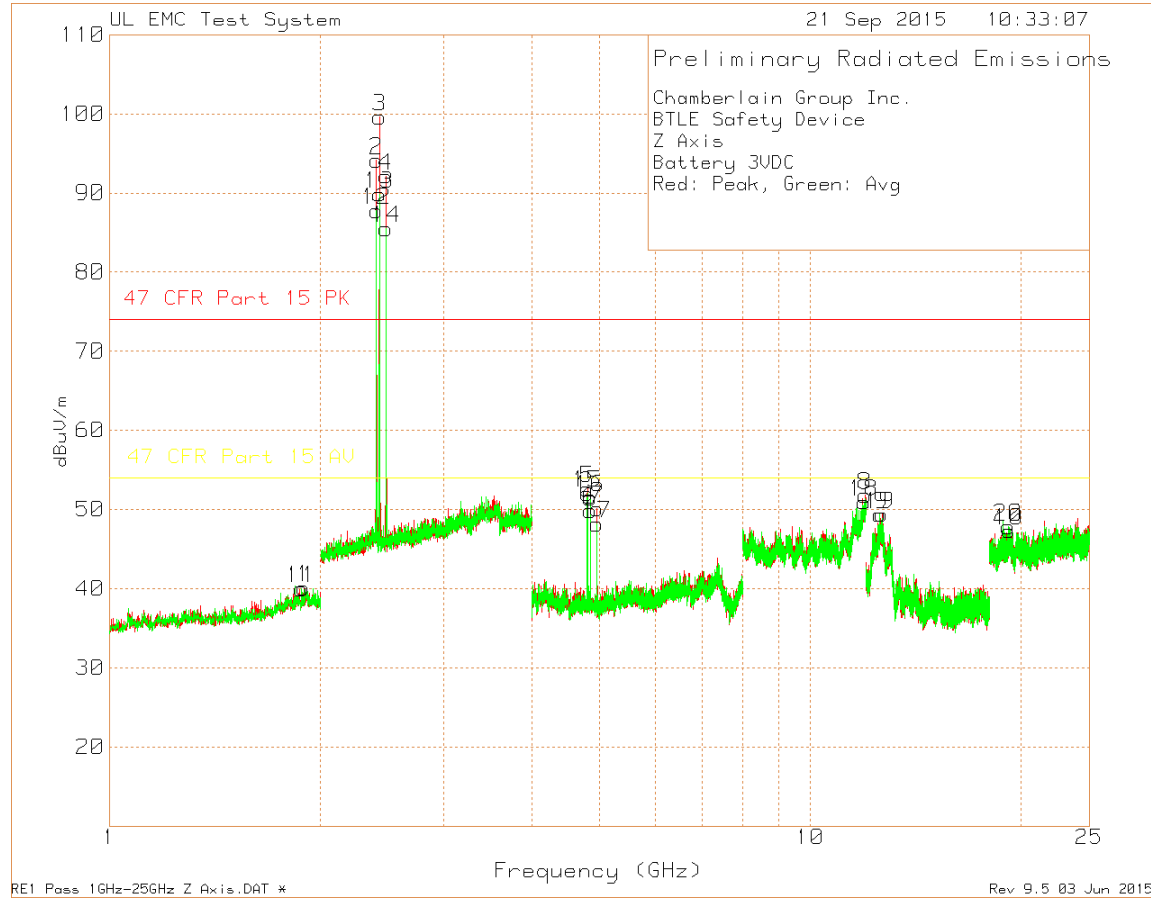
Chamberlain Group Inc.															
BTLE Safety Device															
X Axis															
Battery 3VDC															
Red: Peak, Green: Avg															
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Duty Cycle Factor dB	Average Level Duty Cycle Based dBuV/m	47 CFR Part 15, Subpart C Peak Limit dBuV/m	Margin (dB)	47 CFR Part 15, Subpart C Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.805	66.34	Pk	27	-54	39.34	-33.55	-	-	-34.66	54	-14.66	0-360	99	H
2	2.402	72.37	Pk	21.8	4.58	98.75	-33.55	-	-	-	-	44.75	0-360	99	H
3	2.426	62.57	Pk	21.9	4.54	89.01	-33.55	-	-	-	-	35.01	0-360	99	H
4	2.479	65.77	Pk	22	4.36	92.13	-33.55	-	-	-	-	38.13	0-360	99	H
5	4.804	70.86	Pk	27.7	-50.65	47.91	-33.55	14.36	74	-26.09	54	-39.64	0-360	149	H
6	4.852	75.09	Pk	27.7	-50.28	52.51	-33.55	18.96	74	-21.49	54	-35.04	0-360	149	H
7	4.96	72.56	Pk	27.8	-50.74	49.62	-33.55	16.07	74	-24.38	54	-37.93	0-360	100	H
8	11.886	56.09	Pk	37.6	-41.74	51.95	-	-	74	-22.05	54	-2.05	0-360	99	H
9	12.637	43.7	Pk	39.5	-34.07	49.13	-	-	74	-24.87	54	-4.87	0-360	100	H
10	19.273	58.24	Pk	40.3	-49.95	48.59	-	-	74	-25.41	54	-5.41	0-360	100	H
11	1.823	66.89	Pk	27.1	-54.03	39.96	-	-	74	-34.04	54	-14.04	0-360	150	V
12	2.402	62.02	Pk	21.8	4.58	88.4	-	-	-	-	-	34.4	0-360	150	V
13	2.426	61.18	Pk	21.9	4.54	87.62	-	-	-	-	-	33.62	0-360	99	V
14	2.48	65.86	Pk	22	4.36	92.22	-	-	-	-	-	38.22	0-360	99	V
15	4.805	73.56	Pk	27.7	-50.63	50.63	-33.55	17.08	74	-23.37	54	-36.92	0-360	150	V
16	4.853	76.03	Pk	27.7	-50.28	53.45	-33.55	19.9	74	-20.55	54	-34.1	0-360	99	V
17	4.96	75.49	Pk	27.8	-50.74	52.55	-33.55	19	74	-21.45	54	-35	0-360	150	V
18	11.933	55.04	Pk	37.6	-41.24	51.4	-	-	74	-22.6	54	-2.6	0-360	150	V
19	12.601	44.47	Pk	39.5	-34.58	49.39	-	-	74	-24.61	54	-4.61	0-360	150	V
20	19.226	56.94	Pk	40.3	-49.97	47.27	-	-	74	-26.73	54	-6.73	0-360	100	V
Pk - Peak detector															
Radiated Emission Data															
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Duty Cycle Factor dB	Average Level Duty Cycle Based dBuV/m	47 CFR Part 15, Subpart C Peak Limit dBuV/m	Margin (dB)	47 CFR Part 15, Subpart C Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	
4.8034	78.43	Pk	27.7	-50.66	55.47	-33.55	21.92	74	-18.53	54	-32.08	46	150	H	
4.8518	77.14	Pk	27.7	-50.28	54.56	-33.55	21.01	74	-19.44	54	-32.99	50	110	H	
4.9593	73.42	Pk	27.8	-50.74	50.48	-33.55	16.93	74	-23.52	54	-37.07	149	110	H	
4.8043	80.38	Pk	27.7	-50.64	57.44	-33.55	23.89	74	-16.56	54	-30.11	224	100	V	
4.8517	78.69	Pk	27.7	-50.29	56.1	-33.55	22.55	74	-17.9	54	-31.45	220	119	V	
4.9596	76.18	Pk	27.8	-50.74	53.24	-33.55	19.69	74	-20.76	54	-34.31	61	150	V	
Pk - Peak detector															

RADIATED SPURIOUS EMISSIONS, Y-AXIS, 1GHz-25GHz



Chamberlain Group Inc.															
BTLE Safety Device															
Y Axis															
Battery 3VDC															
Red: Peak, Green: Avg															
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Duty Cycle Factor dB	Average Level Duty Cycle Based dBuV/m	47 CFR Part 15, Subpart C Peak Limit dBuV/m	Margin (dB)	47 CFR Part 15, Subpart C Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.869	65.84	Pk	27.3	-53.68	39.46	-	-	74	-34.54	54	-14.54	0-360	100	H
2	2.402	50.31	Pk	21.8	4.58	76.69	-	-	-	-	-	-	0-360	150	H
3	2.426	55.88	Pk	21.9	4.54	82.32	-	-	-	-	-	-	0-360	150	H
4	2.48	54.05	Pk	22	4.36	80.41	-	-	-	-	-	-	0-360	150	H
5	4.804	74.16	Pk	27.7	-50.65	51.21	-33.55	17.66	74	-22.79	54	-36.34	0-360	149	H
6	4.852	73.49	Pk	27.7	-50.28	50.91	-33.55	17.36	74	-23.09	54	-36.64	0-360	101	H
7	4.96	71.13	Pk	27.8	-50.74	48.19	-33.55	14.64	74	-25.81	54	-39.36	0-360	149	H
8	11.936	54.99	Pk	37.6	-41.25	51.34	-	-	74	-22.66	54	-2.66	0-360	150	H
9	12.61	44.66	Pk	39.5	-34.4	49.76	-	-	74	-24.24	54	-4.24	0-360	99	H
10	19.239	56.95	Pk	40.3	-49.91	47.34	-	-	74	-26.66	54	-6.66	0-360	100	H
11	1.846	67.81	Pk	27.2	-53.98	41.03	-	-	74	-32.97	54	-12.97	0-360	150	V
12	2.402	71.37	Pk	21.8	4.58	97.75	-	-	-	-	-	-	0-360	150	V
13	2.425	65.5	Pk	21.9	4.54	91.94	-	-	-	-	-	-	0-360	150	V
14	2.48	61.29	Pk	22	4.36	87.65	-	-	-	-	-	-	0-360	150	V
15	4.804	72.45	Pk	27.7	-50.65	49.5	-33.55	15.95	74	-24.5	54	-38.05	0-360	100	V
16	4.852	74.09	Pk	27.7	-50.28	51.51	-33.55	17.96	74	-22.49	54	-36.04	0-360	100	V
17	4.961	72.21	Pk	27.8	-50.74	49.27	-33.55	15.72	74	-24.73	54	-38.28	0-360	150	V
18	11.911	54.97	Pk	37.6	-41.33	51.24	-	-	74	-22.76	54	-2.76	0-360	150	V
19	12.615	43.56	Pk	39.5	-34.28	48.78	-	-	74	-25.22	54	-5.22	0-360	100	V
20	19.728	56.29	Pk	40.3	-49.31	47.28	-	-	74	-26.72	54	-6.72	0-360	100	V
Pk - Peak detector															
Radiated Emission Data															
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Duty Cycle Factor dB	Average Level Duty Cycle Based dBuV/m	47 CFR Part 15, Subpart C Peak Limit dBuV/m	Margin (dB)	47 CFR Part 15, Subpart C Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	
4.8524	75.84	Pk	27.7	-50.28	53.26	-33.55	19.71	74	-20.74	54	-34.29	160	100	H	
4.8045	75	Pk	27.7	-50.64	52.06	-33.55	18.51	74	-21.94	54	-35.49	115	150	H	
4.9594	76.07	Pk	27.8	-50.74	53.13	-33.55	19.58	74	-20.87	54	-34.42	157	105	H	
4.8038	75.91	Pk	27.7	-50.65	52.96	-33.55	19.41	74	-21.04	54	-34.59	98	100	V	
4.8523	74.88	Pk	27.7	-50.28	52.3	-33.55	18.75	74	-21.7	54	-35.25	276	100	V	
4.9599	73	Pk	27.8	-50.74	50.06	-33.55	16.51	74	-23.94	54	-37.49	286	100	V	
Pk - Peak detector															

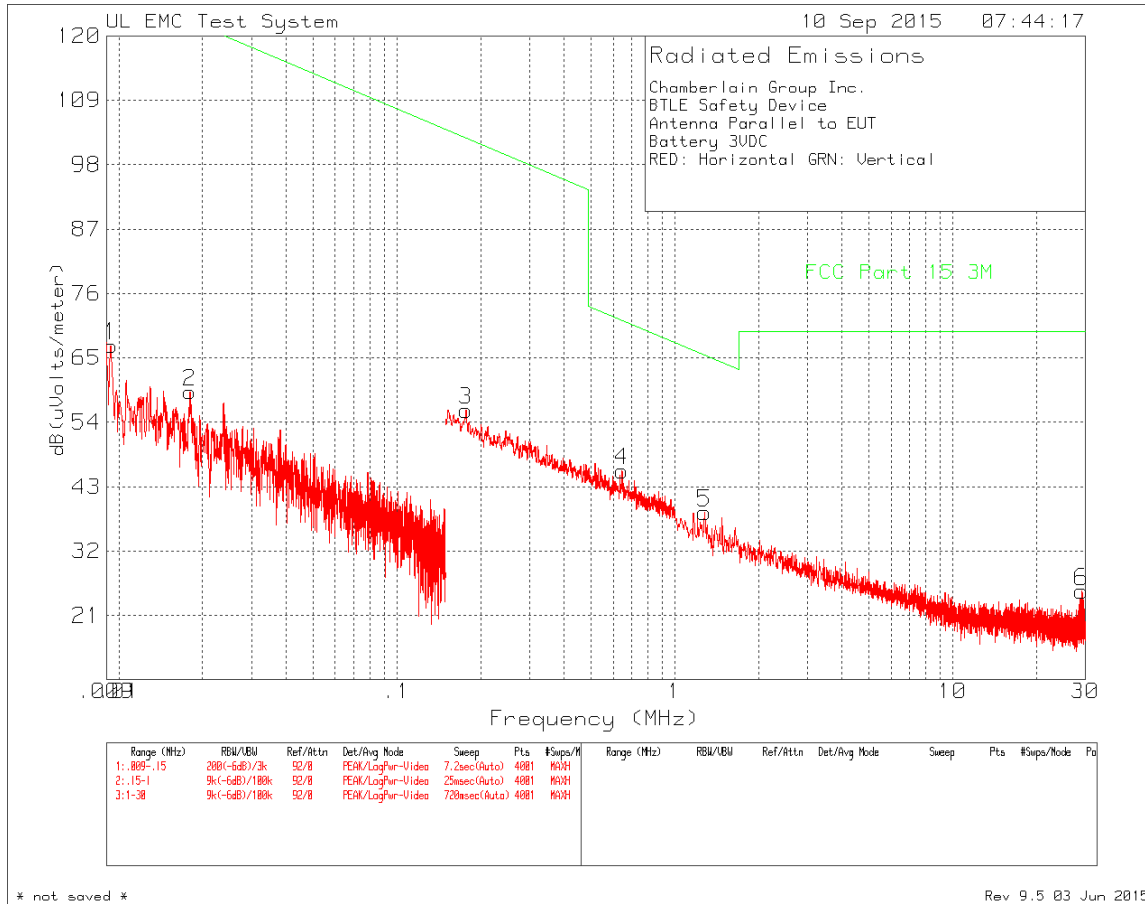
RADIATED SPURIOUS EMISSIONS, Z-AXIS, 1GHz-25GHz



Chamberlain Group Inc.															
BTLE Safety Device															
Z Axis															
Battery 3VDC															
Red: Peak, Green: Avg															
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Duty Cycle Factor dB	Average Level Duty Cycle Based dBuV/m	47 CFR Part 15, Subpart C Peak Limit dBuV/m	Margin (dB)	47 CFR Part 15, Subpart C Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.891	66.29	Pk	27.4	-53.58	40.11	-	-	74	-33.89	54	-13.89	0-360	99	H
2	2.402	67.73	Pk	21.8	4.58	94.11	-	-	-	-	-	-	0-360	150	H
3	2.426	73.16	Pk	21.9	4.54	99.6	-	-	-	-	-	-	0-360	150	H
4	2.48	65.8	Pk	22	4.36	92.16	-	-	-	-	-	-	0-360	99	H
5	4.804	75.58	Pk	27.7	-50.65	52.63	-33.55	19.08	74	-21.37	54	-34.92	0-360	100	H
6	4.852	72.47	Pk	27.7	-50.28	49.89	-33.55	16.34	74	-24.11	54	-37.66	0-360	149	H
7	4.96	73.07	Pk	27.8	-50.74	50.13	-33.55	16.58	74	-23.87	54	-37.42	0-360	100	H
8	11.974	55.46	Pk	37.5	-41.17	51.79	-	-	74	-22.21	54	-2.21	0-360	150	H
9	12.645	44.19	Pk	39.5	-34.31	49.38	-	-	74	-24.62	54	-4.62	0-360	150	H
10	19.199	57.03	Pk	40.3	-50.02	47.31	-	-	74	-26.69	54	-6.69	0-360	100	H
11	1.877	66.26	Pk	27.3	-53.58	39.98	-	-	74	-34.02	54	-14.02	0-360	150	V
12	2.402	61.39	Pk	21.8	4.58	87.77	-	-	-	-	-	-	0-360	100	V
13	2.426	63.42	Pk	21.9	4.54	89.86	-	-	-	-	-	-	0-360	100	V
14	2.48	59.16	Pk	22	4.36	85.52	-	-	-	-	-	-	0-360	150	V
15	4.804	74.99	Pk	27.7	-50.65	52.04	-33.55	18.49	74	-21.96	54	-35.51	0-360	100	V
16	4.852	74.06	Pk	27.7	-50.28	51.48	-33.55	17.93	74	-22.52	54	-36.07	0-360	150	V
17	4.959	71.11	Pk	27.8	-50.74	48.17	-33.55	14.62	74	-25.83	54	-39.38	0-360	100	V
18	11.926	54.55	Pk	37.6	-41.21	50.94	-	-	74	-23.06	54	-3.06	0-360	100	V
19	12.558	45.45	Pk	39.4	-35.47	49.38	-	-	74	-24.62	54	-4.62	0-360	150	V
20	19.161	57.23	Pk	40.3	-49.73	47.8	-	-	74	-26.2	54	-6.2	0-360	100	V
Pk - Peak detector															
Radiated Emission Data															
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level dBuV/m	Duty Cycle Factor dB	Average Level Duty Cycle Based dBuV/m	47 CFR Part 15, Subpart C Peak Limit dBuV/m	Margin (dB)	47 CFR Part 15, Subpart C Average Limit dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	
4.8043	77.87	Pk	27.7	-50.64	54.93	-33.55	21.38	74	-19.07	54	-32.62	273	100	H	
4.8518	76.91	Pk	27.7	-50.28	54.33	-33.55	20.78	74	-19.67	54	-33.22	275	100	H	
4.9594	74.78	Pk	27.8	-50.74	51.84	-33.55	18.29	74	-22.16	54	-35.71	89	100	H	
4.8034	78.58	Pk	27.7	-50.66	55.62	-33.55	22.07	74	-18.38	54	-31.93	271	150	H	
4.8513	76.1	Pk	27.7	-50.29	53.51	-33.55	19.96	74	-20.49	54	-34.04	272	100	H	
4.9593	74.37	Pk	27.8	-50.74	51.43	-33.55	17.88	74	-22.57	54	-36.12	248	100	H	
4.8044	78.28	Pk	27.7	-50.64	55.34	-33.55	21.79	74	-18.66	54	-32.21	67	110	V	
4.8515	77.35	Pk	27.7	-50.29	54.76	-33.55	21.21	74	-19.24	54	-32.79	64	100	V	
4.9602	76.31	Pk	27.8	-50.74	53.37	-33.55	19.82	74	-20.63	54	-34.18	272	100	V	
4.8044	79.45	Pk	27.7	-50.64	56.51	-33.55	22.96	74	-17.49	54	-31.04	140	100	V	
4.8524	78.94	Pk	27.7	-50.28	56.36	-33.55	22.81	74	-17.64	54	-31.19	140	100	V	
4.9598	75.54	Pk	27.8	-50.74	52.6	-33.55	19.05	74	-21.4	54	-34.95	349	100	V	
Pk - Peak detector															

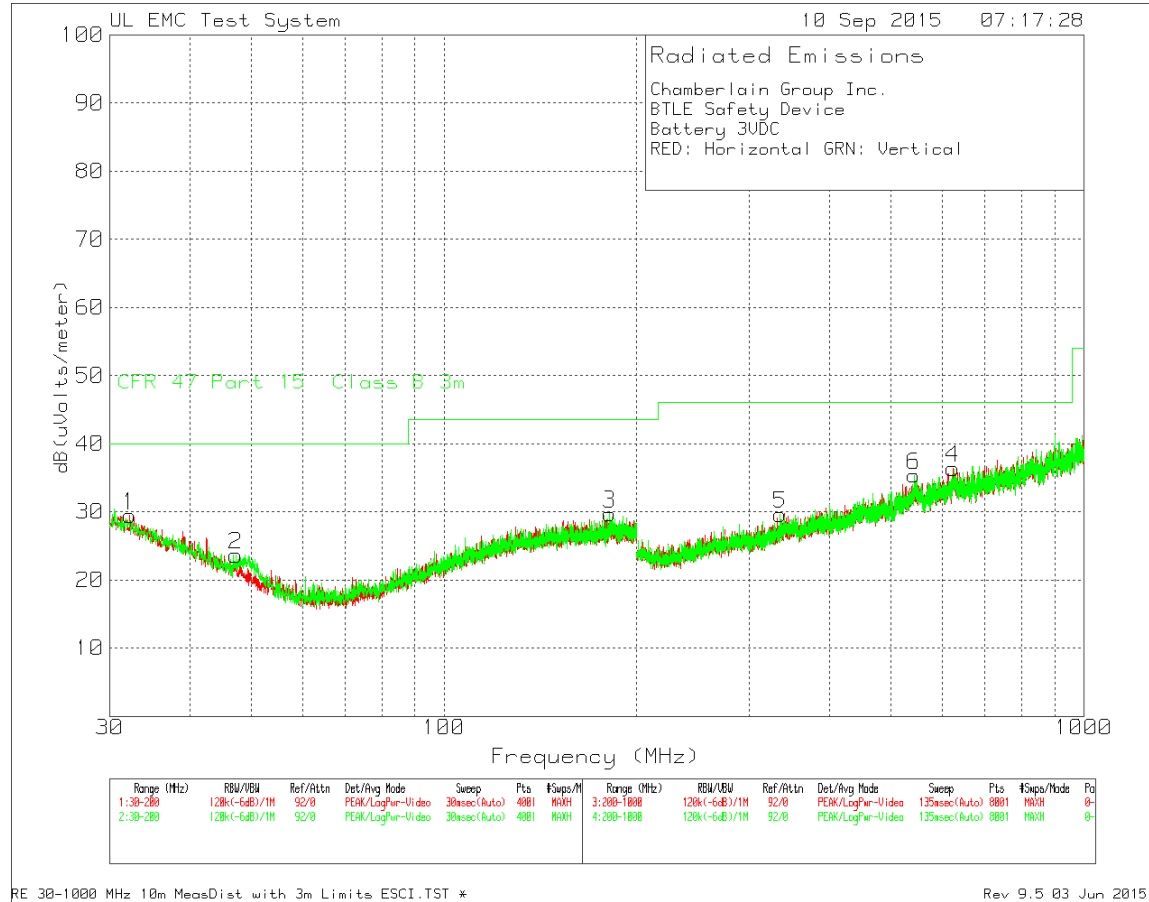
9.3. BELOW 1 GHz

SPURIOUS EMISSIONS 9kHz TO 30MHz



* No emissions recorded between 9kHz to 30MHz

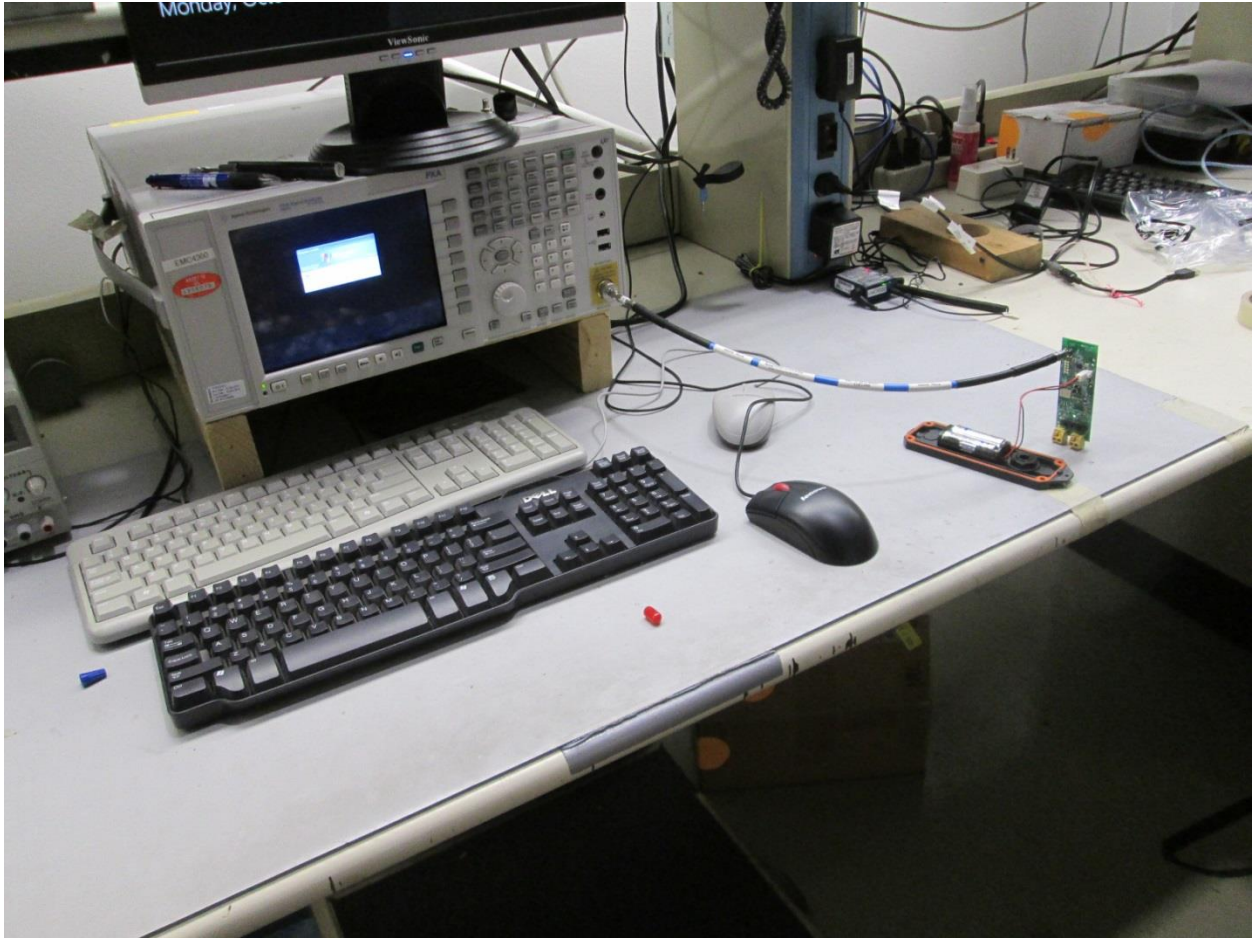
SPURIOUS EMISSIONS 30MHz TO 1000MHz



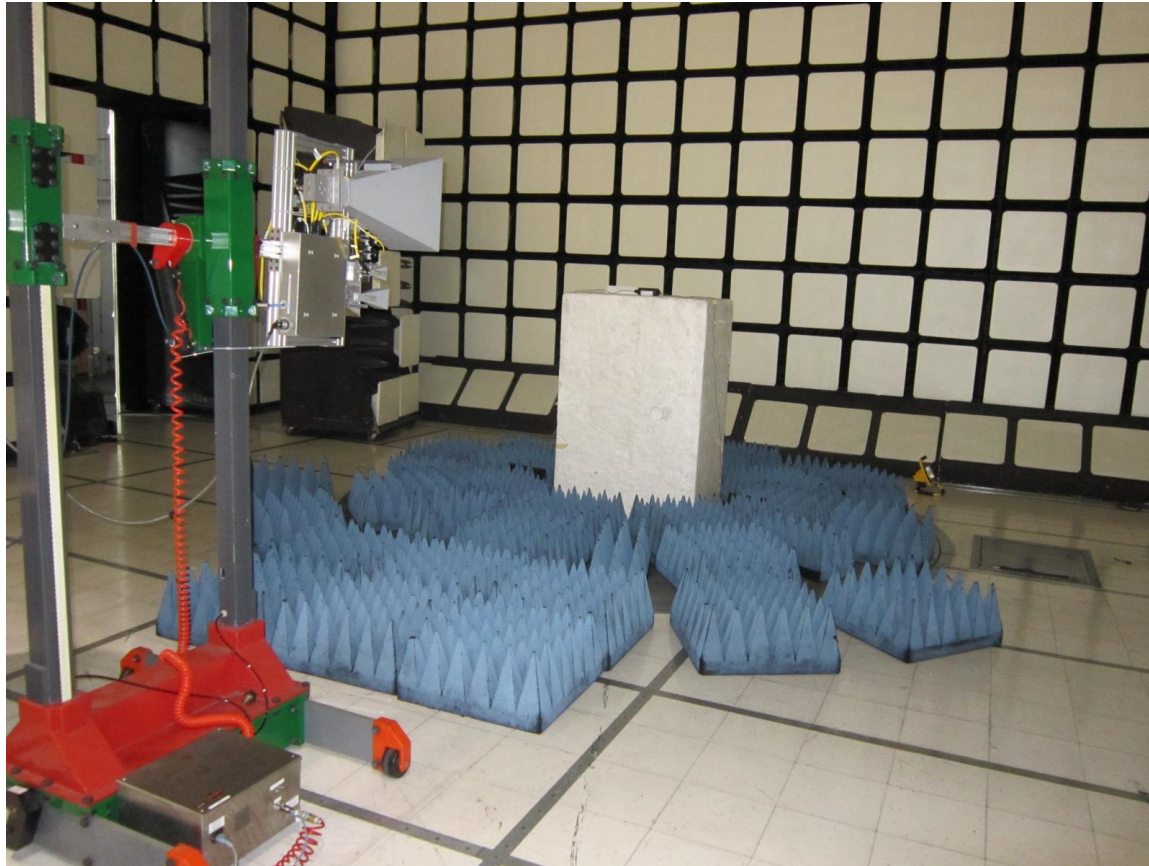
* No emissions between 30MHz – 1GHz

10. SETUP PHOTOS

Antenna Port Measurements



Radiated Spurious Emissions above 1GHz



X-Axis Setup



Y-Axis



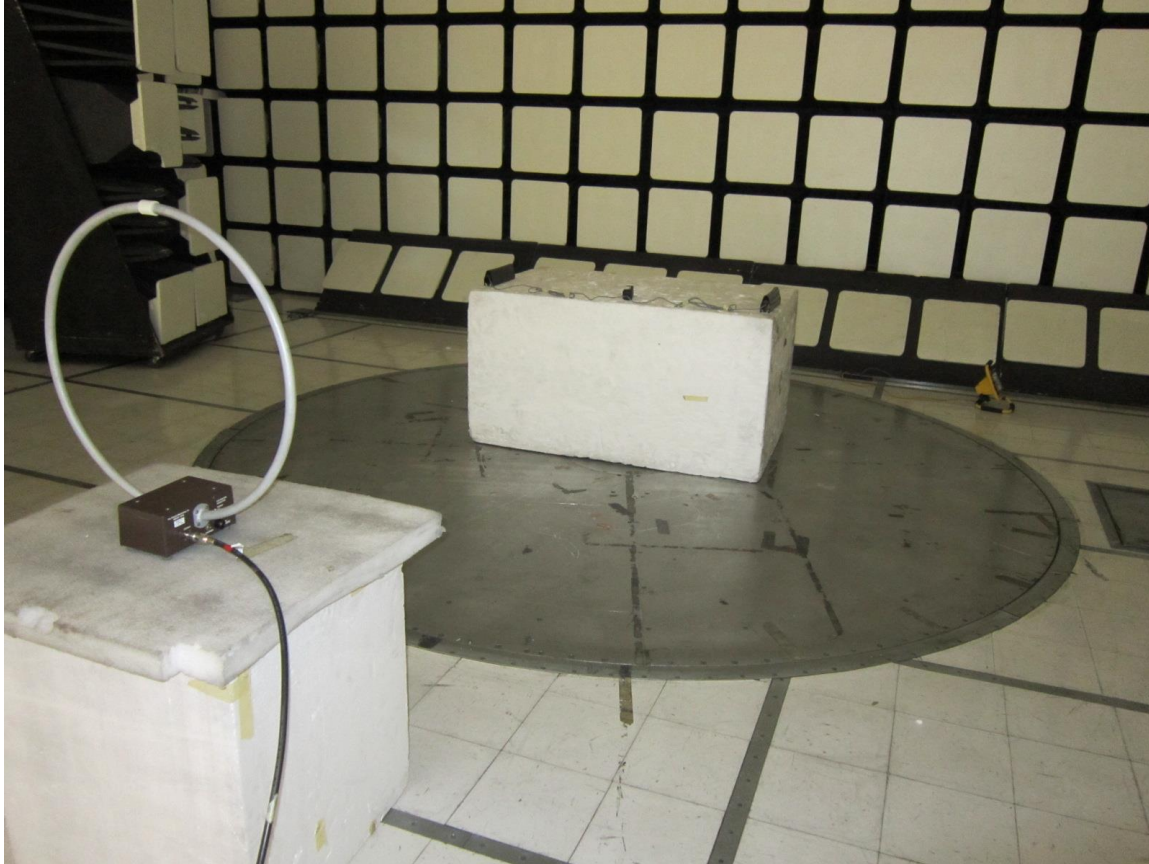
Z-Axis



Radiated Emissions 30MHz-1GHz



Radiated Emissions 9kHz to 30MHz



END OF REPORT