



SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

FCC RADIO TEST REPORT

Applicant's company	Buffalo Inc.
Applicant Address	AKAMONDORI Bldg., 30-20, Ohsu 3-chome, Naka-ku Nagoya, 460-8315 Japan
FCC ID	FDI000000028
Manufacturer's company	Buffalo Inc.
Manufacturer Address	AKAMONDORI Bldg., 30-20, Ohsu 3-chome, Naka-ku Nagoya, 460-8315 Japan

Product Name	AirStation
Brand Name	Buffalo Inc.
Model No.	WSR-1166DD
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250 MHz / 5725 ~ 5850 MHz
Received Date	Nov. 27, 2014
Final Test Date	Feb. 05, 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.

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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.



Table of Contents

1. VERIFICATION OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	4
3.3. Table for Filed Antenna.....	5
3.4. Table for Carrier Frequencies	6
3.5. Table for Test Modes	7
3.6. Table for Testing Locations.....	9
3.7. Table for Supporting Units	9
3.8. Table for Parameters of Test Software Setting	10
3.9. EUT Operation during Test	10
3.10. Duty Cycle.....	10
3.11. Test Configurations	11
4. TEST RESULT	14
4.1. AC Power Line Conducted Emissions Measurement.....	14
4.2. 26dB Bandwidth and 99% Occupied Bandwidth Measurement.....	18
4.3. 6dB Spectrum Bandwidth Measurement	29
4.4. Maximum Conducted Output Power Measurement.....	34
4.5. Power Spectral Density Measurement	37
4.6. Radiated Emissions Measurement	46
4.7. Band Edge Emissions Measurement	71
4.8. Frequency Stability Measurement	80
4.9. Antenna Requirements	84
5. LIST OF MEASURING EQUIPMENTS	85
6. MEASUREMENT UNCERTAINTY.....	87
APPENDIX A. PHOTOGRAPHS OF EUT.....	A1 ~ A18
APPENDIX B. TEST PHOTOS.....	B1 ~ B5
APPENDIX C. MAXIMUM PERMISSIBLE EXPOSURE.....	C1 ~ C3
APPENDIX D. RADIATED EMISSION CO-LOCATION REPORT	D1 ~ D3

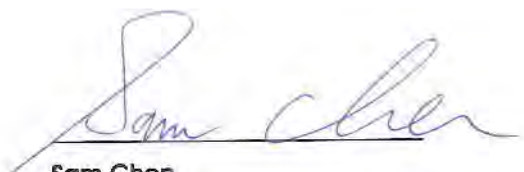
History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR511645AB	Rev. 01	Initial issue of report	Mar. 12, 2015

1. VERIFICATION OF COMPLIANCE

Product Name : AirStation
Brand Name : Buffalo Inc.
Model No. : WSR-1166DD
Applicant : Buffalo 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. 27, 2014 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	19.50 dB
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.3	15.407(e)	6dB Spectrum Bandwidth	Complies	-
4.4	15.407(a)	Maximum Conducted Output Power	Complies	4.56 dB
4.5	15.407(a)	Power Spectral Density	Complies	5.15 dB
4.6	15.407(b)	Radiated Emissions	Complies	4.56 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.07 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
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)
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 ~ 5250 MHz / 5725 ~ 5850 MHz
Channel Number	9 for 20MHz bandwidth ; 4 for 40MHz bandwidth 2 for 80MHz bandwidth
Channel Band Width (99%)	Band 1: IEEE 802.11a: 17.76 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 18.36 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.00 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.20 MHz Band 4: IEEE 802.11a: 17.64 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 18.36 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 36.80 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.20 MHz
Maximum Conducted Output Power	Band 1: IEEE 802.11a: 25.44 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 24.57 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 23.69 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 22.82 dBm Band 4: IEEE 802.11a: 25.38dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 24.85 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 23.70 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 22.46 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
Operating Mode	☐ Outdoor access point	
	☒ Indoor access point	
	☐ Fixed point-to-point access points	
	☐ Mobile and portable client devices	

Antenna and Band width

Antenna	Two (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)	2	MCS 0-15
802.11n (HT40)	2	MCS 0-15
802.11ac (VHT20)	2	MCS 0-9/Nss1-2
802.11ac (VHT40)	2	MCS 0-9/Nss1-2
802.11ac (VHT80)	2	MCS 0-9/Nss1-2
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	APD	WA-18G12U	Input: 100-240V~50-60Hz 0.5A (0,5A) Max. Output: 12V, 1.5A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		
					2.4GHz	5GHz (Band 1)	5GHz (Band 4)
1	Airgain	N2420SH-TS10-G165U	PCB Antenna	I-Pex	2.80	-	-
2	Airgain	WSR-1166	Printed Antenna	I-Pex	2.30	-	-
3	Airgain	N5X20SC-T10-W75UR2	PCB Antenna	I-Pex	-	2.10	3.90
4	Airgain	N5X20SC-T-B40U	PCB Antenna	I-Pex	-	2.80	3.10

Note: The EUT has four antennas.

<For 2.4GHz Band>

For IEEE 802.11b/g/n mode (2TX/2RX)

Chain 1 and Chain 2 can be used as transmitting/receiving antenna.

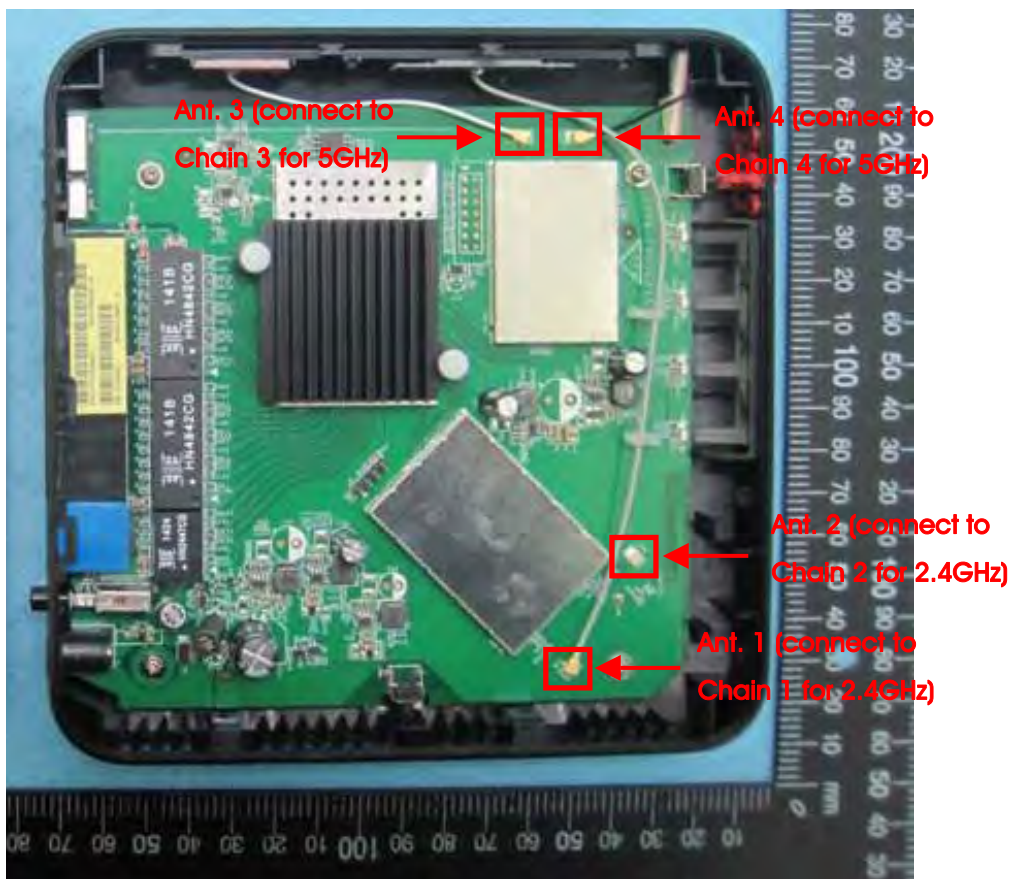
Chain 1 and Chain 2 could transmit/receive simultaneously.

<For 5GHz Band>

For IEEE 802.11a/n/ac mode(2TX/2RX)

Chain 3 and Chain 4 can be used as transmitting/receiving antenna.

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, 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 38, 46, 151, 159.

For 80MHz bandwidth systems, use Channel 42, 155.

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	-	-
5725~5850 MHz Band 4	149	5745 MHz	157	5785 MHz
	151	5755 MHz	159	5795 MHz
	153	5765 MHz	161	5805 MHz
	155	5775 MHz	165	5825 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	Normal Link		-	-	-
Max. Conducted Output Power	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/1 57/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/1 57/165	3+4
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3+4
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3+4
Power Spectral Density	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/1 57/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/1 57/165	3+4
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3+4
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3+4
26dB Spectrum Bandwidth & 99% Occupied Bandwidth Measurement	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/1 57/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/1 57/165	3+4
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3+4
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3+4
6dB Spectrum Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	3+4
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3+4
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3+4
	11ac VHT80	Band 4	MCS0/Nss1	155	3+4
Radiated Emission Below 1GHz	Normal Link		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/1 57/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/1 57/165	3+4
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3+4
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3+4

Band Edge Emission	11a/BPSK	Band 1&4	6Mbps	36/40/48/149/1 57/165	3+4
	11ac VHT20	Band 1&4	MCS0/Nss1	36/40/48/149/1 57/165	3+4
	11ac VHT40	Band 1&4	MCS0/Nss1	38/46/151/159	3+4
	11ac VHT80	Band 1&4	MCS0/Nss1	42/155	3+4
Frequency Stability	20 MHz	Band 1&4	-	40/157	3+4
	40 MHz	Band 1&4	-	38/151	3+4
	80 MHz	Band 1&4	-	42/155	3+4

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

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. AP Mode

Mode 2. Repeater Mode (with 2.4GHz)

Mode 3. Repeater Mode (with 5GHz)

Mode 2 is the worst case, so it was selected to record in this test report.

For Radiated Emission test<Below 1GHz>:

Mode 1. AP Mode

Mode 2. Repeater Mode (with 2.4GHz)

Mode 3. Repeater Mode (with 5GHz)

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

For Radiated Emission test<Above 1GHz>:

Mode 1. EUT Standing

For Co-location MPE and Radiated Emission Co-location Test:

The EUT could be applied with 2.4GHz WLAN function and 5GHz WLAN function; therefore Co-location Maximum Permissible Exposure (Please refer to Appendix C) and Radiated Emission Co-location (please refer to Appendix D) tests are added for simultaneously transmit between 2.4GHz WLAN function and 5GHz WLAN function.

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 <Below 1GHz>

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	E2K4965AGNM
NB	DELL	M1340	E2K4965AGNM
NB	DELL	E6430	DoC
NB	DELL	D420	E2KWM3945ABG

For Test Site No: 03CH01-CB <Above 1GHz>

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	E2K4965AGNM

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC
NB	DELL	E6430	DoC
NB	DELL	E6430	DoC
NB	DELL	E6430	DoC
NB	DELL	E6430	DoC
AP Router	Planex	GW-AP54SGX	KA220030603014-1

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	M1330	E2K4965AGNM

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	MT7662 QA v1.0.3.2					
Mode	Test Frequency (MHz)					
	NCB: 20MHz					
	5180 MHz	5200 MHz	5240 MHz	5745 MHz	5785 MHz	5825 MHz
802.11a	25/26	25/26	25/26	20/20	20/20	20/20
802.11ac MCS0/Nss1 VHT20	25/26	25/26	25/26	1F/1F	1F/1F	1F/1F
Mode	NCB: 40MHz					
802.11ac MCS0/Nss1 VHT40	5190 MHz	5230 MHz	5755 MHz	5795 MHz		
	21/22	21/22	1C/1C	1C/1C		
Mode	NCB: 80MHz					
802.11ac MCS0/Nss1 VHT80	5210 MHz			5775 MHz		
	20/21			19/19		

3.9. EUT Operation during Test

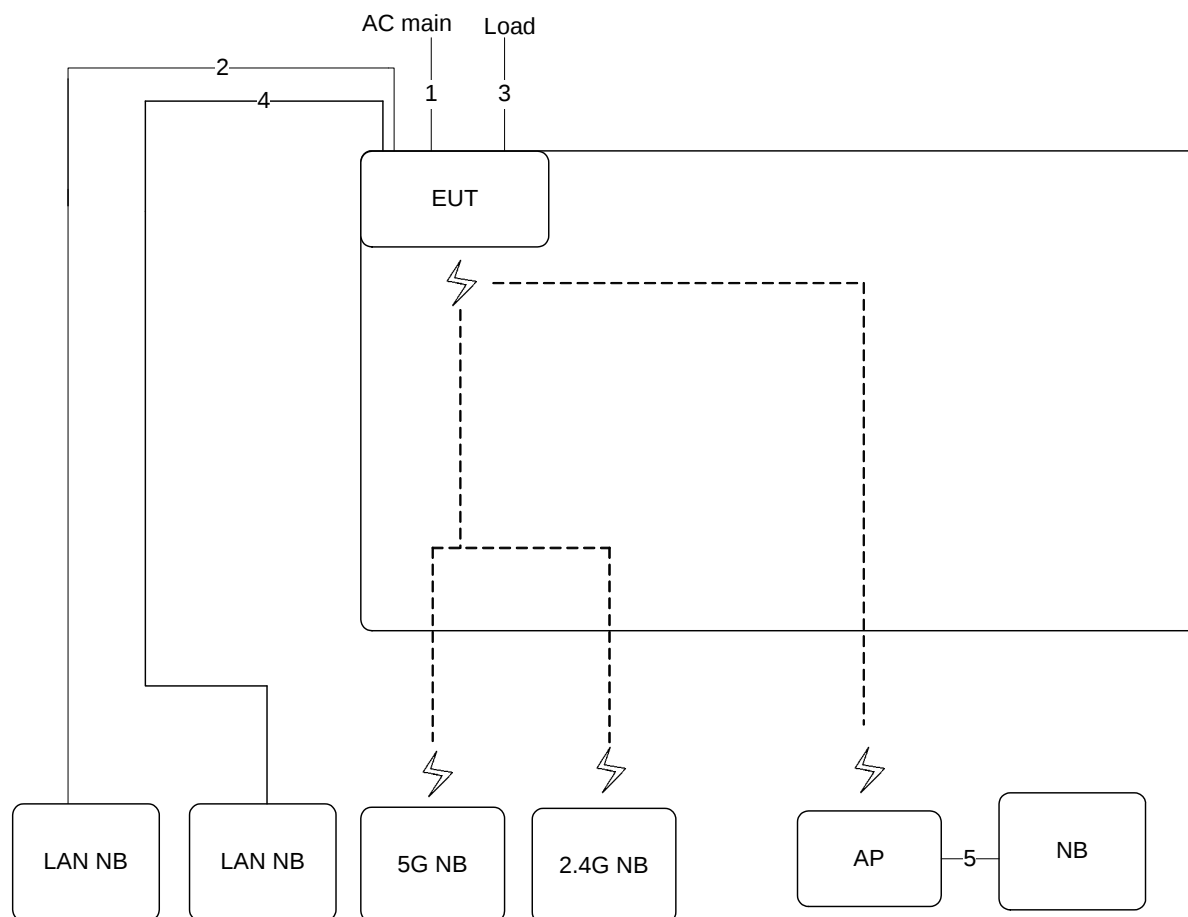
The EUT was programmed to be in continuously transmitting mode.

3.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	1.000	1.000	100.00%	0.00	0.01
802.11ac MCS0/Nss1 VHT20	1.000	1.000	100.00%	0.00	0.01
802.11ac MCS0/Nss1 VHT40	1.000	1.000	100.00%	0.00	0.01
802.11ac MCS0/Nss1 VHT80	1.000	1.000	100.00%	0.00	0.01

3.11. Test Configurations

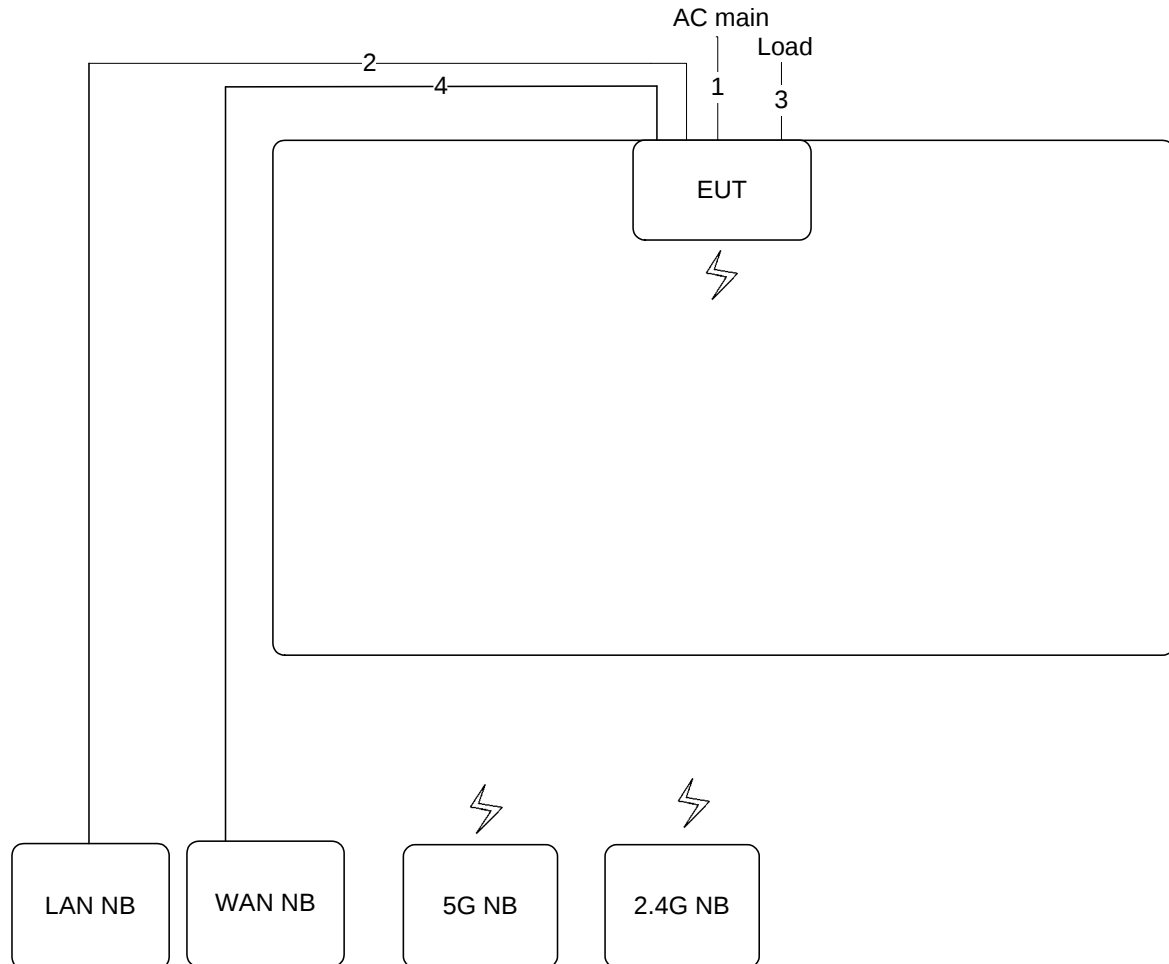
3.11.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length	Remark
1	Power cable	No	1.5m	-
2	RJ-45 cable	No	10m	-
3	RJ-45 cable*3	No	1.5m	Load
4	RJ-45 cable	No	10m	-
5	RJ-45 cable	No	1m	-

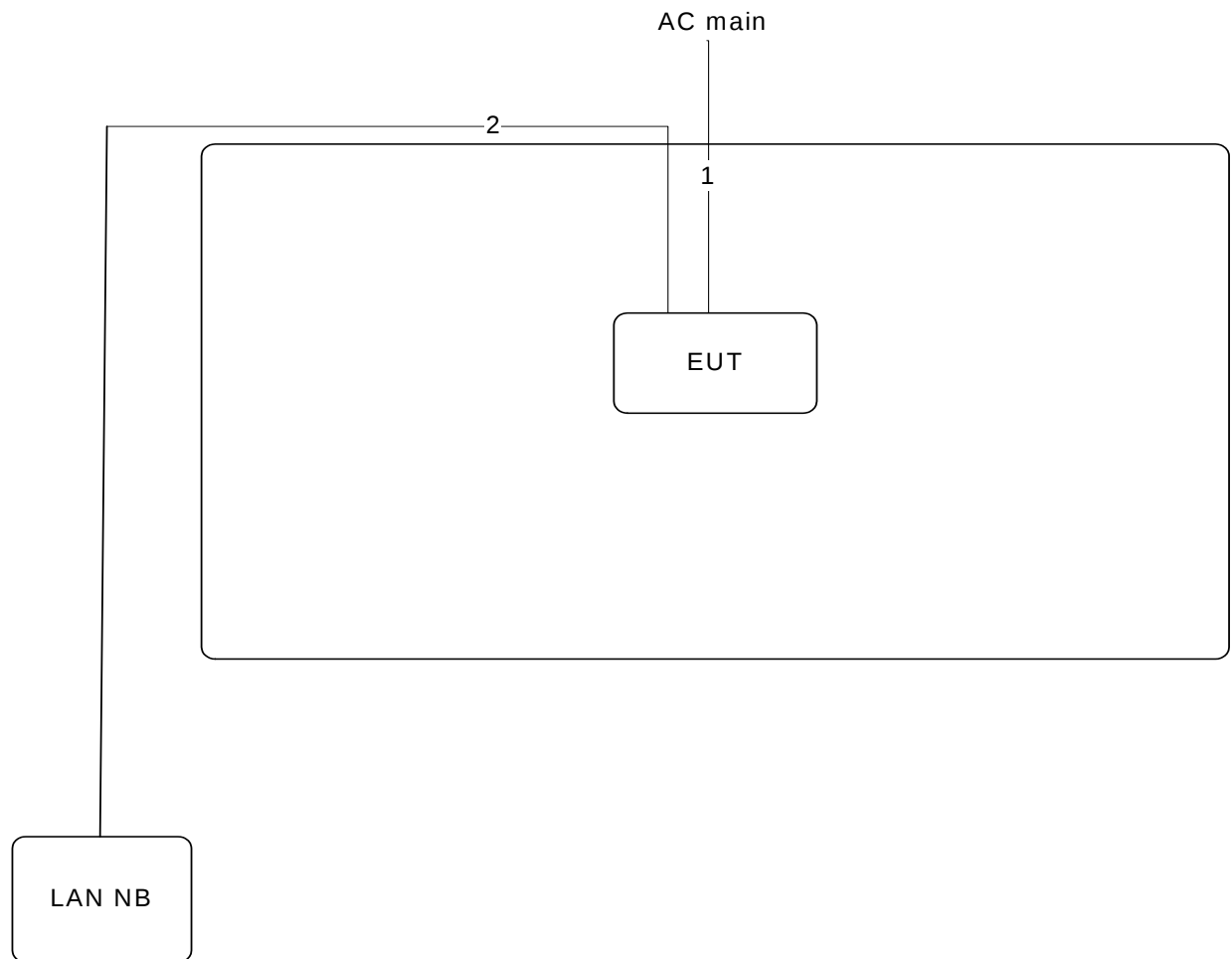
3.11.2. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



Item	Connection	Shielded	Length	Remark
1	Power cable	No	1.5m	-
2	RJ-45 cable	No	10m	-
3	RJ-45 cable*3	No	1.5m	Load
4	RJ-45 cable	No	10m	-

Test Configuration: above 1GHz



Item	Connection	Shielded	Length(m)
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

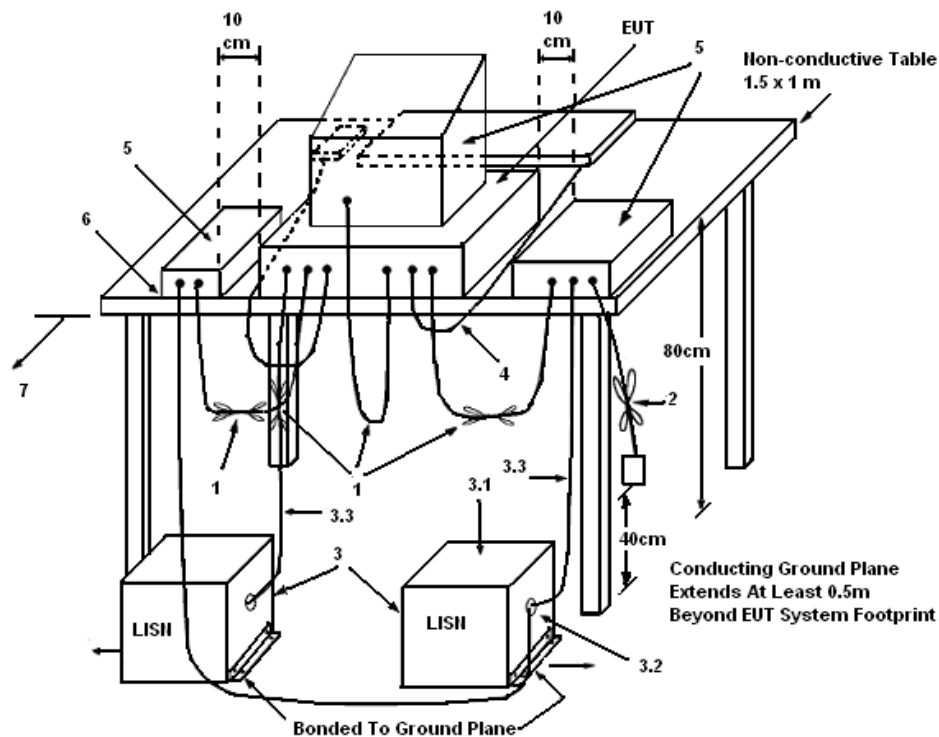
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

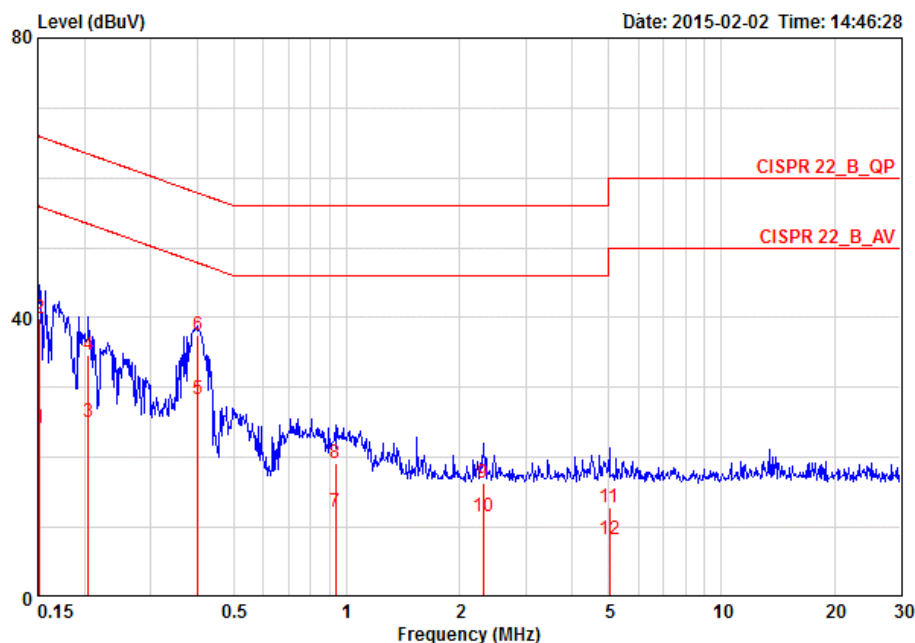
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

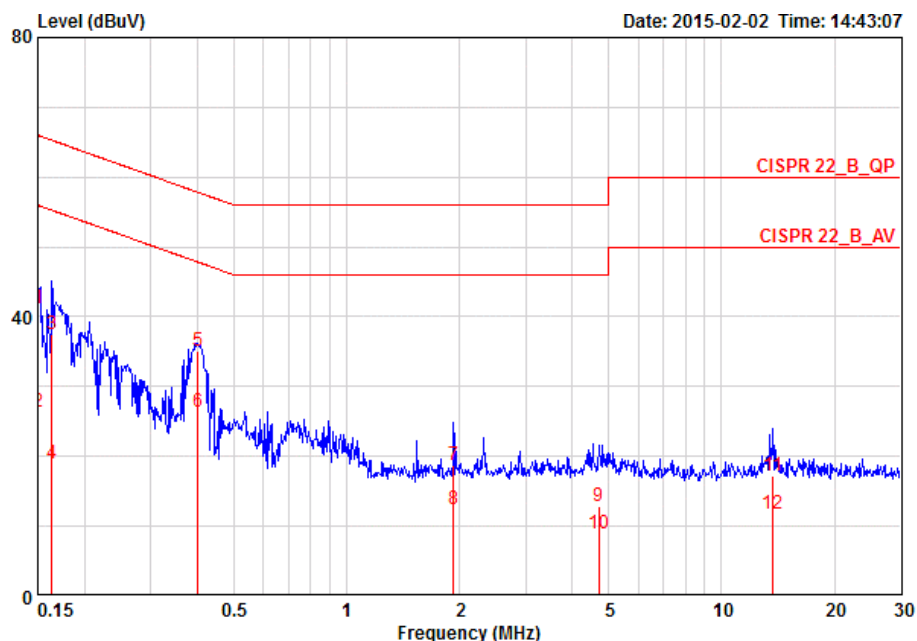
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	22°C	Humidity	51%
Test Engineer	Hank Huang	Phase	Line
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over	Limit	Read	LISN	Cable		
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark	Pol/Phase
			dB	dBuV	dBuV	dB	dB		
1	0.15160	24.16	-31.75	55.91	14.23	9.77	0.16	AVERAGE	LINE
2	0.15160	39.95	-25.96	65.91	30.02	9.77	0.16	QP	LINE
3	0.20505	25.16	-28.25	53.40	15.21	9.78	0.17	AVERAGE	LINE
4	0.20505	34.57	-28.84	63.40	24.62	9.78	0.17	QP	LINE
5	0.40187	28.31	-19.50	47.81	18.36	9.77	0.18	AVERAGE	LINE
6	0.40187	37.39	-20.42	57.81	27.44	9.77	0.18	QP	LINE
7	0.93314	12.21	-33.79	46.00	2.24	9.77	0.20	AVERAGE	LINE
8	0.93314	19.19	-36.81	56.00	9.22	9.77	0.20	QP	LINE
9	2.309	16.30	-39.70	56.00	6.30	9.74	0.26	QP	LINE
10	2.309	11.45	-34.55	46.00	1.45	9.74	0.26	AVERAGE	LINE
11	5.031	12.80	-47.20	60.00	2.80	9.68	0.32	QP	LINE
12	5.031	8.25	-41.75	50.00	-1.75	9.68	0.32	AVERAGE	LINE

Temperature	22°C	Humidity	51%
Test Engineer	Hank Huang	Phase	Neutral
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over	Limit	Read	LISN	Cable		
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark	Pol/Phase
			dB	dBuV	dBuV	dB	dB		
1	0.15000	41.24	-24.76	66.00	31.16	9.92	0.16	QP	NEUTRAL
2	0.15000	26.30	-29.70	56.00	16.22	9.92	0.16	AVERAGE	NEUTRAL
3	0.16327	37.40	-27.90	65.30	27.32	9.92	0.16	QP	NEUTRAL
4	0.16327	18.92	-36.38	55.30	8.84	9.92	0.16	AVERAGE	NEUTRAL
5	0.40187	35.13	-22.68	57.81	25.04	9.91	0.18	QP	NEUTRAL
6	0.40187	26.31	-21.50	47.81	16.22	9.91	0.18	AVERAGE	NEUTRAL
7	1.928	18.83	-37.17	56.00	8.68	9.90	0.25	QP	NEUTRAL
8	1.928	12.45	-33.55	46.00	2.30	9.90	0.25	AVERAGE	NEUTRAL
9	4.696	12.88	-43.12	56.00	2.72	9.84	0.31	QP	NEUTRAL
10	4.696	8.99	-37.01	46.00	-1.17	9.84	0.31	AVERAGE	NEUTRAL
11	13.695	17.27	-42.73	60.00	7.10	9.74	0.43	QP	NEUTRAL
12	13.695	11.79	-38.21	50.00	1.62	9.74	0.43	AVERAGE	NEUTRAL

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	$\geq 3 \times \text{RBW}$
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 4.6.4.

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

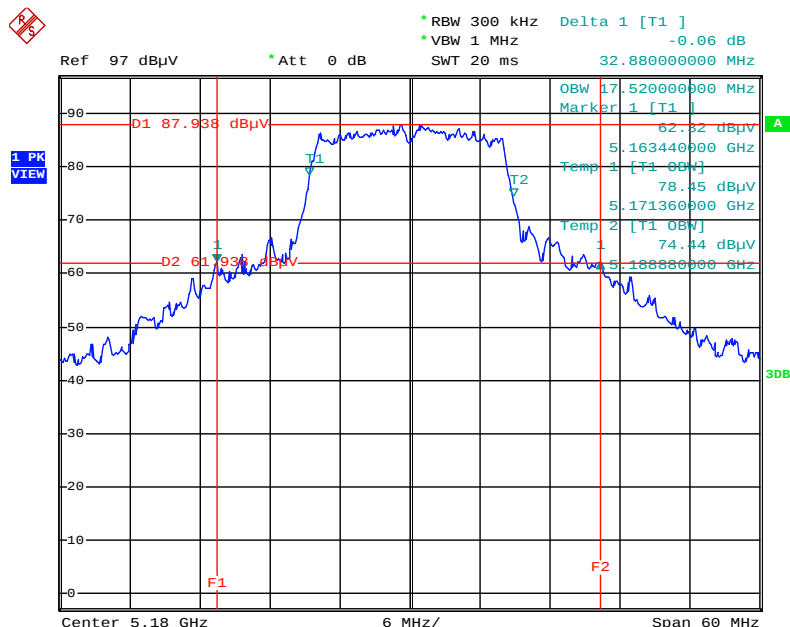
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin / Clemens Fang		

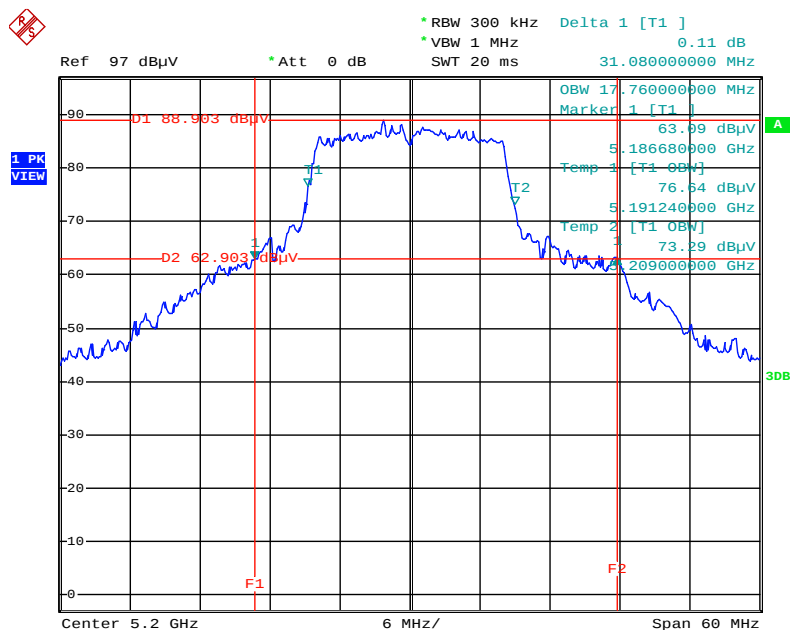
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	32.88	17.52
	5200 MHz	31.08	17.76
	5240 MHz	32.04	17.64
	5745 MHz	28.08	17.28
	5785 MHz	30.60	17.64
	5825 MHz	31.08	17.52
802.11ac MCS0/Nss1 VHT20	5180 MHz	31.44	18.12
	5200 MHz	32.16	18.12
	5240 MHz	34.68	18.36
	5745 MHz	35.76	18.36
	5785 MHz	31.56	18.12
	5825 MHz	31.68	18.12
802.11ac MCS0/Nss1 VHT40	5190 MHz	51.40	36.60
	5230 MHz	55.60	37.00
	5755 MHz	46.80	36.60
	5795 MHz	54.60	36.80
802.11ac MCS0/Nss1 VHT80	5210 MHz	89.60	75.20
	5775 MHz	87.20	75.20

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



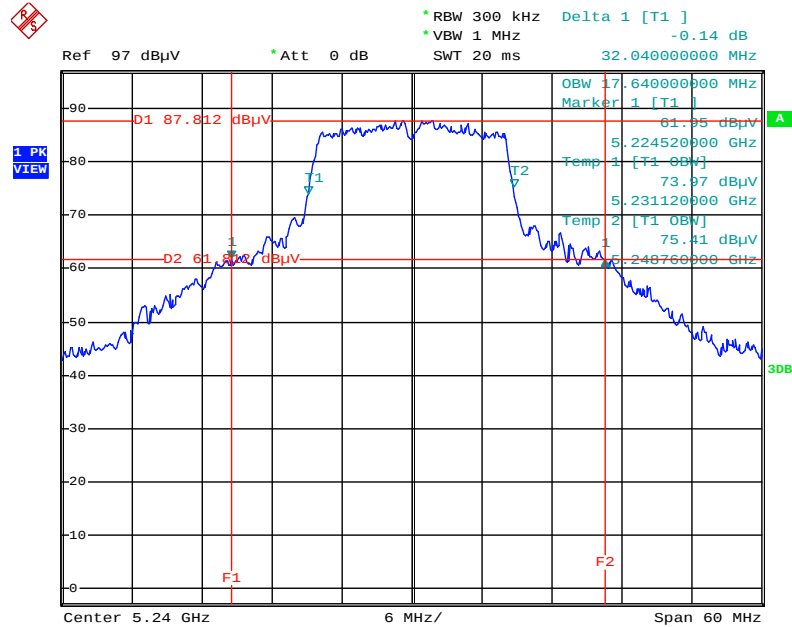
Date: 5.FEB.2015 09:28:13

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



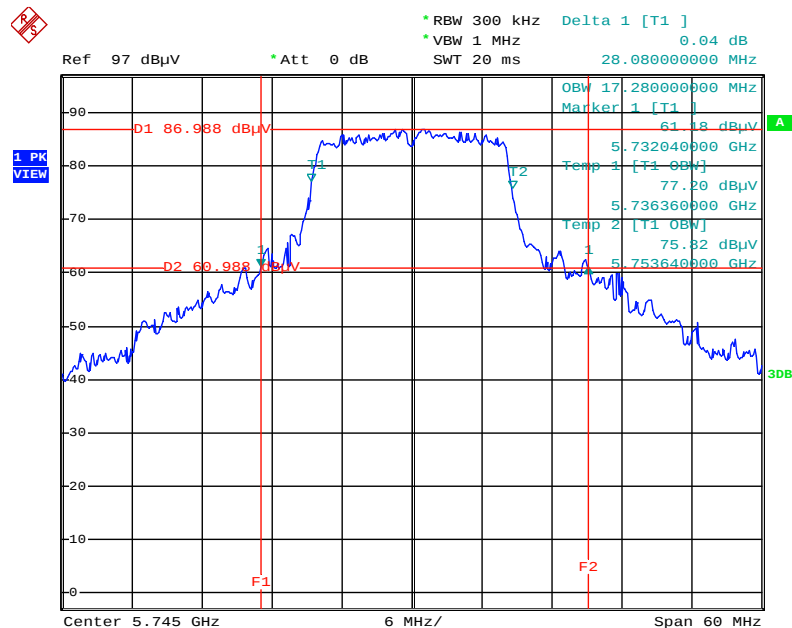
Date: 5.FEB.2015 09:30:05

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



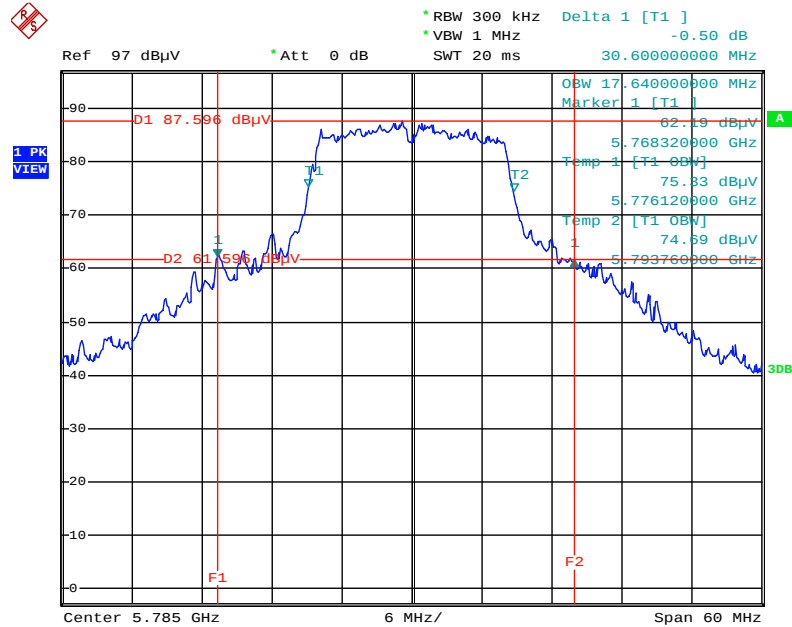
Date: 5.FEB.2015 09:31:49

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5745 MHz



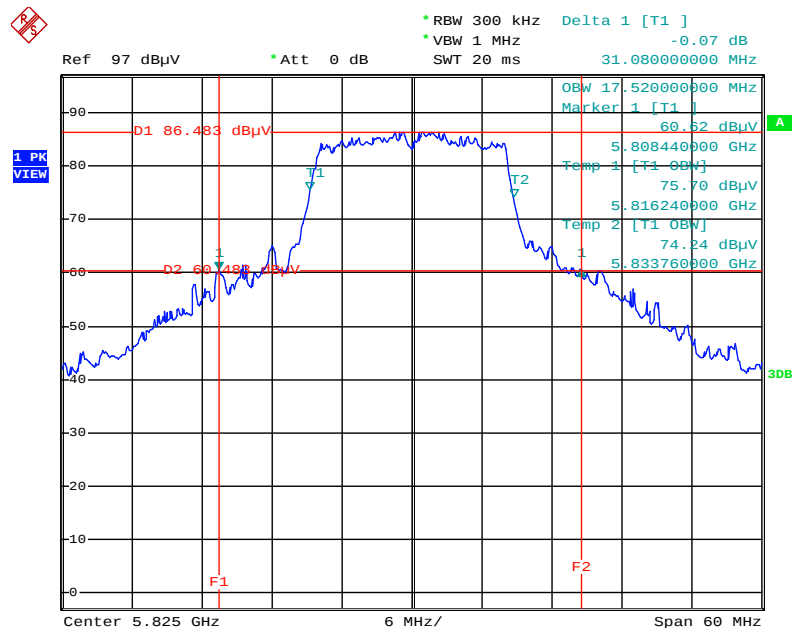
Date: 5.FEB.2015 09:34:38

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5785 MHz



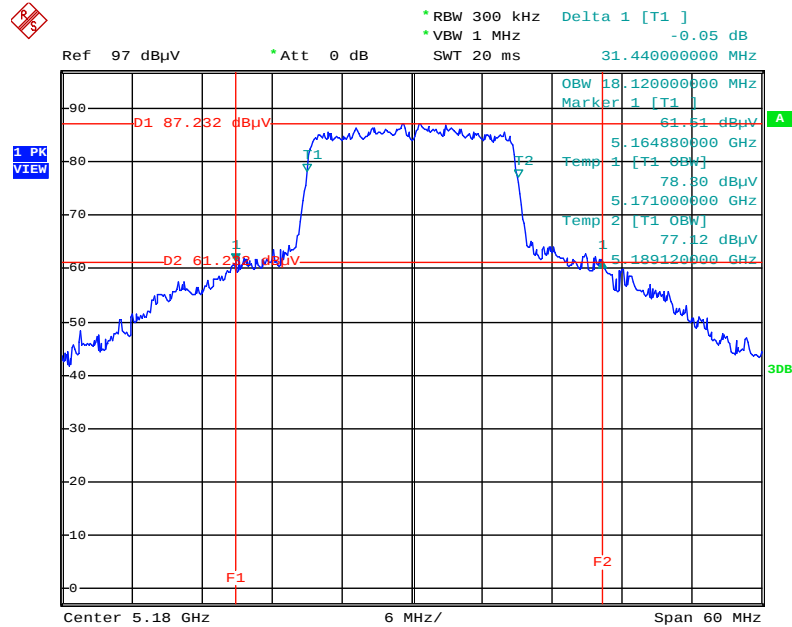
Date: 5.FEB.2015 09:41:52

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5825 MHz



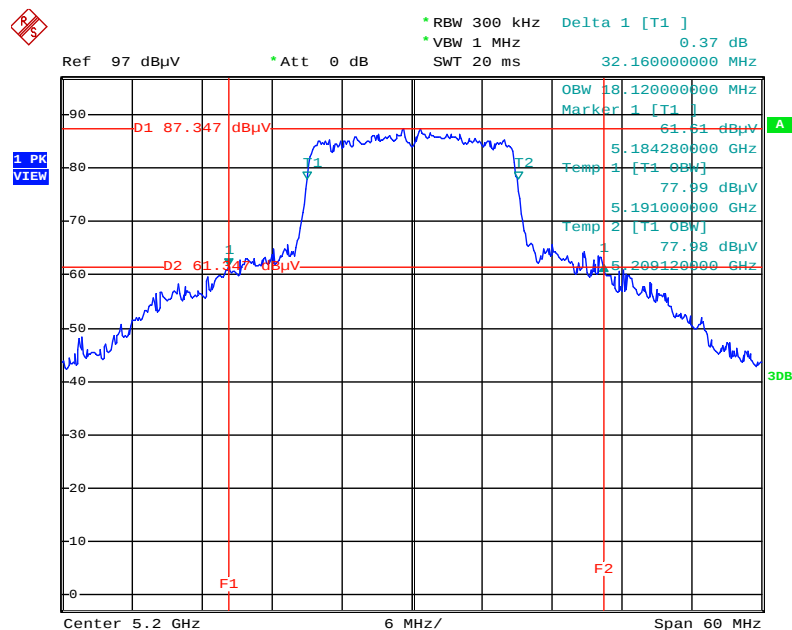
Date: 5.FEB.2015 09:43:53

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



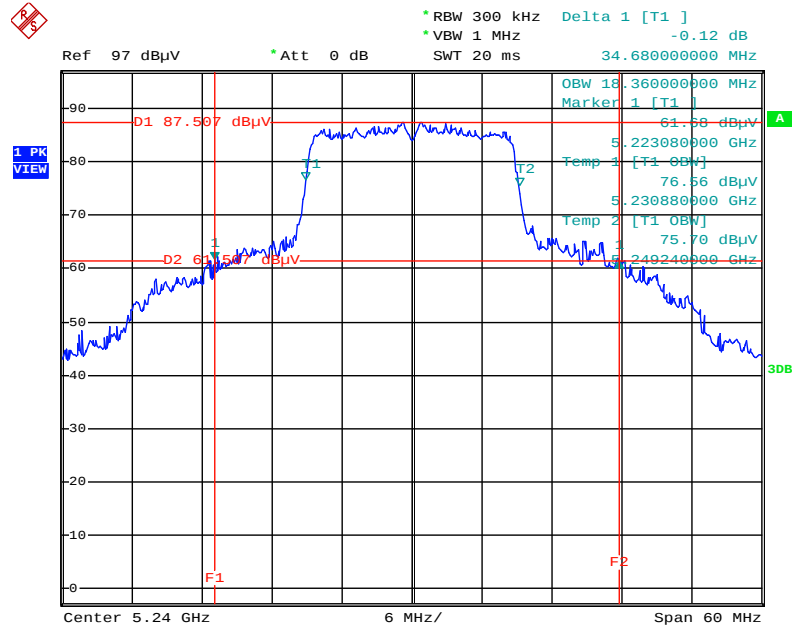
Date: 5.FEB.2015 09:46:59

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



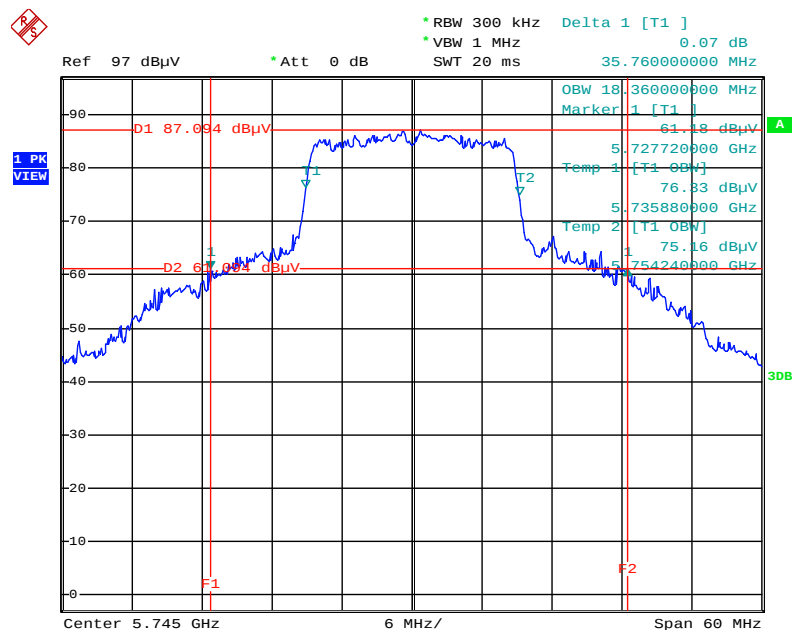
Date: 5.FEB.2015 09:48:09

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



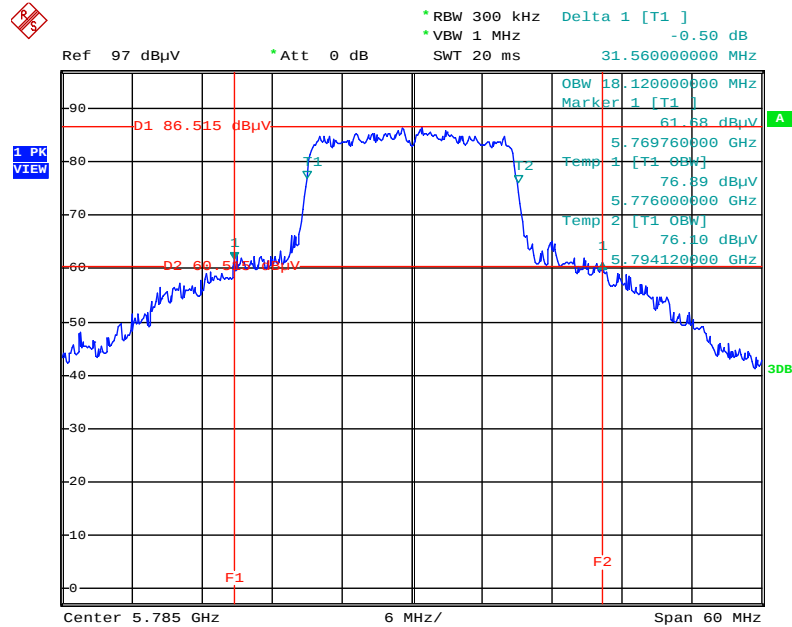
Date: 5.FEB.2015 09:49:07

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5745 MHz



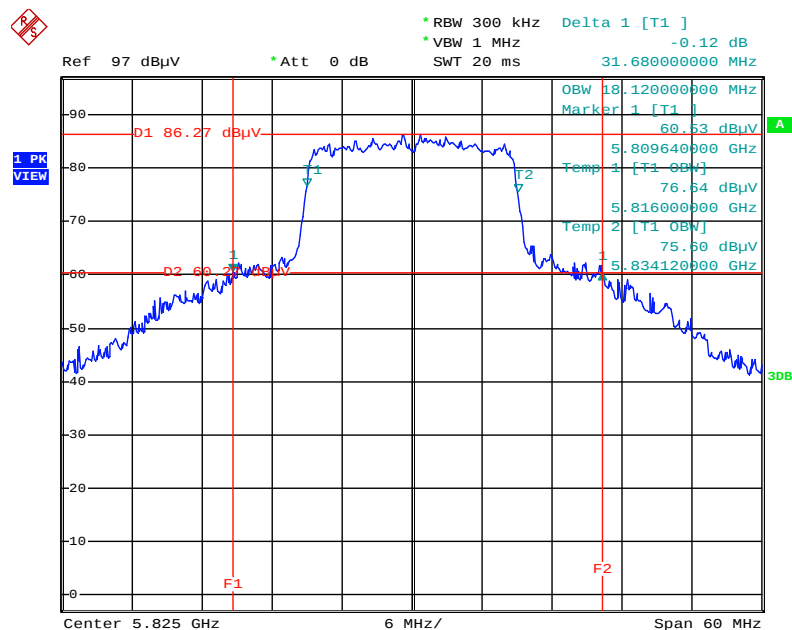
Date: 5.FEB.2015 09:56:45

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5785 MHz



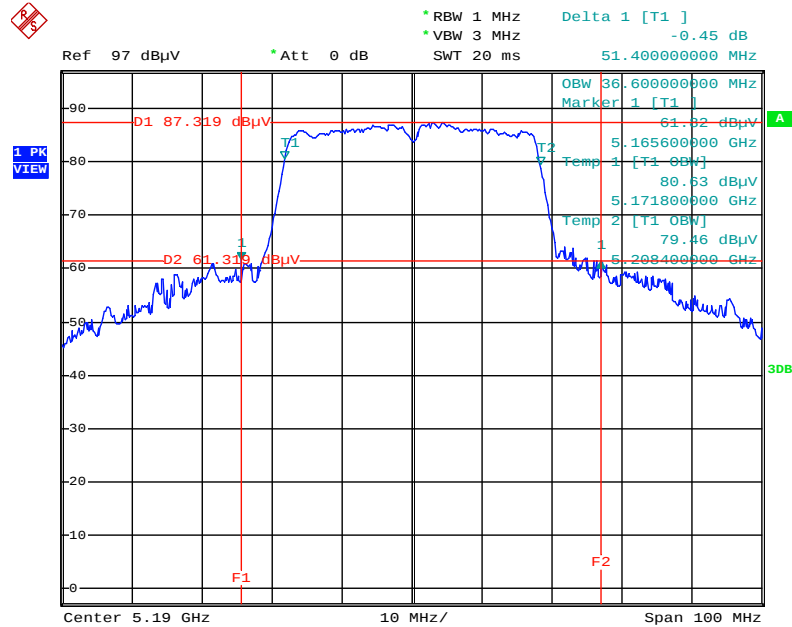
Date: 5.FEB.2015 10:03:54

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5825 MHz



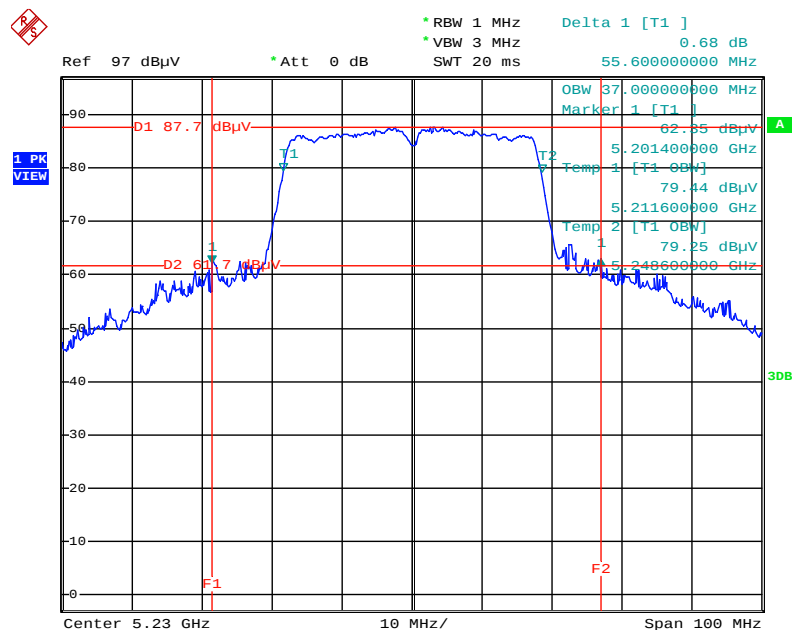
Date: 5.FEB.2015 10:06:10

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



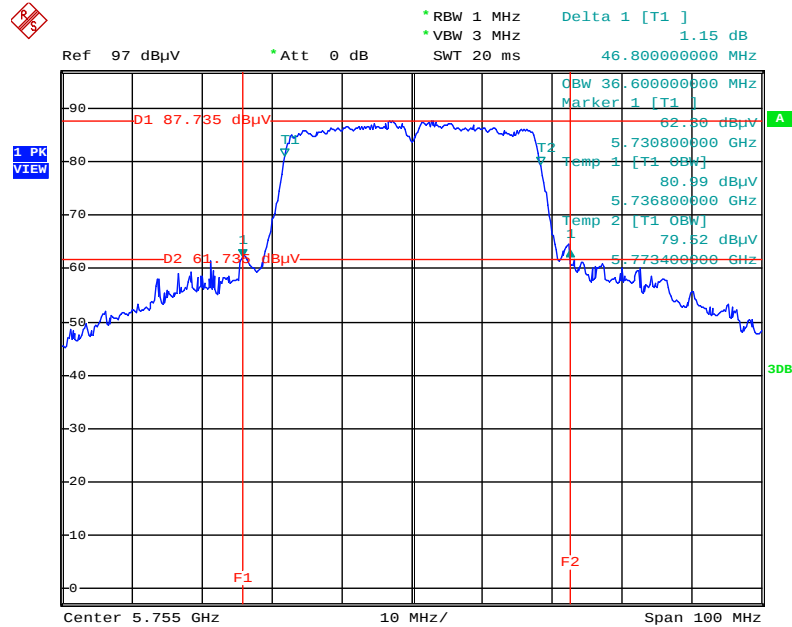
Date: 5.FEB.2015 10:07:08

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



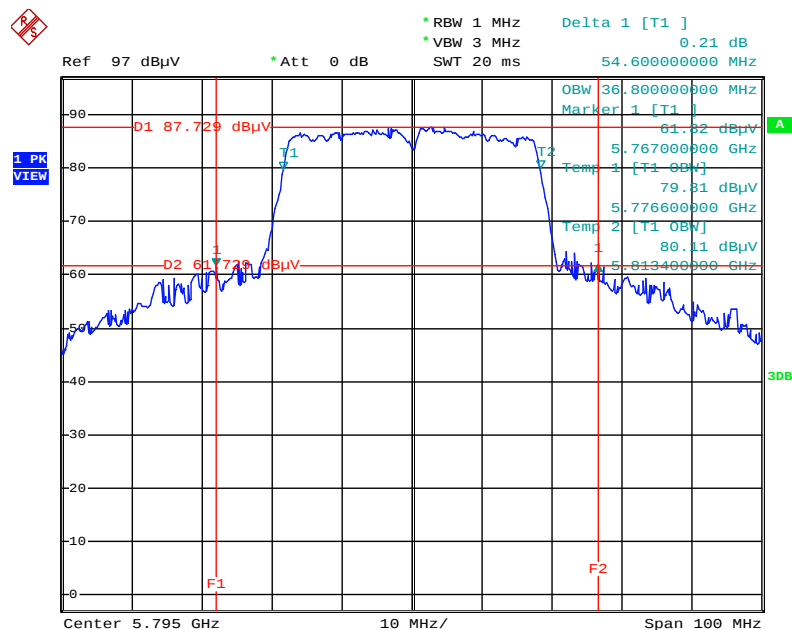
Date: 5.FEB.2015 10:07:59

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5755 MHz



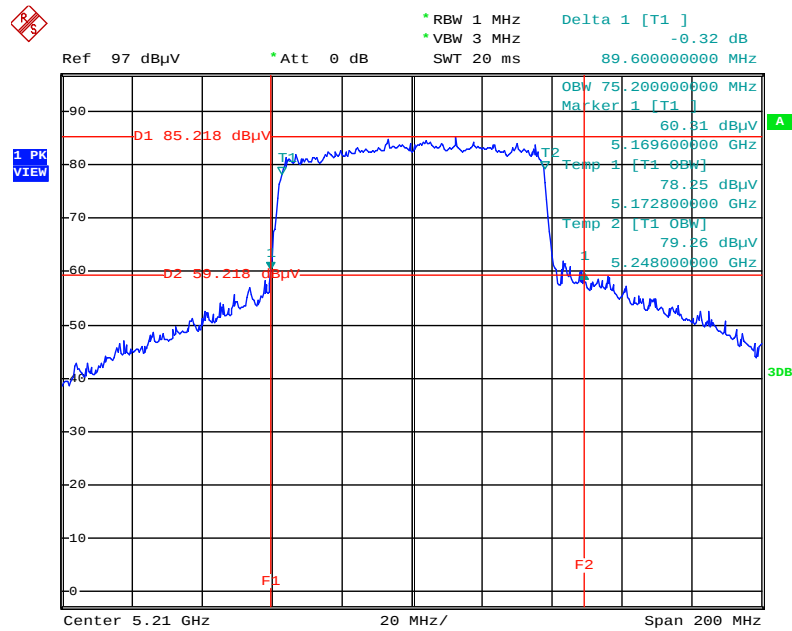
Date: 5.FEB.2015 10:14:22

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5795 MHz



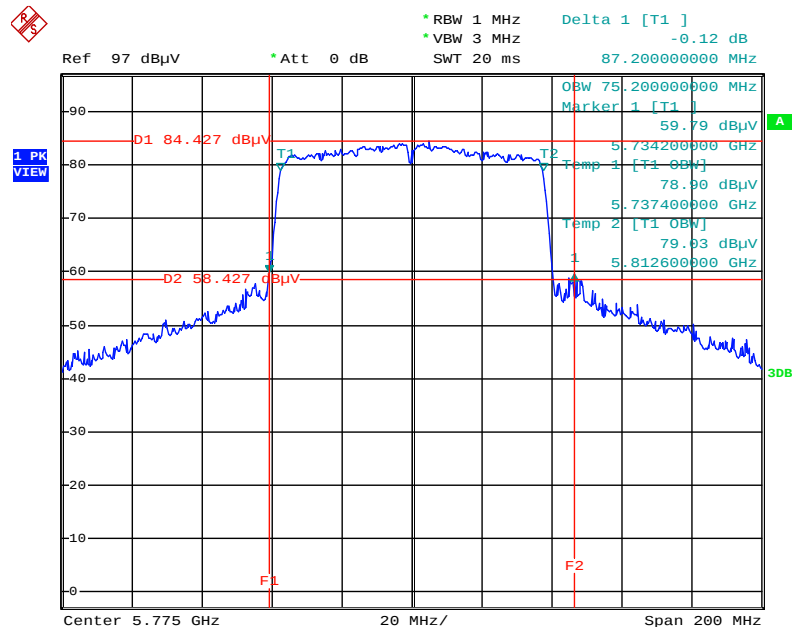
Date: 5.FEB.2015 10:15:08

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



Date: 5.FEB.2015 10:16:55

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 / 5775 MHz



Date: 5.FEB.2015 10:18:27

4.3. 6dB Spectrum Bandwidth Measurement

4.3.1. Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

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.

6dB Spectrum Bandwidth	
Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	approximately 1% of the emission bandwidth
VBW	VBW > RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.3.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (C) Emission Bandwidth.
3. Multiple antenna system was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. Measured the spectrum width with power higher than 6dB below carrier.

4.3.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

This test setup layout is the same as that shown in section 4.6.4.

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 6dB Spectrum Bandwidth

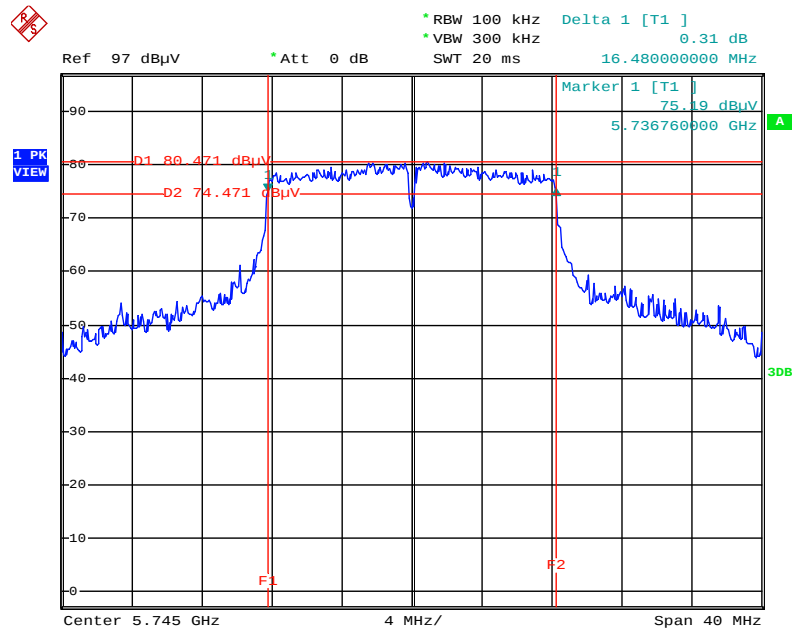
Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin / Clemens Fang		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.48	500	Complies
	5785 MHz	16.48	500	Complies
	5825 MHz	16.48	500	Complies
802.11ac MCS0/Nss1 VHT20	5745 MHz	17.60	500	Complies
	5785 MHz	17.60	500	Complies
	5825 MHz	17.60	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	36.48	500	Complies
	5795 MHz	36.48	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	76.00	500	Complies

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

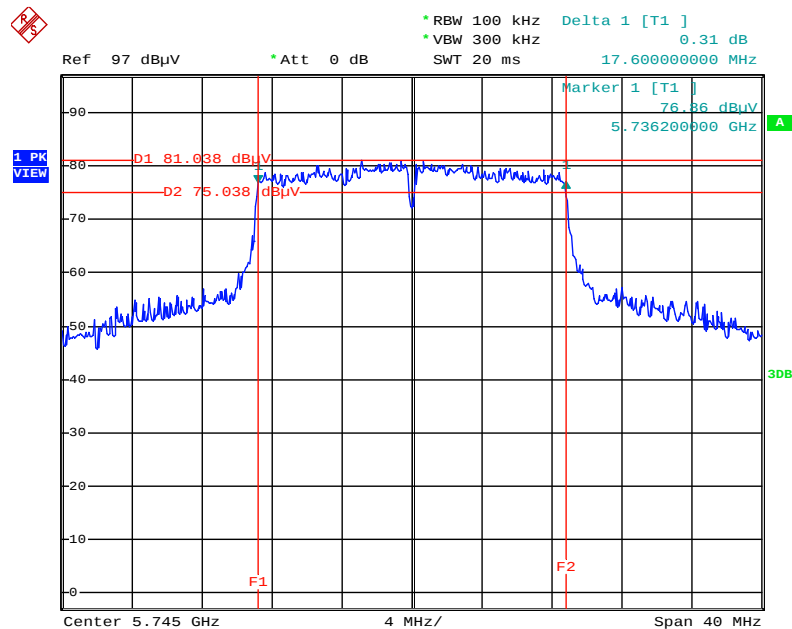
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5745 MHz



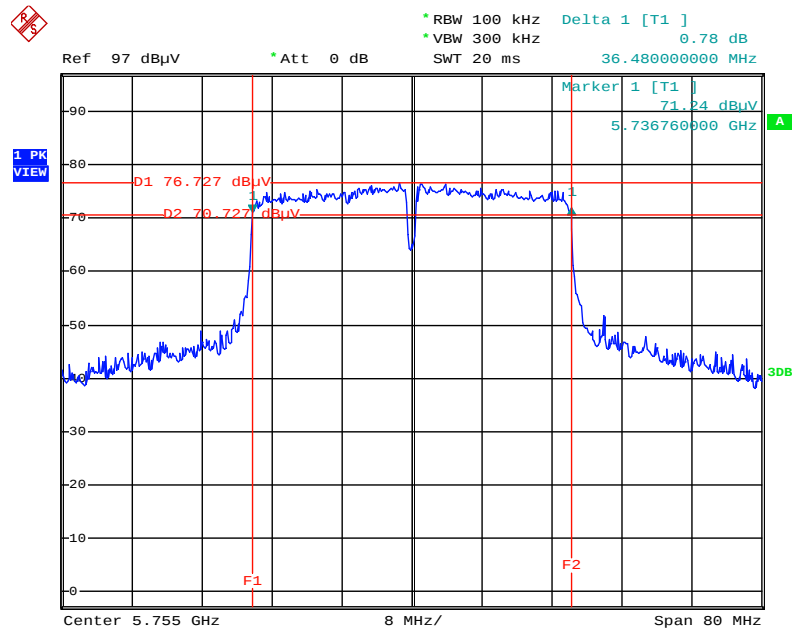
Date: 5.FEB.2015 10:27:14

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5745 MHz



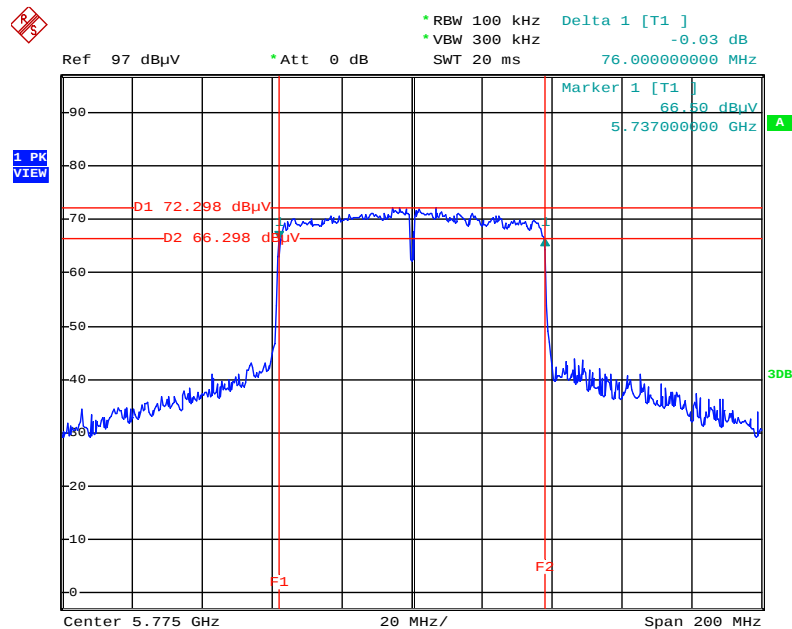
Date: 5.FEB.2015 10:25:14

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5755MHz



Date: 5.FEB.2015 10:23:22

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 / 5775 MHz



Date: 5.FEB.2015 10:21:58

4.4. Maximum Conducted Output Power Measurement

4.4.1. 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.

☒	5.725~5.85 GHz	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.
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4.4.2. Measuring Instruments and Setting

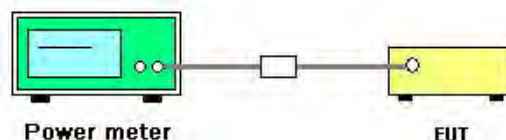
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.4.3. 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.

4.4.4. 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 Maximum Conducted Output Power

Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin / Clemens Fang	Test Date	Feb. 05, 2015

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
802.11a	5180 MHz	21.69	22.69	25.23	30.00	Complies
	5200 MHz	22.39	22.47	25.44	30.00	Complies
	5240 MHz	22.49	22.30	25.41	30.00	Complies
	5745 MHz	22.61	22.11	25.38	30.00	Complies
	5785 MHz	21.23	22.37	24.85	30.00	Complies
	5825 MHz	21.62	21.80	24.72	30.00	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	20.31	19.94	23.14	30.00	Complies
	5200 MHz	21.43	19.98	23.78	30.00	Complies
	5240 MHz	21.30	21.80	24.57	30.00	Complies
	5745 MHz	21.79	21.60	24.71	30.00	Complies
	5785 MHz	21.66	22.01	24.85	30.00	Complies
	5825 MHz	21.88	21.69	24.80	30.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	20.28	21.04	23.69	30.00	Complies
	5230 MHz	20.61	20.71	23.67	30.00	Complies
	5755 MHz	20.53	20.85	23.70	30.00	Complies
	5795 MHz	20.54	20.38	23.47	30.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	19.33	20.25	22.82	30.00	Complies
	5775 MHz	19.53	19.36	22.46	30.00	Complies

4.5. Power Spectral Density Measurement

4.5.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.4.1.

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
☒	5.725~5.85 GHz	30 dBm/500kHz

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 the spectrum analyzer.

For 5.15~5.25 GHz

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

For 5.725~5.85 GHz

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RBW	$RBW \geq 1/T$
VBW	$VBW \geq 3 RBW$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple
Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ is the reduced resolution bandwidth of the spectrum analyzer set during measurement.	

4.5.3. Test Procedures

For 5.15~5.25 GHz

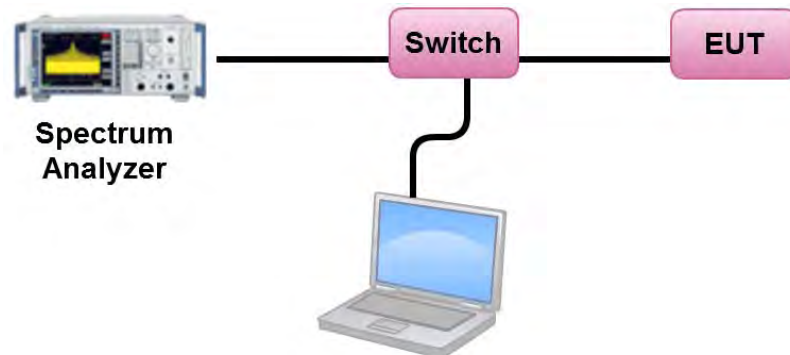
1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD).
3. Multiple 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.

For 5.725~5.85 GHz

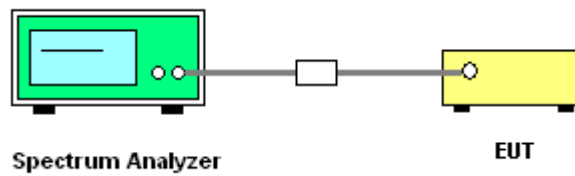
1. Test procedures refer KDB662911 D01 v02r01 section In-Band Power Spectral Density (PSD) Measurements option (b) Measure and sum spectral maximal across the outputs.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/RBW$ (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The measured result of PSD level must add $10\log(500\text{kHz}/RBW)$ and the final result should ≤ 30 dBm.

4.5.4. Test Setup Layout

For 5.15~5.25 GHz



For 5.725~5.85 GHz



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Power Spectral Density

Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin / Clemens Fang	Test Date	Feb. 05, 2015

Configuration IEEE 802.11a / Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	11.79	17.00	Complies
40	5200 MHz	11.85	17.00	Complies
48	5240 MHz	11.84	17.00	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{f,k} \right\}^2}{N_{ANT}} \right] = 5.47\text{dBi}$, so limit = 17 dBm/MHz

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	11.79	-3.01	8.78	29.47	Complies
157	5785 MHz	11.48	-3.01	8.47	29.47	Complies
165	5825 MHz	11.29	-3.01	8.28	29.47	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{f,k} \right\}^2}{N_{ANT}} \right] = 6.53\text{dBi}$, so limit = 30-(6.53-6)=29.47 dBm/500kHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	9.76	17.00	Complies
40	5200 MHz	10.33	17.00	Complies
48	5240 MHz	11.06	17.00	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{f,k} \right\}^2}{N_{ANT}} \right] = 5.47\text{dBi}$, so limit = 17 dBm/MHz

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	11.29	-3.01	8.28	29.47	Complies
157	5785 MHz	11.39	-3.01	8.38	29.47	Complies
165	5825 MHz	11.28	-3.01	8.27	29.47	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{f,k} \right\}^2}{N_{ANT}} \right] = 6.53\text{dBi}$, so limit = 30-(6.53-6)=29.47 dBm/500kHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	7.31	17.00	Complies
46	5230 MHz	7.27	17.00	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 5.47\text{dBi}$, so limit = 17 dBm/MHz

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	7.35	-3.01	4.34	29.47	Complies
159	5795 MHz	7.16	-3.01	4.15	29.47	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 6.53\text{dBi}$, so limit = 30-(6.53-6)=29.47 dBm/500kHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
42	5210 MHz	3.46	17.00	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 5.47\text{dBi}$, so limit = 17 dBm/MHz

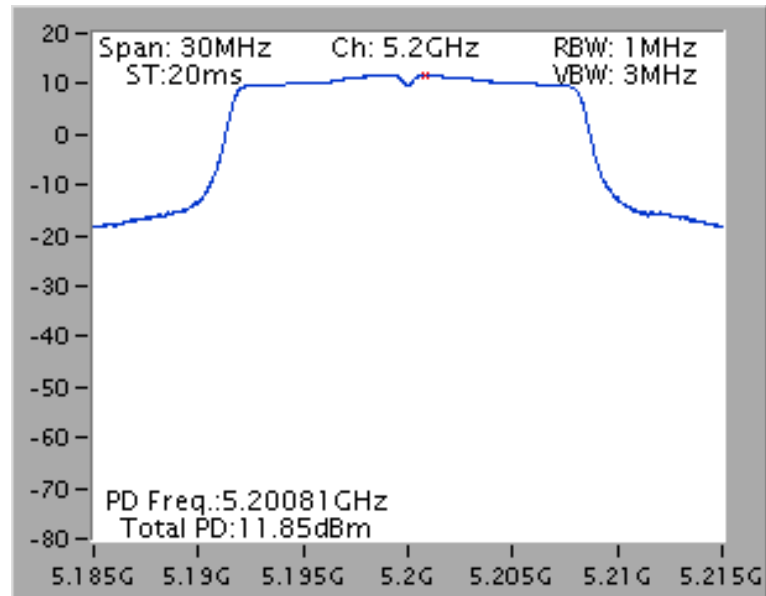
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	3.32	-3.01	0.31	29.47	Complies

Note: $DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ch}} \left\{ \sum_{k=1}^{N_{ant}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 6.53\text{dBi}$, so limit = 30-(6.53-6)=29.47 dBm/500kHz

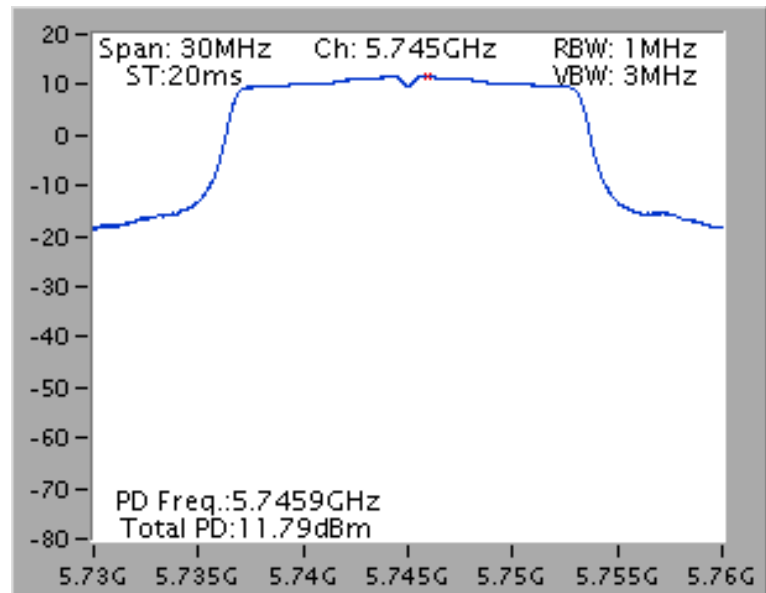
Note: All the test values were listed in the report.

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

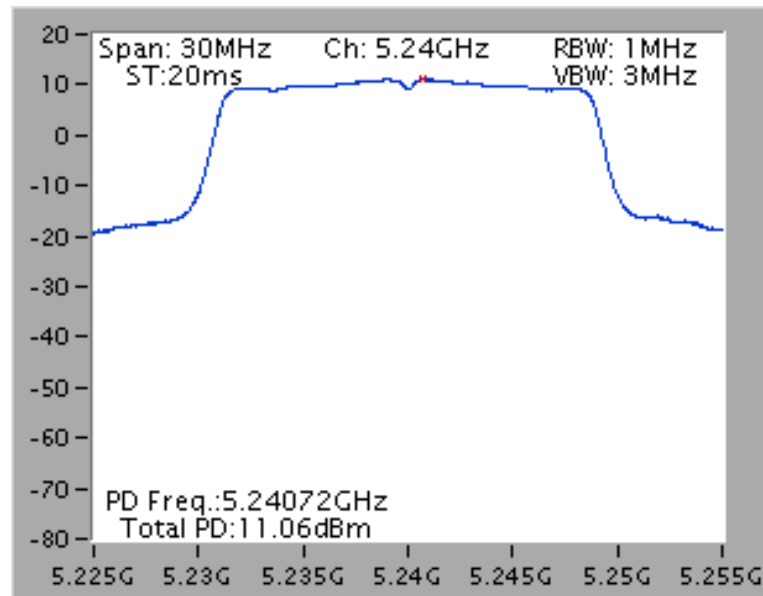
Power Density Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5200 MHz



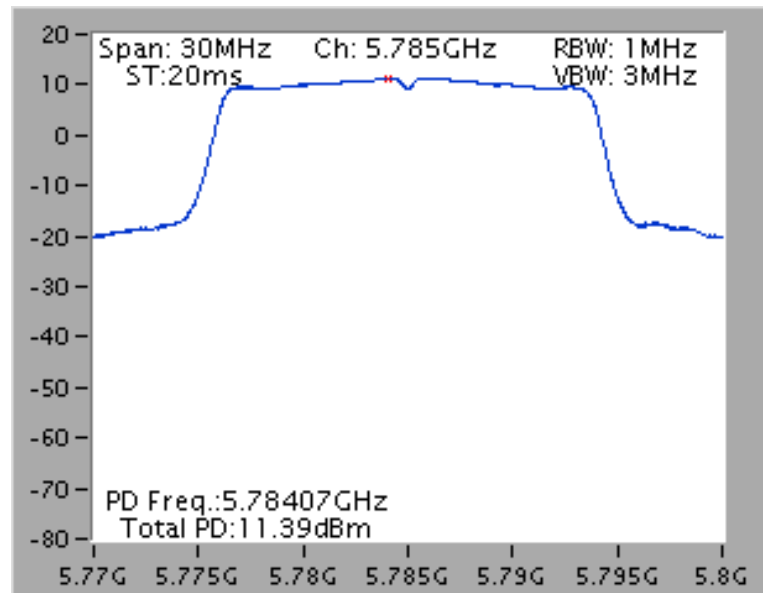
Power Density Plot on Configuration IEEE 802.11a / Chain 3 + Chain 4 / 5745 MHz



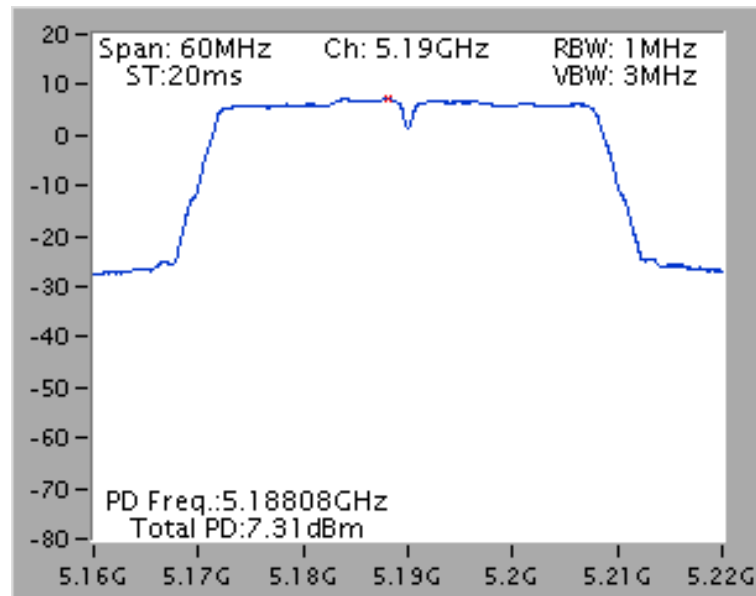
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5240MHz



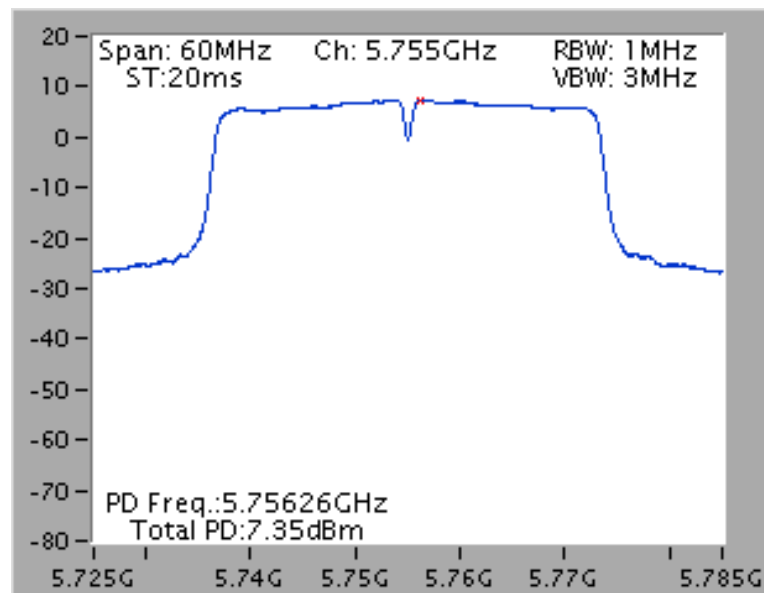
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 / 5785 MHz



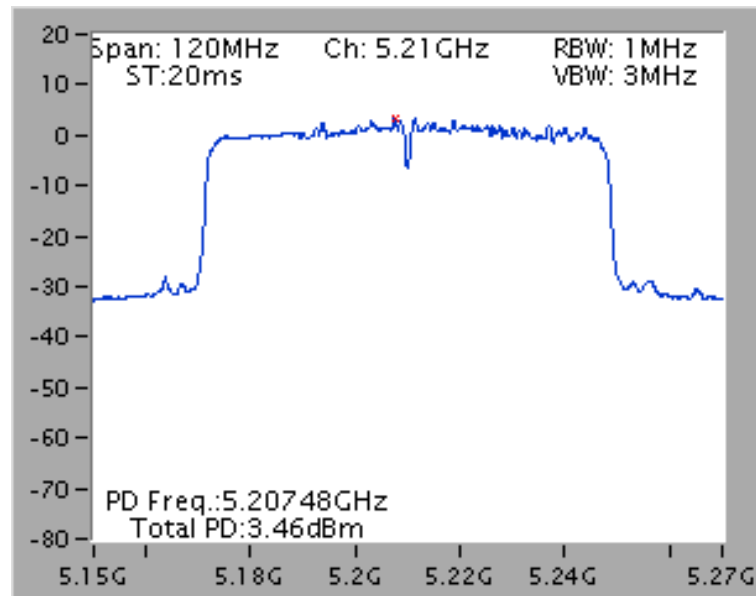
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5190 MHz



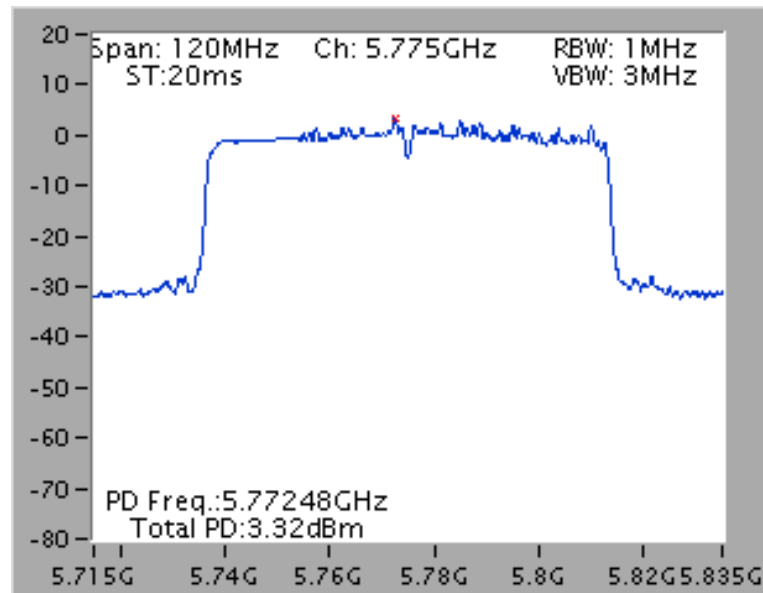
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 / 5755 MHz



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



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 / 5775 MHz



4.6. Radiated 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.

For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions 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 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

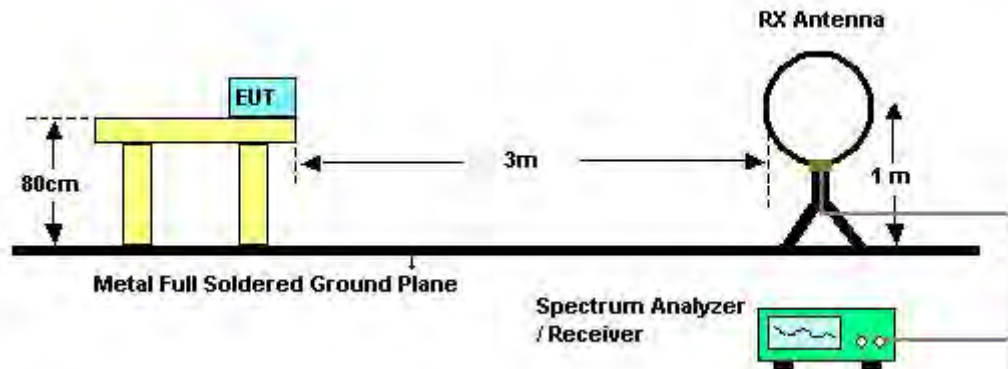
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

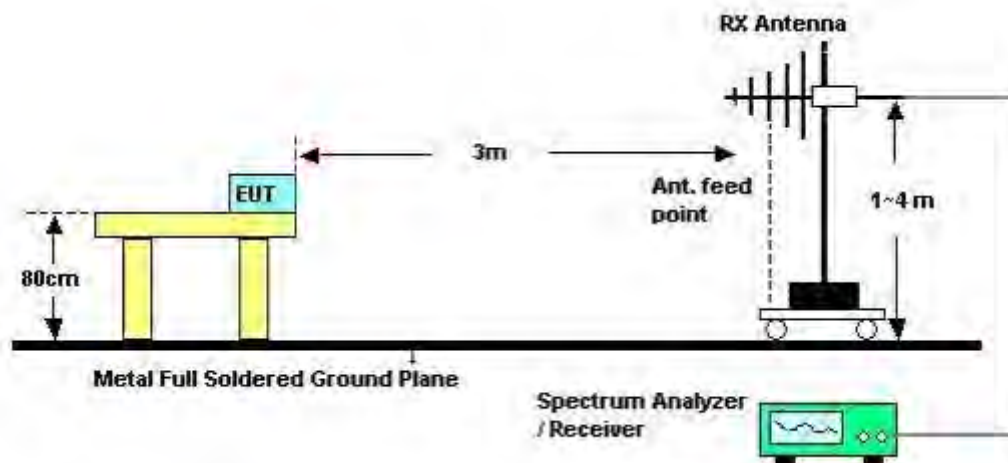
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 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.

4.6.4. Test Setup Layout

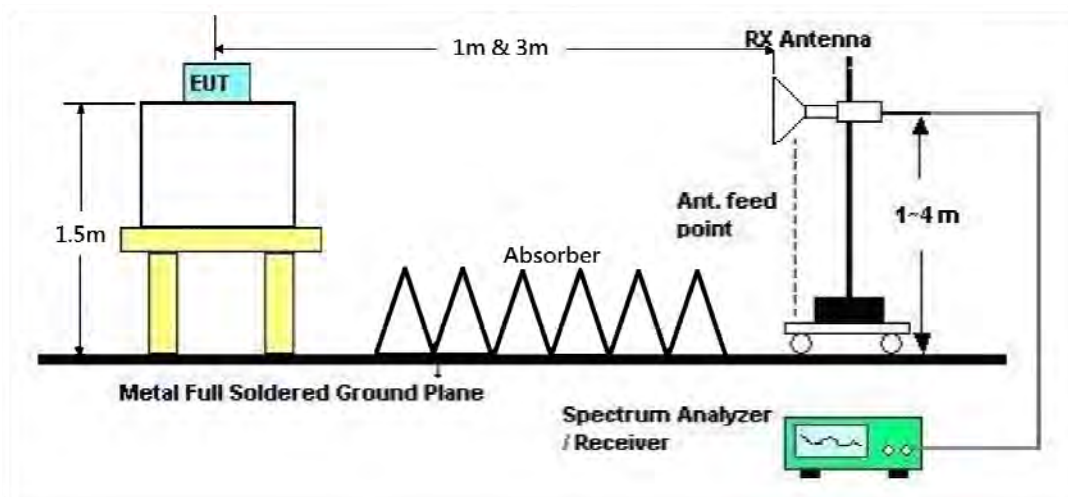
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	Normal Link
Test Date	Feb. 04, 2015	Test Mode	Mode 1

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

Note:

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

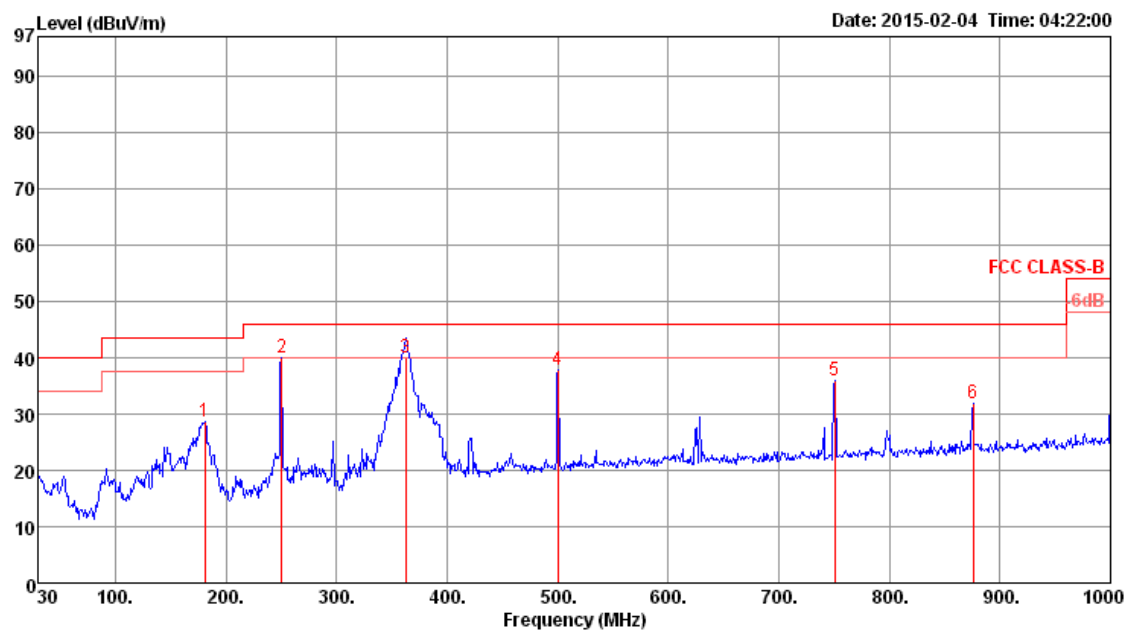
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

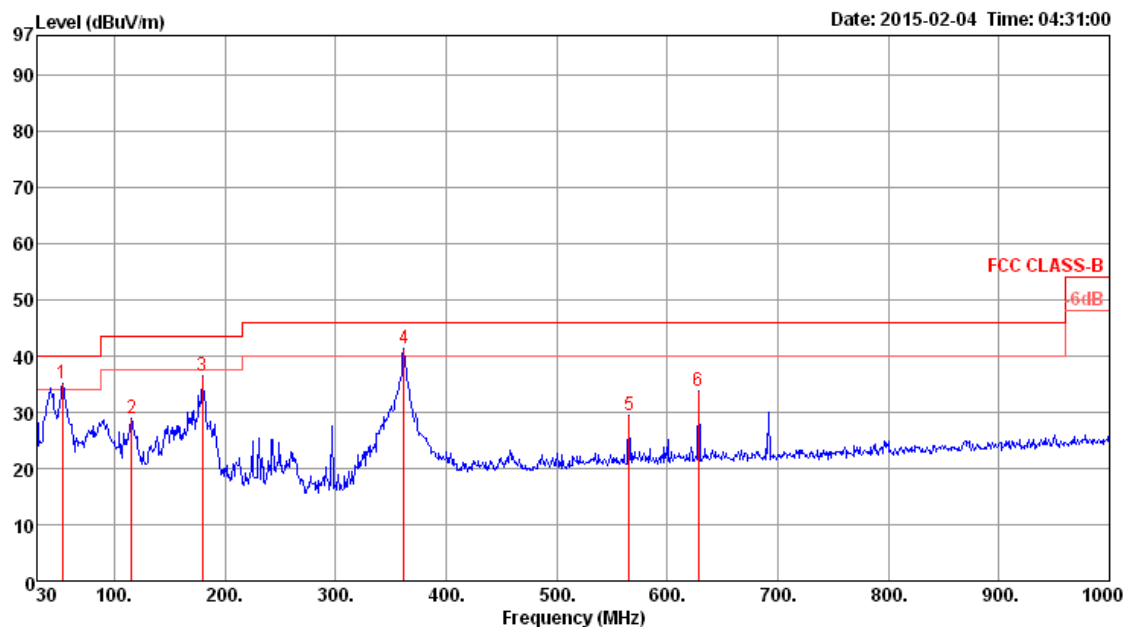
Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	Normal Link
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
1	181.32	28.66	43.50	-14.84	41.34	1.57	12.94	27.19	Peak	100	0 HORIZONTAL
2	250.19	40.02	46.00	-5.98	52.47	1.78	12.77	27.00	Peak	100	0 HORIZONTAL
3	362.78	40.00	46.00	-6.00	50.13	2.15	15.06	27.34	QP	100	248 HORIZONTAL
4	500.45	37.69	46.00	-8.31	45.49	2.67	17.63	28.10	Peak	100	0 HORIZONTAL
5	750.71	35.93	46.00	-10.07	41.10	3.20	19.43	27.80	Peak	100	0 HORIZONTAL
6	875.84	31.80	46.00	-14.20	35.44	3.46	20.35	27.45	Peak	100	0 HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Remark	cm	deg	
1	53.28	35.05	40.00	-4.95	53.99	0.85	8.00	27.79	Peak	400	0	VERTICAL
2	115.36	28.78	43.50	-14.72	42.87	1.27	12.16	27.52	Peak	400	0	VERTICAL
3	179.38	36.35	43.50	-7.15	48.85	1.56	13.14	27.20	Peak	400	0	VERTICAL
4	361.74	41.44	46.00	-4.56	51.58	2.15	15.04	27.33	Peak	400	0	VERTICAL
5	565.44	29.50	46.00	-16.50	36.44	2.79	18.37	28.10	Peak	400	0	VERTICAL
6	628.49	33.82	46.00	-12.18	40.12	2.91	18.86	28.07	Peak	400	0	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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.

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

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 36 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	
1	15542.34	47.40	54.00	-6.60	34.10	10.77	38.12	35.59	Average	181	156	HORIZONTAL
2	15545.87	61.60	74.00	-12.40	48.29	10.78	38.12	35.59	Peak	181	156	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	
1	15542.18	46.33	54.00	-7.67	33.03	10.77	38.12	35.59	Average	165	201	VERTICAL
2	15542.60	60.06	74.00	-13.94	46.76	10.77	38.12	35.59	Peak	165	201	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 40 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15590.06	43.07	54.00	-10.93	29.83	10.78	38.04	35.58 Average	100	296	HORIZONTAL
2	15599.74	55.83	74.00	-18.17	42.59	10.78	38.04	35.58 Peak	100	296	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15590.58	55.76	74.00	-18.24	42.52	10.78	38.04	35.58 Peak	100	307	VERTICAL
2	15606.67	43.28	54.00	-10.72	30.07	10.78	38.01	35.58 Average	100	307	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 48 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15720.51	57.77	74.00	-16.23	44.69	10.79	37.85	35.56 Peak	245	186	HORIZONTAL
2	15721.44	44.67	54.00	-9.33	31.59	10.79	37.85	35.56 Average	245	186	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15715.03	55.94	74.00	-18.06	42.86	10.79	37.85	35.56 Peak	100	117	VERTICAL
2	15715.74	42.74	54.00	-11.26	29.66	10.79	37.85	35.56 Average	100	117	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 149 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11488.24	45.30	54.00	-8.70	31.64	9.24	39.50	35.08	Average	238	342	HORIZONTAL
2	11491.35	58.19	74.00	-15.81	44.53	9.24	39.50	35.08	Peak	238	342	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11485.51	43.73	54.00	-10.27	30.07	9.24	39.50	35.08	Average	150	117	VERTICAL
2	11492.08	57.29	74.00	-16.71	43.63	9.24	39.50	35.08	Peak	150	117	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 157 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

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	11569.04	48.71	54.00	-5.29	35.07	9.26	39.47	35.09	Average	105	275	HORIZONTAL
2	11569.20	64.81	74.00	-9.19	51.17	9.26	39.47	35.09	Peak	105	275	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	11565.61	45.40	54.00	-8.60	31.75	9.26	39.48	35.09	Average	100	333	VERTICAL
2	11567.95	55.90	74.00	-18.10	42.26	9.26	39.47	35.09	Peak	100	333	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 165 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	11643.59	61.14	74.00	-12.86	47.49	9.28	39.44	35.07	Peak	113	274 HORIZONTAL
2	11651.92	45.82	54.00	-8.18	32.17	9.28	39.44	35.07	Average	113	274 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	11651.76	44.23	54.00	-9.77	30.58	9.28	39.44	35.07	Average	100	110 VERTICAL
2	11652.08	57.83	74.00	-16.17	44.18	9.28	39.44	35.07	Peak	100	110 VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15542.44	44.13	54.00	-9.87	30.83	10.77	38.12	35.59 Average	100	143	HORIZONTAL
2	15547.82	57.92	74.00	-16.08	44.61	10.78	38.12	35.59 Peak	100	143	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15541.38	55.76	74.00	-18.24	42.46	10.77	38.12	35.59 Peak	100	41	VERTICAL
2	15542.47	42.74	54.00	-11.26	29.44	10.77	38.12	35.59 Average	100	41	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15598.40	56.13	74.00	-17.87	42.89	10.78	38.04	35.58 Peak	100	74	HORIZONTAL
2	15598.46	44.02	54.00	-9.98	30.78	10.78	38.04	35.58 Average	100	74	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15599.52	56.39	74.00	-17.61	43.15	10.78	38.04	35.58 Peak	100	323	VERTICAL
2	15601.67	43.55	54.00	-10.45	30.31	10.78	38.04	35.58 Average	100	323	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss 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	57.68	74.00	-16.32	44.60	10.79	37.85	35.56 Peak	100	354	HORIZONTAL
2	15724.55	44.13	54.00	-9.87	31.05	10.79	37.85	35.56 Average	100	354	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15715.90	43.47	54.00	-10.53	30.39	10.79	37.85	35.56 Average	100	174	VERTICAL
2	15721.41	56.22	74.00	-17.78	43.14	10.79	37.85	35.56 Peak	100	174	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	11488.97	60.22	74.00	-13.78	46.56	9.24	39.50	35.08	Peak	132	276 HORIZONTAL
2	11494.10	46.79	54.00	-7.21	33.13	9.24	39.50	35.08	Average	132	276 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	11489.55	57.06	74.00	-16.94	43.40	9.24	39.50	35.08	Peak	118	130 VERTICAL
2	11490.90	44.46	54.00	-9.54	30.80	9.24	39.50	35.08	Average	118	130 VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

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	11568.91	44.73	54.00	-9.27	31.09	9.26	39.47	35.09	Average	164	104	HORIZONTAL
2	11571.92	56.52	74.00	-17.48	42.87	9.26	39.47	35.08	Peak	164	104	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	11565.45	57.73	74.00	-16.27	44.08	9.26	39.48	35.09	Peak	100	356	VERTICAL
2	11566.86	43.94	54.00	-10.06	30.29	9.26	39.48	35.09	Average	100	356	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

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	11649.87	49.45	54.00	-4.55	35.80	9.28	39.44	35.07	Average	214	33	HORIZONTAL
2	11657.24	65.24	74.00	-8.76	51.59	9.28	39.44	35.07	Peak	214	33	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	11648.08	44.56	54.00	-9.44	30.91	9.28	39.44	35.07	Average	222	310	VERTICAL
2	11657.05	57.88	74.00	-16.12	44.23	9.28	39.44	35.07	Peak	222	310	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15565.19	43.30	54.00	-10.70	30.01	10.78	38.09	35.58	Average	100	301	HORIZONTAL
2	15568.65	56.09	74.00	-17.91	42.80	10.78	38.09	35.58	Peak	100	301	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	15554.68	56.12	74.00	-17.88	42.81	10.78	38.12	35.59	Peak	100	339	VERTICAL
2	15560.13	43.42	54.00	-10.58	30.13	10.78	38.09	35.58	Average	100	339	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15700.96	56.16	74.00	-17.84	43.05	10.79	37.88	35.56 Peak	100	215	HORIZONTAL
2	15704.04	43.32	54.00	-10.68	30.21	10.79	37.88	35.56 Average	100	215	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	15695.77	43.27	54.00	-10.73	30.16	10.79	37.88	35.56 Average	100	93	VERTICAL
2	15705.64	56.51	74.00	-17.49	43.40	10.79	37.88	35.56 Peak	100	93	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss Factor	Factor	Remark	cm	deg	Pol/Phase
			dBuV/m	dB	dBuV	dB	dB/m	dB			
1	11509.36	43.17	54.00	-10.83	29.52	9.25	39.50	35.10	Average	100	347 HORIZONTAL
2	11527.50	56.32	74.00	-17.68	42.67	9.25	39.49	35.09	Peak	100	347 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss Factor	Factor	Remark	cm	deg	Pol/Phase
			dBuV/m	dB	dBuV	dB	dB/m	dB			
1	11519.62	55.35	74.00	-18.65	41.71	9.25	39.49	35.10	Peak	100	24 VERTICAL
2	11525.90	42.72	54.00	-11.28	29.07	9.25	39.49	35.09	Average	100	24 VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss Factor	Factor	Remark	cm	deg	Pol/Phase
1	11576.47	57.36	74.00	-16.64	43.71	9.26	39.47	35.08	Peak	220	187 HORIZONTAL
2	11589.62	45.51	54.00	-8.49	31.85	9.27	39.47	35.08	Average	220	187 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss Factor	Factor	Remark	cm	deg	Pol/Phase
1	11587.95	56.59	74.00	-17.41	42.93	9.27	39.47	35.08	Peak	233	80 VERTICAL
2	11590.45	44.52	54.00	-9.48	30.86	9.27	39.47	35.08	Average	233	80 VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss Factor	Factor	Remark	cm	deg	Pol/Phase
			dBuV/m	dB	dBuV	dB	dB/m	dB			
1	15611.41	55.72	74.00	-18.28	42.50	10.78	38.01	35.57 Peak	100	162	HORIZONTAL
2	15620.00	43.04	54.00	-10.96	29.82	10.78	38.01	35.57 Average	100	162	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss Factor	Factor	Remark	cm	deg	Pol/Phase
			dBuV/m	dB	dBuV	dB	dB/m	dB			
1	15612.88	43.08	54.00	-10.92	29.86	10.78	38.01	35.57 Average	100	84	VERTICAL
2	15645.38	55.70	74.00	-18.30	42.53	10.78	37.96	35.57 Peak	100	84	VERTICAL

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 3 + Chain 4
Test Date	Jan. 17, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	11532.37	55.05	74.00	-18.95	41.39	9.26	39.49	35.09	Peak	100	183 HORIZONTAL
2	11542.69	42.66	54.00	-11.34	29.00	9.26	39.49	35.09	Average	100	183 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	11536.09	55.50	74.00	-18.50	41.84	9.26	39.49	35.09	Peak	100	337 VERTICAL
2	11544.62	42.32	54.00	-11.68	28.66	9.26	39.49	35.09	Average	100	337 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.

4.7. Band Edge Emissions Measurement

4.7.1. 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.

For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions 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

4.7.2. 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	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

4.7.3. Test Procedures

- The test procedure is the same as section 4.6.3, only the frequency range investigated is limited to 100MHz around band edges.

4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

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 transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 36, 40, 48 / Chain 3 + Chain 4
Test Date	Nov. 27, 2014		

Channel 36

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
1	5149.36	69.44	74.00	-4.56	64.50	6.13	34.01	35.20	Peak	187	112 HORIZONTAL
2	5150.00	53.23	54.00	-0.77	48.29	6.13	34.01	35.20	Average	187	112 HORIZONTAL
3	5179.36	103.02			97.99	6.15	34.08	35.20	Average	187	112 HORIZONTAL
4	5181.60	112.05			107.02	6.15	34.08	35.20	Peak	187	112 HORIZONTAL

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

Channel 40

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
1	5146.47	58.04	74.00	-15.96	53.10	6.13	34.01	35.20	Peak	143	184 VERTICAL
2	5150.00	45.84	54.00	-8.16	40.90	6.13	34.01	35.20	Average	143	184 VERTICAL
3	5200.96	103.17			98.10	6.16	34.11	35.20	Average	143	184 VERTICAL
4	5203.21	112.15			107.08	6.16	34.11	35.20	Peak	143	184 VERTICAL

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

Channel 48

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
1	5150.00	45.23	54.00	-8.77	40.29	6.13	34.01	35.20	Average	100	108 VERTICAL
2	5150.00	55.96	74.00	-18.04	51.02	6.13	34.01	35.20	Peak	100	108 VERTICAL
3	5238.08	101.34			96.18	6.18	34.18	35.20	Average	100	108 VERTICAL
4	5240.00	112.24			107.08	6.18	34.18	35.20	Peak	100	108 VERTICAL
5	5350.00	45.10	54.00	-8.90	39.62	6.26	34.42	35.20	Average	100	108 VERTICAL
6	5350.00	56.25	74.00	-17.75	50.77	6.26	34.42	35.20	Peak	100	108 VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 3 + Chain 4
Test Date	Nov. 27, 2014		

Channel 149

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5714.68	68.09	68.20	-0.11	61.98	6.44	34.87	35.20	Peak	166	337 HORIZONTAL
2	5721.80	78.13	78.20	-0.07	72.01	6.45	34.87	35.20	Peak	166	337 HORIZONTAL
3	5743.40	102.75			96.60	6.45	34.90	35.20	Average	166	337 HORIZONTAL
4	5744.36	112.18			106.03	6.45	34.90	35.20	Peak	166	337 HORIZONTAL

Item 3, 4 are the fundamental frequency at 5745 MHz.

Channel 157

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5714.04	58.30	68.20	-9.90	52.19	6.44	34.87	35.20	Peak	113	112 VERTICAL
2	5724.36	58.81	78.20	-19.39	52.67	6.45	34.89	35.20	Peak	113	112 VERTICAL
3	5783.40	109.81			103.62	6.46	34.93	35.20	Peak	113	112 VERTICAL
4	5784.36	100.40			94.21	6.46	34.93	35.20	Average	113	112 VERTICAL
5	5850.32	57.51	78.20	-20.69	51.24	6.49	34.98	35.20	Peak	113	112 VERTICAL
6	5870.58	58.92	68.20	-9.28	52.63	6.50	34.99	35.20	Peak	113	112 VERTICAL

Item 3, 4 are the fundamental frequency at 5785 MHz.

Channel 165

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5825.96	103.56			97.31	6.48	34.97	35.20	Average	153	296 HORIZONTAL
2	5827.56	112.88			106.63	6.48	34.97	35.20	Peak	153	296 HORIZONTAL
3	5850.00	72.96	78.20	-5.24	66.69	6.49	34.98	35.20	Peak	153	296 HORIZONTAL
4	5860.00	63.89	68.20	-4.31	57.60	6.50	34.99	35.20	Peak	153	296 HORIZONTAL

Item 1, 2 are the fundamental frequency at 5825 MHz.

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Chain 3 + Chain 4
Test Date	Nov. 27, 2014		

Channel 36

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5150.00	52.11	54.00	-1.89	47.17	6.13	34.01	35.20	Average	166	91 HORIZONTAL
2	5150.00	68.77	74.00	-5.23	63.83	6.13	34.01	35.20	Peak	166	91 HORIZONTAL
3	5181.60	112.24			107.21	6.15	34.08	35.20	Peak	166	91 HORIZONTAL
4	5182.24	102.38			97.35	6.15	34.08	35.20	Average	166	91 HORIZONTAL

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

Channel 40

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5149.36	56.93	74.00	-17.07	51.99	6.13	34.01	35.20	Peak	241	269 HORIZONTAL
2	5150.00	45.64	54.00	-8.36	40.70	6.13	34.01	35.20	Average	241	269 HORIZONTAL
3	5197.76	101.30			96.23	6.16	34.11	35.20	Average	241	269 HORIZONTAL
4	5198.08	111.17			106.10	6.16	34.11	35.20	Peak	241	269 HORIZONTAL

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

Channel 48

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5102.89	57.90	74.00	-16.10	53.09	6.10	33.91	35.20	Peak	179	89 HORIZONTAL
2	5150.00	44.89	54.00	-9.11	39.95	6.13	34.01	35.20	Average	179	89 HORIZONTAL
3	5242.40	101.56			96.38	6.20	34.18	35.20	Average	179	89 HORIZONTAL
4	5242.40	111.00			105.82	6.20	34.18	35.20	Peak	179	89 HORIZONTAL
5	5350.00	45.19	54.00	-8.81	39.71	6.26	34.42	35.20	Average	179	89 HORIZONTAL
6	5350.00	55.38	74.00	-18.62	49.90	6.26	34.42	35.20	Peak	179	89 HORIZONTAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Chain 3 + Chain 4
Test Date	Nov. 27, 2014		

Channel 149

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5715.00	67.19	68.20	-1.01	61.08	6.44	34.87	35.20	Peak	168	304 HORIZONTAL
2	5725.00	77.75	78.20	-0.45	71.61	6.45	34.89	35.20	Peak	168	304 HORIZONTAL
3	5742.76	101.02			94.87	6.45	34.90	35.20	Average	168	304 HORIZONTAL
4	5743.08	111.51			105.36	6.45	34.90	35.20	Peak	168	304 HORIZONTAL

Item 3, 4 are the fundamental frequency at 5745 MHz.

Channel 157

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5712.44	57.44	68.20	-10.76	51.33	6.44	34.87	35.20	Peak	199	186 VERTICAL
2	5724.04	58.05	78.20	-20.15	51.91	6.45	34.89	35.20	Peak	199	186 VERTICAL
3	5787.24	100.89			94.69	6.47	34.93	35.20	Average	199	186 VERTICAL
4	5787.56	112.00			105.80	6.47	34.93	35.20	Peak	199	186 VERTICAL
5	5850.00	58.75	78.20	-19.45	52.48	6.49	34.98	35.20	Peak	199	186 VERTICAL
6	5861.92	58.31	68.20	-9.89	52.02	6.50	34.99	35.20	Peak	199	186 VERTICAL

Item 3, 4 are the fundamental frequency at 5785 MHz.

Channel 165

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5823.08	110.79			104.56	6.48	34.95	35.20	Peak	168	304 HORIZONTAL
2	5825.96	100.92			94.67	6.48	34.97	35.20	Average	168	304 HORIZONTAL
3	5850.64	71.98	78.20	-6.22	65.71	6.49	34.98	35.20	Peak	168	304 HORIZONTAL
4	5861.60	64.21	68.20	-3.99	57.92	6.50	34.99	35.20	Peak	168	304 HORIZONTAL

Item 1, 2 are the fundamental frequency at 5825 MHz.

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Chain 3 + Chain 4
Test Date	Nov. 27, 2014		

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	5149.36	64.16	74.00	-9.84	59.22	6.13	34.01	35.20	Peak	174	325 VERTICAL
2	5150.00	52.01	54.00	-1.99	47.07	6.13	34.01	35.20	Average	174	325 VERTICAL
3	5191.92	94.78			89.74	6.16	34.08	35.20	Average	174	325 VERTICAL
4	5195.13	106.57			101.50	6.16	34.11	35.20	Peak	174	325 VERTICAL

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

Channel 46

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss 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	45.28	54.00	-8.72	40.34	6.13	34.01	35.20	Average	174	320 VERTICAL
2	5150.00	56.67	74.00	-17.33	51.73	6.13	34.01	35.20	Peak	174	320 VERTICAL
3	5231.28	107.37			102.21	6.18	34.18	35.20	Peak	174	320 VERTICAL
4	5231.60	96.04			90.88	6.18	34.18	35.20	Average	174	320 VERTICAL

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

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Chain 3 + Chain 4
Test Date	Nov. 27, 2014		

Channel 151

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5708.59	67.97	68.20	-0.23	61.86	6.44	34.87	35.20	Peak	166	304 HORIZONTAL
2	5724.68	72.96	78.20	-5.24	66.82	6.45	34.89	35.20	Peak	166	304 HORIZONTAL
3	5750.19	106.61			100.46	6.45	34.90	35.20	Peak	166	304 HORIZONTAL
4	5756.60	96.10			89.94	6.46	34.90	35.20	Average	166	304 HORIZONTAL

Item 3, 4 are the fundamental frequency at 5755 MHz.

Channel 159

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5710.51	58.63	68.20	-9.57	52.52	6.44	34.87	35.20	Peak	183	188 VERTICAL
2	5723.40	62.00	78.20	-16.20	55.86	6.45	34.89	35.20	Peak	183	188 VERTICAL
3	5793.40	97.18			90.97	6.47	34.94	35.20	Average	183	188 VERTICAL
4	5796.28	108.71			102.50	6.47	34.94	35.20	Peak	183	188 VERTICAL
5	5850.00	62.59	78.20	-15.61	56.32	6.49	34.98	35.20	Peak	183	188 VERTICAL
6	5860.00	60.05	68.20	-8.15	53.76	6.50	34.99	35.20	Peak	183	188 VERTICAL

Item 3, 4 are the fundamental frequency at 5795 MHz.

Temperature	25°C	Humidity	40%
Test Engineer	Peter Wu / Eddie Weng	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42, 155 / Chain 3 + Chain 4
Test Date	Nov. 27, 2014		

Channel 42

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5143.59	70.91	74.00	-3.09	65.97	6.13	34.01	35.20	Peak	146	185 VERTICAL
2	5150.00	53.83	54.00	-0.17	48.89	6.13	34.01	35.20	Average	146	185 VERTICAL
3	5213.21	93.66			88.54	6.17	34.15	35.20	Average	146	185 VERTICAL
4	5216.41	104.73			99.61	6.17	34.15	35.20	Peak	146	185 VERTICAL
5	5350.00	44.53	54.00	-9.47	39.05	6.26	34.42	35.20	Average	146	185 VERTICAL
6	5350.80	56.51	74.00	-17.49	51.03	6.26	34.42	35.20	Peak	146	185 VERTICAL

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

Channel 155

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	5712.60	67.76	68.20	-0.44	61.65	6.44	34.87	35.20	Peak	172	298 HORIZONTAL
2	5725.00	71.40	78.20	-6.80	65.26	6.45	34.89	35.20	Peak	172	298 HORIZONTAL
3	5778.21	93.16			86.97	6.46	34.93	35.20	Average	172	298 HORIZONTAL
4	5779.01	103.58			97.39	6.46	34.93	35.20	Peak	172	298 HORIZONTAL
5	5854.01	66.67	78.20	-11.53	60.39	6.50	34.98	35.20	Peak	172	298 HORIZONTAL
6	5860.80	64.81	68.20	-3.39	58.52	6.50	34.99	35.20	Peak	172	298 HORIZONTAL

Item 3, 4 are the fundamental frequency at 5775 MHz.

Note:

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

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

4.8. Frequency Stability Measurement

4.8.1. 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).

4.8.2. Measuring Instruments and Setting

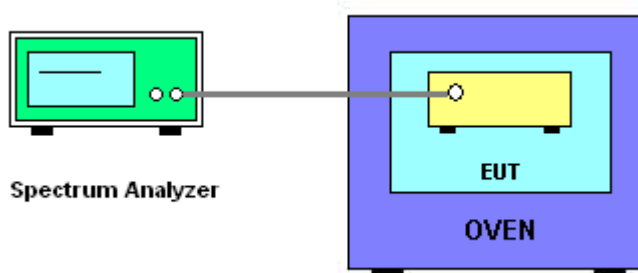
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.8.3. 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. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is $-30^\circ\text{C} \sim 50^\circ\text{C}$.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

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

4.8.7. Test Result of Frequency Stability

Temperature	26°C	Humidity	63%
Test Engineer	Mars Lin / Clemens Fang	Test Date	Feb. 05, 2015

Mode: 20 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5200 MHz	5785 MHz
126.50	5200.0021	5785.0021
110.00	5199.9934	5784.9928
93.50	5199.9912	5784.9912
Max. Deviation (MHz)	0.008800	0.008800
Max. Deviation (ppm)	1.69	1.52

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5200 MHz	5785 MHz
-30	5200.0080	5785.0080
-20	5200.0060	5785.0060
-10	5200.0036	5785.0036
0	5200.0004	5785.0004
10	5199.9968	5784.9968
20	5199.9934	5784.9928
30	5199.9914	5784.9914
40	5199.9896	5784.9896
50	5199.9884	5784.9884
Max. Deviation (MHz)	0.011600	0.011600
Max. Deviation (ppm)	2.23	2.01

Mode: 40 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5190 MHz	5755 MHz
126.50	5189.9978	5754.9982
110.00	5189.9952	5754.9942
93.50	5189.9926	5754.9924
Max. Deviation (MHz)	0.007400	0.007600
Max. Deviation (ppm)	1.43	1.32

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5190 MHz	5755 MHz
-30	5190.0080	5755.0080
-20	5190.0060	5755.0060
-10	5190.0036	5755.0036
0	5190.0004	5755.0004
10	5189.9968	5754.9968
20	5189.9952	5754.9942
30	5189.9914	5754.9914
40	5189.9896	5754.9896
50	5189.9884	5754.9884
Max. Deviation (MHz)	0.011600	0.011600
Max. Deviation (ppm)	2.24	2.02

Mode: 80 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
(V)	5210 MHz	5775 MHz
126.50	5209.9984	5774.9942
110.00	5209.9942	5774.9928
93.50	5209.9912	5774.9908
Max. Deviation (MHz)	0.008800	0.009200
Max. Deviation (ppm)	1.69	1.59

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
(°C)	5210 MHz	5775 MHz
-30	5210.0080	5775.0080
-20	5210.0060	5775.0060
-10	5210.0036	5775.0036
0	5210.0004	5775.0004
10	5209.9968	5774.9968
20	5209.9942	5774.9928
30	5209.9914	5774.9914
40	5209.9896	5774.9896
50	5209.9884	5774.9884
Max. Deviation (MHz)	0.011600	0.011600
Max. Deviation (ppm)	2.23	2.01

4.9. Antenna Requirements

4.9.1. 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.

4.9.2. 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	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. 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	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	FSV40	101026	9kHz ~ 40GHz	Aug. 28, 2014	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-1	N/A	1 GHz ~ 26.5 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz ~ 26.5 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	Dec.12, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz ~ 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz ~ 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz ~ 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	1126203	300MHz~40GHz	Oct. 06, 2014	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1210004	300MHz~40GHz	Oct. 06, 2014	Conducted (TH01-CB)

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

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%