Partial FCC Test Report

Report No.:	RF191114C18-1
FCC ID:	PPD-QCNFA344AH
Test Model:	QCNFA344A
Received Date:	Nov. 14, 2019
Test Date:	Jan. 08, 2020 ~Jan. 22, 2020
Issued Date:	Feb. 21, 2020
Applicant:	Qualcomm Atheros, Inc.
Address:	1700 Technology Drive, San Jose, CA 95110
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.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan
FCC Registration / Designation Number:	427177 / TW0011

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Release Control Record

Issue No.	Description	Date Issued
RF191114C18-1	Original Release	Feb. 21, 2020

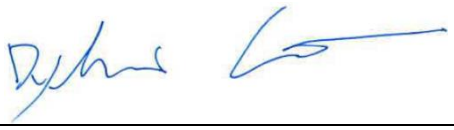
1 Certificate of Conformity

Product:	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand:	Lenovo
Test Model:	QCNFA344A
Sample Status:	Engineering Sample
Applicant:	Qualcomm Atheros, Inc.
Test Date:	Jan. 08, 2020 ~Jan. 22, 2020
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 :  , **Date:** Feb. 21, 2020

Shelly Hsueh / Specialist

Approved by :  , **Date:** Feb. 21, 2020

Dylan Chiou / Senior 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)(6)	AC Power Conducted Emissions	N/A	Refer to Note 1
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.01 dB at 5350.11 MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	N/A	Refer to Note 1
---	Occupied Bandwidth Measurement	-	Reference only
15.407(a)(1/2/3)	Peak Power Spectral Density	N/A	Refer to Note 1
15.407(e)	6 dB Bandwidth	N/A	Refer to Note 1
15.407(g)	Frequency Stability	N/A	Refer to Note 1
15.203	Antenna Requirement	N/A	Refer to Note 1

Note:

1. This report is a partial report according to customer requirements, only test item of Radiated Emissions (above 1GHz) Harmonic and Band Edge Measurement were performed for this report. Other testing data please refer to BV CPS report no.: RF150107E06B-1 for module (Brand: Qualcomm Atheros, Model: QCNFA344A).
2. For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.
3. 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
4. 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**	**Expended Uncertainty (k=2) (±)**
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand	Lenovo
Test Model	QCNFA344A
Status of EUT	Engineering Sample
Nominal Voltage	20.0 Vdc (adapter)
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 300 Mbps 802.11ac: up to 866.7 Mbps
Operating Frequency	5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5720 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) 5260 ~ 5320 MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5500 ~ 5720 MHz: 12 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 6 for 802.11n (HT40), 802.11ac (VHT40) 2 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)
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	N/A

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitter and two receiver

Modulation Mode	Tx Function
802.11a	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT20)	2TX
802.11ac (VHT40)	2TX
802.11ac (VHT80)	2TX

* 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)

2. The WLAN/BT module (Brand: Qualcomm Atheros, Model: QCNFA344A) was installed in the EUT.
3. The antenna information is listed as below.

No.	Antenna Type	Manufacturer	Parts Number	Antenna Gain (dBi)				
				BT	WLAN 2.4 GHz	WLAN 5.15~5.35 GHz	WLAN 5.47~5.725 GHz	WLAN 5.725~5.85 GHz
1	PIFA	Wistron Neweb Corporation	Main Antenna: DQ6615G8600 (81EAA615.G86) Aux. Antenna: DQ6615G8600 (81EAA615.G86)	Aux.: -1.18	Main: -1.80 Aux.: -1.18	Main: -0.26 Aux.: -0.15	Main: -1.13 Aux.: -2.01	Main: -0.80 Aux.: -2.01
2		Wistron Neweb Corporation	Main Antenna: DQ6615G9300 (81EAA615.G93) Aux. Antenna: DQ6615G9300 (81EAA615.G93)	Aux.: -0.53	Main: -2.27 Aux.: -0.53	Main: -0.53 Aux.: -0.29	Main: -1.55 Aux.: -0.82	Main: -1.19 Aux.: -0.99
3		High-Tek Electronics Co., Ltd	Main Antenna: DQ60ACQD063 (0ACQD019089N) Aux. Antenna: DQ60ACQD063 (0ACQD019089N)	Aux.: 0.75	Main: -1.71 Aux.: 0.75	Main: -0.03 Aux.: -0.5	Main: 1.88 Aux.: 0.27	Main: 2.8 Aux.: 0.27
4		High-Tek Electronics Co., Ltd	Main Antenna: DQ60ACQD064 (0ACQD019069N) Aux. Antenna: DQ60ACQD064 (0ACQD019069N)	Aux.: -0.86	Main: 0.05 Aux.: -0.86	Main: 1.74 Aux.: -0.71	Main: 2.27 Aux.: 0.92	Main: 2.87 Aux.: 0.13

4. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Lenovo	ADLX65YCC3D	I/P: 100-240 Vac, 50-60 Hz, 1.8 A O/P: 20V, 3.25A / 15V, 3A / 9V, 2A / 5V, 2A 1.75M/0core
Adapter	Lenovo	ADLX65YDC3D	I/P: 100-240 Vac, 50-60 Hz, 1.8 A O/P: 20V, 3.25A / 15V, 3A / 9V, 2A / 5V, 2A 1.8M/0core

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 5260 ~ 5320 MHz

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300
56	5280	64	5320

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270	62	5310

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
58	5290

For 5500 ~ 5720 MHz

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	124	5620
104	5520	128	5640
108	5540	132	5660
112	5560	136	5680
116	5580	140	5700
120	5600	144	5720

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)
102	5510	126	5630
110	5550	134	5670
118	5590	142	5710

2 channels are provided for 802.11ac (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	122	5610

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≥1G	
-	√	-

Where **RE≥1G:** Radiated Emission above 1 GHz

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-" 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)	Test Item
-	5180-5240	802.11n (HT20)	36 to 48	36	OFDM	BPSK	6.5	Band Edge
-		802.11n (HT40)	38 to 46	38	OFDM	BPSK	13.5	Band Edge
-		802.11ac (VHT80)	42	42	OFDM	BPSK	29.3	Band Edge
-	5260-5320	802.11a	52 to 64	52	OFDM	BPSK	6.0	Harmonic
-		802.11n (HT20)	52 to 64	64	OFDM	BPSK	6.5	Band Edge
-		802.11n (HT40)	54 to 62	62	OFDM	BPSK	13.5	Band Edge
-		802.11ac (VHT80)	58	58	OFDM	BPSK	29.3	Band Edge
-	5500-5720	802.11a	100 to 144	116	OFDM	BPSK	6.0	Harmonic
-		802.11n (HT20)	100 to 144	100, 140	OFDM	BPSK	6.5	Band Edge
-		802.11n (HT40)	102 to 142	102, 134	OFDM	BPSK	13.5	Band Edge
-		802.11ac (VHT80)	106 to 122	106, 122	OFDM	BPSK	29.3	Band Edge
-	5745-5825	802.11a	149 to 165	157	OFDM	BPSK	6.0	Harmonic
-		802.11n (HT20)	149 to 165	149, 165	OFDM	BPSK	6.5	Band Edge
-		802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5	Band Edge
-		802.11ac (VHT80)	155	155	OFDM	BPSK	29.3	Band Edge

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Charles Hisao

3.3 Duty Cycle of Test Signal

MODULATION TYPE: BPSK

Duty cycle of test signal is ≥ 98 %, duty factor is not required.

Duty cycle of test signal is < 98 %, duty factor shall be considered.

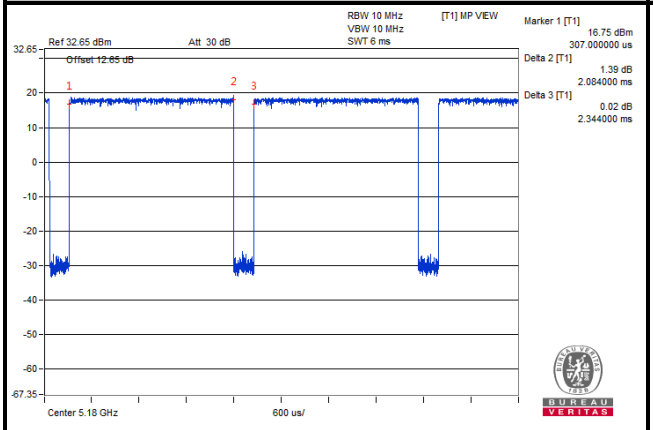
802.11a: Duty cycle = 2.084/2.344 = 0.889, Duty factor = 10 * log(1/0.889) = 0.511

802.11n (HT20): Duty cycle = 3.975/4.032 = 0.986

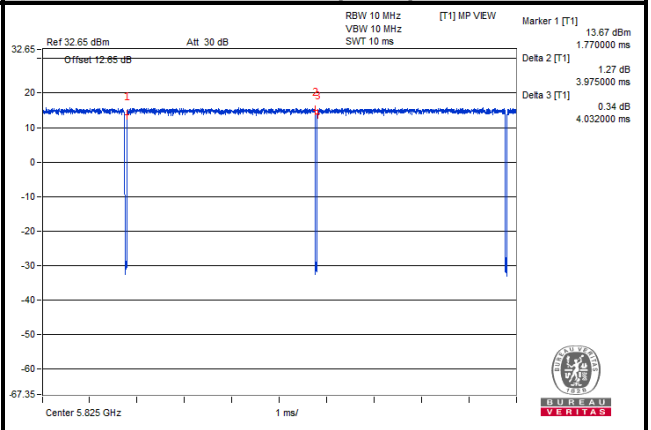
802.11n (HT40): Duty cycle = 3.967/4.035 = 0.983

802.11ac (VHT80): Duty cycle = 3.965/4.028 = 0.984

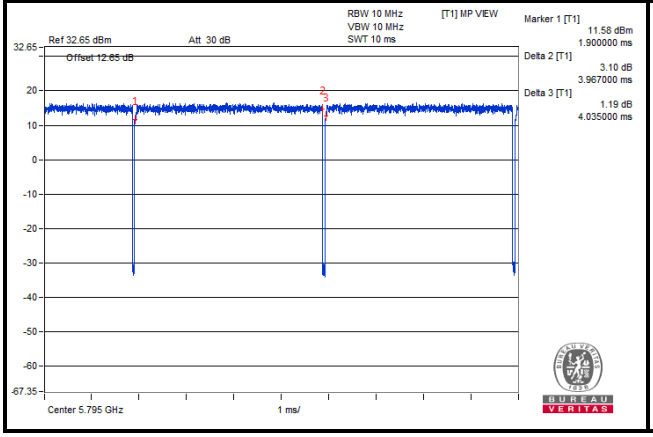
802.11a



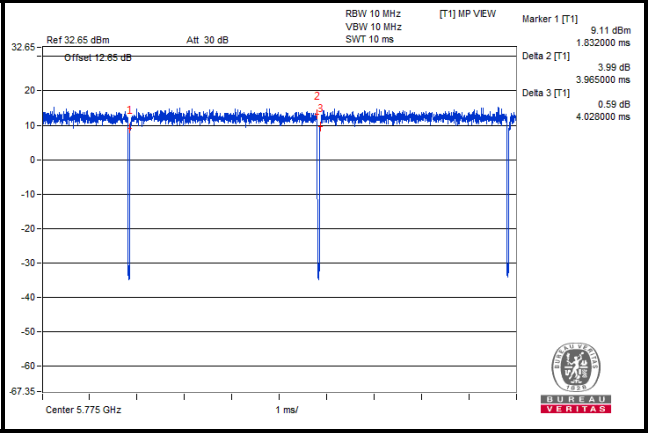
802.11n (HT20)



802.11n (HT40)



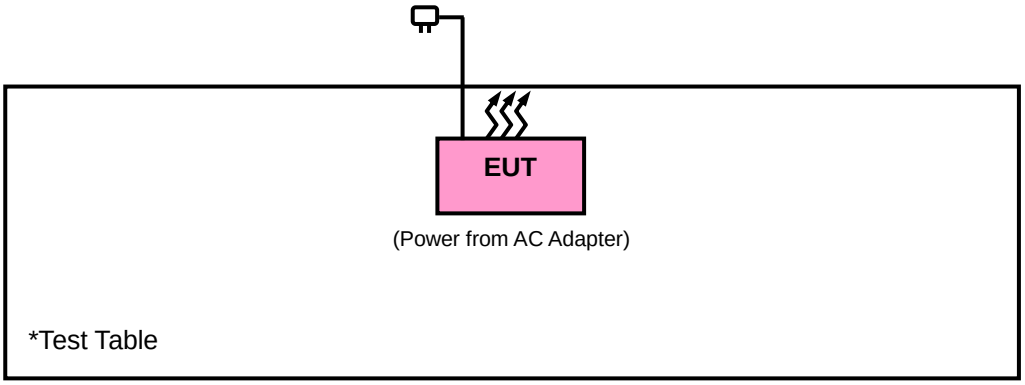
802.11ac (VHT80)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
ANSI C63.10-2013

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

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.

4.1.2 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:

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

4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Aug. 26, 2019	Aug. 25, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 12, 2019	Nov. 11, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent	310N	187226	Jun. 18, 2019	Jun. 17, 2020
Preamplifier Agilent	83017A	MY39501357	Jun. 18, 2019	Jun. 17, 2020
Preamplifier EMCI	EMC 184045	980116	Oct. 08, 2019	Oct. 07, 2020
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 18, 2019	Jun. 17, 2020
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 18, 2019	Jun. 17, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	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 HsinTien Chamber 1.

4.1.4 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:

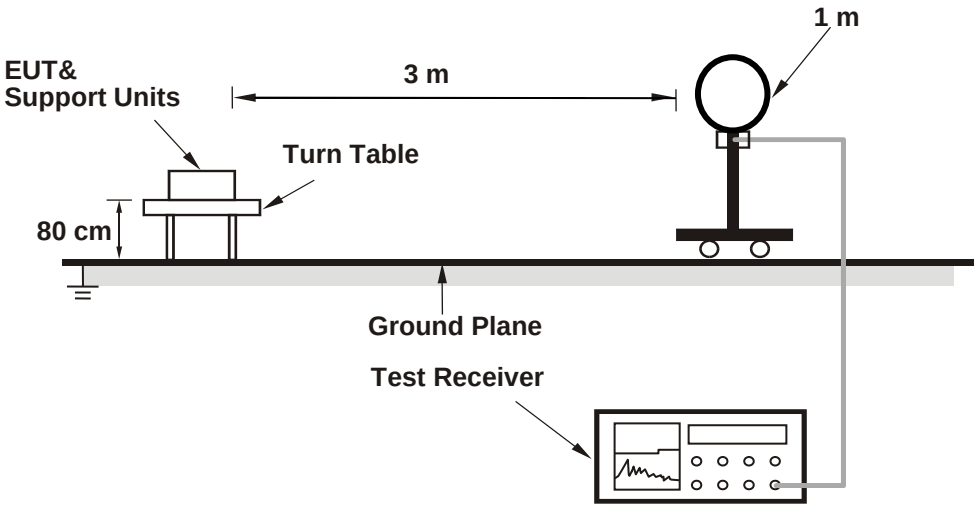
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz. (11a: RBW = 1 MHz, VBW = 1 kHz ; 11n (HT20): RBW = 1 MHz, VBW = 10 Hz ; 11n (HT40): RBW = 1 MHz, VBW = 10 Hz ; 11ac (VHT80): RBW = 1 MHz, VBW = 10 Hz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.5 Deviation from Test Standard

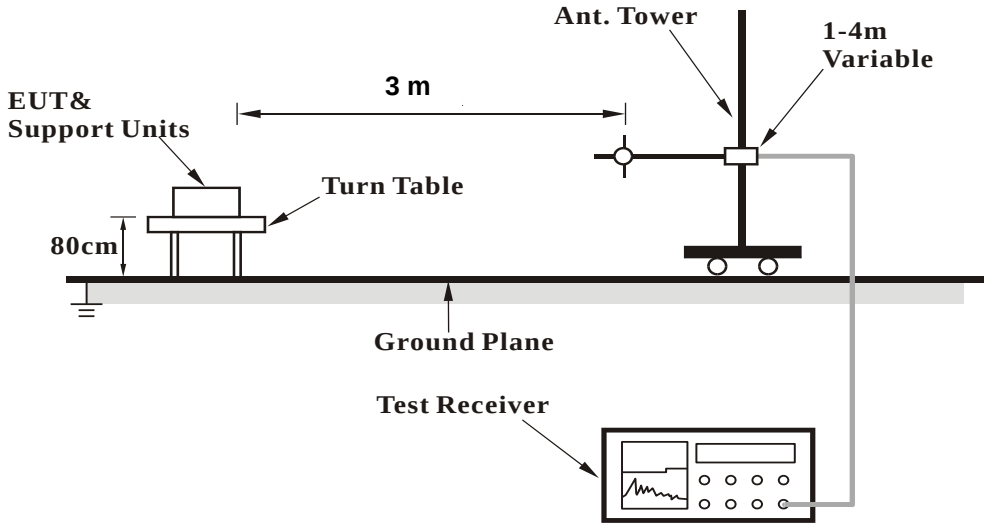
No deviation.

4.1.6 Test Setup

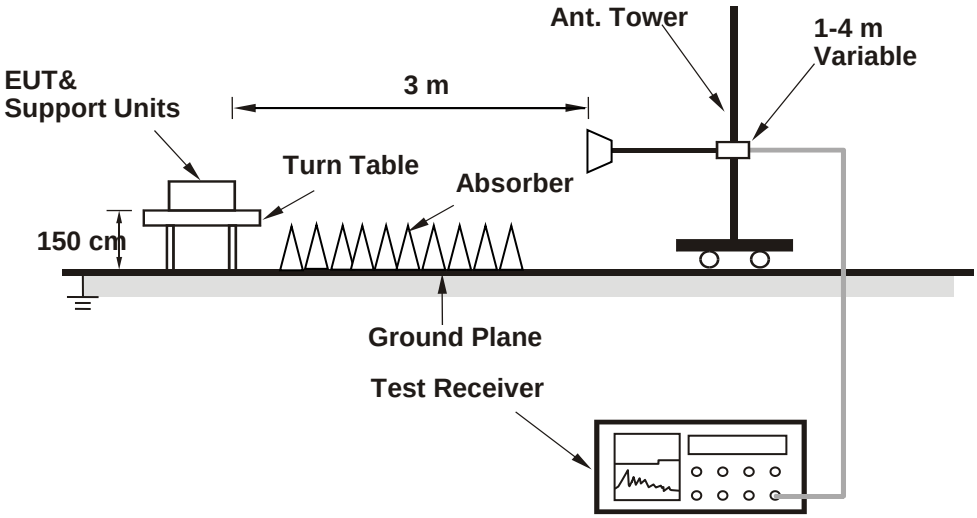
<Radiated Emission below 30 MHz>



<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).

4.1.7 EUT Operating Conditions

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

4.1.8 Test Results

Above 1 GHz Data：

802.11a

EUT Test Condition		Measurement Detail	
Channel	Channel 52	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*10520	55.6	39.72	15.88	68.2	-12.6	143	182	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*10520	56.91	41.03	15.88	68.2	-11.29	125	209	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5260 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 116	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
11160	47.35	30.99	16.36	54	-6.65	152	94	Average
11160	56.97	40.61	16.36	74	-17.03	152	94	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
11160	47.82	31.46	16.36	54	-6.18	123	176	Average
11160	57.51	41.15	16.36	74	-16.49	123	176	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5580 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit

EUT Test Condition		Measurement Detail	
Channel	Channel 157	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
11570	47.16	30.67	16.49	54	-6.84	137	180	Average
11570	56.81	40.32	16.49	74	-17.19	137	180	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
11570	47.36	30.87	16.49	54	-6.64	120	317	Average
11570	56.92	40.43	16.49	74	-17.08	120	317	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5785 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 36	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5150	49.66	39.61	10.05	54	-4.34	200	249	Average
5150	60.6	50.55	10.05	74	-13.4	200	249	Peak
#5180	92.65	82.53	10.12			200	249	Average
#5180	99.29	89.17	10.12			200	249	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5149.85	52.59	42.54	10.05	54	-1.41	137	186	Average
5149.85	63.06	53.01	10.05	74	-10.94	138	161	Peak
#5180	95.54	85.42	10.12			138	161	Average
#5180	102.1	91.98	10.12			138	161	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5180 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 64	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5320	93.48	83.39	10.09			200	249	Average
#5320	100.8	90.71	10.09			200	249	Peak
5350	45.89	35.66	10.23	54	-8.11	200	249	Average
5350	59.47	49.24	10.23	74	-14.53	200	249	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5320	95.68	85.59	10.09			138	161	Average
#5320	102.92	92.83	10.09			138	161	Peak
5350.22	47.03	36.8	10.23	54	-6.97	138	161	Average
5350.22	57.55	47.32	10.23	74	-16.45	138	161	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5320 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 100	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5460	47.83	37.32	10.51	54	-6.17	124	97	Average
5460	58.07	47.56	10.51	74	-15.93	124	97	Peak
*5469.52	63.42	52.89	10.53	68.2	-4.78	124	97	Peak
#5500	92.4	81.8	10.6			124	97	Average
#5500	99.16	88.56	10.6			124	97	Peak
5460	47.83	37.32	10.51	54	-6.17	124	97	Average
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5459.92	52.82	42.31	10.51	54	-1.18	101	135	Average
5459.92	64.21	53.7	10.51	74	-9.79	101	135	Peak
*5470	66.96	56.43	10.53	68.2	-1.24	101	135	Peak
#5500	96.59	85.99	10.6			100	135	Average
#5500	103.78	93.18	10.6			100	135	Peak
5459.92	52.82	42.31	10.51	54	-1.18	101	135	Average

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5500 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 140	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5700	91.59	80.64	10.95	54		124	97	Average
#5700	98.64	87.69	10.95	74		124	97	Peak
*5725.24	58.16	47.24	10.92	68.2	-10.04	124	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5700	94.47	83.52	10.95	54		100	135	Average
#5700	101.63	90.68	10.95	74		100	135	Peak
*5725	63.16	52.24	10.92	68.2	-5.04	100	135	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5700 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 149	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5745	91.44	80.56	10.88			116	97	Average
#5745	98.33	87.45	10.88			116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5745	94.67	83.79	10.88			100	175	Average
#5745	101.65	90.77	10.88			100	175	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5618.125	52.94	42.15	10.79	68.2	-15.26	116	97	Peak
5652.775	49.59	38.72	10.87	70.25	-20.66	116	97	Peak
5923.15	49.08	37.97	11.11	69.57	-20.49	116	97	Peak
*5982.475	52.7	41.44	11.26	68.2	-15.5	116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5630.2	51.89	41.08	10.81	68.2	-16.31	100	175	Peak
5658.025	52.07	41.2	10.87	74.14	-22.07	100	175	Peak
5917.375	52.63	41.54	11.09	73.84	-21.21	100	175	Peak
*5964.1	52.38	41.15	11.23	68.2	-15.82	100	175	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5745 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 165	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5825	90.55	79.67	10.88			116	97	Average
#5825	97.32	86.44	10.88			116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5825	93.66	82.78	10.88			100	175	Average
#5825	100.78	89.9	10.88			100	175	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5576.65	52.21	41.48	10.73	68.2	-15.99	116	97	Peak
5652.775	48.93	38.06	10.87	70.25	-21.32	116	97	Peak
5922.1	49.94	38.83	11.11	70.35	-20.41	116	97	Peak
*5986.15	52.72	41.43	11.29	68.2	-15.48	116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5637.55	52.42	41.59	10.83	68.2	-15.78	100	175	Peak
5654.35	50.93	40.06	10.87	71.42	-20.49	100	175	Peak
5923.15	49.19	38.08	11.11	69.57	-20.38	100	175	Peak
*5984.575	52.29	41.03	11.26	68.2	-15.91	100	175	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5825 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 38	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5148.65	47.56	37.51	10.05	54	-6.44	198	260	Average
5148.65	56.4	46.35	10.05	74	-17.6	198	260	Peak
#5190	80.14	70.02	10.12			198	260	Average
#5190	87.37	77.25	10.12			198	260	Peak
5401.26	43.07	32.67	10.4	54	-10.93	198	260	Average
5401.26	51.93	41.53	10.4	74	-22.07	198	260	Peak
*10380	55.37	39.27	16.1	68.2	-12.83	122	276	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5150	51.25	41.2	10.05	54	-2.75	250	317	Average
5150	62.12	52.07	10.05	74	-11.88	250	317	Peak
#5190	85.04	74.92	10.12			250	317	Average
#5190	92.04	81.92	10.12			250	317	Peak
5378.27	43.24	32.9	10.34	54	-10.76	250	317	Average
5378.27	52.28	41.94	10.34	74	-21.72	250	317	Peak
*10380	54.76	38.66	16.1	68.2	-13.44	131	246	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5190 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 62	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5117.6	42.97	33.01	9.96	54	-11.03	198	260	Average
5117.6	52.67	42.71	9.96	74	-21.33	198	260	Peak
#5310	83.37	73.28	10.09			198	260	Average
#5310	88.56	78.47	10.09			198	260	Peak
5350.11	48.44	38.21	10.23	54	-5.56	198	260	Average
5350.11	56.24	46.01	10.23	74	-17.76	198	260	Peak
10620	45.67	29.79	15.88	54	-8.33	131	49	Average
10620	55.27	39.39	15.88	74	-18.73	131	49	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5114.15	43.12	33.16	9.96	54	-10.88	254	312	Average
5114.15	52.52	42.56	9.96	74	-21.48	254	312	Peak
#5310	85.89	75.8	10.09			254	312	Average
#5310	92.72	82.63	10.09			254	312	Peak
5350.22	52.83	42.6	10.23	54	-1.17	254	312	Average
5350.22	60.27	50.04	10.23	74	-13.73	254	312	Peak
10620	44.86	28.98	15.88	54	-9.14	143	148	Average
10620	54.39	38.51	15.88	74	-19.61	143	148	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5310 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 102	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5460	46.28	35.77	10.51	54	-7.72	124	97	Average
5460	55.84	45.33	10.51	74	-18.16	124	97	Peak
*5469.36	64.65	54.12	10.53	68.2	-3.55	124	97	Peak
#5510	88.5	77.9	10.6			124	97	Average
#5510	95.63	85.03	10.6			124	97	Peak
*5725.4	51.5	40.58	10.92	68.2	-16.7	124	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5459.92	50.46	39.95	10.51	54	-3.54	100	135	Average
5459.92	57.69	47.18	10.51	74	-16.31	100	135	Peak
*5469.84	66.31	55.78	10.53	68.2	-1.89	100	135	Peak
#5510	92.5	81.9	10.6			100	135	Average
#5510	99.49	88.89	10.6			100	135	Peak
*5725.32	51.39	40.47	10.92	68.2	-16.81	100	135	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5510 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 134	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5458.16	41.83	31.32	10.51	54	-12.17	124	97	Average
5458.16	52.99	42.48	10.51	74	-21.01	124	97	Peak
#*5469.84	50.34	39.81	10.53	68.2	-17.86	124	97	Peak
#5670	90.5	79.6	10.9			124	97	Average
5670	97.25	86.35	10.9			124	97	Peak
*5725.4	56.27	45.35	10.92	68.2	-11.93	124	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5376.72	41.81	31.49	10.32	54	-12.19	100	135	Average
5376.72	52.46	42.14	10.32	74	-21.54	100	135	Peak
*5469.84	50.92	40.39	10.53	68.2	-17.28	100	135	Peak
5670	93.58	82.68	10.9			100	135	Average
5670	100.37	89.47	10.9			100	135	Peak
*5725.48	57.68	46.76	10.92	68.2	-10.52	100	135	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5670 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 151	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5755	87.49	76.59	10.9			116	97	Average
#5755	94.15	83.25	10.9			116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5755	90.87	79.97	10.9			100	175	Average
#5755	97.61	86.71	10.9			100	175	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5575.6	52.47	41.74	10.73	68.2	-15.73	116	97	Peak
5654.88	49.53	38.66	10.87	71.81	-22.28	116	97	Peak
5921.58	50.09	38.98	11.11	70.73	-20.64	116	97	Peak
*5962	52.38	41.15	11.23	68.2	-15.82	116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5642.275	53.05	42.22	10.83	68.2	-15.15	100	175	Peak
5657.5	50.87	40	10.87	73.75	-22.88	100	175	Peak
5920.53	51.47	40.38	11.09	71.51	-20.04	100	175	Peak
*5957.8	52.41	41.2	11.21	68.2	-15.79	100	175	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5755 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 159	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5795	87.59	76.77	10.82			116	97	Average
#5795	94.31	83.49	10.82			116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5795	90.44	79.62	10.82			100	175	Average
#5795	97.34	86.52	10.82			100	175	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5607.1	51.89	41.14	10.75	68.2	-16.31	116	97	Peak
5656.45	48.85	37.98	10.87	72.97	-24.12	116	97	Peak
5922.625	47.98	36.87	11.11	69.96	-21.98	116	97	Peak
*6010.3	51.99	40.64	11.35	68.2	-16.21	116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5574.55	52.63	41.9	10.73	68.2	-15.57	100	175	Peak
5653.3	48.89	38.02	10.87	70.64	-21.75	100	175	Peak
5917.9	52.21	41.12	11.09	73.45	-21.24	100	175	Peak
*6008.725	52.62	41.27	11.35	68.2	-15.58	100	175	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5795 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

802.11ac (VHT80)

EUT Test Condition		Measurement Detail	
Channel	Channel 42	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5142.95	45.54	35.51	10.03	54	-8.46	198	260	Average
5142.95	53.49	43.46	10.03	74	-20.51	198	260	Peak
#5210	75.51	65.34	10.17			198	260	Average
#5210	82.87	72.7	10.17			198	260	Peak
5441.52	43.23	32.75	10.48	54	-10.77	198	260	Average
5441.52	52.94	42.46	10.48	74	-21.06	198	260	Peak
*10420	55.22	39.06	16.16	68.2	-12.98	109	217	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5145.2	52.32	42.27	10.05	54	-1.68	249	317	Average
5145.2	61.14	51.09	10.05	74	-12.86	249	317	Peak
#5210	81.07	70.9	10.17			249	317	Average
#5210	88.15	77.98	10.17			249	317	Peak
5361.22	43.14	32.88	10.26	54	-10.86	249	317	Average
5361.22	52.91	42.65	10.26	74	-21.09	249	317	Peak
*10420	54.65	38.49	16.16	68.2	-13.55	146	227	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5210 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 58	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5128.7	43.09	33.09	10	54	-10.91	198	260	Average
5128.7	52.42	42.42	10	74	-21.58	198	260	Peak
#5290	76.38	66.28	10.1			198	260	Average
#5290	83.76	73.66	10.1			198	260	Peak
5350.11	47.65	37.42	10.23	54	-6.35	198	260	Average
5350.11	55.54	45.31	10.23	74	-18.46	198	260	Peak
10580	54.21	38.5	15.71	68.2	-13.99	194	127	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5119.85	43.46	33.49	9.97	54	-10.54	248	312	Average
5119.85	52.44	42.47	9.97	74	-21.56	248	312	Peak
#5290	81.91	71.81	10.1			248	312	Average
#5290	88.54	78.44	10.1			248	312	Peak
5350.11	**52.99**	**42.76**	**10.23**	**54**	**-1.01**	**248**	**312**	**Average**
5350.11	62.64	52.41	10.23	74	-11.36	248	312	Peak
10580	55.64	39.93	15.71	68.2	-12.56	172	124	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5290 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 106	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5452.56	48.35	37.84	10.51	54	-5.65	198	260	Average
5452.56	57.09	46.58	10.51	74	-16.91	198	260	Peak
*5469.2	56.86	46.33	10.53	68.2	-11.34	198	260	Peak
#5530	80.64	70.01	10.63			198	260	Average
#5530	87.06	76.43	10.63			198	260	Peak
*5726.04	50.82	39.9	10.92	68.2	-17.38	198	260	Peak
11060	45.86	29.63	16.23	54	-8.14	121	46	Average
11060	55.27	39.04	16.23	74	-18.73	121	46	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5458.16	52.91	42.4	10.51	54	-1.09	246	312	Average
5458.16	61.73	51.22	10.51	74	-12.27	246	312	Peak
*5470	60.13	49.6	10.53	68.2	-8.07	246	312	Peak
#5530	85.29	74.66	10.63			246	312	Average
#5530	91.86	81.23	10.63			246	312	Peak
*5725.24	50.73	39.81	10.92	68.2	-17.47	246	312	Peak
11060	44.81	28.58	16.23	54	-9.19	146	253	Average
11060	54.41	38.18	16.23	74	-19.59	146	253	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5530 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 122	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5450.48	42.93	32.42	10.51	54	-11.07	124	97	Average
5450.48	53.3	42.79	10.51	74	-20.7	124	97	Peak
*5469.52	51.62	41.09	10.53	68.2	-16.58	124	97	Peak
#5610	86.54	75.77	10.77			124	97	Average
#5610	93.79	83.02	10.77			124	97	Peak
*5725.88	52.75	41.83	10.92	68.2	-15.45	124	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
5456.56	42.96	32.45	10.51	54	-11.04	100	135	Average
5456.56	52.63	42.12	10.51	74	-21.37	100	135	Peak
*5469.52	51.91	41.38	10.53	68.2	-16.29	100	135	Peak
#5610	88.97	78.2	10.77			100	135	Average
#5610	95.66	84.89	10.77			100	135	Peak
*5725.32	53.28	42.36	10.92	68.2	-14.92	100	135	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5610 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 155	**Frequency Range**	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hisao

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5775	85.4	74.53	10.87			116	97	Average
#5775	92.1	81.23	10.87			116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
#5775	88.58	77.71	10.87			100	175	Average
#5775	95.23	84.36	10.87			100	175	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5637.55	52.5	41.67	10.83	68.2	-15.7	116	97	Peak
5656.45	54.07	43.2	10.87	72.97	-18.9	116	97	Peak
5916.325	51.26	40.17	11.09	74.62	-23.36	116	97	Peak
*5967.775	51.73	40.5	11.23	68.2	-16.47	116	97	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
*5598.175	52.97	42.22	10.75	68.2	-15.23	100	175	Peak
5651.2	55.32	44.45	10.87	69.09	-13.77	100	175	Peak
5921.575	51.79	40.68	11.11	70.73	-18.94	100	175	Peak
*6011.35	52.11	40.76	11.35	68.2	-16.09	100	175	Peak

Remarks:

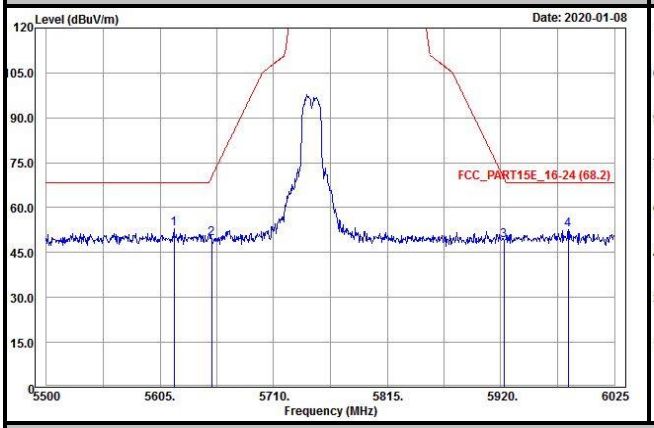
1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 5775 MHz: Fundamental Frequency
3. *: Out of Restricted Band
4. The emission levels of other frequencies were very low against the limit
5. "# ": Fundamental frequency.

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

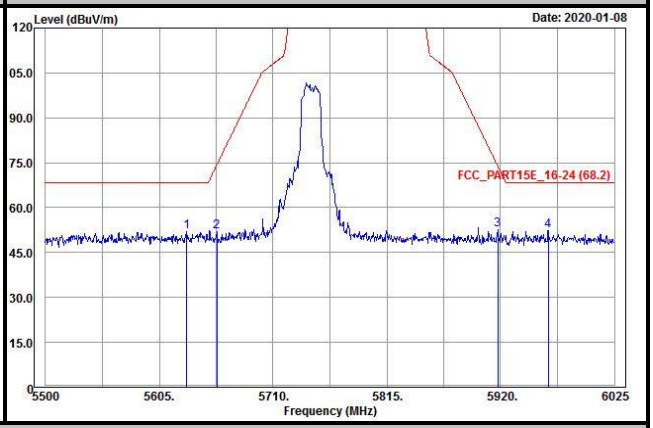
802.11n (HT20)

Ch 149

Horizontal

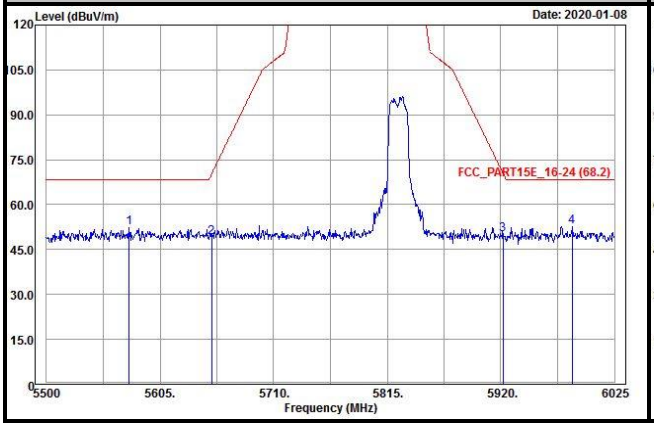


Vertical

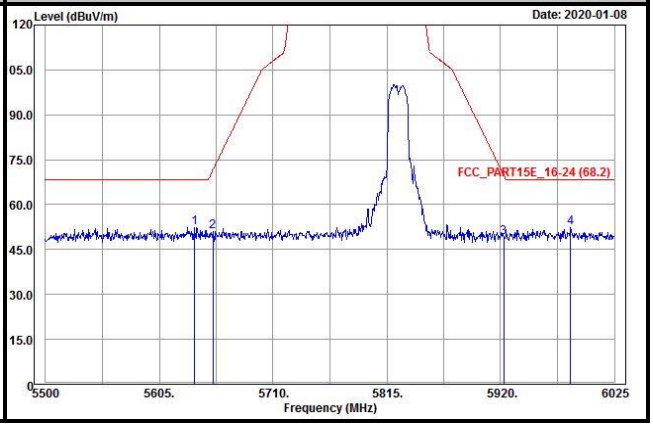


Ch 165

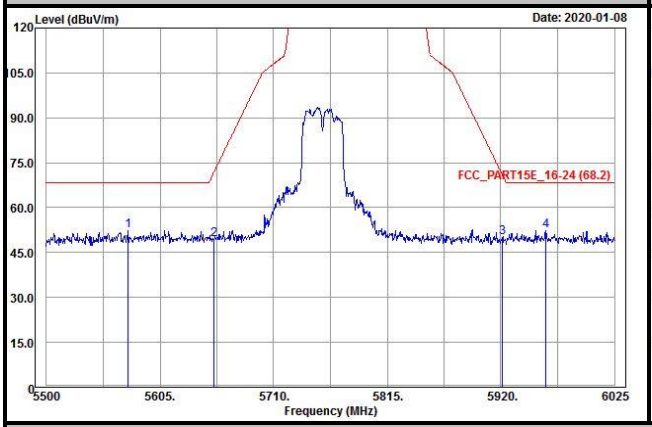
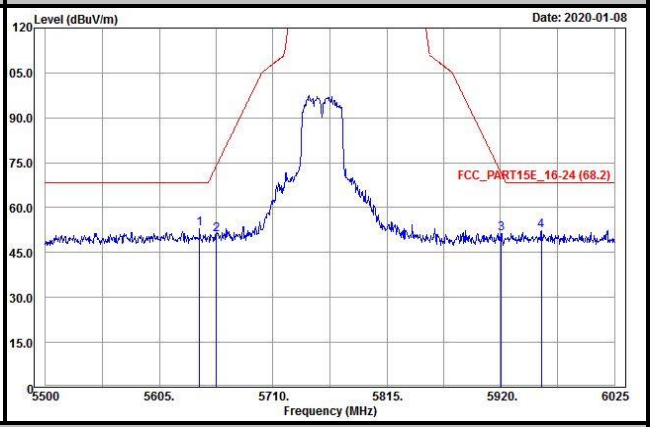
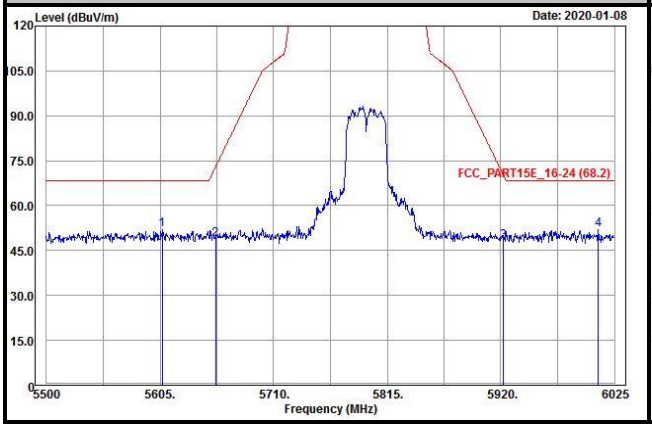
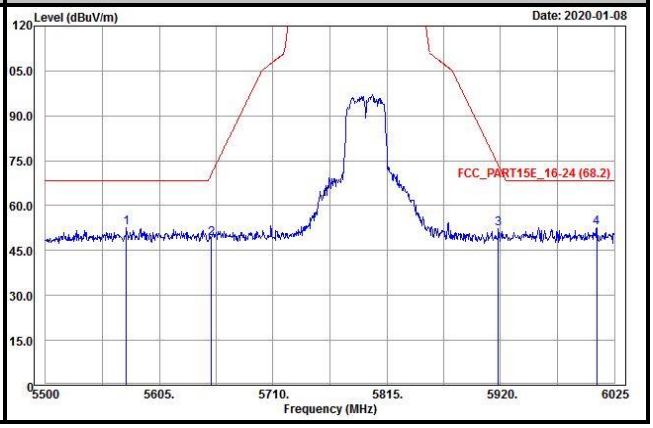
Horizontal



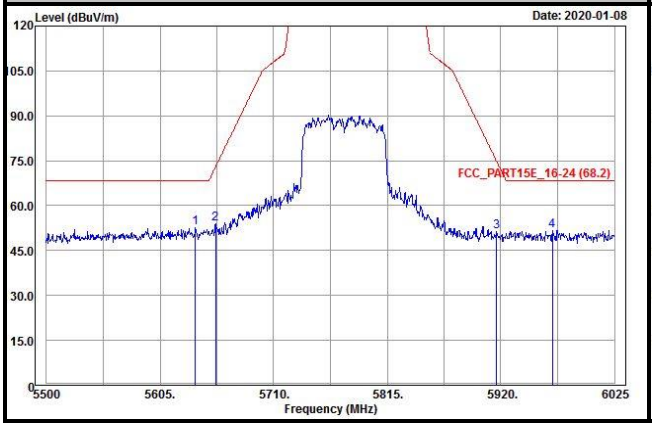
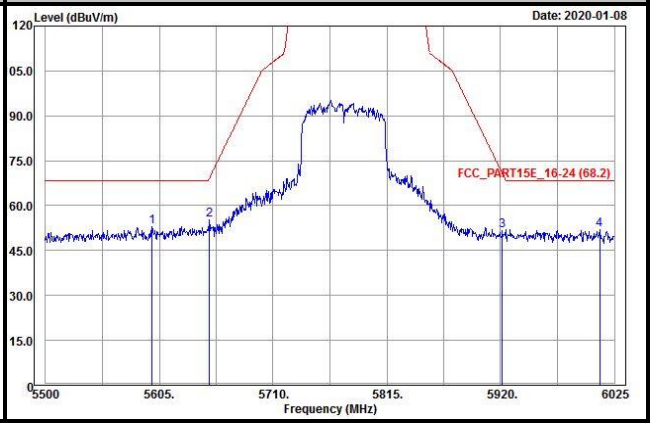
Vertical



802.11n (HT40)

Ch 151	
Horizontal	**Vertical**
	
Ch 159	
Horizontal	**Vertical**
	

802.11ac (VHT80)

Ch 155	
Horizontal	**Vertical**
	

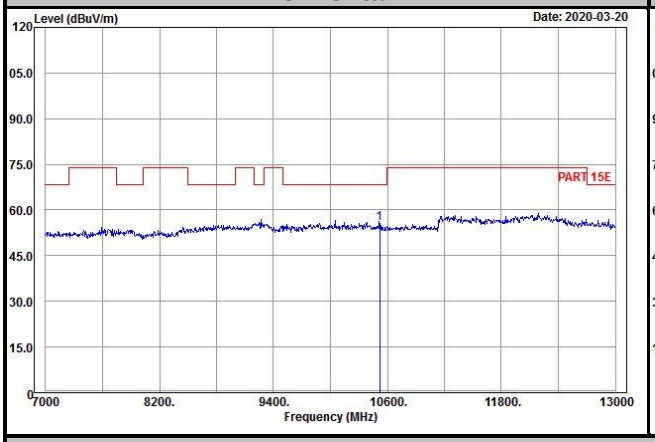
Annex B- Band-edge measurement

802.11a

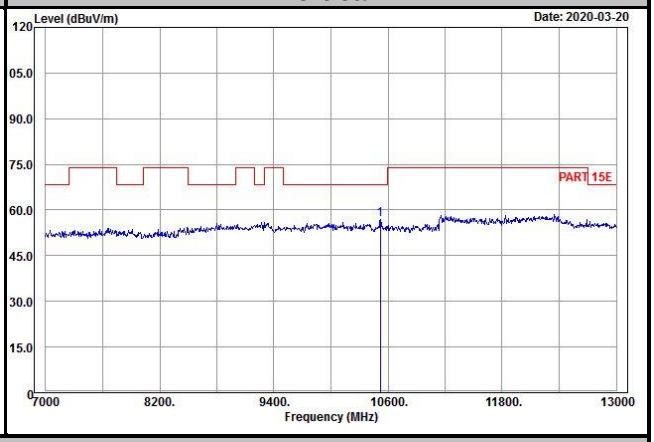
Ch 52

Peak

Horizontal



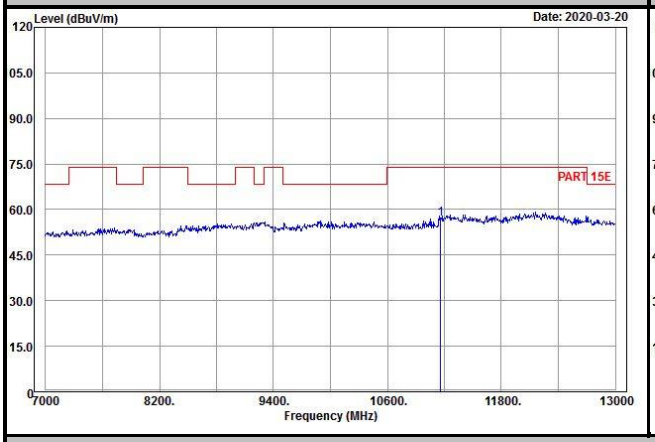
Vertical



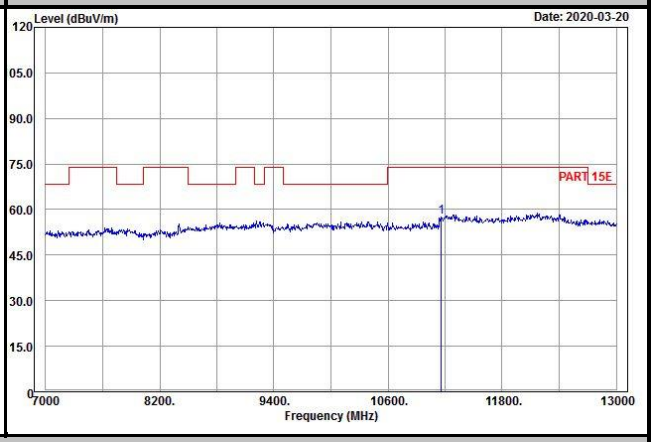
Ch 116

Peak

Horizontal

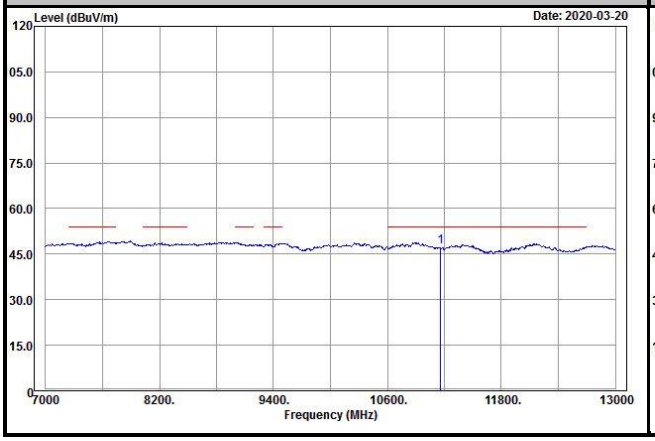


Vertical

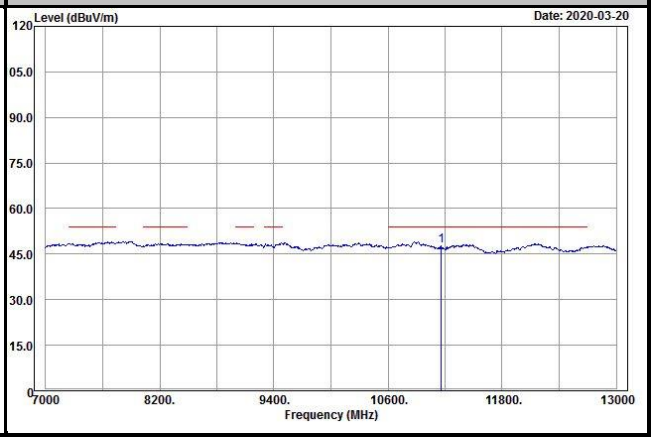


Average

Horizontal



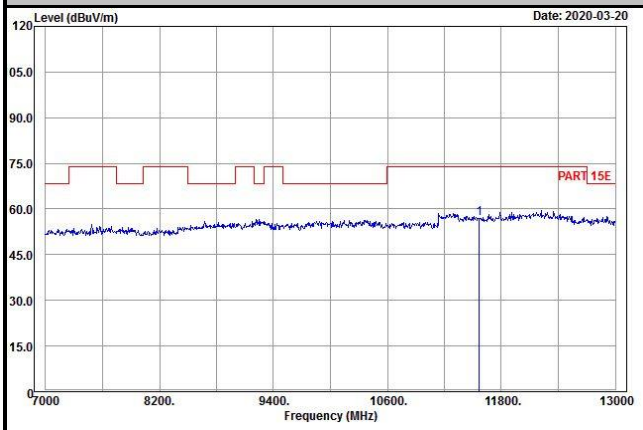
Vertical



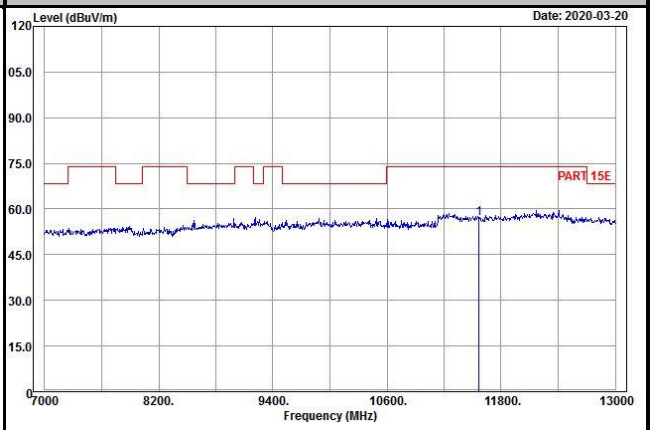
Ch 157

Peak

Horizontal

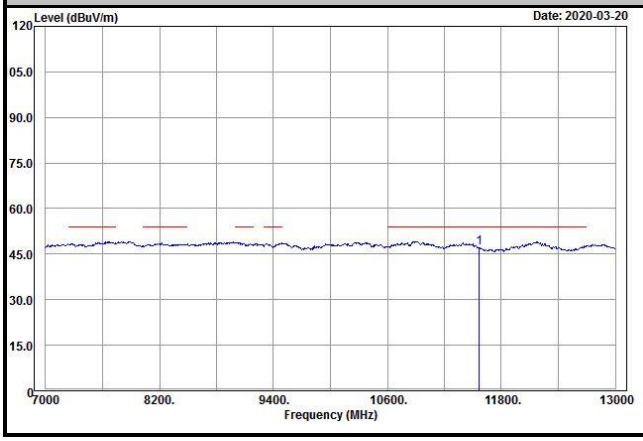


Vertical

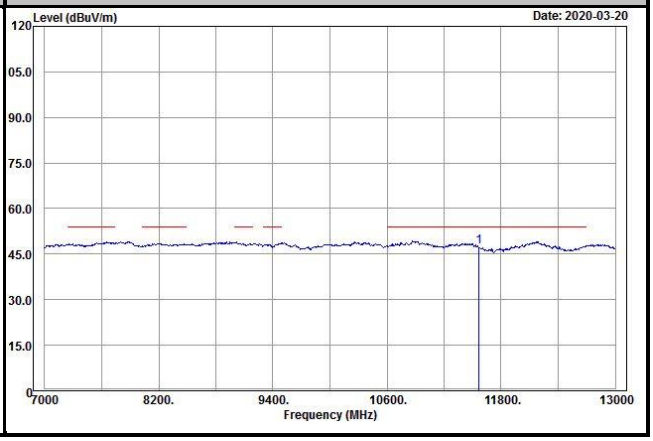


Average

Horizontal



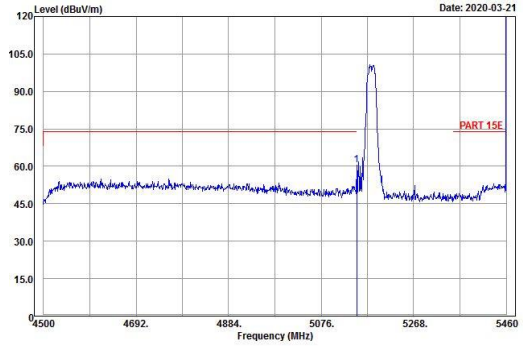
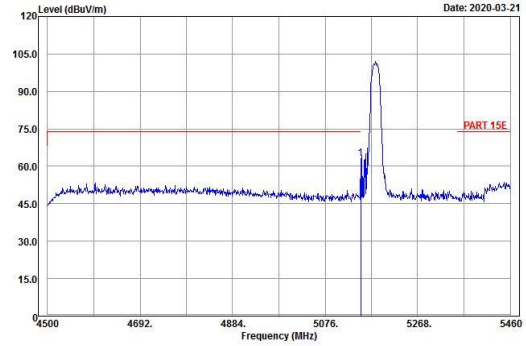
Vertical



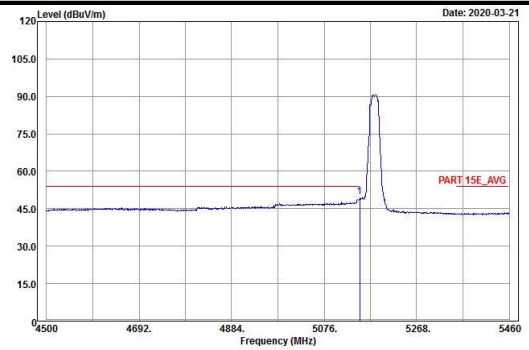
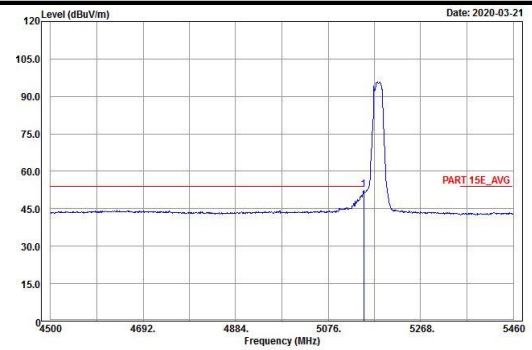
802.11n (HT20)

Ch 36

Peak

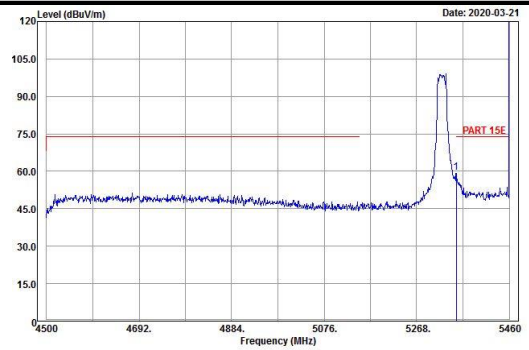
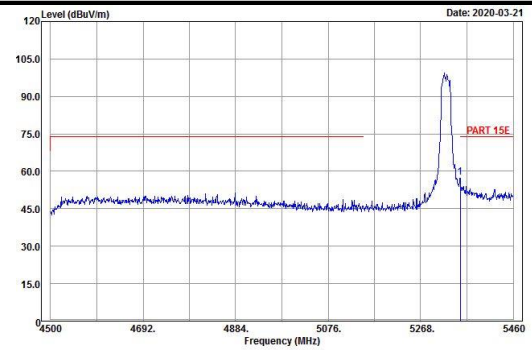
Horizontal	Vertical
	

Average

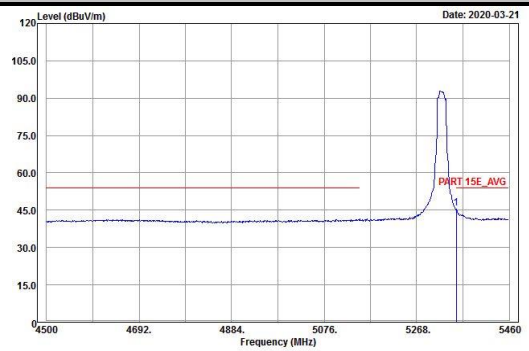
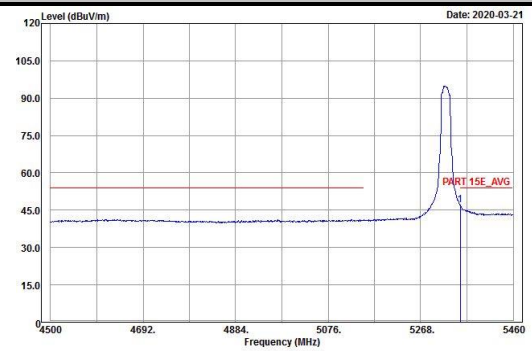
Horizontal	Vertical
	

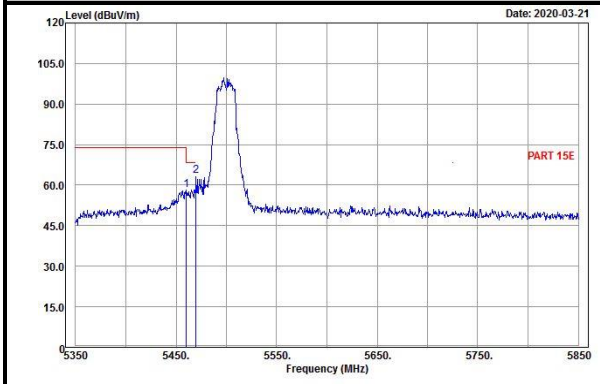
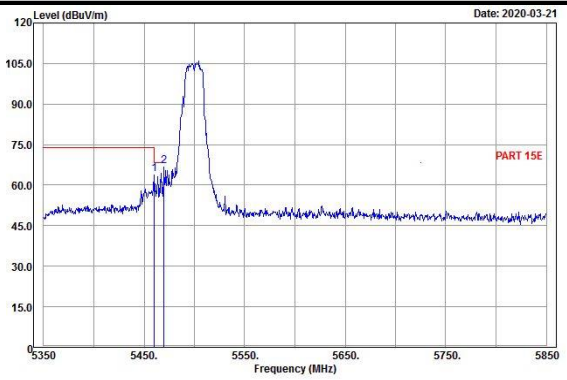
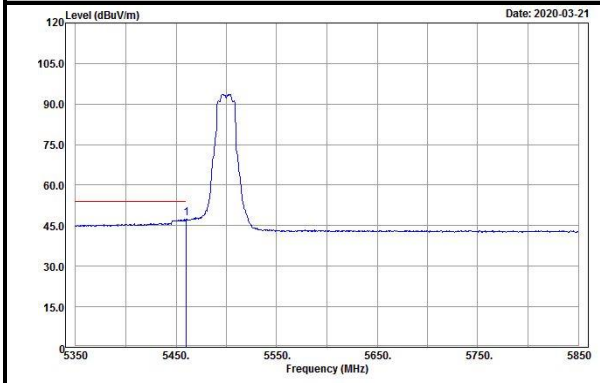
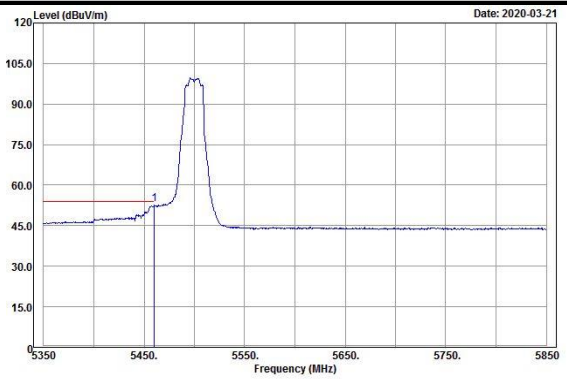
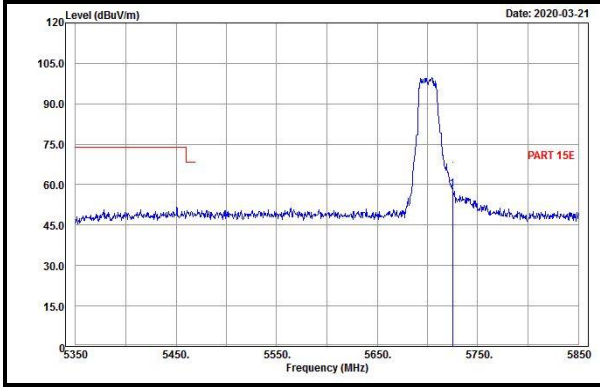
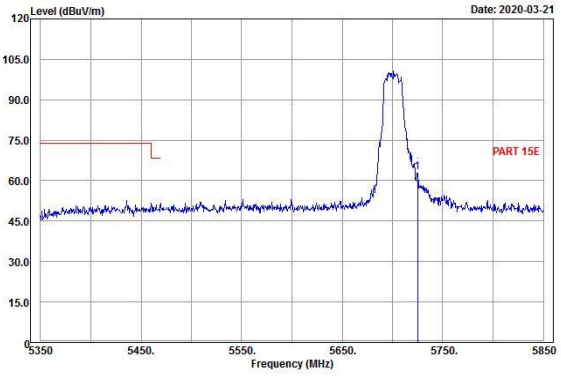
Ch 64

Peak

Horizontal	Vertical
	

Average

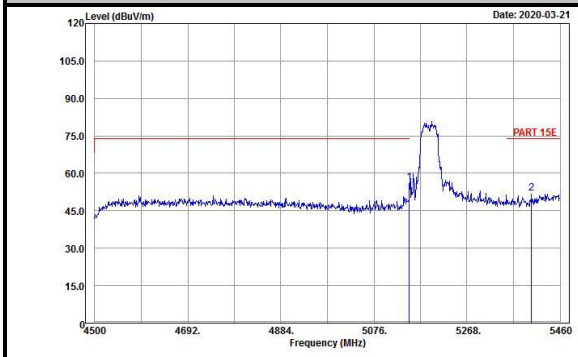
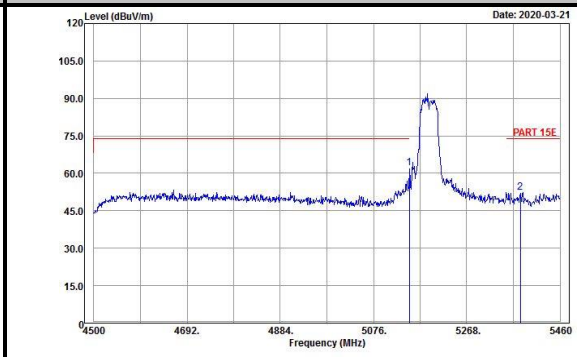
Horizontal	Vertical
	

Ch 100	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	
Ch 140	
Peak	
Horizontal	Vertical
	

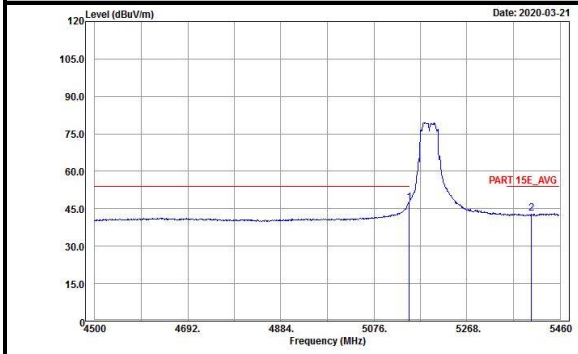
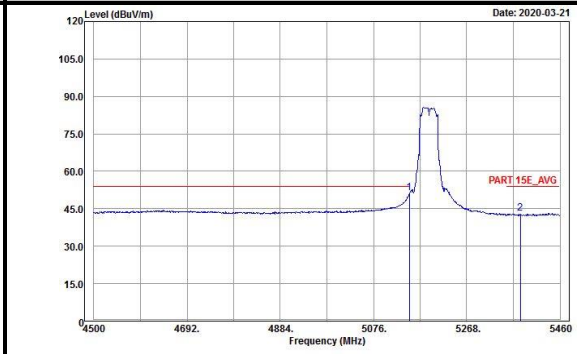
802.11n (HT40)

Ch 38

Peak

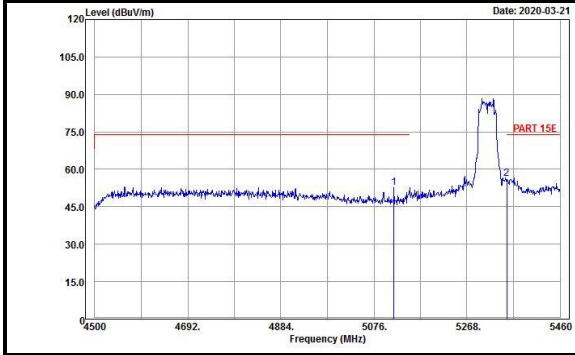
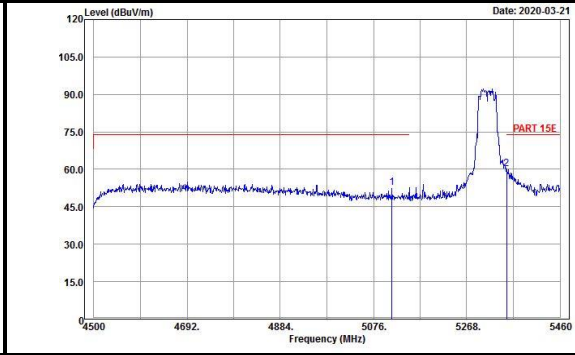
Horizontal	Vertical
	

Average

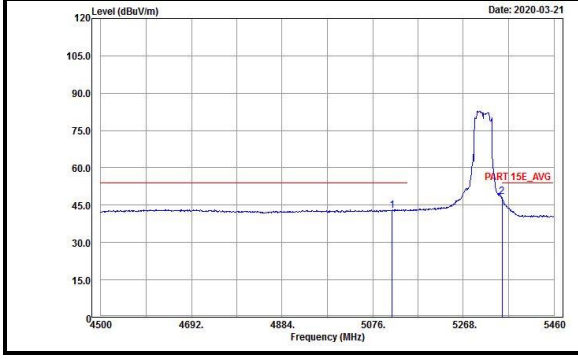
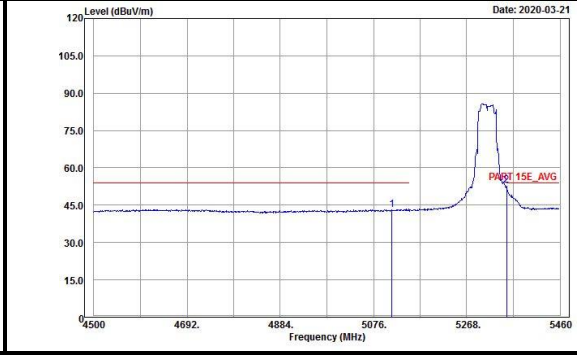
Horizontal	Vertical
	

Ch 62

Peak

Horizontal	Vertical
	

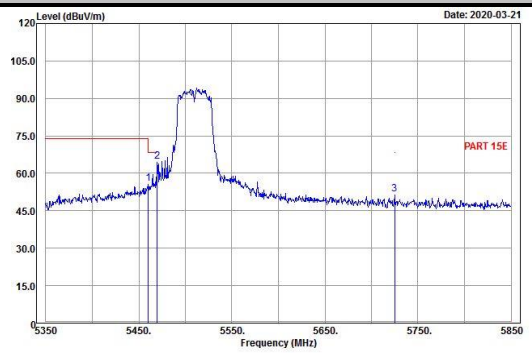
Average

Horizontal	Vertical
	

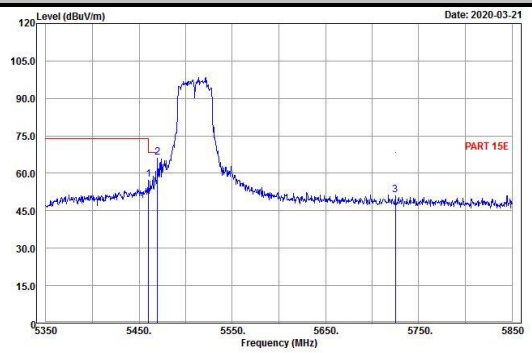
Ch 102

Peak

Horizontal

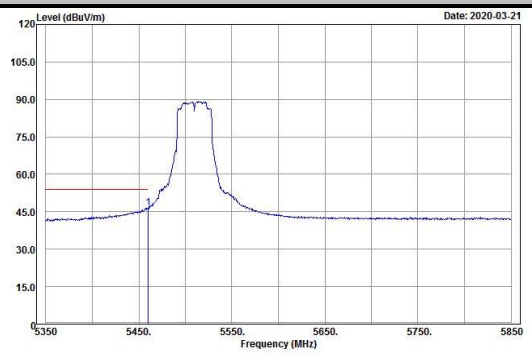


Vertical

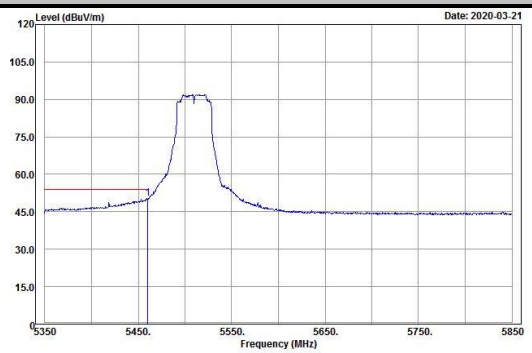


Average

Horizontal



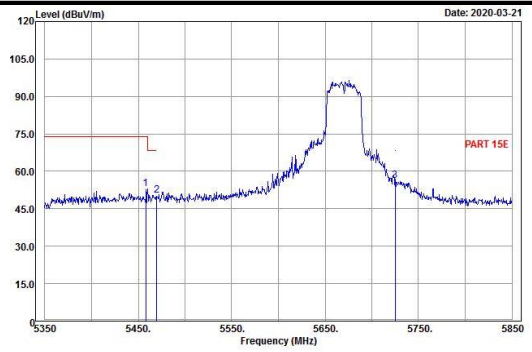
Vertical



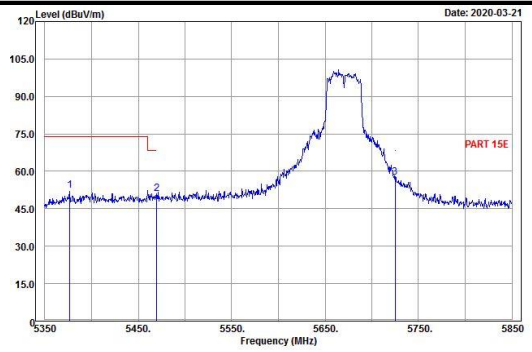
Ch 134

Peak

Horizontal

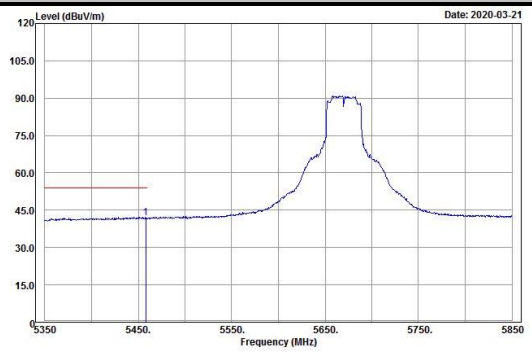


Vertical

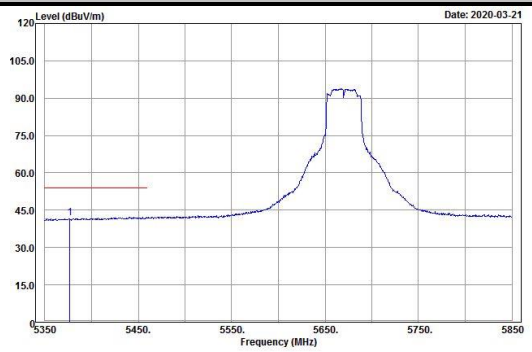


Average

Horizontal



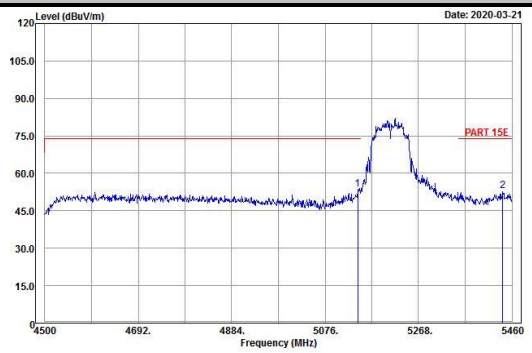
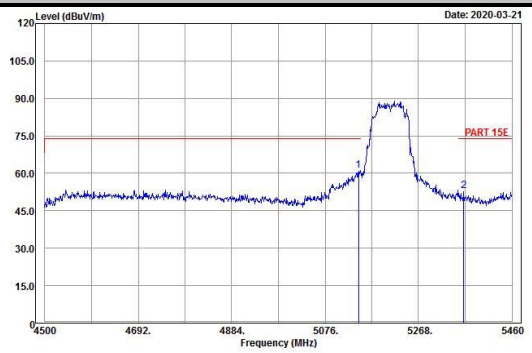
Vertical



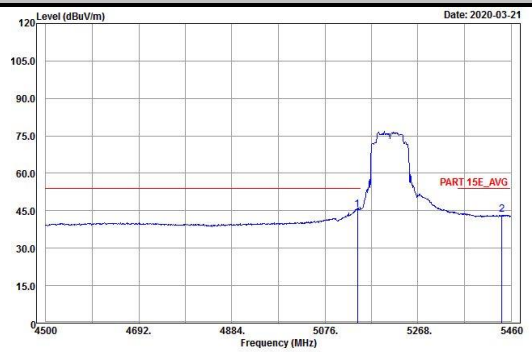
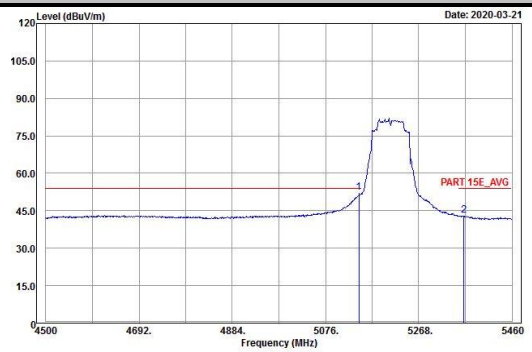
802.11n (HT80)

Ch 42

Peak

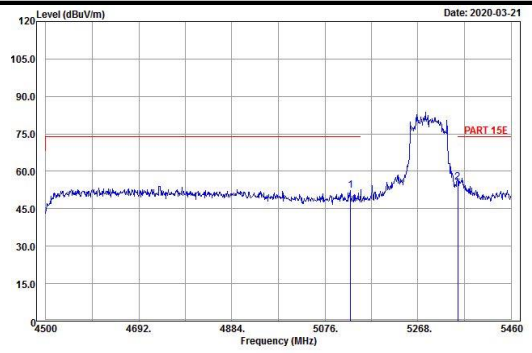
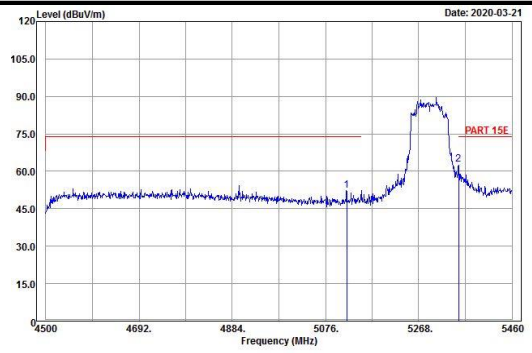
Horizontal	Vertical
	

Average

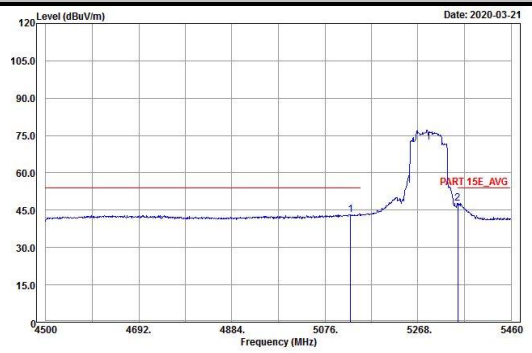
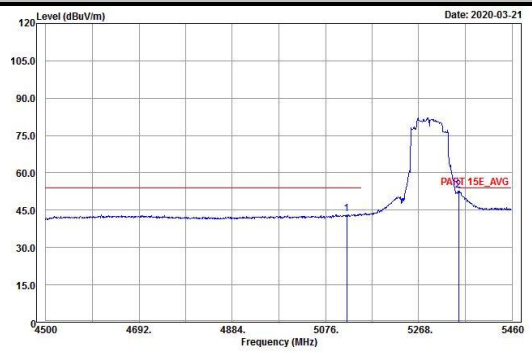
Horizontal	Vertical
	

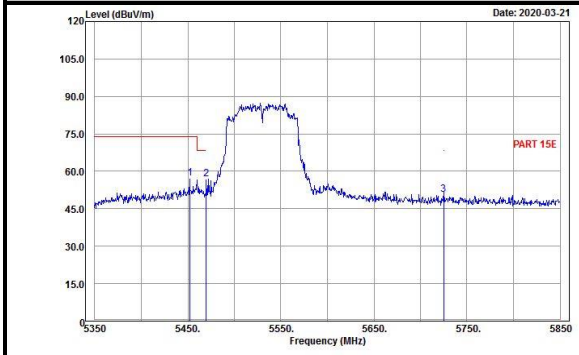
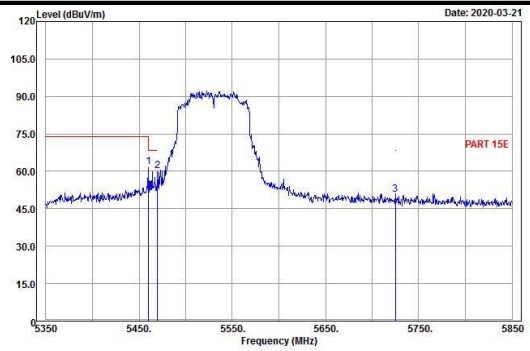
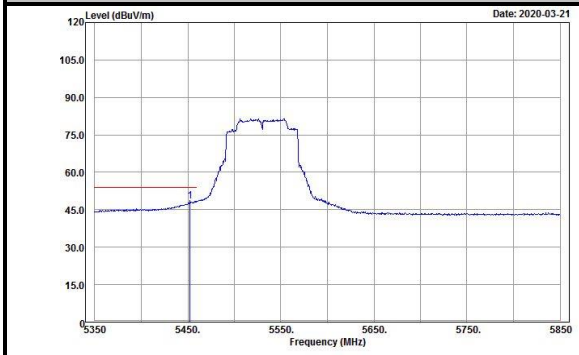
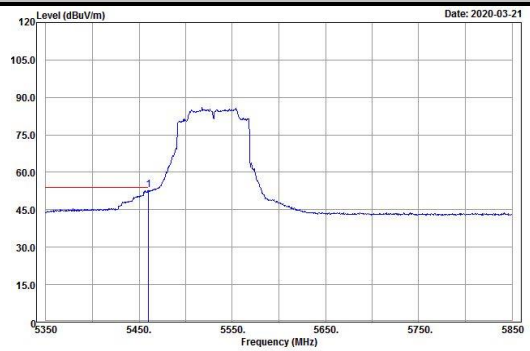
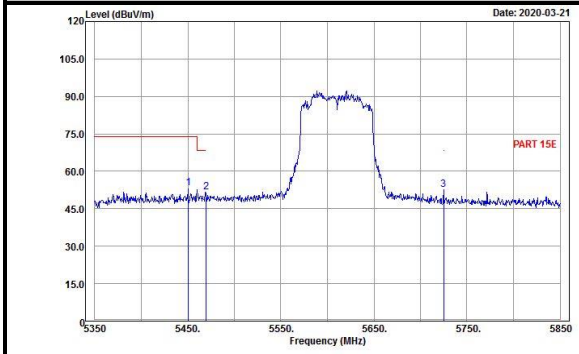
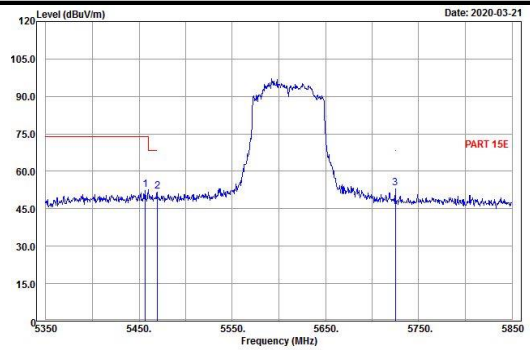
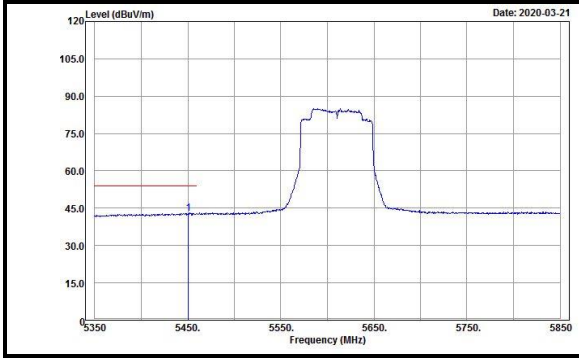
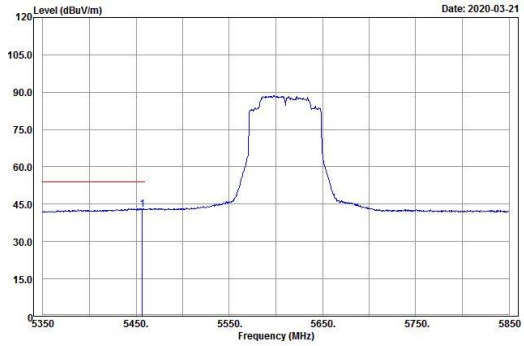
Ch 58

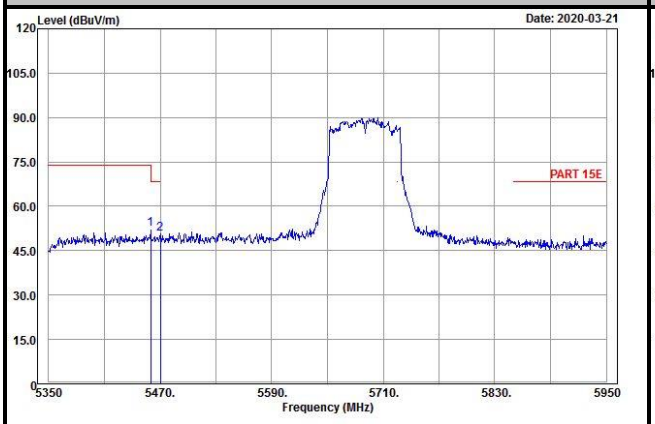
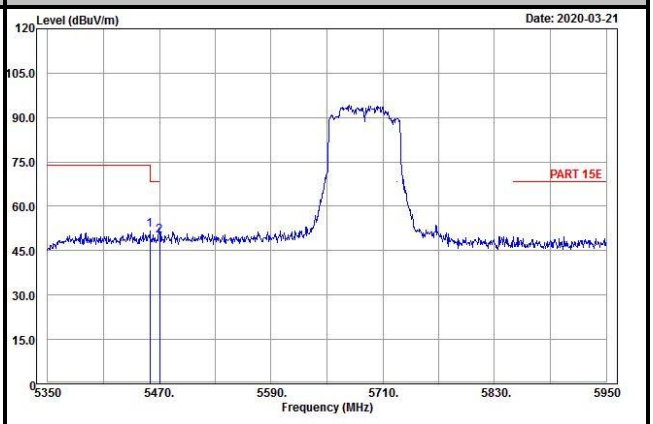
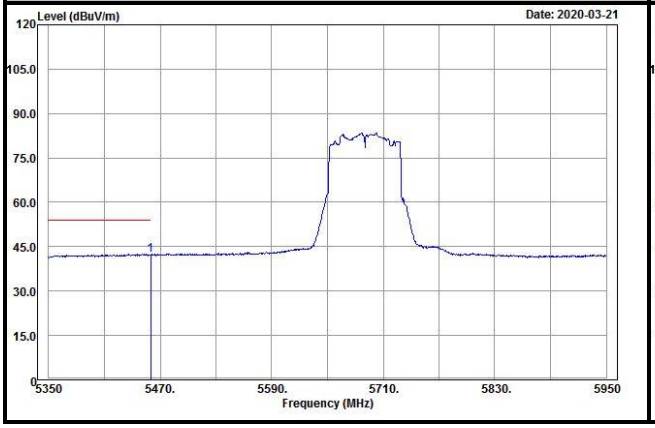
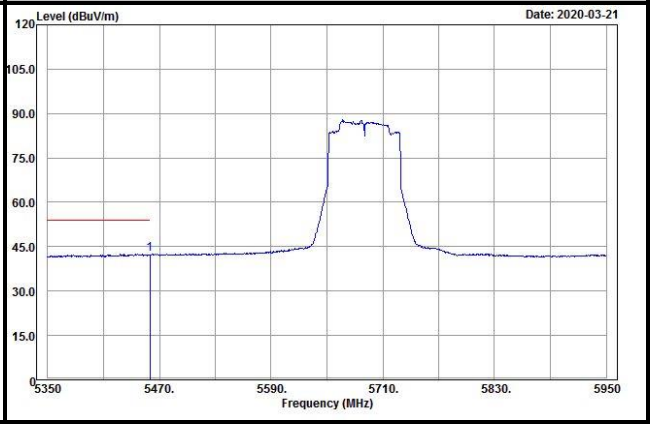
Peak

Horizontal	Vertical
	

Average

Horizontal	Vertical
	

Ch 106	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	
Ch 122	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

Ch 138	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

Annex C- Conducted Output Power Measurement

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
36	5180	14.82	14.65	59.513	17.75
40	5200	14.77	14.57	58.633	17.68
48	5240	14.72	14.60	58.489	17.67
52	5260	14.98	14.94	62.666	17.97
60	5300	14.89	14.45	58.693	17.69
64	5320	14.98	14.96	62.81	17.98
100	5500	14.55	14.51	56.759	17.54
116	5580	14.98	14.97	62.883	17.99
140	5700	14.84	14.79	60.609	17.83
144	5720	14.66	14.58	57.949	17.63
149	5745	14.92	14.90	61.949	17.92
157	5785	15.00	14.97	63.028	18.00
165	5825	14.95	14.91	62.235	17.94

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
36	5180	14.82	14.62	59.312	17.73
40	5200	14.74	14.55	58.295	17.66
48	5240	14.69	14.57	58.086	17.64
52	5260	14.94	14.51	59.438	17.74
60	5300	14.82	14.40	57.881	17.63
64	5320	14.96	14.85	61.882	17.92
100	5500	14.55	14.51	56.759	17.54
116	5580	14.93	14.80	61.317	17.88
140	5700	14.90	14.85	61.452	17.89
144	5720	14.60	14.57	57.482	17.60
149	5745	14.83	14.81	60.678	17.83
157	5785	14.96	14.93	62.45	17.96
165	5825	14.84	14.79	60.609	17.83

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
38	5190	11.34	11.28	27.042	14.32
46	5230	14.33	14.26	53.771	17.31
54	5270	14.38	14.36	54.706	17.38
62	5310	13.81	13.77	47.867	16.80
102	5510	11.35	11.32	27.198	14.35
110	5550	14.36	14.33	54.392	17.36
134	5670	14.32	14.29	53.893	17.32
142	5710	14.26	14.24	53.215	17.26
151	5755	11.37	11.34	27.323	14.37
159	5795	14.41	14.39	55.085	17.41

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
42	5210	10.35	10.27	21.481	13.32
58	5290	11.77	11.68	29.755	14.74
106	5530	11.81	11.75	30.133	14.79
122	5610	11.72	11.66	29.515	14.70
138	5690	14.33	14.24	53.648	17.30
155	5775	9.86	9.82	19.277	12.85

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:

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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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