FCC RF Test Report

APPLICANT	:	ASUSTeK COMPUTER INC.
EQUIPMENT	:	ASUS Phone
BRAND NAME	:	ASUS
MODEL NAME	:	ASUS_Z00XS
MARKETING NAME	:	ZX551ML
FCC ID	:	MSQZ00XS
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was received on Jul. 23, 2015 and testing was completed on Sep. 01, 2015. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR561105-02E	Rev. 01	Initial issue of report	Sep. 29, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	FCC ≤ 24 dBm (depend on band)	Pass	-
3.3	15.407(a)	Power Spectral Density	FCC ≤ 11 dBm (depend on band)	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 3.16 dB at 5149.100 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.30 dB at 13.558 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

ASUSTeK COMPUTER INC.
4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.2 Manufacturer

ASUSTeK COMPUTER INC.
4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	ASUS Phone
Brand Name	ASUS
Model Name	ASUS_Z00XS
Marketing Name	ZX551ML
FCC ID	MSQZ00XS
Sample 1	EUT in black
Sample 2	EUT in white
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/NFC WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth v4.0 EDR/LE
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. All tests are performed on sample 1.
3. AC conducted Emission tests are performed with USB cable 1 and adapter 2 ; Radiated test items are performed with USB cable 2 and adapter 2.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz
Maximum Output Power to Antenna	802.11a : 11.82 dBm / 0.0152 W 802.11n HT20 : 10.73 dBm / 0.0118 W 802.11n HT40 : 10.60 dBm / 0.0115 W 802.11ac VHT20 : 10.72 dBm / 0.0118 W 802.11ac VHT40 : 10.82 dBm / 0.0121 W 802.11ac VHT80 : 9.43 dBm / 0.0088 W
99% Occupied Bandwidth	802.11a : 18.15 MHz 802.11n HT20 : 19.15 MHz 802.11n HT40 : 36.70 MHz 802.11ac VHT20: 19.15 MHz 802.11ac VHT40 : 36.70 MHz 802.11ac VHT80 : 75.84 MHz
Antenna Type	PIFA Antenna with gain -1.88 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

1.5 Modification of EUT

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

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH05-HY	CO05-HY

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

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH10-HY

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. FCC permits the use of the 1.5 meter table as an alternative in C63.10-2013 through inquiry tracking number 961829.

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
	38	**5190**	**46**	**5230**
	40	5200	48	5240
	42	5210		

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

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 mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Avg. Power (dBm)	11.82	11.77	11.72	11.79	11.72	11.79	11.72	11.80

5GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Avg. Power (dBm)	10.73	10.70	10.59	10.69	10.66	10.71	10.64	10.65

5GHz 802.11n HT40mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Avg. Power (dBm)	10.60	10.58	10.60	10.52	10.57	10.55	10.60	10.59

5GHz 802.11ac VHT20 mode									
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8
Avg. Power (dBm)	10.72	10.69	10.69	10.62	10.69	10.64	10.67	10.68	10.70

5GHz 802.11ac VHT40 mode										
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
Avg. Power (dBm)	10.82	10.64	10.55	10.70	10.66	10.59	10.81	10.79	10.72	10.79

5GHz 802.11ac VHT80 mode										
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
Avg. Power (dBm)	9.43	9.39	9.35	9.34	9.36	9.37	9.38	9.36	9.38	9.35

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

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

Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Link + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + SD Card + NFC On

Ch. #		Band I：5150-5250 MHz
		802.11a
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I：5150-5250 MHz
		802.11n HT20
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I：5150-5250 MHz
		802.11n HT40
L	Low	38
M	Middle	-
H	High	46

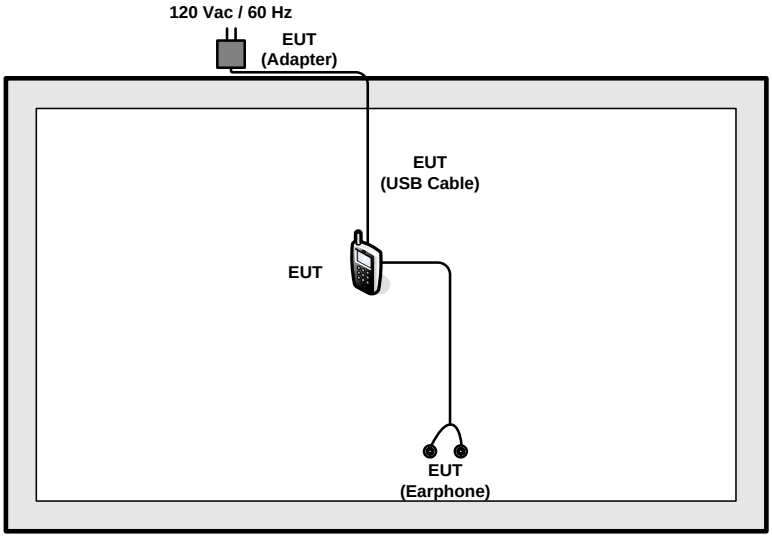
Ch. #		Band I：5150-5250 MHz
		802.11ac VHT20
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I：5150-5250 MHz
		802.11ac VHT40
L	Low	38
M	Middle	-
H	High	46

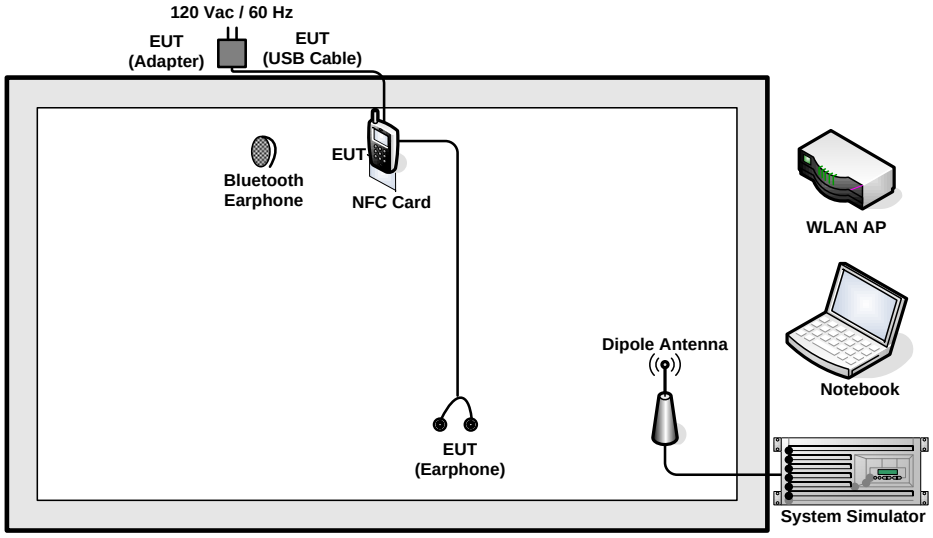
Ch. #		Band I：5150-5250 MHz
		802.11ac VHT80
L	Low	-
M	Middle	42
H	High	-

2.4 Connection Diagram of Test System

< Radiated Emission 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.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
4.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
6.	NFC Card	Metro Taipei	Easy Card	N/A	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

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 4.2 dB and 10dB attenuator.

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

= 4.2 + 10 = 14.2 (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.

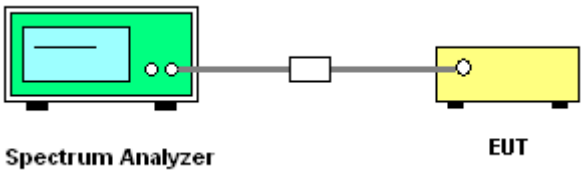
3.1.2 Measuring Instruments

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.

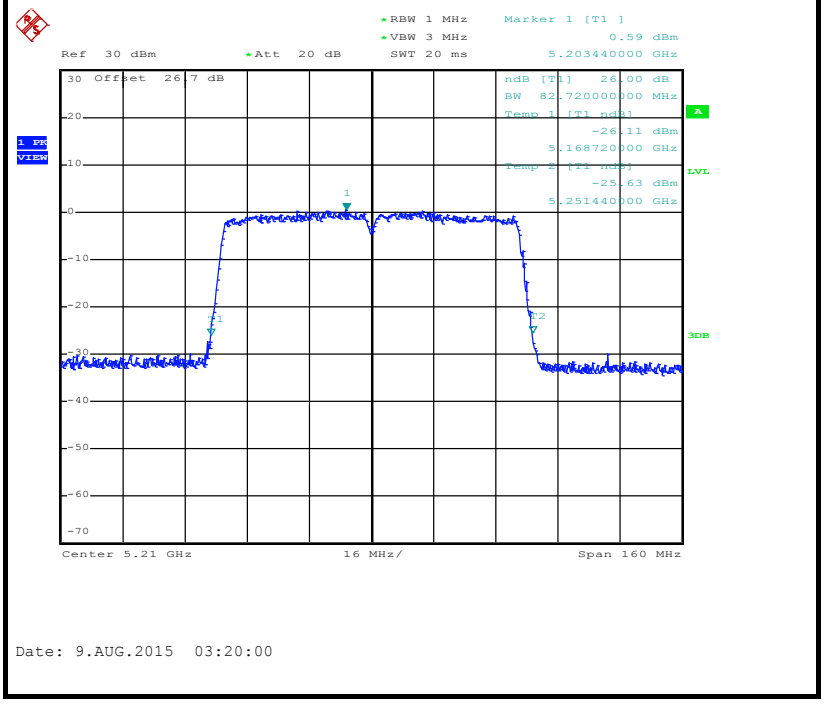
3.1.4 Test Setup



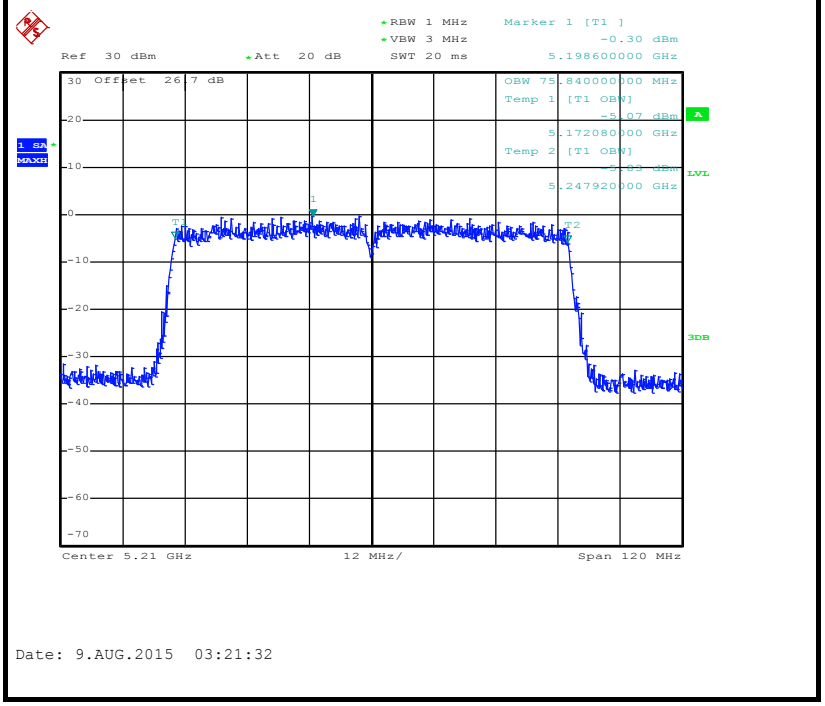
3.1.5 Test Result of 26dB & 99% Occupied Bandwidth Plots

Please refer to Appendix A.

Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



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

<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.

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.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.2.2 Measuring Instruments

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

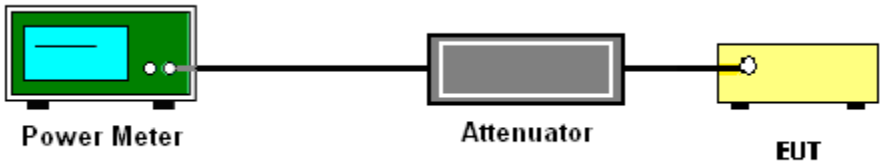
3.2.3 Test Procedures

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



3.3 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.

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

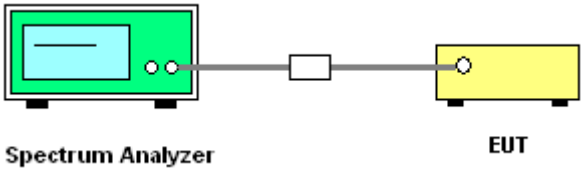
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
Section F) Maximum power spectral density.

 # 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.

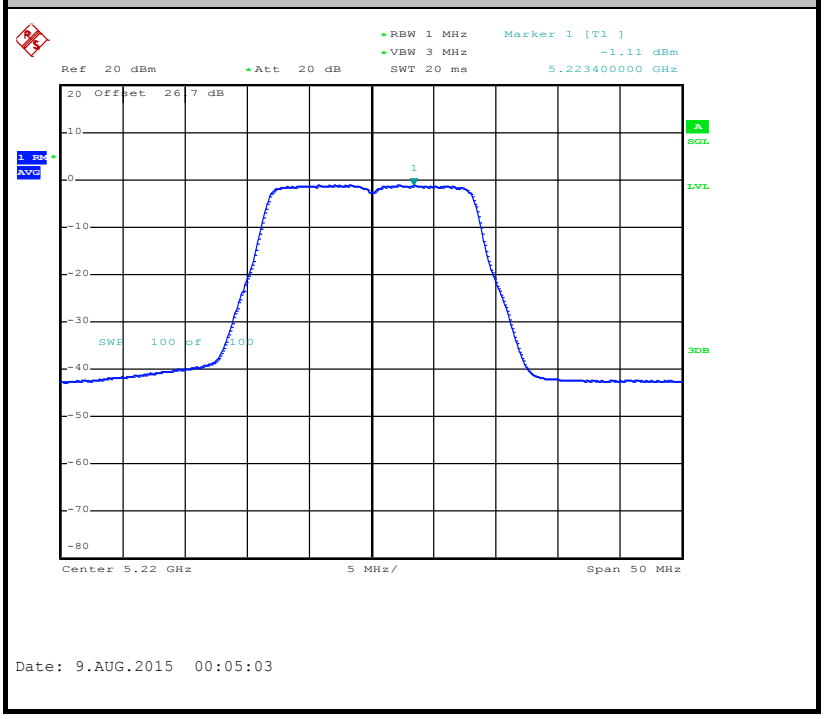
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

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.

(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

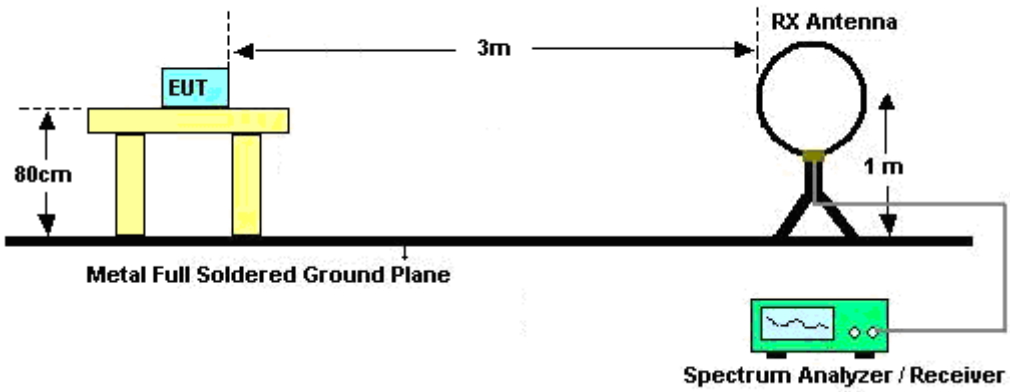
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(μs)	1/T(kHz)	VBW Setting
802.11a	93.42	1420	0.70	1kHz
802.11n HT20	93.33	1344	0.74	1kHz
802.11n HT40	87.01	670	1.49	3kHz
802.11n VHT20	93.41	1360	0.74	1kHz
802.11n VHT40	87.01	670	1.49	3kHz
802.11n VHT80	76.15	332	3.01	10kHz

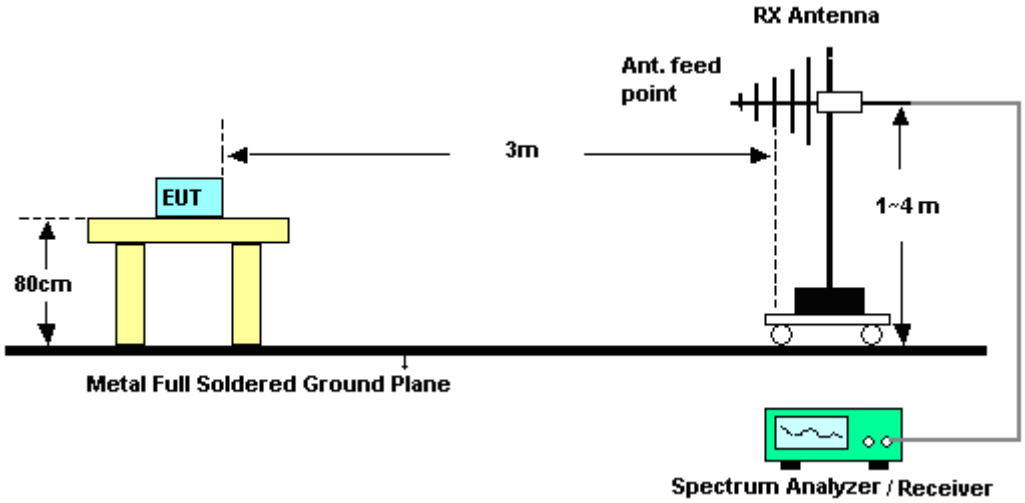
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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

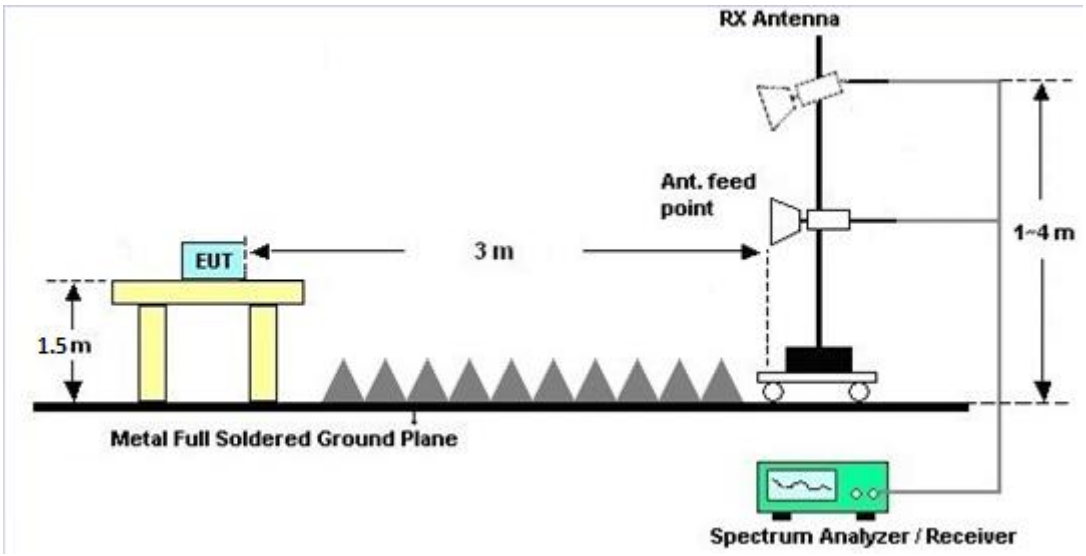
For radiated emissions below 30MHz



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 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 (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.

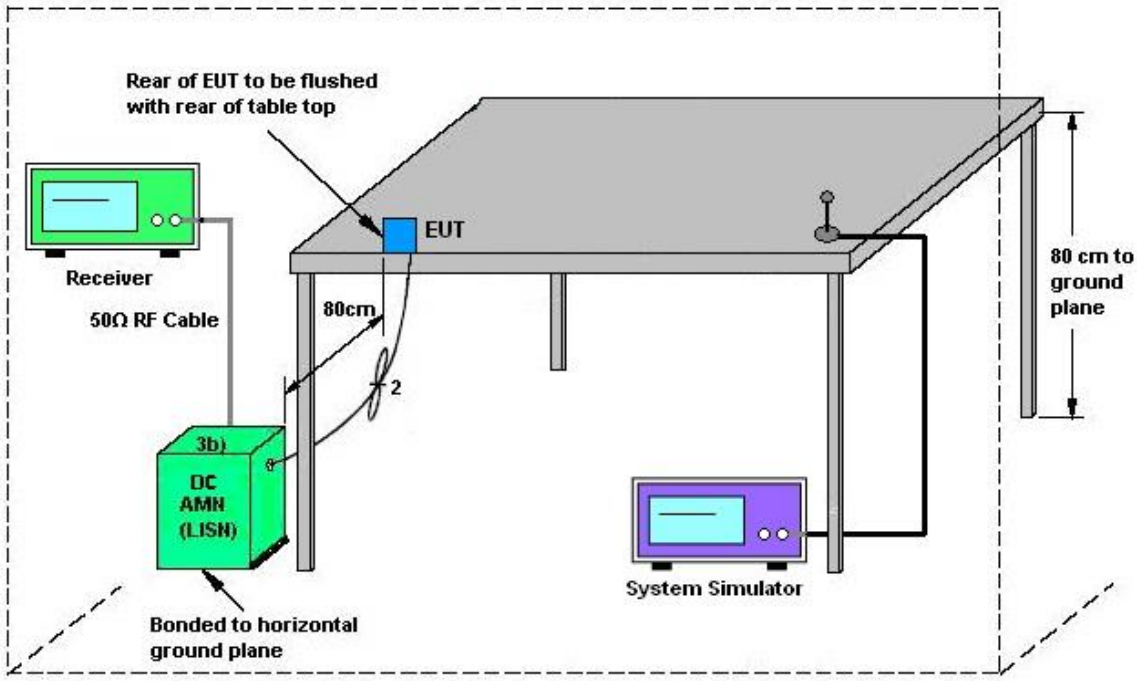
3.5.2 Measuring Instruments

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.

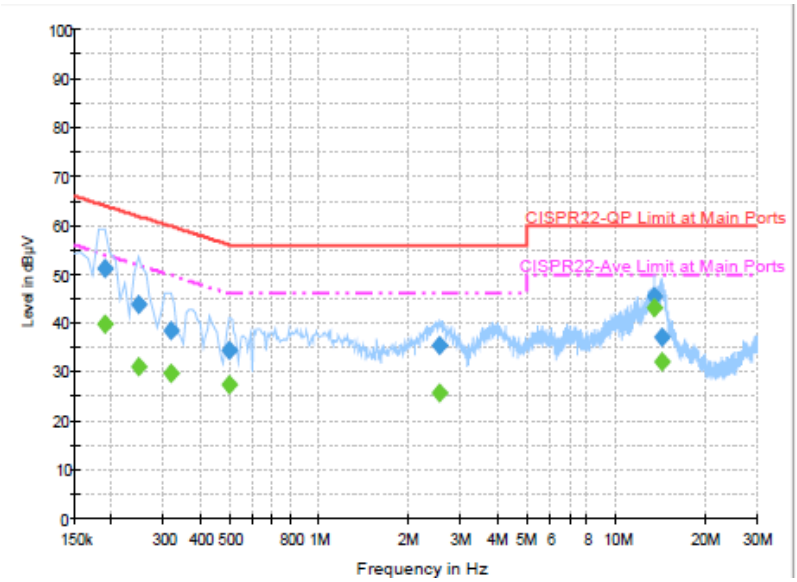
3.5.4 Test Setup



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 :**	26~27℃
Test Engineer :	Kai-Chun Chu	**Relative Humidity :**	56~57%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Link + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + SD Card + NFC On		



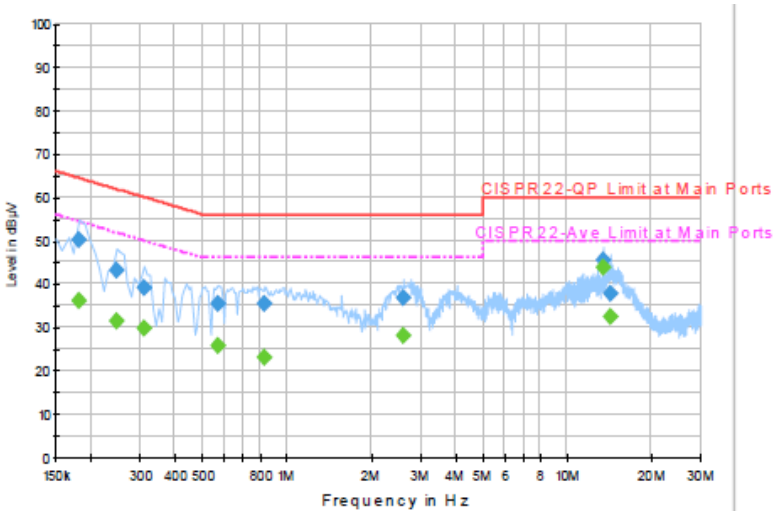
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	51.3	Off	L1	19.5	12.7	64.0
0.246000	43.7	Off	L1	19.5	18.2	61.9
0.318000	38.6	Off	L1	19.5	21.2	59.8
0.502000	34.6	Off	L1	19.4	21.4	56.0
2.550000	35.5	Off	L1	19.7	20.5	56.0
13.558000	45.6	Off	L1	19.9	14.4	60.0
14.270000	37.2	Off	L1	19.9	22.8	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	39.8	Off	L1	19.5	14.2	54.0
0.246000	31.0	Off	L1	19.5	20.9	51.9
0.318000	29.7	Off	L1	19.5	20.1	49.8
0.502000	27.3	Off	L1	19.4	18.7	46.0
2.550000	25.7	Off	L1	19.7	20.3	46.0
13.558000	43.2	Off	L1	19.9	6.8	50.0
14.270000	32.1	Off	L1	19.9	17.9	50.0

Test Mode :	Mode 1	**Temperature :**	26~27℃
Test Engineer :	Kai-Chun Chu	**Relative Humidity :**	56~57%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	GSM850 Link + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + SD Card + NFC On		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	50.2	Off	N	19.5	14.2	64.4
0.246000	43.3	Off	N	19.5	18.6	61.9
0.310000	39.1	Off	N	19.5	20.9	60.0
0.566000	35.5	Off	N	19.4	20.5	56.0
0.838000	35.5	Off	N	19.6	20.5	56.0
2.606000	36.8	Off	N	19.7	19.2	56.0
13.558000	45.5	Off	N	20.0	14.5	60.0
14.286000	37.8	Off	N	19.9	22.2	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	36.1	Off	N	19.5	18.3	54.4
0.246000	31.4	Off	N	19.5	20.5	51.9
0.310000	29.9	Off	N	19.5	20.1	50.0
0.566000	25.6	Off	N	19.4	20.4	46.0
0.838000	23.2	Off	N	19.6	22.8	46.0
2.606000	28.0	Off	N	19.7	18.0	46.0
13.558000	43.7	Off	N	20.0	6.3	50.0
14.286000	32.4	Off	N	19.9	17.6	50.0

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.

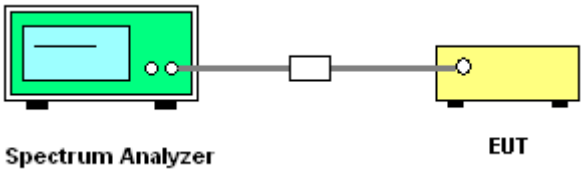
3.6.2 Measuring Instruments

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 peak output power limit.

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1218006	300MHz~40GHz	Oct. 18, 2014	Jul. 26, 2015~ Aug. 11, 2015	Oct. 17, 2015	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jun. 18, 2015	Jul. 26, 2015~ Aug. 11, 2015	Jun. 17, 2016	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1126017	300MHz~40GHz	Oct. 18, 2014	Jul. 26, 2015~ Aug. 11, 2015	Oct. 17, 2015	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SU-241	92003713	-30 ~95 degree	Jun. 15, 2015	Jul. 26, 2015~ Aug. 11, 2015	Jun. 14, 2016	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890089	1V~20V 0.5A~5A	Jan. 14, 2015	Jul. 26, 2015~ Aug. 11, 2015	Jan. 13, 2016	Conducted (TH05-HY)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 03, 2014	Aug. 16, 2015~ Aug. 18, 2015	Nov. 02, 2015	Radiation (03CH10-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9kHZ~30MHz	Feb. 02, 2015	Aug. 16, 2015~ Aug. 18, 2015	Feb. 01, 2016	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY84209521	9kHz~1GHz	Dec. 04, 2014	Aug. 16, 2015~ Aug. 18, 2015	Dec. 03, 2015	Radiation (03CH10-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 24, 2014	Aug. 16, 2015~ Aug. 18, 2015	Nov. 23, 2015	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Aug. 16, 2015~ Aug. 18, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
EMI Test Receiver	Keysight	N9038A	MY54130085	20Hz ~ 8.4GHz	Nov. 05, 2014	Aug. 16, 2015~ Aug. 18, 2015	Nov. 04, 2015	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 03, 2014	Aug. 16, 2015~ Aug. 18, 2015	Oct. 02, 2015	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Nov. 20, 2014	Aug. 16, 2015~ Aug. 18, 2015	Nov. 19, 2015	Radiation (03CH10-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1902246	1GHz~18GHz	Nov. 25, 2014	Aug. 16, 2015~ Aug. 18, 2015	Nov. 24, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHZ	Oct. 14, 2014	Aug. 16, 2015~ Aug. 18, 2015	Oct. 13, 2015	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 16, 2015~ Aug. 18, 2015	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Aug. 16, 2015~ Aug. 18, 2015	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0-360 degree	N/A	Aug. 16, 2015~ Aug. 18, 2015	N/A	Radiation (03CH10-HY)
Preamplifier	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	Jun. 02, 2015	Aug. 16, 2015~ Aug. 18, 2015	Jun. 01, 2016	Radiation (03CH10-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz – 2.75GHz	Dec. 01, 2014	Sep. 01, 2015	Nov. 30, 2015	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2014	Sep. 01, 2015	Dec. 01, 2015	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 01, 2015	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 07, 2015	Sep. 01, 2015	Jan. 06, 2016	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.26

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.90

Appendix A. Conducted Test Results

Report Number : FR561105-02E

Test Engineer:	osolemio Chang	Temperature:	21~25	°C
Test Date:	2015/07/26~2015/08/11	Relative Humidity:	51~54	%

TEST RESULTS DATA
26dB and 99% OBW

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	IC 99% Bandwidth Power Limit (dBm)	IC 99% Bandwidth EIRP Limit (dBm)		
11a	6Mbps	1	36	5180	18.15	23.05	-	22.59		
11a	6Mbps	1	44	5220	18.15	23.05	-	22.59		
11a	6Mbps	1	48	5240	18.05	23.05	-	22.56		
HT20	MCS0	1	36	5180	18.90	23.30	-	22.76		
HT20	MCS0	1	44	5220	18.95	23.25	-	22.78		
HT20	MCS0	1	48	5240	19.15	23.35	-	22.82		
HT40	MCS0	1	38	5190	36.70	41.49	-	23.01		
HT40	MCS0	1	46	5230	36.70	41.58	-	23.01		
VHT20	MCS0	1	36	5180	19.15	23.15	-	22.82		
VHT20	MCS0	1	44	5220	19.00	23.35	-	22.79		
VHT20	MCS0	1	48	5240	18.95	23.35	-	22.78		
VHT40	MCS0	1	38	5190	36.60	41.58	-	23.01		
VHT40	MCS0	1	46	5230	36.70	41.40	-	23.01		
VHT80	MCS0	1	42	5210	75.84	82.72	-	23.01		

TEST RESULTS DATA
Average Power Table

FCC Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6Mbps	1	36	5180	0.30	11.82	24.00	-1.88		Pass
11a	6Mbps	1	44	5220	0.30	11.77	24.00	-1.88		Pass
11a	6Mbps	1	48	5240	0.30	11.78	24.00	-1.88		Pass
HT20	MCS0	1	36	5180	0.30	10.73	24.00	-1.88		Pass
HT20	MCS0	1	44	5220	0.30	10.64	24.00	-1.88		Pass
HT20	MCS0	1	48	5240	0.30	10.69	24.00	-1.88		Pass
HT40	MCS0	1	38	5190	0.60	9.50	24.00	-1.88		Pass
HT40	MCS0	1	46	5230	0.60	10.60	24.00	-1.88		Pass
VHT20	MCS0	1	36	5180	0.30	10.72	24.00	-1.88		Pass
VHT20	MCS0	1	44	5220	0.30	10.62	24.00	-1.88		Pass
VHT20	MCS0	1	48	5240	0.30	10.69	24.00	-1.88		Pass
VHT40	MCS0	1	38	5190	0.60	10.82	24.00	-1.88		Pass
VHT40	MCS0	1	46	5230	0.60	10.73	24.00	-1.88		Pass
VHT80	MCS0	1	42	5210	1.18	9.43	24.00	-1.88		Pass

Report Number : FR561105-02E

TEST RESULTS DATA
Power Spectral Density

FCC Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm/MHz)	DG (dBi)	-	Pass/Fail
11a	6Mbps	1	36	5180	0.30	-0.93	11.00	-1.88		Pass
11a	6Mbps	1	44	5220	0.30	-0.81	11.00	-1.88		Pass
11a	6Mbps	1	48	5240	0.30	-0.90	11.00	-1.88		Pass
HT20	MCS0	1	36	5180	0.30	-2.21	11.00	-1.88		Pass
HT20	MCS0	1	44	5220	0.30	-2.11	11.00	-1.88		Pass
HT20	MCS0	1	48	5240	0.30	-1.99	11.00	-1.88		Pass
HT40	MCS0	1	38	5190	0.60	-5.24	11.00	-1.88		Pass
HT40	MCS0	1	46	5230	0.60	-5.12	11.00	-1.88		Pass
VHT20	MCS0	1	36	5180	0.30	-2.27	11.00	-1.88		Pass
VHT20	MCS0	1	44	5220	0.30	-2.07	11.00	-1.88		Pass
VHT20	MCS0	1	48	5240	0.30	-2.09	11.00	-1.88		Pass
VHT40	MCS0	1	38	5190	0.60	-5.25	11.00	-1.88		Pass
VHT40	MCS0	1	46	5230	0.60	-5.07	11.00	-1.88		Pass
VHT80	MCS0	1	42	5210	1.18	-8.12	11.00	-1.88		Pass

Report Number : FR561105-02E

TEST RESULTS DATA
Frequency Stability

Band I										
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (℃)	Voltage (V)	Note
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	3.6	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	4.35	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	3.85	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	-30	3.85	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	50	3.85	

Appendix B. Radiated Spurious Emission

Test Engineer :	Elvis Chen, Stan Hsieh, Karl Hou and Luke Chang	Temperature :	24~25°C
		Relative Humidity :	53~54%

Band 1 - 5150~5250MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant. 1	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 36 5180MHz		5148.2	52.54	-21.46	74	45.19	31.98	7.94	32.57	162	304	P	H
		5149.85	42.95	-11.05	54	35.6	31.98	7.94	32.57	162	304	A	H
	*	5178	100.2	-	-	92.84	32.02	7.91	32.57	162	304	P	H
	*	5178	94.03	-	-	86.67	32.02	7.91	32.57	162	304	A	H
													H
													H
		5138.9	51.52	-22.48	74	44.19	31.96	7.94	32.57	170	16	P	V
		5149.7	43.4	-10.6	54	36.05	31.98	7.94	32.57	170	16	A	V
	*	5181	101.01	-	-	93.65	32.02	7.91	32.57	170	16	P	V
	*	5181	94.75	-	-	87.39	32.02	7.91	32.57	170	16	A	V
													V
													V
802.11a CH 44 5220MHz		5127.95	51.01	-22.99	74	43.68	31.96	7.94	32.57	152	303	P	H
		5144.9	42.06	-11.94	54	34.71	31.98	7.94	32.57	152	303	A	H
	*	5218	101.26	-	-	93.76	32.06	8.01	32.57	152	303	P	H
	*	5218	93.55	-	-	86.05	32.06	8.01	32.57	152	303	A	H
		5443.5	48.2	-25.8	74	40.16	32.32	8.29	32.57	152	303	P	H
		5442.51	40.44	-13.56	54	32.4	32.32	8.29	32.57	152	303	A	H
		5091.05	50.93	-23.07	74	43.62	31.92	7.96	32.57	157	29	P	V
		5149.55	42.18	-11.82	54	34.83	31.98	7.94	32.57	157	29	A	V
	*	5219	101.73	-	-	94.23	32.06	8.01	32.57	157	29	P	V
	*	5219	94.13	-	-	86.63	32.06	8.01	32.57	157	29	A	V
		5376.62	49.4	-24.6	74	41.44	32.24	8.29	32.57	157	29	P	V
		5436.35	40.12	-13.88	54	32.08	32.32	8.29	32.57	157	29	A	V

802.11a CH 48 5240MHz		5145.2	50.11	-23.89	74	42.76	31.98	7.94	32.57	167	303	P	H
		5084	41.5	-12.5	54	34.21	31.9	7.96	32.57	167	303	A	H
	*	5241	101.32	-	-	93.8	32.08	8.01	32.57	167	303	P	H
	*	5241	93.67	-	-	86.15	32.08	8.01	32.57	167	303	A	H
		5453.07	49.01	-24.99	74	40.95	32.34	8.29	32.57	167	303	P	H
		5458.13	40.52	-13.48	54	32.46	32.34	8.29	32.57	167	303	A	H
		5056.4	50.99	-23.01	74	43.69	31.88	7.99	32.57	160	23	P	V
		5045.75	41.66	-12.34	54	34.38	31.86	7.99	32.57	160	23	A	V
	*	5242	101.3	-	-	93.65	32.1	8.12	32.57	160	23	P	V
	*	5242	94.06	-	-	86.41	32.1	8.12	32.57	160	23	A	V
		5381.68	48.43	-25.57	74	40.45	32.26	8.29	32.57	160	23	P	V
		5459.89	40.15	-13.85	54	32.09	32.34	8.29	32.57	160	23	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	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 36 5180MHz		10359	45.76	-28.24	74	57.22	39.69	11.96	63.11	100	0	P	H
		15540	42.9	-31.1	74	50.29	38.04	14.76	60.19	100	0	P	H
													H
													H
		10359	46.18	-27.82	74	57.64	39.69	11.96	63.11	100	0	P	V
		15540	44.28	-29.72	74	51.67	38.04	14.76	60.19	100	0	P	V
													V
													V
802.11a CH 44 5220MHz		10440	46.92	-27.08	74	58.15	39.79	12.03	63.05	100	0	P	H
		15660	45.33	-28.67	74	52.86	37.85	14.79	60.17	100	0	P	H
													H
													H
		10440	47.26	-26.74	74	58.49	39.79	12.03	63.05	100	0	P	V
		15660	45.68	-28.32	74	53.21	37.85	14.79	60.17	100	0	P	V
													V
													V
802.11a CH 48 5240MHz		10480	48.88	-25.12	74	59.96	39.87	12.06	63.01	100	0	P	H
		15720	42.41	-31.59	74	50.02	37.74	14.81	60.16	100	0	P	H
													H
													H
		10480	47.5	-26.5	74	58.58	39.87	12.06	63.01	100	0	P	V
		15720	43.09	-30.91	74	50.7	37.74	14.81	60.16	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT20(Band Edge @ 3m)

WIFI Ant. 1	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 36 5180MHz		5078	50.57	-23.43	74	43.25	31.9	7.99	32.57	163	301	P	H
		5150	42.5	-11.5	54	35.15	31.98	7.94	32.57	163	301	A	H
	*	5182	100.58	-	-	93.22	32.02	7.91	32.57	163	301	P	H
	*	5182	92.87	-	-	85.51	32.02	7.91	32.57	163	301	A	H
													H
													H
		5143.4	52.04	-21.96	74	44.69	31.98	7.94	32.57	169	16	P	V
		5149.85	42.66	-11.34	54	35.31	31.98	7.94	32.57	169	16	A	V
	*	5181	99.61	-	-	92.25	32.02	7.91	32.57	169	16	P	V
	*	5181	93.22	-	-	85.86	32.02	7.91	32.57	169	16	A	V
													V
													V
802.11n HT20 CH 44 5220MHz		5021.75	50.3	-23.7	74	43.01	31.84	8.02	32.57	159	305	P	H
		5146.1	41.87	-12.13	54	34.52	31.98	7.94	32.57	159	305	A	H
	*	5219	100.01	-	-	92.51	32.06	8.01	32.57	159	305	P	H
	*	5219	92.71	-	-	85.21	32.06	8.01	32.57	159	305	A	H
		5447.35	49.11	-24.89	74	41.05	32.34	8.29	32.57	159	305	P	H
		5441.85	40.4	-13.6	54	32.36	32.32	8.29	32.57	159	305	A	H
		5139.95	50.91	-23.09	74	43.56	31.98	7.94	32.57	166	18	P	V
		5142.2	42.05	-11.95	54	34.7	31.98	7.94	32.57	166	18	A	V
	*	5218	98.64	-	-	91.14	32.06	8.01	32.57	166	18	P	V
	*	5218	92.27	-	-	84.77	32.06	8.01	32.57	166	18	A	V
		5350.99	49.25	-24.75	74	41.37	32.22	8.23	32.57	166	18	P	V
		5444.16	40.19	-13.81	54	32.15	32.32	8.29	32.57	166	18	A	V

802.11n HT20 CH 48 5240MHz		5097.65	51.33	-22.67	74	44.02	31.92	7.96	32.57	164	304	P	H
		5097.95	41.47	-12.53	54	34.16	31.92	7.96	32.57	164	304	A	H
	*	5241	99.95	-	-	92.43	32.08	8.01	32.57	164	304	P	H
	*	5241	92.22	-	-	84.7	32.08	8.01	32.57	164	304	A	H
		5445.26	48.69	-25.31	74	40.65	32.32	8.29	32.57	164	304	P	H
		5459.89	40.35	-13.65	54	32.29	32.34	8.29	32.57	164	304	A	H
		5090.3	50.53	-23.47	74	43.22	31.92	7.96	32.57	165	20	P	V
		5118.2	41.52	-12.48	54	34.19	31.94	7.96	32.57	165	20	A	V
	*	5242	98.33	-	-	90.68	32.1	8.12	32.57	165	20	P	V
	*	5242	92.05	-	-	84.4	32.1	8.12	32.57	165	20	A	V
		5356.38	48.56	-25.44	74	40.68	32.22	8.23	32.57	165	20	P	V
		5456.81	40.18	-13.82	54	32.12	32.34	8.29	32.57	165	20	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	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 36 5180MHz		10359	47.93	-26.07	74	59.39	39.69	11.96	63.11	100	0	P	H
		15540	43.87	-30.13	74	51.26	38.04	14.76	60.19	100	0	P	H
													H
													H
		10359	46.77	-27.23	74	58.23	39.69	11.96	63.11	100	0	P	V
		15540	44.21	-29.79	74	51.6	38.04	14.76	60.19	100	0	P	V
													V
													V
802.11n HT20 CH 44 5220MHz		10440	47.49	-26.51	74	58.72	39.79	12.03	63.05	100	0	P	H
		15660	44.73	-29.27	74	52.26	37.85	14.79	60.17	100	0	P	H
													H
													H
		10440	48.19	-25.81	74	59.42	39.79	12.03	63.05	100	0	P	V
		15660	45.54	-28.46	74	53.07	37.85	14.79	60.17	100	0	P	V
													V
													V
802.11n HT20 CH 48 5240MHz		10479	47.02	-26.98	74	58.1	39.87	12.06	63.01	100	0	P	H
		15720	43.2	-30.8	74	50.81	37.74	14.81	60.16	100	0	P	H
													H
													H
		10479	47	-27	74	58.08	39.87	12.06	63.01	100	0	P	V
		15720	43.21	-30.79	74	50.82	37.74	14.81	60.16	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	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 38 5190MHz		5148.05	58.96	-15.04	74	51.61	31.98	7.94	32.57	152	304	P	H
		5149.1	50.84	-3.16	54	43.49	31.98	7.94	32.57	152	304	A	H
	*	5188	97.1	-	-	89.74	32.02	7.91	32.57	152	304	P	H
	*	5188	89.6	-	-	82.24	32.02	7.91	32.57	152	304	A	H
		5360.56	49.14	-24.86	74	41.24	32.24	8.23	32.57	152	304	P	H
		5358.69	40.66	-13.34	54	32.78	32.22	8.23	32.57	152	304	A	H
		5147.9	56.78	-17.22	74	49.43	31.98	7.94	32.57	171	22	P	V
		5149.25	50.23	-3.77	54	42.88	31.98	7.94	32.57	171	22	A	V
	*	5191	96.08	-	-	88.7	32.04	7.91	32.57	171	22	P	V
	*	5191	89.84	-	-	82.46	32.04	7.91	32.57	171	22	A	V
		5352.86	49.27	-24.73	74	41.39	32.22	8.23	32.57	171	22	P	V
		5413.03	40.48	-13.52	54	32.46	32.3	8.29	32.57	171	22	A	V
802.11n HT40 CH 46 5230MHz		5149.25	50.87	-23.13	74	43.52	31.98	7.94	32.57	156	302	P	H
		5149.7	42.73	-11.27	54	35.38	31.98	7.94	32.57	156	302	A	H
	*	5232	96.51	-	-	88.99	32.08	8.01	32.57	156	302	P	H
	*	5232	89.57	-	-	82.05	32.08	8.01	32.57	156	302	A	H
		5455.49	49.16	-24.84	74	41.1	32.34	8.29	32.57	156	302	P	H
		5360.01	40.61	-13.39	54	32.73	32.22	8.23	32.57	156	302	A	H
		5092.7	51.33	-22.67	74	44.02	31.92	7.96	32.57	184	25	P	V
		5148.05	42.32	-11.68	54	34.97	31.98	7.94	32.57	184	25	A	V
	*	5228	96.75	-	-	89.23	32.08	8.01	32.57	184	25	P	V
	*	5228	89.46	-	-	81.94	32.08	8.01	32.57	184	25	A	V
		5351.43	48.64	-25.36	74	40.76	32.22	8.23	32.57	184	25	P	V
		5453.07	40.46	-13.54	54	32.4	32.34	8.29	32.57	184	25	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	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 38 5190MHz		10380	45.72	-28.28	74	57.14	39.71	11.96	63.09	100	0	P	H
		15570	43.3	-30.7	74	50.73	37.99	14.77	60.19	100	0	P	H
													H
													H
		10380	46.86	-27.14	74	58.28	39.71	11.96	63.09	100	0	P	V
		15570	43.42	-30.58	74	50.85	37.99	14.77	60.19	100	0	P	V
													V
													V
802.11n HT40 CH 46 5230MHz		10461	46.45	-27.55	74	57.6	39.85	12.03	63.03	100	0	P	H
		15690	44.02	-29.98	74	51.58	37.8	14.8	60.16	100	0	P	H
													H
													H
		10461	46.78	-27.22	74	57.93	39.85	12.03	63.03	100	0	P	V
		15690	43.65	-30.35	74	51.21	37.8	14.8	60.16	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant. 1	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 42 5210MHz		5114.15	57.78	-16.22	74	50.45	31.94	7.96	32.57	241	294	P	H
		5148.35	50.16	-3.84	54	42.81	31.98	7.94	32.57	241	294	A	H
	*	5211	91.66	-	-	84.16	32.06	8.01	32.57	241	294	P	H
	*	5211	85.26	-	-	77.76	32.06	8.01	32.57	241	294	A	H
		5387.29	48.71	-25.29	74	40.73	32.26	8.29	32.57	241	294	P	H
		5352.64	41.17	-12.83	54	33.29	32.22	8.23	32.57	241	294	A	H
		5147.3	58.48	-15.52	74	51.13	31.98	7.94	32.57	173	19	P	V
		5149.7	50.12	-3.88	54	42.77	31.98	7.94	32.57	173	19	A	V
	*	5208	93.43	-	-	85.93	32.06	8.01	32.57	173	19	P	V
	*	5208	86.44	-	-	78.94	32.06	8.01	32.57	173	19	A	V
		5424.69	48.56	-25.44	74	40.54	32.3	8.29	32.57	173	19	P	V
		5401.37	40.93	-13.07	54	32.93	32.28	8.29	32.57	173	19	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI Ant. 1	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 42 5210MHz		10419	46.47	-27.53	74	57.77	39.77	12	63.07	100	0	P	H
		15630	44.19	-29.81	74	51.7	37.88	14.78	60.17	100	0	P	H
													H
													H
		10419	47.97	-26.03	74	59.27	39.77	12	63.07	100	0	P	V
		15630	45.23	-28.77	74	52.74	37.88	14.78	60.17	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

WIFI 802.11a (LF @ 3m)

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)
		38.37	26.53	-13.47	40	42.64	15.06	0.65	31.82	-	-	P	H
		103.17	32	-11.5	43.5	51.94	10.7	1.14	31.78	160	57	P	H
		140.16	28.1	-15.4	43.5	46.68	11.87	1.33	31.78	-	-	P	H
		412.7	24.39	-21.61	46	37.32	16.72	2.16	31.81	-	-	P	H
		706.7	23.86	-22.14	46	32.33	20.74	2.82	32.03	-	-	P	H
		781.6	25.56	-20.44	46	32.61	21.92	2.97	31.94	-	-	P	H
													H
													H
													H
													H
													H
802.11a													H
LF		39.45	35.23	-4.77	40	51.9	14.5	0.65	31.82	100	0	P	V
		103.17	28.35	-15.15	43.5	48.29	10.7	1.14	31.78	-	-	P	V
		124.77	22.51	-20.99	43.5	41.2	11.95	1.14	31.78	-	-	P	V
		516.3	27.66	-18.34	46	38.88	18.36	2.33	31.91	-	-	P	V
		734	24.79	-21.21	46	32.59	21.29	2.91	32	-	-	P	V
		825.7	26.67	-19.33	46	33.09	22.3	3.07	31.79	-	-	P	V
													V
													V
													V
													V
													V
													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.
!	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.
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 CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	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)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. 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)

2. 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".