

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 15, Subpart E (Section 15.407)

**Report No.:** RFBAOZ-WTW-P22010912A-2

**FCC ID:** HBW-GDOCAMF1

**Product:** Camera Module

**Brand:** Chamberlain

**Model No.:** GDOCAMF1

**Received Date:** 2024/5/8

**Test Date:** 2024/5/24 ~ 2024/5/27

**Issued Date:** 2024/7/3

**Applicant:** The Chamberlain Group, LLC

**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:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan

**FCC Registration /** 788550 / TW0003

**Designation Number:**

Approved by:

Jeremy Lin

Jeremy Lin / Project Engineer

, Date:

2024/7/3

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Prepared by : Gina Liu / Specialist



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**Release Control Record**

Issue No.	Description	Date Issued
RFBAOZ-WTW-P22010912A-2	Original release.	2024/7/3

## Report Issue History Record

Issue No.	Description	Date Issued
RFBIBJ-WTW-P22010912-2	Original Release	2022/5/4
RFBIBJ-WTW-P22010912A-2	<ol style="list-style-type: none"><li>1. BT shielding change from (Frame+ COVER) to Soldering Cover) for SKU 2</li><li>2. Add 2nd source for SKU 2<ol style="list-style-type: none"><li>a. Flash/ IC/power IC vendor change</li><li>b. BT Matching component/MCU vendor change</li><li>c. 2.4G/5G RF component and diplexer vendor change</li></ol></li></ol>	2024/7/3

## 1 Certificate

**Product:** Camera Module

**Brand:** Chamberlain

**Test Model:** GDOCAMF1

**Sample Status:** Engineering sample

**Applicant:** The Chamberlain Group, LLC

**Test Date:** 2024/5/24 ~ 2024/5/27

**Standard:** 47 CFR FCC Part 15, Subpart E (Section 15.407)

**Measurement** ANSI C63.10-2013

**procedure:** KDB 789033 D02 General UNII Test Procedure New Rules v02r01

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.

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
Clause	Test Item	Result	Remark
15.407(a)(2)	26 dB Bandwidth	N/A	Refer to Note
15.407(a)(1) 15.407(a)(3)	RF Output Power	Pass	Meet the requirement of limit.
15.407(a)(1) 15.407(a)(3)	Power Spectral Density	N/A	Refer to Note
15.407(e)	6 dB Bandwidth	N/A	Refer to Note
---	Occupied Bandwidth	N/A	Refer to Note
15.407(g)	Frequency Stability	N/A	Refer to Note
15.407(b)(9)	AC Power Conducted Emissions	N/A	Refer to Note
15.407(b)(9)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -10.8 dB at 34.85 MHz
15.407(b) (1/10) 15.407(b) (4(i)/10)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -2.5 dB at 5150.00 MHz and 17325.00 MHz
15.203	Antenna Requirement	Pass	Antenna connector is ipex not a standard connector.

Note:

- Only test item of Unwanted Emissions and RF Output Power were performed for this report. Other testing data please refer to BV CPS report no.: RFBIBJ-WTW-P22010912-2.
- 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	Specification	Expanded Uncertainty (k=2) (±)
RF Output Power	-	1.371 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.59 dB
	30 MHz ~ 1 GHz	3.64 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and 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	5.18 GHz ~ 5.24 GHz 5.745 GHz ~ 5.825 GHz
Number of Channel	802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	5.18 GHz ~ 5.24 GHz : 51.404 mW (17.11 dBm) 5.745 GHz ~ 5.825 GHz : 88.92 mW (19.49 dBm)
EUT Category	Client device

Note:

1. This report is issued as a supplementary report to the original report no.: RFBIBJ-WTW-P22010912-2. The differences compared with original report are refer as below. Therefore, only test item of Unwanted Emissions and RF Output Power were performed for this report.

- BT shielding change from (Frame+ COVER) to Soldering Cover) for SKU 2
- Add 2nd source for SKU 2
  - a. Flash/ IC/power IC vendor change
  - b. BT Matching component/MCU vendor change
  - c. 2.4G/5G RF component and diplexer vendor change

2. 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

3. 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 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna No.	Brand	Model	Gain (dBi)	Antenna Type	Connector Type
			5150~5850 MHz		
1	PSA	ASC_RFPCA511512IMLB301	5.29	PCB	ipex(MHF)

2. The EUT incorporates a SISO function:

5 GHz Band		
Modulation Mode	TX & RX Configuration	
802.11a	1TX	1RX
802.11n (HT20)	1TX	1RX
802.11n (HT40)	1TX	1RX
802.11ac (VHT20)	1TX	1RX
802.11ac (VHT40)	1TX	1RX
802.11ac (VHT80)	1TX	1RX

Note:

- The modulation and bandwidth are similar for 802.11n mode for 20 MHz (40 MHz), 802.11ac mode for 20 MHz (40 MHz, 80 MHz), therefore the manufacturer will control the power for 802.11n mode is same as the 802.11ac mode or lower than it and investigated worst case to representative mode in test report.



### 3.3 Channel List

#### FOR 5180 ~ 5240 MHz

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210 MHz

#### FOR 5745 ~ 5825 MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775 MHz

### 3.4 Power Setting

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

### 3.5 Test Mode Applicability and Tested Channel Detail

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

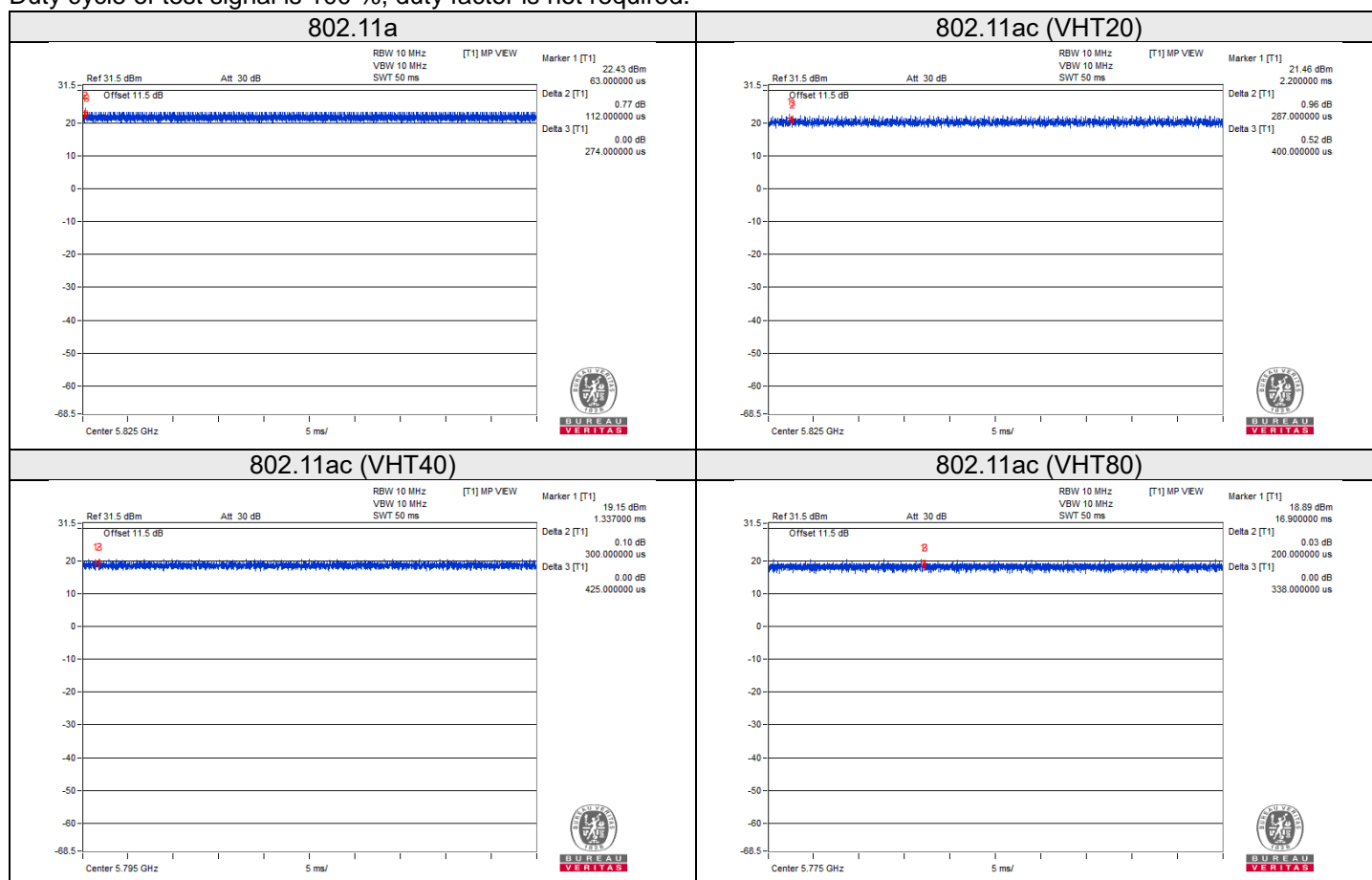
Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	802.11a	36, 40, 48, 149, 157, 165	BPSK	6Mb/s
	802.11ac (VHT20)	36, 40, 48, 149, 157, 165	BPSK	MCS0
	802.11ac (VHT40)	38, 46, 151, 159	BPSK	MCS0
	802.11ac (VHT80)	42, 155	BPSK	MCS0
Unwanted Emissions below 1 GHz	802.11ac (VHT80)	155	BPSK	MCS0
Unwanted Emissions above 1 GHz	802.11ac (VHT80)	42, 155	BPSK	MCS0

Note:

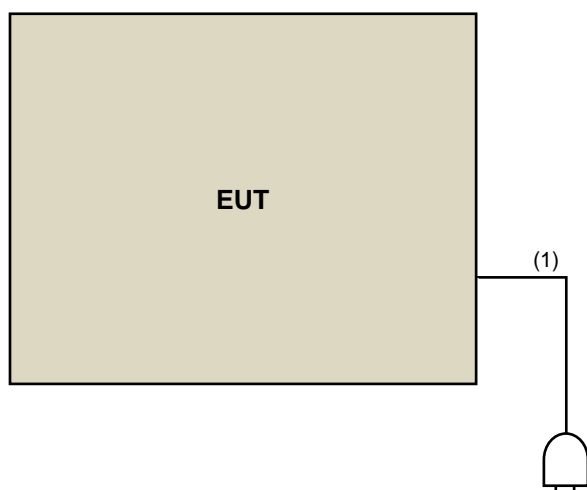
1. The SKU 2 for the EUT has been re-tested as the above test item.
2. For unwanted emission test item, the tested channel was chosen the maximum output power as mode represent to report.

### 3.6 Duty Cycle of Test Signal

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



### 3.7 Connection Diagram of EUT and Peripheral Devices



Under Table

### 3.8 Configuration of Peripheral Devices and Cable Connections

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC power cable	1	1.8	N	0	Supplied by applicant

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Peak Power Analyzer Keysight	8990B	MY51000485	2024/1/21	2025/1/20
Wideband Power Sensor Keysight	N1923A	MY58020002	2024/1/18	2025/1/17
		MY58140009	2024/1/18	2025/1/17

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/5/27

### 4.2 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-155	2023/10/13	2024/10/12
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
Preamplifier Agilent	8447D	2944A10631	2024/5/1	2025/4/30
Preamplifier EMCI	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable Woken	8D-FB	Cable-CH4-01	2023/7/8	2024/7/7
Signal & Spectrum Analyzer R&S	FSW43	101582	2024/4/12	2025/4/11
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2024/5/24

### 4.3 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-408	2023/11/12	2024/11/11
	BBHA 9170	9170-480	2023/11/12	2024/11/11
		BBHA9170241	2023/10/16	2024/10/15
		BBHA9170243	2023/11/12	2024/11/11
Preamplifier EMCI	EMC 184045	980116	2023/9/27	2024/9/26
Preamplifier Keysight	83017A	MY53270295	2024/5/1	2025/4/30
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2023/7/8	2024/7/7
	EMC102-KM-KM-3000	150929	2023/7/8	2024/7/7
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	2024/5/1	2025/4/30
	Sucoflex 104	MY 13380+295012/04	2024/5/1	2025/4/30
Signal & Spectrum Analyzer R&S	FSW43	101582	2024/4/12	2025/4/11
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2024/5/24

## 5 Limits of Test Items

### 5.1 RF Output Power

Operation Band	EUT Category	Limit
U-NII-1	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125mW(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	250mW (24 dBm)

Operation Band	Limit
U-NII-3	1 Watt (30 dBm)

### 5.2 Unwanted Emissions below 1 GHz

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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

### 5.3 Unwanted Emissions above 1 GHz

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)
Above 960	500	3

Notes:

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 Procedure New Rules v02r01	Field Strength at 3 m	
	PK: 74 (dBμV/m)	AV: 54 (dBμV/m)

For transmitters operating in the 5.15-5.25 GHz band:

Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)

For transmitters operating in the 5.725-5.850 GHz band:

Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
15.407(b)(4)(i)	PK: -27 (dBm/MHz) <sup>*1</sup>	PK: 68.2 (dBμV/m) <sup>*1</sup>
	PK: 10 (dBm/MHz) <sup>*2</sup>	PK: 105.2 (dBμV/m) <sup>*2</sup>
	PK: 15.6 (dBm/MHz) <sup>*3</sup>	PK: 110.8 (dBμV/m) <sup>*3</sup>
	PK: 27 (dBm/MHz) <sup>*4</sup>	PK: 122.2 (dBμV/m) <sup>*4</sup>

<sup>\*1</sup> beyond 75 MHz or more above of the band edge.

<sup>\*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

<sup>\*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

<sup>\*4</sup> from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

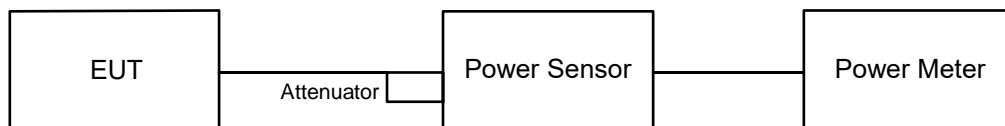
Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

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

## 6 Test Arrangements

### 6.1 RF Output Power

#### 6.1.1 Test Setup



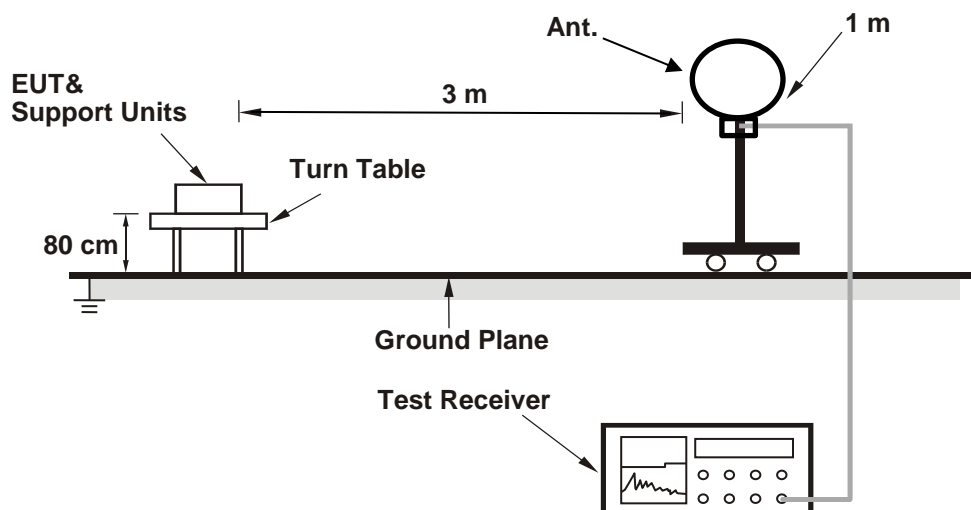
#### 6.1.2 Test Procedure

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 and set the detector to average. Duty factor is not added to measured value.

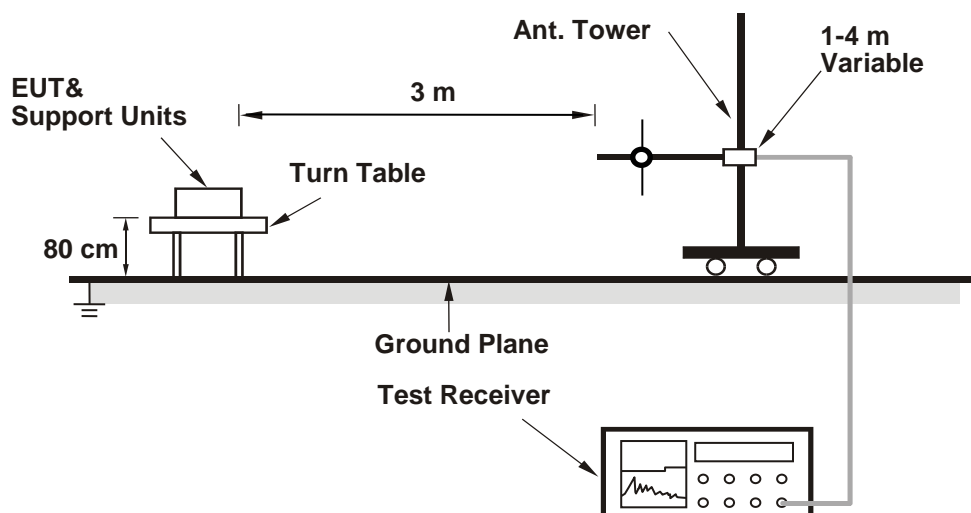
### 6.2 Unwanted Emissions below 1 GHz

#### 6.2.1 Test Setup

##### For Radiated emission below 30 MHz



##### For Radiated emission above 30 MHz



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



## 6.2.2 Test Procedure

### 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 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. 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

### For Radiated emission above 30 MHz

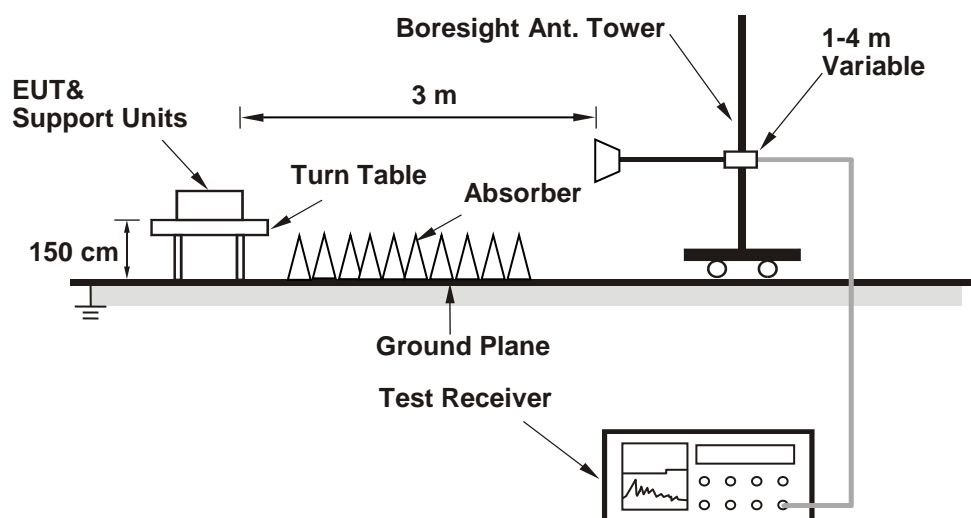
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

## 6.3 Unwanted Emissions above 1 GHz

### 6.3.1 Test Setup



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

### 6.3.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to peak and average detects 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.

#### Notes:

- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- For fundamental and harmonic signal measurement, 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.
- All modes of operation were investigated and the worst-case emissions are reported.

## 7 Test Results of Test Item

### 7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Luis Lee/Wayne Lin
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#### 802.11a

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
36	5180	44.668	16.50	24	Pass
40	5200	44.361	16.47	24	Pass
48	5240	45.394	16.57	24	Pass
149	5745	53.456	17.28	30	Pass
157	5785	61.802	17.91	30	Pass
165	5825	62.373	17.95	30	Pass

#### Notes:

1. For U-NII-1, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.
2. For U-NII-3, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.

#### 802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
36	5180	50.119	17.00	24	Pass
40	5200	49.317	16.93	24	Pass
48	5240	48.417	16.85	24	Pass
149	5745	46.989	16.72	30	Pass
157	5785	45.604	16.59	30	Pass
165	5825	47.534	16.77	30	Pass

#### Notes:

1. For U-NII-1, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.
2. For U-NII-3, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.

#### 802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
38	5190	51.404	17.11	24	Pass
46	5230	46.666	16.69	24	Pass
151	5755	66.069	18.20	30	Pass
159	5795	64.417	18.09	30	Pass

Notes:

1. For U-NII-1, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.
2. For U-NII-3, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.

#### 802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
42	5210	50.582	17.04	24	Pass
155	5775	88.92	19.49	30	Pass

Notes:

1. For U-NII-1, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.
2. For U-NII-3, the antenna gain is 5.29 dBi < 6 dBi, so the output power limit shall not be reduced.

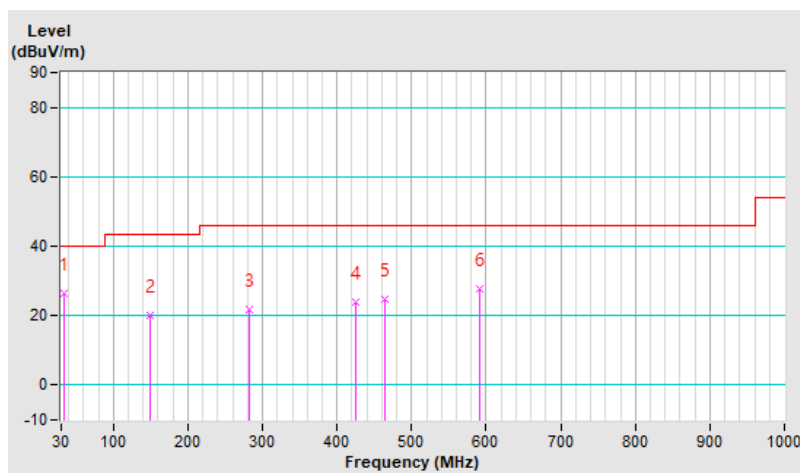
## 7.2 Unwanted Emissions below 1 GHz

RF Mode	802.11ac (VHT80)	Channel	CH 155 : 5775 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 68 % RH
Tested By	Luis Lee		

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	34.85	26.5 QP	40.0	-13.5	1.00 H	277	36.5	-10.0
2	148.34	20.0 QP	43.5	-23.5	1.00 H	223	28.8	-8.8
3	282.20	21.7 QP	46.0	-24.3	1.49 H	18	29.5	-7.8
4	425.76	23.9 QP	46.0	-22.1	1.49 H	274	29.0	-5.1
5	463.59	24.9 QP	46.0	-21.1	1.00 H	320	29.2	-4.3
6	590.66	27.7 QP	46.0	-18.3	1.49 H	13	29.4	-1.7

### 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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

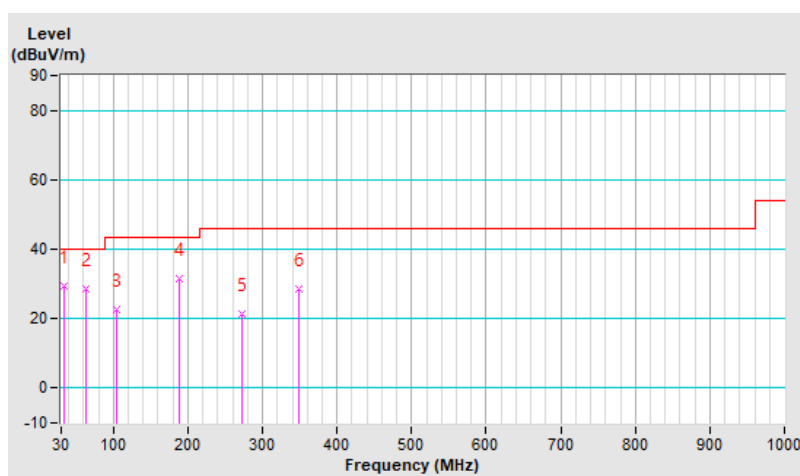


RF Mode	802.11ac (VHT80)	Channel	CH 155 : 5775 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 68 % RH
Tested By	Luis Lee		

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	34.85	29.2 QP	40.0	-10.8	1.49 V	118	39.2	-10.0
2	62.98	28.7 QP	40.0	-11.3	1.49 V	140	38.1	-9.4
3	104.69	22.5 QP	43.5	-21.0	1.49 V	304	34.9	-12.4
4	189.08	31.5 QP	43.5	-12.0	1.49 V	224	42.7	-11.2
5	273.47	21.4 QP	46.0	-24.6	1.49 V	144	29.5	-8.1
6	348.16	28.5 QP	46.0	-17.5	1.49 V	64	35.2	-6.7

#### 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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



### 7.3 Unwanted Emissions above 1 GHz

<b>RF Mode</b>	802.11ax (HE80)	<b>Channel</b>	CH 42 : 5210 MHz
<b>Frequency Range</b>	1 GHz ~ 40 GHz	<b>Detector Function &amp; Bandwidth</b>	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	24°C, 68% RH
<b>Tested By</b>	Luis Lee		

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	68.2 PK	74.0	-5.8	1.00 H	14	55.1	13.1
2	5150.00	51.5 AV	54.0	-2.5	1.00 H	14	38.4	13.1
3	*5210.00	107.3 PK			1.00 H	14	64.0	43.3
4	*5210.00	95.9 AV			1.00 H	14	52.6	43.3
5	5350.00	60.7 PK	74.0	-13.3	1.00 H	14	47.6	13.1
6	5350.00	47.9 AV	54.0	-6.1	1.00 H	14	34.8	13.1
7	#10420.00	60.4 PK	68.2	-7.8	1.84 H	236	38.5	21.9
8	15630.00	60.6 PK	74.0	-13.4	1.99 H	236	39.0	21.6
9	15630.00	48.2 AV	54.0	-5.8	1.99 H	236	26.6	21.6
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	62.3 PK	74.0	-11.7	1.00 V	25	49.2	13.1
2	5150.00	48.6 AV	54.0	-5.4	1.00 V	25	35.5	13.1
3	*5210.00	98.5 PK			1.00 V	25	55.2	43.3
4	*5210.00	88.3 AV			1.00 V	25	45.0	43.3
5	5350.00	60.6 PK	74.0	-13.4	1.00 V	25	47.5	13.1
6	5350.00	47.6 AV	54.0	-6.4	1.00 V	25	34.5	13.1
7	#10420.00	59.4 PK	68.2	-8.8	1.71 V	165	37.5	21.9
8	15630.00	60.3 PK	74.0	-13.7	2.69 V	143	38.7	21.6
9	15630.00	47.9 AV	54.0	-6.1	2.69 V	143	26.3	21.6

#### 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, the limit was restricted at the RF Output Power.
6. " # ": The radiated frequency is out of the restricted band.

<b>RF Mode</b>	802.11ax (HE80)	<b>Channel</b>	CH 155 : 5775 MHz
<b>Frequency Range</b>	1 GHz ~ 40 GHz	<b>Detector Function &amp; Bandwidth</b>	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	24°C, 68% RH
<b>Tested By</b>	Luis Lee		

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	*5775.00	110.9 PK			1.00 H	79	66.3	44.6
2	*5775.00	99.8 AV			1.00 H	79	55.2	44.6
3	11550.00	62.0 PK	74.0	-12.0	1.89 H	248	38.9	23.1
4	11550.00	50.5 AV	54.0	-3.5	1.89 H	248	27.4	23.1
5	#17325.00	65.7 PK	68.2	-2.5	2.04 H	212	39.9	25.8
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	*5775.00	104.9 PK			1.00 V	150	60.3	44.6
2	*5775.00	94.1 AV			1.00 V	150	49.5	44.6
3	11550.00	61.2 PK	74.0	-12.8	1.79 V	165	38.1	23.1
4	11550.00	50.1 AV	54.0	-3.9	1.79 V	165	27.0	23.1
5	#17235.00	65.0 PK	68.2	-3.2	2.55 V	158	39.4	25.6

**Remarks:**

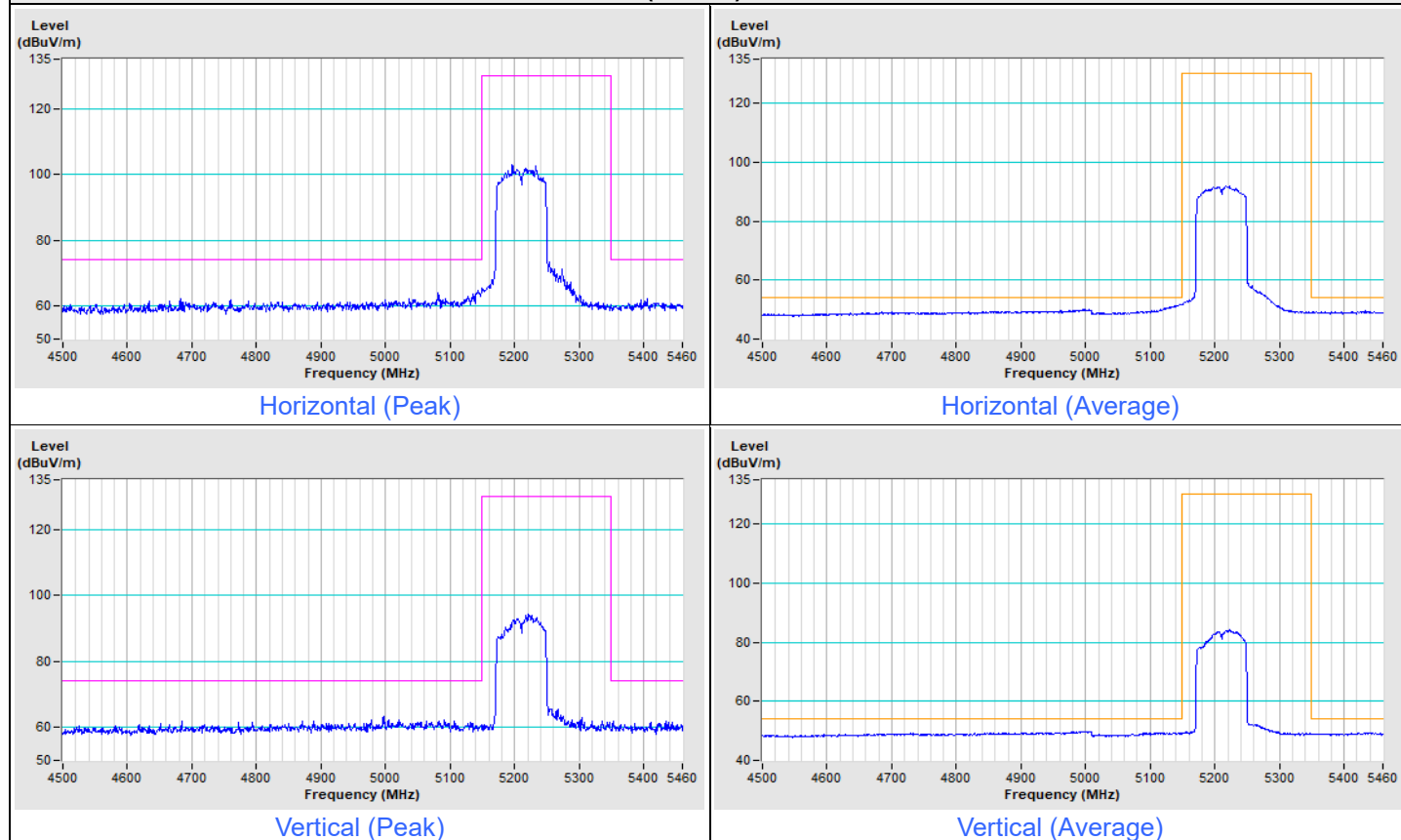
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency,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



## Plot of Band Edge

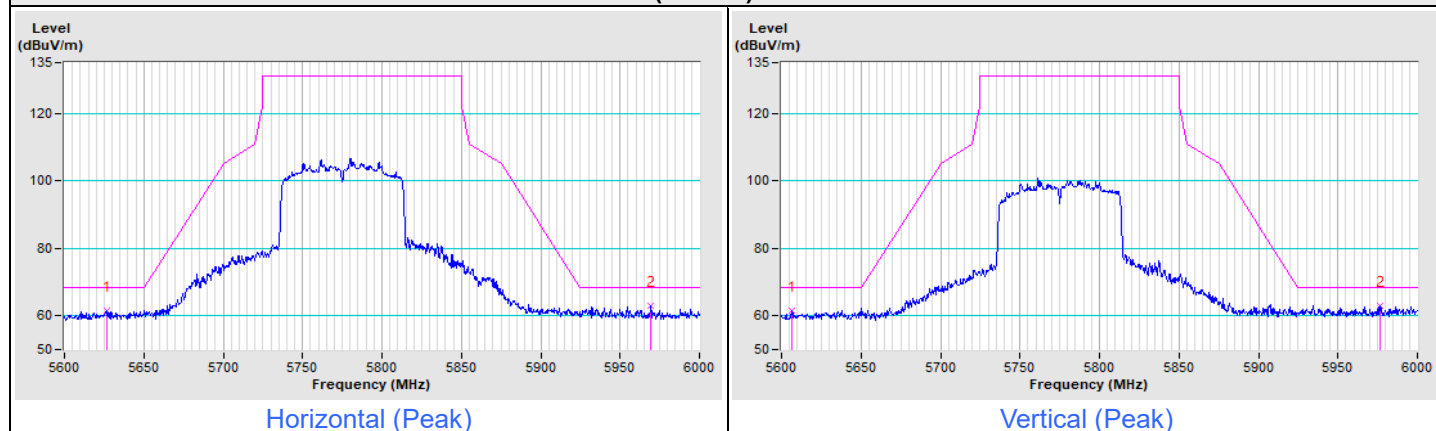
Frequency Range	4.5 GHz ~ 5.46 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
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### 802.11ac (VHT80) Channel 42



Frequency Range	5.6 GHz ~ 6 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak
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### 802.11ac (VHT80) Channel 155



## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 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.

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

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