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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-PCIE0U00**
Manufacturer's company (1)	**ASKEY TECHNOLOGY (JIANG SU) LTD**
Manufacturer Address	NO1388, Jiao Tong Road, Wujiang Economic Technological Development Area Jiangsu Province 215200 China
Manufacturer's company (2)	**Compal Networking (KunShan) Co., LTD.**
Manufacturer Address	No. 520, Nabbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China

Product Name	Dual Band 4x4 802.11ac PCI-E adapter
Brand Name	ASUS
Model No.	PCE-AC88
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250MHz
Received Date	Nov. 05, 2015
Final Test Date	Nov. 14, 2015
Submission Type	Original Equipment

Statement

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

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR5N0421AB	Rev. 01	Initial issue of report	Nov. 19, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	Dual Band 4x4 802.11ac PCI-E adapter
Brand Name	:	ASUS
Model No.	:	PCE-AC88
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 Nov. 05, 2015 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.

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	13.27 dB
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.01 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.48 dB
4.5	15.407(b)	Radiated Emissions	Complies	4.43 dB
4.6	15.407(b)	Band Edge Emissions	Complies	1.08 dB
4.7	15.407(g)	Frequency Stability	Complies	-
4.8	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (4TX, 4RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	IEEE 802.11a: OFDM IEEE 802.11n/ac: see the below table
Data Modulation	IEEE 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM, 1024QAM)
Data Rate (Mbps)	IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n/ac: see the below table
Frequency Range	5150 ~ 5250MHz
Channel Number	4 for 20MHz bandwidth ; 2 for 40MHz bandwidth 1 for 80MHz bandwidth
Channel Band Width (99%)	IEEE 802.11a: 17.28 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 18.15 MHz ; IEEE 802.11ac MCS0/Nss1 (VHT40): 36.76 MHz ; IEEE 802.11ac MCS0/Nss1 (VHT80): 74.96 MHz
Maximum Conducted Output Power	IEEE 802.11a: 23.99 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 23.90 dBm ; IEEE 802.11ac MCS0/Nss1 (VHT40): 23.90 dBm ; IEEE 802.11ac MCS0/Nss1 (VHT80): 21.23 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Communication Mode	☒ IP Based (Load Based)	☐ Frame Based
Beamforming Function	☒ With beamforming	☐ Without beamforming
	The product has beamforming function for 802.11n/ac.	
Operating Mode	☐ Outdoor access point	
	☐ Indoor access point	
	☐ Fixed point-to-point access points	
	☒ Mobile and portable client devices	

Antenna and Band width

Antenna	Four (TX)		
Band width Mode	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)	4	MCS 0-31
802.11n (HT40)	4	MCS 0-31
802.11ac (VHT20)	4	MCS0-11/Nss1-4
802.11ac (VHT40)	4	MCS0-11/Nss1-4
802.11ac (VHT80)	4	MCS0-11/Nss1-4

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

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

Description
Antenna connection pedestal*1

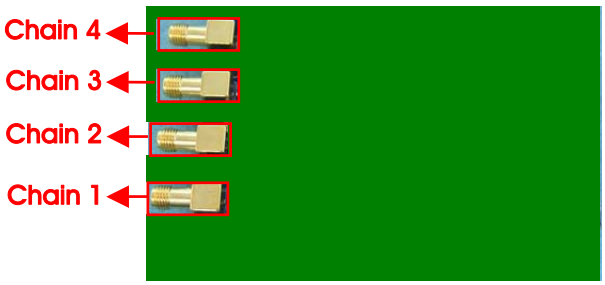
3.3. Table for Filed Antenna

Set	Brand	P/N	Type	Connector	Gain (dBi)		
					2.4GHz	5GHz Band 1	5GHz Band 4
1	WHA YU	C660-510336-A (SRF20141892)	Dipole	Reversed-SMA	1.86	1.97	1.95

Set	Loss of Cable (dB)			True Gain (dBi)		
	2.4GHz	5GHz Band 1	5GHz Band 4	2.4GHz	5GHz Band 1	5GHz Band 4
1	1.70	2.80	2.80	0.16	-0.83	-0.85

Note: The EUT has one set antenna, and each set contains four antennas.

Chain 1, Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.



3.4. 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	-	-

3.5. 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	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
Power Spectral Density	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
Radiated Emission Below 1GHz	CTX		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
Band Edge Emission	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
Frequency Stability	20 MHz	Band 1	-	40	1
	40 MHz	Band 1	-	38	1
	80 MHz	Band 1	-	42	1

Note: 1. The EUT can only be used at Z axis position.

2. VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.

3. There are two functions of EUT, one is beamforming function, and the other is non-beamforming function for 802.11n/ac, after evaluating, beamforming function has been evaluated to be the worst case, so it was selected to test and record in this test report.

The following test modes were performed for all tests:

For AC Power Line Conducted Emissions test:

There are two modes of EUT, one is 2.4GHz WLAN function, and the other is 5GHz WLAN function.

2.4GHz WLAN function generated the worst test result for Radiated emission below 1GHz test, thus the measurement for AC Power Line Conducted Emissions test will follow this same test configuration.

Mode 1. 2.4GHz WLAN function

For Radiated Emissions Below 1GHz test:

Mode 1. 2.4GHz WLAN function

Mode 2. 5GHz WLAN function

Mode 1 is the worst case, so it was selected to record in this test report.

3.6. 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).

3.7. Table for Supporting Units

For Test Site No: 03CH01-CB

For non-beamforming function:

Support Unit	Brand	Model	FCC ID
PC	ASUS	Vintage2-PH1	DoC
LCD Monitor	ASUS	VB171	DoC
Keyboard	ASUS	AS-KBA000	DoC
Mouse	ASUS	MOBTUO	DoC

For beamforming function:

Support Unit	Brand	Model	FCC ID
PC	ASUS	Vintage2-PH1	DoC
LCD Monitor	ASUS	VB171	DoC
Keyboard	ASUS	AS-KBA000	DoC
Mouse	ASUS	MOBTUO	DoC
Wireless ac AP	ASUS	RT-AC88U	DoC
Notebook	DELL	E4300	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
PC	DELL	T3400	DoC
LCD Monitor	DELL	1704FPTt	DoC
Keyboard	iCooky	SK068	DoC
Mouse	Logitech	M-U0026	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
PC	ASUS	Vintage2-PH1	DoC
LCD Monitor	ASUS	VB171	DoC
Keyboard	ASUS	AS-KBA000	DoC
Mouse	ASUS	MOBTUO	DoC

3.8. Table for Parameters of Test Software Setting

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Test Software Version	Mtool 2.0.2.8		
Mode	Test Frequency (MHz)		
	NCB: 20MHz		
	5180 MHz	5200 MHz	5240 MHz
802.11a	71	71	71
802.11ac MCS0/Nss1 VHT20	71	71	71
Mode	NCB: 40MHz		
802.11ac MCS0/Nss1 VHT40	5190 MHz	5230 MHz	
	70	70	
Mode	NCB: 80MHz		
802.11ac MCS0/Nss1 VHT80	5210 MHz		
	58		

3.9. EUT Operation during Test

For non-beamforming function:

The EUT was programmed to be in continuously transmitting mode.

For beamforming function:

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

During the test, the following programs under WIN 7 were executed.

The program was executed as follows:

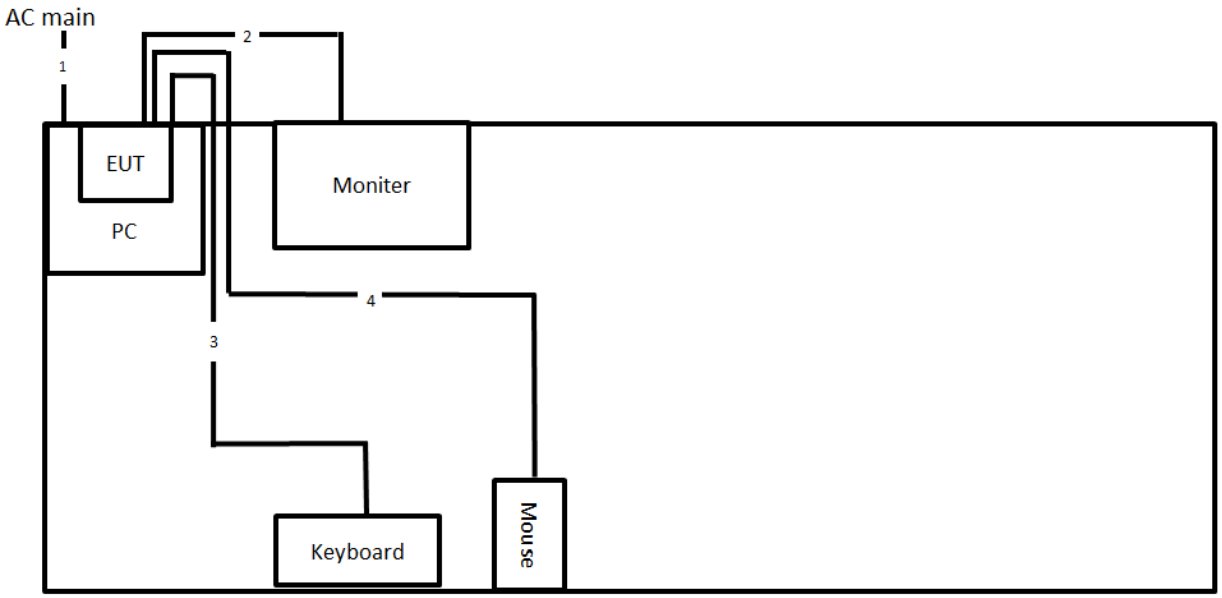
1. During the test, the EUT operation to normal function.
2. Executed command fixed test channel under DOS.
3. Executed "Lantest.exe" to link with the remote workstation to receive and transmit packet by Wireless ac AP and transmit duty cycle no less 98%

3.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.035	2.067	98.45	0.07	0.01
802.11ac MCS0/Nss1 VHT20	3.856	4.320	89.26	0.49	0.26
802.11ac MCS0/Nss1 VHT40	1.870	2.170	86.18	0.65	0.53
802.11ac MCS0/Nss1 VHT80	1.314	1.602	82.02	0.86	0.76

3.11. Test Configurations

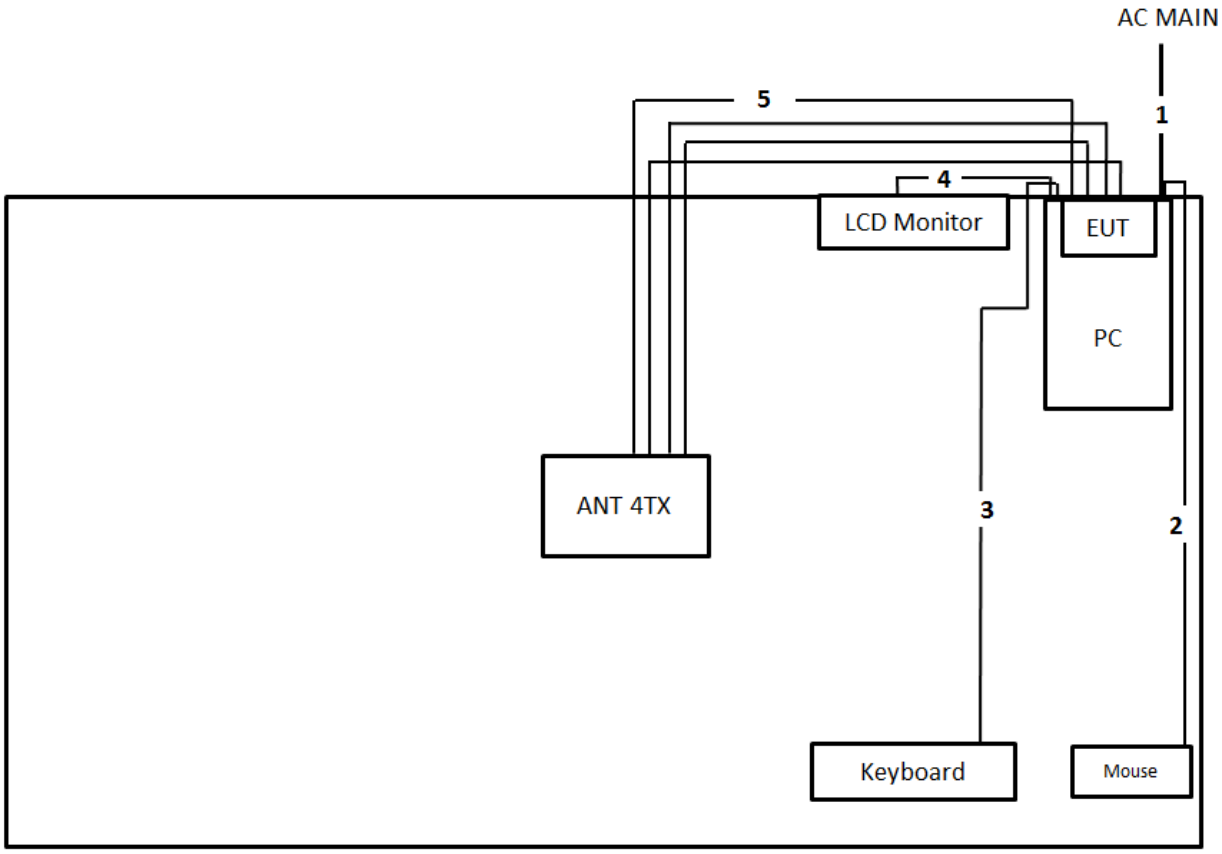
3.11.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
2	VGA cable	Yes	1.8m
3	USB cable	Yes	1.8m
4	USB cable	Yes	1.8m

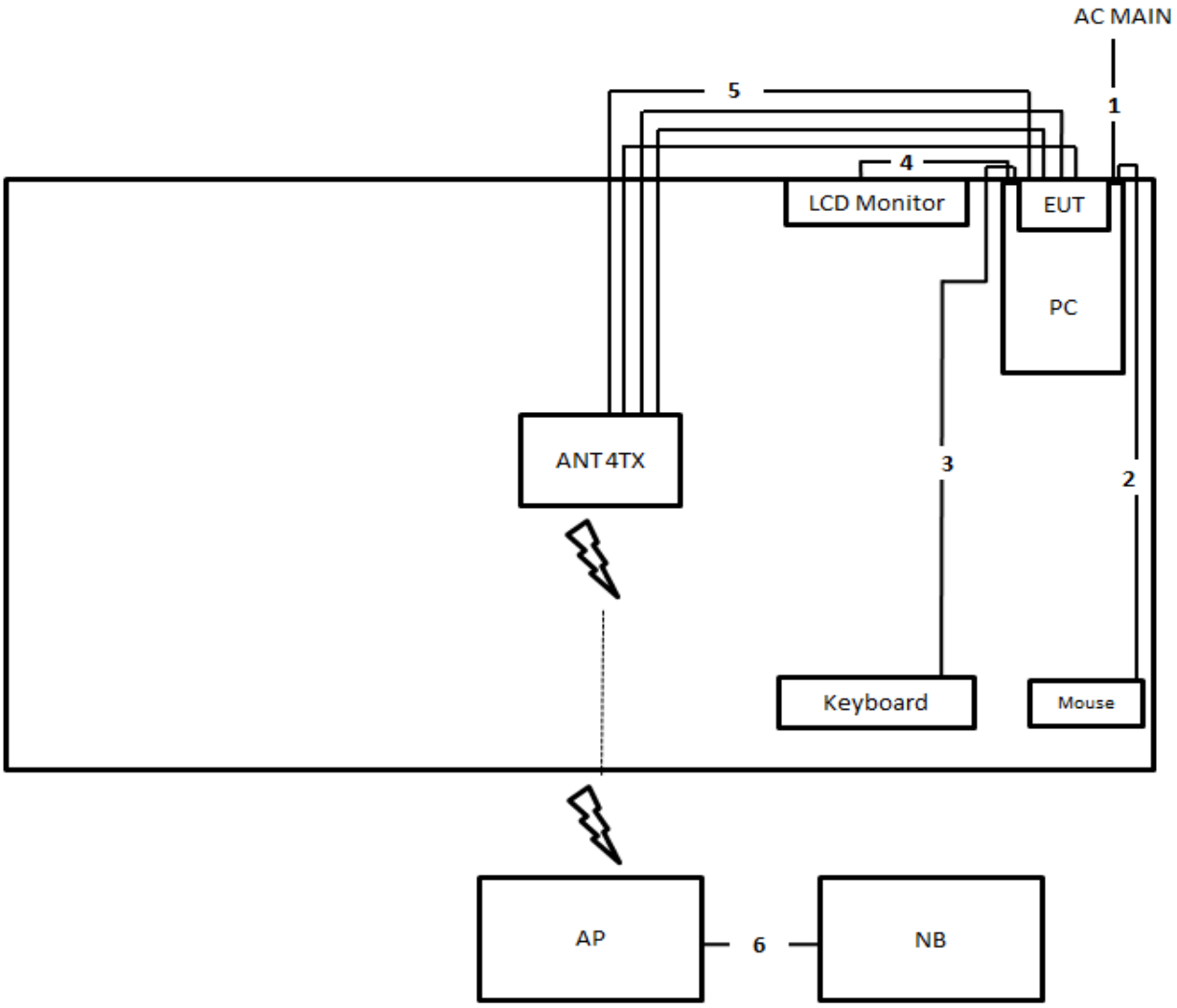
3.11.2. Radiation Emissions Test Configuration

For non-beamforming function:



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
2	USB cable	Yes	1.8m
3	USB cable	Yes	1.8m
4	VGA cable	Yes	1.8m
5	Ant. cable*4	Yes	1m

For beamforming function:



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
2	USB cable	Yes	1.8m
3	USB cable	Yes	1.8m
4	VGA cable	Yes	1.8m
5	Ant. cable*4	Yes	1m
6	RJ-45 cable	No	1.5m

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

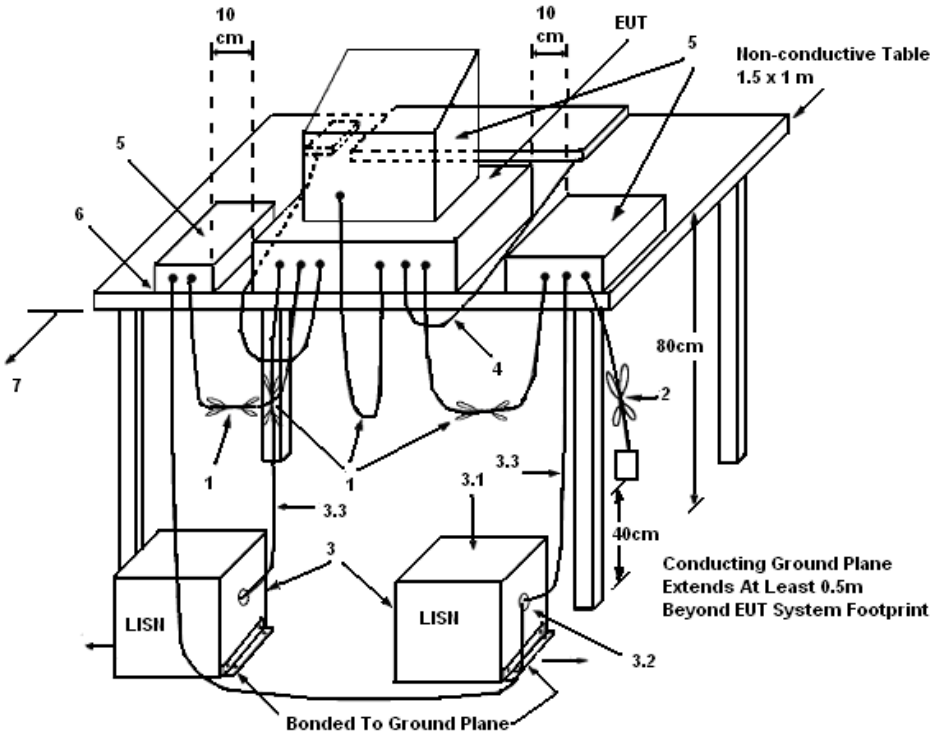
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

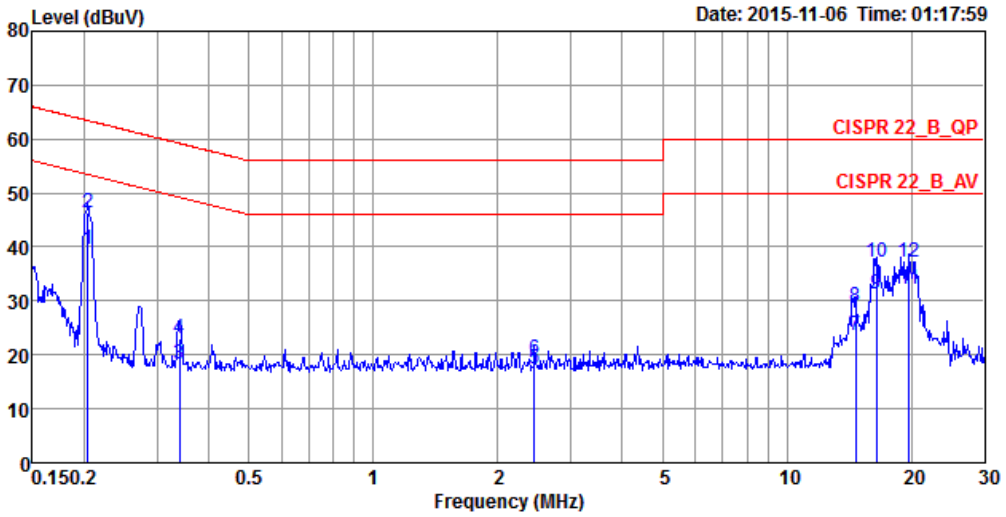
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

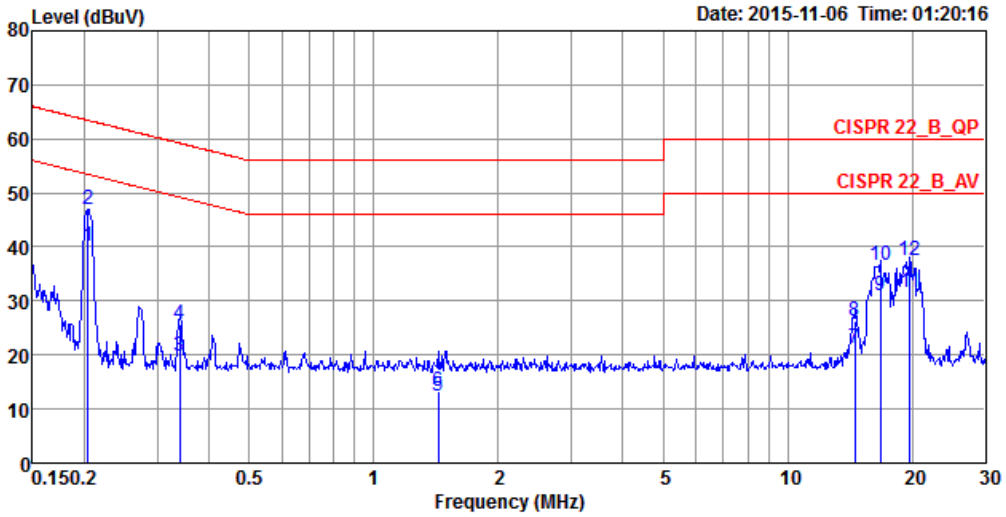
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	59%
Test Engineer	Da Deng	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.2040	39.53	-13.92	53.45	29.55	9.96	0.02	LINE	Average
2	0.2040	46.42	-17.03	63.45	36.44	9.96	0.02	LINE	QP
3	0.3392	18.22	-31.00	49.22	8.21	9.97	0.04	LINE	Average
4	0.3392	23.11	-36.11	59.22	13.10	9.97	0.04	LINE	QP
5	2.4476	17.52	-28.48	46.00	7.50	9.97	0.05	LINE	Average
6	2.4476	19.06	-36.94	56.00	9.04	9.97	0.05	LINE	QP
7	14.6718	23.62	-26.38	50.00	13.17	10.19	0.26	LINE	Average
8	14.6718	28.92	-31.08	60.00	18.47	10.19	0.26	LINE	QP
9	16.4856	31.35	-18.65	50.00	20.87	10.22	0.26	LINE	Average
10	16.4856	37.05	-22.95	60.00	26.57	10.22	0.26	LINE	QP
11	19.7397	32.22	-17.78	50.00	21.70	10.26	0.26	LINE	Average
12	19.7397	37.32	-22.68	60.00	26.80	10.26	0.26	LINE	QP

Temperature	23°C	Humidity	59%
Test Engineer	Da Deng	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.2040	40.18	-13.27	53.45	30.20	9.96	0.02	NEUTRAL	Average
2	0.2040	46.82	-16.63	63.45	36.84	9.96	0.02	NEUTRAL	QP
3	0.3392	19.77	-29.45	49.22	9.76	9.97	0.04	NEUTRAL	Average
4	0.3392	25.63	-33.59	59.22	15.62	9.97	0.04	NEUTRAL	QP
5	1.4333	12.36	-33.64	46.00	2.34	9.96	0.06	NEUTRAL	Average
6	1.4333	13.43	-42.57	56.00	3.41	9.96	0.06	NEUTRAL	QP
7	14.5171	21.24	-28.76	50.00	10.78	10.20	0.26	NEUTRAL	Average
8	14.5171	26.41	-33.59	60.00	15.95	10.20	0.26	NEUTRAL	QP
9	16.7497	30.95	-19.05	50.00	20.46	10.23	0.26	NEUTRAL	Average
10	16.7497	36.55	-23.45	60.00	26.06	10.23	0.26	NEUTRAL	QP
11	19.7397	31.67	-18.33	50.00	21.13	10.28	0.26	NEUTRAL	Average
12	19.7397	37.48	-22.52	60.00	26.94	10.28	0.26	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss

4.2. 26dB Bandwidth and 99% Occupied Bandwidth Measurement

4.2.1. Limit

No restriction limits.

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 spectrum analyzer.

26dB Bandwidth	
Spectrum Parameters	**Setting**
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RBW	Approximately 1% of the emission bandwidth
VBW	VBW > RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto
99% Occupied Bandwidth	
Spectrum Parameters	**Setting**
Span	1.5 times to 5.0 times the OBW
RBW	1 % to 5 % of the OBW
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold

4.2.3. Test Procedures

For Radiated 26dB Bandwidth and 99% Occupied Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. 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%.

4.2.4. Test Setup Layout

For Radiated 26dB Bandwidth and 99% Occupied Bandwidth Measurement:

This test setup layout is the same as that shown in section 4.5.4.

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

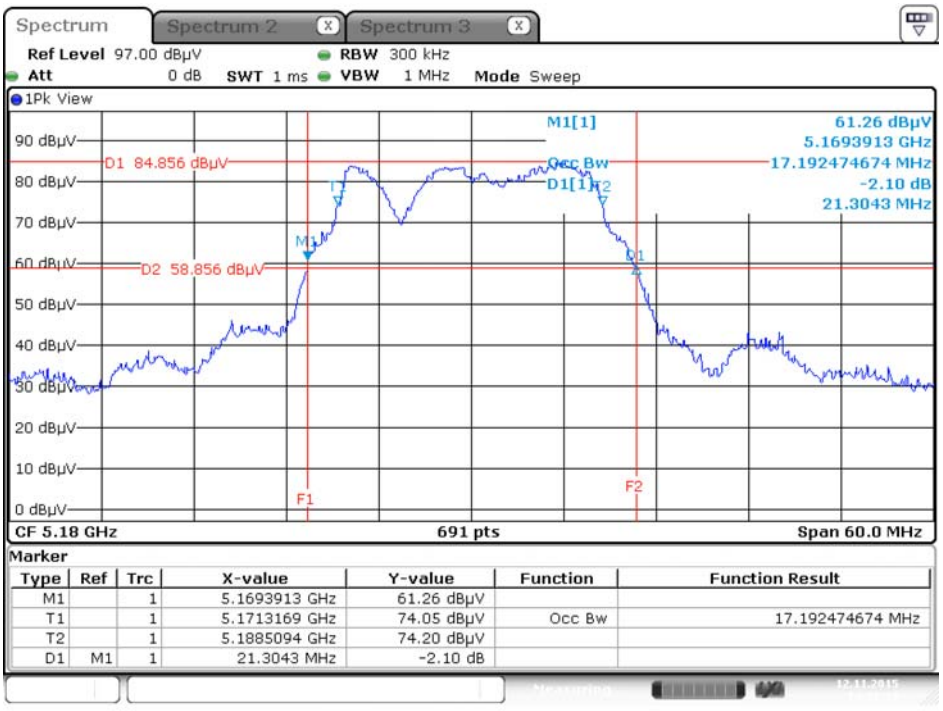
The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of 26dB Bandwidth and 99% Occupied Bandwidth

Temperature	26°C	Humidity	45%
Test Engineer	Eddie Weng		

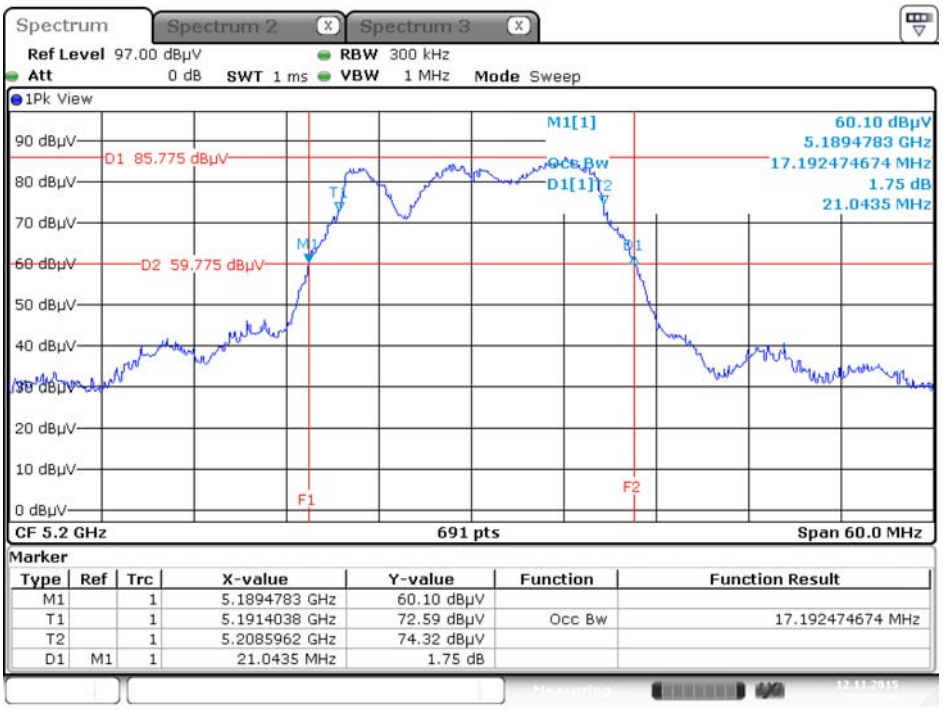
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	21.30	17.19
	5200 MHz	21.04	17.19
	5240 MHz	21.48	17.28
802.11ac MCS0/Nss1 VHT20	5180 MHz	21.57	18.15
	5200 MHz	21.22	18.06
	5240 MHz	21.48	18.06
802.11ac MCS0/Nss1 VHT40	5190 MHz	40.44	36.76
	5230 MHz	40.87	36.61
802.11ac MCS0/Nss1 VHT80	5210 MHz	80.29	74.96

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5180 MHz



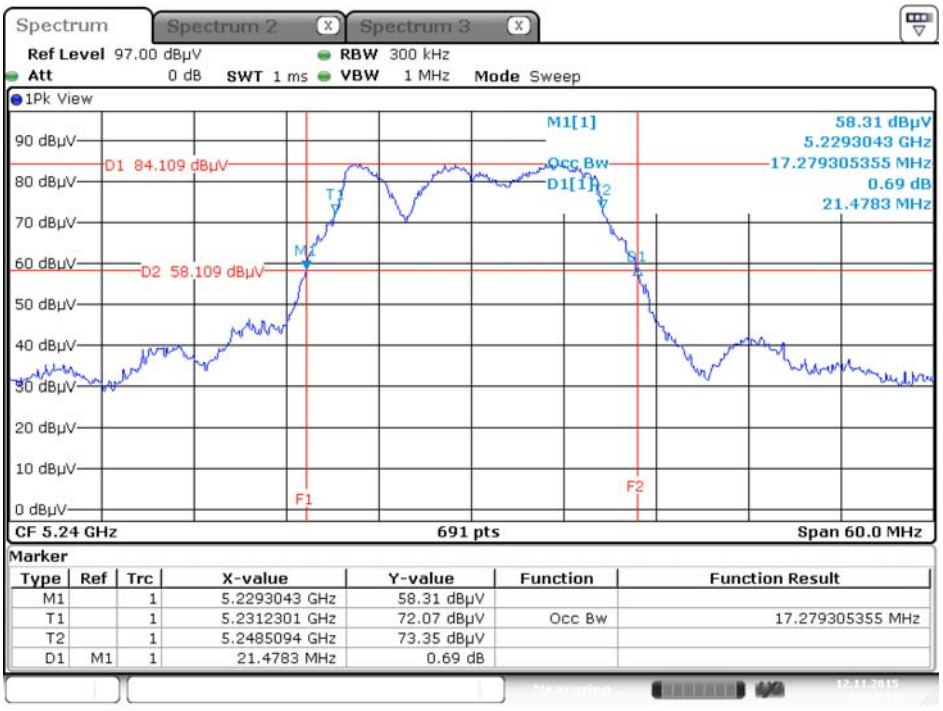
Date: 12.NOV.2015 14:11:10

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5200 MHz



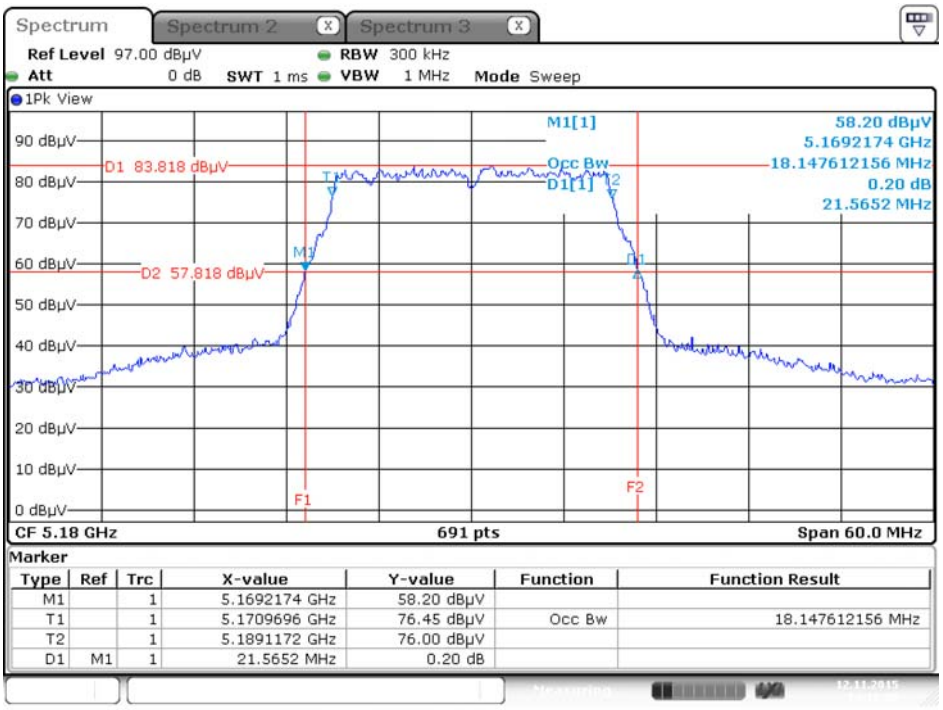
Date: 12.NOV.2015 14:11:43

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5240 MHz



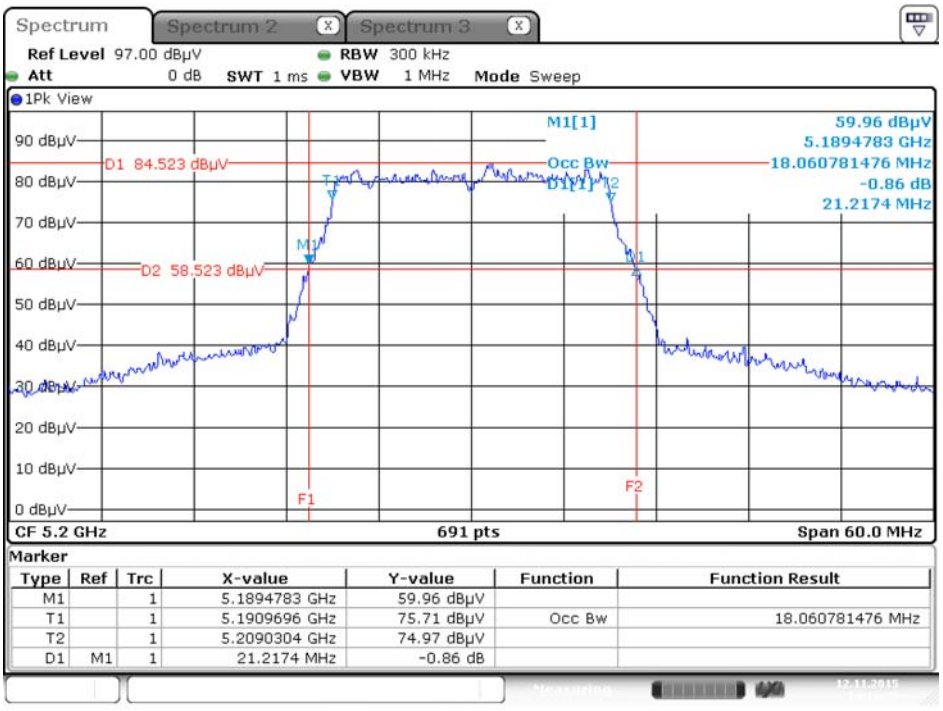
Date: 12.NOV.2015 14:12:13

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5180 MHz



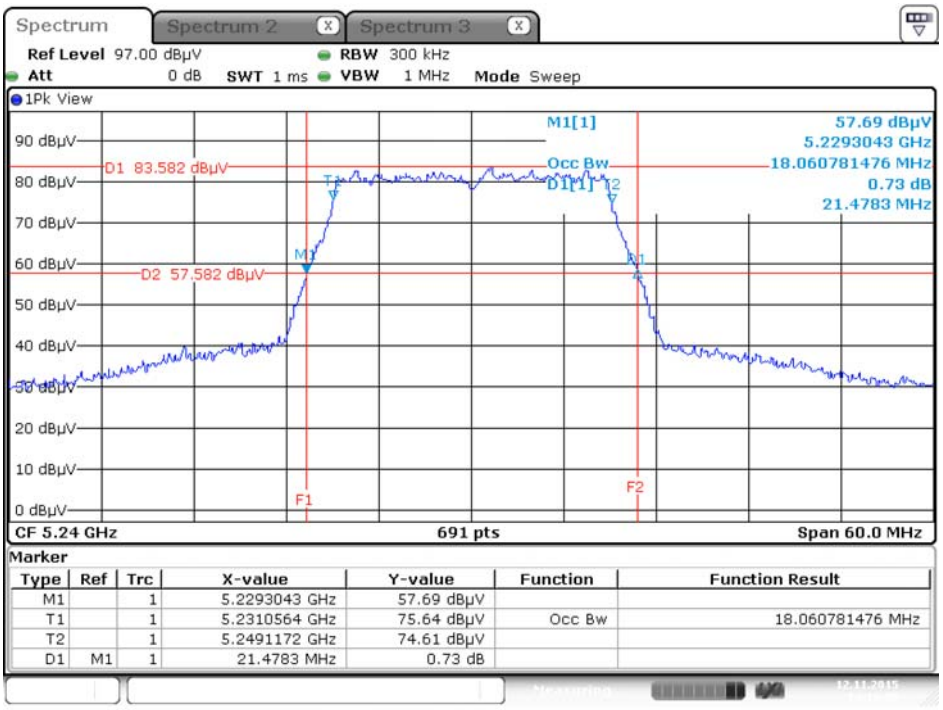
Date: 12.NOV.2015 14:18:00

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5200 MHz



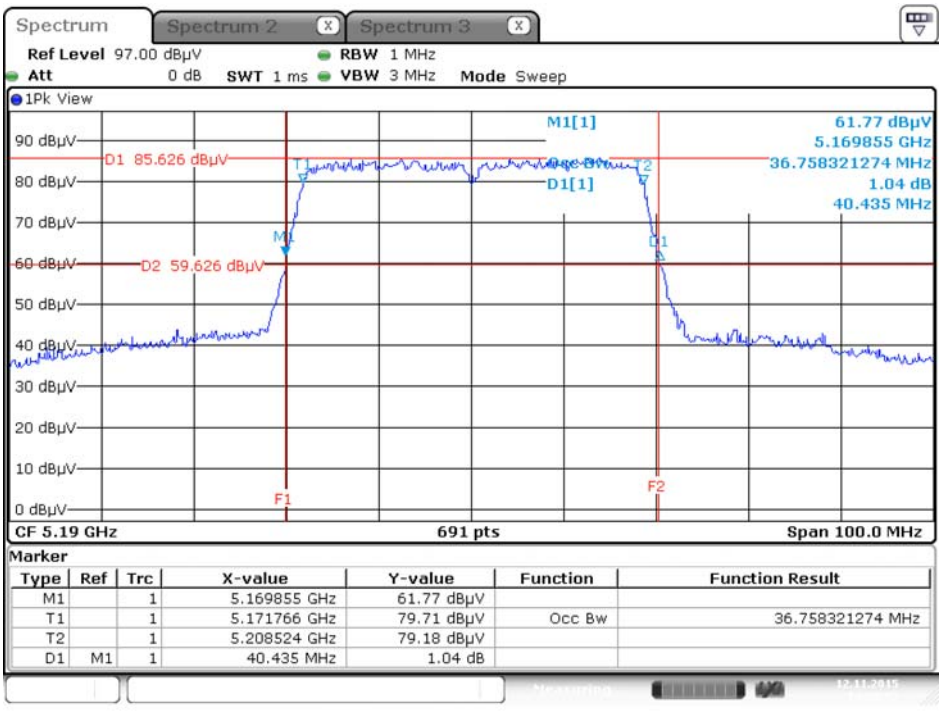
Date: 12.NOV.2015 14:19:29

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5240 MHz



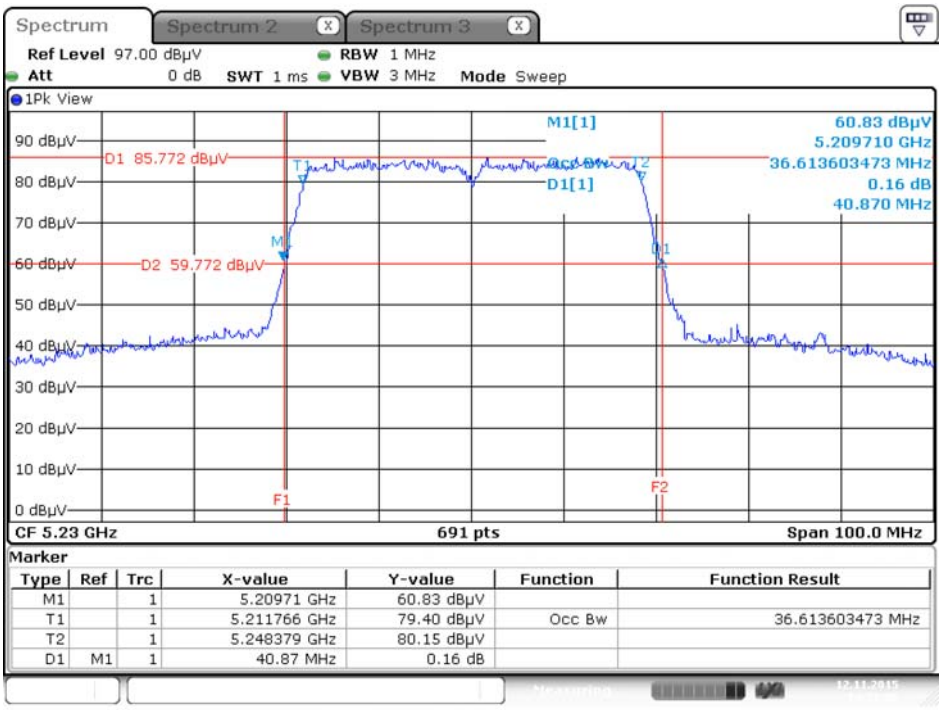
Date: 12.NOV.2015 14:19:59

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5190 MHz



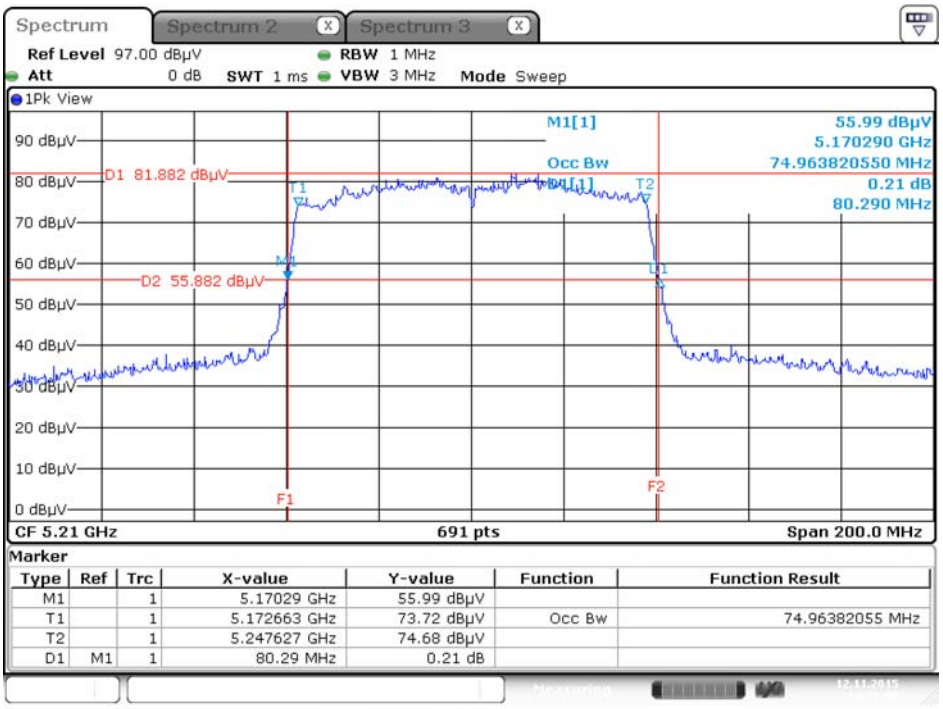
Date: 12.NOV.2015 14:20:53

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5230 MHz



Date: 12.NOV.2015 14:21:26

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5210 MHz



Date: 12.NOV.2015 14:21:58

4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

Frequency Band		Limit
5.15~5.25 GHz		
Operating Mode		
☐	Outdoor access point	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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
☐	Indoor access point	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.
☐	Fixed point-to-point access points	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.
☒	Mobile and portable client devices	The maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24dBm) 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.

4.3.2. Measuring Instruments and Setting

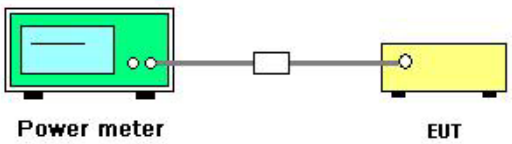
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.3.3. 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.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Maximum Conducted Output Power

Temperature	26°C	Humidity	45%
Test Engineer	Eddie Weng	Test Date	Nov. 12, 2015

Mode	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
802.11a	5180 MHz	17.61	17.82	17.52	18.69	23.96	24.00	Complies
	5200 MHz	17.60	17.87	17.58	18.74	23.99	24.00	Complies
	5240 MHz	17.65	18.02	17.32	18.31	23.86	24.00	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	17.73	17.64	17.27	18.57	23.85	24.00	Complies
	5200 MHz	17.87	17.71	17.32	18.54	23.90	24.00	Complies
	5240 MHz	17.58	17.64	17.43	18.46	23.82	24.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	17.57	17.91	17.53	18.43	23.90	24.00	Complies
	5230 MHz	17.42	18.03	17.17	18.59	23.86	24.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	14.75	14.98	14.81	16.13	21.23	24.00	Complies

Note: For 802.11ac MCS0/Nss1 VHT20, 802.11ac MCS0/Nss1 VHT40, 802.11ac MCS0/Nss1 VHT80:

$$Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$ =5.19dBi <6dBi, so the limit doesn't reduce.

4.4. Power Spectral Density Measurement

4.4.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.3.1.

Frequency Band		Limit
5.15~5.25 GHz		
Operating Mode		
☐	Outdoor access point	17 dBm/MHz
☐	Indoor access point	17 dBm/MHz
☐	Fixed point-to-point access points	17 dBm/MHz
☒	Mobile and portable client devices	11 dBm/MHz

4.4.2. Measuring Instruments and Setting

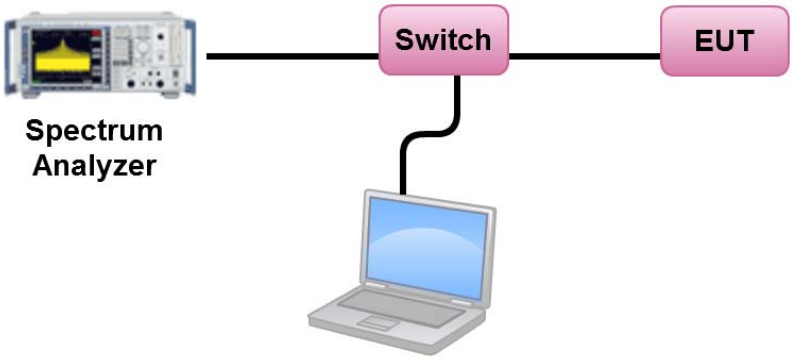
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	1000 kHz
VBW	3000 kHz
Detector	RMS
Trace	AVERAGE
Sweep Time	Auto
Trace Average	100 times

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD).
3. Multiple antenna systems was performed in accordance KDB662911 D01 v02r01 in-Band Power Spectral Density (PSD) Measurements (a) Measure and sum the spectra across the outputs.
4. When measuring first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3 and so on up to the Nth output to obtain the value for the first frequency bin of the summed spectrum. The summed spectrum value for each of the other frequency bins is computed in the same way.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Power Spectral Density

Temperature	26°C	Humidity	45%
Test Engineer	Eddie Weng	Test Date	Nov. 12, 2015

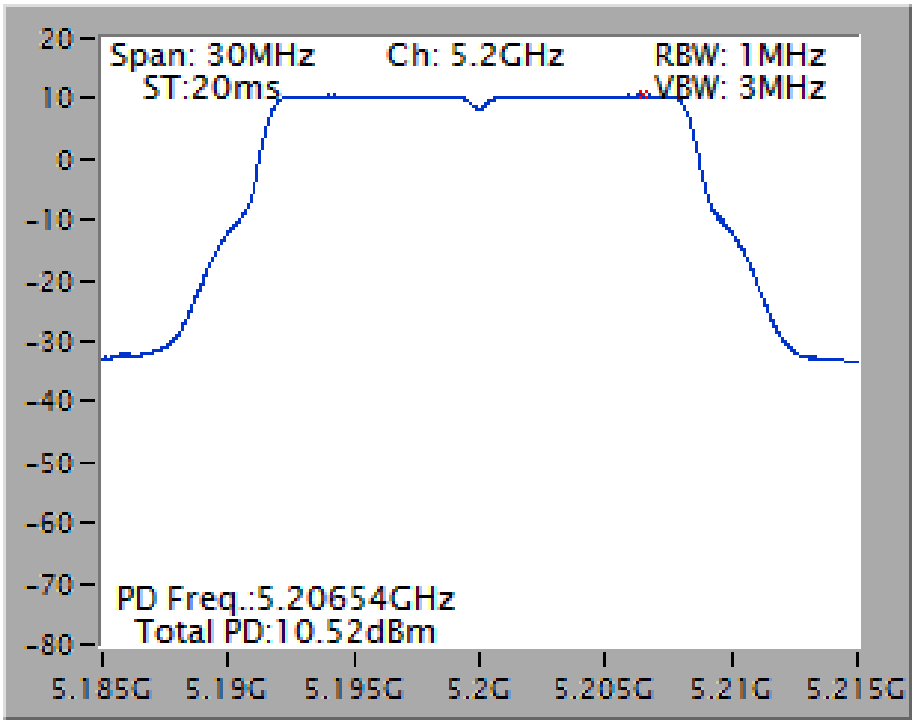
Mode	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
802.11a	5180 MHz	10.46	11.00	Complies
	5200 MHz	10.52	11.00	Complies
	5240 MHz	10.52	11.00	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	10.24	11.00	Complies
	5200 MHz	10.26	11.00	Complies
	5240 MHz	10.19	11.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	7.22	11.00	Complies
	5230 MHz	7.24	11.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	2.23	11.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =5.19dBi <6dBi, so the limit doesn't reduce.

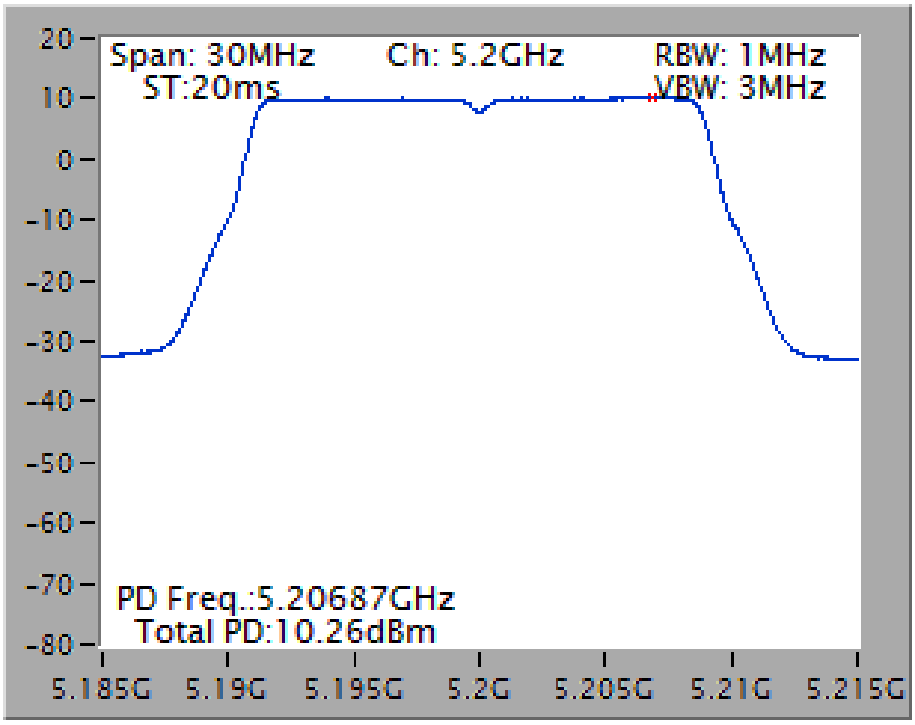
Note: All the test values were listed in the report.

For plots, only the channel with worse result was shown.

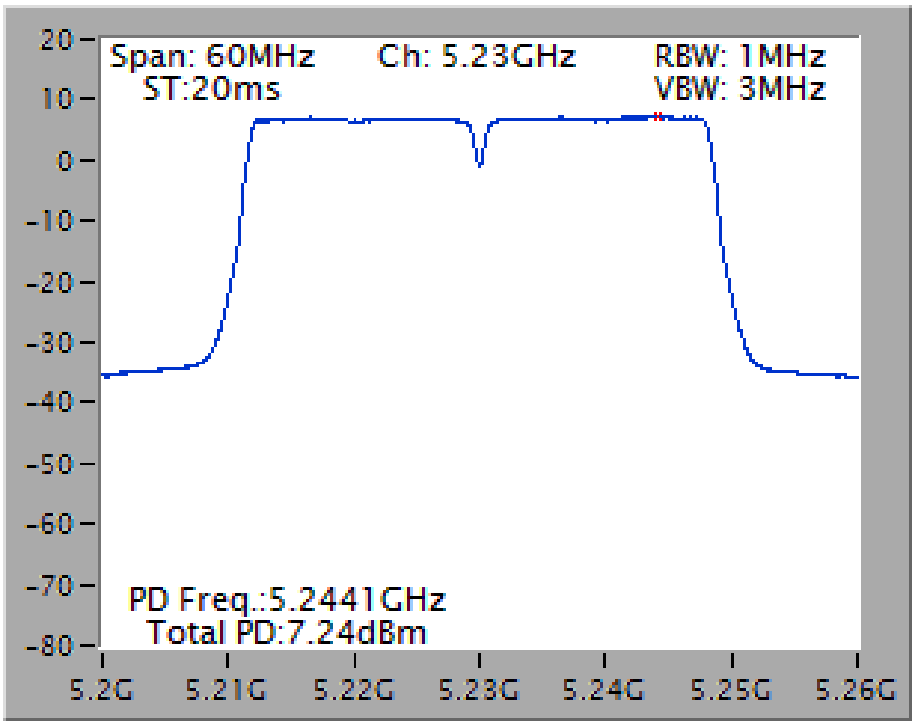
Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5200 MHz



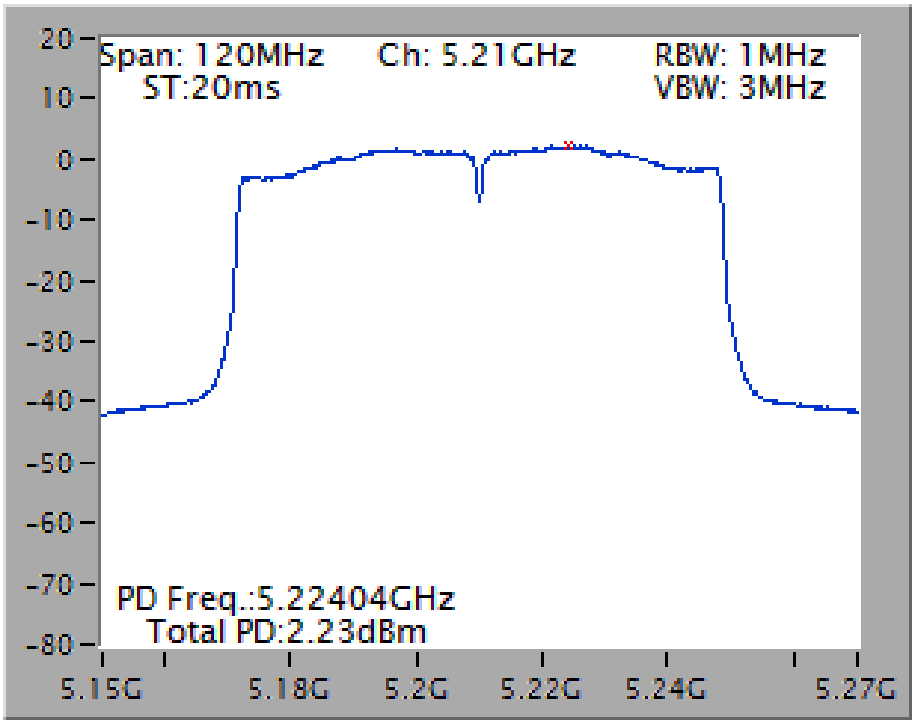
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5200 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5230 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4 / 5210 MHz



4.5. Radiated Emissions Measurement

4.5.1. 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

4.5.2. 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)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for peak

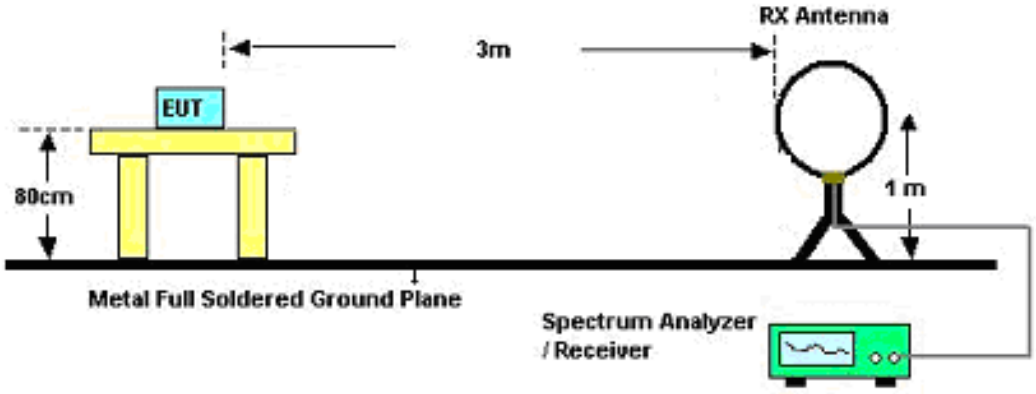
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

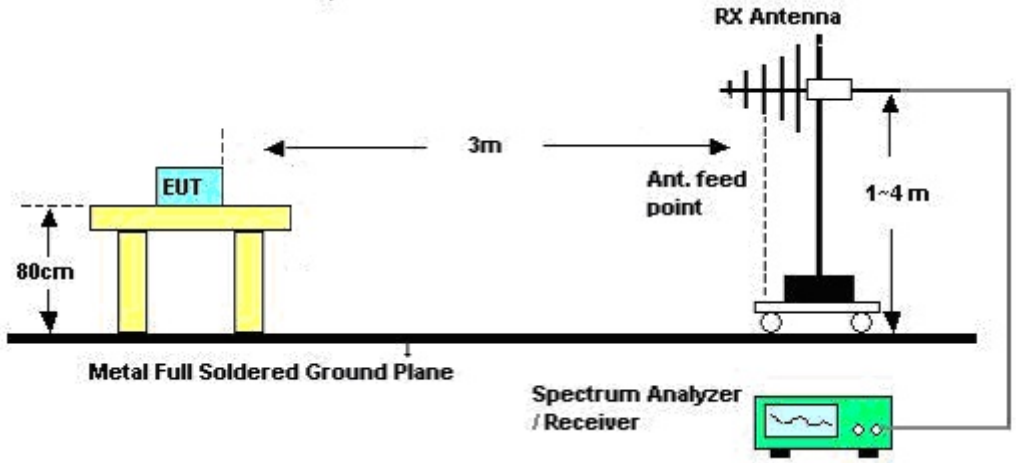
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting 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 3MHz RBW for peak reading. Then 1MHz RBW and 1/T 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.

4.5.4. Test Setup Layout

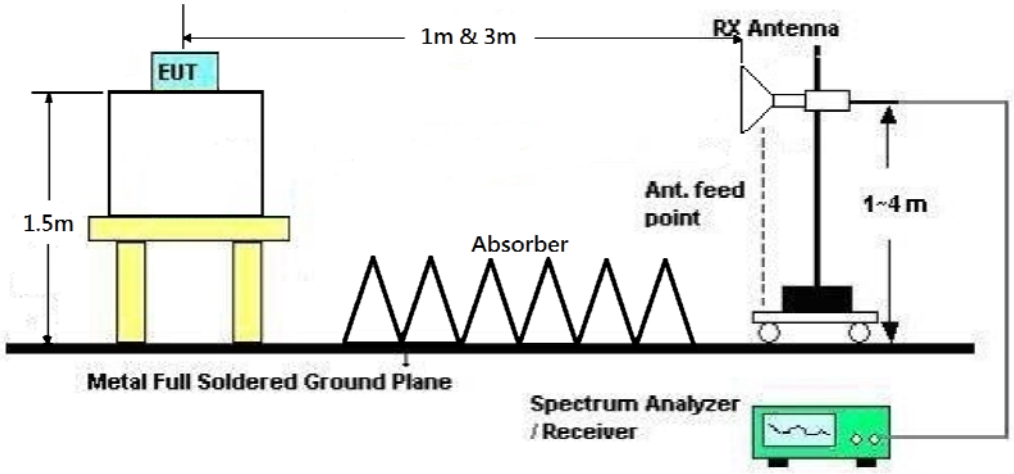
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. 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.

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

Temperature	25°C	Humidity	60%
Test Engineer	Peter Wu	Configurations	CTX
Test Date	Nov. 14, 2015	Test Mode	Mode 1

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 20dB below the permissible value has no need to be reported.

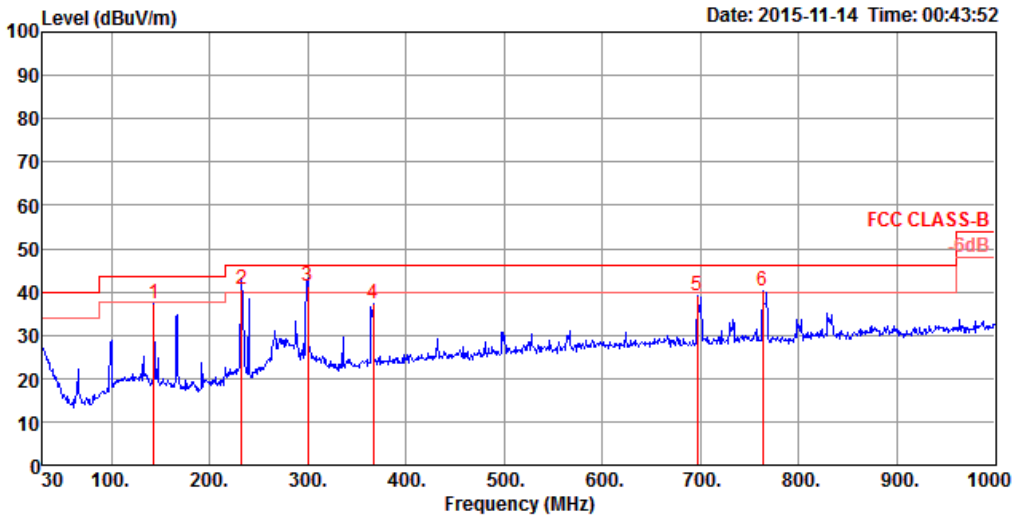
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

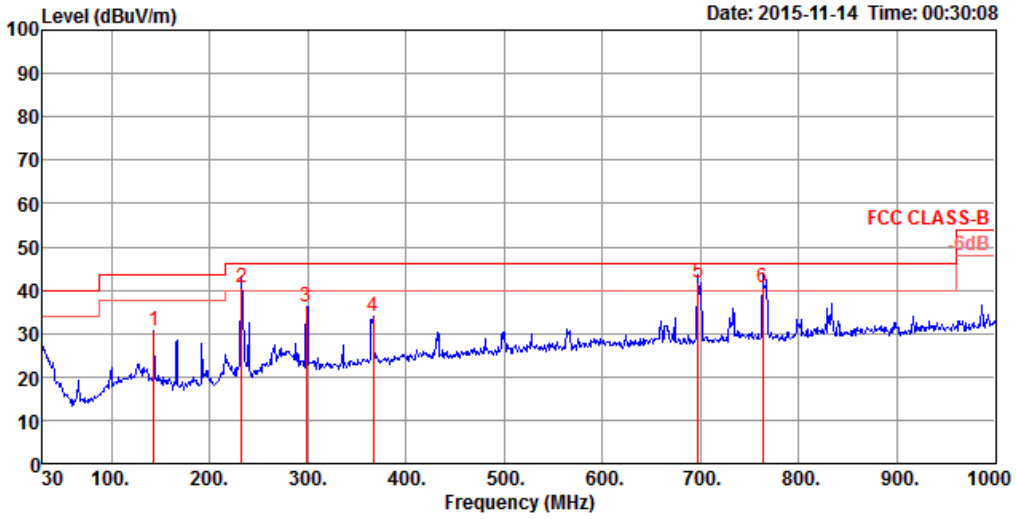
Temperature	25°C	Humidity	60%
Test Engineer	Peter Wu	Configurations	CTX
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	143.49	37.36	43.50	-6.14	56.86	1.08	11.78	32.36	200	222	Peak	HORIZONTAL
2	232.73	40.65	46.00	-5.35	60.10	1.34	11.52	32.31	150	297	QP	HORIZONTAL
3	299.66	41.19	46.00	-4.81	58.10	1.49	13.88	32.28	100	3	QP	HORIZONTAL
4	366.59	37.40	46.00	-8.60	52.34	1.66	15.71	32.31	100	336	Peak	HORIZONTAL
5	696.39	39.26	46.00	-6.74	49.78	2.14	19.70	32.36	150	183	Peak	HORIZONTAL
6	763.32	40.25	46.00	-5.75	49.79	2.24	20.51	32.29	150	318	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	143.49	30.46	43.50	-13.04	49.96	1.08	11.78	32.36	100	24	Peak	VERTICAL
2	232.73	40.65	46.00	-5.35	60.10	1.34	11.52	32.31	100	265	QP	VERTICAL
3	298.69	36.22	46.00	-9.78	53.15	1.49	13.86	32.28	150	189	Peak	VERTICAL
4	366.59	33.81	46.00	-12.19	48.75	1.66	15.71	32.31	100	184	Peak	VERTICAL
5	697.36	41.57	46.00	-4.43	52.09	2.14	19.70	32.36	100	30	QP	VERTICAL
6	763.32	40.67	46.00	-5.33	50.21	2.24	20.51	32.29	100	12	QP	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.

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

Temperature	25°C	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11a CH 36 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 11, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15537.83	57.29	74.00	-16.71	43.99	9.76	38.16	34.62	274	132	Peak	HORIZONTAL
2	15539.78	43.20	54.00	-10.80	29.90	9.76	38.16	34.62	274	132	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15539.23	43.21	54.00	-10.79	29.91	9.76	38.16	34.62	267	134	Average	VERTICAL
2	15539.94	57.03	74.00	-16.97	43.73	9.76	38.16	34.62	267	134	Peak	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11a CH 40 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 11, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15598.60	56.73	74.00	-17.27	43.30	9.81	38.29	34.67	258	137	Peak	HORIZONTAL
2	15602.10	43.32	54.00	-10.68	29.91	9.81	38.29	34.69	258	137	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15600.30	43.33	54.00	-10.67	29.92	9.81	38.29	34.69	221	125	Average	VERTICAL
2	15600.68	57.01	74.00	-16.99	43.60	9.81	38.29	34.69	221	125	Peak	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11a CH 48 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 11, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15720.52	43.71	54.00	-10.29	30.11	9.88	38.50	34.78	214	127	Average	HORIZONTAL
2	15720.64	57.49	74.00	-16.51	43.89	9.88	38.50	34.78	214	127	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15719.13	43.74	54.00	-10.26	30.14	9.88	38.50	34.78	256	133	Average	VERTICAL
2	15720.42	56.94	74.00	-17.06	43.34	9.88	38.50	34.78	256	133	Peak	VERTICAL

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15533.00	47.86	54.00	-6.14	31.69	13.18	35.35	38.34	HORIZONTAL	140	70	Average
2	15547.12	60.54	74.00	-13.46	44.36	13.19	35.35	38.34	HORIZONTAL	140	70	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15533.52	47.81	54.00	-6.19	31.64	13.18	35.35	38.34	VERTICAL	157	310	Average
2	15545.60	60.88	74.00	-13.12	44.71	13.18	35.35	38.34	VERTICAL	157	310	Peak

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15595.40	47.72	54.00	-6.28	31.60	13.21	35.36	38.27	HORIZONTAL	152	210	Average
2	15604.32	60.54	74.00	-13.46	44.48	13.21	35.36	38.21	HORIZONTAL	152	210	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15590.60	47.91	54.00	-6.09	31.79	13.21	35.36	38.27	VERTICAL	156	80	Average
2	15591.48	60.72	74.00	-13.28	44.60	13.21	35.36	38.27	VERTICAL	156	80	Peak

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15713.00	46.98	54.00	-7.02	31.02	13.26	35.38	38.08	HORIZONTAL	154	29	Average
2	15719.44	59.72	74.00	-14.28	43.76	13.26	35.38	38.08	HORIZONTAL	154	29	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15727.28	46.87	54.00	-7.13	30.91	13.26	35.38	38.08	VERTICAL	152	333	Average
2	15728.20	60.31	74.00	-13.69	44.35	13.26	35.38	38.08	VERTICAL	152	333	Peak

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15564.20	60.40	74.00	-13.60	44.30	13.19	35.36	38.27	HORIZONTAL	145	318	Peak
2	15565.80	47.51	54.00	-6.49	31.40	13.20	35.36	38.27	HORIZONTAL	145	318	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15567.36	47.66	54.00	-6.34	31.55	13.20	35.36	38.27	VERTICAL	155	41	Average
2	15568.16	60.84	74.00	-13.16	44.73	13.20	35.36	38.27	VERTICAL	155	41	Peak

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15690.56	46.85	54.00	-7.15	30.83	13.24	35.37	38.15	HORIZONTAL	151	130	Average
2	15698.40	60.42	74.00	-13.58	44.46	13.25	35.37	38.08	HORIZONTAL	151	130	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	15692.88	46.83	54.00	-7.17	30.87	13.25	35.37	38.08	VERTICAL	129	312	Average
2	15698.60	60.13	74.00	-13.87	44.17	13.25	35.37	38.08	VERTICAL	129	312	Peak

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	10417.66	59.05	74.00	-14.95	42.88	11.28	34.85	39.74	HORIZONTAL	161	163	Peak
2	10418.74	45.69	54.00	-8.31	29.52	11.28	34.85	39.74	HORIZONTAL	161	163	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	10420.40	58.51	74.00	-15.49	42.34	11.28	34.85	39.74	VERTICAL	142	289	Peak
2	10420.72	45.90	54.00	-8.10	29.73	11.28	34.85	39.74	VERTICAL	142	289	Average

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.

4.6. Band Edge Emissions Measurement

4.6.1. 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

4.6.2. 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)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for Peak

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3.

4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. 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.

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	25°C	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 11, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5150.00	65.60	74.00	-8.40	60.96	5.84	33.27	34.47	231	250	Peak	VERTICAL
2	5150.00	52.62	54.00	-1.38	47.98	5.84	33.27	34.47	231	250	Average	VERTICAL
3	5172.31	119.43			114.77	5.83	33.30	34.47	231	250	Peak	VERTICAL
4	5172.63	109.25			104.59	5.83	33.30	34.47	231	250	Average	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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5115.06	65.06	74.00	-8.94	60.47	5.85	33.21	34.47	235	229	Peak	VERTICAL
2	5125.32	52.65	54.00	-1.35	48.04	5.84	33.24	34.47	235	229	Average	VERTICAL
3	5192.63	125.35			120.65	5.81	33.36	34.47	235	229	Peak	VERTICAL
4	5193.27	115.37			110.67	5.81	33.36	34.47	235	229	Average	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	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5143.85	60.55	74.00	-13.45	55.91	5.84	33.27	34.47	270	240	Peak	VERTICAL
2	5150.00	47.63	54.00	-6.37	42.99	5.84	33.27	34.47	270	240	Average	VERTICAL
3	5241.44	124.26			119.52	5.79	33.42	34.47	270	240	Peak	VERTICAL
4	5241.92	113.45			108.69	5.78	33.45	34.47	270	240	Average	VERTICAL
5	5352.50	58.37	74.00	-15.63	53.48	5.73	33.63	34.47	270	240	Peak	VERTICAL
6	5362.12	45.85	54.00	-8.15	40.93	5.73	33.66	34.47	270	240	Average	VERTICAL

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

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	5148.80	52.51	54.00	-1.49	46.15	7.78	32.94	31.52	VERTICAL	246	231	Average
2	5148.80	64.48	74.00	-9.52	58.12	7.78	32.94	31.52	VERTICAL	246	231	Peak
3	5186.60	120.31			113.91	7.78	32.94	31.56	VERTICAL	246	231	Peak
4	5187.80	110.46			104.06	7.78	32.94	31.56	VERTICAL	246	231	Average

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

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	5123.20	52.92	54.00	-1.08	46.58	7.78	32.94	31.50	VERTICAL	240	230	Average
2	5123.80	65.58	74.00	-8.42	59.24	7.78	32.94	31.50	VERTICAL	240	230	Peak
3	5194.60	112.43			106.03	7.78	32.94	31.56	VERTICAL	240	230	Average
4	5197.00	122.48			116.08	7.78	32.94	31.56	VERTICAL	240	230	Peak

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

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	5145.80	60.04	74.00	-13.96	53.68	7.78	32.94	31.52	VERTICAL	251	258	Peak
2	5150.00	48.71	54.00	-5.29	42.35	7.78	32.94	31.52	VERTICAL	251	258	Average
3	5232.80	122.11			115.68	7.78	32.94	31.59	VERTICAL	251	258	Peak
4	5234.00	111.68			105.25	7.78	32.94	31.59	VERTICAL	251	258	Average
5	5352.80	47.05	54.00	-6.95	40.53	7.77	32.93	31.68	VERTICAL	251	258	Average
6	5377.40	59.65	74.00	-14.35	53.11	7.77	32.93	31.70	VERTICAL	251	258	Peak

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

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 09, 2015		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	5149.60	65.99	74.00	-8.01	59.63	7.78	32.94	31.52	VERTICAL	249	230	Peak
2	5150.00	52.92	54.00	-1.08	46.56	7.78	32.94	31.52	VERTICAL	249	230	Average
3	5196.80	115.50			109.10	7.78	32.94	31.56	VERTICAL	249	230	Peak
4	5202.80	105.43			99.02	7.78	32.94	31.57	VERTICAL	249	230	Average

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		cm	deg	
1	5150.00	51.02	54.00	-2.98	44.66	7.78	32.94	31.52	VERTICAL	261	259	Average
2	5150.00	63.14	74.00	-10.86	56.78	7.78	32.94	31.52	VERTICAL	261	259	Peak
3	5213.20	109.82			103.41	7.78	32.94	31.57	VERTICAL	261	259	Average
4	5215.60	120.72			114.31	7.78	32.94	31.57	VERTICAL	261	259	Peak

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

Temperature	25℃	Humidity	60%
Test Engineer	Peter Wu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Nov. 10, 2015		

Channel 42

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5147.50	64.06	74.00	-9.94	59.42	5.84	33.27	34.47	228	226	Peak	VERTICAL
2	5150.00	52.87	54.00	-1.13	48.23	5.84	33.27	34.47	228	226	Average	VERTICAL
3	5222.82	112.69			107.97	5.80	33.39	34.47	228	226	Peak	VERTICAL
4	5225.22	102.53			97.79	5.79	33.42	34.47	228	226	Average	VERTICAL
5	5351.03	46.35	54.00	-7.65	41.46	5.73	33.63	34.47	228	226	Average	VERTICAL
6	5375.06	58.54	74.00	-15.46	53.62	5.73	33.66	34.47	228	226	Peak	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

4.7. Frequency Stability Measurement

4.7.1. Limit

In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

4.7.2. Measuring Instruments and Setting

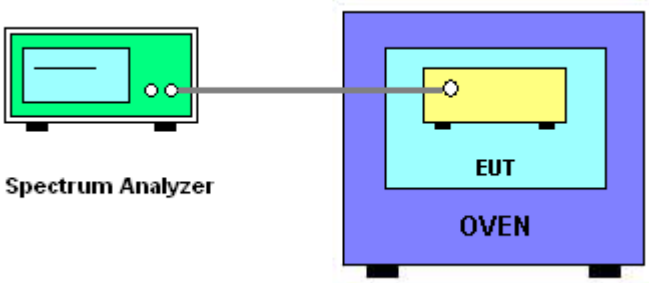
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RBW	10 kHz
VBW	10 kHz
Sweep Time	Auto

4.7.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
7. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
8. Extreme temperature is 0°C~40°C.

4.7.4. Test Setup Layout



4.7.5. Test Deviation

There is no deviation with the original standard.

4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

4.7.7. Test Result of Frequency Stability

Temperature	26°C	Humidity	45%
Test Engineer	Eddie Weng	Test Date	Nov. 12, 2015

Mode: 20 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5199.9886	5199.9872	5199.9854	5199.9833
110.00	5199.9874	5199.9874	5199.9895	5199.9900
93.50	5199.9860	5199.9849	5199.9837	5199.9815
Max. Deviation (MHz)	0.0140	0.0151	0.0163	0.0185
Max. Deviation (ppm)	2.69	2.90	3.13	3.56
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5200 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5199.9869	5199.9852	5199.9846	5199.9840
10	5199.9852	5199.9848	5199.9843	5199.9839
20	5199.9874	5199.9874	5199.9895	5199.9900
30	5199.9860	5199.9849	5199.9835	5199.9819
40	5199.9844	5199.9829	5199.9813	5199.9793
Max. Deviation (MHz)	0.0156	0.0171	0.0187	0.0207
Max. Deviation (ppm)	3.00	3.29	3.60	3.98
Result	Complies			

Mode: 40 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5189.9886	5189.9872	5189.9854	5189.9833
110.00	5189.9839	5189.9861	5189.9845	5189.9826
93.50	5189.9860	5189.9849	5189.9837	5189.9815
Max. Deviation (MHz)	0.0161	0.0151	0.0163	0.0185
Max. Deviation (ppm)	3.10	2.91	3.14	3.56
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5190 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5189.9864	5189.9852	5189.9833	5189.9811
10	5189.9839	5189.9826	5189.9810	5189.9791
20	5189.9874	5189.9874	5189.9884	5189.9878
30	5189.9860	5189.9849	5189.9835	5189.9819
40	5189.9844	5189.9829	5189.9813	5189.9793
Max. Deviation (MHz)	0.0161	0.0174	0.0190	0.0209
Max. Deviation (ppm)	3.10	3.35	3.66	4.03
Result	Complies			

Mode: 80 MHz / Chain 1

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5210 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5209.9914	5209.9900	5209.9882	5209.9861
110.00	5209.9902	5209.9889	5209.9873	5209.9854
93.50	5209.9888	5209.9877	5209.9865	5209.9843
Max. Deviation (MHz)	0.0112	0.0123	0.0135	0.0157
Max. Deviation (ppm)	2.15	2.36	2.59	3.01
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5210 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5209.9925	5209.9913	5209.9894	5209.9872
10	5209.9912	5209.9899	5209.9884	5209.9866
20	5209.9900	5209.9887	5209.9871	5209.9852
30	5209.9886	5209.9875	5209.9861	5209.9845
40	5209.9870	5209.9855	5209.9839	5209.9819
Max. Deviation (MHz)	0.0130	0.0145	0.0161	0.0181
Max. Deviation (ppm)	2.50	2.78	3.09	3.47
Result	Complies			

4.8. Antenna Requirements

4.8.1. 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.

4.8.2. 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. 22, 2015	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 02, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 02, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 03, 2014	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 06, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	1 GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	1 GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 12, 2014	Conducted (TH01-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Sep. 21, 2015	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 02, 2015	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)	3.2 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%