FCC CO-LOCATION RADIO TEST REPORT

FCC ID	:	**2AP67-5926**
Equipment	:	**Digital Media Receiver**
Model Name	:	**K9Y29E**
Applicant	:	**Onaka LLC** **1915 NE Stucki Ave., Ste 400** **Beaverton, OR 97006**
Standard	:	**FCC Part 15 Subpart E §15.407**

The testing was completed on Oct. 17, 2018. We, SPORTON INTERNATIONAL INC., 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: Joseph Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
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History of this test report

Report No.	Version	Description	Issued Date
FR842410-01F	01	Initial issue of report	Nov. 01, 2018
FR842410-01F	02	Add description of worst plane in section 2 on page 7	Nov. 07, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.1	15.407(b)	Unwanted Emissions	Pass
3.2	15.203 15.407(a)	Antenna Requirement	Pass

Reviewed by: Wii Chang

Report Producer: Polly Tsai

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Digital Media Receiver
Model Name	K9Y29E
FCC ID	2AP67-5926
EUT supports Radios application	WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz 5180 MHz ~ 5240 MHz
Antenna Type / Gain	**<Bluetooth LE>** FPC Inverted-F Antenna type with gain 3.01 dBi **<2400 MHz ~ 2483.5 MHz>** Ant. 1 : PCB Printed Inverted-F Antenna type with gain 1.28 dBi Ant. 2 : FPC Inverted-F Antenna type with gain 1.41 dBi **<5180 MHz ~ 5240 MHz>** Ant. 1 : PCB Printed Inverted-F Antenna type with gain 3.18 dBi Ant. 2 : FPC Inverted-F Antenna type with gain 1.55 dBi
Type of Modulation	Bluetooth LE : GFSK 802.11a/g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

1.3 Modification of EUT

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

1.4 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
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.**
	03CH13-HY

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

1.5 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 v04
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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 two configurations, with accessories and without accessories. The worst case (without accessories) was recorded in this report.

2.1 Carrier Frequency and Channel

2400-2483.5 MHz 802.11g		2400-2483.5 MHz 802.11g		2400-2483.5 MHz 802.11n HT20	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
01	2412	13	2472	11	2462

5150-5250 MHz 802.11a		5150-5250 MHz 802.11ac VHT80	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
36	5180	42	5210

2400-2483.5 MHz Bluetooth - LE	
Channel	**Freq. (MHz)**
39	2480

2.2 Test Mode

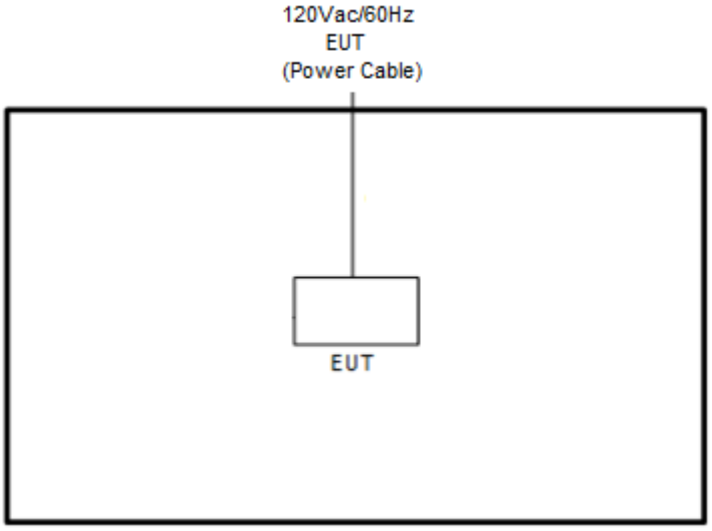
Final test modes are considering the modulation and worse data rates as below table.

<Co-Location>

Modulation	Data Rate
802.11n HT20 + Bluetooth LE	**MCS0 + 2 Mbps**
802.11g + Bluetooth LE	**6 Mbps + 2 Mbps**
802.11a + Bluetooth LE	**6 Mbps + 2 Mbps**
802.11ac VHT80 + Bluetooth LE	**MCS0 + 2 Mbps**

2.3 Connection Diagram of Test System

<Co-location Mode>



2.4 EUT Operation Test Setup

The RF test items, utility “CMD” was installed in EUT 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

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.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/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.[3]

(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.[4]

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 ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

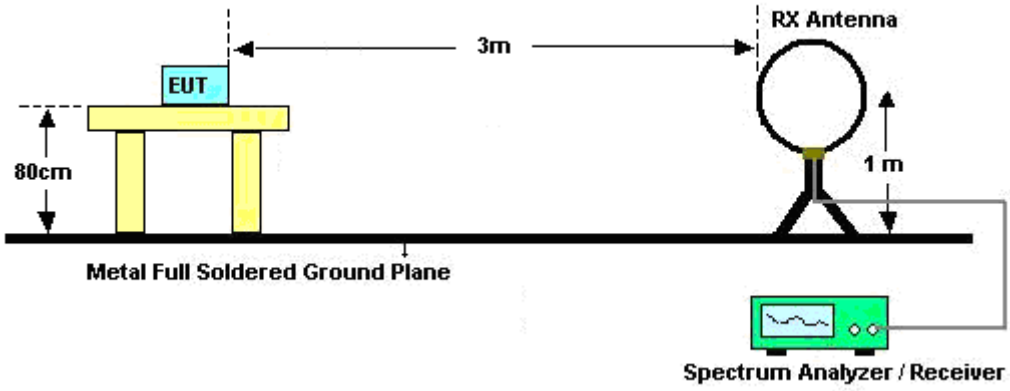
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

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.

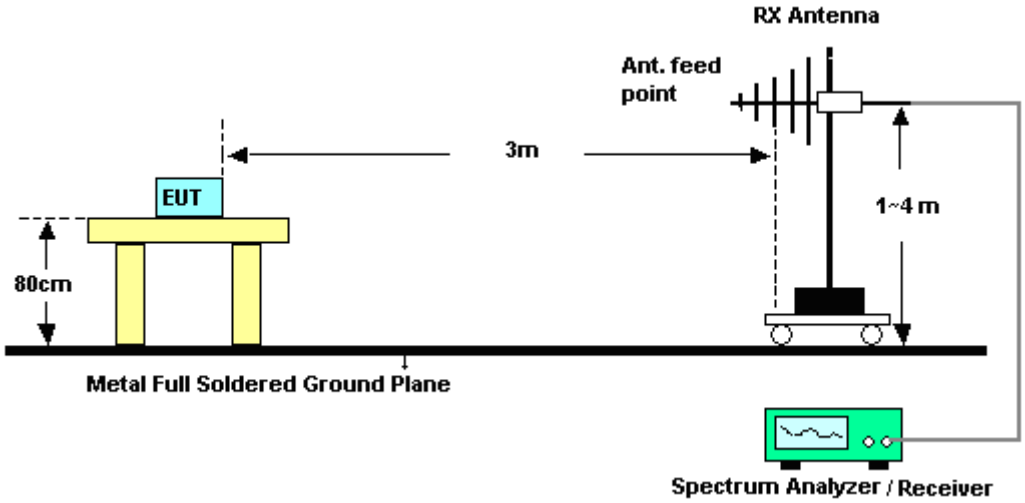
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level 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

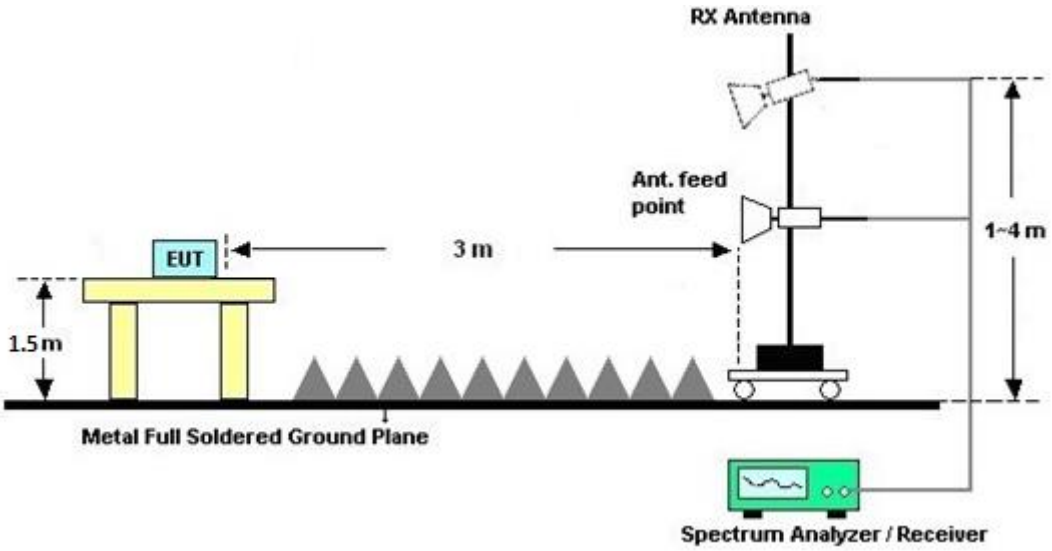
For radiated emissions below 30MHz



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
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz ~ 18GHz	Jun. 29, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jun. 28, 2019	Radiation (03CH13-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Nov. 10, 2017	Oct. 12, 2018~ Oct. 17, 2018	Nov. 09, 2018	Radiation (03CH13-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 16, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jul. 15, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WLKS1200-8SS	SN3	1G Low pass Filter	Nov. 21, 2017	Oct. 12, 2018~ Oct. 17, 2018	Nov. 22, 2018	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN5	3G High Pass	Mar. 08, 2018	Oct. 12, 2018~ Oct. 17, 2018	Mar. 07, 2019	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Jan. 19, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jan. 18, 2020	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800N1D01N-06	40103&07	30MHz to 1GHz	Jan. 10, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jan. 09, 2019	Radiation (03CH13-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800054001	1GHz~18GHz	Apr. 16, 2018	Oct. 12, 2018~ Oct. 17, 2018	Apr. 15, 2019	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Feb. 02, 2018	Oct. 12, 2018~ Oct. 17, 2018	Feb. 01, 2019	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 15, 2018	Oct. 12, 2018~ Oct. 17, 2018	Mar. 14, 2019	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Oct. 12, 2018~ Oct. 17, 2018	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Oct. 12, 2018~ Oct. 17, 2018	N/A	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 27, 2017	Oct. 12, 2018~ Oct. 17, 2018	Nov. 26, 2018	Radiation (03CH13-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 16, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jan. 15, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Jan. 22, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	335041/4	30M-18G	Jan. 22, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/4	30M~18GHz	Jan. 22, 2018	Oct. 12, 2018~ Oct. 17, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30M~40GHz	Mar. 14, 2018	Oct. 12, 2018~ Oct. 17, 2018	Mar. 13, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30M~40GHz	Mar. 14, 2018	Oct. 12, 2018~ Oct. 17, 2018	Mar. 13, 2019	Radiation (03CH13-HY)
Software	AUDIX	E3 6.2009-8-24c	RK-001124	N/A	N/A	Oct. 12, 2018~ Oct. 17, 2018	N/A	Radiation (03CH13-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))	**4.9**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.4**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.3**

Appendix A. Radiated Spurious Emission

Test Engineer :	Alex Jheng, Fu Chen, and Wilson Wu	Temperature :	24.8~24.9°C
		Relative Humidity :	50~52%

Co-location Mode

Bluetooth LE (2Mbps) and WIFI 802.11n HT20 (Band edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
Simultaneously		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE(2M) CH39 2480MHz + 11n_HT20 _Tx_Ch11 2462MHz(Ant1)	*	2462	107.89	-	-	94.79	27.41	15.57	29.88	267	305	P	H
	*	2462	100.3	-	-	87.2	27.41	15.57	29.88	267	305	A	H
		2484.84	66.44	-7.56	74	53.25	27.46	15.61	29.88	267	305	P	H
		2483.52	52.16	-1.84	54	38.97	27.46	15.61	29.88	267	305	A	H
	*	2462	108.75	-	-	95.65	27.41	15.57	29.88	283	243	P	V
	*	2462	101.19	-	-	88.09	27.41	15.57	29.88	283	243	A	V
		2483.56	66.67	-7.33	74	53.48	27.46	15.61	29.88	283	243	P	V
		2483.52	53.1	-0.9	54	39.91	27.46	15.61	29.88	283	243	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11g (Band edge @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11g_Tx_Ch13 2472MHz(Ant2)	*	2472	98.91	-	-	85.74	27.46	15.59	29.88	290	171	P	H
	*	2472	90.62	-	-	77.45	27.46	15.59	29.88	290	171	A	H
		2484.04	58.43	-15.57	74	45.24	27.46	15.61	29.88	290	171	P	H
		2483.64	48.25	-5.75	54	35.06	27.46	15.61	29.88	290	171	A	H
	*	2472	103.55	-	-	90.38	27.46	15.59	29.88	243	203	P	V
	*	2472	95.94	-	-	82.77	27.46	15.59	29.88	243	203	A	V
		2483.52	62.81	-11.19	74	49.62	27.46	15.61	29.88	243	203	P	V
		2483.52	52.05	-1.95	54	38.86	27.46	15.61	29.88	243	203	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11g CDD (Band edge @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11g_Tx_Ch01 _2412MHz (Ant1+2)		2389.9	65.28	-8.72	74	52.45	27.23	15.49	29.89	107	276	P	H
		2390	50.46	-3.54	54	37.63	27.23	15.49	29.89	107	276	A	H
	*	2412	109.71	-	-	96.79	27.28	15.53	29.89	107	276	P	H
	*	2412	102.37	-	-	89.45	27.28	15.53	29.89	107	276	A	H
		2389.8	64.91	-9.09	74	52.08	27.23	15.49	29.89	231	259	P	V
		2390	52.98	-1.02	54	40.15	27.23	15.49	29.89	231	259	A	V
	*	2412	113.72	-	-	100.8	27.28	15.53	29.89	231	259	P	V
	*	2412	106.57	-	-	93.65	27.28	15.53	29.89	231	259	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11a (Band edge @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant1)		5149.76	59.64	-14.36	74	49.33	31.69	8.17	29.55	275	332	P	H
		5149.5	51.62	-2.38	54	41.31	31.69	8.17	29.55	275	332	A	H
	*	5180	113.66	-	-	103.28	31.71	8.22	29.55	275	332	P	H
	*	5180	106.35	-	-	95.97	31.71	8.22	29.55	275	332	A	H
		5150	60.22	-13.78	74	49.91	31.69	8.17	29.55	117	268	P	V
		5150	49.48	-4.52	54	39.17	31.69	8.17	29.55	117	268	A	V
	*	5180	111.02	-	-	100.64	31.71	8.22	29.55	117	268	P	V
	*	5180	103.51	-	-	93.13	31.71	8.22	29.55	117	268	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11a (Band edge @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant2)		5148.98	61.27	-12.73	74	50.96	31.69	8.17	29.55	328	165	P	H
		5150	51.5	-2.5	54	41.19	31.69	8.17	29.55	328	165	A	H
	*	5180	110.2	-	-	99.82	31.71	8.22	29.55	328	165	P	H
	*	5180	103.18	-	-	92.8	31.71	8.22	29.55	328	165	A	H
		5146.9	62.8	-11.2	74	52.49	31.69	8.17	29.55	100	230	P	V
		5149.76	52.39	-1.61	54	42.08	31.69	8.17	29.55	100	230	A	V
	*	5180	111.5	-	-	101.12	31.71	8.22	29.55	100	230	P	V
	*	5180	104.37	-	-	93.99	31.71	8.22	29.55	100	230	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11ac VHT80 TXBF (Band edge @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11ac_VHT80 _Tx_Ch42 5210MHz (Ant1+2)		5134.94	57.13	-16.87	74	46.85	31.68	8.15	29.55	271	321	P	H
		5148.72	52.64	-1.36	54	42.33	31.69	8.17	29.55	271	321	A	H
	*	5210	100.16	-	-	89.75	31.73	8.24	29.56	271	321	P	H
	*	5210	93.12	-	-	82.71	31.73	8.24	29.56	271	321	A	H
		5408.76	50.36	-23.64	74	39.79	31.84	8.31	29.58	271	321	P	H
		5456.08	43.71	-10.29	54	32.97	31.87	8.46	29.59	271	321	A	H
		5148.98	54.28	-19.72	74	43.97	31.69	8.17	29.55	100	219	P	V
		5138.06	48.53	-5.47	54	38.25	31.68	8.15	29.55	100	219	A	V
	*	5210	96.17	-	-	85.76	31.73	8.24	29.56	100	219	P	V
	*	5210	90.15	-	-	79.74	31.73	8.24	29.56	100	219	A	V
		5391.4	51.28	-22.72	74	40.73	31.83	8.3	29.58	100	219	P	V
		5415.2	43.68	-10.32	54	33.05	31.85	8.36	29.58	100	219	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11n_HT20 _Tx_Ch11 2462MHz(Ant1)		4924	43.15	-30.85	74	61.58	31.46	8.64	58.53	100	0	P	H
		4960	36.78	-37.22	74	54.97	31.53	8.79	58.51	100	0	P	H
		7386	49	-25	74	60.68	36.37	10.67	58.72	100	0	P	H
		7440	42.54	-31.46	74	53.97	36.49	10.74	58.66	100	0	P	H
		4924	41.3	-32.7	74	59.73	31.46	8.64	58.53	100	0	P	V
		4960	35.66	-38.34	74	53.85	31.53	8.79	58.51	100	0	P	V
		7386	54.82	-19.18	74	66.5	36.37	10.67	58.72	100	299	P	V
		7386	40.83	-13.17	54	52.51	36.37	10.67	58.72	100	299	A	V
		7440	42.29	-31.71	74	53.72	36.49	10.74	58.66	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11g_Tx_Ch13 2472MHz(Ant2)		4944	38.58	-35.42	74	56.89	31.5	8.71	58.52	100	0	P	H
		4960	37.18	-36.82	74	55.37	31.53	8.79	58.51	100	0	P	H
		7416	42.55	-31.45	74	54.14	36.41	10.7	58.7	100	0	P	H
		7440	42.77	-31.23	74	54.2	36.49	10.74	58.66	100	0	P	H
		4944	37.98	-36.02	74	56.29	31.5	8.71	58.52	100	0	P	V
		4960	37.29	-36.71	74	55.48	31.53	8.79	58.51	100	0	P	V
		7416	42.18	-31.82	74	53.77	36.41	10.7	58.7	100	0	P	V
		7440	43.45	-30.55	74	54.88	36.49	10.74	58.66	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11g CDD (Harmonic @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11g_Tx_Ch01 _2412MHz (Ant1+2)		4824	53.99	-20.01	74	73.03	31.26	8.27	58.57	365	159	P	H
		4824	43.53	-10.47	54	62.57	31.26	8.27	58.57	365	159	A	H
		4960	36.82	-37.18	74	55.01	31.53	8.79	58.51	100	0	P	H
		7440	42.54	-31.46	74	53.97	36.49	10.74	58.66	100	0	P	H
		4824	47.04	-26.96	74	66.08	31.26	8.27	58.57	100	0	P	V
		4960	37.06	-36.94	74	55.25	31.53	8.79	58.51	100	0	P	V
		7440	42.46	-31.54	74	53.89	36.49	10.74	58.66	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant1)		4960	48.26	-25.74	74	38.44	31.53	7.83	29.54	100	0	P	H
		7440	43	-31	74	54.09	36.49	11.08	58.66	100	0	P	H
		10360	46.25	-21.95	68.2	54.91	39.76	12.34	60.76	100	0	P	H
		15540	46.81	-27.19	74	54.15	38.62	14.61	60.57	100	0	P	H
		4960	48.51	-25.49	74	38.69	31.53	7.83	29.54	100	0	P	V
		7440	43.33	-30.67	74	54.42	36.49	11.08	58.66	100	0	P	V
		10360	45.55	-22.65	68.2	54.21	39.76	12.34	60.76	100	0	P	V
		15540	45.14	-28.86	74	52.48	38.62	14.61	60.57	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant2)		4960	48.77	-25.23	74	38.95	31.53	7.83	29.54	100	0	P	H
		7440	42.77	-31.23	74	53.86	36.49	11.08	58.66	100	0	P	H
		10360	46.33	-21.87	68.2	54.99	39.76	12.34	60.76	100	0	P	H
		15540	59.5	-14.5	74	66.84	38.62	14.61	60.57	100	305	P	H
		15540	48.48	-5.52	54	55.82	38.62	14.61	60.57	100	305	A	H
		4960	48.79	-25.21	74	38.97	31.53	7.83	29.54	100	0	P	V
		7440	42.92	-31.08	74	54.01	36.49	11.08	58.66	100	0	P	V
		10360	46.97	-21.23	68.2	55.63	39.76	12.34	60.76	100	0	P	V
		15540	57.26	-16.74	74	64.6	38.62	14.61	60.57	100	131	P	V
		15540	47.5	-6.5	54	54.84	38.62	14.61	60.57	100	131	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE (2Mbps) and WIFI 802.11ac VHT80 TXBF (Harmonic @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11ac_VHT80 _Tx_Ch42 5210MHz (Ant1+2)		4960	48.98	-25.02	74	39.16	31.53	7.83	29.54	100	0	P	H
		7440	44	-30	74	55.09	36.49	11.08	58.66	100	0	P	H
		10420	46.99	-21.21	68.2	55.63	39.85	12.36	60.85	100	0	P	H
		15630	44.24	-29.76	74	51.71	38.37	14.65	60.49	100	0	P	H
		4960	48.55	-25.45	74	38.73	31.53	7.83	29.54	100	0	P	V
		7440	44.06	-29.94	74	55.15	36.49	11.08	58.66	100	0	P	V
		10420	47	-21.2	68.2	55.64	39.85	12.36	60.85	100	0	P	V
		15630	44.25	-29.75	74	51.72	38.37	14.65	60.49	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11n HT20 (LF @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11n_HT20 _Tx_Ch11 2462MHz(Ant1)		31.35	24	-16	40	31.59	23.96	0.79	32.34	-	-	P	H
		37.56	22.04	-17.96	40	32.83	20.73	0.81	32.33	-	-	P	H
		149.88	25.33	-18.17	43.5	38.9	17.16	1.55	32.28	-	-	P	H
		563.2	29.5	-16.5	46	32.94	25.89	2.88	32.21	-	-	P	H
		889.4	32.79	-13.21	46	31.8	29	3.55	31.56	-	-	P	H
		958.7	33.81	-12.19	46	30	31.07	3.71	30.97	100	0	P	H
		31.08	31.96	-8.04	40	39.55	23.96	0.79	32.34	100	0	P	V
		86.16	20.71	-19.29	40	37.36	14.42	1.23	32.3	-	-	P	V
		149.88	23.95	-19.55	43.5	37.52	17.16	1.55	32.28	-	-	P	V
		563.2	30.68	-15.32	46	34.12	25.89	2.88	32.21	-	-	P	V
		896.4	36.61	-9.39	46	35.57	29.02	3.55	31.53	-	-	P	V
		938.4	35.55	-10.45	46	33	30.01	3.7	31.16	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11g (LF @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11g_Tx_Ch13 2472MHz(Ant2)		31.08	23.78	-16.22	40	31.37	23.96	0.79	32.34	-	-	P	H
		149.88	25.59	-17.91	43.5	39.16	17.16	1.55	32.28	-	-	P	H
		282.72	25.58	-20.42	46	36.79	18.89	2.05	32.15	-	-	P	H
		761.3	31.39	-14.61	46	32.04	28.13	3.28	32.06	-	-	P	H
		902.7	38.21	-7.79	46	37.03	29.07	3.59	31.48	100	0	P	H
		953.8	33.47	-12.53	46	29.97	30.81	3.71	31.02	-	-	P	H
		31.08	32.34	-7.66	40	39.93	23.96	0.79	32.34	-	-	P	V
		93.99	25.03	-18.47	43.5	40.52	15.46	1.34	32.29	-	-	P	V
		149.88	23.67	-19.83	43.5	37.24	17.16	1.55	32.28	-	-	P	V
		563.2	30.75	-15.25	46	34.19	25.89	2.88	32.21	-	-	P	V
		902.7	40.17	-5.83	46	38.99	29.07	3.59	31.48	100	0	P	V
		938.4	36.43	-9.57	46	33.88	30.01	3.7	31.16	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11g CDD (LF @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11g_Tx_Ch01 _2412MHz (Ant1+2)		31.35	24.26	-15.74	40	31.85	23.96	0.79	32.34	-	-	P	H
		149.88	25.24	-18.26	43.5	38.81	17.16	1.55	32.28	-	-	P	H
		282.72	25.63	-20.37	46	36.84	18.89	2.05	32.15	-	-	P	H
		563.2	28.38	-17.62	46	31.82	25.89	2.88	32.21	-	-	P	H
		902.7	38.49	-7.51	46	37.31	29.07	3.59	31.48	100	0	P	H
		948.9	33.95	-12.05	46	30.75	30.55	3.71	31.06	-	-	P	H
		31.35	32.19	-7.81	40	39.78	23.96	0.79	32.34	100	0	P	V
		84.81	21.58	-18.42	40	38.39	14.26	1.23	32.3	-	-	P	V
		98.31	24.76	-18.74	43.5	39.79	15.91	1.35	32.29	-	-	P	V
		771.8	30.58	-15.42	46	31.11	28.22	3.29	32.04	-	-	P	V
		938.4	37.44	-8.56	46	34.89	30.01	3.7	31.16	-	-	P	V
		950.3	34.36	-11.64	46	31.06	30.65	3.71	31.06	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11a (LF @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant1)		31.35	24.9	-15.1	40	33.3	23.96	-0.02	32.34	-	-	P	H
		149.88	23.09	-20.41	43.5	38.16	17.16	0.05	32.28	-	-	P	H
		282.72	23.32	-22.68	46	36.51	18.89	0.07	32.15	-	-	P	H
		619.2	25.47	-20.53	46	31.72	25.84	0.11	32.2	-	-	P	H
		891.5	34.55	-11.45	46	36.99	29	0.11	31.55	100	0	P	H
		948.2	30.23	-15.77	46	30.61	30.55	0.14	31.07	-	-	P	H
		31.08	32.08	-7.92	40	40.48	23.96	-0.02	32.34	100	0	P	V
		38.1	26.17	-13.83	40	37.77	20.73	0	32.33	-	-	P	V
		86.16	19.37	-20.63	40	37.21	14.42	0.04	32.3	-	-	P	V
		563.2	25.9	-20.1	46	32.12	25.89	0.1	32.21	-	-	P	V
		894.3	34.1	-11.9	46	36.52	29.01	0.11	31.54	-	-	P	V
		938.4	32.97	-13.03	46	33.99	30.01	0.13	31.16	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11a (LF @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant2)		31.35	25.22	-14.78	40	33.62	23.96	-0.02	32.34	100	0	P	H
		149.88	23.56	-19.94	43.5	38.63	17.16	0.05	32.28	-	-	P	H
		282.72	23.65	-22.35	46	36.84	18.89	0.07	32.15	-	-	P	H
		687.8	26.25	-19.75	46	31.88	26.44	0.1	32.17	-	-	P	H
		891.5	34.99	-11.01	46	37.43	29	0.11	31.55	-	-	P	H
		947.5	29.83	-16.17	46	30.27	30.5	0.14	31.08	-	-	P	H
		31.08	30.29	-9.71	40	38.69	23.96	-0.02	32.34	100	0	P	V
		49.98	19.67	-20.33	40	37.44	14.53	0.02	32.32	-	-	P	V
		282.72	25.08	-20.92	46	38.27	18.89	0.07	32.15	-	-	P	V
		894.3	31.93	-14.07	46	34.35	29.01	0.11	31.54	-	-	P	V
		938.4	32.56	-13.44	46	33.58	30.01	0.13	31.16	-	-	P	V
		950.3	31.91	-14.09	46	32.18	30.65	0.14	31.06	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11ac VHT80 TXBF (LF @ 3m)

WIFI Ant. Simultaneously	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(2M) CH39 2480MHz + 11ac_VHT80 _Tx_Ch42 5210MHz (Ant1+2)		31.08	24.96	-15.04	40	33.36	23.96	-0.02	32.34	100	0	P	H
		149.88	23.37	-20.13	43.5	38.44	17.16	0.05	32.28	-	-	P	H
		282.72	23.79	-22.21	46	36.98	18.89	0.07	32.15	-	-	P	H
		563.2	26.11	-19.89	46	32.33	25.89	0.1	32.21	-	-	P	H
		784.4	27.12	-18.88	46	30.8	28.23	0.11	32.02	-	-	P	H
		958	30.02	-15.98	46	29.79	31.07	0.14	30.98	-	-	P	H
		31.08	30.05	-9.95	40	38.45	23.96	-0.02	32.34	-	-	P	V
		42.96	24.48	-15.52	40	38.81	17.99	0.01	32.33	-	-	P	V
		49.98	35.68	-4.32	40	53.45	14.53	0.02	32.32	100	0	P	V
		563.2	27.67	-18.33	46	33.89	25.89	0.1	32.21	-	-	P	V
		839.7	28.06	-17.94	46	30.78	28.95	0.13	31.8	-	-	P	V
		938.4	33.73	-12.27	46	34.75	30.01	0.13	31.16	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
-	The signal is **Unintentional Radiators**.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		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)

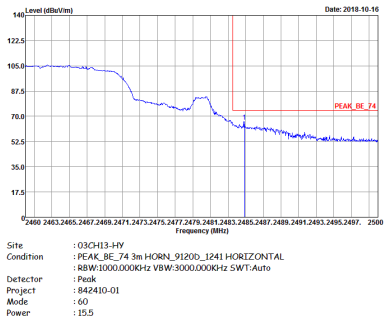
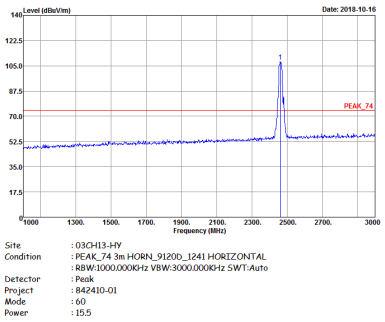
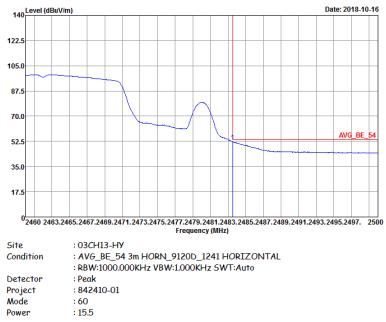
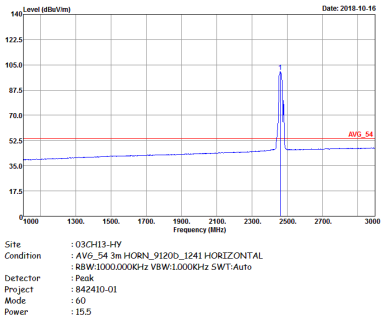
Both peak and average measured complies with the limit line, so test result is “PASS”.

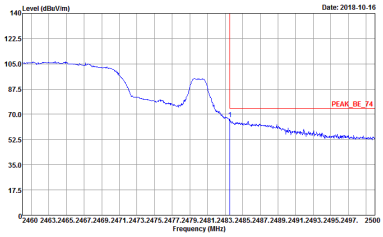
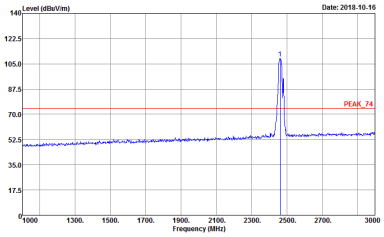
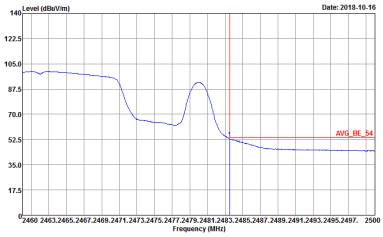
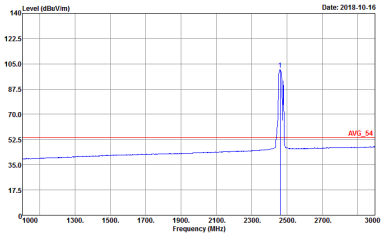
Appendix B. Radiated Spurious Emission Plots

Test Engineer :	Alex Jheng, Fu Chen, and Wilson Wu	Temperature :	24.8~24.9°C
		Relative Humidity :	50~52%

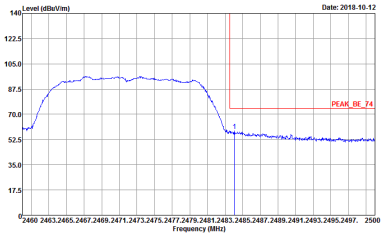
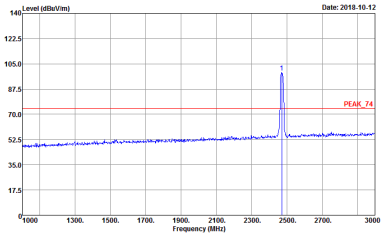
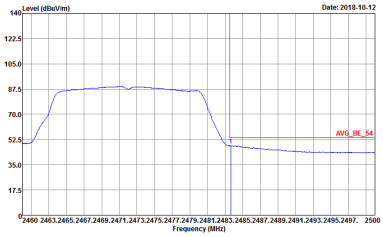
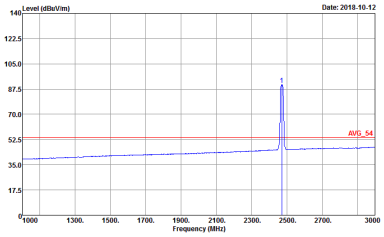
Co-location Mode

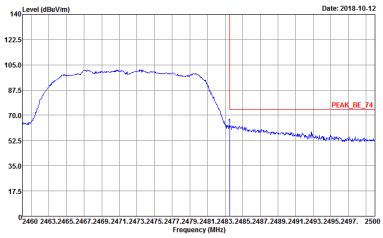
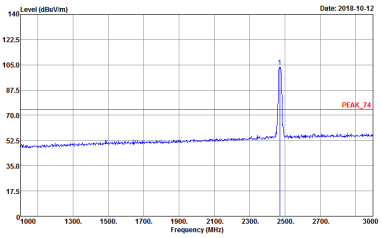
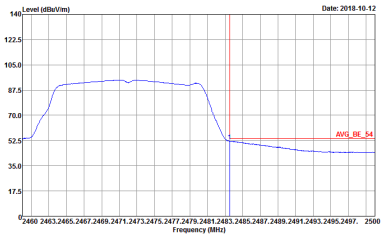
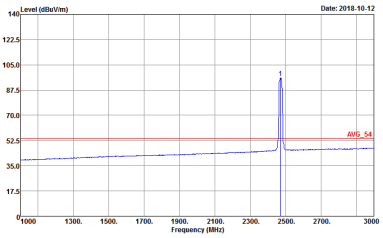
Bluetooth LE (2Mbps) and WIFI 802.11n HT20 (Band edge @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11n_HT20_Tx_Ch11 2462MHz(Ant1)	
Simultaneously	Horizontal	Fundamental
Peak		
Avg.		

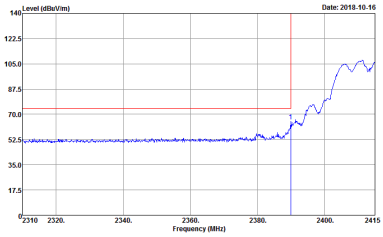
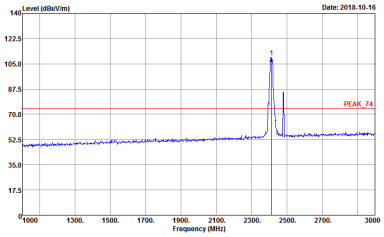
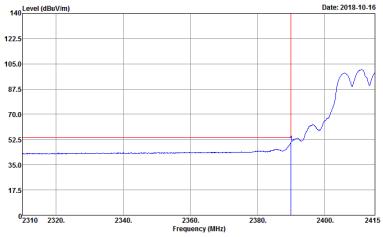
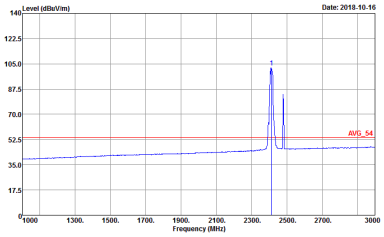
ANT	BLE(2M) CH39 2480MHz + 11n_HT20_Tx_Ch11 2462MHz(Ant1)	
Simultaneously	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 60 Power : 15.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 60 Power : 15.5
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 60 Power : 15.5	 Site : 03CH13-HY Condition : AVG_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 60 Power : 15.5

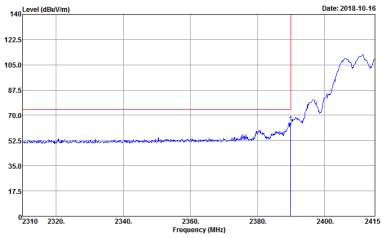
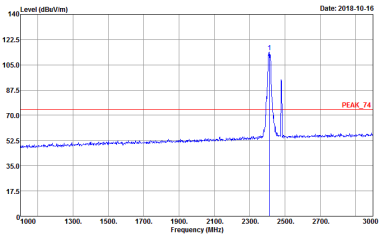
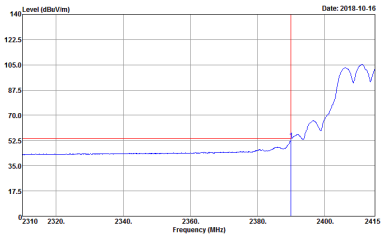
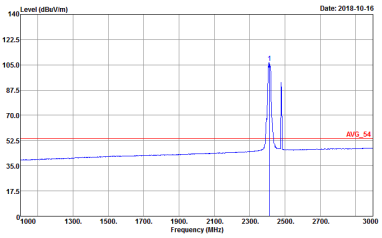
Bluetooth LE (2Mbps) and WIFI 802.11g (Band edge @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch13 2472MHz(Ant2)	
Simultaneously	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9	 Site : 03CH13-HY Condition : AV6_54 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9

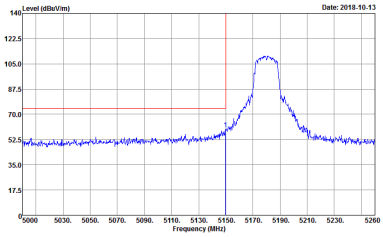
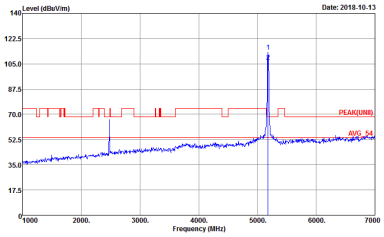
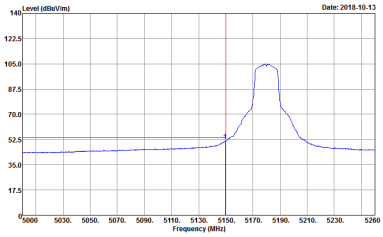
ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch13 2472MHz(Ant2)	
Simultaneously	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9	 Site : 03CH13-HY Condition : AV6_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 61 Power : 9

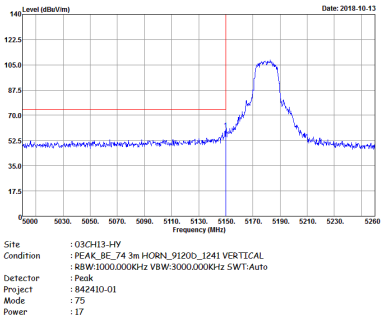
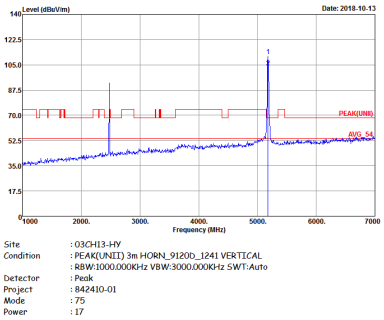
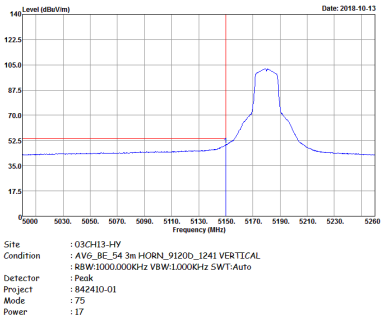
Bluetooth LE (2Mbps) and WIFI 802.11g CDD (Band edge @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch01 2412MHz(Ant1+2)	
Simultaneously	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5	 Site : 03CH13-HY Condition : AV6_54 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5

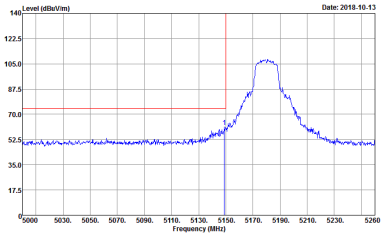
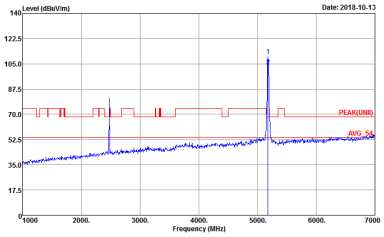
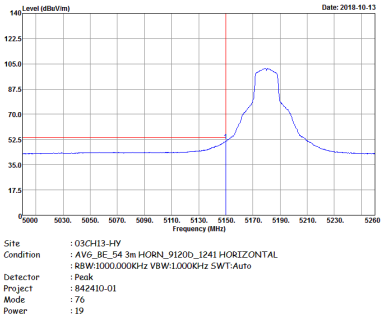
ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch01 2412MHz(Ant1+2)	
Simultaneously	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5	 Site : 03CH13-HY Condition : AV6_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 62 Power : 15.5

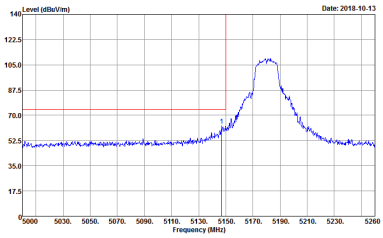
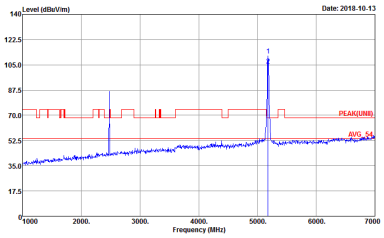
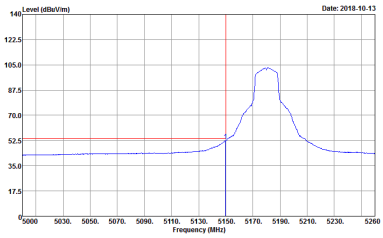
Bluetooth LE (2Mbps) and WIFI 802.11a (Band edge @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant1)	
Simultaneously	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 75 Power : 17	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 75 Power : 17
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 75 Power : 17	Left blank

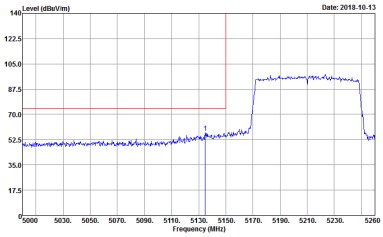
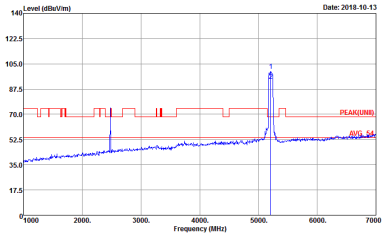
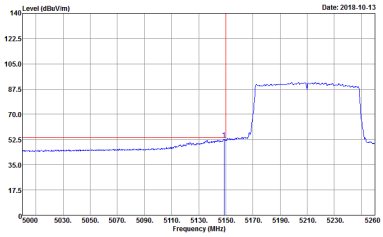
ANT	BLE(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant1)	
Simultaneously	Vertical	Fundamental
Peak		
Avg.		Left blank

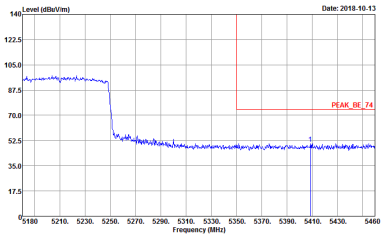
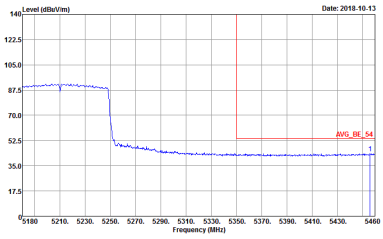
Bluetooth LE (2Mbps) and WIFI 802.11a (Band edge @ 3m)

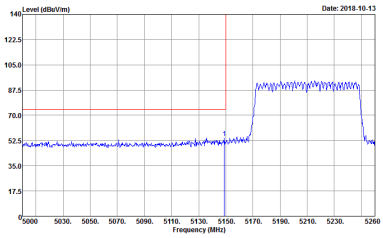
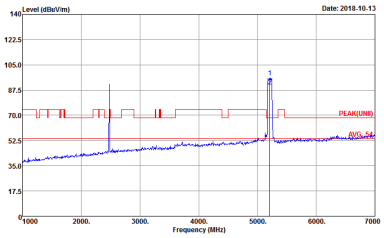
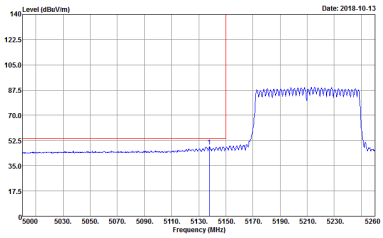
ANT	BLE(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant2)	
Simultaneously	Horizontal	Fundamental
Peak		
Avg.		Left blank

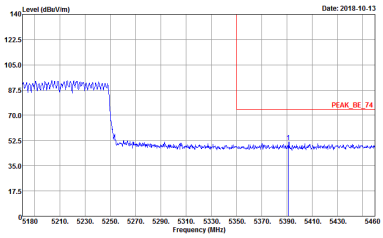
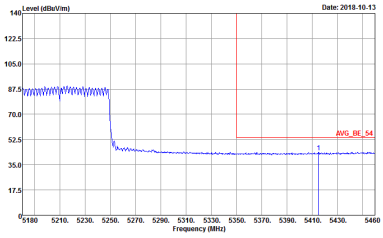
ANT	BLE(2M) CH39 2480MHz+ 11a_Tx_Ch36 5180MHz(Ant2)	
Simultaneously	**Vertical**	**Fundamental**
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 76 Power : 19	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 76 Power : 19
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 76 Power : 19	Left blank

Bluetooth LE (2Mbps) and WIFI 802.11ac VHT80 TXBF (Band edge @ 3m)

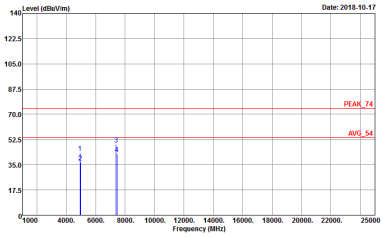
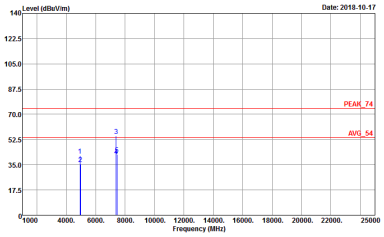
ANT	BLE(2M) CH39 2480MHz + 11ac_VHT80_Tx_Ch42 5210MHz(Ant1+2)	
Simultaneously	**Horizontal**	**Fundamental**
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5	Left blank

ANT	BLE(2M) CH39 2480MHz + 11ac_VHT80_Tx_Ch42 5210MHz(Ant1+2)	
Simultaneously	**Horizontal**	**Fundamental**
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5	Left blank
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 HORIZONTAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5	Left blank

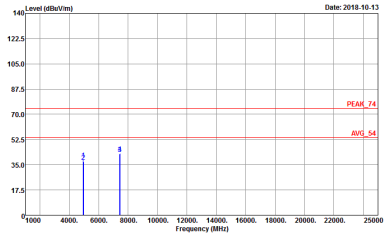
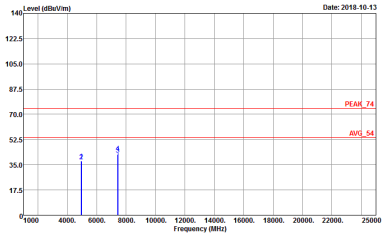
ANT	BLE(2M) CH39 2480MHz + 11ac_VHT80_Tx_Ch42 5210MHz(Ant1+2)	
Simultaneously	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5	Left blank

ANT	BLE(2M) CH39 2480MHz + 11ac_VHT80_Tx_Ch42 5210MHz(Ant1+2)	
Simultaneously	**Vertical**	**Fundamental**
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5	Left blank
Avg.	 Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak Project : 842410-01 Mode : 77 Power : 10.5	Left blank

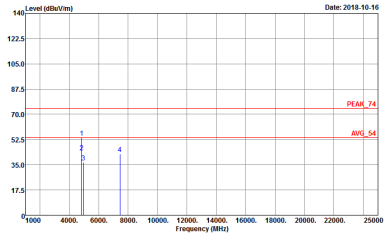
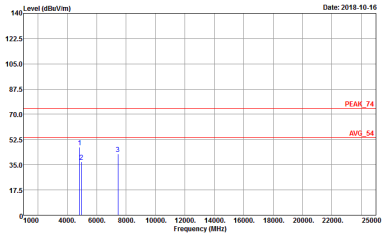
Bluetooth LE (2Mbps) and WIFI 802.11n HT20 (Harmonic @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11n_HT20_Tx_Ch11 2462MHz(Ant1)	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 842410-01 Mode : 60 Power : BLE_Tx_Ch39 + : 11g(n20)_Tx_Ch11	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 842410-01 Mode : 60 Power : BLE_Tx_Ch39 + : 11g(n20)_Tx_Ch11

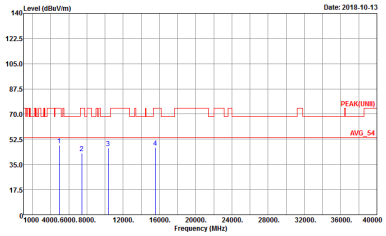
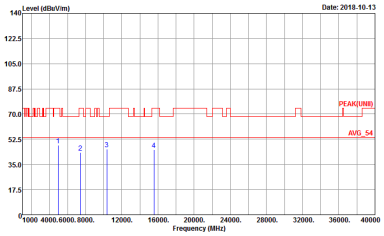
Bluetooth LE (2Mbps) and WIFI 802.11g (Harmonic @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch13 2472MHz(Ant2)	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 842410-01 Mode : 61 Power : BLE_Defult+WLAN 2.46_9	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 842410-01 Mode : 61 Power : BLE_Defult+WLAN 2.46_9

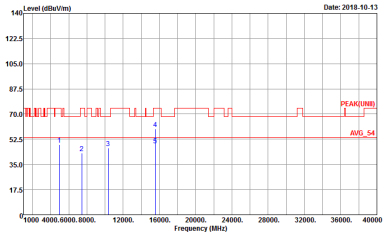
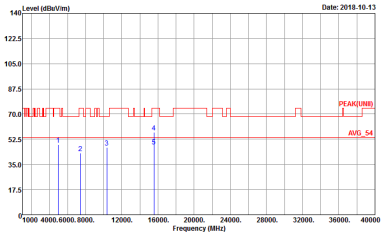
Bluetooth LE (2Mbps) and WIFI 802.11g CDD (Harmonic @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch01 2412MHz(Ant1+2)	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 842410-01 Mode : 62 Power : BLE_Defult+WLAN 2.4G_15.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 842410-01 Mode : 62 Power : BLE_Defult+WLAN 2.4G_15.5

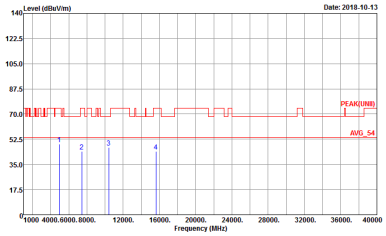
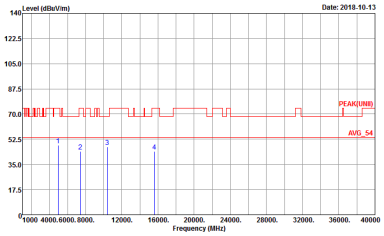
Bluetooth LE (2Mbps) and WIFI 802.11a (Harmonic @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant1)	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 842410-01 Mode : 75 Power : BLE_Defult+WLAN 5G_17	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 842410-01 Mode : 75 Power : BLE_Defult+WLAN 5G_17

Bluetooth LE (2Mbps) and WIFI 802.11a (Harmonic @ 3m)

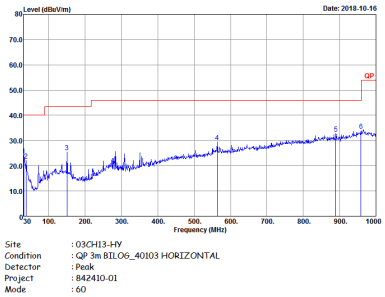
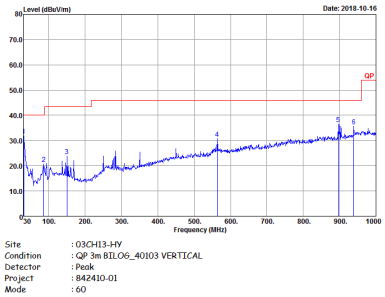
ANT	BLE(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant2)	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 842410-01 Mode : 76 Power : BLE_Defult+WLAN 5G_19	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 842410-01 Mode : 76 Power : BLE_Defult+WLAN 5G_19

Bluetooth LE (2Mbps) and WIFI 802.11ac VHT80 TXBF (Harmonic @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11ac_VHT80_Tx_Ch42 5210MHz(Ant1+2)	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 842410-01 Mode : 77 Power : BLE_Defult+WLAN 5G_10.5	 Site : 03CH13-HY Condition : PEAK(UNII) 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 842410-01 Mode : 77 Power : BLE_Defult+WLAN 5G_10.5

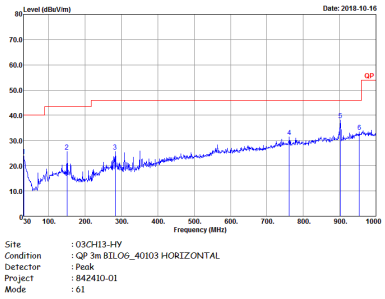
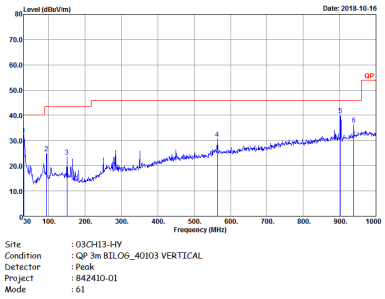
Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11n HT20 (LF @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11n_HT20_Tx_Ch11 2462MHz(Ant1)	
Simultaneously	Horizontal	Vertical
QP / Peak		

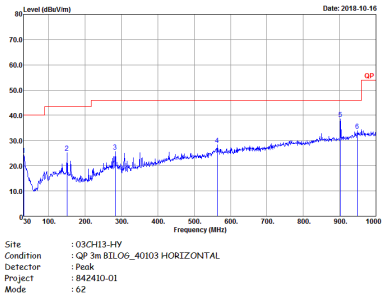
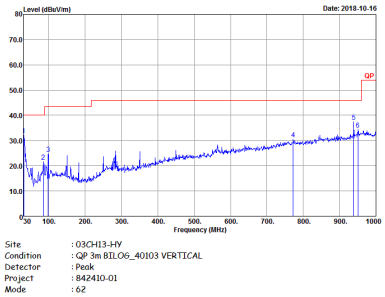
Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11g (LF @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch13 2472MHz(Ant2)	
Simultaneously	Horizontal	Vertical
QP / Peak		

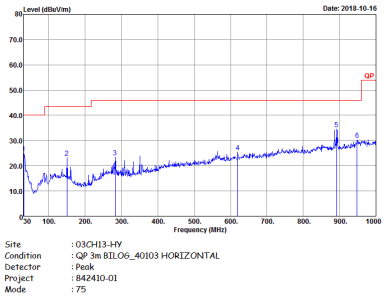
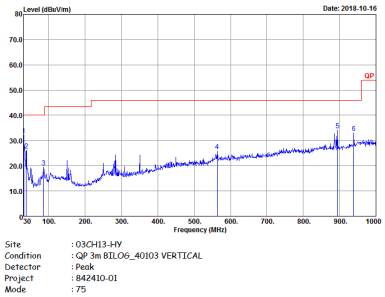
Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11g CDD (LF @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11g_Tx_Ch01 2412MHz(Ant1+2)	
Simultaneously	Horizontal	Vertical
QP / Peak		

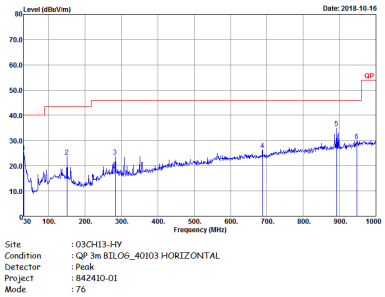
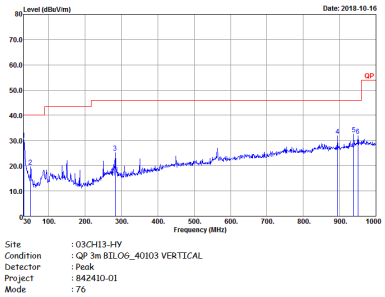
Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11a (LF @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant1)	
Simultaneously	Horizontal	Vertical
QP / Peak		

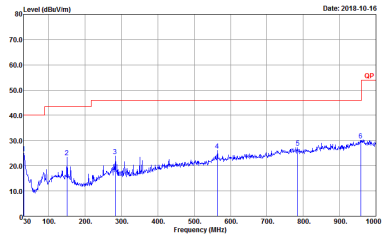
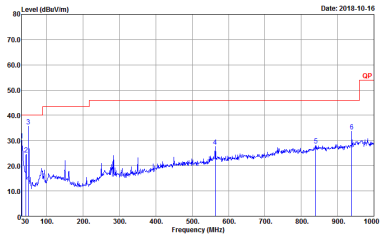
Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11a (LF @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11a_Tx_Ch36 5180MHz(Ant2)	
Simultaneously	Horizontal	Vertical
QP / Peak		

Emission below 1GHz

Bluetooth LE (2Mbps) and WIFI 802.11ac VHT80 TXBF (LF @ 3m)

ANT	BLE(2M) CH39 2480MHz + 11ac_VHT80_Tx_Ch42 5210MHz(Ant1+2)	
Simultaneously	Horizontal	Vertical
QP / Peak	 Site : 03CH13-HY Condition : QP 3m BILOG_40103 HORIZONTAL Detector : Peak Project : 842410-01 Mode : 77	 Site : 03CH13-HY Condition : QP 3m BILOG_40103 VERTICAL Detector : Peak Project : 842410-01 Mode : 77

Appendix C. Duty Cycle Plots

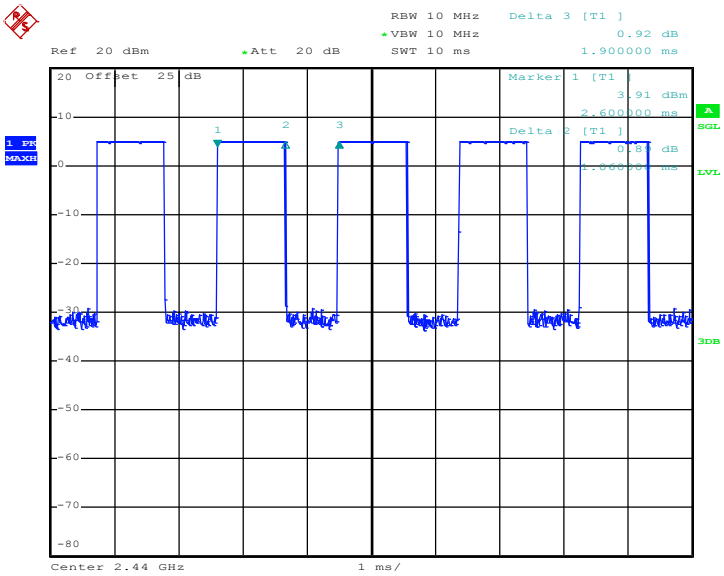
<CDD Mode>

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
2	2.4GHz 802.11g	93.33	1400.00	0.71	1kHz	0.30
1+2	2.4GHz 802.11g for Ant. 1	93.33	1400.00	0.71	1kHz	0.30
1+2	2.4GHz 802.11g for Ant. 2	93.24	1380.00	0.72	1kHz	0.30
1	2.4GHz 802.11n HT20	92.86	1300.00	0.77	1kHz	0.32
1	5GHz 802.11a	92.67	1390.00	0.72	1kHz	0.33
2	5GHz 802.11a	93.31	1395.00	0.72	1kHz	0.30
-	Bluetooth - LE for 2Mbps	55.79	1060.00	0.94	1kHz	2.53

<TXBF Mode>

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
1+2	5GHz 802.11ac VHT80 for Ant. 1	88.89	320.00	3.13	10kHz	0.51
1+2	5GHz 802.11ac VHT80 for Ant. 2	88.89	320.00	3.13	10kHz	0.51

Bluetooth - LE for 2Mbps

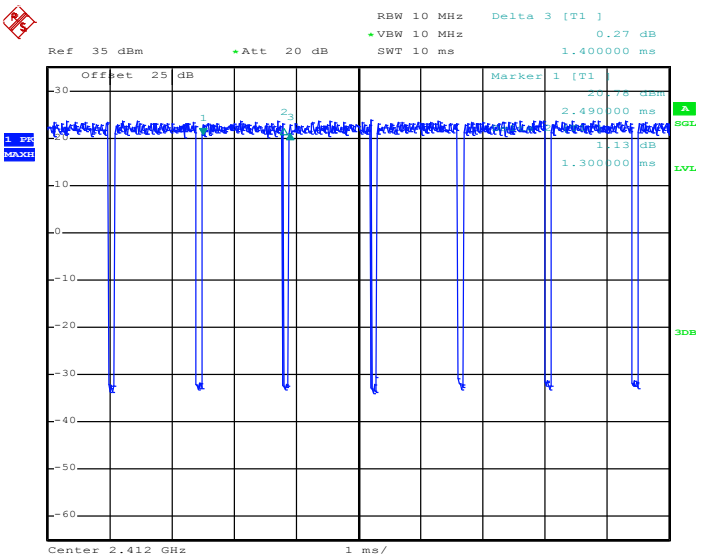


Date: 4.OCT.2018 21:18:10

<CDD Mode>

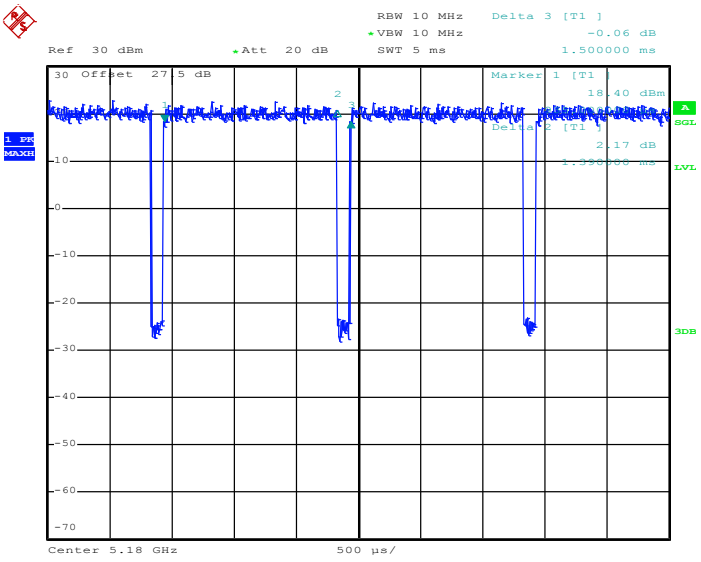
<Ant. 1>

2.4GHz 802.11n HT20



Date: 3.OCT.2018 23:49:54

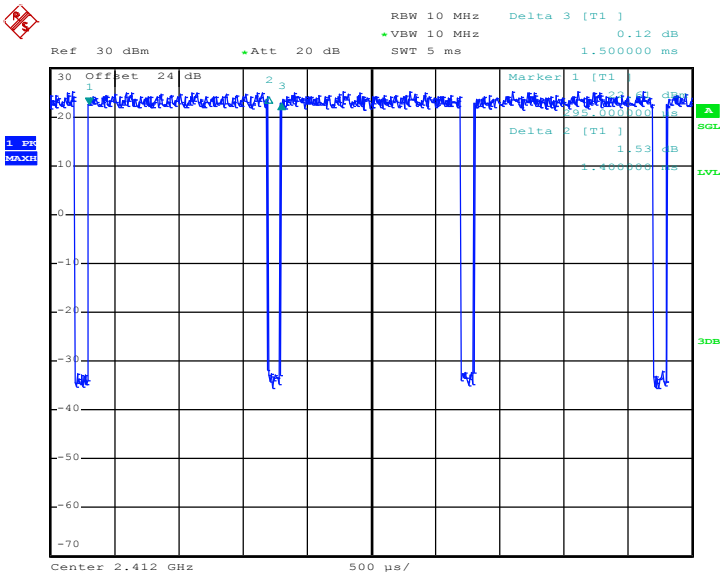
5GHz 802.11a



Date: 2.OCT.2018 16:35:31

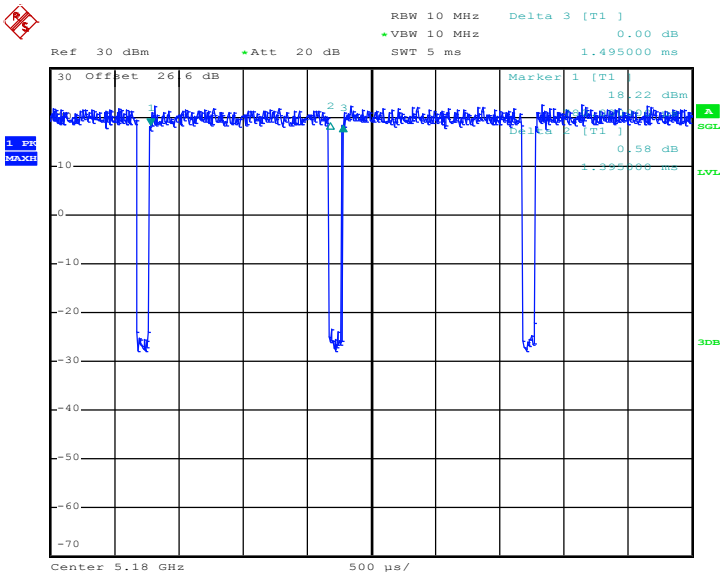
<Ant. 2>

2.4GHz 802.11g



Date: 3.OCT.2018 23:27:22

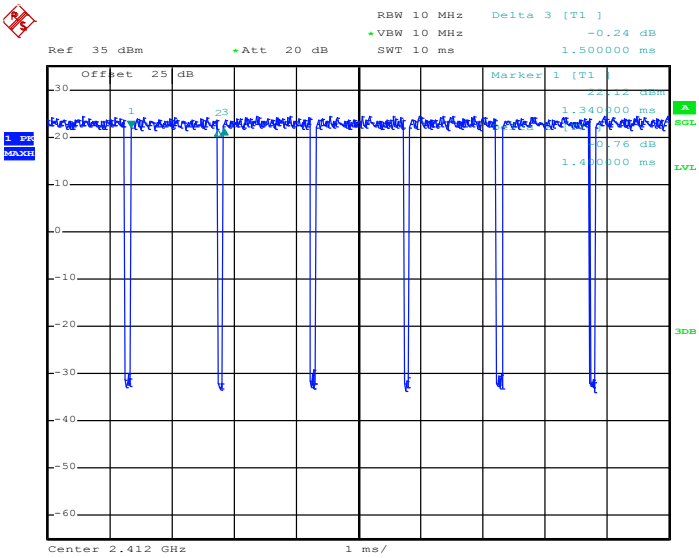
5GHz 802.11a



Date: 2.OCT.2018 17:00:35

MIMO <Ant. 1>

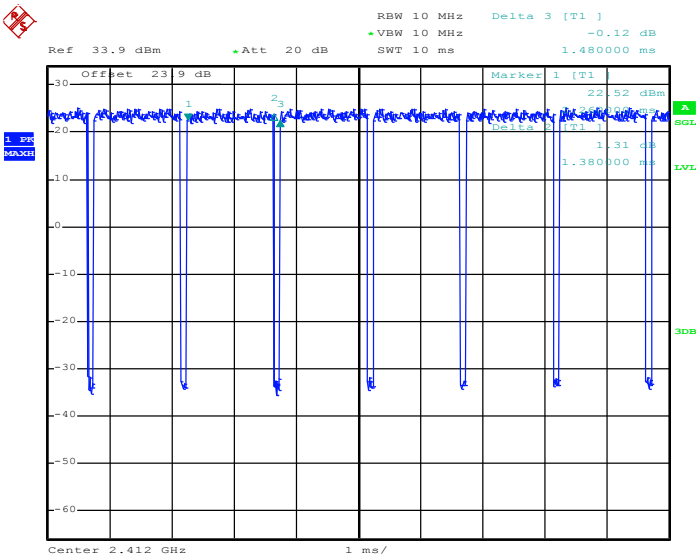
2.4GHz 802.11g



Date: 3.OCT.2018 23:36:31

MIMO <Ant. 2>

2.4GHz 802.11g

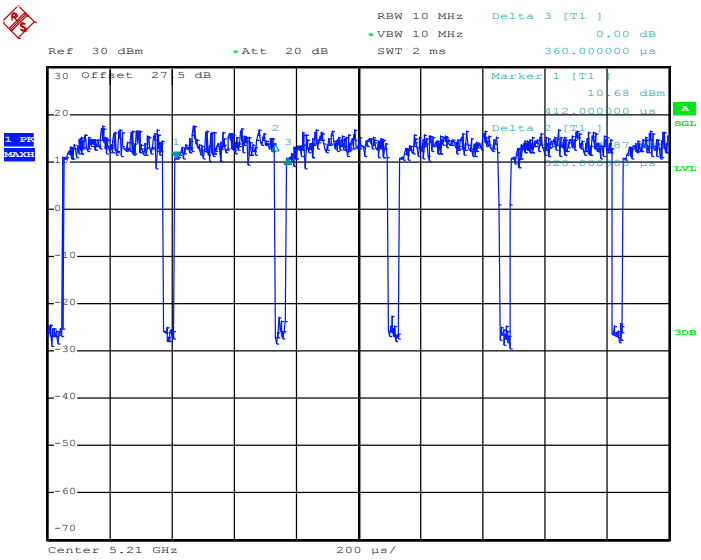


Date: 3.OCT.2018 23:35:50

<TXBF Mode>

MIMO <Ant. 1>

5GHz 802.11ac VHT80



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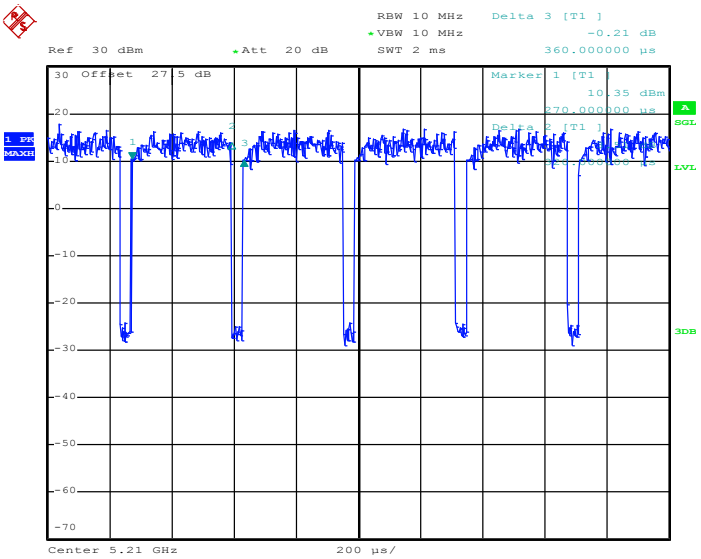
MIMO <Ant. 2>

5GHz 802.11ac VHT80



Date: 10.OCT.2018 00:01:14

THE END