



FCC CO-LOCATION RADIO TEST REPORT

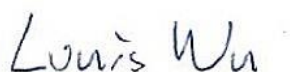
FCC ID : U8G-P1AX203
Equipment : Peplink Pepwave Wireless Product
Brand Name :



Model Name : MAX BR2 Pro
MAX-BR2-PRO-5GH-T-PRM
Applicant : PISMO LABS TECHNOLOGY LIMITED
A8, 5/F, HK Spinners Industrial Building, Phase 6, 481
Castle Peak Road, Cheung Sha Wan, Hong Kong
Manufacturer : PISMO LABS TECHNOLOGY LIMITED
A8, 5/F, HK Spinners Industrial Building, Phase 6, 481
Castle Peak Road, Cheung Sha Wan, Hong Kong
Standard : FCC Part 15 Subpart E §15.407

The product was received on Jun. 07, 2022 and testing was performed from Nov. 16, 2022 to Dec. 15, 2022. 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 report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.



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	Issue Date
FR260702D	01	Initial issue of report	Dec. 16, 2022
FR260702D	02	Revise Antenna information and separate Setup Photographs	Dec. 19, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.407(b)	Unwanted Emissions	Pass	2.99 dB under the limit at 4874.000 MHz
3.2	15.203 15.407(a)	Antenna Requirement	Pass	-

Declaration of Conformity:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation".

Comments and Explanations:

1. The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.
2. The purpose of different model name is for marketing segmentation.

Reviewed by: Lewis Ho**Report Producer: Ruby Zou**

1 General Description

1.1 Product Feature of Equipment Under Test

LTE/5G NR, Wi-Fi 2.4GHz 802.11b/g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, and GPS

Product Feature	
Integrated WWAN Module	Brand Name: Sierra Model Name: EM9191 FCC ID: N7NEM91
Antenna Type	WWAN: Omni-directional Antenna WLAN: < Ant. 1>: Omni-directional Antenna < Ant. 2>: Omni-directional Antenna GPS: Directional Antenna

WLAN Antenna information		
2412 MHz ~ 2462 MHz	Peak Gain (dBi)	Ant. 1: 2.44 Ant. 2: 2.44
5150 MHz ~ 5250 MHz	Peak Gain (dBi)	Ant. 1: 4.1 Ant. 2: 4.1
5725 MHz ~ 5850 MHz	Peak Gain (dBi)	Ant. 1: 4.73 Ant. 2: 4.73

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.
2. After assessing, the test is performed by choosing WLAN 5GHz Band 1, Band 4 Maximum power and WWAN Maximum power.

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 E
- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 15.247 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.
- ♦ 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.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

2.1 Carrier Frequency and Channel

2400-2483.5 MHz		5150~5250 MHz	
802.11b		802.11ax HE40	
Channel	Freq. (MHz)	Channel	Freq. (MHz)
06	2437	46	5230

2.2 Test Mode

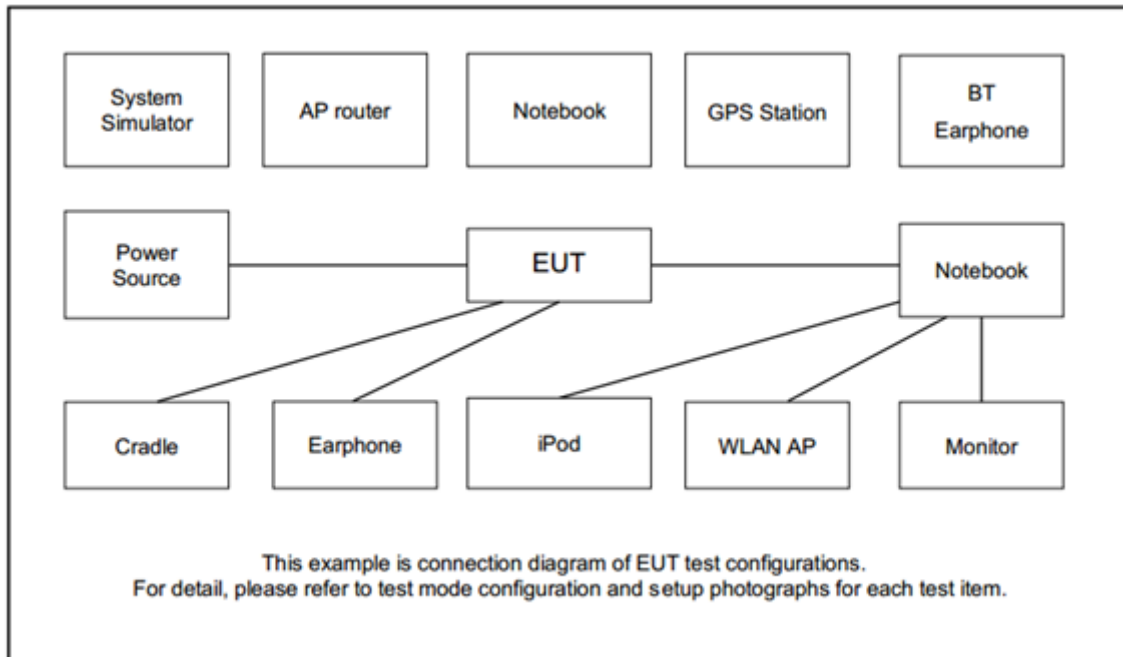
Final test modes are considering the modulation and worse data rates as below table.

<Co-Location>

Test Mode	Modulation	Data Rate
Mode 1	LTE Band 41 + 802.11b for MIMO <Ant. 1+2> + 802.11ax HE40 for MIMO <Ant. 1+2>	QPSK + MCS0 + MCS0

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

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

For WLAN test items, the EUT links with Notebook, and test program was provided and enabled EUT to transmit and receive signals continuously.

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.

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

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.

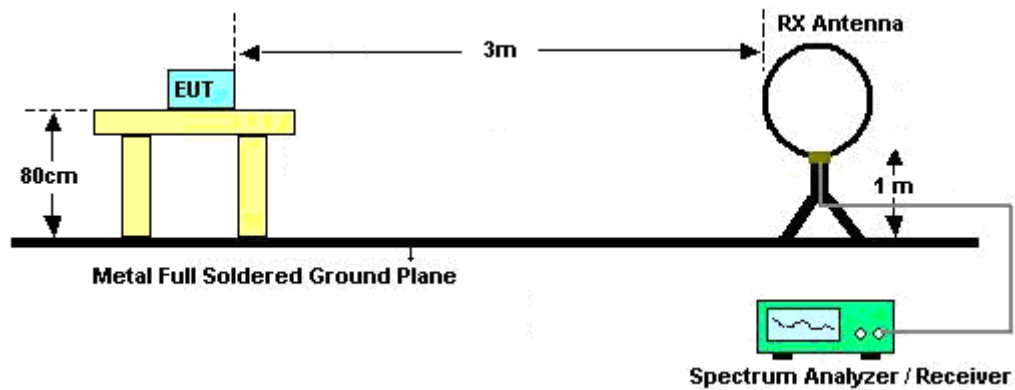
3.1.3 Test Procedures

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 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW $\geq$ 3 MHz
 - Detector = Peak
 - Sweep time = auto
 - Trace mode = max hold
 - (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
 - RBW = 1 MHz
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT is 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 is set 3 meters away from the receiving antenna which is 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 is 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. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as "-".

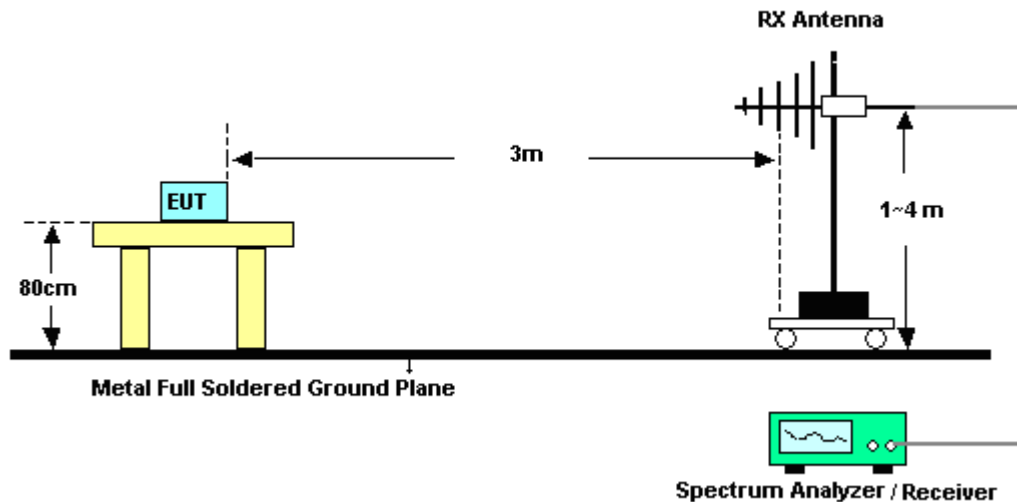
7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as “-”.

3.1.4 Test Setup

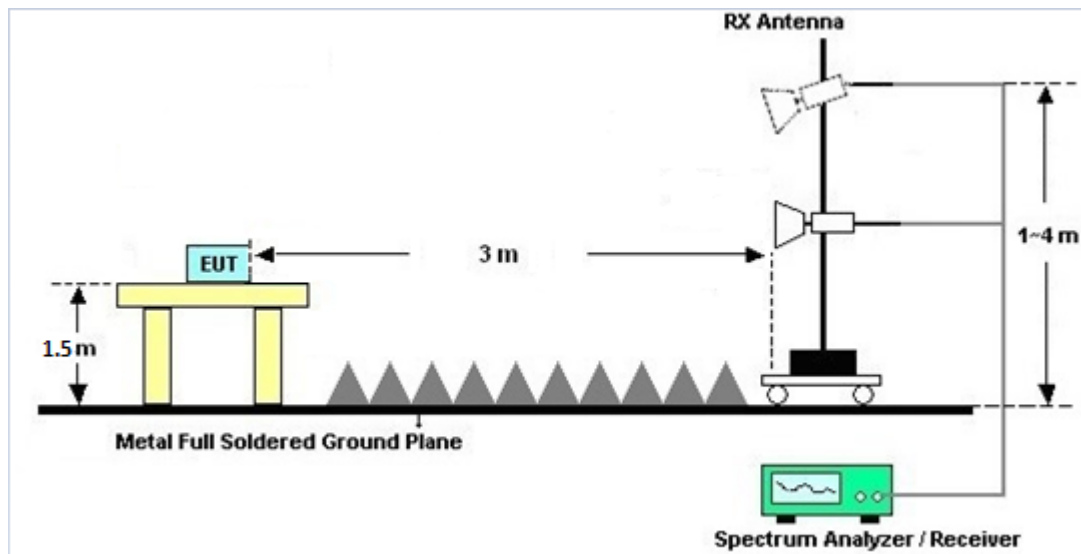
For radiated emissions below 30MHz



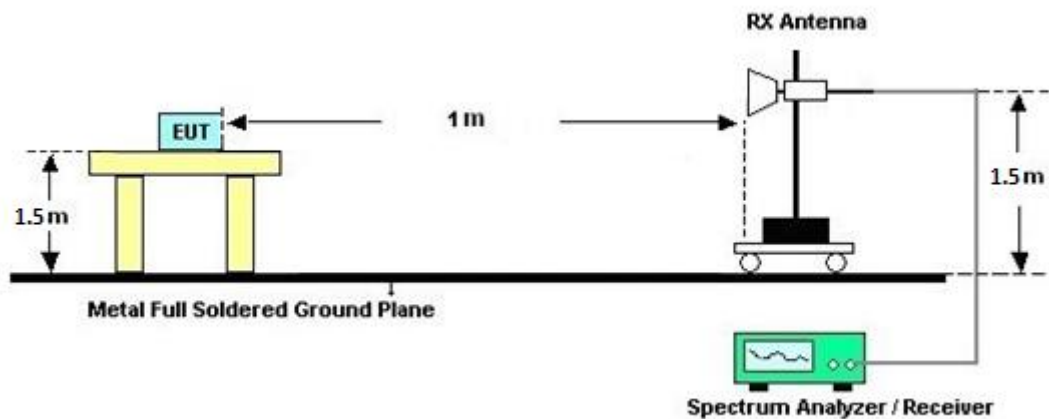
For radiated emissions from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



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

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

There is adequate comparison measurement 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 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

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



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	Sep. 20, 2022	Nov. 16, 2022~ Dec. 15, 2022	Sep. 19, 2023	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N-06	47020 & 06	30MHz~1GHz	Oct. 08, 2022	Nov. 16, 2022~ Dec. 15, 2022	Oct. 07, 2023	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1522	1GHz~18GHz	Mar. 10, 2022	Nov. 16, 2022~ Dec. 15, 2022	Mar. 09, 2023	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA9170	00994	18GHz~40GHz	Nov. 04, 2022	Nov. 16, 2022~ Dec. 15, 2022	Nov. 03, 2023	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Oct. 18, 2022	Nov. 16, 2022~ Dec. 15, 2022	Oct. 17, 2023	Radiation (03CH16-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz~44GHz	Mar. 07, 2022	Nov. 16, 2022~ Dec. 15, 2022	Mar. 06, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	805935/4	N/A	Aug. 09, 2022	Nov. 16, 2022~ Dec. 15, 2022	Aug. 08, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	802434/4	N/A	Aug. 09, 2022	Nov. 16, 2022~ Dec. 15, 2022	Aug. 08, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-57 57	N/A	Aug. 09, 2022	Nov. 16, 2022~ Dec. 15, 2022	Aug. 08, 2023	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1GHz	Jul. 04, 2022	Nov. 16, 2022~ Dec. 15, 2022	Jul. 03, 2023	Radiation (03CH16-HY)
Preamplifier	EMEC	EM1G18G	060812	1GHz~18GHz	Dec. 27, 2021	Nov. 16, 2022~ Dec. 15, 2022	Dec. 26, 2022	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Oct. 25, 2022	Nov. 16, 2022~ Dec. 15, 2022	Oct. 24, 2023	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 28, 2022	Nov. 16, 2022~ Dec. 15, 2022	Jun. 27, 2023	Radiation (03CH16-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Nov. 16, 2022~ Dec. 15, 2022	N/A	Radiation (03CH16-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Nov. 16, 2022~ Dec. 15, 2022	N/A	Radiation (03CH16-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Nov. 16, 2022~ Dec. 15, 2022	N/A	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Nov. 16, 2022~ Dec. 15, 2022	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% ($U = 2Uc(y)$)	6.50 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.6 dB
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Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.5 dB
--	--------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.6 dB
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Appendix A. Radiated Spurious Emission

Test Engineer :	Andy Yang	Temperature :	20~25°C
		Relative Humidity :	50~60%

LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>

+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2>

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b Ch 06 2437MHz		2352.84	54.73	-19.27	74	40.72	27.21	17.28	30.48	100	12	P	H
		2387.56	45.7	-8.3	54	31.47	27.35	17.35	30.47	100	12	A	H
	*	2437	107.34	-	-	94.1	28.08	17.66	30.4	100	12	P	H
	*	2437	104.4	-	-	90.96	28.08	17.66	30.4	100	12	A	H
		2496.78	56.43	-17.57	74	41.44	27.89	17.53	30.43	100	12	P	H
		2497.2	47.63	-6.37	54	32.64	27.89	17.53	30.43	100	12	A	H
		2389.8	54.63	-19.37	74	40.38	27.36	17.36	30.47	223	178	P	V
		2389.94	46.47	-7.53	54	32.22	27.36	17.36	30.47	223	178	A	V
	*	2437	120.43	-	-	105.82	27.62	17.44	30.45	223	178	P	V
	*	2437	117.25	-	-	102.64	27.62	17.44	30.45	223	178	A	V
		2489.29	57.6	-16.4	74	42.66	27.86	17.51	30.43	223	178	P	V
		2486.35	48.11	-5.89	54	33.18	27.85	17.51	30.43	223	178	A	V



Band 1 5150~5250MHz

WIFI 802.11ax HE40_Full (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE40 Full Ch 46 5230MHz		5057.46	55	-19	74	39.67	33.17	11.54	29.38	200	162	P	H
		5037.18	46.16	-7.84	54	30.79	33.2	11.53	29.36	200	162	A	H
	*	5230	99.63	-	-	84.49	33.04	11.65	29.55	200	162	P	H
	*	5230	92.53	-	-	77.39	33.04	11.65	29.55	200	162	A	H
		5437.88	54.24	-19.76	74	39.27	32.82	11.89	29.74	200	162	P	H
		5452.44	44.9	-9.1	54	29.96	32.8	11.9	29.76	200	162	A	H
												P	H
												P	H
												P	H
												P	H
		4858	64.12	-9.88	74	49.66	32.63	11.31	29.48	200	197	P	V
		4858	50.4	-3.6	54	35.94	32.63	11.31	29.48	200	197	A	V
		5035.36	57.58	-16.42	74	42.21	33.2	11.53	29.36	200	197	P	V
		5149.24	49.41	-4.59	54	34.29	33	11.59	29.47	200	197	A	V
	*	5230	119.75	-	-	104.61	33.04	11.65	29.55	200	197	P	V
	*	5230	111.67	-	-	96.53	33.04	11.65	29.55	200	197	A	V
		5382.16	57.44	-16.56	74	42.45	32.86	11.82	29.69	200	197	P	V
		5376	47.7	-6.3	54	32.71	32.85	11.82	29.68	200	197	A	V
												P	V
												P	V
												P	V
												P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>
+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2> (Harmonic @ 3 m)**

WIFI Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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)	
LTE Band 41 + 11b_Ch06 + 11ax_HE40_Ch46		4874	55.65	-18.35	74	40.03	32.7	12.39	29.47	100	269	P	H	
		4874	47.38	-6.62	54	31.76	32.7	12.39	29.47	100	269	A	H	
		7311	44.07	-29.93	74	58.85	37.13	13.81	65.72	-	-	P	H	
		10460	47.35	-20.85	68.2	58.92	38.88	16.29	66.74	-	-	P	H	
		15690	46.69	-27.31	74	55.86	37.26	19.89	66.32	-	-	P	H	
														H
														H
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		4874	61.04	-12.96	74	45.42	32.7	12.39	29.47	200	167	P	V	
		4874	51.01	-2.99	54	35.39	32.7	12.39	29.47	200	167	A	V	
		7311	44.05	-29.95	74	58.83	37.13	13.81	65.72	-	-	P	V	
		10460	46.78	-21.42	68.2	58.35	38.88	16.29	66.74	-	-	P	V	
		15690	47.34	-26.66	74	56.51	37.26	19.89	66.32	-	-	P	V	
														V
														V
														V
														V
														V
														V
Remark	1. No other spurious found.													
	2. All results are PASS against Peak and Average limit line.													
	3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.													

Emission above 18GHz

LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>

+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2> (SHF @ 1m)

[illegible]

Emission below 1GHz
LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>
+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2> (LF)

WIFI Ant.	Note	Frequency	Level	Margin	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)
LTE Band 41 + 11b_Ch06 + 11ax_HE40_Ch46		45.12	28.96	-11.04	40	43.77	16.63	0.84	32.28	-	-	P	H
		160.68	33.36	-10.14	43.5	47.24	16.47	1.94	32.29	-	-	P	H
		250.05	39.11	-6.89	46	50.55	18.47	2.43	32.34	-	-	P	H
		500.2	28.34	-17.66	46	33.6	23.87	3.42	32.55	-	-	P	H
		671	28.56	-17.44	46	31.04	26.1	4.01	32.59	-	-	P	H
		958.7	33.56	-12.44	46	29.65	30.33	4.84	31.26	-	-	P	H
													H
													H
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													H
		51.87	35.59	-4.41	40	53.48	13.43	0.98	32.3	100	179	Q	V
		125.04	34.49	-9.01	43.5	47.57	17.51	1.7	32.29	-	-	P	V
		250.05	34.72	-11.28	46	46.16	18.47	2.43	32.34	-	-	P	V
		500.2	26.05	-19.95	46	31.31	23.87	3.42	32.55	-	-	P	V
		723.5	30.21	-15.79	46	31.6	26.93	4.17	32.49	-	-	P	V
		958.7	32.74	-13.26	46	28.83	30.33	4.84	31.26	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as “-” means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.												



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	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					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. Margin(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. Margin(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. Margin(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 :	Andy Yang	Temperature :	20~25°C
		Relative Humidity :	50~60%

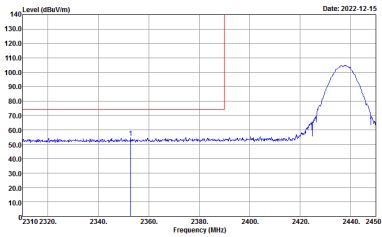
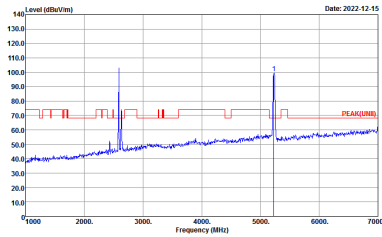
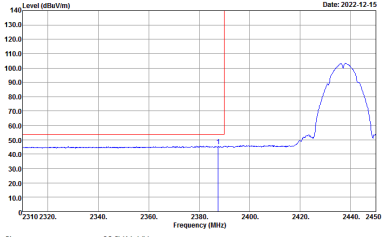
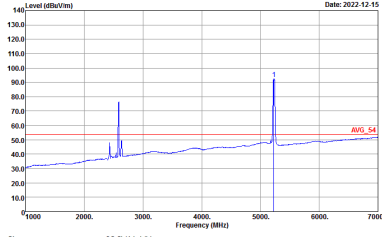
Note symbol

-L	Low channel location
-R	High channel location

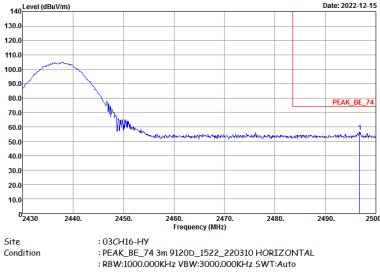
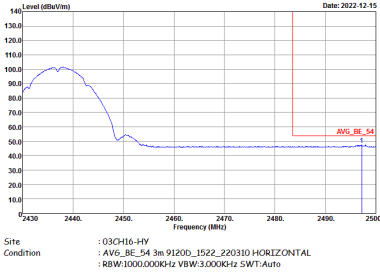
**LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>
+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2>**

2.4GHz 2400~2483.5MHz

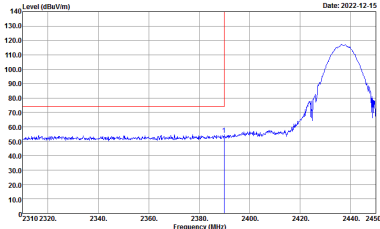
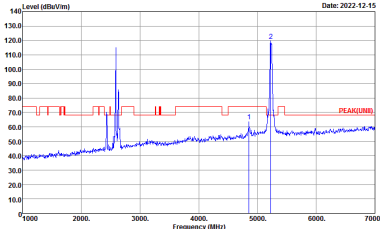
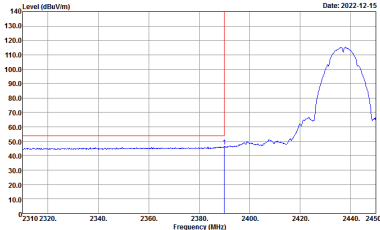
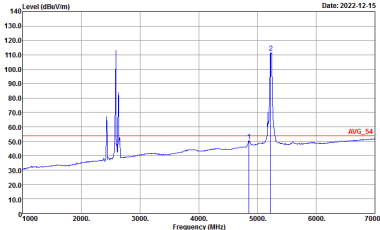
WIFI 802.11b (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AV6_BE_54 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AV6_54 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:0.300KHz SWT:Auto



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

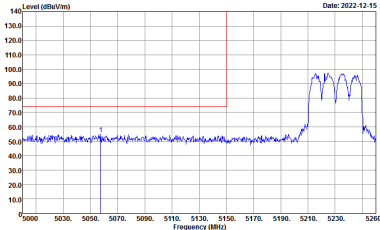
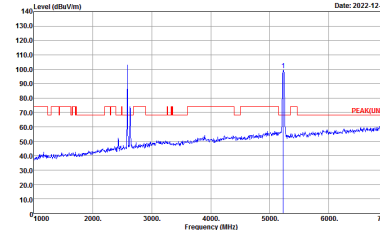
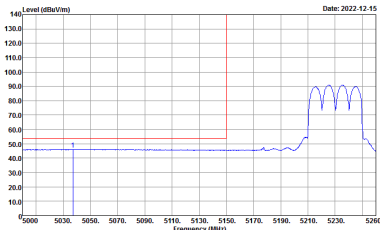
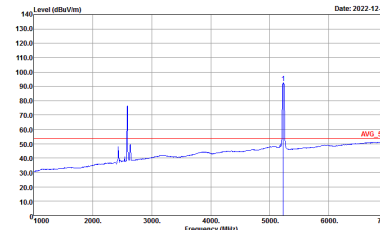


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

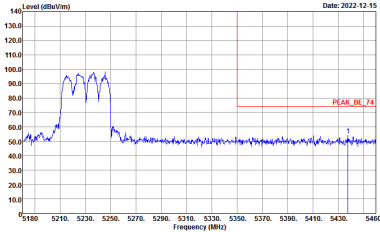
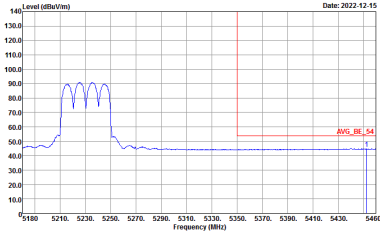


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

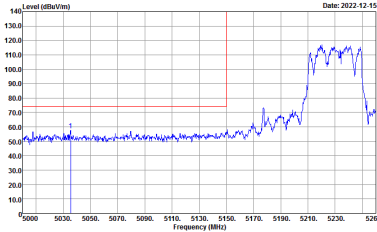
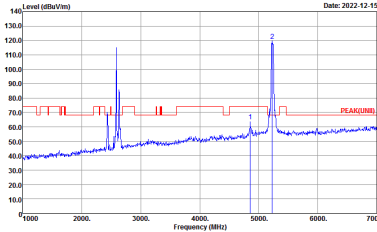
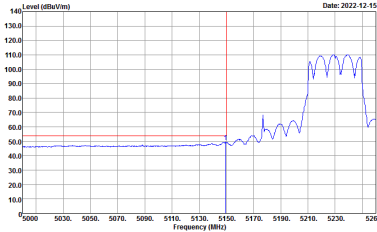
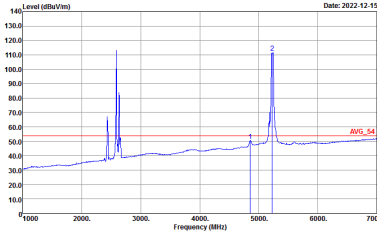
Band 1 5150~5250MHz
WIFI 802.11ax HE40_Full (Band Edge @ 3m)

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full CH46 5230MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNII) 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

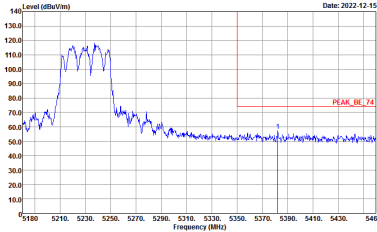
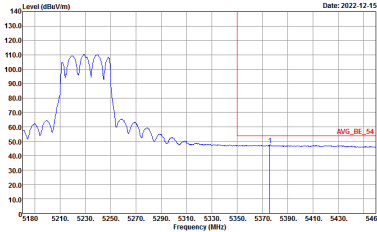


WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full CH46 5230MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_220310 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



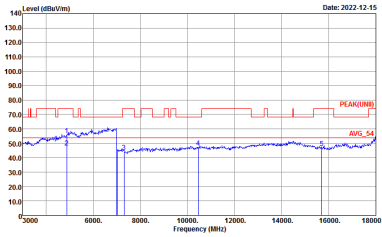
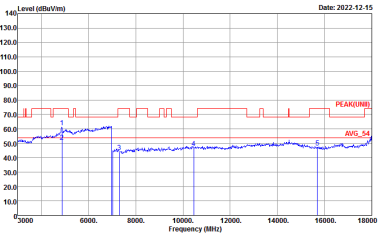
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full CH46 5230MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full CH46 5230MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_220310 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_220310 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



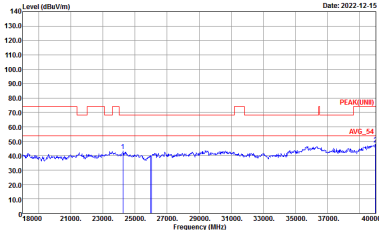
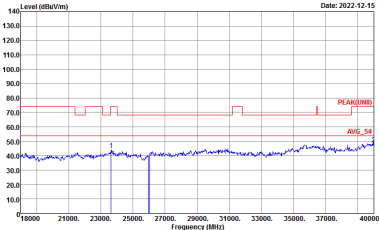
LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>
+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2> (Harmonic @ 3m)

ANT	LTE Band 41 + 11b_Ch06 + 11ax_HE40_Ch46	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522_220310 HORIZONTAL :	 Site : 03CH16-HY Condition : PEAK(UNIT) 3m 91200_1522_220310 VERTICAL :



Emission above 18GHz

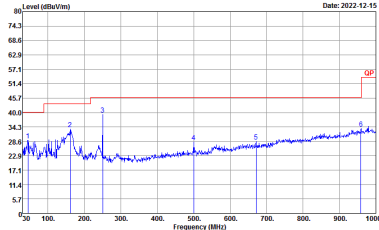
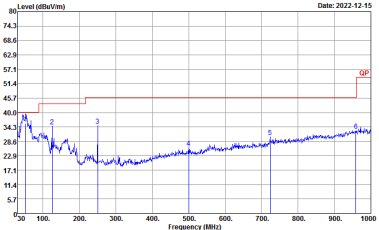
LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>
+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2> (SHF)

ANT	LTE Band 41 + 11b_Ch06 + 11ax_HE40_Ch46 SHF	
Simultaneously	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK(UNI) 1m SHF ANT_9170_00993 HORIZONTAL :	 Site : 03CH16-HY Condition : PEAK(UNI) 1m SHF ANT_9170_00993 VERTICAL :



Emission below 1GHz

LTE Band 41 + 802.11b_TX_Ch06 for MIMO <Ant. 1+2>
+ 802.11ax HE40_TX_Ch46 for MIMO <Ant. 1+2> (LF)

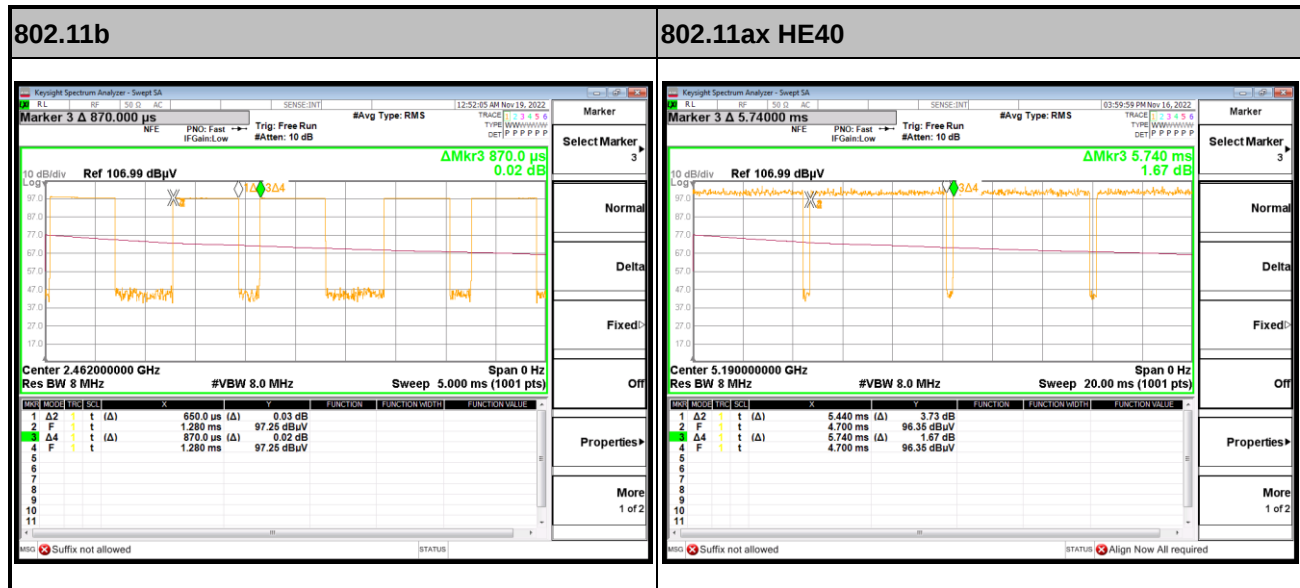
ANT	LTE Band 41 + 11b_Ch06 + 11ax_HE40_Ch46 LF	
Simultaneously	Horizontal	Vertical
QP / Peak	 Site : 03CH16-HY Condition : QP 3m BLO6_47020_221008_H HORIZONTAL :	 Site : 03CH16-HY Condition : QP 3m BLO6_47020_221008_H VERTICAL :



Appendix C. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1+2	802.11b	74.71	650	1.54	3kHz
1+2	5GHz 802.11ax HE40 Full RU	94.77	5440	0.18	300Hz

MIMO <Ant. 1+2>



—THE END—