Testing Tomorrow's Technology

Application

For

Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraphs 15.207, 15.209 and 15.249

And

RSS-210 For Industry Canada

For the

Clean Hands Safe Hands

Model: CHSH Badge

FCC ID: 2AHQD-BADGE

UST Project: 16-0058
Issue Date: April 7, 2016

Total Pages in This Report: 33

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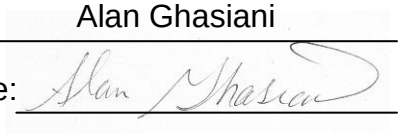
I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date April 7, 2016

MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Clean Hands Safe Hands

MODEL: CHSH Badge

FCC ID: 2AHQD-BADGE

DATE: April 7, 2016

This report concerns (check one): Original grant [X]
Class II change

Equipment type: BLE Transmitter

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until: _____N/A_____
date
agrees to notify the Commission by N/A
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

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Equipment Label(s)
Block Diagram(s)
Schematic(s)
Test Configuration Photographs
Internal Photographs
External Photographs
Antenna Photographs
Theory of Operation
User's Manual

1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 249.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on March 28, 2016 in good operating condition.

1.3 Product Description

The Equipment Under Test (EUT) is the Clean Hands Safe Hands Model CHSH Badge. The CHSH Badge is an integral part of the Clean Hands Safe Hands hand hygiene monitoring system. It functions as both replacement reel hardware to hold provider identification, and a BLE transmitter that broadcasts a unique identification string every 100 ms whenever the badge is in motion. This identification string allows the user to connect provider interaction with other system hardware (dispenser sensors) back to their individual profile.

Antenna: PCB Trace Antenna
Modulation: GFSK (FHSS)

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.4:2014, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2014)*,and *ANSI C63.10.2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices*.

A list of EUT and Peripherals is found in Table 1 below. A block diagram of the tested system is shown in Figure 1. Test configuration photographs are provided in separate Appendices

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is 186022. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

1.6 Related Submittals

The EUT is subject to the following FCC authorizations:

a) Certification under section 15.249 as a transmitter.
b) Verification under 15.101 as a digital device and receiver.

The Verification requirement shares many common report elements with the Certification report. Therefore, though this report is mostly intended to provide data for the Certification process, the Verification authorization report (part 15.107 and 15.109) for the EUT is included herein.

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Clean Hands Safe Hands	CHSH Badge	Engineering Sample	2AHQD-BADGE (pending)	N/A
Antenna See antenna details	--	--	--	--

U= Unshielded
S= Shielded
P= Power
D= Data

2 Tests and Measurements

2.1 Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are indicated.

Table 2. Test Instruments

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	E4407B	AGILENT	US41442935	2/11/2016
LOOP ANTENNA	SAS-200/562	A.H. Systems	142	9/28/2015 2 yr.
BICONICAL ANTENNA	3110B	EMCO	9307-1431	8/25/2015 2 yr.
LOG PERIODIC ANTENNA	3146	EMCO	9110-3236	11/19/2014 2 yr.
HORN ANTENNA	3115	EMCO	9107-3723	7/8/2014 2 yr.
HORN ANTENNA	3116	EMO	9505-2255	1/27/2015 2 yr.
PRE-AMPLIFIER	8449B	HEWLETT-PACKARD	3008A00480	12/1/2015
PRE-AMPLIFIER	8477E	HEWLETT-PACKARD	1145A00307	12/3/2015

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

2.2 Modifications to EUT Hardware

No physical modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 below.

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates at 2402 MHz to 2480 MHz, 3 test frequencies were used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10^{th} harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to 5 times the highest internal clock frequency.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

The radiated and conducted emissions limits shown herein are based on the following:

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.5.3 Pulsed Transmitter Averaging

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may be expressed logarithmically in dB.

NOTE: If the transmitter was programmed to transmit at >98% duty cycle, then, wherever applicable (where the detection mode was AVG) the duty cycle factor calculated will be applied.

2.6 EUT Antenna Requirements (CFR 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4. Allowed Antenna(s)

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB_i	TYPE OF CONNECTOR
1	Clean Hands Safe Hands	PCB Monopole	Engineering Sample	N/A	Trace

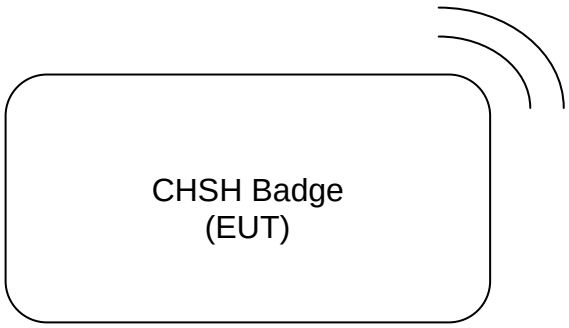

Figure 1. Block Diagram of Test Configuration

2.7 Restricted Bands of Operation (Part 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.1

2.8 Transmitter Duty Cycle (CFR 35 (c))

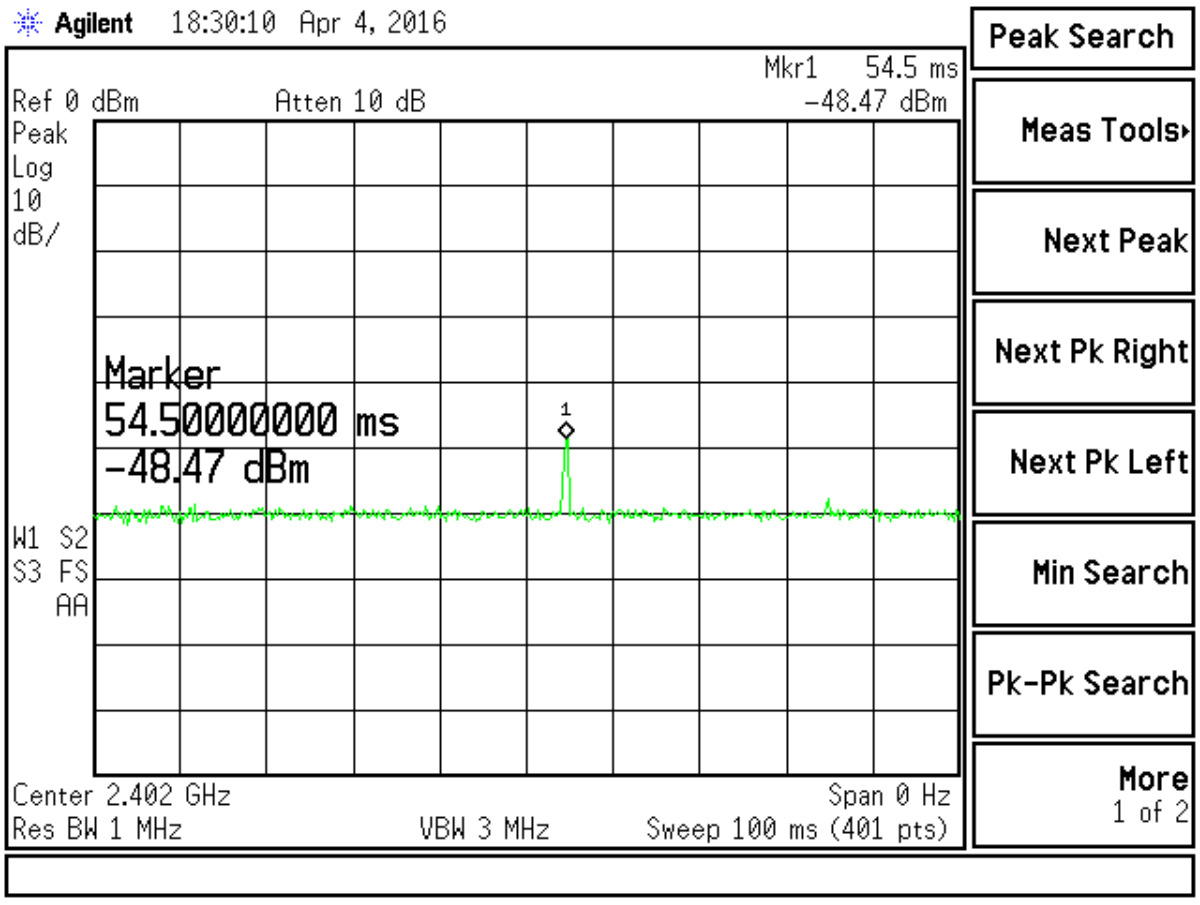

Figure 2. Duty Cycle 100ms Sweep Time

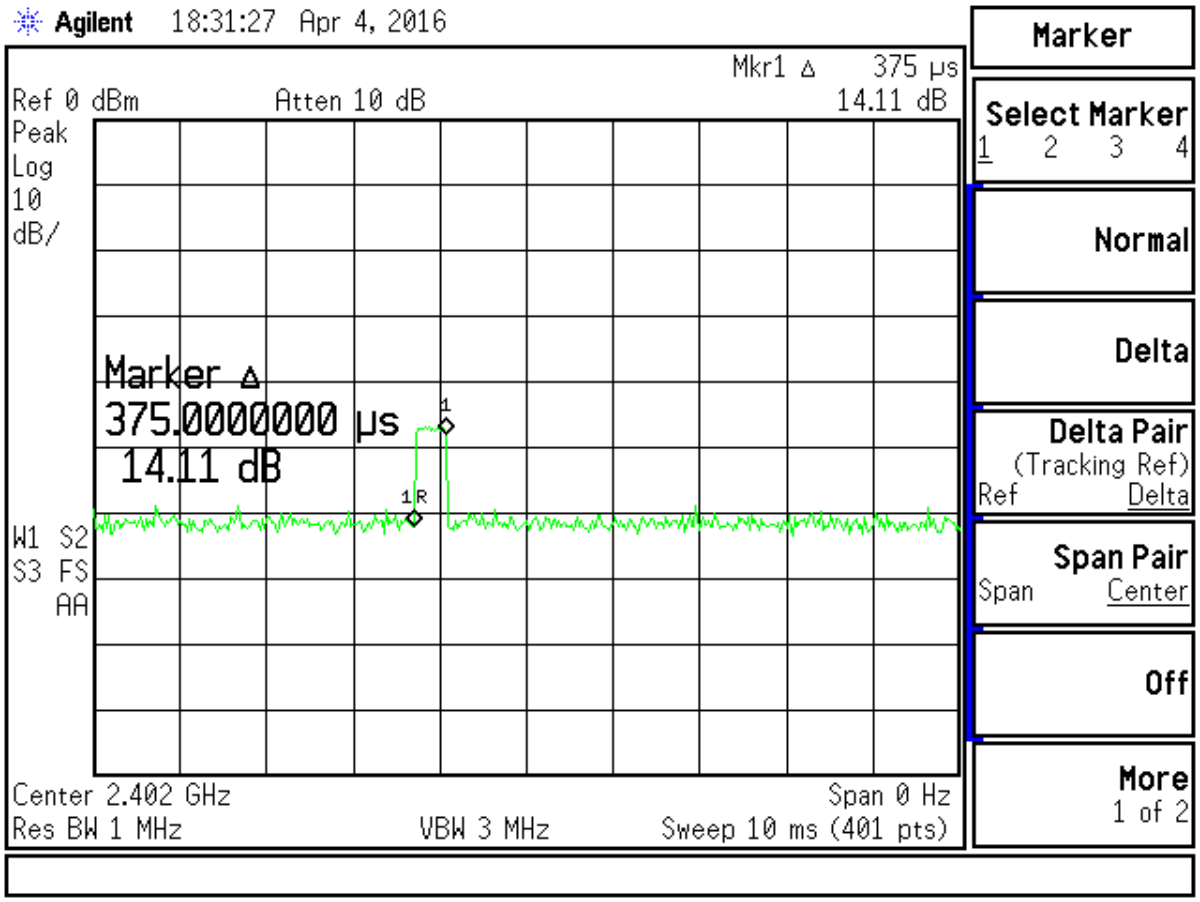

Figure 3. Transmitter Pulse Width

Total Pulse Train from Figure 3 = .375 (Pulse Train)

(.375 ms Total Time On)/(100 ms Total Pulse Train) = .0038 Numeric Duty Cycle
Duty Cycle = 20 Log (.0038) = -48.4 dB

Since the Duty Cycle is less than -20 dB, only a -20 dB Duty Cycle correction factor will be applied in this test report.

NOTE: The transmitter was programmed to transmit at >98% duty cycle, therefore wherever applicable (where the detection mode was AVG) the duty cycle factor calculated above will be applied.

2.9 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207)

Since the EUT is battery powered, this test was not applied. The EUT is powered by a coin cell battery, CR2450, rated 3VDC.

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.249(a),(c)) (IC RSS 210, A2.9 (a))

Radiated Spurious measurements: the EUT was placed into a continuous transmit mode of operation (>98% duty cycle) and tested per FCC KDB Publication 558074 and ANSI C63.10:2013. A preliminary scan was performed on the EUT to find signal frequencies that were caused by the transmitter part of the device. To obtain worse case results the EUT was tested in X, Y and Z axes or in the orientation of normal operation if the device is designed to operation in a fixed position.

Radiated measurements were then conducted between the frequency range of 9 KHz (or lowest frequency used/generated by the device) up to the tenth harmonic of the device (no greater than 40 GHz). In the band below 30 MHz a resolution bandwidth (RBW) of 9 kHz was used; emissions below 1 GHz were tested with a RBW of 120 KHz and emissions above 1 GHz were tested with a RBW of 1 MHz. All video bandwidth settings were at least three times the RBW value.

The EUT was investigated to CFR 15.209, General requirements for unwanted spurious emissions.

Table 5. Spurious Radiated Emissions below 30 MHz

9 kHz to 30 MHz, 15.209 limits							
Test: Radiated Emissions				**Client:** Clean Hands Safe Hands			
Project: 16-0058				**Model:** CHSH Badge			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**AVG Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or AVG**
No emissions found greater than 20 dB from the applicable limit from the lowest clock frequency (9 kHz to 30 MHz).							

Sample Calculation: N/A

Test Date: April 4, 2016
Tested By
Signature:  Name: George Yang

Table 6. Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.249(a)					**Client:** Clean Hands Safe Hands			
Project: 16-0058					**Model:** CHSH Badge			
Frequency (MHz)	**Test Data (dBuV)**	**Factor (dB)**	**AF+CA -AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector Mode**
Low - Channel								
2402.00	52.50		30.08	82.58	114.0	3.0m./HORZ	31.4	**PK**
4804.28	62.76	-9.50	3.32	56.58	74.0	1.0m./VERT	17.4	**PK**
7206.82	61.75	-9.50	8.21	60.46	74.0	1.0m./VERT	13.5	**PK**
9607.20	54.14	-9.50	4.29	48.93	74.0	1.0m./VERT	25.0	**PK**
Mid - Channel								
2425.00	50.83		30.16	80.99	114.0	3.0m./HORZ	33.0	**PK**
4852.45	67.79	-9.50	3.88	62.17	74.0	1.0m./VERT	11.8	**PK**
7277.35	59.85	-9.50	8.21	58.56	74.0	1.0m./VERT	15.4	**PK**
9704.30	54.30	-9.50	4.35	49.15	74.0	1.0m./VERT	24.8	**PK**
High - Channel								
2480.00	51.56		30.16	81.72	114.0	3.0m./HORZ	32.3	**PK**
4960.28	68.25	-9.50	5.00	63.75	74.0	1.0m./VERT	10.2	**PK**
7440.75	58.19	-9.50	8.59	57.28	74.0	1.0m./VERT	16.7	**PK**
9920.97	53.54	-9.50	5.56	49.60	74.0	1.0m./VERT	24.4	**PK**

Notes:
1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for peak measurements of CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. (~) Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
4. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 2402.00 MHz:

Magnitude of Measured Frequency	52.50	dBuV
+Antenna Factor + Cable Loss - Amplifier Gain	30.08	dB/m
Corrected Result	82.58	dBuV/m

Test Date: April 4, 2016
Tested By
Signature:  Name: George Yang

Table 7. Average Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.249(a)					**Client:** Clean Hands Safe Hands			
Project: 16-0058					**Model:** CHSH Badge			
Frequency (MHz)	**Test Data (dBuV)**	**Factor (dB)**	**AF+CA -AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector Mode**
Low - Channel								
2402.00	52.50	-20.00	30.08	62.58	94.0	3.0m./HORZ	31.4	**PK**
4804.28	62.76	-29.50	3.32	36.58	54.0	1.0m./VERT	17.4	**PK**
7206.82	61.75	-29.50	8.21	40.46	54.0	1.0m./VERT	13.5	**PK**
9607.20	54.14	-29.50	4.29	28.93	54.0	1.0m./VERT	25.0	**PK**
Mid - Channel								
2425.00	50.83	-20.00	30.16	60.99	94.0	3.0m./HORZ	33.0	**PK**
4852.45	67.79	-29.50	3.88	42.17	54.0	1.0m./VERT	11.8	**PK**
7277.35	59.85	-29.50	8.21	38.56	54.0	1.0m./VERT	15.4	**PK**
9704.30	54.30	-29.50	4.35	29.15	54.0	1.0m./VERT	24.8	**PK**
High - Channel								
2480.00	51.56	-20.00	30.16	61.72	94.0	3.0m./HORZ	32.3	**PK**
4960.28	68.25	-29.50	5.00	43.75	54.0	1.0m./VERT	10.2	**PK**
7440.75	58.19	-29.50	8.59	37.28	54.0	1.0m./VERT	16.7	**PK**
9920.97	53.54	-29.50	5.56	29.60	54.0	1.0m./VERT	24.4	**PK**

Notes:
1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for peak measurements of CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. (~) Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
4. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
5. Duty Cycle factor of -20 dB is added to the additional factor column.

Sample Calculation at 2402.0 MHz:

Magnitude of Measured Frequency	52.50	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	30.08	dB/m
Duty Cycle Correction Factor	-20.00	dB
Corrected Result	62.58	dBuV/m

Test Date: April 4, 2016
Tested By
Signature: _____ Name: George Yang

2.11 Band Edge Measurements – (CFR 15.249 (d))

Band Edge measurements are made following the guidelines in FCC KDB Publication No. 558074 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Radiated measurements are performed to demonstrate compliance with the requirement of 15.249(d) that all emissions outside of the band edges be attenuated by at least 50 dB or 15.209 limits, when compared to its highest in-band value (contained in a 100 kHz band).

To capture the band edge, set the Spectrum Analyzer frequency span set to 2 MHz to capture the peak level of the emission operating on the channel closest to the band edge as well as any modulation products falling outside of the authorized band of operation. See figure and calculations below for more detail.

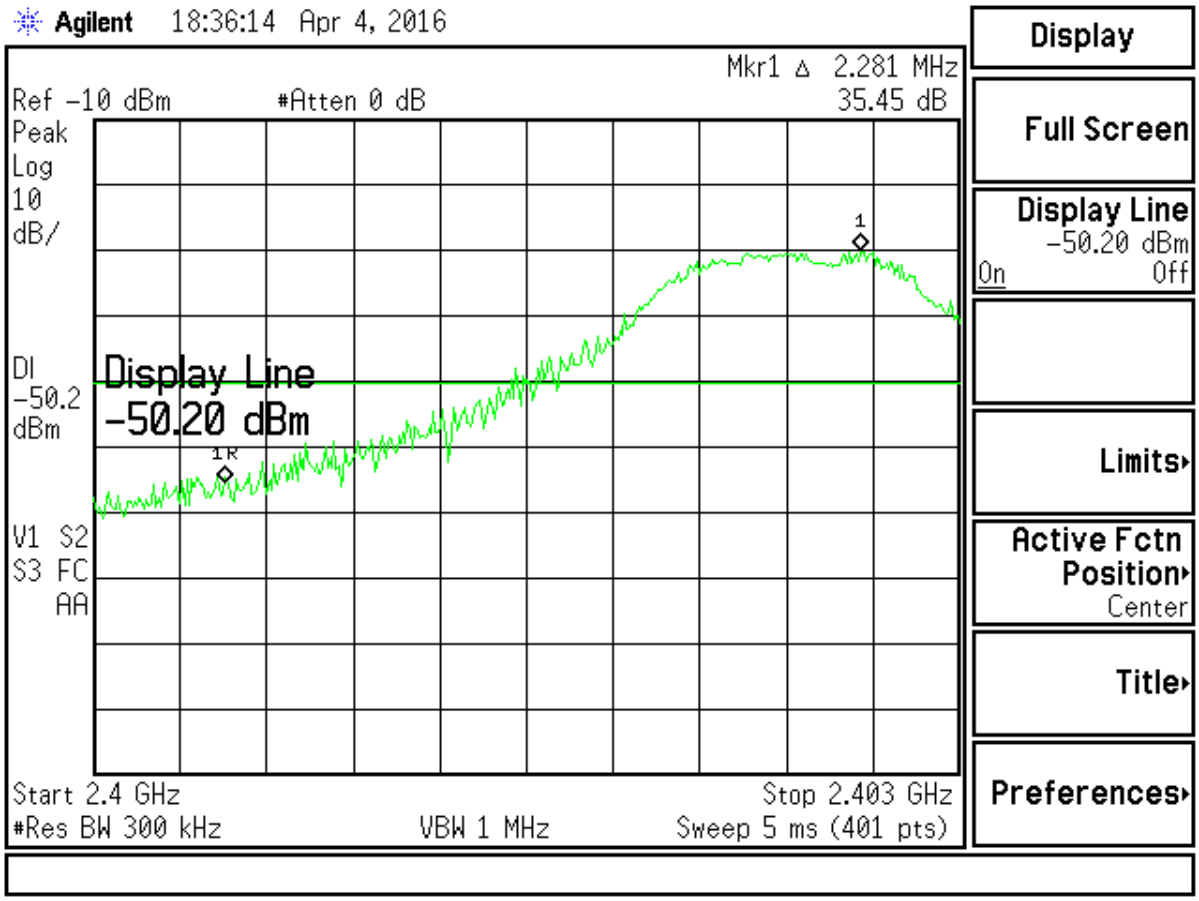

Figure 4. Band Edge Compliance, Low Channel Delta - Peak

Low Channel Corrected Measured Value from Table 6	82.58	dBuV
Low Channel Band Edge Delta from Figure 4	35.45	dB
Calculated Result (PEAK)	47.13	dBuV/m
Band Edge Limit (AVG)	54.00	dBuV/m
Calculated Result (PEAK)	47.13	dBuV/m
Band Edge Margin	6.87	dBuV/m

Note: Peak meets AVG limits.

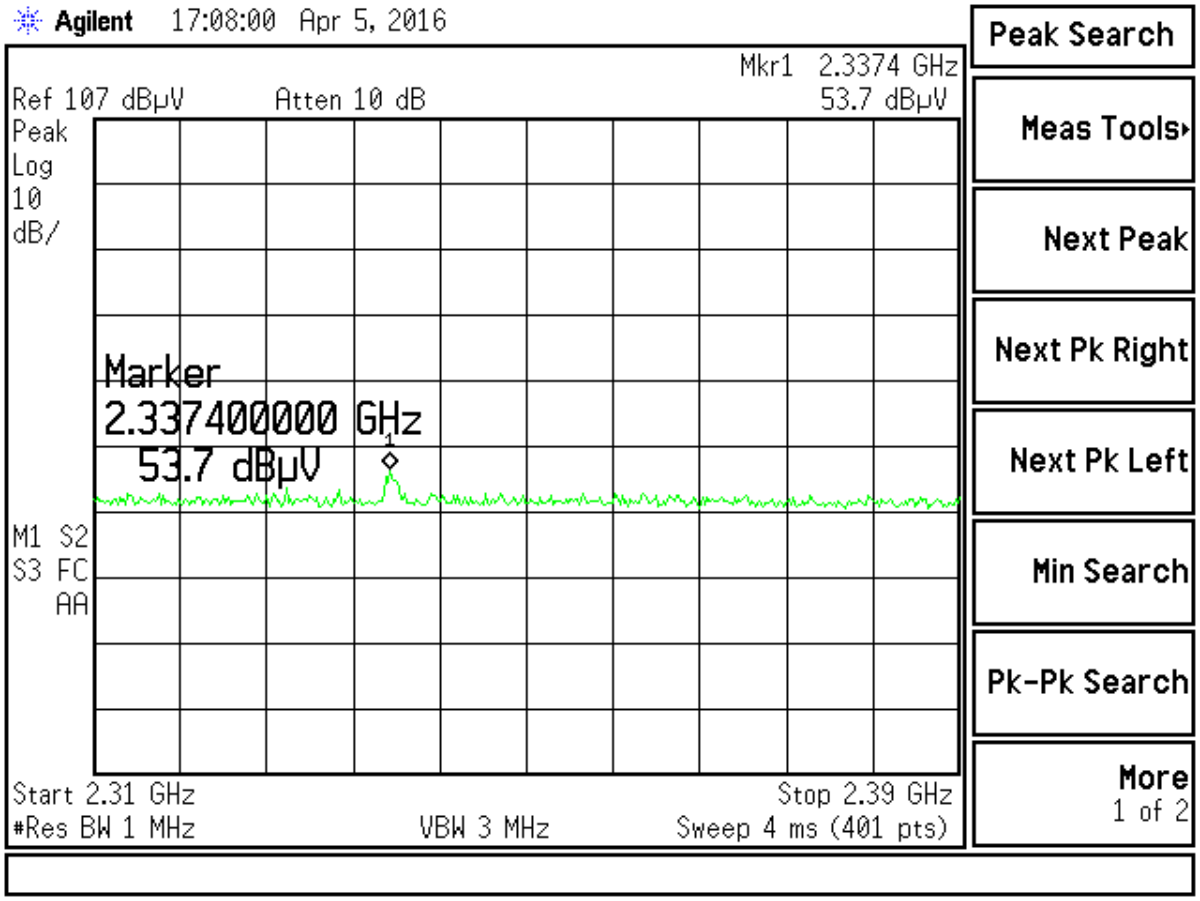

Figure 5. Radiated Restricted Band 2310 MHz to 2390 MHz, Peak

Table 8. Radiated Restricted Band 2310 MHz to 2390 MHz, Peak

2310 MHz to 2390 MHz Restricted Band Peak Measurements							
Test: Radiated Emissions				**Client:** CHSH			
Project: 16-0058				**Model:** CHSH Badge			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or AVG**
PEAK value vs. PK limit							
2337.40	53.70	-4.76	48.94	74.0	3.0m./VERT	25.1	**PK**
PEAK value vs. AVG limit							
2337.40	53.70	-4.76	48.94	54.0	3.0m./VERT	5.1	**PK**

Test Date: April 4, 2016
Tested By
Signature: Name: George Yang

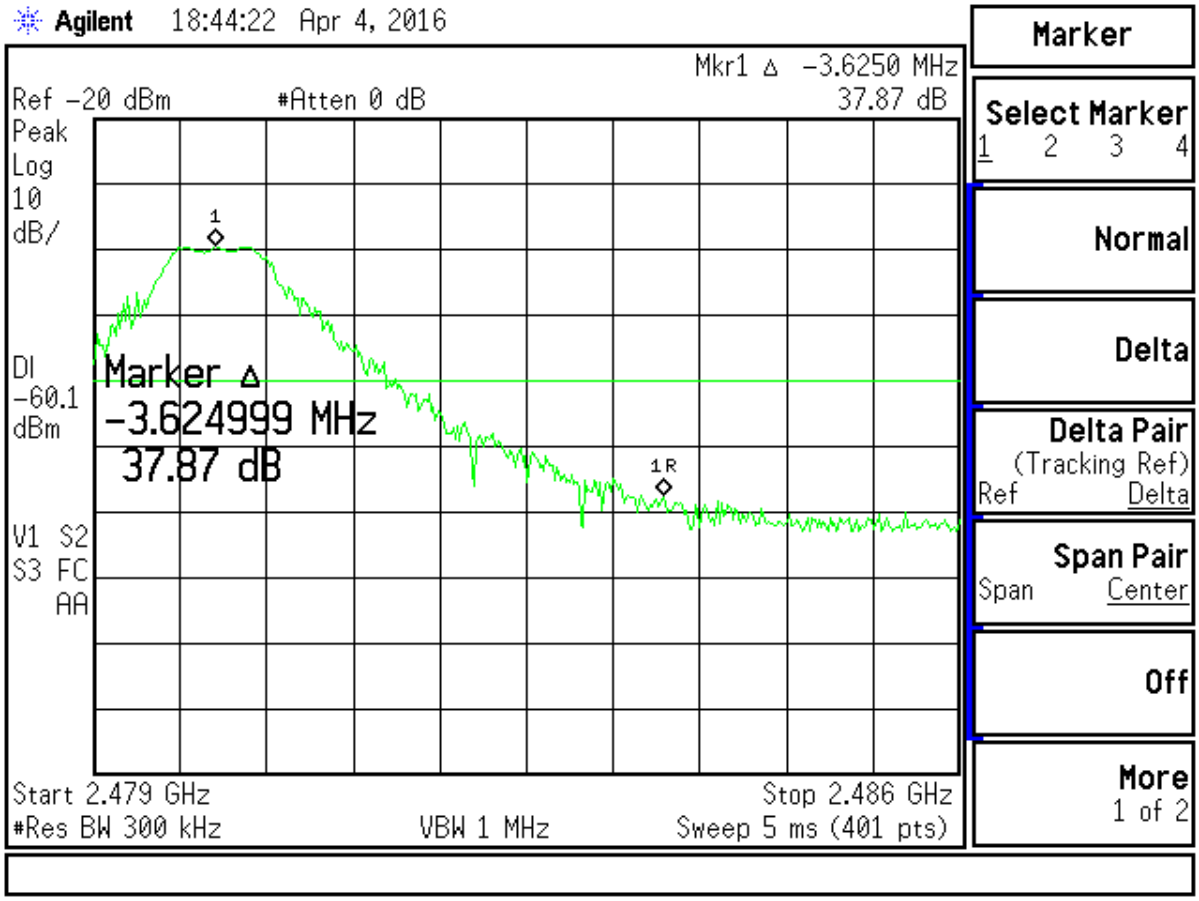

Figure 6. Band Edge Compliance, High Channel Delta – Peak

High Channel Corrected Measured Value from Table 6	81.72	dBuV
High Channel Band Edge Delta from Figure 6	37.87	dB
Calculated Result (PEAK)	43.85	dBuV/m
Band Edge Limit (AVG)	54.00	dBuV/m
Calculated Result (PEAK)	43.85	dBuV/m
Band Edge Margin	10.15	dBuV/m

Note: Peak meets AVG limits

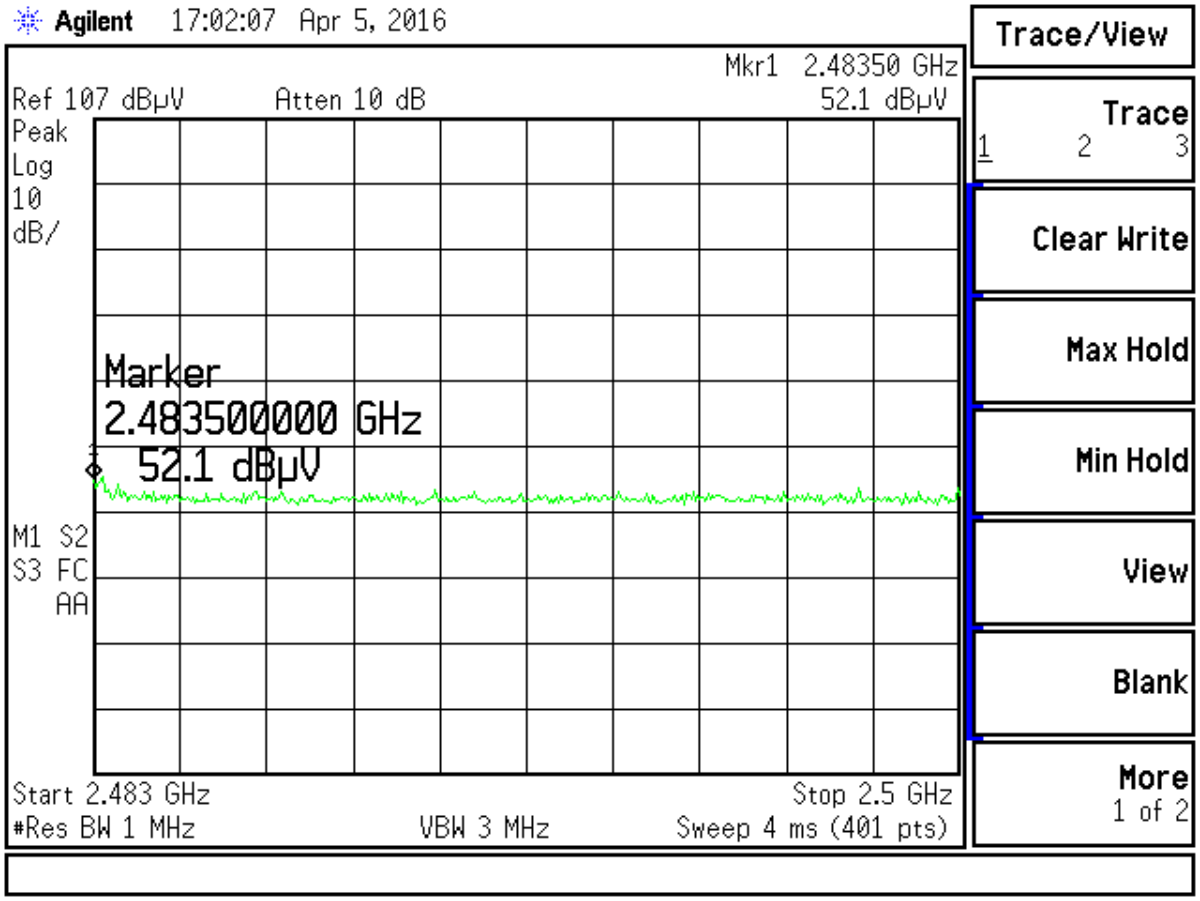

Figure 7. Radiated Restricted Band 2483.5 MHz to 2500 MHz, Peak

Table 9. Radiated Restricted Band 2483.5 MHz to 2500 MHz, Peak

2483.5 MHz to 2500 MHz Restricted Band Peak Measurements							
Test: Radiated Emissions				**Client:** CHSH			
Project: 16-0058				**Model:** CHSH Badge			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**PK Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or AVG**
PEAK value vs. PK limit							
2483.50	52.60	-3.86	48.74	74.0	3.0m./VERT	25.3	**PK**
PEAK value vs. AVG limit							
2483.50	52.60	-3.86	48.74	54.0	3.0m./VERT	5.3	**PK**

Test Date: April 4, 2016
Tested By
Signature: Name: George Yang

2.12 Occupied Bandwidth (CFR 15.215 (c))

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

These measurements were performed while the EUT was in a constant transmit mode. A method similar to the marker delta method was used to capture the points. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW ≥ RBW. The results of this test are given in Table 12 and Figures 10-12.

Table 10. 20 dB Bandwidth

Frequency (MHz)	20 dB Bandwidth (MHz)
2402	1.619
2426	1.934
2480	1.985

Test Date: May 6, 2016
Tested By
Signature:  Name: George Yang

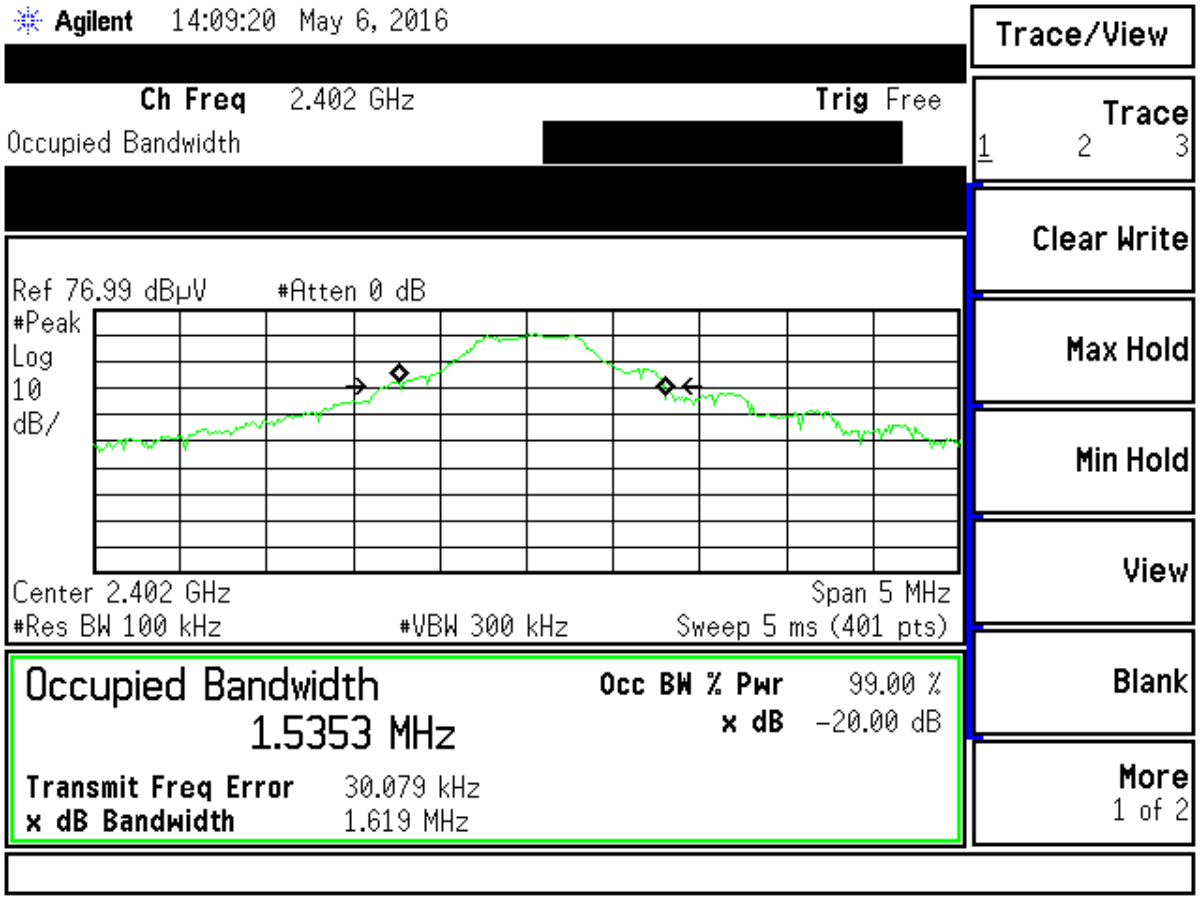

Figure 8. Twenty dB Bandwidth - IC RSS 210, A8.1– Low Channel

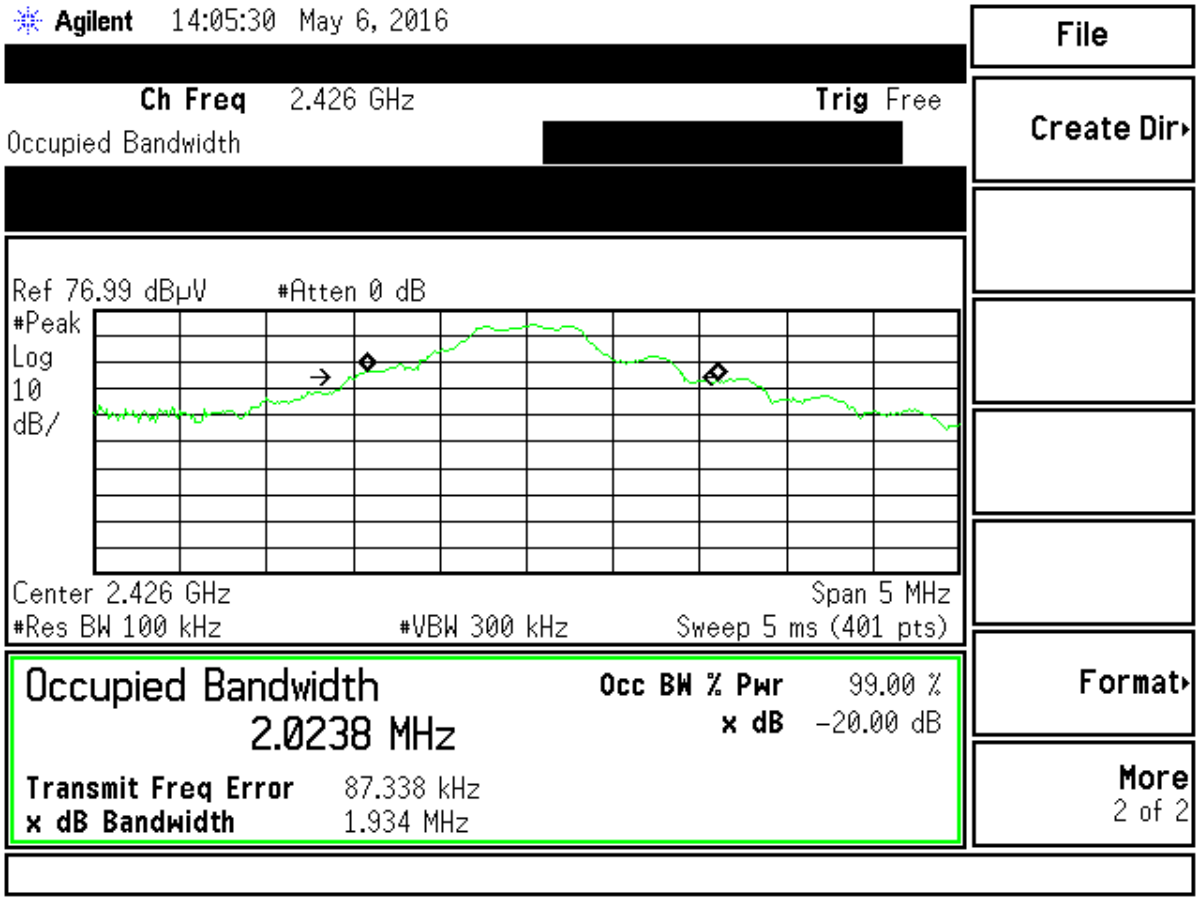

Figure 9. Twenty dB Bandwidth -IC RSS 210, A8.1 – Mid Channel

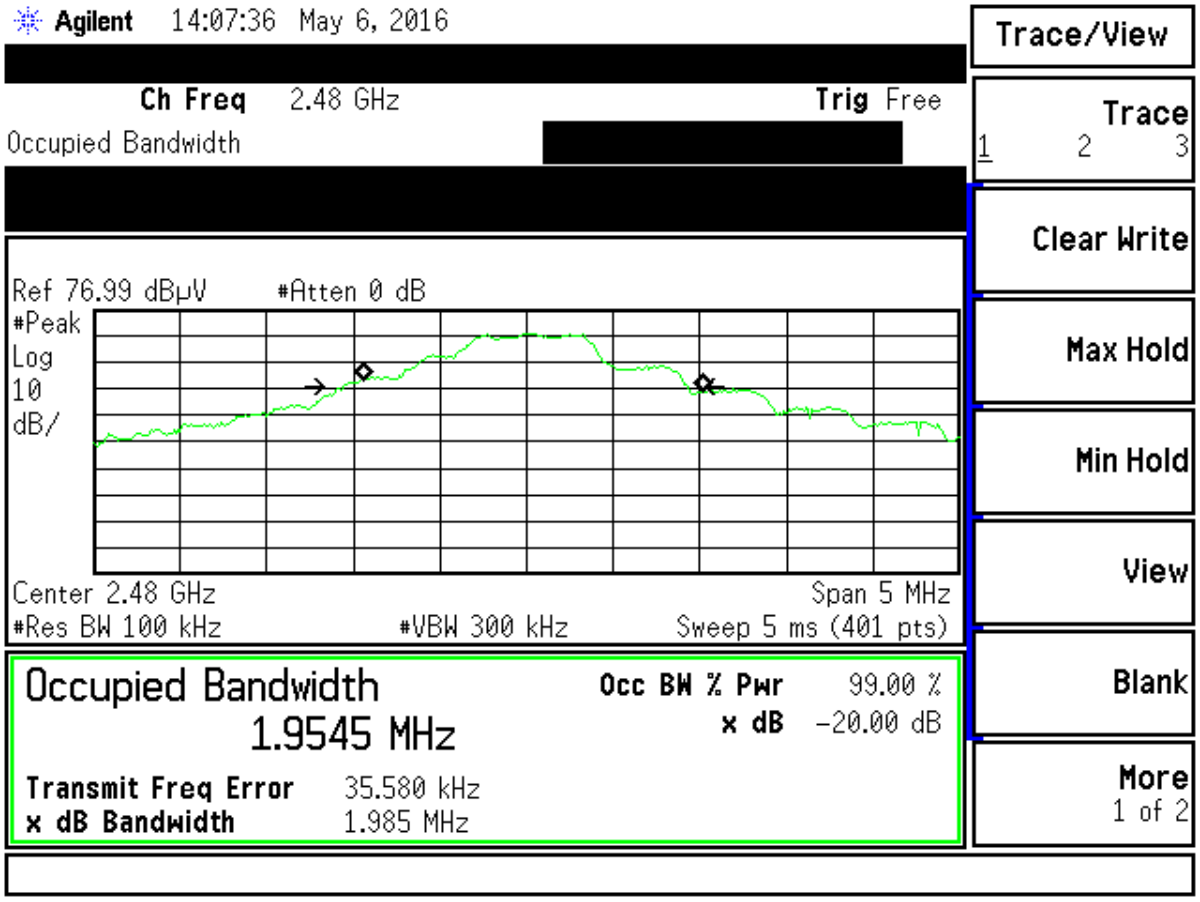

Figure 10. Twenty dB Bandwidth -IC RSS 210, A8.1 – High Channel

2.13 Unintentional Radiator, Powerline Emissions (CFR 15.107)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.107, per ANSI C63.4:2014, Paragraph 7, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmission.

Since the EUT is battery powered, this test was not applied. The EUT is powered by a coin cell battery, CR2450, rated 3VDC.

NOTE: The test data provided in this section is to support the requirement for the digital apparatus.

Table 11. Transmitter Power Line Conducted Emissions Test Data, Part 15.107

9kHz to 30 MHz with Class B Limits						
Test: Power Line Conducted Emissions				**Client:** Clean Hands Safe Hands		
Project: 16-0058				**Model:** CHSH Badge		
Frequency (MHz)	**Test Data (dBuv)**	**LISN+CL-PA (dB)**	**Results (dBuV)**	**AVG Limits (dBuV)**	**Margin (dB)**	**Detector PK, QP, or AVG**
The EUT is battery powered: therefore this test is not applicable.						

SAMPLE CALCULATION: N/A

Test Date: April 4, 2016
Tested By
Signature: _____ Name: George Yang

2.14 Unintentional Radiator, Radiated Emissions (CFR 15.109)

Radiated emissions disturbance Measurements were performed with an instrument having both peak and quasi-peak detectors over the frequency range of 30 MHz to 12.5 GHz. Measurements of the radiated emissions were made with the receiver antenna at a distance of 3 m from the boundary of the test unit.

The test antenna was varied from 1 m to 4 m in height while watching the analyzers' display for the maximum magnitude of the signal at the test frequency. The antenna polarization (horizontal or vertical) and test sample azimuth were varied during the measurements to find the maximum field strength readings to record.

The worst-case radiated emissions in the range of 30 MHz to 12.5 GHz are more than 20 dB below the limit.

NOTE: The test data provided in this section is to support the requirement for the digital apparatus.

Table 12. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109), 30 MHz to 1000 MHz

30 MHz to 1000 MHz with Class B Limits							
Test: Radiated Emissions				**Client:** Clean Hands Safe Hands			
Project: 16-0058				**Model:** CHSH Badge			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**QP Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or QP**
198.15	41.70	-11.43	30.27	43.5	3m./HORZ	13.2	**PK**
169.91	42.48	-12.67	29.81	43.5	3m./VERT	13.7	**PK**
995.91	40.73	-1.38	39.35	54.0	3m./HORZ	14.6	**PK**
902.11	40.64	-2.84	37.80	46.0	3m./VERT	8.2	**PK**
97.15	41.55	-15.47	26.08	43.5	3m./HORZ	17.4	**PK**
33.83	45.67	-13.96	31.71	40.0	3m./VERT	8.3	**PK**
616.00	40.05	-0.98	39.07	46.0	3m./HORZ	6.9	**PK**
654.00	40.13	-0.36	39.77	46.0	3m./VERT	6.2	**PK**
No other emissions seen greater than 20 dB from the applicable limit.							

Tested from 30 MHz to 1 GHz

SAMPLE CALCULATION at 198.15 MHz:

Magnitude of Measured Frequency	41.70	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	-11.43	dB/m
Corrected Result	30.27	dBuV/m

Test Date: April 4, 2016
Tested By
Signature:  Name: George Yang

Table 13. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109), 1 GHz to 12.5 GHz

1 GHz to 12.5 GHz with Class B Limits							
Test: Radiated Emissions				**Client:** Clean Hands Safe Hands			
Project: 16-0058				**Model:** CHSH Badge			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**AVG Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or AVG**
No Emissions seen greater than 20 dB from the applicable limit.							

Tested from 1 GHz to 12.5 GHz

SAMPLE CALCULATION : N/A

Test Date: April 4, 2016
Tested By
Signature:  Name: George Yang

2.15 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4. A coverage factor of k=2 was used to give a level of confidence of approximately 95%.

2.15.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.78 dB.

This EUT is battery powered; therefore this tested was deemed not applicable.

2.15.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.39 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ± 5.18 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ± 5.21dB.

The data listed in this test report does have sufficient margin to negate the effects of uncertainty. Therefore, the EUT unconditionally meets this requirement.