FCC RADIO TEST REPORT

FCC ID	:	**UZ7WS5001**
Equipment	:	**WS50 Wearable Computer**
Brand Name	:	**Zebra**
Model Name	:	**WS5001**
Applicant	:	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Manufacturer	:	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Dec. 20, 2021 and testing was performed from Jan. 05, 2022 to Mar. 03, 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)

TEL : 886-3-327-0868
FAX : 886-3-327-0855

Table of Contents

History of this test report

Report No.	Version	Description	Issue Date
FR1O0707-02F	01	Initial issue of report	Mar. 18, 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	8.93 dB under the limit at 64.920 MHz
3.5	15.207	AC Conducted Emission	Pass	4.73 dB under the limit at 13.560 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: Wei Chen

Report Producer: Lucy Wu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	WS50 Wearable Computer
Brand Name	Zebra
Model Name	WS5001
FCC ID	UZ7WS5001
EUT supports Radios application	NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	EV2.2
SW Version	11-12-01.00-RN-U00-PRD-WTX-04
FW Version	FUSION_QA_3_1.0.0.007_R
MFD	SKU 1: 23NOV21 SKU 3-1: 14DEC21 SKU 3-2: 15DEC21 SKU 5: 23NOV21
EUT Stage	Identical Prototype

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

SKU List				
Helix SKU	**Scanner**	**Battery**	**Camera**	**Mounting**
SKU 1	SE4770	1.6x Battery	N/A	Finger Trigger
SKU 3-1	N/A	1x Battery	Yes	Wrist Strap
SKU 3-2	N/A	1x Battery	N/A	Wrist Strap
SKU 5	SE4770	1.6x Battery	N/A	BOH

Specification of Accessories				
Adaptor	**Brand Name**	Zebra	**Model Number**	PWR-WUA5V12W0US
Battery 1x	**Brand Name**	Zebra	**Model Number**	BT-000446
Battery 1.6x	**Brand Name**	Zebra	**Model Number**	BT-000446B
USB charging cable with cup	**Brand Name**	Zebra	**Model Number**	CBL-WS5X-USB1-01
USB C CABLE	**Brand Name**	Zebra	**Model Number**	CBL-TC2X-USBC-01

Supported Unit used in test configuration and system				
Converged Scanner Shell	**Brand Name**	Zebra	**Part Number**	SG-WS5X-SHLCS-01
Replacement Finger Trigger for Converged	**Brand Name**	Zebra	**Part Number**	SG-WS5X-TRGA-01
Wrist Shell	**Brand Name**	Zebra	**Part Number**	SG-WS5X-SHLWR-01
Wrist Strap	**Brand Name**	Zebra	**Part Number**	SG-WS5X-WSTRP-01
Wrist Mount (without strap)	**Brand Name**	Zebra	**Part Number**	SG-WS5X-WSTMT-01
Wrist Mount with strap	**Brand Name**	Zebra	**Part Number**	SG-WS5X-WPLTS-01
Back of Hand Mount for Converged	**Brand Name**	Zebra	**Part Number**	SG-WS5X-BHMT-01

1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx/Rx Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power to Antenna	802.11a: 19.80 dBm / 0.0955 W 802.11n HT20: 19.70 dBm / 0.0933 W 802.11n HT40: 19.60 dBm / 0.0912 W 802.11ac VHT20: 19.60 dBm / 0.0912 W 802.11ac VHT40: 19.80 dBm / 0.0955 W 802.11ac VHT80: 19.80 dBm / 0.0955 W
99% Occupied Bandwidth	802.11a: 17.88 MHz 802.11n HT20: 18.53 MHz 802.11n HT40: 37.56 MHz 802.11ac VHT80: 75.16 MHz
Antenna Type / Gain	PIFA Antenna with gain 3.92 dBi
Type of Modulation	802.11a/n: OFDM (BPSK/QPSK/16QAM/64QAM) 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)

Note:

1. For other wireless features of this EUT, test report will be issued separately.
2. 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 AC Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.

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

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	TH05-HY, 03CH11-HY

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

FCC designation No.: TW1190 and TW3786

1.5 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.
- ANSI C63.10-2013

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane 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.
2. The above Frequency and Channel with "#" are 802.11ac VHT80

2.2 Test Mode

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

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20 (Covered by HT20)	MCS0
802.11ac VHT40 (Covered by HT40)	MCS0
802.11ac VHT80	MCS0

802.11a RF Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)							
		6M		9M	12M	18M	24M	36M	48M	54M
Duty Cycle (%)		91.10		87.30	83.80	77.70	72.60	64.20	57.90	55.20
CH 149	5745	**19.80**	CH 149	19.80	19.80	19.50	19.50	19.50	19.40	19.40
CH 157	5785	19.70								
CH 165	5825	19.60								

802.11n HT20 RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Duty Cycle (%)		90.50		82.90	76.80	71.60	63.70	57.40	55.10	53.00
CH 149	5745	19.60	CH 157	19.60	19.60	19.50	19.50	19.50	19.40	19.40
CH 157	5785	**19.70**								
CH 165	5825	**19.70**								

802.11n HT40 RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Duty Cycle (%)		99.40		98.20	97.40	96.60	95.40	94.10	93.70	93.30
CH 151	5755	**19.60**	CH 151	19.50	19.50	19.40	19.10	19.10	19.00	19.00
CH 159	5795	**19.60**								

802.11ac VHT20 RF Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
Duty Cycle (%)		99.40		98.20	97.50	96.80	95.50	94.50	94.00	93.60	92.80
CH 149	5745	19.50	CH 157	19.60	19.60	19.50	19.50	19.50	19.40	19.40	19.40
CH 157	5785	**19.60**									
CH 165	5825	**19.60**									

802.11ac VHT40 RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Duty Cycle (%)		98.80		96.70	95.40	94.40	92.80	91.60	91.00	90.50	89.70	89.20
CH 151	5755	**19.80**	CH 151	19.70	19.50	19.40	19.10	19.10	19.00	19.00	19.00	19.00
CH 159	5795	**19.80**										

802.11ac VHT80 RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Duty Cycle (%)		97.50		93.60	91.90	90.40	88.70	87.70	86.70	86.50	85.90	85.30
CH 155	5775	**19.80**	CH 155	19.70	19.70	19.60	19.60	19.60	19.50	19.50	19.50	19.50

Test Cases	
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (5GHz) Link + NFC Link + Camera + Battery 1 (1x) + USB C CABLE (Data Link with Notebook) + Wrist Strap for SKU 3-1

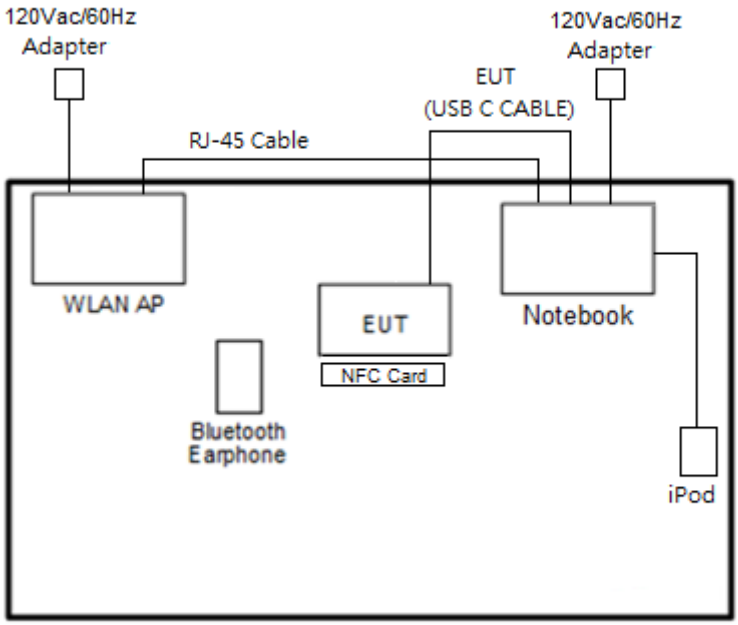
Remark:
1. For Radiated Test Cases, the tests were performed with Battery 1.6x and SKU 1
2. Data Link with Notebook means data application transferred mode between EUT and Notebook.

Ch. #		Band IV：5725-5850 MHz			
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

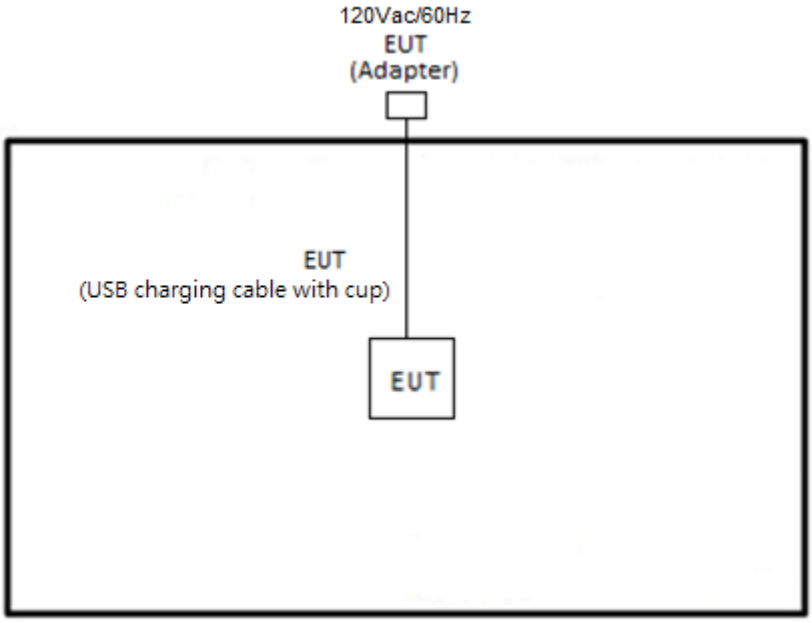
Remark: For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.

2.3 Connection Diagram of Test System

<AC Conducted Emission Mode>



<WLAN Tx Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY700A2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
3.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	N/A
4.	Notebook	Dell	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	NFC Card	N/A	N/A	N/A	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “QRCT4.0.00158.0” was installed in EUT 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.

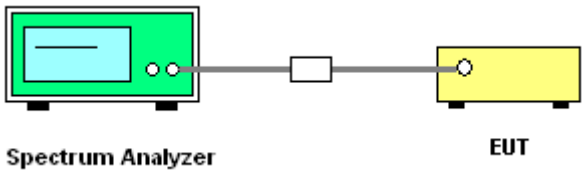
3.1.2 Measuring Instruments

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

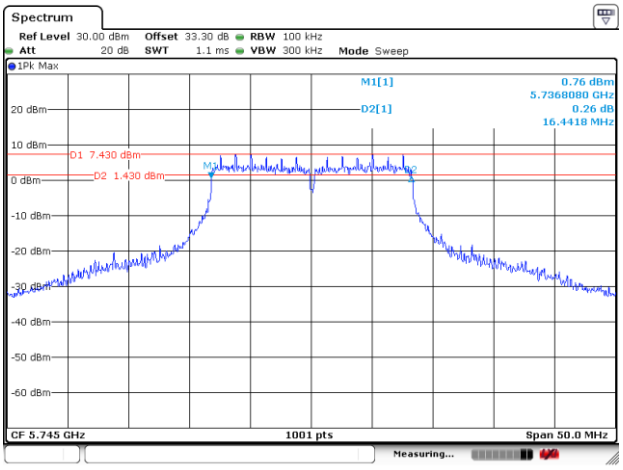
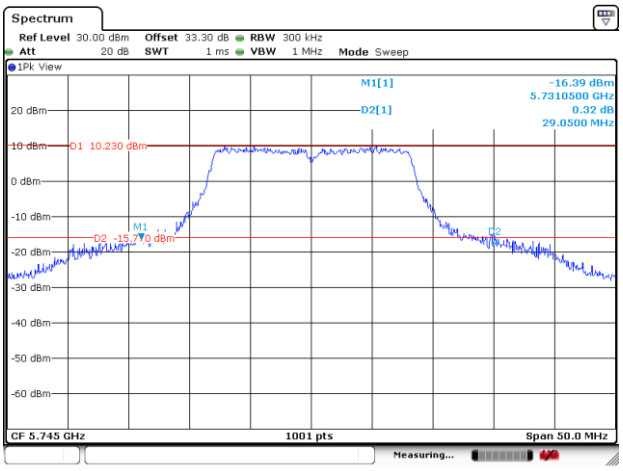
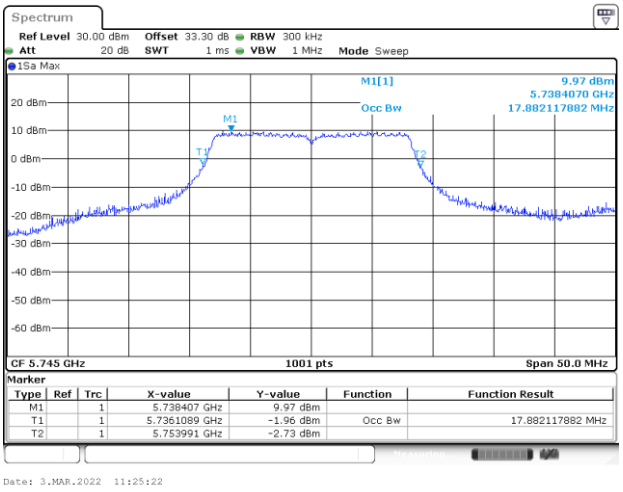


3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

Test Engineer :	Mina Liu	Temperature :	21~25℃
		Relative Humidity :	51~54%

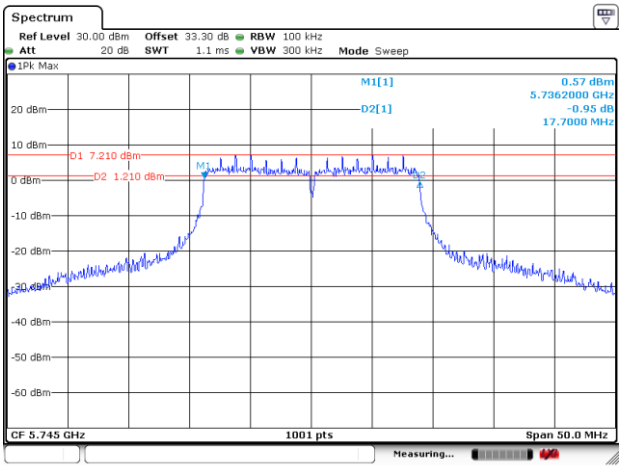
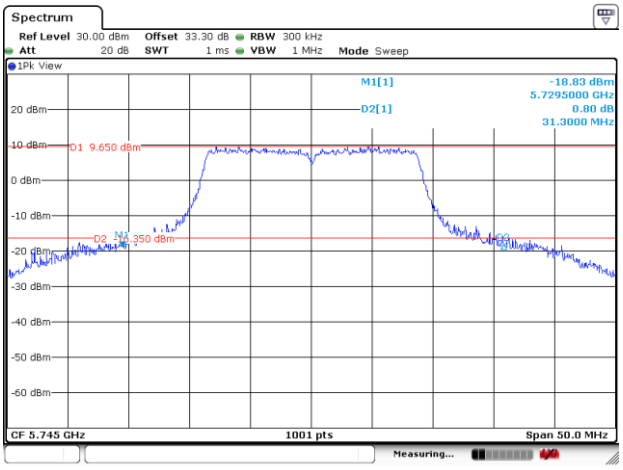
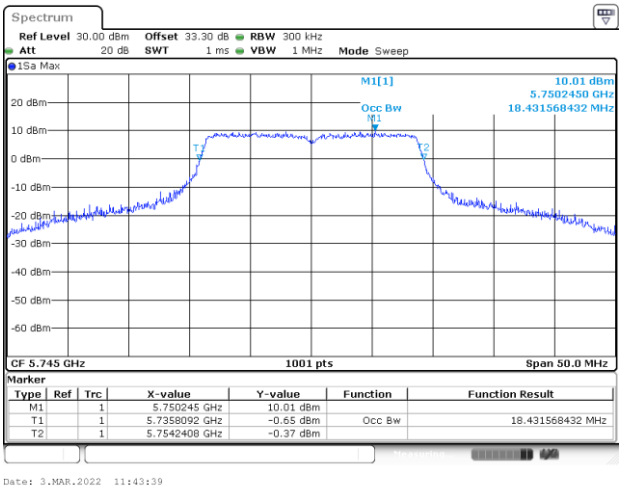
Band IV single antenna												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	149	5745	17.88	-	29.05	-	**16.44**	-	0.5	Pass
11a	6Mbps	1	157	5785	17.63	-	32.55	-	**16.44**	-	0.5	Pass
11a	6Mbps	1	165	5825	17.53	-	28.70	-	16.50	-	0.5	Pass
HT20	MCS0	1	149	5745	18.43	-	31.30	-	17.70	-	0.5	Pass
HT20	MCS0	1	157	5785	18.53	-	32.95	-	17.70	-	0.5	Pass
HT20	MCS0	1	165	5825	18.43	-	33.45	-	17.70	-	0.5	Pass
HT40	MCS0	1	151	5755	37.46	-	58.23	-	35.82	-	0.5	Pass
HT40	MCS0	1	159	5795	37.56	-	59.76	-	35.73	-	0.5	Pass
VHT80	MCS0	1	155	5775	**75.16**	-	**114.88**	-	75.36	-	0.5	Pass

<802.11a>

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

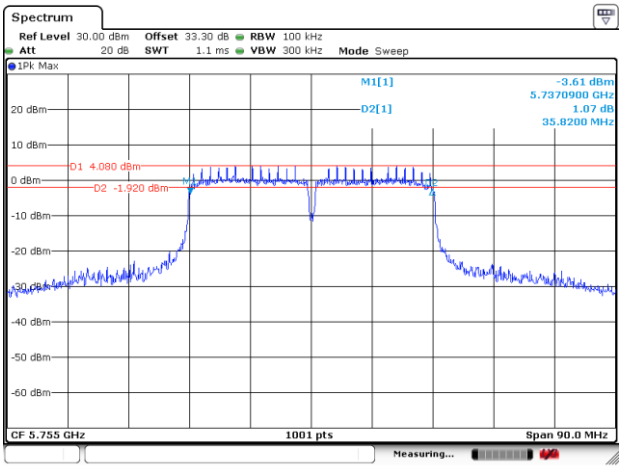
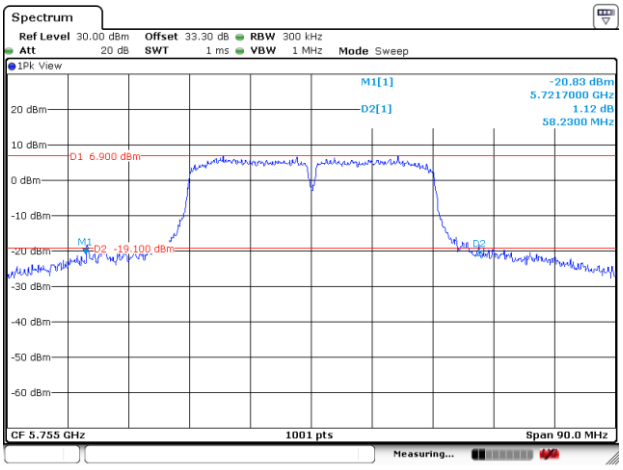
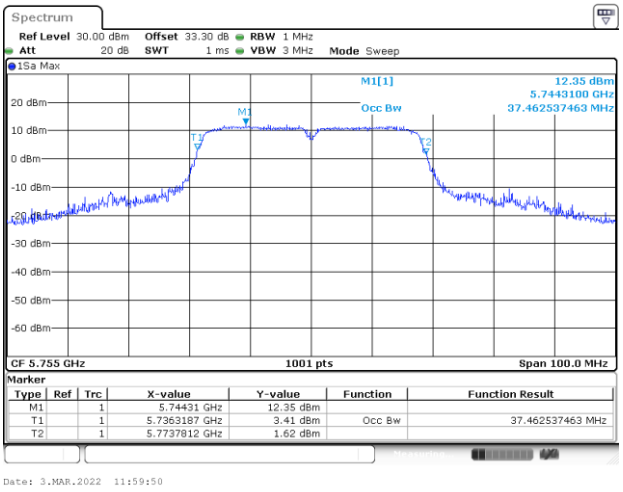
Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

<802.11n HT20>

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

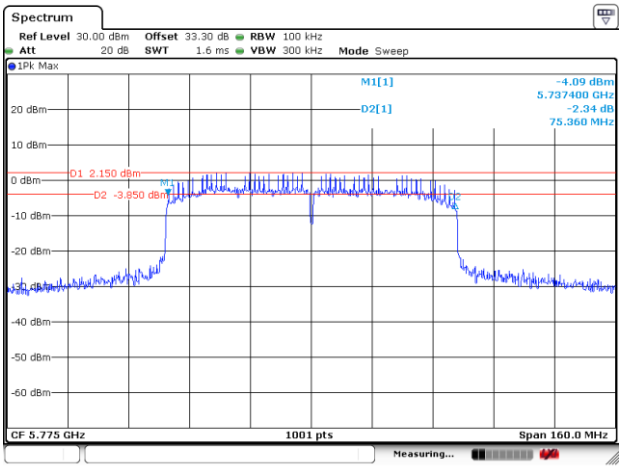
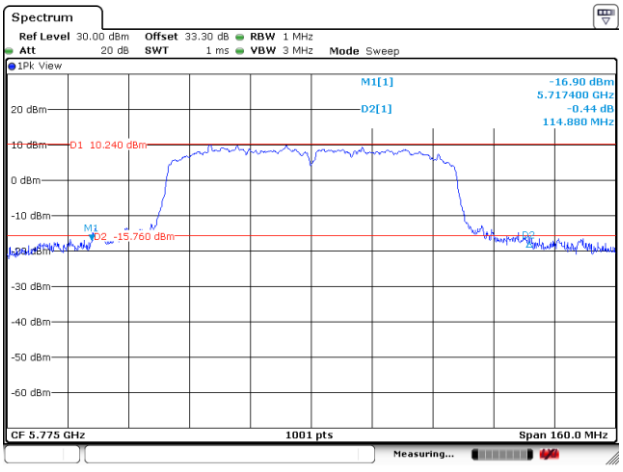
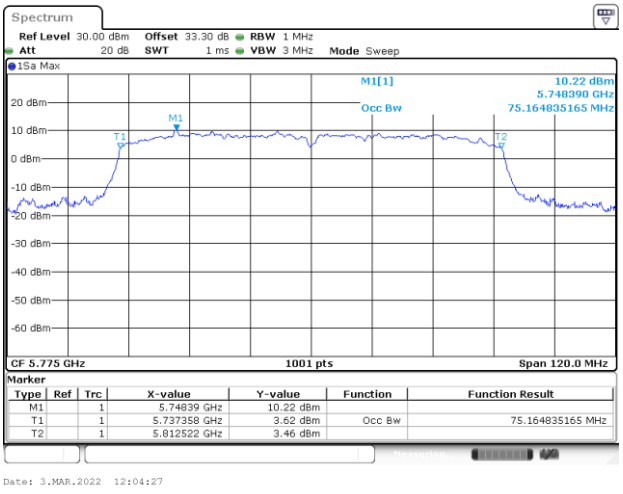
Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

<802.11n HT40>

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.

<802.11ac VHT80>

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.

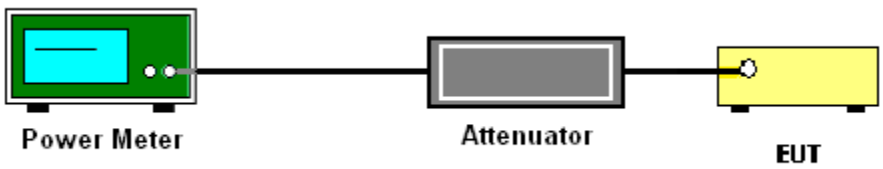
3.2.3 Test Procedures

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.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Test Engineer :	Mina Liu	Temperature :	21~25℃
		Relative Humidity :	51~54%

Band IV single antenna												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	**19.80**	-	-	30.00	-	3.92	-	Pass
11a	6Mbps	1	157	5785	19.70	-		30.00	-	3.92	-	Pass
11a	6Mbps	1	165	5825	19.60	-		30.00	-	3.92	-	Pass
HT20	MCS0	1	149	5745	19.60	-		30.00	-	3.92	-	Pass
HT20	MCS0	1	157	5785	19.70	-		30.00	-	3.92	-	Pass
HT20	MCS0	1	165	5825	19.70	-		30.00	-	3.92	-	Pass
HT40	MCS0	1	151	5755	19.60	-		30.00	-	3.92	-	Pass
HT40	MCS0	1	159	5795	19.60	-		30.00	-	3.92	-	Pass
VHT20	MCS0	1	149	5745	19.50	-		30.00	-	3.92	-	Pass
VHT20	MCS0	1	157	5785	19.60	-		30.00	-	3.92	-	Pass
VHT20	MCS0	1	165	5825	19.60	-		30.00	-	3.92	-	Pass
VHT40	MCS0	1	151	5755	**19.80**	-		30.00	-	3.92	-	Pass
VHT40	MCS0	1	159	5795	**19.80**	-		30.00	-	3.92	-	Pass
VHT80	MCS0	1	155	5775	**19.80**	-		30.00	-	3.92	-	Pass

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.

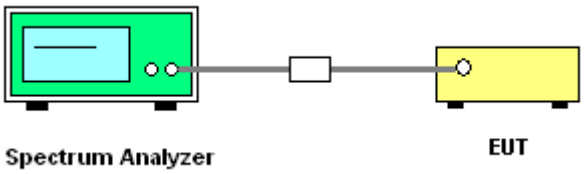
 # Method SA-2 #

(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.

3.3.4 Test Setup

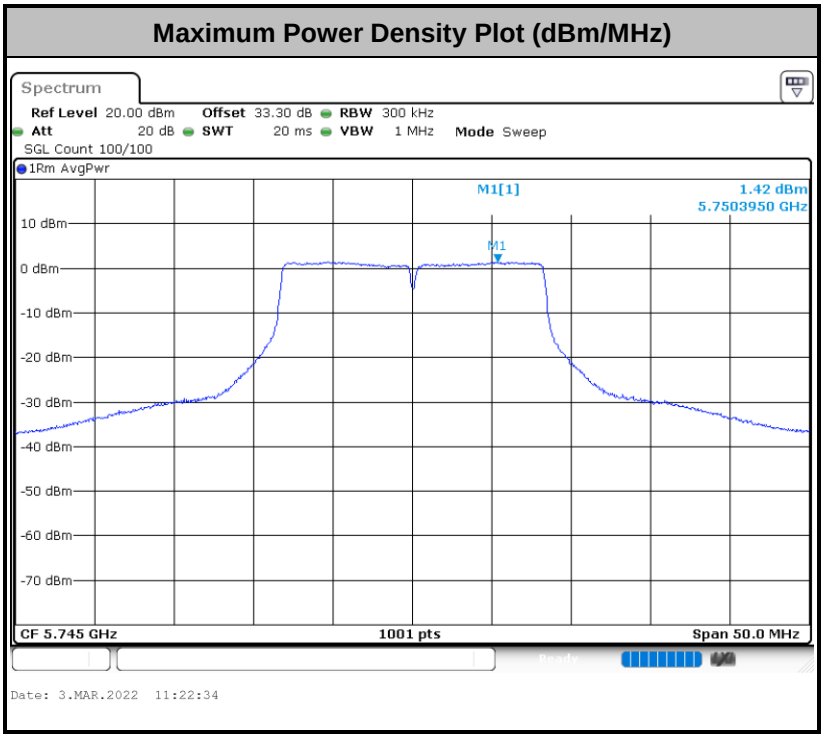


3.3.5 Test Result of Power Spectral Density

Test Engineer :	Mina Liu	Temperature :	21~25℃
		Relative Humidity :	51~54%

Band IV single antenna														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	10log (500kHz /RBW) Factor (dB)		Average Power Density with Duty Factor (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	2.22	-	**4.41**	-		30.00	-	3.92	-	Pass
11a	6Mbps	1	157	5785	2.22	-	4.35	-		30.00	-	3.92	-	Pass
11a	6Mbps	1	165	5825	2.22	-	4.31	-		30.00	-	3.92	-	Pass
HT20	MCS0	1	149	5745	2.22	-	3.80	-		30.00	-	3.92	-	Pass
HT20	MCS0	1	157	5785	2.22	-	3.68	-	-	30.00	-	3.92	-	Pass
HT20	MCS0	1	165	5825	2.22	-	3.78	-		30.00	-	3.92	-	Pass
HT40	MCS0	1	151	5755	2.22	-	0.55	-		30.00	-	3.92	-	Pass
HT40	MCS0	1	159	5795	2.22	-	0.65	-		30.00	-	3.92	-	Pass
VHT80	MCS0	1	155	5775	2.22	-	-1.40	-		30.00	-	3.92	-	Pass

Maximum Power Density Plot (dBm/MHz)



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

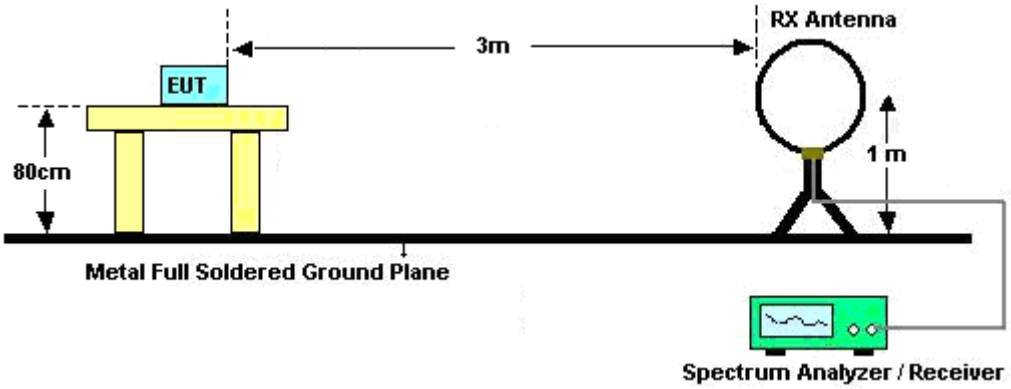
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000 MHz

   - 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.

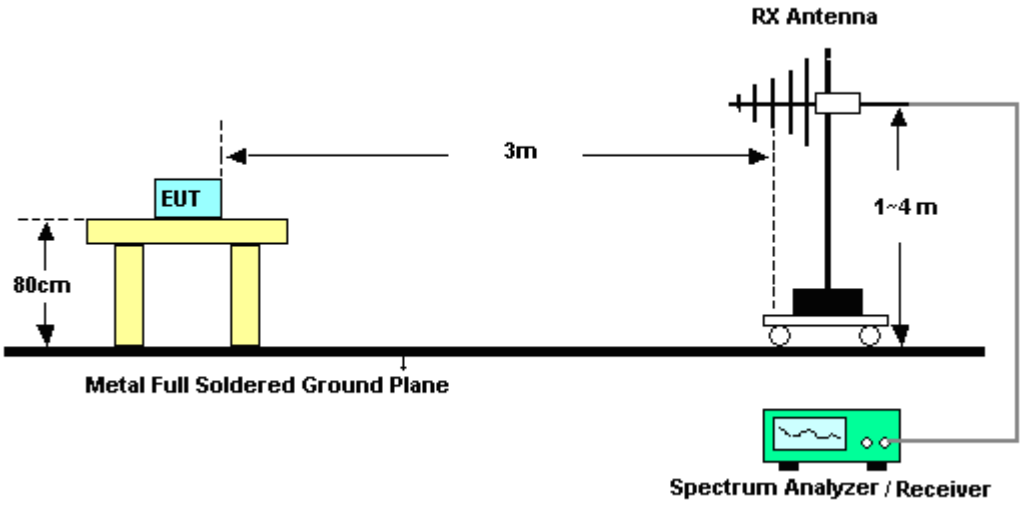
6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit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

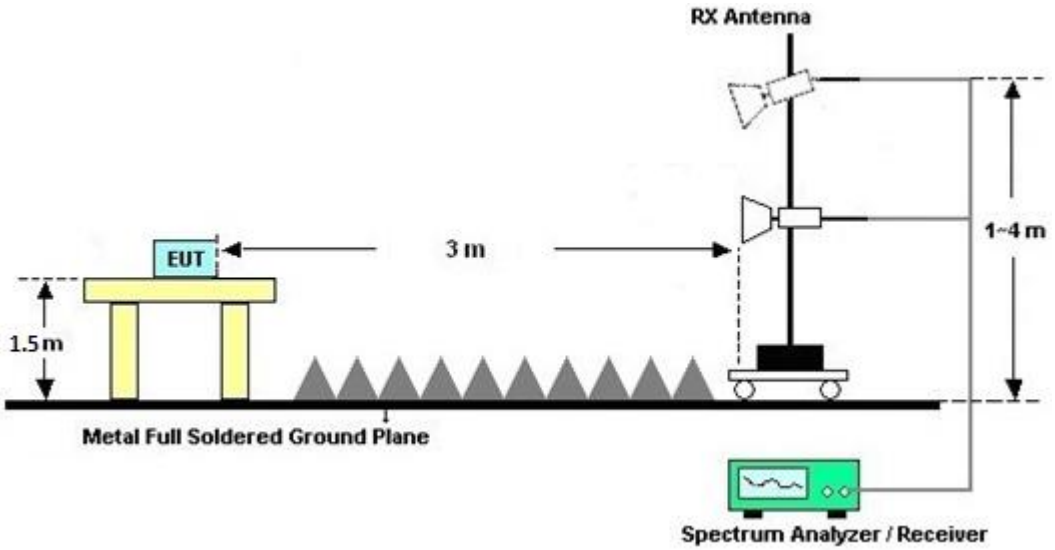
For radiated emissions below 30MHz



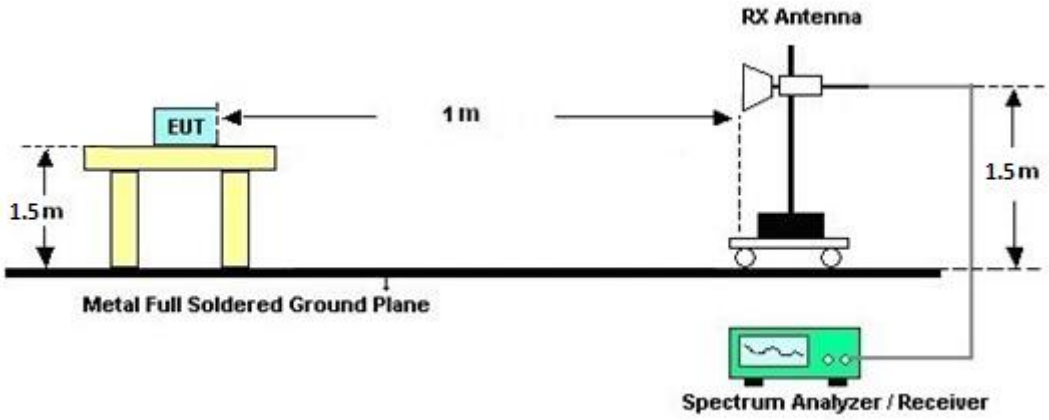
For radiated emissions from 30MHz to 1GHz



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 B and C.

3.4.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.

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.

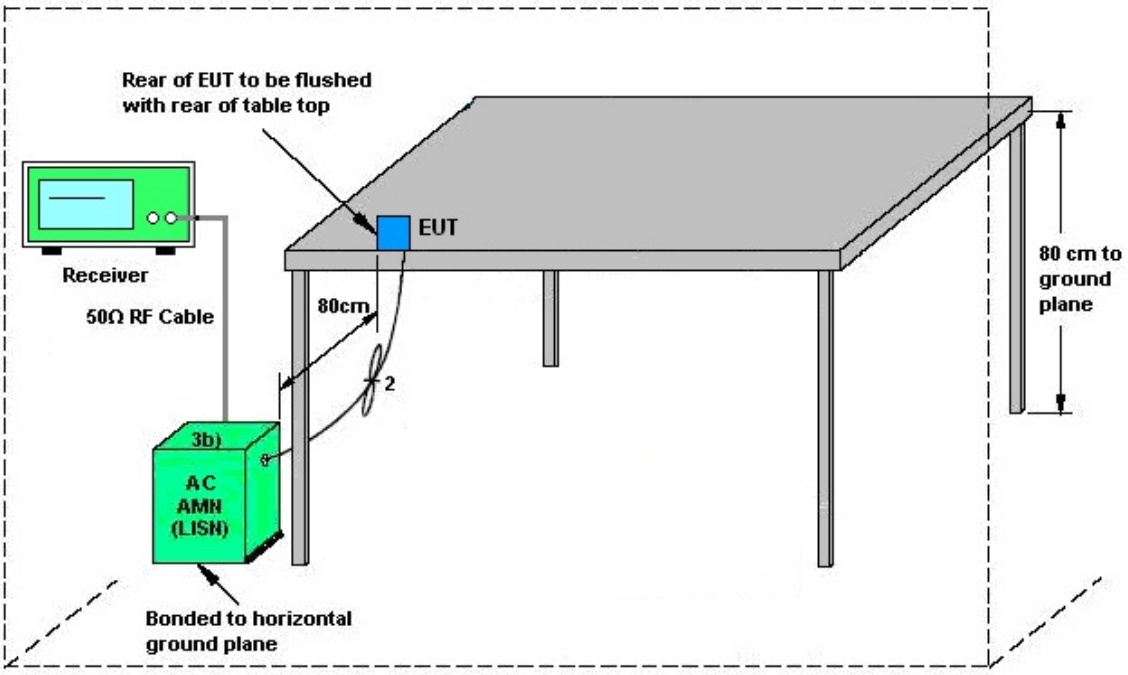
3.5.2 Measuring Instruments

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



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

3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

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

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~50 MHz	Jan. 07, 2022	Jan. 09, 2022~ Feb. 08, 2022	Jan. 06, 2023	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 09, 2021	Jan. 09, 2022~ Feb. 08, 2022	Oct. 08, 2022	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 25, 2021	Jan. 09, 2022~ Feb. 08, 2022	Oct. 24, 2022	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz~40GHz	Nov. 30, 2021	Jan. 09, 2022~ Feb. 08, 2022	Nov. 29, 2022	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 10, 2021	Jan. 09, 2022~ Feb. 08, 2022	Dec. 09, 2022	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 10, 2021	Jan. 09, 2022~ Feb. 08, 2022	Nov. 09, 2022	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-303	17100018000 55007	1GHz~18GHz	Jun. 16, 2021	Jan. 09, 2022~ Feb. 08, 2022	Jun. 15, 2022	Radiation (03CH11-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2021	Jan. 09, 2022~ Feb. 08, 2022	Jun. 21, 2022	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 15, 2021	Jan. 09, 2022~ Feb. 08, 2022	Oct. 14, 2022	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY55420170	20MHz~8.4GHz	Jul. 15, 2021	Jan. 09, 2022~ Feb. 08, 2022	Jul. 14, 2022	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Jan. 09, 2022~ Feb. 08, 2022	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jan. 09, 2022~ Feb. 08, 2022	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jan. 09, 2022~ Feb. 08, 2022	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Jan. 09, 2022~ Feb. 08, 2022	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 11, 2021	Jan. 09, 2022~ Feb. 08, 2022	Mar. 10, 2022	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 11, 2021	Jan. 09, 2022~ Feb. 08, 2022	Mar. 10, 2022	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30M-18G	Mar. 11, 2021	Jan. 09, 2022~ Feb. 08, 2022	Mar. 10, 2022	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102，SUCOFLEX 104	811852/4,MY2859/2,MY9837/4PE	30MHz-18GHz	Nov. 15, 2021	Jan. 09, 2022~ Feb. 08, 2022	Nov. 14, 2022	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1.53G Low Pass	Sep. 13, 2021	Jan. 09, 2022~ Feb. 08, 2022	Sep. 12, 2022	Radiation (03CH11-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40SS	SN3	6.75GHz High Pass Filter	Sep. 13, 2021	Jan. 09, 2022~ Feb. 08, 2022	Sep. 12, 2022	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP140325	N/A	Nov. 26, 2021	Jan. 09, 2022~ Feb. 08, 2022	Nov. 25, 2022	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP200880	N/A	Sep. 30, 2021	Jan. 09, 2022~ Feb. 08, 2022	Sep. 29, 2022	Radiation (03CH11-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 16, 2021	Jan. 05, 2022~ Mar. 03, 2022	Nov. 15, 2022	Conducted (TH05-HY)
Power Meter	DARE	RPR3006W	16I00054SNO 12 (NO:113)	10MHz~6GHz	Dec. 16, 2021	Jan. 05, 2022~ Mar. 03, 2022	Dec. 15, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	Jan. 05, 2022~ Mar. 03, 2022	Aug. 29, 2022	Conducted (TH05-HY)
Switch Control Manframe	E-IUSTRUME NT	ETF-1405-0	EC1900067 (BOX7)	N/A	Aug. 12, 2021	Jan. 05, 2022~ Mar. 03, 2022	Aug. 11, 2022	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Feb. 17, 2022	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2021	Feb. 17, 2022	Nov. 30, 2022	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2021	Feb. 17, 2022	Nov. 16, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 03, 2021	Feb. 17, 2022	Dec. 02, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2021	Feb. 17, 2022	Nov. 15, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Feb. 17, 2022	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBE CK	VTSD 9561-F N	00691	N/A	Jul. 28, 2021	Feb. 17, 2022	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 30, 2021	Feb. 17, 2022	Dec. 29, 2022	Conduction (CO05-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))	**5.4 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.9 dB**

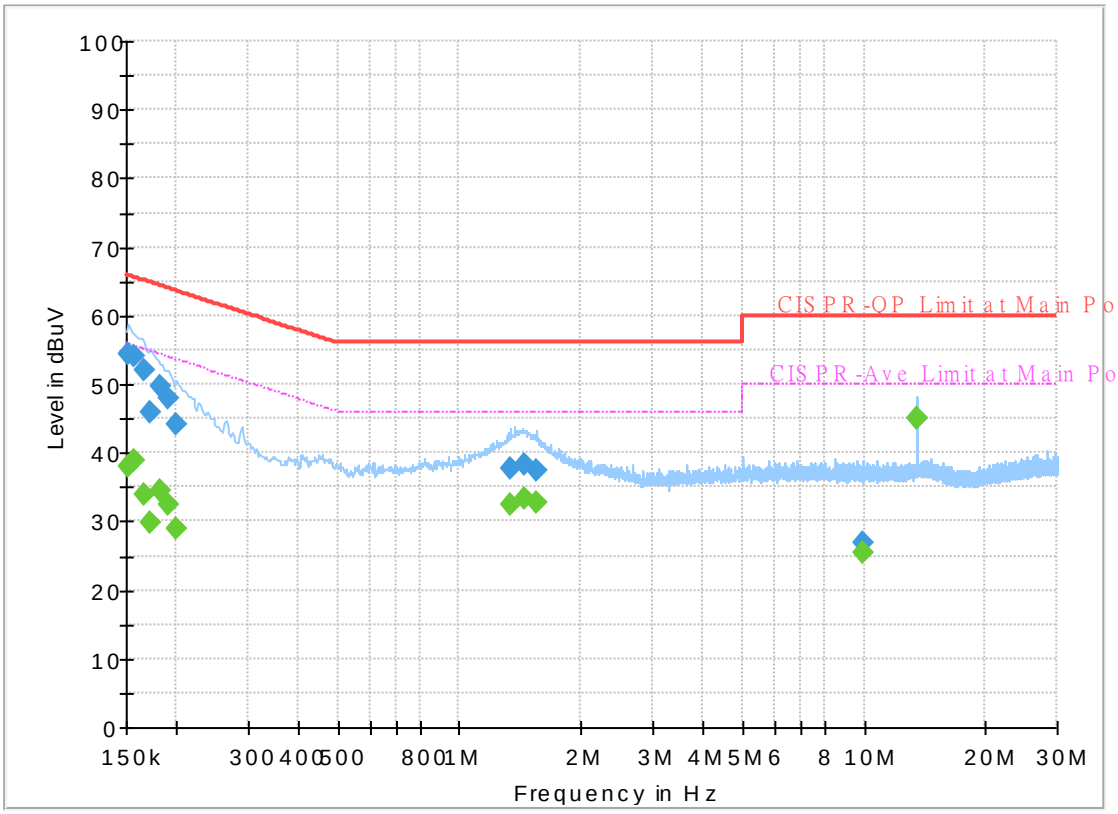
Appendix A. AC Conducted Emission Test Results

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

EUT Information

Report NO :	1O0707-02
Test Mode :	Mode 1
Test Voltage :	Power From System
Phase :	Line

Full Spectrum



Final_Result

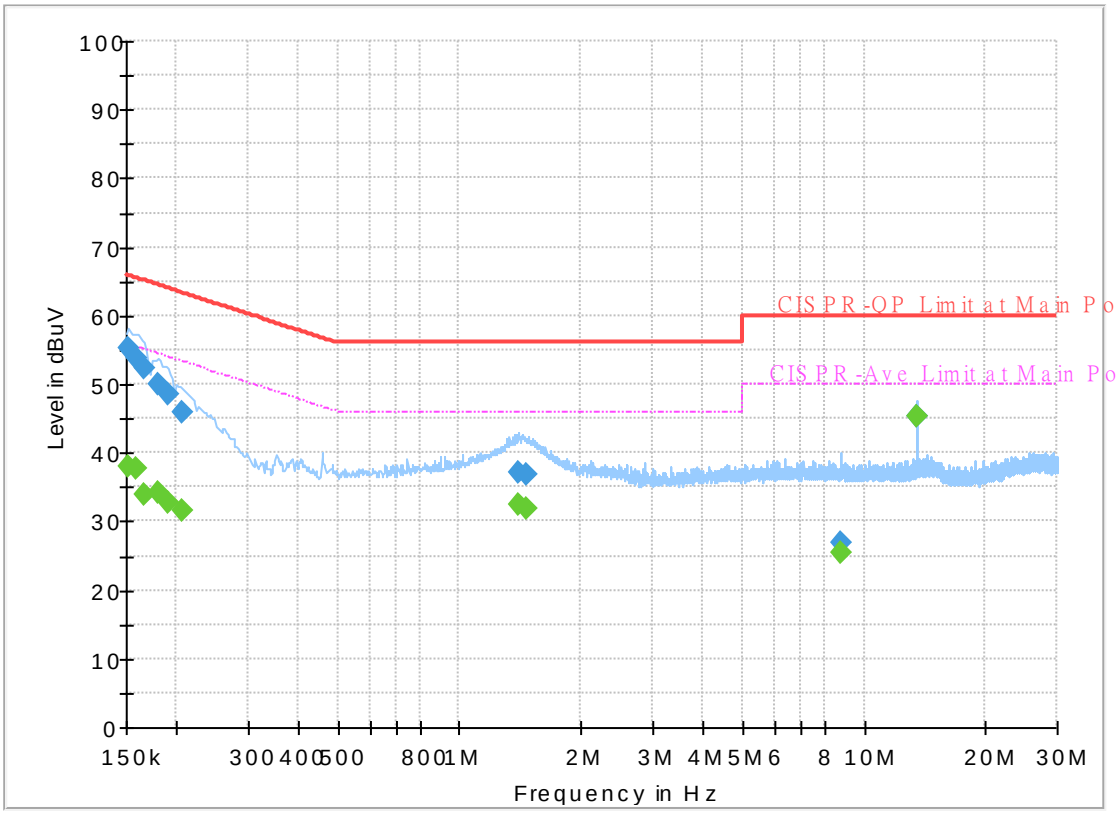
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	37.94	55.88	17.94	L1	OFF	19.6
0.152250	54.37	---	65.88	11.51	L1	OFF	19.6
0.156750	---	38.91	55.63	16.72	L1	OFF	19.6
0.156750	54.23	---	65.63	11.40	L1	OFF	19.6
0.165750	---	34.02	55.17	21.15	L1	OFF	19.6
0.165750	51.97	---	65.17	13.20	L1	OFF	19.6
0.172500	---	29.75	54.84	25.09	L1	OFF	19.6
0.172500	46.05	---	64.84	18.79	L1	OFF	19.6
0.181500	---	34.61	54.42	19.81	L1	OFF	19.6
0.181500	49.59	---	64.42	14.83	L1	OFF	19.6
0.190500	---	32.56	54.02	21.46	L1	OFF	19.6
0.190500	47.97	---	64.02	16.05	L1	OFF	19.6
0.199500	---	28.86	53.63	24.77	L1	OFF	19.6
0.199500	44.29	---	63.63	19.34	L1	OFF	19.6
1.340250	---	32.55	46.00	13.45	L1	OFF	19.6
1.340250	37.63	---	56.00	18.37	L1	OFF	19.6
1.448250	---	33.34	46.00	12.66	L1	OFF	19.6
1.448250	38.35	---	56.00	17.65	L1	OFF	19.6
1.549500	---	32.71	46.00	13.29	L1	OFF	19.6
1.549500	37.31	---	56.00	18.69	L1	OFF	19.6
9.888000	---	25.43	50.00	24.57	L1	OFF	20.0

9.888000	**26.96**	**---**	**60.00**	**33.04**	**L1**	**OFF**	**20.0**
13.560000	**---**	**44.98**	**50.00**	**5.02**	**L1**	**OFF**	**20.1**
13.560000	**45.04**	**---**	**60.00**	**14.96**	**L1**	**OFF**	**20.1**

EUT Information

Report NO :	1O0707-02
Test Mode :	Mode 1
Test Voltage :	Power From System
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	38.11	55.88	17.77	N	OFF	19.6
0.152250	55.23	---	65.88	10.65	N	OFF	19.6
0.159000	---	37.69	55.52	17.83	N	OFF	19.6
0.159000	53.67	---	65.52	11.85	N	OFF	19.6
0.165750	---	33.93	55.17	21.24	N	OFF	19.6
0.165750	52.42	---	65.17	12.75	N	OFF	19.6
0.179250	---	34.32	54.52	20.20	N	OFF	19.6
0.179250	50.04	---	64.52	14.48	N	OFF	19.6
0.190500	---	32.79	54.02	21.23	N	OFF	19.6
0.190500	48.48	---	64.02	15.54	N	OFF	19.6
0.206250	---	31.64	53.36	21.72	N	OFF	19.6
0.206250	45.77	---	63.36	17.59	N	OFF	19.6
1.401000	---	32.46	46.00	13.54	N	OFF	19.6
1.401000	37.19	---	56.00	18.81	N	OFF	19.6
1.473000	---	31.87	46.00	14.13	N	OFF	19.6
1.473000	36.71	---	56.00	19.29	N	OFF	19.6
8.736000	---	25.45	50.00	24.55	N	OFF	20.0
8.736000	26.93	---	60.00	33.07	N	OFF	20.0
13.560000	---	45.27	50.00	4.73	N	OFF	20.2
13.560000	45.31	---	60.00	14.69	N	OFF	20.2

Appendix B. Radiated Spurious Emission

Test Engineer :	Daniel Lee, Hayden Wu, James Chiu and Fu Chen	Temperature :	19.5~22.5°C
		Relative Humidity :	54.6~68.3%

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5608.8	48.43	-19.77	68.2	39.21	32.02	10.69	33.49	214	43	P	H
		5699.6	55.35	-49.56	104.91	45.87	32.2	10.79	33.51	214	43	P	H
		5717.6	66.33	-43.8	110.13	56.76	32.27	10.82	33.52	214	43	P	H
		5724.4	75.54	-45.29	120.83	65.94	32.3	10.82	33.52	214	43	P	H
	*	5745	112.54	-	-	102.83	32.38	10.85	33.52	214	43	P	H
	*	5745	104.92	-	-	95.21	32.38	10.85	33.52	214	43	A	H
													H
													H
		5633.8	50.43	-17.77	68.2	41.13	32.07	10.72	33.49	242	341	P	V
		5693.2	56.64	-43.55	100.19	47.17	32.19	10.79	33.51	242	341	P	V
		5719.8	71.36	-39.38	110.74	61.78	32.28	10.82	33.52	242	341	P	V
		5724.4	86.59	-34.24	120.83	76.99	32.3	10.82	33.52	242	341	P	V
	*	5745	115.35	-	-	105.64	32.38	10.85	33.52	242	341	P	V
	*	5745	106.46	-	-	96.75	32.38	10.85	33.52	242	341	A	V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5634	49.5	-18.7	68.2	40.2	32.07	10.72	33.49	199	43	P	H
		5689.75	48.94	-48.7	97.64	39.49	32.18	10.78	33.51	199	43	P	H
		5717.5	50.29	-59.81	110.1	40.72	32.27	10.82	33.52	199	43	P	H
		5721	50.01	-63.07	113.08	40.43	32.28	10.82	33.52	199	43	P	H
	*	5785	113.2	-	-	103.44	32.4	10.89	33.53	199	43	P	H
	*	5785	105.03	-	-	95.27	32.4	10.89	33.53	199	43	A	H
		5851.25	51.02	-68.33	119.35	41.1	32.51	10.96	33.55	199	43	P	H
		5860	49.55	-59.85	109.4	39.6	32.54	10.96	33.55	199	43	P	H
		5899.75	49.53	-37.32	86.85	39.39	32.7	11	33.56	199	43	P	H
		5926.5	49.85	-18.35	68.2	39.65	32.75	11.02	33.57	199	43	P	H
													H
802.11a CH 157 5785MHz													H
		5636.75	49.72	-18.48	68.2	40.43	32.07	10.72	33.5	224	340	P	V
		5693.5	50.61	-49.8	100.41	41.14	32.19	10.79	33.51	224	340	P	V
		5719.25	51.88	-58.71	110.59	42.3	32.28	10.82	33.52	224	340	P	V
		5723	53.81	-63.83	117.64	44.22	32.29	10.82	33.52	224	340	P	V
	*	5785	114.18	-	-	104.42	32.4	10.89	33.53	224	340	P	V
	*	5785	106.46	-	-	96.7	32.4	10.89	33.53	224	340	A	V
		5850.25	49.91	-71.72	121.63	40	32.5	10.96	33.55	224	340	P	V
		5872	49.1	-56.94	106.04	39.1	32.59	10.97	33.56	224	340	P	V
		5910	51.33	-27.94	79.27	41.17	32.72	11.01	33.57	224	340	P	V
		5930	48.94	-19.26	68.2	38.72	32.76	11.03	33.57	224	340	P	V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
	*	5825	110.53	-	-	100.69	32.45	10.93	33.54	224	224	P	H
	*	5825	102.96	-	-	93.12	32.45	10.93	33.54	224	224	A	H
		5851.6	63.31	-55.24	118.55	53.39	32.51	10.96	33.55	224	224	P	H
		5856.2	60.79	-49.67	110.46	50.86	32.52	10.96	33.55	224	224	P	H
		5878.6	53.36	-49.17	102.53	43.33	32.61	10.98	33.56	224	224	P	H
		5936.2	48.57	-19.63	68.2	38.34	32.77	11.03	33.57	224	224	P	H
													H
802.11a													H
CH 165	*	5825	113.97	-	-	104.13	32.45	10.93	33.54	268	165	P	V
5825MHz	*	5825	105.68	-	-	95.84	32.45	10.93	33.54	268	165	A	V
		5850	64.28	-57.92	122.2	54.38	32.5	10.95	33.55	268	165	P	V
		5859.8	62.04	-47.41	109.45	52.09	32.54	10.96	33.55	268	165	P	V
		5877.4	54.92	-48.5	103.42	44.89	32.61	10.98	33.56	268	165	P	V
		5939	49.55	-18.65	68.2	39.3	32.78	11.04	33.57	268	165	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. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11490	46.01	-27.99	74	50.46	39.9	17.74	62.09	-	-	P	H
		13399	46.63	-27.37	74	50.57	40.09	19.05	63.08	-	-	P	H
		14480	47.5	-26.5	74	49.35	41.3	19.88	63.03	-	-	P	H
		17235	46.47	-21.73	68.2	42.54	40.4	22.02	58.49	-	-	P	H
		17989	52.85	-21.15	74	40.05	46.62	22.81	56.63	-	-	P	H
		17989	43.4	-10.6	54	30.6	46.62	22.81	56.63	-	-	A	H
													H
													H
													H
													H
													H
802.11a CH 149 5745MHz													H
		11490	44.98	-29.02	74	49.43	39.9	17.74	62.09	-	-	P	V
		13399	46.18	-27.82	74	50.12	40.09	19.05	63.08	-	-	P	V
		14471	47.78	-26.22	74	49.65	41.3	19.87	63.04	-	-	P	V
		17235	47.2	-21	68.2	43.27	40.4	22.02	58.49	-	-	P	V
		17989	52.05	-21.95	74	39.25	46.62	22.81	56.63	-	-	P	V
		17989	43.89	-10.11	54	31.09	46.62	22.81	56.63	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11570	45.54	-28.46	74	50.19	39.76	17.82	62.23	-	-	P	H
		13380	46.13	-27.87	74	50.16	40	19.05	63.08	-	-	P	H
		14491	47.34	-26.66	74	49.15	41.3	19.9	63.01	-	-	P	H
		17355	46.77	-21.43	68.2	41.81	40.99	22.15	58.18	-	-	P	H
		17978	52.99	-21.01	74	40.39	46.45	22.8	56.65	-	-	P	H
		17978	43.17	-10.83	54	30.57	46.45	22.8	56.65	-	-	A	H
													H
													H
													H
													H
													H
802.11a CH 157 5785MHz													H
		11570	46.92	-27.08	74	51.57	39.76	17.82	62.23	-	-	P	V
		13314	46.07	-27.93	74	50.43	39.67	19.03	63.06	-	-	P	V
		14480	47.1	-26.9	74	48.95	41.3	19.88	63.03	-	-	P	V
		17355	47.07	-21.13	68.2	42.11	40.99	22.15	58.18	-	-	P	V
		17989	52.64	-21.36	74	39.84	46.62	22.81	56.63	-	-	P	V
		17989	43.9	-10.1	54	31.1	46.62	22.81	56.63	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz		10949	47.96	-26.04	74	51.92	40.25	17.23	61.44	-	-	P	H
		11650	45.53	-28.47	74	50.55	39.45	17.9	62.37	-	-	P	H
		14469	47.51	-20.69	68.2	49.38	41.3	19.87	63.04	-	-	P	H
		17475	52.75	-15.45	68.2	46.74	41.6	22.27	57.86	-	-	P	H
		17989	53.01	-20.99	74	40.21	46.62	22.81	56.63	-	-	P	H
		17989	42.92	-11.08	54	30.12	46.62	22.81	56.63	-	-	A	H
													H
													H
													H
													H
													H
													H
		11433	47.84	-26.16	74	52.28	39.9	17.68	62.02	-	-	P	V
		11650	45.76	-28.24	74	50.78	39.45	17.9	62.37	-	-	P	V
		14480	47.83	-26.17	74	49.68	41.3	19.88	63.03	-	-	P	V
		17475	54.03	-14.17	68.2	48.02	41.6	22.27	57.86	-	-	P	V
		17989	54.26	-19.74	74	41.46	46.62	22.81	56.63	-	-	P	V
		17989	44.03	-9.97	54	31.23	46.62	22.81	56.63	-	-	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 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5638.4	50.11	-18.09	68.2	40.81	32.08	10.72	33.5	212	43	P	H
		5693.8	56.91	-43.72	100.63	47.44	32.19	10.79	33.51	212	43	P	H
		5717.8	69.95	-40.23	110.18	60.38	32.27	10.82	33.52	212	43	P	H
		5721.4	79.87	-34.12	113.99	70.28	32.29	10.82	33.52	212	43	P	H
	*	5745	112.92	-	-	103.21	32.38	10.85	33.52	212	43	P	H
	*	5745	104.87	-	-	95.16	32.38	10.85	33.52	212	43	A	H
802.11n													H
HT20													H
CH 149		5631.2	48.64	-19.56	68.2	39.35	32.06	10.72	33.49	241	341	P	V
5745MHz		5693.4	58.96	-41.37	100.33	49.49	32.19	10.79	33.51	241	341	P	V
		5719.8	68.89	-41.85	110.74	59.31	32.28	10.82	33.52	241	341	P	V
		5724.8	82.84	-38.9	121.74	73.24	32.3	10.82	33.52	241	341	P	V
	*	5745	113.99	-	-	104.28	32.38	10.85	33.52	241	341	P	V
	*	5745	106.39	-	-	96.68	32.38	10.85	33.52	241	341	A	V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5633	49.49	-18.71	68.2	40.19	32.07	10.72	33.49	200	43	P	H
		5692.75	49.7	-50.16	99.86	40.23	32.19	10.79	33.51	200	43	P	H
		5717.25	51.62	-58.41	110.03	42.06	32.27	10.81	33.52	200	43	P	H
		5720	50.28	-60.52	110.8	40.7	32.28	10.82	33.52	200	43	P	H
	*	5785	112.4	-	-	102.64	32.4	10.89	33.53	200	43	P	H
	*	5785	104.77	-	-	95.01	32.4	10.89	33.53	200	43	A	H
		5850	50.69	-71.51	122.2	40.79	32.5	10.95	33.55	200	43	P	H
		5871.75	50.32	-55.79	106.11	40.32	32.59	10.97	33.56	200	43	P	H
		5917.5	50.01	-23.72	73.73	39.82	32.74	11.02	33.57	200	43	P	H
		5940.75	49.58	-18.62	68.2	39.33	32.78	11.04	33.57	200	43	P	H
802.11n													H
HT20													H
CH 157		5624.75	48.71	-19.49	68.2	39.44	32.05	10.71	33.49	215	341	P	V
5785MHz		5654.25	49.15	-22.21	71.36	39.8	32.11	10.74	33.5	215	341	P	V
		5718.25	52.5	-57.81	110.31	42.93	32.27	10.82	33.52	215	341	P	V
		5723	49.95	-67.69	117.64	40.36	32.29	10.82	33.52	215	341	P	V
	*	5782	114.02	-	-	104.26	32.4	10.89	33.53	215	341	P	V
	*	5782	106.28	-	-	96.52	32.4	10.89	33.53	215	341	A	V
		5852.25	50.1	-66.97	117.07	40.18	32.51	10.96	33.55	215	341	P	V
		5868.75	50.39	-56.56	106.95	40.4	32.58	10.97	33.56	215	341	P	V
		5912.75	49.05	-28.19	77.24	38.88	32.73	11.01	33.57	215	341	P	V
		5945.5	51.34	-16.86	68.2	41.09	32.79	11.04	33.58	215	341	P	V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
	*	5825	110.58	-	-	100.74	32.45	10.93	33.54	100	133	P	H
	*	5825	103.05	-	-	93.21	32.45	10.93	33.54	100	133	A	H
		5850	66.56	-55.64	122.2	56.66	32.5	10.95	33.55	100	133	P	H
		5855	59	-51.8	110.8	49.07	32.52	10.96	33.55	100	133	P	H
		5878.6	53.98	-48.55	102.53	43.95	32.61	10.98	33.56	100	133	P	H
		5944.4	49.48	-18.72	68.2	39.23	32.79	11.04	33.58	100	133	P	H
802.11n													H
HT20													H
CH 165	*	5825	111.39	-	-	101.55	32.45	10.93	33.54	347	74	P	V
5825MHz	*	5825	104.11	-	-	94.27	32.45	10.93	33.54	347	74	A	V
		5850	68.07	-54.13	122.2	58.17	32.5	10.95	33.55	347	74	P	V
		5856.4	62.3	-48.11	110.41	52.36	32.53	10.96	33.55	347	74	P	V
		5877	55.11	-48.6	103.71	45.08	32.61	10.98	33.56	347	74	P	V
		5933.2	49.27	-18.93	68.2	39.04	32.77	11.03	33.57	347	74	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 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11490	45.22	-28.78	74	49.67	39.9	17.74	62.09	-	-	P	H
		13325	45.85	-28.15	74	50.16	39.72	19.03	63.06	-	-	P	H
		14469	46.69	-21.51	68.2	48.56	41.3	19.87	63.04	-	-	P	H
		17235	45.38	-22.82	68.2	41.45	40.4	22.02	58.49	-	-	P	H
		17978	53.45	-20.55	74	40.85	46.45	22.8	56.65	-	-	P	H
		17978	43.18	-10.82	54	30.58	46.45	22.8	56.65	-	-	A	H
													H
													H
													H
													H
802.11n													H
HT20													H
CH 149		11490	46.06	-27.94	74	50.51	39.9	17.74	62.09	-	-	P	V
5745MHz		13369	45.98	-28.02	74	50.07	39.94	19.04	63.07	-	-	P	V
		14480	47.31	-26.69	74	49.16	41.3	19.88	63.03	-	-	P	V
		17235	45.73	-22.47	68.2	41.8	40.4	22.02	58.49	-	-	P	V
		17978	53.84	-20.16	74	41.24	46.45	22.8	56.65	-	-	P	V
		17978	43.67	-10.33	54	31.07	46.45	22.8	56.65	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11570	46.52	-27.48	74	51.17	39.76	17.82	62.23	-	-	P	H
		13358	46.07	-27.93	74	50.21	39.89	19.04	63.07	-	-	P	H
		14491	48.83	-25.17	74	50.64	41.3	19.9	63.01	-	-	P	H
		14491	40.04	-13.96	54	41.85	41.3	19.9	63.01	-	-	A	H
		17355	47.62	-20.58	68.2	42.66	40.99	22.15	58.18	-	-	P	H
		17989	53.54	-20.46	74	40.74	46.62	22.81	56.63	-	-	P	H
		17989	43.65	-10.35	54	30.85	46.62	22.81	56.63	-	-	A	H
													H
													H
													H
802.11n													H
HT20													H
CH 157		11570	46.52	-27.48	74	51.17	39.76	17.82	62.23	-	-	P	V
5785MHz		13391	46.11	-27.89	74	50.08	40.06	19.05	63.08	-	-	P	V
		14480	48.06	-25.94	74	49.91	41.3	19.88	63.03	-	-	P	V
		14480	39.72	-14.28	54	41.57	41.3	19.88	63.03	-	-	A	V
		17355	47.82	-20.38	68.2	42.86	40.99	22.15	58.18	-	-	P	V
		17989	53.91	-20.09	74	41.11	46.62	22.81	56.63	-	-	P	V
		17989	43.89	-10.11	54	31.09	46.62	22.81	56.63	-	-	A	V
													V
													V
													V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11650	46.43	-27.57	74	51.45	39.45	17.9	62.37	-	-	P	H
		13303	46.42	-27.58	74	50.85	39.61	19.02	63.06	-	-	P	H
		14491	47.17	-26.83	74	48.98	41.3	19.9	63.01	-	-	P	H
		17475	47.68	-20.52	68.2	41.67	41.6	22.27	57.86	-	-	P	H
		17989	53.63	-20.37	74	40.83	46.62	22.81	56.63	-	-	P	H
		17989	43.4	-10.6	54	30.6	46.62	22.81	56.63	-	-	A	H
													H
													H
													H
													H
802.11n													H
HT20													H
CH 165		11650	47.55	-26.45	74	52.57	39.45	17.9	62.37	-	-	P	V
5825MHz		13391	45.85	-28.15	74	49.82	40.06	19.05	63.08	-	-	P	V
		14480	47.33	-26.67	74	49.18	41.3	19.88	63.03	-	-	P	V
		17475	47.75	-20.45	68.2	41.74	41.6	22.27	57.86	-	-	P	V
		17989	53.77	-20.23	74	40.97	46.62	22.81	56.63	-	-	P	V
		17989	43.9	-10.1	54	31.1	46.62	22.81	56.63	-	-	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 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5649.75	53.68	-14.52	68.2	44.34	32.1	10.74	33.5	214	44	P	H
		5695.75	62.73	-39.34	102.07	53.26	32.19	10.79	33.51	214	44	P	H
		5720	81.03	-29.77	110.8	71.45	32.28	10.82	33.52	214	44	P	H
		5721	81.03	-32.05	113.08	71.45	32.28	10.82	33.52	214	44	P	H
	*	5755	110.27	-	-	100.54	32.4	10.86	33.53	214	44	P	H
	*	5755	102.23	-	-	92.5	32.4	10.86	33.53	214	44	A	H
		5851.75	50.55	-67.66	118.21	40.63	32.51	10.96	33.55	214	44	P	H
		5857.5	53.05	-57.05	110.1	43.11	32.53	10.96	33.55	214	44	P	H
		5890.5	49.88	-43.82	93.7	39.79	32.66	10.99	33.56	214	44	P	H
		5938.5	49.04	-19.16	68.2	38.8	32.78	11.03	33.57	214	44	P	H
802.11n													H
HT40													H
CH 151		5649.75	53.22	-14.98	68.2	43.88	32.1	10.74	33.5	230	342	P	V
5755MHz		5699.5	63.18	-41.65	104.83	53.7	32.2	10.79	33.51	230	342	P	V
		5720	83.54	-27.26	110.8	73.96	32.28	10.82	33.52	230	342	P	V
		5721	83.54	-29.54	113.08	73.96	32.28	10.82	33.52	230	342	P	V
	*	5755	111.87	-	-	102.14	32.4	10.86	33.53	230	342	P	V
	*	5755	103.63	-	-	93.9	32.4	10.86	33.53	230	342	A	V
		5850.25	52.7	-68.93	121.63	42.79	32.5	10.96	33.55	230	342	P	V
		5857.75	53.97	-56.06	110.03	44.03	32.53	10.96	33.55	230	342	P	V
		5881.25	51.69	-48.87	100.56	41.65	32.62	10.98	33.56	230	342	P	V
		5942	49.59	-18.61	68.2	39.34	32.78	11.04	33.57	230	342	P	V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5613.75	49.32	-18.88	68.2	40.08	32.03	10.7	33.49	222	43	P	H
		5696.5	57.56	-45.06	102.62	48.09	32.19	10.79	33.51	222	43	P	H
		5717.5	63.8	-46.3	110.1	54.23	32.27	10.82	33.52	222	43	P	H
		5724.25	66.81	-53.68	120.49	57.21	32.3	10.82	33.52	222	43	P	H
	*	5775	109.97	-	-	100.22	32.4	10.88	33.53	222	43	P	H
	*	5775	102.16	-	-	92.41	32.4	10.88	33.53	222	43	A	H
		5851.5	54.55	-64.23	118.78	44.63	32.51	10.96	33.55	222	43	P	H
		5856.75	55.06	-55.25	110.31	45.12	32.53	10.96	33.55	222	43	P	H
		5880.75	51.42	-49.51	100.93	41.38	32.62	10.98	33.56	222	43	P	H
		5926.75	50.44	-17.76	68.2	40.24	32.75	11.02	33.57	222	43	P	H
802.11n													H
HT40													H
CH 159		5626.5	48.89	-19.31	68.2	39.62	32.05	10.71	33.49	239	341	P	V
5795MHz		5699	58.53	-45.93	104.46	49.05	32.2	10.79	33.51	239	341	P	V
		5715.5	66.71	-42.83	109.54	57.16	32.26	10.81	33.52	239	341	P	V
		5724.5	71.96	-49.1	121.06	62.36	32.3	10.82	33.52	239	341	P	V
	*	5775	111.88	-	-	102.13	32.4	10.88	33.53	239	341	P	V
	*	5775	103.59	-	-	93.84	32.4	10.88	33.53	239	341	A	V
		5853.5	57.37	-56.85	114.22	47.45	32.51	10.96	33.55	239	341	P	V
		5858.5	58.83	-50.99	109.82	48.89	32.53	10.96	33.55	239	341	P	V
		5878.75	53.31	-49.1	102.41	43.27	32.62	10.98	33.56	239	341	P	V
		5927.5	49.16	-19.04	68.2	38.95	32.76	11.02	33.57	239	341	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 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11510	45.58	-28.42	74	50.06	39.88	17.76	62.12	-	-	P	H
		13292	45.65	-28.35	74	50.1	39.59	19.02	63.06	-	-	P	H
		14469	47.07	-21.13	68.2	48.94	41.3	19.87	63.04	-	-	P	H
		17265	44.12	-24.08	68.2	39.99	40.49	22.05	58.41	-	-	P	H
		17978	53.47	-20.53	74	40.87	46.45	22.8	56.65	-	-	P	H
		17978	43.18	-10.82	54	30.58	46.45	22.8	56.65	-	-	A	H
													H
													H
													H
													H
802.11n													H
HT40													H
CH 151		11510	46.26	-27.74	74	50.74	39.88	17.76	62.12	-	-	P	V
5755MHz		13380	45.63	-28.37	74	49.66	40	19.05	63.08	-	-	P	V
		14469	47.05	-21.15	68.2	48.92	41.3	19.87	63.04	-	-	P	V
		17265	43.72	-24.48	68.2	39.59	40.49	22.05	58.41	-	-	P	V
		17989	53.86	-20.14	74	41.06	46.62	22.81	56.63	-	-	P	V
		17989	43.9	-10.1	54	31.1	46.62	22.81	56.63	-	-	A	V
													V
													V
													V
													V
													V
													V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11466	47.59	-26.41	74	52.04	39.9	17.71	62.06	-	-	P	H
		11590	45.23	-28.77	74	49.93	39.72	17.84	62.26	-	-	P	H
		14491	46.4	-27.6	74	48.21	41.3	19.9	63.01	-	-	P	H
		17385	45.83	-22.37	68.2	40.56	41.19	22.18	58.1	-	-	P	H
		17989	52.81	-21.19	74	40.01	46.62	22.81	56.63	-	-	P	H
		17989	43.34	-10.66	54	30.54	46.62	22.81	56.63	-	-	A	H
													H
													H
													H
													H
802.11n													H
HT40													H
CH 159		11191	47.2	-26.8	74	51.85	39.63	17.45	61.73	-	-	P	V
5795MHz		11590	46.52	-27.48	74	51.22	39.72	17.84	62.26	-	-	P	V
		14480	46.15	-27.85	74	48	41.3	19.88	63.03	-	-	P	V
		17385	45.72	-22.48	68.2	40.45	41.19	22.18	58.1	-	-	P	V
		17989	53.43	-20.57	74	40.63	46.62	22.81	56.63	-	-	P	V
		17989	43.83	-10.17	54	31.03	46.62	22.81	56.63	-	-	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 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5645.75	55.39	-12.81	68.2	46.07	32.09	10.73	33.5	211	43	P	H
		5698	62.99	-40.74	103.73	53.51	32.2	10.79	33.51	211	43	P	H
		5706.25	70.46	-36.49	106.95	60.94	32.23	10.8	33.51	211	43	P	H
		5723	71.64	-46	117.64	62.05	32.29	10.82	33.52	211	43	P	H
	*	5795	106.89	-	-	97.13	32.4	10.9	33.54	211	43	P	H
	*	5795	98.32	-	-	88.56	32.4	10.9	33.54	211	43	A	H
		5851.75	76.9	-41.31	118.21	66.98	32.51	10.96	33.55	211	43	P	H
		5866.25	73.29	-34.36	107.65	63.32	32.56	10.97	33.56	211	43	P	H
		5886.25	70.03	-26.82	96.85	59.95	32.65	10.99	33.56	211	43	P	H
		5927	52.43	-15.77	68.2	42.23	32.75	11.02	33.57	211	43	P	H
802.11ac													H
VHT80													H
CH 155		5649.25	55.64	-12.56	68.2	46.3	32.1	10.74	33.5	238	341	P	V
5775MHz		5697.25	65.74	-37.43	103.17	56.27	32.19	10.79	33.51	238	341	P	V
		5720	71.56	-39.24	110.8	61.98	32.28	10.82	33.52	238	341	P	V
		5723.5	74.39	-44.39	118.78	64.8	32.29	10.82	33.52	238	341	P	V
	*	5795	108.61	-	-	98.85	32.4	10.9	33.54	238	341	P	V
	*	5795	99.77	-	-	90.01	32.4	10.9	33.54	238	341	A	V
		5852.25	78.17	-38.9	117.07	68.25	32.51	10.96	33.55	238	341	P	V
		5860.25	74.02	-35.31	109.33	64.07	32.54	10.96	33.55	238	341	P	V
		5886.25	71.02	-25.83	96.85	60.94	32.65	10.99	33.56	238	341	P	V
		5933	52.93	-15.27	68.2	42.7	32.77	11.03	33.57	238	341	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 802.11ac VHT80 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		11550	46.8	-27.2	74	51.39	39.8	17.8	62.19	-	-	P	H
		17325	46.18	-22.02	68.2	41.55	40.77	22.11	58.25	-	-	P	H
		18000	53.84	-20.16	74	40.82	46.8	22.82	56.6	-	-	P	H
		18000	43.68	-10.32	54	30.66	46.8	22.82	56.6	-	-	A	H
													H
													H
													H
													H
													H
													H
i802.11ac													H
VHT80													H
CH 155		11550	47.61	-26.39	74	52.2	39.8	17.8	62.19	-	-	P	V
5775MHz		17325	44.37	-23.83	68.2	39.74	40.77	22.11	58.25	-	-	P	V
		18000	53.69	-20.31	74	40.67	46.8	22.82	56.6	-	-	P	V
		18000	43.61	-10.39	54	30.59	46.8	22.82	56.6	-	-	A	V
													V
													V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.
4. The emission level close to 18GHz is checked that the average emission level is noise floor only.

Emission above 18GHz

5GHz WIFI 802.11ac VHT80 (SHF @ 1m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		39104	47.9	-26.1	74	61.1	43.86	-0.52	56.54	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
5GHz													H
802.11ac													H
VHT80		39566	47.04	-26.96	74	59.03	44.65	-0.42	56.22	-	-	P	V
SHF													V
													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 802.11ac VHT80 (LF @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		63.95	24.63	-15.37	40	44.07	11.81	1.21	32.46	-	-	P	H
		126.03	24.17	-19.33	43.5	37.54	17.34	1.71	32.42	-	-	P	H
		180.35	23.23	-20.27	43.5	39	14.7	2.03	32.5	-	-	P	H
		771.08	27.62	-18.38	46	27.4	27.99	4.16	31.93	-	-	P	H
		857.41	29.29	-16.71	46	27.19	29.13	4.42	31.45	-	-	P	H
		953.44	30.05	-15.95	46	25.67	30.57	4.68	30.87	-	-	P	H
													H
													H
													H
													H
5GHz													H
802.11ac													H
VHT80		40.67	30.51	-9.49	40	43.06	18.89	0.99	32.43	100	343	Q	V
LF		64.92	31.07	-8.93	40	50.5	11.81	1.22	32.46	-	-	P	V
		174.53	27.68	-15.82	43.5	43.09	15.08	2	32.49	-	-	P	V
		801.15	28.39	-17.61	46	27.78	28.1	4.25	31.74	-	-	P	V
		896.21	29.28	-16.72	46	27.14	28.85	4.54	31.25	-	-	P	V
		952.47	29.97	-16.03	46	25.65	30.52	4.68	30.88	-	-	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	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a 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 @5650MHz:

1. Level(dBμV/m)

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

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 68.2(dBμV/m)

= -12.75 (dB)

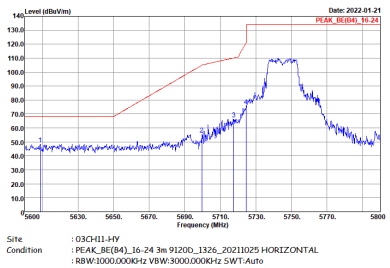
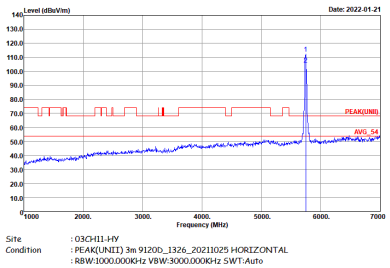
Both peak and average measured complies with the limit line, so test result is “PASS”.

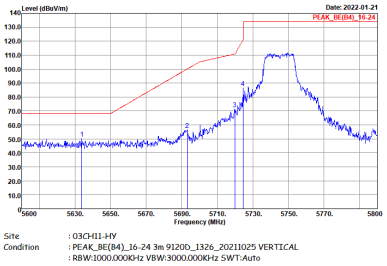
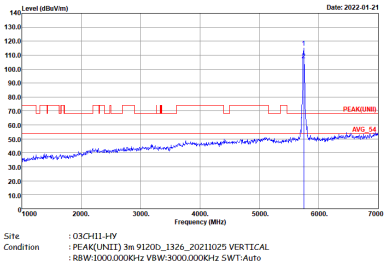
Appendix C. Radiated Spurious Emission Plots

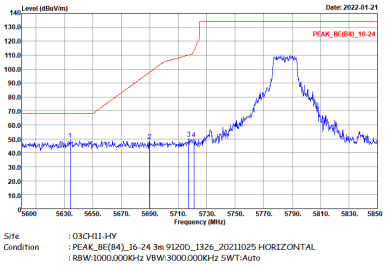
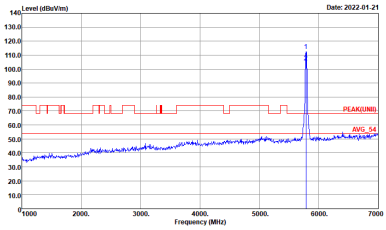
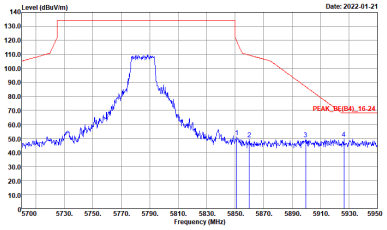
Test Engineer :	Daniel Lee, Hayden Wu, James Chiu and Fu Chen	**Temperature :**	19.5~22.5°C
		Relative Humidity :	54.6~68.3%

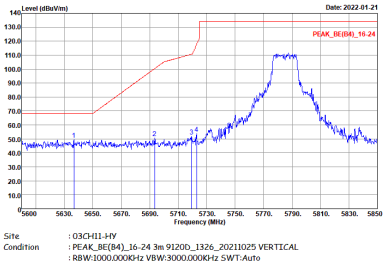
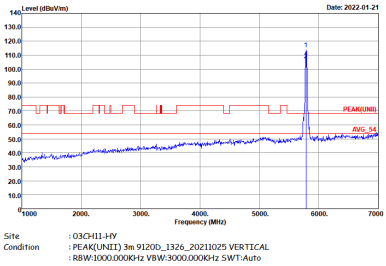
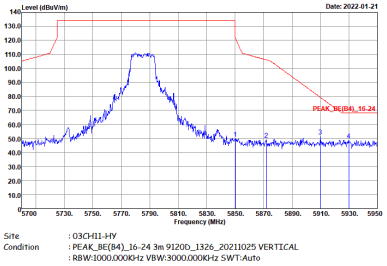
Band 4 - 5725~5850MHz

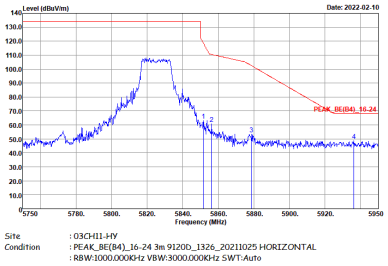
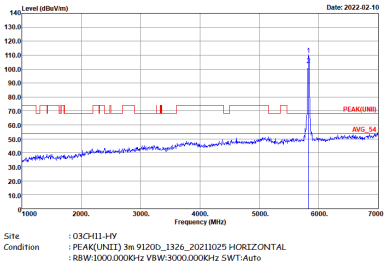
WIFI 802.11a (Band Edge @ 3m)

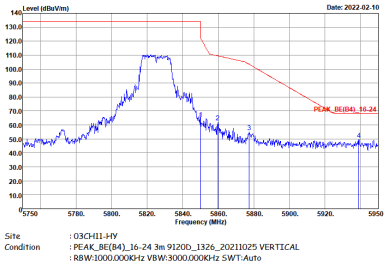
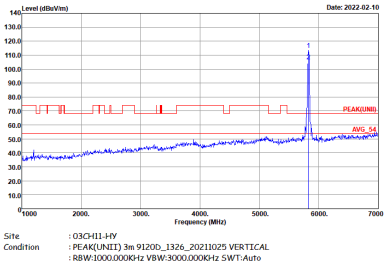
WIFI	**Band 4 5725~5850MHz Band Edge @ 3m**	
ANT	**802.11a CH149 5745MHz**	
1	**Horizontal**	**Fundamental**
Peak		

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

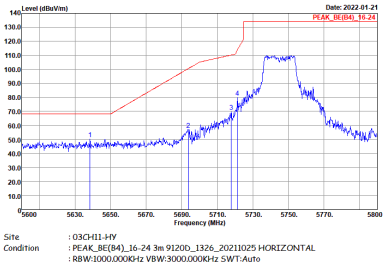
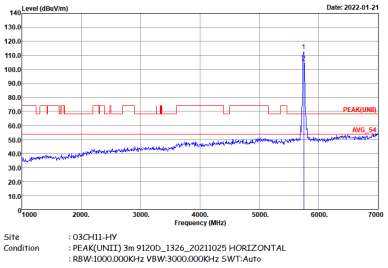
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH11-HY Condition : PEAK(UNII) 3m 9120D_1326_20211025 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

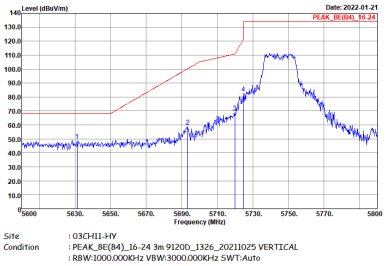
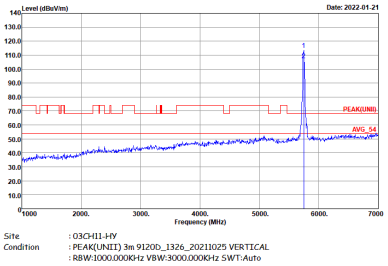
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

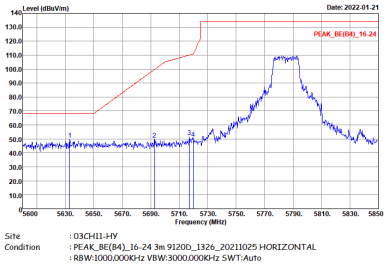
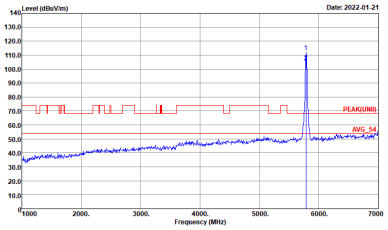
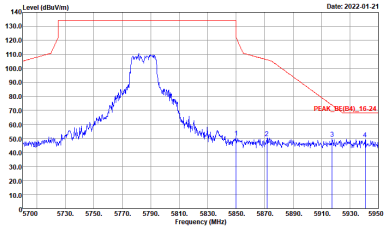
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Horizontal	Fundamental
Peak		

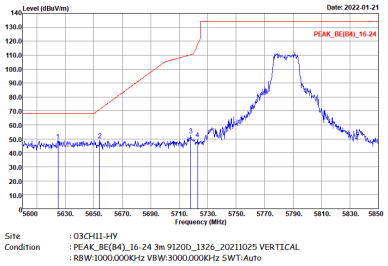
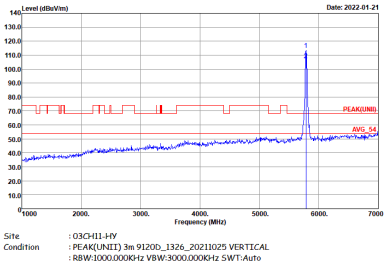
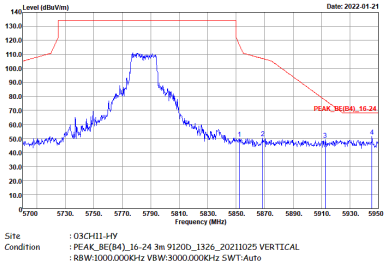
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Vertical	Fundamental
Peak		

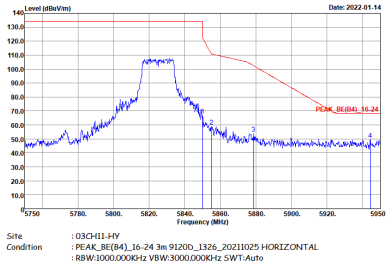
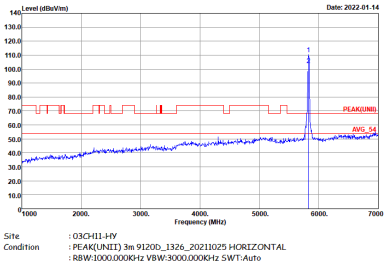
Band 4 5725~5850MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

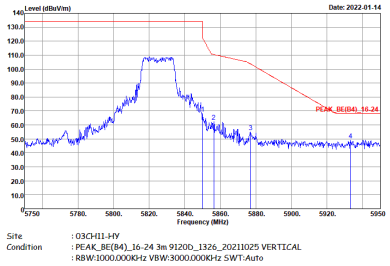
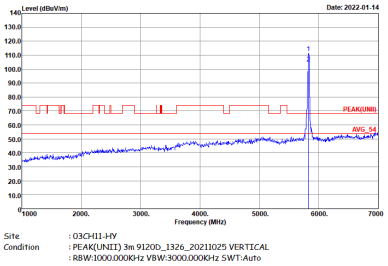
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Horizontal	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Vertical	Fundamental
Peak		

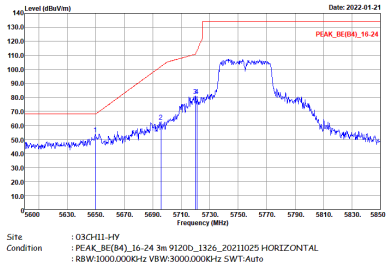
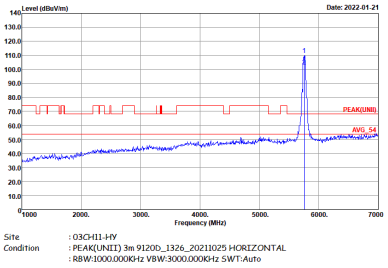
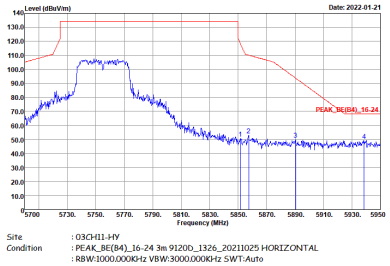
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH11-HY Condition : PEAK(UNII) 3m 9120D_1326_20211025 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

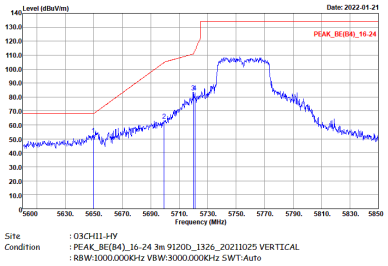
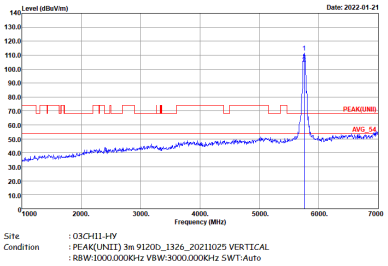
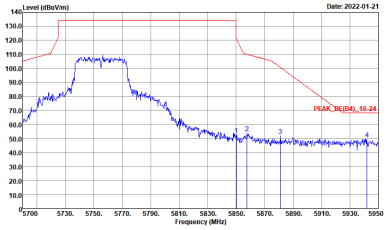
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

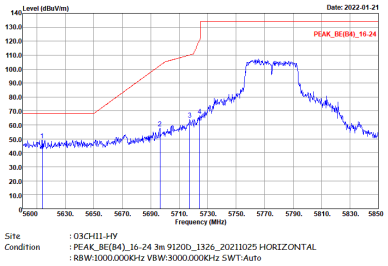
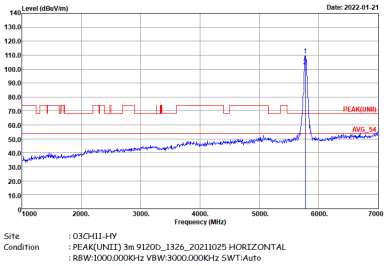
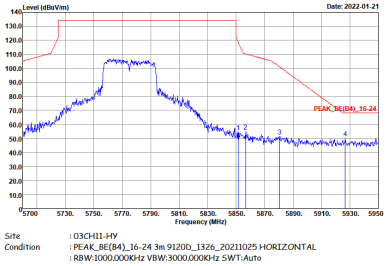
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Horizontal	Fundamental
Peak		

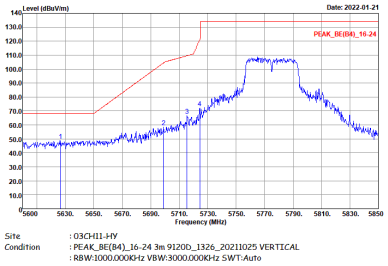
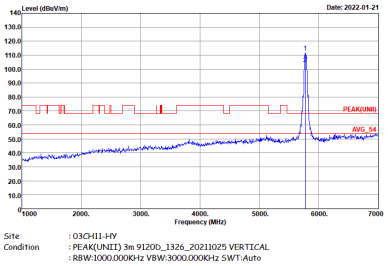
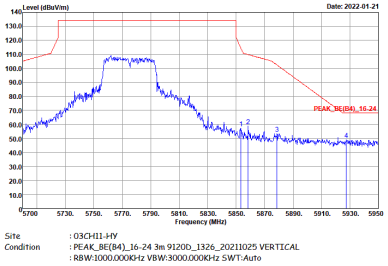
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Vertical	Fundamental
Peak		

Band 4 5725~5850MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

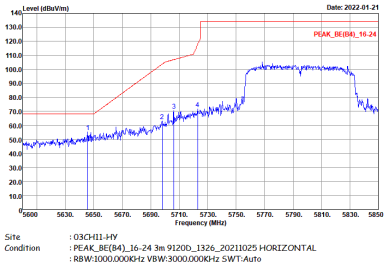
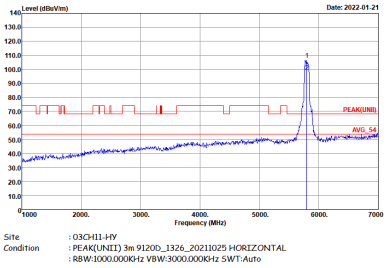
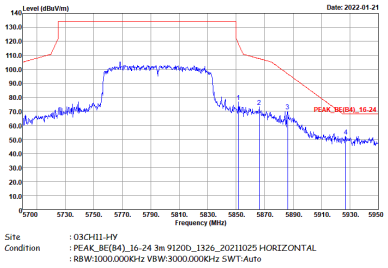
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Horizontal	Fundamental
Peak		
Peak		Left blank

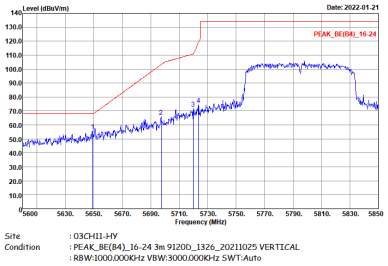
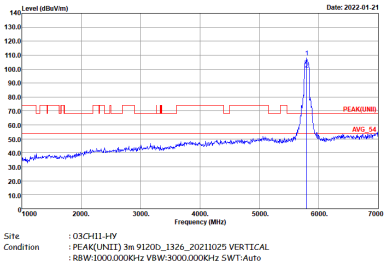
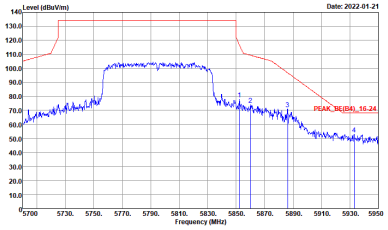
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH11-HY Condition : PEAK(UNII) 3m 9120D_1326_20211025 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Fundamental
Peak		
Peak		Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

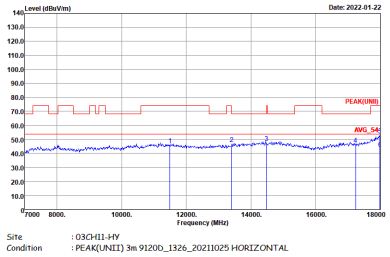
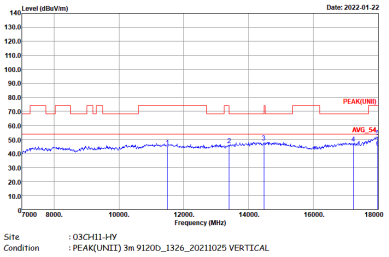
Band 4 5725~5850MHz
WIFI 802.11ac VHT80 (Band Edge @ 3m)

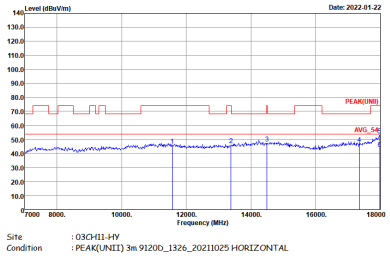
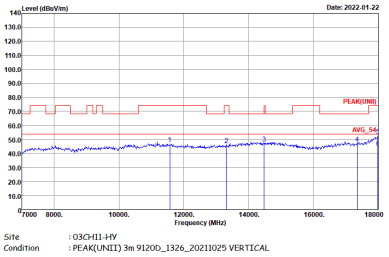
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
1	Horizontal	Fundamental
Peak		
Peak		Left blank

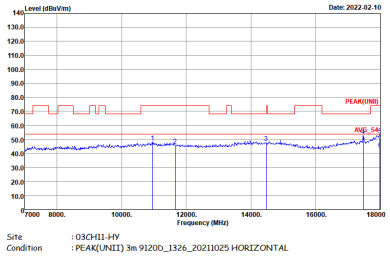
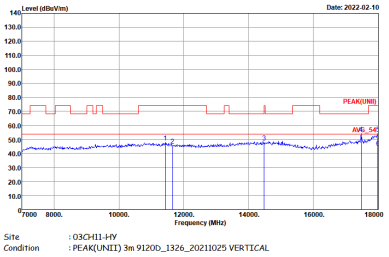
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH11-HY Condition : PEAK(UNII) 3m 9120D_1326_20211025 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m 9120D_1326_20211025 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

Band 4 - 5725~5850MHz

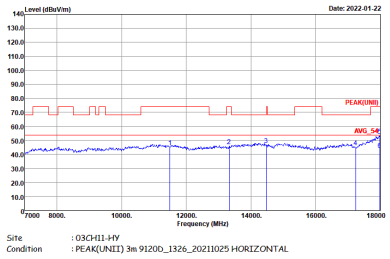
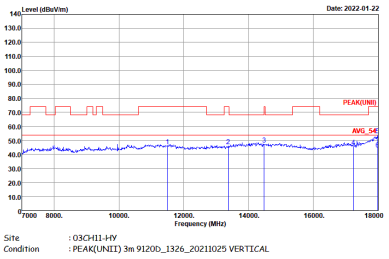
WIFI 802.11a (Harmonic @ 3m)

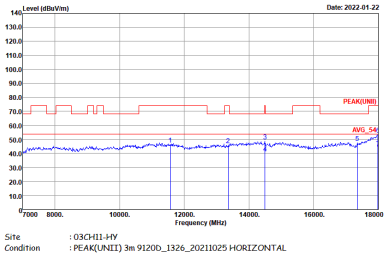
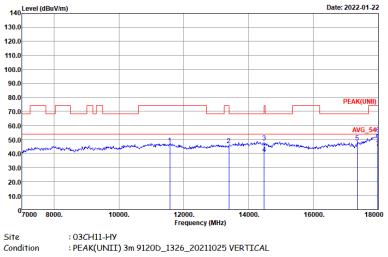
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Vertical
Peak Avg.		

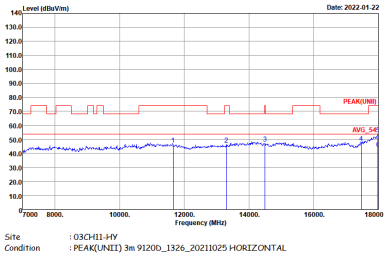
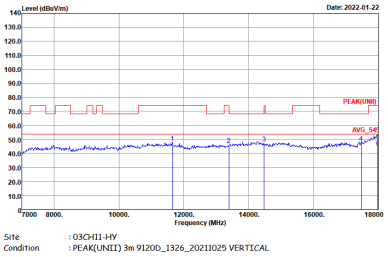
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Vertical
Peak Avg.		

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

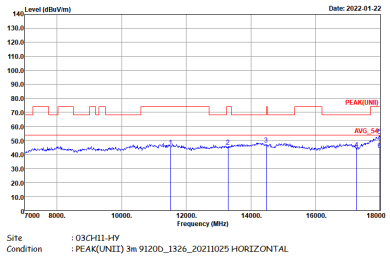
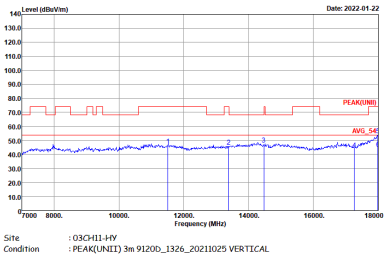
Band 4 5725~5850MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

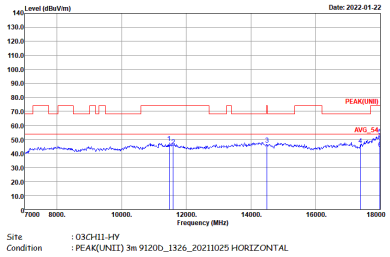
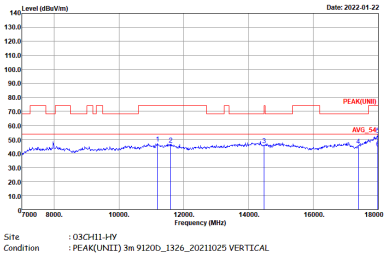
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT20 CH157 5785MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT20 CH165 5825MHz	
1	Horizontal	Vertical
Peak Avg.		

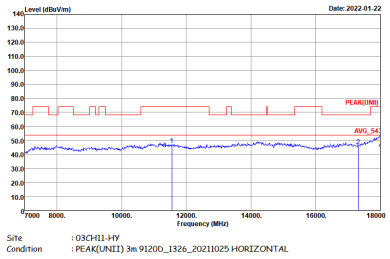
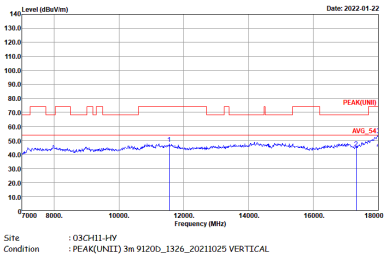
Band 4 5725~5850MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Vertical
Peak Avg.		

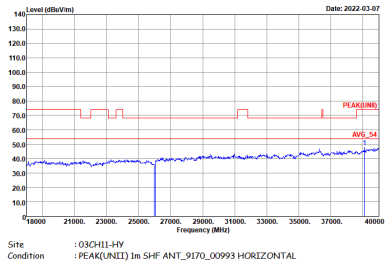
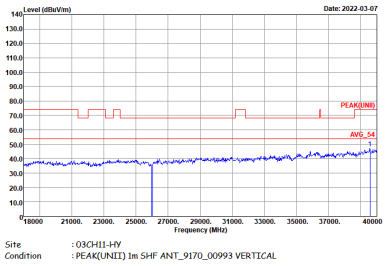
Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
1	Horizontal	Vertical
Peak Avg.		

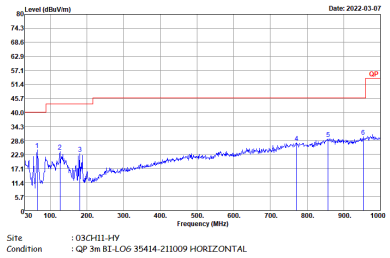
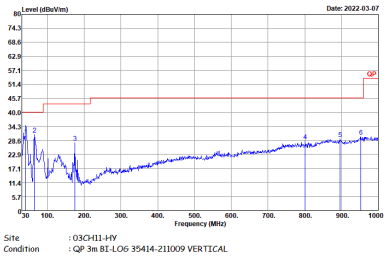
Emission above 18GHz

5GHz WIFI 802.11ac VHT80 (SHF @ 1m)

WIFI	5GHz WIFI	
ANT	802.11ac VHT80 SHF	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

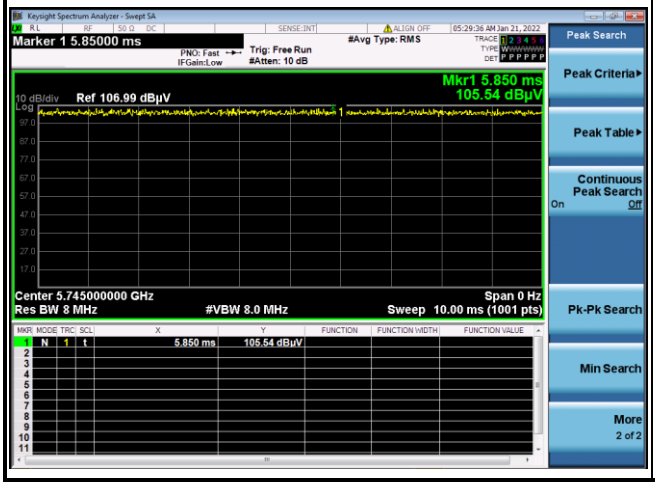
5GHz WIFI 802.11ac VHT80 (LF @ 3m)

WIFI	5GHz WIFI	
ANT	802.11ac VHT80 LF	
1	Horizontal	Vertical
QP / Peak		

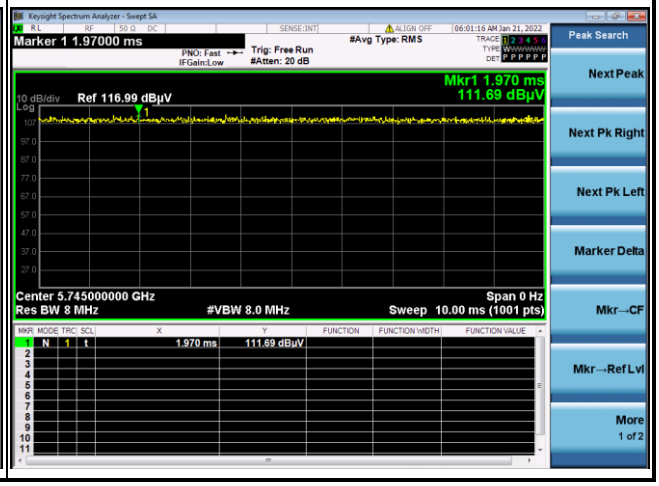
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
802.11a	100.00	-	-	10Hz
5GHz 802.11n HT20	100.00	-	-	10Hz
5GHz 802.11n HT40	98.94	-	-	10Hz
5GHz 802.11ac VHT80	96.12	248	4.03	10kHz

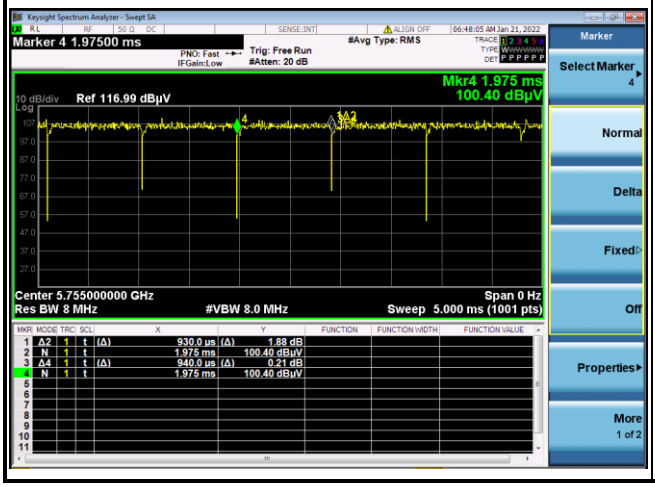
802.11a



5GHz 802.11n HT20



5GHz 802.11n HT40



5GHz 802.11ac VHT80