



FCC CO-LOCATION RADIO TEST REPORT

FCC ID : TVE-3417T0695A

Equipment : Network Security Gateway

Brand Name : FORTINET **FORTINET®**

Model Name : FortiWiFi 80F-2R-POExxxxxx,
FORTIWIFI-80F-2R-POExxxxxx, FWF-80F-2R-POExxxxxx,
FortiWiFi 81F-2R-POExxxxxx,
FORTIWIFI-81F-2R-POExxxxxx, FWF-81F-2R-POExxxxxx,
FortiWiFi 80F-2R-3G4G-POExxxxxx,
FORTIWIFI-80F-2R-3G4G-POExxxxxx,
FWF-80F-2R-3G4G-POExxxxxx,
FortiWiFi 81F-2R-3G4G-POExxxxxx,
FORTIWIFI-81F-2R-3G4G-POExxxxxx,
FWF-81F-2R-3G4G-POExxxxxx
(where "x" can be used "A-Z", or "0-9", or "-", or blank
for software purposes or marketing purposes only)

Marketing Name : FortiWiFi 80F-2R-POE, FortiWiFi 81F-2R-POE, FortiWiFi
80F-2R-3G4G-POE, FortiWiFi 81F-2R-3G4G-POE

Applicant : Fortinet Inc.
899 KIFER RD
SUNNYVALE CA 94086
UNITED STATES

Manufacturer : Fortinet Inc.
899 KIFER RD
SUNNYVALE CA 94086
UNITED STATES

Standard : FCC Part 15 Subpart E §15.407



The product was received on Feb. 10, 2021 and testing was started from Mar. 12, 2021 and completed on Mar. 30, 2021. We, Sporton International Inc. Wensan 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 test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR121023D	01	Initial issue of report	Apr. 09, 2021
FR121023D	02	Update FCC Designation Number	Apr. 26, 2021

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 0.63 dB at 2483.500 MHz
3.2	15.203 15.407(a)	Antenna Requirement	Pass	-

Note: This is a variant report by adding SKU (Model Name: FWF-81F-2R-3G4G-POE). All the test cases were performed on original report which can be referred to Sporton Report Number FR111826E. Based on the original report, the test cases were verified.

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: Dara Chiu

1 General Description

1.1 Product Feature of Equipment Under Test

WCDMA/LTE, Bluetooth - LE, Wi-Fi 2.4GHz 802.11b/g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax and GNSS.

Product Specification subjective to this standard	
Antenna Type	WWAN: Dipole Antenna WLAN: <Ant. 1> Dipole Antenna <Ant. 2> Dipole Antenna <Ant. 3> Dipole Antenna Bluetooth - LE: <Ant. 4> PIFA Antenna GPS/Glonass/BDS/Galileo: Dipole Antenna

Antenna information		
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	<Ant. 1>: 3.24 <Ant. 2>: 3.24 <Ant. 3>: 3.24 <Ant. 4>: 0.74
5150 MHz ~ 5250 MHz	Peak Gain (dBi)	<Ant. 1>: 3.27 <Ant. 2>: 3.27 <Ant. 3>: 3.27
5725 MHz ~ 5850 MHz	Peak Gain (dBi)	<Ant. 1>: 1.58 <Ant. 2>: 1.58 <Ant. 3>: 1.58

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

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. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH16-HY

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

FCC designation No.: TW3786

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 C §15.247
- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ 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 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ 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. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

- a. 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 degrees (Ant. Vertical) were recorded in this report.

2.1 Carrier Frequency and Channel

2400-2483.5 MHz Bluetooth - LE		2400-2483.5 MHz 802.11b		2400-2483.5 MHz 802.11n HT40	
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
39	2480	6	2437	9	2452

5150-5250 MHz 802.11n HT40		5725-5850 MHz 802.11ac VHT80	
Channel	Freq. (MHz)	Channel	Freq. (MHz)
38	5190	151	5755

Remark: During the Radiated Spurious Emission test, the EUT turn on the WWAN functions simultaneously.

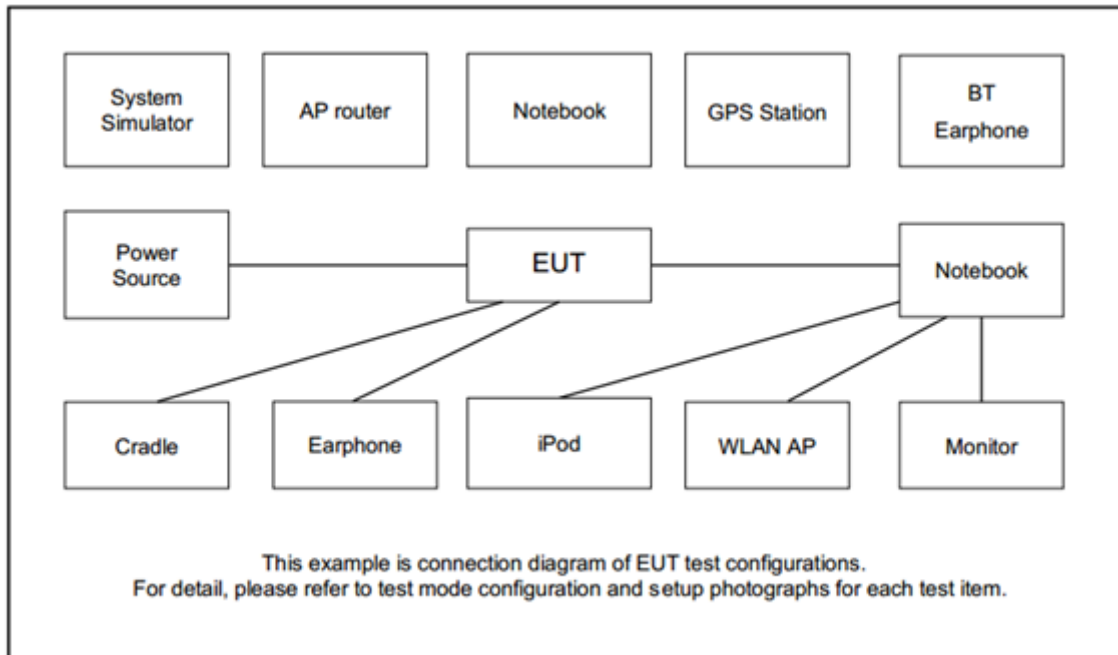
2.2 Test Mode

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

<Co-Location>

Modulation	Data Rate
Bluetooth LE Ant. 4 + WLAN 2.4GHz 802.11b MIMO Ant. 1 + 3 + LTE Band 41	2Mbps + 1 Mbps + QPSK
Bluetooth LE Ant. 4 + WLAN 2.4GHz 802.11n HT40 Ant. 2 + LTE Band 41	2Mbps + MCS0 + QPSK
Bluetooth LE Ant. 4 + WLAN 5GHz 802.11ax HE80 MIMO Ant. 1 + 3 + LTE Band 41	2Mbps + MCS0 + QPSK
Bluetooth LE Ant. 4 + WLAN 5GHz 802.11n HT40 Ant. 2 + LTE Band 41	2Mbps + MCS0 + QPSK

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.5 EUT Operation Test Setup

The RF test items, utility "QSPR Version5.0-00196" 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) Sections 15.407(b)(1-3) specifies the unwanted emissions limit 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.
- (ii) Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are based on the use of a peak detector.

3.1.2 Measuring Instruments

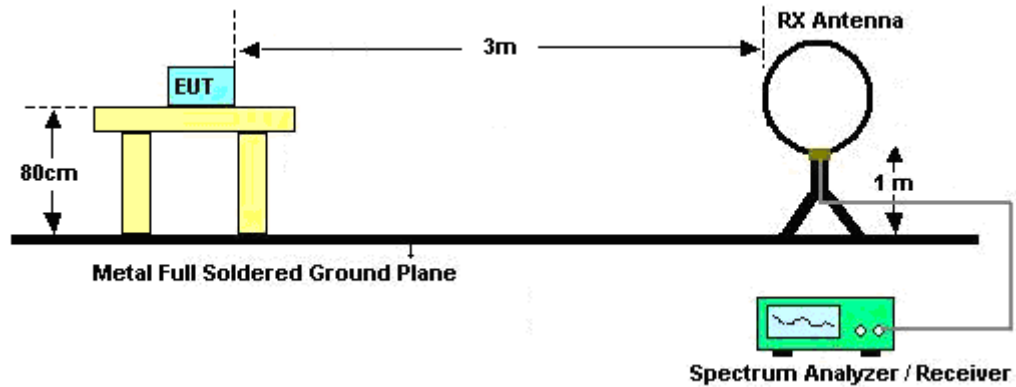
See list of measuring equipment of this test report.

3.1.3 Test Procedures

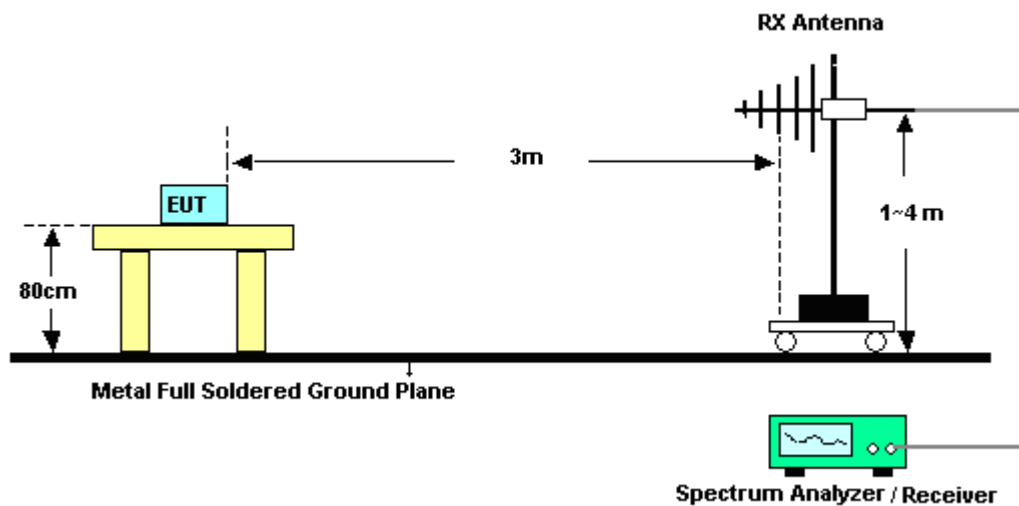
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000 MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak 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 1000 MHz
 - 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 1 GHz and 1.5 meter for frequency above 1 GHz 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 1 GHz, 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 1 GHz, the emission level of the EUT in peak mode was 20 dB 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

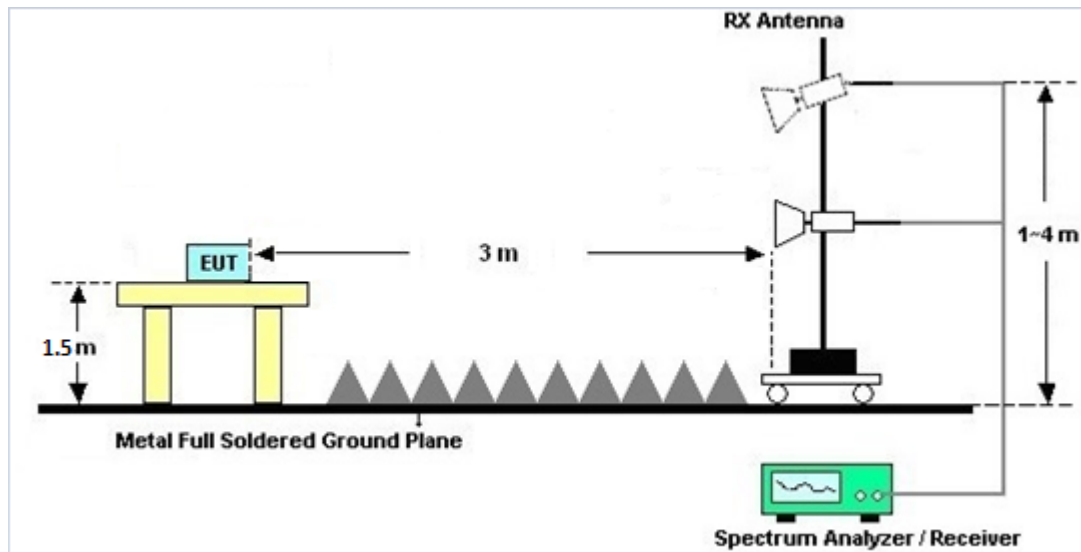
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated test 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	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jul. 14, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Jul. 13, 2021	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N-06	47020 & 06	30MHz to 1GHz	Oct. 11, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Oct. 10, 2021	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1G	Sep. 30, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Sep. 29, 2021	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Sep. 29, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Sep. 28, 2021	Radiation (03CH16-HY)
Amplifier	EMCI	EMC051845SE	980729	1-18GHz	Jul. 10, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Jul. 09, 2021	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz ~40GHz	May 22, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	May 21, 2021	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec.10, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Dec. 09, 2021	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A	MY59053012	3Hz~26.5GHz	Nov.18, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Nov. 17, 2021	Radiation (03CH16-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Jan. 15, 2021	Mar. 12, 2021 ~ Mar. 30, 2021	Jan. 14, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11680/4PE	NA	Aug. 29, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Aug. 28, 2021	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11688/4PE	NA	Aug. 29, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Aug. 28, 2021	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5757	NA	Aug. 29, 2020	Mar. 12, 2021 ~ Mar. 30, 2021	Aug. 28, 2021	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Mar. 12, 2021 ~ Mar. 30, 2021	N/A	Radiation (03CH16-HY)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Mar. 12, 2021 ~ Mar. 30, 2021	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Mar. 12, 2021 ~ Mar. 30, 2021	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Mar. 12, 2021 ~ Mar. 30, 2021	N/A	Radiation (03CH16-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.5
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.3
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7
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Appendix A. Radiated Spurious Emission

Test Engineer :	Karl Hou , Caster Liao, and Andy Yang	Temperature :	20 ~ 25°C
		Relative Humidity :	50 ~ 60%

BLE + WIFI 802.11b + LTE

BLE (Band Edge @ 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)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 1+3 802.11b CH06 2437MHz + LTE Band 41	*	2480	93.64	-	-	77.84	27.4	8.74	30.26	100	238	P	H
	*	2480	92.13	-	-	76.33	27.4	8.74	30.26	100	238	A	H
		2490.96	56.57	-17.43	74	40.74	27.4	8.76	30.25	100	238	P	H
		2483.52	45.42	-8.58	54	29.61	27.4	8.74	30.25	100	238	A	H
													H
													H
	*	2480	96.94	-	-	81.14	27.4	8.74	30.26	247	182	P	V
	*	2480	95.45	-	-	79.65	27.4	8.74	30.26	247	182	A	V
		2497.92	56.69	-17.31	74	40.85	27.4	8.77	30.25	247	182	P	V
		2483.52	46.25	-7.75	54	30.44	27.4	8.74	30.25	247	182	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11b (Band Edge @ 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)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 1+3 802.11b CH06 2437MHz + LTE Band 41		2323.44	57.07	-16.93	74	41.16	27.85	8.44	30.3	200	339	P	H
		2375.66	46.72	-7.28	54	30.9	27.65	8.53	30.28	200	339	A	H
	*	2437	114.82	-	-	99.09	27.43	8.65	30.27	200	339	P	H
	*	2437	111.77	-	-	96.04	27.43	8.65	30.27	200	339	A	H
		2489.08	56.8	-17.2	74	40.98	27.4	8.75	30.25	200	339	P	H
		2496.78	47.13	-6.87	54	31.29	27.4	8.77	30.25	200	339	A	H
		2349.62	58.25	-15.75	74	42.33	27.8	8.49	30.29	100	56	P	V
		2389.52	47.09	-6.91	54	31.33	27.56	8.56	30.28	100	56	A	V
	*	2437	121.88	-	-	106.15	27.43	8.65	30.27	100	56	P	V
	*	2437	118.75	-	-	103.02	27.43	8.65	30.27	100	56	A	V
		2484.04	57.53	-16.47	74	41.72	27.4	8.74	30.25	100	56	P	V
		2484.67	48.94	-5.06	54	33.12	27.4	8.75	30.25	100	56	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



BLE + WIFI 802.11b + LTE (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)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 1+3 802.11b CH06 2437MHz + LTE Band 41		4874	42.41	-31.59	74	53.27	31.15	12.87	55.37	100	0	P	H
		4960	40.88	-33.12	74	51.57	31.34	12.86	55.39	100	0	P	H
		7311	54.03	-19.97	74	57.71	36.42	15.74	56.26	250	23	P	H
		7311	49.71	-4.29	54	53.39	36.42	15.74	56.26	250	23	A	H
		7440	45.94	-28.06	74	49.44	36.4	15.97	56.29	100	0	P	H
													H
													H
		4874	43.82	-30.18	74	54.68	31.15	12.87	55.37	100	0	P	V
		4960	40.7	-33.3	74	51.39	31.34	12.86	55.39	100	0	P	V
		7311	56.26	-17.74	74	59.94	36.42	15.74	56.26	100	348	P	V
		7311	52.43	-1.57	54	56.11	36.42	15.74	56.26	100	348	A	V
		7440	47.84	-26.16	74	51.34	36.4	15.97	56.29	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz
BLE + WIFI 802.11b + LTE (LF)

	Note	Frequency	Level	Over Limit	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	(H/V)	
Ant 4 BLE(2M) CH 39 2480MHz + Ant 1+3 802.11b CH06 2437MHz + LTE Band 41		98.87	25.49	-18.01	43.5	40.6	15.96	1.48	32.61			P	H	
		159.01	26.45	-17.05	43.5	40.51	16.7	1.9	32.78			P	H	
		254.07	27.93	-18.07	46	38.88	19.08	2.56	32.72			P	H	
		332.64	35.9	-10.1	46	45.34	19.98	2.97	32.49			P	H	
		454.86	39.67	-6.33	46	45.2	23.39	3.52	32.53	100	0	P	H	
		721.61	36.27	-9.73	46	36.83	27.31	4.49	32.5			P	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
		53.28	31.76	-8.24	40	50.63	12.94	0.97	32.83				P	V
		98.87	31.65	-11.85	43.5	46.76	15.96	1.48	32.61				P	V
		458.74	39.67	-6.33	46	45.16	23.43	3.53	32.54	100	0		P	V
		500.45	34.17	-11.83	46	38.89	24.16	3.67	32.66				P	V
		615.88	35.17	-10.83	46	37.59	25.94	4.14	32.63				P	V
		730.34	35.65	-10.35	46	35.76	27.78	4.51	32.54				P	V
														V
														V
														V
													V	
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



**BLE + WIFI 802.11n HT40 + LTE
BLE (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)
Ant 4	*	2480	94.51	-	-	78.71	27.4	8.74	30.26	100	119	P	H
BLE(2M)	*	2480	92.86	-	-	77.06	27.4	8.74	30.26	100	119	A	H
CH 39		2487.32	57.1	-16.9	74	41.28	27.4	8.75	30.25	100	119	P	H
2480MHz		2483.52	46.04	-7.96	54	30.23	27.4	8.74	30.25	100	119	A	H
+													H
Ant 2													H
802.11n	*	2480	97.84	-	-	82.04	27.4	8.74	30.26	121	162	P	V
HT40	*	2480	96.27	-	-	80.47	27.4	8.74	30.26	121	162	A	V
CH09		2483.88	57.73	-16.27	74	41.92	27.4	8.74	30.25	121	162	P	V
2452MHz		2483.52	48.25	-5.75	54	32.44	27.4	8.74	30.25	121	162	A	V
+													V
LTE Band													V
41													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11n HT40 (Band Edge @ 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)
Ant 4		2383.5	56.55	-17.45	74	40.76	27.6	8.55	30.28	100	342	P	H
BLE(2M)		2359.42	46.28	-7.72	54	30.41	27.74	8.5	30.29	100	342	A	H
CH 39	*	2452	93.56	-	-	77.82	27.4	8.68	30.26	100	342	P	H
2480MHz	*	2452	85.9	-	-	70.16	27.4	8.68	30.26	100	342	A	H
+		2483.69	57.19	-16.81	74	41.38	27.4	8.74	30.25	100	342	P	H
Ant 2		2483.5	48.15	-5.85	54	32.34	27.4	8.74	30.25	100	342	A	H
802.11n		2318.12	56.1	-17.9	74	40.19	27.86	8.43	30.3	106	117	P	V
HT40		2347.1	46.18	-7.82	54	30.26	27.81	8.48	30.29	106	117	A	V
CH09	*	2452	101.74	-	-	86	27.4	8.68	30.26	106	117	P	V
2452MHz	*	2452	93.61	-	-	77.87	27.4	8.68	30.26	106	117	A	V
+		2483.83	61.4	-12.6	74	45.59	27.4	8.74	30.25	106	117	P	V
LTE Band		2483.5	53.37	-0.63	54	37.56	27.4	8.74	30.25	106	117	A	V
41													
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



BLE + WIFI 802.11n HT40 + LTE (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)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 2 802.11n HT40 CH09 2452MHz + LTE Band 41		4904	40.88	-33.12	74	51.78	31.12	12.86	55.38	100	0	P	H
		4960	39.94	-34.06	74	50.63	31.34	12.86	55.39	100	0	P	H
		7356	45.4	-28.6	74	48.9	36.49	15.86	56.27	100	0	P	H
		7440	45.78	-28.22	74	49.28	36.4	15.97	56.29	100	0	P	H
													H
													H
													H
		4904	40.55	-33.45	74	51.45	31.12	12.86	55.38	100	0	P	V
		4960	40.4	-33.6	74	51.09	31.34	12.86	55.39	100	0	P	V
		7356	45.07	-28.93	74	48.57	36.49	15.86	56.27	100	0	P	V
		7440	46.06	-27.94	74	49.56	36.4	15.97	56.29	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz
BLE + WIFI 802.11n HT40 + LTE (LF)

	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 2 802.11n HT40 CH09 2452MHz + LTE Band 41		93.05	29.35	-14.15	43.5	45.32	15.19	1.41	32.63			P	H
		317.12	32.49	-13.51	46	42.51	19.5	2.89	32.52			P	H
		333.61	35.04	-10.96	46	44.45	20.01	2.97	32.49			P	H
		348.16	34.61	-11.39	46	43.43	20.49	3.05	32.46			P	H
		459.71	43.79	-2.21	46	49.26	23.45	3.53	32.54	209	315	Q	H
		749.74	36.65	-9.35	46	36.42	28.16	4.55	32.63			P	H
													H
													H
													H
													H
													H
													H
		51.34	31.13	-8.87	40	49.27	13.71	0.95	32.84	100	51	Q	V
		96.93	33.51	-9.99	43.5	48.92	15.7	1.45	32.62			P	V
		183.26	29.43	-14.07	43.5	45.01	15.05	2.08	32.86			P	V
		333.61	29.81	-16.19	46	39.22	20.01	2.97	32.49			P	V
		465.53	41.55	-4.45	46	46.89	23.57	3.55	32.56	100	324	Q	V
		721.61	35.32	-10.68	46	35.88	27.31	4.49	32.5			P	V
													V
													V
													V
													V
													V
													V
												V	
												V	
												V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



BLE + WIFI 802.11ax HE80 Full + LTE
BLE (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)
Ant 4	*	2480	93.57	-	-	77.77	27.4	18.66	30.26	100	235	P	H
BLE(2M)	*	2480	91.91	-	-	76.11	27.4	18.66	30.26	100	235	A	H
CH 39		2497.64	56.5	-17.5	74	40.66	27.4	18.69	30.25	100	235	P	H
2480MHz		2483.52	45	-9	54	29.19	27.4	18.66	30.25	100	235	A	H
+													H
Ant 1+3													H
802.11ax	*	2480	96.8	-	-	81	27.4	18.66	30.26	251	178	P	V
HE80	*	2480	95.28	-	-	79.48	27.4	18.66	30.26	251	178	A	V
CH 155		2493.28	56.45	-17.55	74	40.62	27.4	18.68	30.25	251	178	P	V
5775MHz		2483.52	45.66	-8.34	54	29.85	27.4	18.66	30.25	251	178	A	V
+													V
LTE Band													V
41													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												


WIFI 802.11ax HE80 Full (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)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 1+3 802.11ax HE80 CH 155 5775MHz + LTE Band 41		5640.2	61.28	-6.92	68.2	45.76	31.62	13.68	29.78	383	30	P	H
		5698.4	67.91	-36.11	104.02	52.29	31.7	13.73	29.81	383	30	P	H
		5715.6	70.22	-39.35	109.57	54.5	31.79	13.74	29.81	383	30	P	H
		5724.4	72.07	-48.76	120.83	56.29	31.85	13.75	29.82	383	30	P	H
	*	5775	109.21	-	-	93.24	32	13.8	29.83	383	30	P	H
	*	5775	99.05	-	-	83.08	32	13.8	29.83	383	30	A	H
		5854.4	65.38	-46.79	112.17	49.32	32.11	13.81	29.86	383	30	P	H
		5856.8	67.47	-42.83	110.3	51.42	32.11	13.81	29.87	383	30	P	H
		5875.4	63.64	-41.26	104.9	47.55	32.15	13.81	29.87	383	30	P	H
		5934.2	55.24	-12.96	68.2	39.05	32.27	13.81	29.89	383	30	P	H
		5649.6	67.37	-0.83	68.2	51.88	31.6	13.68	29.79	367	243	P	V
		5695.8	72.43	-29.67	102.1	56.81	31.69	13.73	29.8	367	243	P	V
		5715.4	76.58	-32.93	109.51	60.86	31.79	13.74	29.81	367	243	P	V
		5724.8	80.42	-41.32	121.74	64.64	31.85	13.75	29.82	367	243	P	V
	*	5775	115.69	-	-	99.72	32	13.8	29.83	367	243	P	V
	*	5775	105.43	-	-	89.46	32	13.8	29.83	367	243	A	V
		5854.4	73.1	-39.07	112.17	57.04	32.11	13.81	29.86	367	243	P	V
		5861	74.52	-34.6	109.12	58.46	32.12	13.81	29.87	367	243	P	V
		5880.2	68.66	-32.68	101.34	52.56	32.16	13.81	29.87	367	243	P	V
		5927	58.8	-9.4	68.2	42.63	32.25	13.81	29.89	367	243	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



BLE + WIFI 802.11ax HE80 Full + LTE (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)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 1+3 802.11ax HE80 CH 155 5775MHz + LTE Band 41		4960	56.49	-17.51	74	40.32	31.34	14.47	29.64	100	0	P	H
		4960	44.28	-9.72	54	28.11	31.34	14.47	29.64	100	0	A	H
		7440	45.55	-28.45	74	48.69	36.4	16.75	56.29	100	0	P	H
		11550	56.58	-17.42	74	52.08	39.8	20.16	55.46	263	285	P	H
		11550	47.18	-6.82	54	42.68	39.8	20.16	55.46	263	285	A	H
		17325	52.19	-16.01	68.2	42.52	41.32	25.2	56.85	100	0	P	H
													H
		4960	55.52	-18.48	74	39.35	31.34	14.47	29.64	100	0	P	V
		4960	44.5	-9.5	54	28.33	31.34	14.47	29.64	100	0	A	V
		7440	45.08	-28.92	74	48.22	36.4	16.75	56.29	100	0	P	V
		11550	58.47	-15.53	74	53.97	39.8	20.16	55.46	100	319	P	V
		11550	48.44	-5.56	54	43.94	39.8	20.16	55.46	100	319	A	V
		17325	54.47	-13.73	68.2	44.8	41.32	25.2	56.85	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 802.11ax HE80 + Full + LTE (LF)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	Limit (dB)	Line (dBμV/m)	Level (dBμV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	(H/V)
Ant 4 BLE(2M) CH 39 2480MHz + Ant 1+3 802.11ax HE80 CH 155 5775MHz + LTE Band 41		127	26.16	-17.34	43.5	39.46	17.6	1.78	32.68			P	H
		159.01	26.59	-16.91	43.5	40.65	16.7	2.02	32.78			P	H
		333.61	35.65	-10.35	46	45.06	20.01	3.07	32.49			P	H
		459.71	39.52	-6.48	46	44.99	23.45	3.62	32.54	100	0	P	H
		500.45	34.11	-11.89	46	38.83	24.16	3.78	32.66			P	H
		749.74	35.4	-10.6	46	35.17	28.16	4.7	32.63			P	H
													H
													H
													H
													H
													H
													H
		63.95	29.95	-10.05	40	49.62	11.94	1.17	32.78			P	V
		98.87	32.14	-11.36	43.5	47.25	15.96	1.54	32.61			P	V
		183.26	30.95	-12.55	43.5	46.53	15.05	2.23	32.86			P	V
		332.64	29.43	-16.57	46	38.87	19.98	3.07	32.49			P	V
		454.86	39.01	-6.99	46	44.54	23.39	3.61	32.53	100	0	P	V
		500.45	34.13	-11.87	46	38.85	24.16	3.78	32.66			P	V
													V
													V
												V	
												V	
												V	
												V	
												V	
												V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



BLE + WIFI 802.11n HT40 + LTE

BLE (Band Edge @ 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)
Ant 4 BLE CH 39 2480MHz + Ant 2 802.11n HT40 CH 38 5219MHz + LTE Band 41	*	2480	93.46	-	-	77.66	27.4	18.66	30.26	100	237	P	H
	*	2480	91.89	-	-	76.09	27.4	18.66	30.26	100	237	A	H
		2484.64	55.97	-18.03	74	40.15	27.4	18.67	30.25	100	237	P	H
		2483.52	44.85	-9.15	54	29.04	27.4	18.66	30.25	100	237	A	H
													H
													H
	*	2480	96.95	-	-	81.15	27.4	18.66	30.26	214	180	P	V
	*	2480	95.34	-	-	79.54	27.4	18.66	30.26	214	180	A	V
		2487.24	56.93	-17.07	74	41.11	27.4	18.67	30.25	214	180	P	V
		2483.52	45.56	-8.44	54	29.75	27.4	18.66	30.25	214	180	A	V
													V
													V
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												



WIFI 802.11n HT40 (Band Edge @ 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)
Ant 4 BLE CH 39 2480MHz + Ant 2 802.11n HT40 CH 38 5219MHz + LTE Band 41		5148.72	57.25	-16.75	74	42.07	31.8	13.05	29.67	302	34	P	H
		5150	50.13	-3.87	54	34.95	31.8	13.05	29.67	302	34	A	H
	*	5190	106.59	-	-	91.53	31.64	13.1	29.68	302	34	P	H
	*	5190	98.54	-	-	83.48	31.64	13.1	29.68	302	34	A	H
		5359.76	56.01	-17.99	74	41.18	31.14	13.4	29.71	302	34	P	H
		5359.76	48.57	-5.43	54	33.74	31.14	13.4	29.71	302	34	A	H
		5149.76	57.71	-16.29	74	42.53	31.8	13.05	29.67	396	247	P	V
		5149.5	50.26	-3.74	54	35.08	31.8	13.05	29.67	396	247	A	V
	*	5190	109.49	-	-	94.43	31.64	13.1	29.68	396	247	P	V
	*	5190	101.6	-	-	86.54	31.64	13.1	29.68	396	247	A	V
		5354.16	59.37	-14.63	74	44.57	31.12	13.39	29.71	396	247	P	V
		5359.76	51.56	-2.44	54	36.73	31.14	13.4	29.71	396	247	A	V
Remark		1. No other spurious found. 2. All results are PASS against Peak and Average limit line.											



BLE + WIFI 802.11n HT40 + LTE (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)
Ant 4 BLE CH 39 2480MHz + Ant 2 802.11n HT40 CH 38 5219MHz + LTE Band 41		4960	56.26	-17.74	74	39.96	31.34	14.6	29.64	100	0	P	H
		4960	44.39	-9.61	54	28.09	31.34	14.6	29.64	100	0	A	H
		7440	45.57	-28.43	74	48.71	36.4	16.75	56.29	100	0	P	H
		10380	48.69	-19.51	68.2	45.99	39.52	19.4	56.22	100	0	P	H
		15570	46.41	-27.59	74	40.68	37.89	23.25	55.41	100	0	P	H
													H
													H
		4960	55.97	-18.03	74	39.67	31.34	14.6	29.64	100	0	P	V
		4960	44.28	-9.72	54	27.98	31.34	14.6	29.64	100	0	A	V
		7440	46.06	-27.94	74	49.2	36.4	16.75	56.29	100	0	P	V
		10380	49.47	-18.73	68.2	46.77	39.52	19.4	56.22	100	0	P	V
		15570	46.74	-27.26	74	41.01	37.89	23.25	55.41	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz
BLE + WIFI 802.11n HT40 + LTE (LF)

	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Ant 4 BLE CH 39 2480MHz + Ant 2 802.11n HT40 CH 38 5219MHz + LTE Band 41		100.81	29.6	-13.9	43.5	44.48	16.16	1.56	32.6	-	-	P	H
		151.25	28.09	-15.41	43.5	41.65	17.24	1.96	32.76	-	-	P	H
		332.64	35.31	-10.69	46	44.75	19.98	3.07	32.49	-	-	P	H
		460.68	43.74	-2.26	46	49.2	23.46	3.62	32.55	205	317	Q	H
		615.88	32.58	-13.42	46	35	25.94	4.27	32.63	-	-	P	H
		749.74	35.91	-10.09	46	35.68	28.16	4.7	32.63	-	-	P	H
													H
													H
													H
													H
													H
													H
		58.13	29.31	-10.69	40	49.02	12.01	1.09	32.81	100	48	Q	V
		98.87	32.41	-11.09	43.5	47.52	15.96	1.54	32.61	-	-	P	V
		116.33	28.91	-14.59	43.5	42.38	17.49	1.69	32.65	-	-	P	V
		332.64	29.29	-16.71	46	38.73	19.98	3.07	32.49	-	-	P	V
		461.65	41.29	-4.71	46	46.72	23.49	3.63	32.55	100	327	Q	V
		500.45	33.65	-12.35	46	38.37	24.16	3.78	32.66	-	-	P	V
													V
													V
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												V	
												V	
												V	
												V	
												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	Peak or Average
H/V	Horizontal or Vertical

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.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		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”.



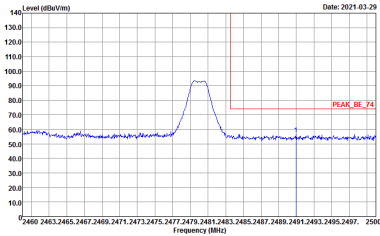
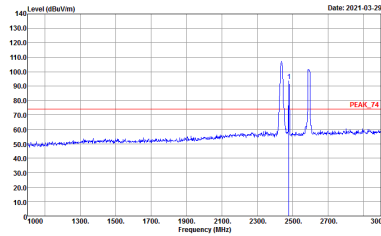
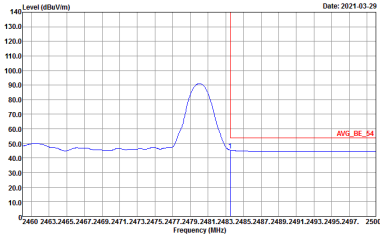
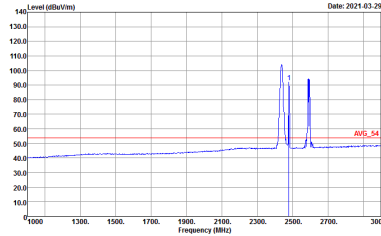
Appendix B. Radiated Spurious Emission

Test Engineer :	Karl Hou , Caster Liao, and Andy Yang	Temperature :	20 ~ 25°C
		Relative Humidity :	50 ~ 60%

Note symbol

-L	Low channel location
-R	High channel location

BLE + WIFI 802.11b + LTE
BLE (Band Edge @ 3m)

Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41			
	Horizontal	Fundamental	
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	

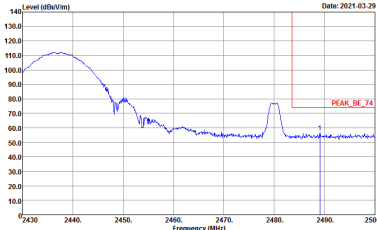
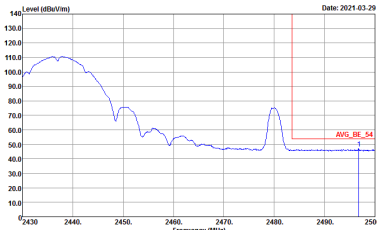


Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41		
	Vertical	Fundamental
Peak	Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg	Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto



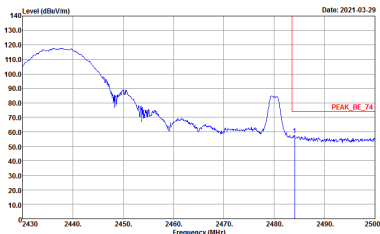
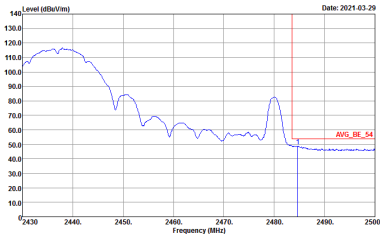
WIFI 802.11b (Band Edge @ 3m)

Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41 - L		
	Horizontal	Fundamental
Peak	Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto	Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto

Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41 - R		
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	Left blank

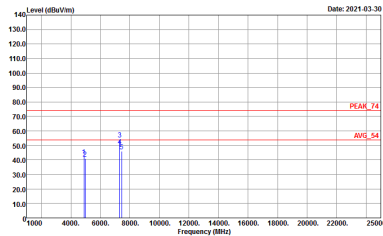
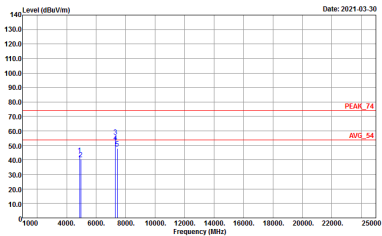


Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41 - L		
	Vertical	Fundamental
Peak	Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto	Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto

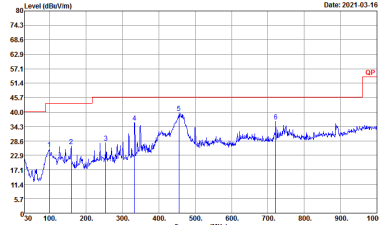
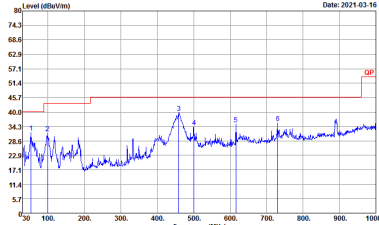
Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41 - R		
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL RBW:1000.0000kHz VBW:3000.0000kHz SWT:Auto	
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL RBW:1000.0000kHz VBW:3000.0000kHz SWT:Auto	



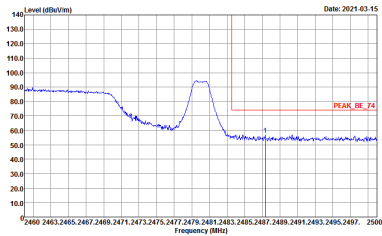
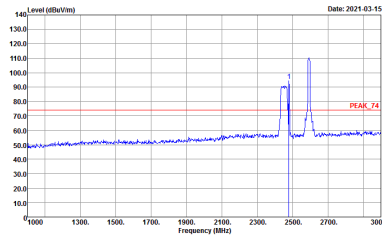
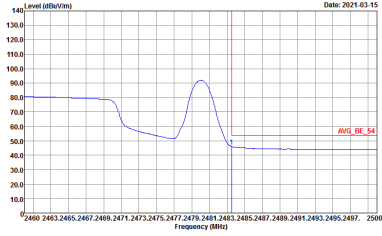
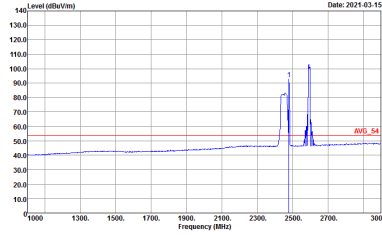
BLE + WIFI 802.11b + LTE (Harmonic @ 3m)

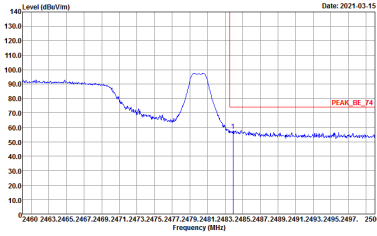
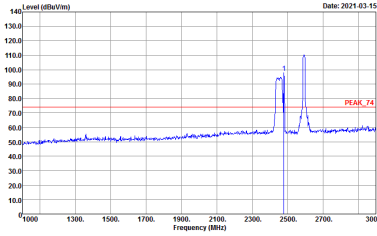
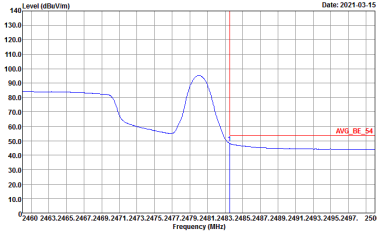
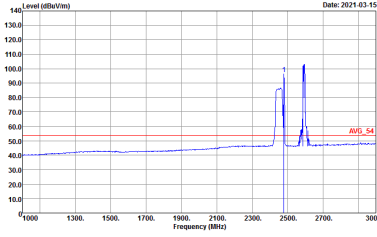
Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41		
	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL

Emission below 1GHz
BLE + WIFI 802.11b + LTE (LF)

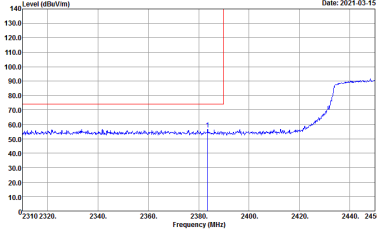
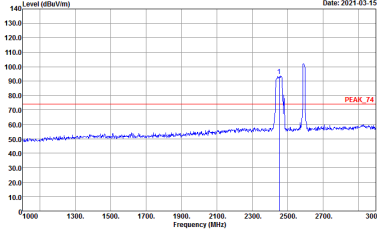
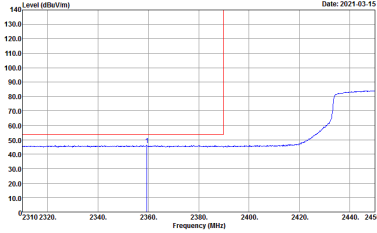
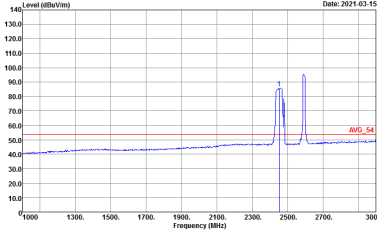
	Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11b CH06 + LTE Band 41	
	Horizontal	Vertical
QP / Peak	 Site : 03CHI6-HY Condition : QP 3m BIL06_47020406 HORIZONTAL	 Site : 03CHI6-HY Condition : QP 3m BIL06_47020406 VERTICAL

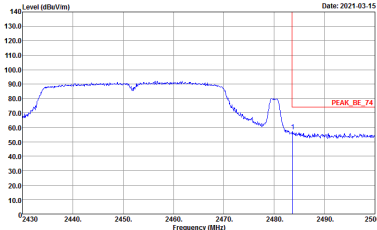
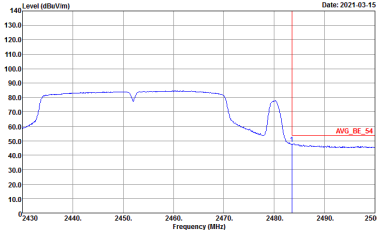
BLE + WLAN2.4G 802.11n HT40 + LTE
BLE (Band Edge @ 3m)

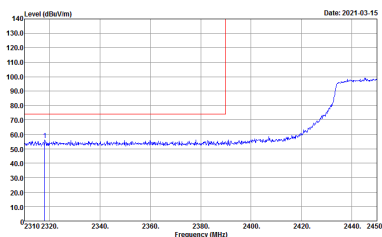
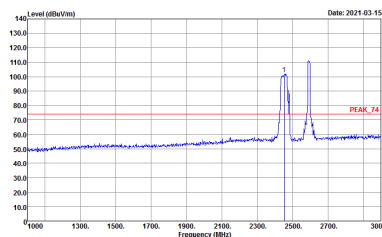
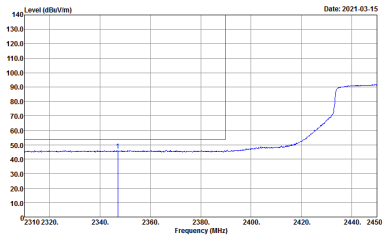
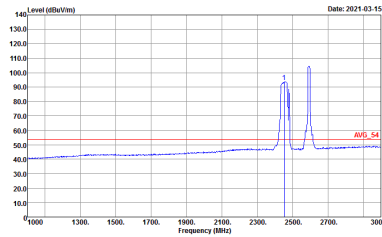
Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41		
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_F4 3m 91200_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_F4 3m 91200_1522 HORIZONTAL RBW:1000.000KHz VBW:0.010KHz SWT:Auto

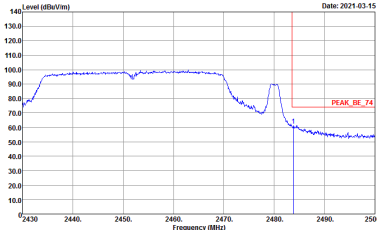
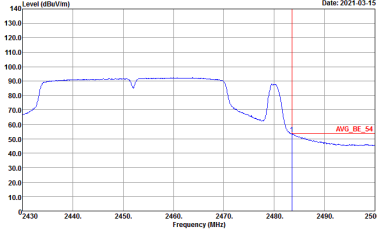
ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto
	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL RBW:1000.0000Hz VBW:0.0100Hz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 VERTICAL RBW:1000.0000Hz VBW:0.0100Hz SWT:Auto

WIFI 802.11n HT40 (Band Edge @ 3m)

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41 - L	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41 - R	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41 - L	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41 - R	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



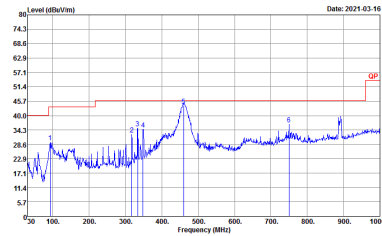
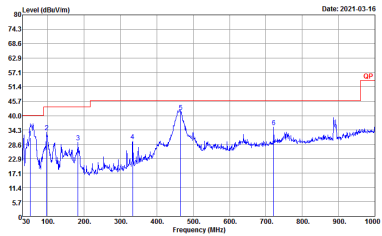
BLE + WIFI 802.11n HT40 + LTE (Harmonic @ 3m)

Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41		
	Horizontal	Vertical
Peak Avg.	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL



Emission below 1GHz

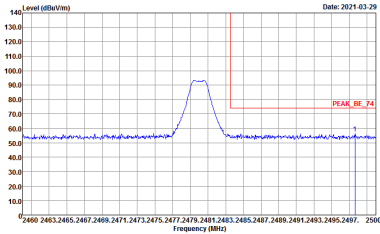
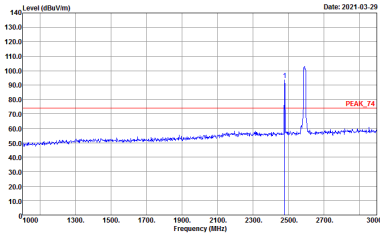
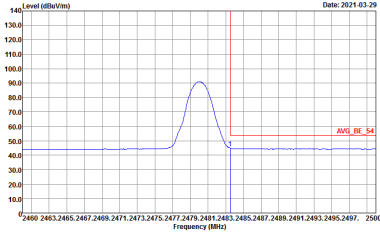
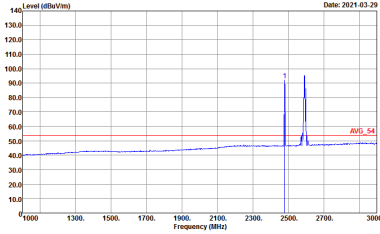
BLE + WIFI 802.11n HT40 + LTE (LF)

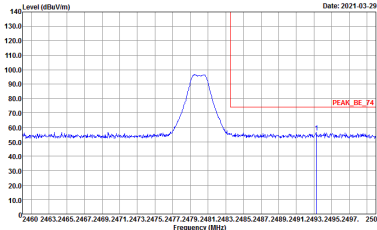
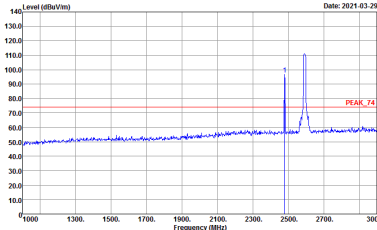
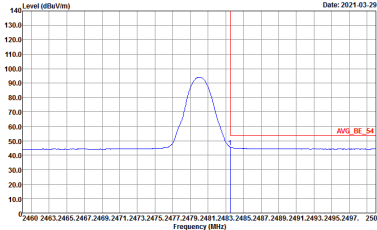
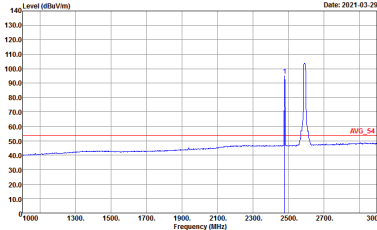
Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 Ch09 + LTE Band 41		
	Horizontal	Vertical
QP / Peak	 Site : 03CH16-HY Condition : QP 3m BIL06_47020406 HORIZONTAL	 Site : 03CH16-HY Condition : QP 3m BIL06_47020406 VERTICAL



BLE + WIFI 802.11ax HE80 Full + LTE

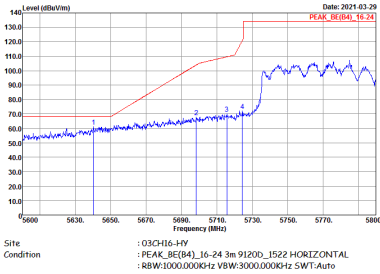
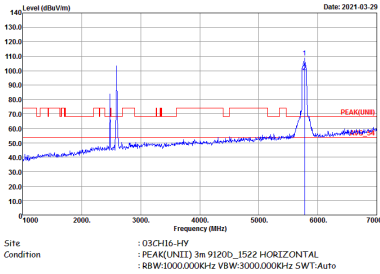
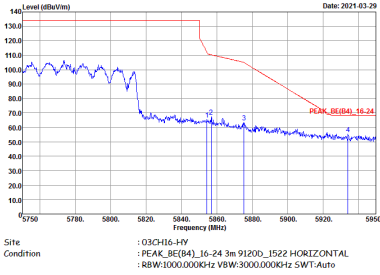
BLE (Band Edge @ 3m)

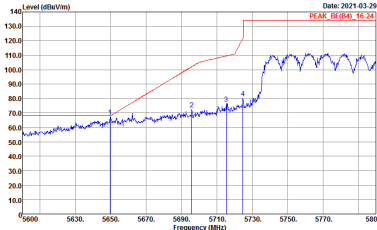
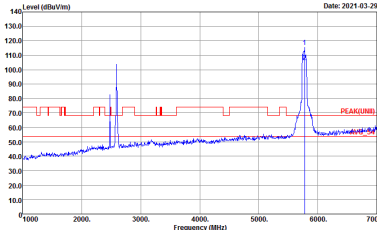
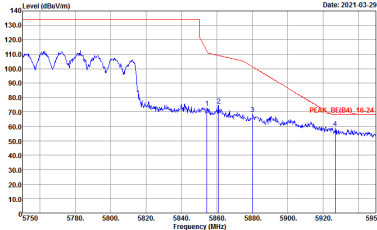
ANT	Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11ax HT80 Ch155 + LTE Band 41 Link	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto

ANT	Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11ax HT80 Ch155 + LTE Band 41 Link	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto



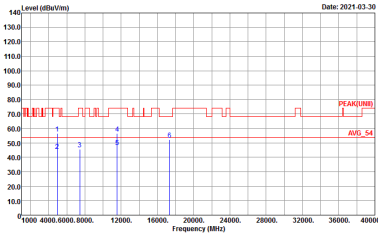
WIFI 802.11ax HE80 Full (Band Edge @ 3m)

ANT	Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11ax HT80 Ch155 + LTE Band 41 Link	
	Horizontal	Fundamental
Peak		
Avg.		

ANT	Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11a Ch36 + LTE Band 41 Link	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE(B4)_16-24 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(LNB) 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : PEAK_BE(B4)_16-24 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	



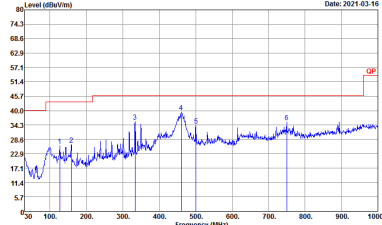
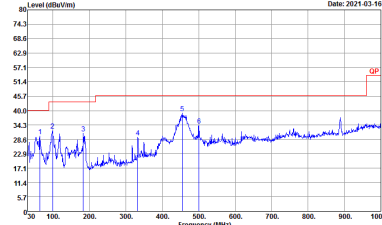
BLE + WIFI 802.11ax HE80 Full + LTE (Harmonic @ 3m)

ANT	Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11ax HT80 Ch155 + LTE Band 41 Link	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-1HY Condition : PEAK(UNIT) 3m 91200_1522 HORIZONTAL	 Site : 03CH16-1HY Condition : PEAK(UNIT) 3m 91200_1522 VERTICAL

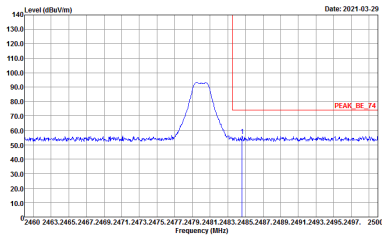
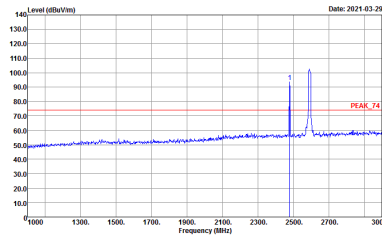
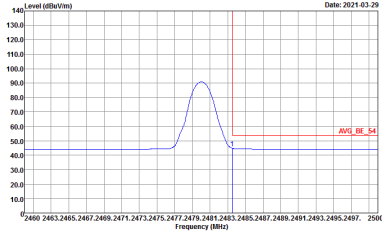
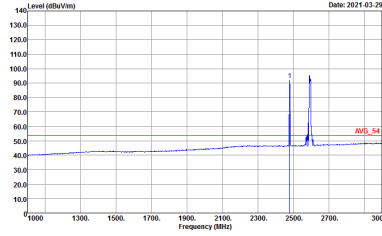


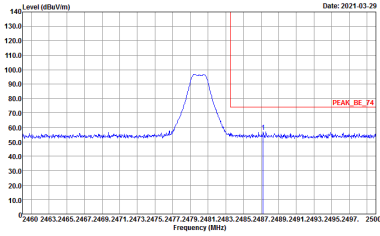
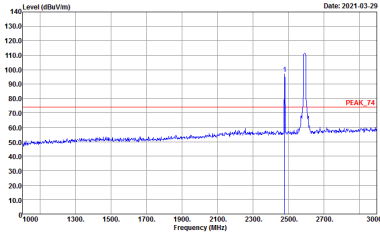
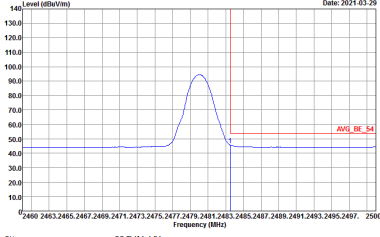
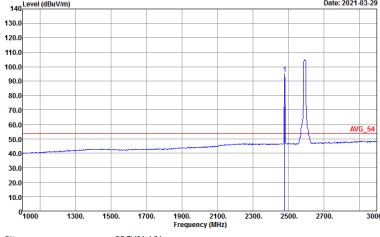
Emission below 1GHz

BLE + WIFI 802.11ax HE80 Full + LTE (LF)

ANT	Ant 4_BLE(2M) Ch39 + Ant 1+3_802.11ax HT80 Ch155 + LTE Band 41 Link	
	Horizontal	Vertical
QP / Peak	 Site : 03CH16-HY Condition : QP 3m 81LO6_47020406 HORIZONTAL	 Site : 03CH16-HY Condition : QP 3m 81LO6_47020406 VERTICAL

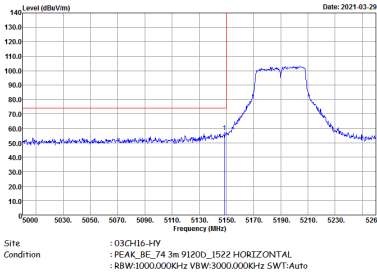
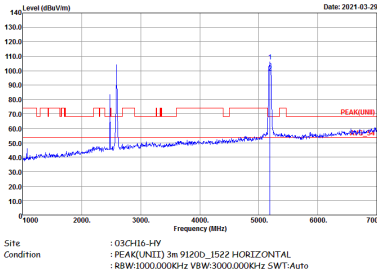
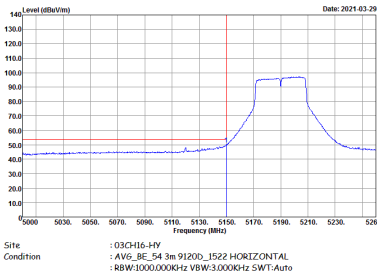
BLE + WIFI 802.11n HT40 + LTE
BLE (Band Edge @ 3m)

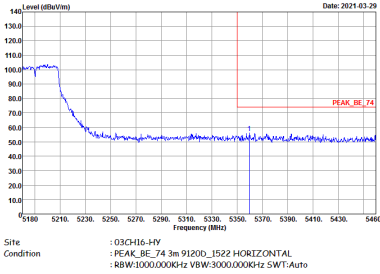
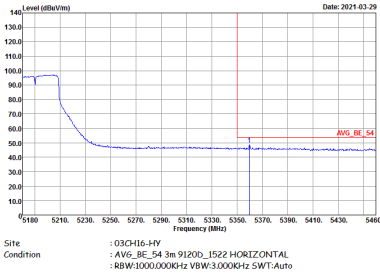
ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto

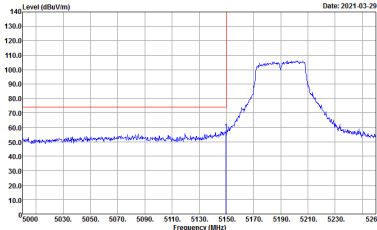
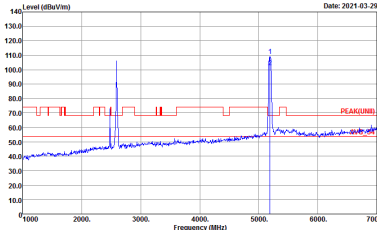
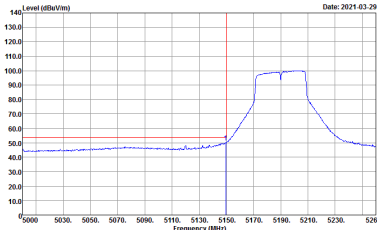
ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link	
	Vertical	Fundamental
Peak	 Level (dBuV/m) vs Frequency (MHz) Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	 Level (dBuV/m) vs Frequency (MHz) Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto
Avg	 Level (dBuV/m) vs Frequency (MHz) Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL : RBW:1000.0000Hz VBW:0.0100Hz SWT:Auto	 Level (dBuV/m) vs Frequency (MHz) Site : 03CH16-HY Condition : AVG_54 3m 91200_1522 VERTICAL : RBW:1000.0000Hz VBW:0.0100Hz SWT:Auto

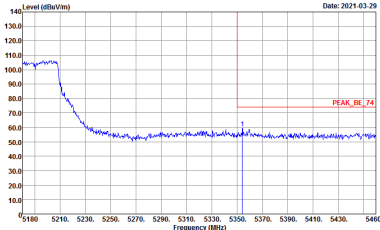
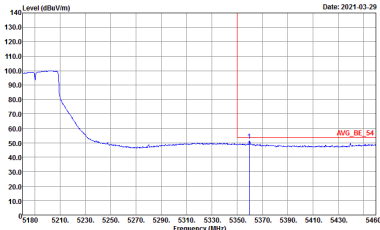


WIFI 802.11n HT40 (Band Edge @ 3m)

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link - L	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto	Left blank

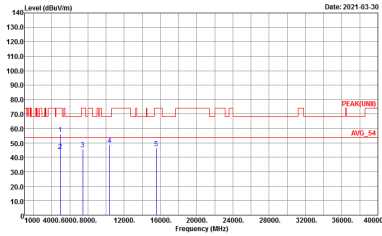
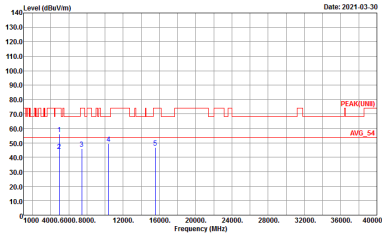
ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link - R	
	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link - L	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNEE) 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522 VERTICAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto	Left blank

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link - R	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200.1522 VERTICAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200.1522 VERTICAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	Left blank



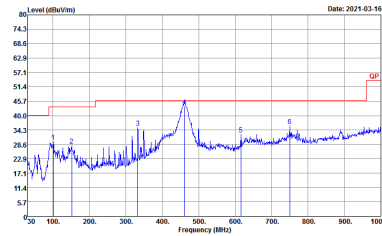
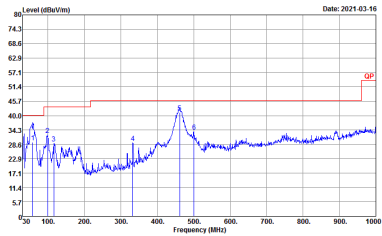
BLE + WIFI 802.11n HT40 + LTE (Harmonic @ 3m)

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522 HORIZONTAL	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522 VERTICAL



Emission below 1GHz

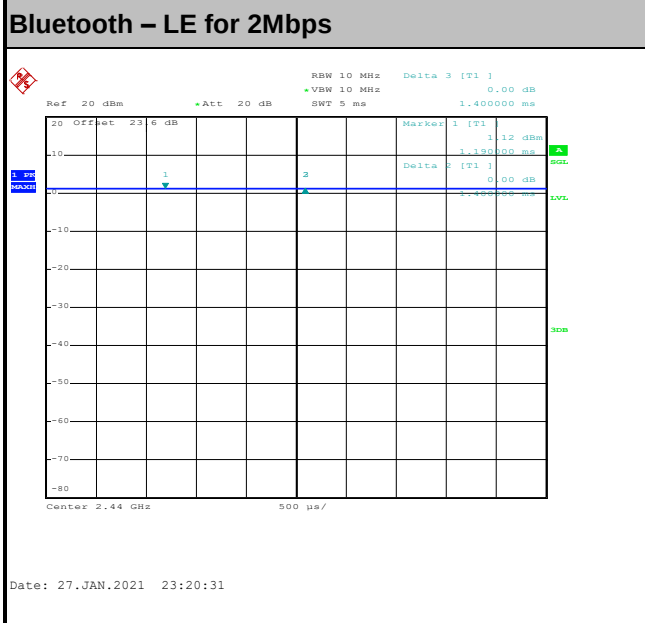
BLE + WIFI 802.11n HT40 + LTE (LF)

ANT	Ant 4_BLE(2M) Ch39 + Ant 2_802.11n HT40 CH38 + LTE Band 41 Link	
	Horizontal	Vertical
QP / Peak	 Site : 03CH16-HY Condition : QP 3m 81LOG_47020406 HORIZONTAL	 Site : 03CH16-HY Condition : QP 3m 81LOG_47020406 VERTICAL

Appendix C. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
4	Bluetooth –LE for 2Mbps	100	-	-	10Hz	0.00
2	2.4GHz 802.11n HT40	92.08	930	1.08	3kHz	0.36
2	5GHz 802.11n HT40	95.88	930	1.08	3kHz	0.18
1+3	802.11b for Ant. 1	75.27	685	1.46	3kHz	1.23
1+3	802.11b for Ant. 3	76.11	685	1.46	3kHz	1.19
1+3	5GHz 802.11ax HE80 Full RU for Ant 1	93.80	5450	0.18	300Hz	0.28
1+3	5GHz 802.11ax HE80 Full RU for Ant 3	93.81	5460	0.18	300Hz	0.28

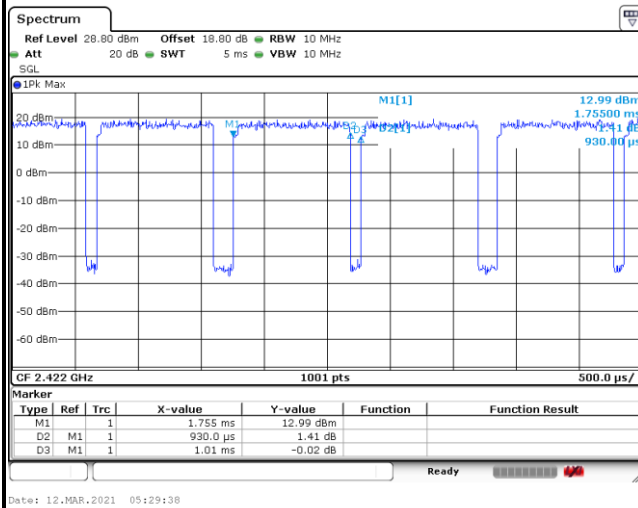
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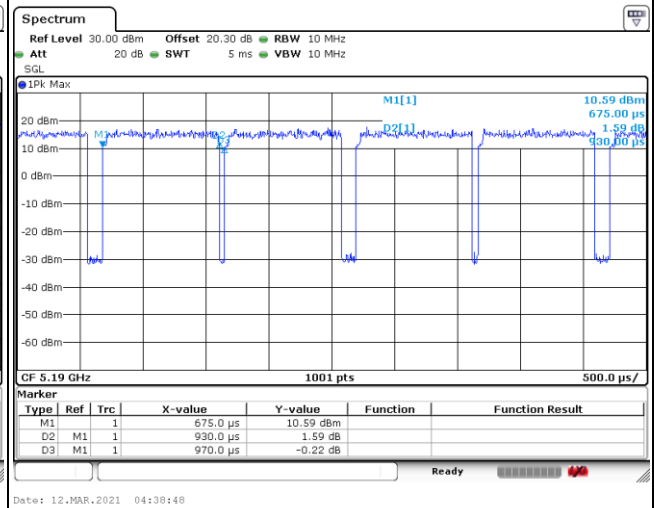


<Ant. 2>

802.11n HT40

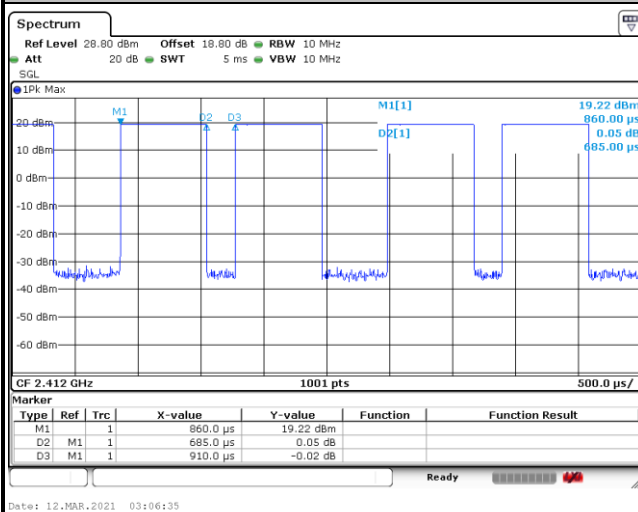


802.11n HT40

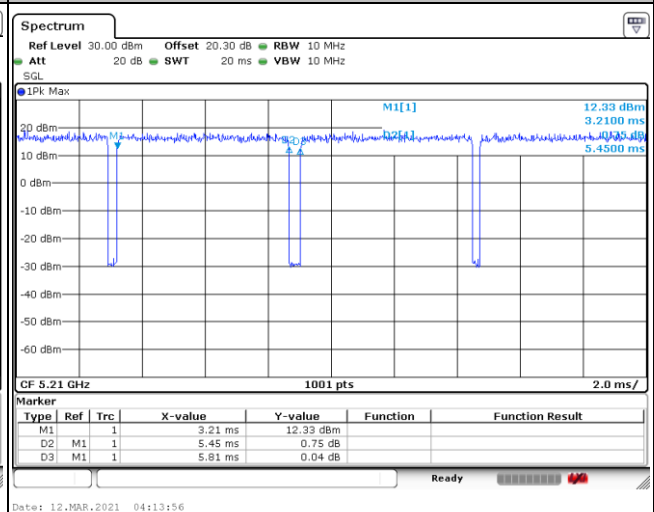


MIMO <Ant. 1>

802.11b

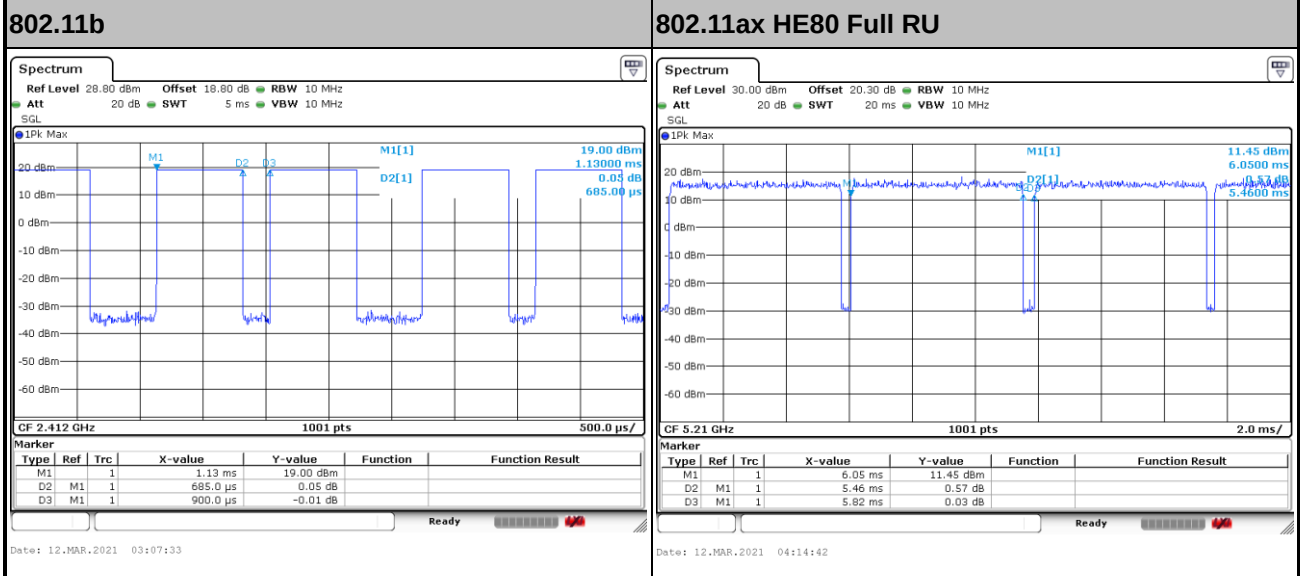


802.11ax HE80 Full RU





MIMO <Ant. 3>



—THE END—