



SPORTON International Inc.

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FCC RADIO TEST REPORT

Applicant's company	ASUSTeK COMPUTER INC.
Applicant Address	4F, No. 150, Li-Te Rd., Peitou, Taipei 112, Taiwan
FCC ID	MSQ-RTAC68UV2
Manufacturer's company (1)	Compal Networking (KunShan) Co., LTD.
Manufacturer Address	No. 520, Nabbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China
Manufacturer's company (2)	Askey Technology (Jiangsu) Ltd.
Manufacturer Address	1388, Jiao Tong Road, Wujiang Economic Technological Development Area, Jiang Su Province, P.R.C

Product Name	Wireless-AC1900 Dual Band Gigabit Router
Brand Name	ASUS
Model No.	RT-AC68U, RT-AC68R, RT-AC68W, RT-AC68P, TM-AC1900, RT-AC1900, RT-AC68U V2
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250MHz
Received Date	Dec. 04, 2013
Final Test Date	Dec. 10, 2014
Submission Type	Class II Change
Operating Mode	Master

Statement

Test result included is for the IEEE 802.11n and IEEE 802.11 a/ac of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2013, 47 CFR FCC Part 15 Subpart E, KDB789033 D02 v01, KDB662911 D01 v02r01, KDB644545 D03 v01.**

The test equipment used to perform the test is calibrated and traceable to NML/ROC.





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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3D0426-03AB	Rev. 01	Initial issue of report	Dec. 26, 2014



1. CERTIFICATE OF COMPLIANCE

Product Name : Wireless-AC1900 Dual Band Gigabit Router
Brand Name : ASUS
Model No. : RT-AC68U, RT-AC68R, RT-AC68W, RT-AC68P, TM-AC1900, RT-AC1900,
RT-AC68U V2
Applicant : ASUSTeK COMPUTER INC.
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 04, 2013 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

A handwritten signature in blue ink that reads 'Sam Chen'. The signature is written in a cursive style with a horizontal line underneath the name.

Sam Chen
SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	Complies	12.70 dB
4.2	15.407(a)	Maximum Conducted Output Power	Complies	3.72 dB
4.3	15.407(b)	Radiated Emissions	Complies	4.65 dB
4.4	15.407(b)	Band Edge Emissions	Complies	1.07 dB
4.5	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	see the below table for IEEE 802.11n/ac
Data Modulation	For 802.11n: OFDM (BPSK / QPSK / 16QAM / 64QAM) For 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n/ac
Frequency Range	5150 ~ 5250MHz
Channel Number	4 for 20MHz bandwidth ; 2 for 40MHz bandwidth 1 for 80MHz bandwidth
Maximum Conducted Output Power	<u>For non-beamforming function:</u> 802.11ac MCS0/Nss1 (VHT20): 21.73 dBm ; 802.11ac MCS0/Nss1 (VHT40): 24.09 dBm ; 802.11ac MCS0/Nss1 (VHT80): 17.40 dBm <u>For beamforming function:</u> 802.11ac MCS0/Nss1 (VHT20): 23.47 dBm ; 802.11ac MCS0/Nss1 (VHT40): 22.80 dBm ; 802.11ac MCS0/Nss1 (VHT80): 16.04 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	OFDM for IEEE 802.11a
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	OFDM (6/9/12/18/24/36/48/54)
Frequency Range	5150 ~ 5250MHz
Channel Number	4
Maximum Conducted Output Power	24.48 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Communication Mode	<input checked="" type="checkbox"/> IP Based (Load Based)	<input type="checkbox"/> Frame Based
Band width Mode	Description	
IEEE 802.11a	<input type="checkbox"/> With beamforming	<input checked="" type="checkbox"/> Without beamforming
IEEE 802.11n	<input checked="" type="checkbox"/> With beamforming	<input type="checkbox"/> Without beamforming
IEEE 802.11ac	<input checked="" type="checkbox"/> With beamforming	<input type="checkbox"/> Without beamforming

Antenna and Band width

Antenna	Three (TX)		
	20 MHz	40 MHz	80 MHz
IEEE 802.11a	V	X	X
IEEE 802.11n	V	V	X
IEEE 802.11ac	V	V	V

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	3	MCS0-23
802.11n (HT40)	3	MCS0-23
802.11ac (VHT20)	3	MCS 0-9/Nss1-3
802.11ac (VHT40)	3	MCS 0-9/Nss1-3
802.11ac (VHT80)	3	MCS 0-9/Nss1-3

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput).
Then EUT support HT20 and HT40.

Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT support VHT20, VHT40 and VHT80.

Note 3: Modulation modes consist of below configuration:
HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80: IEEE 802.11ac

3.2. Accessories

Power	Brand	Model	Rating
Adapter 1	PIE	AD890326	Input: 100-240Vac, 50/60Hz, 0.8A Output: 19Vdc, 1.75A
Adapter 2	ENERTRONIX	EXA1206UH	Input: 100-240Vac, 50-60Hz, 1.0A Output: 19Vdc, 1.75A
Adapter 3	Delta	ADP-33AW B	Input: 100-240Vac~1A 50-60Hz Output: 19Vdc, 1.75A
Other			
RJ-45 cable*1: Shielded, 1.5m			

3.3. Table for Filed Antenna

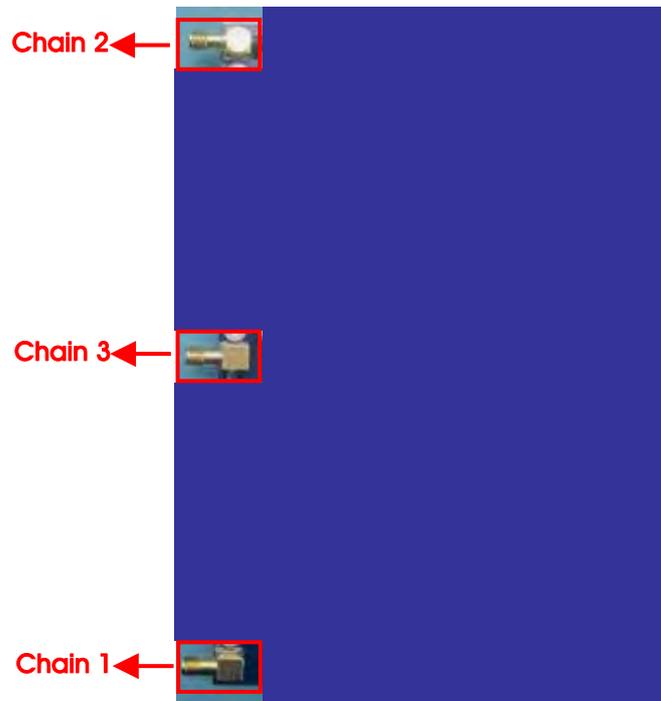
3.4. Table for Filed Antenna

Set	Brand	P/N	Antenna Type	Connector	Gain (dBi)		
					2.4GHz	5GHz	
						Band 1	Band 4
1	PSA	RFDPA141000SBLB802	Dipole Antenna	Reverse SMA	1.91	4.04	3.94
2	M.gear	C660-510333-A (SRF20141699)	Dipole Antenna	Reverse SMA	1.51	2.76	3.29

Note: The EUT has two set of antenna and each set has three antennas.

These antennas can be used as transmitting and receiving antenna.

Chain 1, Chain 2 and Chain 3 could transmit/receive simultaneously.



3.5. Table for Carrier Frequencies

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48.

For 40MHz bandwidth systems, use Channel 38, 46.

For 80MHz bandwidth systems, use Channel 42.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5250 MHz Band 1	36	5180 MHz	44	5220 MHz
	38	5190 MHz	46	5230 MHz
	40	5200 MHz	48	5240 MHz
	42	5210 MHz	-	-

3.6. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode		Data Rate	Channel	Chain
AC Power Conducted Emission	CTX		-	-	-
Max. Conducted Output Power	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3
Radiated Emission Below 1GHz	CTX		-	-	-
Radiated Emission Above 1GHz	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3
Band Edge Emission	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3
Frequency Stability	Un-modulation		-	40	1+2+3

Note 1: VHT20/VHT40 covers HT20/HT40, due to same modulation.

Note 2: The EUT has non-beamforming function and beamforming function for 802.11n/ac. They were verified for all tests, and all test results were recorded in the report.

Note 3: Radiated Emission above 1GHz and Band Edge Emissions were tested based on original Conducted Output Power.

The following test modes were performed for all tests:

For AC Power Line Conducted Emissions test:

The EUT has two SKU (SKU 1 and SKU 2). After evaluating, SKU1 was the worst case, Consequently, measurement for Conducted Emission will follow this same test mode

Mode 1. EUT (SKU1) + 2.4GHz + Adapter 2

Mode 2. EUT (SKU1) + 5GHz + Adapter 2

Mode 2 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3~4 will follow this same test mode.

Mode 3. EUT (SKU1) + 5GHz + Adapter 3

Mode 4. EUT (SKU1) + 5GHz + Adapter 1

Mode 3 is the worst case, so it was selected to record in this test report.

For Radiated Emissions Below 1GHz test:

The EUT has two SKU (SKU 1 and SKU 2). After evaluating, SKU1 was the worst case, Consequently, measurement for Radiated Emission <Below 1GHz> will follow this same test mode

Mode 1. EUT (SKU1) + 2.4GHz + Adapter 2

Mode 2. EUT (SKU1) + 5GHz + Adapter 2

Mode 1 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3~4 will follow this same test mode.

Mode 3. EUT (SKU1) + 2.4GHz + Adapter 1

Mode 4. EUT (SKU1) + 2.4GHz + Adapter 3

Mode 3 is the worst case, so it was selected to record in this test report.

For Radiated Emissions Above 1GHz test:

The EUT has two SKU (SKU 1 and SKU 2). not affect more than above 1GHz test, so test SKU1.

Mode 1: CTX-Standing

3.7. Table for Multiple List

1. There are two kinds of appearances (black and white) of this EUT with 7 models which are identical to each other in all aspects except for the following table:

Brand Name	Model Name	Description
ASUS	RT-AC68U	All the models are identical, the difference model for difference brand served as marketing strategy.
	RT-AC68R	
	RT-AC68W	
	RT-AC68P	
	TM-AC1900	
	RT-AC1900	
	RT-AC68U V2	

From the above models, model: RT-AC68U was selected as representative model for the test and its data was recorded in this report.

2. The EUT has two SKU which are identical to each other in all aspects except for the following table:

Description \ SKU	SKU1	SKU2
Vendor	NET SWAPN(FCE)	MINGTEK
LAN port transformer (Model No.)	FCE_NS771802	HN18101CG
WAN port transformer (Model No.)	FCE_NS773602	HN36201CG
Spec	DIP 10/100/1000 BASE-T	1GB DUAL DIP

3.8. Table for Class II Change

This product is an extension of original report under Sporton project number: FR3D0426AB

Below is the table for the change of the product with respect to the original one.

Report No.	Modifications	Performance Checking
FR3D0426-03AB	(1) Change chip from BCM4360KMLG to BCM43602KMLG. From radio perspective, they are same RF feature. The only differences are adding low power feature and CPU performance to BCM43602KMLG. (2) Add a set of same type antenna with lower gain: C660-510333-A (SRF20141699). (3) Add an adapter (Brand: Delta / Model: ADP-33AW B). (4) Add a model name: RT-AC68U V2.	1. AC Power Line Conducted Emissions 2. Radiated Emissions 3. Band Edge Emissions

3.9. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

3.10. Table for Supporting Units

For Test Site No: CO01-CB and TH-01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

For Test Site No: 03CH01-CB (below 1GHz)

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	DoC

For Test Site No: 03CH01-CB (above 1GHz)

For non-beamforming function:

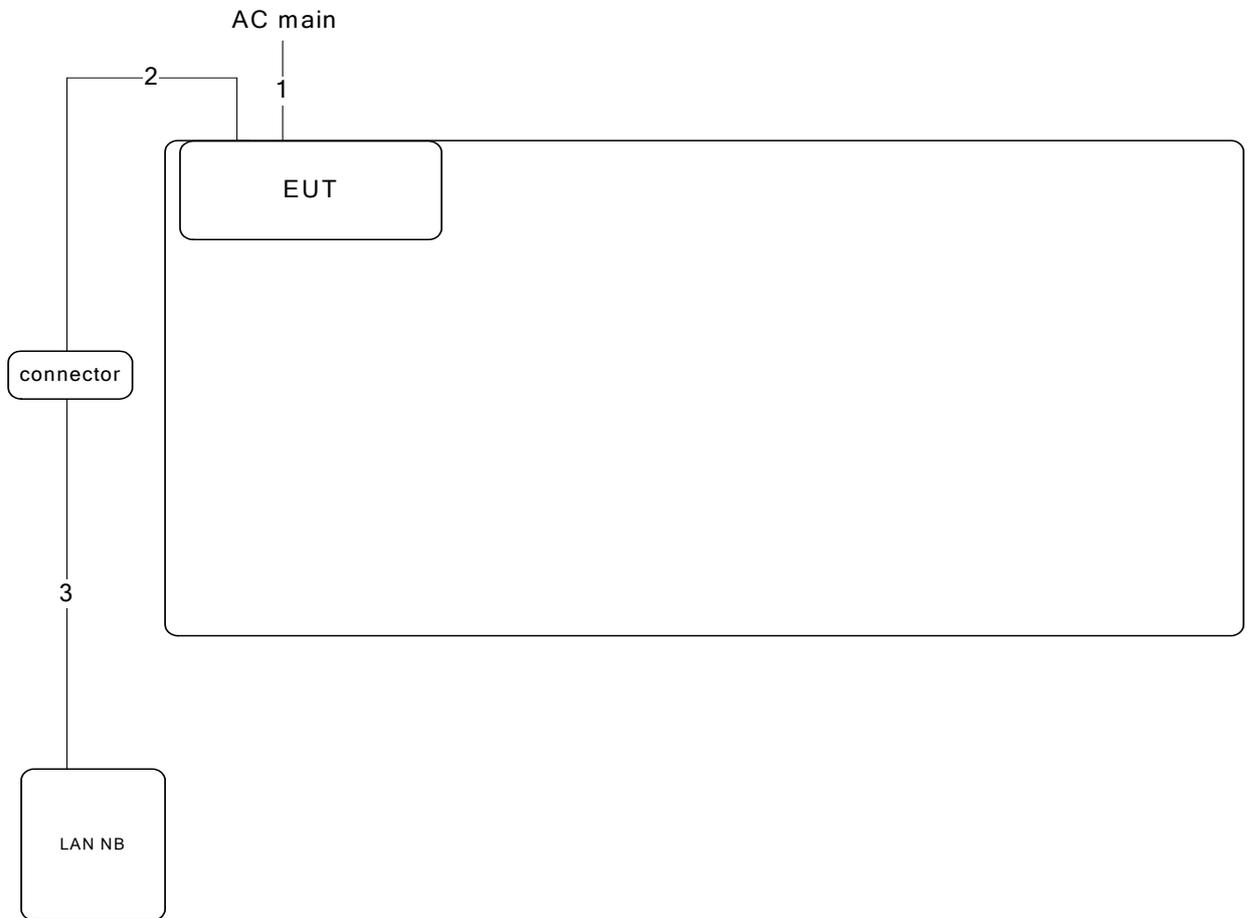
Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	DoC

For Beamforming function:

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	DoC
NB	DELL	M1340	DoC
WiFi USB Adapter	NETGEAR	A6200	PY312200200

3.11. Test Configurations

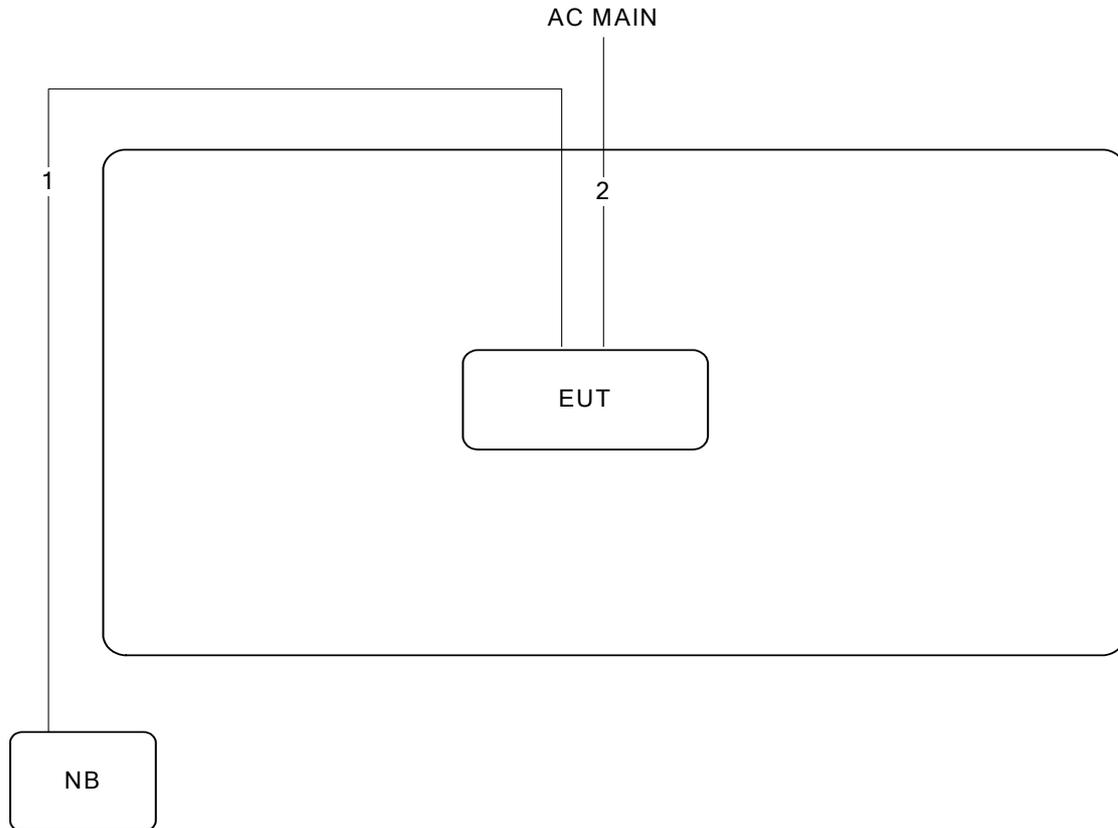
3.11.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	2.4m
2	RJ-45 cable	Yes	1.5m
3	RJ-45 cable	Yes	10m

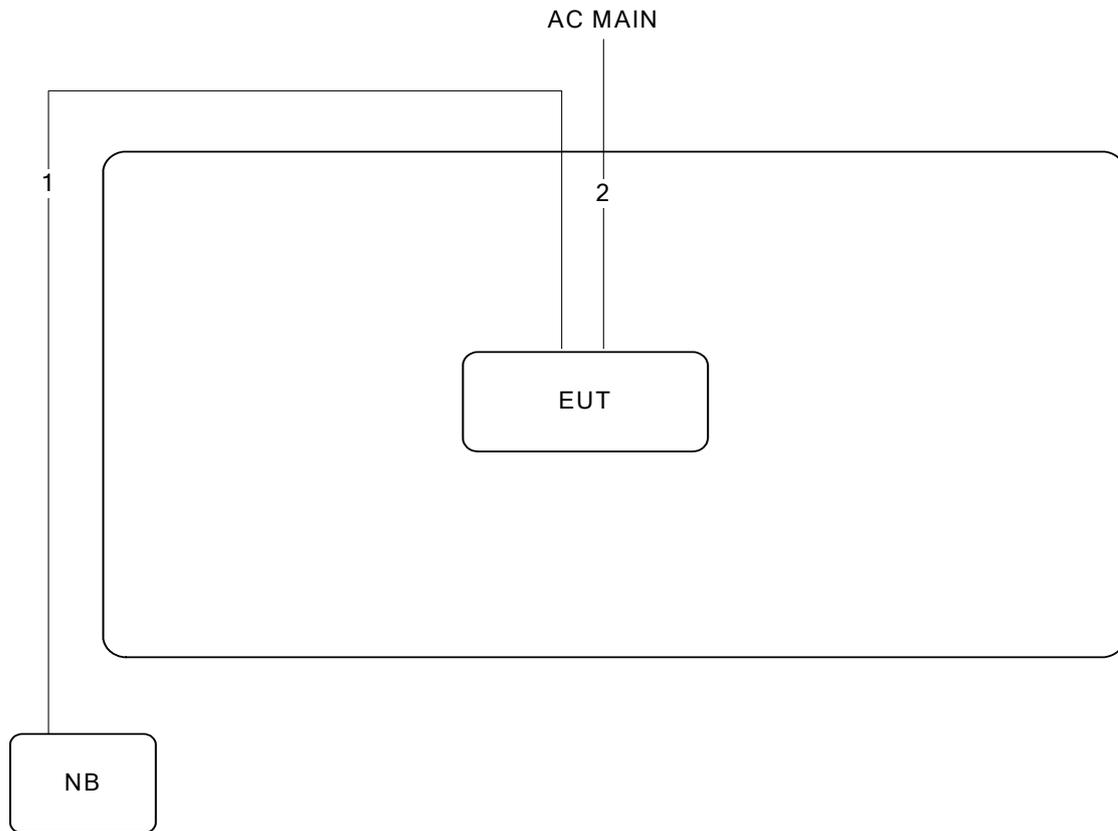
3.11.2. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



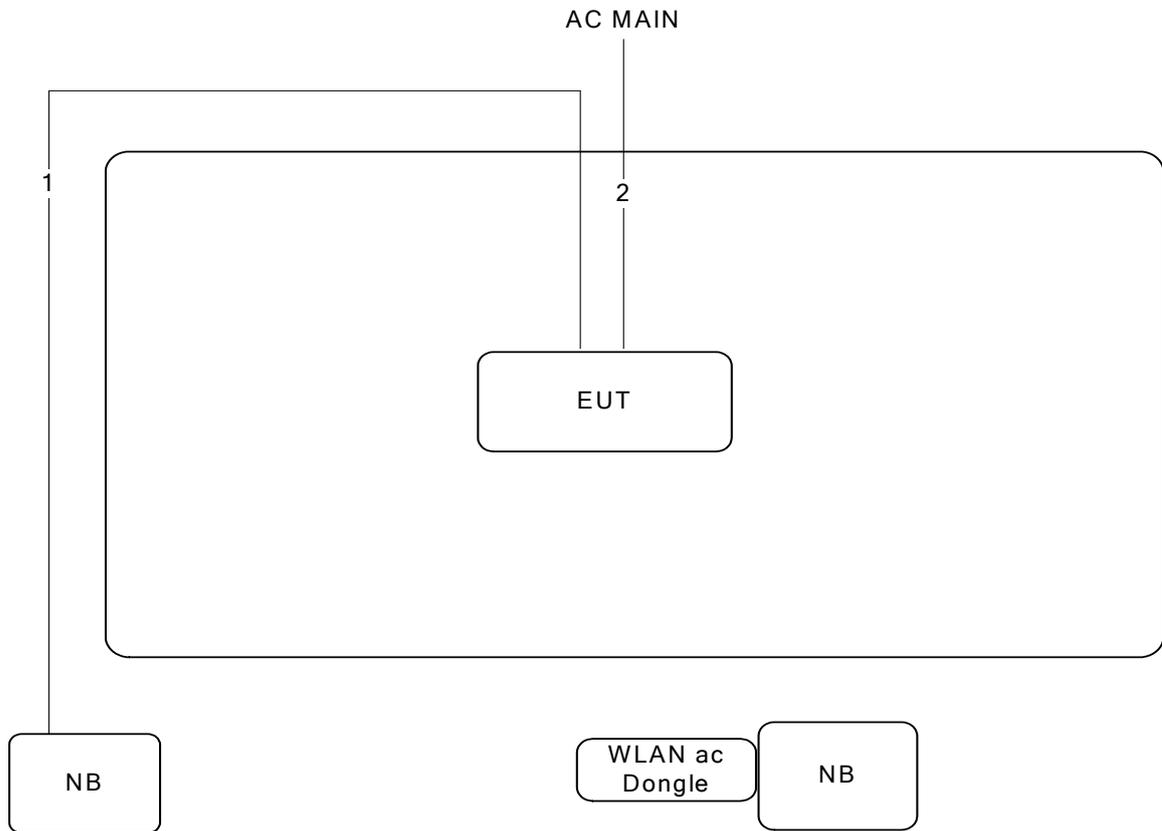
Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m

Test Configuration: above 1GHz / For non-beamforming function:



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m

Test Configuration: above 1GHz / For beamforming function:



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product that is designed to connect to the 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 below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

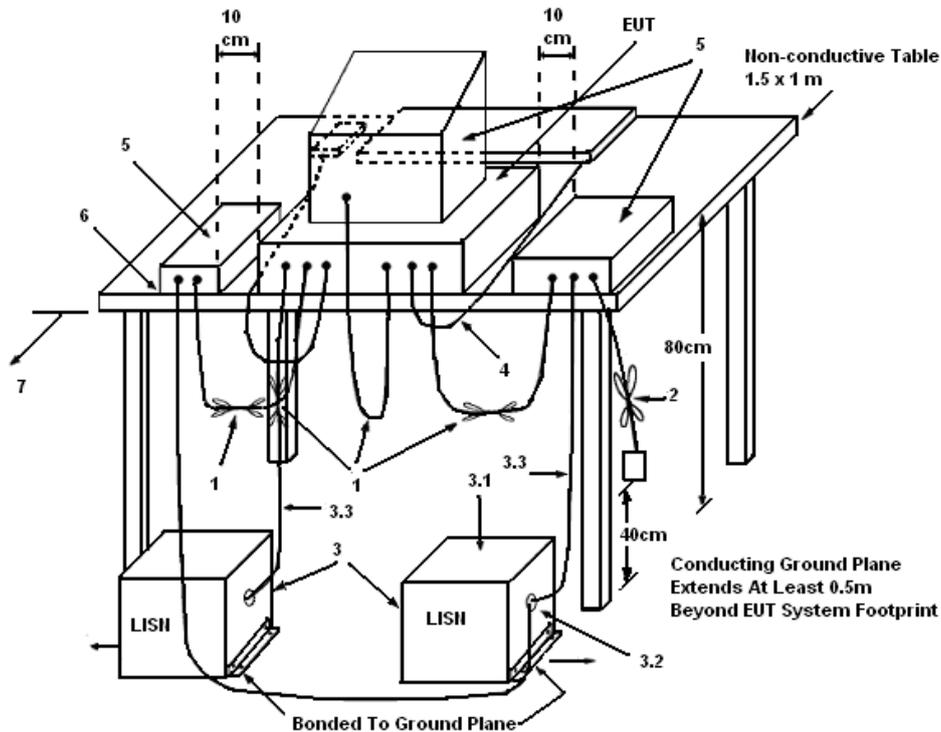
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω . LISN can be placed on top of, or immediately beneath, reference ground plane.
 - (3.1) All other equipment powered from additional LISN(s).
 - (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
 - (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

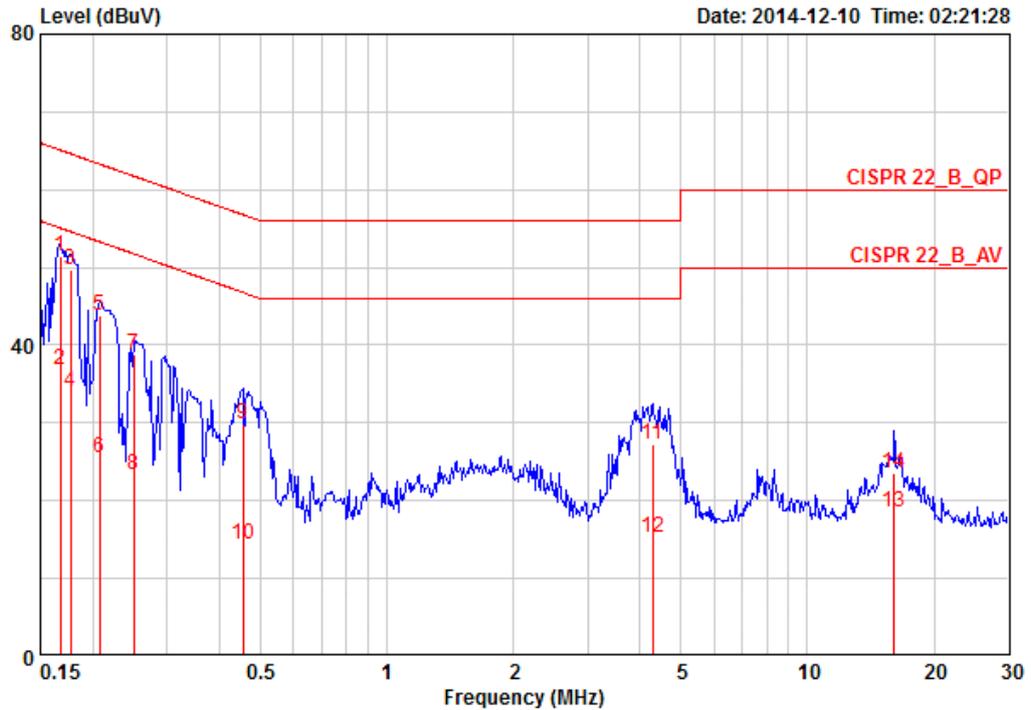
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

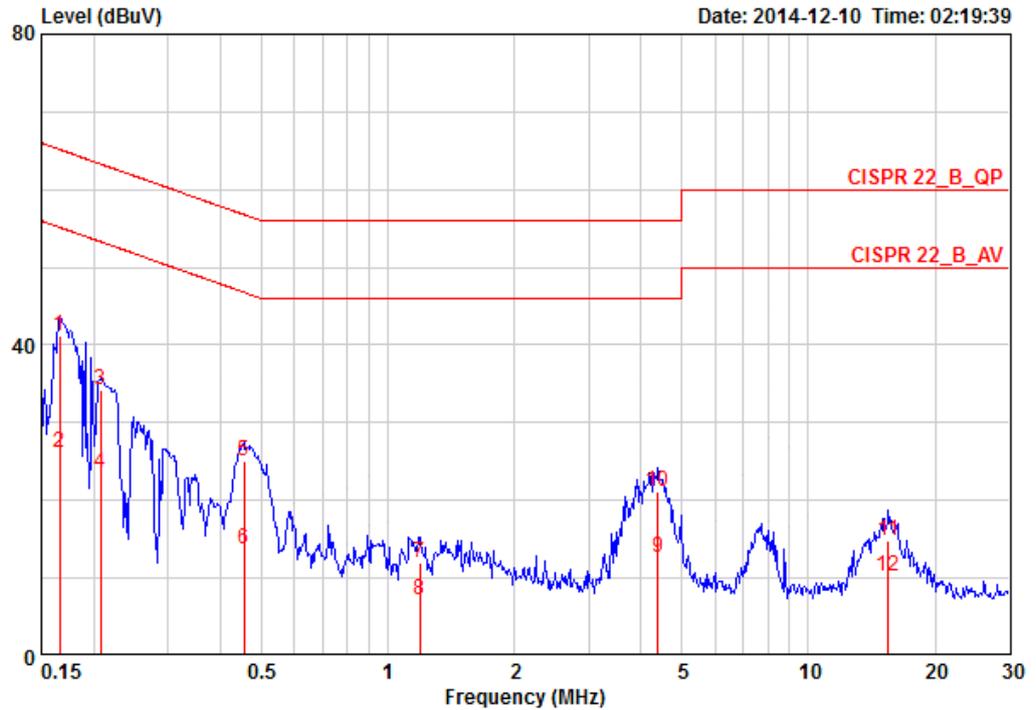
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	26°C	Humidity	58%
Test Engineer	Parody Lin	Phase	Line
Configuration	CTX	Test Mode	Mode 3



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.16765	51.38	-13.70	65.08	41.44	9.77	0.16	QP	LINE
2	0.16765	36.79	-18.29	55.08	26.85	9.77	0.16	AVERAGE	LINE
3	0.17678	49.66	-14.98	64.64	39.72	9.78	0.16	QP	LINE
4	0.17678	33.91	-20.73	54.64	23.97	9.78	0.16	AVERAGE	LINE
5	0.20723	43.75	-19.57	63.32	33.80	9.78	0.17	QP	LINE
6	0.20723	25.59	-27.73	53.32	15.64	9.78	0.17	AVERAGE	LINE
7	0.25078	38.75	-22.98	61.73	28.80	9.78	0.17	QP	LINE
8	0.25078	23.26	-28.47	51.73	13.31	9.78	0.17	AVERAGE	LINE
9	0.45395	29.91	-26.89	56.80	19.96	9.77	0.18	QP	LINE
10	0.45395	14.47	-32.33	46.80	4.52	9.77	0.18	AVERAGE	LINE
11	4.292	27.35	-28.65	56.00	17.34	9.70	0.31	QP	LINE
12	4.292	15.25	-30.75	46.00	5.24	9.70	0.31	AVERAGE	LINE
13	16.055	18.44	-31.56	50.00	8.48	9.50	0.46	AVERAGE	LINE
14	16.055	23.60	-36.40	60.00	13.64	9.50	0.46	QP	LINE

Temperature	26°C	Humidity	58%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	CTX	Test Mode	Mode 3



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.16589	41.28	-23.88	65.16	31.20	9.92	0.16	QP	NEUTRAL
2	0.16589	26.26	-28.90	55.16	16.18	9.92	0.16	AVERAGE	NEUTRAL
3	0.20723	34.15	-29.17	63.32	24.06	9.92	0.17	QP	NEUTRAL
4	0.20723	23.45	-29.87	53.32	13.36	9.92	0.17	AVERAGE	NEUTRAL
5	0.45395	25.06	-31.74	56.80	14.97	9.91	0.18	QP	NEUTRAL
6	0.45395	13.74	-33.06	46.80	3.65	9.91	0.18	AVERAGE	NEUTRAL
7	1.191	12.07	-43.93	56.00	1.94	9.92	0.21	QP	NEUTRAL
8	1.191	7.23	-38.77	46.00	-2.90	9.92	0.21	AVERAGE	NEUTRAL
9	4.384	12.63	-33.37	46.00	2.47	9.85	0.31	AVERAGE	NEUTRAL
10	4.384	21.09	-34.91	56.00	10.93	9.85	0.31	QP	NEUTRAL
11	15.470	14.91	-45.09	60.00	4.73	9.73	0.45	QP	NEUTRAL
12	15.470	10.25	-39.75	50.00	0.07	9.73	0.45	AVERAGE	NEUTRAL

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For the band 5.15~5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2.2. Measuring Instruments and Setting

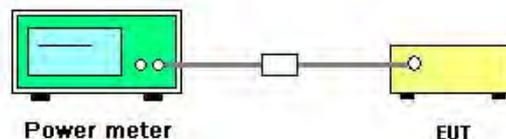
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (E) Maximum conducted output power =>3. Measurement using a Power Meter (PM) =>b) Method PM-G (Measurement using a gated RF average power meter).
3. Multiple antenna systems was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

Temperature	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac
Test Date	Jul. 24, 2014	Test Function	Non-beamforming function

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
36	5180 MHz	16.90	16.71	17.26	21.73	30.00	Complies
40	5200 MHz	16.78	16.33	17.11	21.52	30.00	Complies
48	5240 MHz	16.78	16.4	17.21	21.58	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
38	5190 MHz	14.51	14.48	14.82	19.38	30.00	Complies
46	5230 MHz	19.17	19.25	19.54	24.09	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
42	5210 MHz	12.16	12.53	13.14	17.40	30.00	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a
Test Date	Jul. 24, 2014	Test Function	Non-beamforming function

Configuration IEEE 802.11a

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
36	5180 MHz	18.65	18.82	19.72	23.86	29.87	Complies
40	5200 MHz	19.51	19.34	20.22	24.48	29.98	Complies
48	5240 MHz	16.24	16.02	16.87	21.16	29.83	Complies

Note: Ch 36 power limit= $17+10*\log(B)$ or 30dBm; $17+10*\log(19.36)=29.87\text{dBm}<30\text{dBm}$, so limit=29.87dBm.

Ch 40 power limit= $17+10*\log(B)$ or 30dBm; $17+10*\log(19.84)=29.98\text{dBm}<30\text{dBm}$, so limit=29.98dBm.

Ch 48 power limit= $17+10*\log(B)$ or 30dBm; $17+10*\log(19.20)=29.83\text{dBm}<30\text{dBm}$, so limit=29.83dBm.

Temperature	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac
Test Date	Jul. 24, 2014	Test Function	Beamforming function

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
36	5180 MHz	15.28	15.45	15.88	20.32	27.19	Complies
40	5200 MHz	16.58	16.84	17.02	21.59	27.19	Complies
48	5240 MHz	18.47	18.75	18.88	23.47	27.19	Complies

Note: Directional gain = $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 8.81 \text{ dBi} > 6 \text{ dBi}$, so limit = $30 - (8.81 - 6) = 27.19 \text{ dBm}$.

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
38	5190 MHz	12.05	12.47	13.25	17.39	27.19	Complies
46	5230 MHz	17.38	17.83	18.77	22.80	27.19	Complies

Note: Directional gain = $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 8.81 \text{ dBi} > 6 \text{ dBi}$, so limit = $30 - (8.81 - 6) = 27.19 \text{ dBm}$.

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
42	5210 MHz	10.28	11.49	11.88	16.04	27.19	Complies

Note: Directional gain = $10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 8.81 \text{ dBi} > 6 \text{ dBi}$, so limit = $30 - (8.81 - 6) = 27.19 \text{ dBm}$.

4.3. Radiated Emissions Measurement

4.3.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

4.3.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RBW / VBW (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1 MHz / 3MHz for peak

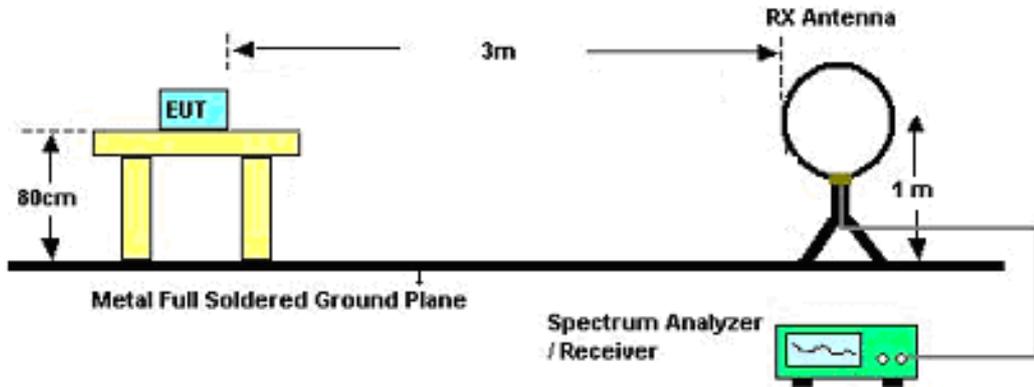
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.3.3. Test Procedures

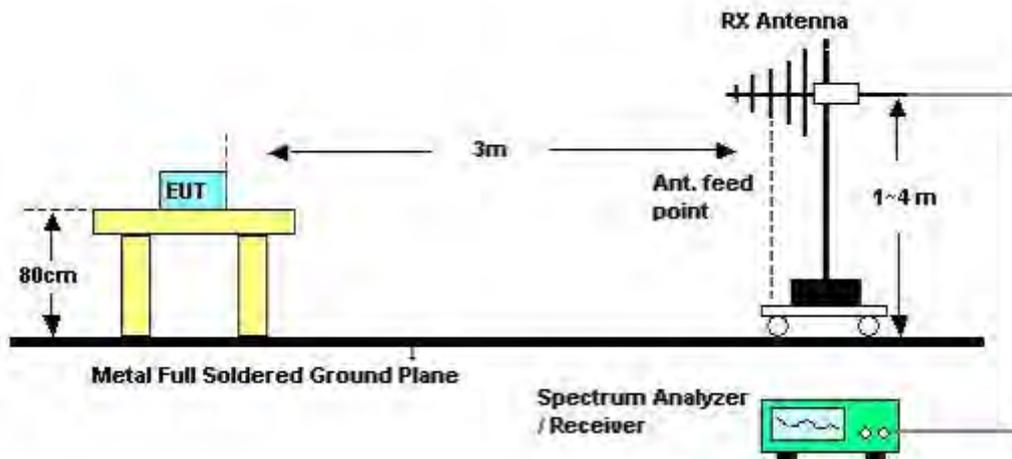
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.3.4. Test Setup Layout

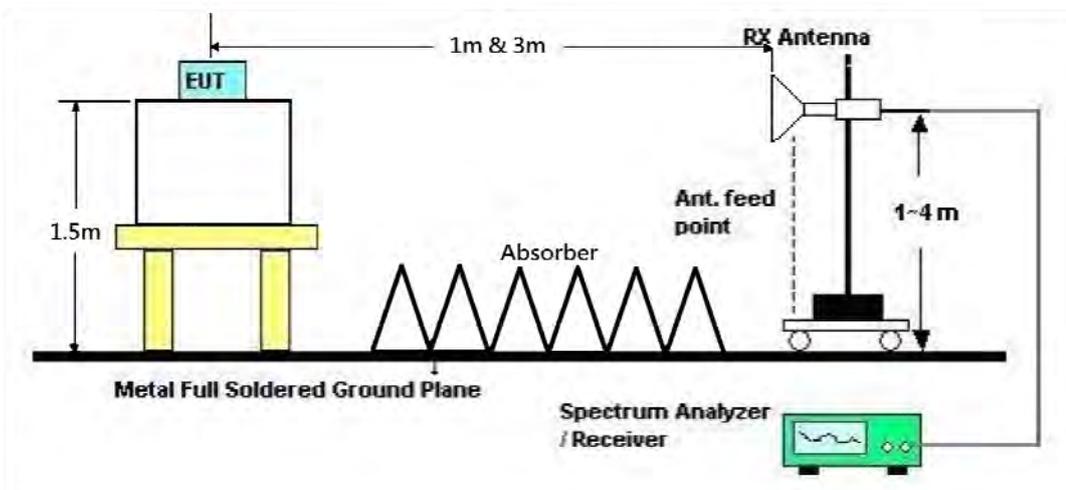
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

For non-beamforming function:

The EUT was programmed to be in continuously transmitting mode.

For beamforming function:

The EUT was programmed to be in beamforming transmitting mode.

4.3.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	CTX
Test Date	Dec. 08, 2014	Test Mode	Mode 3

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

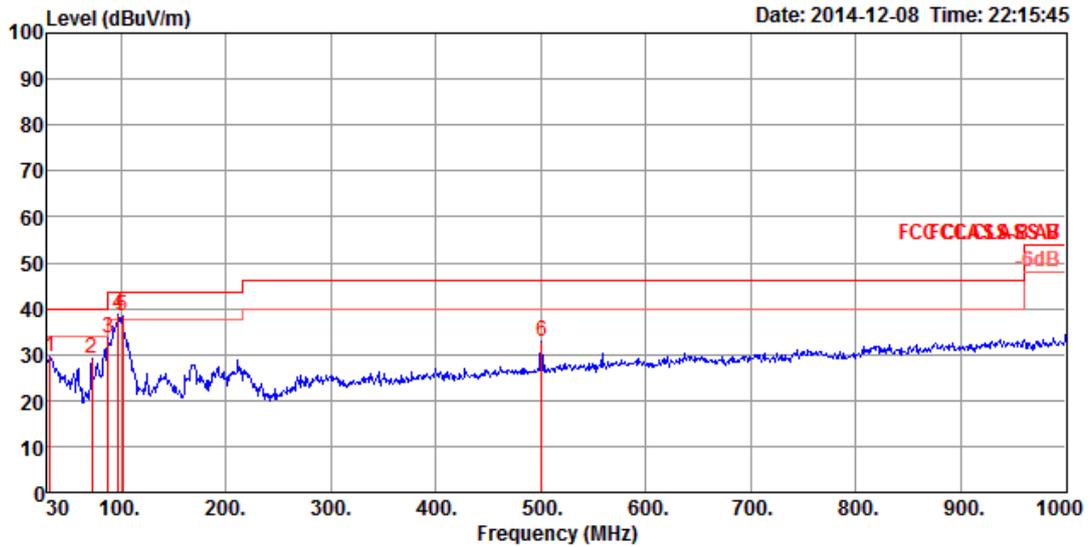
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.3.8. Results of Radiated Emissions (30MHz~1GHz)

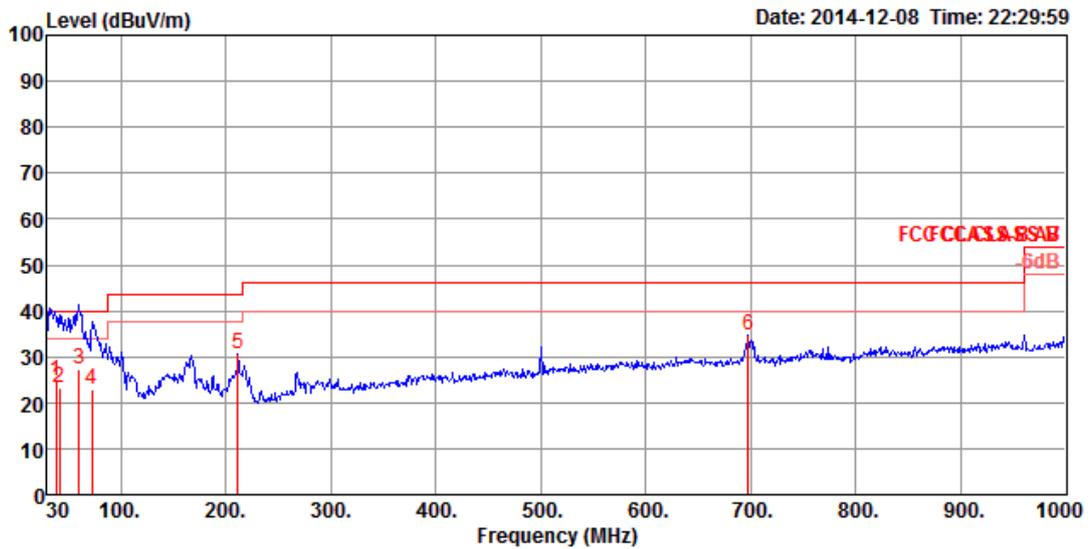
Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	CTX
Test Mode	Mode 3		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	32.91	29.62	40.00	-10.38	43.07	0.48	18.30	32.23	150	123	HORIZONTAL
2	72.68	29.26	40.00	-10.74	53.75	0.74	7.02	32.25	400	311	HORIZONTAL
3	88.20	33.62	43.50	-9.88	56.15	0.82	8.88	32.23	200	122	HORIZONTAL
4	97.90	38.85	43.50	-4.65	59.49	0.86	10.72	32.22	300	311	HORIZONTAL
5	101.78	38.26	43.50	-5.24	58.32	0.87	11.34	32.27	400	99	HORIZONTAL
6	500.45	32.83	46.00	-13.17	45.22	1.96	17.80	32.15	150	242	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	38.76	24.89	40.00	-15.11	41.82	0.55	14.81	32.29	QP	123	246	VERTICAL
2	41.71	23.31	40.00	-16.69	41.92	0.57	13.10	32.28	QP	100	130	VERTICAL
3	60.20	27.29	40.00	-12.71	52.02	0.67	6.90	32.30	QP	100	157	VERTICAL
4	72.77	22.88	40.00	-17.12	47.35	0.74	7.03	32.24	QP	174	254	VERTICAL
5	211.39	30.59	43.50	-12.91	50.58	1.27	10.79	32.05	Peak	100	197	VERTICAL
6	697.36	34.65	46.00	-11.35	44.92	2.29	19.69	32.25	Peak	150	13	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.3.9. Results for Radiated Emissions (1GHz~40GHz)

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15539.40	42.64	54.00	-11.36	29.34	10.77	38.12	35.59	Average	100	245	HORIZONTAL
2	15540.58	55.61	74.00	-18.39	42.31	10.77	38.12	35.59	Peak	100	245	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15539.31	56.18	74.00	-17.82	42.88	10.77	38.12	35.59	Peak	100	123	VERTICAL
2	15539.88	42.74	54.00	-11.26	29.44	10.77	38.12	35.59	Average	100	123	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15599.88	55.94	74.00	-18.06	42.70	10.78	38.04	35.58	Peak	100	352	HORIZONTAL
2	15600.29	42.51	54.00	-11.49	29.27	10.78	38.04	35.58	Average	100	352	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15599.47	42.64	54.00	-11.36	29.40	10.78	38.04	35.58	Average	100	125	VERTICAL
2	15600.67	56.11	74.00	-17.89	42.87	10.78	38.04	35.58	Peak	100	125	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15719.06	42.90	54.00	-11.10	29.82	10.79	37.85	35.56	Average	100	312	HORIZONTAL
2	15719.23	55.84	74.00	-18.16	42.76	10.79	37.85	35.56	Peak	100	312	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15719.74	42.68	54.00	-11.32	29.60	10.79	37.85	35.56	Average	100	129	VERTICAL
2	15720.59	56.01	74.00	-17.99	42.93	10.79	37.85	35.56	Peak	100	129	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15569.98	55.90	74.00	-18.10	42.61	10.78	38.09	35.58	Peak	100	126	HORIZONTAL
2	15570.26	42.81	54.00	-11.19	29.52	10.78	38.09	35.58	Average	100	126	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15570.05	42.88	54.00	-11.12	29.59	10.78	38.09	35.58	Average	100	253	VERTICAL
2	15570.20	55.91	74.00	-18.09	42.62	10.78	38.09	35.58	Peak	100	253	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15690.15	55.63	74.00	-18.37	42.49	10.79	37.91	35.56	Peak	100	165	HORIZONTAL
2	15690.72	42.74	54.00	-11.26	29.60	10.79	37.91	35.56	Average	100	165	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15689.24	56.92	74.00	-17.08	43.78	10.79	37.91	35.56	Peak	100	30	VERTICAL
2	15690.05	42.76	54.00	-11.24	29.62	10.79	37.91	35.56	Average	8960	30	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15629.96	55.71	74.00	-18.29	42.51	10.78	37.99	35.57	Peak	100	269	HORIZONTAL
2	15630.02	42.67	54.00	-11.33	29.47	10.78	37.99	35.57	Average	100	269	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15630.24	55.49	74.00	-18.51	42.29	10.78	37.99	35.57	Peak	100	172	VERTICAL
2	15630.73	42.52	54.00	-11.48	29.32	10.78	37.99	35.57	Average	160	172	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15539.33	42.75	54.00	-11.25	29.45	10.77	38.12	35.59 Average	100	342	HORIZONTAL
2	15540.14	55.96	74.00	-18.04	42.66	10.77	38.12	35.59 Peak	100	342	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15539.57	42.72	54.00	-11.28	29.42	10.77	38.12	35.59 Average	100	123	VERTICAL
2	15540.09	55.84	74.00	-18.16	42.54	10.77	38.12	35.59 Peak	100	123	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15599.12	55.90	74.00	-18.10	42.66	10.78	38.04	35.58	Peak	100	169	HORIZONTAL
2	15599.90	42.75	54.00	-11.25	29.51	10.78	38.04	35.58	Average	100	169	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15600.01	42.62	54.00	-11.38	29.38	10.78	38.04	35.58	Average	100	13	VERTICAL
2	15600.45	56.55	74.00	-17.45	43.31	10.78	38.04	35.58	Peak	100	13	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15639.70	55.52	74.00	-18.48	42.32	10.78	37.99	35.57	Peak	100	246	HORIZONTAL
2	15640.43	42.31	54.00	-11.69	29.14	10.78	37.96	35.57	Average	100	246	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15639.38	42.35	54.00	-11.65	29.15	10.78	37.99	35.57	Average	100	8	VERTICAL
2	15640.45	56.02	74.00	-17.98	42.85	10.78	37.96	35.57	Peak	100	8	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15544.17	43.60	54.00	-10.40	30.29	10.78	38.12	35.59	Average	101	280	HORIZONTAL
2	15548.28	56.94	74.00	-17.06	43.63	10.78	38.12	35.59	Peak	100	280	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15539.36	56.67	74.00	-17.33	43.37	10.77	38.12	35.59	Peak	100	109	VERTICAL
2	15542.58	43.63	54.00	-10.37	30.33	10.77	38.12	35.59	Average	100	109	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15593.52	56.74	74.00	-17.26	43.50	10.78	38.04	35.58	Peak	100	280	HORIZONTAL
2	15607.64	43.64	54.00	-10.36	30.42	10.78	38.01	35.57	Average	183	280	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15595.75	43.45	54.00	-10.55	30.21	10.78	38.04	35.58	Average	100	150	VERTICAL
2	15602.55	56.33	74.00	-17.67	43.09	10.78	38.04	35.58	Peak	100	150	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15710.30	56.28	74.00	-17.72	43.20	10.79	37.85	35.56	Peak	100	222	HORIZONTAL
2	15722.29	43.25	54.00	-10.75	30.17	10.79	37.85	35.56	Average	100	222	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15719.10	43.05	54.00	-10.95	29.97	10.79	37.85	35.56	Average	100	150	VERTICAL
2	15727.58	56.26	74.00	-17.74	43.20	10.79	37.83	35.56	Peak	100	150	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15565.83	56.76	74.00	-17.24	43.47	10.78	38.09	35.58	Peak	100	79	HORIZONTAL
2	15566.01	43.69	54.00	-10.31	30.40	10.78	38.09	35.58	Average	100	79	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15566.70	56.45	74.00	-17.55	43.16	10.78	38.09	35.58	Peak	100	280	VERTICAL
2	15570.87	43.74	54.00	-10.26	30.45	10.78	38.09	35.58	Average	100	280	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15671.94	43.20	54.00	-10.80	30.04	10.79	37.93	35.56	Average	100	120	HORIZONTAL
2	15683.92	57.04	74.00	-16.96	43.90	10.79	37.91	35.56	Peak	100	120	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15675.01	43.34	54.00	-10.66	30.20	10.79	37.91	35.56	Average	100	300	VERTICAL
2	15708.75	56.25	74.00	-17.75	43.17	10.79	37.85	35.56	Peak	100	300	VERTICAL



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15613.68	43.61	54.00	-10.39	30.39	10.78	38.01	35.57	Average	100	94	HORIZONTAL
2	15639.73	56.94	74.00	-17.06	43.74	10.78	37.99	35.57	Peak	100	94	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	15626.76	56.53	74.00	-17.47	43.33	10.78	37.99	35.57	Peak	100	280	VERTICAL
2	15664.38	43.55	54.00	-10.45	30.39	10.79	37.93	35.56	Average	100	280	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.4. Band Edge Emissions Measurement

4.4.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (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

4.4.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1 MHz / 3MHz for Peak

4.4.3. Test Procedures

The test procedure is the same as section 4.3.3, only the frequency range investigated is limited to 100MHz around bandedges.

4.4.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.3.4.

4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

For Non-beamforming function:

The EUT was programmed to be in continuously transmitting mode.

For beamforming function:

The EUT was programmed to be in beamforming transmitting mode.

4.4.7. Test Result of Band Edge and Fundamental Emissions

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.40	49.16	54.00	-4.84	44.22	6.13	34.01	35.20	Average	167	35	VERTICAL
2	5149.20	62.88	74.00	-11.12	57.94	6.13	34.01	35.20	Peak	167	35	VERTICAL
3	5179.20	105.07	---	---	100.04	6.15	34.08	35.20	Average	167	35	VERTICAL
4	5179.20	115.48	---	---	110.45	6.15	34.08	35.20	Peak	167	35	VERTICAL
5	5390.87	60.07	74.00	-13.93	54.50	6.28	34.49	35.20	Peak	167	35	VERTICAL
6	5396.47	51.90	54.00	-2.10	46.32	6.29	34.49	35.20	Average	167	35	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5199.20	104.56	---	---	99.49	6.16	34.11	35.20	Average	159	356	VERTICAL
2	5204.81	115.20	---	---	110.13	6.16	34.11	35.20	Peak	159	356	VERTICAL
3	5417.31	51.73	54.00	-2.27	46.06	6.31	34.56	35.20	Average	159	356	VERTICAL
4	5417.31	59.26	74.00	-14.74	53.59	6.31	34.56	35.20	Peak	159	356	VERTICAL

Item 1, 2 are the fundamental frequency at 5200 MHz.

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5239.20	105.34	---	---	100.18	6.18	34.18	35.20	Average	158	356	VERTICAL
2	5239.20	114.92	---	---	109.76	6.18	34.18	35.20	Peak	158	356	VERTICAL
3	5458.97	52.26	54.00	-1.74	46.50	6.33	34.63	35.20	Average	158	356	VERTICAL
4	5458.97	59.53	74.00	-14.47	53.77	6.33	34.63	35.20	Peak	158	356	VERTICAL

Item 1, 2 are the fundamental frequency at 5240 MHz.

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.36	66.22	74.00	-7.78	61.28	6.13	34.01	35.20	Peak	177	356	VERTICAL
2	5149.68	52.93	54.00	-1.07	47.99	6.13	34.01	35.20	Average	177	356	VERTICAL
3	5194.49	98.26			93.19	6.16	34.11	35.20	Average	177	356	VERTICAL
4	5194.49	109.84			104.77	6.16	34.11	35.20	Peak	177	356	VERTICAL

Item 3, 4 are the fundamental frequency at 5190 MHz.

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5000.16	52.49	54.00	-1.51	47.96	6.03	33.70	35.20	Average	155	360	VERTICAL
2	5140.39	63.53	74.00	-10.47	58.62	6.13	33.98	35.20	Peak	155	360	VERTICAL
3	5234.81	103.76			98.60	6.18	34.18	35.20	Average	155	360	VERTICAL
4	5240.42	115.34			110.18	6.18	34.18	35.20	Peak	155	360	VERTICAL

Item 3, 4 are the fundamental frequency at 5230 MHz.



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Channel 42

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5150.00	52.45	54.00	-1.55	47.51	6.13	34.01	35.20	Average	161	360	VERTICAL
2	5150.00	65.68	74.00	-8.32	60.74	6.13	34.01	35.20	Peak	161	360	VERTICAL
3	5204.39	92.13			87.06	6.16	34.11	35.20	Average	161	360	VERTICAL
4	5205.19	105.22			100.15	6.16	34.11	35.20	Peak	161	360	VERTICAL

Item 3, 4 are the fundamental frequency at 5210 MHz.

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Non-beamforming function

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5148.40	69.92	74.00	-4.08	64.98	6.13	34.01	35.20	Peak	183	356	VERTICAL
2	5149.20	52.69	54.00	-1.31	47.75	6.13	34.01	35.20	Average	183	356	VERTICAL
3	5179.20	107.97			102.94	6.15	34.08	35.20	Average	183	356	VERTICAL
4	5179.20	117.88			112.85	6.15	34.08	35.20	Peak	183	356	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5117.95	52.55	54.00	-1.45	47.70	6.11	33.94	35.20	Average	181	359	VERTICAL
2	5119.55	63.56	74.00	-10.44	58.71	6.11	33.94	35.20	Peak	181	359	VERTICAL
3	5199.20	108.25			103.18	6.16	34.11	35.20	Average	181	359	VERTICAL
4	5199.20	118.27			113.20	6.16	34.11	35.20	Peak	181	359	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5020.99	49.97	54.00	-4.03	45.39	6.05	33.73	35.20	Average	176	356	VERTICAL
2	5020.99	60.20	74.00	-13.80	55.62	6.05	33.73	35.20	Peak	176	356	VERTICAL
3	5239.20	105.96			100.80	6.18	34.18	35.20	Average	176	356	VERTICAL
4	5239.20	115.78			110.62	6.18	34.18	35.20	Peak	176	356	VERTICAL

Item 3, 4 are the fundamental frequency at 5240 MHz.

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5000.07	49.10	54.00	-4.90	44.57	6.03	33.70	35.20	Average	185	40	VERTICAL
2	5092.11	61.14	74.00	-12.86	56.37	6.10	33.87	35.20	Peak	185	40	VERTICAL
3	5178.26	103.00			97.97	6.15	34.08	35.20	Average	185	40	VERTICAL
4	5180.58	113.70			108.67	6.15	34.08	35.20	Peak	185	40	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5127.57	49.84	54.00	-4.16	44.94	6.12	33.98	35.20	Average	189	311	VERTICAL
2	5127.57	61.61	74.00	-12.39	56.71	6.12	33.98	35.20	Peak	189	311	VERTICAL
3	5202.17	115.65			110.58	6.16	34.11	35.20	Peak	189	311	VERTICAL
4	5202.89	104.00			98.93	6.16	34.11	35.20	Average	189	311	VERTICAL
5	5360.85	60.13	74.00	-13.87	54.64	6.27	34.42	35.20	Peak	189	311	VERTICAL
6	5416.57	51.51	54.00	-2.49	45.84	6.31	34.56	35.20	Average	189	311	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4999.54	51.37	54.00	-2.63	46.84	6.03	33.70	35.20	Average	151	1	VERTICAL
2	5125.40	61.60	74.00	-12.40	56.74	6.12	33.94	35.20	Peak	151	1	VERTICAL
3	5237.11	117.30			112.14	6.18	34.18	35.20	Peak	151	1	VERTICAL
4	5239.28	106.56			101.40	6.18	34.18	35.20	Average	151	1	VERTICAL
5	5392.69	61.37	74.00	-12.63	55.80	6.28	34.49	35.20	Peak	151	1	VERTICAL
6	5458.54	49.11	54.00	-4.89	43.35	6.33	34.63	35.20	Average	151	1	VERTICAL

Item 3, 4 are the fundamental frequency at 5240 MHz.

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5147.97	64.24	74.00	-9.76	59.30	6.13	34.01	35.20	Peak	155	360	VERTICAL
2	5150.00	51.88	54.00	-2.12	46.94	6.13	34.01	35.20	Average	155	360	VERTICAL
3	5195.21	99.49			94.42	6.16	34.11	35.20	Average	155	360	VERTICAL
4	5195.21	110.05			104.98	6.16	34.11	35.20	Peak	155	360	VERTICAL

Item 3, 4 are the fundamental frequency at 5190 MHz.

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5146.53	52.39	54.00	-1.61	47.45	6.13	34.01	35.20	Average	222	134	VERTICAL
2	5147.11	64.36	74.00	-9.64	59.42	6.13	34.01	35.20	Peak	222	134	VERTICAL
3	5235.21	107.59			102.43	6.18	34.18	35.20	Average	222	134	VERTICAL
4	5236.95	117.20			112.04	6.18	34.18	35.20	Peak	222	134	VERTICAL
5	5350.00	60.93	74.00	-13.07	55.45	6.26	34.42	35.20	Peak	222	134	VERTICAL
6	5372.40	49.46	54.00	-4.54	43.93	6.27	34.46	35.20	Average	222	134	VERTICAL

Item 3, 4 are the fundamental frequency at 5230 MHz.



Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3
Test Date	Nov. 22, 2014	Test Function	Beamforming function

Channel 42

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	5149.13	64.67	74.00	-9.33	59.73	6.13	34.01	35.20	Peak	156	2	VERTICAL
2	5149.42	52.55	54.00	-1.45	47.61	6.13	34.01	35.20	Average	156	2	VERTICAL
3	5179.03	107.18			102.15	6.15	34.08	35.20	Peak	156	2	VERTICAL
4	5205.95	95.11			90.04	6.16	34.11	35.20	Average	156	2	VERTICAL

Item 3, 4 are the fundamental frequency at 5210 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

4.5. Antenna Requirements

4.5.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.5.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 17, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 17, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 04, 2014	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 26, 2014	Radiation (03CH01-CB)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Apr. 22, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100080	9kHz ~ 40GHz	Oct. 15, 2014	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 12, 2013	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESR26	101289	9kHz~26GHz	Aug. 22, 2014	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO 2000	N/A	1 m - 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
Signal analyzer	Agilent	N9010A	MY52220519	10Hz~44GHz	Dec. 11, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

“*” Calibration Interval of instruments listed above is two years.

N.C.R. means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%