TEST REPORT

CERTIFICATE OF CONFORMITY

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

Report No.: RFBHCP-WTW-P22090444-3

FCC ID: ACJ932AH2201

Model No.: AH2201

Received Date: 2022/3/11

Test Date: 2022/6/16 ~ 2022/8/17

Issued Date: 2022/10/19

Applicant: Panasonic Corporation of North America

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

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FCC Registration / Designation Number: 788550 / TW0003

Approved by: Jeremy Lin , **Date:** 2022/10/19

Jeremy Lin / Project Engineer

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Prepared by : Lena Wang / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBHCP-WTW-P22090444-3	Original Release	2022/10/19

1 Certificate

Product:	Display Audio
Brand:	Panasonic
Test Model:	AH2201
Sample Status:	Engineering Sample
Applicant:	Panasonic Corporation of North America
Test Date:	2022/6/16 ~ 2022/8/17
Standard:	47 CFR FCC Part 15, Subpart E (Section 15.407)
Measurement procedure:	ANSI C63.10-2013 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)(3)	RF Output Power	Pass	Meet the requirement of limit.
15.407(a)(3)	Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6 dB Bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
---	Occupied Bandwidth	Pass	Reference only.
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.407(b)(9)	AC Power Conducted Emissions	N/A	Without AC power port of the EUT
15.407(b)(9)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -3.7 dB at 45.52 MHz
15.407(b) (4(i)/10)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -7.9 dB at 11490.00 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note: 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) (±)
Occupied Bandwidth	-	491.896 Hz
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.59 dB
	30 MHz ~ 1 GHz	3.6 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	Display Audio
Brand	Panasonic
Test Model	AH2201
Status of EUT	Engineering Sample
Power Supply Rating	10-16 Vdc
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps
Operating Frequency	5745 ~ 5825 MHz
Number of Channel	802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80):
Output Power	29.04 mW (14.63 dBm)

Note:

1. 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.
2. The BT could transmit simultaneously with WLAN 5GHz at the same time.
3. Spurious emission of the simultaneous operation has been evaluated and no non-compliance found.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna No.	Gain (dBi)	Antenna Type	Connector Type
	WLAN 5G		
1	1.8	PCB	N/A

* Detail antenna specification please refer to antenna datasheet or an antenna gain measurement report.

4. The EUT provides one completed transmitter and receiver.

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

* The bandwidth and modulation are similar for HT20/HT40 on 802.11n mode and VHT20/VHT40/VHT80 on 802.11ac mode. Therefore the investigated worst case is the representative mode in test report. (Final test mode refer section 3.4)

3.3 Channel List

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 Test Mode Applicability and Tested Channel Detail

Worst Case:	The EUT is designed to be positioned on the Z-plane only.

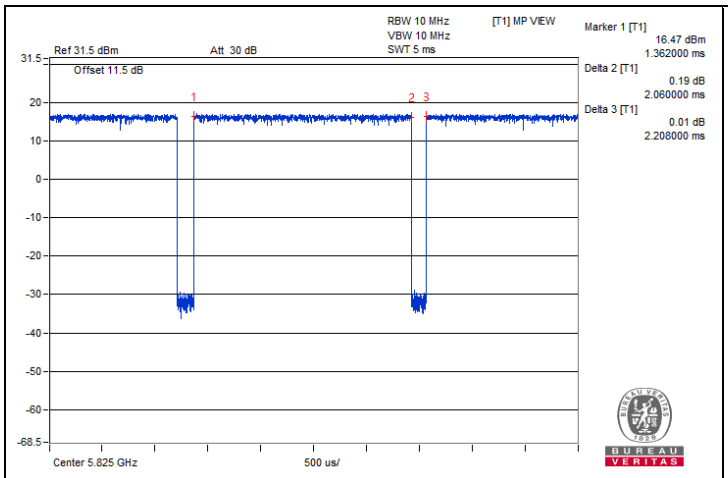
Following channel(s) was (were) selected for the final test as listed below:

Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power / Power Spectral Density	802.11a	149, 157, 165	BPSK	6Mb/s
	802.11n (HT20)	149, 157, 165	BPSK	MCS0
	802.11n (HT40)	151, 159	BPSK	MCS0
	802.11ac (VHT80)	155	BPSK	MCS0
6 dB Bandwidth	802.11a	149, 157, 165	BPSK	6Mb/s
	802.11n (HT20)	149, 157, 165	BPSK	MCS0
	802.11n (HT40)	151, 159	BPSK	MCS0
	802.11ac (VHT80)	155	BPSK	MCS0
Occupied Bandwidth	802.11a	149, 157, 165	BPSK	6Mb/s
	802.11n (HT20)	149, 157, 165	BPSK	MCS0
	802.11n (HT40)	151, 159	BPSK	MCS0
	802.11ac (VHT80)	155	BPSK	MCS0
Frequency Stability	802.11a	36	un-modulation	-
Unwanted Emissions below 1 GHz	802.11n (HT40)	151	BPSK	MCS0
Unwanted Emissions above 1 GHz	802.11a	149, 157, 165	BPSK	6Mb/s
	802.11n (HT20)	149, 157, 165	BPSK	MCS0
	802.11n (HT40)	151, 159	BPSK	MCS0
	802.11ac (VHT80)	155	BPSK	MCS0

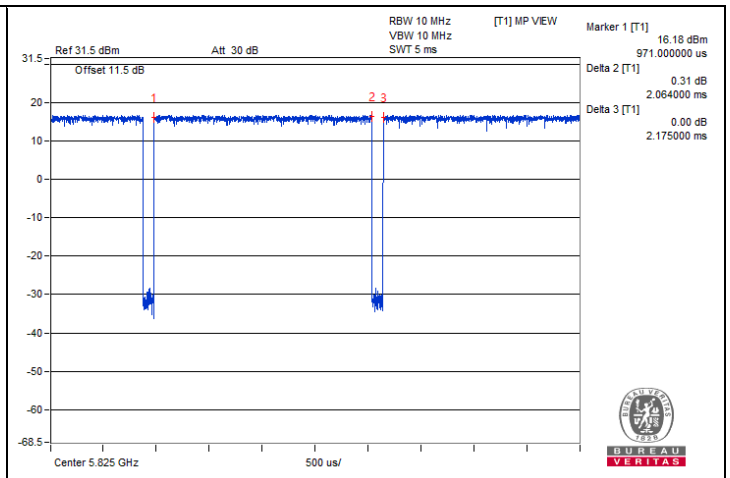
3.5 Duty Cycle of Test Signal

Duty cycle of test signal is >= 98 %, duty factor is not required.
Duty cycle of test signal is < 98 %, duty factor shall be considered.

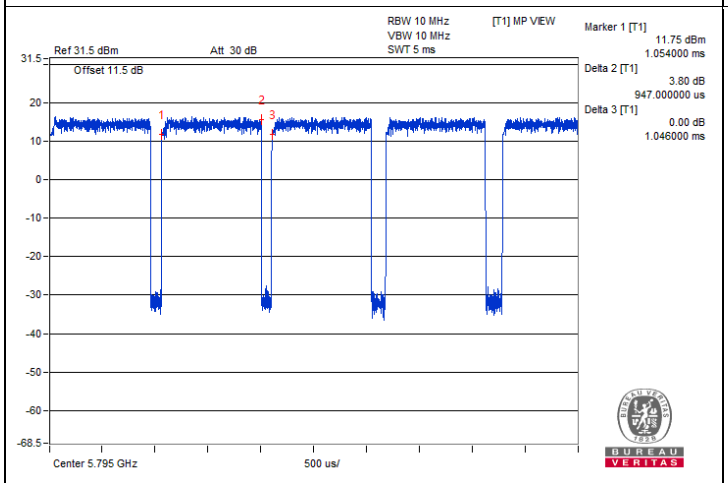
802.11a: Duty cycle = 2.06 ms / 2.208 ms x 100% = 93.3%, duty factor = 10 * log (1/Duty cycle) = 0.30 dB
802.11n (HT20): Duty cycle = 2.064 ms / 2.175 ms x 100% = 94.9%, duty factor = 10 * log (1/Duty cycle) = 0.23 dB
802.11n (HT40): Duty cycle = 0.947 ms / 1.046 ms x 100% = 90.5%, duty factor = 10 * log (1/Duty cycle) = 0.43 dB
802.11ac (VHT80): Duty cycle = 0.461 ms / 0.564 ms x 100% = 81.7%, duty factor = 10 * log (1/Duty cycle) = 0.88 dB



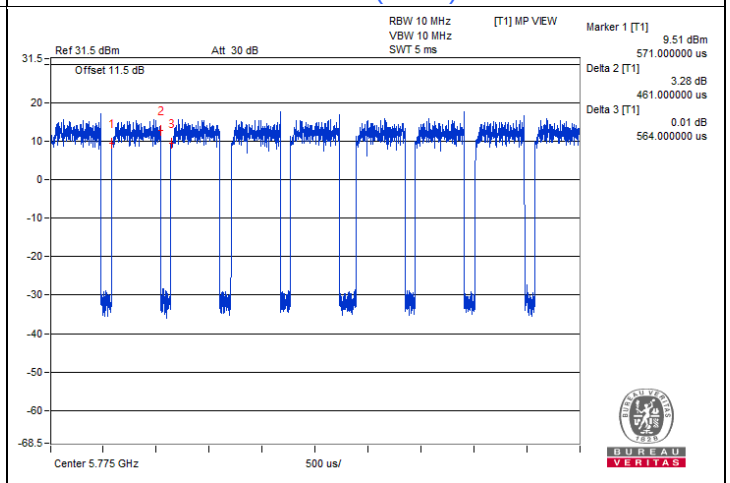
802.11a



802.11n (HT20)



802.11n (HT40)

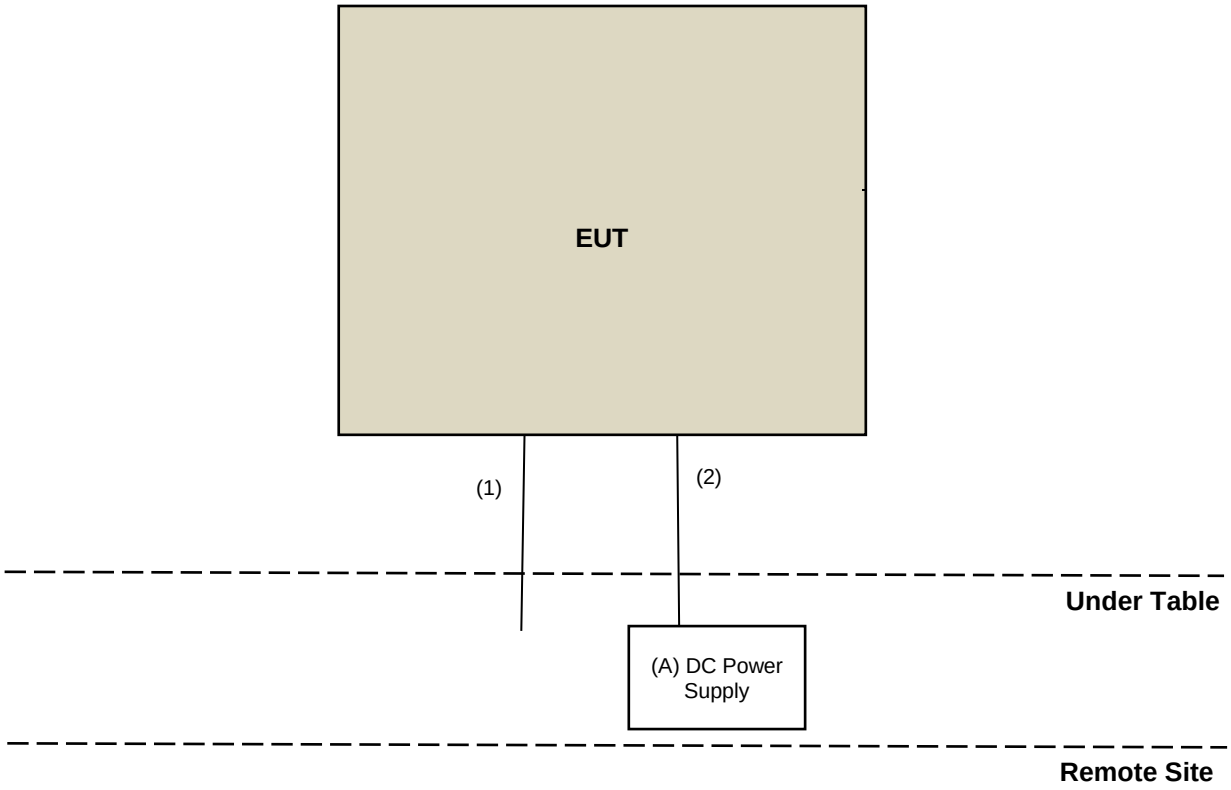


802.11ac (VHT80)

3.6 Test Program Used and Operation Descriptions

Controlling software TERA TERM VERSION 4.71 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	DC Power Supply	Keysight	U8002A	MY56330015	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	Signal Cable	1	1.5	N	0	Supplied by antenna
2	DC Cable	1	0.41	N	0	Supplied by antenna

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	2022/1/18	2023/1/17
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	2022/7/13	2023/7/12
Wideband Power Sensor(N1923A) KEYSIGHT	N1923A	MY58020002	2022/1/17	2023/1/16
SMA Fixed Attenuator WOKEN	00800A1K01A-20	N/A	2022/06/16	202306/15

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2022/8/17

4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	100979	2022/3/25	2023/3/24

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2022/6/16

4.3 6 dB Bandwidth

Refer to section 4.2 to get information of the instruments.

4.4 Occupied Bandwidth

Refer to section 4.2 to get information of the instruments.

4.5 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
3-channel DC power supply JIN YIH Technology	ODP3033	ODP30332128138	N/A	N/A
Digital Multimeter Fluke	87-III	70360755	2021/7/8	2022/7/7
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	100979	2022/3/25	2023/3/24
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	2022/1/3	2023/1/2

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2022/6/16

4.6 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower &Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB9168	9168-472	2021/10/28	2022/10/27
Loop Antenna EMCI	EM-6879	269	2021/9/16	2022/9/15
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Pre-Ammlifier EMCI	EMC 330H	980112	2021/10/5	2022/10/4
Pre-amplifier EMCI	EMC001340	980201	2021/9/15	2022/9/14
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2022/1/15	2023/1/14
RF Coaxial Cable WORKEN	8D-FB	Cable-Ch10-01	2021/10/5	2022/10/4
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Test Receiver Agilent	N9038A	MY51210203	2021/9/22	2022/9/21
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2022/8/17

4.7 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower &Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	7	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-969	2021/11/14	2022/11/13
	BBHA 9170	148	2021/11/14	2022/11/13
Pre-Ammlifier EMCI	EMC 012645	980115	2021/10/5	2022/10/4
	EMC 184045	980116	2021/10/5	2022/10/4
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2022/7/9	2023/7/8
	EMC102-KM-KM-3000	150929	2022/7/9	2023/7/8
	EMC104-SM-SM-8000	171005	2021/10/5	2022/10/4
RF Coaxial Cable HUBER SUHNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	2021/10/5	2022/10/4
RF FLITER MICRO-TRONICS	BRM17690	004	2022/1/10	2023/1/9
	BRM50716	060	2022/1/10	2023/1/9
Signal Analyzer Agilent	N9010A	MY52220314	2021/12/3	2022/12/2
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2022/8/17

5 Limits of Test Items

5.1 RF Output Power

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

*B is the 26 dB emission bandwidth in megahertz

5.2 Power Spectral Density

Operation Band	Limit
U-NII-3	30 dBm/ 500 kHz

5.3 6 dB Bandwidth

Within the 5.725-5.850 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.4 Occupied Bandwidth

The results are for reference only.

5.5 Frequency Stability

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

5.6 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).

5.7 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)
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

*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.

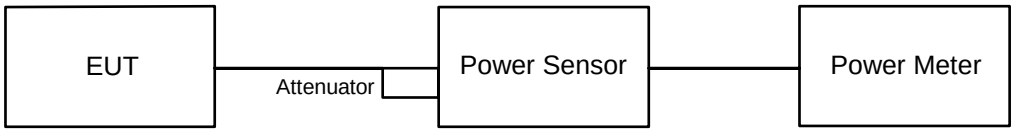
Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

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

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup

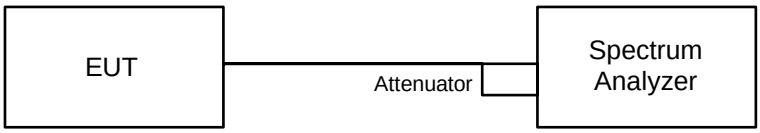


6.1.2 Test Procedure

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 Power Spectral Density

6.2.1 Test Setup



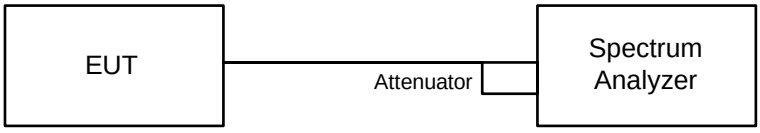
6.2.2 Test Procedure

For specified measurement bandwidth 500 kHz:
Method SA-2

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
c. Scale the observed power level to an equivalent value in 500 kHz by adjusting (increasing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300 kHz)
d. Sweep points ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
e. Sweep time = auto, trigger set to “free run”.
f. Trace average at least 100 traces in power averaging mode.
g. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
h. Record the max value and add 10 log (1/duty cycle).

6.3 6 dB Bandwidth

6.3.1 Test Setup

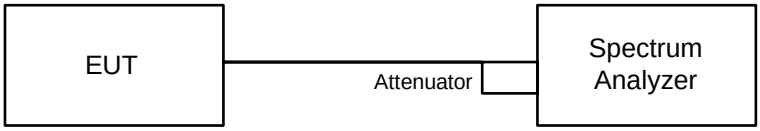


6.3.2 Test Procedure

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

6.4 Occupied Bandwidth

6.4.1 Test Setup

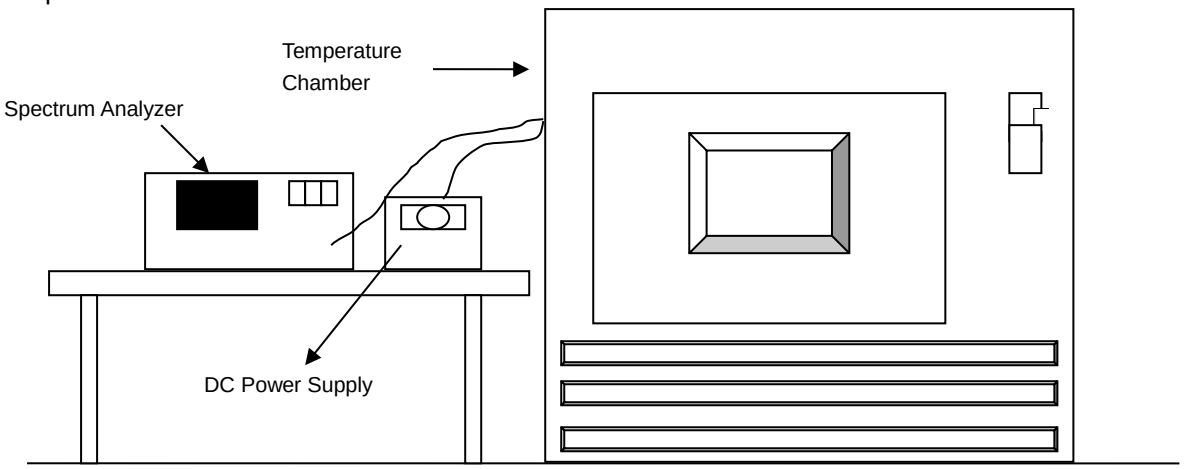


6.4.2 Test Procedure

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

6.5 Frequency Stability

6.5.1 Test Setup



6.5.2 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.

b. Turn the EUT on and couple its output to a spectrum analyzer.

c. Turn the EUT off and set the chamber to the highest temperature specified.

d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.

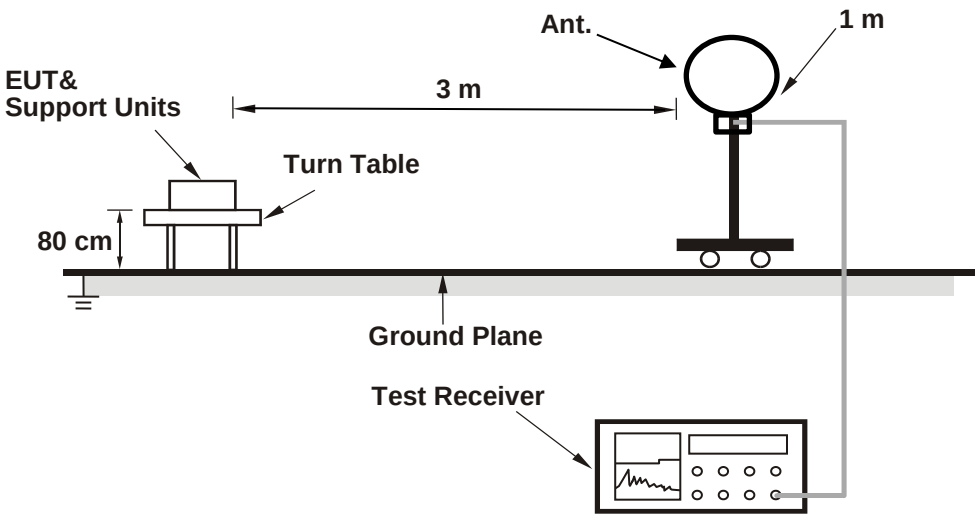
e. Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

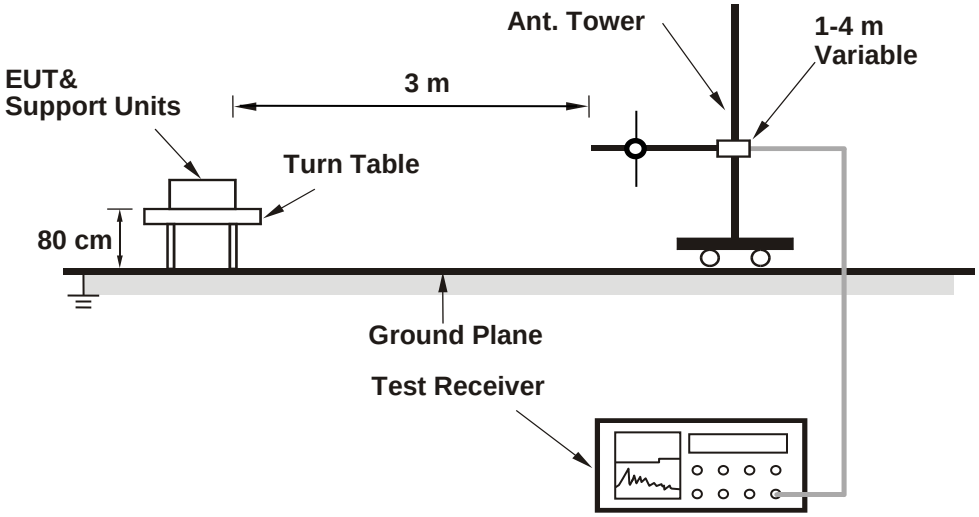
6.6 Unwanted Emissions below 1 GHz

6.6.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



6.6.2 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.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.
2. 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.

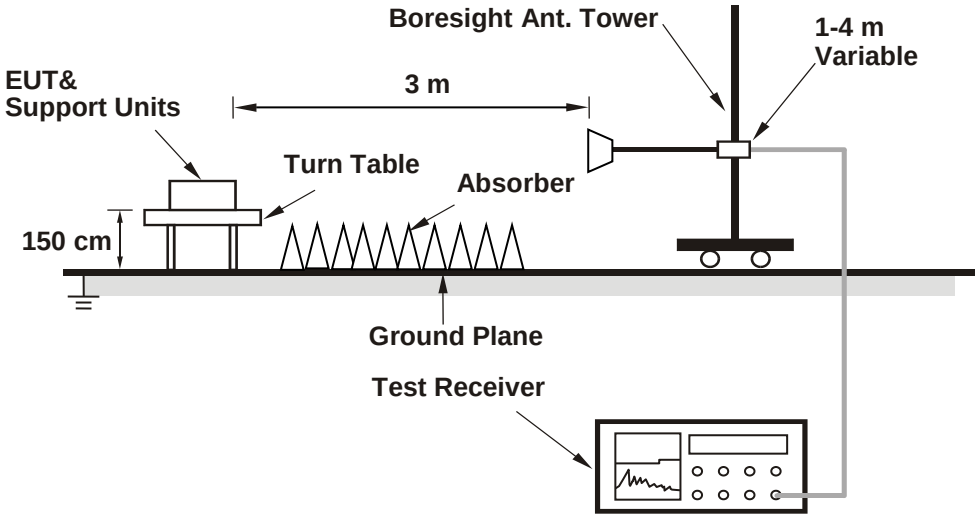
Notes:

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.

6.7 Unwanted Emissions above 1 GHz

6.7.1 Test Setup

For Radiated emission above 1 GHz



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

6.7.2 Test Procedure

a. 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.

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 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:

1. 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.
2. For fundamental and harmonic signal measurement, 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.
3. 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:	13.2 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Chris Lin

802.11a

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
149	5745	24.21	13.84	30	Pass
157	5785	28.314	14.52	30	Pass
165	5825	24.66	13.92	30	Pass

Note: For U-NII-3, the antenna gain is 1.8 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
149	5745	23.988	13.80	30	Pass
157	5785	25.763	14.11	30	Pass
165	5825	23.55	13.72	30	Pass

Note: For U-NII-3, the antenna gain is 1.8 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
151	5755	**29.04**	**14.63**	30	Pass
159	5795	25.645	14.09	30	Pass

Note: For U-NII-3, the antenna gain is 1.8 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
155	5775	26.122	14.17	30	Pass

Note: For U-NII-3, the antenna gain is 1.8 dBi < 6 dBi, so the output power limit shall not be reduced.

7.2 Power Spectral Density

Input Power:	13.2 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Chris Lin

802.11a

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)	Duty Factor (dB)	PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Test Result
149	5745	-8.01	0.3	-5.49	30	Pass
157	5785	-9.09	0.3	-6.57	30	Pass
165	5825	-9.6	0.3	-7.08	30	Pass

Note: For U-NII-3, the antenna gain is 1.8 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)	Duty Factor (dB)	PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Test Result
149	5745	-6.9	0.23	-4.45	30	Pass
157	5785	-7.36	0.23	-4.91	30	Pass
165	5825	-7.85	0.23	-5.40	30	Pass

Note: For U-NII-3, the antenna gain is 1.8 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)	Duty Factor (dB)	PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Test Result
151	5755	-11.52	0.43	-8.87	30	Pass
159	5795	-11.85	0.43	-9.20	30	Pass

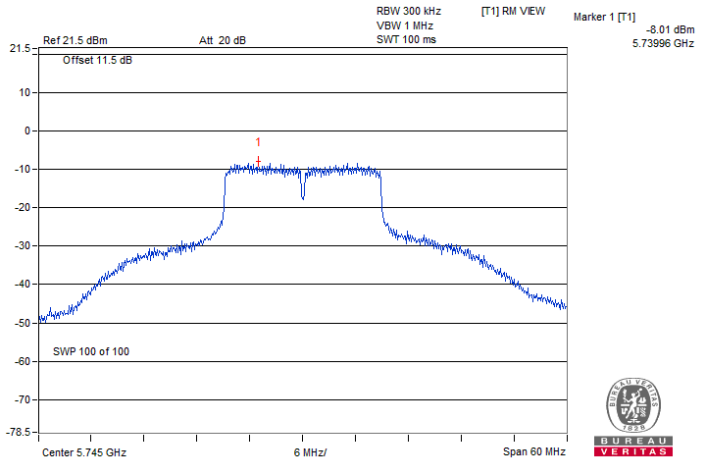
Note: For U-NII-3, the antenna gain is 1.8 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11ac (VHT80)

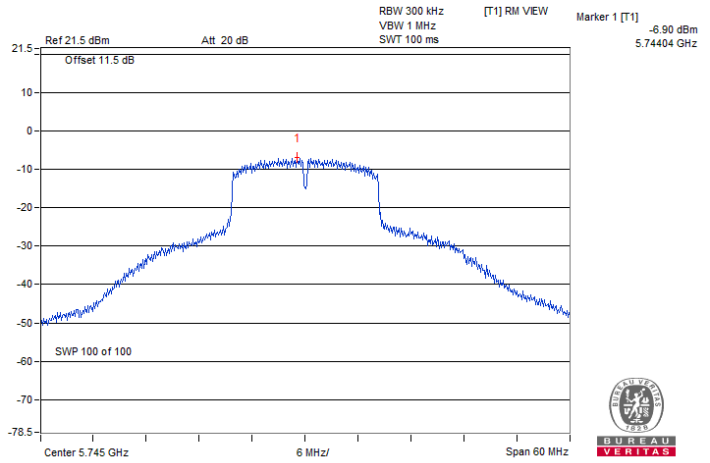
Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)	Duty Factor (dB)	PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Test Result
155	5775	-15.19	0.88	-12.09	30	Pass

Note: For U-NII-3, the antenna gain is 1.8 dBi < 6 dBi, so the power density limit shall not be reduced.

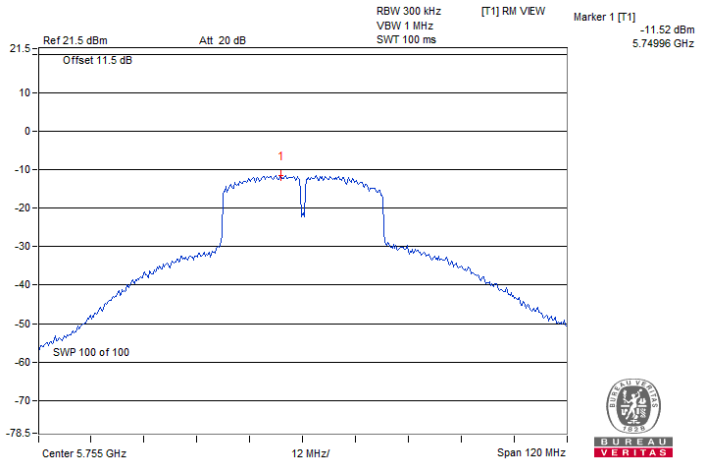
Spectrum Plot of Maximum Value



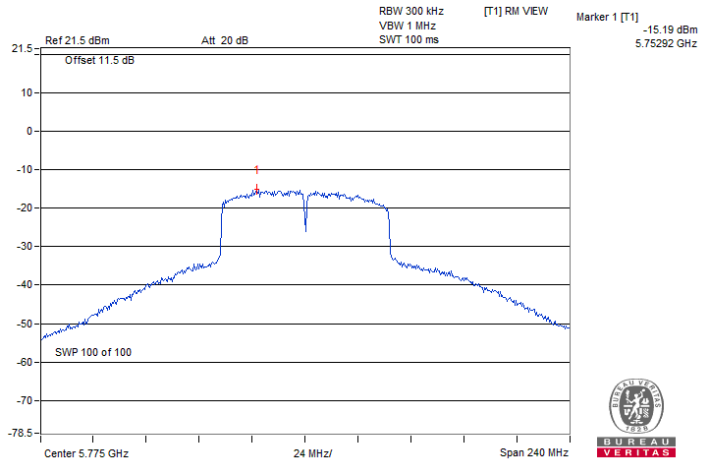
802.11a : CH 149



802.11n (HT20) : CH 149



802.11n (HT40) : CH 151



802.11ac (VHT80) : CH 155

7.3 6 dB Bandwidth

Input Power:	13.2 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Chris Lin

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
149	5745	17.34	0.5	Pass
157	5785	17.69	0.5	Pass
165	5825	17.66	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
149	5745	15.16	0.5	Pass
157	5785	15.22	0.5	Pass
165	5825	15.21	0.5	Pass

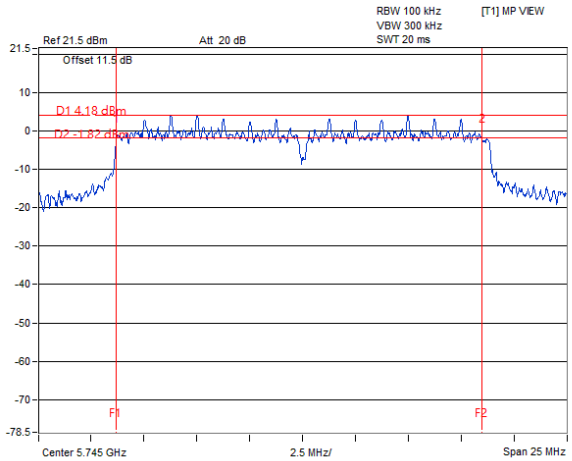
802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
151	5755	35.08	0.5	Pass
159	5795	35.13	0.5	Pass

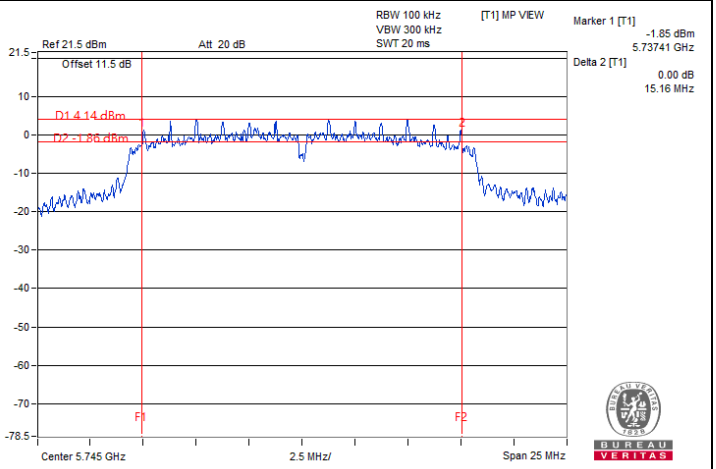
802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
155	5775	72.71	0.5	Pass

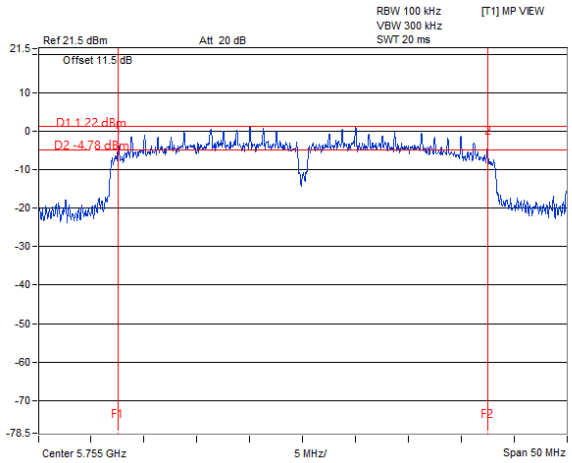
Spectrum Plot of Minimum Value



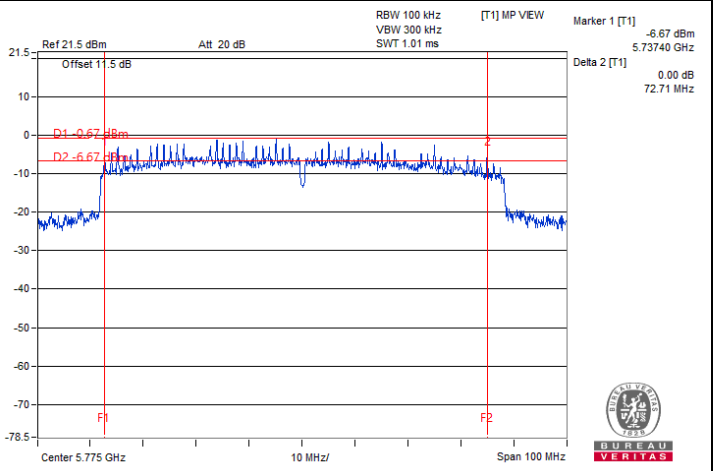
802.11a : CH 149



802.11n (HT20) : CH 149



802.11n (HT40) : CH 151



802.11ac (VHT80) : CH 155

7.4 Occupied Bandwidth

Input Power:	13.2 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Chris Lin

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
149	5745	28.14
157	5785	27.24
165	5825	25.56

802.11n (HT20)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
149	5745	26.58
157	5785	25.32
165	5825	22.2

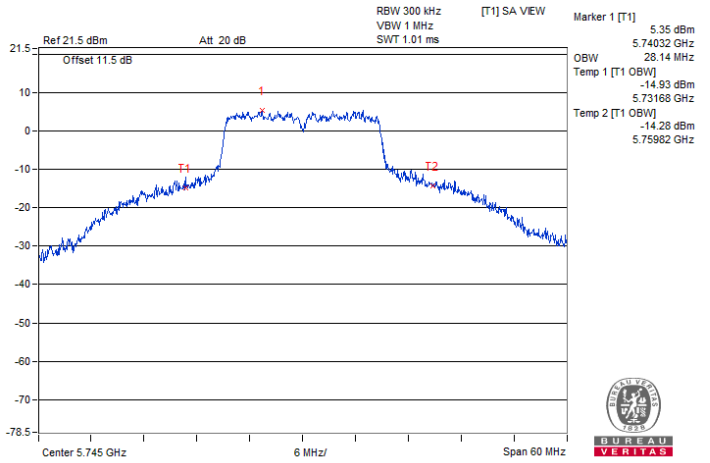
802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
151	5755	48.48
159	5795	37.68

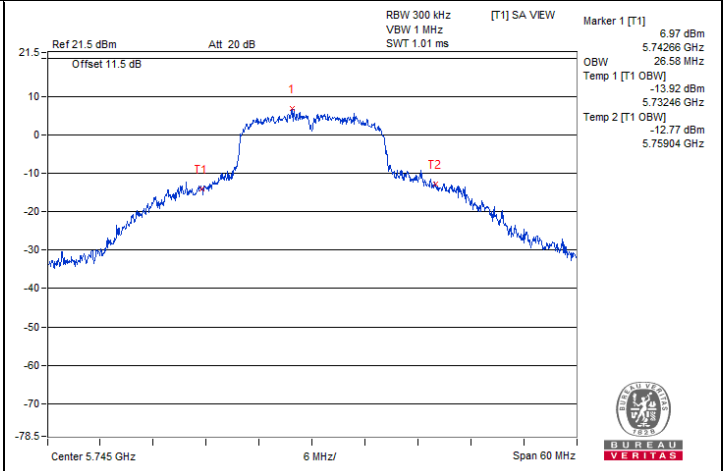
802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
155	5775	106.56

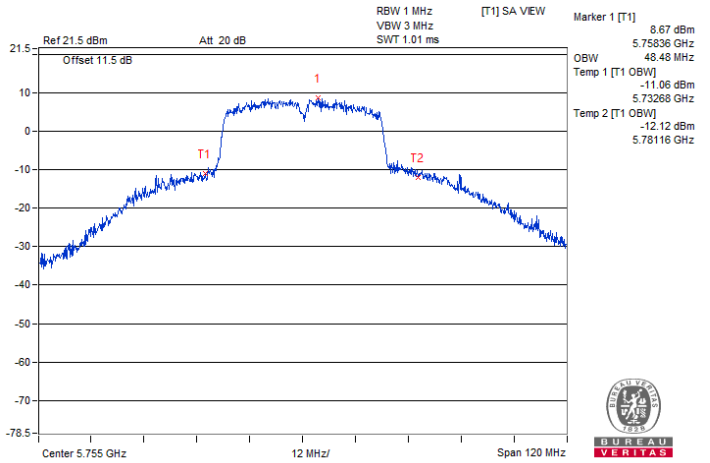
Spectrum Plot of Maximum Value



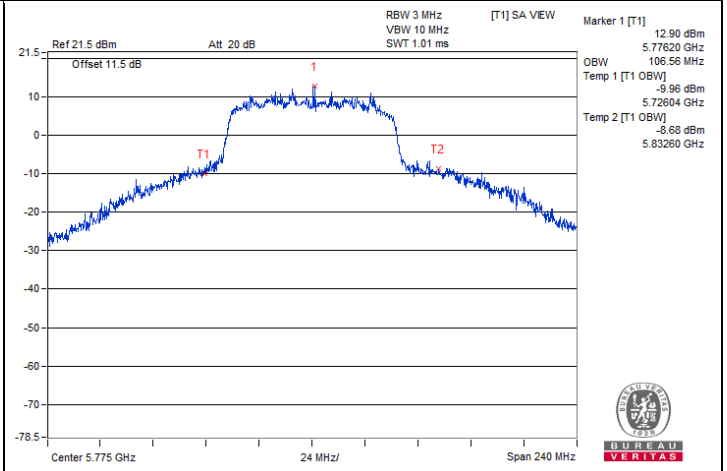
802.11a : CH 149



802.11n (HT20) : CH 149



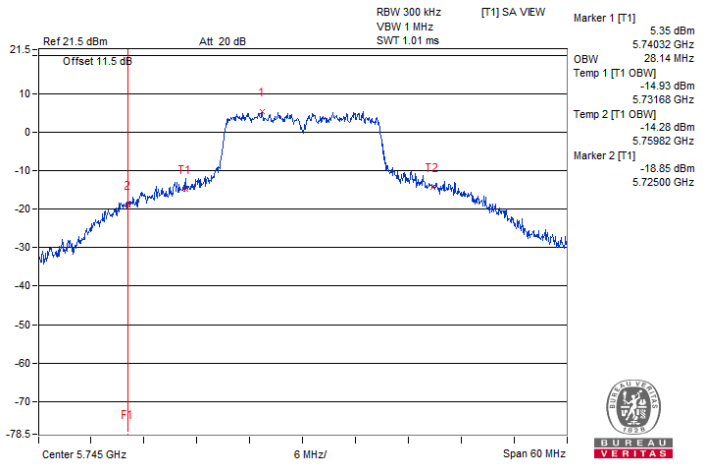
802.11n (HT40) : CH 151



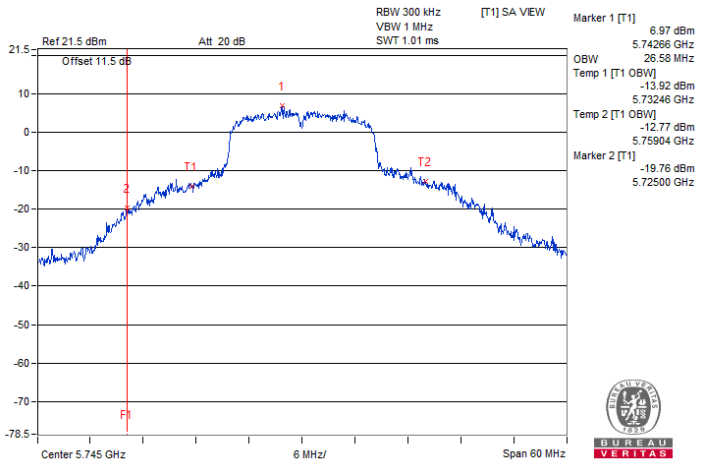
802.11ac (VHT80) : CH 155

Spectrum Plot for nearby DFS band

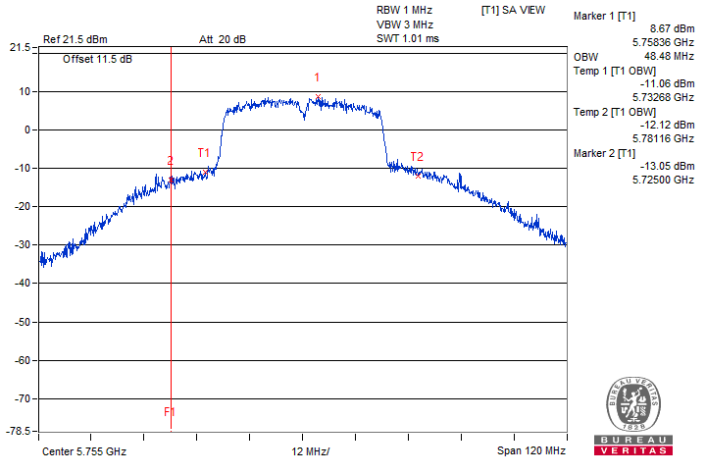
(DFS is required, if 99% OCP straddle into U-NII-2C band)



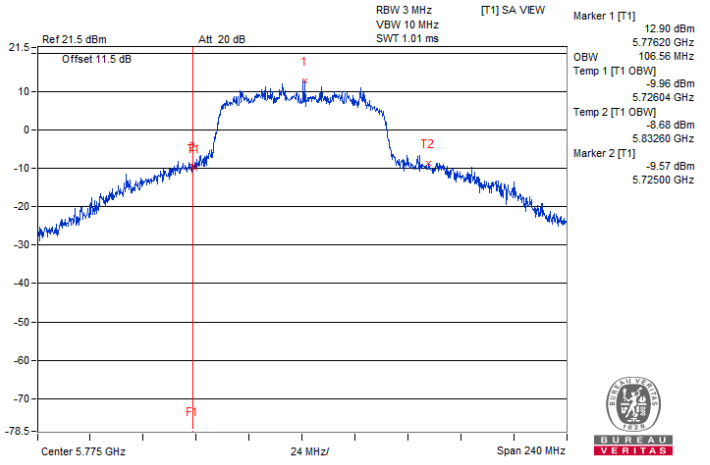
802.11a : CH 149



802.11n (HT20) : CH 149



802.11n (HT40) : CH 151



802.11ac (VHT80) : CH 155

7.5 Frequency Stability

Input Power:	13.2 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Chris Lin

802.11a

Frequency Stability Versus Temp.									
Operating Frequency: 5745 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result
70	13.2	5744.9782	Pass	5744.9788	Pass	5744.9789	Pass	5744.9766	Pass
60	13.2	5745.0068	Pass	5745.0068	Pass	5745.0057	Pass	5745.0063	Pass
50	13.2	5744.997	Pass	5744.9941	Pass	5744.9956	Pass	5744.9961	Pass
40	13.2	5744.9746	Pass	5744.9762	Pass	5744.9768	Pass	5744.9725	Pass
30	13.2	5744.9883	Pass	5744.9846	Pass	5744.9835	Pass	5744.9867	Pass
20	13.2	5744.9708	Pass	5744.9729	Pass	5744.9734	Pass	5744.9741	Pass
10	13.2	5745.0105	Pass	5745.0114	Pass	5745.01	Pass	5745.0118	Pass
0	13.2	5745.0052	Pass	5745.0025	Pass	5745.0025	Pass	5745.0059	Pass
-10	13.2	5745.0144	Pass	5745.0138	Pass	5745.015	Pass	5745.0175	Pass
-20	13.2	5744.9905	Pass	5744.9949	Pass	5744.9935	Pass	5744.9902	Pass
-30	13.2	5745.0262	Pass	5745.0247	Pass	5745.0229	Pass	5745.0253	Pass

Frequency Stability Versus Voltage									
Operating Frequency: 5745 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result
20	15.18	5744.9729	Pass	5744.9725	Pass	5744.9688	Pass	5744.9682	Pass
	13.2	5744.9708	Pass	5744.9729	Pass	5744.9734	Pass	5744.9741	Pass
	11.22	5744.9627	Pass	5744.9614	Pass	5744.9598	Pass	5744.9626	Pass

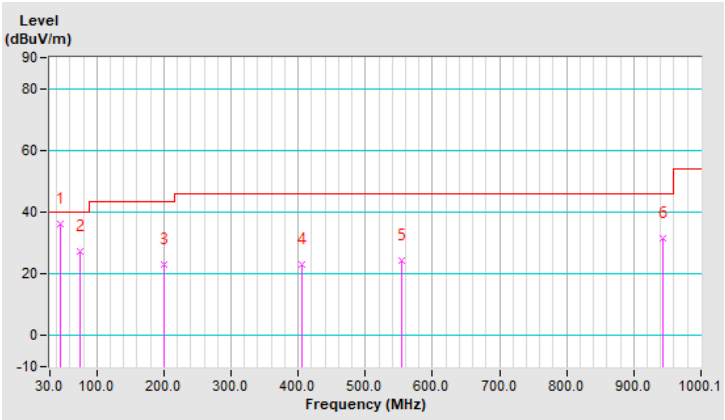
7.6 Unwanted Emissions below 1 GHz

RF Mode	TX 802.11n (HT40)	**Channel**	CH 151：5755 MHz
Frequency Range	30 MHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz
Input Power (System)	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 72% RH
Tested By	Vincent Chen		

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	**45.52**	**36.3 QP**	**40.0**	**-3.7**	**2.00 H**	**291**	**49.0**	**-12.7**
2	74.62	27.2 QP	40.0	-12.8	1.50 H	99	43.3	-16.1
3	200.74	23.2 QP	43.5	-20.3	2.00 H	254	39.3	-16.1
4	405.43	22.9 QP	46.0	-23.1	2.00 H	333	32.1	-9.2
5	553.85	24.5 QP	46.0	-21.5	1.00 H	262	29.6	-5.1
6	943.83	31.7 QP	46.0	-14.3	1.00 H	14	29.1	2.6

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 of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

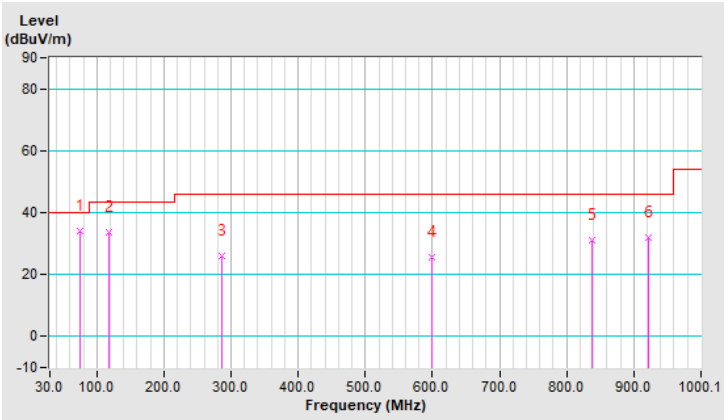


RF Mode	TX 802.11n (HT40)	**Channel**	CH 151：5755 MHz
Frequency Range	30 MHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz
Input Power (System)	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 72% RH
Tested By	Vincent Chen		

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	74.62	34.1 QP	40.0	-5.9	1.50 V	8	50.2	-16.1
2	118.28	33.6 QP	43.5	-9.9	2.00 V	135	48.1	-14.5
3	287.08	26.2 QP	46.0	-19.8	2.00 V	186	38.8	-12.6
4	598.48	25.5 QP	46.0	-20.5	1.00 V	164	29.1	-3.6
5	837.12	31.0 QP	46.0	-15.0	1.00 V	285	29.8	1.2
6	922.49	32.0 QP	46.0	-14.0	1.50 V	144	29.9	2.1

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 emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



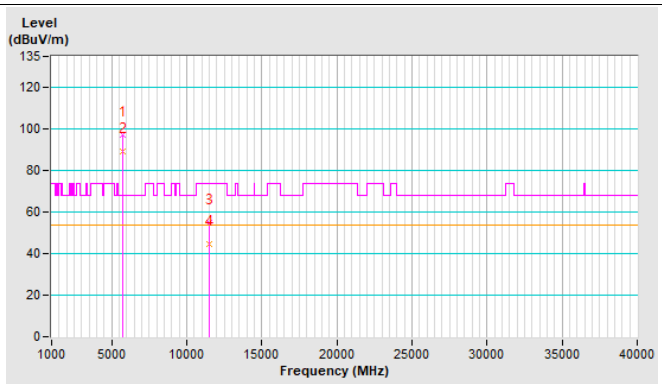
7.7 Unwanted Emissions above 1 GHz

RF Mode	TX 802.11a	**Channel**	CH 149：5745 MHz
Frequency Range	1 GHz ~ 40 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 72% RH
Tested By	Vincent Chen		

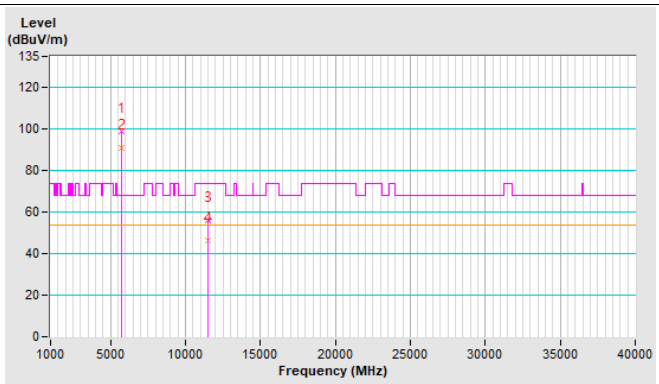
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	#5638.80	52.4 PK	68.2	-15.8	1.99 H	187	68.3	-15.9
2	*5745.00	97.3 PK			1.99 H	187	60.3	37.0
3	*5745.00	89.3 AV			1.99 H	187	52.3	37.0
4	#5938.00	49.8 PK	68.2	-18.4	1.99 H	187	65.2	-15.4
5	11490.00	54.9 PK	74.0	-19.1	3.57 H	187	57.4	-2.5
6	11490.00	44.8 AV	54.0	-9.2	3.57 H	187	47.3	-2.5
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	#5644.80	50.8 PK	68.2	-17.4	1.66 V	217	66.7	-15.9
2	*5745.00	98.7 PK			1.66 V	217	61.7	37.0
3	*5745.00	91.2 AV			1.66 V	217	54.2	37.0
4	#5928.40	49.5 PK	68.2	-18.7	1.66 V	217	64.9	-15.4
5	11490.00	55.9 PK	74.0	-18.1	3.74 V	198	58.4	-2.5
6	**11490.00**	**46.1 AV**	**54.0**	**-7.9**	**3.74 V**	**198**	**48.6**	**-2.5**

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.



Horizontal



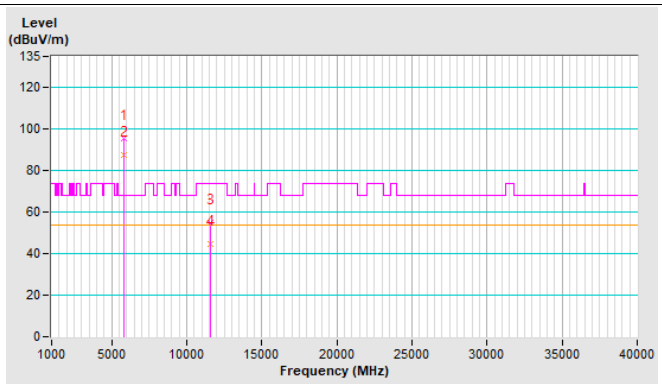
Vertical

RF Mode	TX 802.11a	Channel	CH 157：5785 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

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	#5630.40	50.1 PK	68.2	-18.1	1.00 H	225	66.0	-15.9
2	*5785.00	95.8 PK			1.00 H	225	58.8	37.0
3	*5785.00	87.8 AV			1.00 H	225	50.8	37.0
4	#5978.00	49.4 PK	68.2	-18.8	1.00 H	225	64.9	-15.5
5	11570.00	54.7 PK	74.0	-19.3	2.74 H	110	57.5	-2.8
6	11570.00	44.5 AV	54.0	-9.5	2.74 H	110	47.3	-2.8
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	#5616.40	50.7 PK	68.2	-17.5	1.61 V	216	66.7	-16.0
2	*5785.00	95.9 PK			1.61 V	216	58.9	37.0
3	*5785.00	88.0 AV			1.61 V	216	51.0	37.0
4	#5928.00	49.9 PK	68.2	-18.3	1.61 V	216	65.3	-15.4
5	11570.00	55.6 PK	74.0	-18.4	3.33 V	297	58.4	-2.8
6	11570.00	45.4 AV	54.0	-8.6	3.33 V	297	48.2	-2.8

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.



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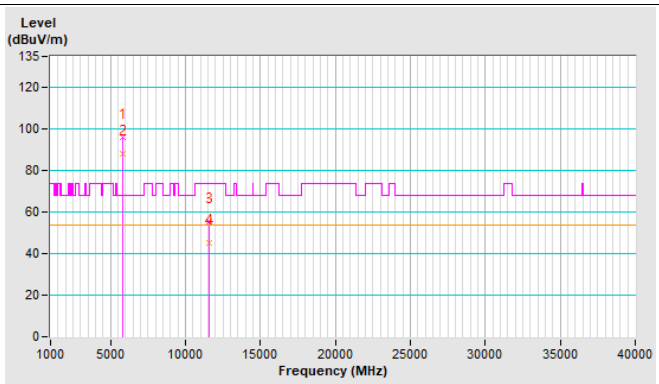


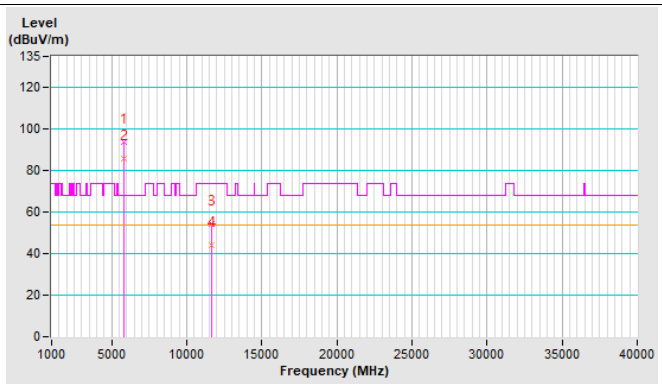
Vertical

RF Mode	TX 802.11a	Channel	CH 165：5825 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

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	#5646.80	51.5 PK	68.2	-16.7	1.95 H	186	67.3	-15.8
2	*5825.00	93.6 PK			1.95 H	186	56.4	37.2
3	*5825.00	86.0 AV			1.95 H	186	48.8	37.2
4	#5936.40	49.2 PK	68.2	-19.0	1.95 H	186	64.6	-15.4
5	11650.00	54.2 PK	74.0	-19.8	2.63 H	211	57.4	-3.2
6	11650.00	44.1 AV	54.0	-9.9	2.63 H	211	47.3	-3.2
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	#5617.20	50.1 PK	68.2	-18.1	1.66 V	160	66.1	-16.0
2	*5825.00	95.2 PK			1.66 V	160	58.0	37.2
3	*5825.00	87.2 AV			1.66 V	160	50.0	37.2
4	#5937.60	50.1 PK	68.2	-18.1	1.66 V	160	65.5	-15.4
5	11650.00	55.2 PK	74.0	-18.8	3.23 V	287	58.4	-3.2
6	11650.00	45.1 AV	54.0	-8.9	3.23 V	287	48.3	-3.2

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.



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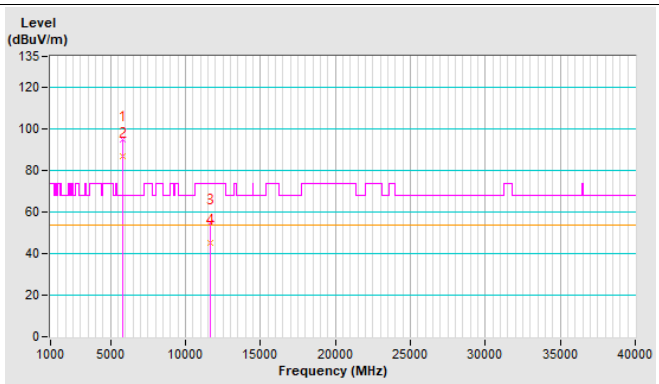


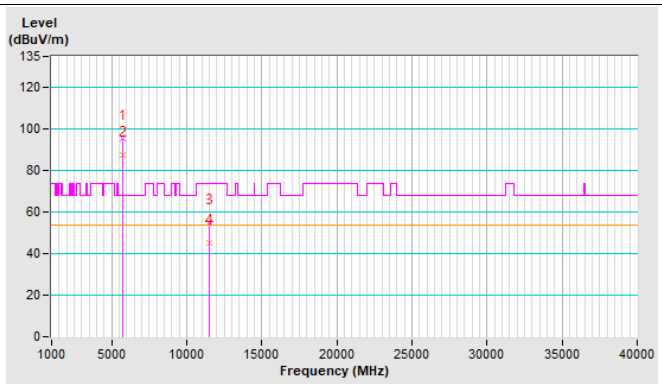
Vertical

RF Mode	TX 802.11n (HT20)	Channel	CH 149：5745 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

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	#5628.40	51.6 PK	68.2	-16.6	1.00 H	202	67.5	-15.9
2	*5745.00	95.3 PK			1.00 H	202	58.3	37.0
3	*5745.00	87.6 AV			1.00 H	202	50.6	37.0
4	#5934.80	51.1 PK	68.2	-17.1	1.00 H	202	66.5	-15.4
5	11490.00	54.9 PK	74.0	-19.1	3.23 H	287	57.4	-2.5
6	11490.00	45.1 AV	54.0	-8.9	3.23 H	287	47.6	-2.5
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	#5610.40	51.0 PK	68.2	-17.2	1.63 V	216	67.1	-16.1
2	*5745.00	96.4 PK			1.63 V	216	59.4	37.0
3	*5745.00	88.8 AV			1.63 V	216	51.8	37.0
4	#5944.80	49.9 PK	68.2	-18.3	1.63 V	216	65.3	-15.4
5	11490.00	55.9 PK	74.0	-18.1	3.74 V	114	58.4	-2.5
6	**11490.00**	**46.1 AV**	**54.0**	**-7.9**	**3.74 V**	**114**	**48.6**	**-2.5**

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.



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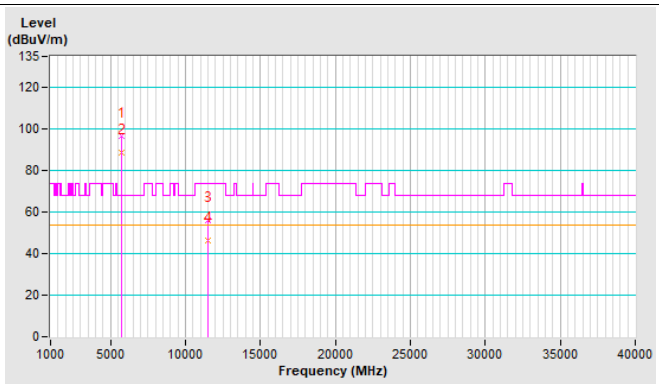


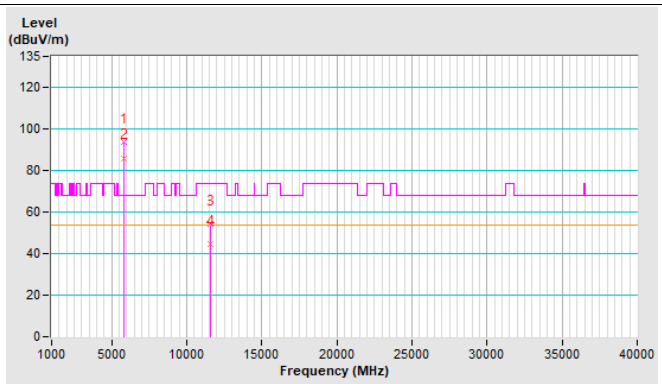
Vertical

RF Mode	TX 802.11n (HT20)	Channel	CH 157：5785 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

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	#5631.60	51.0 PK	68.2	-17.2	1.00 H	189	66.9	-15.9
2	*5785.00	93.7 PK			1.00 H	189	56.7	37.0
3	*5785.00	86.1 AV			1.00 H	189	49.1	37.0
4	#5977.20	49.5 PK	68.2	-18.7	1.00 H	189	65.0	-15.5
5	11570.00	54.6 PK	74.0	-19.4	3.23 H	287	57.4	-2.8
6	11570.00	44.8 AV	54.0	-9.2	3.23 H	287	47.6	-2.8
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	#5625.20	50.6 PK	68.2	-17.6	1.51 V	216	66.5	-15.9
2	*5785.00	95.9 PK			1.51 V	216	58.9	37.0
3	*5785.00	88.0 AV			1.51 V	216	51.0	37.0
4	#5930.40	50.2 PK	68.2	-18.0	1.51 V	216	65.6	-15.4
5	11570.00	55.6 PK	74.0	-18.4	3.63 V	314	58.4	-2.8
6	11570.00	45.7 AV	54.0	-8.3	3.63 V	314	48.5	-2.8

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.



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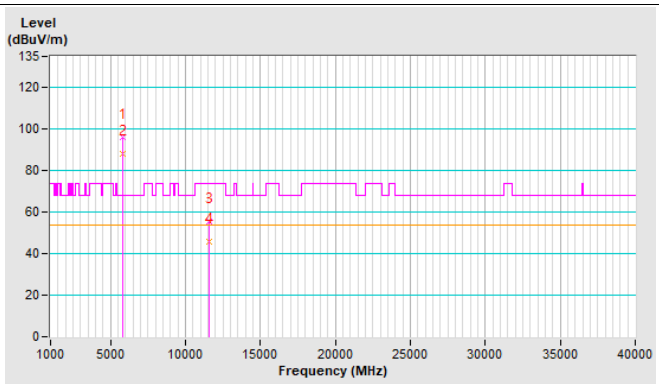


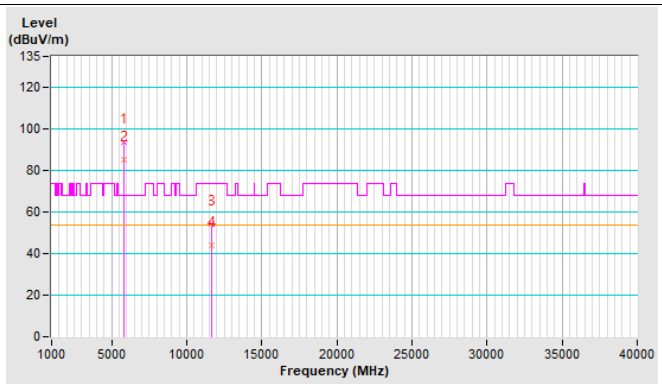
Vertical

RF Mode	TX 802.11n (HT20)	Channel	CH 165：5825 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

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	#5649.20	50.5 PK	68.2	-17.7	1.01 H	228	66.3	-15.8
2	*5825.00	93.6 PK			1.01 H	228	56.4	37.2
3	*5825.00	85.5 AV			1.01 H	228	48.3	37.2
4	#5941.20	50.1 PK	68.2	-18.1	1.01 H	228	65.5	-15.4
5	11650.00	54.4 PK	74.0	-19.6	3.23 H	287	57.6	-3.2
6	11650.00	44.3 AV	54.0	-9.7	3.23 H	287	47.5	-3.2
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	#5639.60	50.8 PK	68.2	-17.4	1.65 V	160	66.7	-15.9
2	*5825.00	94.6 PK			1.65 V	160	57.4	37.2
3	*5825.00	86.9 AV			1.65 V	160	49.7	37.2
4	#5934.00	50.0 PK	68.2	-18.2	1.65 V	160	65.4	-15.4
5	11650.00	55.5 PK	74.0	-18.5	3.74 V	108	58.7	-3.2
6	11650.00	45.3 AV	54.0	-8.7	3.74 V	108	48.5	-3.2

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.



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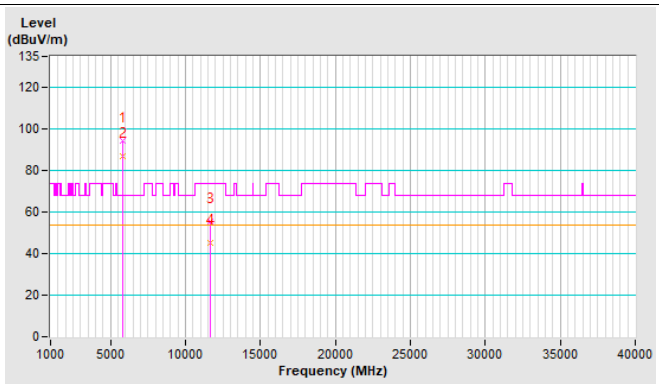


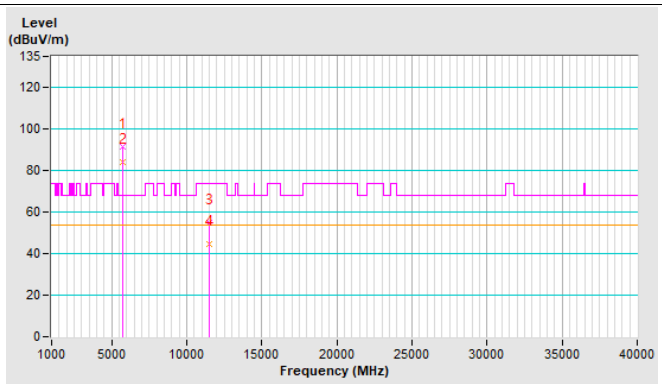
Vertical

RF Mode	TX 802.11n (HT40)	Channel	CH 151：5755 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

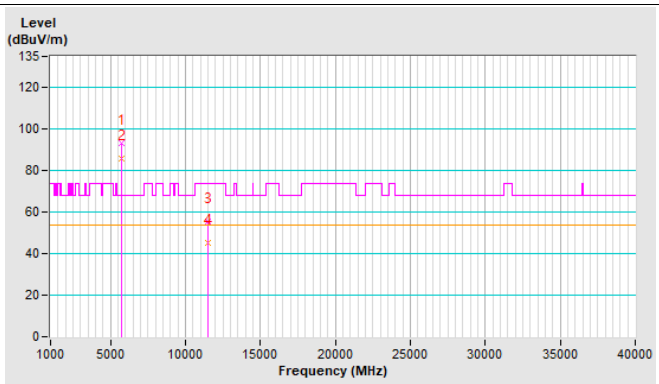
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5625.60	51.5 PK	68.2	-16.7	1.00 H	236	67.4	-15.9
2	*5755.00	91.5 PK			1.00 H	236	54.5	37.0
3	*5755.00	83.9 AV			1.00 H	236	46.9	37.0
4	#5928.40	49.7 PK	68.2	-18.5	1.00 H	236	65.1	-15.4
5	11510.00	54.7 PK	74.0	-19.3	2.74 H	103	57.4	-2.7
6	11510.00	44.6 AV	54.0	-9.4	2.74 H	103	47.3	-2.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5629.20	50.4 PK	68.2	-17.8	1.58 V	165	66.3	-15.9
2	*5755.00	93.0 PK			1.58 V	165	56.0	37.0
3	*5755.00	85.6 AV			1.58 V	165	48.6	37.0
4	#5930.40	50.8 PK	68.2	-17.4	1.58 V	165	66.2	-15.4
5	11510.00	55.7 PK	74.0	-18.3	3.22 V	289	58.4	-2.7
6	11510.00	45.4 AV	54.0	-8.6	3.22 V	289	48.1	-2.7

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



Horizontal



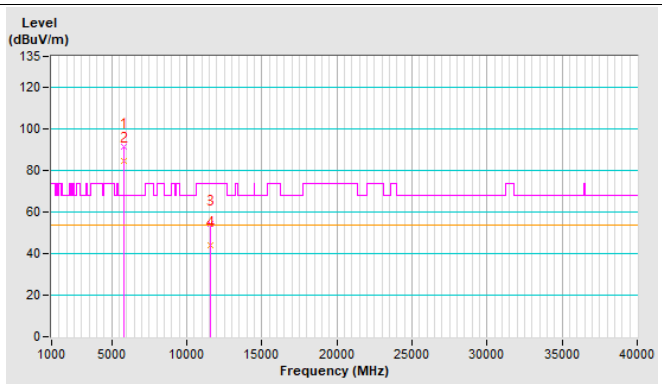
Vertical

RF Mode	TX 802.11n (HT40)	Channel	CH 159：5795 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

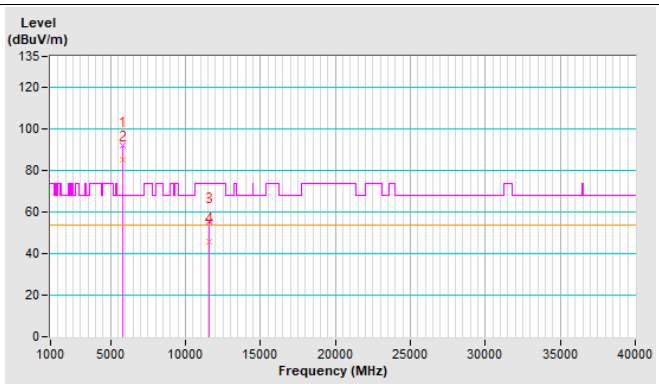
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5635.20	51.5 PK	68.2	-16.7	1.02 H	213	67.4	-15.9
2	*5795.00	91.8 PK			1.02 H	213	54.8	37.0
3	*5795.00	84.6 AV			1.02 H	213	47.6	37.0
4	#5929.60	49.8 PK	68.2	-18.4	1.02 H	213	65.2	-15.4
5	11590.00	54.4 PK	74.0	-19.6	2.32 H	220	57.4	-3.0
6	11590.00	44.3 AV	54.0	-9.7	2.32 H	220	47.3	-3.0
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	#5639.60	50.7 PK	68.2	-17.5	1.66 V	163	66.6	-15.9
2	*5795.00	92.1 PK			1.66 V	163	55.1	37.0
3	*5795.00	85.2 AV			1.66 V	163	48.2	37.0
4	#5954.00	50.6 PK	68.2	-17.6	1.66 V	163	66.2	-15.6
5	11590.00	55.4 PK	74.0	-18.6	3.23 V	296	58.4	-3.0
6	11590.00	45.7 AV	54.0	-8.3	3.23 V	296	48.7	-3.0

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.



Horizontal



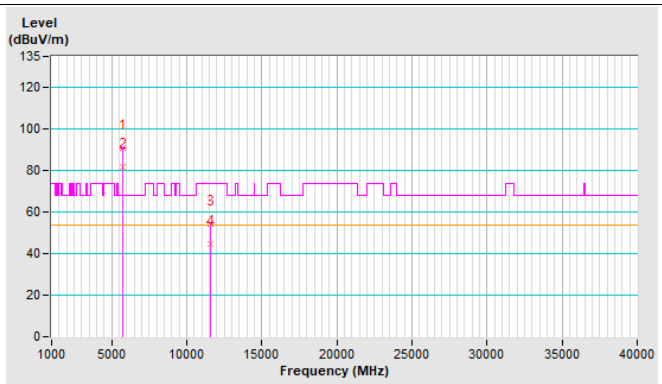
Vertical

RF Mode	TX 802.11ac (VHT80)	Channel	CH 155：5775 MHz
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 KHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	23°C, 72% RH
Tested By	Vincent Chen		

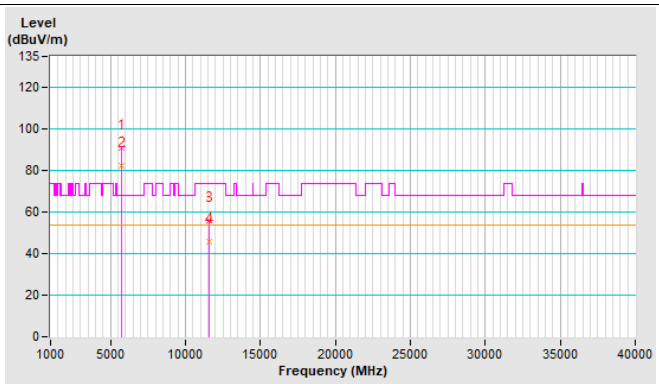
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5648.00	51.6 PK	68.2	-16.6	1.00 H	213	67.4	-15.8
2	*5775.00	90.8 PK			1.00 H	213	53.8	37.0
3	*5775.00	81.7 AV			1.00 H	213	44.7	37.0
4	#5989.60	49.9 PK	68.2	-18.3	1.00 H	213	65.4	-15.5
5	11550.00	54.6 PK	74.0	-19.4	3.23 H	297	57.4	-2.8
6	11550.00	44.7 AV	54.0	-9.3	3.23 H	297	47.5	-2.8
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	#5633.60	52.2 PK	68.2	-16.0	1.73 V	164	68.1	-15.9
2	*5775.00	91.1 PK			1.73 V	164	54.1	37.0
3	*5775.00	82.5 AV			1.73 V	164	45.5	37.0
4	#5935.60	50.0 PK	68.2	-18.2	1.73 V	164	65.4	-15.4
5	11550.00	55.9 PK	74.0	-18.1	3.23 V	296	58.7	-2.8
6	11550.00	45.7 AV	54.0	-8.3	3.23 V	296	48.5	-2.8

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.



Horizontal

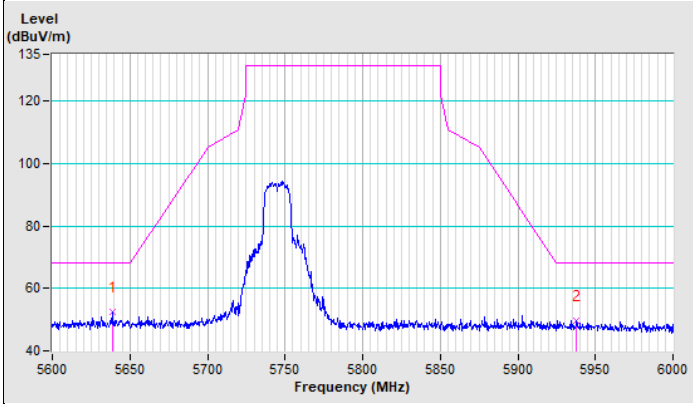


Vertical

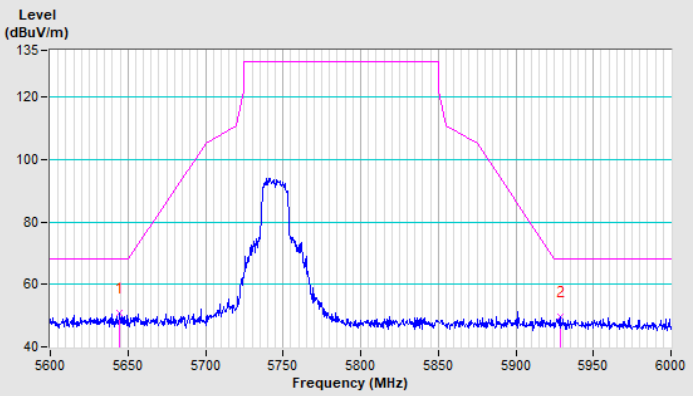
Band Edge Measurement

802.11a Channel 149

Horizontal (Peak)

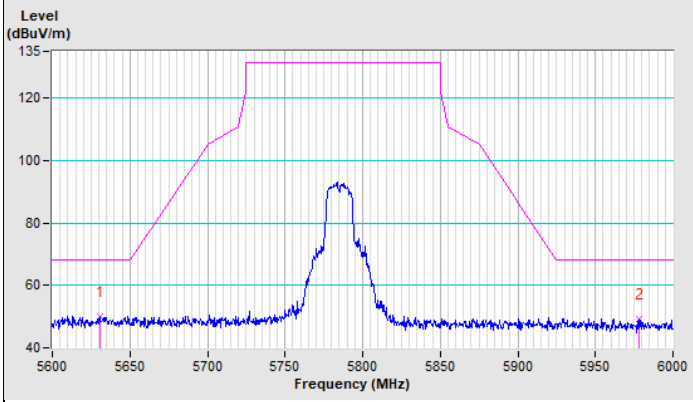


Vertical (Peak)

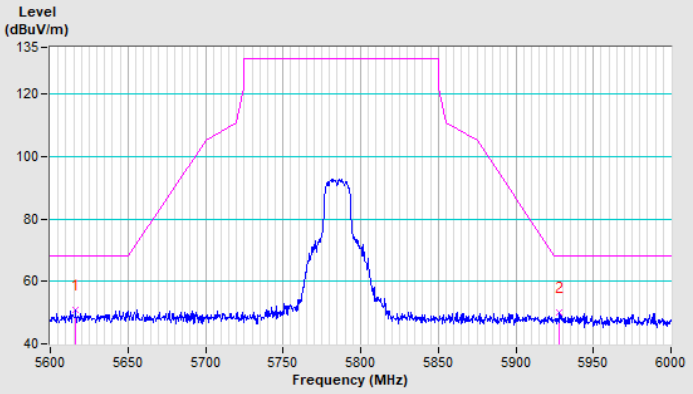


802.11a Channel 157

Horizontal (Peak)

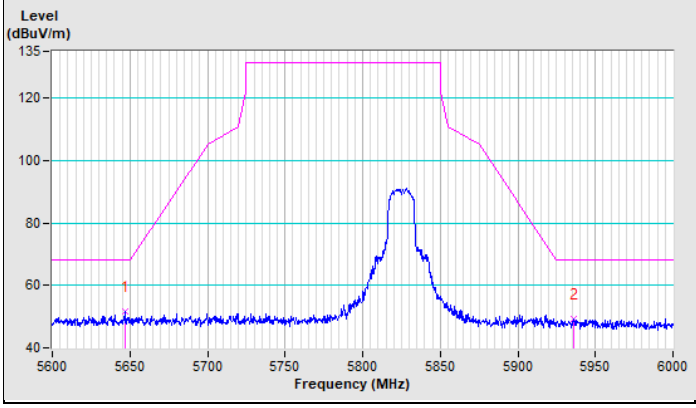


Vertical (Peak)

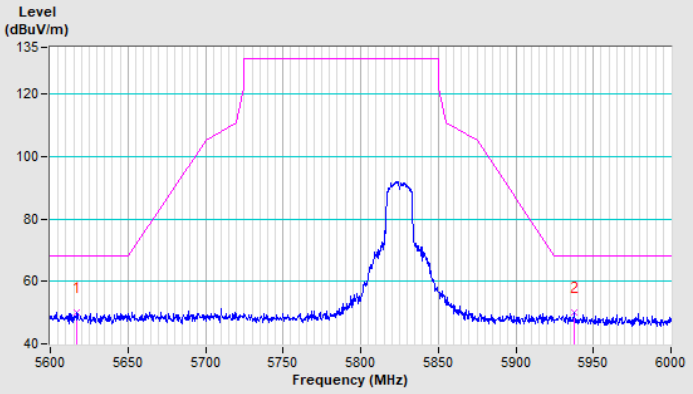


802.11a Channel 165

Horizontal (Peak)

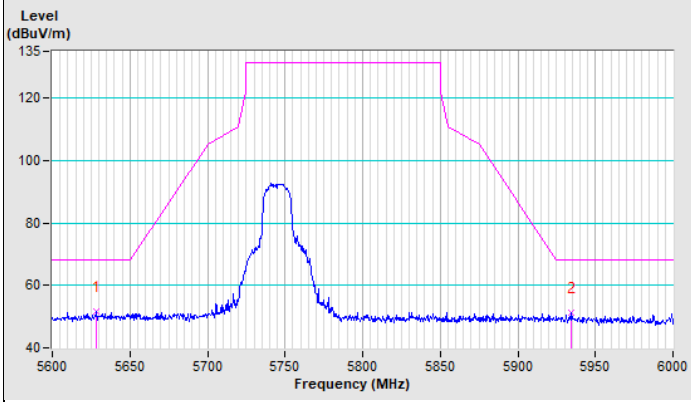


Vertical (Peak)

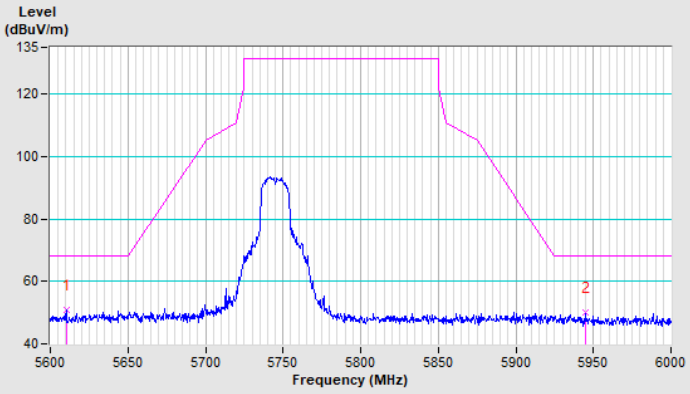


802.11n (HT20) Channel 149

Horizontal (Peak)

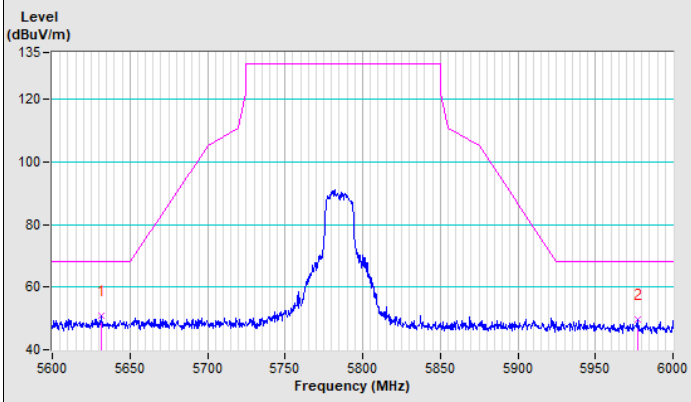


Vertical (Peak)

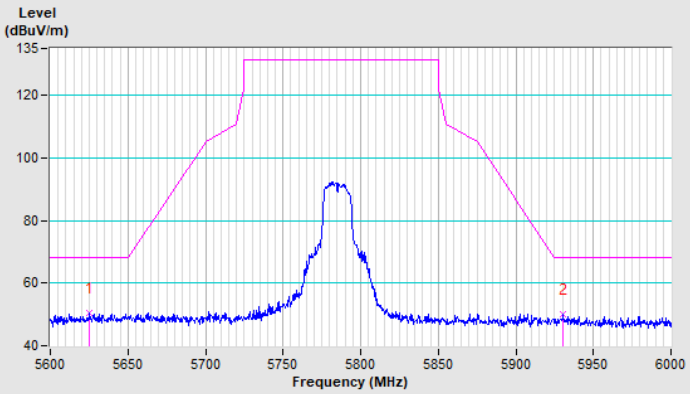


802.11n (HT20) Channel 157

Horizontal (Peak)

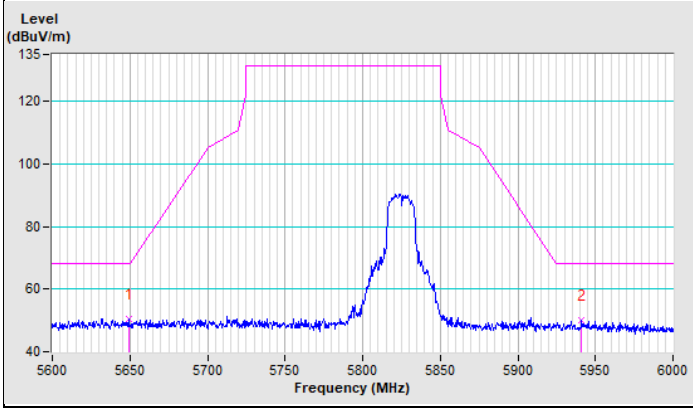


Vertical (Peak)

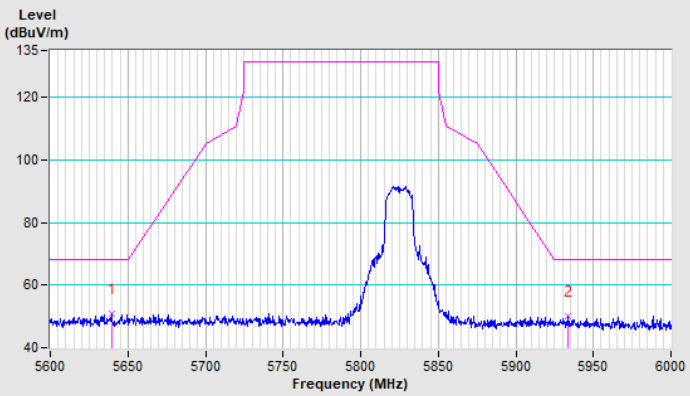


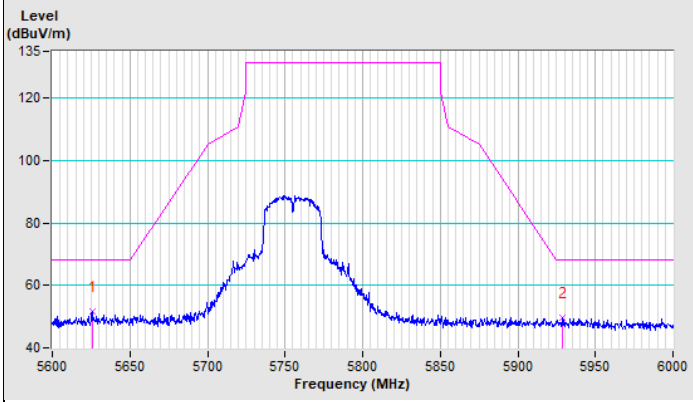
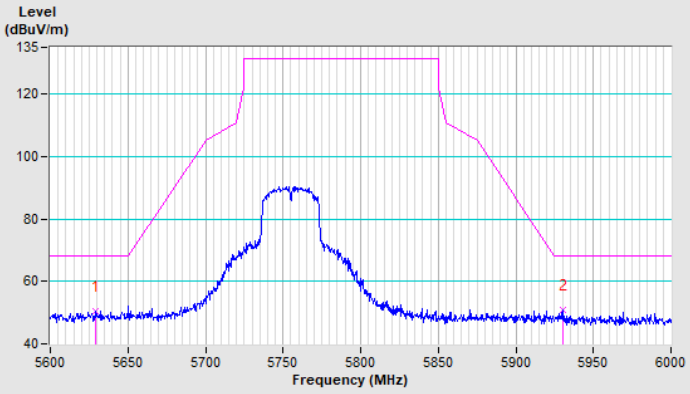
802.11n (HT20) Channel 165

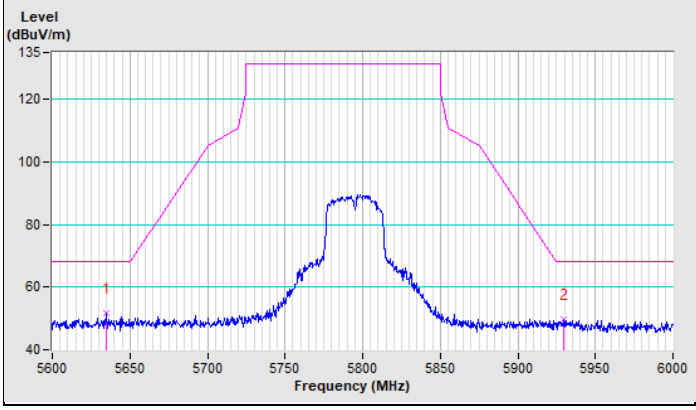
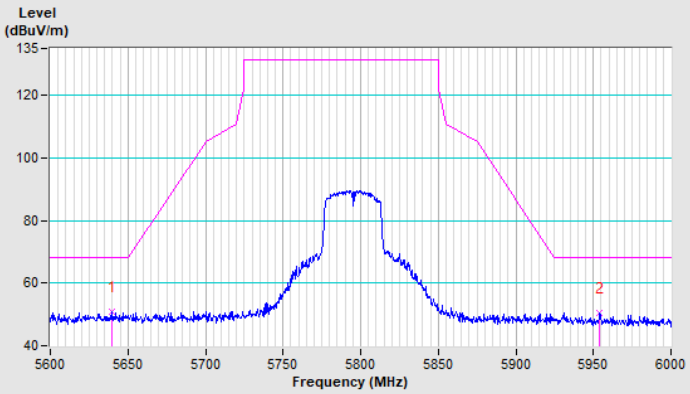
Horizontal (Peak)

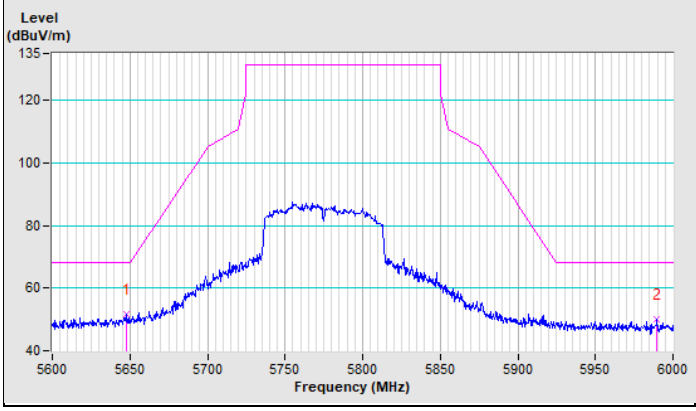
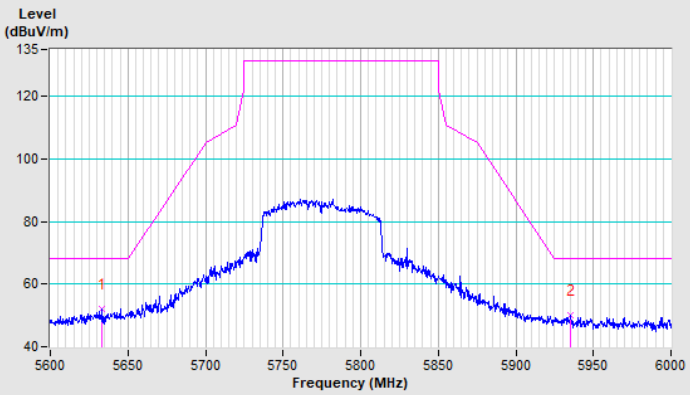


Vertical (Peak)



802.11n (HT40) Channel 151	
Horizontal (Peak)	Vertical (Peak)
	

802.11n (HT40) Channel 159	
Horizontal (Peak)	Vertical (Peak)
	

802.11ac (VHT80) Channel 155	
Horizontal (Peak)	Vertical (Peak)
	

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.

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

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Tel: 886-3-6668565
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Fax: 886-3-3270892

Email: service.adt@bureauveritas.com
Web Site: http://ee.bureauveritas.com.tw

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

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