



# FCC CO-LOCATION RADIO TEST REPORT

**FCC ID** : 2AG0Z-P4LK  
**Equipment** : Media receiver  
**Brand Name** : facebook  
**Model Name** : WD50JM  
**Applicant** : Facebook Technologies, LLC  
1 Hacker Way, Menlo Park, CA 94025, USA  
**Standard** : FCC Part 15 Subpart E §15.407

The product was received on May 24, 2019 and testing was started from Jun. 28, 2019 and completed on Jul. 03, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Jones Tsai

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



## Table of Contents

<b>History of this test report.....</b>	<b>3</b>
<b>Summary of Test Result.....</b>	<b>4</b>
<b>1 General Description .....</b>	<b>5</b>
1.1 Product Feature of Equipment Under Test.....	5
1.2 Modification of EUT .....	5
1.3 Testing Location .....	5
1.4 Applicable Standards.....	5
<b>2 Test Configuration of Equipment Under Test .....</b>	<b>6</b>
2.1 Carrier Frequency and Channel .....	6
2.2 Test Mode.....	6
2.3 Connection Diagram of Test System.....	7
2.4 EUT Operation Test Setup .....	7
<b>3 Test Result .....</b>	<b>8</b>
3.1 Unwanted Emissions Measurement .....	8
3.2 Antenna Requirements .....	12
<b>4 List of Measuring Equipment.....</b>	<b>13</b>
<b>5 Uncertainty of Evaluation .....</b>	<b>14</b>
<b>Appendix A. Radiated Spurious Emission</b>	
<b>Appendix B. Radiated Spurious Emission Plots</b>	
<b>Appendix C. Duty Cycle Plots</b>	
<b>Appendix D. Setup Photographs</b>	



## History of this test report

Report No.	Version	Description	Issued Date
FR952409F	01	Initial issue of report	Jul. 14, 2019
FR952409F	02	Revise the connection diagram of test system in section 2.3	Jul. 22, 2019
FR952409F	03	Revise the Radiated Spurious Emission Plots data in appendix B	Jul. 30, 2019

## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.407(b)	Unwanted Emissions	Pass	Under limit 4.02 dB at 2483.560 MHz
3.2	15.203 15.407(a)	Antenna Requirement	Pass	-

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by: Wii Chang**

**Report Producer: Maggie Chiang**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac, and Wi-Fi 5GHz 802.11a/n/ac

Product specification subjective to this standard	
Antenna Type	WLAN <Ant. 1>: FPC Antenna <Ant. 2>: FPC Antenna Bluetooth: FPC Antenna

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No.
	03CH012-HY

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No. TW0007

## 1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ ANSI C63.10-2013

### Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

### 2.1 Carrier Frequency and Channel

2400-2483.5 MHz Bluetooth LE		2400-2483.5 MHz 802.11ac VHT20		5470-5725 MHz 802.11ac VHT40	
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
00	2402	11	2462	102	5510

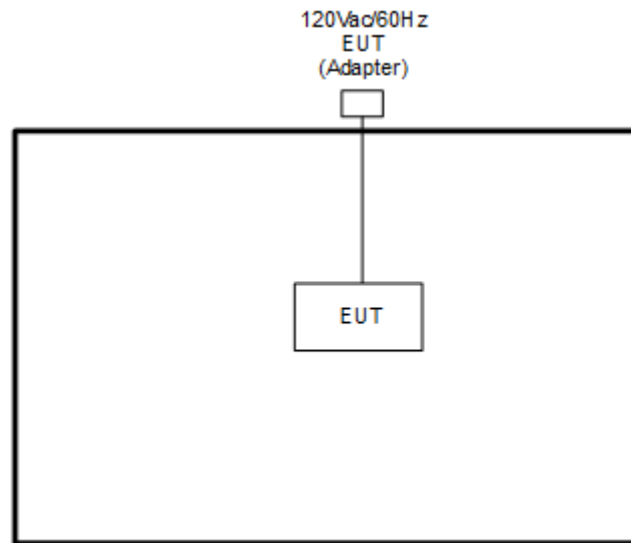
### 2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

<Co-Location>

Modulation	Data Rate
Bluetooth - LE 2Mbps + 2.4GHz 802.11ac VHT20 Ant. 2	2Mbps + MCS0
Bluetooth - LE 2Mbps + 5GHz 802.11ac VHT40 Ant. 1	2Mbps + MCS0
Bluetooth - LE 2Mbps + 5GHz 802.11ac VHT40 Ant. 2	2Mbps + MCS0

## 2.3 Connection Diagram of Test System



## 2.4 EUT Operation Test Setup

The RF test items, utility "QRCT Version 4.0.00067" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

### 3 Test Result

#### 3.1 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

##### 3.1.1 Limit of Unwanted Emissions

- (1) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

**Note:** The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \text{ } \mu\text{V/m, where P is the eirp (Watts)}$$

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

- (2) KDB789033 D02 v02r01 G)2)c)

- (i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.<sup>3</sup>
- (ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.<sup>4</sup>

**Note 3:** An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

**Note 4:** Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).



### 3.1.2 Measuring Instruments

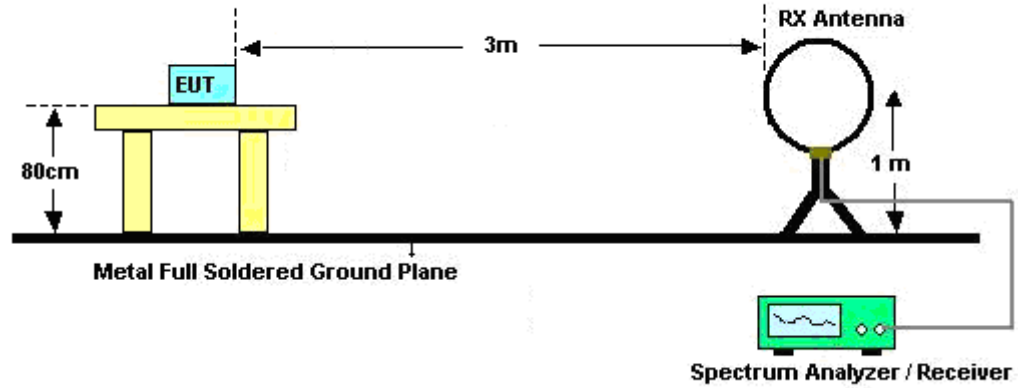
See list of measuring equipment of this test report.

### 3.1.3 Test Procedures

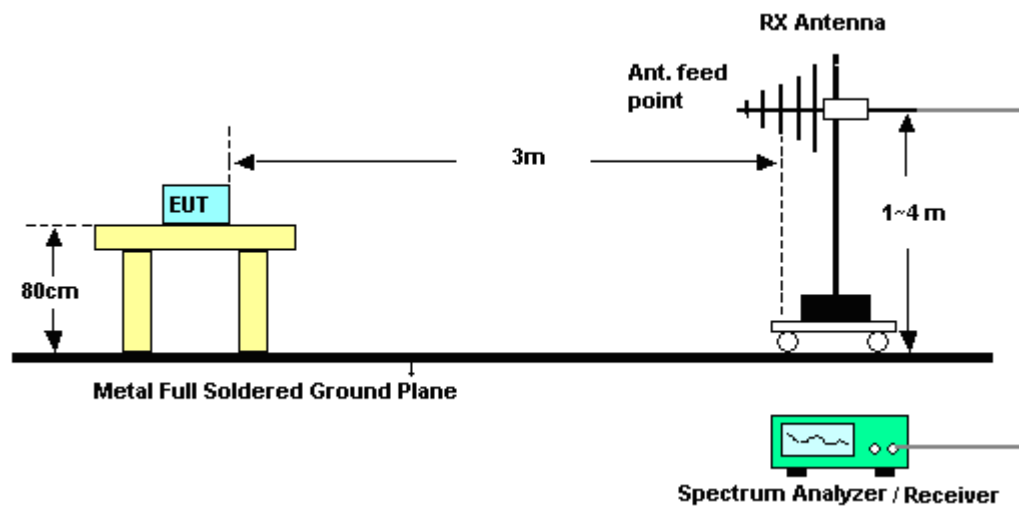
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules **v02r01**.  
Section G) Unwanted emissions measurement.
  - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
    - RBW = 120 kHz
    - VBW = 300 kHz
    - Detector = Peak
    - Trace mode = max hold
  - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
    - RBW = 1 MHz
    - VBW  $\geq$  3 MHz
    - Detector = Peak
    - Sweep time = auto
    - Trace mode = max hold
  - (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
    - RBW = 1 MHz
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW  $\geq$  1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.1.4 Test Setup

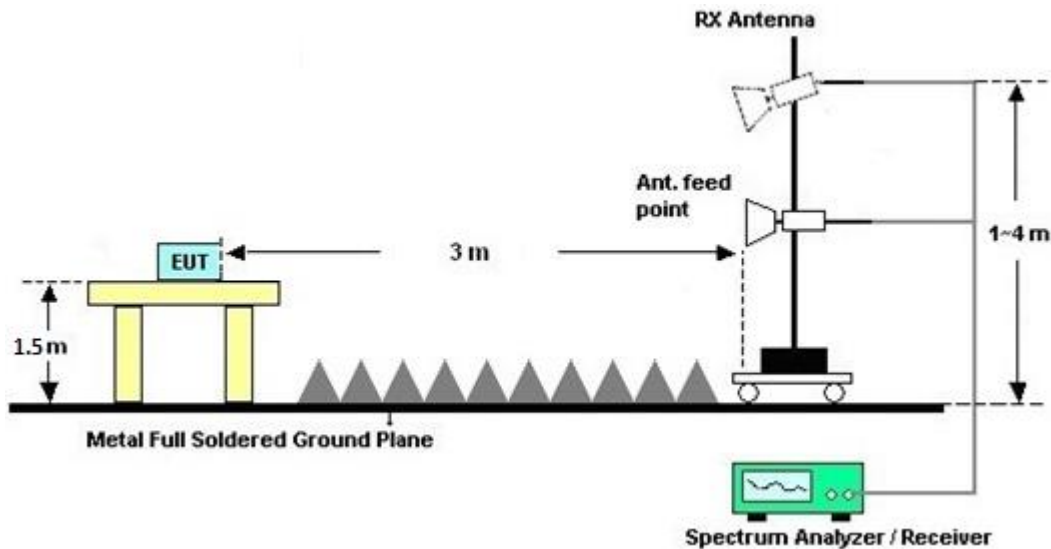
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



**For radiated emissions above 1GHz**



### 3.1.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

### 3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

### 3.1.7 Duty Cycle

Please refer to Appendix C.

### 3.1.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix A and B.



## **3.2 Antenna Requirements**

### **3.2.1 Standard Applicable**

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **3.2.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **3.2.3 Antenna Gain**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL 6111D&00800N 1D01N-06	37059&01	30MHz~1GHz	Oct. 13, 2018	Jun. 28, 2019~ Jul. 03, 2019	Oct. 12, 2019	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Nov. 09, 2018	Jun. 28, 2019~ Jul. 03, 2019	Nov. 08, 2019	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170584	18GHz ~ 40GHz	Dec. 05, 2018	Jun. 28, 2019~ Jul. 03, 2019	Dec. 04, 2019	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 25, 2019	Jun. 28, 2019~ Jul. 03, 2019	Mar. 24, 2020	Radiation (03CH12-HY)
Preamplifier	Agilent	8449B	3008A02375	1GHz~26.5GHz	May 27, 2019	Jun. 28, 2019~ Jul. 03, 2019	May 26, 2020	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-00101 800-30-10P	1590074	1GHz~18GHz	May 20, 2019	Jun. 28, 2019~ Jul. 03, 2019	May 19, 2020	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Jun. 28, 2019~ Jul. 03, 2019	Dec. 05, 2019	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 26, 2018	Jun. 28, 2019~ Jul. 03, 2019	Dec. 25, 2019	Radiation (03CH12-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 19, 2019	Jun. 28, 2019~ Jul. 03, 2019	Mar. 18, 2020	Radiation (03CH12-HY)
Filter	Wainwright	WLK4-1000-15 30-6000-40SS	SN11	1 GHz Lowpass	Sep. 16, 2018	Jun. 28, 2019~ Jul. 03, 2019	Sep. 15, 2019	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 0SS	SN3	3 GHz Highpass	Sep. 16, 2018	Jun. 28, 2019~ Jul. 03, 2019	Sep. 15, 2019	Radiation (03CH12-HY)
Filter	Woken	WHKX8-5272.5 -6750-18000-4 0ST	SN2	6.75G Highpass	Sep. 17, 2018	Jun. 28, 2019~ Jul. 03, 2019	Sep.16, 2019	Radiation (03CH12-HY)
Notch Filter	Wainwright	WRCGV2400/2 483-2390/2493 -35/10SS	SN4	2.4G	Nov. 02, 2018	Jun. 28, 2019~ Jul. 03, 2019	Nov. 01, 2019	Radiation (03CH12-HY)
Notch Filter	Wainwright	WRCJV12-569 5-5725-5850-5 880-40SS	SN6	5GBand4	Jul. 05, 2018	Jun. 28, 2019~ Jul. 03, 2019	Jul. 04, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30M-18G	Mar. 13, 2019	Jun. 28, 2019~ Jul. 03, 2019	Mar. 12, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Oct. 16, 2018	Jun. 28, 2019~ Jul. 03, 2019	Oct. 15, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30M~40GHz	Oct. 16, 2018	Jun. 28, 2019~ Jul. 03, 2019	Oct. 15, 2019	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jun. 28, 2019~ Jul. 03, 2019	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jun. 28, 2019~ Jul. 03, 2019	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Jun. 28, 2019~ Jul. 03, 2019	N/A	Radiation (03CH12-HY)

## 5 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.1
--	-----

### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.2
--	-----

### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.7
--	-----



## Appendix A. Radiated Spurious Emission

Test Engineer :	Jack Cheng, Lance Chiang, and Chuan Chu	Temperature :	21~24°C
		Relative Humidity :	56~68%

## BLE + WIFI 802.11ac VHT20 (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
BLE CH 00 2402MHz		2336.88	55.13	-18.87	74	43.98	27.68	16.56	33.09	143	229	P	H
		2349.165	48.14	-5.86	54	37.06	27.61	16.58	33.11	143	229	A	H
	*	2402	100.08	-	-	89.11	27.5	16.64	33.17	143	229	P	H
	*	2402	99.02	-	-	88.05	27.5	16.64	33.17	143	229	A	H
		2346.225	56.05	-17.95	74	44.96	27.62	16.58	33.11	106	349	P	V
		2339.61	48.39	-5.61	54	37.26	27.66	16.57	33.1	106	349	A	V
	*	2402	101.78	-	-	90.81	27.5	16.64	33.17	106	349	P	V
	*	2402	100.73	-	-	89.76	27.5	16.64	33.17	106	349	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

## BLE + WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11ac VHT20 CH 11 2462MHz Ant 2	*	2462	106.47	-	-	95.64	27.38	16.69	33.24	157	309	P	H
	*	2462	97.64	-	-	86.81	27.38	16.69	33.24	157	309	A	H
		2486.32	58.36	-15.64	74	47.59	27.33	16.71	33.27	157	309	P	H
		2483.52	47.6	-6.4	54	36.83	27.33	16.71	33.27	157	309	A	H
	*	2462	109.9	-	-	99.07	27.38	16.69	33.24	268	276	P	V
	*	2462	100.91	-	-	90.08	27.38	16.69	33.24	268	276	A	V
		2484.4	61.6	-12.4	74	50.83	27.33	16.71	33.27	268	276	P	V
		2483.56	49.98	-4.02	54	39.21	27.33	16.71	33.27	268	276	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## BLE + WIFI 802.11ac VHT20 (Harmonic @ 3m)

	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz + 802.11ac VHT20 CH 11 2462MHz Ant 2		4804	36.23	-37.77	74	53.27	31.1	11.02	59.16	100	0	P	H
		4924	37.36	-36.64	74	54.36	31.2	10.98	59.18	100	0	P	H
		7386	42.6	-31.4	74	51.98	36.36	13.41	59.15	100	0	P	H
		4804	36.11	-37.89	74	53.15	31.1	11.02	59.16	100	0	P	V
		4924	36.74	-37.26	74	53.74	31.2	10.98	59.18	100	0	P	V
		7386	42.05	-31.95	74	51.43	36.36	13.41	59.15	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

## Emission below 1GHz

## BLE + WIFI 802.11ac VHT20 (LF)

	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz + 802.11ac VHT20 CH 11 2462MHz Ant 2		105.66	26.83	-16.67	43.5	39.22	16.61	1.42	30.42	-	-	P	H
		122.15	27.08	-16.42	43.5	38.57	17.47	1.45	30.41	-	-	P	H
		159.98	29.61	-13.89	43.5	41.59	16.71	1.67	30.36	-	-	P	H
		749.74	31.89	-14.11	46	29.63	27.93	3.74	29.41	-	-	P	H
		894.27	35.23	-10.77	46	31.28	29.02	4.08	29.15	100	0	P	H
		917.55	34.76	-11.24	46	30.4	29.32	4.13	29.09	-	-	P	H
		32.91	30.8	-9.2	40	37.3	22.89	0.84	30.23	100	0	P	V
		105.66	23.31	-20.19	43.5	35.7	16.61	1.42	30.42	-	-	P	V
		156.1	24.45	-19.05	43.5	36.27	16.9	1.65	30.37	-	-	P	V
		833.16	33.2	-12.8	46	29.84	28.66	3.94	29.24	-	-	P	V
		890.39	34.48	-11.52	46	30.51	29.05	4.07	29.15	-	-	P	V
		959.26	35.79	-10.21	46	29.69	30.84	4.23	28.97	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												





## BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)

BLE	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz		2311.05	55.76	-18.24	74	44.46	27.83	16.53	33.06	118	227	P	H
		2341.29	47.75	-6.25	54	36.63	27.65	16.57	33.1	118	227	A	H
	*	2402	97.95	-	-	86.98	27.5	16.64	33.17	118	227	P	H
	*	2402	96.88	-	-	85.91	27.5	16.64	33.17	118	227	A	H
		2331.105	55.61	-18.39	74	44.43	27.71	16.56	33.09	137	351	P	V
		2311.575	47.99	-6.01	54	36.69	27.83	16.53	33.06	137	351	A	V
	*	2402	100.64	-	-	89.67	27.5	16.64	33.17	137	351	P	V
	*	2402	99.41	-	-	88.44	27.5	16.64	33.17	137	351	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

## BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT40 CH 102 5510MHz Ant 1		5435.92	50.4	-23.6	74	42	31.64	10.2	33.44	207	250	P	H
		5470	50.09	-18.11	68.2	41.49	31.78	10.25	33.43	207	250	P	H
		5452.72	43.54	-10.46	54	35.04	31.71	10.22	33.43	207	250	A	H
	*	5510	98.56	-	-	89.81	31.88	10.3	33.43	207	250	P	H
	*	5510	90.66	-	-	81.91	31.88	10.3	33.43	207	250	A	H
		5725	51.71	-16.49	68.2	42.62	32.05	10.5	33.46	207	250	P	H
		5441.2	54.43	-19.57	74	46	31.66	10.21	33.44	205	69	P	V
		5466.64	57.23	-10.97	68.2	48.65	31.77	10.24	33.43	205	69	P	V
		5452.48	47.85	-6.15	54	39.35	31.71	10.22	33.43	205	69	A	V
	*	5510	107.79	-	-	99.04	31.88	10.3	33.43	205	69	P	V
	*	5510	100.21	-	-	91.46	31.88	10.3	33.43	205	69	A	V
		5732.87	54.59	-13.61	68.2	45.48	32.07	10.5	33.46	205	69	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## BLE + WIFI 802.11ac VHT40 (Harmonic @ 3m)

	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz + 802.11ac VHT40 CH 102 5510MHz Ant 1		4804	55.46	-18.54	74	47.92	31.1	9.93	33.49	285	33	P	H
		4804	47.52	-6.48	54	39.98	31.1	9.93	33.49	285	33	A	H
		11020	47.76	-26.24	74	48.39	40.12	15.74	56.49	100	0	P	H
		16530	46.59	-21.61	68.2	42.68	39.4	20.23	55.72	100	0	P	H
		4804	55.76	-18.24	74	48.22	31.1	9.93	33.49	184	69	P	V
		4804	49.95	-4.05	54	42.41	31.1	9.93	33.49	184	69	A	V
		11020	47.53	-26.47	74	48.16	40.12	15.74	56.49	100	0	P	V
		16530	47.15	-21.05	68.2	43.24	39.4	20.23	55.72	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

## Emission below 1GHz

## BLE + WIFI 802.11ac VHT40 (LF)

	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz + 802.11ac VHT40 CH 102 5510MHz Ant 1		33.88	23.29	-16.71	40	30.22	22.46	0.85	30.24	-	-	P	H
		106.63	28.36	-15.14	43.5	40.69	16.67	1.42	30.42	-	-	P	H
		214.3	25.65	-17.85	43.5	38.94	15.12	1.89	30.3	-	-	P	H
		718.7	36.18	-9.82	46	34.94	27.07	3.65	29.48	-	-	P	H
		887.48	36.47	-9.53	46	32.5	29.07	4.06	29.16	100	0	P	H
		892.33	36.36	-9.64	46	32.4	29.04	4.07	29.15	-	-	P	H
		30.97	28.63	-11.37	40	34.27	23.74	0.82	30.2	-	-	P	V
		104.69	24.67	-18.83	43.5	37.15	16.52	1.42	30.42	-	-	P	V
		169.68	26.17	-17.33	43.5	39.12	15.68	1.72	30.35	-	-	P	V
		766.23	33.23	-12.77	46	30.79	28.03	3.78	29.37	-	-	P	V
		888.45	36.24	-9.76	46	32.28	29.06	4.06	29.16	-	-	P	V
		957.32	36.32	-9.68	46	30.29	30.78	4.22	28.97	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



## BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)

BLE	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz Ant 1		2323.545	56.15	-17.85	74	44.92	27.76	16.55	33.08	117	229	P	H
		2335.305	47.82	-6.18	54	36.66	27.69	16.56	33.09	117	229	A	H
	*	2402	99.86	-	-	88.89	27.5	16.64	33.17	117	229	P	H
	*	2402	98.84	-	-	87.87	27.5	16.64	33.17	117	229	A	H
		2387.595	56.13	-17.87	74	45.14	27.52	16.63	33.16	139	350	P	V
		2372.685	48.63	-5.37	54	37.61	27.55	16.61	33.14	139	350	A	V
	*	2402	102.35	-	-	91.38	27.5	16.64	33.17	139	350	P	V
	*	2402	101.15	-	-	90.18	27.5	16.64	33.17	139	350	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

## BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT40 CH 102 5510MHz Ant 2		5458.48	54.59	-19.41	74	46.06	31.73	10.23	33.43	191	254	P	H
		5468.56	55.24	-12.96	68.2	46.65	31.77	10.25	33.43	191	254	P	H
		5459.92	45.15	-8.85	54	36.61	31.74	10.23	33.43	191	254	A	H
	*	5510	103.51	-	-	94.76	31.88	10.3	33.43	191	254	P	H
	*	5510	95.81	-	-	87.06	31.88	10.3	33.43	191	254	A	H
		5740.43	51.21	-16.99	68.2	42.08	32.08	10.51	33.46	191	254	P	H
		5458.48	52.04	-21.96	74	43.51	31.73	10.23	33.43	396	300	P	V
		5470	53.99	-14.21	68.2	45.39	31.78	10.25	33.43	396	300	P	V
		5457.52	44.73	-9.27	54	36.2	31.73	10.23	33.43	396	300	A	V
	*	5510	103.79	-	-	95.04	31.88	10.3	33.43	396	300	P	V
	*	5510	96.04	-	-	87.29	31.88	10.3	33.43	396	300	A	V
		5737.28	52.7	-15.5	68.2	43.58	32.07	10.51	33.46	396	300	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## BLE + WIFI 802.11ac VHT40 (Harmonic @ 3m)

	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz Ant 1 + 802.11ac VHT40 CH 102 5510MHz Ant 2		4804	55.57	-18.43	74	48.03	31.1	9.93	33.49	282	31	P	H
		4804	46.69	-7.31	54	39.15	31.1	9.93	33.49	282	31	A	H
		11020	47	-27	74	51.97	40.12	16.63	61.72	100	0	P	H
		16530	48.28	-19.92	68.2	47.34	39.4	21.23	59.69	100	0	P	H
		4804	59.03	-14.97	74	51.49	31.1	9.93	33.49	186	72	P	V
		4804	49.55	-4.45	54	42.01	31.1	9.93	33.49	186	72	A	V
		11020	46.77	-27.23	74	51.74	40.12	16.63	61.72	100	0	P	V
		16530	48.26	-19.94	68.2	47.32	39.4	21.23	59.69	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

## Emission below 1GHz

## BLE + WIFI 802.11ac VHT40 (LF)

	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz Ant 1 + 802.11ac VHT40 CH 102 5510MHz Ant 2		92.08	28.76	-14.74	43.5	42.82	15.04	1.34	30.44	-	-	P	H
		105.66	27.62	-15.88	43.5	40.01	16.61	1.42	30.42	-	-	P	H
		212.36	28.3	-15.2	43.5	41.6	15.12	1.88	30.3	-	-	P	H
		715.79	38	-8	46	36.85	26.99	3.64	29.48	100	0	P	H
		863.23	34.48	-11.52	46	30.41	29.25	4.01	29.19	-	-	P	H
		935.01	33.45	-12.55	46	28.33	29.99	4.17	29.04	-	-	P	H
		30	26.75	-13.25	40	31.95	24.17	0.81	30.18	-	-	P	V
		92.08	23.58	-19.92	43.5	37.64	15.04	1.34	30.44	-	-	P	V
		214.3	23.14	-20.36	43.5	36.43	15.12	1.89	30.3	-	-	P	V
		716.76	33.18	-12.82	46	31.99	27.02	3.65	29.48	-	-	P	V
		786.6	34.34	-11.66	46	31.73	28.11	3.82	29.32	100	0	P	V
		937.92	34.05	-11.95	46	28.81	30.1	4.17	29.03	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



**Note symbol**

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>

**A calculation example for radiated spurious emission is shown as below:**

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)

2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

**Both peak and average measured complies with the limit line, so test result is “PASS”.**



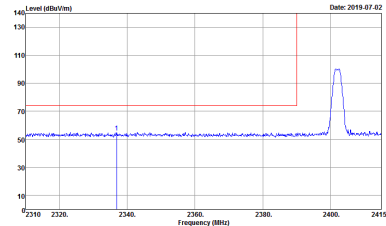
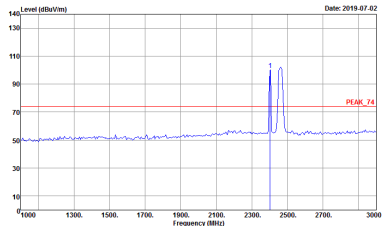
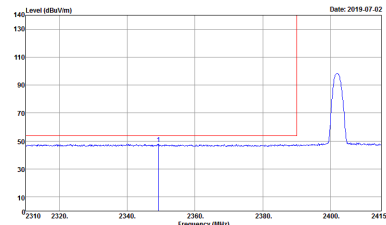
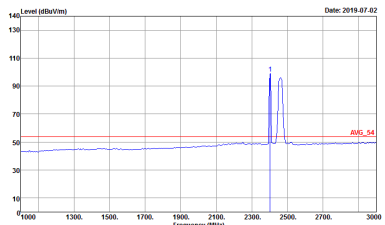
## Appendix B. Radiated Spurious Emission Plots

<b>Test Engineer :</b>	Jack Cheng, Lance Chiang, and Chuan Chu	<b>Temperature :</b>	21~24°C
		<b>Relative Humidity :</b>	56~68%

### Note symbol

-L	Low channel location
-R	High channel location

**BLE + WIFI 802.11ac VHT20 (Band Edge @ 3m)**

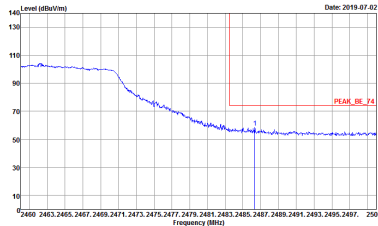
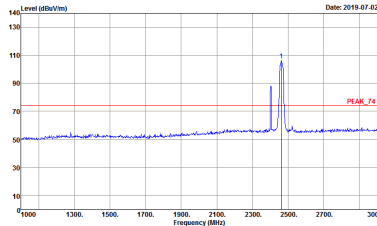
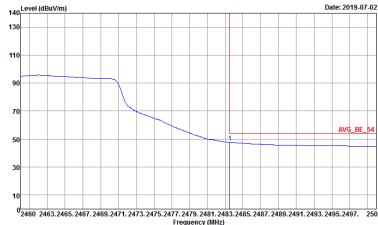
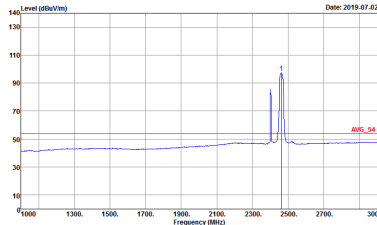
BLE	BLE + WIFI 802.11g Band Edge @ 3m	
ANT	BLE CH00	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 952409 Mode : 1</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 952409 Mode : 1</p>
Avg.	 <p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Project : 952409 Mode : 1</p>	 <p>Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Project : 952409 Mode : 1</p>

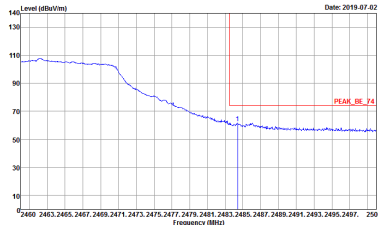
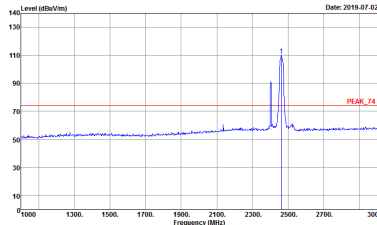
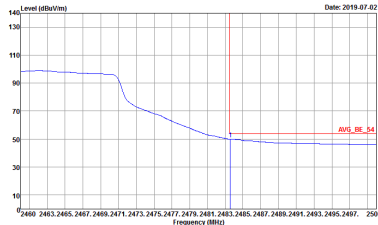
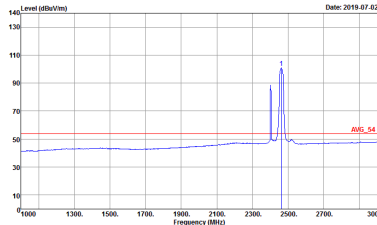




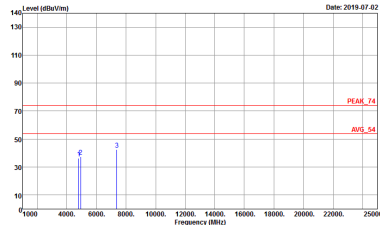
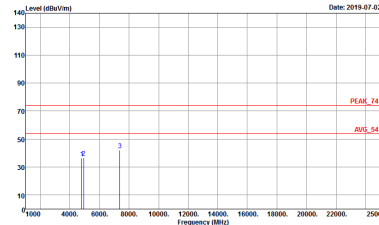
BLE	BLE + WIFI 802.11g Band Edge @ 3m	
ANT	BLE CH00	
1	Vertical	Fundamental
Peak	<p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 1</p>	<p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 1</p>
	<p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Avg. Project : 952409 Mode : 1</p>	<p>Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Avg. Project : 952409 Mode : 1</p>

**BLE + WIFI 802.11ac VHT20 (Band Edge @ 3m)**

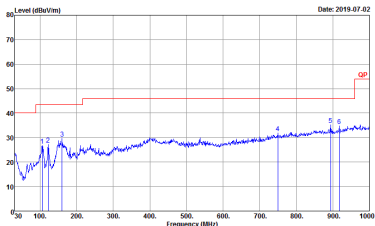
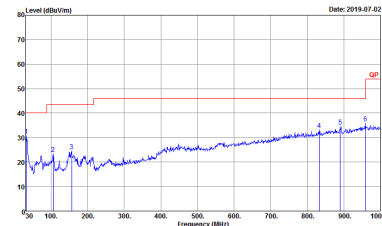
WIFI	BLE + WIFI 802.11ac VHT20 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT20 Ch11	
2	Horizontal	Fundamental
<b>Peak</b>	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>
<b>Avg.</b>	 <p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>	 <p>Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>

WIFI	BLE + WIFI 802.11ac VHT20 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT20 Ch11	
2	Vertical	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>	 <p>Site : 03CH12-HY Condition : PEAK_F4 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>
	 <p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>	 <p>Site : 03CH12-HY Condition : AVG_F4 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 1 Setting : 15.5</p>

**BLE + WIFI 802.11ac VHT20 (Harmonic @ 3m)**

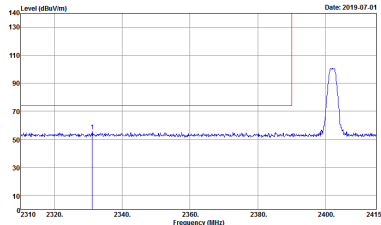
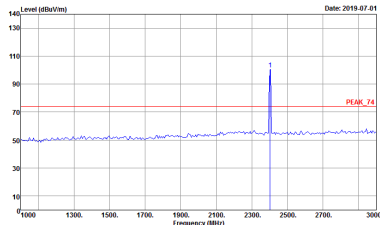
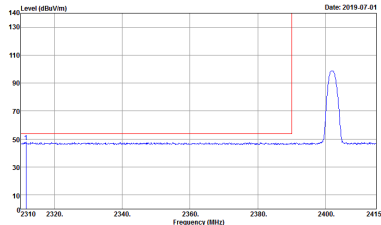
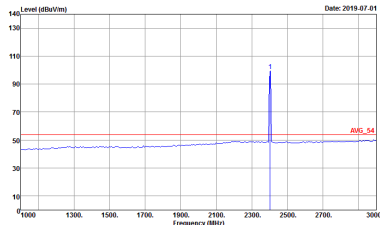
	<b>BLE + WIFI 802.11ac VHT Harmonic @ 3m</b>	
	<b>BLE CH00 Ant 1 + WIFI 802.11ac VHT20 Ch11 Ant 2</b>	
	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak Avg.</b>	 <p> Site : 03CH12-HY  Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL  Detector : Peak  Project : 952409  Mode : 1 </p>	 <p> Site : 03CH12-HY  Condition : PEAK_74 3m HORN_91200_1328 VERTICAL  Detector : Peak  Project : 952409  Mode : 1 </p>

**Emission below 1GHz**
**BLE + WIFI 802.11ac VHT20 (LF)**

	BLE + WIFI 802.11ac VHT20 LF	
	BLE CH00 Ant 1 + WIFI 802.11ac VHT20 Ch11 Ant 2	
	Horizontal	Vertical
<b>QP / Peak</b>	 <p>           Site : 03CH12-HY            Condition : QP 3m 81LO6_6111D_37059 HORIZONTAL            Detector : Peak            Project : 952409         </p>	 <p>           Site : 03CH12-HY            Condition : QP 3m 81LO6_6111D_37059 VERTICAL            Detector : Peak            Project : 952409         </p>

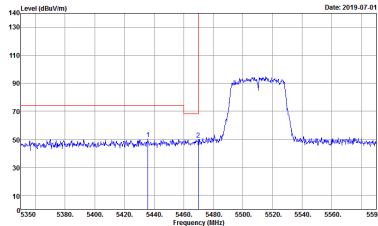
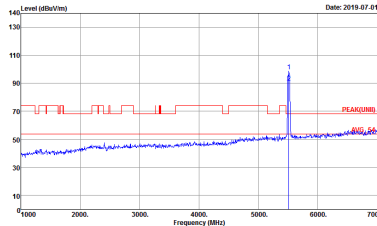
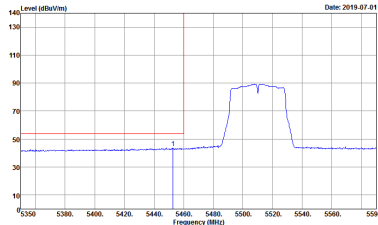
**BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)**

BLE	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	BLE CH00	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 952409 Date: 2019-07-01</p>	<p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 952409 Date: 2019-07-01</p>
Avg.	<p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Project : Peak Mode : 952409 Date: 2019-07-01</p>	<p>Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Project : Peak Mode : 952409 Date: 2019-07-01</p>

BLE	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	BLE CH00	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2</p>
	 <p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2</p>	 <p>Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2</p>

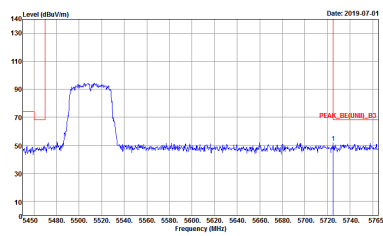


BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)

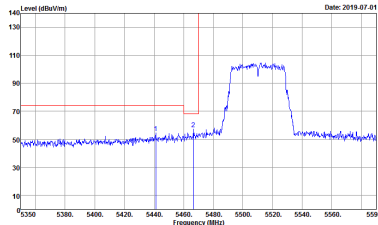
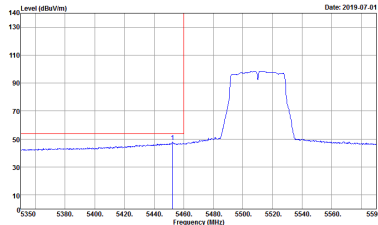
WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - L	
1	Horizontal	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_BE(UNIT)_B3 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 2 Setting : 15.5</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK(UNIT) 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 2 Setting : 15.5</p></div>
Avg.	<div><p>Site : 03CH12-HY Condition : AVG_BE(UNIT)_B3 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.0KHz SWT:Auto Peak Project : 952409 Mode : 2 Setting : 15.5</p></div>	Left blank



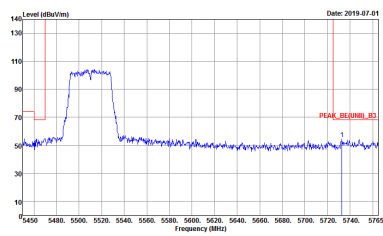


WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - R	
1	Horizontal	Fundamental
Peak	<div><p>Site : 03CH2Z-HY Condition : PEAK_RE(UNIT)_B3 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 2 Setting : 15.5</p></div>	Left blank



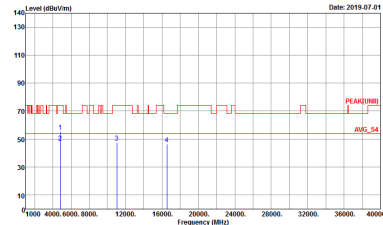
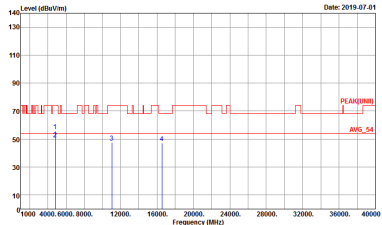
WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - L	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE(UNIT)_B3 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2 Setting : 15.5</p>	 <p>Site : 03CH12-HY Condition : PEAK(UNIT) 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2 Setting : 15.5</p>
	 <p>Site : 03CH12-HY Condition : AVG_BE(UNIT)_B3 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2 Setting : 15.5</p>	Left Blank



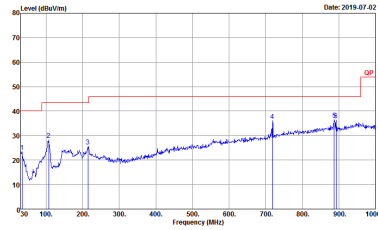
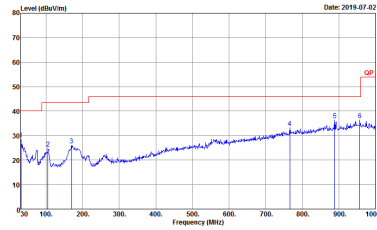
WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - R	
1	Vertical	Fundamental
Peak	<div><p>Site : 03CH2Z-HY Condition : PEAK_SECUNIII_83 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2 Setting : 15.5</p></div>	Left Blank



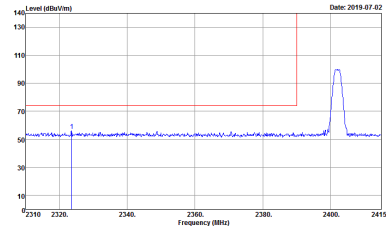
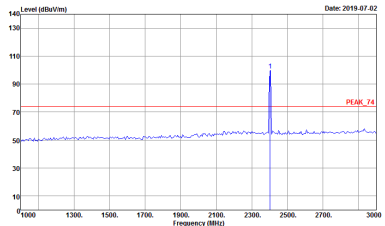
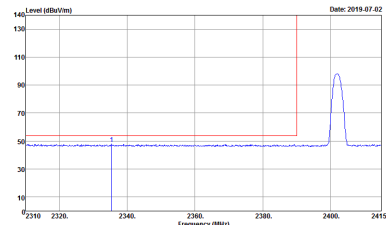
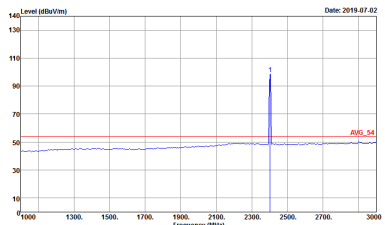
BLE + WIFI 802.11ac VHT40 (Harmonic @ 3m)

	BLE + WIFI 802.11ac VHT40 Harmonic @ 3m	
	BLE CH00 Ant 1 + WIFI 802.11ac VHT40 Ch102 Ant 1	
	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH12-HY Condition : PEAK(UNIT) 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 2</p>	 <p>Site : 03CH12-HY Condition : PEAK(UNIT) 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 2</p>

**Emission below 1GHz**
**BLE + WIFI 802.11ac VHT40 (LF)**

	BLE + WIFI 802.11ac VHT40 LF	
	B BLE CH00 Ant 1 + WIFI 802.11ac VHT40 Ch102 Ant 1	
	Horizontal	Vertical
QP / Peak	 <p>           Site : 03CH12-HY            Condition : QP 3m 81LO6_6111D_37059 HORIZONTAL            Detector : Peak            Project : 952409         </p>	 <p>           Site : 03CH12-HY            Condition : QP 3m 81LO6_6111D_37059 VERTICAL            Detector : Peak            Project : 952409         </p>

**BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)**

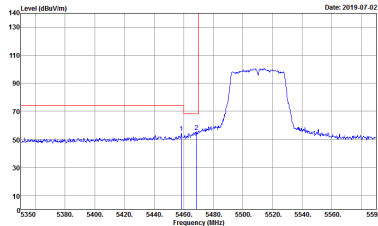
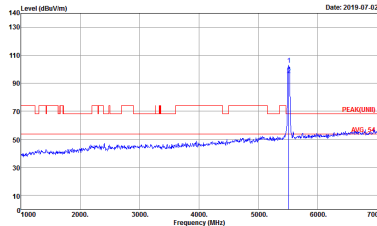
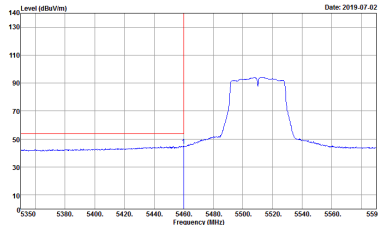
BLE	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	BLE CH00	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 952409 : 3</p>	 <p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 952409 : 3</p>
Avg.	 <p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Project : Peak Mode : 952409 : 3</p>	 <p>Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Project : Peak Mode : 952409 : 3</p>



BLE	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	BLE CH00	
1	Vertical	Fundamental
Peak	<p>Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 3</p>	<p>Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 3</p>
	<p>Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Avg. Project : 952409 Mode : 3</p>	<p>Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 VERTICAL Detector : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Avg. Project : 952409 Mode : 3</p>

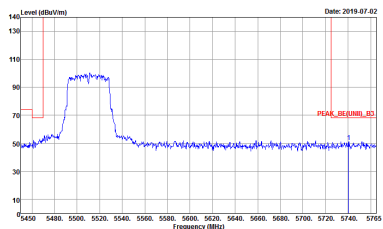


BLE + WIFI 802.11ac VHT40 (Band Edge @ 3m)

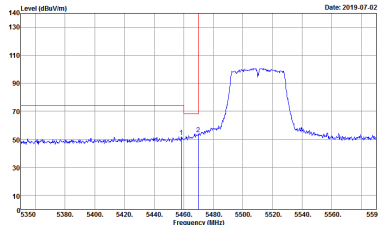
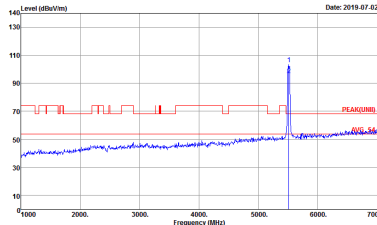
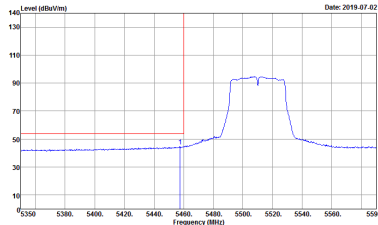
WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - L	
2	Horizontal	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_BE(UNIT)_B3 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK(UNIT)_B3 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>
Avg.	<div><p>Site : 03CH12-HY Condition : AVG_BE(UNIT)_B3 3m HORN_9120D_1328 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>	Left blank



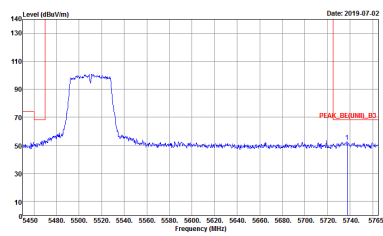


WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - R	
2	Horizontal	Fundamental
Peak	<div><p>Site : 03CH2Z-HY Condition : PEAK_SECUNII_83 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>	Left blank



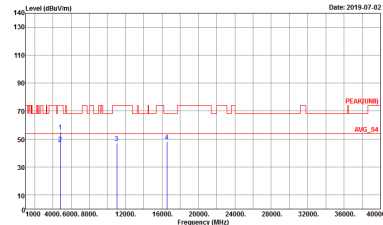
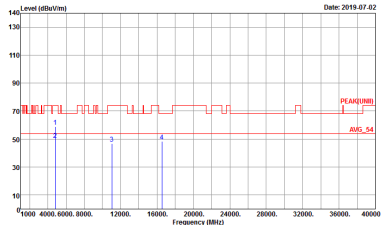
WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - L	
2	Vertical	Fundamental
Peak	<div><p>Site : 03CH12-HY Condition : PEAK_BE(UNIT)_B3 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>	<div><p>Site : 03CH12-HY Condition : PEAK(UNIT) 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>
Avg.	<div><p>Site : 03CH12-HY Condition : AVG_BE(UNIT)_B3 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>	Left Blank



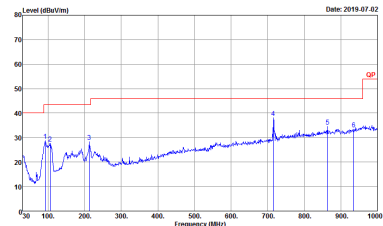
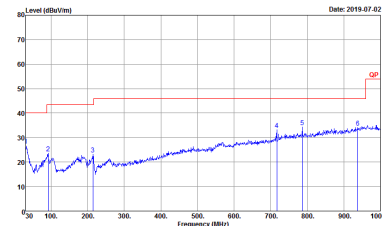
WIFI	BLE + WIFI 802.11ac VHT40 Band Edge @ 3m	
ANT	WIFI 802.11ac VHT40 Ch102 - R	
2	Vertical	Fundamental
Peak	<div><p>Site : 03CH2Z-HY Condition : PEAK_RE(UNII)_B3 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 3 Setting : 15.5</p></div>	Left Blank



BLE + WIFI 802.11ac VHT40 (Harmonic @ 3m)

	BLE + WIFI 802.11ac VHT40 Harmonic @ 3m	
	BLE CH00 Ant 1 + WIFI 802.11ac VHT40 Ch102 Ant 2	
	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH12-HY Condition : PEAK(UNIT) 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 952409 Mode : 3</p>	 <p>Site : 03CH12-HY Condition : PEAK(UNIT) 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 952409 Mode : 3</p>

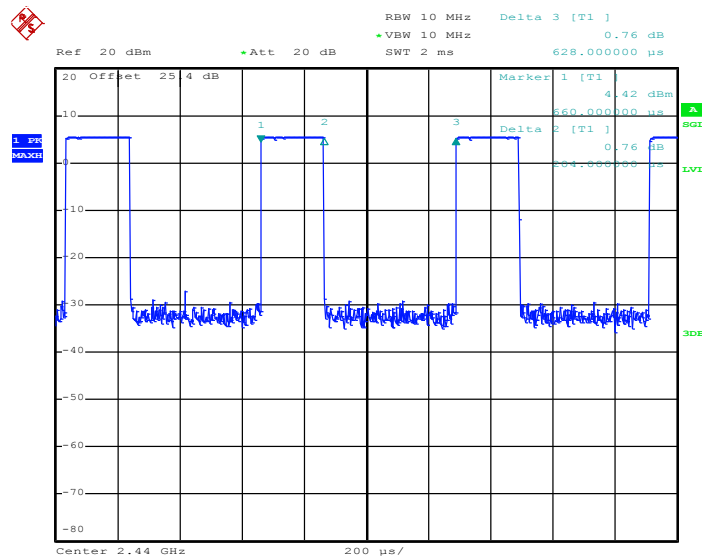
**Emission below 1GHz**
**BLE + WIFI 802.11ac VHT40 (LF)**

	<b>BLE + WIFI 802.11ac VHT40 Harmonic @ 3m</b>	
	<b>BLE CH00 Ant 1 + WIFI 802.11ac VHT40 Ch102 Ant 2</b>	
	<b>Horizontal</b>	<b>Vertical</b>
<b>QP / Peak</b>	 <p>           Site : 03CH12-HY            Condition : QP 3m 81LO6_6111D_37059 HORIZONTAL            Detector : Peak            Project : 952409         </p>	 <p>           Site : 03CH12-HY            Condition : QP 3m 81LO6_6111D_37059 VERTICAL            Detector : Peak            Project : 952409         </p>

## Appendix C. Duty Cycle Plots

Antenna	Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor (dB)
-	Bluetooth – LE for 2Mbps	32.48	204.00	4.90	10kHz	4.88
2	2.4GHz 802.11ac20	97.69	1900.00	0.53	1kHz	0.10
1	5GHz 802.11ac VHT40	95.90	935.00	1.07	3kHz	0.18
2	5GHz 802.11ac VHT40	95.90	935.00	1.07	3kHz	0.18

### Bluetooth LE for 2Mbps

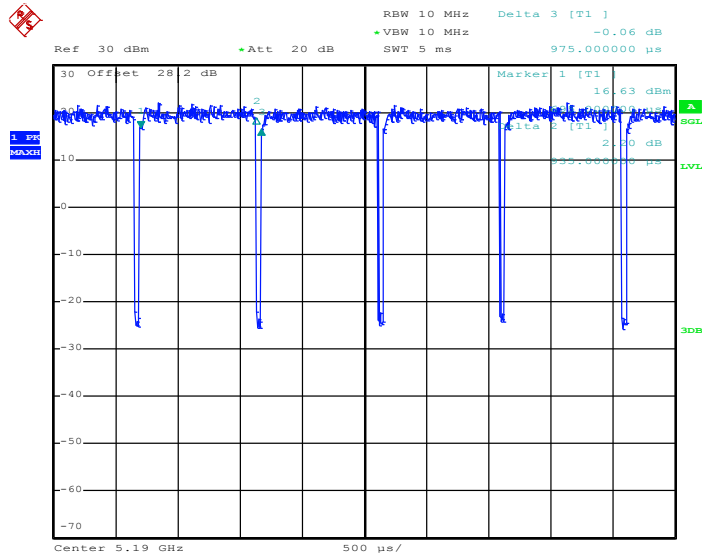


Date: 18.JUN.2019 03:25:06



<Ant. 1>

5GHz 802.11ac VHT40



Date: 10.JUN.2019 04:32:55



## 2.4GHz 802.11ac20



## 5GHz 802.11ac VHT40

