FCC RADIO TEST REPORT

FCC ID	:	**QYLAX211NG**
Equipment	:	**Wireless Module**
Brand Name	:	**Getac**
Model Name	:	**AX211NGW**
Applicant	:	**Getac Technology Corporation.** **5F., Building A, No. 209, Sec.1, Nangang Rd.,Nangang Dist., Taipei City 115018, Taiwan, R.O.C.**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Aug. 10, 2023 and testing was performed from Aug. 29, 2023 to Sep. 18, 2023. 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 partial 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.

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	Issue Date
FR381701-02E	01	Initial issue of report	Nov. 03, 2023

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.403(i)	6dB & 26dB Bandwidth	-	See Note
-	2.1049	99% Occupied Bandwidth	-	See Note
3.1	15.407(a)	Maximum Conducted Output Power	Pass	-
-	15.407(a)	Power Spectral Density	-	See Note
3.2	15.407(b)	Unwanted Emissions	Pass	-
3.3	15.207	AC Conducted Emission	Pass	-
3.4	15.203	Antenna Requirement	Pass	-

Note:

1. For host device, Radiated Spurious Emission is verified and complies with the limit in this test report.
2. For host device, the Conducted Output Power is no difference after compared to module (Model: AX211NGW)

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”.
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Yun Huang
Report Producer: Rachel Hsieh

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
General Specs	Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax and Wi-Fi 6GHz 802.11ax
Sample 1	EUT with Host 1
Sample 2	EUT with Host 2
Sample 3	EUT with Host 3
Antenna Type	WLAN: <Main>: PIFA Antenna <Aux.>: PIFA Antenna Bluetooth: PIFA Antenna

The product was installed into Tablet PC (Brand Name: Getac, Model Name: F110, F110G7, F110-701, F110-711, F110-721, F110-Exc, F110Y (Y= 10 characters, Y can be 0-9, a-z, A-Z, "-", "_" or blank for marketing purpose and no impact safety related critical components and constructions.)) during test, and the host information was recorded in the following table.

Host Information	
Host 1	Host with SKU A
Host 2	Host with SKU B
Host 3	Host with SKU C

Antenna Information for Host			
Antenna	**Manufacturer**	PULSE	
	Antenna Type	PIFA Antenna	PIFA Antenna
	Part number	422GA4500004	422GA4500009
	Peak gain (dBi)	Main Antenna :	Aux. Antenna :
		WLAN(5G B4): 1.9	WLAN(5G B4): 2.9

Sample Information for Host			
	SKU A	**SKU B**	**SKU C**
CPU	i5-1335U	i5-1335U	I7-1365U
DDR	Kingston 8GB	Kingston 16GB	Kingston 32GB
SSD	256GB	512GB	1TB
PANEL	Full FHD AUO	Full FHD AUO	Full FHD AUO
DIGITIZER	Not Support	EMRright Digitizer	EMRright Digitizer
OPTION BAY	MicroSD Card	Barcode Reader	LAN
Expansion Bay	N/A	HID RFID	SMART CARD
Right side option	RFID (SN-NSVG7-C01)	Not Support	Fringer Print
WLAN/BT	Intel AX211	Intel AX211	Intel AX211
WWAN(4G)	NA	LN920A12-WW	LN920A12-WW
GNSS	GPS/GNSS (MC-1010-V2B)	LN920A12-WW	LN920A12-WW
Rear 8M Camera	Support	Support	Support
Webcam FHD	Support	Not Support	Support
IR Webcam	Not Support	Support	Support
USB3.2 Gen2 x 1 Type-A	Support	Support	Support
Type-C (thunder bolt)	Support	Support	Support
Audio/MIC	Support	Support	Support
Fischer	Not Support	Not Support	Not Support

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

1.1.1 Antenna Directional Gain

<For CDD Mode>

Follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)f)ii)

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows:

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

G_{ANT} is set equal to the gain of the antenna having the highest gain.

For PSD measurements, the directional gain calculation.

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k / 20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

As minimum N_{SS}=1 is supported by EUT, the formula can be simplified as:

Directional gain = $10*\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi

Where G1, G2….GN denote single antenna gain.

The directional gain “DG” is calculated as following table.

			DG for Power	DG for PSD	Power Limit Reduction	PSD Limit Reduction
	Chain A (dBi)	Chain B (dBi)	(dBi)	(dBi)	(dB)	(dB)
Band IV	2.90	1.90	2.90	5.42	0.00	0.00

Calculation example:

If a device has two antenna, G_{ANT1}= 2.9dBi; G_{ANT2}= 1.9dBi

Directional gain of power measurement = max(2.9, 1.9) + 0 = 2.9 dBi

Directional gain of PSD derived from formula which is

10 x log { { [10^ (2.9 dBi / 20) + 10^ (1.9 dBi / 20)] ^ 2 } / 2 }

= 5.42 dBi

Power and PSD limit reduction = Composite gain – 6dBi, (min = 0)

1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	CO05-HY (TAF Code: 1190)
Remark	The AC Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.

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

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.**
	TH05-HY, 03CH11-HY

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

FCC designation No.: TW1190 and TW3786

1.4 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
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

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: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155#	5775	165	5825

Note:

1. The above Frequency and Channel with "*" are 802.11n HT40 and 802.11ac VHT40 and 802.11ax HE40.
2. The above Frequency and Channel with "#" are 802.11ac VHT80 and 802.11ax HE80.

2.2 Test Mode

The final test modes include the worst data rates for each modulation shown in the table below.

Single Mode

Modulation	Data Rate
802.11a	**6 Mbps**
802.11ax HE20	**MCS0**
802.11ax HE40	**MCS0**
802.11ax HE80	**MCS0**

MIMO Mode

Modulation	Data Rate
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE80	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (5GHz) Link + H-Pattern + Earphone + Battery 2 + Adapter 3 for Sample 3
Remark: For Radiated Test Cases, the tests were performed with Adapter 3, Battery 2 and Sample 3.	

<Chain A>

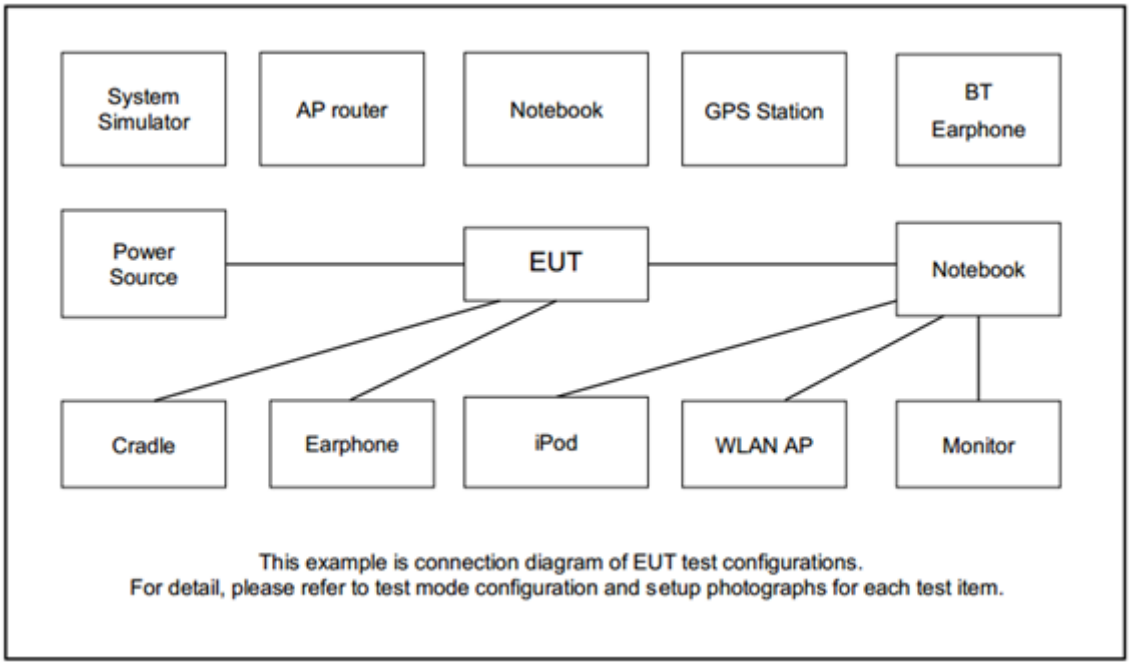
Ch. #		Band IV：5725-5850 MHz
		802.11ax HE20
L	Low	-
M	Middle	-
H	High	165

MIMO <Chain A+B>

Ch. #		Band IV：5725-5850 MHz
		802.11ax HE20
L	Low	-
M	Middle	157
H	High	-

Remark: For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.

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.	Bluetooth Earphone	Sony Ericsson	MW600	PY700A2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude 3420	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “DRTU.03544.22.200.0” was installed in Host 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 Maximum Conducted Output Power Measurement

3.1.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

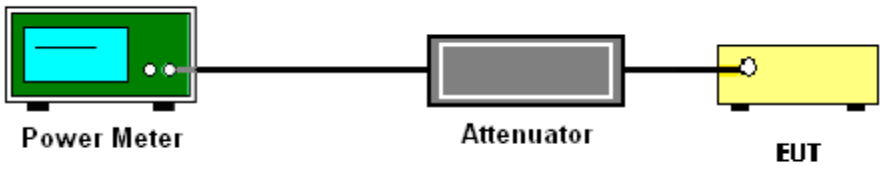
3.1.3 Test Procedures

The testing follows Method PM-G of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM-G (Measurement using a gated RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit at its maximum power control level.
3. Measure the average power of the transmitter.
4. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01

3.1.4 Test Setup



3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.2 Unwanted Emissions Measurement

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

3.2.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

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

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

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

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

(3) 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.

3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.2.3 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 ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

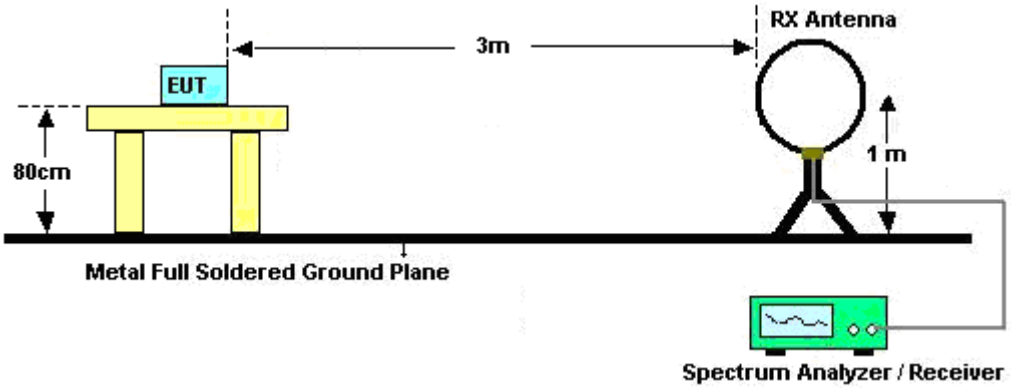
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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.

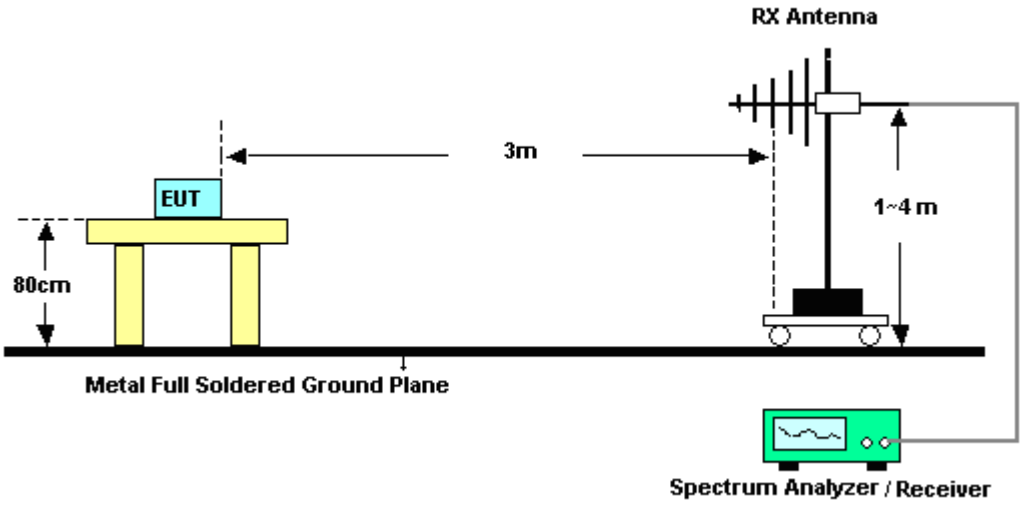
6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit 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 "-".

3.2.4 Test Setup

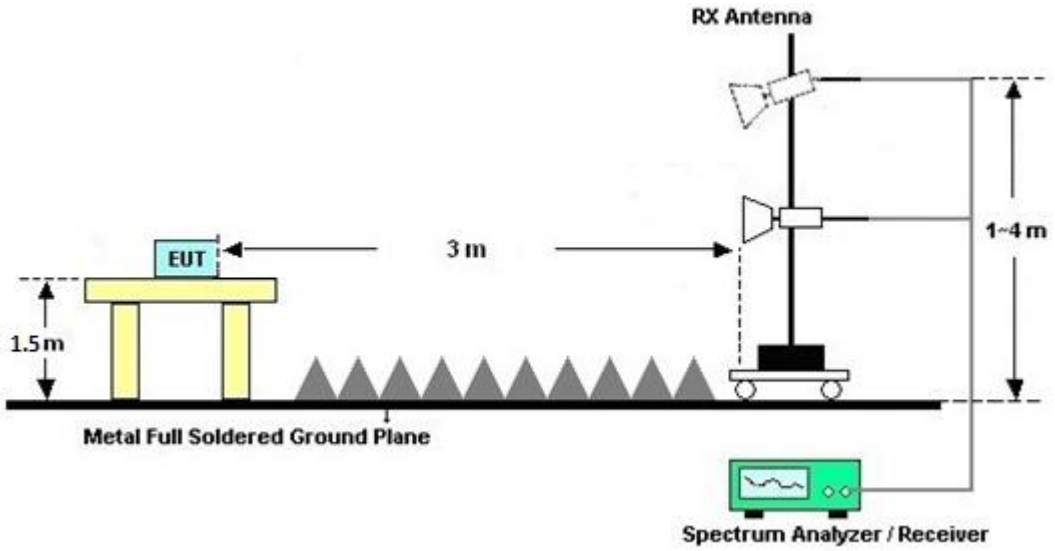
For radiated emissions below 30MHz



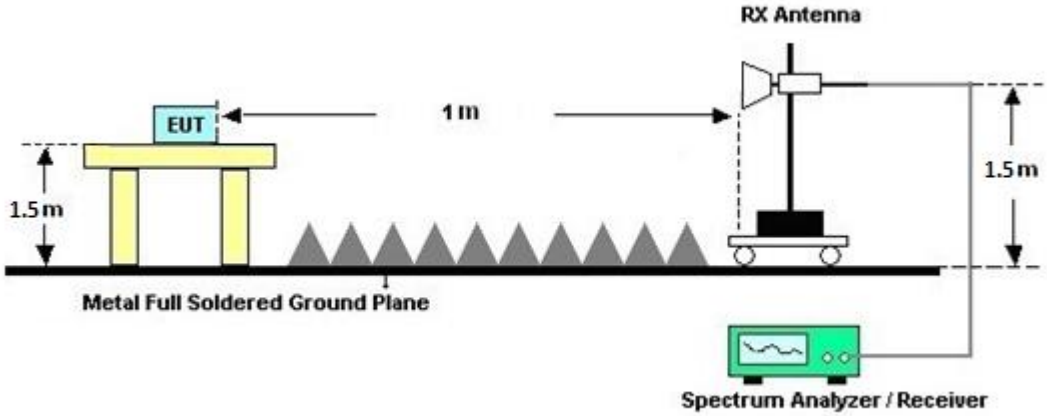
For radiated emissions from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



3.2.5 Test Results of Radiated 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.

3.2.6 Test Result of Radiated Band Edges

Please refer to Appendix C and D.

3.2.7 Duty Cycle

Please refer to Appendix E.

3.2.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.

3.3 AC Conducted Emission Measurement

3.3.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

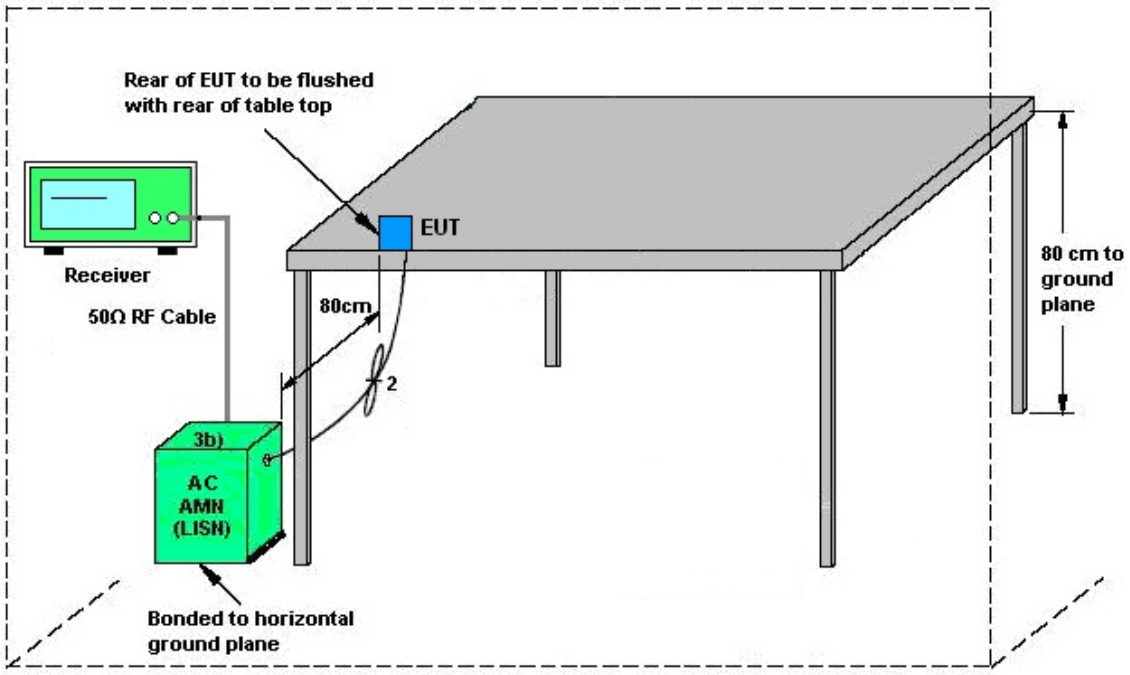
3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.3.3 Test Procedures

1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN shall be used.
6. Both Line and Neutral shall be tested in order to find out the maximum conducted emission.
7. The frequency range from 150 kHz to 30 MHz is scanned.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.3.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.4 Antenna Requirements

3.4.1 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.

3.4.2 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
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 08, 2022	Sep. 11, 2023~ Sep. 16, 2023	Oct. 07, 2023	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	01620	1GHz~18GHz	Aug. 17, 2023	Sep. 11, 2023~ Sep. 16, 2023	Aug. 16, 2024	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00994	18GHz~40GHz	Nov. 04, 2022	Sep. 11, 2023~ Sep. 16, 2023	Nov. 03, 2023	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 09, 2022	Sep. 11, 2023~ Sep. 16, 2023	Dec. 08, 2023	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 09, 2022	Sep. 11, 2023~ Sep. 16, 2023	Nov. 08, 2023	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-303	171000180005007	1GHz~18GHz	Jun. 14, 2023	Sep. 11, 2023~ Sep. 16, 2023	Jun. 13, 2024	Radiation (03CH11-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 27, 2023	Sep. 11, 2023~ Sep. 16, 2023	Jun. 26, 2024	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 07, 2022	Sep. 11, 2023~ Sep. 16, 2023	Oct. 06, 2023	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Oct. 18, 2022	Sep. 11, 2023~ Sep. 16, 2023	Oct. 17, 2023	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Sep. 11, 2023~ Sep. 16, 2023	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Sep. 11, 2023~ Sep. 16, 2023	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Sep. 11, 2023~ Sep. 16, 2023	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Sep. 11, 2023~ Sep. 16, 2023	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz~40GHz	Mar. 07, 2023	Sep. 11, 2023~ Sep. 16, 2023	Mar. 06, 2024	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801595/2	30MHz~40GHz	Mar. 07, 2023	Sep. 11, 2023~ Sep. 16, 2023	Mar. 06, 2024	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9K~30M	Mar. 07, 2023	Sep. 11, 2023~ Sep. 16, 2023	Mar. 06, 2024	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	30M~40G	Mar. 07, 2023	Sep. 11, 2023~ Sep. 16, 2023	Mar. 06, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1.53G Low Pass	Sep. 11, 2023	Sep. 11, 2023~ Sep. 16, 2023	Sep. 10, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60SS	SN3	3GHz High Pass Filter	Sep. 11, 2023	Sep. 11, 2023~ Sep. 16, 2023	Sep. 10, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40SS	SN3	6.75GHz High Pass Filter	Sep. 11, 2023	Sep. 11, 2023~ Sep. 16, 2023	Sep. 10, 2024	Radiation (03CH11-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 17. 2022	Aug. 30, 2023~ Sep. 18, 2023	Nov. 16. 2023	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO 12 (NO:113)	10MHz~6GHz	Dec. 13, 2022	Aug. 30, 2023~ Sep. 18, 2023	Dec. 12, 2023	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101564	10Hz ~ 40GHz	Sep. 13, 2022	Aug. 30, 2023~ Sep. 01, 2023	Sep. 12, 2023	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101565	10Hz ~ 40GHz	Dec. 26, 2022	Sep. 02, 2023~ Sep. 18, 2023	Dec. 25, 2023	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 29, 2023	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2022	Aug. 29, 2023	Nov. 30, 2023	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2022	Aug. 29, 2023	Nov. 16, 2023	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 17, 2022	Aug. 29, 2023	Nov. 16, 2023	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Aug. 29, 2023	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	00691	9kHz-200MHz	Jul. 28, 2023	Aug. 29, 2023	Jul. 27, 2024	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 29, 2022	Aug. 29, 2023	Dec. 28, 2023	Conduction (CO05-HY)

5 Measurement Uncertainty

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.5 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.3 dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.4 dB**

Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.8 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.3 dB**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Ching Chen	Temperature:	21~25	°C
Test Date:	2023/8/30~2023/9/18	Relative Humidity:	51~54	%
Remark: For Conducted Test Items, Ant. 1 means Chain A (Aux.) and Ant. 2 means Chain B (Main).				

TEST RESULTS DATA
Average Power Table

U-NII-3 single antenna												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	20.60	20.70		30.00	30.00	2.90	1.90	Pass
11a	6Mbps	1	157	5785	20.60	20.70		30.00	30.00	2.90	1.90	Pass
11a	6Mbps	1	165	5825	21.00	20.80		30.00	30.00	2.90	1.90	Pass

TEST RESULTS DATA
Average Power Table

U-NII-3 single antenna													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
HE20	MCS0	1	149	5745	Full	20.90	20.70		30.00	30.00	2.90	1.90	Pass
HE20	MCS0	1	157	5785	Full	21.00	20.70		30.00	30.00	2.90	1.90	Pass
HE20	MCS0	1	165	5825	Full	20.80	20.80		30.00	30.00	2.90	1.90	Pass
HE40	MCS0	1	151	5755	Full	20.60	20.30		30.00	30.00	2.90	1.90	Pass
HE40	MCS0	1	159	5795	Full	20.60	20.90		30.00	30.00	2.90	1.90	Pass
HE80	MCS0	1	155	5775	Full	19.50	19.80		30.00	30.00	2.90	1.90	Pass

U-NII-3 MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
HE20	MCS0	2	149	5745	Full	21.00	20.70	23.86	30.00		2.90		Pass
HE20	MCS0	2	157	5785	Full	20.80	20.70	23.76	30.00		2.90		Pass
HE20	MCS0	2	165	5825	Full	21.00	20.70	23.86	30.00		2.90		Pass
HE40	MCS0	2	151	5755	Full	20.20	19.80	23.01	30.00		2.90		Pass
HE40	MCS0	2	159	5795	Full	20.70	20.40	23.56	30.00		2.90		Pass
HE80	MCS0	2	155	5775	Full	17.90	17.80	20.86	30.00		2.90		Pass

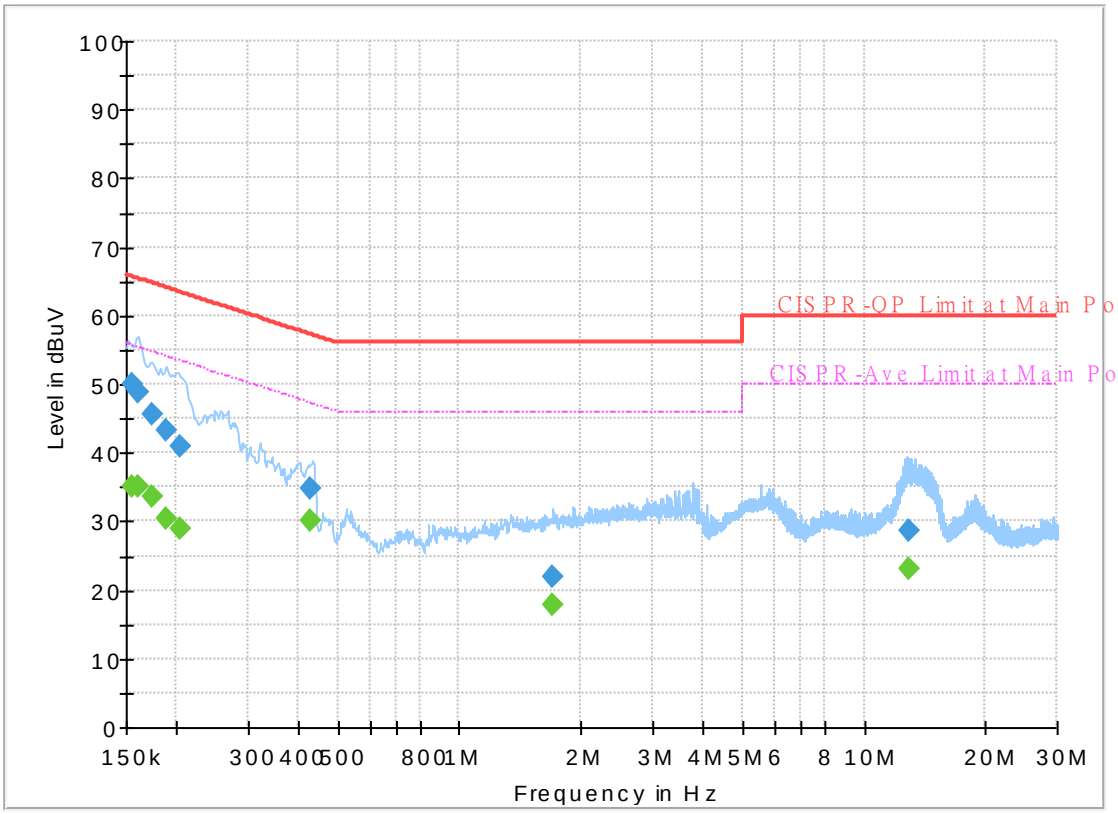
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	**Temperature :**	23~26℃
		Relative Humidity :	45~55%

EUT Information

Report NO :	381701-02
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



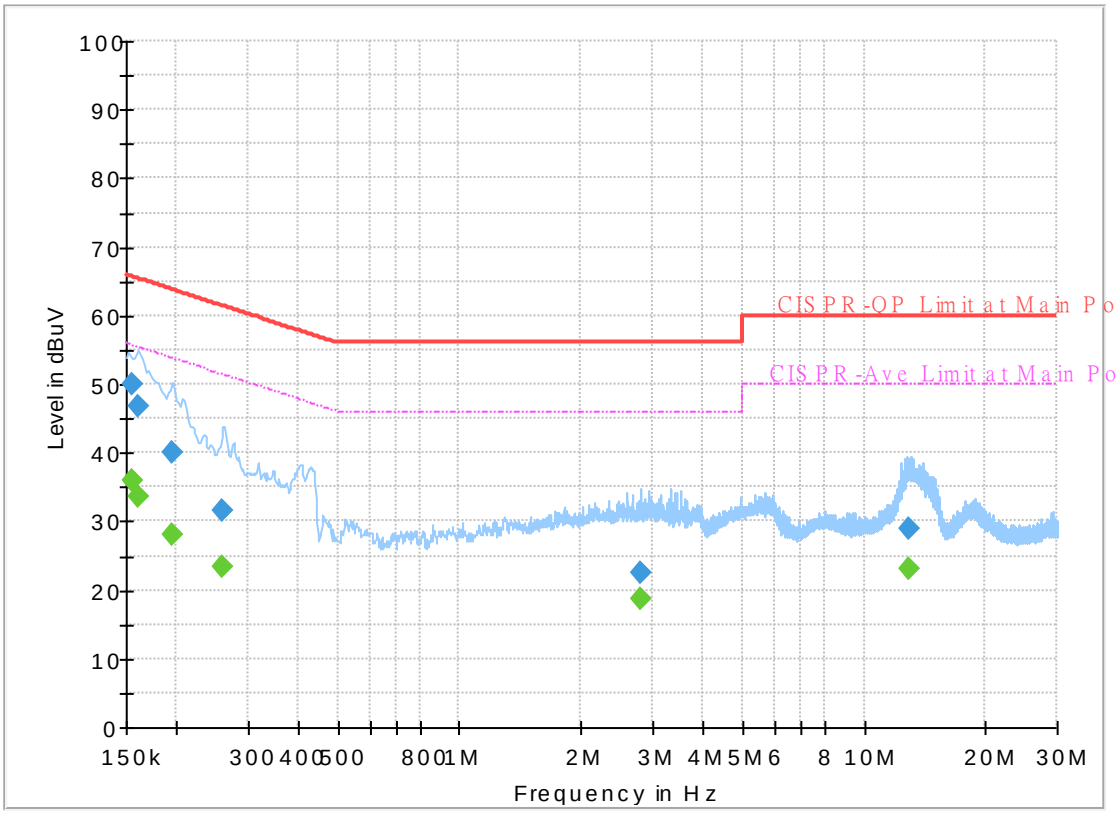
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154500	---	35.06	55.75	20.69	L1	OFF	19.8
0.154500	49.88	---	65.75	15.87	L1	OFF	19.8
0.161250	---	35.21	55.40	20.19	L1	OFF	19.8
0.161250	48.83	---	65.40	16.57	L1	OFF	19.8
0.174750	---	33.58	54.73	21.15	L1	OFF	19.8
0.174750	45.58	---	64.73	19.15	L1	OFF	19.8
0.188250	---	30.29	54.11	23.82	L1	OFF	19.8
0.188250	43.33	---	64.11	20.78	L1	OFF	19.8
0.204000	---	29.09	53.45	24.36	L1	OFF	19.8
0.204000	40.89	---	63.45	22.56	L1	OFF	19.8
0.429000	---	29.98	47.27	17.29	L1	OFF	19.8
0.429000	34.73	---	57.27	22.54	L1	OFF	19.8
1.704750	---	17.77	46.00	28.23	L1	OFF	19.9
1.704750	21.87	---	56.00	34.13	L1	OFF	19.9
12.891750	---	23.10	50.00	26.90	L1	OFF	19.9
12.891750	28.75	---	60.00	31.25	L1	OFF	19.9

EUT Information

Report NO :	381701-02
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154500	---	36.01	55.75	19.74	N	OFF	19.8
0.154500	49.93	---	65.75	15.82	N	OFF	19.8
0.161250	---	33.58	55.40	21.82	N	OFF	19.8
0.161250	46.80	---	65.40	18.60	N	OFF	19.8
0.195000	---	28.02	53.82	25.80	N	OFF	19.8
0.195000	40.13	---	63.82	23.69	N	OFF	19.8
0.260250	---	23.29	51.42	28.13	N	OFF	19.8
0.260250	31.51	---	61.42	29.91	N	OFF	19.8
2.802750	---	18.57	46.00	27.43	N	OFF	19.8
2.802750	22.58	---	56.00	33.42	N	OFF	19.8
12.961500	---	23.17	50.00	26.83	N	OFF	20.0
12.961500	28.85	---	60.00	31.15	N	OFF	20.0

Appendix C. Radiated Spurious Emission

Test Engineer :	Yuan Lee, Sam Chou and Troye Hsieh	Temperature :	19.8~22.1°C
		Relative Humidity :	55.1~65.6%

Remark: For Radiated Spurious Emission, Ant. 1 means Chain A (Aux.) and Ant. 2 means Chain B (Main).

Band 4 5725~5850MHz

WIFI 802.11ax HE20_Full (Band Edge @ 3m)

WIFI Ant. 1	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)
	*	5825	112.58	-	-	100.93	33.95	11.35	33.65	100	251	P	H
	*	5825	105.29	-	-	93.64	33.95	11.35	33.65	100	251	A	H
		5850	72.34	-49.86	122.2	60.66	34	11.33	33.65	100	251	P	H
		5855	66.93	-43.87	110.8	55.23	34.02	11.33	33.65	100	251	P	H
		5877.2	60.72	-42.85	103.57	48.95	34.11	11.31	33.65	100	251	P	H
		5925	53.25	-14.95	68.2	41.37	34.25	11.28	33.65	100	251	P	H
802.11ax													H
HE20 Full													H
CH 165	*	5825	109.15	-	-	97.5	33.95	11.35	33.65	297	242	P	V
5825MHz	*	5825	101.37	-	-	89.72	33.95	11.35	33.65	297	242	A	V
		5851.4	67.65	-51.36	119.01	55.96	34.01	11.33	33.65	297	242	P	V
		5857	62.58	-47.66	110.24	50.87	34.03	11.33	33.65	297	242	P	V
		5876.4	56.88	-47.28	104.16	45.11	34.11	11.31	33.65	297	242	P	V
		5949	53.19	-15.01	68.2	41.29	34.3	11.26	33.66	297	242	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ax HE20 Full (Harmonic @ 3m)

WIFI Ant. 1	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)
		11650	46.46	-27.54	74	50.97	38.6	18.55	61.66	-	-	P	H
		17475	45.76	-22.44	68.2	40.87	38.65	23.37	57.13	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
802.11ax													H
HE20 Full													H
CH 165		11650	46.57	-27.43	74	51.08	38.6	18.55	61.66	-	-	P	V
5825MHz		17475	45.95	-22.25	68.2	41.06	38.65	23.37	57.13	-	-	P	V
													V
													V
													V
													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.

Band 4 - 5725~5850MHz

WIFI 802.11ax HE20_Full (Harmonic @ 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)
		11570	46.93	-27.07	74	51.06	38.82	18.5	61.45	-	-	P	H
		17355	46	-22.2	68.2	41.59	38.61	23.31	57.51	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
802.11ax													H
HE20 Full													H
CH 157		11570	46.48	-27.52	74	50.61	38.82	18.5	61.45	-	-	P	V
5785MHz		17355	45.66	-22.54	68.2	41.25	38.61	23.31	57.51	-	-	P	V
													V
													V
													V
													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

5GHz WIFI 802.11ax HE20 Full (SHF @ 1m)

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 HE20 Full SHF		39776	51.52	-22.48	74	39.36	44.44	23.89	56.17	-	-	P	H
		39776	43.18	-10.82	54	31.02	44.44	23.89	56.17	-	-	A	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		39930	51.1	-22.9	74	38.55	44.69	23.84	55.98	-	-	P	V
		39930	43.74	-10.26	54	31.19	44.69	23.84	55.98	-	-	A	V
													V
													V
													V
													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 with sufficient margin against limit line or noise floor only.

Emission below 1GHz

5GHz WIFI 802.11ax HE20 Full (LF @ 3m)

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE20 Full LF		33.78	23.78	-16.22	40	32.78	22.29	0.9	32.19	-	-	P	H
		166.62	20.66	-22.84	43.5	35.08	15.61	2.05	32.08	-	-	P	H
		236.28	24.11	-21.89	46	37.24	16.53	2.38	32.04	-	-	P	H
		631.1	34.05	-11.95	46	36.18	26.05	3.84	32.02	-	-	P	H
		680.8	33.28	-12.72	46	34.95	26.41	3.98	32.06	-	-	P	H
		979	34.21	-19.79	54	29.61	30.36	4.74	30.5	-	-	P	H
													H
													H
													H
													H
													H
													H
		33.24	28.05	-11.95	40	36.84	22.5	0.89	32.18	100	320	Q	V
		115.05	26.06	-17.44	43.5	39.44	17.03	1.74	32.15	-	-	P	V
		277.59	21.24	-24.76	46	32.11	18.59	2.55	32.01	-	-	P	V
		637.4	38.87	-7.13	46	40.91	26.1	3.86	32	-	-	P	V
		948.2	33.63	-12.37	46	29.72	30.08	4.65	30.82	-	-	P	V
		988.8	34.24	-19.76	54	29.7	30.17	4.77	30.4	-	-	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.
!	Test result is **Margin** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

WIFI 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)
802.11a CH 149 5745MHz		5650	55.45	-12.75	68.2	54.51	32.22	4.58	35.86	103	308	P	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 @ 5650MHz:

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) – 68.2(dBμV/m)

= -12.75 (dB)

Peak measured complies with the limit line, so test result is “PASS”.

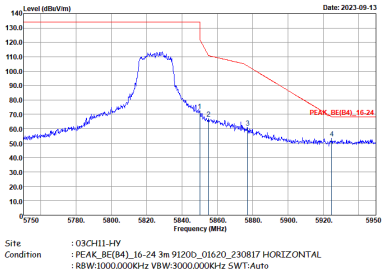
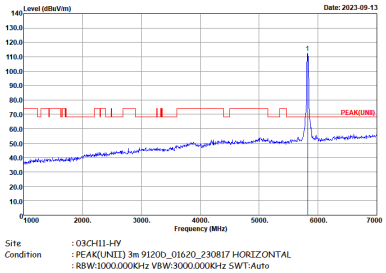
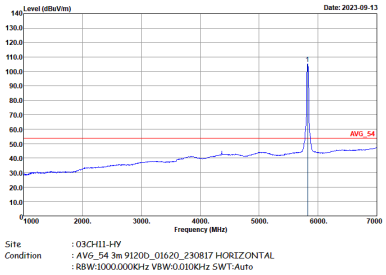
Appendix D. Radiated Spurious Emission Plots

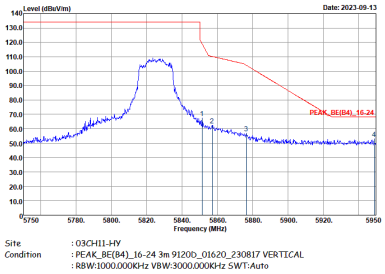
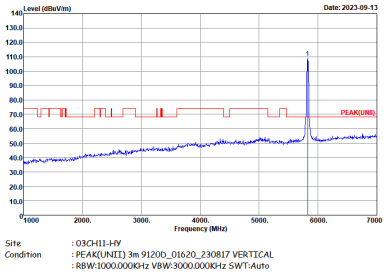
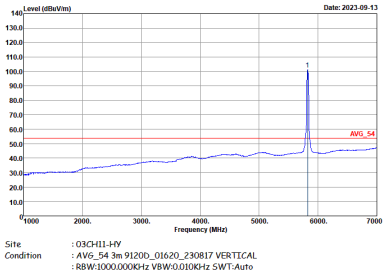
Test Engineer :	Yuan Lee, Sam Chou and Troye Hsieh	**Temperature :**	19.8~22.1°C
		Relative Humidity :	55.1~65.6%

Remark: For Radiated Spurious Emission Plots, Ant. 1 means Chain A (Aux.) and Ant. 2 means Chain B (Main).

Band 4 - 5725~5850MHz

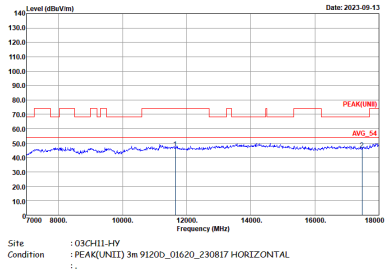
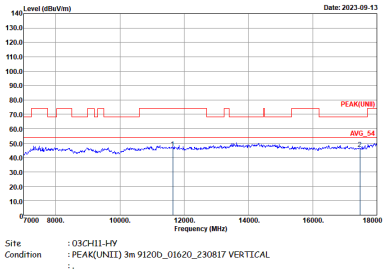
WIFI 802.11ax HE20 Full (Band Edge @ 3m)

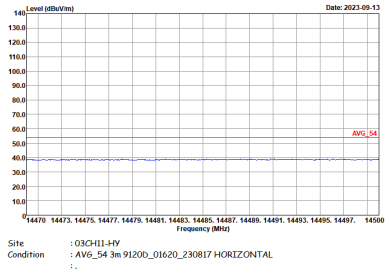
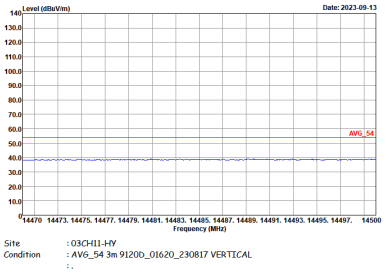
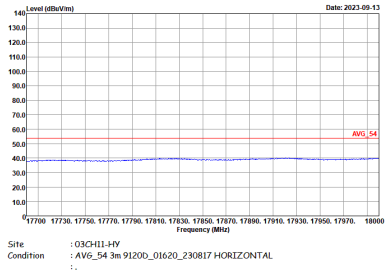
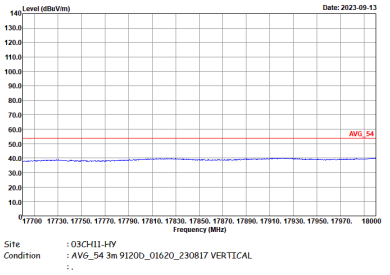
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH165 5825MHz	
1	Horizontal	Fundamental
Peak		
Avg	Left blank	

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH165 5825MHz	
1	Vertical	Fundamental
Peak		
Avg	Left blank	

Band 4 - 5725~5850MHz

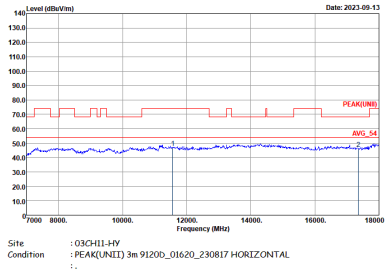
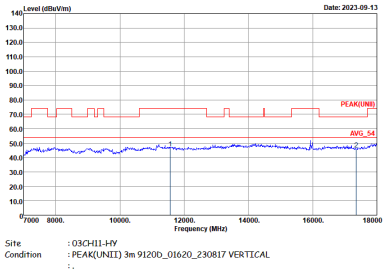
WIFI 802.11ax HE20 Full (Harmonic @ 3m)

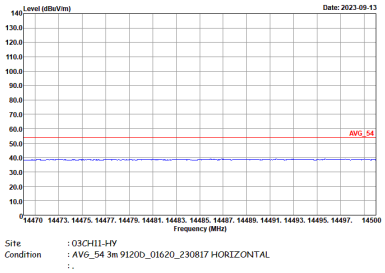
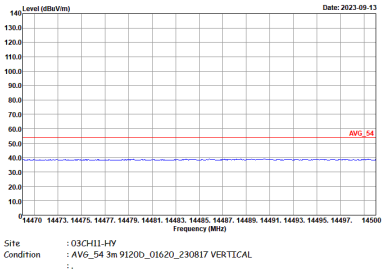
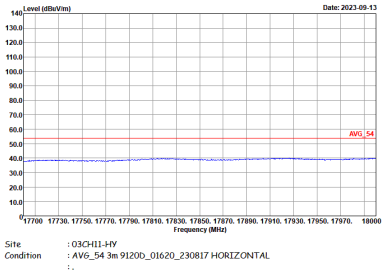
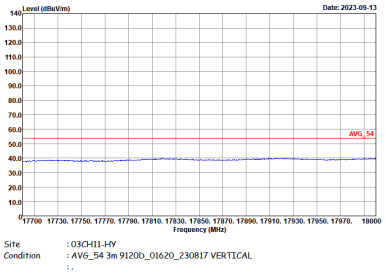
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Full CH165 5825MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Full CH165 5825MHz	
1	Horizontal	Vertical
14.47G ~14.5G Avg.	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 HORIZONTAL	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 VERTICAL
17.7G ~18G Avg	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 HORIZONTAL	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 VERTICAL

Band 4 - 5725~5850MHz

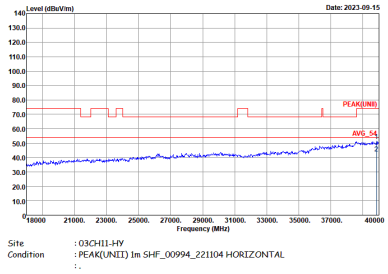
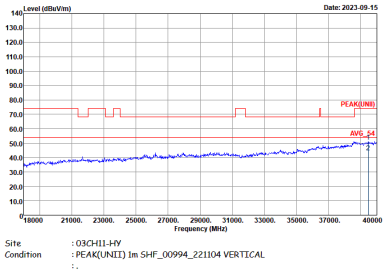
WIFI 802.11ax HE20 Full (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Full CH157 5785MHz	
1+2	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Full CH157 5785MHz	
1+2	Horizontal	Vertical
14.47G ~14.5G Avg.	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 HORIZONTAL	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 VERTICAL
17.7G ~18G Avg	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 HORIZONTAL	 Site : 03CH11-HY Condition : AV6_54 3m 9120D_01620_230817 VERTICAL

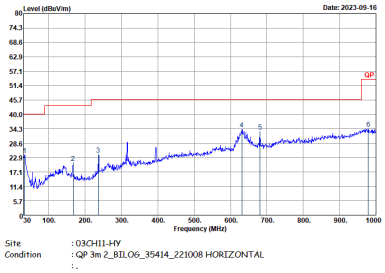
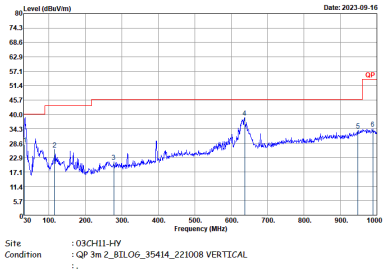
Emission above 18GHz

5GHz WIFI 802.11ax HE20 Full (SHF @ 1m)

WIFI	5GHz WIFI	
ANT	802.11ax HE20 Full SHF	
1+2	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

5GHz WIFI 802.11ax HE20 Full (LF @ 3m)

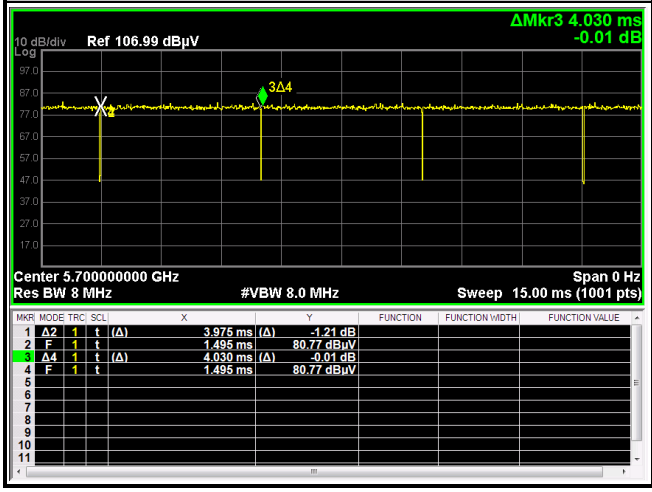
WIFI	5GHz WIFI	
ANT	802.11ax HE20 Full LF	
1+2	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

Chain	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
A	5GHz 802.11ax HE20 Full RU	98.64	-	-	10Hz
A+B	5GHz 802.11ax HE20 Full RU	98.84	-	-	10Hz

<Chain A>

5GHz 802.11ax HE20 Full RU



MIMO <Chain A+B>

5GHz 802.11ax HE20 Full RU