

## FCC Test Report

**Report No.:** RF180507C22

**FCC ID:** KA2WR953B1

**Test Model:** DWR-953

**Received Date:** May 07, 2018

**Test Date:** May 24, 2018 ~ May 25, 2018

**Issued Date:** Jun. 06, 2018

**Applicant:** D-Link Corporation

**Address:** 17595 Mt. Herrmann, Fountain Valley, California, United States, 92708

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

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

**Test Location:** No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

**FCC Registration /  
Designation Number:** 788550 / TW0003



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### Release Control Record

Issue No.	Description	Date Issued
RF180507C22	Original Release	Jun. 06, 2018

## 1 Certificate of Conformity

**Product:** LTE Wi-Fi Router

**Brand:** D-Link

**Test Model:** DWR-953

**Sample Status:** Engineering Sample

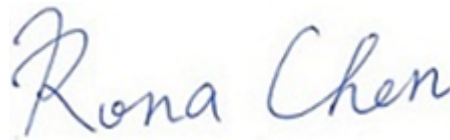
**Applicant:** D-Link Corporation

**Test Date:** May 24, 2018 ~ May 25, 2018

**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.

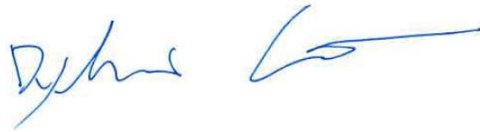
**Prepared by :**



**Date:** Jun. 06, 2018

Rona Chen / Specialist

**Approved by :**



**Date:** Jun. 06, 2018

Dylan Chiou / 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	Pass	Meet the requirement of limit. Minimum passing margin is -15.54 dB at 0.30249 MHz.
15.407(b) (1/2/3/4(iii)/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.54 dB at 5619.825 MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6 dB Bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is SMA female.

\*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOB test plots were recorded in Annex A.

### 2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	LTE Wi-Fi Router
<b>Brand</b>	D-Link
<b>Test Model</b>	DWR-953
<b>Status of EUT</b>	Engineering Sample
<b>Power Supply Rating</b>	12 Vdc (Adapter)
<b>Modulation Type</b>	256QAM, 64QAM, 16QAM, QPSK, BPSK
<b>Modulation Technology</b>	OFDM
<b>Transfer Rate</b>	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 300.0 Mbps 802.11ac: up to 866.7 Mbps
<b>Operating Frequency</b>	5745 ~ 5825 MHz
<b>Number of Channel</b>	5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80)
<b>Output Power</b>	202.211 mW
<b>Antenna Type</b>	PCB antenna with 3.33 dBi gain
<b>Antenna Connector</b>	SMA female
<b>Accessory Device</b>	Refer to Note as below
<b>Data Cable Supplied</b>	Refer to Note as below

#### Note:

- The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

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

- The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1	D-Link	2ABB018F	I/P: 100-240 Vac, 50/60 Hz, 0.6 A O/P: 12 Vdc, 1.5 A 1.15m non-shielded cable w/o core
Adapter 2	D-Link	WB-18D12R	I/P: 100-240 Vac, 50/60 Hz, 0.5 A O/P: 12 Vdc, 1.5 A 1.2m non-shielded cable w/o core
WLAN Chipset	Realtek	RTL8192ER (2.4G), RTL8812BRH(5G)	--
WWAN Module	BroadMobi	BM806U-E1	--

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

### 3.2 Description of Test Modes

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

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

2 channels are provided for 802.11n (HT40):

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

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
155	5775



### 3.2.1 Test Mode Applicability and Tested Channel Detail

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

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz      **RE<1G**: Radiated Emission below 1 GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

**Note:**

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-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)	
-	5745-5825	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0	
-		802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5	
-		802.11n (HT40)	151 to 159	151, 159	151, 159	OFDM	BPSK	13.5
-		802.11ac (VHT80)	155	155	155	OFDM	BPSK	29.3

#### **Radiated Emission Test (Below 1 GHz):**

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

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

#### **Power Line Conducted Emission Test:**

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

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

**Antenna Port Conducted Measurement:**

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

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

**Test Condition:**

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang
APCM	25 deg. C, 65 % RH	12 Vdc	Gavin Wu

### 3.3 Duty Cycle of Test Signal

#### MODULATION TYPE: BPSK

Duty cycle of test signal is < 98 %, duty factor is required.

**802.11a:** Duty cycle = 1.359/1.451 = 0.937, Duty factor =  $10 * \log(1/0.937) = 0.28$

**802.11n (HT20):** Duty cycle = 0.659/0.714 = 0.923, Duty factor =  $10 * \log(1/0.923) = 0.35$

**802.11n (HT40):** Duty cycle = 0.338/0.417 = 0.811, Duty factor =  $10 * \log(1/0.811) = 0.91$

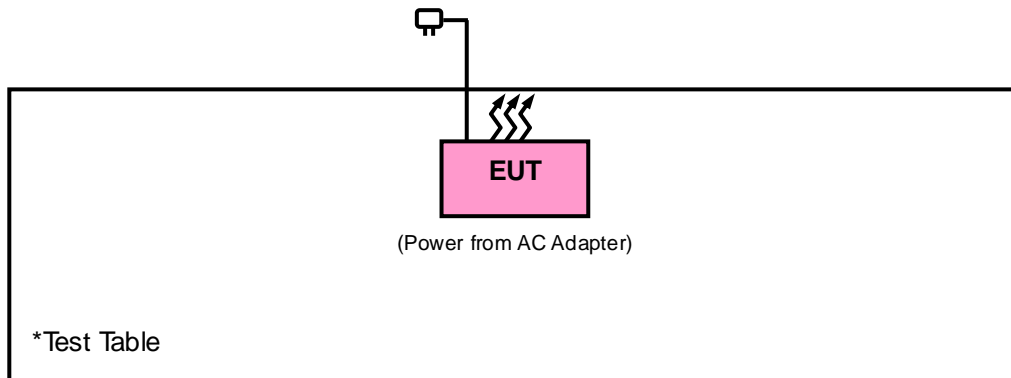
**802.11ac (VHT80):** Duty cycle = 0.315/0.369 = 0.854, Duty factor =  $10 * \log(1/0.854) = 0.69$



### 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)**

**789033 D02 General UNII Test Procedures New Rules v02r01**

**662911 D01 Multiple Transmitter Output 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. Other emissions shall be at least 20 dB below the highest level of the desired power:

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) <sup>*1</sup> PK:10 (dBm/MHz) <sup>*2</sup> PK:15.6 (dBm/MHz) <sup>*3</sup> PK:27 (dBm/MHz) <sup>*4</sup>	PK: 68.2 (dBµV/m) <sup>*1</sup> PK:105.2 (dBµV/m) <sup>*2</sup> PK: 110.8 (dBµV/m) <sup>*3</sup> PK:122.2 (dBµV/m) <sup>*4</sup>
	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	

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

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

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

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

**Note:**

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

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

#### 4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
HORN Antenna Schwarzbeck	BBHA 9120D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
Fixed Attenuator Mini-Circuits	BW-N10W5+	1301	Aug. 14, 2017	Aug. 13, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 23, 2017	Jun. 22, 2018
Loop Antenna	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier EMCI	EMC001340	980201	Nov. 01, 2017	Oct. 30, 2018
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 13, 2017	Oct. 12, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8 000&3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 20, 2017	Oct. 19, 2018
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Temperature & Humidity Chamber	GTH-120-40-CP-A R	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 30, 2017	Jun. 29, 2018

- Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 10.
  3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
  4. The IC Site Registration No. is IC7450F-10.



#### 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. Both 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:**

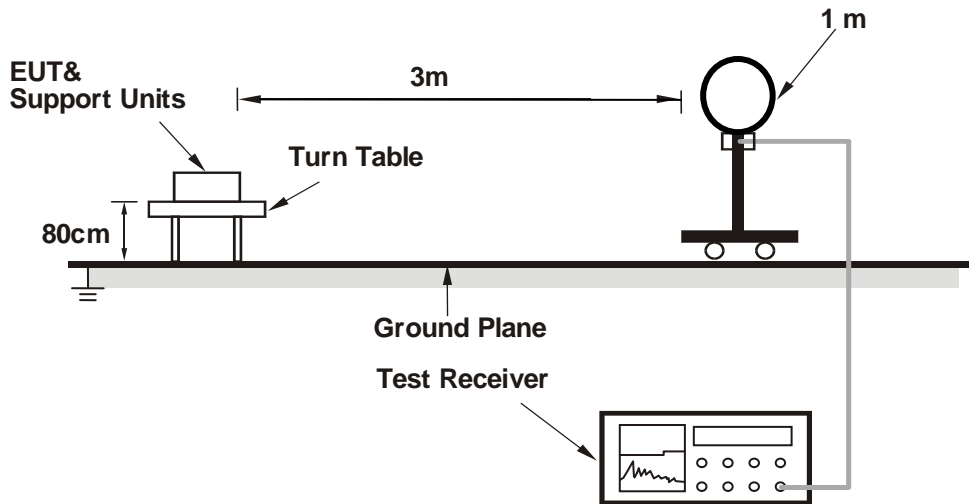
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.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

4.1.5 Deviation from Test Standard

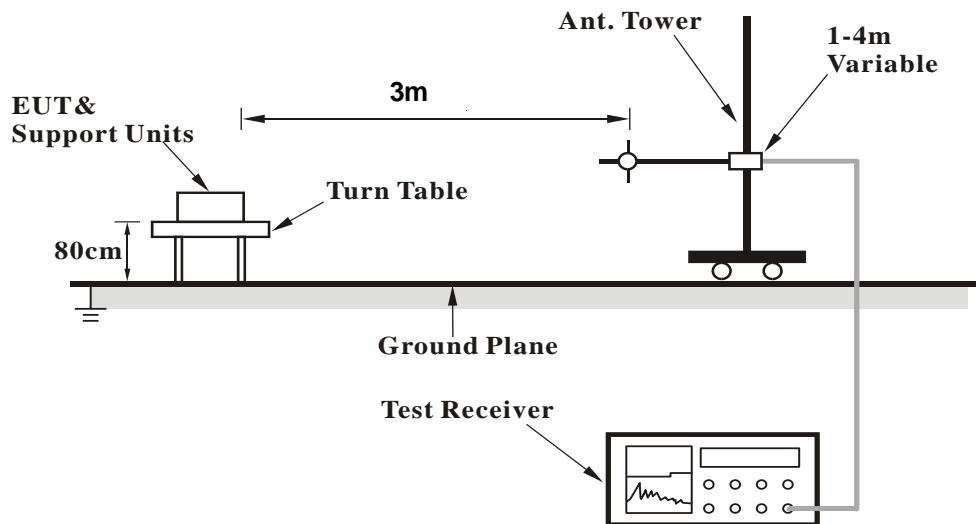
No deviation.

4.1.6 Test Set Up

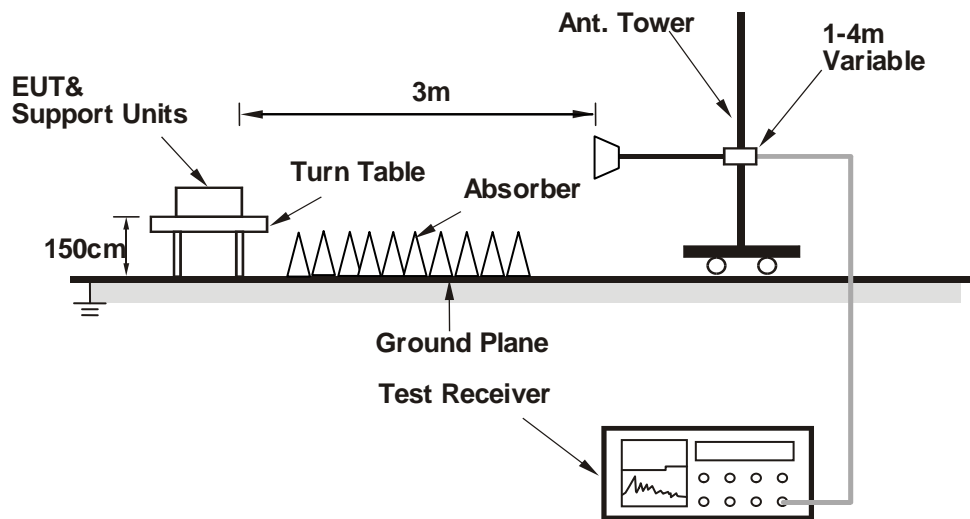
<Radiated Emission below 30 MHz>



<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

- Placed the EUT on a testing table.
- 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 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	Getaz Yang

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5745	102.46	100.94			32.21	6.78	37.47	306	215	Average
5745	111.88	110.36			32.21	6.78	37.47	306	215	Peak
11490	46.44	48.31	54	-7.56	40.25	10.66	52.78	115	68	Average
11490	57.55	59.42	74	-16.45	40.25	10.66	52.78	115	68	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5745	106.65	105.13			32.21	6.78	37.47	190	90	Average
5745	114.87	113.35			32.21	6.78	37.47	190	90	Peak
11490	46.78	48.65	54	-7.22	40.25	10.66	52.78	203	50	Average
11490	57.88	59.75	74	-16.12	40.25	10.66	52.78	203	50	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5554.275	51.26	49.87	68.2	-16.94	31.89	6.62	37.12	306	215	Peak
5658.3	51.41	49.98	74.36	-22.95	32.06	6.71	37.34	306	215	Peak
5922.875	51.89	50.01	69.77	-17.88	32.52	6.86	37.5	306	215	Peak
6008.85	51.97	49.92	68.2	-16.23	32.67	6.89	37.51	306	215	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5637.4	53.39	51.93	68.2	-14.81	32.04	6.7	37.28	190	90	Peak
5652.6	53.7	52.21	70.13	-16.43	32.06	6.71	37.28	190	90	Peak
5918.6	51.83	49.98	72.92	-21.09	32.49	6.86	37.5	190	90	Peak
5946.15	53.19	51.27	68.2	-15.01	32.55	6.87	37.5	190	90	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5745 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- 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	Getaz Yang

### <Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5785	102.1	100.56			32.26	6.82	37.54	305	191	Average
5785	111.54	110			32.26	6.82	37.54	305	191	Peak
11570	46.53	48.65	54	-7.47	40.13	10.76	53.01	112	78	Average
11570	54.18	56.3	74	-19.82	40.13	10.76	53.01	112	78	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5785	106.4	104.86			32.26	6.82	37.54	196	86	Average
5785	114.44	112.9			32.26	6.82	37.54	196	86	Peak
11570	46.74	48.86	54	-7.26	40.13	10.76	53.01	199	48	Average
11570	55.36	57.48	74	-18.64	40.13	10.76	53.01	199	48	Peak

### <Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5581.825	52.97	51.53	68.2	-15.23	31.95	6.65	37.16	305	191	Peak
5655.925	51.95	50.52	72.6	-20.65	32.06	6.71	37.34	305	191	Peak
5921.45	51.75	49.9	70.82	-19.07	32.49	6.86	37.5	305	191	Peak
5977.5	52.45	50.48	68.2	-15.75	32.6	6.88	37.51	305	191	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5615.075	52.74	51.29	68.2	-15.46	31.98	6.69	37.22	196	86	Peak
5659.725	52.1	50.67	75.42	-23.32	32.06	6.71	37.34	196	86	Peak
5918.6	51.96	50.11	72.92	-20.96	32.49	6.86	37.5	196	86	Peak
5971.325	52.6	50.66	68.2	-15.6	32.57	6.88	37.51	196	86	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5785 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

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	Getaz Yang

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5825	102.11	100.45			32.35	6.84	37.53	305	191	Average
5825	111.18	109.52			32.35	6.84	37.53	305	191	Peak
11650	46.45	48.76	54	-7.55	40.03	10.8	53.14	118	79	Average
11650	54.95	57.26	74	-19.05	40.03	10.8	53.14	118	79	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5825	106.16	104.5			32.35	6.84	37.53	190	86	Average
5825	114.29	112.63			32.35	6.84	37.53	190	86	Peak
11650	46.35	48.66	54	-7.65	40.03	10.8	53.14	211	59	Average
11650	53.88	56.19	74	-20.12	40.03	10.8	53.14	211	59	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5629.325	51.66	50.24	68.2	-16.54	32.01	6.69	37.28	305	191	Peak
5660.2	51.44	50.01	75.77	-24.33	32.06	6.71	37.34	305	191	Peak
5922.875	52.74	50.86	69.77	-17.03	32.52	6.86	37.5	305	191	Peak
5976.075	52.96	50.99	68.2	-15.24	32.6	6.88	37.51	305	191	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5578.025	52.5	51.09	68.2	-15.7	31.92	6.65	37.16	190	86	Peak
5657.825	52.11	50.68	74.01	-21.9	32.06	6.71	37.34	190	86	Peak
5919.55	52.58	50.73	72.22	-19.64	32.49	6.86	37.5	190	86	Peak
5928.1	53.29	51.41	68.2	-14.91	32.52	6.86	37.5	190	86	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5825 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

### 802.11n (HT20)

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	Getaz Yang

#### <Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5745	102.27	100.75			32.21	6.78	37.47	310	196	Average
5745	111.82	110.3			32.21	6.78	37.47	310	196	Peak
11490	45.98	47.85	54	-8.02	40.25	10.66	52.78	119	61	Average
11490	55.48	57.35	74	-18.52	40.25	10.66	52.78	119	61	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5745	106.5	104.98			32.21	6.78	37.47	187	82	Average
5745	114.37	112.85			32.21	6.78	37.47	187	82	Peak
11490	46.07	47.94	54	-7.93	40.25	10.66	52.78	206	59	Average
11490	55.76	57.63	74	-18.24	40.25	10.66	52.78	206	59	Peak

#### <Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5626.95	52.2	50.72	68.2	-16	32.01	6.69	37.22	310	196	Peak
5653.55	51.78	50.29	70.84	-19.06	32.06	6.71	37.28	310	196	Peak
5915.75	51.75	49.9	75.02	-23.27	32.49	6.86	37.5	310	196	Peak
5926.2	52.18	50.3	68.2	-16.02	32.52	6.86	37.5	310	196	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5644.05	52.63	51.17	68.2	-15.57	32.04	6.7	37.28	187	82	Peak
5657.825	53.72	52.29	74.01	-20.29	32.06	6.71	37.34	187	82	Peak
5916.225	53.04	51.19	74.67	-21.63	32.49	6.86	37.5	187	82	Peak
5971.325	52.39	50.45	68.2	-15.81	32.57	6.88	37.51	187	82	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5745 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- 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	Getaz Yang

**<Spurious Emission>**

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5785	102.02	100.48			32.26	6.82	37.54	305	196	Average
5785	111.28	109.74			32.26	6.82	37.54	305	196	Peak
11570	45.56	47.68	54	-8.44	40.13	10.76	53.01	116	66	Average
11570	55	57.12	74	-19	40.13	10.76	53.01	116	66	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5785	106.26	104.72			32.26	6.82	37.54	191	82	Average
5785	114.56	113.02			32.26	6.82	37.54	191	82	Peak
11570	45.86	47.98	54	-8.14	40.13	10.76	53.01	209	58	Average
11570	54.67	56.79	74	-19.33	40.13	10.76	53.01	209	58	Peak

**<Out of Band Emission (OOBE)>**

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5573.275	51.94	50.5	68.2	-16.26	31.92	6.64	37.12	305	196	Peak
5659.725	51.61	50.18	75.42	-23.81	32.06	6.71	37.34	305	196	Peak
5922.875	52.14	50.26	69.77	-17.63	32.52	6.86	37.5	305	196	Peak
6005.525	52.47	50.46	68.2	-15.73	32.63	6.89	37.51	305	196	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5647.375	52.47	51.01	68.2	-15.73	32.04	6.7	37.28	191	82	Peak
5653.55	52.03	50.54	70.84	-18.81	32.06	6.71	37.28	191	82	Peak
5917.65	51.67	49.82	73.62	-21.95	32.49	6.86	37.5	191	82	Peak
5977.025	52.73	50.76	68.2	-15.47	32.6	6.88	37.51	191	82	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5785 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit



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	Getaz Yang

### <Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5825	102.22	100.56			32.35	6.84	37.53	314	189	Average
5825	111.82	110.16			32.35	6.84	37.53	314	189	Peak
11650	45.38	47.69	54	-8.62	40.03	10.8	53.14	114	59	Average
11650	54.18	56.49	74	-19.82	40.03	10.8	53.14	114	59	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5825	106.04	104.38			32.35	6.84	37.53	196	80	Average
5825	113.6	111.94			32.35	6.84	37.53	196	80	Peak
11650	45.55	47.86	54	-8.45	40.03	10.8	53.14	209	59	Average
11650	54.73	57.04	74	-19.27	40.03	10.8	53.14	209	59	Peak

### <Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5646.425	52.34	50.88	68.2	-15.86	32.04	6.7	37.28	314	189	Peak
5654.025	51.44	50.01	71.19	-19.75	32.06	6.71	37.34	314	189	Peak
5923.825	52.05	50.17	69.07	-17.02	32.52	6.86	37.5	314	189	Peak
5930	52.97	51.09	68.2	-15.23	32.52	6.86	37.5	314	189	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5588	52.46	51.01	68.2	-15.74	31.95	6.66	37.16	196	80	Peak
5659.25	51.73	50.3	75.07	-23.34	32.06	6.71	37.34	196	80	Peak
5917.65	51.96	50.11	73.62	-21.66	32.49	6.86	37.5	196	80	Peak
5972.75	52.7	50.73	68.2	-15.5	32.6	6.88	37.51	196	80	Peak

#### Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5825 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

### 802.11n (HT40)

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	Getaz Yang

#### <Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5755	101.08	99.53			32.23	6.79	37.47	277	213	Average
5755	109.14	107.59			32.23	6.79	37.47	277	213	Peak
11510	45.37	47.26	54	-8.63	40.23	10.69	52.81	111	67	Average
11510	55.52	57.41	74	-18.48	40.23	10.69	52.81	111	67	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5755	104.21	102.66			32.23	6.79	37.47	199	79	Average
5755	113.31	111.76			32.23	6.79	37.47	199	79	Peak
11510	45.27	47.16	54	-8.73	40.23	10.69	52.81	200	44	Average
11510	55.52	57.41	74	-18.48	40.23	10.69	52.81	200	44	Peak

#### <Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5641.2	56.87	55.41	68.2	-11.33	32.04	6.7	37.28	277	213	Peak
5658.3	60.62	59.19	74.36	-13.74	32.06	6.71	37.34	277	213	Peak
5920.025	50.67	48.82	71.87	-21.2	32.49	6.86	37.5	277	213	Peak
6012.175	53.3	51.24	68.2	-14.9	32.67	6.89	37.5	277	213	Peak

Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5641.2	63.64	62.18	68.2	-4.56	32.04	6.7	37.28	199	79	Peak
5657.825	63.09	61.66	74.01	-10.92	32.06	6.71	37.34	199	79	Peak
5920.975	53.22	51.37	71.17	-17.95	32.49	6.86	37.5	199	79	Peak
5972.75	53.11	51.14	68.2	-15.09	32.6	6.88	37.51	199	79	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5755 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

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	Getaz Yang

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5795	101.2	99.62			32.29	6.83	37.54	318	198	Average
5795	109.96	108.38			32.29	6.83	37.54	318	198	Peak
11590	45.23	47.35	54	-8.77	40.11	10.78	53.01	119	56	Average
11590	54.41	56.53	74	-19.59	40.11	10.78	53.01	119	56	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5795	103.9	102.32			32.29	6.83	37.54	193	77	Average
5795	113.28	111.7			32.29	6.83	37.54	193	77	Peak
11590	45.02	47.14	54	-8.98	40.11	10.78	53.01	215	64	Average
11590	54.21	56.33	74	-19.79	40.11	10.78	53.01	215	64	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5645.95	55.33	53.87	68.2	-12.87	32.04	6.7	37.28	318	198	Peak
5659.25	53.45	52.02	75.07	-21.62	32.06	6.71	37.34	318	198	Peak
5920.025	54.28	52.43	71.87	-17.59	32.49	6.86	37.5	318	198	Peak
5931.425	53.2	51.32	68.2	-15	32.52	6.86	37.5	318	198	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5642.15	57.78	56.32	68.2	-10.42	32.04	6.7	37.28	193	77	Peak
5656.4	55.87	54.44	72.95	-17.08	32.06	6.71	37.34	193	77	Peak
5922.875	57.81	55.93	69.77	-11.96	32.52	6.86	37.5	193	77	Peak
5930	55.23	53.35	68.2	-12.97	32.52	6.86	37.5	193	77	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5795 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

802.11ac (VHT80)

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	Getaz Yang

<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5775	99.39	97.82			32.26	6.81	37.5	306	198	Average
5775	108.23	106.66			32.26	6.81	37.5	306	198	Peak
11550	45.69	47.73	54	-8.31	40.16	10.74	52.94	119	64	Average
11550	54.69	56.73	74	-19.31	40.16	10.74	52.94	119	64	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5775	100.57	99			32.26	6.81	37.5	186	78	Average
5775	109.52	107.95			32.26	6.81	37.5	186	78	Peak
11550	45.7	47.74	54	-8.3	40.16	10.74	52.94	200	55	Average
11550	54.95	56.99	74	-19.05	40.16	10.74	52.94	200	55	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5626.475	66.06	64.58	68.2	-2.14	32.01	6.69	37.22	306	198	Peak
5651.65	65.87	64.38	69.43	-3.56	32.06	6.71	37.28	306	198	Peak
5922.875	65.18	63.3	69.77	-4.59	32.52	6.86	37.5	306	198	Peak
5927.15	66.86	64.98	68.2	-1.34	32.52	6.86	37.5	306	198	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5619.825	67.66	66.18	68.2	-0.54	32.01	6.69	37.22	186	78	Peak
5659.25	68.5	67.07	75.07	-6.57	32.06	6.71	37.34	186	78	Peak
5915.75	65.56	63.71	75.02	-9.46	32.49	6.86	37.5	186	78	Peak
5927.625	67.58	65.7	68.2	-0.62	32.52	6.86	37.5	186	78	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5775 MHz: Fundamental Frequency
- \*: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit

**9 kHz ~ 30 MHz Data:**

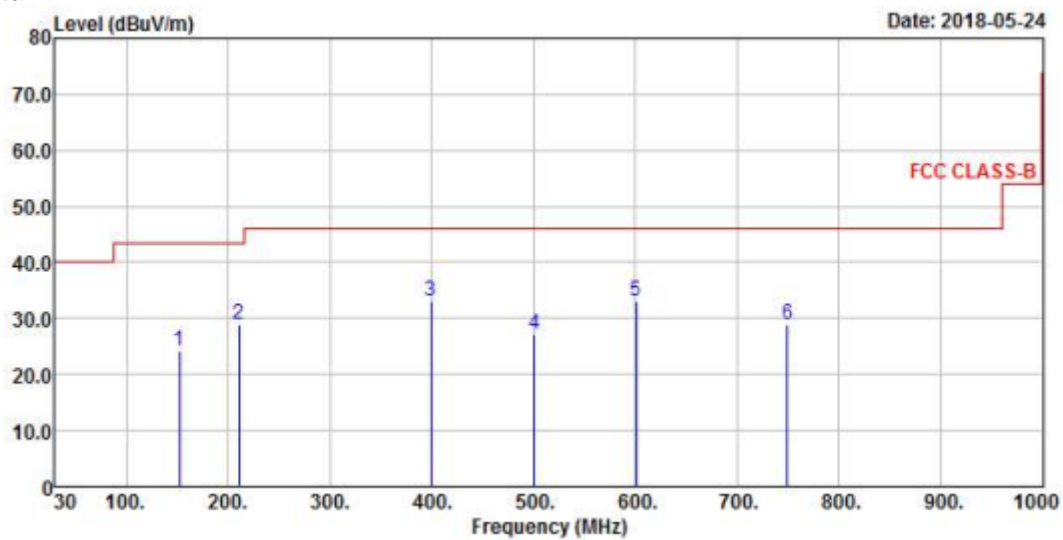
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

**30 MHz ~ 1 GHz Worst-Case Data:**

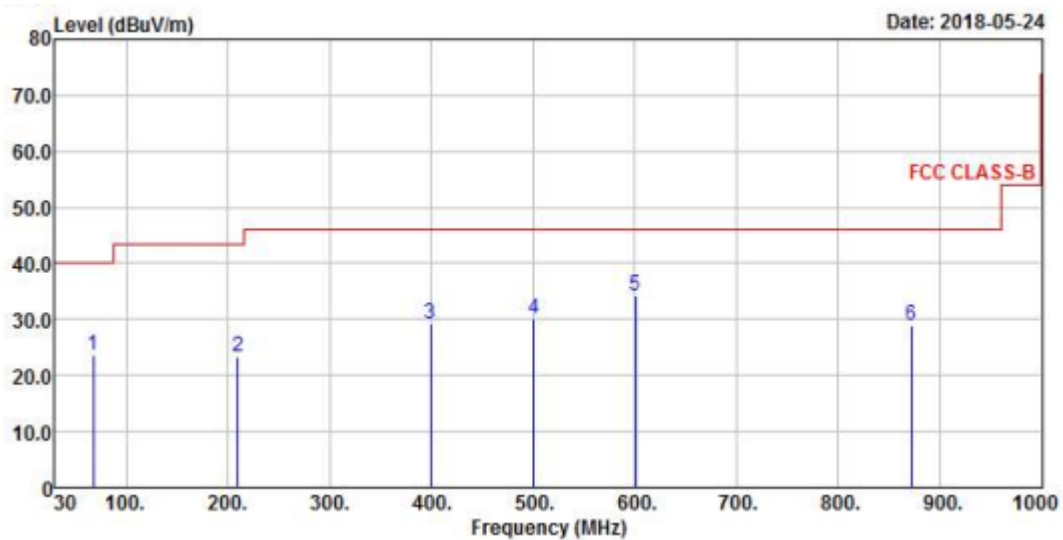
**802.11ac (VHT80)**

EUT Test Condition		Measurement Detail	
Channel	Channel 155	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

**Horizontal**



**Vertical**



**Antenna Polarity & Test Distance: Horizontal at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
152.22	24.17	42.13	43.5	-19.33	12.71	0.99	31.66	106	255	Peak
210.42	28.86	49.36	43.5	-14.64	9.81	1.28	31.59	134	112	Peak
399.57	33.2	47.91	46	-12.8	15.33	2.09	32.13	100	343	Peak
500.45	27.07	38.84	46	-18.93	17.33	2.52	31.62	149	224	Peak
600.36	32.98	42.72	46	-13.02	19.61	2.9	32.25	132	174	Peak
749.74	28.9	35.17	46	-17.1	21.52	3.51	31.3	147	113	Peak

**Antenna Polarity & Test Distance: Vertical at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
67.83	23.68	43.78	40	-16.32	11	0.63	31.73	143	11	Peak
209.45	23.4	43.96	43.5	-20.1	9.77	1.28	31.61	140	120	Peak
399.57	29.14	43.85	46	-16.86	15.33	2.09	32.13	112	154	Peak
500.45	30.21	41.98	46	-15.79	17.33	2.52	31.62	141	359	Peak
600.36	34.18	43.92	46	-11.82	19.61	2.9	32.25	148	257	Peak
871.96	28.96	33.87	46	-17.04	23.15	3.94	32	102	81	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

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

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

### 4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The test was performed in HwaYa Shielded Room 1.  
 3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 Test Procedures

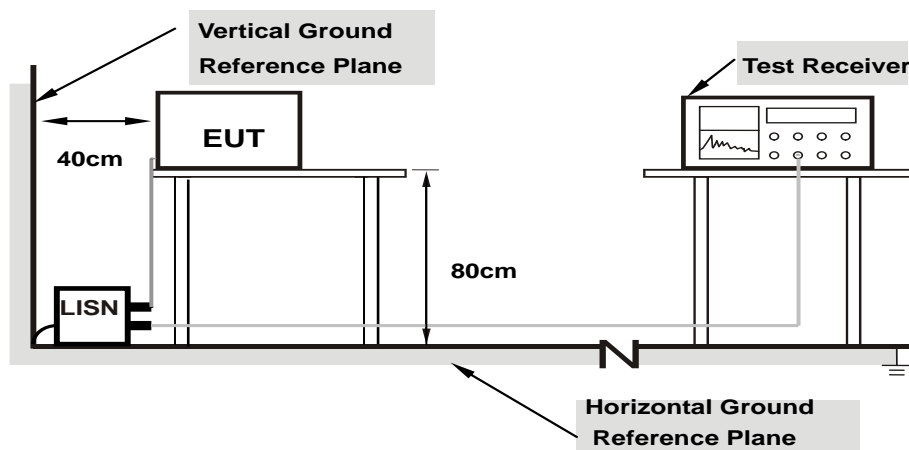
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



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

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

#### 4.2.6 EUT Operating Conditions

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



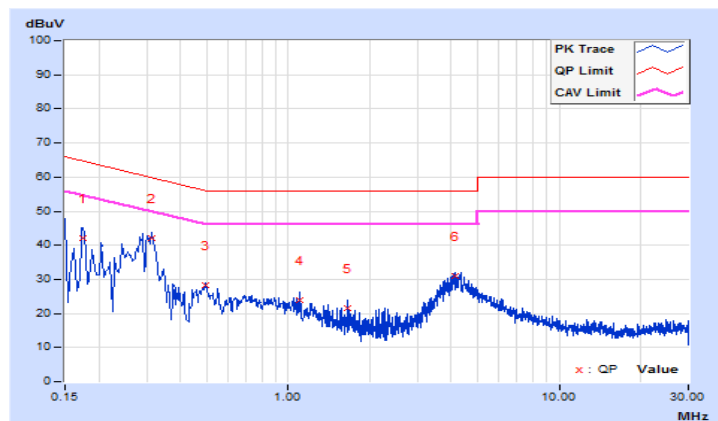
#### 4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2018/5/25

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17374	10.10	31.90	18.17	42.00	28.27	64.78	54.78	-22.78	-26.51
2	0.31422	10.11	32.06	20.74	42.17	30.85	59.86	49.86	-17.69	-19.01
3	0.49799	10.12	18.24	2.91	28.36	13.03	56.03	46.03	-27.67	-33.00
4	1.09622	10.15	13.67	0.49	23.82	10.64	56.00	46.00	-32.18	-35.36
5	1.64753	10.17	11.22	0.64	21.39	10.81	56.00	46.00	-34.61	-35.19
6	4.12647	10.29	20.54	9.48	30.83	19.77	56.00	46.00	-25.17	-26.23

Remarks:

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

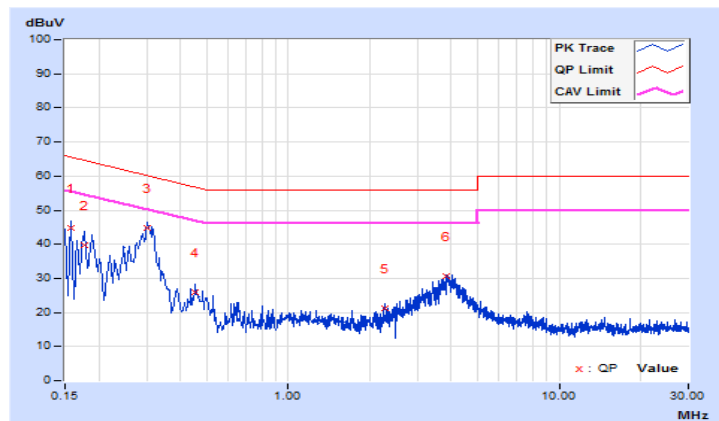


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2018/5/25

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	10.10	34.57	17.57	44.67	27.67	65.58	55.58	-20.91	-27.91
2	0.17744	10.10	29.65	14.53	39.75	24.63	64.60	54.60	-24.85	-29.97
<b>3</b>	<b>0.30249</b>	<b>10.11</b>	<b>34.52</b>	<b>17.75</b>	<b>44.63</b>	<b>27.86</b>	<b>60.17</b>	<b>50.17</b>	<b>-15.54</b>	<b>-22.31</b>
4	0.45498	10.12	15.72	3.94	25.84	14.06	56.78	46.78	-30.94	-32.72
5	2.28877	10.19	11.12	0.26	21.31	10.45	56.00	46.00	-34.69	-35.55
6	3.80976	10.26	20.40	8.32	30.66	18.58	56.00	46.00	-25.34	-27.42

Remarks:

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



### 4.3 Transmit Power Measurement

#### 4.3.1 Limits of Transmit Power Measurement

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

\*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

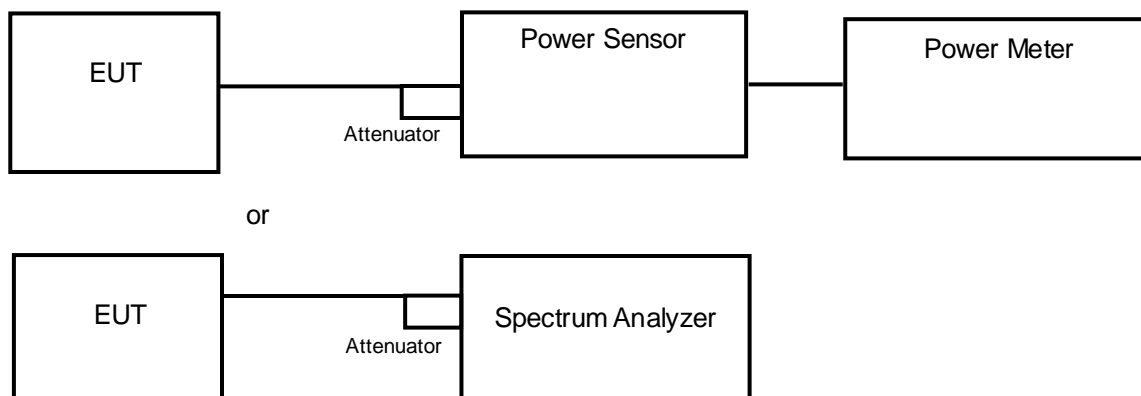
Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  MHz for any  $N_{ANT}$ ;

Array Gain =  $5 \log(N_{ANT}/N_{SS})$  dB or 3 dB, whichever is less for 20 MHz channel widths with  $N_{ANT} \geq 5$ .

For power measurements on all other devices: Array Gain =  $10 \log(N_{ANT}/N_{SS})$  dB.

#### 4.3.2 Test Setup

##### <Power Output Measurement>



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

##### **Average Power Measurement**

<802.11a, 802.11n (HT20), 802.11n (HT40)>

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

<802.11ac (VHT80)>

- a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- b. Set sweep trigger to "free run".
- c. Set RBW = 1 MHz.
- d. Set VBW  $\geq$  3 MHz
- e. Number of points in sweep  $\geq$  2 Span / RBW.
- f. Sweep time  $\leq$  (number of points in sweep) \* T
- g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
- h. Detector = RMS.
- i. Trace mode = max hold.
- j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

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

#### 4.3.7 Test Result

##### Power Output:

##### 802.11a

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	19.43	20.24	193.382	22.86	30	Pass
157	5785	18.98	20.31	186.467	22.71	30	Pass
165	5825	18.85	20.13	179.775	22.55	30	Pass

##### 802.11n (HT20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	19.40	20.25	193.021	22.86	30	Pass
157	5785	18.93	20.34	186.306	22.70	30	Pass
165	5825	18.42	20.11	172.067	22.36	30	Pass

##### 802.11n (HT40)

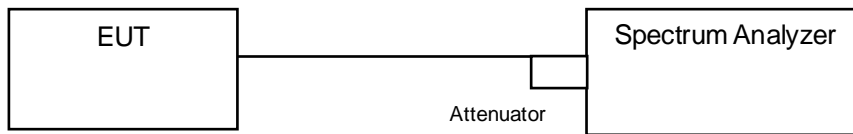
Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	19.58	20.47	202.211	23.06	30	Pass
159	5795	19.01	20.45	190.533	22.80	30	Pass

##### 802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	17.35	18.26	121.313	20.84	30	Pass

## 4.4 Occupied Bandwidth Measurement

### 4.4.1 Test Setup



### 4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.4.3 Test Procedure

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

#### 4.4.4 Test Results

##### 802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	17.89	17.59
157	5785	17.12	17.21
165	5825	16.93	17.04

##### 802.11n (HT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	18.17	18.07
157	5785	17.98	17.98
165	5825	17.89	17.88

##### 802.11n (HT40)

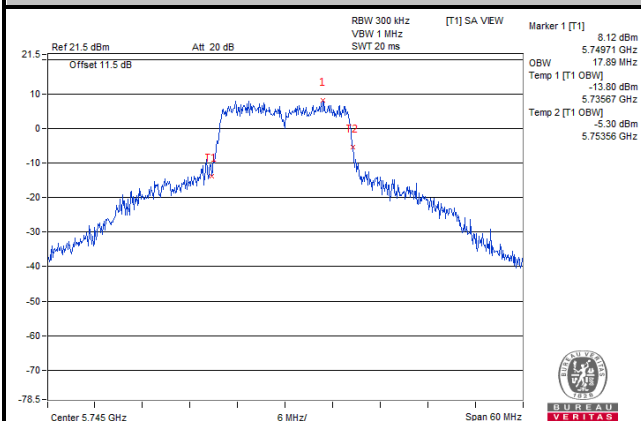
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
151	5755	37.31	37.31
159	5795	37.02	37.11

##### 802.11ac (VHT80)

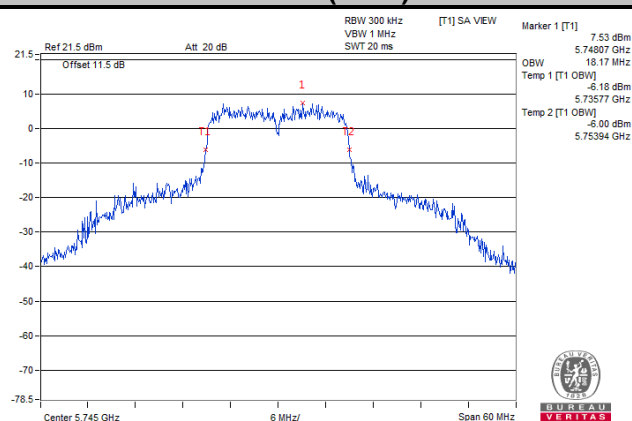
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
155	5775	75.77	76.15

### Spectrum Plot of Worst Value

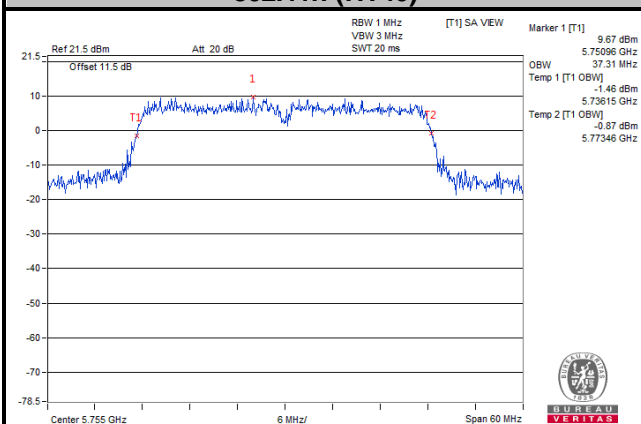
#### 802.11a



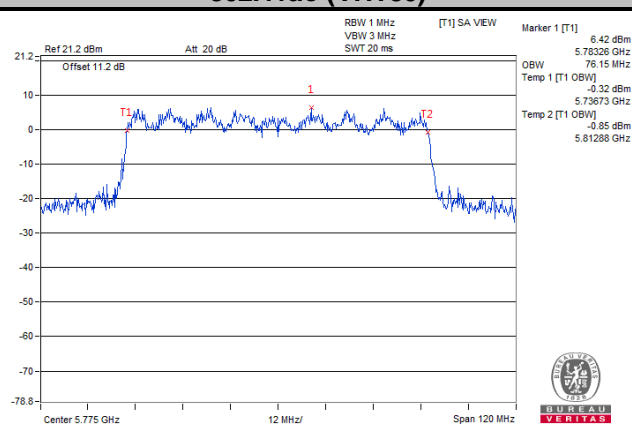
#### 802.11n (HT20)



#### 802.11n (HT40)



#### 802.11ac (VHT80)



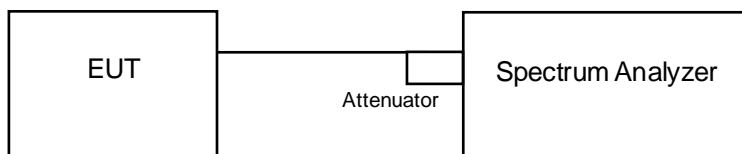


## 4.5 Peak Power Spectral Density Measurement

### 4.5.1 Limits of Peak Power Spectral Density Measurement

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

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

### 4.5.4 Test Procedures

#### ✳️ For U-NII-3: with duty cycle

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

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Conditions

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

#### 4.5.7 Test Results

##### 802.11a

TX Chain	Channel	Frequency (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	149	5745	-5.16	-2.94	3.01	0.28	0.35	29.66	Pass
	157	5785	-5.12	-2.90	3.01	0.28	0.39	29.66	Pass
	165	5825	-5.43	-3.21	3.01	0.28	0.08	29.66	Pass
1	149	5745	-4.08	-1.86	3.01	0.28	1.43	29.66	Pass
	157	5785	-4.54	-2.32	3.01	0.28	0.97	29.66	Pass
	165	5825	-4.43	-2.21	3.01	0.28	1.08	29.66	Pass

**Note:**

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = 3.33 dBi + 10log(2) = 6.34 dBi > 6 dBi , so the power density limit shall be reduced to 30-(6.34-6) = 29.66 dBm.
- RBW / VBW = 300kHz / 1MHz, PSD(dBm/500kHz) = PSD(dBm/300kHz) + 10\*log(500kHz/300kHz) = PSD(dBm/300kHz) + 2.22dB
- Refer to section 3.3 for duty cycle spectrum plot.

##### 802.11n (HT20)

TX Chain	Channel	Frequency (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	149	5745	-5.23	-3.01	3.01	0.35	0.35	29.66	Pass
	157	5785	-5.55	-3.33	3.01	0.35	0.03	29.66	Pass
	165	5825	-5.78	-3.56	3.01	0.35	-0.20	29.66	Pass
1	149	5745	-3.96	-1.74	3.01	0.35	1.62	29.66	Pass
	157	5785	-4.22	-2.00	3.01	0.35	1.36	29.66	Pass
	165	5825	-4.37	-2.15	3.01	0.35	1.21	29.66	Pass

**Note:**

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = 3.33 dBi + 10log(2) = 6.34 dBi > 6 dBi , so the power density limit shall be reduced to 30-(6.34-6) = 29.66 dBm.
- RBW / VBW = 300kHz / 1MHz, PSD(dBm/500kHz) = PSD(dBm/300kHz) + 10\*log(500kHz/300kHz) = PSD(dBm/300kHz) + 2.22dB
- RBW / VBW = 300kHz / 1MHz, PSD(dBm/500kHz) = PSD(dBm/300kHz) + 10\*log(500kHz/300kHz) = PSD(dBm/300kHz) + 2.22dB
- Refer to section 3.3 for duty cycle spectrum plot.

### 802.11n (HT40)

TX Chain	Channel	Frequency (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	151	5755	-9.09	-6.87	3.01	0.91	-2.95	29.66	Pass
	159	5795	-9.76	-7.54	3.01	0.91	-3.62	29.66	Pass
1	151	5755	-8.13	-5.91	3.01	0.91	-1.99	29.66	Pass
	159	5795	-8.47	-6.25	3.01	0.91	-2.33	29.66	Pass

**Note:**

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = 3.33 dBi + 10log(2) = 6.34 dBi > 6 dBi , so the power density limit shall be reduced to 30-(6.34-6) = 29.66 dBm.
- RBW / VBW = 300kHz / 1MHz, PSD(dBm/500kHz) = PSD(dBm/300kHz) + 10\*log(500kHz/300kHz) = PSD(dBm/300kHz) + 2.22dB
- Refer to section 3.3 for duty cycle spectrum plot.

### 802.11ac (VHT80)

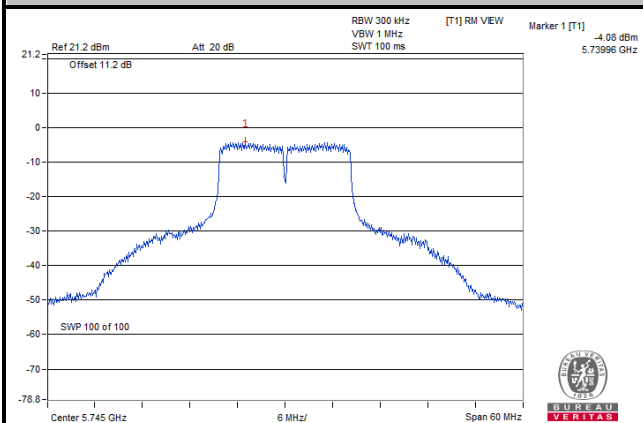
TX Chain	Channel	Frequency (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	155	5775	-13.64	-11.42	3.01	0.69	-7.72	29.66	Pass
1	155	5775	-12.22	-10.00	3.01	0.69	-6.30	29.66	Pass

**Note:**

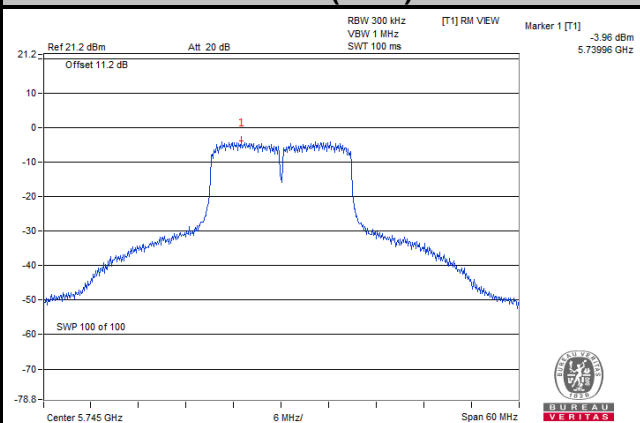
- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = 3.33 dBi + 10log(2) = 6.34 dBi > 6 dBi , so the power density limit shall be reduced to 30-(6.34-6) = 29.66 dBm.
- RBW / VBW = 300kHz / 1MHz, PSD(dBm/500kHz) = PSD(dBm/300kHz) + 10\*log(500kHz/300kHz) = PSD(dBm/300kHz) + 2.22dB
- Refer to section 3.3 for duty cycle spectrum plot.

### Spectrum Plot of Worst Value

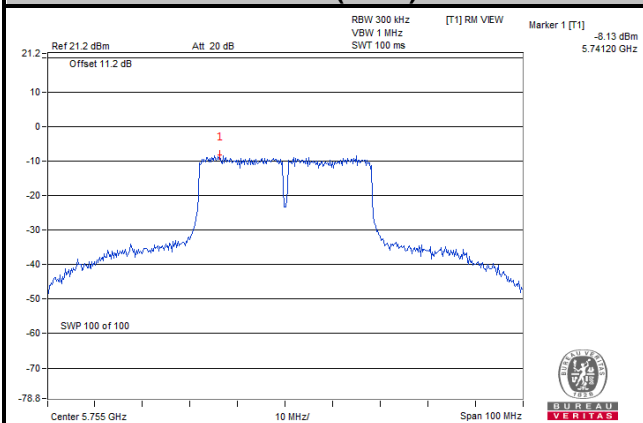
#### 802.11a



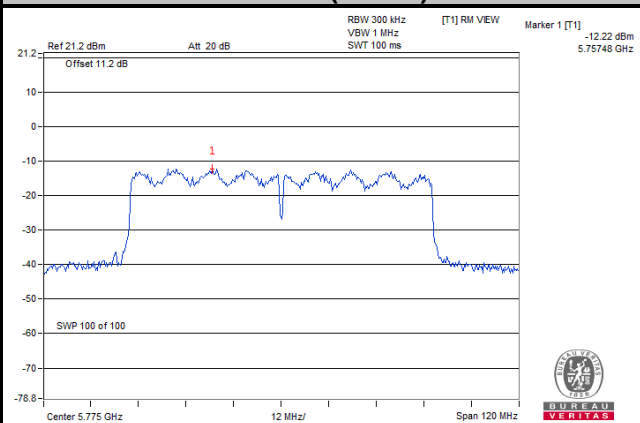
#### 802.11n (HT20)



#### 802.11n (HT40)



#### 802.11ac (VHT80)

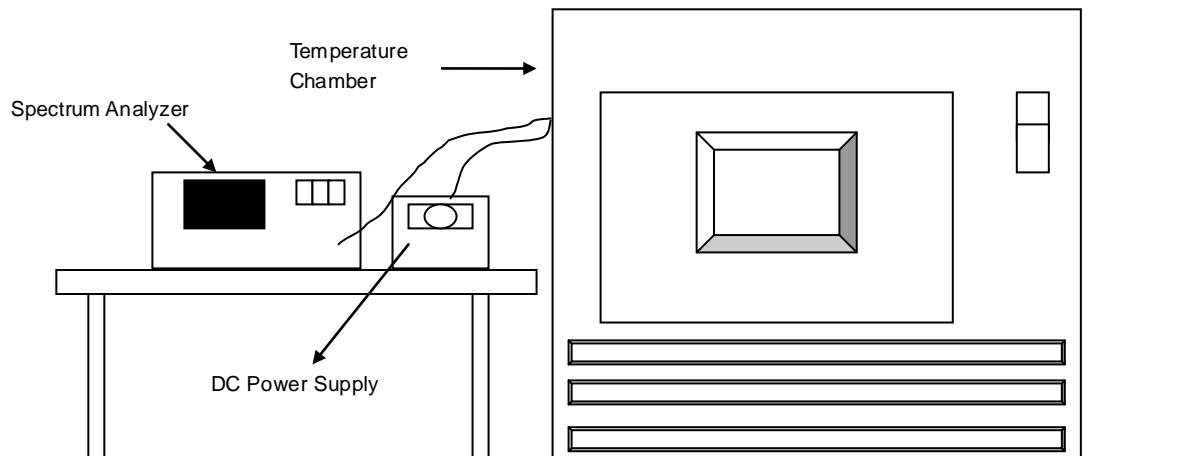


## 4.6 Frequency Stability

### 4.6.1 Limit of Frequency Stability Measurement

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

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

### 4.6.4 Test Procedure

- To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
- The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10 dB lower than the measured peak value.
- The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

### 4.6.5 Deviation from Test Standard

No deviation.

### 4.6.6 EUT Operating Condition

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

#### 4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5745 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
40	12	5745.0207	3.60000	5745.0246	4.28000	5745.0253	4.40000	5745.0242	4.21000
30	12	5745.0017	0.30000	5745.0041	0.71000	5745.0048	0.84000	5745.0019	0.33000
20	12	5744.9806	-3.38000	5744.9828	-2.99000	5744.9825	-3.05000	5744.9829	-2.98000
10	12	5744.9956	-0.77000	5744.9906	-1.64000	5744.994	-1.04000	5744.9919	-1.41000
0	12	5745.02	3.48000	5745.0193	3.36000	5745.0197	3.43000	5745.016	2.79000

Frequency Stability Versus Temp.									
Operating Frequency: 5745 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
20	13.8	5744.98	-3.48000	5744.9839	-2.80000	5744.9817	-3.19000	5744.984	-2.79000
	12	5744.9806	-3.38000	5744.9828	-2.99000	5744.9825	-3.05000	5744.9829	-2.98000
	10.2	5744.9795	-3.57000	5744.9834	-2.89000	5744.9818	-3.17000	5744.9827	-3.01000

## 4.7 6 dB Bandwidth Measurement

### 4.7.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

### 4.7.2 Test Setup



### 4.7.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

### 4.7.4 Test Procedure

#### MEASUREMENT PROCEDURE REF

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

### 4.7.5 Deviation from Test Standard

No deviation.

### 4.7.6 EUT Operating Condition

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

## 4.7.7 Test Results

## 802.11a

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	15.71	15.73	0.5	Pass
157	5785	15.72	15.87	0.5	Pass
165	5825	15.73	16.09	0.5	Pass

## 802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.61	16.34	0.5	Pass
157	5785	16.60	16.33	0.5	Pass
165	5825	16.60	16.35	0.5	Pass

## 802.11n (HT40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.79	35.56	0.5	Pass
159	5795	35.77	35.80	0.5	Pass

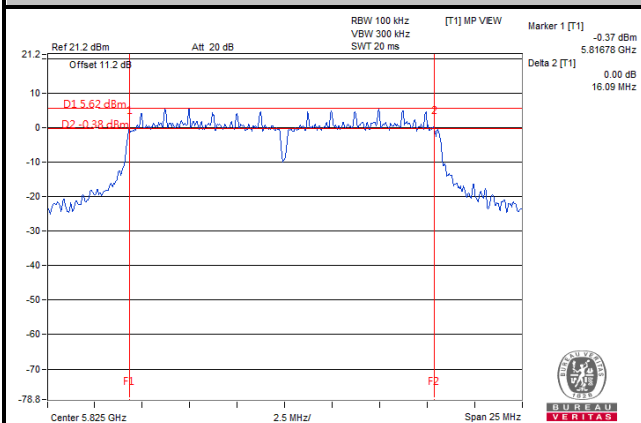
## 802.11ac (VHT80)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.30	75.39	0.5	Pass

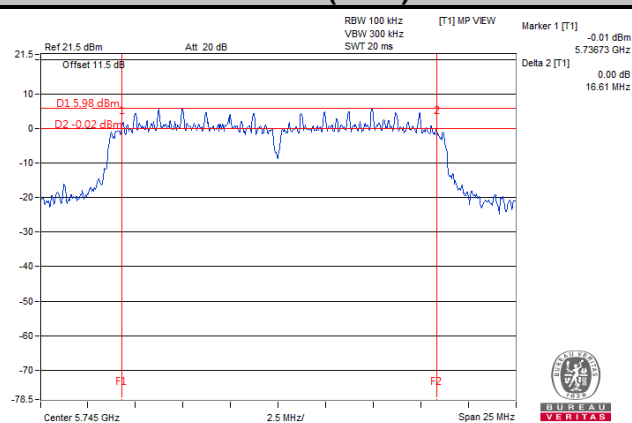


### Spectrum Plot of Worst Value

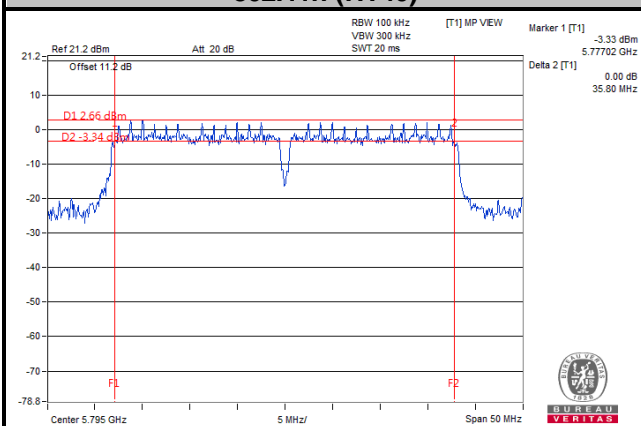
#### 802.11a



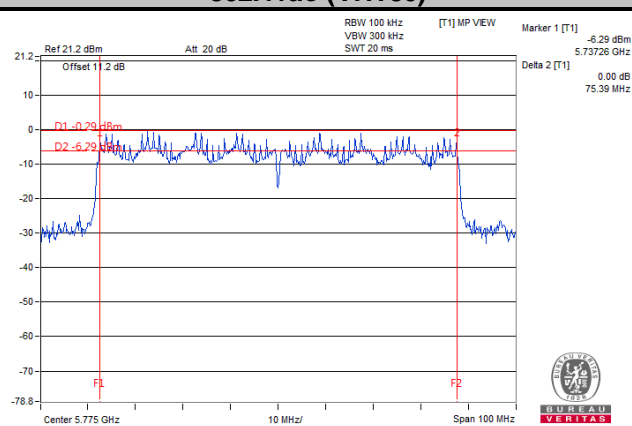
#### 802.11n (HT20)



#### 802.11n (HT40)



#### 802.11ac (VHT80)

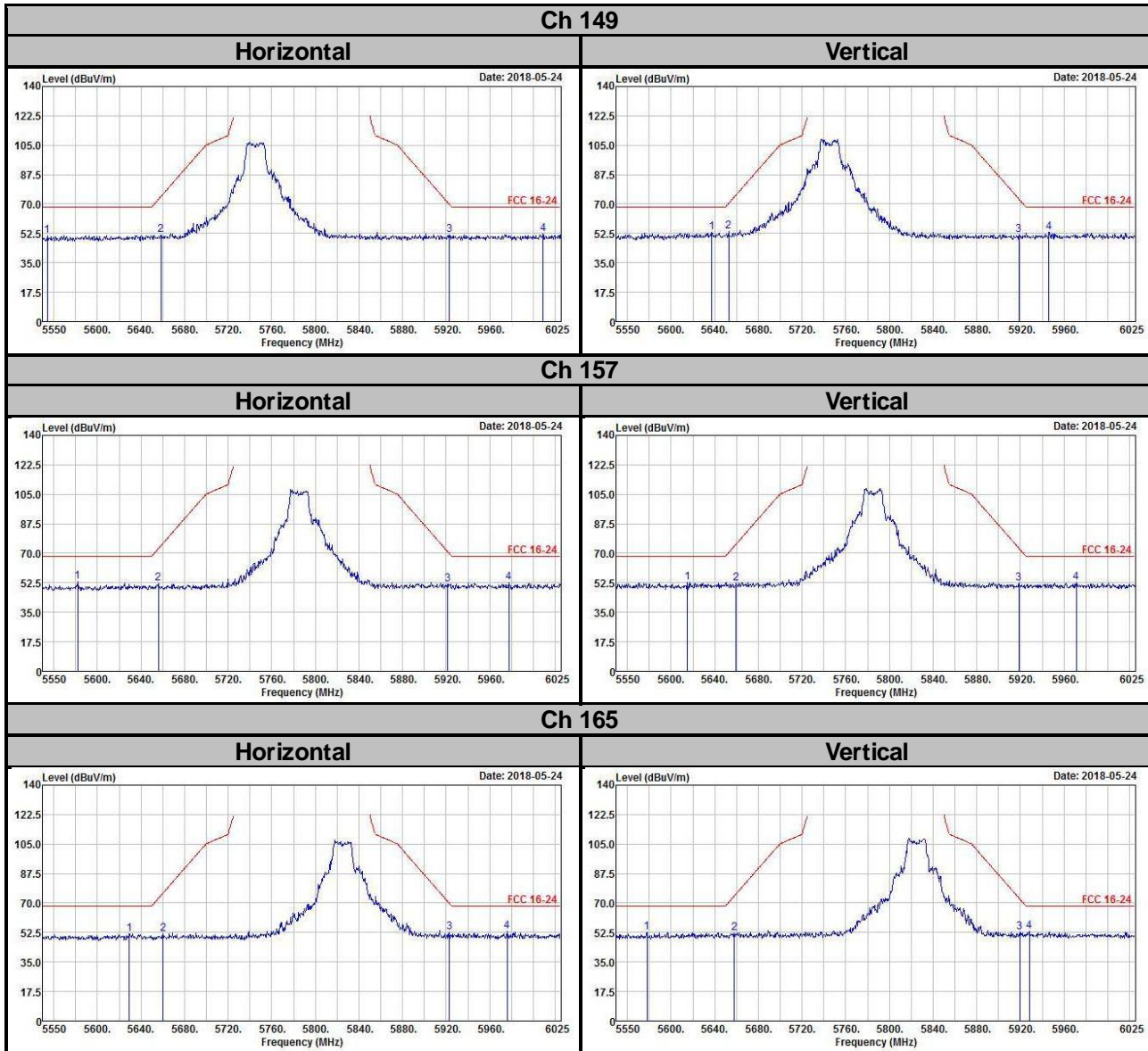


## 5 Pictures of Test Arrangements

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

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

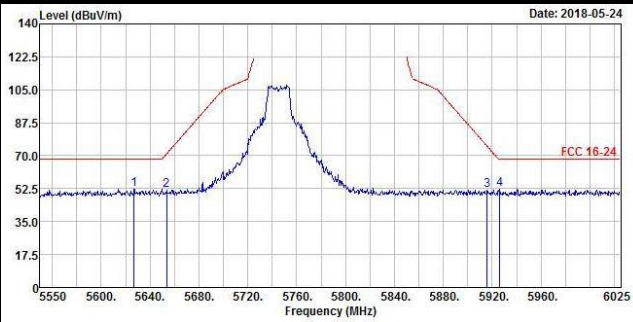
## 802.11a



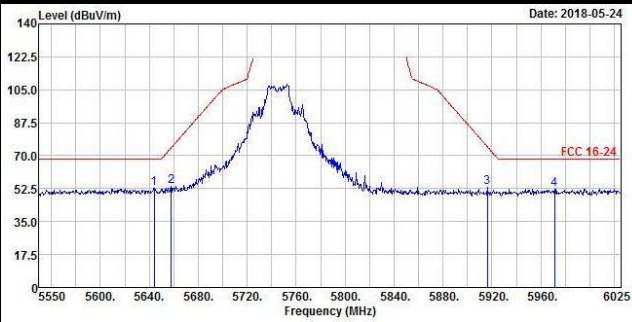
802.11n (HT20)

Ch 149

Horizontal

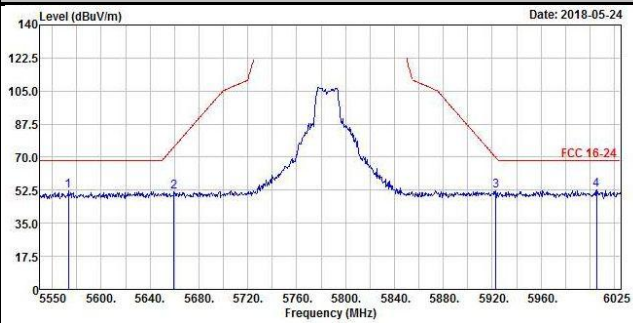


Vertical

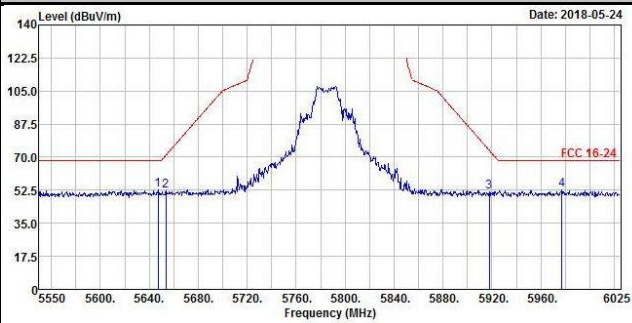


Ch 157

Horizontal

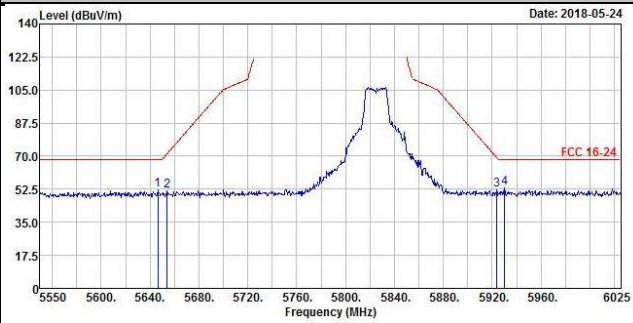


Vertical

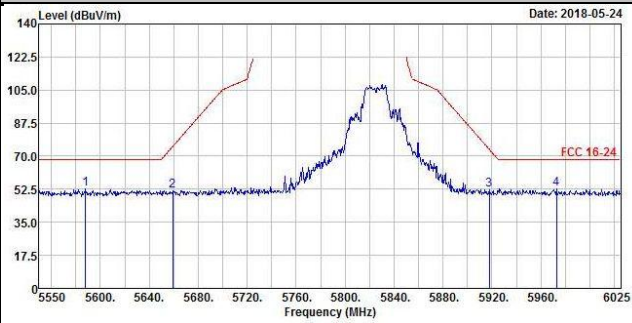


Ch 165

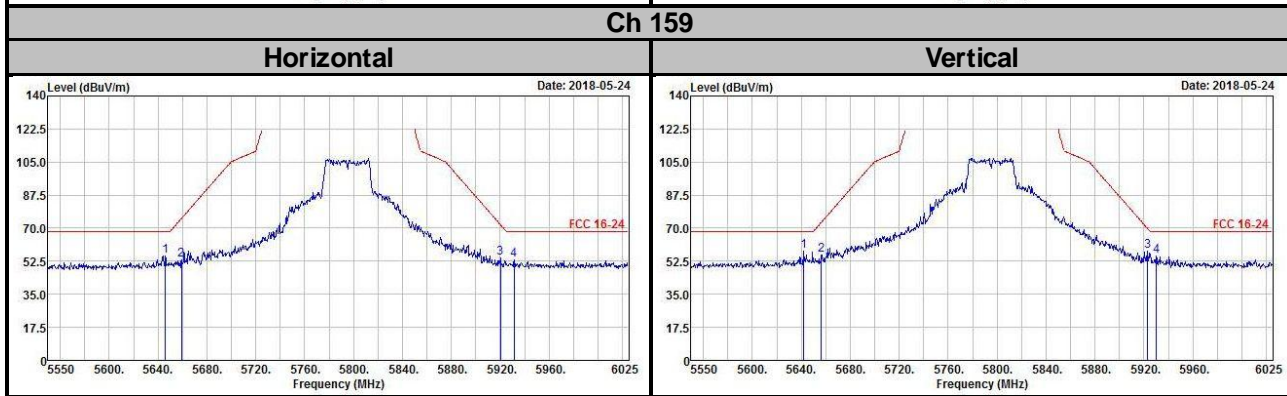
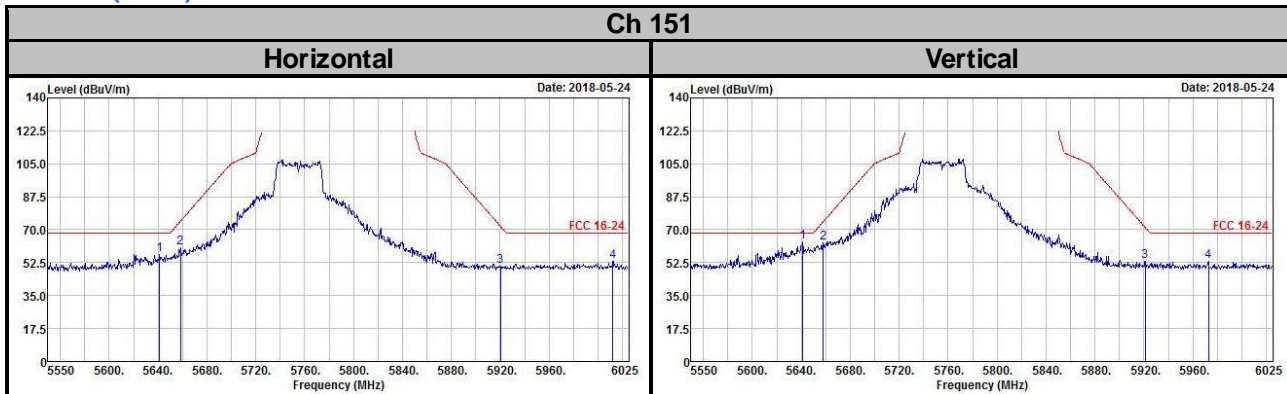
Horizontal



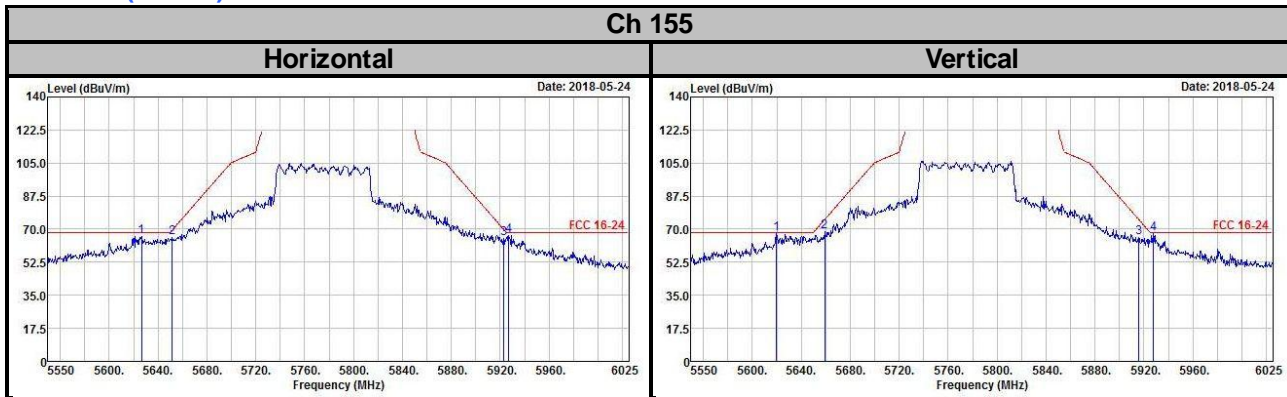
Vertical



### 802.11n (HT40)



### 802.11ac (VHT80)



## Appendix – Information on 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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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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

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