FCC RF Test Report

APPLICANT	**:**	**Joyous LLC**
EQUIPMENT	**:**	**Mobile Phone**
MODEL NAME	**:**	**SD4930UR**
FCC ID	**:**	**ZWH-1210**
STANDARD	**:**	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	**:**	**(NII) Unlicensed National Information Infrastructure**

The testing completed on Jan. 28, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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 **3**

SUMMARY OF TEST RESULT **4**

1 GENERAL DESCRIPTION **5**

1.1 Applicant 5
1.2 Feature of Equipment Under Test 5
1.3 Product Specification of Equipment Under Test 5
1.4 Modification of EUT 5
1.5 Testing Site 6
1.6 Applied Standards 6

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **7**

2.1 Carrier Frequency Channel 7
2.2 Pre-Scanned RF Power 8
2.3 Test Mode 9
2.4 Connection Diagram of Test System 11
2.5 Support Unit used in test configuration and system 12
2.6 EUT Operation Test Setup 12
2.7 Measurement Results Explanation Example 13

3 TEST RESULT **14**

3.1 26dB Bandwidth Measurement 14
3.2 Maximum Conducted Output Power Measurement 20
3.3 Power Spectral Density Measurement 22
3.4 Peak Excursion Ratio Measurement 25
3.5 Unwanted Radiated Emission Measurement 27
3.6 AC Conducted Emission Measurement 59
3.7 Frequency Stability Measurement 63
3.8 Automatically Discontinue Transmission 65
3.9 Antenna Requirements 66

4 LIST OF MEASURING EQUIPMENT **67**

5 UNCERTAINTY OF EVALUATION **68**

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR372301-01E	Rev. 01	Initial issue of report	Mar. 14, 2014
FR372301-01E	Rev. 02	Updated frequency stability statement	Apr. 14, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	26dB Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 17, 24, 30 dBm (depend on band)	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 4, 11, 17 dBm (depend on band)	Pass	-
3.4	15.407(a)(6)	Peak Excursion Ratio	≤ 13dB	Pass	-
3.5	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 3.58 dB at 5150.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 9.10 dB at 0.158 MHz
3.7	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.8	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.9	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Joyous LLC
1090 Vermont Avenue NW Suite 430
Washington, DC 20005

1.2 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Mobile Phone
Model Name	SD4930UR
FCC ID	ZWH-1210
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 v3.0 + EDR Bluetooth v4.0 + LE NFC

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

1.3 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 : 14.80 dBm / 0.0302 W 802.11n HT20 : 14.78 dBm / 0.0301 W 802.11n HT40 : 16.78 dBm / 0.0476 W 802.11ac VHT20 : 14.79 dBm / 0.0301 W 802.11ac VHT40 : 16.78 dBm / 0.0476 W 802.11ac VHT80 : 14.74 dBm / 0.0298 W
Antenna Type	Fixed Internal Antenna with gain -0.86 dBi
Type of Modulation	802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

1.4 Modification of EUT

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

1.5 Testing Site

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: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC Registration No.
	TH02-HY	CO05-HY	03CH08-HY	636805

Note: The test site complies with ANSI C63.4 2003 requirement.

1.6 Applied 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 D01 General UNII Test Procedures v01r03
- ANSI C63.4-2003

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
	38	5190	46	5230
	40	5200	48	5240
	42	5210		

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.

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)	14.80	14.75	14.78	14.66	14.72	14.70	14.68	14.68

5GHz 802.11n HT20 mode									
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	400GI	14.74	14.70	14.71	14.74	14.72	14.73	14.68	14.69
	800GI	14.78	14.65	14.73	14.78	14.76	14.75	14.77	14.76

5GHz 802.11n HT40 mode									
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	400GI	16.64	16.64	16.60	16.62	16.58	16.61	16.60	16.63
	800GI	16.78	16.67	16.63	16.65	16.68	16.67	16.67	16.65

5GHz 802.11ac VHT20 mode										
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
Average Power (dBm)	400GI	14.72	14.62	14.65	14.57	14.62	14.64	14.70	14.61	14.59
	800GI	14.79	14.77	14.69	14.68	14.69	14.76	14.74	14.68	14.66

5GHz 802.11ac VHT40 mode											
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Average Power (dBm)	400GI	16.71	16.67	16.64	16.60	16.59	16.53	16.71	16.64	16.60	16.66
	800GI	16.78	16.67	16.68	16.65	16.68	16.66	16.71	16.68	16.61	16.64

5GHz 802.11ac VHT80 mode											
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Average Power (dBm)	400GI	14.70	14.53	14.59	14.59	14.63	14.63	14.68	14.63	14.67	14.63
	800GI	14.74	14.60	14.62	14.67	14.66	14.65	14.67	14.67	14.67	14.67

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 BW Power Spectral Density	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/H
		802.11ac VHT20	MCS0	L/M/H
		802.11ac VHT40	MCS0	L/H
		802.11ac VHT80	MCS0	M
	Output Power	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/H
		802.11ac VHT20	MCS0	L/M/H
		802.11ac VHT40	MCS0	L/H
		802.11ac VHT80	MCS0	M
	Peak Excursion	802.11a	6 Mbps	L
		802.11n HT20	MCS0	L
		802.11n HT40	MCS0	L
		802.11ac VHT20	MCS0	L
		802.11ac VHT40	MCS0	L
		802.11ac VHT80	MCS0	M
	Frequency Stability	802.11a	6 Mbps	L/H

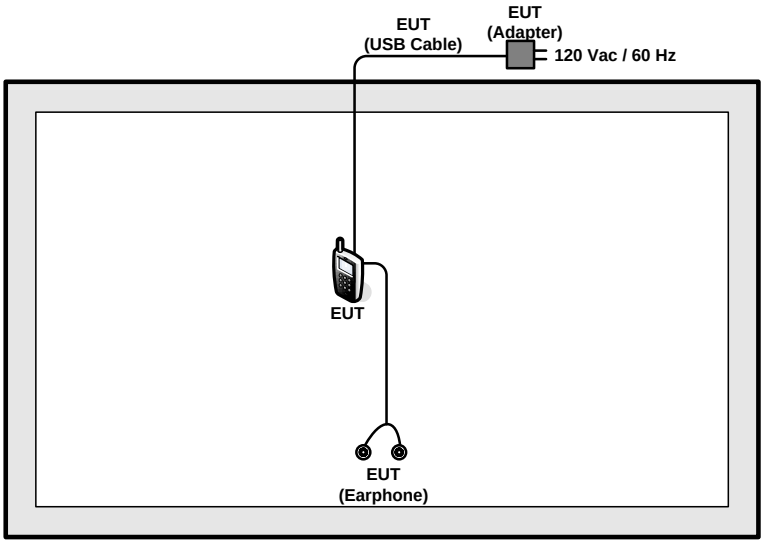
Test Cases				
Radiated TCs	Test Items	Mode	Data rate	Test Channel
	Radiated Band Edge	802.11a	6 Mbps	L/H
		802.11n HT20	MCS0	L/H
		802.11n HT40	MCS0	L/H
		802.11ac VHT20	MCS0	L/H
		802.11ac VHT40	MCS0	L/H
		802.11ac VHT80	MCS0	M
	Radiated Spurious Emission	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/H
		802.11ac VHT20	MCS0	L/M/H
		802.11ac VHT40	MCS0	L/H
		802.11ac VHT80	MCS0	M
AC Conducted Emission	Mode 1 : WCDMA Band II Idle + WLAN (5GHz, 802.11ac VHT40, CH46, MCS0) Link + Bluetooth Idle + Earphone + USB Cable (Data Link with Notebook) + NFC On Mode 2 : GSM850 Idle + WLAN (5GHz, 802.11ac VHT40, CH46, MCS0) Tx + Earphone + USB Cable (Charging from Adapter) + H-Pattern			

Ch. #		Band I：5150-5250 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	36	36	38
M	Middle	44	44	-
H	High	48	48	46

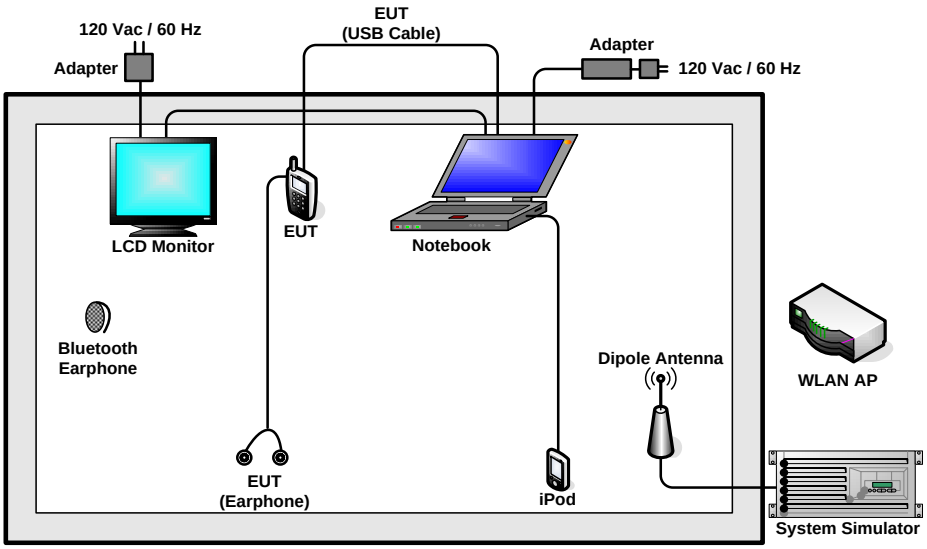
Ch. #		Band I：5150-5250 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	36	38	-
M	Middle	44	-	42
H	High	48	46	-

2.4 Connection Diagram of Test System

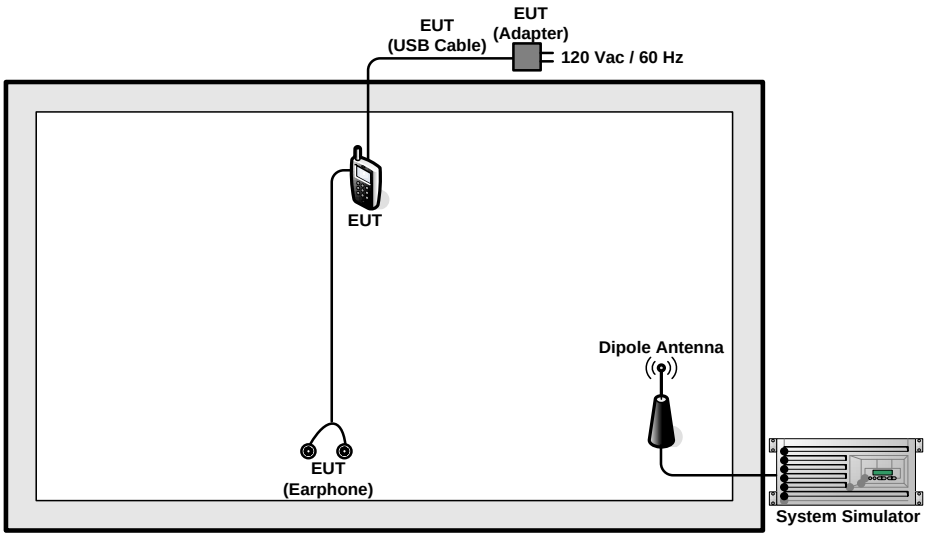
<WLAN Tx Mode>



<EUT with USB Cable (Link with Notebook) for AC Conducted Emission Mode 1>



<EUT with Adapter for AC Conducted Emission Mode 2>



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	R&S	CMU 200	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.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, “QRCT” 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 Bandwidth Measurement

3.1.1 Description of 26dB Bandwidth

There is no restriction limits for bandwidth. The maximum conducted output power can be limited by measured emission bandwidth (B).

For the band 5150-5250 MHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.

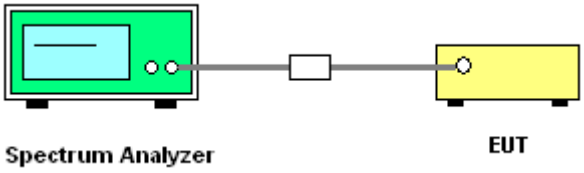
3.1.2 Measuring Instruments

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 D01 General UNII Test Procedures v01r03.
   Section D) 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. Measure and record the results in the test report.

3.1.4 Test Setup



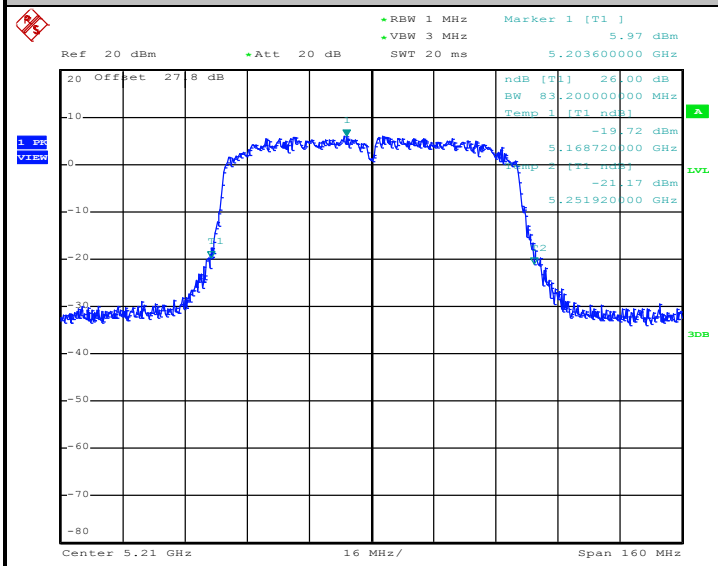
3.1.5 Test Result of 26dB Bandwidth Plots

Test Band :	5GHz band 1	**Temperature :**	21~26℃
Test Engineer :	Stuart Lin	**Relative Humidity :**	45~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	26dB Bandwidth (MHz)	FCC 26dB Bandwidth Power Limit (dBm)
11a	6Mbps	1	36	5180	22.35	16.99
11a	6Mbps	1	44	5220	22.30	16.99
11a	6Mbps	1	48	5240	22.30	16.99
HT20	MCS0	1	36	5180	22.75	16.99
HT20	MCS0	1	44	5220	22.45	16.99
HT20	MCS0	1	48	5240	22.60	16.99
HT40	MCS0	1	38	5190	44.64	16.99
HT40	MCS0	1	46	5230	45.54	16.99
VHT20	MCS0	1	36	5180	22.40	16.99
VHT20	MCS0	1	44	5220	22.40	16.99
VHT20	MCS0	1	48	5240	22.55	16.99
VHT40	MCS0	1	38	5190	44.82	16.99
VHT40	MCS0	1	46	5230	45.09	16.99
VHT80	MCS0	1	42	5210	83.20	16.99

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

Maximum 26dB Bandwidth



Date: 28.NOV.2013 15:30:14

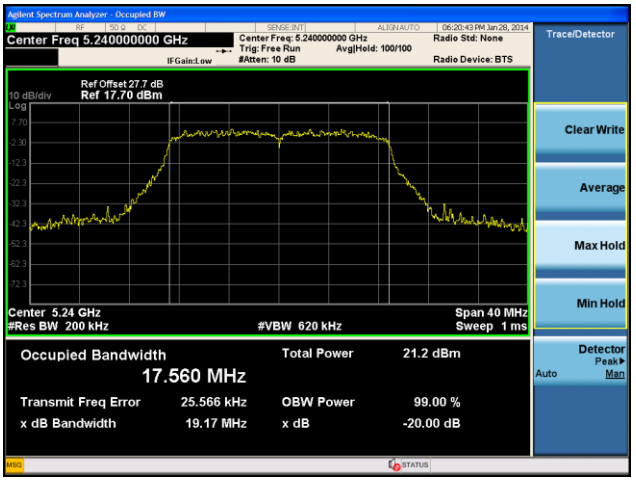
3.1.6 Test Result of 20dB Bandwidth Plots

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth Upper Frequency (FH) (MHz)	Upper Limit Line (MHz)	Pass/Fail
11a	6Mbps	1	48	5240	18.33	5249.17	5250	Pass
HT20	MCS0	1	48	5240	19.17	5249.59		Pass
HT40	MCS0	1	46	5230	37.26	5248.63		Pass
VHT20	MCS0	1	48	5240	19.02	5249.51		Pass
VHT40	MCS0	1	46	5230	37.18	5248.59		Pass
VHT80	MCS0	1	42	5210	79.17	5249.59		Pass

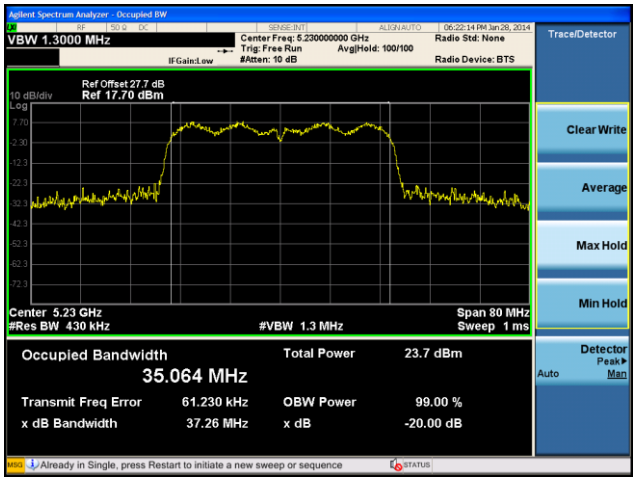
20dB Occupied Bandwidth

802.11a CH48 5240MHz

802.11n HT20 CH48 5240MHz

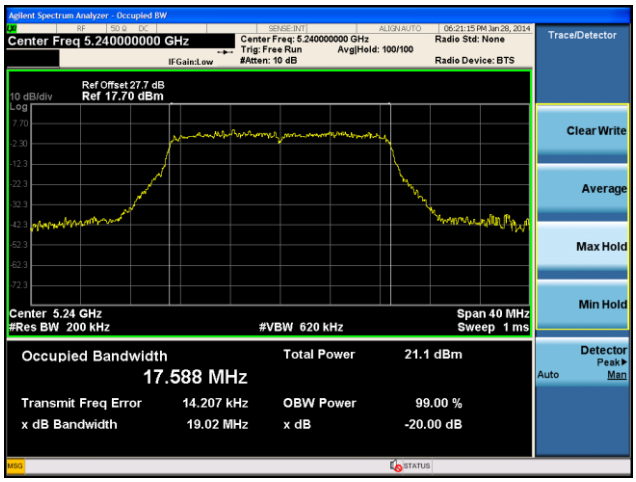


802.11n HT40 CH46 5230MHz

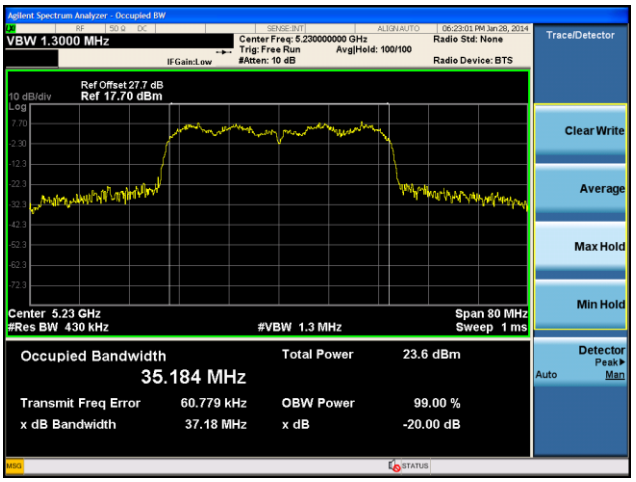


20dB Occupied Bandwidth

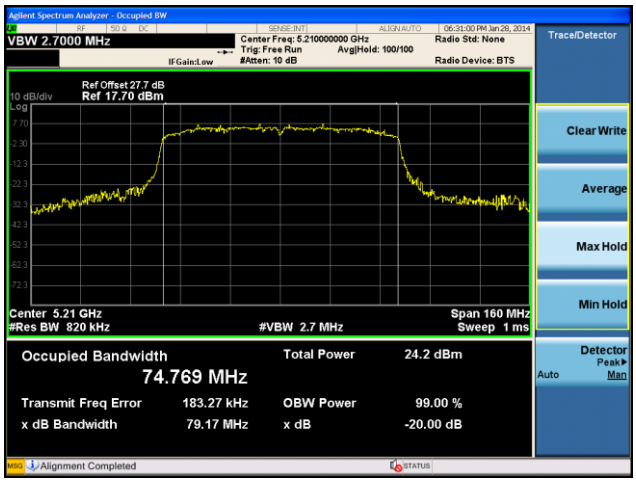
802.11a VHT20 CH48 5240MHz



802.11ac VHT40 CH46 5230MHz



802.11 ac VHT80 CH42 5210MHz



3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5150-5250 MHz, the maximum conducted output power shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B, where B is the 26 dB emissions bandwidth in 1-MHz. If transmitting antenna directional gain is greater than 6 dBi, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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.

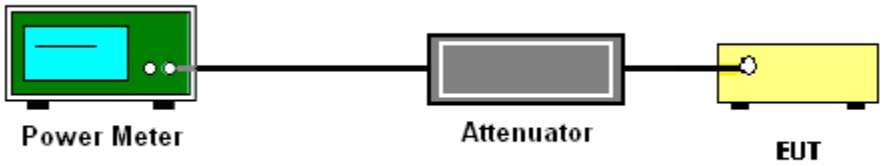
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D01 General UNII Test Procedures v01r03.

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 :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

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	0.00	14.80	16.99	-0.86	Pass
11a	6Mbps	1	44	5220	0.00	14.71	16.99	-0.86	Pass
11a	6Mbps	1	48	5240	0.00	14.67	16.99	-0.86	Pass
HT20	MCS0	1	36	5180	0.00	14.72	16.99	-0.86	Pass
HT20	MCS0	1	44	5220	0.00	14.78	16.99	-0.86	Pass
HT20	MCS0	1	48	5240	0.00	14.73	16.99	-0.86	Pass
HT40	MCS0	1	38	5190	0.07	16.49	16.99	-0.86	Pass
HT40	MCS0	1	46	5230	0.07	16.78	16.99	-0.86	Pass
VHT20	MCS0	1	36	5180	0.04	14.79	16.99	-0.86	Pass
VHT20	MCS0	1	44	5220	0.04	14.69	16.99	-0.86	Pass
VHT20	MCS0	1	48	5240	0.04	14.78	16.99	-0.86	Pass
VHT40	MCS0	1	38	5190	0.11	16.43	16.99	-0.86	Pass
VHT40	MCS0	1	46	5230	0.11	16.78	16.99	-0.86	Pass
VHT80	MCS0	1	42	5210	0.17	14.74	16.99	-0.86	Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. For the band 5150-5250 MHz, the maximum average conducted output power shall not exceed lesser of 50 mW (17dBm) or 4 dBm + 10log (B), where B is 26dB BW for FCC.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5150-5250 MHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band.

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 D01 General UNII Test Procedures v01r03.

Section F) Peak power spectral density (PPSD).

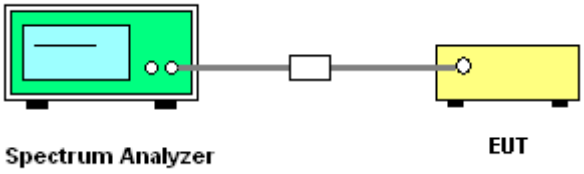
Note: Though the rule refers to “peak power spectral density”, the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission.

 # 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 = 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

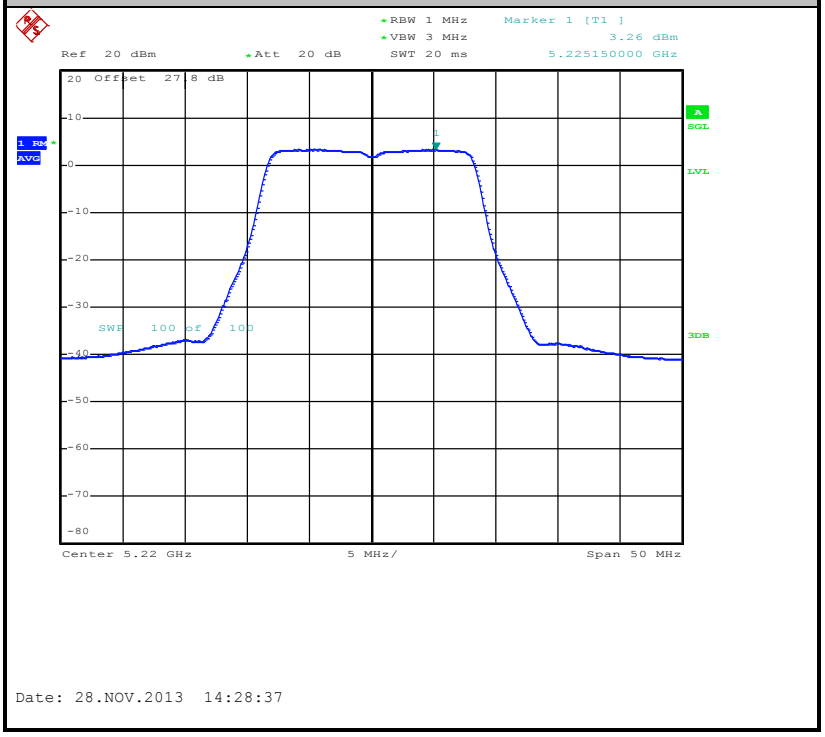


3.3.5 Test Result of Power Spectral Density

Test Band :	5GHz band 1	**Temperature :**	21~26℃
Test Engineer :	Stuart Lin	**Relative Humidity :**	45~54%

Mod.	Data Rate	N_{TX}	CH	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm)	DG (dBi)	EIRP PSD Limit (dBm)	Pass/Fail
11a	6Mbps	1	36	5180	0.00	3.22	4.00	-0.86	10	Pass
11a	6Mbps	1	44	5220	0.00	3.26	4.00	-0.86	10	Pass
11a	6Mbps	1	48	5240	0.00	2.72	4.00	-0.86	10	Pass
HT20	MCS0	1	36	5180	0.00	2.97	4.00	-0.86	10	Pass
HT20	MCS0	1	44	5220	0.00	2.72	4.00	-0.86	10	Pass
HT20	MCS0	1	48	5240	0.00	2.40	4.00	-0.86	10	Pass
HT40	MCS0	1	38	5190	0.07	1.80	4.00	-0.86	10	Pass
HT40	MCS0	1	46	5230	0.07	1.69	4.00	-0.86	10	Pass
VHT20	MCS0	1	36	5180	0.04	3.22	4.00	-0.86	10	Pass
VHT20	MCS0	1	44	5220	0.04	3.19	4.00	-0.86	10	Pass
VHT20	MCS0	1	48	5240	0.04	2.51	4.00	-0.86	10	Pass
VHT40	MCS0	1	38	5190	0.11	1.72	4.00	-0.86	10	Pass
VHT40	MCS0	1	46	5230	0.11	1.78	4.00	-0.86	10	Pass
VHT80	MCS0	1	42	5210	0.17	-2.59	4.00	-0.86	10	Pass

Worst Case Power Spectral Density(dBm/MHz)



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

3.4 Peak Excursion Ratio Measurement

3.4.1 Limit of Peak Excursion Ratio

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

The testing follows FCC KDB 789033 D01 General UNII Test Procedures v01r03.

Section G) Peak excursion measurement

1. The transmitter output is connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emission bandwidth.
3. Find the maximum of the peak-max-hold spectrum.

   *Set RBW = 1MHz.

   *Set VBW ≥ 3MHz.

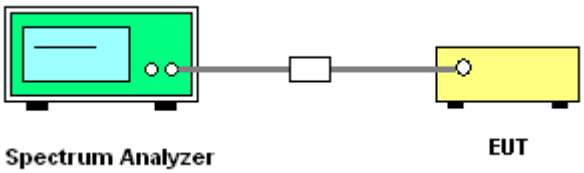
   *Detector = peak.

   *Trace mode = max-hold.

   *Allow the sweeps to continue until the trace stabilizes.

   *Use the peak search function to find the peak of the spectrum.
4. Use the procedure found under section 3.3 to measure the PPSD.
5. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

3.4.4 Test Setup



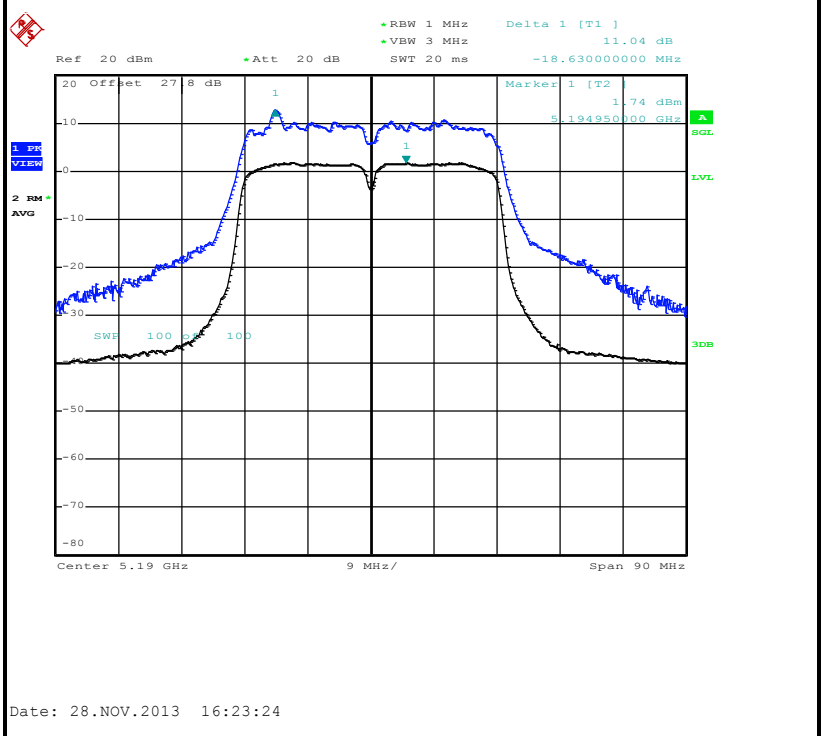
3.4.5 Test Result of Peak Excursion Ratio

Test Band :	5GHz band 1	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	N_{TX}	Channel	Freq. (MHz)	Peak Excursion Ratio (dB)					Max. Limits (dB)	Pass/Fail
				BPSK	QPSK	16QAM	64QAM	256QAM		
11a	1	36	5180	10.01	10.51	10.65	10.02	-	13	Pass
HT20	1	36	5180	9.63	10.21	9.81	9.86	-	13	Pass
HT40	1	38	5190	10.39	10.13	10.13	10.82	-	13	Pass
VHT20	1	36	5180	9.15	9.08	8.62	9.17	8.56	13	Pass
VHT40	1	38	5190	9.04	10.94	8.74	8.49	8.44	13	Pass
VHT80	1	42	5210	8.85	8.51	8.41	8.66	9.25	13	Pass

Note: All modulation measured based on the minimum data rate setting.

Worst Case Peak Excursion Ratio (dB)



Note: Peak Excursion Ratio (dB) = Peak – (Average + Duty Cycle Offset)

Duty Cycle Offset: 0.1 dB

3.5 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.

3.5.1 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 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.

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The testing follows FCC KDB 789033 D01 General UNII Test Procedures v01r03.

   Section H) 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

   - The setting follows the H) 5) of FCC KDB 789033.
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

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

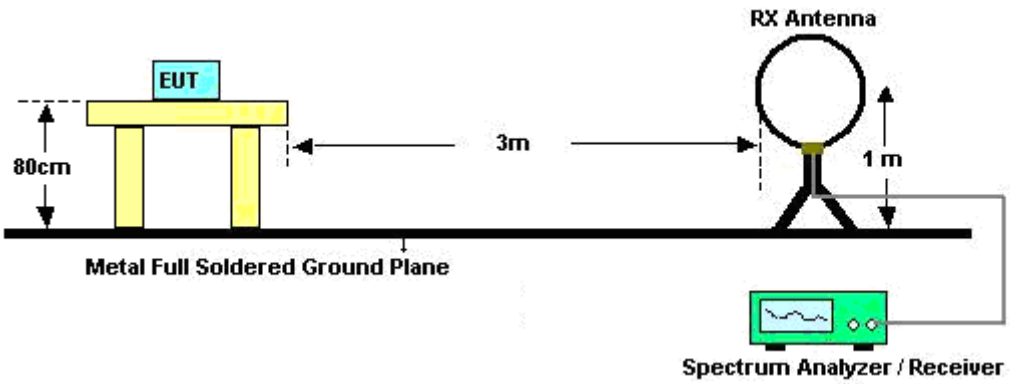
   - The setting follows H) 6) of FCC KDB 789033.
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle (%)	T(μs)	1/T(kHz)	VBW Setting
802.11a	100.00	-	-	10Hz
802.11n HT20	100.00	-	-	10Hz
802.11n HT40	98.40	-	-	10Hz
802.11ac VHT20	99.11	-	-	10Hz
802.11ac VHT40	97.60	488.00	2.05	3kHz
802.11ac VHT80	96.12	248.00	4.03	10kHz

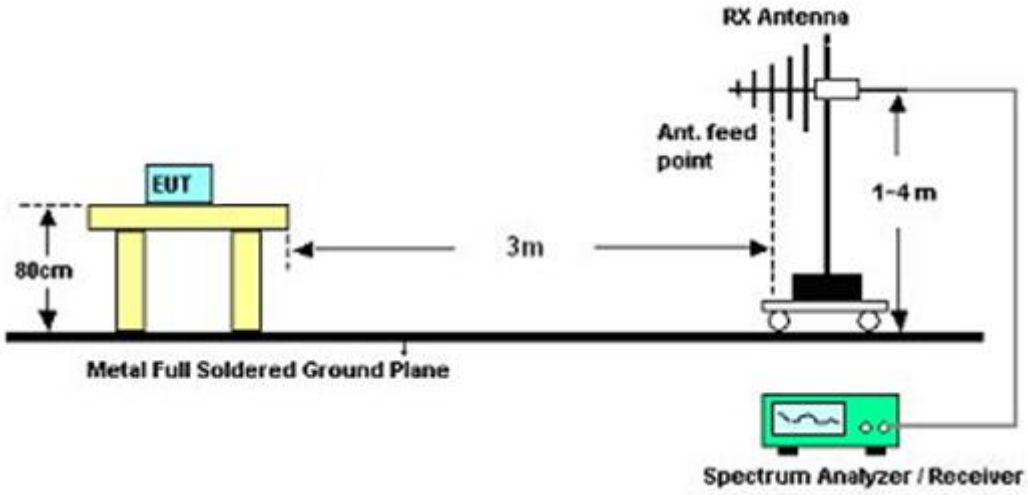
2. The EUT was placed on a rotatable table top 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters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

3.5.4 Test Setup

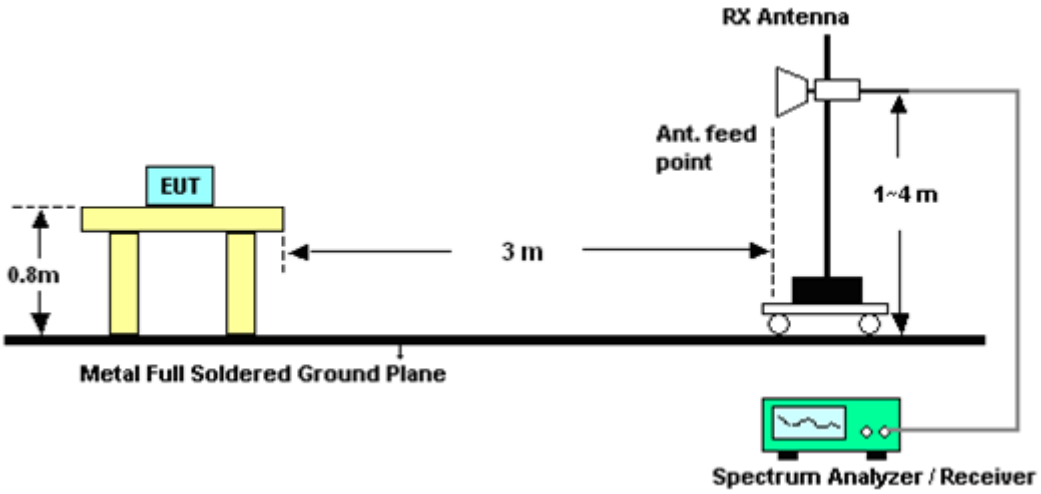
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 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.

3.5.6 Test Result

3.5.6.1 Test Result of Radiated Band Edges

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5149.4	59.6	-14.4	74	51.47	34.42	8.65	34.94	103	136	Peak
5127.5	43.18	-10.82	54	35.12	34.41	8.6	34.95	103	136	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5148.2	58.38	-15.62	74	50.49	34.18	8.65	34.94	160	339	Peak
5127.65	43.57	-10.43	54	35.73	34.19	8.6	34.95	160	339	Average

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5128.25	52.19	-21.81	74	44.13	34.41	8.6	34.95	103	144	Peak
5143.85	40.94	-13.06	54	32.81	34.42	8.65	34.94	103	144	Average
5359.68	52.23	-21.77	74	43.74	34.54	8.8	34.85	103	144	Peak
5377.72	41.17	-12.83	54	32.66	34.55	8.8	34.84	103	144	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5076.65	52.53	-21.47	74	44.78	34.23	8.49	34.97	110	336	Peak
5149.7	40.72	-13.28	54	32.83	34.18	8.65	34.94	110	336	Average
5438.33	52.16	-21.84	74	43.7	34.47	8.81	34.82	110	336	Peak
5378.49	41.02	-12.98	54	32.69	34.37	8.8	34.84	110	336	Average

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5149.25	59.21	-14.79	74	51.08	34.42	8.65	34.94	167	338	Peak
5128.25	43.87	-10.13	54	35.81	34.41	8.6	34.95	167	338	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5147.45	60.44	-13.56	74	52.55	34.18	8.65	34.94	100	354	Peak
5128.4	45.4	-8.6	54	37.56	34.19	8.6	34.95	100	354	Average

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5089.25	51.8	-22.2	74	43.9	34.38	8.49	34.97	102	142	Peak
5149.1	40.86	-13.14	54	32.73	34.42	8.65	34.94	102	142	Average
5429.31	51.95	-22.05	74	43.39	34.57	8.81	34.82	102	142	Peak
5376.4	41.13	-12.87	54	32.62	34.55	8.8	34.84	102	142	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5064.8	52.43	-21.57	74	44.72	34.25	8.44	34.98	158	333	Peak
5144	40.68	-13.32	54	32.79	34.18	8.65	34.94	158	333	Average
5403.13	52	-22	74	43.62	34.4	8.81	34.83	158	333	Peak
5436.79	41	-13	54	32.54	34.47	8.81	34.82	158	333	Average

Test Mode :	802.11n HT40	**Temperature :**	20~21°C
Test Channel :	38	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5149.55	69.18	-4.82	74	61.05	34.42	8.65	34.94	104	140	Peak
5149.55	48.7	-5.3	54	40.57	34.42	8.65	34.94	104	140	Average
5435.47	52.23	-21.77	74	43.67	34.57	8.81	34.82	104	140	Peak
5378.16	41.12	-12.88	54	32.61	34.55	8.8	34.84	104	140	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5147.45	69.68	-4.32	74	61.79	34.18	8.65	34.94	100	342	Peak
5149.85	49.21	-4.79	54	41.32	34.18	8.65	34.94	100	342	Average
5394.66	52.37	-21.63	74	44	34.4	8.81	34.84	100	342	Peak
5435.25	40.96	-13.04	54	32.5	34.47	8.81	34.82	100	342	Average

Test Mode :	802.11n HT40	**Temperature :**	20~21°C
Test Channel :	46	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5125.85	53.15	-20.85	74	45.09	34.41	8.6	34.95	102	142	Peak
5127.35	41.94	-12.06	54	33.88	34.41	8.6	34.95	102	142	Average
5367.16	52.79	-21.21	74	44.29	34.55	8.8	34.85	102	142	Peak
5360.67	41.24	-12.76	54	32.74	34.55	8.8	34.85	102	142	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5147.6	57.54	-16.46	74	49.65	34.18	8.65	34.94	111	340	Peak
5127.35	42.48	-11.52	54	34.64	34.19	8.6	34.95	111	340	Average
5357.04	51.99	-22.01	74	43.74	34.3	8.8	34.85	111	340	Peak
5436.02	40.96	-13.04	54	32.5	34.47	8.81	34.82	111	340	Average

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5148.35	56.21	-17.79	74	48.08	34.42	8.65	34.94	126	142	Peak
5128.25	43.58	-10.42	54	35.52	34.41	8.6	34.95	126	142	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5149.7	59.58	-14.42	74	51.69	34.18	8.65	34.94	100	342	Peak
5128.1	45.47	-8.53	54	37.63	34.19	8.6	34.95	100	342	Average

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5104.85	52.44	-21.56	74	44.47	34.38	8.55	34.96	102	145	Peak
5143.85	40.93	-13.07	54	32.8	34.42	8.65	34.94	102	145	Average
5368.48	52.34	-21.66	74	43.84	34.55	8.8	34.85	102	145	Peak
5377.83	41.17	-12.83	54	32.66	34.55	8.8	34.84	102	145	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5072.45	52.65	-21.35	74	44.9	34.23	8.49	34.97	110	340	Peak
5144.15	40.71	-13.29	54	32.82	34.18	8.65	34.94	110	340	Average
5396.53	52.16	-21.84	74	43.79	34.4	8.81	34.84	110	340	Peak
5436.13	40.98	-13.02	54	32.52	34.47	8.81	34.82	110	340	Average

Test Mode :	802.11ac VHT40	**Temperature :**	20~21°C
Test Channel :	38	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5147.6	67.63	-6.37	74	59.5	34.42	8.65	34.94	104	149	Peak
5148.35	49.37	-4.63	54	41.24	34.42	8.65	34.94	104	149	Average
5397.52	51.95	-22.05	74	43.42	34.56	8.81	34.84	104	149	Peak
5375.08	41.68	-12.32	54	33.17	34.55	8.8	34.84	104	149	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5148.35	69.51	-4.49	74	61.62	34.18	8.65	34.94	100	342	Peak
5150	50.42	-3.58	54	42.53	34.18	8.65	34.94	100	342	Average
5438.88	52.4	-21.6	74	43.94	34.47	8.81	34.82	100	342	Peak
5447.35	41.5	-12.5	54	33.01	34.5	8.81	34.82	100	342	Average

Test Mode :	802.11ac VHT40	**Temperature :**	20~21°C
Test Channel :	46	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5147.75	52.51	-21.49	74	44.38	34.42	8.65	34.94	114	139	Peak
5127.35	41.92	-12.08	54	33.86	34.41	8.6	34.95	114	139	Average
5361.11	52.11	-21.89	74	43.61	34.55	8.8	34.85	114	139	Peak
5358.69	41.17	-12.83	54	32.68	34.54	8.8	34.85	114	139	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5125.85	54.27	-19.73	74	46.43	34.19	8.6	34.95	111	341	Peak
5127.35	42.56	-11.44	54	34.72	34.19	8.6	34.95	111	341	Average
5381.79	51.7	-22.3	74	43.36	34.37	8.81	34.84	111	341	Peak
5445.92	40.98	-13.02	54	32.49	34.5	8.81	34.82	111	341	Average

Test Mode :	802.11ac VHT80	**Temperature :**	20~21°C
Test Channel :	42	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5148.35	61.04	-12.96	74	52.91	34.42	8.65	34.94	103	134	Peak
5148.5	46.62	-7.38	54	38.49	34.42	8.65	34.94	103	134	Average
5419.19	52.22	-21.78	74	43.67	34.57	8.81	34.83	103	134	Peak
5357.81	42.11	-11.89	54	33.62	34.54	8.8	34.85	103	134	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5150	63.31	-10.69	74	55.42	34.18	8.65	34.94	110	340	Peak
5147.3	48.05	-5.95	54	40.16	34.18	8.65	34.94	110	340	Average
5377.5	52.1	-21.9	74	43.77	34.37	8.8	34.84	110	340	Peak
5394.11	42.1	-11.9	54	33.76	34.37	8.81	34.84	110	340	Average

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

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5178 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
99.66	25.75	-17.75	43.5	46.48	10.01	1.17	31.91	-	-	Peak
141.51	26.7	-16.8	43.5	46.41	10.71	1.39	31.81	125	201	Peak
236.82	26.42	-19.58	46	45.87	10.5	1.79	31.74	-	-	Peak
307	25.28	-20.72	46	41.62	13.31	2.02	31.67	-	-	Peak
358.1	26.52	-19.48	46	41.39	14.67	2.18	31.72	-	-	Peak
431.6	25.78	-20.22	46	38.46	16.26	2.4	31.34	-	-	Peak
5178	94.4	-	-	86.17	34.45	8.71	34.93	103	136	Average
5178	105.25	-	-	97.02	34.45	8.71	34.93	103	136	Peak
10359	42.23	-31.77	54	49.99	37.69	12	57.45	100	0	Peak
15540	45.63	-28.37	54	46.74	40.33	17.13	58.57	100	0	Peak

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5182 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	28.71	-11.29	40	38.47	21.66	0.64	32.06	125	168	Peak
36.75	28.26	-11.74	40	45.28	14.24	0.71	31.97	-	-	Peak
253.02	26.35	-19.65	46	44.27	11.98	1.84	31.74	-	-	Peak
502.3	24.06	-21.94	46	35.47	17.16	2.6	31.17	-	-	Peak
673.1	24.18	-21.82	46	33.31	18.87	2.99	30.99	-	-	Peak
954.5	24.47	-21.53	46	30.41	21	3.58	30.52	-	-	Peak
5182	94.75	-	-	86.82	34.15	8.71	34.93	160	339	Average
5182	106.09	-	-	98.16	34.15	8.71	34.93	160	339	Peak
10359	41.3	-32.7	54	49.6	37.15	12	57.45	100	0	Peak
15540	44.9	-29.1	54	46.84	39.5	17.13	58.57	100	0	Peak

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	44	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5222 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5222	94.67	-	-	86.34	34.47	8.77	34.91	114	142	Average
5222	105.79	-	-	97.46	34.47	8.77	34.91	114	142	Peak
10440	40.04	-33.96	54	47.68	37.75	12.04	57.43	100	0	Peak
15660	44.54	-29.46	54	45.16	40.8	17.06	58.48	100	0	Peak

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	44	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5222 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5222	96.55	-	-	88.56	34.13	8.77	34.91	110	338	Average
5222	107.74	-	-	99.75	34.13	8.77	34.91	110	338	Peak
10440	40.2	-33.8	54	48.46	37.13	12.04	57.43	100	0	Peak
15660	44.03	-29.97	54	45.95	39.5	17.06	58.48	100	0	Peak

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5242 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5242	94.43	-	-	86.07	34.5	8.77	34.91	103	144	Average
5242	105.6	-	-	97.24	34.5	8.77	34.91	103	144	Peak
10479	41.25	-32.75	54	48.8	37.79	12.07	57.41	100	0	Peak
15720	42.91	-31.09	54	43.23	41.07	17.03	58.42	100	0	Peak

Test Mode :	802.11a	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5242 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5242	96.27	-	-	88.31	34.1	8.77	34.91	110	336	Average
5242	107.33	-	-	99.37	34.1	8.77	34.91	110	336	Peak
10479	40.21	-33.79	54	48.44	37.11	12.07	57.41	100	0	Peak
15720	42.01	-31.99	54	43.9	39.5	17.03	58.42	100	0	Peak

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5178 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
100.74	25.22	-18.28	43.5	45.63	10.32	1.18	31.91	-	-	Peak
141.51	26.59	-16.91	43.5	46.3	10.71	1.39	31.81	105	200	Peak
233.58	28.7	-17.3	46	48.6	10.05	1.78	31.73	-	-	Peak
307	25.98	-20.02	46	42.32	13.31	2.02	31.67	-	-	Peak
361.6	25.85	-20.15	46	40.62	14.74	2.19	31.7	-	-	Peak
431.6	27.34	-18.66	46	40.02	16.26	2.4	31.34	-	-	Peak
5178	94.13	-	-	85.9	34.45	8.71	34.93	167	338	Average
5178	105.31	-	-	97.08	34.45	8.71	34.93	167	338	Peak
10359	40.42	-33.58	54	48.18	37.69	12	57.45	100	0	Peak
15540	44.51	-29.49	54	45.62	40.33	17.13	58.57	100	0	Peak

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5178 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	28.28	-11.72	40	38.04	21.66	0.64	32.06	-	-	Peak
38.64	28.58	-11.42	40	46.61	13.24	0.73	32	144	215	Peak
233.58	26.28	-19.72	46	45.9	10.33	1.78	31.73	-	-	Peak
499.5	24.13	-21.87	46	35.62	17.08	2.59	31.16	-	-	Peak
566.7	24.25	-21.75	46	34.24	18.5	2.76	31.25	-	-	Peak
997.9	23.73	-30.27	54	28.96	21.59	3.68	30.5	-	-	Peak
5178	96.33	-	-	88.4	34.15	8.71	34.93	-	-	Average
5178	107.29	-	-	99.36	34.15	8.71	34.93	100	354	Peak
10359	41.28	-32.72	54	49.58	37.15	12	57.45	100	0	Peak
15540	44.32	-29.68	54	46.26	39.5	17.13	58.57	100	0	Peak

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	44	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5222 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5222	93.45	-	-	85.12	34.47	8.77	34.91	125	144	Average
5222	104.55	-	-	96.22	34.47	8.77	34.91	125	144	Peak
10440	41.11	-32.89	54	48.75	37.75	12.04	57.43	100	0	Peak
15660	45.39	-28.61	54	46.01	40.8	17.06	58.48	100	0	Peak

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	44	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5222 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5222	95.66	-	-	87.67	34.13	8.77	34.91	110	337	Average
5222	106.89	-	-	98.9	34.13	8.77	34.91	110	337	Peak
10440	39.74	-34.26	54	48	37.13	12.04	57.43	100	0	Peak
15660	44.09	-29.91	54	46.01	39.5	17.06	58.48	100	0	Peak

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5242 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5242	93.87	-	-	85.51	34.5	8.77	34.91	102	142	Average
5242	105.15	-	-	96.79	34.5	8.77	34.91	102	142	Peak
10479	42.7	-31.3	54	50.25	37.79	12.07	57.41	100	0	Peak
15720	45.54	-28.46	54	45.86	41.07	17.03	58.42	100	0	Peak

Test Mode :	802.11n HT20	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5242 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5242	94.78	-	-	86.82	34.1	8.77	34.91	158	333	Average
5242	105.98	-	-	98.02	34.1	8.77	34.91	158	333	Peak
10479	41.01	-32.99	54	49.24	37.11	12.07	57.41	100	0	Peak
15720	43.98	-30.02	54	45.87	39.5	17.03	58.42	100	0	Peak

Test Mode :	802.11n HT40	**Temperature :**	20~21°C
Test Channel :	38	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5188 MHz is fundamental signal which can be ignored. 2. 10380 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
100.47	25.15	-18.35	43.5	45.57	10.32	1.17	31.91	-	-	Peak
141.51	26.21	-17.29	43.5	45.92	10.71	1.39	31.81	132	321	Peak
236.82	28.61	-17.39	46	48.06	10.5	1.79	31.74	-	-	Peak
307	26.17	-19.83	46	42.51	13.31	2.02	31.67	-	-	Peak
351.8	25.94	-20.06	46	41.13	14.41	2.16	31.76	-	-	Peak
428.8	26.08	-19.92	46	38.69	16.34	2.4	31.35	-	-	Peak
5188	92.28	-	-	84.05	34.45	8.71	34.93	104	140	Average
5188	103.94	-	-	95.71	34.45	8.71	34.93	104	140	Peak
10380	41.38	-32.62	54	49.11	37.71	12.01	57.45	100	0	Peak
15570	44.93	-29.07	54	45.88	40.47	17.12	58.54	100	0	Peak

Test Mode :	802.11n HT40	**Temperature :**	20~21°C
Test Channel :	38	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5188 MHz is fundamental signal which can be ignored. 2. 10380 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	28.61	-11.39	40	38.37	21.66	0.64	32.06	147	258	Peak
36.48	27.76	-12.24	40	44.78	14.24	0.71	31.97	-	-	Peak
253.02	26.68	-19.32	46	44.6	11.98	1.84	31.74	-	-	Peak
358.1	22.72	-23.28	46	37.59	14.67	2.18	31.72	-	-	Peak
499.5	24.08	-21.92	46	35.57	17.08	2.59	31.16	-	-	Peak
978.3	23.87	-30.13	54	29.41	21.34	3.63	30.51	-	-	Peak
5188	94.52	-	-	86.59	34.15	8.71	34.93	100	342	Average
5188	106.36	-	-	98.43	34.15	8.71	34.93	100	342	Peak
10380	40.88	-33.12	54	49.17	37.15	12.01	57.45	100	0	Peak
15570	44.68	-29.32	54	46.6	39.5	17.12	58.54	100	0	Peak

Test Mode :	802.11n HT40	**Temperature :**	20~21°C
Test Channel :	46	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5232 MHz is fundamental signal which can be ignored. 2. 10461 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5232	92.59	-	-	84.24	34.49	8.77	34.91	102	142	Average
5232	103.91	-	-	95.56	34.49	8.77	34.91	102	142	Peak
10461	41.17	-32.83	54	48.75	37.77	12.06	57.41	100	0	Peak
15690	44.83	-29.17	54	45.3	40.93	17.05	58.45	100	0	Peak

Test Mode :	802.11n HT40	**Temperature :**	20~21°C
Test Channel :	46	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5228 MHz is fundamental signal which can be ignored. 2. 10461 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5228	94.3	-	-	86.33	34.11	8.77	34.91	111	340	Average
5228	105.62	-	-	97.65	34.11	8.77	34.91	111	340	Peak
10461	39.94	-34.06	54	48.18	37.11	12.06	57.41	100	0	Peak
15690	43.63	-30.37	54	45.53	39.5	17.05	58.45	100	0	Peak

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5178 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
100.74	24.81	-18.69	43.5	45.22	10.32	1.18	31.91	-	-	Peak
142.05	26.38	-17.12	43.5	46.09	10.71	1.39	31.81	101	203	Peak
233.58	28.67	-17.33	46	48.57	10.05	1.78	31.73	-	-	Peak
307	25.32	-20.68	46	41.66	13.31	2.02	31.67	-	-	Peak
358.1	26.74	-19.26	46	41.61	14.67	2.18	31.72	-	-	Peak
425.3	26.56	-19.44	46	39.16	16.38	2.39	31.37	-	-	Peak
5178	93.52	-	-	85.29	34.45	8.71	34.93	126	142	Average
5178	104.75	-	-	96.52	34.45	8.71	34.93	126	142	Peak
10359	41.13	-32.87	54	48.89	37.69	12	57.45	100	0	Peak
15540	45.53	-28.47	54	46.64	40.33	17.13	58.57	100	0	Peak

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	36	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5178 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	28.94	-11.06	40	38.7	21.66	0.64	32.06	126	102	Peak
38.64	28.21	-11.79	40	46.24	13.24	0.73	32	-	-	Peak
233.58	26.33	-19.67	46	45.95	10.33	1.78	31.73	-	-	Peak
358.1	23.19	-22.81	46	38.06	14.67	2.18	31.72	-	-	Peak
502.3	24.57	-21.43	46	35.98	17.16	2.6	31.17	-	-	Peak
673.1	23.39	-22.61	46	32.52	18.87	2.99	30.99	-	-	Peak
5178	96.16	-	-	88.23	34.15	8.71	34.93	100	342	Average
5178	106.97	-	-	99.04	34.15	8.71	34.93	100	342	Peak
10359	41.14	-32.86	54	49.44	37.15	12	57.45	100	0	Peak
15540	44.7	-29.3	54	46.64	39.5	17.13	58.57	100	0	Peak

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	44	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5222 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5222	93.38	-	-	85.05	34.47	8.77	34.91	104	142	Average
5222	104.13	-	-	95.8	34.47	8.77	34.91	104	142	Peak
10440	40.7	-33.3	54	48.34	37.75	12.04	57.43	100	0	Peak
15660	44.71	-29.29	54	45.33	40.8	17.06	58.48	100	0	Peak

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	44	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5222 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5222	94.88	-	-	86.89	34.13	8.77	34.91	110	342	Average
5222	105.46	-	-	97.47	34.13	8.77	34.91	110	342	Peak
10440	40.59	-33.41	54	48.85	37.13	12.04	57.43	100	0	Peak
15660	44.06	-29.94	54	45.98	39.5	17.06	58.48	100	0	Peak

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5242 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5242	94.15	-	-	85.79	34.5	8.77	34.91	102	145	Average
5242	105.13	-	-	96.77	34.5	8.77	34.91	102	145	Peak
10479	40.44	-33.56	54	47.99	37.79	12.07	57.41	100	0	Peak
15720	42.82	-31.18	54	43.14	41.07	17.03	58.42	100	0	Peak

Test Mode :	802.11ac VHT20	**Temperature :**	20~21°C
Test Channel :	48	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5242 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5242	95.05	-	-	87.09	34.1	8.77	34.91	110	340	Average
5242	106.12	-	-	98.16	34.1	8.77	34.91	110	340	Peak
10479	39.94	-34.06	54	48.17	37.11	12.07	57.41	100	0	Peak
15720	41.35	-32.65	54	43.24	39.5	17.03	58.42	100	0	Peak

Test Mode :	802.11ac VHT40	**Temperature :**	20~21°C
Test Channel :	38	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5192 MHz is fundamental signal which can be ignored. 2. 10380 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
98.85	25.11	-18.39	43.5	45.86	10.01	1.16	31.92	-	-	Peak
141.78	26.62	-16.88	43.5	46.33	10.71	1.39	31.81	144	201	Peak
236.82	28.34	-17.66	46	47.79	10.5	1.79	31.74	-	-	Peak
303.5	25.56	-20.44	46	42.05	13.16	2.01	31.66	-	-	Peak
358.1	26.31	-19.69	46	41.18	14.67	2.18	31.72	-	-	Peak
428.8	27.3	-18.7	46	39.91	16.34	2.4	31.35	-	-	Peak
5192	94.3	-	-	86.01	34.46	8.76	34.93	104	149	Average
5192	104.1	-	-	95.81	34.46	8.76	34.93	104	149	Peak
10380	40.74	-33.26	54	48.47	37.71	12.01	57.45	100	0	Peak
15570	44.92	-29.08	54	45.87	40.47	17.12	58.54	100	0	Peak

Test Mode :	802.11ac VHT40	**Temperature :**	20~21°C
Test Channel :	38	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5188 MHz is fundamental signal which can be ignored. 2. 10380 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	29.08	-10.92	40	38.84	21.66	0.64	32.06	112	165	Peak
36.75	27.88	-12.12	40	44.9	14.24	0.71	31.97	-	-	Peak
233.58	26.16	-19.84	46	45.78	10.33	1.78	31.73	-	-	Peak
502.3	24.01	-21.99	46	35.42	17.16	2.6	31.17	-	-	Peak
563.2	24.14	-21.86	46	34.15	18.5	2.75	31.26	-	-	Peak
964.3	24.01	-29.99	54	29.79	21.13	3.6	30.51	-	-	Peak
5188	95.53	-	-	87.6	34.15	8.71	34.93	100	342	Average
5188	105.5	-	-	97.57	34.15	8.71	34.93	100	342	Peak
10380	42.22	-31.78	54	50.51	37.15	12.01	57.45	100	0	Peak
15570	43.84	-30.16	54	45.76	39.5	17.12	58.54	100	0	Peak

Test Mode :	802.11ac VHT40	**Temperature :**	20~21°C
Test Channel :	46	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5228 MHz is fundamental signal which can be ignored. 2. 10461 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5228	92.71	-	-	84.36	34.49	8.77	34.91	114	139	Average
5228	104.61	-	-	96.26	34.49	8.77	34.91	114	139	Peak
10461	41.35	-32.65	54	48.93	37.77	12.06	57.41	100	0	Peak
15690	43.71	-30.29	54	44.18	40.93	17.05	58.45	100	0	Peak

Test Mode :	802.11ac VHT40	**Temperature :**	20~21°C
Test Channel :	46	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5232 MHz is fundamental signal which can be ignored. 2. 10461 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5232	94.27	-	-	86.3	34.11	8.77	34.91	111	341	Average
5232	104.93	-	-	96.96	34.11	8.77	34.91	111	341	Peak
10461	40.01	-33.99	54	48.25	37.11	12.06	57.41	100	0	Peak
15690	41.53	-32.47	54	43.43	39.5	17.05	58.45	100	0	Peak

Test Mode :	802.11ac VHT80	**Temperature :**	20~21°C
Test Channel :	42	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Horizontal
Remark :	1. 5208 MHz is fundamental signal which can be ignored. 2. 10419 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
100.2	25.53	-17.97	43.5	45.95	10.32	1.17	31.91	-	-	Peak
143.4	26.74	-16.76	43.5	46.68	10.47	1.4	31.81	121	201	Peak
236.82	28.85	-17.15	46	48.3	10.5	1.79	31.74	-	-	Peak
303.5	25.8	-20.2	46	42.29	13.16	2.01	31.66	-	-	Peak
358.1	26.37	-19.63	46	41.24	14.67	2.18	31.72	-	-	Peak
425.3	26.46	-19.54	46	39.06	16.38	2.39	31.37	-	-	Peak
5208	90.02	-	-	81.71	34.47	8.76	34.92	103	134	Average
5208	99.41	-	-	91.1	34.47	8.76	34.92	103	134	Peak
10419	41.11	-32.89	54	48.78	37.73	12.03	57.43	100	0	Peak
15630	45.26	-28.74	54	45.95	40.73	17.07	58.49	100	0	Peak

Test Mode :	802.11ac VHT80	**Temperature :**	20~21°C
Test Channel :	42	**Relative Humidity :**	50~51%
Test Engineer :	Jet Lui	**Polarization :**	Vertical
Remark :	1. 5212 MHz is fundamental signal which can be ignored. 2. 10419 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit. 4. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	29.17	-10.83	40	38.93	21.66	0.64	32.06	115	213	Peak
36.75	28.11	-11.89	40	45.13	14.24	0.71	31.97	-	-	Peak
253.02	26.44	-19.56	46	44.36	11.98	1.84	31.74	-	-	Peak
358.1	23.23	-22.77	46	38.1	14.67	2.18	31.72	-	-	Peak
502.3	24.3	-21.7	46	35.71	17.16	2.6	31.17	-	-	Peak
673.1	23.52	-22.48	46	32.65	18.87	2.99	30.99	-	-	Peak
5212	92.2	-	-	84.22	34.13	8.77	34.92	110	340	Average
5212	101.42	-	-	93.44	34.13	8.77	34.92	110	340	Peak
10419	40.93	-33.07	54	49.2	37.13	12.03	57.43	100	0	Peak
15630	44.91	-29.09	54	46.83	39.5	17.07	58.49	100	0	Peak

3.6 AC Conducted Emission Measurement

3.6.1 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.

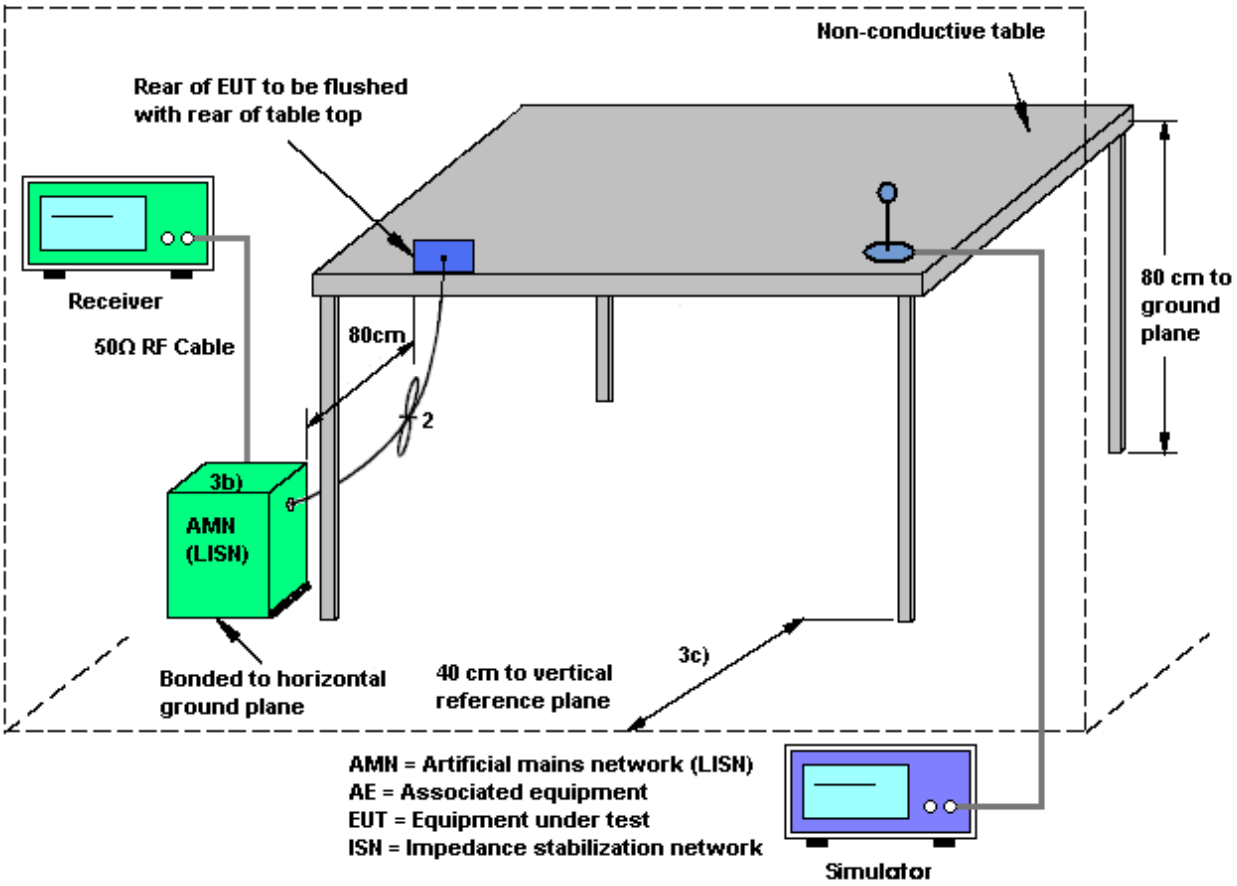
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

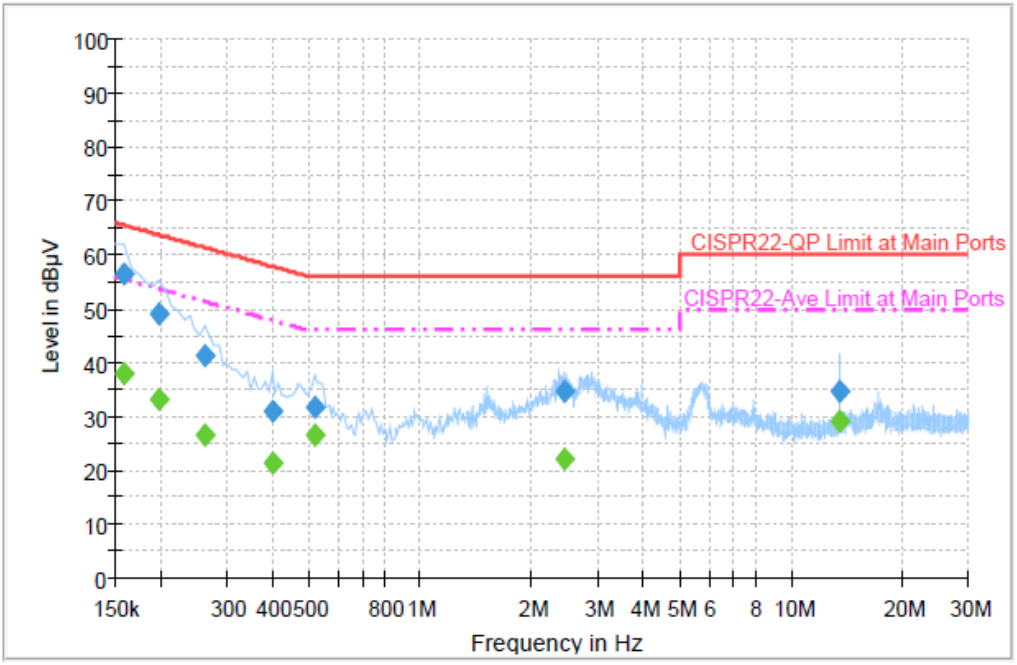
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Kai-Chun Chu	**Relative Humidity :**	46~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WCDMA Band II Idle + WLAN (5GHz, 802.11ac VHT40, CH46, MCS0) Link + Bluetooth Idle + Earphone + USB Cable (Data Link with Notebook) + NFC On		



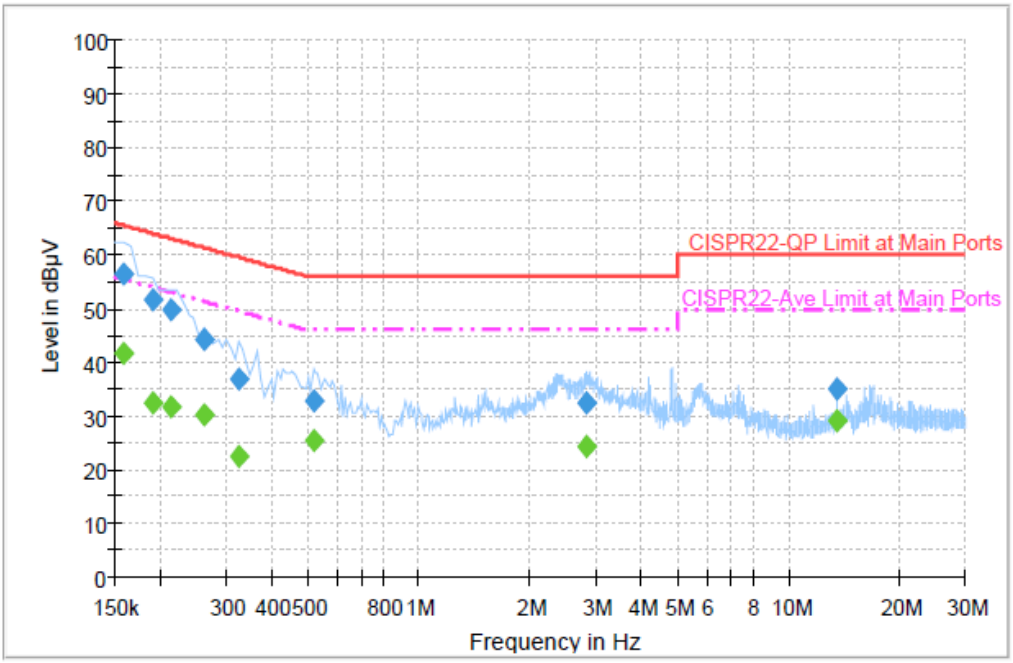
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	56.5	Off	L1	19.3	9.1	65.6
0.198000	49.0	Off	L1	19.3	14.7	63.7
0.262000	41.4	Off	L1	19.4	20.0	61.4
0.398000	31.2	Off	L1	19.5	26.7	57.9
0.518000	31.7	Off	L1	19.4	24.3	56.0
2.438000	34.6	Off	L1	19.6	21.4	56.0
13.558000	34.7	Off	L1	19.8	25.3	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	38.1	Off	L1	19.3	17.5	55.6
0.198000	33.3	Off	L1	19.3	20.4	53.7
0.262000	26.7	Off	L1	19.4	24.7	51.4
0.398000	21.3	Off	L1	19.5	26.6	47.9
0.518000	26.4	Off	L1	19.4	19.6	46.0
2.438000	22.2	Off	L1	19.6	23.8	46.0
13.558000	29.0	Off	L1	19.8	21.0	50.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band II Idle + WLAN (5GHz, 802.11ac VHT40, CH46, MCS0) Link + Bluetooth Idle + Earphone + USB Cable (Data Link with Notebook) + NFC On		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	56.5	Off	N	19.3	9.1	65.6
0.190000	51.7	Off	N	19.4	12.3	64.0
0.214000	49.9	Off	N	19.4	13.1	63.0
0.262000	44.5	Off	N	19.4	16.9	61.4
0.326000	37.0	Off	N	19.4	22.6	59.6
0.518000	33.0	Off	N	19.4	23.0	56.0
2.846000	32.4	Off	N	19.6	23.6	56.0
13.558000	35.0	Off	N	19.9	25.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	41.8	Off	N	19.3	13.8	55.6
0.190000	32.5	Off	N	19.4	21.5	54.0
0.214000	31.6	Off	N	19.4	21.4	53.0
0.262000	30.4	Off	N	19.4	21.0	51.4
0.326000	22.3	Off	N	19.4	27.3	49.6
0.518000	25.6	Off	N	19.4	20.4	46.0
2.846000	24.4	Off	N	19.6	21.6	46.0
13.558000	29.3	Off	N	19.9	20.7	50.0

3.7 Frequency Stability Measurement

3.7.1 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.

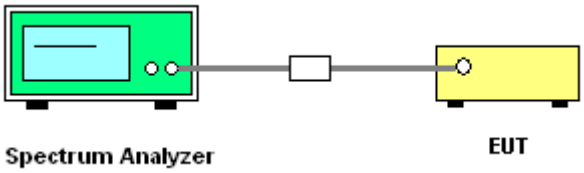
3.7.2 Measuring Instruments

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

3.7.3 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.

3.7.4 Test Setup



3.7.5 Test Result of Frequency Stability

Test Band :	5GHz band 1	**Temperature :**	21~26℃
Test Engineer :	Stuart Lin	**Relative Humidity :**	45~54%

Mod.	Data Rate	N_{TX}	Channel	Frequency (MHz)	Center Frequency (MHz)	Frequency Deviation (Hz)	Frequency Stability (ppm)
11a	6Mbps	1	36	5180	5180	0	0.00
11a	6Mbps	1	48	5240	5240	0	0.00

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.

3.8 Automatically Discontinue Transmission

3.8.1 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.

3.8.2 Measuring Instruments

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

3.8.3 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.

3.9 Antenna Requirements

3.9.1 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.

3.9.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.9.3 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. 07, 2013	Nov. 24, 2013 ~ Jan. 28, 2014	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 17, 2013	Nov. 24, 2013 ~ Jan. 28, 2014	Aug. 16, 2014	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 17, 2013	Nov. 24, 2013 ~ Jan. 28, 2014	Aug. 16, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Nov. 30, 2013	Nov. 14, 2014	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Nov. 30, 2013	Dec. 11, 2013	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 06, 2012	Nov. 30, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 30, 2013	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz – 26.5GHz	Jan. 23, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Jan. 22, 2014	Radiation (03CH08-HY)
Bilog Antenna	Teseq GmbH	CBL6112D	35379	30MHz~2GHz	Oct. 10, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Oct. 09, 2014	Radiation (03CH08-HY)
Horn Antenna	ESCO	3117	000143261	1GHz~18GHz	Jan. 08, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Jan. 07, 2014	Radiation (03CH08-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz~40GHz	Oct. 03, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Oct. 02, 2014	Radiation (03CH08-HY)
Amplifier	SONOMA	310N	187231	9kHz~1GHz	May 15, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	May 14, 2014	Radiation (03CH08-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590074	1GHz~18GHz	Jul. 09, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Jul. 08, 2014	Radiation (03CH08-HY)
Pre Amplifier	Agilent	8449B	3008A02665	1GHz~26.5GHz	Sep. 04, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Sep. 03, 2014	Radiation (03CH08-HY)
Turn Table	Chaintek	Chaintek 3000	N/A	0~360 Degree	N/A	Dec. 03, 2013 ~ Dec. 04, 2013	N/A	Radiation (03CH08-HY)
Antenna Mast	MF	MFA520BS	N/A	1m~4m	N/A	Dec. 03, 2013 ~ Dec. 04, 2013	N/A	Radiation (03CH08-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 MHz	Jul. 03, 2012	Dec. 03, 2013 ~ Dec. 04, 2013	Jul. 03, 2014	Radiation (03CH08-HY)
Amplifier	EM	EM18G40G	060604	18GHz ~ 40GHz	Oct. 17, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Oct. 16, 2014	Radiation (03CH08-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Dec. 03, 2013 ~ Dec. 04, 2013	Jun. 06, 2014	Radiation (03CH08-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))	**4.30**