



# 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 C §15.247

The product was received on Aug. 10, 2023 and testing was performed from Aug. 29, 2023 to Sep. 19, 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
FR381701-02C	01	Initial issue of report	Nov. 03, 2023



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.247(a)(2)	6dB Bandwidth	-	See Note
-	2.1049	99% Occupied Bandwidth	-	See Note
3.1	15.247(b)	Power Output Measurement	Pass	-
-	15.247(e)	Power Spectral Density	-	See Note
-	15.247(d)	Conducted Band Edges	-	See Note
		Conducted Spurious Emission	-	See Note
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	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: Clio Lo**



# 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 : WLAN(2.4G): 2.79	Aux. Antenna : WLAN(2.4G): 2.31



<b>Sample Information for Host</b>			
	<b>SKU A</b>	<b>SKU B</b>	<b>SKU C</b>
<b>CPU</b>	i5-1335U	i5-1335U	I7-1365U
<b>DDR</b>	Kingston 8GB	Kingston 16GB	Kingston 32GB
<b>SSD</b>	256GB	512GB	1TB
<b>PANEL</b>	Full FHD AUO	Full FHD AUO	Full FHD AUO
<b>DIGITIZER</b>	Not Support	EMRright Digitizer	EMRright Digitizer
<b>OPTION BAY</b>	MicroSD Card	Barcode Reader	LAN
<b>Expansion Bay</b>	N/A	HID RFID	SMART CARD
<b>Right side option</b>	RFID (SN-NSVG7-C01)	Not Support	Fringer Print
<b>WLAN/BT</b>	Intel AX211	Intel AX211	Intel AX211
<b>WWAN(4G)</b>	NA	LN920A12-WW	LN920A12-WW
<b>GNSS</b>	GPS/GNSS (MC-1010-V2B)	LN920A12-WW	LN920A12-WW
<b>Rear 8M Camera</b>	Support	Support	Support
<b>Webcam FHD</b>	Support	Not Support	Support
<b>IR Webcam</b>	Not Support	Support	Support
<b>USB3.2 Gen2 x 1 Type-A</b>	Support	Support	Support
<b>Type-C (thunder bolt)</b>	Support	Support	Support
<b>Audio/MIC</b>	Support	Support	Support
<b>Fischer</b>	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  $k$ th antenna is being fed by spatial stream  $j$ , or zero if it is not;  
 $G_k$  is the gain in dBi of the  $k$ th antenna.

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

$$Directional\ gain = 10 \cdot \log \left[ \left( 10^{G_1 / 20} + 10^{G_2 / 20} + \dots + 10^{G_N / 20} \right)^2 / N_{ANT} \right] \text{ dBi}$$

Where  $G_1, G_2, \dots, G_N$  denote single antenna gain.

The directional gain "DG" is calculated as following table.

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Chain A	Chain B	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
<b>2.4GHz</b>	2.31	2.79	2.79	5.56	0.00	0.00

Calculation example:

If a device has two antenna,  $G_{ANT1}= 2.31\text{dBi}$ ;  $G_{ANT2}=2.79\text{dBi}$

Directional gain of power measurement =  $\max(2.31, 2.79) + 0 = 2.79 \text{ dBi}$

Directional gain of PSD derived from formula which is

$$10 \times \log \left\{ \left[ \left( 10^{(2.31 \text{ dBi} / 20)} + 10^{(2.79 \text{ dBi} / 20)} \right)^2 \right] / 2 \right\}$$

$$= 5.56 \text{ dBi}$$

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

<b>Test Site</b>	Sporton International Inc. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b> CO05-HY (TAF Code: 1190)
<b>Remark</b>	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.

<b>Test Site</b>	Sporton International Inc. Wensan Laboratory
<b>Test Site Location</b>	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
<b>Test Site No.</b>	<b>Sporton Site No.</b> 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 C §15.247
- ♦ FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02
- ♦ 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)
2400-2483.5 MHz	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		



## 2.2 Test Mode

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

### Single Antenna

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11ax HE20	MCS0

### MIMO Antenna

Modulation	Data Rate
802.11n HT40	MCS0
802.11ax HE20	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :Bluetooth Link + WLAN (2.4GHz) Link + H-Pattern + Earphone + Battery 2 + Adapter 3 for Sample 3
<b>Remark:</b> For Radiated Test Cases, the tests were performed with Adapter 3, Battery 2 and Sample 3.	

### <Chain A>

Ch. #	2400-2483.5 MHz
	802.11ax HE20
Low	01
Middle	-
High	-

### <Chain B>

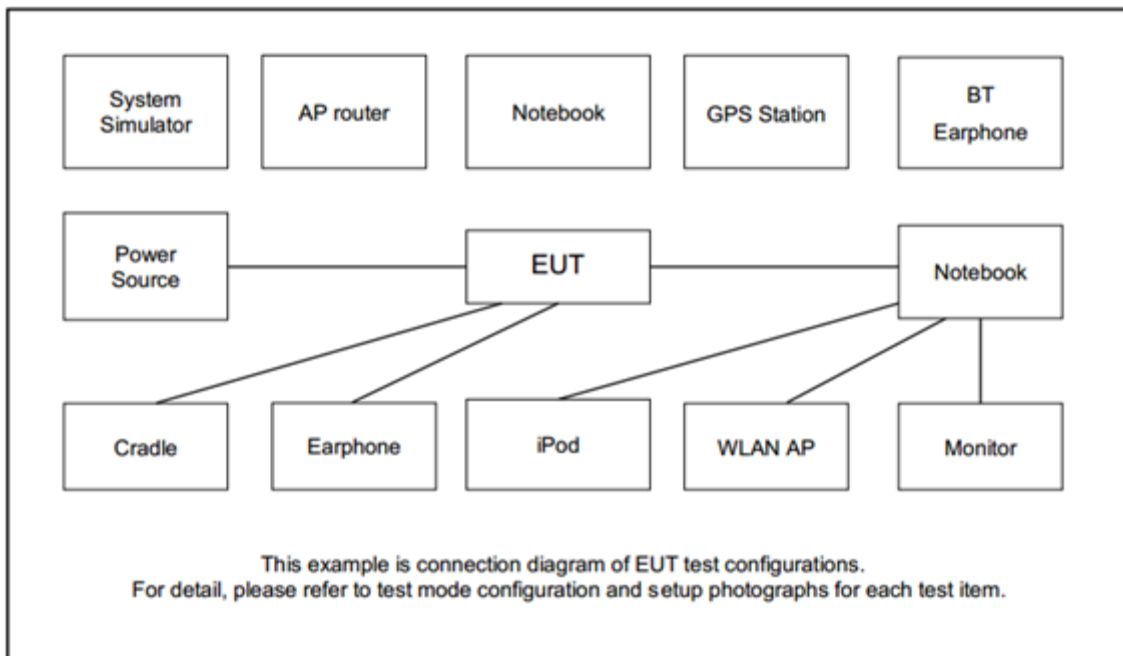
Ch. #	2400-2483.5 MHz
	802.11ax HE20
Low	01
Middle	-
High	-

**MIMO <Chain A+B>**

Ch. #	2400-2483.5 MHz
	802.11n HT40
Low	-
Middle	-
High	09

**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.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
4.	Notebook	Dell	Latitude 3420	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

## 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 Output Power Measurement

##### 3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna with directional gain greater than 6 dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

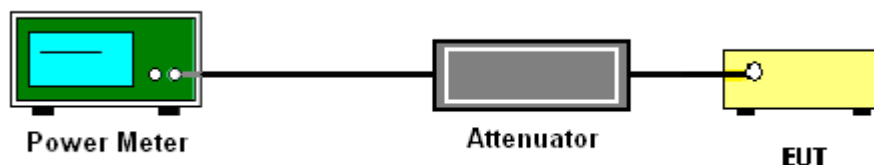
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

1. For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1
2. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.1 Method AVGPM
3. The RF output of EUT is connected to the power meter by RF cable and attenuator. The path loss is compensated to the results for each measurement.
4. Set the maximum power setting and enable the EUT to transmit continuously.
5. Measure the conducted output power and record the results in the test report.
6. 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 Peak Output Power

Please refer to Appendix A.

##### 3.1.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.



### 3.2 Radiated Band Edges and Spurious Emission Measurement

#### 3.2.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device is measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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

#### 3.2.2 Measuring Instruments

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

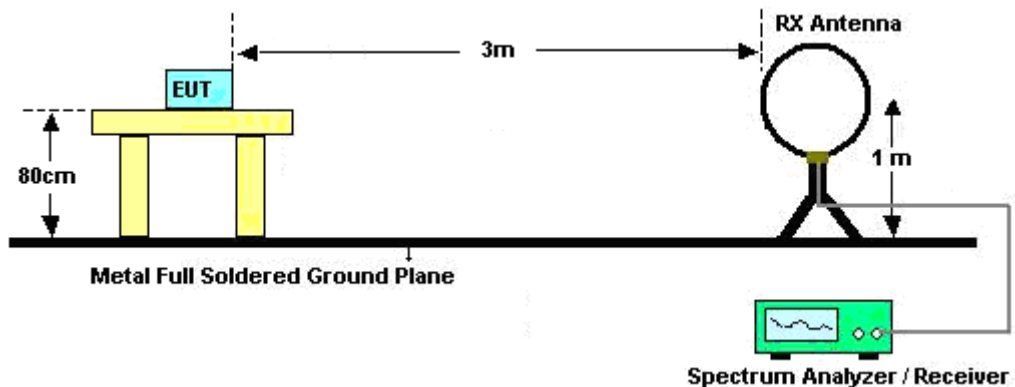
#### 3.2.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. 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.
4. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
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 “-“.

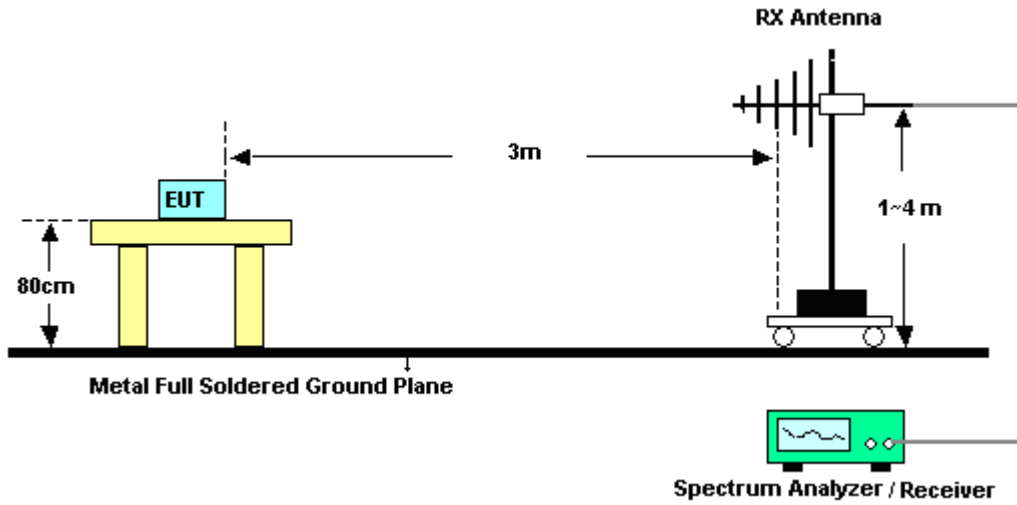
7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as “-“.
8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW = 100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3 MHz for  $f \geq 1$  GHz for peak measurement.For average measurement:
  - 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.

### 3.2.4 Test Setup

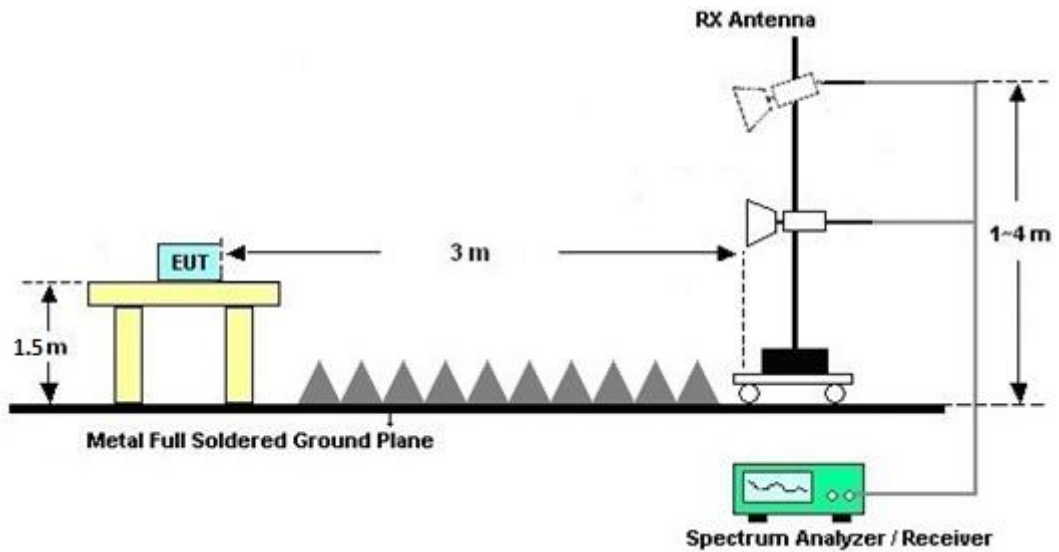
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz

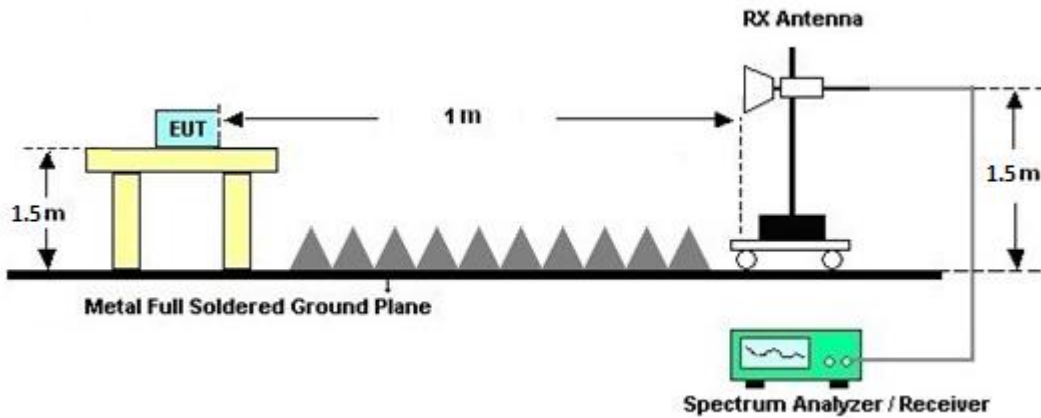


For radiated test from 1GHz to 18GHz





For radiated test above 18GHz



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

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 comes out very similar.

### 3.2.6 Test Result of Radiated Spurious at 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 Radiated Spurious Emission (30MHz ~ 10<sup>th</sup> 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 (IF bandwidth = 9kHz) with Maximum Hold Mode.

### 3.3.4 Test Setup



### 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	17100018000 55007	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	TECEPEL	DTM-303A	TP201996	N/A	Nov. 17, 2022	Aug. 30, 2023~ Sep. 19, 2023	Nov. 16, 2023	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	15I00041SNO 10 (NO:248)	10MHz~6GHz	Jan. 05, 2023	Aug. 30, 2023~ Sep. 19, 2023	Jan. 04, 2024	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	932001	N/A	Sep. 26, 2022	Aug. 30, 2023~ Sep. 19, 2023	Sep. 25, 2023	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	846202	300MHz~40GHz	Sep. 26, 2022	Aug. 30, 2023~ Sep. 19, 2023	Sep. 25, 2023	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 23, 2023	Aug. 30, 2023~ Sep. 01, 2023	Aug. 22, 2024	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101565	10Hz ~ 40GHz	Dec. 26, 2022	Sep. 19, 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:	2023/8/30-2023/9/19	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 Output Power (Reporting Only)**

2.4GHz Band Single Antenna																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power with duty factor (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	19.23	18.84		30.00	30.00	2.31	2.79	21.54	21.63	36.00	36.00	Pass
11b	1Mbps	1	6	2437	19.79	18.93		30.00	30.00	2.31	2.79	22.10	21.72	36.00	36.00	Pass
11b	1Mbps	1	11	2462	19.09	19.74		30.00	30.00	2.31	2.79	21.40	22.53	36.00	36.00	Pass
11b	1Mbps	1	12	2467	17.07	17.09		30.00	30.00	2.31	2.79	19.38	19.88	36.00	36.00	Pass
11b	1Mbps	1	13	2472	13.02	13.26		30.00	30.00	2.31	2.79	15.33	16.05	36.00	36.00	Pass
11g	6Mbps	1	1	2412	18.12	17.87		30.00	30.00	2.31	2.79	20.43	20.66	36.00	36.00	Pass
11g	6Mbps	1	6	2437	21.70	21.17		30.00	30.00	2.31	2.79	24.01	23.96	36.00	36.00	Pass
11g	6Mbps	1	11	2462	17.79	17.99		30.00	30.00	2.31	2.79	20.10	20.78	36.00	36.00	Pass
11g	6Mbps	1	12	2467	15.25	15.52		30.00	30.00	2.31	2.79	17.56	18.31	36.00	36.00	Pass
11g	6Mbps	1	13	2472	11.72	12.29		30.00	30.00	2.31	2.79	14.03	15.08	36.00	36.00	Pass

2.4GHz Band MIMO																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power with duty factor (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
HT40	MCS0	2	3	2422	15.73	15.61	18.68	30.00		2.79		21.47		36.00		Pass
HT40	MCS0	2	6	2437	16.58	16.46	19.53	30.00		2.79		22.32		36.00		Pass
HT40	MCS0	2	9	2452	15.08	15.09	18.10	30.00		2.79		20.89		36.00		Pass
HT40	MCS0	2	10	2457	8.61	8.78	11.71	30.00		2.79		14.50		36.00		Pass
HT40	MCS0	2	11	2462	9.72	10.03	12.89	30.00		2.79		15.68		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

**TEST RESULTS DATA**  
**Peak Output Power**

2.4GHz Band Single Antenna																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	22.02	21.81		30.00	30.00	2.31	2.79	24.33	24.60	36.00	36.00	Pass
11b	1Mbps	1	6	2437	22.45	21.89		30.00	30.00	2.31	2.79	24.76	24.68	36.00	36.00	Pass
11b	1Mbps	1	11	2462	22.14	22.26		30.00	30.00	2.31	2.79	24.45	25.05	36.00	36.00	Pass
11b	1Mbps	1	12	2467	20.34	20.38		30.00	30.00	2.31	2.79	22.65	23.17	36.00	36.00	Pass
11b	1Mbps	1	13	2472	16.76	16.86		30.00	30.00	2.31	2.79	19.07	19.65	36.00	36.00	Pass
11g	6Mbps	1	1	2412	22.48	22.26		30.00	30.00	2.31	2.79	24.79	25.05	36.00	36.00	Pass
11g	6Mbps	1	6	2437	24.55	24.48		30.00	30.00	2.31	2.79	26.86	27.27	36.00	36.00	Pass
11g	6Mbps	1	11	2462	22.22	22.49		30.00	30.00	2.31	2.79	24.53	25.28	36.00	36.00	Pass
11g	6Mbps	1	12	2467	19.95	20.03		30.00	30.00	2.31	2.79	22.26	22.82	36.00	36.00	Pass
11g	6Mbps	1	13	2472	16.82	17.63		30.00	30.00	2.31	2.79	19.13	20.42	36.00	36.00	Pass

2.4GHz Band MIMO																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
HT40	MCS0	2	3	2422	21.24	21.07	24.17	30.00		2.79		26.96		36.00		Pass
HT40	MCS0	2	6	2437	22.13	22.04	25.10	30.00		2.79		27.89		36.00		Pass
HT40	MCS0	2	9	2452	20.90	20.88	23.90	30.00		2.79		26.69		36.00		Pass
HT40	MCS0	2	10	2457	14.00	14.27	17.15	30.00		2.79		19.94		36.00		Pass
HT40	MCS0	2	11	2462	15.48	15.76	18.63	30.00		2.79		21.42		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

**TEST RESULTS DATA**  
**Average Output Power (Reporting Only)**

2.4GHz Band Single Antenna																	
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	RU Config	Average Conducted Power with duty factor (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
HE20	MCS0	1	1	2412	Full	18.11	17.71		30.00	30.00	2.31	2.79	20.42	20.50	36.00	36.00	Pass
HE20	MCS0	1	6	2437	Full	21.54	21.00		30.00	30.00	2.31	2.79	23.85	23.79	36.00	36.00	Pass
HE20	MCS0	1	11	2462	Full	17.78	17.98		30.00	30.00	2.31	2.79	20.09	20.77	36.00	36.00	Pass
HE20	MCS0	1	12	2467	Full	15.27	15.53		30.00	30.00	2.31	2.79	17.58	18.32	36.00	36.00	Pass
HE20	MCS0	1	13	2472	Full	11.34	11.90		30.00	30.00	2.31	2.79	13.65	14.69	36.00	36.00	Pass

2.4GHz Band MIMO																	
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	RU Config	Average Conducted Power with duty factor (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
HE20	MCS0	2	1	2412	Full	16.29	15.98	19.15	30.00		2.79		21.94		36.00		Pass
HE20	MCS0	2	6	2437	Full	21.42	21.12	24.28	30.00		2.79		27.07		36.00		Pass
HE20	MCS0	2	11	2462	Full	16.33	16.36	19.36	30.00		2.79		22.15		36.00		Pass
HE20	MCS0	2	12	2467	Full	11.88	12.17	15.04	30.00		2.79		17.83		36.00		Pass
HE20	MCS0	2	13	2472	Full	9.45	9.75	12.61	30.00		2.79		15.40		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

**TEST RESULTS DATA**  
**Peak Output Power**

2.4GHz Band Single Antenna																	
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	RU Config	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
HE20	MCS0	1	1	2412	Full	22.54	22.31		30.00	30.00	2.31	2.79	24.85	25.10	36.00	36.00	Pass
HE20	MCS0	1	6	2437	Full	24.45	24.52		30.00	30.00	2.31	2.79	26.76	27.31	36.00	36.00	Pass
HE20	MCS0	1	11	2462	Full	22.29	22.65		30.00	30.00	2.31	2.79	24.60	25.44	36.00	36.00	Pass
HE20	MCS0	1	12	2467	Full	20.08	20.37		30.00	30.00	2.31	2.79	22.39	23.16	36.00	36.00	Pass
HE20	MCS0	1	13	2472	Full	17.13	17.86		30.00	30.00	2.31	2.79	19.44	20.65	36.00	36.00	Pass

2.4GHz Band MIMO																	
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	RU Config	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
HE20	MCS0	2	1	2412	Full	20.92	20.73	23.84	30.00		2.79		26.63		36.00		Pass
HE20	MCS0	2	6	2437	Full	24.41	24.46	27.45	30.00		2.79		30.24		36.00		Pass
HE20	MCS0	2	11	2462	Full	21.09	21.07	24.09	30.00		2.79		26.88		36.00		Pass
HE20	MCS0	2	12	2467	Full	16.45	16.59	19.53	30.00		2.79		22.32		36.00		Pass
HE20	MCS0	2	13	2472	Full	15.28	15.55	18.43	30.00		2.79		21.22		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.



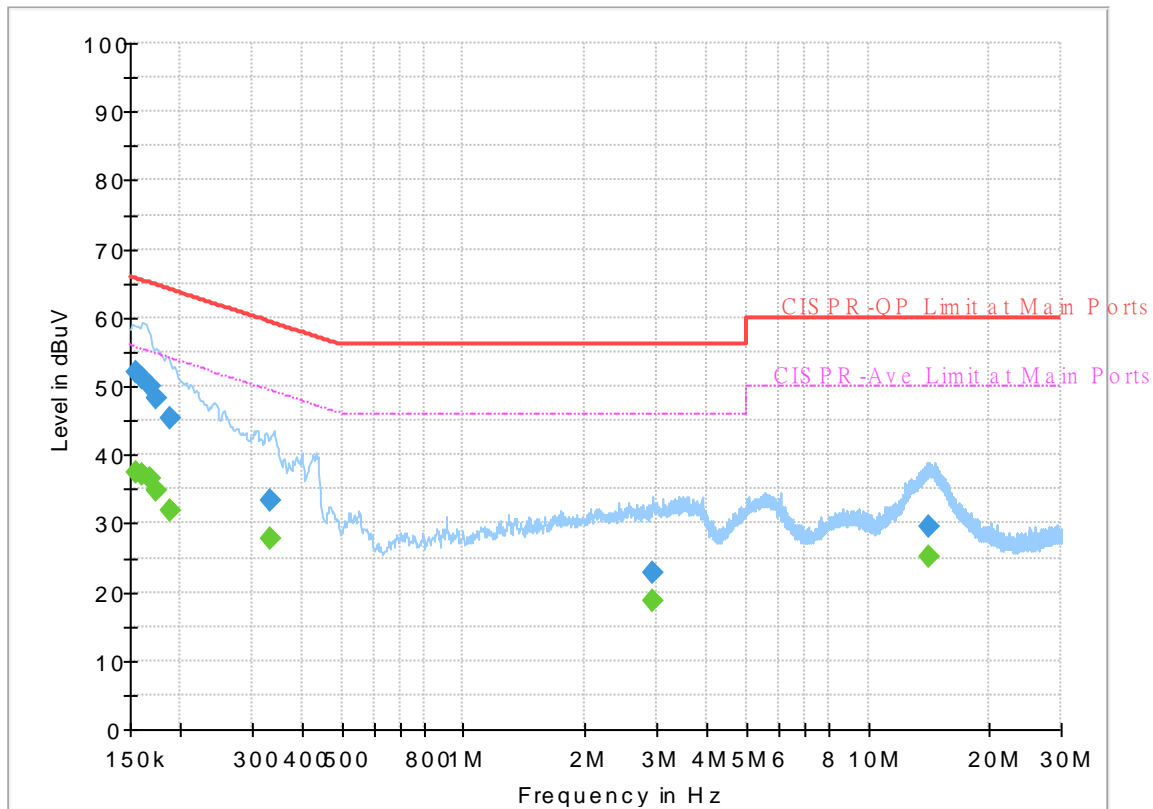
## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	Temperature :	23~26°C
		Relative Humidity :	45~55%

# EUT Information

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

Full Spectrum



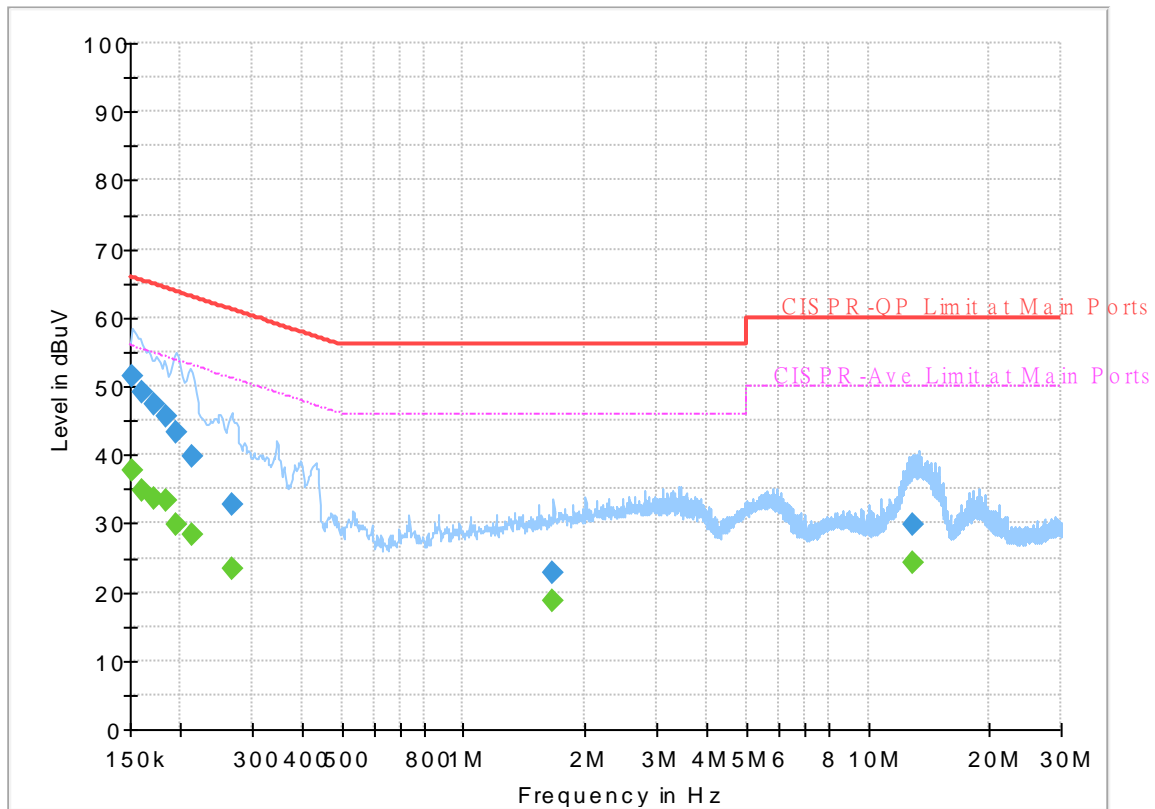
## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154500	---	37.31	55.75	18.44	L1	OFF	19.8
0.154500	52.01	---	65.75	13.74	L1	OFF	19.8
0.161250	---	37.01	55.40	18.39	L1	OFF	19.8
0.161250	51.14	---	65.40	14.26	L1	OFF	19.8
0.168000	---	36.47	55.06	18.59	L1	OFF	19.8
0.168000	50.08	---	65.06	14.98	L1	OFF	19.8
0.174750	---	34.91	54.73	19.82	L1	OFF	19.8
0.174750	48.28	---	64.73	16.45	L1	OFF	19.8
0.188250	---	31.95	54.11	22.16	L1	OFF	19.8
0.188250	45.32	---	64.11	18.79	L1	OFF	19.8
0.334500	---	27.85	49.34	21.49	L1	OFF	19.8
0.334500	33.24	---	59.34	26.10	L1	OFF	19.8
2.924250	---	18.68	46.00	27.32	L1	OFF	19.9
2.924250	22.79	---	56.00	33.21	L1	OFF	19.9
14.106750	---	25.04	50.00	24.96	L1	OFF	19.9
14.106750	29.63	---	60.00	30.37	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)
0.152250	---	37.66	55.88	18.22	N	OFF	19.8
0.152250	51.56	---	65.88	14.32	N	OFF	19.8
0.161250	---	34.89	55.40	20.51	N	OFF	19.8
0.161250	48.99	---	65.40	16.41	N	OFF	19.8
0.172500	---	33.73	54.84	21.11	N	OFF	19.8
0.172500	47.24	---	64.84	17.60	N	OFF	19.8
0.183750	---	33.19	54.31	21.12	N	OFF	19.8
0.183750	45.62	---	64.31	18.69	N	OFF	19.8
0.195000	---	29.86	53.82	23.96	N	OFF	19.8
0.195000	43.16	---	63.82	20.66	N	OFF	19.8
0.213000	---	28.43	53.09	24.66	N	OFF	19.8
0.213000	39.68	---	63.09	23.41	N	OFF	19.8
0.267000	---	23.36	51.21	27.85	N	OFF	19.8
0.267000	32.88	---	61.21	28.33	N	OFF	19.8
1.668750	---	18.73	46.00	27.27	N	OFF	19.8
1.668750	22.90	---	56.00	33.10	N	OFF	19.8
12.914250	---	24.20	50.00	25.80	N	OFF	20.0
12.914250	29.89	---	60.00	30.11	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).

2.4GHz 2400~2483.5MHz

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

WIFI Ant.	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 CH 01 2412MHz		2389.275	65.59	-8.41	74	55.2	27.49	17.1	34.2	306	240	P	H	
		2390	52.21	-1.79	54	41.81	27.5	17.1	34.2	306	240	A	H	
	*	2412	112.83	-	-	102.39	27.5	17.13	34.19	306	240	P	H	
	*	2412	102.8	-	-	92.36	27.5	17.13	34.19	306	240	A	H	
													H	
														H
			2387.385	66.94	-7.06	74	56.58	27.47	17.09	34.2	125	259	P	V
			2390	52.23	-1.77	54	41.83	27.5	17.1	34.2	125	259	A	V
		*	2412	110.95	-	-	100.51	27.5	17.13	34.19	125	259	P	V
		*	2412	101.53	-	-	91.09	27.5	17.13	34.19	125	259	A	V
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.													





2.4GHz 2400~2483.5MHz

WIFI 802.11 ax 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 )	
802.11ax HE20 Full CH 01 2412MHz		4824	40.7	-33.3	74	54.17	32.54	11.79	57.8	-	-	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
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													H	
													H	
													H	
			4824	41.74	-32.26	74	55.21	32.54	11.79	57.8	-	-	P	V
														V
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
<b>Remark</b>	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.													



2.4GHz 2400~2483.5MHz

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

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
2		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)	
802.11ax HE20 Full CH 01 2412MHz		2389.8	62.41	-11.59	74	52.01	27.5	17.1	34.2	175	319	P	H	
		2390	48.5	-5.5	54	38.1	27.5	17.1	34.2	175	319	A	H	
	*	2412	105.66	-	-	95.22	27.5	17.13	34.19	175	319	P	H	
	*	2412	96.6	-	-	86.16	27.5	17.13	34.19	175	319	A	H	
													H	
													H	
			2389.8	66.41	-7.59	74	56.01	27.5	17.1	34.2	369	284	P	V
			2390	51.57	-2.43	54	41.17	27.5	17.1	34.2	369	284	A	V
	*		2412	109.39	-	-	98.95	27.5	17.13	34.19	369	284	P	V
	*		2412	100.19	-	-	89.75	27.5	17.13	34.19	369	284	A	V
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.													



2.4GHz 2400~2483.5MHz

WIFI 802.11 ax HE20 Full (Harmonic @ 3m)

WIFI Ant. 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 CH 01 2412MHz		4824	42.21	-31.79	74	55.68	32.54	11.79	57.8	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
	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.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 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)
802.11n HT40 CH 09 2452MHz		2381.36	52.96	-21.04	74	42.67	27.41	17.09	34.21	100	65	P	H
		2388.88	42.9	-11.1	54	32.51	27.49	17.1	34.2	100	65	A	H
	*	2452	108.03	-	-	97.52	27.5	17.19	34.18	100	65	P	H
	*	2452	99.84	-	-	89.33	27.5	17.19	34.18	100	65	A	H
		2493.2	66.53	-7.47	74	55.74	27.7	17.25	34.16	100	65	P	H
		2483.92	51.95	-2.05	54	41.19	27.7	17.23	34.17	100	65	A	H
		2382	53.19	-20.81	74	42.88	27.42	17.09	34.2	300	106	P	V
		2388.24	42.5	-11.5	54	32.12	27.48	17.1	34.2	300	106	A	V
	*	2452	107.71	-	-	97.2	27.5	17.19	34.18	300	106	P	V
	*	2452	99.5	-	-	88.99	27.5	17.19	34.18	300	106	A	V
		2483.76	68.3	-5.7	74	57.54	27.7	17.23	34.17	300	106	P	V
		2483.52	52.95	-1.05	54	42.19	27.7	17.23	34.17	300	106	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT40 (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 )	
802.11n HT40 CH 09 2452MHz		4904	42.07	-31.93	74	55.27	32.72	11.91	57.83	-	-	P	H	
		7356	43.95	-30.05	74	51.33	36.66	14.39	58.43	-	-	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			4904	42.03	-31.97	74	55.23	32.72	11.91	57.83	-	-	P	V
			7356	46.81	-27.19	74	54.19	36.66	14.39	58.43	-	-	P	V
														V
														V
														V
														V
														V
													V	
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> <li>The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.</li> </ol>													



**Emission above 18GHz  
2.4GHz WIFI 802.11n HT40 (SHF)**

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)	
2.4GHz 802.11n HT40 SHF		39944	51.17	-22.83	74	38.6	44.71	23.83	55.97	-	-	P	H	
		39944	43.59	-10.41	54	31.02	44.71	23.83	55.97	-	-	A	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			38586	51.37	-22.63	74	40.5	43.63	24.29	57.05	-	-	P	V
			38586	40.92	-13.08	54	30.05	43.63	24.29	57.05	-	-	A	V
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
<b>Remark</b>	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

2.4GHz WIFI 802.11n HT40 (LF)

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 )	
2.4GHz 802.11n HT40 LF		30.54	23.34	-16.66	40	30.97	23.68	0.85	32.16	-	-	P	H	
		166.62	21.22	-22.28	43.5	35.64	15.61	2.05	32.08	-	-	P	H	
		237.09	23.64	-22.36	46	36.68	16.61	2.39	32.04	-	-	P	H	
		630.4	34.13	-11.87	46	36.28	26.04	3.84	32.03	-	-	P	H	
		880.3	32.77	-13.23	46	31.24	28.52	4.39	31.38	-	-	P	H	
		994.4	34.17	-19.83	54	29.77	29.97	4.78	30.35	-	-	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
			33.24	27.64	-12.36	40	36.43	22.5	0.89	32.18	100	357	Q	V
			122.61	26.22	-17.28	43.5	39.23	17.35	1.8	32.16	-	-	P	V
			236.82	23.82	-22.18	46	36.89	16.58	2.39	32.04	-	-	P	V
			393.8	29.4	-16.6	46	37.09	21.4	2.99	32.08	-	-	P	V
			629	39.48	-6.52	46	41.67	26.01	3.83	32.03	-	-	P	V
			978.3	34.75	-19.25	54	30.14	30.39	4.73	30.51	-	-	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**

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





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

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		( 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 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).

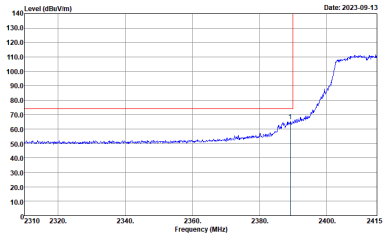
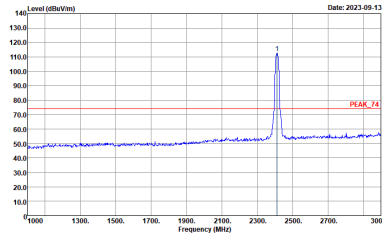
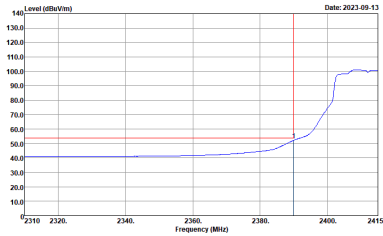
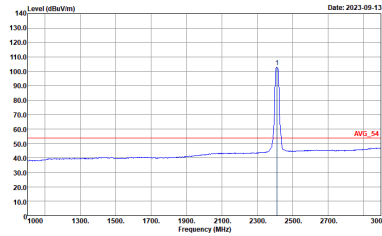
### Note symbol

-L	Low channel location
-R	High channel location

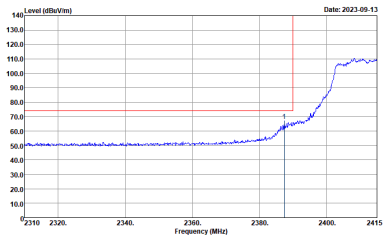
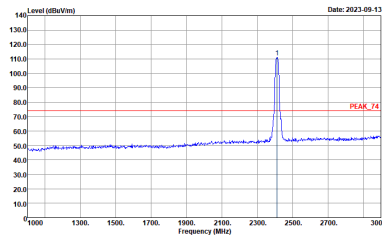
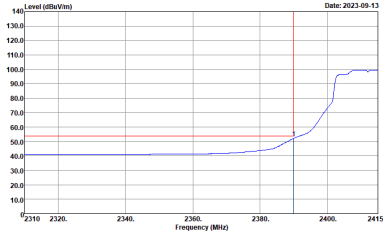
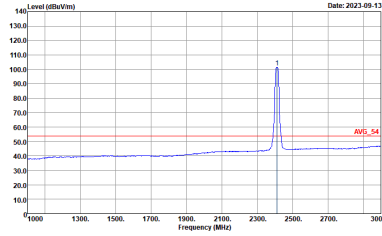


2.4GHz 2400~2483.5MHz

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

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH01 2412MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH11-HY Condition : AVG_BE_54 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : AVG_54 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH01 2412MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH11-HY Condition : AVG_BE_54 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : AVG_54 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

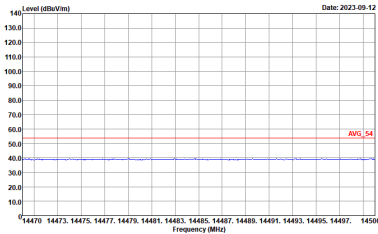
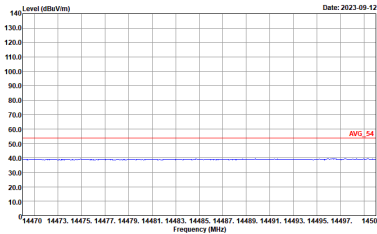
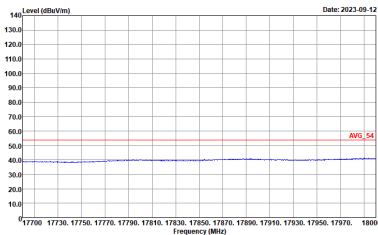
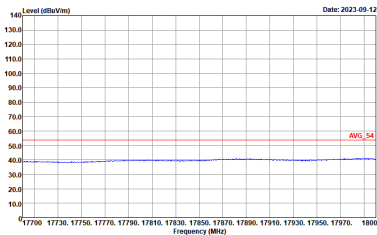


2.4GHz 2400~2483.5MHz

WIFI 802.11 ax HE20 Full (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11 ax HE20 Full CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9120D_01620_230817 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9120D_01620_230817 VERTICAL</p>

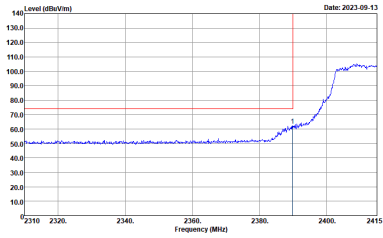
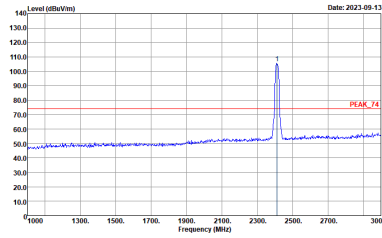
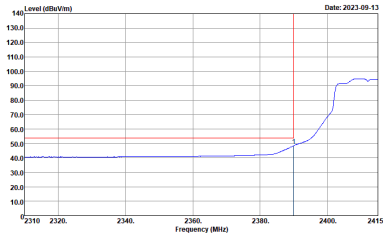
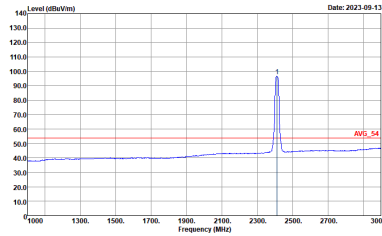


WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11 ax HE20 Full CH01 2412MHz	
1	Horizontal	Vertical
<p>14.47G ~14.5G Avg.</p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 HORIZONTAL</p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 VERTICAL</p>
<p>17.7G ~18G Avg</p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 HORIZONTAL</p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 VERTICAL</p>

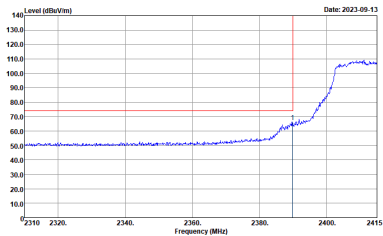
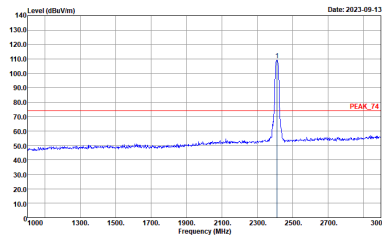
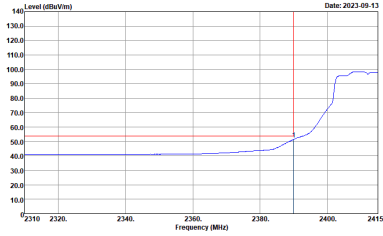
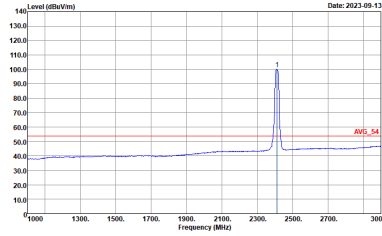


2.4GHz 2400~2483.5MHz

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

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH01 2412MHz	
2	Horizontal	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH11-HY Condition : AVG_BE_54 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : AVG_54 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH01 2412MHz	
2	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH11-HY Condition : AVG_BE_54 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : AVG_54 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>





2.4GHz 2400~2483.5MHz

WIFI 802.11 ax HE20 Full (Harmonic @ 3m)

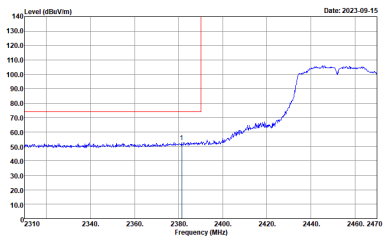
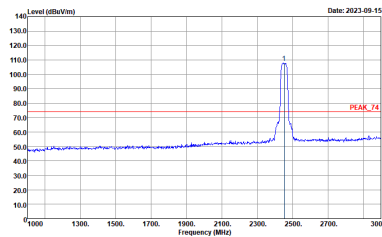
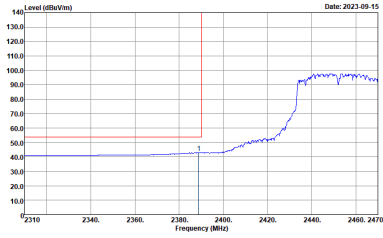
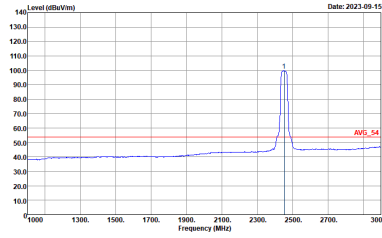
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11 ax HE20 Full CH01 2412MHz	
2	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9120D_01620_230817 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9120D_01620_230817 VERTICAL</p>



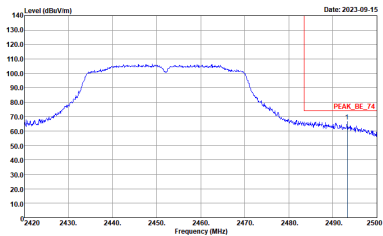
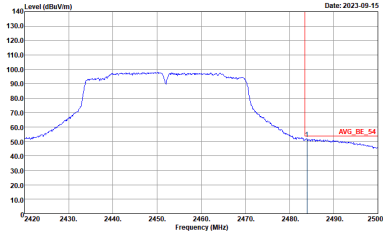
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11 ax HE20 Full CH01 2412MHz	
2	Horizontal	Vertical
<p>14.47G ~14.5G Avg.</p>	<p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 VERTICAL</p>
<p>17.7G ~18G Avg</p>	<p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 VERTICAL</p>



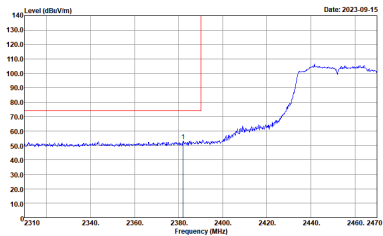
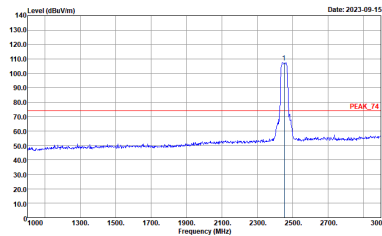
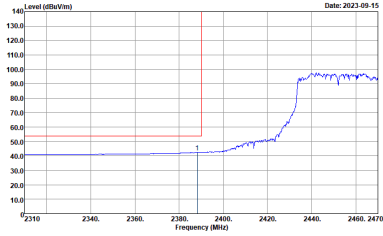
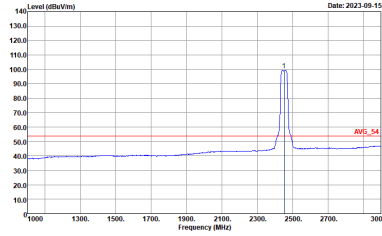
2.4GHz 2400~2483.5MHz  
 WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1+2	Horizontal	Fundamental
Peak	 <p>Site : 03CH11-HY        Condition : PEAK_BE_74 3m 91200_01620_230817 HORIZONTAL        : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Site : 03CH11-HY        Condition : PEAK_74 3m 91200_01620_230817 HORIZONTAL        : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Site : 03CH11-HY        Condition : AVG_BE_54 3m 91200_01620_230817 HORIZONTAL        : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	 <p>Site : 03CH11-HY        Condition : AVG_54 3m 91200_01620_230817 HORIZONTAL        : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>

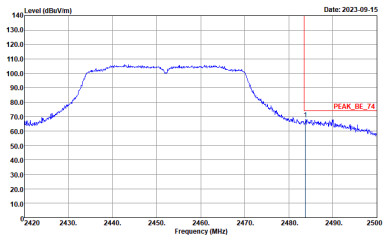
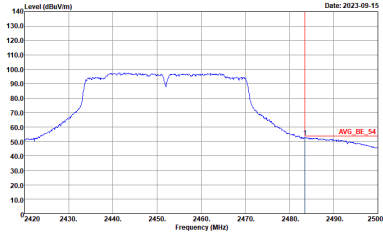


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Horizontal	Fundamental
<p><b>Peak</b></p>	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Left blank</p>
<p><b>Avg.</b></p>	 <p>Site : 03CH11-HY Condition : AVG_BE_54 3m 91200_01620_230817 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	<p>Left blank</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1+2	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH11-HY Condition : AVG_BE_54 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : AVG_54 3m 91200_01620_230817 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



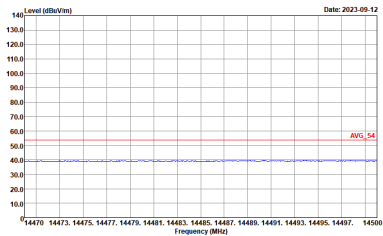
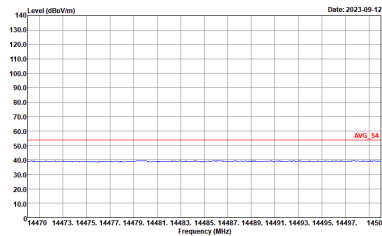
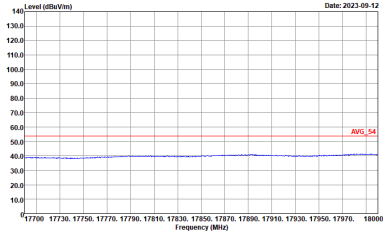
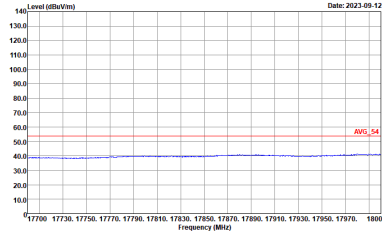
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Vertical	Fundamental
<p><b>Peak</b></p>	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_01620_230817 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Left blank</p>
<p><b>Avg.</b></p>	 <p>Site : 03CH11-HY Condition : AVG_BE_54 3m 91200_01620_230817 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	<p>Left blank</p>



2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT40 CH09 2452MHz	
1+2	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9120D_01620_230817 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9120D_01620_230817 VERTICAL</p>



WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT40 CH09 2452MHz	
1+2	Horizontal	Vertical
<p><b>14.47G</b> <b>~14.5G</b> <b>Avg.</b></p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 HORIZONTAL</p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 VERTICAL</p>
<p><b>17.7G</b> <b>~18G</b> <b>Avg</b></p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 HORIZONTAL</p>	 <p>Site : 03CH11-HY Condition : AV6_54 3m 91200_01620_230817 VERTICAL</p>





Emission above 18GHz
2.4GHz WIFI 802.11n HT40 (SHF @ 1m)

Table with 3 columns: WIFI (2.4GHz 2400~2483.5MHz), ANT (802.11n HT40 SHF), and 1+2 (Horizontal and Vertical). It contains two graphs showing Level (dBuV/m) vs Frequency (MHz) for Peak and Avg. measurements.



Emission below 1GHz  
2.4GHz WIFI 802.11n HT40 (LF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11n HT40 LF	
1+2	Horizontal	Vertical
QP / Peak	<p>Site : 03CH11-HY Condition : QP 3m 2_BILO6_35414_221008 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : QP 3m 2_BILO6_35414_221008 VERTICAL</p>

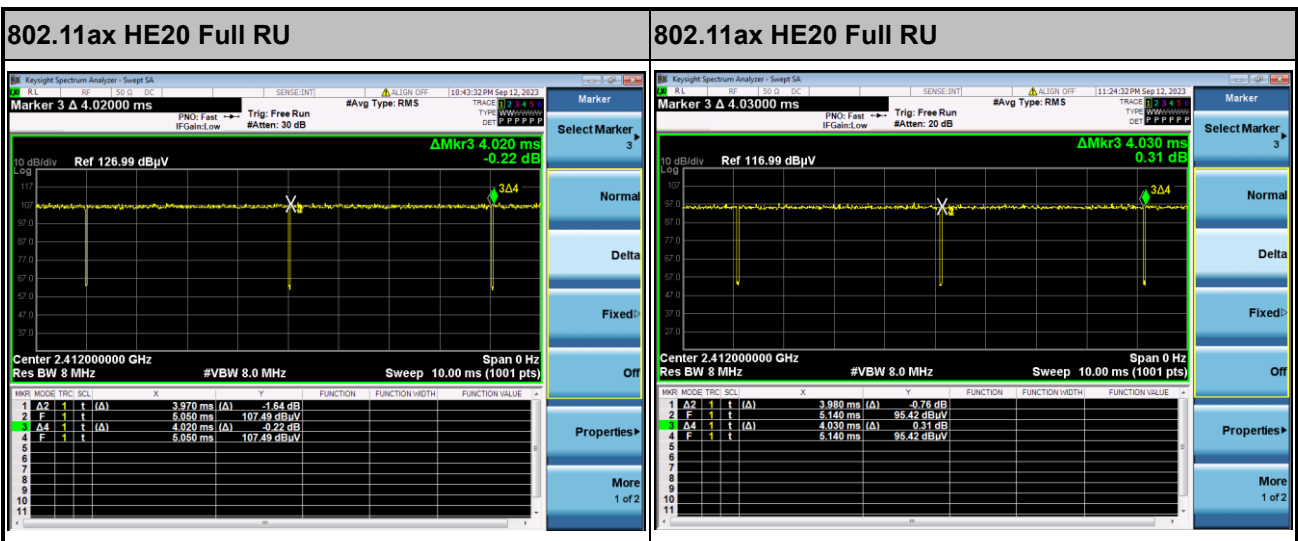


## Appendix E. Duty Cycle Plots

Chain	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
A	2.4GHz 802.11ax HE20 Full RU	98.76	-	-	10Hz
B	2.4GHz 802.11ax HE20 Full RU	98.76	-	-	10Hz
A+B	2.4GHz 802.11n HT40	99.50	-	-	10Hz

### <Chain A>

### <Chain B>



### MIMO <Chain A+B>

