FCC RF Test Report

APPLICANT	:	**Tobii Technology AB**
EQUIPMENT	:	**DMS-SE07**
BRAND NAME	:	**Tobii**
MODEL NAME	:	**Glasses2 RU**
FCC ID	:	**W5M-DMSSE07**
STANDARD	:	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	:	**(NII) Unlicensed National Information Infrastructure**

The product was received on Oct. 24, 2014 and testing was completed on Dec. 05, 2014. 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 Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4O2406C	Rev. 01	Initial issue of report	Feb. 17, 2015
FR4O2406C	Rev. 02	Adding the loop antenna in section 4.	Feb. 24, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm/MHz &15.209(a)	Pass	Under limit 0.37 dB at 5724.200 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 4.30 dB at 13.358 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

Tobii Technology AB
Karlsrov. 2D, 182 53 Danderyd, Sweden

1.2 Manufacturer

Advantech Co. Ltd
No.1, Alley 20, Lane 26, Rueiguang Rd., Neihu District,Taipei City, Taiwan, R.O.C.

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	DMS-SE07
Brand Name	Tobii
Model Name	Glasses2 RU
FCC ID	W5M-DMSSE07
EUT supports Radios application	WLAN 11a/b/g/n HT20

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

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	5725 MHz ~ 5850 MHz
Maximum Output Power	802.11a : 13.40 dBm / 0.0219 W 802.11n HT20 : 13.29 dBm / 0.0213 W
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
Antenna Type	PIFA Antenna with gain 4.26 dBi

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 Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	**Sporton Site No.**		
	TH02-HY	CO05-HY	03CH05-HY

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 (Z 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 and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151	5755	159	5795
	153	5765	161	5805
	155	5775	165	5825

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
Average Power (dBm)	13.40	13.39	12.68	12.64	11.66	11.71	10.28	10.27

5GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	13.29	12.49	12.37	11.61	11.54	10.15	10.11	9.30

2.3 Test Mode

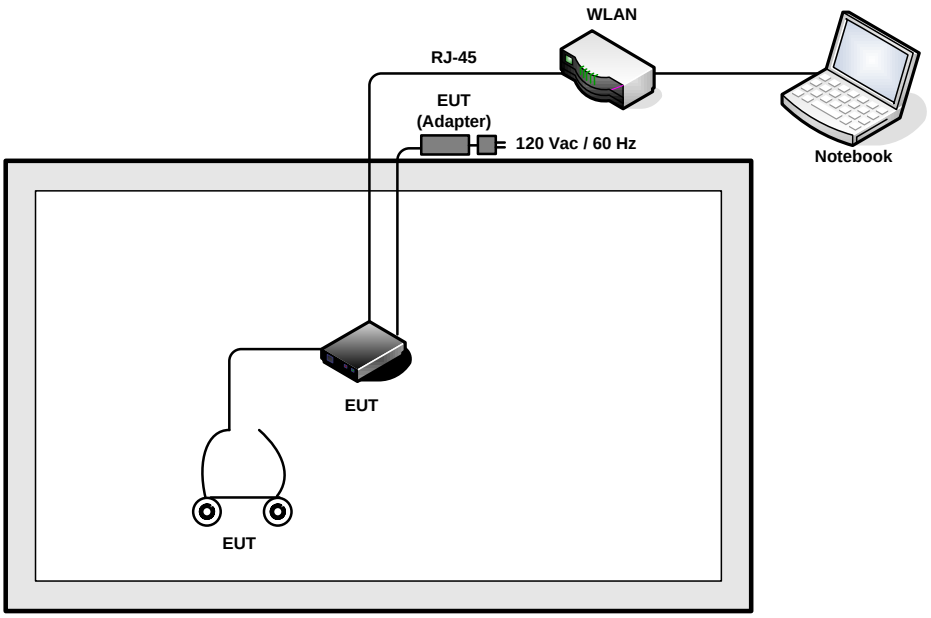
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	**Mode**	**Data rate**	**Test Channel**
Conducted TCs	**6dB Bandwidth Power Spectral Density**	**802.11a**	**6 Mbps**	**L/M/H**
		802.11n HT20	**MCS0**	**L/M/H**
	Output Power	**802.11a**	**6 Mbps**	**L/M/H**
		802.11n HT20	**MCS0**	**L/M/H**
	Frequency Stability	**802.11a**	**6 Mbps**	**L**
Radiated TCs	**Radiated Band Edge**	**802.11a**	**6 Mbps**	**L/M/H**
		802.11n HT20	**MCS0**	**L/M/H**
	Radiated Spurious Emission	**802.11a**	**6 Mbps**	**L/M/H**
		802.11n HT20	**MCS0**	**L/M/H**
AC Conducted Emission	Mode 1 ： WLAN (5GHz) Link + TC			
Remark: TC stands for Test Configuration, and consists of HDMI Cable, Adapter, and RJ-45.				

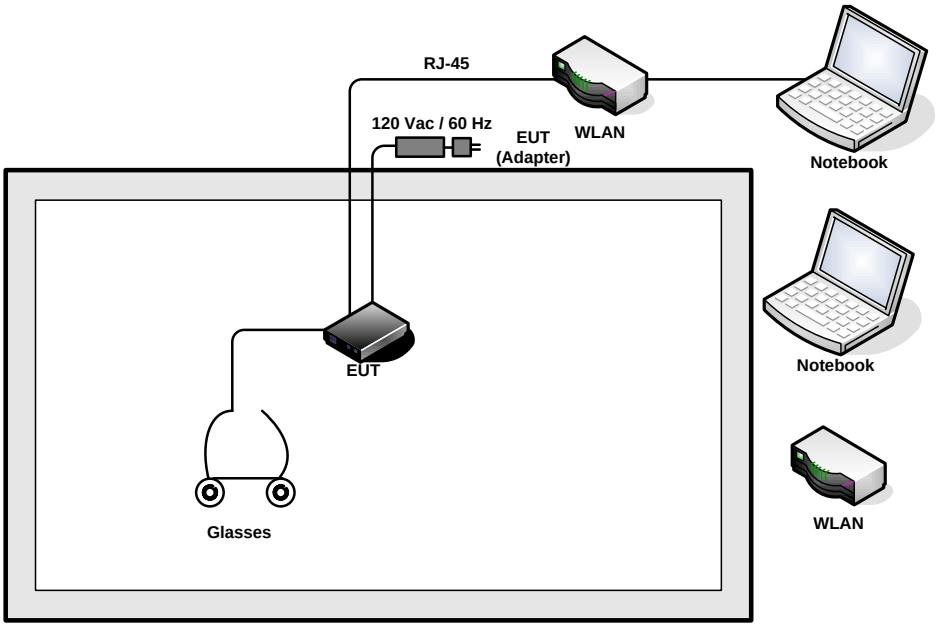
Ch. #		**Band IV：5725-5850 MHz**	
		802.11a	**802.11n HT20**
L	**Low**	149	149
M	**Middle**	157	157
H	**High**	165	165

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	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-865L	KA2IR865LA1	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN function, the calibrator command line tool installed in the notebook makes 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 6dB Bandwidth Measurement

3.1.1 Description of 6dB Bandwidth

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

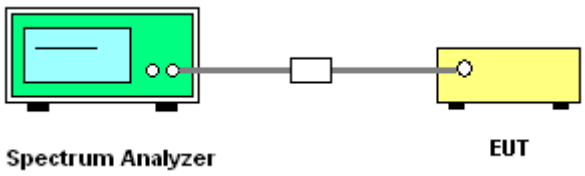
3.1.2 Measuring Instruments

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 for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

3.1.4 Test Setup

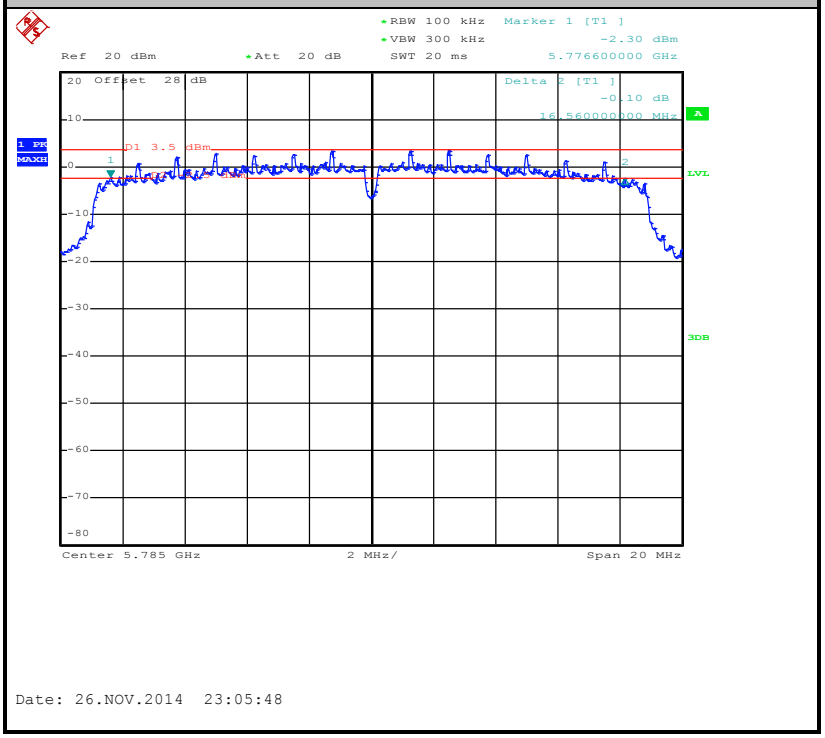


3.1.5 Test Result of 6dB Bandwidth

Test Band :	5GHz band 4	Temperature :	21~26℃
Test Engineer :	Alex Lee	Relative Humidity :	45~54%

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	6 dB Bandwidth (MHz)	FCC 6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
11a	6Mbps	1	149	5745	15.68	0.5	Pass
11a	6Mbps	1	157	5785	15.64	0.5	Pass
11a	6Mbps	1	165	5825	15.68	0.5	Pass
HT20	MCS0	1	149	5745	16.20	0.5	Pass
HT20	MCS0	1	157	5785	16.56	0.5	Pass
HT20	MCS0	1	165	5825	16.16	0.5	Pass

Maximum 6dB 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 the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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

3.2.2 Measuring Instruments

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

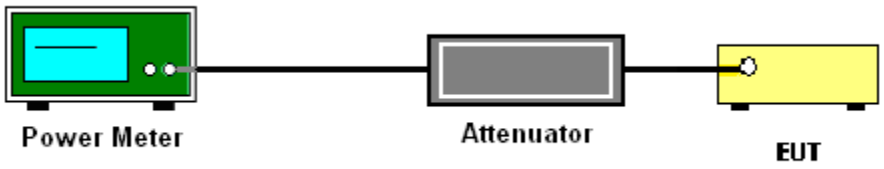
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules 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 4	Temperature :	21~26℃
Test Engineer :	Alex Lee	Relative Humidity :	45~54%

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass /Fail
11a	6Mbps	1	149	5745	0.09	13.10	30.00	4.26	Pass
11a	6Mbps	1	157	5785	0.09	13.40	30.00	4.26	Pass
11a	6Mbps	1	165	5825	0.09	12.80	30.00	4.26	Pass
HT20	MCS0	1	149	5745	0.10	12.21	30.00	4.26	Pass
HT20	MCS0	1	157	5785	0.10	13.29	30.00	4.26	Pass
HT20	MCS0	1	165	5825	0.10	12.83	30.00	4.26	Pass

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

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

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules 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 D01 General UNII Test Procedures v01r03.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 300 kHz.
   - Set VBW ≥ 1 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(500kHz/RBW) to the test result.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

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

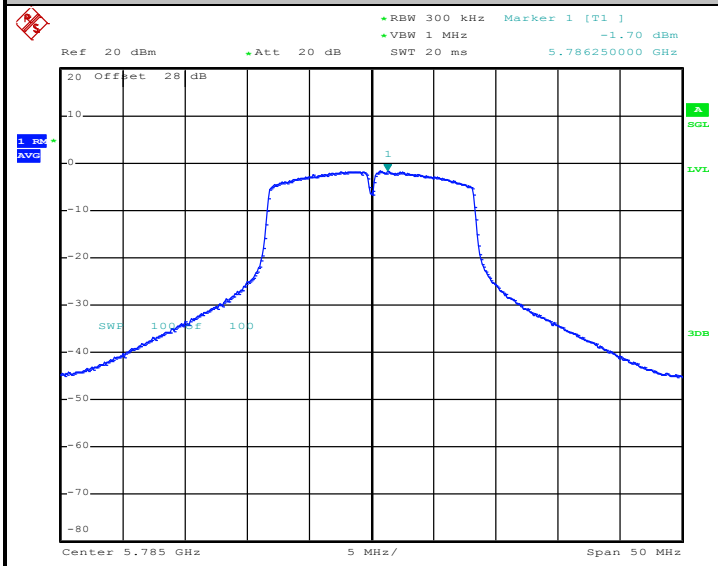
3.3.4 Test Setup

3.3.5 Test Result of Power Spectral Density

Test Band :	5GHz band 4	Temperature :	21~26℃
Test Engineer :	Alex Lee	Relative Humidity :	45~54%

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass /Fail
11a	6Mbps	1	149	5745	0.09	2.22	0.46	30.00	4.26	Pass
11a	6Mbps	1	157	5785	0.09	2.22	0.61	30.00	4.26	Pass
11a	6Mbps	1	165	5825	0.09	2.22	0.20	30.00	4.26	Pass
HT20	MCS0	1	149	5745	0.10	2.22	-0.55	30.00	4.26	Pass
HT20	MCS0	1	157	5785	0.10	2.22	0.35	30.00	4.26	Pass
HT20	MCS0	1	165	5825	0.10	2.22	0.01	30.00	4.26	Pass

Worst Case Power Density (dBm/300kHz)



3.4 Unwanted Emissions Measurement

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

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5725-5850 MHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBμV/m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBμV/m).

(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 v01r03 H)2)c)(i) 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.

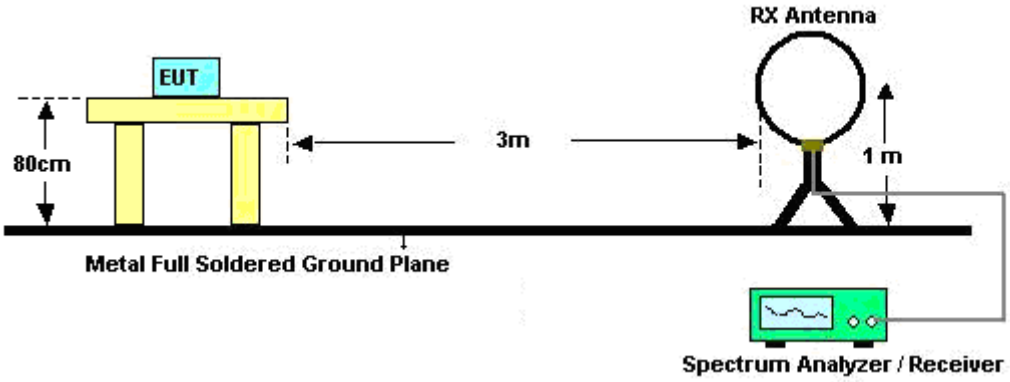
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11a	97.90	1400	0.71	1kHz
1	802.11n HT20	97.62	1312	0.76	1kHz

2. The EUT was placed on a rotatable table top 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.

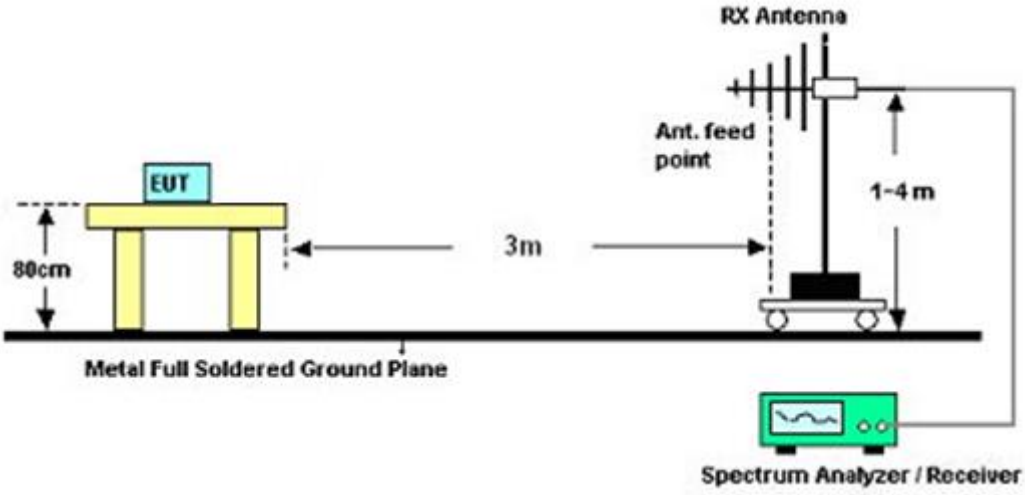
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst 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

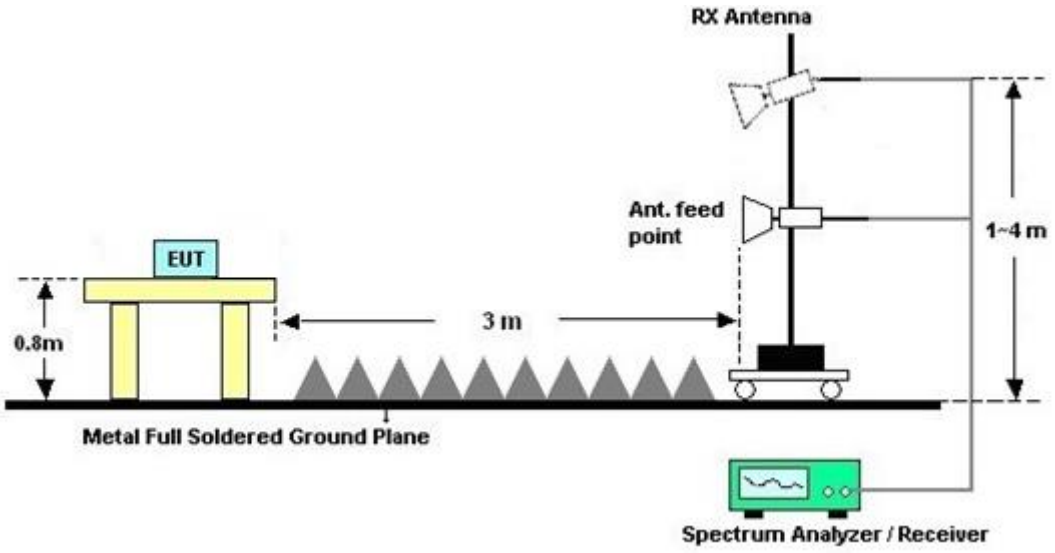
For radiated emissions below 30MHz



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.

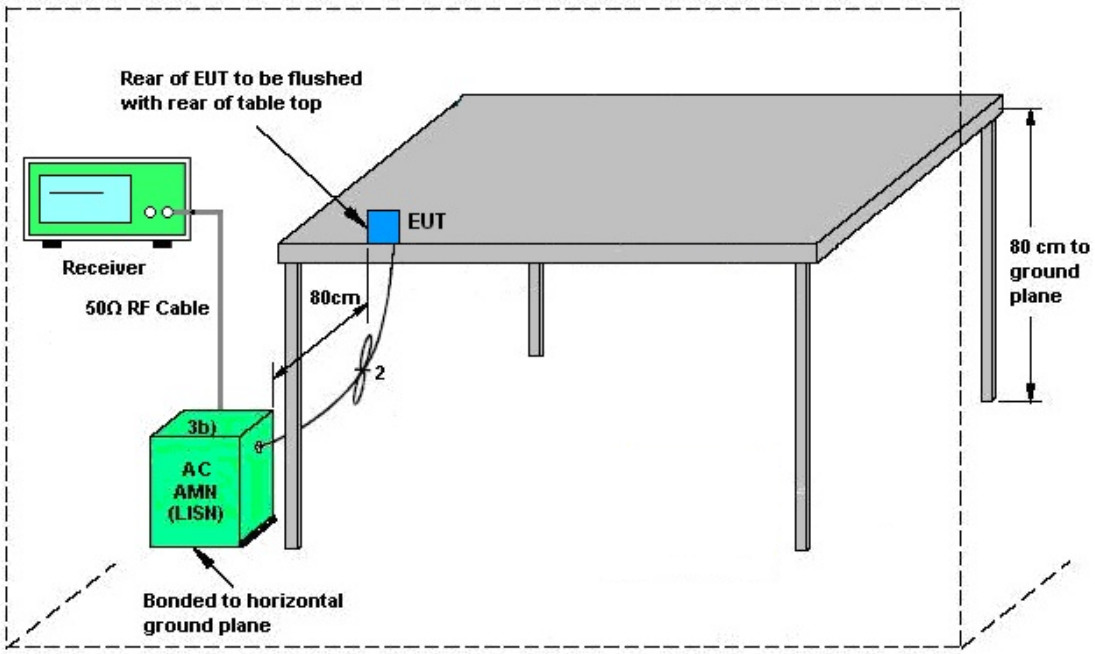
3.5.2 Measuring Instruments

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.

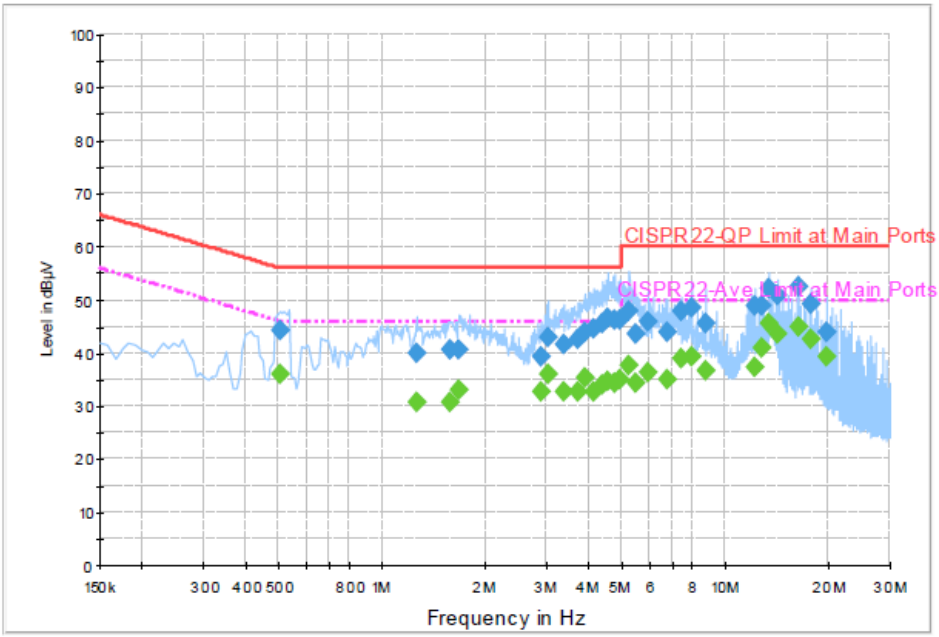
3.5.4 Test Setup



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

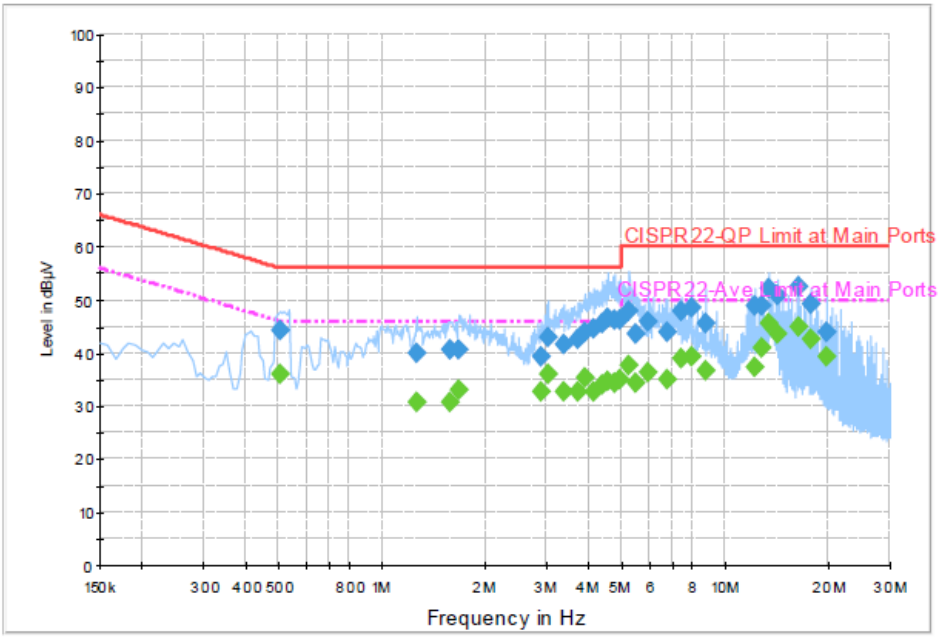
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5GHz) Link + TC		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.502000	44.2	Off	L1	19.5	11.8	56.0
1.254000	39.8	Off	L1	19.5	16.2	56.0
1.574000	40.7	Off	L1	19.5	15.3	56.0
1.670000	40.5	Off	L1	19.5	15.5	56.0
2.886000	39.2	Off	L1	19.5	16.8	56.0
3.038000	42.9	Off	L1	19.5	13.1	56.0
3.358000	41.7	Off	L1	19.5	14.3	56.0
3.694000	42.6	Off	L1	19.5	13.4	56.0
3.862000	44.0	Off	L1	19.5	12.0	56.0
4.118000	44.4	Off	L1	19.6	11.6	56.0
4.358000	45.6	Off	L1	19.6	10.4	56.0
4.542000	46.4	Off	L1	19.6	9.6	56.0
4.750000	46.2	Off	L1	19.6	9.8	56.0
4.934000	46.2	Off	L1	19.6	9.8	56.0

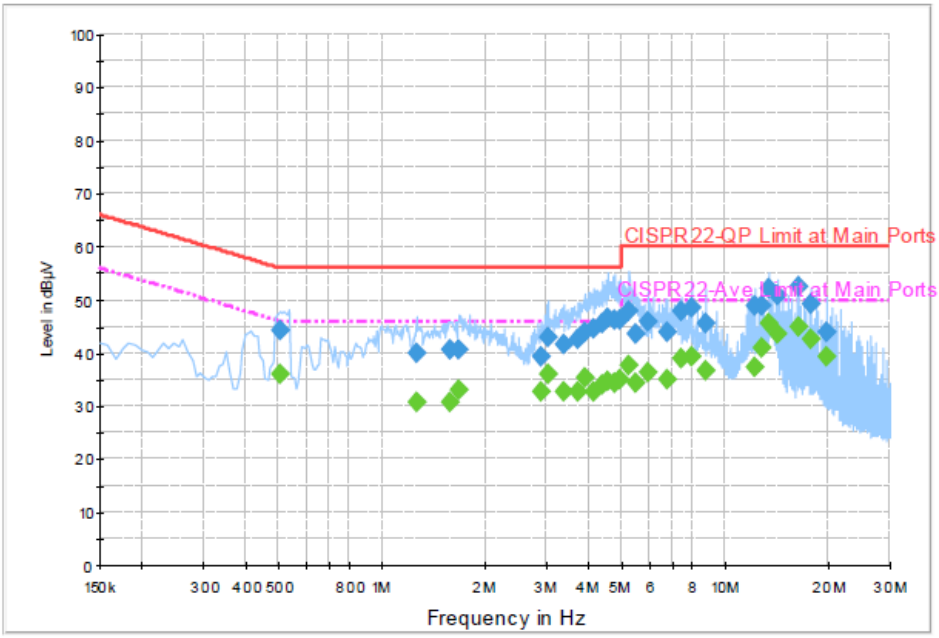
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5GHz) Link + TC		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
5.238000	47.9	Off	L1	19.6	12.1	60.0
5.478000	43.5	Off	L1	19.6	16.5	60.0
5.910000	45.9	Off	L1	19.6	14.1	60.0
6.766000	43.9	Off	L1	19.6	16.1	60.0
7.374000	47.7	Off	L1	19.6	12.3	60.0
7.926000	48.5	Off	L1	19.6	11.5	60.0
8.718000	45.6	Off	L1	19.6	14.4	60.0
12.198000	48.8	Off	L1	19.7	11.2	60.0
12.750000	48.9	Off	L1	19.7	11.1	60.0
13.358000	52.1	Off	L1	19.7	7.9	60.0
14.214000	50.9	Off	L1	19.7	9.1	60.0
16.230000	52.4	Off	L1	19.7	7.6	60.0
17.694000	49.1	Off	L1	19.7	10.9	60.0
19.710000	44.0	Off	L1	19.7	16.0	60.0

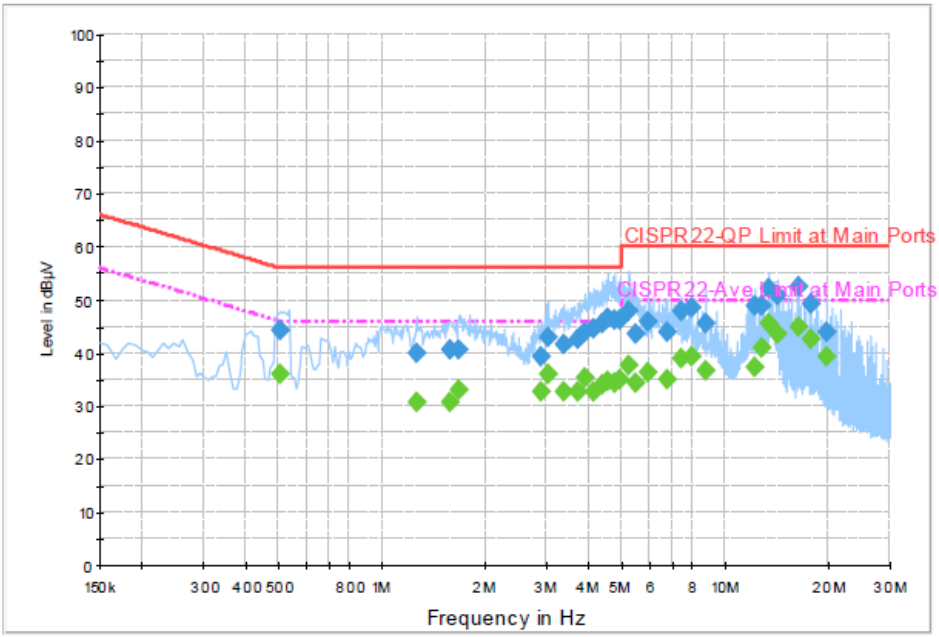
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5GHz) Link + TC		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.502000	36.1	Off	L1	19.5	9.9	46.0
1.254000	30.8	Off	L1	19.5	15.2	46.0
1.574000	30.8	Off	L1	19.5	15.2	46.0
1.670000	32.9	Off	L1	19.5	13.1	46.0
2.886000	32.8	Off	L1	19.5	13.2	46.0
3.038000	35.9	Off	L1	19.5	10.1	46.0
3.358000	32.7	Off	L1	19.5	13.3	46.0
3.694000	32.8	Off	L1	19.5	13.2	46.0
3.862000	35.2	Off	L1	19.5	10.8	46.0
4.118000	32.8	Off	L1	19.6	13.2	46.0
4.358000	34.0	Off	L1	19.6	12.0	46.0
4.542000	34.7	Off	L1	19.6	11.3	46.0
4.750000	34.4	Off	L1	19.6	11.6	46.0
4.934000	35.1	Off	L1	19.6	10.9	46.0

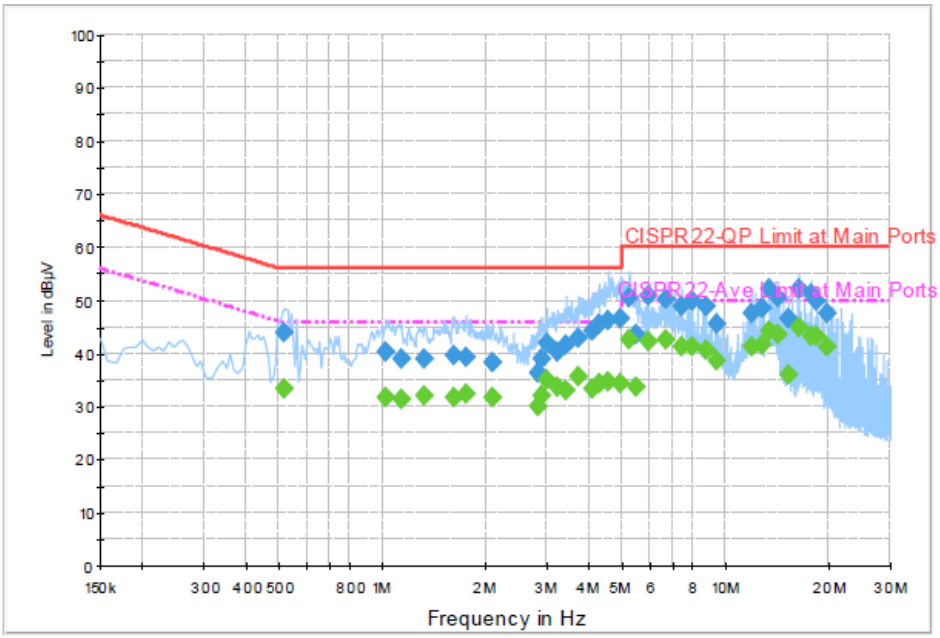
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5GHz) Link + TC		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
5.238000	37.5	Off	L1	19.6	12.5	50.0
5.478000	34.2	Off	L1	19.6	15.8	50.0
5.910000	36.2	Off	L1	19.6	13.8	50.0
6.766000	35.0	Off	L1	19.6	15.0	50.0
7.374000	38.8	Off	L1	19.6	11.2	50.0
7.926000	39.3	Off	L1	19.6	10.7	50.0
8.718000	36.7	Off	L1	19.6	13.3	50.0
12.198000	37.4	Off	L1	19.7	12.6	50.0
12.750000	40.9	Off	L1	19.7	9.1	50.0
13.358000	45.7	Off	L1	19.7	4.3	50.0
14.214000	43.7	Off	L1	19.7	6.3	50.0
16.230000	44.8	Off	L1	19.7	5.2	50.0
17.694000	42.7	Off	L1	19.7	7.3	50.0
19.710000	39.4	Off	L1	19.7	10.6	50.0

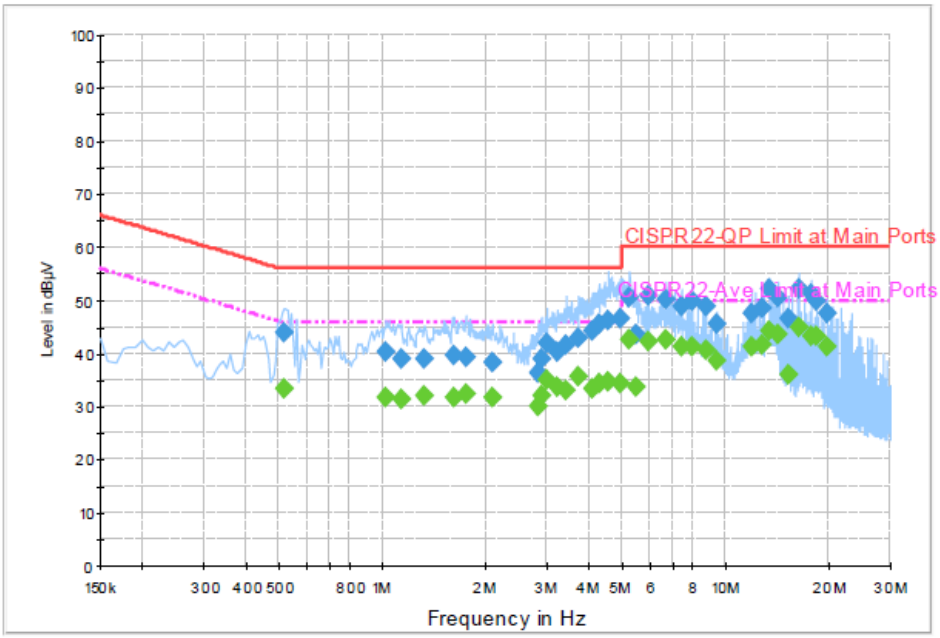
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5GHz) Link + TC		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.518000	43.9	Off	N	19.5	12.1	56.0
1.022000	40.3	Off	N	19.5	15.7	56.0
1.126000	39.1	Off	N	19.5	16.9	56.0
1.318000	38.9	Off	N	19.5	17.1	56.0
1.614000	39.7	Off	N	19.5	16.3	56.0
1.742000	39.2	Off	N	19.5	16.8	56.0
2.078000	38.2	Off	N	19.2	17.8	56.0
2.822000	36.3	Off	N	19.5	19.7	56.0
2.886000	39.1	Off	N	19.5	16.9	56.0
3.006000	42.0	Off	N	19.6	14.0	56.0
3.206000	40.4	Off	N	19.6	15.6	56.0
3.406000	41.4	Off	N	19.6	14.6	56.0
3.710000	43.0	Off	N	19.6	13.0	56.0
4.054000	44.1	Off	N	19.6	11.9	56.0
4.246000	45.5	Off	N	19.6	10.5	56.0
4.542000	46.3	Off	N	19.6	9.7	56.0
4.886000	46.4	Off	N	19.6	9.6	56.0

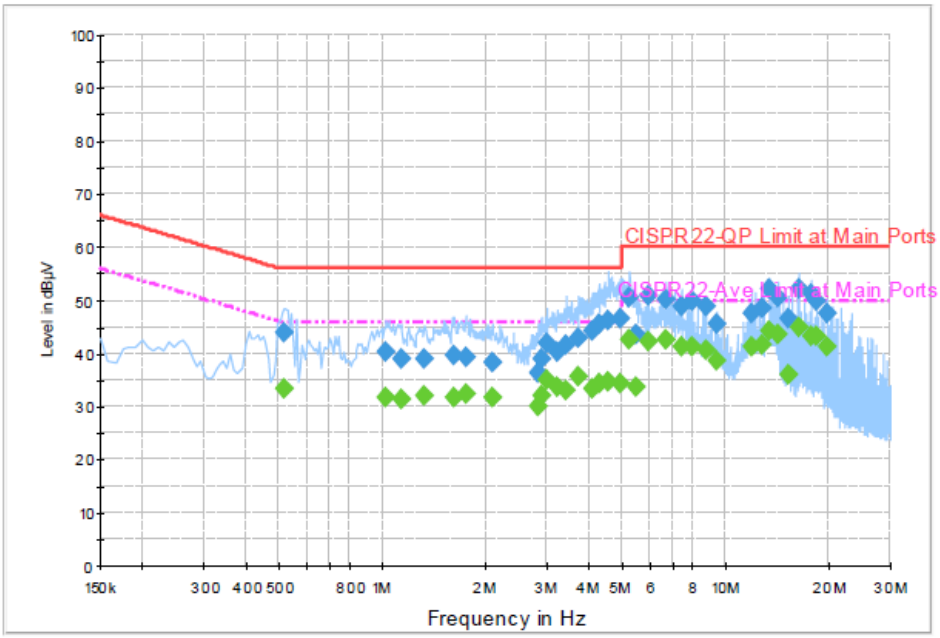
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5GHz) Link + TC		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
5.238000	50.6	Off	N	19.6	9.4	60.0
5.462000	43.6	Off	N	19.6	16.4	60.0
5.910000	50.8	Off	N	19.6	9.2	60.0
6.702000	50.2	Off	N	19.6	9.8	60.0
7.374000	49.0	Off	N	19.6	11.0	60.0
7.926000	49.9	Off	N	19.6	10.1	60.0
8.718000	48.7	Off	N	19.7	11.3	60.0
9.390000	45.4	Off	N	19.7	14.6	60.0
11.894000	47.5	Off	N	19.7	12.5	60.0
12.750000	48.6	Off	N	19.7	11.4	60.0
13.358000	52.2	Off	N	19.7	7.8	60.0
14.214000	50.5	Off	N	19.7	9.5	60.0
15.254000	46.6	Off	N	19.8	13.4	60.0
16.230000	52.3	Off	N	19.8	7.7	60.0
17.694000	51.1	Off	N	19.8	8.9	60.0
18.246000	49.8	Off	N	19.8	10.2	60.0
19.710000	47.6	Off	N	19.8	12.4	60.0

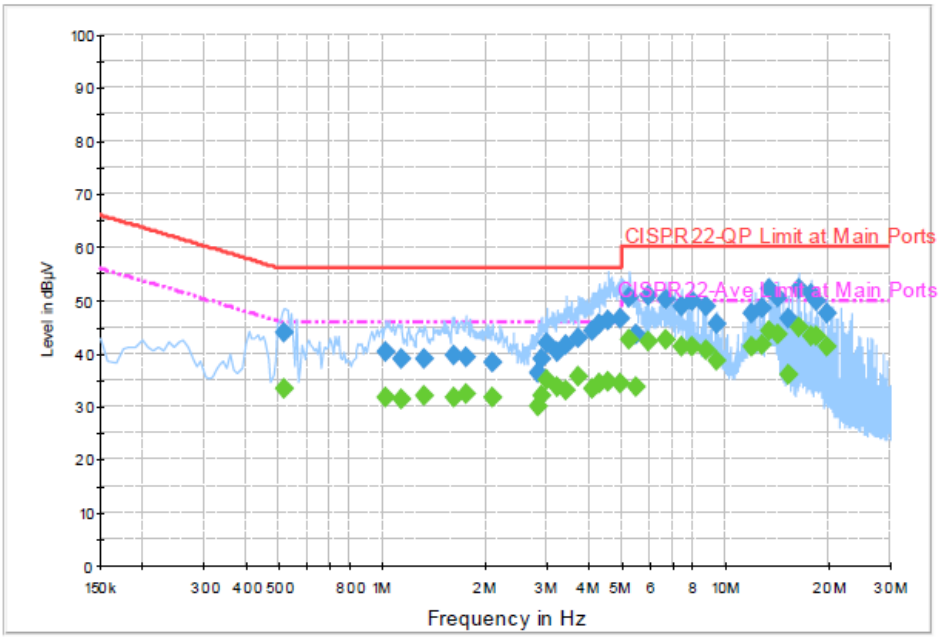
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5GHz) Link + TC		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.518000	33.4	Off	N	19.5	12.6	46.0
1.022000	31.7	Off	N	19.5	14.3	46.0
1.126000	31.5	Off	N	19.5	14.5	46.0
1.318000	32.0	Off	N	19.5	14.0	46.0
1.614000	31.5	Off	N	19.5	14.5	46.0
1.742000	32.4	Off	N	19.5	13.6	46.0
2.078000	31.7	Off	N	19.2	14.3	46.0
2.822000	30.0	Off	N	19.5	16.0	46.0
2.886000	32.2	Off	N	19.5	13.8	46.0
3.006000	35.0	Off	N	19.6	11.0	46.0
3.206000	33.6	Off	N	19.6	12.4	46.0
3.406000	32.9	Off	N	19.6	13.1	46.0
3.710000	35.6	Off	N	19.6	10.4	46.0
4.054000	33.3	Off	N	19.6	12.7	46.0
4.246000	34.4	Off	N	19.6	11.6	46.0
4.542000	34.6	Off	N	19.6	11.4	46.0
4.886000	34.4	Off	N	19.6	11.6	46.0

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5GHz) Link + TC		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
5.238000	42.6	Off	N	19.6	7.4	50.0
5.462000	33.7	Off	N	19.6	16.3	50.0
5.910000	42.3	Off	N	19.6	7.7	50.0
6.702000	42.5	Off	N	19.6	7.5	50.0
7.374000	41.3	Off	N	19.6	8.7	50.0
7.926000	41.4	Off	N	19.6	8.6	50.0
8.718000	40.5	Off	N	19.7	9.5	50.0
9.390000	38.6	Off	N	19.7	11.4	50.0
11.894000	41.1	Off	N	19.7	8.9	50.0
12.750000	41.5	Off	N	19.7	8.5	50.0
13.358000	44.2	Off	N	19.7	5.8	50.0
14.214000	43.7	Off	N	19.7	6.3	50.0
15.254000	35.9	Off	N	19.8	14.1	50.0
16.230000	44.7	Off	N	19.8	5.3	50.0
17.694000	43.3	Off	N	19.8	6.7	50.0
18.246000	43.3	Off	N	19.8	6.7	50.0
19.710000	41.3	Off	N	19.8	8.7	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.

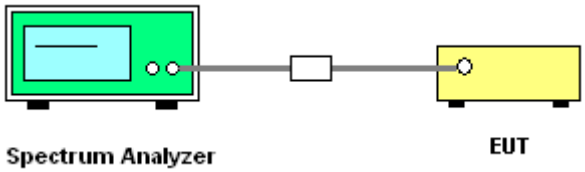
3.6.2 Measuring Instruments

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

Test Band :	5GHz band 4	Test Engineer :	Alex Lee

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (˚C)	Voltage (V)
11a	6Mbps	1	149	5745	5745.000	0.000	0.00	20	3.0
11a	6Mbps	1	149	5745	5745.022	0.022	3.85	20	4.2
11a	6Mbps	1	149	5745	5744.978	-0.022	-3.85	20	3.6
11a	6Mbps	1	149	5745	5745.000	0.000	0.00	-30	3.6
11a	6Mbps	1	149	5745	5745.000	0.000	0.00	50	3.6

Note: Center Frequency = (Low Frequency + High Frequency) / 2.

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

Non-standard antenna connector 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 Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Nov. 13, 2014 ~ Dec. 03, 2014	Jun. 08, 2015	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 09, 2014	Nov. 13, 2014 ~ Dec. 03, 2014	Aug. 08, 2015	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 09, 2014	Nov. 13, 2014 ~ Dec. 03, 2014	Aug. 08, 2015	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 12, 2014	Nov. 27, 2014	Nov. 11, 2015	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Nov. 27, 2014	Dec. 11, 2014	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 02, 2014	Nov. 27, 2014	Dec. 01, 2015	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 27, 2014	N/A	Conduction (CO05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Jun. 08, 2015	Radiation (03CH05-HY)
Bilog Antenna	Schaffner	CBL6111C	2725	30MHz~1GHz	Sep. 27, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Sep. 26, 2015	Radiation (03CH05-HY)
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz~18GHz	Apr. 16, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Apr. 15, 2015	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Oct. 02, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Oct. 01, 2015	Radiation (03CH05-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590074	100kHz~18GHz	Jul. 07, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Jul. 06, 2015	Radiation (03CH05-HY)
Preamplifier	EMCI	EMC011830	980148	DC~18GHz	Jun. 23, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Jun. 22, 2015	Radiation (03CH05-HY)
Preamplifier	COM-POWER	PA-103	161075	9kHz~30MHz	Apr. 15, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Apr. 14, 2015	Radiation (03CH05-HY)
Preamplifier	Miteq	TTA0204	1872107	18GHz~40GHz	May 23, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	May 22, 2015	Radiation (03CH05-HY)
Turn Table	HD	HD100	420/611	0 - 360 degree	N/A	Nov. 20, 2014 ~ Dec. 05, 2014	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	HD100	240/666	1 m - 4 m	N/A	Nov. 20, 2014 ~ Dec. 05, 2014	N/A	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Nov. 20, 2014 ~ Dec. 05, 2014	Jul. 27, 2015	Radiation (03CH05-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))	**5.10**