



# FCC RF Test Report

**APPLICANT** : Lenovo (Shanghai) Electronics Technology Co., Ltd.  
**EQUIPMENT** : Portable Tablet Computer  
**BRAND NAME** : Lenovo  
**MODEL NAME** : Lenovo YT-X703X  
**FCC ID** : O57YTX703X  
**STANDARD** : FCC Part 15 Subpart E §15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure

The product was received on Jul. 04, 2016 and testing was completed on Jul. 31, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

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Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL (KUNSHAN) INC.**  
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China



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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤15.407(b)(4)(i) &15.209(a)	Pass	Under limit 6.24 dB at 249.220 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 9.61 dB at 0.600 MHz
3.6	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-



# 1 General Description

## 1.1 Applicant

**Lenovo (Shanghai) Electronics Technology Co., Ltd.**

NO.68 BUILDING, 199 FENJU RD, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

## 1.2 Manufacturer

**Lenovo PC HK Limited**

23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
<b>Equipment</b>	Portable Tablet Computer
<b>Brand Name</b>	Lenovo
<b>Model Name</b>	Lenovo YT-X703X
<b>FCC ID</b>	O57YTX703X
<b>EUT supports Radios application</b>	GPRS/EGPRS/WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ WLAN 5GHz 802.11a/n HT20/HT40/ WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/
<b>IMEI Code</b>	Conducted: 861688030009815 Radiation: 861688030009773 Conduction: N/A
<b>HW Version</b>	Lenovo Tablet YT-X703X
<b>SW Version</b>	YT-X703X_160914
<b>EUT Stage</b>	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



### 1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
<b>Tx/Rx Channel Frequency Range</b>	5745 MHz ~ 5825 MHz
<b>Maximum Output Power</b>	802.11a : 11.34 dBm / 0.0136 W 802.11n HT20 : 9.76 dBm / 0.0095 W 802.11n HT40 : 10.34 dBm / 0.0108 W 802.11ac VHT20: 9.94 dBm / 0.0099 W 802.11ac VHT40: 10.32 dBm / 0.0108 W 802.11ac VHT80: 10.00 dBm / 0.0100 W
<b>99% Occupied Bandwidth</b>	802.11a : 18.58 MHz 802.11n HT20 : 19.18 MHz 802.11n HT40 : 36.66 MHz 802.11ac VHT20: 19.18 MHz 802.11ac VHT40: 36.76 MHz 802.11ac VHT80: 74.69 MHz
<b>Antenna Type / Gain</b>	PIFA Antenna with gain 1.1 dBi
<b>Type of Modulation</b>	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

### 1.5 Component List

**Note:** there are two types of EUT, the details refer the following table. According to the difference, we evaluate it is not affect RF performance, so only choose sample 1 to perform RF test.

Component	Sample 1	Sample 2
<b>Battery</b>	Sunwoda: L16D3K31 3.75 Vdc, 9300 mAh	SCUD: L16D3K31 3.75 Vdc, 9300 mAh
<b>Rear Camera</b>	Qtech: F5695AK	AVC: CCBFL05006
<b>LCM+TP ASM</b>	Ofilm : AUO 10.1 WQXGA IPS+10.1 inch GFF Direct bounding + S7813	GIS : Innolux 10.1 WQXGA IPS+10.1 inch GFF Direct bounding + S7813
<b>DRAM</b>	Samsung: K3QF4F40BM-FGCF	Hynix: H9CKNNNDATMUPR-NUH
<b>EMMC</b>	Samsung: KLMCG4JENB-B041	Toshiba: THGBMFG8C2LBAIL



### 1.6 Modification of EUT

No modifications are made to the EUT during all test items.

### 1.7 Testing Location

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.			
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
<b>Test Site No.</b>	<b>Sporton Site No.</b>			<b>FCC Registration No.</b>
	TH01-KS	CO01-KS	03CH03-KS	306251

**Note:** The test site complies with ANSI C63.4 2014 requirement.

### 1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02
- ♦ ANSI C63.10-2013

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



## 2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in four orthogonal panels, X, Y, Z and laptop. The worst cases were recorded in this report.

### 2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5745 MHz ~ 5825 MHz Band 4 (U-NII-3)	149	5745	157	5785
	<b>151</b>	<b>5755</b>	<b>159</b>	<b>5795</b>
	153	5765	165	5825
	155	5775		

**Note:** The above Frequency and Channel in boldface were 802.11n HT40.



## 2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

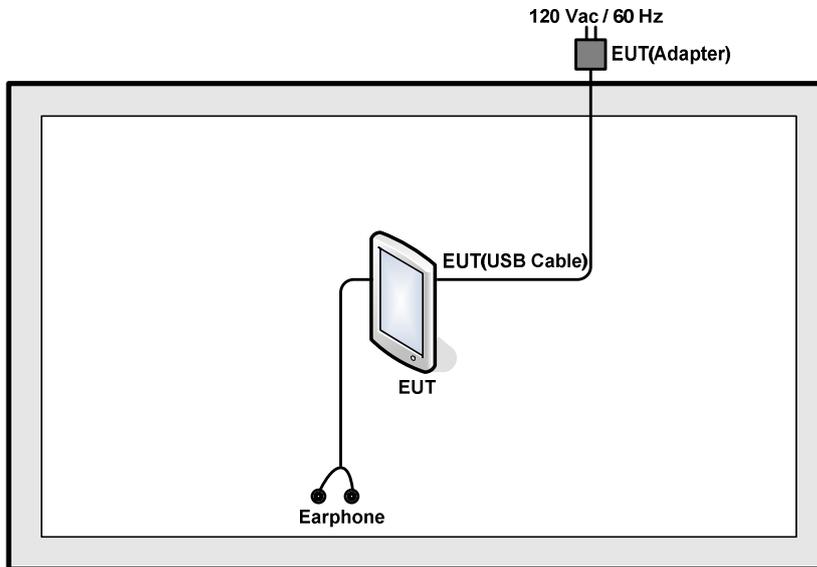
<b>AC Conducted Emission</b>	<p>Mode 1 : GPRS850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 12V) + Battery 1 + Earphone for Sample 1</p> <p>Mode 2 : <b>GPRS850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 5.2V) + Battery 2 + Earphone for Sample 2</b></p>
<b>Remark:</b>	
<ol style="list-style-type: none"> <li>For Radiated TCs, the tests were performed with adapter, earphone, USB cable and battery 1 for Sample 1.</li> <li>The worst case of conducted emission is mode 2; only the test data of it was reported.</li> </ol>	

Ch. #		Band IV : 5745 ~ 5825 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

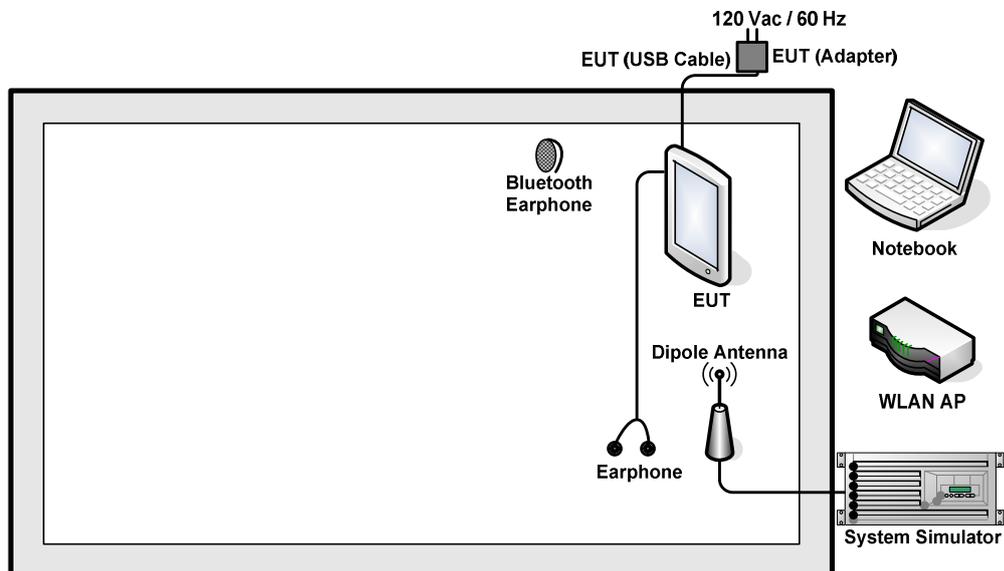
Ch. #		Band IV : 5745 ~ 5825 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

## 2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>





## 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
3.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Lenovo	LBH505	N/A	N/A	N/A
5.	Earphone	Lenovo	LH102	N/A	Unshielded, 1.2 m	N/A
6.	DC Power Supply	GW INSTEK	GPD-2303S	N/A	N/A	Unshielded, 1.8 m

## 2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the Notebook under large package sizes transmission.

## 2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 6.5 dB

Offset (dB) = RF cable loss(dB).

= 6.5 (dB)

### 3 Test Result

#### 3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

##### 3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

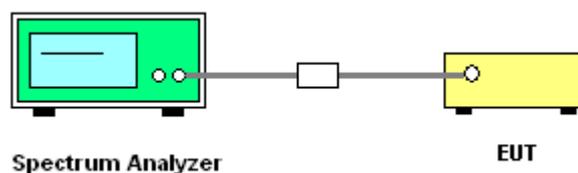
##### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

##### 3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.  
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

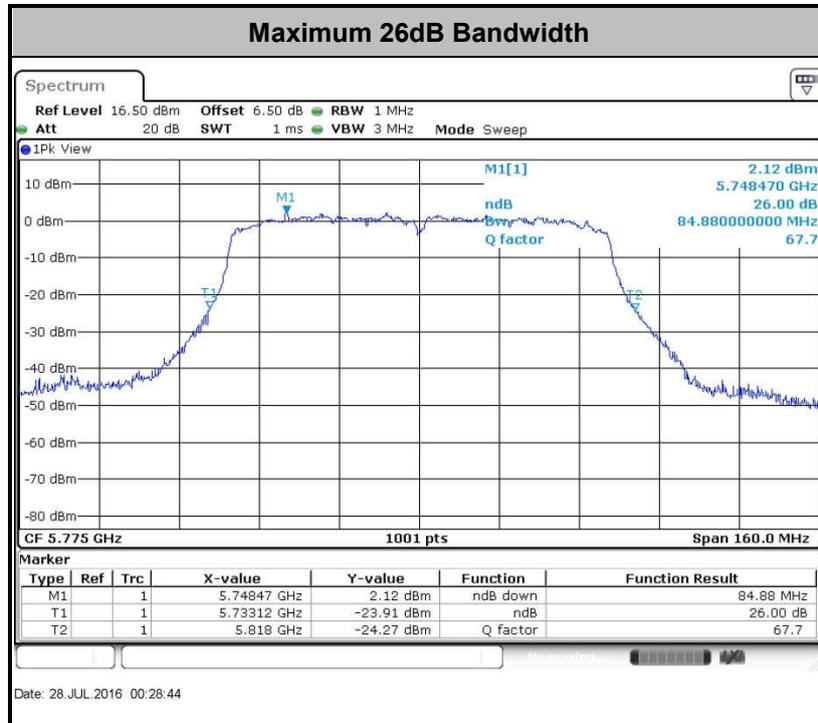
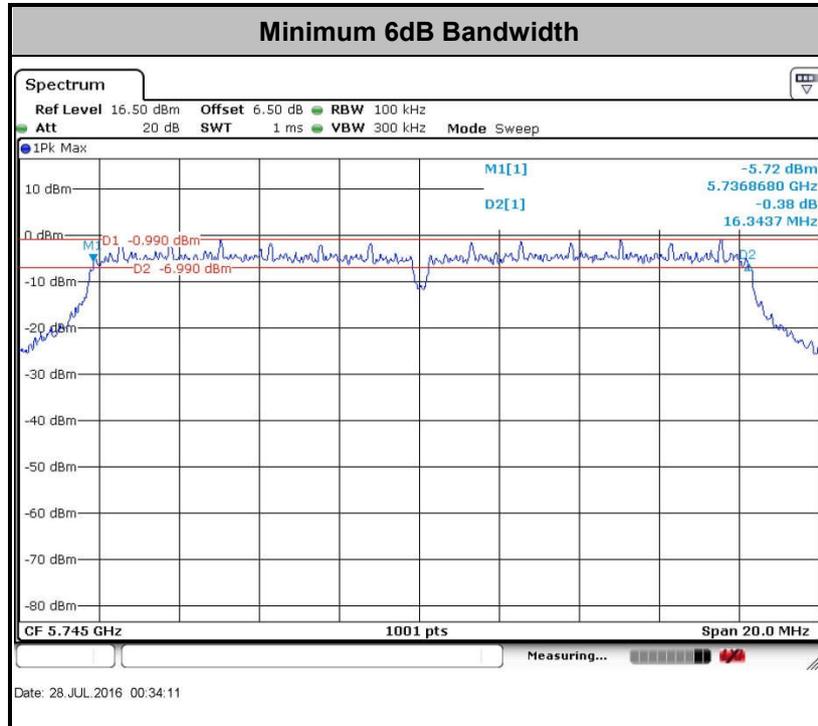
##### 3.1.4 Test Setup

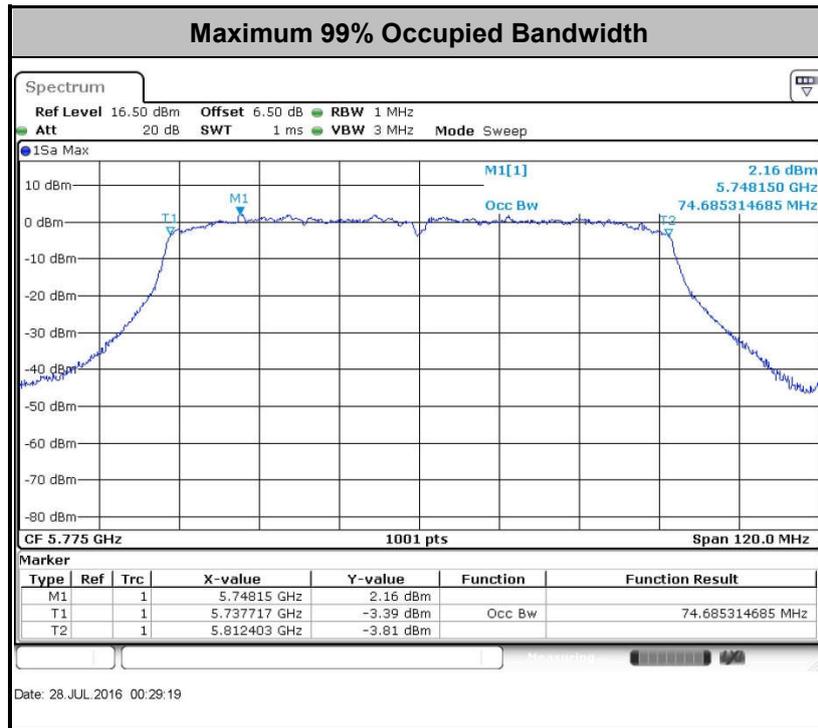




### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.





**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

## 3.2 Maximum Conducted Output Power Measurement

### 3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

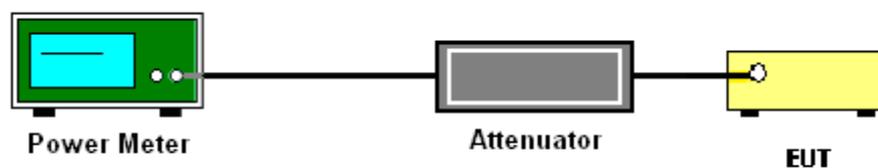
### 3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor,  $10 \log(1/x)$ , where  $x$  is the duty cycle.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

#### 3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02. Section F) Maximum power spectral density.

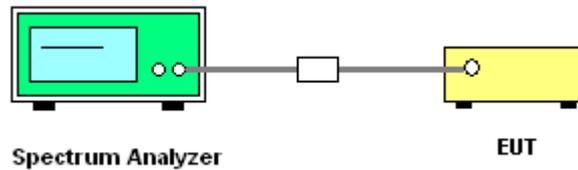
##### # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
  - Measure the duty cycle.
  - Set span to encompass the entire emission bandwidth (EBW) of the signal.
  - Set RBW = 300 kHz.
  - Set VBW  $\geq$  1 MHz.
  - Number of points in sweep  $\geq$  2 Span / RBW.
  - Sweep time = auto.
  - Detector = RMS
  - Trace average at least 100 traces in power averaging mode.
  - Add  $10 \log(500\text{kHz}/\text{RBW})$  to the test result.
  - Add  $10 \log(1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add  $10 \log(1/0.25) = 6$  dB if the duty cycle is 25 percent.

2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

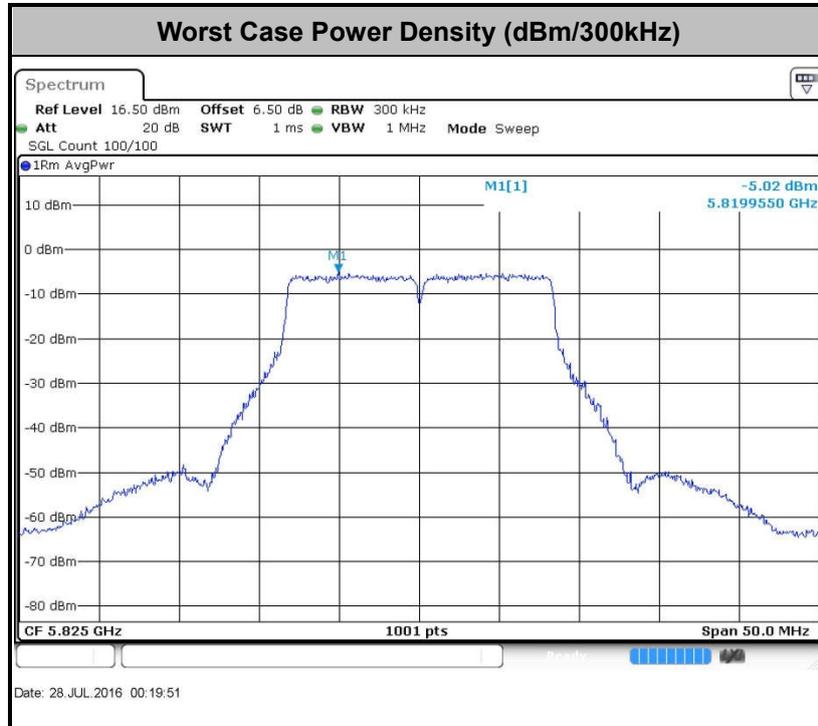
### 3.3.4 Test Setup





### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.





### 3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

#### 3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

Frequency (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:** The following formula is used to convert the EIRP to field strength.

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

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
-27	68.3

(3) KDB 789033 D02 General UNII Test Procedures New Rules v01r02 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.



### **3.4.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

### **3.4.3 Test Procedures**

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02. Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW  $\geq$  3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

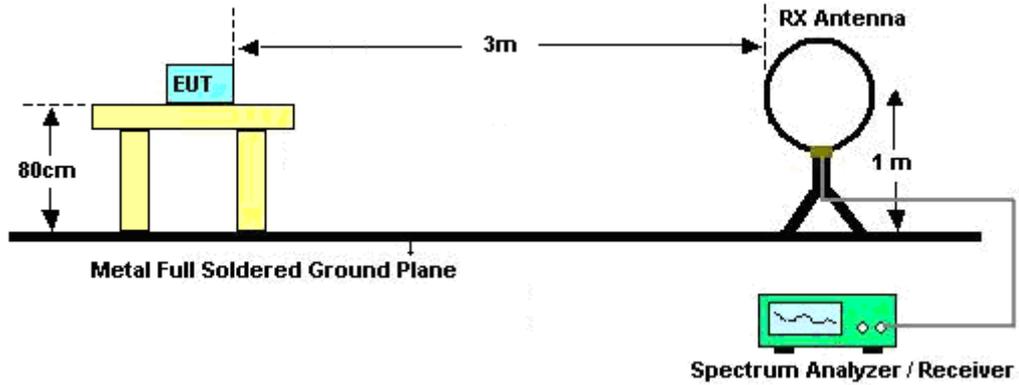
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW  $\geq$  1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



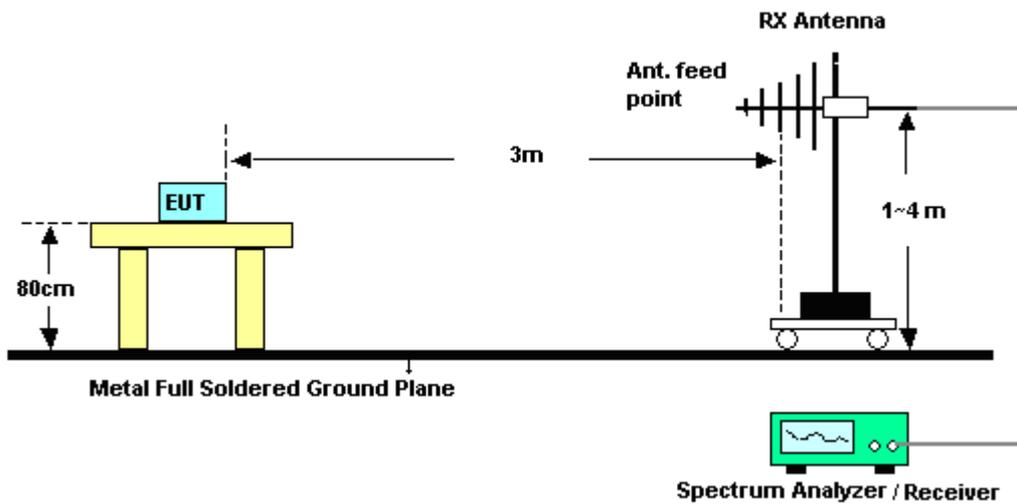
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.4.4 Test Setup

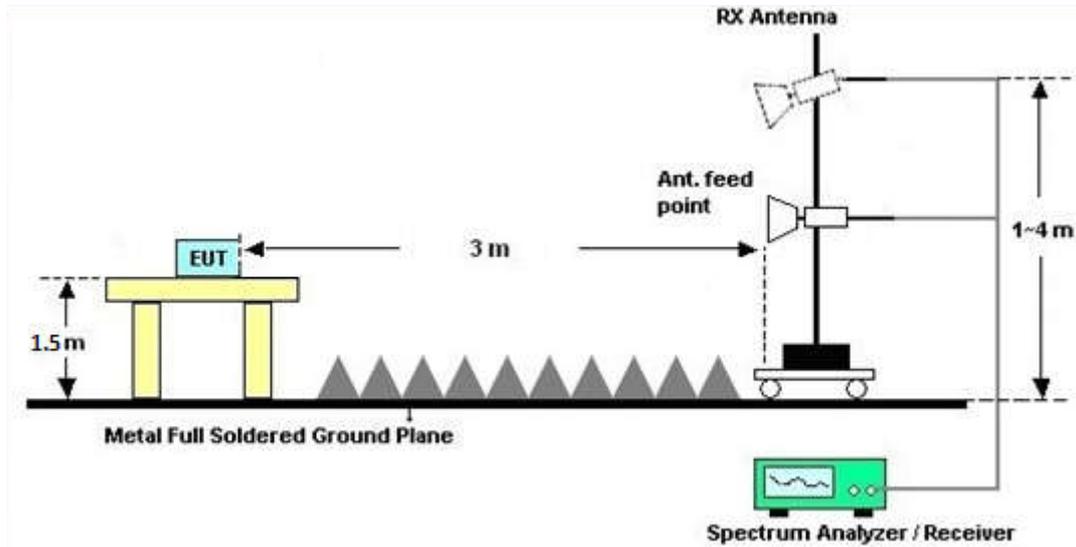
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.4.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### 3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B.

### 3.4.7 Duty Cycle

Please refer to Appendix C.

### 3.4.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B.



### 3.5 AC Conducted Emission Measurement

#### 3.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

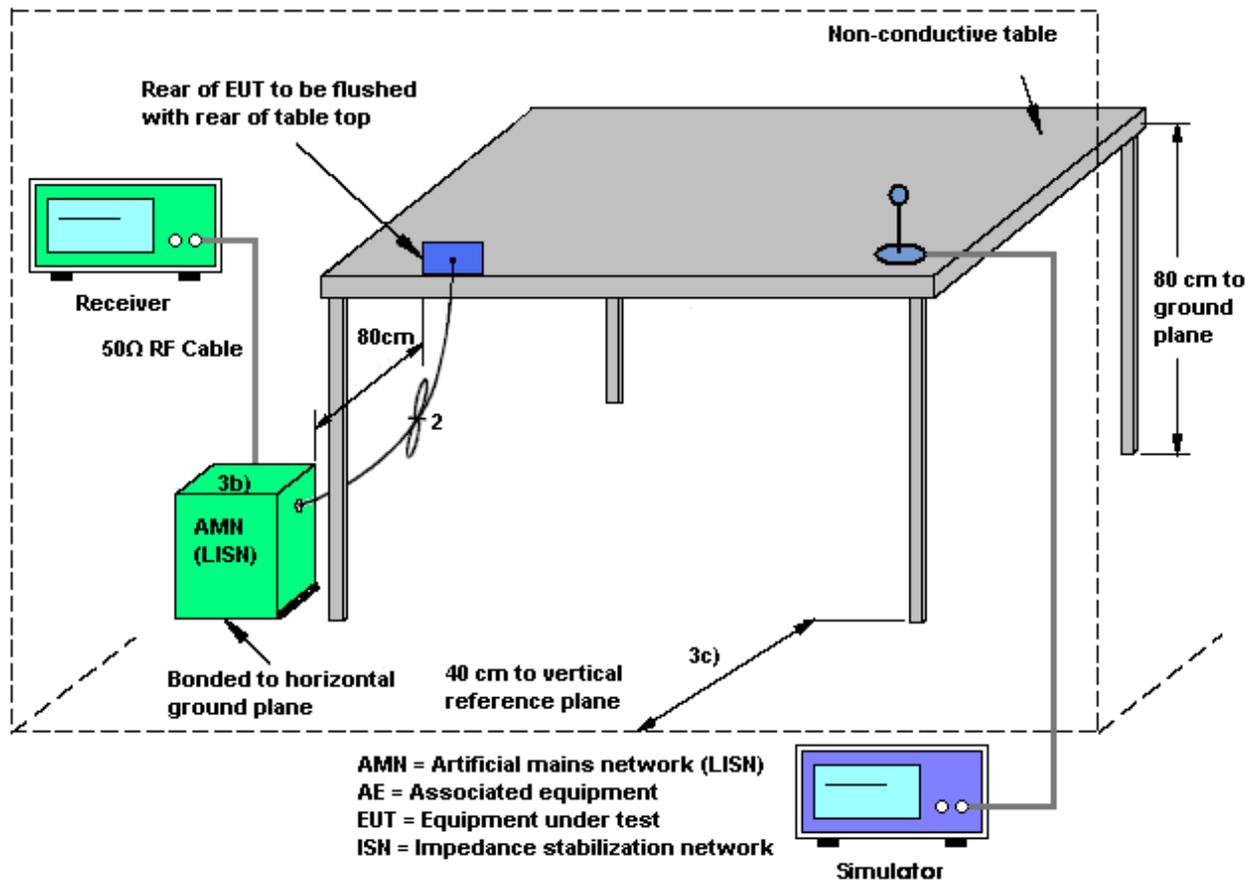
#### 3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

#### 3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

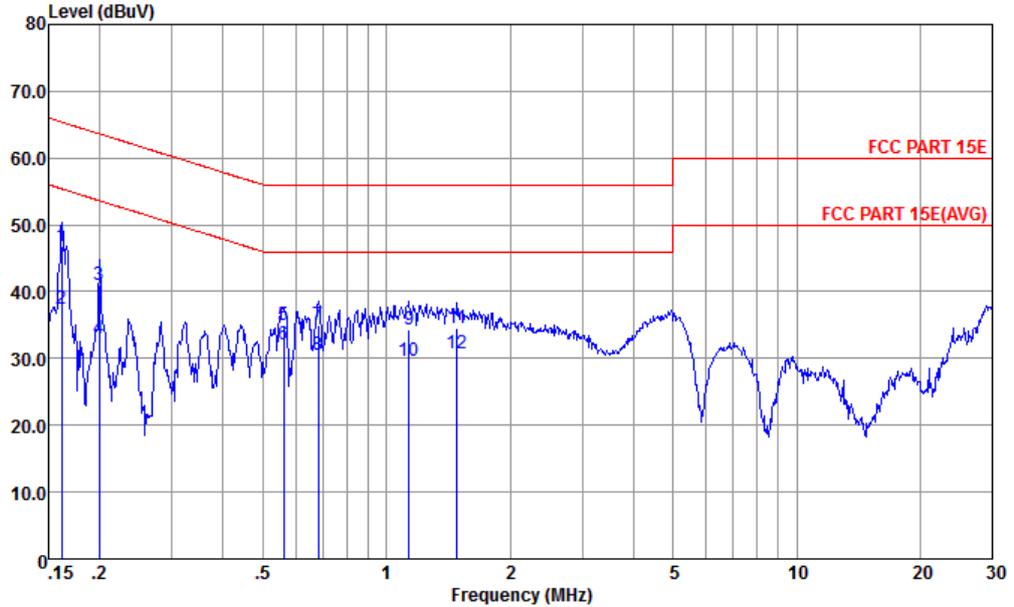
### 3.5.4 Test Setup





3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 2	Temperature :	22~24°C
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GPRS850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 5.2V) + Battery 2 + Earphone for Sample 2		

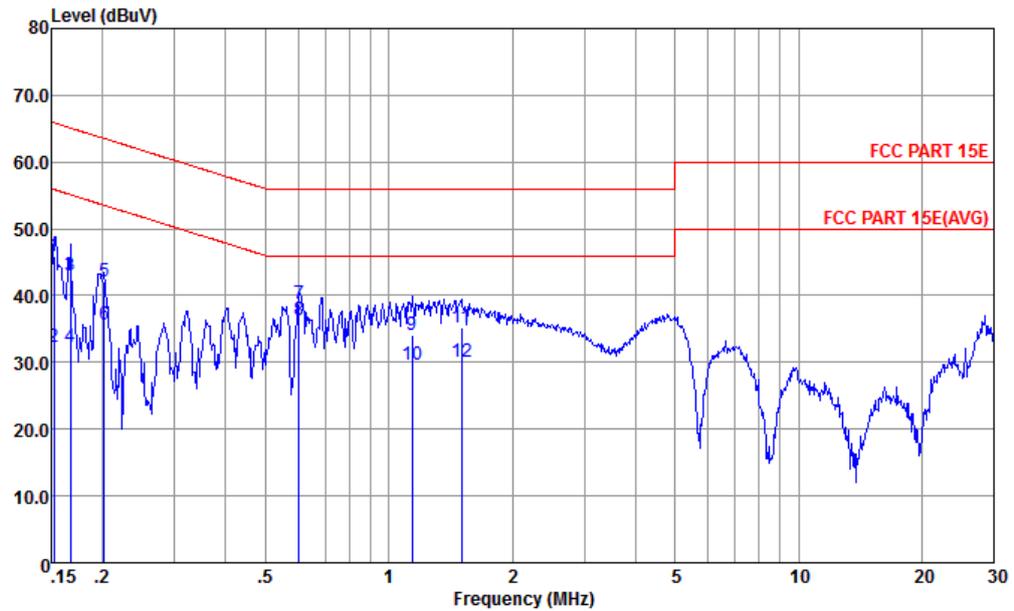


Site : C001-KS  
 Condition : FCC PART 15E LISN-L-20151024 LINE  
 mode : Mode 2

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16	46.86	-18.52	65.38	36.30	0.45	10.11	QP
2	0.16	37.46	-17.92	55.38	26.90	0.45	10.11	Average
3	0.20	40.95	-22.67	63.62	30.60	0.22	10.13	QP
4	0.20	32.95	-20.67	53.62	22.60	0.22	10.13	Average
5	0.56	34.99	-21.01	56.00	24.60	0.23	10.16	QP
6 *	0.56	31.99	-14.01	46.00	21.60	0.23	10.16	Average
7	0.68	34.99	-21.01	56.00	24.60	0.24	10.15	QP
8	0.68	30.49	-15.51	46.00	20.10	0.24	10.15	Average
9	1.14	34.27	-21.73	56.00	23.89	0.24	10.14	QP
10	1.14	29.67	-16.33	46.00	19.29	0.24	10.14	Average
11	1.49	34.65	-21.35	56.00	24.30	0.21	10.14	QP
12	1.49	30.65	-15.35	46.00	20.30	0.21	10.14	Average



Test Mode :	Mode 2	Temperature :	22~24°C
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GPRS850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 5.2V) + Battery 2 + Earphone for Sample 2		



Site : CO01-KS  
 Condition : FCC PART 15E LISN-N-20151024 NEUTRAL  
 mode : Mode 2

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15	46.01	-19.86	65.87	35.60	0.30	10.11	QP
2	0.15	32.31	-23.56	55.87	21.90	0.30	10.11	Average
3	0.17	43.02	-22.10	65.12	32.60	0.30	10.12	QP
4	0.17	32.32	-22.80	55.12	21.90	0.30	10.12	Average
5	0.20	42.04	-21.50	63.54	31.60	0.31	10.13	QP
6	0.20	35.64	-17.90	53.54	25.20	0.31	10.13	Average
7	0.60	38.79	-17.21	56.00	28.30	0.33	10.16	QP
8 *	0.60	36.39	-9.61	46.00	25.90	0.33	10.16	Average
9	1.14	34.11	-21.89	56.00	23.60	0.37	10.14	QP
10	1.14	29.61	-16.39	46.00	19.10	0.37	10.14	Average
11	1.50	35.31	-20.69	56.00	24.79	0.38	10.14	QP
12	1.50	30.11	-15.89	46.00	19.59	0.38	10.14	Average

## 3.6 Frequency Stability Measurement

### 3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

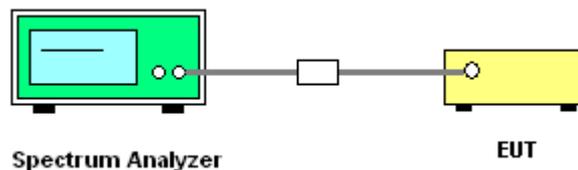
### 3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.6.3 Test Procedures

1. 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.
2. 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 10dB lower than the measured peak value.
3. 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.

### 3.6.4 Test Setup



### 3.6.5 Test Result of Frequency Stability

Please refer to Appendix A.



## **3.7 Automatically Discontinue Transmission**

### **3.7.1 Limit of Automatically Discontinue Transmission**

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

### **3.7.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

### **3.7.3 Test Result of Automatically Discontinue Transmission**

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



## **3.8 Antenna Requirements**

### **3.8.1 Standard Applicable**

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **3.8.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **3.8.3 Antenna Gain**

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum output power limit.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Sep. 10, 2015	Jul. 27, 2016~ Jul. 28, 2016	Sep. 09, 2016	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 20, 2016	Jul. 27, 2016~ Jul. 28, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Jul. 27, 2016~ Jul. 28, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Jul. 27, 2016~ Jul. 28, 2016	Oct. 23, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Jul. 29, 2016~ Jul. 31, 2016	Sep. 09, 2016	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 22, 2016	Jul. 29, 2016~ Jul. 31, 2016	Apr. 21, 2017	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 07, 2015	Jul. 29, 2016~ Jul. 31, 2016	Nov. 06, 2016	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz-2GHz	Apr. 16, 2016	Jul. 29, 2016~ Jul. 31, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 16, 2016	Jul. 29, 2016~ Jul. 31, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz ~40GHz	Mar. 03, 2016	Jul. 29, 2016~ Jul. 31, 2016	Mar. 02, 2017	Radiation (03CH03-KS)
Amplifier	Burgeon	BPA-530	102212	0.01MHz-3000M Hz	Aug. 10, 2015	Jul. 29, 2016~ Jul. 31, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840 -35-HG	1887435	18~40GHz	Aug. 27, 2015	Jul. 29, 2016~ Jul. 31, 2016	Aug. 26, 2016	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 24, 2015	Jul. 29, 2016~ Jul. 31, 2016	Oct. 23, 2016	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jul. 29, 2016~ Jul. 31, 2016	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jul. 29, 2016~ Jul. 31, 2016	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jul. 29, 2016~ Jul. 31, 2016	NCR	Radiation (03CH03-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Jul. 25, 2016	Sep. 09, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	Jul. 25, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	Jul. 25, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	Jul. 25, 2016	Oct. 23, 2016	Conduction (CO01-KS)

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.3dB
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.5dB
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### Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.5dB
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### Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.6dB
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## **Appendix A. Conducted Test Results**

Test Engineer:	Ivan Zhang	Temperature:	21~25	°C
Test Date:	2016/7/27~2016/7/28	Relative Humidity:	51~54	%

**TEST RESULTS DATA**  
**6dB and 26dB EBW and 99% OBW**

Band IV									
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	18.43	23.676	16.3437	0.5	Pass
11a	6Mbps	1	157	5785	18.58	23.726	16.3636	0.5	Pass
11a	6Mbps	1	165	5825	18.48	23.726	16.3636	0.5	Pass
HT20	MCS 0	1	149	5745	19.18	23.926	17.5824	0.5	Pass
HT20	MCS 0	1	157	5785	19.18	23.926	17.5824	0.5	Pass
HT20	MCS 0	1	165	5825	19.08	23.726	17.5824	0.5	Pass
HT40	MCS 0	1	151	5755	36.66	44.865	35.4845	0.5	Pass
HT40	MCS 0	1	159	5795	36.56	44.595	35.3247	0.5	Pass
VHT20	MCS 0	1	149	5745	19.18	23.876	17.5824	0.5	Pass
VHT20	MCS 0	1	157	5785	19.18	23.926	17.5624	0.5	Pass
VHT20	MCS 0	1	165	5825	19.13	23.726	17.5824	0.5	Pass
VHT40	MCS 0	1	151	5755	36.76	44.685	35.1648	0.5	Pass
VHT40	MCS 0	1	159	5795	36.76	44.685	35.3646	0.5	Pass
VHT80	MCS 0	1	155	5775	74.69	84.88	75.045	0.5	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Band IV										
Mod.	Data Rate	N <sub>TX</sub>	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.20	10.71	30.00	1.10		Pass
11a	6Mbps	1	157	5785	0.20	11.13	30.00	1.10		Pass
11a	6Mbps	1	165	5825	0.20	11.34	30.00	1.10		Pass
HT20	MCS 0	1	149	5745	0.62	8.66	30.00	1.10		Pass
HT20	MCS 0	1	157	5785	0.62	9.70	30.00	1.10		Pass
HT20	MCS 0	1	165	5825	0.62	9.76	30.00	1.10		Pass
HT40	MCS 0	1	151	5755	1.18	9.66	30.00	1.10		Pass
HT40	MCS 0	1	159	5795	1.18	10.34	30.00	1.10		Pass
VHT20	MCS 0	1	149	5745	0.79	8.77	30.00	1.10		Pass
VHT20	MCS 0	1	157	5785	0.79	9.71	30.00	1.10		Pass
VHT20	MCS 0	1	165	5825	0.79	9.94	30.00	1.10		Pass
VHT40	MCS 0	1	151	5755	1.49	9.67	30.00	1.10		Pass
VHT40	MCS 0	1	159	5795	1.49	10.32	30.00	1.10		Pass
VHT80	MCS 0	1	155	5775	2.58	10.00	30.00	1.10		Pass

**TEST RESULTS DATA**  
**Power Spectral Density**

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.20	2.22	-4.00	30.00	1.10	Pass
11a	6Mbps	1	157	5785	0.20	2.22	-2.83	30.00	1.10	Pass
11a	6Mbps	1	165	5825	0.20	2.22	-2.60	30.00	1.10	Pass
HT20	MCS 0	1	149	5745	0.62	2.22	-5.45	30.00	1.10	Pass
HT20	MCS 0	1	157	5785	0.62	2.22	-3.92	30.00	1.10	Pass
HT20	MCS 0	1	165	5825	0.62	2.22	-4.30	30.00	1.10	Pass
HT40	MCS 0	1	151	5755	1.18	2.22	-6.83	30.00	1.10	Pass
HT40	MCS 0	1	159	5795	1.18	2.22	-5.92	30.00	1.10	Pass
VHT20	MCS 0	1	149	5745	0.79	2.22	-5.37	30.00	1.10	Pass
VHT20	MCS 0	1	157	5785	0.79	2.22	-3.68	30.00	1.10	Pass
VHT20	MCS 0	1	165	5825	0.79	2.22	-4.26	30.00	1.10	Pass
VHT40	MCS 0	1	151	5755	1.49	2.22	-7.32	30.00	1.10	Pass
VHT40	MCS 0	1	159	5795	1.49	2.22	-6.40	30.00	1.10	Pass
VHT80	MCS 0	1	155	5775	2.58	2.22	-8.39	30.00	1.10	Pass

**TEST RESULTS DATA**  
**Frequency Stability**

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	3.6	
11a	6M bps	1	149	5745	5745.050	0.050	8.70	20	4.2	
11a	6M bps	1	149	5745	5745.050	0.050	8.70	20	3.75	
11a	6M bps	1	149	5745	5745.050	0.050	8.70	-30	3.75	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	50	3.75	



## Appendix B. Radiated Spurious Emission

### Band 4 - 5725~5850MHz

#### WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11a CH 149 5745MHz	*	5738	99.92	-	-	95.82	32.05	8.34	36.29	296	289	P	H
	*	5740	92.75	-	-	88.65	32.05	8.34	36.29	296	289	A	H
		5692.4	49.02	-50.68	99.7	45	32.02	8.25	36.25	296	289	P	H
		5719.5	47.12	-63.64	110.76	43.05	32.04	8.31	36.28	296	289	P	H
		5724.6	54.75	-66.64	121.39	50.68	32.04	8.31	36.28	296	289	P	H
	*	5738	100.77	-	-	96.67	32.05	8.34	36.29	248	360	P	V
	*	5742	93.3	-	-	89.2	32.05	8.34	36.29	248	360	A	V
		5692	49.74	-49.66	99.4	45.72	32.02	8.25	36.25	248	360	P	V
		5711.2	46.28	-62.16	108.44	42.24	32.03	8.28	36.27	248	360	P	V
		5724.6	53.6	-67.79	121.39	49.53	32.04	8.31	36.28	248	360	P	V
802.11a CH 157 5785MHz	*	5790	100.29	-	-	96.11	32.07	8.43	36.32	277	289	P	H
	*	5778	93.23	-	-	89.08	32.06	8.4	36.31	277	289	A	H
	*	5780	98.8	-	-	94.65	32.06	8.4	36.31	300	360	P	V
	*	5780	91.23	-	-	87.08	32.06	8.4	36.31	300	360	A	V
802.11a CH 165 5825MHz	*	5822	102.6	-	-	98.4	32.08	8.47	36.35	276	273	P	H
	*	5818	95.37	-	-	91.17	32.08	8.45	36.33	276	273	A	H
		5853.9	46.96	-66.45	113.41	42.72	32.1	8.51	36.37	276	273	P	H
		5866.06	46.91	-60.89	107.8	42.67	32.1	8.51	36.37	276	273	P	H
		5877.27	48.87	-54.74	103.61	44.62	32.1	8.53	36.38	276	273	P	H
	*	5818	99.52	-	-	95.32	32.08	8.45	36.33	267	360	P	V
	*	5820	91.96	-	-	87.76	32.08	8.47	36.35	267	360	A	V
		5853.14	45.39	-69.75	115.14	41.17	32.09	8.49	36.36	267	360	P	V
		5870.62	45.75	-60.77	106.52	41.5	32.1	8.53	36.38	267	360	P	V
	5877.08	46.97	-56.78	103.75	42.72	32.1	8.53	36.38	267	360	P	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11a (Harmonic @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11a CH 149		11490	47.76	-26.24	74	56.01	38.59	10.14	56.98	100	0	P	H
5745MHz		11490	46.2	-27.8	74	54.45	38.59	10.14	56.98	100	360	P	V
802.11a CH 157		11570	47.45	-26.55	74	55.56	38.75	10.29	57.15	100	360	P	H
5785MHz		11570	45.1	-28.9	74	53.21	38.75	10.29	57.15	100	0	P	V
802.11a CH 165		11650	45.57	-28.43	74	53.54	38.9	10.42	57.29	100	0	P	H
5825MHz		11650	48.79	-25.21	74	56.76	38.9	10.42	57.29	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11n HT20 (Band Edge @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11n HT20 CH 149 5745MHz		5693.4	50.7	-49.73	100.43	46.68	32.02	8.25	36.25	301	74	P	H
		5717.3	46.27	-63.88	110.15	42.23	32.03	8.28	36.27	301	74	P	H
		5724.8	54.86	-66.98	121.84	50.79	32.04	8.31	36.28	301	74	P	H
	*	5740	98.98	-	-	94.88	32.05	8.34	36.29	301	74	P	H
	*	5738	91.8	-	-	87.7	32.05	8.34	36.29	301	74	A	H
		5692.9	49.11	-50.96	100.07	45.09	32.02	8.25	36.25	296	264	P	V
		5703.3	46.78	-59.45	106.23	42.74	32.03	8.28	36.27	296	264	P	V
		5724.9	53.35	-68.72	122.07	49.28	32.04	8.31	36.28	296	264	P	V
	*	5740	100.07	-	-	95.97	32.05	8.34	36.29	296	264	P	V
*	5740	92.49	-	-	88.39	32.05	8.34	36.29	296	264	A	V	
802.11n HT20 CH 157 5785MHz	*	5778	98.43	-	-	94.28	32.06	8.4	36.31	295	76	P	H
	*	5790	91.63	-	-	87.45	32.07	8.43	36.32	295	76	A	H
	*	5780	100.08	-	-	95.93	32.06	8.4	36.31	294	264	P	V
	*	5778	92.53	-	-	88.38	32.06	8.4	36.31	294	264	A	V
802.11n HT20 CH 165 5825MHz	*	5830	99.22	-	-	95.02	32.08	8.47	36.35	329	109	P	H
	*	5820	92.07	-	-	87.87	32.08	8.47	36.35	329	109	A	H
		5852	45.26	-72.48	117.74	41.04	32.09	8.49	36.36	329	109	P	H
		5861.31	45.98	-63.15	109.13	41.74	32.1	8.51	36.37	329	109	P	H
		5876.7	48.84	-55.2	104.04	44.59	32.1	8.53	36.38	329	109	P	H
	*	5818	100.04	-	-	95.84	32.08	8.45	36.33	284	265	P	V
	*	5820	92.83	-	-	88.63	32.08	8.47	36.35	284	265	A	V
		5852.76	46.28	-69.73	116.01	42.06	32.09	8.49	36.36	284	265	P	V
		5868.72	46.55	-60.51	107.06	42.31	32.1	8.51	36.37	284	265	P	V
	5877.08	48.59	-55.16	103.75	44.34	32.1	8.53	36.38	284	265	P	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11n HT20 (Harmonic @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11n HT20 CH 149 5745MHz		11490	47.77	-26.23	74	56.02	38.59	10.14	56.98	100	0	P	H
		11490	46.53	-27.47	74	54.78	38.59	10.14	56.98	100	360	P	V
802.11n HT20 CH 157 5785MHz		11570	50.25	-23.75	74	58.36	38.75	10.29	57.15	100	0	P	H
		11570	49.85	-24.15	74	57.96	38.75	10.29	57.15	100	360	P	V
802.11n HT20 CH 165 5825MHz		11650	48.74	-25.26	74	56.71	38.9	10.42	57.29	100	0	P	H
		11650	47.96	-26.04	74	55.93	38.9	10.42	57.29	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11n HT40 (Band Edge @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11n HT40 CH 151 5755MHz		5688.12	46.29	-50.25	96.54	42.27	32.02	8.25	36.25	126	108	P	H
		5718.6	52.21	-58.3	110.51	48.14	32.04	8.31	36.28	126	108	P	H
		5723.56	54.44	-64.58	119.02	50.37	32.04	8.31	36.28	126	108	P	H
	*	5746	93.19	-	-	89.09	32.05	8.34	36.29	126	108	P	H
	*	5742	86.56	-	-	82.46	32.05	8.34	36.29	126	108	A	H
		5695	47.12	-54.49	101.61	43.1	32.02	8.25	36.25	100	358	P	V
		5716.76	54.35	-55.64	109.99	50.31	32.03	8.28	36.27	100	358	P	V
		5724.52	57.02	-64.19	121.21	52.95	32.04	8.31	36.28	100	358	P	V
	*	5746	97.96	-	-	93.86	32.05	8.34	36.29	100	358	P	V
	*	5744	91.17	-	-	87.07	32.05	8.34	36.29	100	358	A	V
802.11n HT40 CH 159 5795MHz	*	5782	93.91	-	-	89.76	32.06	8.4	36.31	123	110	P	H
	*	5784	87.3	-	-	83.15	32.06	8.4	36.31	123	110	A	H
		5854.72	46.2	-65.34	111.54	41.96	32.1	8.51	36.37	123	110	P	H
		5860.08	46.29	-63.19	109.48	42.05	32.1	8.51	36.37	123	110	P	H
		5884.88	45.95	-52.01	97.96	41.7	32.1	8.53	36.38	123	110	P	H
	*	5782	98.33	-	-	94.18	32.06	8.4	36.31	100	360	P	V
	*	5784	91.44	-	-	87.29	32.06	8.4	36.31	100	360	A	V
		5854.24	46.1	-66.53	112.63	41.86	32.1	8.51	36.37	100	360	P	V
		5869.36	47.15	-59.73	106.88	42.91	32.1	8.51	36.37	100	360	P	V
	5879.12	46.97	-55.27	102.24	42.72	32.1	8.53	36.38	100	360	P	V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

Table with 14 columns: WIFI, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for 802.11n HT40 CH 151 and CH 159 at 11510MHz and 11590MHz.



**Band 4 5725~5850MHz**  
**WIFI 802.11ac VHT20 (Band Edge @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT20 CH 149 5745MHz		5692.84	47.98	-52.04	100.02	43.96	32.02	8.25	36.25	131	108	P	H
		5714.6	46.36	-63.03	109.39	42.32	32.03	8.28	36.27	131	108	P	H
		5725	51.89	-70.41	122.2	47.82	32.04	8.31	36.28	131	108	P	H
	*	5738	96.96	-	-	92.86	32.05	8.34	36.29	131	108	P	H
	*	5740	90.24	-	-	86.14	32.05	8.34	36.29	131	108	A	H
		5692.84	51.18	-48.84	100.02	47.16	32.02	8.25	36.25	100	352	P	V
		5719.96	49.83	-61.06	110.89	45.76	32.04	8.31	36.28	100	352	P	V
		5724.84	57.23	-64.7	121.93	53.16	32.04	8.31	36.28	100	352	P	V
	*	5740	100.38	-	-	96.28	32.05	8.34	36.29	100	352	P	V
	5738	93.55	-	-	89.45	32.05	8.34	36.29	100	352	A	V	
802.11ac VHT20 CH 157 5785MHz	*	5778	96.67	-	-	92.52	32.06	8.4	36.31	136	109	P	H
	*	5788	89.82	-	-	85.64	32.07	8.43	36.32	136	109	A	H
	*	5780	100.94	-	-	96.79	32.06	8.4	36.31	100	359	P	V
	*	5780	94.03	-	-	89.88	32.06	8.4	36.31	100	359	A	V
802.11ac VHT20 CH 165 5825MHz	*	5820	96.61	-	-	92.41	32.08	8.47	36.35	139	106	P	H
	*	5830	89.59	-	-	85.39	32.08	8.47	36.35	139	106	A	H
		5852.48	45.68	-70.96	116.64	41.46	32.09	8.49	36.36	139	106	P	H
		5867.28	47.92	-59.54	107.46	43.68	32.1	8.51	36.37	139	106	P	H
		5876.8	47.38	-56.58	103.96	43.13	32.1	8.53	36.38	139	106	P	H
	*	5830	101.88	-	-	97.68	32.08	8.47	36.35	100	357	P	V
	*	5830	94.73	-	-	90.53	32.08	8.47	36.35	100	357	A	V
		5852.56	46.47	-69.99	116.46	42.25	32.09	8.49	36.36	100	357	P	V
		5873.44	46.59	-59.15	105.74	42.34	32.1	8.53	36.38	100	357	P	V
	5876.88	50.44	-53.46	103.9	46.19	32.1	8.53	36.38	100	357	P	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz
WIFI 802.11ac VHT20 (Harmonic @ 3m)

Table with 14 columns: WIFI, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for channels 149, 157, and 165.



**Band 4 5725~5850MHz**  
**WIFI 802.11ac VHT40 (Band Edge @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT40 CH 151 5755MHz		5685.72	45.82	-48.95	94.77	41.8	32.02	8.25	36.25	123	110	P	H
		5719.64	53.57	-57.23	110.8	49.5	32.04	8.31	36.28	123	110	P	H
		5724.44	57.25	-63.77	121.02	53.18	32.04	8.31	36.28	123	110	P	H
	*	5752	93.05	-	-	88.93	32.05	8.37	36.3	123	110	P	H
	*	5744	86.59	-	-	82.49	32.05	8.34	36.29	123	110	A	H
		5699.56	46.86	-58.12	104.98	42.84	32.02	8.25	36.25	100	352	P	V
		5719.32	56.33	-54.38	110.71	52.26	32.04	8.31	36.28	100	352	P	V
		5724.6	61.66	-59.73	121.39	57.59	32.04	8.31	36.28	100	352	P	V
	*	5742	97.48	-	-	93.38	32.05	8.34	36.29	100	352	P	V
	5744	90.42	-	-	86.32	32.05	8.34	36.29	100	352	A	V	
802.11ac VHT40 CH 159 5795MHz	*	5790	92.92	-	-	88.74	32.07	8.43	36.32	106	104	P	H
	*	5784	86.51	-	-	82.36	32.06	8.4	36.31	106	104	A	H
		5851.52	46.1	-72.73	118.83	41.88	32.09	8.49	36.36	106	104	P	H
		5869.76	46.06	-60.71	106.77	41.82	32.1	8.51	36.37	106	104	P	H
		5875.52	46.59	-58.32	104.91	42.34	32.1	8.53	36.38	106	104	P	H
	*	5792	97.87	-	-	93.69	32.07	8.43	36.32	100	357	P	V
	*	5784	91.24	-	-	87.09	32.06	8.4	36.31	100	357	A	V
		5851.04	46.09	-73.84	119.93	41.87	32.09	8.49	36.36	100	357	P	V
		5867.76	46.78	-60.55	107.33	42.54	32.1	8.51	36.37	100	357	P	V
	5883.6	46.47	-52.44	98.91	42.22	32.1	8.53	36.38	100	357	P	V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11ac VHT40 (Harmonic @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT40		11510	46.65	-27.35	74	54.9	38.6	10.17	57.02	100	360	P	H
CH 151 5755MHz		11510	48.81	-25.19	74	57.06	38.6	10.17	57.02	100	0	P	V
802.11ac VHT40		11590	48.23	-25.77	74	56.31	38.79	10.32	57.19	100	0	P	H
CH 159 5795MHz		11590	48.81	-25.19	74	56.89	38.79	10.32	57.19	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11ac VHT80 (Band Edge @ 3m)**

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT80 CH 155 5775MHz		5693.72	48.57	-52.1	100.67	44.55	32.02	8.25	36.25	270	243	P	H
		5719.32	52.95	-57.76	110.71	48.88	32.04	8.31	36.28	270	243	P	H
		5724.2	56	-64.48	120.48	51.93	32.04	8.31	36.28	270	243	P	H
	*	5768	94.95	-	-	90.83	32.05	8.37	36.3	270	243	P	H
	*	5748	87.69	-	-	83.59	32.05	8.34	36.29	270	243	A	H
		5850.48	46.8	-74.41	121.21	42.58	32.09	8.49	36.36	270	243	P	H
		5863.36	46.5	-62.06	108.56	42.26	32.1	8.51	36.37	270	243	P	H
		5885.6	47.04	-50.39	97.43	42.79	32.1	8.53	36.38	270	243	P	H
		5698.52	47.52	-56.69	104.21	43.5	32.02	8.25	36.25	127	262	P	V
		5718.92	51.05	-59.55	110.6	46.98	32.04	8.31	36.28	127	262	P	V
		5724.92	53.98	-68.14	122.12	49.91	32.04	8.31	36.28	127	262	P	V
	*	5754	93.19	-	-	89.07	32.05	8.37	36.3	127	262	P	V
	*	5756	86.46	-	-	82.34	32.05	8.37	36.3	127	262	A	V
		5850.8	46.63	-73.85	120.48	42.41	32.09	8.49	36.36	127	262	P	V
		5873.92	47.06	-58.54	105.6	42.81	32.1	8.53	36.38	127	262	P	V
	5887.36	46.54	-49.58	96.12	42.29	32.1	8.53	36.38	127	262	P	V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT80		11550	50.59	-23.41	74	58.74	38.71	10.26	57.12	100	360	P	H
CH 155 5775MHz		11550	46.5	-27.5	74	54.65	38.71	10.26	57.12	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz  
WIFI 802.11ac VHT80 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
5GHz ac VHT80 LF		33.88	27.63	-12.37	40	41.38	18.04	0.7	32.49	-	-	P	H
		44.55	24.81	-15.19	40	43.78	12.8	0.83	32.6	-	-	P	H
		159.98	32	-11.5	43.5	49.69	13.19	1.53	32.41	-	-	P	H
		249.22	39.76	-6.24	46	57.34	13.15	1.73	32.46	100	36	P	H
		280.26	37.55	-8.45	46	53.45	14.23	1.97	32.1	-	-	P	H
		339.43	37.58	-8.42	46	51.83	15.61	2.27	32.13	-	-	P	H
		33.88	27.4	-12.6	40	41.15	18.04	0.7	32.49	-	-	P	V
		44.55	24.09	-15.91	40	43.06	12.8	0.83	32.6	-	-	P	V
		159.98	31.2	-12.3	43.5	48.89	13.19	1.53	32.41	-	-	P	V
		246.31	38.25	-7.75	46	55.97	13.01	1.73	32.46	100	21	P	V
		286.08	36.15	-9.85	46	51.87	14.43	2.02	32.17	-	-	P	V
		337.49	38.05	-7.95	46	52.36	15.57	2.26	32.14	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

- Level(dBμV/m) =  
Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
- Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

- Level(dBμV/m)  
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)  
= 55.45 (dBμV/m)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average Limit @ 2390MHz:**

- Level(dBμV/m)  
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)  
= 43.54 (dBμV/m)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

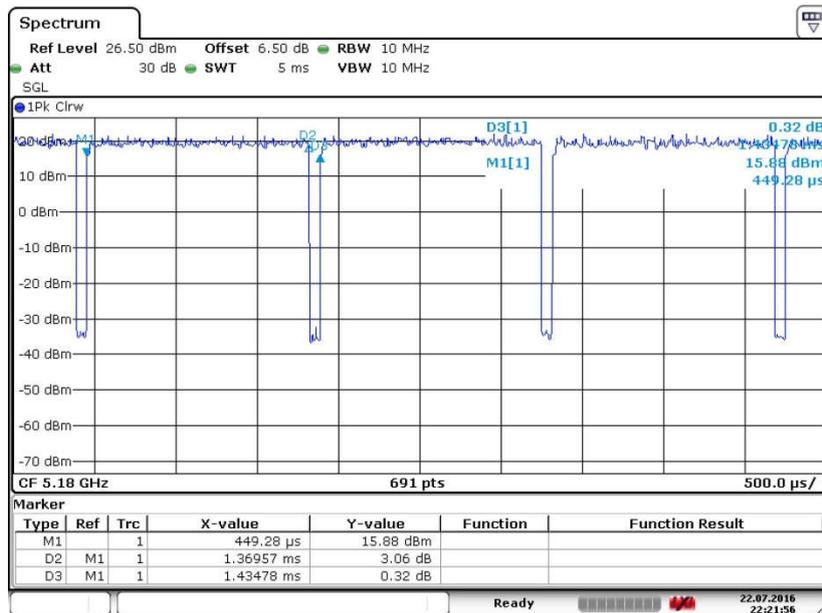
Both peak and average measured complies with the limit line, so test result is “PASS”.



### Appendix C. Duty Cycle Plots

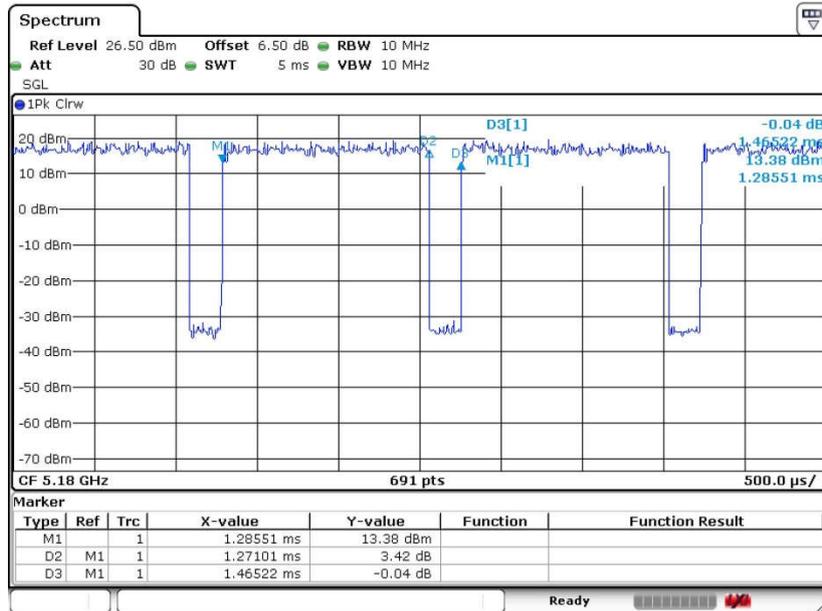
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	95.46	1.37	0.73	1kHz
802.11n HT20	86.75	1.27	0.79	1kHz
802.11n HT40	76.17	0.64	1.56	3kHz
802.11ac VHT20	83.37	0.97	1.03	3kHz
802.11ac VHT40	70.92	0.49	2.04	3kHz
802.11ac VHT80	55.16	0.25	4.04	10kHz

#### 802.11a

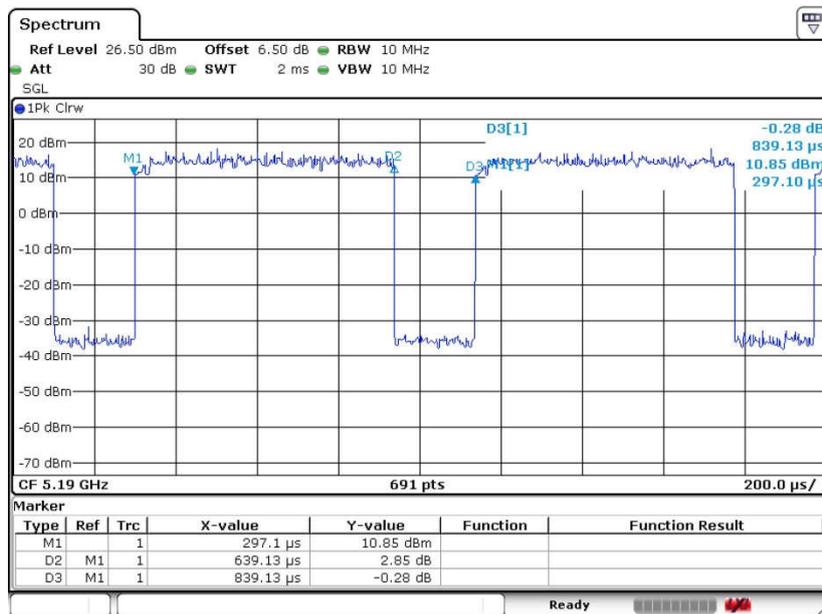




802.11n HT20

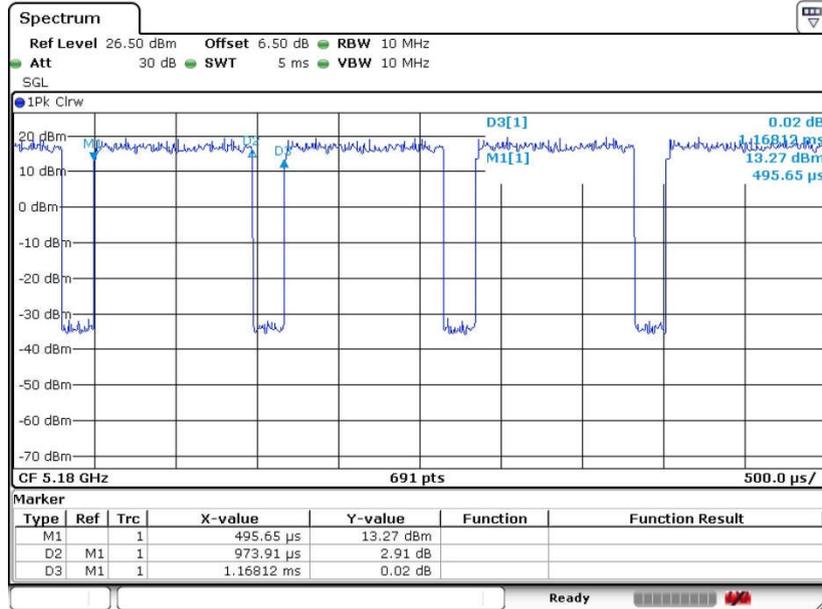


802.11n HT40

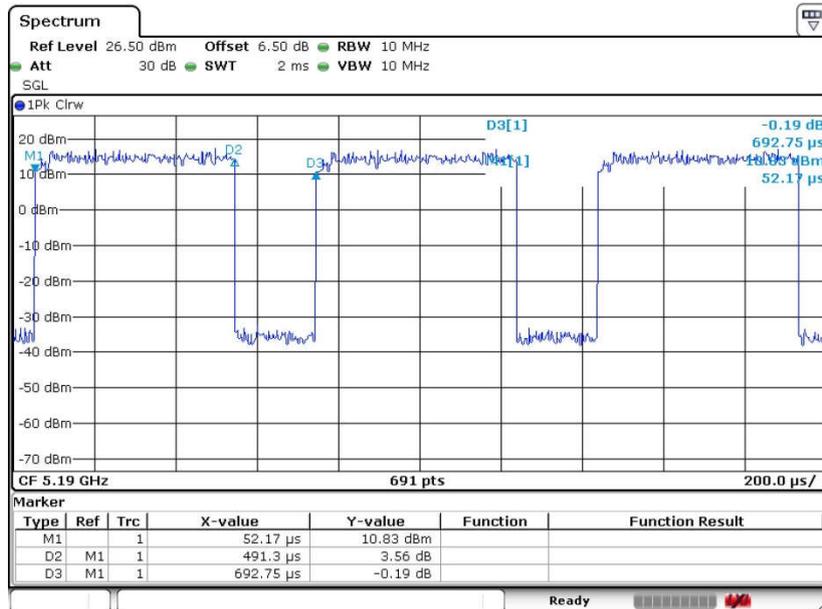




802.11ac VHT20



802.11ac VH40





802.11ac VHT80

