FCC RADIO TEST REPORT

FCC ID	**:**	**A4RGE2AE**
Equipment	**:**	**Phone**
Applicant	**:**	**Google LLC** **1600 Amphitheatre Parkway,** **Mountain View, California, 94043 USA**
Standard	**:**	**FCC Part 15 Subpart E §15.407**

The product was received on Mar. 17, 2022 and testing was performed from Mar. 23, 2022 to May 19, 2022. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

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
FR1O2919-05F	01	Initial issue of report	May 25, 2022
FR1O2919-05F	02	1. Add remark in section 2.2 2. Revise Table of Contents, antenna type, appendix A and C 3. Revise 26dB & 99% Occupied Bandwidth 4. Remove model name	Jun. 02, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403(i)	6dB & 26dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.407(a)	Maximum Conducted Output Power	Pass	-
3.3	15.407(a)	Power Spectral Density	Pass	-
3.4	15.407(b)	Unwanted Emissions	Pass	3.23 dB under the limit at 17385.000 MHz
3.5	15.207	AC Conducted Emission	Pass	21.27 dB under the limit at 1.649 MHz
3.6	15.203 15.407(a)	Antenna Requirement	Pass	-

Declaration of Conformity:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results. 2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation".
Comments and Explanations:
The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: William Chen

Report Producer: Cindy Liu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Phone
FCC ID	A4RGE2AE
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/ NFC/GNSS/WPC/WPT/UWB WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE

Remark: The above EUT's information was declared by manufacturer.

EUT Information List	
S/N	**Performed Test Item**
23061FDH300012	RF Conducted Measurement
22271FDH30001G	Radiated Spurious Emission
22271FDH30000P	Conducted Emission

1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	**MIMO <Ant. 4+8>** 802.11a: 23.22 dBm / 0.2099 W 802.11n HT20: 23.23 dBm / 0.2104 W 802.11n HT40: 22.37 dBm / 0.1726 W 802.11ac VHT20: 23.35 dBm / 0.2163 W 802.11ac VHT40: 22.47 dBm / 0.1766 W 802.11ac VHT80: 22.88 dBm / 0.1941 W 802.11ax HE20: 23.43 dBm / 0.2203 W 802.11ax HE40: 22.57 dBm / 0.1807 W 802.11ax HE80: 22.98 dBm / 0.1986 W
99% Occupied Bandwidth	**MIMO <Ant. 4>** 802.11a: 17.13 MHz 802.11ax HE20: 19.18 MHz 802.11ac HE40: 37.86 MHz 802.11ac HE80: 77.20 MHz **MIMO <Ant. 8>** 802.11a: 19.08 MHz 802.11ax HE20: 19.88 MHz 802.11ac HE40: 37.96 MHz 802.11ac HE80: 77.20 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) 802.11ax: OFDMA (BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)
Antenna Type / Gain	**<Ant. 4> :** ILA Antenna with gain 1.20 dBi **<Ant. 8> :** ILA Antenna with gain -3.50 dBi
Antenna Function Description	<table><tr><td></td><td>Ant. 4</td><td>Ant. 8</td></tr><tr><td>802.11 a/n/ac/ax MIMO</td><td>V</td><td>V</td></tr></table>

Remark:

1. MIMO Ant. 4+8 Directional Gain is a calculated result from MIMO Ant. 4 and MIMO Ant. 8. The formula used in calculation is documented in section 3.6.
2. Power of MIMO Ant. 4 + Ant. 8 is a calculated result from sum of the power MIMO Ant. 4 and MIMO Ant. 8.
3. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.3 Modification of EUT

No modifications made to the EUT during the testing.

1.4 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 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, 03CH16-HY

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

FCC designation No.: TW1190 and TW3786

1.5 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.

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 accessory (Adapter or Earphone), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane with Adapter as worst plane.

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

This device support 26/52/106/242/484-tone RU.

The PSD of partial RU is reduced to be smaller than full RU according to TCB workshop interim guidance Oct., 2018.

The 242-tone RU is covered by 20MHz channel and 484-tone RU is covered by 40MHz channe.

The 802.11ax mode is investigated among different tones, full resource units (RU), partial resource units. The partial RU has no higher power than full RU's, thus the full RU is chosen as main test configuration.

The CDD mode is chosen as worst case configuration for all test cases due to higher power than SISO mode.

The 802.11n/ac mode has no higher power and PSD than 802.11ax mode, thus the 802.11ax mode is chosen as main test configuration, and the 802.11n/ac mode is verified the power.

The final test modes consider the modulation and the worst data rates as shown in the table below.

MIMO Mode

Modulation	Data Rate
802.11a	**6 Mbps**
802.11n HT20 (Covered by HE20)	**MCS0**
802.11n HT40 (Covered by HE40)	**MCS0**
802.11ac VHT20 (Covered by HE20)	**MCS0**
802.11ac VHT40 (Covered by HE40)	**MCS0**
802.11ac VHT80 (Covered by HE80)	**MCS0**
802.11ax HE20	**MCS0**
802.11ax HE40	**MCS0**
802.11ax HE80	**MCS0**

Remark: The conducted power level of each chain in MIMO mode is equal or higher than SISO mode.

Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + WLAN (5GHz) Link + Bluetooth Link + USB Cable 1 (Charging from Adapter 2)

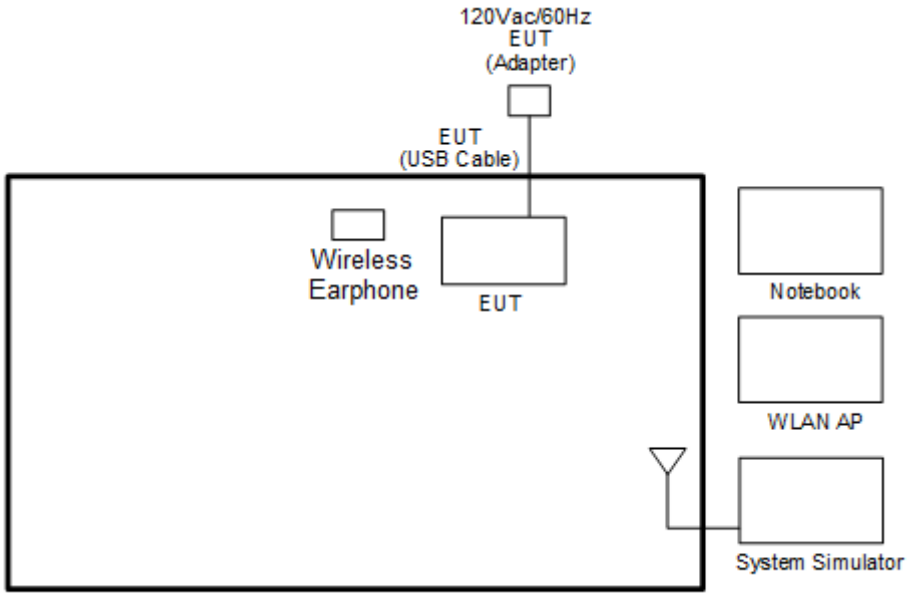
Remark:
1. For Radiated Test Cases, the tests were performed with Adapter 2 and USB Cable 1.
2. During the preliminary test, both charging modes (Adapter mode and WPT Charging mode) were verified. It is determined that the adaptor mode is the worst case for official test.

Ch. #		Band IV：5725-5850 MHz			
		802.11a	802.11ax HE20	802.11ax HE40	802.11ax HE80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

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

<AC Conducted Emission Mode>



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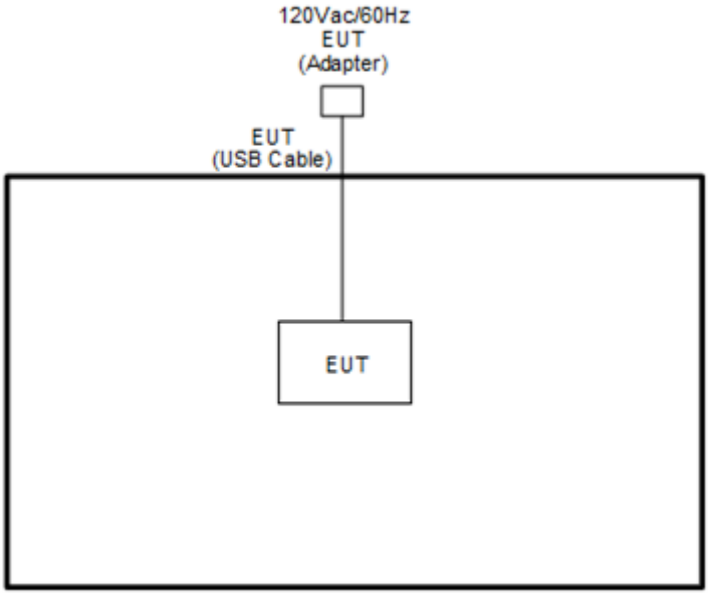


2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	Wireless Earphone	Google	G1007/G1008	A4RG1007/ A4RG1008	N/A	N/A
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
4.	Notebook	Dell	Latitude 3400	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 “cmd 10.0.17134.1304” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

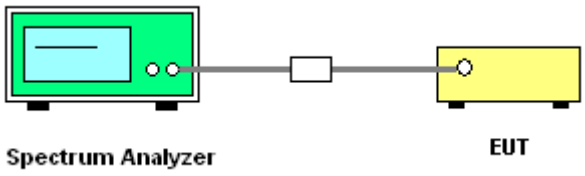
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth for the band 5.725-5.85 GHz
2. Set RBW = 100 kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

3.1.4 Test Setup

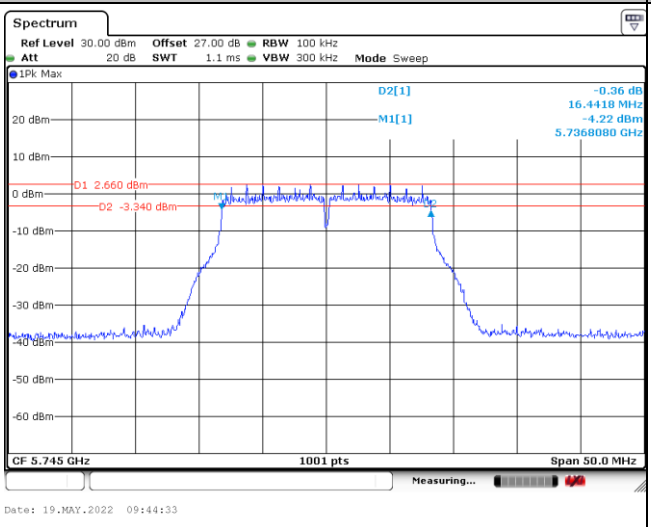
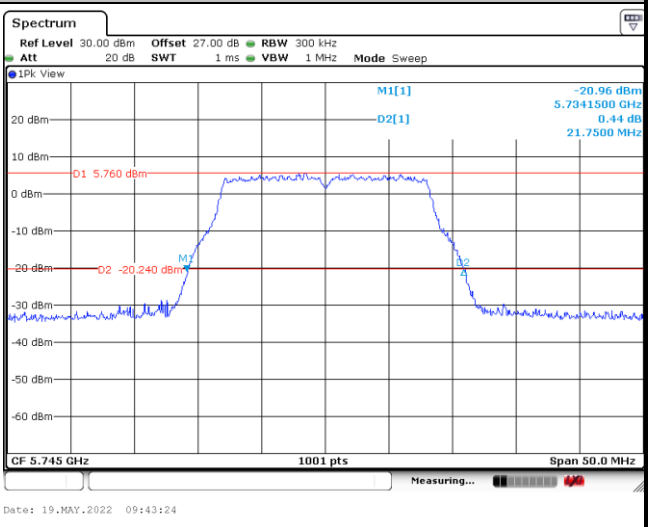
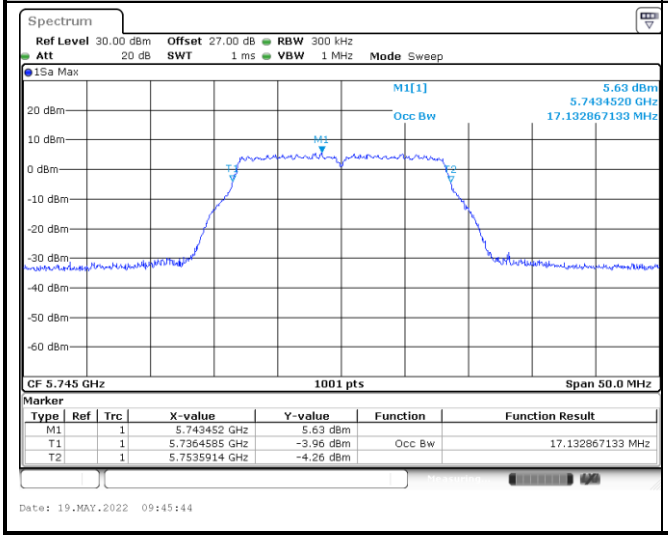


3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

Please refer to Appendix A.

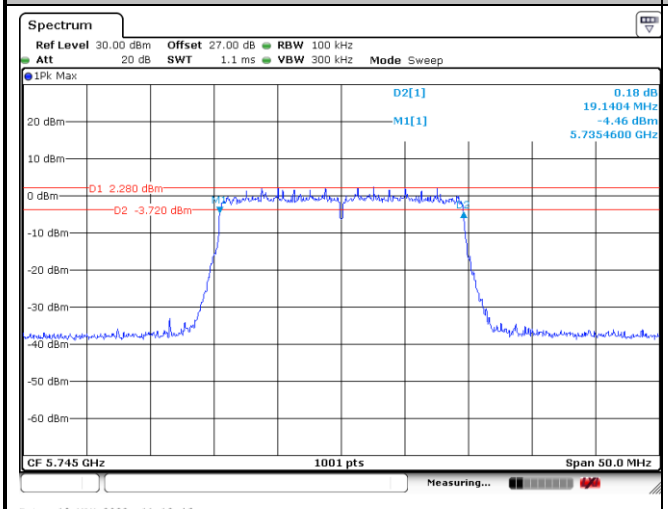
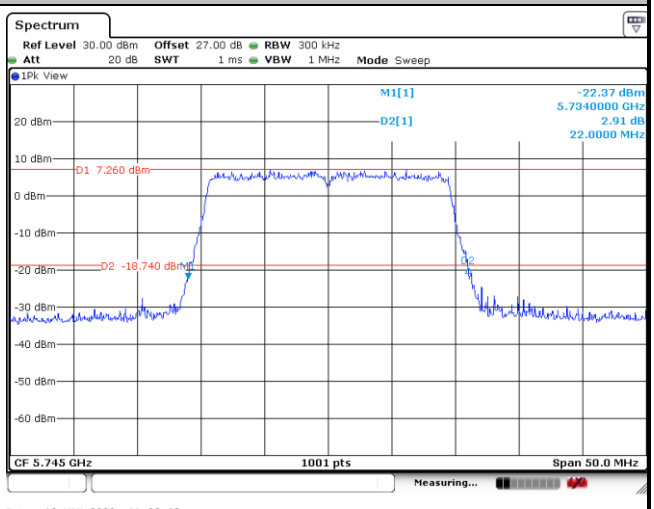
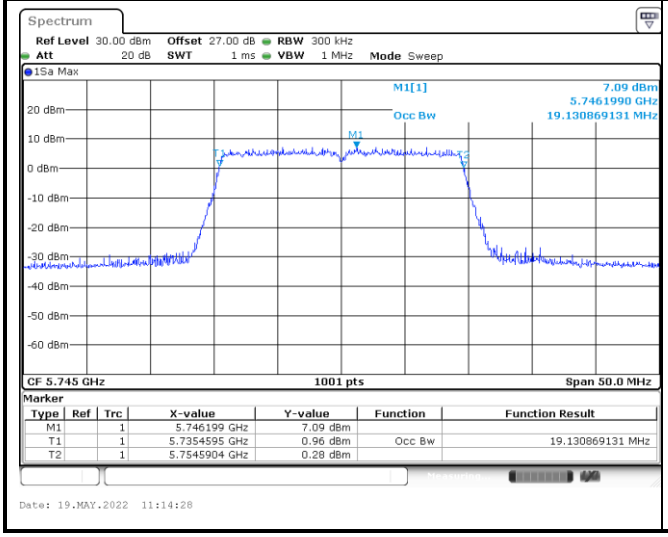
MIMO <Ant. 4+8>

<802.11a>

6dB Bandwidth	26dB Bandwidth
	
99% Occupied Bandwidth	**NA**
	

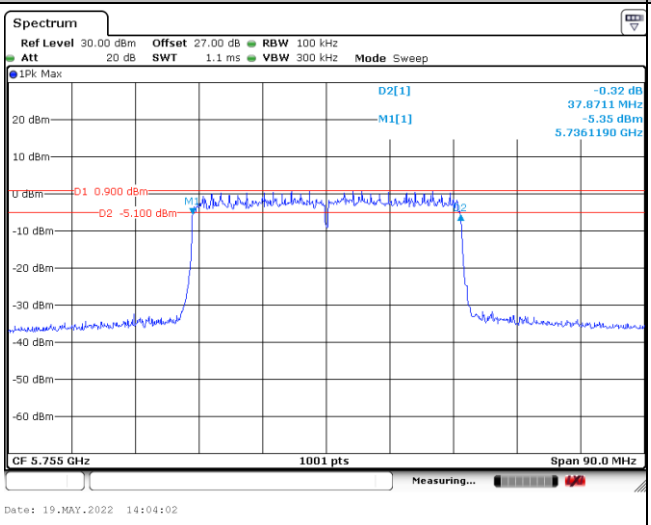
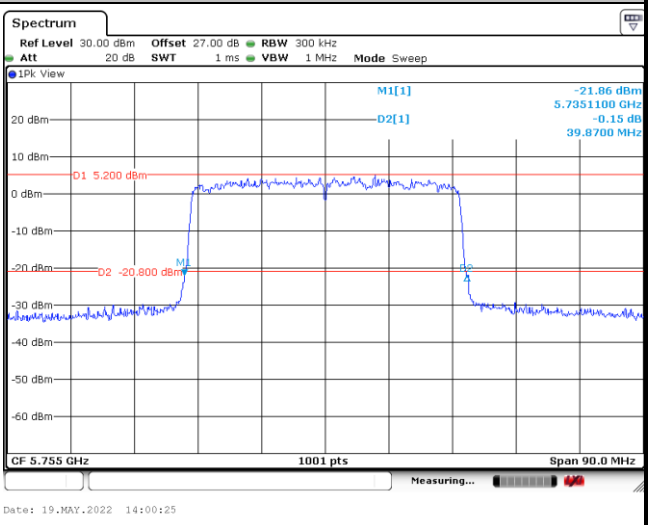
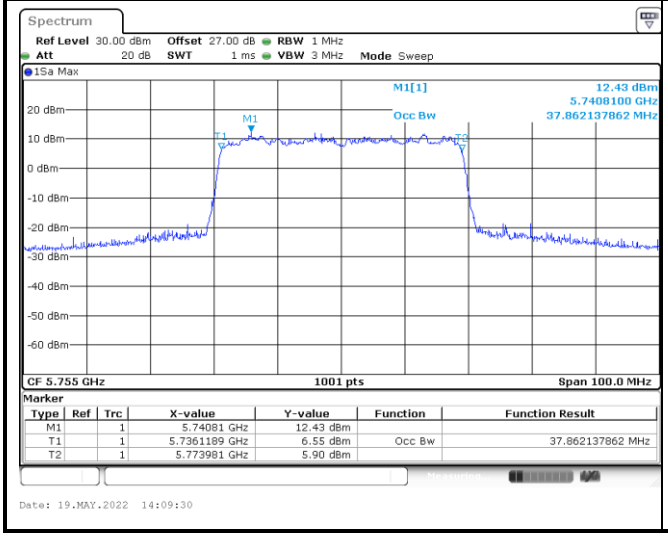
Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

<802.11ax HE20>

6dB Bandwidth	26dB Bandwidth
	
99% Occupied Bandwidth	**NA**
	

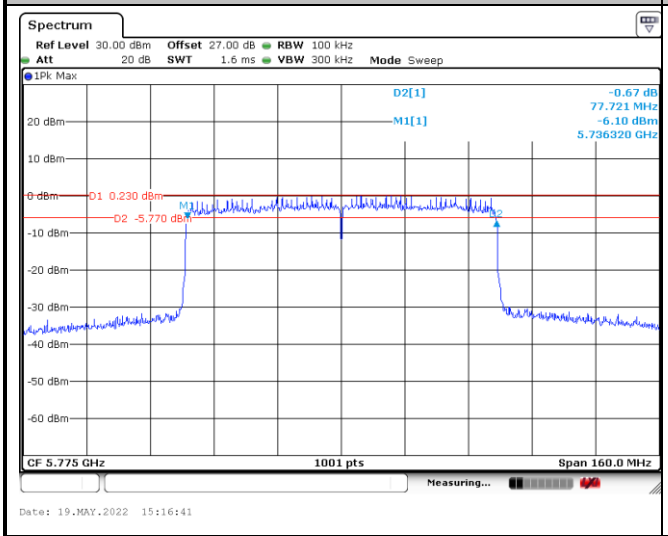
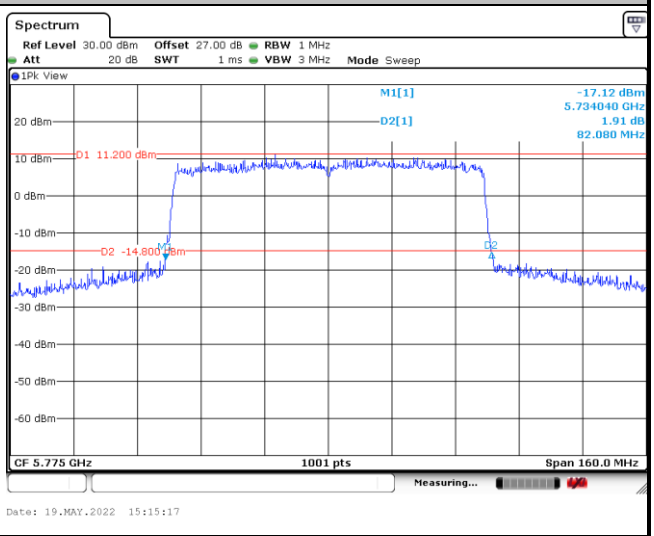
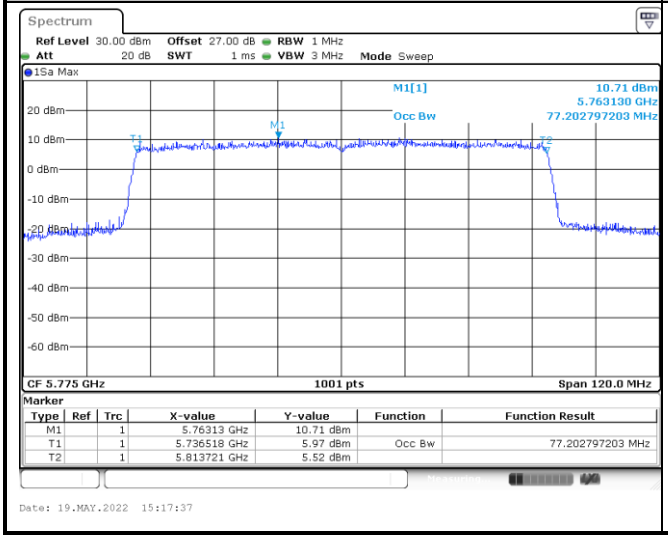
Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

<802.11ax HE40>

6dB Bandwidth	26dB Bandwidth
	
99% Occupied Bandwidth	**NA**
	

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

<802.11ax HE80>

6dB Bandwidth	26dB Bandwidth
	
99% Occupied Bandwidth	**NA**
	

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Maximum Conducted Output Power Measurement

3.2.1 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.

3.2.2 Measuring Instruments

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

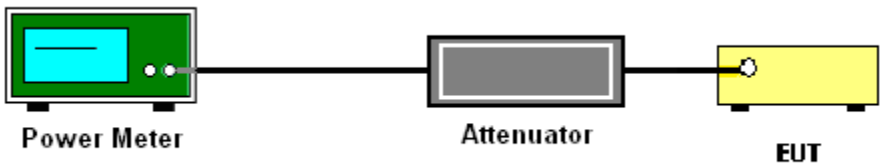
3.2.3 Test Procedures

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

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

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.

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Section F) Maximum power spectral density.

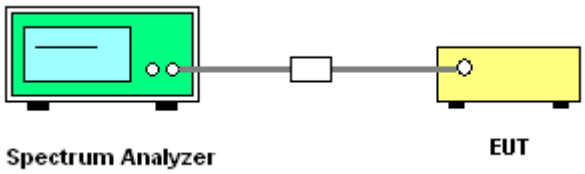
 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300kHz.
- Set VBW ≥ 1 MHz.
- Add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

1. The RF output of EUT is connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
   Method (c): Measure and add 10 log(N_{ANT}) dB.
   With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity 10 log(N_{ANT}) dB is added to each spectrum value before comparing to the emission limit. The addition of 10 log(N_{ANT}) dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{ANT}$ th of the PSD limit.

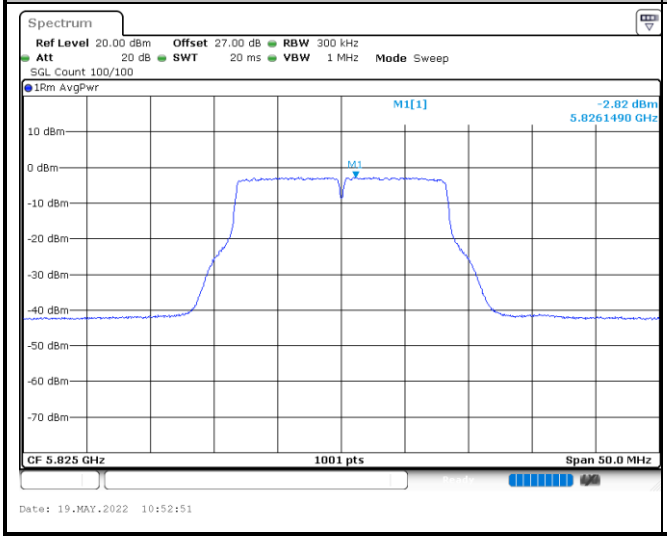
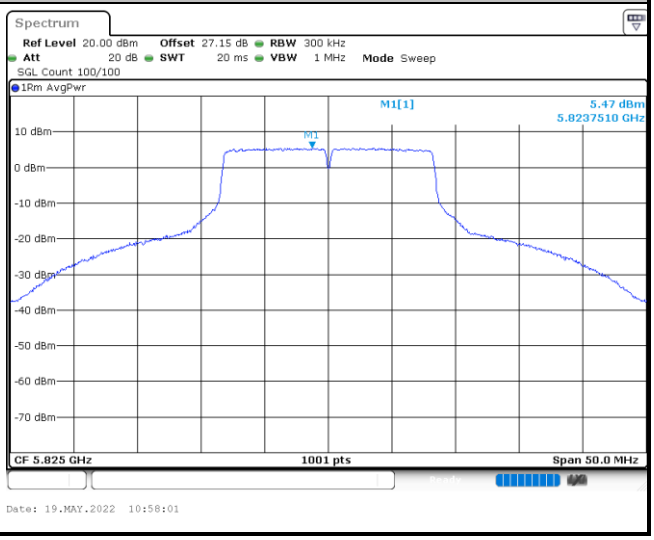
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

<802.11a>

Maximum Power Density Plot (dBm/500kHz)	
MIMO Ant. 4	**MIMO Ant. 8**
	

<802.11ax HE20>

Maximum Power Density Plot (dBm/500kHz)	
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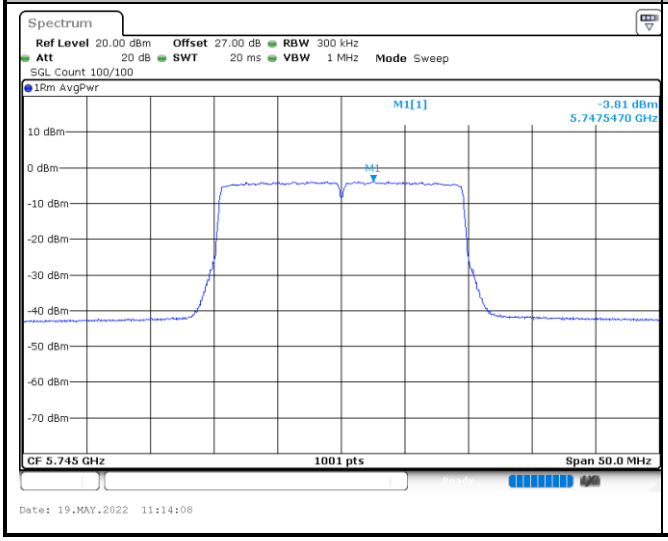	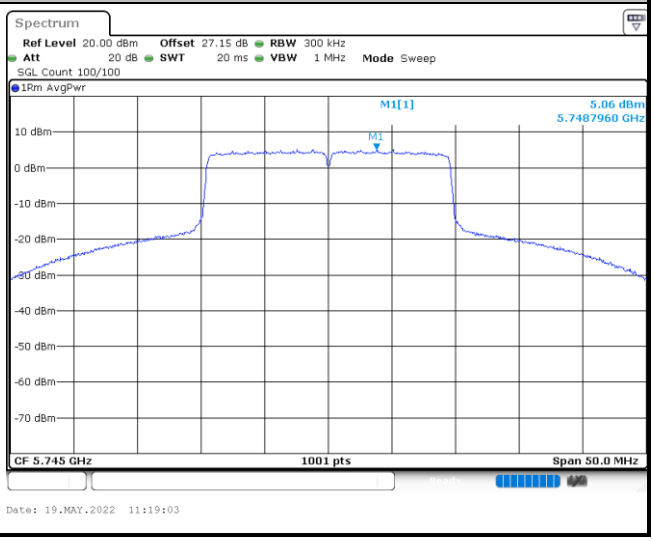

<802.11ax HE40>

Maximum Power Density Plot (dBm/500kHz)	
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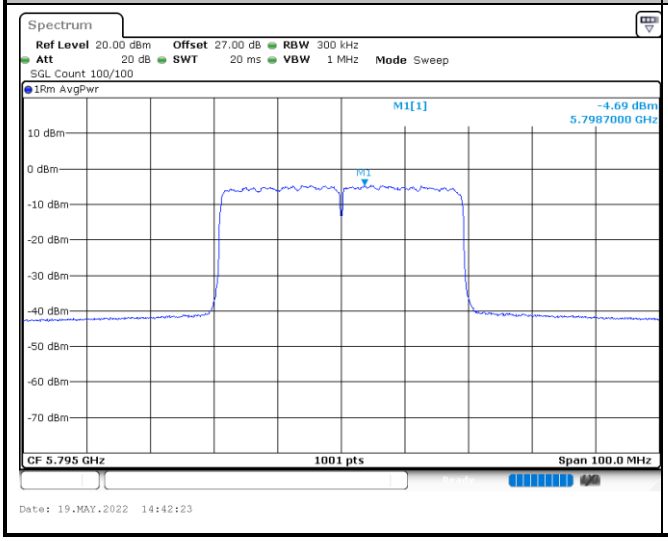
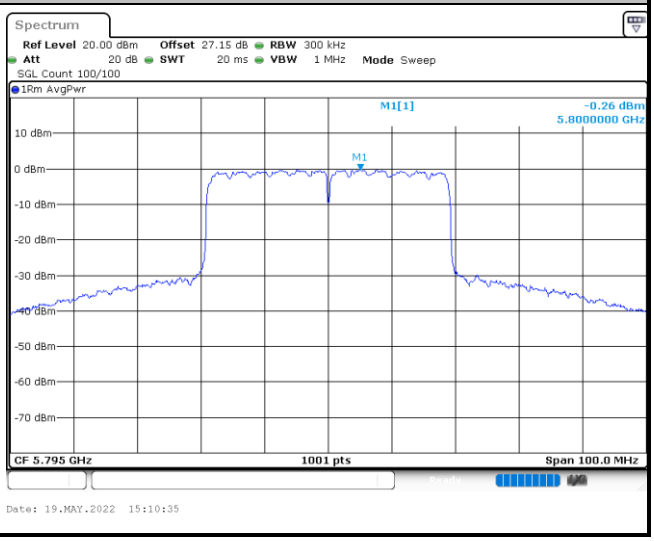
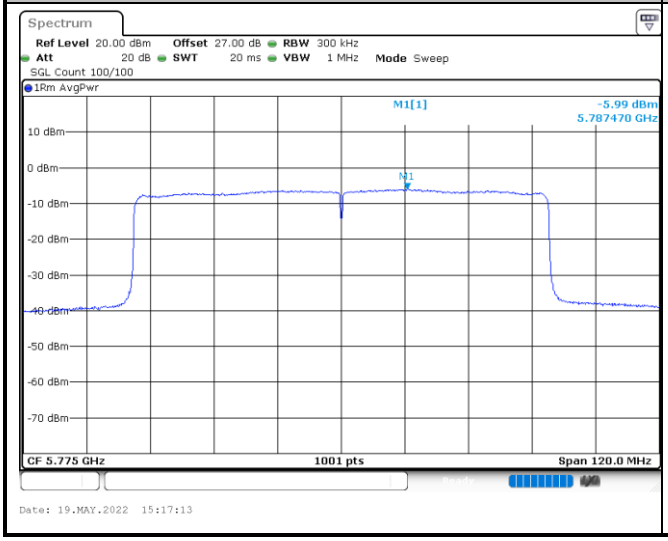
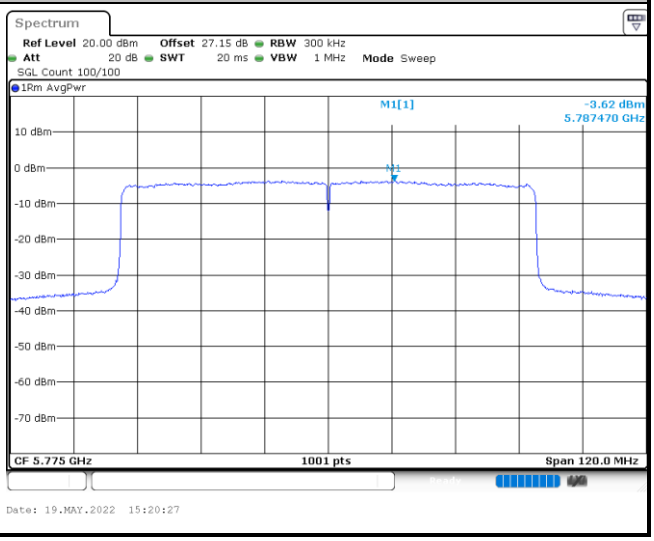
	

<802.11ax HE80>

Maximum Power Density Plot (dBm/500kHz)	
MIMO Ant. 4	**MIMO Ant. 8**
	

Note: Average Power Density (dB) = Measured value+ Duty Factor

3.4 Unwanted Emissions Measurement

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

3.4.1 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.

3.4.2 Measuring Instruments

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

3.4.3 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

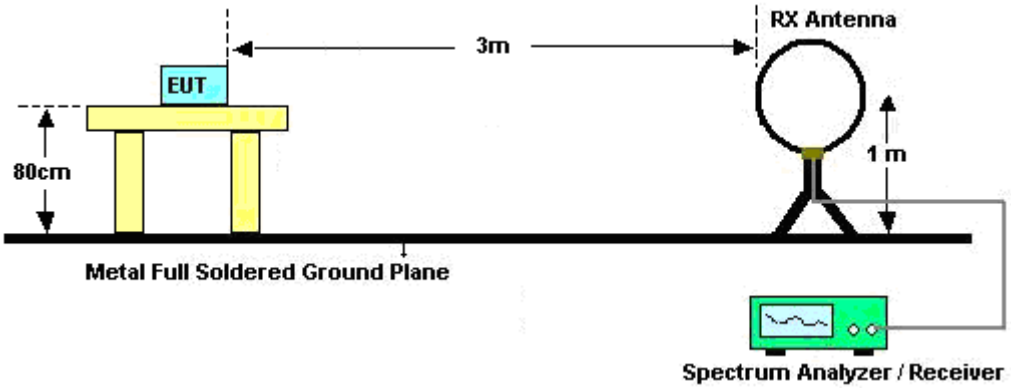
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000 MHz

   - 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.

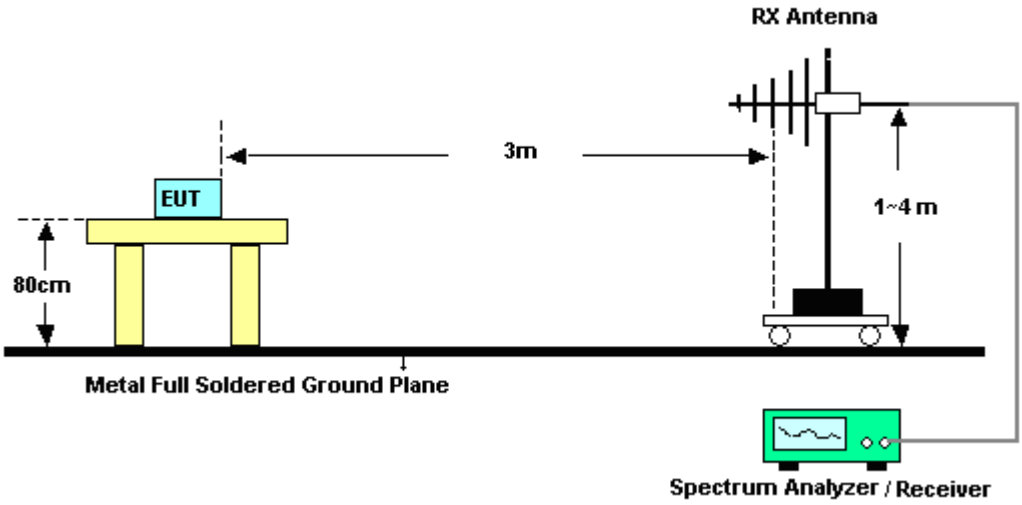
6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit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

3.4.4 Test Setup

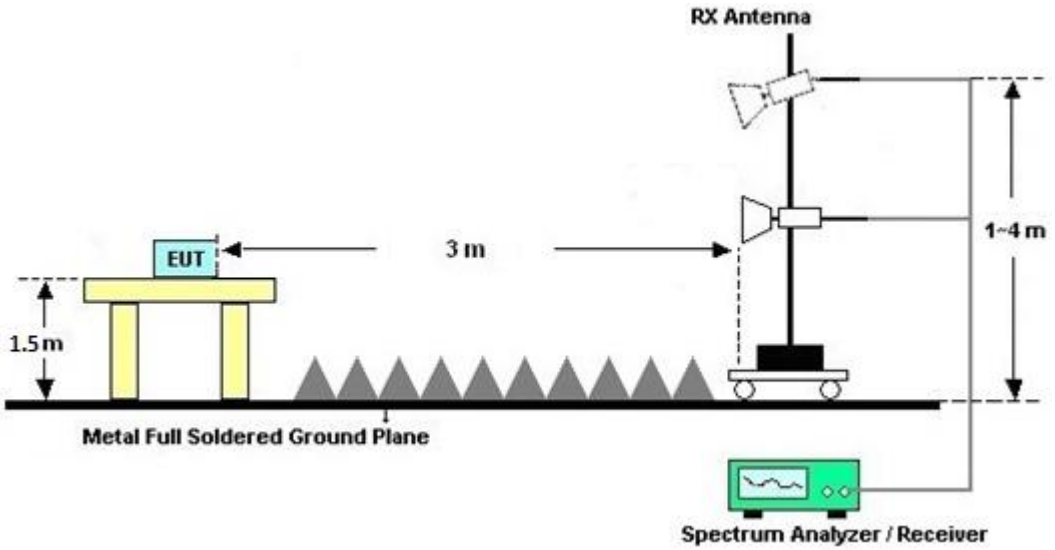
For radiated emissions below 30MHz



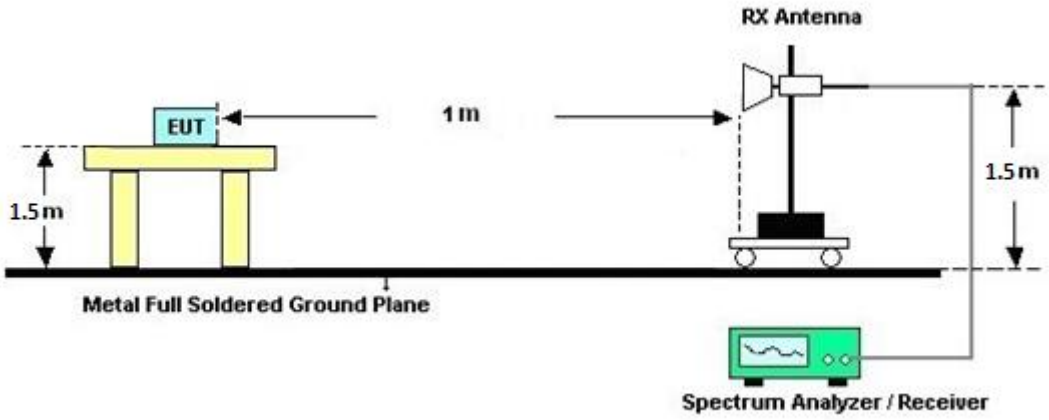
For radiated emissions from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



3.4.5 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.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix C and D.

3.4.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

3.5 AC Conducted Emission Measurement

3.5.1 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.

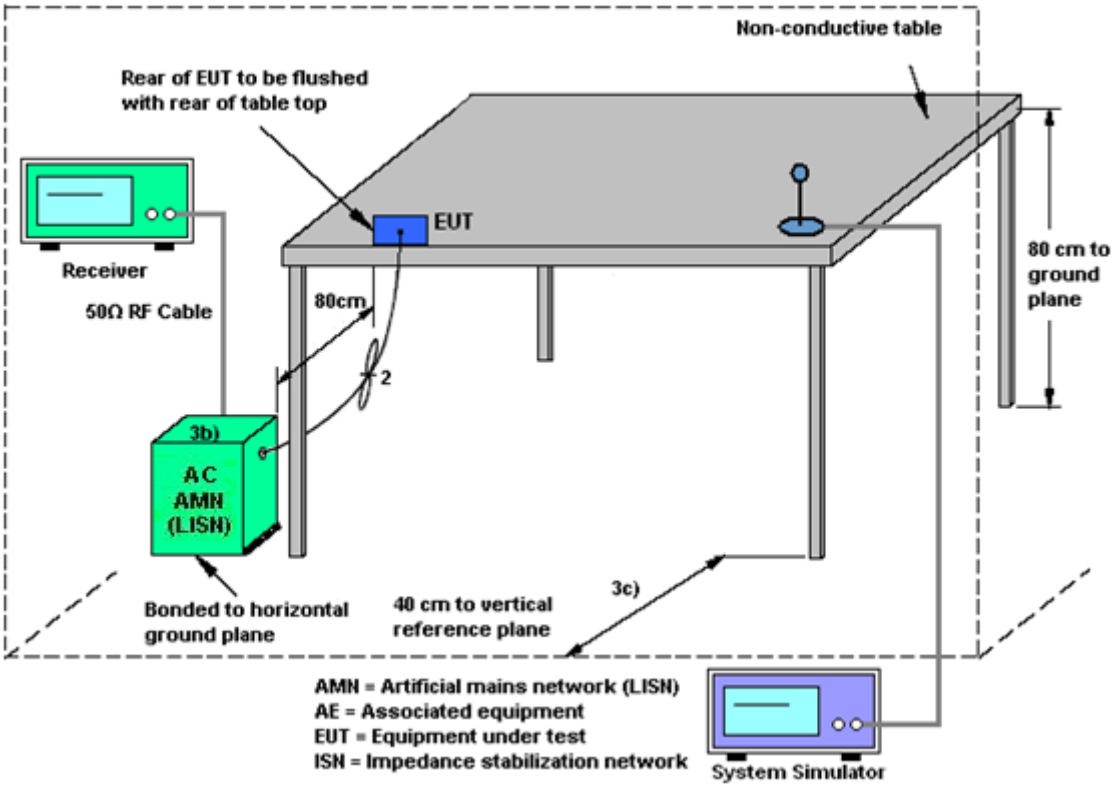
3.5.2 Measuring Instruments

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

3.5.3 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.

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.6 Antenna Requirements

3.6.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For power measurements on IEEE 802.11 devices,

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

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 follows F)2)f)ii) of KDB 662911 D01 v02r01.

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

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.

For example: If a device has two antenna, G_{ANT1}= 3.6dBi; G_{ANT2}=4.2dBi

Directional gain of power measurement = max(3.6, 4.2) + 0 = 4.2 dBi

Directional gain of PSD measurement = $10 * \log[(10^{3.6/20} + 10^{4.2/20})^2 / 2]$ = 6.92 dBi

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

<CDD Modes>						
			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant. 4	Ant. 8	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
Band IV	1.20	-3.50	1.20	2.17	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)
PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

Calculation example:
The DG for PSD is derived from formula is
10 x log { { [10^ (1.20 dBi / 20) + 10^ (-3.50 dBi / 20)] ^ 2 } / 2 }
= 2.17 dBi

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 07, 2021	Apr. 13, 2022~ May 18, 2022	Sep. 06, 2022	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N -06	47020 & 06	30MHz to 1GHz	Oct. 09, 2021	Apr. 13, 2022~ May 18, 2022	Oct. 08, 2022	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02114	1G~18GHz	Aug. 04, 2021	Apr. 13, 2022~ May 18, 2022	Aug. 03, 2022	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	00993	18GHz ~40GHz	Nov. 30, 2021	Apr. 13, 2022~ May 18, 2022	Nov. 29, 2022	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1G	Jul. 05, 2021	Apr. 13, 2022~ May 18, 2022	Jul. 04, 2022	Radiation (03CH16-HY)
Amplifier	EMCI	EMC051845SE	980729	1-18GHz	Jul. 09, 2021	Apr. 13, 2022~ May 18, 2022	Jul. 08, 2022	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2021	Apr. 13, 2022~ May 18, 2022	Jun. 21, 2022	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 09, 2021	Apr. 13, 2022~ May 18, 2022	Dec. 08, 2022	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A	MY59053012	3Hz~26.5GHz	Nov. 18, 2021	Apr. 13, 2022~ May 18, 2022	Nov. 17, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11680/4PE	NA	Aug. 28, 2021	Apr. 13, 2022~ May 18, 2022	Aug. 27, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11688/4PE	NA	Aug. 28, 2021	Apr. 13, 2022~ May 18, 2022	Aug. 27, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5757	NA	Aug. 28, 2021	Apr. 13, 2022~ May 18, 2022	Aug. 27, 2022	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Apr. 13, 2022~ May 18, 2022	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Apr. 13, 2022~ May 18, 2022	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Apr. 13, 2022~ May 18, 2022	N/A	Radiation (03CH16-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Apr. 19, 2022	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2021	Apr. 19, 2022	Nov. 30, 2022	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2021	Apr. 19, 2022	Nov. 16, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 03, 2021	Apr. 19, 2022	Dec. 02, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Apr. 19, 2022	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-FN	00691	N/A	Jul. 28, 2021	Apr. 19, 2022	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 30, 2021	Apr. 19, 2022	Dec. 29, 2022	Conduction (CO05-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 16, 2021	Mar. 23, 2022~ May 19, 2022	Nov. 15, 2022	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO 12 (NO:113)	10MHz~6GHz	Dec. 16, 2021	Mar. 23, 2022~ May 19, 2022	Dec. 15, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	Mar. 23, 2022~ May 19, 2022	Aug. 29, 2022	Conducted (TH05-HY)
Switch Control Mainframe	E-IUSTRUME NT	ETF-1405-0	EC1900067 (BOX7)	N/A	Aug. 12, 2021	Mar. 23, 2022~ May 19, 2022	Aug. 11, 2022	Conducted (TH05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.1 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.8 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.8 dB**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Eason Huang	Temperature:	21~25	°C
Test Date:	2022/3/23~05/19	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant 4	Ant 8	Ant 4	Ant 8	Ant 4	Ant 8		
11a	6Mbps	2	149	5745	17.13	19.08	21.75	34.40	16.44	16.44	0.5	Pass
11a	6Mbps	2	157	5785	17.13	18.98	21.70	35.75	16.44	16.44	0.5	Pass
11a	6Mbps	2	165	5825	17.13	19.03	21.50	35.80	16.44	16.44	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 4	Ant 8	SUM	Ant 4	Ant 8	Ant 4	Ant 8	
11a	6Mbps	2	149	5745	14.60	22.55	23.20	30.00		1.20		Pass
11a	6Mbps	2	157	5785	14.80	22.45	23.14	30.00		1.20		Pass
11a	6Mbps	2	165	5825	14.80	22.55	23.22	30.00		1.20		Pass
HT20	MCS0	2	149	5745	14.20	22.65	23.23	30.00		1.20		Pass
HT20	MCS0	2	157	5785	14.40	22.55	23.17	30.00		1.20		Pass
HT20	MCS0	2	165	5825	14.80	22.45	23.14	30.00		1.20		Pass
HT40	MCS0	2	151	5755	15.10	21.25	22.19	30.00		1.20		Pass
HT40	MCS0	2	159	5795	15.60	21.35	22.37	30.00		1.20		Pass
VHT20	MCS0	2	149	5745	14.45	22.75	23.35	30.00		1.20		Pass
VHT20	MCS0	2	157	5785	14.65	22.65	23.29	30.00		1.20		Pass
VHT20	MCS0	2	165	5825	15.05	22.55	23.26	30.00		1.20		Pass
VHT40	MCS0	2	151	5755	15.20	21.35	22.29	30.00		1.20		Pass
VHT40	MCS0	2	159	5795	15.70	21.45	22.47	30.00		1.20		Pass
VHT80	MCS0	2	155	5775	17.10	21.55	22.88	30.00		1.20		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV MIMO																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		10log (500kHz /RBW) Factor (dB)		Average Power Density with Duty Factor (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 4	Ant 8	Ant 4	Ant 8	Ant 4	Ant 8	SUM	Ant 4	Ant 8	Ant 4	Ant 8	
11a	6Mbps	2	149	5745	0.29	0.30	2.22		0.03	7.91	10.92	30.00		2.17		Pass
11a	6Mbps	2	157	5785	0.29	0.30	2.22		0.01	7.89	10.90	30.00		2.17		Pass
11a	6Mbps	2	165	5825	0.29	0.30	2.22		-0.31	7.98	10.99	30.00		2.17		Pass

Note: PSD Sum = Max PSD(Ant. 4, Ant. 8) + 10 log (n)

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
						Ant 4	Ant 8	Ant 4	Ant 8	Ant 4	Ant 8		
HE20	MCS0	2	149	5745	Full	19.13	19.83	22.00	41.80	19.14	19.04	0.5	Pass
HE20	MCS0	2	157	5785	Full	19.13	19.83	22.10	38.65	19.19	19.04	0.5	Pass
HE20	MCS0	2	165	5825	Full	19.18	19.88	21.85	38.80	19.09	18.94	0.5	Pass
HE40	MCS0	2	151	5755	Full	37.86	37.86	39.87	40.05	37.87	37.87	0.5	Pass
HE40	MCS0	2	159	5795	Full	37.76	37.96	40.14	39.78	38.05	37.71	0.5	Pass
HE80	MCS0	2	155	5775	Full	77.20	77.20	82.08	81.92	77.72	77.40	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 4	Ant 8	SUM	Ant 4	Ant 8	Ant 4	Ant 8	
HE20	MCS0	2	149	5745	Full	14.40	22.85	23.43	30.00		1.20		Pass
HE20	MCS0	2	149	5745	26/0	4.70	13.65	14.17	30.00		1.20		Pass
HE20	MCS0	2	149	5745	52/37	8.00	16.75	17.29	30.00		1.20		Pass
HE20	MCS0	2	149	5745	106/53	10.90	19.75	20.28	30.00		1.20		Pass
HE20	MCS0	2	157	5785	Full	14.60	22.75	23.37	30.00		1.20		Pass
HE20	MCS0	2	157	5785	26/4	5.00	13.95	14.47	30.00		1.20		Pass
HE20	MCS0	2	157	5785	52/38	8.00	16.45	17.03	30.00		1.20		Pass
HE20	MCS0	2	157	5785	106/53	11.20	19.65	20.23	30.00		1.20		Pass
HE20	MCS0	2	165	5825	Full	15.00	22.65	23.34	30.00		1.20		Pass
HE20	MCS0	2	165	5825	26/8	5.10	13.45	14.04	30.00		1.20		Pass
HE20	MCS0	2	165	5825	52/40	8.30	16.55	17.16	30.00		1.20		Pass
HE20	MCS0	2	165	5825	106/54	11.50	19.95	20.53	30.00		1.20		Pass
HE40	MCS0	2	151	5755	Full	15.30	21.45	22.39	30.00		1.20		Pass
HE40	MCS0	2	159	5795	Full	15.80	21.55	22.57	30.00		1.20		Pass
HE80	MCS0	2	155	5775	Full	17.20	21.65	22.98	30.00		1.20		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV MIMO																	
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		10log (500kHz /RBW) Factor (dB)		Average Power Density with Duty Factor (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
						Ant 4	Ant 8	Ant 4	Ant 8	Ant 4	Ant 8	SUM	Ant 4	Ant 8	Ant 4	Ant 8	
HE20	MCS0	2	149	5745	Full	0.18	0.18	2.22		-1.41	7.46	10.47	30.00		2.17		Pass
HE20	MCS0	2	149	5745	26/0	0.18	0.18	2.22		-1.48	7.03	10.04	30.00		2.17		Pass
HE20	MCS0	2	149	5745	52/37	0.18	0.18	2.22		-1.43	7.18	10.19	30.00		2.17		Pass
HE20	MCS0	2	149	5745	106/53	0.18	0.18	2.22		-1.45	7.22	10.23	30.00		2.17		Pass
HE20	MCS0	2	157	5785	Full	0.18	0.18	2.22		-1.26	7.23	10.24	30.00		2.17		Pass
HE20	MCS0	2	157	5785	26/4	0.18	0.18	2.22		-1.37	7.16	10.17	30.00		2.17		Pass
HE20	MCS0	2	157	5785	52/38	0.18	0.18	2.22		-1.37	7.11	10.12	30.00		2.17		Pass
HE20	MCS0	2	157	5785	106/53	0.18	0.18	2.22		-1.49	7.12	10.13	30.00		2.17		Pass
HE20	MCS0	2	165	5825	Full	0.18	0.18	2.22		-0.90	7.36	10.37	30.00		2.17		Pass
HE20	MCS0	2	165	5825	26/8	0.18	0.18	2.22		-0.94	7.11	10.12	30.00		2.17		Pass
HE20	MCS0	2	165	5825	52/40	0.18	0.18	2.22		-1.03	7.29	10.30	30.00		2.17		Pass
HE20	MCS0	2	165	5825	106/54	0.18	0.18	2.22		-0.98	7.33	10.34	30.00		2.17		Pass
HE40	MCS0	2	151	5755	Full	0.41	0.41	2.22		-2.75	2.30	5.31	30.00		2.17		Pass
HE40	MCS0	2	159	5795	Full	0.41	0.41	2.22		-2.06	2.37	5.38	30.00		2.17		Pass
HE80	MCS0	2	155	5775	Full	0.35	0.35	2.22		-3.42	-1.05	1.96	30.00		2.17		Pass

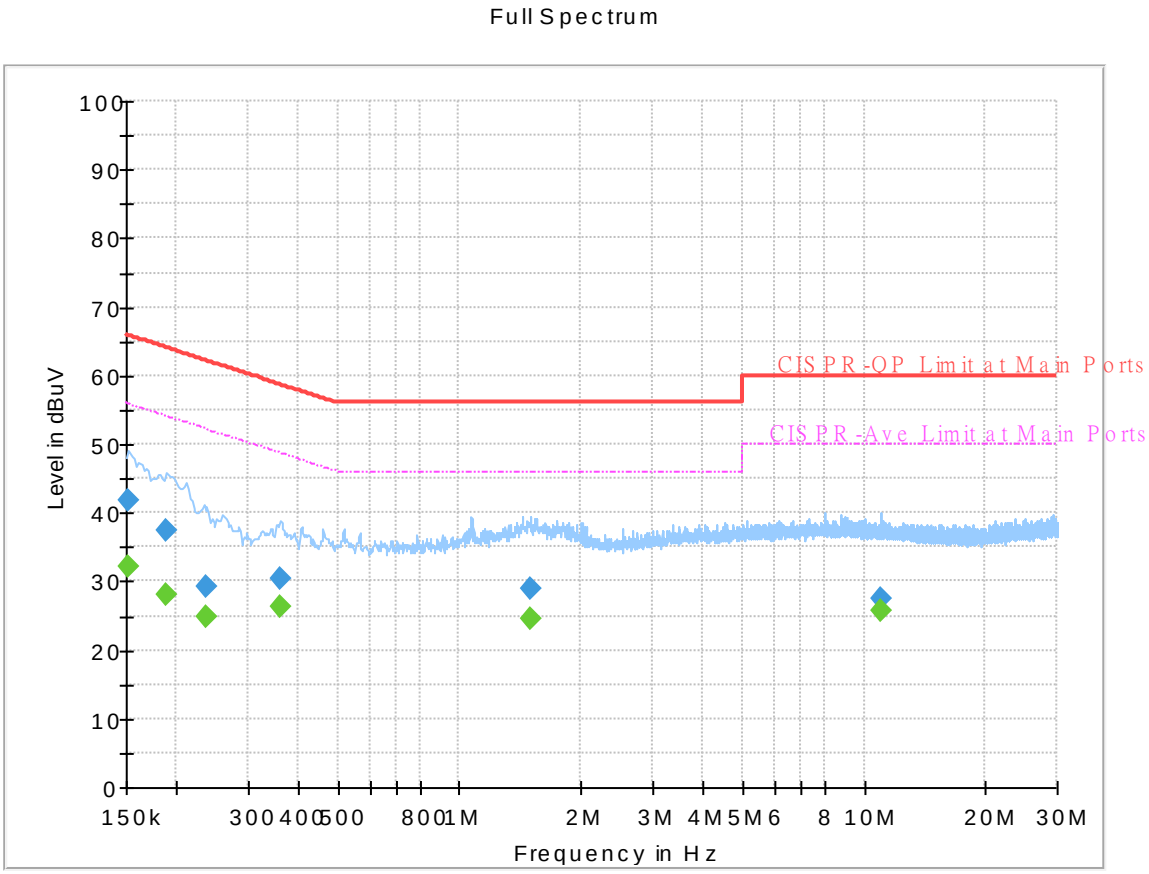
Note: PSD Sum = Max PSD(Ant. 4, Ant. 8) + 10 log (n)

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	**Temperature :**	23~26℃
		Relative Humidity :	45~55%

EUT Information

Report NO :	1O2919-05
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line



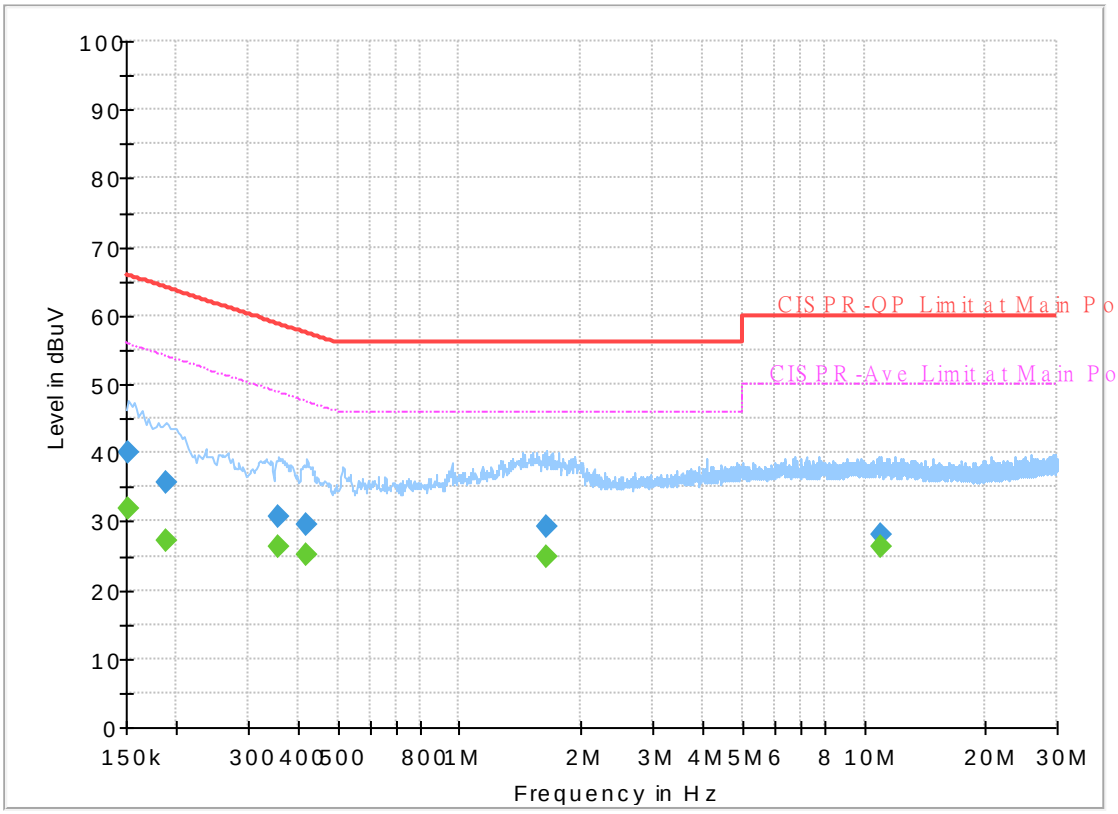
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	32.15	55.88	23.73	L1	OFF	19.6
0.152250	41.82	---	65.88	24.06	L1	OFF	19.6
0.188250	---	27.94	54.11	26.17	L1	OFF	19.6
0.188250	37.57	---	64.11	26.54	L1	OFF	19.6
0.237750	---	24.95	52.17	27.22	L1	OFF	19.6
0.237750	29.23	---	62.17	32.94	L1	OFF	19.6
0.361500	---	26.23	48.69	22.46	L1	OFF	19.6
0.361500	30.29	---	58.69	28.40	L1	OFF	19.6
1.493250	---	24.61	46.00	21.39	L1	OFF	19.7
1.493250	28.88	---	56.00	27.12	L1	OFF	19.7
10.968000	---	25.76	50.00	24.24	L1	OFF	20.1
10.968000	27.51	---	60.00	32.49	L1	OFF	20.1

EUT Information

Report NO :	1O2919-05
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	---	31.86	55.88	24.02	N	OFF	19.6
0.152250	40.19	---	65.88	25.69	N	OFF	19.6
0.188250	---	27.18	54.11	26.93	N	OFF	19.6
0.188250	35.66	---	64.11	28.45	N	OFF	19.6
0.357000	---	26.22	48.80	22.58	N	OFF	19.6
0.357000	30.63	---	58.80	28.17	N	OFF	19.6
0.420000	---	25.16	47.45	22.29	N	OFF	19.6
0.420000	29.49	---	57.45	27.96	N	OFF	19.6
1.648500	---	24.73	46.00	21.27	N	OFF	19.7
1.648500	29.19	---	56.00	26.81	N	OFF	19.7
10.972500	---	26.21	50.00	23.79	N	OFF	20.1
10.972500	28.07	---	60.00	31.93	N	OFF	20.1

Appendix C. Radiated Spurious Emission

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

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
4+8		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5611.8	55.55	-12.65	68.2	39.03	33.22	12.89	29.59	105	237	P	H
		5657.6	55.87	-17.98	73.85	39.26	33.3	12.91	29.6	105	237	P	H
		5719.4	56.27	-54.36	110.63	39.51	33.42	12.95	29.61	105	237	P	H
		5723.6	64.68	-54.33	119.01	47.9	33.44	12.95	29.61	105	237	P	H
	*	5745	107.19	-	-	90.27	33.57	12.96	29.61	105	237	P	H
	*	5745	99.75	-	-	82.83	33.57	12.96	29.61	105	237	A	H
													H
													H
		5624.4	55.99	-12.21	68.2	39.44	33.25	12.89	29.59	100	141	P	V
		5694.4	56.73	-44.34	101.07	40.1	33.3	12.93	29.6	100	141	P	V
		5716	58.1	-51.58	109.68	41.37	33.4	12.94	29.61	100	141	P	V
		5725	62.81	-59.39	122.2	46.02	33.45	12.95	29.61	100	141	P	V
	*	5745	104.66	-	-	87.74	33.57	12.96	29.61	100	141	P	V
	*	5745	96.64	-	-	79.72	33.57	12.96	29.61	100	141	A	V
													V
													V

WIFI Ant. 4+8	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)
		5623.4	56.31	-11.89	68.2	39.76	33.25	12.89	29.59	100	238	P	H
		5652	56.45	-13.24	69.69	39.84	33.3	12.91	29.6	100	238	P	H
		5709.4	56.44	-51.39	107.83	39.75	33.36	12.94	29.61	100	238	P	H
		5724.6	56.39	-64.9	121.29	39.6	33.45	12.95	29.61	100	238	P	H
	*	5785	108.09	-	-	91.06	33.67	12.98	29.62	100	238	P	H
	*	5785	100.17	-	-	83.14	33.67	12.98	29.62	100	238	A	H
		5852.8	56.8	-59.02	115.82	39.61	34	12.82	29.63	100	238	P	H
		5869.6	56.56	-50.15	106.71	39.44	34	12.76	29.64	100	238	P	H
		5902.4	57.59	-27.3	84.89	40.57	34	12.66	29.64	100	238	P	H
		5933.6	56.57	-11.63	68.2	39.59	34.07	12.56	29.65	100	238	P	H
													H
802.11a													H
CH 157		5602.6	55.6	-12.6	68.2	39.1	33.21	12.88	29.59	102	141	P	V
5785MHz		5672.4	56.29	-28.53	84.82	39.67	33.3	12.92	29.6	102	141	P	V
		5715.4	55.57	-53.94	109.51	38.85	33.39	12.94	29.61	102	141	P	V
		5724	56.01	-63.91	119.92	39.23	33.44	12.95	29.61	102	141	P	V
	*	5785	105.05	-	-	88.02	33.67	12.98	29.62	102	141	P	V
	*	5785	97.17	-	-	80.14	33.67	12.98	29.62	102	141	A	V
		5851	55.87	-64.05	119.92	38.68	34	12.82	29.63	102	141	P	V
		5868	56.27	-50.89	107.16	39.14	34	12.77	29.64	102	141	P	V
		5909.2	56.8	-23.06	79.86	39.78	34.02	12.64	29.64	102	141	P	V
		5929.6	56.47	-11.73	68.2	39.49	34.06	12.57	29.65	102	141	P	V
													V
													V

WIFI Ant. 4+8	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	108.38	-	-	91.25	33.85	12.91	29.63	100	237	P	H
	*	5825	100.23	-	-	83.1	33.85	12.91	29.63	100	237	A	H
		5851.4	60.23	-58.78	119.01	43.04	34	12.82	29.63	100	237	P	H
		5858.4	61.52	-48.33	109.85	44.35	34	12.8	29.63	100	237	P	H
		5875.6	57.83	-46.92	104.75	40.73	34	12.74	29.64	100	237	P	H
		5931.8	56.81	-11.39	68.2	39.84	34.06	12.56	29.65	100	237	P	H
													H
802.11a													H
CH 165	*	5825	105.69	-	-	88.56	33.85	12.91	29.63	100	26	P	V
5825MHz	*	5825	97.12	-	-	79.99	33.85	12.91	29.63	100	26	A	V
		5851.2	59.9	-59.56	119.46	42.71	34	12.82	29.63	100	26	P	V
		5860.6	58.13	-51.1	109.23	40.97	34	12.79	29.63	100	26	P	V
		5875.6	57.53	-47.22	104.75	40.43	34	12.74	29.64	100	26	P	V
		5925.8	57.79	-10.41	68.2	40.81	34.05	12.58	29.65	100	26	P	V
													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 802.11a (Harmonic @ 3m)

WIFI Ant. 4+8	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		11490	47.99	-26.01	74	44.93	38.84	19.23	55.01	-	-	P	H
		14471	49.48	-24.52	74	41.67	40.4	21.73	54.32	-	-	P	H
		14471	42.58	-11.42	54	34.77	40.4	21.73	54.32	-	-	A	H
		17235	57.96	-10.24	68.2	50.73	37.81	25.11	55.69	-	-	P	H
		17956	54.41	-19.59	74	42.87	42.65	25.46	56.57	-	-	P	H
		17956	43.13	-10.87	54	31.59	42.65	25.46	56.57	-	-	A	H
													H
													H
													H
													H
													H
													H
		11490	46.25	-27.75	74	43.19	38.84	19.23	55.01	-	-	P	V
		14471	46.92	-27.08	74	39.11	40.4	21.73	54.32	-	-	P	V
		14471	42.65	-11.35	54	34.84	40.4	21.73	54.32	-	-	A	V
		17235	64.78	-3.42	68.2	57.55	37.81	25.11	55.69	100	28	P	V
		17989	52.41	-21.59	74	40.61	42.91	25.48	56.59	-	-	P	V
		17989	43.47	-10.53	54	31.67	42.91	25.48	56.59	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 4+8	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	46.51	-27.49	74	43.42	38.8	19.27	54.98	-	-	P	H
		14471	47.61	-26.39	74	39.8	40.4	21.73	54.32	-	-	P	H
		14471	42.28	-11.72	54	34.47	40.4	21.73	54.32	-	-	A	H
		17355	58.13	-10.07	68.2	50.75	38.17	25.16	55.95	-	-	P	H
		17978	53.36	-20.64	74	41.66	42.82	25.47	56.59	-	-	P	H
		17978	43.4	-10.6	54	31.7	42.82	25.47	56.59	-	-	A	H
													H
													H
													H
													H
													H
802.11a CH 157 5785MHz													H
		11570	46.56	-27.44	74	43.47	38.8	19.27	54.98	-	-	P	V
		14471	48.78	-25.22	74	40.97	40.4	21.73	54.32	-	-	P	V
		14471	42.27	-11.73	54	34.46	40.4	21.73	54.32	-	-	A	V
		17355	64.82	-3.38	68.2	57.44	38.17	25.16	55.95	100	29	P	V
		17802	53.49	-20.51	74	43.55	41.02	25.39	56.47	-	-	P	V
		17802	41.45	-12.55	54	31.51	41.02	25.39	56.47	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 4+8	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	46.6	-27.4	74	43.55	38.7	19.3	54.95	-	-	P	H
		14471	48.83	-25.17	74	41.02	40.4	21.73	54.32	-	-	P	H
		14471	42.28	-11.72	54	34.47	40.4	21.73	54.32	-	-	A	H
		17475	54.97	-13.23	68.2	47.51	38.45	25.22	56.21	-	-	P	H
		17989	53.81	-20.19	74	42.01	42.91	25.48	56.59	-	-	P	H
		17989	43.37	-10.63	54	31.57	42.91	25.48	56.59	-	-	A	H
													H
													H
													H
													H
													H
802.11a CH 165 5825MHz													H
		11650	46.09	-27.91	74	43.04	38.7	19.3	54.95	-	-	P	V
		14471	49	-25	74	41.19	40.4	21.73	54.32	-	-	P	V
		14471	42.18	-11.82	54	34.37	40.4	21.73	54.32	-	-	A	V
		17475	64.44	-3.76	68.2	56.98	38.45	25.22	56.21	100	30	P	V
		17879	53.25	-20.75	74	42.4	41.95	25.42	56.52	-	-	P	V
		17879	42.51	-11.49	54	31.66	41.95	25.42	56.52	-	-	A	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.
4. The emission level close to 18GHz is checked that the average emission level is noise floor only.

Band 4 5725~5850MHz

WIFI 802.11ax HE20_Full (Band Edge @ 3m)

WIFI Ant. 4+8	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)
		5643	55.69	-12.51	68.2	39.1	33.29	12.9	29.6	100	117	P	H
		5695.6	56.1	-45.86	101.96	39.48	33.3	12.93	29.61	100	117	P	H
		5718	58.61	-51.63	110.24	41.87	33.41	12.94	29.61	100	117	P	H
		5724.8	69.56	-52.18	121.74	52.77	33.45	12.95	29.61	100	117	P	H
	*	5745	109.63	-	-	92.71	33.57	12.96	29.61	100	117	P	H
	*	5745	98.2	-	-	81.28	33.57	12.96	29.61	100	117	A	H
802.11ax													H
HE20 Full													H
CH 149		5635.4	55.52	-12.68	68.2	38.94	33.27	12.9	29.59	100	142	P	V
5745MHz		5677.6	56.61	-32.05	88.66	39.99	33.3	12.92	29.6	100	142	P	V
		5719.4	62.36	-48.27	110.63	45.6	33.42	12.95	29.61	100	142	P	V
		5724.4	66.13	-54.7	120.83	49.34	33.45	12.95	29.61	100	142	P	V
	*	5745	105.55	-	-	88.63	33.57	12.96	29.61	100	142	P	V
	*	5745	94.61	-	-	77.69	33.57	12.96	29.61	100	142	A	V
													V
													V

WIFI Ant. 4+8	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)
		5634.6	55.61	-12.59	68.2	39.03	33.27	12.9	29.59	101	117	P	H
		5694	55.8	-44.98	100.78	39.17	33.3	12.93	29.6	101	117	P	H
		5711.4	56.41	-51.98	108.39	39.71	33.37	12.94	29.61	101	117	P	H
		5721.2	55.36	-58.18	113.54	38.59	33.43	12.95	29.61	101	117	P	H
	*	5785	109.34	-	-	92.31	33.67	12.98	29.62	101	117	P	H
	*	5785	98.3	-	-	81.27	33.67	12.98	29.62	101	117	A	H
		5852.6	55.36	-60.91	116.27	38.17	34	12.82	29.63	101	117	P	H
		5856.2	57	-53.46	110.46	39.82	34	12.81	29.63	101	117	P	H
		5908.2	56.41	-24.19	80.6	39.39	34.02	12.64	29.64	101	117	P	H
		5946.6	55.47	-12.73	68.2	38.52	34.09	12.51	29.65	101	117	P	H
802.11ax													H
HE20 Full													H
CH 157		5615.8	55.75	-12.45	68.2	39.22	33.23	12.89	29.59	106	173	P	V
5785MHz		5652	55.91	-13.78	69.69	39.3	33.3	12.91	29.6	106	173	P	V
		5715.2	54.87	-54.59	109.46	38.15	33.39	12.94	29.61	106	173	P	V
		5722.8	54.89	-62.29	117.18	38.11	33.44	12.95	29.61	106	173	P	V
	*	5785	105.53	-	-	88.5	33.67	12.98	29.62	106	173	P	V
	*	5785	94.3	-	-	77.27	33.67	12.98	29.62	106	173	A	V
		5851.4	55.67	-63.34	119.01	38.48	34	12.82	29.63	106	173	P	V
		5859.4	55.86	-53.71	109.57	38.69	34	12.8	29.63	106	173	P	V
		5882.4	55.89	-43.81	99.7	38.81	34	12.72	29.64	106	173	P	V
		5944.8	55.38	-12.82	68.2	38.42	34.09	12.52	29.65	106	173	P	V
													V
													V

WIFI Ant. 4+8	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	111.18	-	-	94.05	33.85	12.91	29.63	100	117	P	H
	*	5825	98.76	-	-	81.63	33.85	12.91	29.63	100	117	A	H
		5850.2	61.7	-60.04	121.74	44.5	34	12.83	29.63	100	117	P	H
		5856.4	58.48	-51.93	110.41	41.3	34	12.81	29.63	100	117	P	H
		5877.6	58.21	-45.06	103.27	41.11	34	12.74	29.64	100	117	P	H
		5936.8	56.87	-11.33	68.2	39.9	34.07	12.55	29.65	100	117	P	H
802.11ax													H
HE20 Full													H
CH 165	*	5825	105.98	-	-	88.85	33.85	12.91	29.63	101	171	P	V
5825MHz	*	5825	95.04	-	-	77.91	33.85	12.91	29.63	101	171	A	V
		5850.2	61.7	-60.04	121.74	44.5	34	12.83	29.63	101	171	P	V
		5868.4	56.95	-50.1	107.05	39.82	34	12.77	29.64	101	171	P	V
		5919.4	56.33	-16	72.33	39.34	34.04	12.6	29.65	101	171	P	V
		5932	56.09	-12.11	68.2	39.12	34.06	12.56	29.65	101	171	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. 4+8	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)
		11490	47.36	-26.64	74	44.3	38.84	19.23	55.01	-	-	P	H
		14471	48.28	-25.72	74	40.47	40.4	21.73	54.32	-	-	P	H
		14471	42.65	-11.35	54	34.84	40.4	21.73	54.32	-	-	A	H
		17235	60.12	-8.08	68.2	52.89	37.81	25.11	55.69	-	-	P	H
		17956	53.07	-20.93	74	41.53	42.65	25.46	56.57	-	-	P	H
		17956	43.13	-10.87	54	31.59	42.65	25.46	56.57	-	-	A	H
													H
													H
													H
													H
802.11ax													H
HE20 Full													H
CH 149		11490	45.54	-28.46	74	42.48	38.84	19.23	55.01	-	-	P	V
5745MHz		14471	47.48	-26.52	74	39.67	40.4	21.73	54.32	-	-	P	V
		14471	42.36	-11.64	54	34.55	40.4	21.73	54.32	-	-	A	V
		17235	64.41	-3.79	68.2	57.18	37.81	25.11	55.69	100	28	P	V
		17967	52.22	-21.78	74	40.6	42.74	25.46	56.58	-	-	P	V
		17967	43.3	-10.7	54	31.68	42.74	25.46	56.58	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 4+8	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	46.83	-27.17	74	43.74	38.8	19.27	54.98	-	-	P	H
		14471	48.23	-25.77	74	40.42	40.4	21.73	54.32	-	-	P	H
		14471	42.5	-11.5	54	34.69	40.4	21.73	54.32	-	-	A	H
		17355	54.65	-13.55	68.2	47.27	38.17	25.16	55.95	-	-	P	H
		17945	53.77	-20.23	74	42.32	42.56	25.45	56.56	-	-	P	H
		17945	42.89	-11.11	54	31.44	42.56	25.45	56.56	-	-	A	H
													H
													H
													H
													H
802.11ax													H
HE20 Full													H
CH 157		11570	46.16	-27.84	74	43.07	38.8	19.27	54.98	-	-	P	V
5785MHz		14471	46.64	-27.36	74	38.83	40.4	21.73	54.32	-	-	P	V
		14471	42.65	-11.35	54	34.84	40.4	21.73	54.32	-	-	A	V
		17355	64.91	-3.29	68.2	57.53	38.17	25.16	55.95	100	28	P	V
		17978	52.22	-21.78	74	40.52	42.82	25.47	56.59	-	-	P	V
		17978	43.59	-10.41	54	31.89	42.82	25.47	56.59	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 4+8	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	46.31	-27.69	74	43.26	38.7	19.3	54.95	-	-	P	H
		14471	49	-25	74	41.19	40.4	21.73	54.32	-	-	P	H
		14471	42.38	-11.62	54	34.57	40.4	21.73	54.32	-	-	A	H
		17475	52.63	-15.57	68.2	45.17	38.45	25.22	56.21	-	-	P	H
		17989	53.43	-20.57	74	41.63	42.91	25.48	56.59	-	-	P	H
		17989	43.16	-10.84	54	31.36	42.91	25.48	56.59	-	-	A	H
													H
													H
													H
													H
802.11ax													H
HE20 Full													H
CH 165		11650	45.21	-28.79	74	42.16	38.7	19.3	54.95	-	-	P	V
5825MHz		14471	46.41	-27.59	74	38.6	40.4	21.73	54.32	-	-	P	V
		14471	42.24	-11.76	54	34.43	40.4	21.73	54.32	-	-	A	V
		17475	64.52	-3.68	68.2	57.06	38.45	25.22	56.21	100	30	P	V
		17956	52.45	-21.55	74	40.91	42.65	25.46	56.57	-	-	P	V
		17956	43.21	-10.79	54	31.67	42.65	25.46	56.57	-	-	A	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.
4. The emission level close to 18GHz is checked that the average emission level is noise floor only.

Band 4 5725~5850MHz

WIFI 802.11ax HE40_Full (Band Edge @ 3m)

WIFI Ant. 4+8	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)
		5623.4	56.89	-11.31	68.2	40.34	33.25	12.89	29.59	101	117	P	H
		5696.2	56.96	-45.44	102.4	40.34	33.3	12.93	29.61	101	117	P	H
		5718.8	68.46	-42	110.46	51.71	33.41	12.95	29.61	101	117	P	H
		5722	70.93	-44.43	115.36	54.16	33.43	12.95	29.61	101	117	P	H
	*	5755	107.88	-	-	90.92	33.61	12.97	29.62	101	117	P	H
	*	5755	96.49	-	-	79.53	33.61	12.97	29.62	101	117	A	H
		5851.8	56.08	-62.02	118.1	38.89	34	12.82	29.63	101	117	P	H
		5874	56.03	-49.45	105.48	38.92	34	12.75	29.64	101	117	P	H
		5895.6	57.22	-32.7	89.92	40.18	34	12.68	29.64	101	117	P	H
		5944.6	57.47	-10.73	68.2	40.51	34.09	12.52	29.65	101	117	P	H
802.11ax													H
HE40 Full													H
CH 151		5613.6	56.25	-11.95	68.2	39.72	33.23	12.89	29.59	100	141	P	V
5755MHz		5672.8	56.64	-28.47	85.11	40.02	33.3	12.92	29.6	100	141	P	V
		5719.6	62.06	-48.63	110.69	45.3	33.42	12.95	29.61	100	141	P	V
		5724.8	63.04	-58.7	121.74	46.25	33.45	12.95	29.61	100	141	P	V
	*	5755	101.78	-	-	84.82	33.61	12.97	29.62	100	141	P	V
	*	5755	91.36	-	-	74.4	33.61	12.97	29.62	100	141	A	V
		5850.6	56.08	-64.75	120.83	38.88	34	12.83	29.63	100	141	P	V
		5864.4	56.82	-51.35	108.17	39.68	34	12.78	29.64	100	141	P	V
		5883.8	56.12	-42.55	98.67	39.04	34	12.72	29.64	100	141	P	V
		5930.4	56.67	-11.53	68.2	39.69	34.06	12.57	29.65	100	141	P	V
													V
													V

WIFI Ant. 4+8	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)
		5641.8	56.14	-12.06	68.2	39.56	33.28	12.9	29.6	103	117	P	H
		5681.8	57.49	-34.28	91.77	40.87	33.3	12.92	29.6	103	117	P	H
		5717.4	56.15	-53.92	110.07	39.42	33.4	12.94	29.61	103	117	P	H
		5725	56.28	-65.92	122.2	39.49	33.45	12.95	29.61	103	117	P	H
	*	5795	108.04	-	-	90.98	33.69	12.99	29.62	103	117	P	H
	*	5795	96.8	-	-	79.74	33.69	12.99	29.62	103	117	A	H
		5851.6	58.21	-60.34	118.55	41.02	34	12.82	29.63	103	117	P	H
		5867.4	57.49	-49.84	107.33	40.36	34	12.77	29.64	103	117	P	H
		5876.6	56.48	-47.53	104.01	39.38	34	12.74	29.64	103	117	P	H
		5944.8	55.87	-12.33	68.2	38.91	34.09	12.52	29.65	103	117	P	H
802.11ax													H
HE40 Full													H
CH 159		5617.6	56.25	-11.95	68.2	39.71	33.24	12.89	29.59	101	117	P	V
5795MHz		5667	56.09	-24.73	80.82	39.47	33.3	12.92	29.6	101	117	P	V
		5709.4	55.91	-51.92	107.83	39.22	33.36	12.94	29.61	101	117	P	V
		5723.2	55.32	-62.78	118.1	38.54	33.44	12.95	29.61	101	117	P	V
	*	5795	101.93	-	-	84.87	33.69	12.99	29.62	101	117	P	V
	*	5795	91.21	-	-	74.15	33.69	12.99	29.62	101	117	A	V
		5850.2	56.5	-65.24	121.74	39.3	34	12.83	29.63	101	117	P	V
		5861	56.49	-52.63	109.12	39.33	34	12.79	29.63	101	117	P	V
		5916	57.27	-17.57	74.84	40.27	34.03	12.61	29.64	101	117	P	V
		5927.4	56.38	-11.82	68.2	39.4	34.05	12.58	29.65	101	117	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 HE40_Full (Harmonic @ 3m)

WIFI Ant. 4+8	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)
		11510	46.12	-27.88	74	43.08	38.8	19.24	55	-	-	P	H
		14471	48.46	-25.54	74	40.65	40.4	21.73	54.32	-	-	P	H
		14471	42.46	-11.54	54	34.65	40.4	21.73	54.32	-	-	A	H
		17265	54.39	-13.81	68.2	47.13	37.9	25.11	55.75	-	-	P	H
		17890	53.35	-20.65	74	42.38	42.08	25.42	56.53	-	-	P	H
		17890	42.76	-11.24	54	31.79	42.08	25.42	56.53	-	-	A	H
													H
													H
													H
													H
802.11ax													H
HE40 Full													H
CH 151		11510	46.71	-27.29	74	43.67	38.8	19.24	55	-	-	P	V
5755MHz		14471	47.33	-26.67	74	39.52	40.4	21.73	54.32	-	-	P	V
		14471	42.35	-11.65	54	34.54	40.4	21.73	54.32	-	-	A	V
		17265	64.46	-3.74	68.2	57.2	37.9	25.11	55.75	100	29	P	V
		17978	52.2	-21.8	74	40.5	42.82	25.47	56.59	-	-	P	V
		17978	43.37	-10.63	54	31.67	42.82	25.47	56.59	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 4+8	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)
		11590	46.62	-27.38	74	43.51	38.8	19.28	54.97	-	-	P	H
		14471	47.5	-26.5	74	39.69	40.4	21.73	54.32	-	-	P	H
		14471	42.65	-11.35	54	34.84	40.4	21.73	54.32	-	-	A	H
		17385	54.76	-13.44	68.2	47.34	38.26	25.17	56.01	-	-	P	H
		17956	52.05	-21.95	74	40.51	42.65	25.46	56.57	-	-	P	H
		17956	42.98	-11.02	54	31.44	42.65	25.46	56.57	-	-	A	H
													H
													H
													H
													H
802.11ax													H
HE40 Full													H
CH 159		11590	45.45	-28.55	74	42.34	38.8	19.28	54.97	-	-	P	V
5795MHz		14471	45.82	-28.18	74	38.01	40.4	21.73	54.32	-	-	P	V
		14471	42.5	-11.5	54	34.69	40.4	21.73	54.32	-	-	A	V
		17385	64.97	-3.23	68.2	57.55	38.26	25.17	56.01	100	30	P	V
		17934	51.64	-22.36	74	40.28	42.47	25.45	56.56	-	-	P	V
		17934	42.87	-11.13	54	31.51	42.47	25.45	56.56	-	-	A	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.
4. The emission level close to 18GHz is checked that the average emission level is noise floor only.

Band 4 5725~5850MHz

WIFI 802.11ax HE80_Full (Band Edge @ 3m)

WIFI Ant. 4+8	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)
		5633.6	56.56	-11.64	68.2	39.98	33.27	12.9	29.59	103	117	P	H
		5699.6	62.16	-42.75	104.91	45.54	33.3	12.93	29.61	103	117	P	H
		5711.6	67.58	-40.87	108.45	50.88	33.37	12.94	29.61	103	117	P	H
		5720.6	67.59	-44.58	112.17	50.83	33.42	12.95	29.61	103	117	P	H
	*	5775	105.43	-	-	88.42	33.65	12.98	29.62	103	117	P	H
	*	5775	93.52	-	-	76.51	33.65	12.98	29.62	103	117	A	H
		5852	66.71	-50.93	117.64	49.52	34	12.82	29.63	103	117	P	H
		5855.4	65.45	-45.24	110.69	48.27	34	12.81	29.63	103	117	P	H
		5875.4	59.05	-45.85	104.9	41.95	34	12.74	29.64	103	117	P	H
		5949	57	-11.2	68.2	40.04	34.1	12.51	29.65	103	117	P	H
802.11ax													H
HE80 Full													H
CH 155		5614.4	55.83	-12.37	68.2	39.3	33.23	12.89	29.59	100	117	P	V
5775MHz		5697.8	56.48	-47.1	103.58	39.86	33.3	12.93	29.61	100	117	P	V
		5717.2	59.08	-50.94	110.02	42.35	33.4	12.94	29.61	100	117	P	V
		5723	60.92	-56.72	117.64	44.14	33.44	12.95	29.61	100	117	P	V
	*	5775	99.09	-	-	82.08	33.65	12.98	29.62	100	117	P	V
	*	5775	88.03	-	-	71.02	33.65	12.98	29.62	100	117	A	V
		5850	58.1	-64.1	122.2	40.9	34	12.83	29.63	100	117	P	V
		5857	56.3	-53.94	110.24	39.13	34	12.8	29.63	100	117	P	V
		5909.8	56.4	-23.02	79.42	39.39	34.02	12.63	29.64	100	117	P	V
		5937.2	56.03	-12.17	68.2	39.07	34.07	12.54	29.65	100	117	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 HE80_Full (Harmonic @ 3m)

WIFI Ant. 4+8	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)
		11550	47.31	-26.69	74	44.24	38.8	19.25	54.98	-	-	P	H
		14471	49.75	-24.25	74	41.94	40.4	21.73	54.32	-	-	P	H
		14471	42.69	-11.31	54	34.88	40.4	21.73	54.32	-	-	A	H
		17325	58.24	-9.96	68.2	50.9	38.08	25.14	55.88	-	-	P	H
		17868	53.48	-20.52	74	42.75	41.82	25.42	56.51	-	-	P	H
		17868	42.47	-11.53	54	31.74	41.82	25.42	56.51	-	-	A	H
													H
													H
													H
													H
802.11ax													H
HE80 Full													H
CH 155		11550	45.86	-28.14	74	42.79	38.8	19.25	54.98	-	-	P	V
5775MHz		14471	47.65	-26.35	74	39.84	40.4	21.73	54.32	-	-	P	V
		14471	42.56	-11.44	54	34.75	40.4	21.73	54.32	-	-	A	V
		17325	64.77	-3.43	68.2	57.43	38.08	25.14	55.88	100	30	P	V
		17901	52.92	-21.08	74	41.81	42.21	25.43	56.53	-	-	P	V
		17901	42.77	-11.23	54	31.66	42.21	25.43	56.53	-	-	A	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.
4. The emission level close to 18GHz is checked that the average emission level is noise floor only.

Emission above 18GHz

5GHz WIFI 802.11ax HE80 Full (SHF @ 1m)

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+8		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE80 Full SHF		20864	35.04	-38.96	74	55.29	37.89	-3.39	54.75	-	-	P	H
		37634	42.55	-25.65	68.2	58.49	42.67	-1.04	57.57	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		23488	35.57	-32.63	68.2	53.77	38.8	-3	54	-	-	P	V
		31614	40.61	-33.39	74	58.6	40.6	-1.98	56.61	-	-	P	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 HE80 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.	
4+8		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE80 Full LF		97.9	31.24	-12.26	43.5	46.19	15.56	1.79	32.3	-	-	P	H
		158.04	24.58	-18.92	43.5	37.77	16.76	2.3	32.25	-	-	P	H
		493.66	25.83	-20.17	46	30.3	23.93	3.96	32.36	-	-	P	H
		721.61	29.47	-16.53	46	29.93	27.24	4.67	32.37	-	-	P	H
		840.92	32.69	-13.31	46	30.6	28.99	5.1	32	-	-	P	H
		950.53	34.02	-11.98	46	29.19	30.57	5.46	31.2	-	-	P	H
													H
													H
													H
													H
													H
													H
		33.88	29.95	-10.05	40	38.59	22.77	0.9	32.31	-	-	P	V
		95.96	28.4	-15.1	43.5	43.53	15.41	1.77	32.31	-	-	P	V
		180.35	27.27	-16.23	43.5	42.01	15.05	2.43	32.22	-	-	P	V
		559.62	28.29	-17.71	46	30.51	26.08	4.14	32.44	-	-	P	V
		784.66	33.87	-12.13	46	33.24	28.02	4.89	32.28	-	-	P	V
		930.16	33.72	-12.28	46	29.86	29.8	5.39	31.33	-	-	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 **over limit** 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	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+8		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(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. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 11490MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

=40.1(dB/m) + 19.23(dB) + 54.14(dBμV) – 60.62 (dB)

= 52.85 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 52.85(dBμV/m) – 74(dBμV/m)

= -21.15(dB)

For Average Limit @ 11490MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

=40.1(dB/m) + 19.23(dB) +44.95(dBμV) – 60.62 (dB)

= 43.66 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.66(dBμV/m) – 54(dBμV/m)

= -10.34(dB)

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

Appendix D. Radiated Spurious Emission Plots

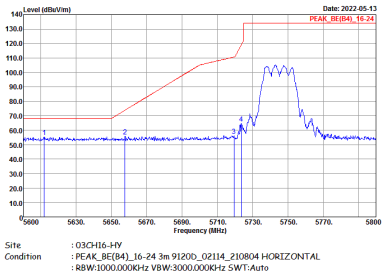
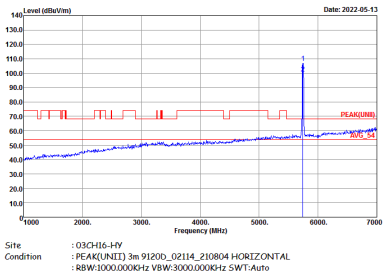
Test Engineer :	Karl Hou and Andy Yang	**Temperature :**	20~25°C
		Relative Humidity :	50~60%

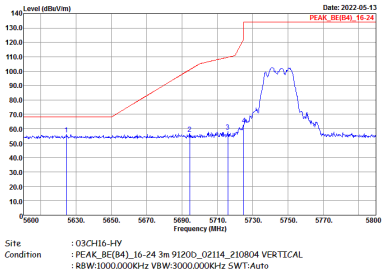
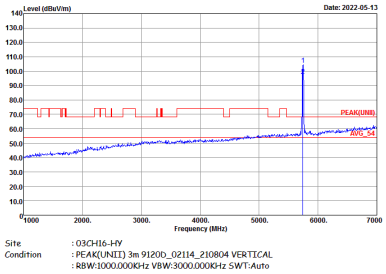
Note symbol

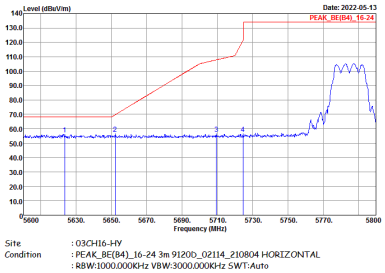
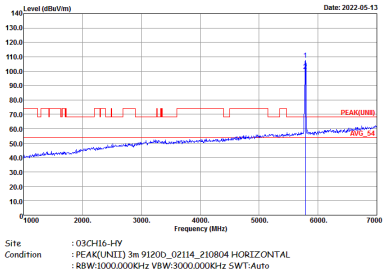
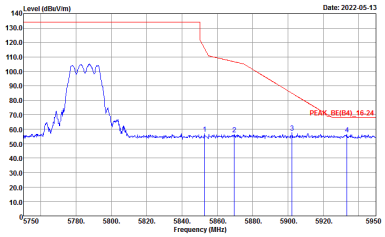
-L	**Low channel location**
-R	**High channel location**

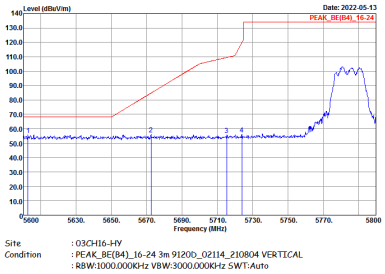
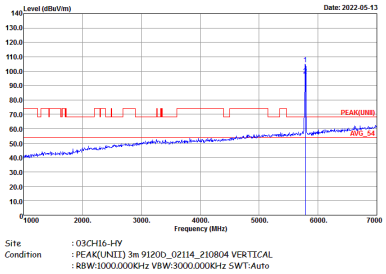
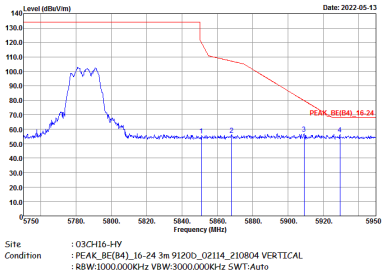
Band 4 - 5725~5850MHz

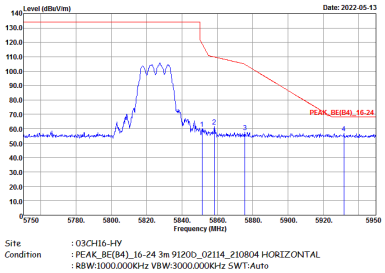
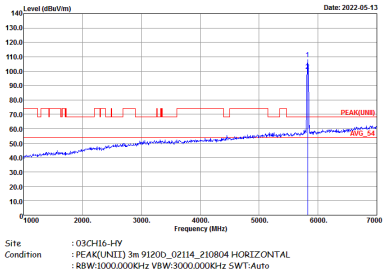
WIFI 802.11a (Band Edge @ 3m)

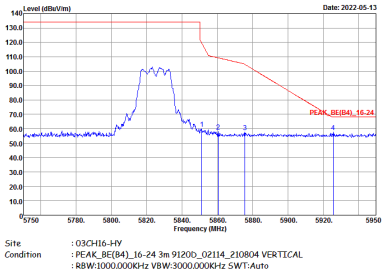
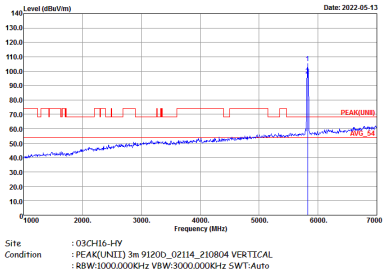
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
4+8	Horizontal	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
4+8	Vertical	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
4+8	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNII) 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH16-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

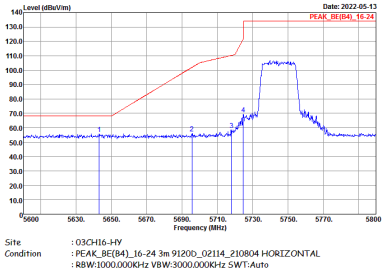
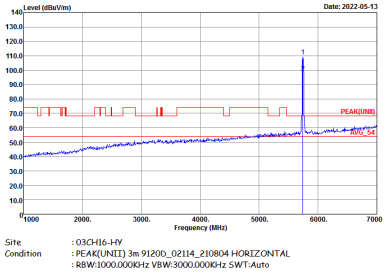
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
4+8	Vertical	Fundamental
Peak		
Peak		Left blank

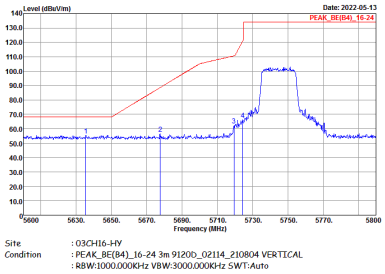
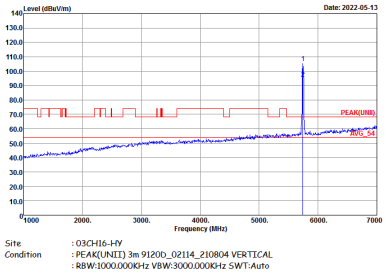
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
4+8	Horizontal	Fundamental
Peak		

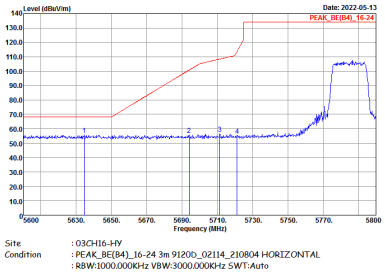
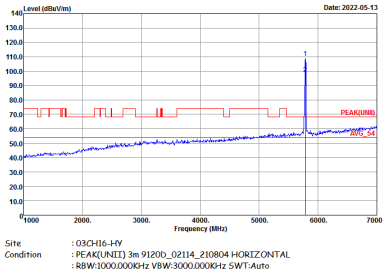
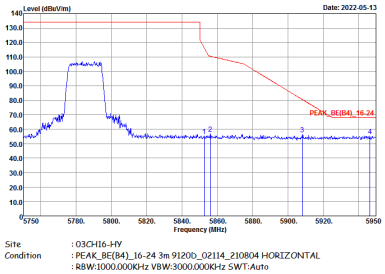
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
4+8	Vertical	Fundamental
Peak		

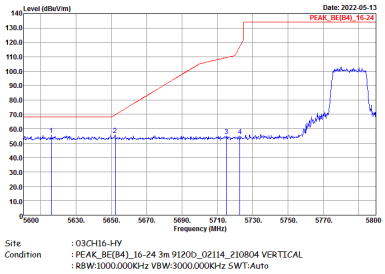
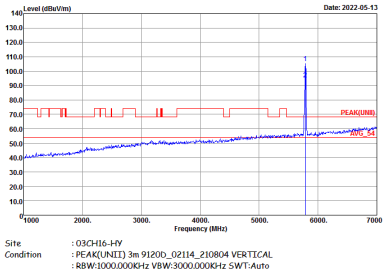
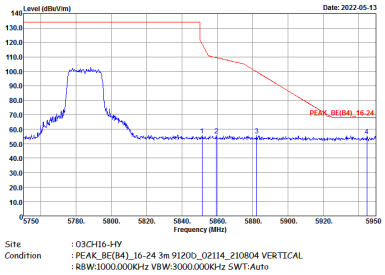
Band 4 5725~5850MHz

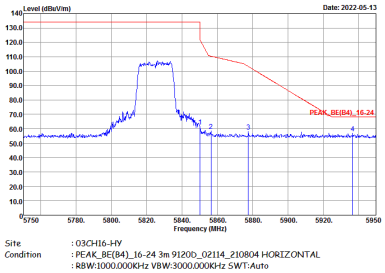
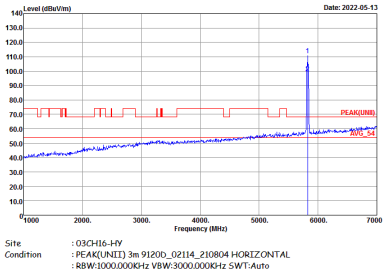
WIFI 802.11ax HE20 Full (Band Edge @ 3m)

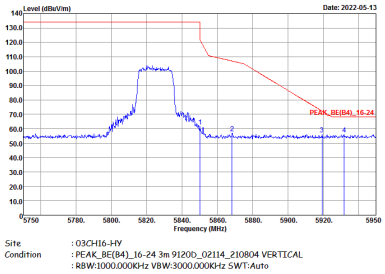
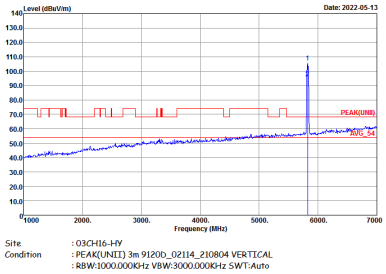
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH149 5745MHz	
4+8	Horizontal	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH149 5745MHz	
4+8	Vertical	Fundamental
Peak		

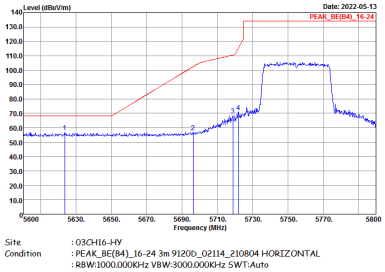
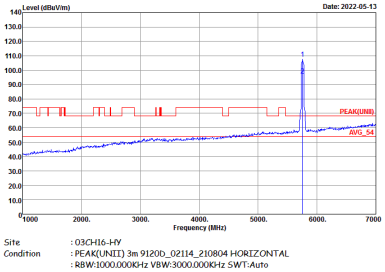
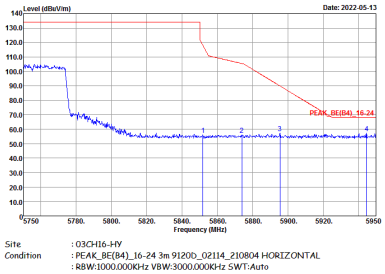
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH157 5785MHz	
4+8	Horizontal	Fundamental
Peak		
Peak		Left blank

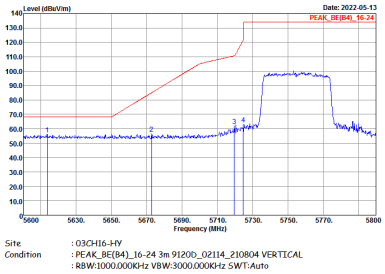
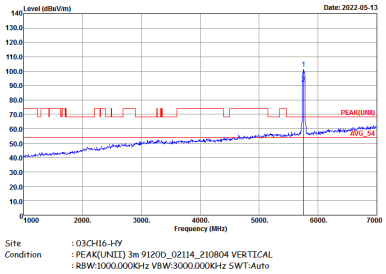
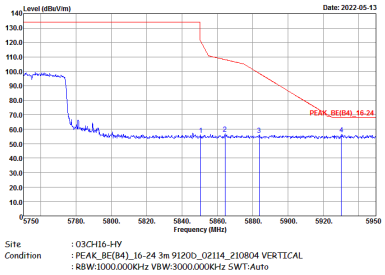
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH157 5785MHz	
4+8	Vertical	Fundamental
Peak		
Peak		Left blank

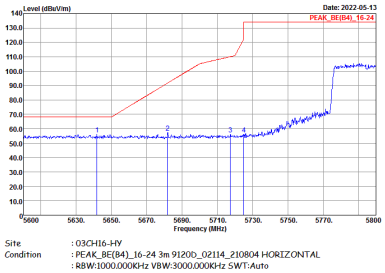
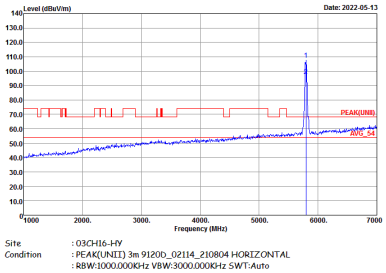
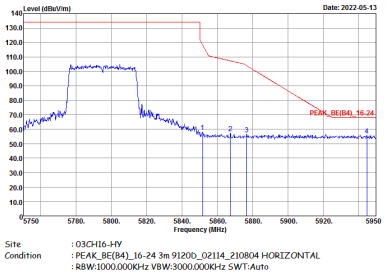
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH165 5825MHz	
4+8	Horizontal	Fundamental
Peak		

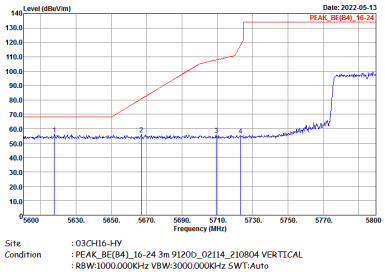
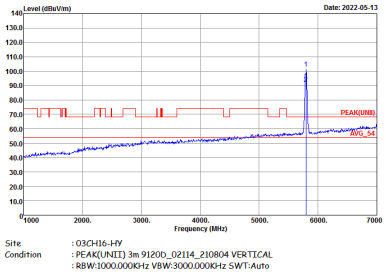
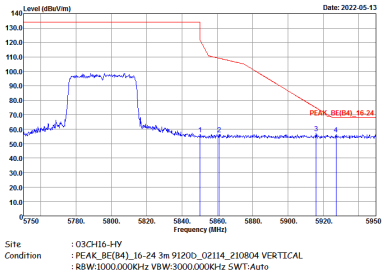
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE20 Full CH165 5825MHz	
4+8	Vertical	Fundamental
Peak		

Band 4 5725~5850MHz
WIFI 802.11ax HE40 Full (Band Edge @ 3m)

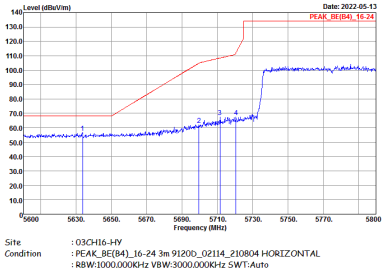
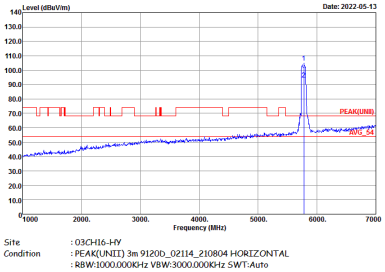
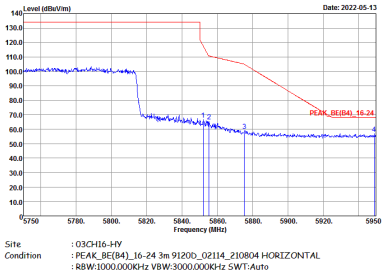
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full CH151 5755MHz	
4+8	Horizontal	Fundamental
Peak		
Peak		Left blank

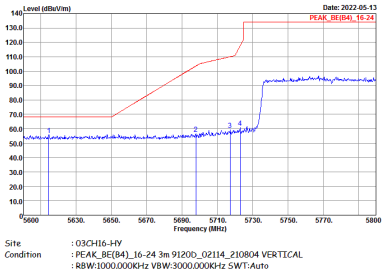
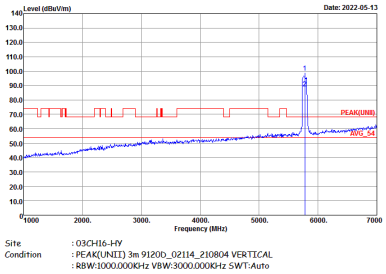
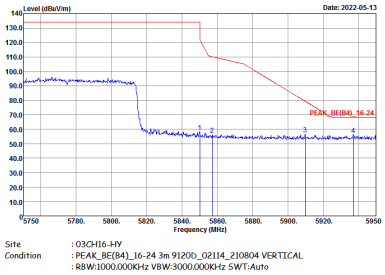
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full CH151 5755MHz	
4+8	Vertical	Fundamental
Peak		
Peak		Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full HT40 CH159 5795MHz	
4+8	Horizontal	Fundamental
Peak		
Peak		Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE40 Full CH159 5795MHz	
4+8	Vertical	Fundamental
Peak		
Peak		Left blank

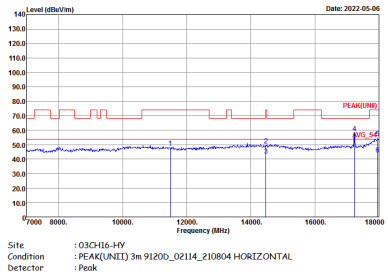
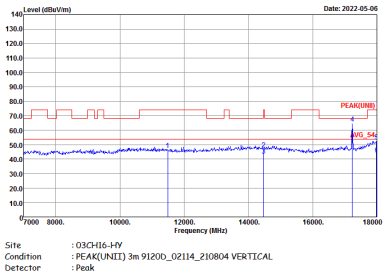
Band 4 5725~5850MHz
WIFI 802.11ax HE80 Full (Band Edge @ 3m)

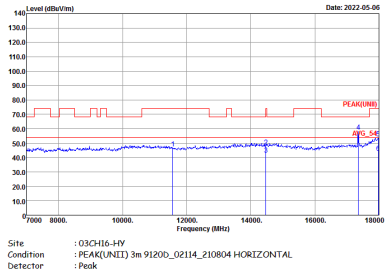
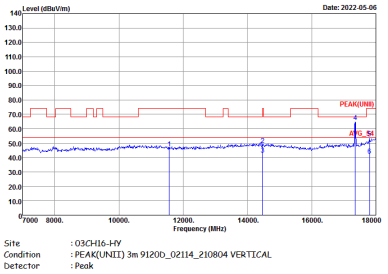
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH155 5775MHz	
4+8	Horizontal	Fundamental
Peak		
Peak		Left blank

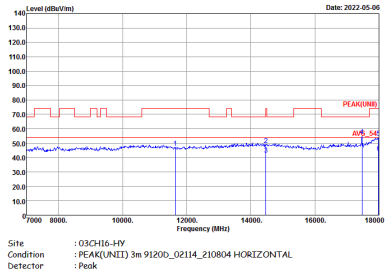
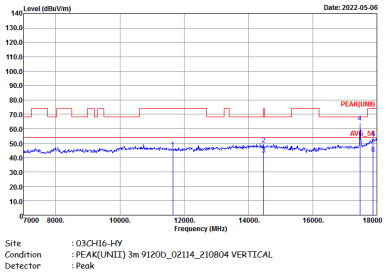
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH155 5775MHz	
4+8	Vertical	Fundamental
Peak		
Peak		Left blank

Band 4 - 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

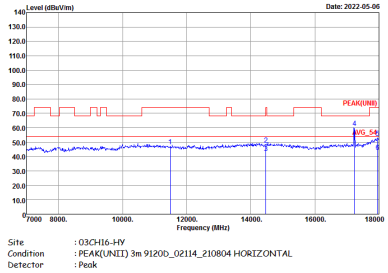
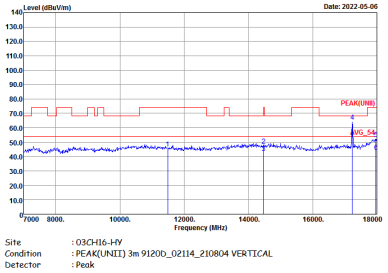
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
4+8	Horizontal	Vertical
Peak Avg.		

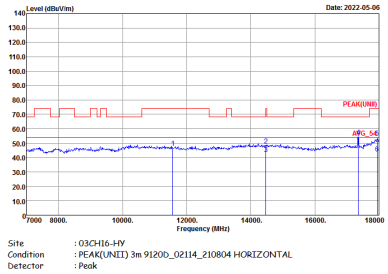
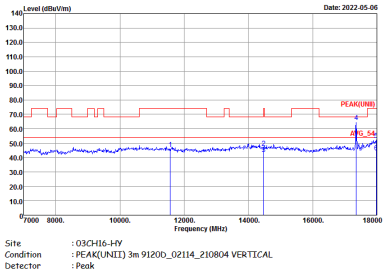
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
4+8	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK(UNII) 3m 9120D_02114_210804 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : PEAK(UNII) 3m 9120D_02114_210804 VERTICAL Detector : Peak

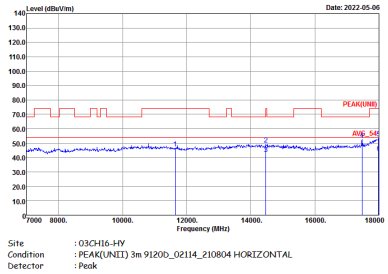
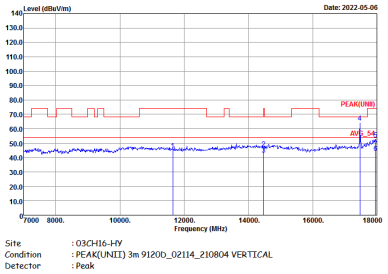
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH165 5825MHz	
4+8	Horizontal	Vertical
Peak Avg.		

Band 4 5725~5850MHz

WIFI 802.11ax HE20 Full (Harmonic @ 3m)

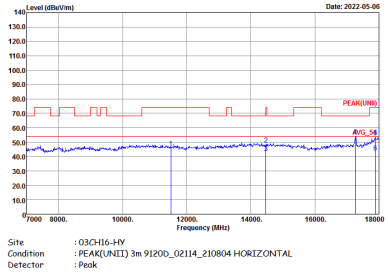
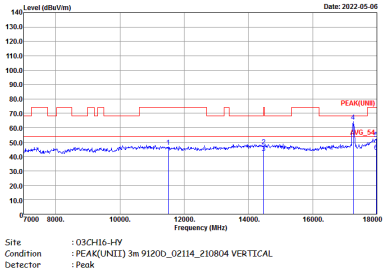
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Full CH149 5745MHz	
4+8	Horizontal	Vertical
Peak Avg.		

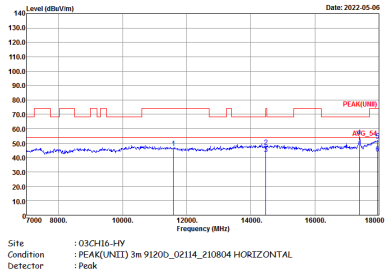
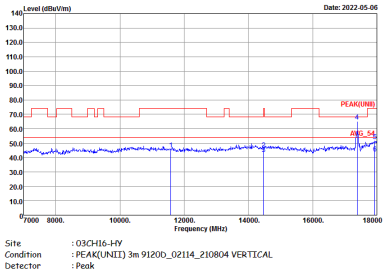
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Full CH157 5785MHz	
4+8	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Full CH165 5825MHz	
4+8	Horizontal	Vertical
Peak Avg.		

Band 4 5725~5850MHz

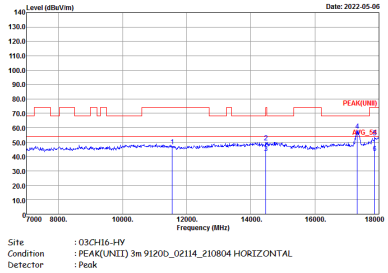
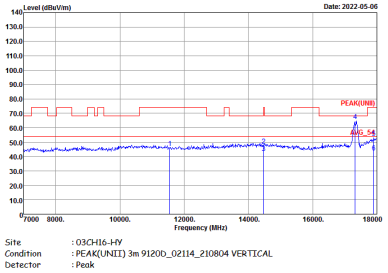
WIFI 802.11ax HE40 Full (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE40 Full CH151 5755MHz	
4+8	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE40 Full CH159 5795MHz	
4+8	Horizontal	Vertical
Peak Avg.		

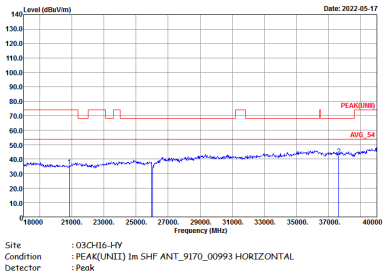
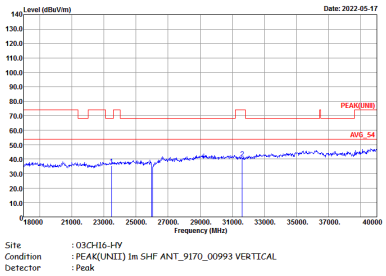
Band 4 5725~5850MHz

WIFI 802.11ax HE80 Full (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE80 Full CH155 5775MHz	
4+8	Horizontal	Vertical
Peak Avg.		

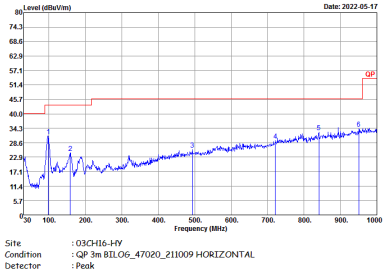
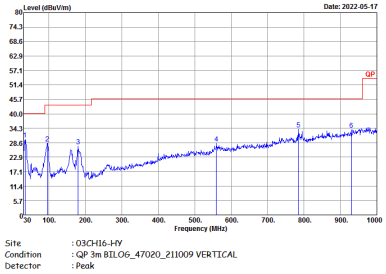
Emission above 18GHz

5GHz WIFI 802.11ax HE80 Full (SHF @ 1m)

WIFI	5GHz WIFI	
ANT	802.11ax HE80 Full SHF	
4+8	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

5GHz WIFI 802.11ax HE80 Full (LF @ 3m)

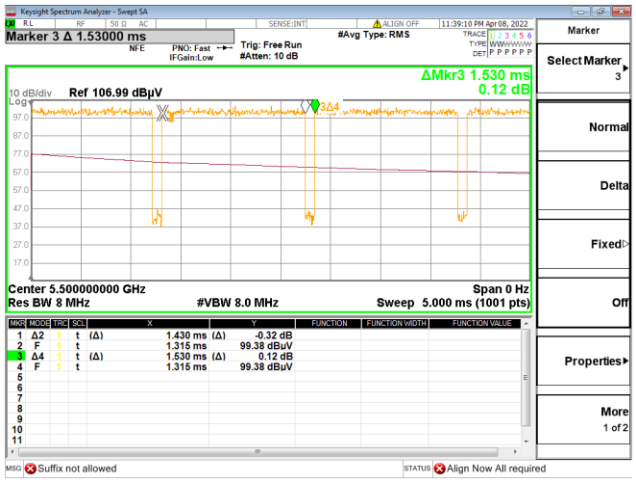
WIFI	5GHz WIFI	
ANT	802.11ax HE80 Full LF	
4+8	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

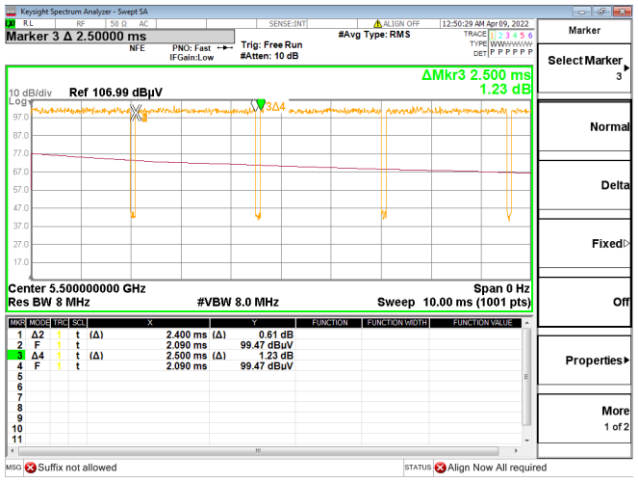
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
4+8	802.11a	93.46	1430	0.70	1kHz
4+8	5GHz 802.11ax HE20 Full RU	96.00	2400	0.42	1kHz
4+8	5GHz 802.11ax HE40 Full RU	92.16	1235	0.81	1kHz
4+8	5GHz 802.11ax HE80 Full RU	92.19	1180	0.85	1kHz

MIMO <Ant. 4+8>

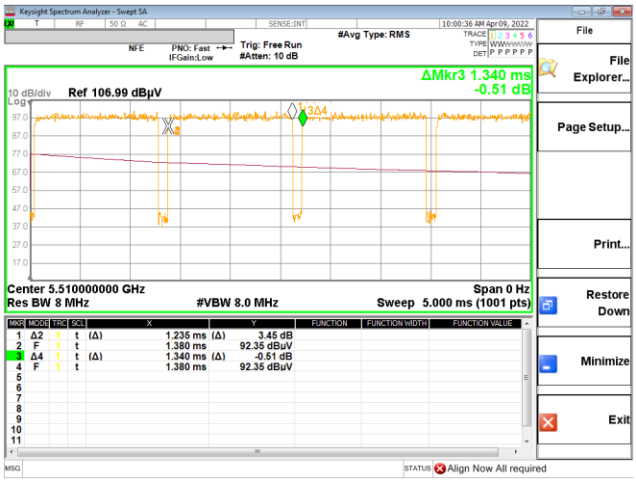
802.11a



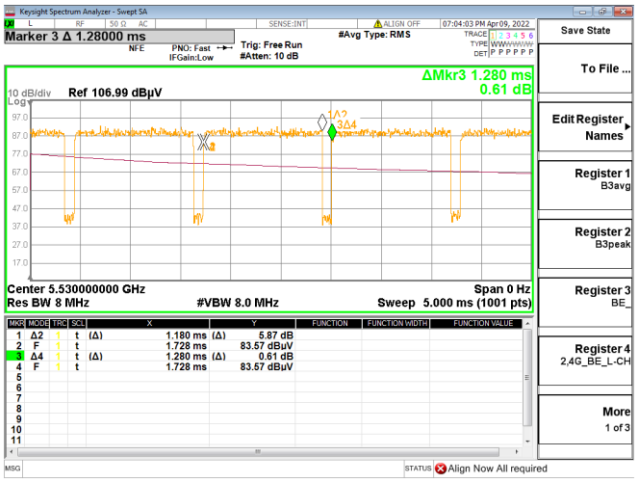
5GHz 802.11ax HE20 Full RU



5GHz 802.11ax HE40 Full RU



5GHz 802.11ax HE80 Full RU



THE END