

FCC Test Report

Report No.: RFBIBJ-WTW-P22010912-2

FCC ID: HBW-GDOCAMF1

Test Model: GDOCAMF1

Received Date: Feb. 16, 2022

Test Date: Feb. 16 ~ Feb. 24, 2022

Issued Date: May 04, 2022

Applicant: The Chamberlain Group Inc.

Address: 300 Windsor Drive Oak Brook, IL 60523

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location (1): No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan

Test Location (2): No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan

FCC Registration / 788550 / TW0003

Designation Number: 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBIBJ-WTW-P22010912-2	Original Release	May 04, 2022

1 Certificate of Conformity

Product: Camera Module

Brand: Chamberlain

Test Model: GDOCAMF1

Sample Status: Engineering Sample

Applicant: The Chamberlain Group Inc.

Test Date: Feb. 16 ~ Feb. 24, 2022

Standards: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Gina Liu, **Date:** May 04, 2022
Gina Liu / Specialist

Approved by : Jeremy Lin, **Date:** May 04, 2022
Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(9)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -14.48 dB at 4.31400 MHz.
15.407(b) (1/2/3/4(i/ii)/ 9)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.56 dB at 15600.00 MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6 dB Bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is ipex not a standard connector.

Note:

- For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOB test plots were recorded in Annex A.
- For U-NII-1, U-NII-2A, U-NII-2C band compliance with rule 15.407(b) of the band-edge items, the test plots were recorded in Annex B. Test Procedures refer to report 4.1.3.
- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.00 dB
	30 MHz ~ 200 MHz	2.91 dB
	200 MHz ~ 1000 MHz	2.93 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Camera Module
Brand	Chamberlain
Test Model	GDOCAMF1
Status of EUT	Engineering Sample
Power Supply Rating	Input: 100-240 Vac, 50-60 Hz, 0.3 A (from power board) Output: 5.0 Vdc, 1.0 A
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 150.0 Mbps 802.11ac: up to 433.3 Mbps
Operating Frequency	5180 ~ 5240 MHz, 5745 ~ 5825 MHz
Number of Channel	5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
Output Power	54.45 mW for 5180 ~ 5240 MHz 94.624 mW for 5745 ~ 5825 MHz
Antenna Type	PCB antenna with 5.29 dBi gain
Antenna Connector	ipex(MHF)
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

- There're 2 SKU for the EUT listed as below.

SKU	Model	Part number	Description
1	GDOCAMF1	EVT RTK	Audio Amplifier-Realtek_ALC105-VF-CGT
2		EVT TI	Audio Amplifier-TI_TPA2011D1YFFR
* After pre-tested all the modes and found SKU 1 was the worst. Therefore only SKU 1 was for the final test and presented in the test			

- The EUT incorporates a SISO function.

Modulation Mode	Tx Function
802.11a	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX
802.11ac (VHT20)	1TX
802.11ac (VHT40)	1TX
802.11ac (VHT80)	1TX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

3. Power setting is as below:

802.11a		802.11ac (VHT20)		802.11ac (VHT40)		802.11ac (VHT80)	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
36	44	36	46	38	45	42	47
40	44	40	46	46	46	155	54
48	44	48	46	151	49		
149	47	149	46	159	48		
157	48	157	45				
165	48	165	45				

4. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

5. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

For 5180 ~ 5240 MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
42	5210

For 5745 ~ 5825 MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
155	5775

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz

RE<1G: Radiated Emission below 1 GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

Note: "-" means no effect.

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-		802.11ac (VHT20)	36 to 48	36, 40, 48	OFDM	BPSK	7.5
-		802.11ac (VHT40)	38 to 46	38, 46	OFDM	BPSK	15.0
-		802.11ac (VHT80)	42	42	OFDM	BPSK	29.3
-	5745-5825	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-		802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	7.5
-		802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	15.0
-		802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5745-5825	802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5745-5825	802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

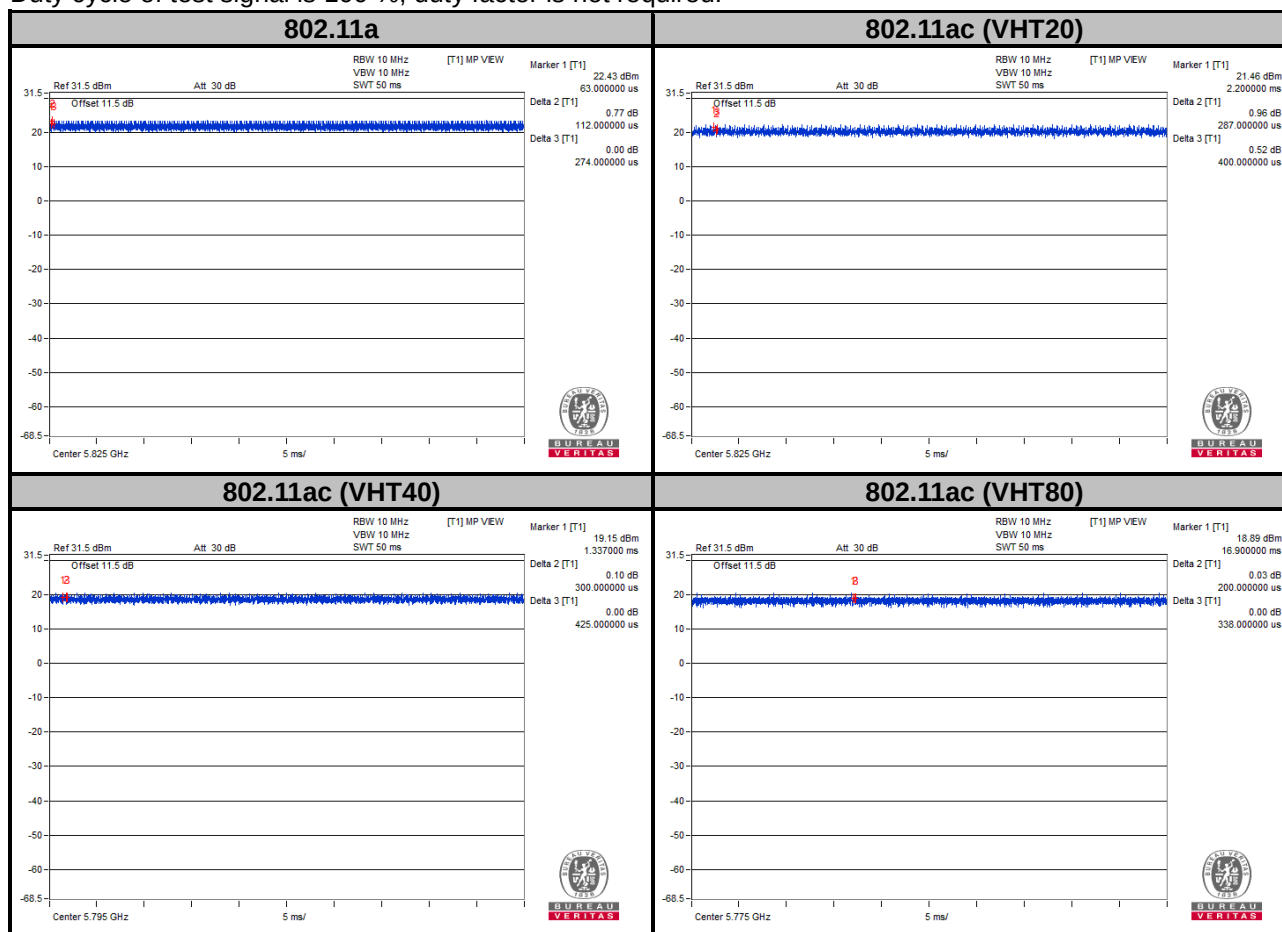
EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-		802.11n (HT20)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
-		802.11n (HT40)	38 to 46	38, 46	OFDM	BPSK	13.5
-		802.11ac (VHT80)	42	42	OFDM	BPSK	29.3
-	5745-5825	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-		802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
-		802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5
-		802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Hans Wu / Raymond Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Raymond Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Raymond Lee
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Chum Wu

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.

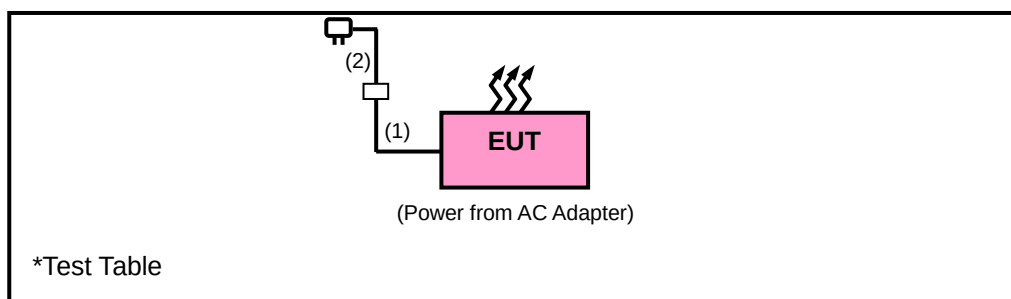


3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC power cable	1	0.5	N	0	Provided by client
2.	AC power extension socket	1	2.0	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart E (15.407)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (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:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Limits of Unwanted Emission Out of the Restricted Bands

Applicable To		Limit	
789033 D02 General UNII Test Procedures New Rules v02r01		Field Strength at 3 m	
		PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
Frequency Band	Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
5150~5250 MHz	15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	☒ 15.407(b)(4)(i)	PK:-27 (dBm/MHz) ^{*1} PK:10 (dBm/MHz) ^{*2} PK:15.6 (dBm/MHz) ^{*3} PK:27 (dBm/MHz) ^{*4}	PK: 68.2 (dBμV/m) ^{*1} PK:105.2 (dBμV/m) ^{*2} PK: 110.8 (dBμV/m) ^{*3} PK:122.2 (dBμV/m) ^{*4}
	☐ 15.407(b)(4)(ii)	Emission limits in section 15.247(d)	

^{*1} beyond 75 MHz or more above of the band edge.

^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038B	MY60180019	Jan. 27, 2022	Jan. 26, 2023
Spectrum Analyzer KEYSIGHT	N9020B	MY60110513	Dec. 24, 2021	Dec. 23, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-1214	Oct. 27, 2021	Oct. 26, 2022
HORN Antenna RF SPIN	DRH18-E	210101A18E	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	9170-1049	Nov. 14, 2021	Nov. 13, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC330N	980798	Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980809	Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980786	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(9000+3000+1000)	201244+ 201232+ 210103	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+3000+500)	201251+ 201249+ 201248	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+ 201255	Jan. 17, 2022	Jan. 16, 2023
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFA-515BSN	NA	NA	NA
Turn Table Max-Full	MFT-201SS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208676	NA	NA
Wideband Power Sensor KEYSIGHT	N1923A	MY58020002	Jan. 17, 2022	Jan. 16, 2023
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 18, 2022	Jan. 17, 2023
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Jan. 03, 2022	Jan. 02, 2023
DC power supply Keysight	U8002A	MY56330015	NA	NA
Digital Multimeter Fluke	87-III	70360755	Jul. 08, 2021	Jul. 07, 2022

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in WM Chamber 9.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

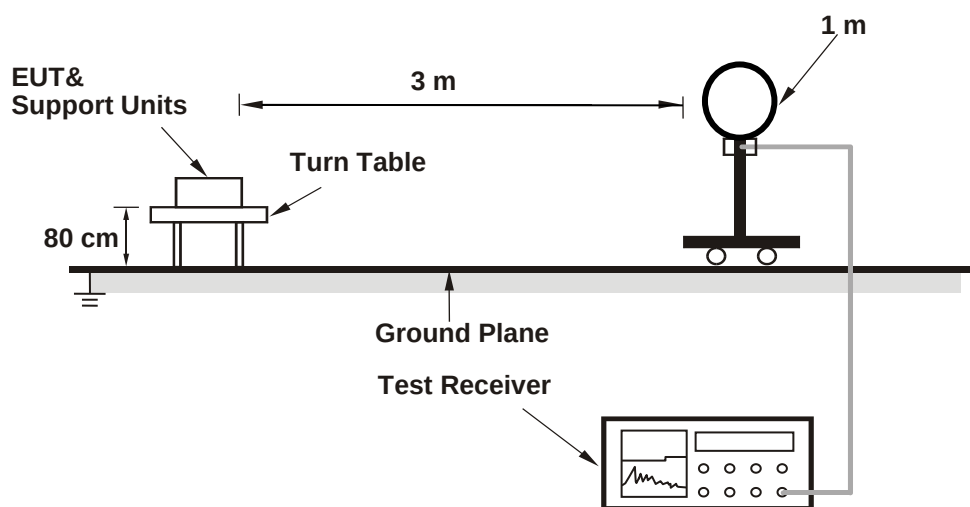
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10 Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

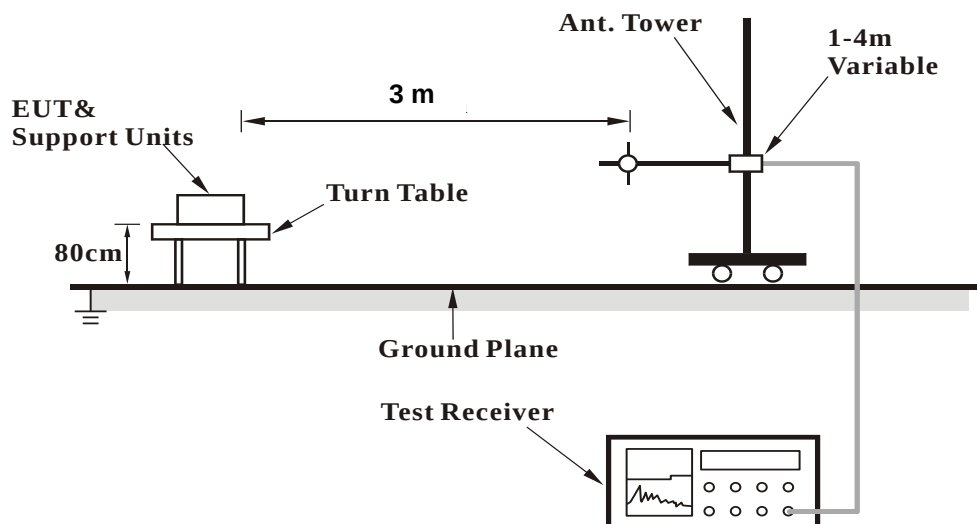
No deviation.

4.1.5 Test Setup

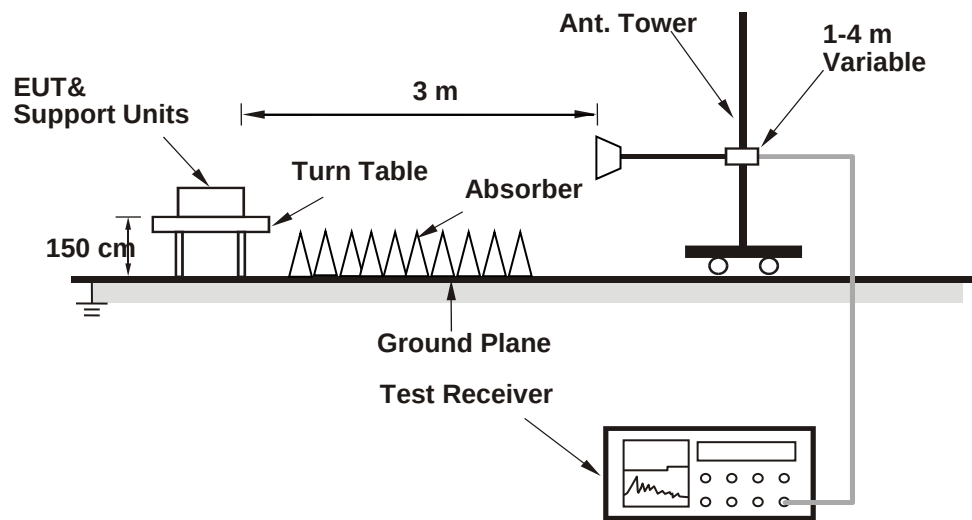
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data :

RF Mode	TX 802.11a	Channel	CH 36 : 5180 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	69.40 PK	74.00	-4.60	1.48 H	18	66.54	2.86
2	5150.00	52.45 AV	54.00	-1.55	1.48 H	18	49.59	2.86
3	*5180.00	113.19 PK			1.48 H	18	72.85	40.34
4	*5180.00	104.55 AV			1.48 H	18	64.21	40.34
5	#10360.00	56.76 PK	68.20	-11.44	1.42 H	101	48.82	7.94
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	62.74 PK	74.00	-11.26	1.29 V	276	59.88	2.86
2	5150.00	47.23 AV	54.00	-6.77	1.29 V	276	44.37	2.86
3	*5180.00	104.67 PK			1.29 V	276	64.33	40.34
4	*5180.00	96.05 AV			1.29 V	276	55.71	40.34
5	#10360.00	54.87 PK	68.20	-13.33	1.47 V	176	46.93	7.94

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	Channel	CH 40 : 5200 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5200.00	117.07 PK			1.00 H	12	76.75	40.32
2	*5200.00	108.12 AV			1.00 H	12	67.80	40.32
3	#10400.00	59.45 PK	68.20	-8.75	1.28 H	102	51.52	7.93
4	15600.00	66.30 PK	74.00	-7.70	2.02 H	48	55.37	10.93
5	15600.00	53.44 AV	54.00	-0.56	2.02 H	48	42.51	10.93

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5200.00	107.46 PK			1.20 V	271	67.14	40.32
2	*5200.00	98.57 AV			1.20 V	271	58.25	40.32
3	#10400.00	57.83 PK	68.20	-10.37	1.49 V	180	49.90	7.93
4	15600.00	64.48 PK	74.00	-9.52	2.21 V	4	53.55	10.93
5	15600.00	52.57 AV	54.00	-1.43	2.21 V	4	41.64	10.93

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	Channel	CH 48 : 5240 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5240.00	116.98 PK			1.01 H	16	76.84	40.14
2	*5240.00	107.99 AV			1.01 H	16	67.85	40.14
3	5350.00	58.23 PK	74.00	-15.77	1.01 H	16	55.90	2.33
4	5350.00	45.74 AV	54.00	-8.26	1.01 H	16	43.41	2.33
5	#10480.00	60.03 PK	68.20	-8.17	1.35 H	60	52.24	7.79
6	15720.00	66.29 PK	74.00	-7.71	2.08 H	50	55.32	10.97
7	15720.00	53.40 AV	54.00	-0.60	2.08 H	50	42.43	10.97
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5240.00	107.11 PK			1.33 V	274	66.97	40.14
2	*5240.00	98.30 AV			1.33 V	274	58.16	40.14
3	5350.00	56.41 PK	74.00	-17.59	1.33 V	274	54.08	2.33
4	5350.00	45.00 AV	54.00	-9.00	1.33 V	274	42.67	2.33
5	#10480.00	57.00 PK	68.20	-11.20	1.43 V	179	49.21	7.79
6	15720.00	64.37 PK	74.00	-9.63	2.23 V	2	53.40	10.97
7	15720.00	52.20 AV	54.00	-1.80	2.23 V	2	41.23	10.97

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	Channel	CH 149 : 5745 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5610.00	57.79 PK	68.20	-10.41	1.19 H	70	54.57	3.22
2	*5745.00	110.99 PK			1.19 H	70	69.45	41.54
3	*5745.00	102.68 AV			1.19 H	70	61.14	41.54
4	#5984.40	58.61 PK	68.20	-9.59	1.19 H	70	54.30	4.31
5	11490.00	60.65 PK	74.00	-13.35	1.71 H	163	51.56	9.09
6	11490.00	49.25 AV	54.00	-4.75	1.71 H	163	40.16	9.09
7	#17235.00	67.52 PK	68.20	-0.68	2.17 H	31	57.77	9.75
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5631.60	58.16 PK	68.20	-10.04	1.00 V	58	54.76	3.40
2	*5745.00	104.91 PK			1.00 V	58	63.37	41.54
3	*5745.00	95.87 AV			1.00 V	58	54.33	41.54
4	#5987.20	57.75 PK	68.20	-10.45	1.00 V	58	53.41	4.34
5	11490.00	58.22 PK	74.00	-15.78	1.51 V	183	49.13	9.09
6	11490.00	47.75 AV	54.00	-6.25	1.51 V	183	38.66	9.09
7	#17235.00	64.09 PK	68.20	-4.11	2.26 V	354	54.34	9.75

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	Channel	CH 157 : 5785 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5634.40	57.91 PK	68.20	-10.29	1.11 H	60	54.49	3.42
2	*5785.00	111.91 PK			1.11 H	60	70.35	41.56
3	*5785.00	103.45 AV			1.11 H	60	61.89	41.56
4	#5990.40	58.06 PK	68.20	-10.14	1.11 H	60	53.69	4.37
5	11570.00	62.28 PK	74.00	-11.72	1.86 H	165	53.14	9.14
6	11570.00	50.66 AV	54.00	-3.34	1.86 H	165	41.52	9.14
7	#17355.00	67.51 PK	68.20	-0.69	2.06 H	27	57.48	10.03
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5629.60	57.43 PK	68.20	-10.77	1.00 V	58	54.05	3.38
2	*5785.00	105.66 PK			1.00 V	58	64.10	41.56
3	*5785.00	96.82 AV			1.00 V	58	55.26	41.56
4	#5980.00	57.72 PK	68.20	-10.48	1.00 V	58	53.44	4.28
5	11570.00	58.52 PK	74.00	-15.48	1.53 V	180	49.38	9.14
6	11570.00	47.68 AV	54.00	-6.32	1.53 V	180	38.54	9.14
7	#17355.00	64.55 PK	68.20	-3.65	2.25 V	357	54.52	10.03

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	Channel	CH 165 : 5825 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5633.60	57.62 PK	68.20	-10.58	1.00 H	69	54.20	3.42
2	*5825.00	111.79 PK			1.00 H	69	70.22	41.57
3	*5825.00	103.13 AV			1.00 H	69	61.56	41.57
4	#5997.60	58.47 PK	68.20	-9.73	1.00 H	69	54.04	4.43
5	11650.00	62.38 PK	74.00	-11.62	1.92 H	168	53.38	9.00
6	11650.00	50.79 AV	54.00	-3.21	1.92 H	168	41.79	9.00
7	#17475.00	67.58 PK	68.20	-0.62	2.11 H	29	57.34	10.24
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5642.40	56.69 PK	68.20	-11.51	1.14 V	62	53.20	3.49
2	*5825.00	105.72 PK			1.14 V	62	64.15	41.57
3	*5825.00	97.12 AV			1.14 V	62	55.55	41.57
4	#5994.00	58.64 PK	68.20	-9.56	1.14 V	62	54.24	4.40
5	11650.00	58.44 PK	74.00	-15.56	1.59 V	182	49.44	9.00
6	11650.00	47.52 AV	54.00	-6.48	1.59 V	182	38.52	9.00
7	#17475.00	64.47 PK	68.20	-3.73	2.21 V	347	54.23	10.24

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 36 : 5180 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	68.62 PK	74.00	-5.38	1.08 H	13	65.76	2.86
2	5150.00	53.35 AV	54.00	-0.65	1.08 H	13	50.49	2.86
3	*5180.00	114.24 PK			1.08 H	13	73.90	40.34
4	*5180.00	105.64 AV			1.08 H	13	65.30	40.34
5	#10360.00	56.63 PK	68.20	-11.57	1.33 H	104	48.69	7.94
6	15540.00	63.32 PK	74.00	-10.68	2.05 H	53	52.17	11.15
7	15540.00	51.87 AV	54.00	-2.13	2.05 H	53	40.72	11.15
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	59.81 PK	74.00	-14.19	1.18 V	282	56.95	2.86
2	5150.00	47.45 AV	54.00	-6.55	1.18 V	282	44.59	2.86
3	*5180.00	105.13 PK			1.18 V	282	64.79	40.34
4	*5180.00	96.21 AV			1.18 V	282	55.87	40.34
5	#10360.00	55.29 PK	68.20	-12.91	1.53 V	184	47.35	7.94
6	15540.00	62.77 PK	74.00	-11.23	2.26 V	8	51.62	11.15
7	15540.00	51.17 AV	54.00	-2.83	2.26 V	8	40.02	11.15

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 40 : 5200 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5200.00	117.15 PK			1.03 H	18	76.83	40.32
2	*5200.00	108.17 AV			1.03 H	18	67.85	40.32
3	#10400.00	59.18 PK	68.20	-9.02	1.38 H	105	51.25	7.93
4	15600.00	65.70 PK	74.00	-8.30	2.09 H	55	54.77	10.93
5	15600.00	53.12 AV	54.00	-0.88	2.09 H	55	42.19	10.93

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5200.00	107.50 PK			1.31 V	270	67.18	40.32
2	*5200.00	98.70 AV			1.31 V	270	58.38	40.32
3	#10400.00	57.22 PK	68.20	-10.98	1.50 V	177	49.29	7.93
4	15600.00	64.76 PK	74.00	-9.24	2.22 V	7	53.83	10.93
5	15600.00	52.36 AV	54.00	-1.64	2.22 V	7	41.43	10.93

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 48 : 5240 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5240.00	117.05 PK			1.12 H	15	76.91	40.14
2	*5240.00	108.11 AV			1.12 H	15	67.97	40.14
3	5350.00	57.00 PK	74.00	-17.00	1.12 H	15	54.67	2.33
4	5350.00	45.96 AV	54.00	-8.04	1.12 H	15	43.63	2.33
5	#10480.00	61.61 PK	68.20	-6.59	1.01 H	56	53.82	7.79
6	15720.00	66.27 PK	74.00	-7.73	2.00 H	46	55.30	10.97
7	15720.00	53.10 AV	54.00	-0.90	2.00 H	46	42.13	10.97
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5240.00	108.01 PK			1.15 V	269	67.87	40.14
2	*5240.00	99.03 AV			1.15 V	269	58.89	40.14
3	5350.00	56.67 PK	74.00	-17.33	1.15 V	269	54.34	2.33
4	5350.00	44.80 AV	54.00	-9.20	1.15 V	269	42.47	2.33
5	#10480.00	56.97 PK	68.20	-11.23	1.45 V	171	49.18	7.79
6	15720.00	65.37 PK	74.00	-8.63	2.25 V	11	54.40	10.97
7	15720.00	52.10 AV	54.00	-1.90	2.25 V	11	41.13	10.97

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 149 : 5745 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5602.00	57.38 PK	68.20	-10.82	1.00 H	68	54.24	3.14
2	*5745.00	110.90 PK			1.00 H	68	69.36	41.54
3	*5745.00	102.43 AV			1.00 H	68	60.89	41.54
4	#5979.60	58.07 PK	68.20	-10.13	1.00 H	68	53.81	4.26
5	11490.00	60.97 PK	74.00	-13.03	1.92 H	168	51.88	9.09
6	11490.00	49.00 AV	54.00	-5.00	1.92 H	168	39.91	9.09
7	#17235.00	67.20 PK	68.20	-1.00	2.09 H	35	57.45	9.75
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5630.40	57.56 PK	68.20	-10.64	1.00 V	58	54.16	3.40
2	*5745.00	104.05 PK			1.00 V	58	62.51	41.54
3	*5745.00	95.22 AV			1.00 V	58	53.68	41.54
4	#5954.80	57.42 PK	68.20	-10.78	1.00 V	58	53.36	4.06
5	11490.00	58.45 PK	74.00	-15.55	1.55 V	176	49.36	9.09
6	11490.00	47.29 AV	54.00	-6.71	1.55 V	176	38.20	9.09
7	#17235.00	63.05 PK	68.20	-5.15	2.15 V	355	53.30	9.75

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 157 : 5785 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5645.20	57.60 PK	68.20	-10.60	1.00 H	58	54.08	3.52
2	*5785.00	110.80 PK			1.00 H	58	69.24	41.56
3	*5785.00	102.01 AV			1.00 H	58	60.45	41.56
4	#5983.20	59.46 PK	68.20	-8.74	1.00 H	58	55.16	4.30
5	11570.00	61.92 PK	74.00	-12.08	1.85 H	166	52.78	9.14
6	11570.00	50.24 AV	54.00	-3.76	1.85 H	166	41.10	9.14
7	#17355.00	67.33 PK	68.20	-0.87	2.18 H	56	57.30	10.03
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5625.20	56.81 PK	68.20	-11.39	1.08 V	59	53.46	3.35
2	*5785.00	103.18 PK			1.08 V	59	61.62	41.56
3	*5785.00	94.58 AV			1.08 V	59	53.02	41.56
4	#5975.60	58.67 PK	68.20	-9.53	1.08 V	59	54.44	4.23
5	11570.00	58.21 PK	74.00	-15.79	1.52 V	180	49.07	9.14
6	11570.00	46.98 AV	54.00	-7.02	1.52 V	180	37.84	9.14
7	#17355.00	63.10 PK	68.20	-5.10	2.13 V	356	53.07	10.03

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 165 : 5825 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5638.00	56.66 PK	68.20	-11.54	1.00 H	59	53.20	3.46
2	*5825.00	110.66 PK			1.00 H	59	69.09	41.57
3	*5825.00	102.38 AV			1.00 H	59	60.81	41.57
4	#5986.80	59.18 PK	68.20	-9.02	1.00 H	59	54.85	4.33
5	11650.00	62.20 PK	74.00	-11.80	1.82 H	165	53.20	9.00
6	11650.00	50.48 AV	54.00	-3.52	1.82 H	165	41.48	9.00
7	#17475.00	67.39 PK	68.20	-0.81	2.20 H	61	57.15	10.24
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5604.40	57.36 PK	68.20	-10.84	1.07 V	58	54.19	3.17
2	*5825.00	103.34 PK			1.07 V	58	61.77	41.57
3	*5825.00	94.66 AV			1.07 V	58	53.09	41.57
4	#6000.00	58.99 PK	68.20	-9.21	1.07 V	58	54.54	4.45
5	11650.00	58.24 PK	74.00	-15.76	1.53 V	184	49.24	9.00
6	11650.00	46.96 AV	54.00	-7.04	1.53 V	184	37.96	9.00
7	#17475.00	63.45 PK	68.20	-4.75	2.26 V	355	53.21	10.24

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT40)	Channel	CH 38 : 5190 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/16

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	68.78 PK	74.00	-5.22	1.06 H	14	65.92	2.86
2	5150.00	53.24 AV	54.00	-0.76	1.06 H	14	50.38	2.86
3	*5190.00	109.45 PK			1.06 H	14	69.12	40.33
4	*5190.00	99.93 AV			1.06 H	14	59.60	40.33
5	#10380.00	55.53 PK	68.20	-12.67	1.09 H	62	47.59	7.94
6	15570.00	62.40 PK	74.00	-11.60	1.98 H	44	51.36	11.04
7	15570.00	50.88 AV	54.00	-3.12	1.98 H	44	39.84	11.04
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	59.51 PK	74.00	-14.49	1.36 V	273	56.65	2.86
2	5150.00	46.81 AV	54.00	-7.19	1.36 V	273	43.95	2.86
3	*5190.00	99.83 PK			1.36 V	273	59.50	40.33
4	*5190.00	90.33 AV			1.36 V	273	50.00	40.33
5	#10380.00	55.27 PK	68.20	-12.93	1.52 V	179	47.33	7.94
6	15570.00	62.19 PK	74.00	-11.81	2.29 V	0	51.15	11.04
7	15570.00	50.64 AV	54.00	-3.36	2.29 V	0	39.60	11.04

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT40)	Channel	CH 46 : 5230 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/17

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	67.07 PK	74.00	-6.93	1.11 H	13	64.21	2.86
2	5150.00	53.41 AV	54.00	-0.59	1.11 H	13	50.55	2.86
3	*5230.00	114.88 PK			1.11 H	13	74.70	40.18
4	*5230.00	105.69 AV			1.11 H	13	65.51	40.18
5	5350.00	59.15 PK	74.00	-14.85	1.11 H	13	56.82	2.33
6	5350.00	46.76 AV	54.00	-7.24	1.11 H	13	44.43	2.33
7	#10460.00	58.75 PK	68.20	-9.45	1.13 H	61	50.93	7.82
8	15690.00	64.80 PK	74.00	-9.20	2.06 H	47	53.87	10.93
9	15690.00	53.20 AV	54.00	-0.80	2.06 H	47	42.27	10.93
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	58.14 PK	74.00	-15.86	1.15 V	268	55.28	2.86
2	5150.00	46.96 AV	54.00	-7.04	1.15 V	268	44.10	2.86
3	*5230.00	105.97 PK			1.15 V	268	65.79	40.18
4	*5230.00	96.89 AV			1.15 V	268	56.71	40.18
5	5350.00	57.55 PK	74.00	-16.45	1.15 V	268	55.22	2.33
6	5350.00	45.08 AV	54.00	-8.92	1.15 V	268	42.75	2.33
7	#10460.00	56.36 PK	68.20	-11.84	1.49 V	172	48.54	7.82
8	15690.00	63.86 PK	74.00	-10.14	2.20 V	1	52.93	10.93
9	15690.00	51.75 AV	54.00	-2.25	2.20 V	1	40.82	10.93

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.
6. " # " : The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT40)	Channel	CH 151 : 5755 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/17

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5622.00	58.89 PK	68.20	-9.31	1.00 H	62	55.58	3.31
2	*5755.00	110.33 PK			1.00 H	62	68.77	41.56
3	*5755.00	100.96 AV			1.00 H	62	59.40	41.56
4	#5939.60	58.29 PK	68.20	-9.91	1.00 H	62	54.32	3.97
5	11510.00	63.35 PK	74.00	-10.65	1.83 H	161	54.24	9.11
6	11510.00	50.85 AV	54.00	-3.15	1.83 H	161	41.74	9.11
7	#17265.00	67.16 PK	68.20	-1.04	2.18 H	112	57.34	9.82
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5607.20	56.48 PK	68.20	-11.72	1.00 V	57	53.29	3.19
2	*5755.00	102.12 PK			1.00 V	57	60.56	41.56
3	*5755.00	93.27 AV			1.00 V	57	51.71	41.56
4	#5975.20	58.69 PK	68.20	-9.51	1.00 V	57	54.46	4.23
5	11510.00	58.79 PK	74.00	-15.21	1.51 V	173	49.68	9.11
6	11510.00	47.38 AV	54.00	-6.62	1.51 V	173	38.27	9.11
7	#17265.00	62.92 PK	68.20	-5.28	2.12 V	343	53.10	9.82

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT40)	Channel	CH 159 : 5795 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/17

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5600.40	58.99 PK	68.20	-9.21	1.00 H	59	55.86	3.13
2	*5795.00	109.13 PK			1.00 H	59	67.57	41.56
3	*5795.00	100.13 AV			1.00 H	59	58.57	41.56
4	#5997.20	59.44 PK	68.20	-8.76	1.00 H	59	55.02	4.42
5	11590.00	63.07 PK	74.00	-10.93	1.84 H	159	53.92	9.15
6	11590.00	50.41 AV	54.00	-3.59	1.84 H	159	41.26	9.15
7	#17385.00	67.28 PK	68.20	-0.92	2.16 H	107	57.20	10.08
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5634.00	56.78 PK	68.20	-11.42	1.00 V	60	53.36	3.42
2	*5795.00	108.97 PK			1.00 V	60	67.41	41.56
3	*5795.00	100.07 AV			1.00 V	60	58.51	41.56
4	#5932.80	60.93 PK	68.20	-7.27	1.00 V	60	57.00	3.93
5	11590.00	58.70 PK	74.00	-15.30	1.49 V	186	49.55	9.15
6	11590.00	47.05 AV	54.00	-6.95	1.49 V	186	37.90	9.15
7	#17385.00	62.53 PK	68.20	-5.67	2.22 V	350	52.45	10.08

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT80)	Channel	CH 42 : 5210 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/17

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	69.28 PK	74.00	-4.72	1.08 H	15	66.42	2.86
2	5150.00	53.25 AV	54.00	-0.75	1.08 H	15	50.39	2.86
3	*5210.00	106.39 PK			1.08 H	15	66.12	40.27
4	*5210.00	96.44 AV			1.08 H	15	56.17	40.27
5	5350.00	56.47 PK	74.00	-17.53	1.08 H	15	54.14	2.33
6	5350.00	45.62 AV	54.00	-8.38	1.08 H	15	43.29	2.33
7	#10420.00	55.23 PK	68.20	-12.97	1.04 H	65	47.34	7.89
8	15630.00	61.56 PK	74.00	-12.44	2.13 H	57	50.63	10.93
9	15630.00	50.59 AV	54.00	-3.41	2.13 H	57	39.66	10.93
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	59.04 PK	74.00	-14.96	1.21 V	271	56.18	2.86
2	5150.00	46.99 AV	54.00	-7.01	1.21 V	271	44.13	2.86
3	*5210.00	97.82 PK			1.21 V	271	57.55	40.27
4	*5210.00	87.08 AV			1.21 V	271	46.81	40.27
5	5350.00	56.33 PK	74.00	-17.67	1.21 V	271	54.00	2.33
6	5350.00	45.22 AV	54.00	-8.78	1.21 V	271	42.89	2.33
7	#10420.00	54.98 PK	68.20	-13.22	1.48 V	170	47.09	7.89
8	15630.00	61.46 PK	74.00	-12.54	2.27 V	6	50.53	10.93
9	15630.00	50.47 AV	54.00	-3.53	2.27 V	6	39.54	10.93

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.
6. " # " : The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT80)	Channel	CH 155 : 5775 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Hans Wu	Test Date	2022/2/17

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5650.40	59.00 PK	68.50	-9.50	1.00 H	74	55.44	3.56
2	*5775.00	107.93 PK			1.00 H	74	66.37	41.56
3	*5775.00	98.50 AV			1.00 H	74	56.94	41.56
4	#5934.00	60.33 PK	68.20	-7.87	1.00 H	74	56.40	3.93
5	11550.00	63.31 PK	74.00	-10.69	1.75 H	163	54.17	9.14
6	11550.00	50.46 AV	54.00	-3.54	1.75 H	163	41.32	9.14
7	#17325.00	67.20 PK	68.20	-1.00	2.32 H	110	57.22	9.98
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5638.00	56.77 PK	68.20	-11.43	1.16 V	59	53.31	3.46
2	*5775.00	102.06 PK			1.17 V	60	60.50	41.56
3	*5775.00	92.26 AV			1.17 V	60	50.70	41.56
4	#5945.60	58.63 PK	68.20	-9.57	1.16 V	59	54.64	3.99
5	11550.00	58.77 PK	74.00	-15.23	1.51 V	176	49.63	9.14
6	11550.00	47.19 AV	54.00	-6.81	1.51 V	176	38.05	9.14
7	#17325.00	62.66 PK	68.20	-5.54	2.12 V	348	52.68	9.98

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.
6. " # " : The radiated frequency is out of the restricted band.

9 kHz ~ 1 GHz Worst-Case Data:

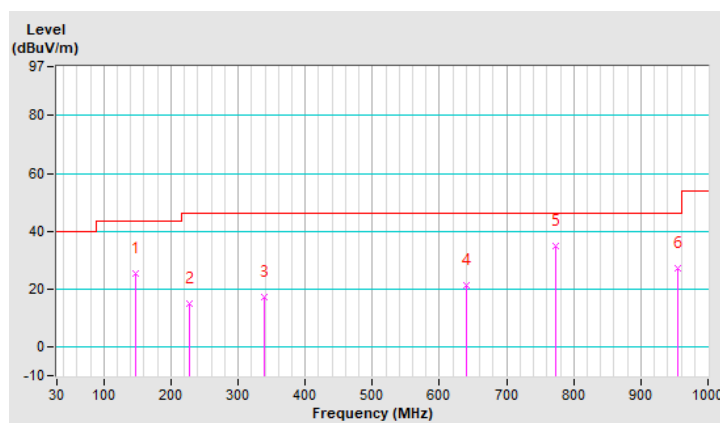
802.11ac (VHT80)

RF Mode	TX 802.11ac (VHT80)	Channel	CH 155 : 5775 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/17

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	148.09	25.38 QP	43.50	-18.12	2.00 H	359	43.54	-18.16
2	226.81	15.00 QP	46.00	-31.00	1.51 H	232	36.02	-21.02
3	339.28	17.07 QP	46.00	-28.93	1.01 H	18	33.39	-16.32
4	640.12	21.39 QP	46.00	-24.61	1.51 H	344	31.16	-9.77
5	772.26	34.71 QP	46.00	-11.29	2.00 H	42	42.73	-8.02
6	955.01	27.06 QP	46.00	-18.94	1.51 H	108	32.52	-5.46

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

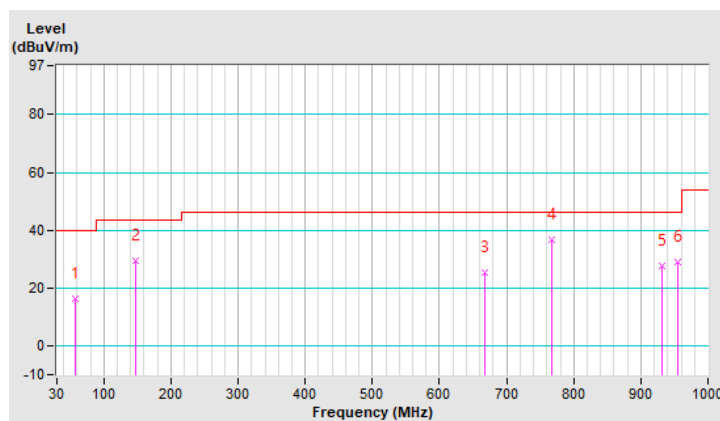


RF Mode	TX 802.11ac (VHT80)	Channel	CH 155 : 5775 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 68% RH
Tested By	Raymond Lee	Test Date	2022/2/17

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	56.71	16.43 QP	40.00	-23.57	1.00 V	65	34.97	-18.54
2	148.09	29.52 QP	43.50	-13.98	1.49 V	137	47.68	-18.16
3	668.23	25.45 QP	46.00	-20.55	1.00 V	352	35.02	-9.57
4	766.64	36.89 QP	46.00	-9.11	1.49 V	141	44.87	-7.98
5	931.12	27.42 QP	46.00	-18.58	1.00 V	39	33.18	-5.76
6	955.01	29.08 QP	46.00	-16.92	1.00 V	72	34.54	-5.46

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

- Note: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 03, 2021	Dec. 02, 2022
RF signal cable Woken	5D-FB	Cable-cond1-01	Jan. 15, 2022	Jan. 14, 2023
LISN/AMN ROHDE & SCHWARZ (EUT)	ENV216	101826	Mar. 14, 2022	Mar. 13, 2023
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Sep. 07, 2021	Sep. 06, 2022
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1 (Conduction 1).
 3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

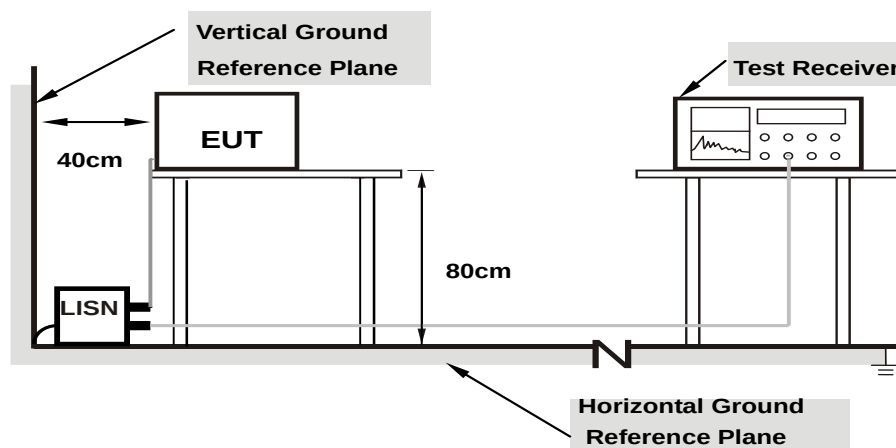
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit -20 dB) was not recorded.

Note: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



- Note:** 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

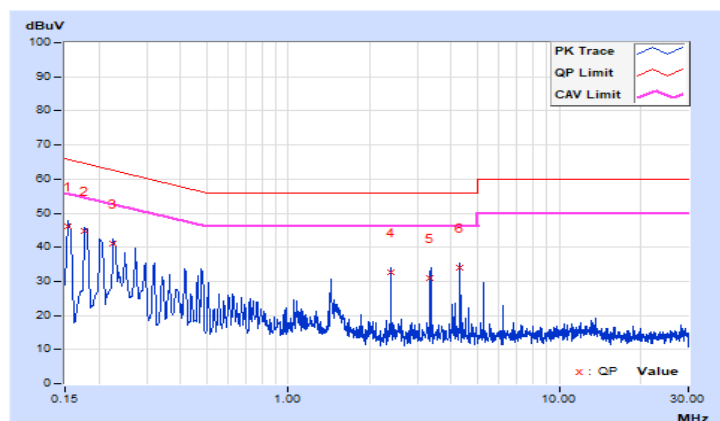
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23 °C, 69% RH
Tested by	Raymond Lee	Test Date	2022/2/18

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	9.77	36.44	17.31	46.21	27.08	65.78	55.78	-19.57	-28.70
2	0.17800	9.79	35.14	15.47	44.93	25.26	64.58	54.58	-19.65	-29.32
3	0.22600	9.81	31.25	15.06	41.06	24.87	62.60	52.60	-21.54	-27.73
4	2.39400	9.98	22.56	21.48	32.54	31.46	56.00	46.00	-23.46	-14.54
5	3.35021	10.00	21.03	19.20	31.03	29.20	56.00	46.00	-24.97	-16.80
6	4.31400	10.02	23.84	21.50	33.86	31.52	56.00	46.00	-22.14	-14.48

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

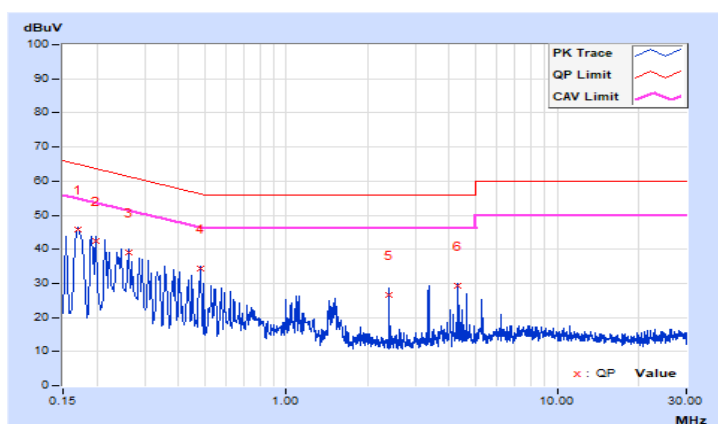


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23 °C, 69% RH
Tested by	Raymond Lee	Test Date	2022/2/18

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16932	9.84	36.02	15.34	45.86	25.18	64.99	54.99	-19.13	-29.81
2	0.19800	9.86	32.48	14.06	42.34	23.92	63.69	53.69	-21.35	-29.77
3	0.26200	9.88	29.28	12.96	39.16	22.84	61.37	51.37	-22.21	-28.53
4	0.48200	9.95	24.46	12.65	34.41	22.60	56.30	46.30	-21.89	-23.70
5	2.39400	10.05	16.64	12.45	26.69	22.50	56.00	46.00	-29.31	-23.50
6	4.31400	10.10	19.33	18.81	29.43	28.91	56.00	46.00	-26.57	-17.09

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.3 Transmit Power Measurement

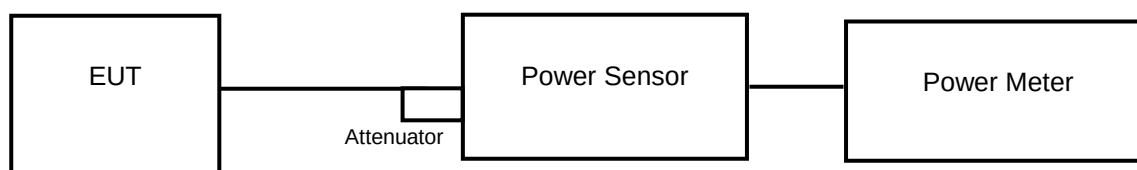
4.3.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125 mW (21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Mobile and Portable client device	250 mW (24 dBm)
U-NII-2A			250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-2C			250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-3		√	1 Watt (30 dBm)

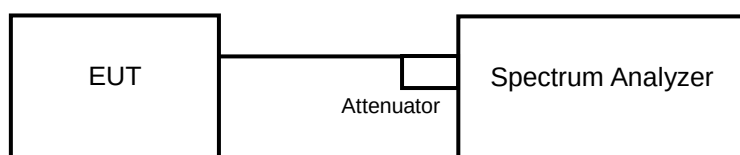
*B is the 26 dB emission bandwidth in megahertz

4.3.2 Test Setup

<Power Output Measurement>



<26 dB Bandwidth>



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Average Power Measurement

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

26 dB Bandwidth

- a. Set RBW = approximately 1 % of the emission bandwidth.
- b. Set the VBW $\geq 3 \times$ RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Results

Power Output:

802.11a

Channel	Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
36	5180	47.973	16.81	24	Pass
40	5200	47.098	16.73	24	Pass
48	5240	48.306	16.84	24	Pass
149	5745	57.28	17.58	30	Pass
157	5785	67.298	18.28	30	Pass
165	5825	68.707	18.37	30	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
36	5180	52.602	17.21	24	Pass
40	5200	52.966	17.24	24	Pass
48	5240	52.24	17.18	24	Pass
149	5745	50.933	17.07	30	Pass
157	5785	49.204	16.92	30	Pass
165	5825	50.816	17.06	30	Pass

802.11ac (VHT40)

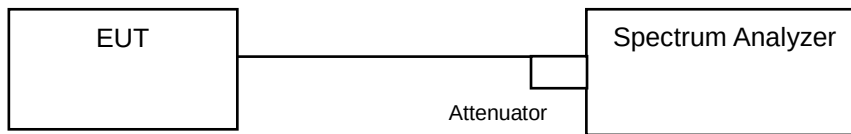
Channel	Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
38	5190	54.45	17.36	24	Pass
46	5230	52.845	17.23	24	Pass
151	5755	70.958	18.51	30	Pass
159	5795	68.077	18.33	30	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
42	5210	52.966	17.24	24	Pass
155	5775	94.624	19.76	30	Pass

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1 % to 5 % of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to SAMPLE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
36	5180	16.92
40	5200	16.92
48	5240	16.95
149	5745	16.95
157	5785	17.04
165	5825	17.04

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
36	5180	18.17
40	5200	18.17
48	5240	18.17
149	5745	18.00
157	5785	18.00
165	5825	18.12

802.11ac (VHT40)

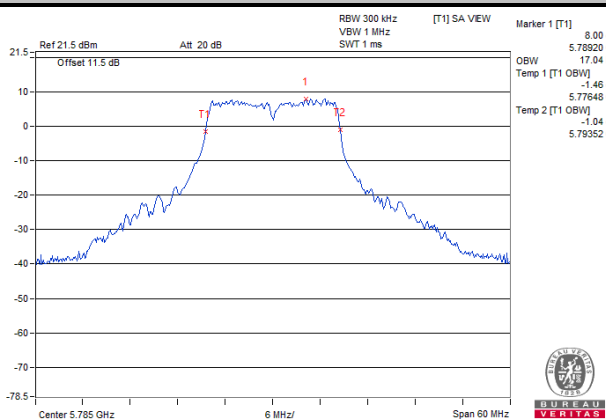
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
38	5190	37.08
46	5230	37.20
151	5755	37.32
159	5795	37.20

802.11ac (VHT80)

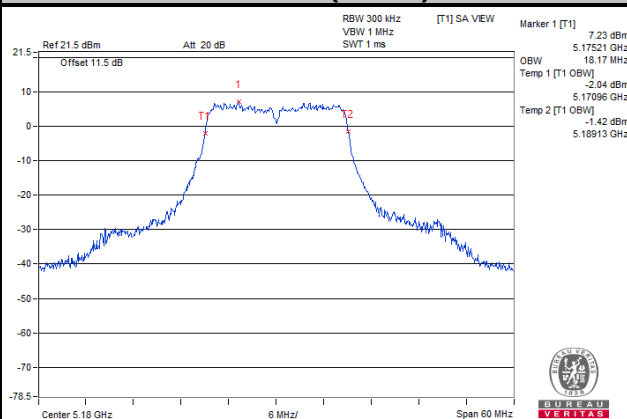
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
42	5210	75.60
155	5775	75.36

Spectrum Plot of Worst Value

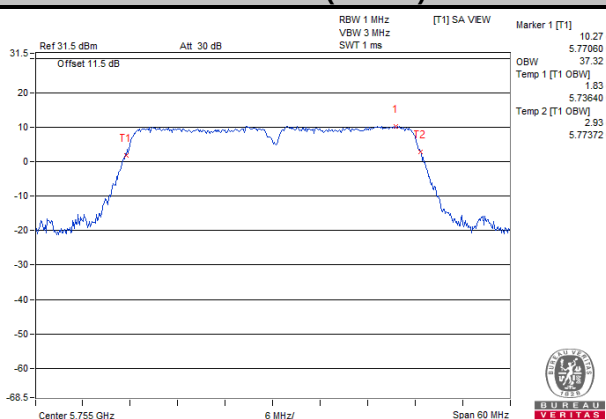
802.11a



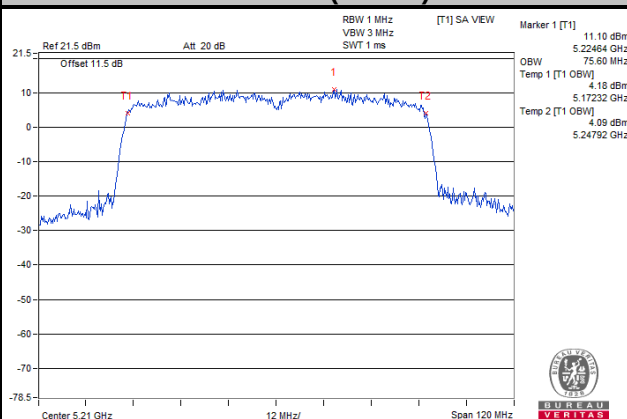
802.11ac (VHT20)



802.11ac (VHT40)



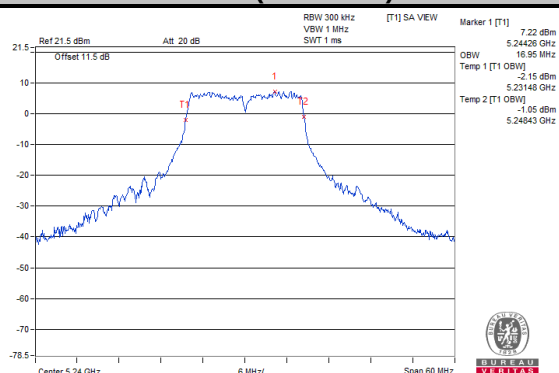
802.11ac (VHT80)



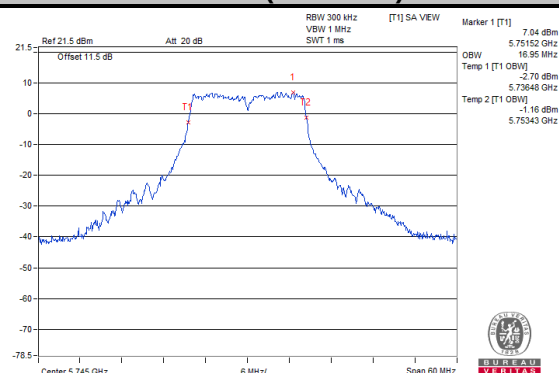
Spectrum Plot for Nearby DFS Band

802.11a

Ch 48 (5240 MHz)

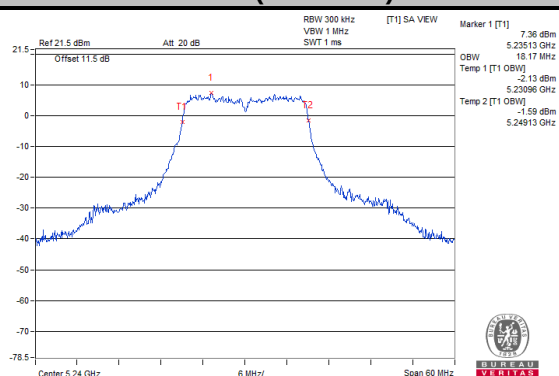


Ch 149 (5745 MHz)

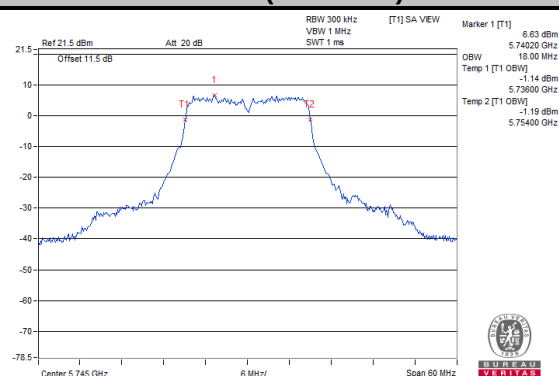


802.11ac (VHT20)

Ch 48 (5240 MHz)

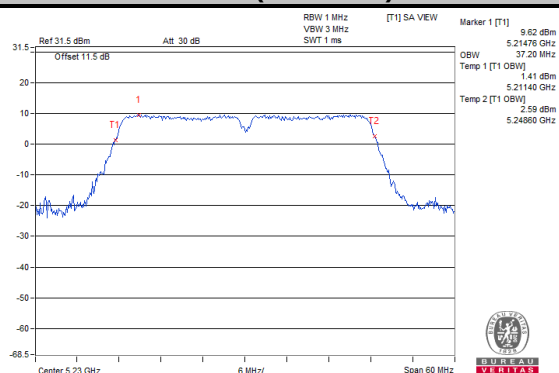


Ch 149 (5745 MHz)

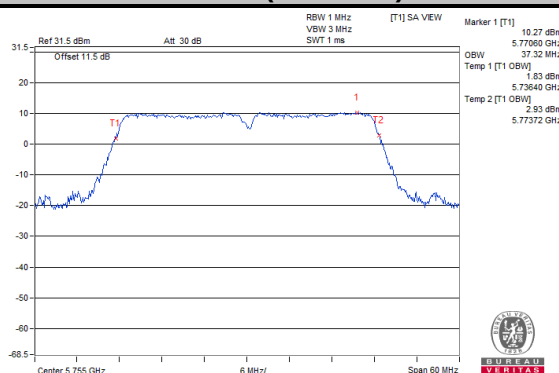


802.11ac (VHT40)

Ch 46 (5230 MHz)

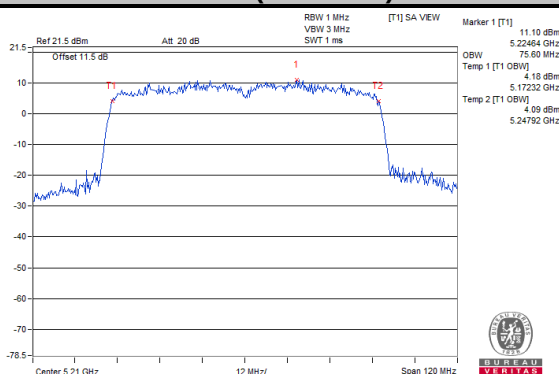


Ch 151 (5755 MHz)

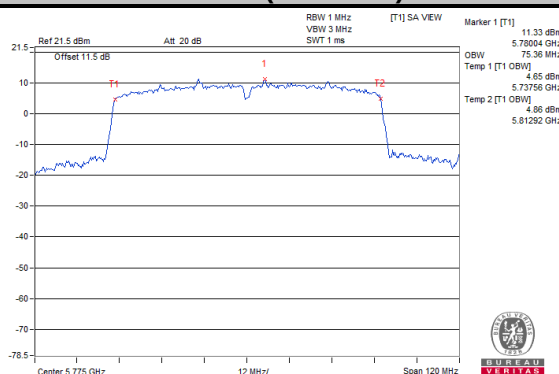


802.11ac (VHT80)

Ch 42 (5210 MHz)



Ch 155 (5775 MHz)

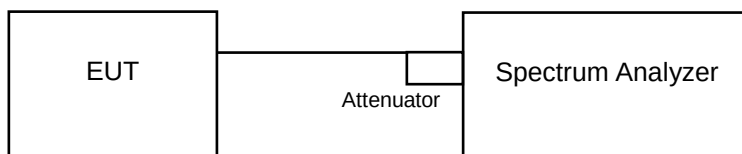


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17 dBm/MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	11 dBm/MHz
U-NII-2A			11 dBm/MHz
U-NII-2C			11 dBm/MHz
U-NII-3	√		30 dBm/500 kHz

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1 band:

Using method SA-1 Duty cycle >98%

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value

✖ For U-NII-3: without duty cycle & Duty cycle >98 %

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 RBW, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (increasing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500 \text{ kHz} / 300 \text{ kHz})$.
5. Sweep time = auto, trigger set to "free run".
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

For U-NII-1 Band

802.11a

Channel	Frequency (MHz)	PSD (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
36	5180	3.51	11	Pass
40	5200	3.53	11	Pass
48	5240	3.73	11	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	PSD (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
36	5180	3.28	11	Pass
40	5200	3.28	11	Pass
48	5240	3.24	11	Pass

802.11ac (VHT40)

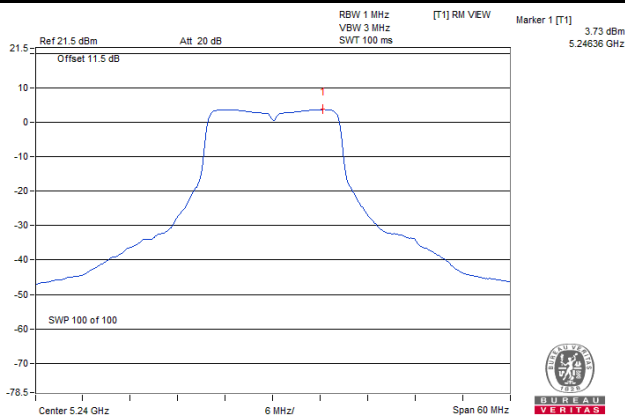
Channel	Frequency (MHz)	PSD (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
38	5190	0.24	11	Pass
46	5230	0.29	11	Pass

802.11ac (VHT80):

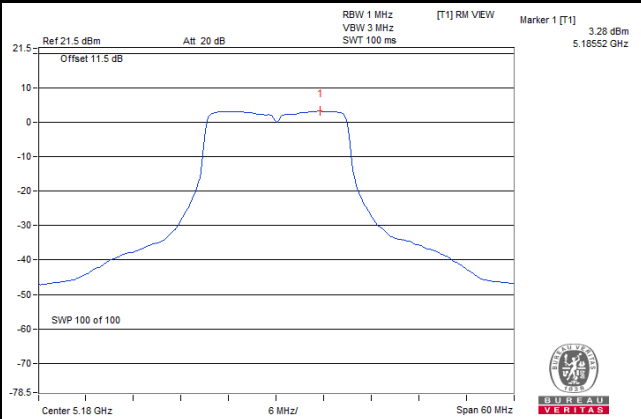
Channel	Frequency (MHz)	PSD (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
42	5210	-2.94	11	Pass

Spectrum Plot of Worst Value

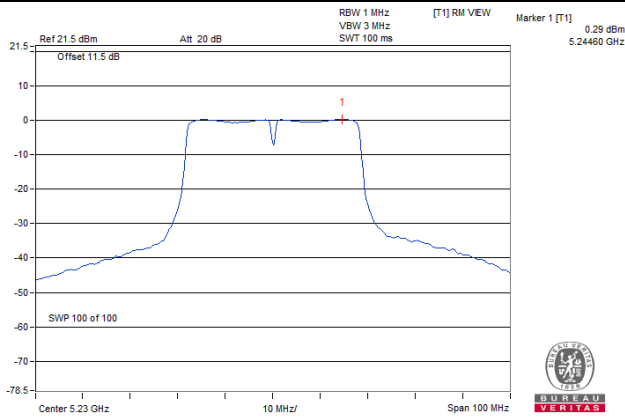
802.11a



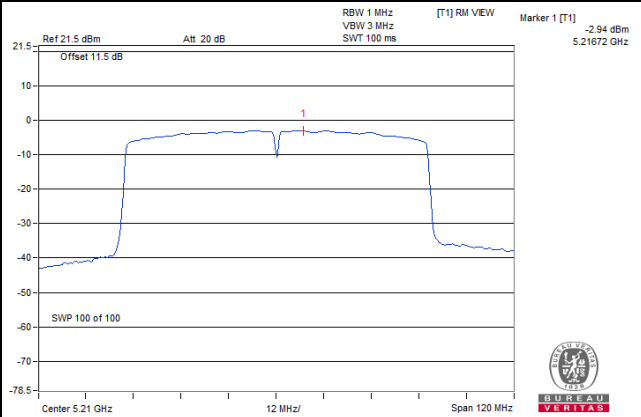
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



For U-NII-3 Band

802.11a

Channel	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
149	5745	-4.98	-2.76	30	Pass
157	5785	-3.89	-1.67	30	Pass
165	5825	-3.38	-1.16	30	Pass

802.11ac (VHT20)

Channel	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
149	5745	-5.64	-3.42	30	Pass
157	5785	-5.77	-3.55	30	Pass
165	5825	-5.01	-2.79	30	Pass

802.11ac (VHT40)

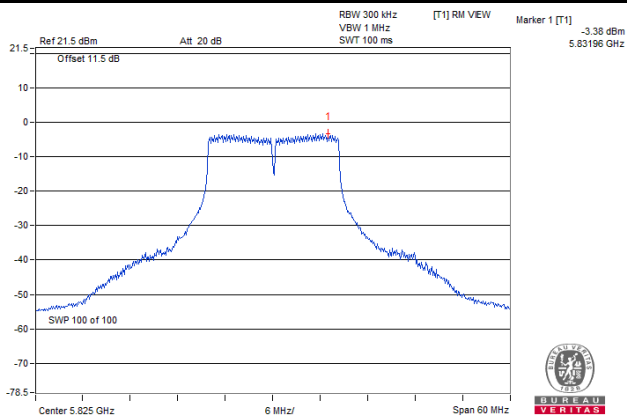
Channel	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
151	5755	-7.58	-5.36	30	Pass
159	5795	-7.20	-4.98	30	Pass

802.11ac (VHT80)

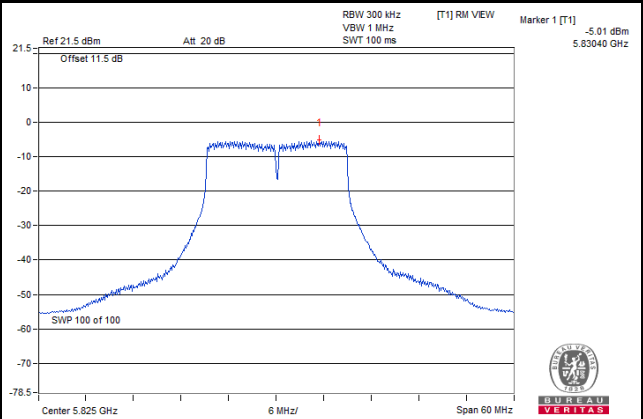
Channel	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
155	5775	-9.02	-6.8	30	Pass

Spectrum Plot of Worst Value

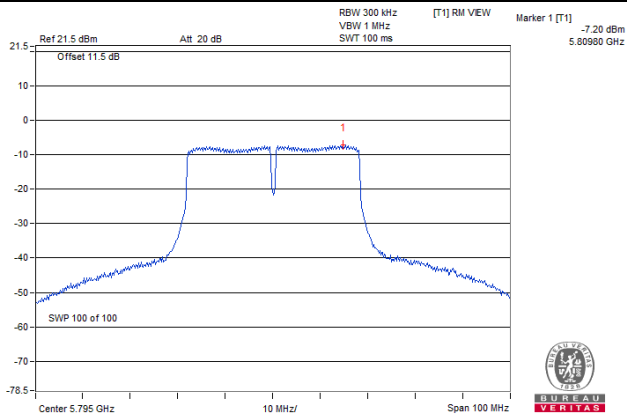
802.11a



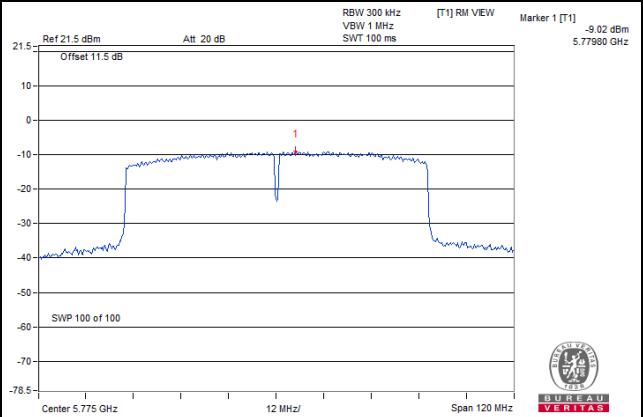
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)

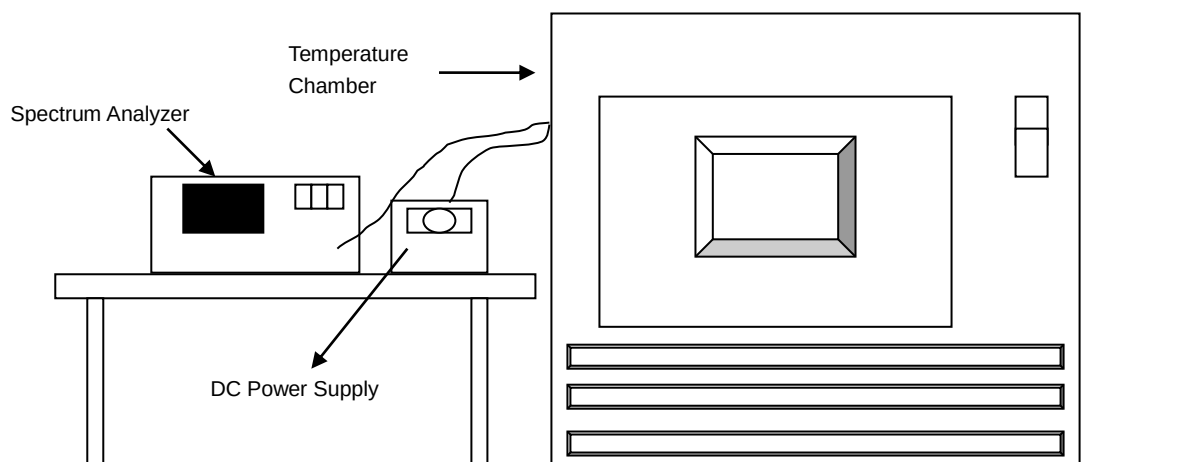


4.6 Frequency Stability

4.6.1 Limit of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation.

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
65	5	5180.0076	Pass	5180.009	Pass	5180.0071	Pass	5180.009	Pass
60	5	5180.0079	Pass	5180.011	Pass	5180.0118	Pass	5180.01	Pass
50	5	5180.003	Pass	5180.0031	Pass	5180.004	Pass	5180.0039	Pass
40	5	5180.0162	Pass	5180.0149	Pass	5180.0155	Pass	5180.0156	Pass
30	5	5179.9803	Pass	5179.9801	Pass	5179.9797	Pass	5179.9822	Pass
20	5	5179.9858	Pass	5179.9892	Pass	5179.9866	Pass	5179.9863	Pass
10	5	5179.9872	Pass	5179.9857	Pass	5179.9832	Pass	5179.9862	Pass
0	5	5179.9748	Pass	5179.9766	Pass	5179.9785	Pass	5179.9785	Pass
-10	5	5179.9819	Pass	5179.9858	Pass	5179.9849	Pass	5179.985	Pass
-20	5	5179.9787	Pass	5179.9782	Pass	5179.9748	Pass	5179.979	Pass
-25	5	5179.9886	Pass	5179.9895	Pass	5179.9865	Pass	5179.9872	Pass

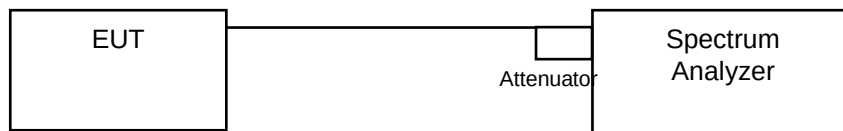
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
20	5.75	5179.9786	Pass	5179.9821	Pass	5179.9814	Pass	5179.9826	Pass
	5	5179.9858	Pass	5179.9892	Pass	5179.9866	Pass	5179.9863	Pass
	4.25	5179.9877	Pass	5179.9847	Pass	5179.9834	Pass	5179.9858	Pass

4.7 6 dB Bandwidth Measurement

4.7.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100 kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	16.61	0.5	Pass
157	5785	16.63	0.5	Pass
165	5825	16.63	0.5	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	17.86	0.5	Pass
157	5785	17.86	0.5	Pass
165	5825	17.86	0.5	Pass

802.11ac (VHT40)

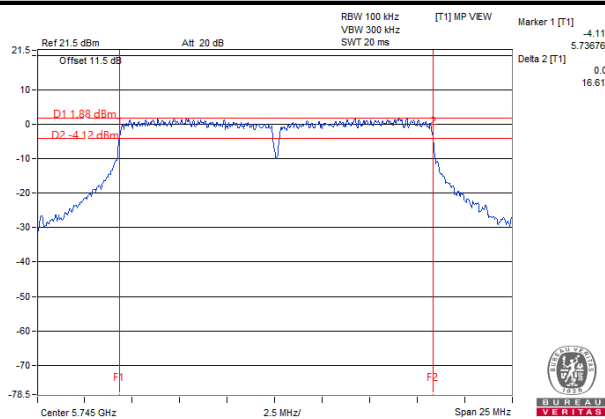
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
151	5755	36.64	0.5	Pass
159	5795	36.62	0.5	Pass

802.11ac (VHT80)

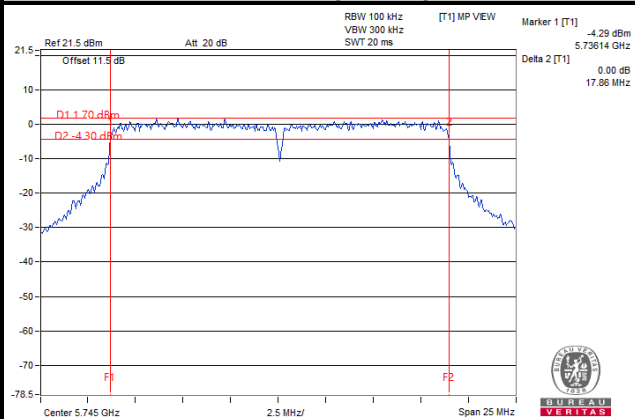
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
155	5775	76.63	0.5	Pass

Spectrum Plot of Worst Value

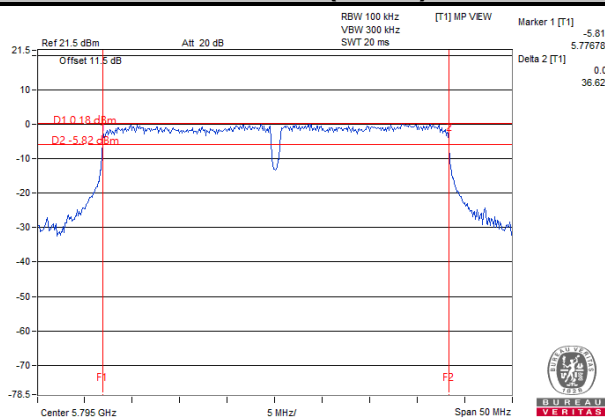
802.11a



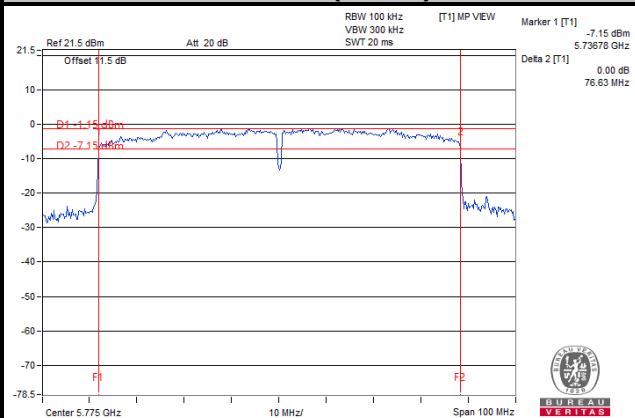
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



5 Pictures of Test Arrangements

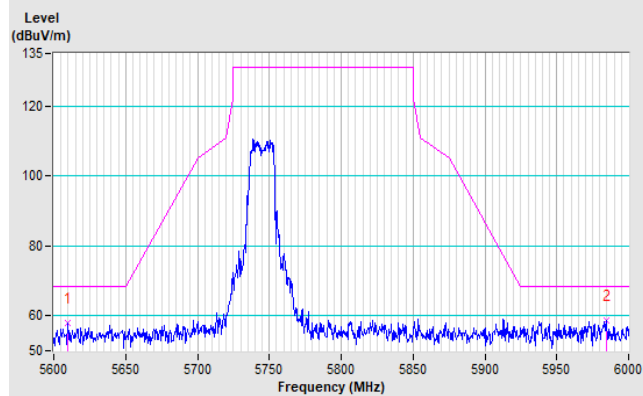
Please refer to the attached file (Test Setup Photo).

Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

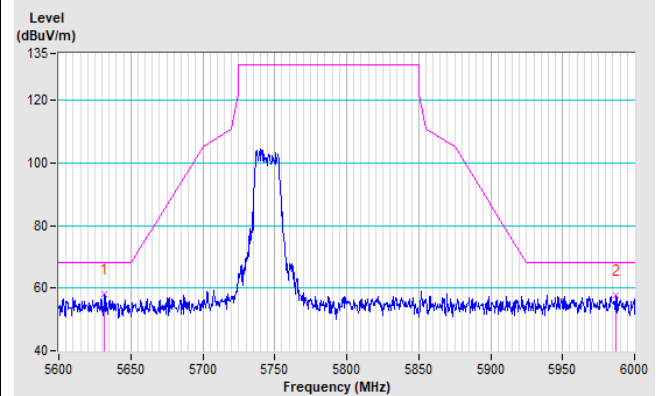
802.11a

CH 149 5745 MHz

Horizontal

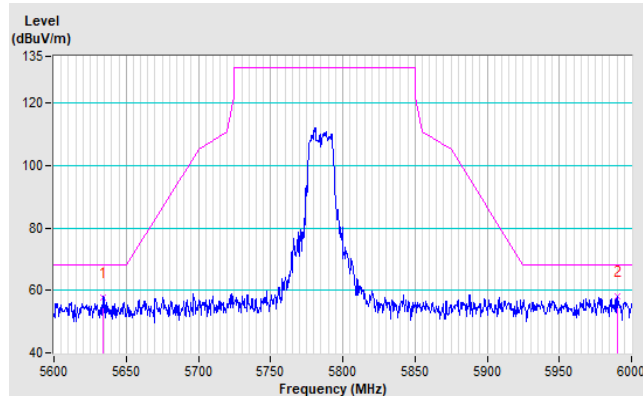


Vertical

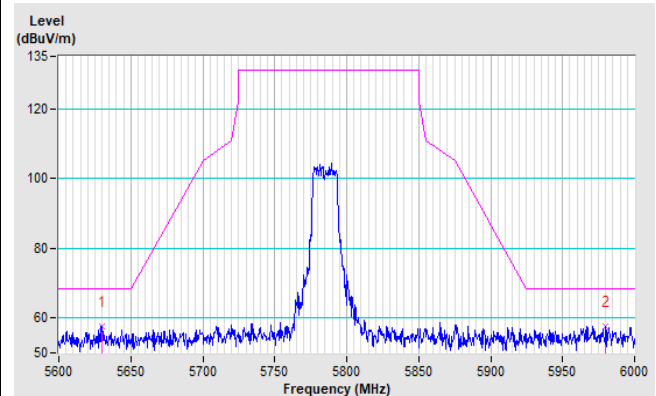


CH 157 5785 MHz

Horizontal

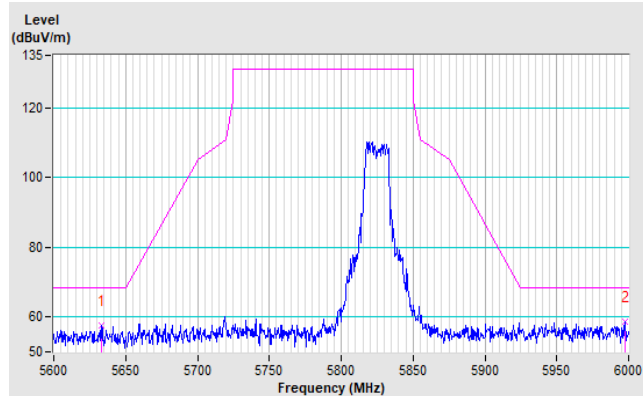


Vertical

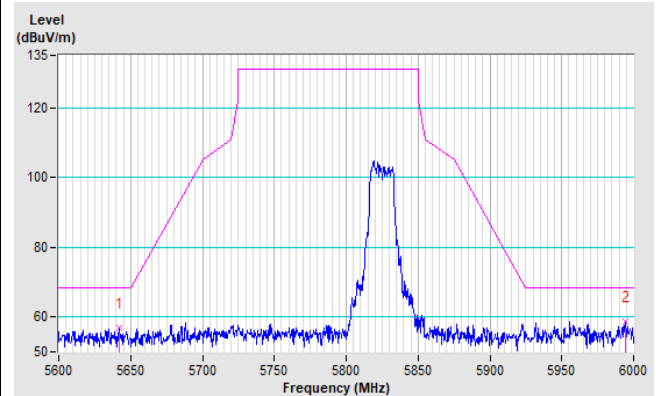


CH 165 5825 MHz

Horizontal



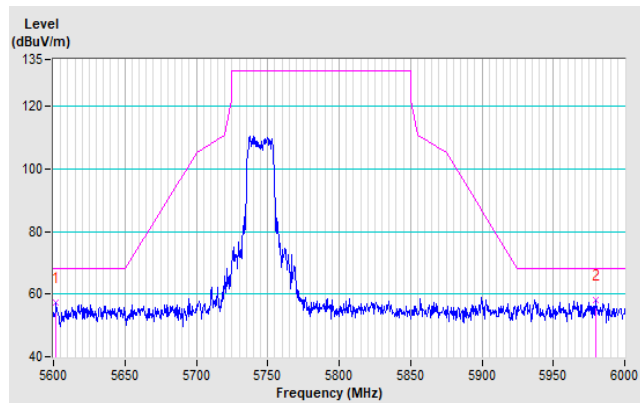
Vertical



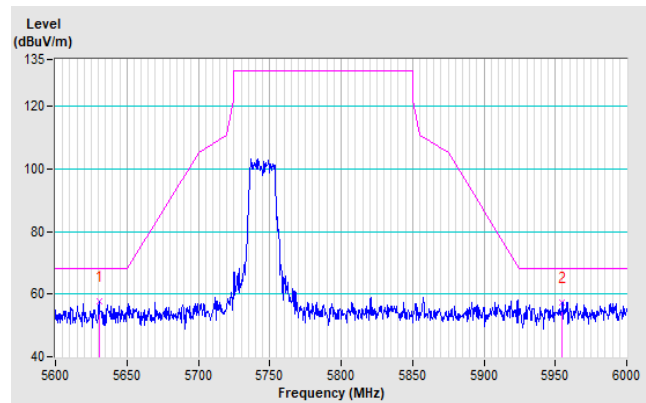
802.11ac (VHT20)

CH 149 5745 MHz

Horizontal

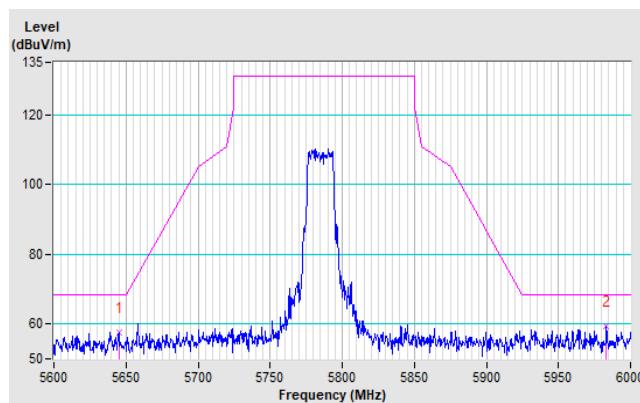


Vertical

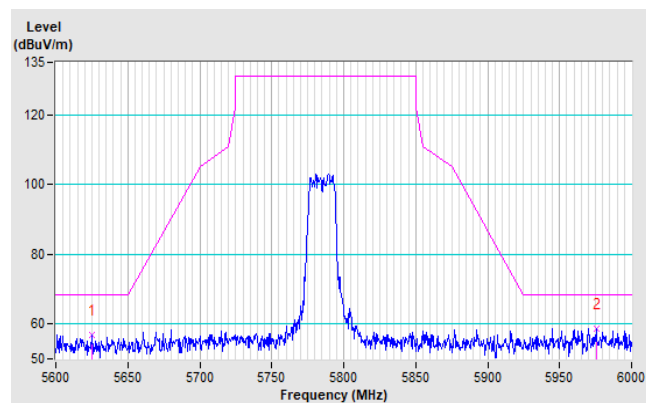


CH 157 5785 MHz

Horizontal

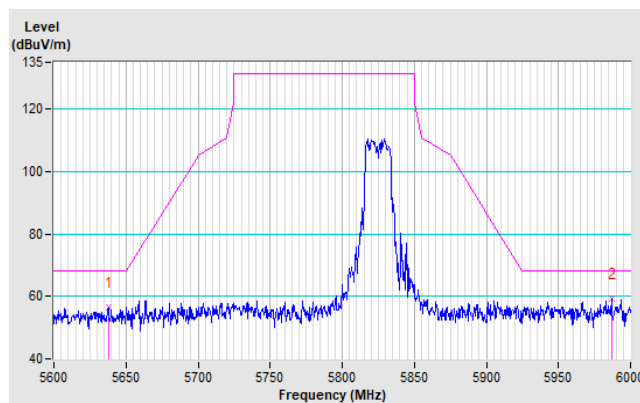


Vertical

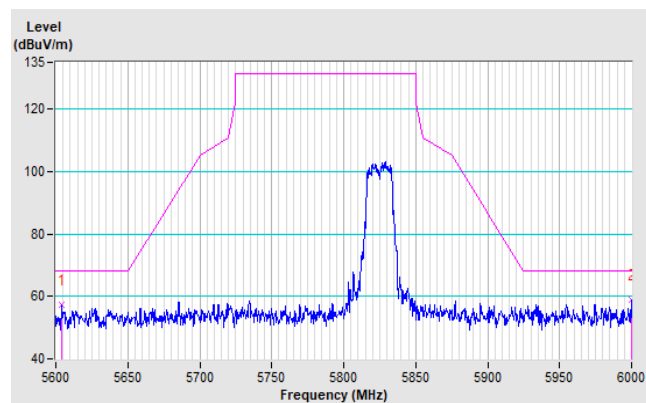


CH 165 5825 MHz

Horizontal



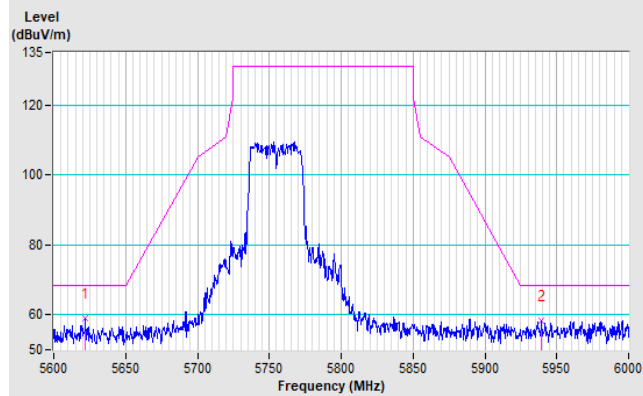
Vertical



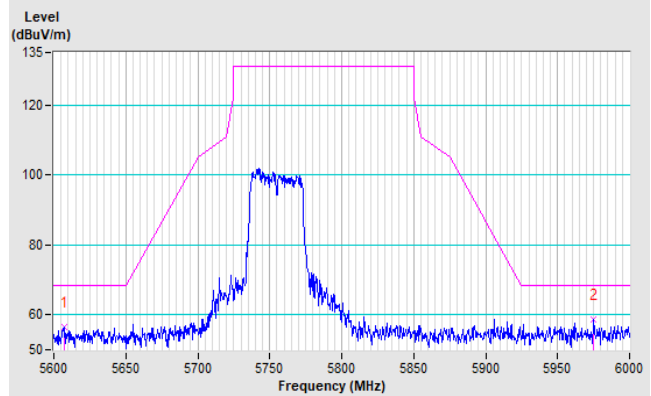
802.11ac (VHT40)

CH 151 5755 MHz

Horizontal

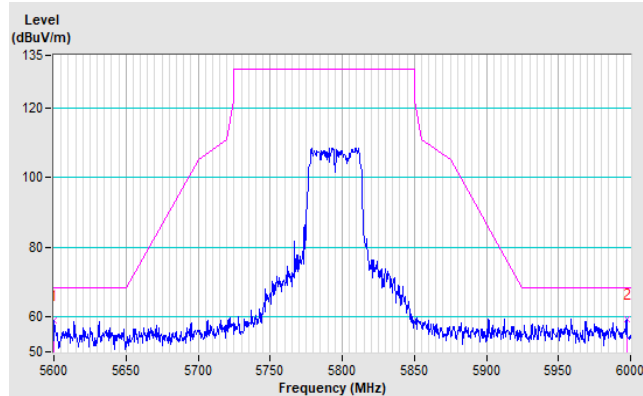


Vertical

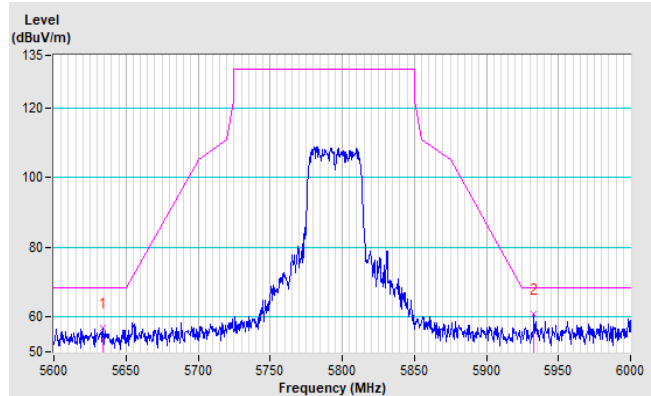


CH 159 5795 MHz

Horizontal



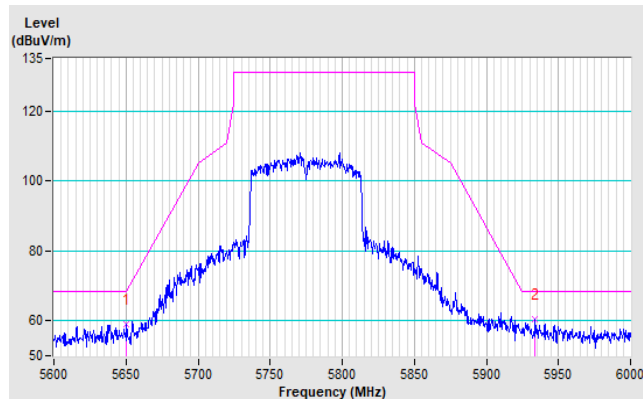
Vertical



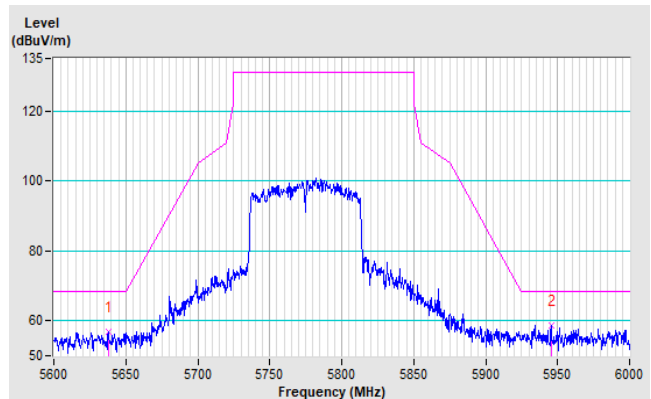
802.11ac (VHT80)

CH 155 5775 MHz

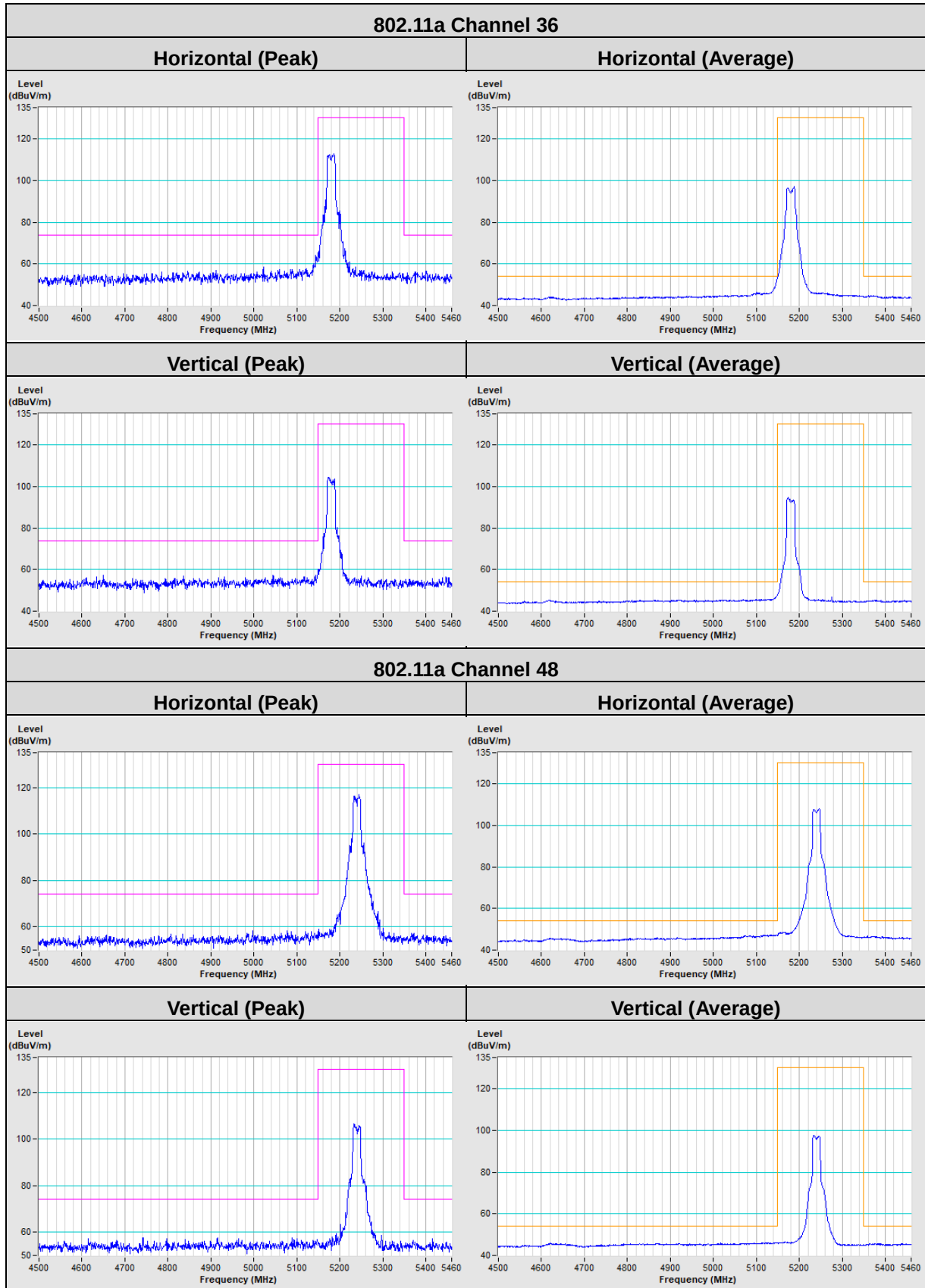
Horizontal

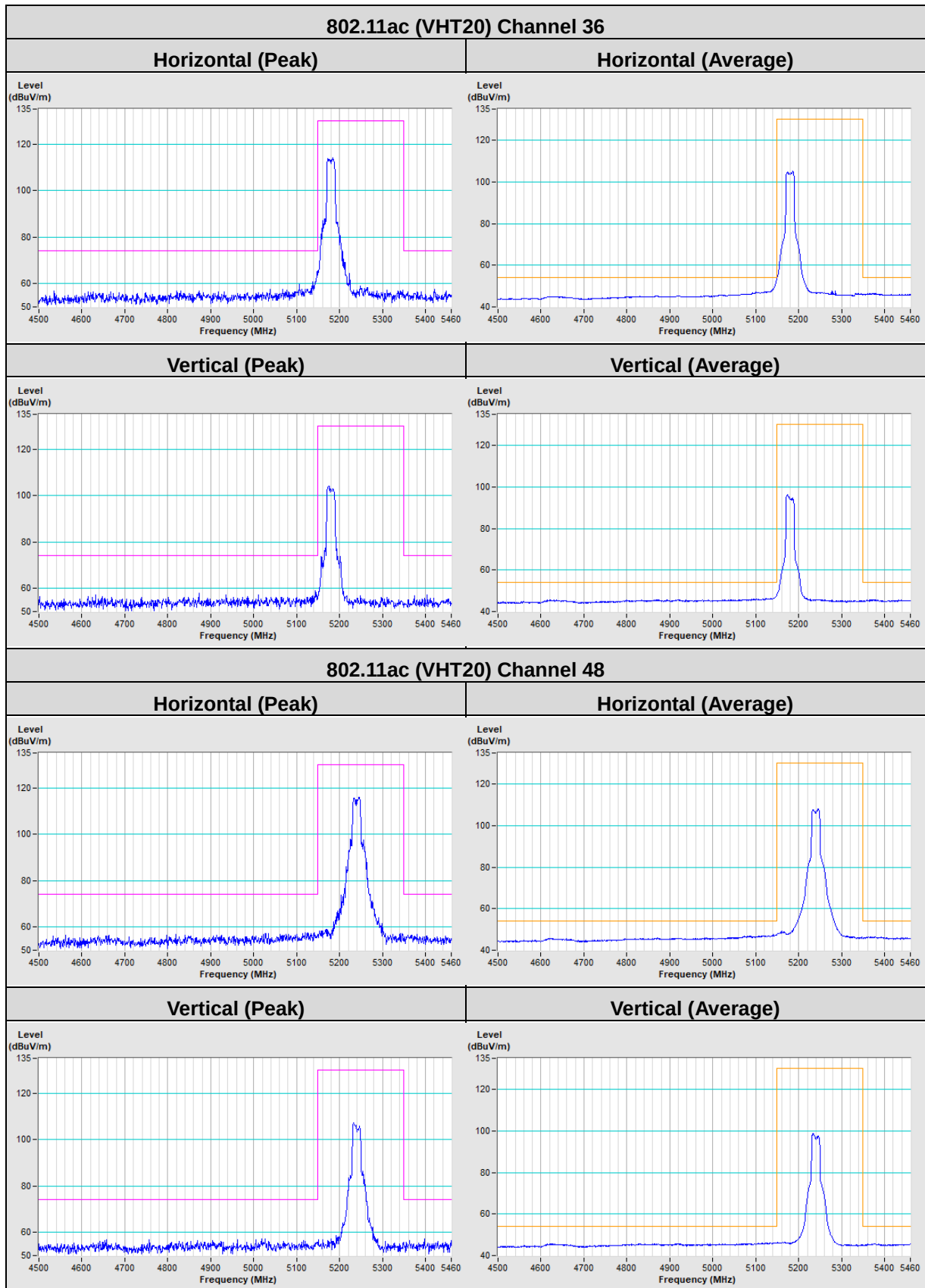


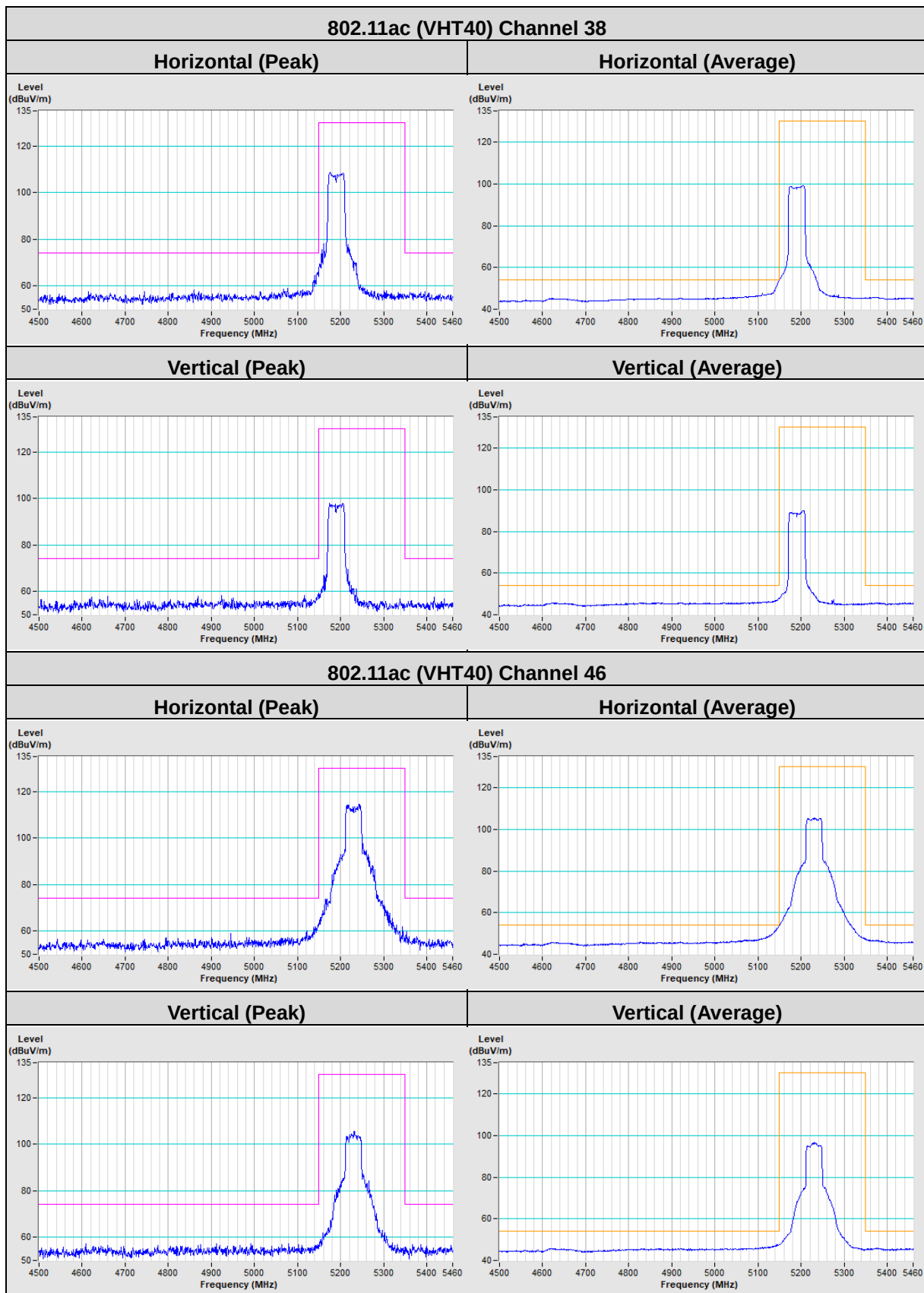
Vertical

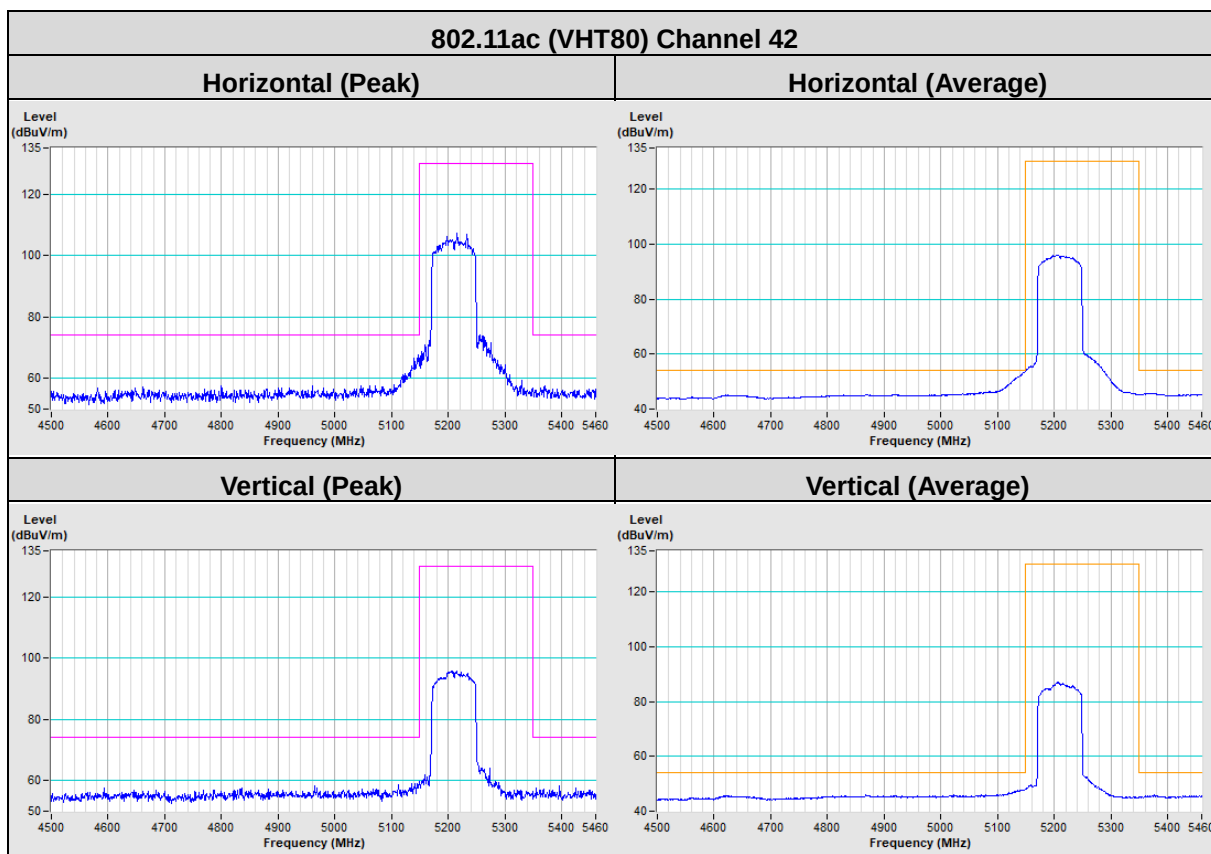


Annex B- Band Edge Measurement









Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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