FCC RF Test Report

APPLICANT	:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Portable Tablet Computer
BRAND NAME	:	lenovo
MODEL NAME	:	Lenovo TAB 2 A10-70F
FCC ID	:	O57TAB2A1070F
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was received on Dec. 18, 2014 and testing was completed on Jan. 21, 2015. 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.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
2627

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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D1801-01D	Rev. 01	Initial issue of report	Jan. 29, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	2.1049 15.403(i)	RSS-210 A9.2	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	RSS-210 A9.2	Maximum Conducted Output Power	≤ 24 dBm (depend on band)	Pass	-
3.3	15.407(a)	RSS-210 A9.2	Power Spectral Density	≤ 11 dBm (depend on band)	Pass	-
3.4	15.407(b)	RSS-210 A9.3	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 5.31 dB at 77.530 MHz
3.5	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 18.22 dB at 2.740 MHz
3.6	15.407(g)	-	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	RSS-210 A9.4	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	RSS-210 A9.2	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Lenovo (Shanghai) Electronics Technology Co., Ltd.
No. 68 Building, 199 Fenju Road, Wai Gao Qiao FTZ, Shanghai, 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	
Equipment	Portable Tablet Computer
Brand Name	lenovo
Model Name	Lenovo TAB 2 A10-70F
FCC ID	O57TAB2A1070F
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n (HT20/HT40) WLAN 5GHz 802.11a Bluetooth v3.0+EDR/Bluetooth v4.0 LE
HW Version	A1990_MB_PCB_V2.0
SW Version	A7-30HC_S000007_141017_ROW
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples is only for memory capacity, sample 1 is 32GB, sample 2 is 16GB.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz 5500 MHz ~ 5700 MHz
Maximum Output Power to Antenna	**<5180 MHz ~ 5240 MHz>** 802.11a : 10.54 dBm / 0.0113 W **<5260 MHz ~ 5320 MHz>** 802.11a : 10.74 dBm / 0.0119 W **<5500 MHz ~ 5700 MHz>** 802.11a : 9.80 dBm / 0.0095 W
Antenna Type / Gain	**<5180 MHz ~ 5240 MHz>** PIFA Antenna with gain 1.75 dBi **<5260 MHz ~ 5320 MHz>** PIFA Antenna with gain 2.27 dBi **<5500 MHz ~ 5700 MHz>** PIFA Antenna with gain 2.94 dBi
Type of Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC Registration No.**
	TH01-KS	03CH01-KS	CO01-KS	149928

Note: The test site complies with ANSI C63.4 2009 requirement.

1.7 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 v01
- ANSI C63.10-2009

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 three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5150-5250 MHz Band 1 (U-NII-1)	36	5180	44	5220
	40	5200	48	5240

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5250-5350 MHz Band 2 (U-NII-2A)	52	5260	60	5300
	56	5280	64	5320

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5470-5600 MHz and 5650-5725 MHz Band 3 (U-NII-2C)	100	5500	116	5580
	104	5520	132	5660
	108	5540	136	5680
	112	5560	140	5700

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

5GHz 802.11a RF Output Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index 6Mbps	Channel	9M bps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	**10.54**	CH 36	10.33	10.34	10.31	10.34	10.44	10.12	10.19
CH 44	5220	10.36								
CH 48	5240	9.75								
CH 52	5260	**10.74**	CH 52	10.61	10.64	10.66	10.67	10.71	9.96	9.91
CH 60	5300	10.30								
CH 64	5320	10.24								
CH 100	5500	9.61	CH 116	9.66	9.72	9.66	9.60	9.50	9.76	9.71
CH 116	5580	**9.80**								
CH 140	5700	9.66								

2.3 Test Mode

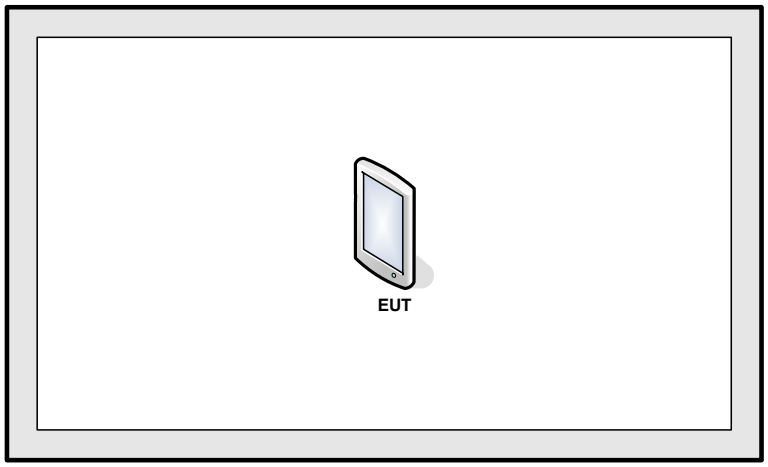
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	**Mode**	**Data rate**	**Test Channel**
Conducted TCs	**26dB and 99% BW Power Spectral Density**	**802.11a**	**6 Mbps**	**L/M/H**
	Output Power	**802.11a**	**6 Mbps**	**L/M/H**
	Frequency Stability	**802.11a**	**6 Mbps**	**L/M/H**
Radiated TCs	**Radiated Band Edge**	**802.11a**	**6 Mbps**	**L/H**
	Radiated Spurious Emission	**802.11a**	**6 Mbps**	**L/M/H**
AC Conducted Emission	Mode 1 ： Bluetooth Link + WLAN 5GHz Link + USB Cable (Charging from Adapter) + Earphone			
Remark: For Radiated TCs, the tests were performed with adapter, earphone and USB cable.				

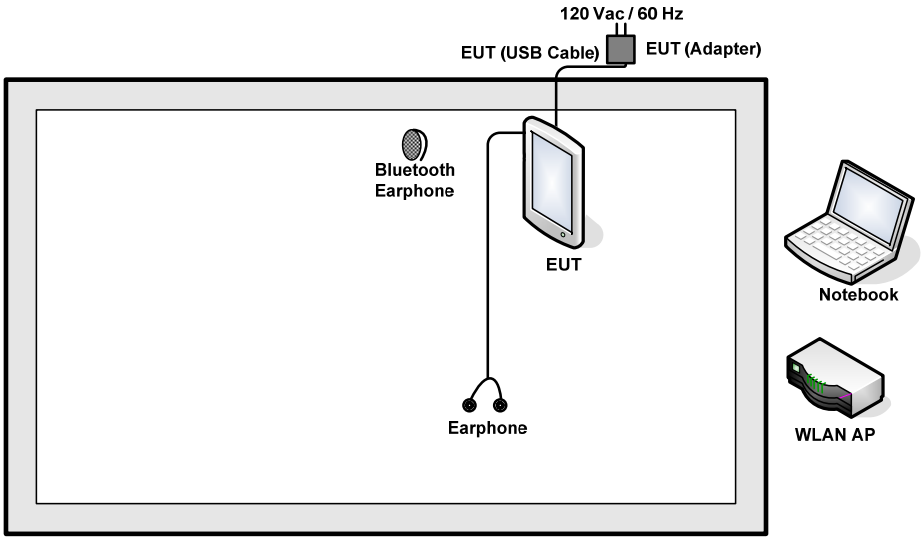
Ch. #		**Band I：5150-5250 MHz**	**Band II：5250-5350 MHz**	**Band III：5470-5600 MHz and 5650-5725MHz**
		802.11a	**802.11a**	**802.11a**
L	**Low**	36	52	100
M	**Middle**	44	60	116
H	**High**	48	64	140

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
2.	Notebook	Lenovo	G480	FCC DoC	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	Bluetooth Earphone	Lenovo	LBH505	N/A	N/A	N/A
4.	Earphone	Lenovo	SH100	N/A	Unshielded, 1.8 m	N/A
5.	DC Power Supply	GW INSTEK	GPD-2303S	N/A	N/A	Unshielded, 1.8 m

2.6 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 WLAN AP under large package sizes transmission.

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor 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 and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 7.3 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 7.3 + 10 = 17.3 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

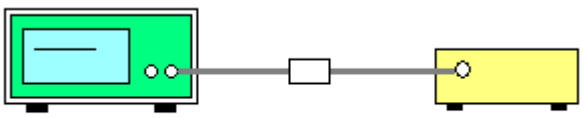
3.1.2 Measuring Instruments

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 v01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 26dB & 99% Occupied Bandwidth Plots

Test Band :	5GHz band 1	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

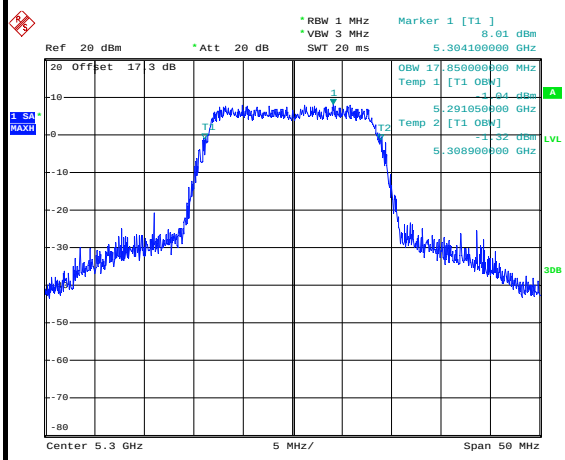
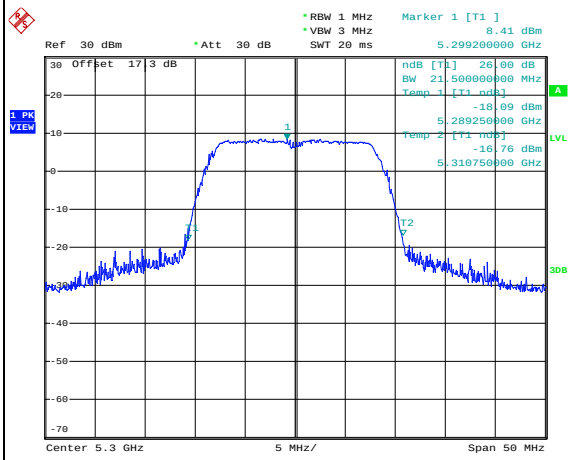
Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	99% Bandwidth (MHz)	99% Bandwidth EIRP Limit (dBm)
11a	6Mbps	1	36	5180	17.55	22.44
11a	6Mbps	1	44	5220	17.65	22.47
11a	6Mbps	1	48	5240	17.55	22.44

Test Band :	5GHz band 2	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)	IC 99% Bandwidth EIRP Limit (dBm)	FCC 26dB Bandwidth Power Limit (dBm)
11a	6Mbps	1	52	5260	17.65	21.35	29.47	23.98
11a	6Mbps	1	60	5300	17.85	21.50	29.52	23.98
11a	6Mbps	1	64	5320	17.70	21.35	29.48	23.98

Test Band :	5GHz band 3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)	IC 99% Bandwidth EIRP Limit (dBm)	FCC 26dB Bandwidth Power Limit (dBm)
11a	6Mbps	1	100	5500	17.55	21.30	29.44	23.98
11a	6Mbps	1	116	5580	17.60	21.10	29.46	23.98
11a	6Mbps	1	140	5700	17.50	21.35	29.43	23.98

Maximum 99% Occupied Bandwidth	Maximum 26dB Bandwidth
	

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.

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.

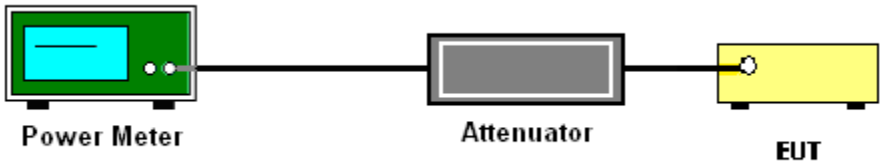
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

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

Test Band :	5GHz band 1	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail
11a	6Mbps	1	36	5180	0.52	10.54	23.98	1.75	Pass
11a	6Mbps	1	44	5220	0.52	10.36	23.98	1.75	Pass
11a	6Mbps	1	48	5240	0.52	9.75	23.98	1.75	Pass

Note: Final Output Power equals to Measured Output Power adds the duty factor.

Test Band :	5GHz band 2	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail
11a	6Mbps	1	52	5260	0.52	10.74	23.98	2.27	Pass
11a	6Mbps	1	60	5300	0.52	10.30	23.98	2.27	Pass
11a	6Mbps	1	64	5320	0.52	10.24	23.98	2.27	Pass

Note: Final Output Power equals to Measured Output Power adds the duty factor.

Test Band :	5GHz band 3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail
11a	6Mbps	1	100	5500	0.52	9.61	23.98	2.94	Pass
11a	6Mbps	1	116	5580	0.52	9.80	23.98	2.94	Pass
11a	6Mbps	1	140	5700	0.52	9.66	23.98	2.94	Pass

Note: Final Output Power equals to Measured Output Power adds the duty factor.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz 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

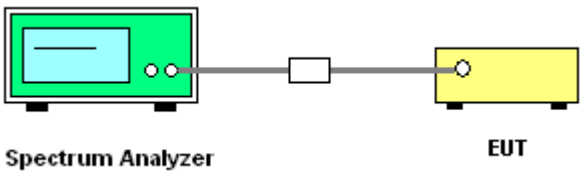
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Section F) Maximum power spectral density.

 # 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 v01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - 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

Test Band :	5GHz band 1	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	CH	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm)	DG (dBi)	Pass/Fail
11a	6Mbps	1	36	5180	0.52	-1.82	11.00	1.75	Pass
11a	6Mbps	1	44	5220	0.52	-1.72	11.00	1.75	Pass
11a	6Mbps	1	48	5240	0.52	-1.21	11.00	1.75	Pass

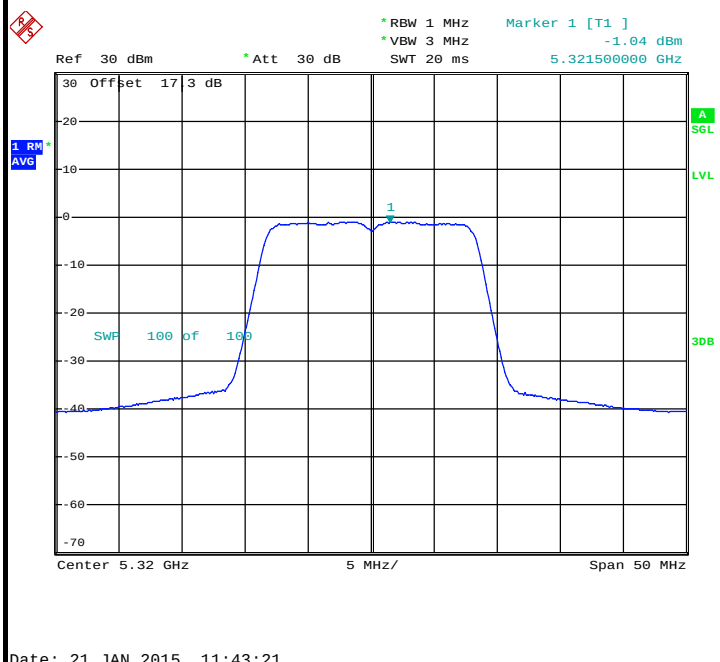
Test Band :	5GHz band 2	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	CH	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm)	DG (dBi)	Pass/Fail
11a	6Mbps	1	52	5260	0.52	-0.89	11.00	2.27	Pass
11a	6Mbps	1	60	5300	0.52	-0.53	11.00	2.27	Pass
11a	6Mbps	1	64	5320	0.52	-0.52	11.00	2.27	Pass

Test Band :	5GHz band 3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	CH	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm)	DG (dBi)	Pass/Fail
11a	6Mbps	1	100	5500	0.52	-1.46	11.00	2.94	Pass
11a	6Mbps	1	116	5580	0.52	-1.85	11.00	2.94	Pass
11a	6Mbps	1	140	5700	0.52	-2.38	11.00	2.94	Pass

Worst Case Power Spectral Density(dBm/MHz)



Note: Average Power Density (dB) = Measured value+ Duty Factor

3.4 Unwanted Radiated Emission 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 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

(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.

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

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

(3) KDB789033 v01 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 v01. 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 ≥ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

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

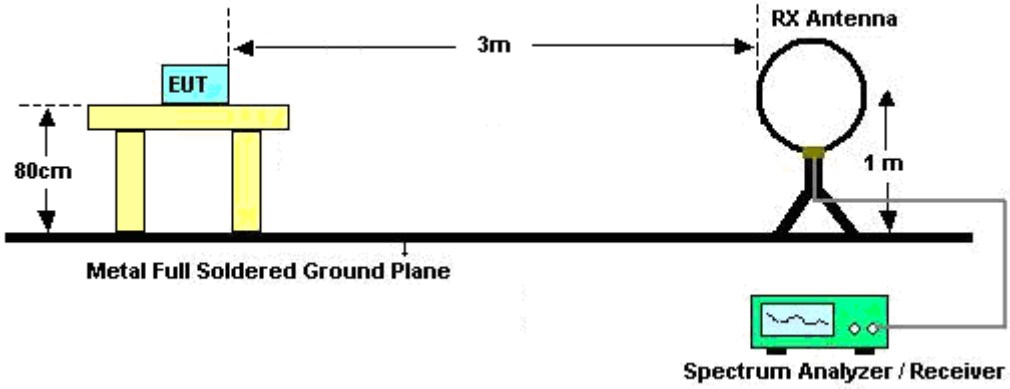
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	88.78	1.39	0.72	1kHz

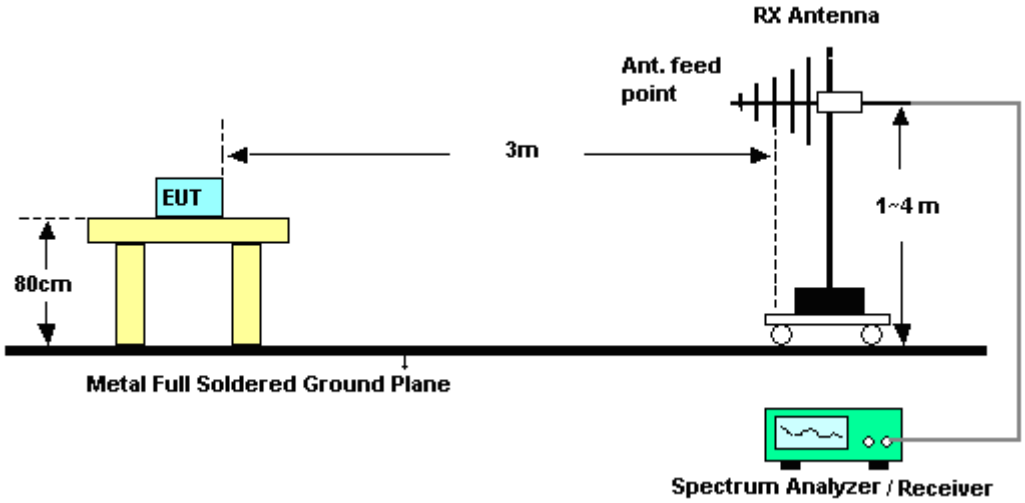
2. The EUT was placed on a turntable with 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above 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

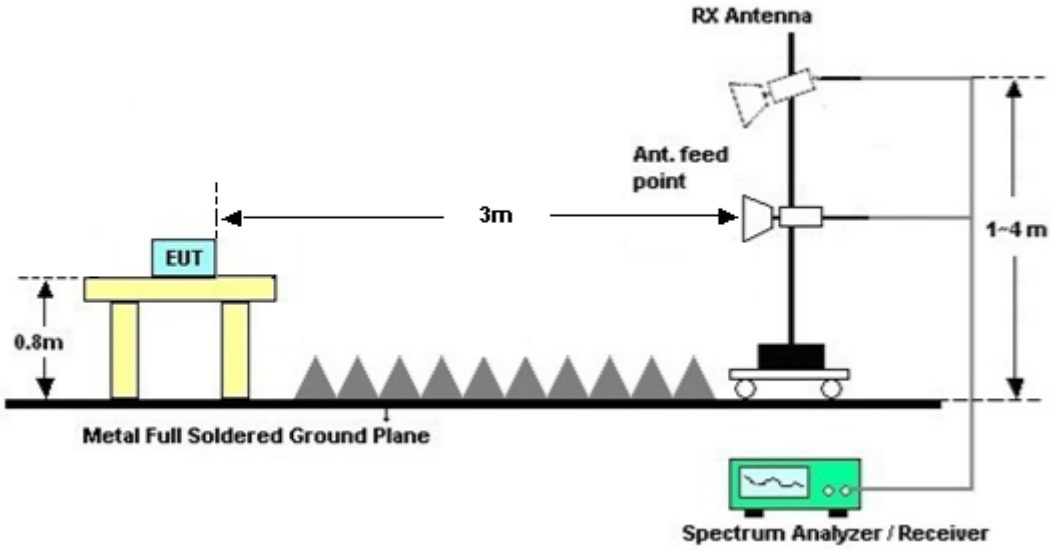
For radiated emissions below 30MHz



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 A.

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

Please refer to Appendix A.

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 (dBμV)	
	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.

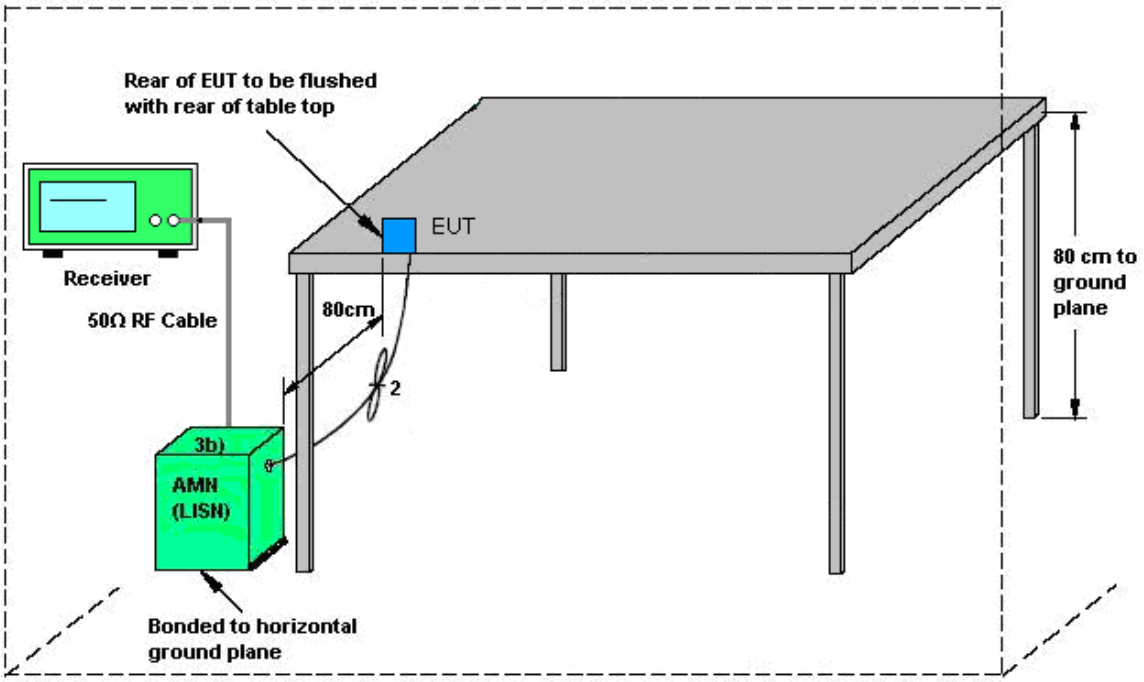
3.5.2 Measuring Instruments

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.

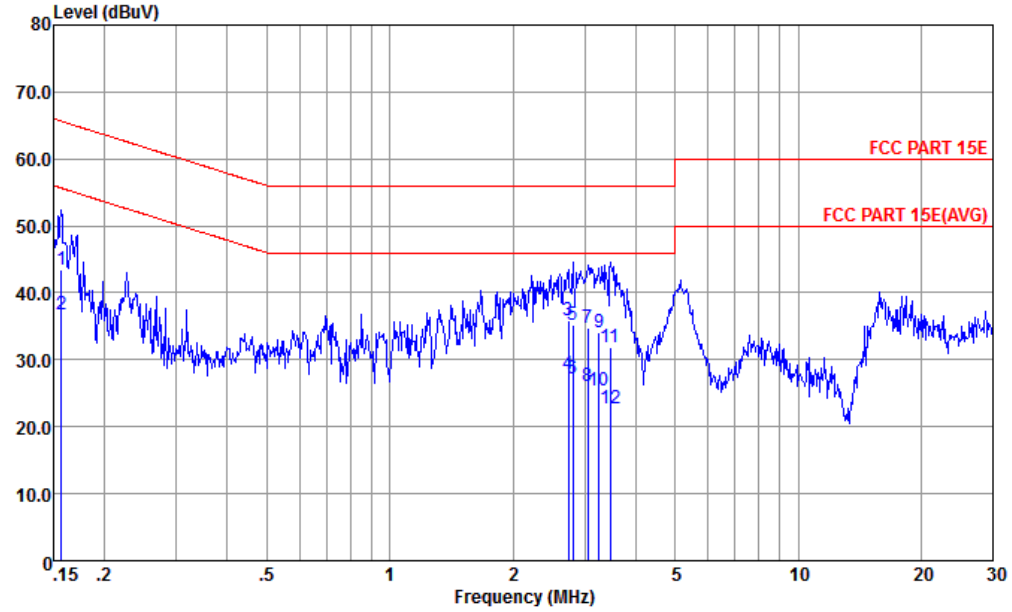
3.5.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.5.5 Test Result of AC Conducted Emission

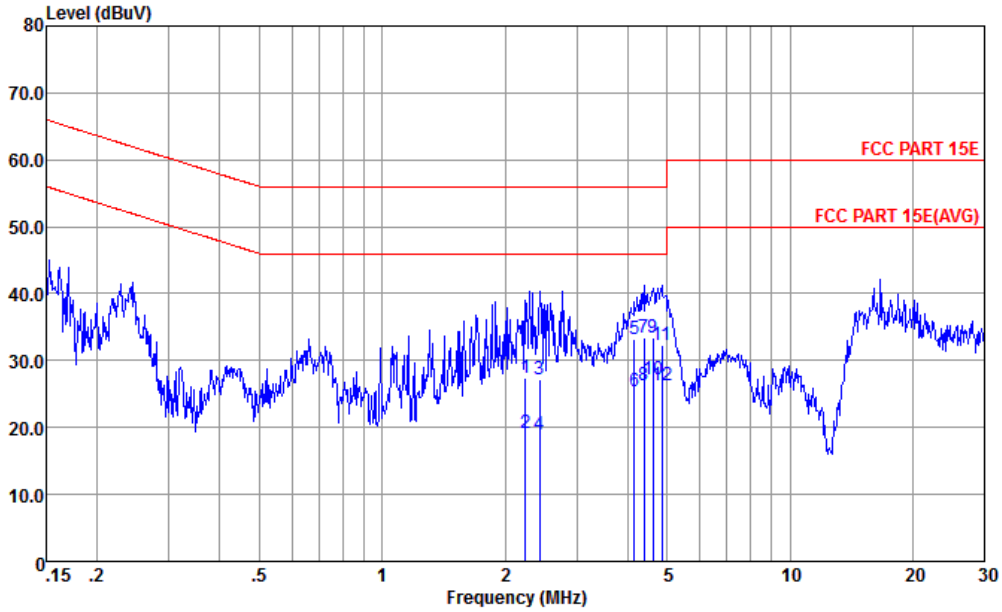
Test Mode :	Mode 1	**Temperature :**	22~24℃
Test Engineer :	Eko Guan	**Relative Humidity :**	30~33%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	Bluetooth Link + WLAN 5GHz Link + USB Cable (Charging from Adapter) + Earphone		



Site : CO01-KS
Condition : FCC PART 15E LISN-L20140306 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.16	43.53	-22.12	65.65	31.30	1.85	10.38	QP
2		0.16	36.73	-18.92	55.65	24.50	1.85	10.38	Average
3		2.74	35.78	-20.22	56.00	24.91	0.12	10.75	QP
4	*	2.74	27.78	-18.22	46.00	16.91	0.12	10.75	Average
5		2.81	35.19	-20.81	56.00	24.30	0.13	10.76	QP
6		2.81	27.09	-18.91	46.00	16.20	0.13	10.76	Average
7		3.06	34.73	-21.27	56.00	23.80	0.14	10.79	QP
8		3.06	26.03	-19.97	46.00	15.10	0.14	10.79	Average
9		3.26	34.06	-21.94	56.00	23.10	0.16	10.80	QP
10		3.26	25.36	-20.64	46.00	14.40	0.16	10.80	Average
11		3.47	31.88	-24.12	56.00	20.90	0.17	10.81	QP
12		3.47	22.68	-23.32	46.00	11.70	0.17	10.81	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eko Guan	Relative Humidity :	30~33%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN 5GHz Link + USB Cable (Charging from Adapter) + Earphone		



Site : CO01-KS
Condition : FCC PART 15E LISN-N20140306 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	2.25	27.32	-28.68	56.00	16.50	0.11	10.71	QP
2	2.25	19.22	-26.78	46.00	8.40	0.11	10.71	Average
3	2.43	27.24	-28.76	56.00	16.40	0.11	10.73	QP
4	2.43	19.04	-26.96	46.00	8.20	0.11	10.73	Average
5	4.16	33.12	-22.88	56.00	22.10	0.19	10.83	QP
6	4.16	25.42	-20.58	46.00	14.40	0.19	10.83	Average
7	4.38	33.43	-22.57	56.00	22.40	0.19	10.84	QP
8	4.38	26.33	-19.67	46.00	15.30	0.19	10.84	Average
9	4.62	33.44	-22.56	56.00	22.40	0.20	10.84	QP
10 *	4.62	27.14	-18.86	46.00	16.10	0.20	10.84	Average
11	4.85	32.34	-23.66	56.00	21.29	0.20	10.85	QP
12	4.85	26.24	-19.76	46.00	15.19	0.20	10.85	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.

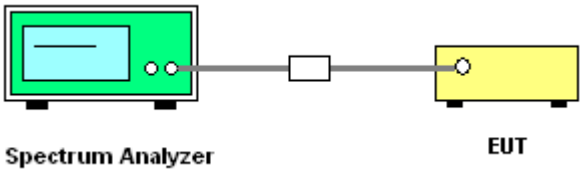
3.6.2 Measuring Instruments

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

Test Band :	5GHz band 1,2,3	Test Engineer :	Issac Song

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (˚C)	Voltage (V)
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	25	3.6
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	25	4.35
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	25	3.8
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	-30	3.8
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	50	3.8

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (˚C)	Voltage (V)
11a	6Mbps	1	64	5320	5320.000	0.000	0.00	25	3.6
11a	6Mbps	1	64	5320	5320.000	0.000	0.00	25	4.35
11a	6Mbps	1	64	5320	5320.000	0.000	0.00	25	3.8
11a	6Mbps	1	64	5320	5320.050	0.000	0.00	-30	3.8
11a	6Mbps	1	64	5320	5320.000	0.000	0.00	50	3.8

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (˚C)	Voltage (V)
11a	6Mbps	1	100	5500	5500.000	0.000	0.00	25	3.6
11a	6Mbps	1	100	5500	5500.000	0.000	0.00	25	4.35
11a	6Mbps	1	100	5500	5500.000	0.000	0.00	25	3.8
11a	6Mbps	1	100	5500	5500.000	0.000	0.00	-30	3.8
11a	6Mbps	1	100	5500	5500.000	0.000	0.00	50	3.8

Note:

1. Center Frequency = (Low Frequency + High Frequency) / 2.
2. The frequency band 5180-5240MHz which was verified by testing against other standard is less than 20 ppm which is sufficient to maintain the signal within the 5150-5250MHz band.

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 peak output power limit.

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014	Jan. 20, 2015~ Jan. 21, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Feb. 27, 2014	Jan. 20, 2015~ Jan. 21, 2015	Feb. 26, 2015	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Feb. 27, 2014	Jan. 20, 2015~ Jan. 21, 2015	Feb. 26, 2015	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 25, 2014	Jan. 20, 2015~ Jan. 21, 2015	Oct. 24, 2015	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Oct. 25, 2014	Jan. 13, 2015	Oct. 24, 2015	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014	Jan. 13, 2015	Oct. 27, 2015	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 13, 2014	Jan. 13, 2015	Nov. 12, 2015	Radiation (03CH01-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30Mhz-2Ghz	Sep. 13, 2014	Jan. 13, 2015	Sep. 12, 2015	Radiation (03CH01-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014	Jan. 13, 2015	Nov. 07, 2015	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 08, 2014	Jan. 13, 2015	Nov. 07, 2015	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Mar. 10, 2014	Jan. 13, 2015	Mar. 09, 2015	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161073	1MHz~1GHz	May 04, 2014	Jan. 13, 2015	May 03, 2015	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02371	1GHz~26.5GHz	Oct. 28, 2014	Jan. 13, 2015	Oct. 27, 2015	Radiation (03CH01-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jan. 13, 2015	NCR	Radiation (03CH01-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jan. 13, 2015	NCR	Radiation (03CH01-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jan. 13, 2015	NCR	Radiation (03CH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2014	Dec. 25, 2014	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Dec. 25, 2014	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Dec. 25, 2014	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Dec. 25, 2014	Oct. 24, 2015	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.3 dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.5 dB**

Appendix A. Radiated Spurious Emission

15E Band 1 - 5150~5250MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz	*	5180	108.47	-	-	100.2	35.26	6.78	33.77	100	149	P	H
	*	5180	97.53	-	-	89.26	35.26	6.78	33.77	100	149	A	H
		5147.6	57.72	-16.28	74	49.47	35.25	6.77	33.77	100	149	P	H
		5150	45.44	-8.56	54	37.19	35.25	6.77	33.77	100	149	A	H
	*	5180	103.06	-	-	94.79	35.26	6.78	33.77	150	77	P	V
	*	5180	92.42	-	-	84.15	35.26	6.78	33.77	150	77	A	V
		5140.85	55.59	-18.41	74	47.34	35.25	6.77	33.77	150	80	P	V
		5141.9	42.01	-11.99	54	33.76	35.25	6.77	33.77	150	80	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		10359	36.74	-37.26	74	60.18	1.46	9.59	34.49	100	161	P	H
		15540	35.17	-38.83	74	56.06	1.57	11.67	34.13	100	62	P	H
		10359	33.99	-40.01	74	57.43	1.46	9.59	34.49	100	201	P	V
		15540	34.08	-39.92	74	54.97	1.57	11.67	34.13	100	14	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 2 - 5250~5350MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 52 5260MHz	*	5260	108.08	-	-	99.7	35.29	6.84	33.75	100	147	P	H
	*	5260	97.17	-	-	88.79	35.29	6.84	33.75	100	147	A	H
		5149.85	55.6	-18.4	74	47.35	35.25	6.77	33.77	100	147	P	H
		5150	42.52	-11.48	54	34.27	35.25	6.77	33.77	100	147	A	H
	*	5260	104.8	-	-	96.42	35.29	6.84	33.75	152	80	P	V
	*	5260	93.32	-	-	84.94	35.29	6.84	33.75	152	80	A	V
		5109.65	53.61	-20.39	74	45.43	35.23	6.73	33.78	152	80	P	V
		5140.85	40.83	-13.17	54	32.58	35.25	6.77	33.77	152	80	A	V
802.11a CH 64 5320MHz	*	5320	110.47	-	-	102.02	35.31	6.87	33.73	100	114	P	H
	*	5320	99.82	-	-	91.37	35.31	6.87	33.73	100	114	A	H
		5350.9	59.44	-14.56	74	50.95	35.32	6.9	33.73	100	114	P	H
		5350	46.65	-7.35	54	38.16	35.32	6.9	33.73	100	114	A	H
	*	5320	107.18	-	-	98.73	35.31	6.87	33.73	150	97	P	V
	*	5320	96.31	-	-	87.86	35.31	6.87	33.73	150	97	A	V
		5367.45	56.56	-17.44	74	48.03	35.33	6.92	33.72	150	97	P	V
		5351.4	43.77	-10.23	54	35.28	35.32	6.9	33.73	150	97	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E band 2 5250~5350MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 52 5260MHz		10521	35.29	-38.71	74	58.33	1.58	9.77	34.39	100	51	P	H
		15783	34.06	-39.94	74	55.22	1.28	11.95	34.39	100	201	P	H
		10521	33.79	-40.21	74	56.83	1.58	9.77	34.39	100	102	P	V
		15783	36.52	-37.48	74	57.68	1.28	11.95	34.39	100	126	P	V
802.11a CH 64 5320MHz		10641	36.53	-37.47	74	59.31	1.7	9.83	34.31	100	23	P	H
		15960	29.12	-44.88	74	51	1.14	11.55	34.57	100	301	P	H
		10641	34.35	-39.65	74	57.13	1.7	9.83	34.31	100	161	P	V
		15960	30.15	-43.85	74	52.03	1.14	11.55	34.57	100	251	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 3 - 5470~5725MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 100 5500MHz	*	5500	109.03	-	-	100.32	35.41	7	33.7	100	110	P	H
	*	5500	96.83	-	-	88.12	35.41	7	33.7	100	110	A	H
		5470	57.66	-16.34	74	49.01	35.39	6.97	33.71	100	110	P	H
		5470	45.61	-8.39	54	36.96	35.39	6.97	33.71	100	110	A	H
	*	5500	106.38	-	-	97.67	35.41	7	33.7	158	96	P	V
	*	5500	95.04	-	-	86.33	35.41	7	33.7	158	96	A	V
		5470	54.84	-19.16	74	46.19	35.39	6.97	33.71	158	96	P	V
		5470	43.51	-10.49	54	34.86	35.39	6.97	33.71	158	96	A	V
802.11a CH 116 5580MHz	*	5580	106.43	-	-	97.65	35.45	7.03	33.7	110	124	P	H
	*	5580	96.23	-	-	87.45	35.45	7.03	33.7	110	124	A	H
	*	5580	105.23	-	-	96.45	35.45	7.03	33.7	100	214	P	V
	*	5580	97.43	-	-	88.65	35.45	7.03	33.7	100	214	A	V
802.11a CH 140 5700MHz	*	5700	108.84	-	-	99.93	35.5	7.11	33.7	100	113	P	H
	*	5700	97.12	-	-	88.21	35.5	7.11	33.7	100	113	A	H
		5725	58.15	-15.85	74	49.19	35.52	7.14	33.7	100	113	P	H
		5725	45.53	-8.47	54	36.57	35.52	7.14	33.7	100	113	A	H
	*	5700	105.02	-	-	96.11	35.5	7.11	33.7	150	99	P	V
	*	5700	93.76	-	-	84.85	35.5	7.11	33.7	150	99	A	V
		5725	55.76	-18.24	74	46.8	35.52	7.14	33.7	150	99	P	V
		5725	42.97	-11.03	54	34.01	35.52	7.14	33.7	150	99	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E band 3 - 5470~5725MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 100 5500MHz		11001	37.39	-36.61	74	59.19	2.21	9.99	34	100	200	P	H
		16500	33.92	-40.08	74	55.16	1.38	11.88	34.5	100	291	P	H
		11001	35.24	-38.76	74	57.04	2.21	9.99	34	100	216	P	V
		16500	32.85	-41.15	74	54.09	1.38	11.88	34.5	100	102	P	V
802.11a CH 116 5580MHz		11160	36.1	-37.9	74	57.13	2.9	10.07	34	100	323	P	H
		16740	33.08	-40.92	74	53.6	1.53	12.1	34.15	100	116	P	H
		11160	34.53	-39.47	74	55.56	2.9	10.07	34	100	221	P	V
		16740	32.47	-41.53	74	52.99	1.53	12.1	34.15	100	18	P	V
802.11a CH 140 5700MHz		11403	38.33	-35.67	74	58.09	4.13	10.11	34	100	219	P	H
		17100	33.83	-40.17	74	53.64	1.83	12.11	33.75	100	319	P	H
		11400	36.17	-37.83	74	55.93	4.13	10.11	34	100	225	P	V
		17100	34.19	-39.81	74	54	1.83	12.11	33.75	1000	212	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Emission below 1GHz

WIFI 802.11a (LF @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a LF		30	24.45	-15.55	40	39.54	18	0.48	33.57			P	H
		71.71	25.85	-14.15	40	53.19	5.46	0.79	33.59	101	204	P	H
		95.96	25.83	-17.67	43.5	48.64	9.91	0.9	33.62			P	H
		190.05	28.42	-15.08	43.5	52.23	8.5	1.25	33.56			P	H
		244.37	27.9	-18.1	46	48.16	11.75	1.44	33.45			P	H
		270.56	27.8	-18.2	46	47.29	12.39	1.53	33.41			P	H
	!	31.94	34.43	-5.57	40	50.96	16.55	0.5	33.58			P	V
	!	77.53	34.69	-5.31	40	61.28	6.2	0.81	33.6	200	124	P	V
		159.01	34.29	-9.21	43.5	57.08	9.64	1.15	33.58			P	V
		226.91	22.75	-23.25	46	44.18	10.67	1.39	33.49			P	V
		253.1	22.63	-23.37	46	42.57	12.04	1.46	33.44			P	V
		450.01	25.21	-20.79	46	40.17	16.3	1.95	33.21			P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency per 15.209(c).
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5147.6	57.72	-16.28	74	49.47	35.25	6.77	33.77	100	149	P	H
		5150	45.44	-8.56	54	37.19	35.25	6.77	33.77	100	149	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 35.25 (dB/m) + 6.77 (dB) + 49.47 (dBμV) –33.77 (dB)

= 57.72 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 57.72 (dBμV/m) – 74(dBμV/m)

= -16.28 (dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 35.25 (dB/m) + 6.77 (dB) + 37.19 (dBμV) –33.77 (dB)

= 45.44 (dBμV/m)

2. Over Limit(dB)

= Level (dBμV/m) – Limit Line (dBμV/m)

= 45.44 (dBμV/m) – 54 (dBμV/m)

= -8.56 (dB)

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